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**New York State Electric & Gas Corporation**

# Remedial Investigation Report

Former Manufactured Gas Plant Site
McMaster Street, Auburn, New York

August 2008

ARCADIS

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**Remedial Investigation Report**

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Site, McMaster Street,
Auburn, New York

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## Executive Summary

This Remedial Investigation (RI) Report presents the findings of environmental investigations conducted at NYSEG's (New York State Electric and Gas Corporation's) McMaster Street former Manufactured Gas Plant (MGP) site (the "site") located in Auburn, New York (Figure 1). ARCADIS conducted the investigations on NYSEG's behalf to characterize environmental conditions at the site in compliance with an Order on Consent between the New York State Department of Environmental Conservation (NYSDEC) and NYSEG dated March 30, 1994.

The MGP operated for approximately 35 years (ca. 1869 to the early 1904) producing gas using the coal carbonization process. One byproduct of the process, coal tar, is present in the soils, bedrock, and groundwater beneath the site and has affected their quality. Coal tar is a dense non-aqueous phase liquid (DNAPL). DNAPLs are heavier than water and tend to sink below the water table when released in sufficient quantities. Coal tar contains many organic compounds, a number of which have toxic properties and are regulated by the NYSDEC. Chief among these are benzene, toluene, ethylbenzene, and xylenes (BTEX) and a more general class of organic compounds called polycyclic aromatic hydrocarbons (PAHs). The BTEX and PAH compounds are considered the constituents of concern (COCs) at the site. It is important to note that these COCs are not unique to coal tar; there are numerous other sources of these compounds.

NYSEG performed two investigations to characterize the nature and extent of site-related COCs from the former MGP. First a Preliminary Site Assessment was performed to identify whether environmental conditions existed at the site that might be related to the MGP. That assessment determined that the quality of soils and groundwater had been affected by the former MGP; therefore, an RI was conducted. The RI determined the nature and extent of site-related COCs and assessed whether the COCs posed risks to human health and the environment.

Over the course of the investigations, 29 monitoring wells were installed, 16 test pits were excavated, an extensive investigation of the Owasco Outlet was performed, a soil vapor investigation was conducted, and over a 150 samples of environmental media were analyzed. The information gathered will support conduct of a Feasibility Study, which will evaluate remedial alternatives.

The RI work is divided into four categories:

- ***Soil, Bedrock, and Groundwater Investigations***
- ***Soil Vapor Investigation***
- ***Owasco Outlet Sediment and Surface Water Investigations***
- ***Risk Evaluation***

The following paragraphs describe the work performed under these categories and the resulting findings.

### *Soil, Bedrock, and Groundwater Investigations*

These investigations characterized the hydrogeology of the site and the nature and extent of site-related impacts to the subsurface. These investigations focused on three units as described below in descending order:

- **Overburden Unit** – Uppermost and most permeable unit (with respect to the three units investigated) comprised mostly of artificial fill and a discontinuous layer of native fine sands, silts and clays that lie on the bedrock surface. The unit is 2 to 10 feet thick and groundwater flow in this unit is primarily toward the Owasco Outlet.

- **Shallow Bedrock Unit** – The Onondaga Limestone and Manlius Limestone comprise the shallow bedrock hydrostratigraphic unit, which makes up the upper approximately 65 to 70 feet of bedrock at the site. Groundwater flow in the unit occurs primarily through fractures in the rock and discharges to the Owasco Outlet. The geometry and other characteristics of the fracture network, which govern groundwater movement, are complex. The permeability of this unit is estimated to be two orders of magnitude lower than the overburden permeability.

- **Deep Bedrock Unit -** The deep bedrock unit consists of Rondout, Cobleskill, and Bertie dolostones that lie below the shallow bedrock unit. This unit was not directly investigated during this RI; however, investigations conducted by others suggest this unit is approximately 130 feet thick. This unit is karstic and can transport large volumes of water in a short period of time. Groundwater movement in this unit is currently being studied by the United States Geological Survey (USGS). Their preliminary findings suggest that water in this unit may move southwestward.

Overburden soils that contain site-related COCs in excess of regulatory criteria consist primarily of those soils that contained visible coal tar. Coal tar was present sporadically in overburden soils in the southern half of the site, and more consistently across most of the northern half of the site beneath the southern bank of the Owasco Outlet. The majority of coal-tar-containing soils at and near the site occur below the water table.

Although the migration pathways for coal tar in the bedrock are complex, its extent in bedrock has been reasonably delineated. Coal tar occurs sporadically in the upper 15-to-20 feet of bedrock, primarily along the northern edge of the site, near the bank of the Outlet, extending westward approximately 150 feet. The hydraulic influences of the Outlet and the physical properties of the coal tar (extremely viscous) inhibit further downward migration of coal tar.

Some of the COCs in coal tar have dissolved and affected the quality of groundwater. The highest concentrations of site-related COCs in groundwater are observed in and downgradient of areas where coal tar has been observed. The extent of site-related COCs in overburden groundwater at levels exceeding Standards or Guidance Values is limited primarily to the site property and to the northwest of the site, along the southern bank of the Owasco Outlet. The extent of site-related COCs in bedrock groundwater at levels exceeding Standards and Guidance Values roughly encompasses the northwestern half of the site property, extending offsite approximately 150 feet to the west, along the southern bank of the Owasco Outlet. Vertically, groundwater exceeding Standards and Guidance Values is limited to the upper 20 to 25 feet of bedrock.

### *Soil Vapor Investigation*

This investigation evaluated whether VOCs from the MGP were present in soil vapor at the site and near the Auburn Tank building west of the site. Five samples were collected on site and three samples were collected near the Auburn Tank building. The investigation found that several VOCs were present in all eight soil vapor samples at low concentrations; however, the VOCs in only two of the samples, both collected on site, appeared to be related to the MGP. This is not surprising because these two samples were collected in areas where coal tar was previously observed. The NYSDOH concluded that the levels of VOCs detected in all of the samples were within the range that is typically observed in urban settings. Furthermore, the NYSDOH and NYSDEC have indicated that no further soil vapor investigations are warranted at the site at this time.

### *Owasco Outlet Sediment and Surface Water Investigations*

These investigations assessed the extent of site-related COCs to the Owasco Outlet sediments and surface water. The investigations found that the streambed contained little fine-grained sediments. Fine-grained sediments occurred in isolated pockets trapped by obstructions in the stream. The majority of the stream bed consisted of coarse sand, gravel, cobbles and boulders. A few feet of these materials overlie bedrock beneath the Outlet and bedrock crops out in the bottom of the Outlet in several areas. Many storm sewer and other outfalls discharge to the Outlet.

Investigations of the Owasco Outlet sediments found the following:

- No ongoing coal tar seeps/sheens were observed along the southern bank or in the upper approximately 1-foot of sediments; however, trace amounts of tar were observed at approximately 0.5 feet below the sediment surface at two isolated locations, and hardened tar ledges were observed sporadically below the water level at the toe of the bank adjacent to the site.

- Coal tar was identified in deeper sediments (generally below 1 foot) below the Owasco Outlet. Tar was observed in the deeper sediments to approximately 250 feet west (downstream) of the site boundary.

- PAHs were present in surficial (upper 0.5 feet) sediment and bank soil samples. The highest concentrations of PAHs in surficial sediments and bank soils were in three surficial sediment samples collected upstream from the site (unrelated to the former MGP); in three bank soil samples located adjacent to the site (which are related to the MGP); and one surficial sediment sample located adjacent to the site (which is related to the MGP).

- COCs in the form of BTEX and PAHs were present in the deeper sediments (below 1 foot) where coal tar was observed adjacent to and downstream of the site.

- Coal tar observed in the deeper sediments does not appear to be discharging upward and into the Owasco Outlet. Given the physical properties of the tar (i.e., denser than water and extremely viscous) and the lack of vertical hydraulic gradient between the coarse sediments and the water in the Outlet, this tar is expected to be largely or wholly immobile; however, physical forces, such as scouring, could potentially mobilize the tar.

- The quality of water flowing in the Outlet has not been affected by the former MGP.

***Risk Evaluation***

Potential risks posed to human health and the environment by potentially site-related constituents were evaluated by performing a Human Heath Exposure Evaluation and a Fish and Wildlife Resource Impact Analysis.

The Human Heath Exposure Evaluation found that levels of potential site-related constituents (BTEX and/or PAHs) in some soils and groundwater affected by the site exceeded appropriate screening criteria; therefore, potentially complete exposure pathways for site-related constituents were evaluated. The evaluation found that the greatest potential for exposure is via direct contact with subsurface soils and groundwater that may be encountered during construction/excavation work. This potential exposure could be mitigated by using properly trained personnel and personal protective equipment. The evaluation also found that there is a potential for exposure to MGP-related constituents in “surface soils”; however, these soils were actually covered by several inches of gravel. Due to the gravel covering, the potential for exposure is limited. The evaluation did not identify any imminent threats to human health posed by the site.

Regarding the environment, the Fish and Wildlife Resource Impact Analysis returned several findings. First, no threatened or endangered plant or animal species were found to inhabit the site or the immediate surrounding areas. The analysis did identify potentially completed exposure pathways for onsite surface soils and Owasco Outlet sediments. The analysis found that PAHs were present in surface soils above applicable criteria, but at a location that provides no wildlife value (i.e., below a gravel covering). Several metals were also present at concentrations above applicable criteria in onsite surface soil samples, but the majority of these exceedances were less than two-fold higher than the criteria and as such, most likely do not present a significant risk to ecological receptors. PAH and metal concentrations exceeded the screening criteria in upstream and downstream surficial sediment samples (upper 6-inches) in the Outlet. Although sediments represent a complete exposure pathway, the PAHs and metals detected in sediment are partially due to sources unrelated to the MGP because of significantly elevated concentrations of these constituents detected in samples collected upstream of the site. BTEX and several PAHs were present above screening criteria in subsurface sediments (deeper than 6 inches in depth) and non-native bank material. However, these media most likely do not present significant ecological exposure pathways based on their limited accessibility. No imminent threats to ecological receptors were identified.

### *Conclusion*

With the findings presented in this report, NYSEG has adequately characterized the nature and extent of the former MGP’s impacts on the environment and fulfilled the requirements of the Order on Consent. Based on the findings of the RI, no imminent threat to human health or the environment has been identified. Following NYSDEC approval of this report, NYSEG will prepare a Feasibility Study to identify Remedial Action Objectives and select appropriate remedial measures for the site.

## 1. Introduction

This *Remedial Investigation Report* (RI Report) documents the findings of environmental investigations conducted from 2004 to 2007 at the McMaster Street former MGP Site (site) (DEC site number 7-06-010) located in Auburn, New York (Figure 1). The RI was performed in accordance with an Order on Consent (Index Number D0-0002-9309) between the New York State Department of Environmental Conservation (NYSDEC) and New York State Electric & Gas Corporation (NYSEG). The environmental investigations were conducted by ARCADIS (formerly known as Blasland, Bouck & Lee, Inc. [BBL]) on behalf of NYSEG to meet the objectives described in the Order on Consent, NYSDEC-approved RI Work Plan (BBL, 2005) and Work Plan Addendum (BBL, 2006). Copies of the work plans are included on the Electronic Attachments data CD included with this RI Report.

This RI Report incorporates agreements made between NYSEG, NYSDEC, and NYSDOH as detailed in the following correspondence:

- NYSDEC’s October 17, 2007 comments on the July 2007 Draft RI Report
- NYSEG’s December 20, 2007 responses the NYSDEC’s comments
- NYSDEC’s March 5, 2008 response to NYSEG’s December 20, 2007 response
- NYSDEC’s June 23, 2008 comments on the May 2008 Draft RI Report
- NYSEG’s July 23, 2008 responses to the NYSDEC’s June 23, 2008 comments

This report also incorporates agreements reached during the following conference calls:

- March 24, 2008 call between NYSEG, NYSDEC, and ARCADIS as summarized in a March 25, 2008 e-mail from ARCADIS to NYSDEC

- May 2, 2008 call between NYSEG, NYSDEC, NYSDOH, and ARCADIS to discuss the soil vapor sampling results

In addition to the findings of the RI work detailed in the above-referenced work plans, this RI Report also incorporates the work and findings of environmental investigations completed during a Preliminary Site Assessment (PSA), which was conducted in 2004 and 2005. The PSA was conducted in accordance with the NYSDEC-approved PSA Work Plan (BBL, 2004). For ease of presentation and review, the combined PSA and RI work and findings are discussed together throughout the remainder of this RI

Report. References to the PSA and RI-related work plans will hereinafter be referred to as “work plans.”

### 1.1 Report Organization

The RI Report is organized as follows:

- **Section 1: Introduction** — Discusses the site setting and history, including a Summary of Previous Investigations and Objectives that state the general purpose of the RI.

- **Section 2: Investigation Activities** — Describes the tasks performed and general methods followed to meet the investigation’s objectives.

- **Section 3: Investigation Findings** — Presents and interprets field observations and laboratory results relating to the principal components of the field work: investigations of soil, bedrock, groundwater, surface water, sediment, and soil vapor.

- **Section 4: Risk Evaluation** — Presents the results of a Fish and Wildlife Resource Impact Analysis (FWRIA) and a Human Health Exposure Evaluation (HHEE) completed for the site.

- **Section 5: Summary and Conclusions** — Summarizes the findings of the RI and presents the conclusions drawn.

The text of this RI Report is supported by a variety of attachments, including tables, figures, boring logs and other items. The CD included with this RI Report contains additional documentation, including the Data Usability Summary Reports (DUSRs). A scanned copy of the previous investigation report is included on the attached CD. A complete list of the items contained on the CD can be found in the table of contents.

### 1.2 Site Setting and History

The site is located in a mixed commercial/residential area of the city of Auburn, in central Cayuga County, New York (Figure 1). The former MGP occupied an approximate 1-acre triangular slice of land that is presently bounded by the Owasco Outlet (Outlet) to the north, railroad right-of-way to the east and south, and an asphalt parking lot and Auburn Tank Manufacturing Company Inc. to the west. A 3,000-square-foot (sf) single-story building currently occupies the site. The closest residence is greater than 300 feet south of the site. A New York State Correctional Facility is located across the Outlet to the north (Figure 2).

NYSEG purchased the property in 2005 from Mr. Frank Rizzo. Mr. Rizzo formerly leased the building for use as an auto collision shop. The building was subsequently and is currently leased as storage space. Apart from the building, the site surface is sporadically covered with vegetation, gravel, weathered asphalt and large pieces of debris (e.g., automotive parts, metal and wood scraps, old railroad ties, empty drums, cement blocks, old commercial asphalt paver). A retaining wall used to support a railroad line is located along the southern site boundary. An electric transmission tower stands on the footprint of the former gas holder in the northern portion of the site, on the southern bank of the Outlet. The grade at the site ranges in elevation from 670 feet above mean sea level (amsl) along the southern boundary to approximately 660 feet amsl along the northern boundary. The eastern part of the site slopes more steeply toward the Outlet than the western part of the site.

**Figure 1.1 – Low Altitude Aerial Photo of Site, looking north**.

Based on communications with personnel from the City of Auburn Department of Public Works, there is no localized groundwater usage in the immediate area of the site; all businesses and residences near the site are supplied by city water. The city of Auburn receives its potable water from Owasco Lake. Water is not withdrawn from the Outlet for potable use.

The McMaster Street MGP was first operated by the Auburn Gas Light Company in 1869, and provided coal gas by coal carbonization. The Auburn Gas Company acquired the Auburn Gas Light Company in 1901 and continued gas production until 1904. The plant ceased operations in 1904 when gas manufacturing was shifted to the Clark Street MGP, which was located ½ mile to the west (downstream) of the site. The Auburn Gas Company was acquired by the Empire Gas and Electric Company circa 1911, which in turn was acquired by NYSEG in 1936 (Atlantic, 1991). According to

NYSEG records, the gas plant was demolished prior to 1940, when the property was occupied by the Shoemaker Coal Company.

Gas production at the MGP was 35,000,000 cubic feet in 1889 and 30,000,000 cubic feet in 1899 (Atlantic, 1991). It is believed the site contained the following major structures: gas holder, purifier house, two coke sheds and retorts. Locations of the historical MGP structures and present-day features are shown on Figure 2. Locations of the historical structures are based on a review of city atlases, plant drawings and Sanborn Maps covering a period from 1886 to 1941. The Green Street former gas holder[1], which served as a gas distribution holder for the McMaster Street MGP and possibly the Clark Street MGP, is located to the south, across Routes 5 and 20. This gas holder will be investigated separately in the future and therefore is not addressed under this investigation.

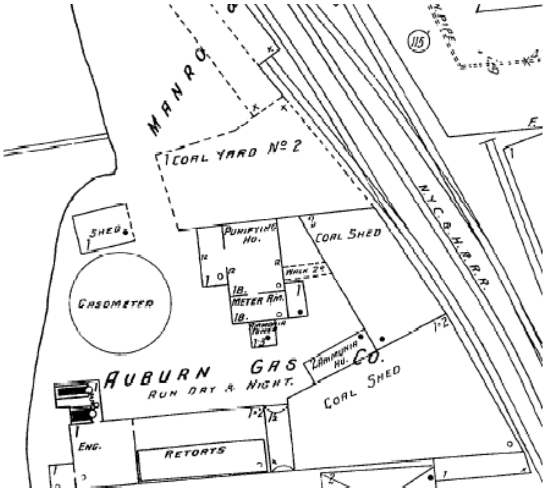

**Figure 1.2 – 1904 Sanborn Map of Site Area.** North is to the left.

### 1.3 Summary of Previous Investigations

On NYSEG's behalf, Atlantic Environmental Services, Inc. performed a site screening investigation of the site between November 1990 and September 1991. The purposes of the investigation were to: 1) determine whether site conditions posed an imminent threat to human health or the environment and 2) provide data necessary to prioritize the site for further investigation. NYSEG performed this work voluntarily prior to the 1995 Consent Order. This investigation consisted of performing historical research, site reconnaissance and limited surface-soil, sediment and surface-water sampling. Four surface-soil samples, three sediment samples and three surface-water samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic

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[1] The Green Street MGP Site will be investigated in the future under the multisite Order on Consent (#D0-0002-9309).

compounds (SVOCs) and inorganics (including lead, chromium and total cyanide). Results of the site screening investigation were transmitted to the NYSDEC in the September 1991 *Site Screening Report* [AES, 1991]), and are summarized below:

- VOCs, SVOCS, or cyanide were not detected in any of the surface-water samples collected from the Outlet. Elevated levels of zinc were detected in an upstream sample and its associated duplicate sample.

- Polycyclic aromatic hydrocarbons (PAHs) were detected in streambed sediments, with elevated concentrations adjacent to and downstream of the site.

- PAHs and 2-methylnaphthalene were detected in surface soils at the site. Only one surface soil sample contained concentrations of cyanide (at a relatively low concentration).

The site was evaluated using a Site Screening Priority Setting System (SPSS) developed by the Electrical Power Research Institute (EPRI). The SPSS evaluation produced an actual risk score of 23.3 and a perceived risk score of 29.7. Direct contact with surficial soils containing constituents associated with MGP residuals was identified as the major route of exposure.

The Site Screening Report (AES, 1991) recommended additional investigations to determine the source of constituents detected in surface soil and sediment. The recommended investigations included groundwater and surface soil studies focusing in areas where former MGP structures existed, and where elevated levels of MGP-related constituents were detected during the site screening investigation.

### 1.4 Remedial Investigation Objectives

The NYSDEC and NYSEG entered into a multi-site Order on Consent (Index #D0-002-9309), effective March 30, 1994, which outlined a general objective to satisfactorily complete RIs at the listed sites (including the McMaster Street Site). The general objective states that an RI should include all the appropriate elements set forth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); the National Contingency Plan (NCP) of March 8, 1990; the United States Environmental Protection Agency (USEPA) guidance document entitled, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA, 1988); and appropriate USEPA and NYSDEC technical and administrative guidance documents, so that when completed, the RI and preceding work would meet the regulatory definition of an RI.

In compliance with the Order on Consent, the RI had the following overall objectives:

1) Characterize the site by establishing the nature and extent of on-site and off-site MGP-related impacts.

2) Provide the information needed to prepare a Feasibility Study (FS) for evaluating on-site and off-site remedial actions to address MGP-related impacts.

# 2. Remedial Investigation Activities

## 2.1 Overview

The RI consisted of two field programs designed to meet the RI objectives discussed in Section 1:

- Terrestrial Investigations – investigations conducted on land
- Owasco Outlet Investigations – investigations conducted in and beneath the Outlet

ARCADIS conducted the fieldwork during the time period of 2004 and 2008. Several other firms contributed work integral to the field effort, as follows:

- Drilling services by Lyon Drilling of Tully, New York
- Drilling services by Parratt-Wolff of East Syracuse, New York
- Analytical services by Severn Trent Laboratories of Buffalo, New York and Edison, New Jersey
- Forensic evaluation services by NewFields Environmental Forensics Practice, LLC of Rockland, Massachusetts
- NAPL physical characterization by Queens University of Ontario, Canada

The United States Geological Survey (USGS) has been conducting a study of the bedrock groundwater flow systems in the region since 2001 (USGS, 2004). ARCADIS contacted Mr. David Eckhardt, a geologist of the USGS' Ithaca, New York office who leads the hydrogeologic studies in concert with the USEPA. Mr. Eckhardt has provided ARCADIS with considerable information regarding the bedrock flow systems in the area. ARCADIS has incorporated that information into the hydrogeologic model for the site that is discussed in Section 3. Mr. Eckhardt also conducted borehole geophysical logging at three bedrock monitoring well locations at the site, and provided the results of the logging to NYSEG. These results have also been incorporated into various aspects of this RI Report. Borehole logs are provided on the attached CD.

The RI work plans outlined the scope of the investigations and the procedures to be used to perform them. This section describes the work completed, including minor, necessary deviations from the work plans. The chronological sequence of field activities is summarized below.

**Table 2.1. Chronology of Field Activities**

| Date | Activity Completed |
|---|---|
| November and December 2004 | Excavated 12 test pits (TP04-1 through TP04-12).<br>Installed six overburden water table monitoring wells (MW04-1 through MW04-6). |
| March and April 2005 | Installed two overburden water table wells (MW05-7 and MW05-8) and three shallow bedrock monitoring wells (MW05-2R, MW05-7R and MW05-8R).<br>Collected groundwater samples and measured fluid levels. |
| June 2005 | Conducted sediment probing and collected sediment samples in the Outlet. |
| August 2005 | Collected surface-water samples in the Outlet. |
| May to August 2006 | Installed two overburden water table wells (MW06-9 and MW06-10) and eight shallow bedrock monitoring wells (MW06-6R, MW06-9R, MW06-10R, MW06-11R, MW06-12R, MW06-13R, MW06-14R and MW06-15R).<br>Collected ten surface soil samples (SS-1 through SS-10).<br>Collected groundwater samples and measured fluid levels.<br>Conducted bank soil and stream channel soil sampling. |
| December 2006 to January 2007 | Installed three intermediate bedrock (MW06-1RI, MW07-16RI and MW07-17RI) and three deep bedrock monitoring wells (MW06-1RD, MW07-16RD and MW07-17RD).<br>Performed packer tests on newly installed bedrock coreholes and collected discrete groundwater samples.<br>Conducted borehole geophysical logging. |
| April 2007 | Collected groundwater samples and measured fluid levels from newly installed intermediate and deep bedrock wells. |
| February 2008 | Collected five on-site and three off-site soil vapor samples (SV-1 through SV-8) and two ambient air samples (both labeled AA-1). |

## 2.2 Terrestrial Investigations

The terrestrial investigations consisted of:

- Drilling soil and bedrock and installing monitoring wells
- Excavating test pits
- Collecting subsurface soil samples
- Measuring water levels at wells and in the Outlet
- Collecting groundwater samples from wells
- Conducting hydraulic-conductivity tests
- Performing down-hole geophysical logging
- Sampling surface soil
- Sampling soil vapor and ambient air

The investigation methods, sampling interval and suite of samples collected varied from point to point to meet the objectives of the RI. This section describes the varied tasks included in the terrestrial investigations, including the general methods applied and general objectives addressed.

Additional information relating to the investigations can be found in the following places:

- Figure 2 depicts monitoring-well, test-pit and surface-soil sampling locations.

- Appendix A contains monitoring well and test pit logs.

- Appendix B contains the Soil Vapor Investigation Report.

- Table 1 provides a comprehensive list of analytical sample locations and analytes, and Tables 2 through 7 summarize analytical results. These results are discussed later in Sections 3 and 4.

### 2.2.1 Borings, Coreholes and Monitoring Wells

Soil and/or bedrock were drilled at 25 locations between 2004 and 2007 during the RI. These borings, and the monitoring wells installed in them, served as the primary method to investigate the geology, hydrogeology and the nature and extent of site-related impacts on and near the site.

The 25 borings ranged in depth from approximately 8 to 80 feet below ground surface (bgs). Ten of the borings were terminated at the bedrock surface and the remaining 15 borings were drilled into the bedrock. Monitoring wells were installed in every boring. All bedrock drilling was completed using bedrock coring equipment and the bedrock holes produced are referred to as “coreholes”. Monitoring wells are listed in Table 2.1 and well construction details are contained in Table 8. The general rationale for installing these wells was to gather sufficient data to define the hydraulic properties beneath the site and define the nature and extent of MGP-related constituents in groundwater.

**Table 2.2. RI Monitoring Well Summary**

| Well ID | Screened Interval (feet bgs) | Location |
|---|---|---|
| MW-04-01 | 1.9-11.9 | On-site well cluster, eastern vacant area, installed in overburden, and intermediate and deep bedrock. |
| MW-06-01RI | 35.0-45.0 | |
| MW-06-01RD | 65.0-75.0 | |
| MW-04-02 | 3.7-13.7 | On-site well cluster, eastern vacant area, installed in overburden shallow bedrock. |
| MW-05-02R | 18.0-28.0 | |
| MW-04-03 | 2.0-12.0 | On-site overburden well, downgradient from former purifiers. |
| MW-04-04 | 3.8-13.8 | On-site overburden well, in footprint of former gas holder. |
| MW-04-05 | 4.7-9.7 | On-site overburden well, adjacent to former retorts. |
| MW-04-06 | 4.9-14.9 | On-site well south of former MGP structures, installed in the overburden and shallow, intermediate and deep bedrock. |
| MW-06-06R | 28.0-38.0 | |
| MW-06-06RI | 50.0-60.0 | |
| MW-06-06RD | 68.0-78.0 | |
| MW-05-07 | 4.8-10.8 | On-site well cluster between for gas holder and retorts, installed in overburden and shallow bedrock. |
| MW-05-07R | 18.0-28.0 | |
| MW-05-08 | 3.5-9.5 | On-site well cluster within footprint of former coke shed, installed in overburden and shallow bedrock. |
| MW-05-08R | 18.0-28.0 | |
| MW-06-09 | 5.2-15.2 | Off-site well cluster southeast of the site in median between the Route 5 and 20 Arterial and the railroad, installed in the overburden and shallow bedrock. |
| MW-06-09R | 28.0-38.0 | |

| Well ID | Screened Interval (feet bgs) | Location |
|---|---|---|
| MW-06-10 | 3.0-8.0 | Off-site well cluster east of Auburn Tank building, installed in overburden and shallow bedrock. Shallow bedrock well west of retort footprint. |
| MW-06-10R | 18.0-28.0 | |
| MW-06-11R | 9.0-19.0 | Off-site shallow bedrock well installed west of former retorts and adjacent to the Outlet. |
| MW-06-12R | 18.0-28.0 | On-site shallow bedrock well installed in footprint of former shed. |
| MW-06-13R | 23.0-33.0 | Off-site shallow bedrock well installed north of Auburn Tank building and adjacent to the Outlet. |
| MW-06-14R | 16.0-26.0 | Off-site shallow bedrock well installed west of Auburn Tank building. |
| MW-06-15R | 12.0-22.0 | Off-site shallow bedrock well installed east of Auburn Tank building. |
| MW-07-16RI | 44.0-54.0 | Off-site intermediate and deep bedrock well cluster installed west north of Auburn Trading Post building (west of the site). |
| MW-07-16RD | 65.0-75.0 | |
| MW-07-17RI | 50.0-60.0 | Off-site intermediate and deep bedrock well cluster installed northeast of Auburn Tank building and adjacent to the Outlet. |
| MW-07-17RD | 68.0-78.0 | |

**Note:**
Monitoring well IDs without a suffix were installed in the overburden; Monitoring wells with an “R” suffix were installed as shallow bedrock wells (typically the upper approximately 25 feet of bedrock); Monitoring wells with an “RI” suffix were installed as intermediate depth bedrock wells (typically screening the 40 to 60 feet bgs zone of bedrock); and Monitoring wells with an “RD” suffix were installed as the deepest bedrock wells (typically screening below 65 feet bgs).

#### *2.2.1.1 Drilling and Monitoring Well Installation Methods*

Borings and monitoring wells were generally drilled/installed consistent with the procedures contained in the work plans. The balance of this section summarizes how the borings were drilled and the wells installed, and notes any necessary departures from the work plans.

Monitoring well installation logs are presented in Appendix A. Subsurface conditions encountered within each soil boring/corehole and well construction details are summarized in the logs. Table 8 summarizes well construction details.

### Overburden Monitoring Wells

Overburden borings were drilled using conventional hollow-stemmed auger/split-spoon sampler techniques. Overburden borings followed a consistent methodology, as follows:

- Soil samples were retrieved continuously from grade to the total boring depth (typically the top of bedrock). Samples were collected using 2-inch split spoon samplers.
- Recovered soil samples were observed and described by the geologist, and screened for VOCs using a photoionization detector (PID). Screening results are provided on the boring logs.
- Selected samples were submitted for various laboratory analyses, as described below.

Upon completion, an overburden monitoring well was installed at each boring location as follows:

- 2-inch inside diameter (ID) Schedule 40 PVC material was used.
- 20-slot screens were used with varying lengths, as described in Table 8.
- Appropriately sized silica sand packs were installed in the annular space around the screened interval and generally 2 feet above.
- Above the sand pack, the well annulus was filled with several feet of bentonite chips to provide a seal. A cement/bentonite grout was placed on top of the seal to approximately 2 feet bgs using tremie pipe.
- Each well was protected at the surface with an 8-inch flush-mount curb box. Each well was also fitted with an appropriately-sized locking J-plug cap.

At least 48 hours after installation, overburden monitoring wells were developed by surging/purging using new polyethylene bailers. The wells were surged and purged until the water removed from the well was reasonably free of visible sediment (50 nephelometric turbidity units [NTUs]), or until the turbidity levels stabilized following the removal of 10 well volumes.

### Bedrock Monitoring Wells

The coreholes used to install monitoring well installations were drilled as follows:

- Once the soil boring was drilled to the top of bedrock (as described above), the upper several feet of bedrock was cored and/or roller-bitted and a 4-inch diameter steel casing was grouted to isolate overburden materials and potential NAPL from the corehole.

- Bedrock was continuously cored using HQ-sized coring equipment which produces bedrock cores for inspection as well as a corehole with a diameter of approximately 3.8 inches.

- Recovered bedrock samples were observed and described by the geologist, and screened for VOCs using a PID. Screening results are provided on the boring logs.

Upon completion, monitoring wells were installed in the coreholes as described below:

- Single wells installed in a corehole were constructed of 2-inch ID Schedule 40 PVC.

- Micro-wells (two wells inside one corehole) were constructed of 1-inch ID Schedule 40 PVC.

- 20-slot screens of varying lengths were used, as shown in Table 8.

- Grouted sumps of varying lengths were installed at the bottom of each well.

- Appropriately sized silica sand packs were installed in the annular space around the screened interval and generally extended 2 feet above the screen top.

- Above the sand pack, the well annulus was filled with several feet of bentonite chips to provide a seal. A cement/bentonite grout was placed on top of the seal to approximately 2 feet bgs using tremie pipe.

- Bedrock monitoring wells are protected at the surface with an 8-inch or 12-inch diameter flush-mount curb boxes (larger diameter curb boxes were used for the clustered micro-wells). Each well was also fitted with a locking J-plug cap.

At least 48 hours after installation, the new bedrock monitoring wells were developed by surging/purging using a submersible, positive-displacement pump and dedicated polyethylene tubing. The wells were surged using a surge block and purged until the water removed from the well was reasonably free of visible sediment (50 NTUs), or until the turbidity levels stabilized following a minimum removal of 3 to 5 well volumes.

The top of the PVC riser of each monitoring well was marked, and the elevation of this mark was determined by survey to the nearest 0.01 foot. Ground surface elevation and well location were also determined by survey. Surveyed coordinates and elevation data for the monitoring wells are provided in Table 8.

Monitoring well installation logs are presented in Appendix A. Subsurface conditions encountered within each soil boring/corehole and well construction details are summarized in the logs. Table 8 provides a summary of the well construction details.

### 2.2.2 Test Pits

Sixteen test pits were excavated during the RI. The test pits were excavated to confirm the location of former MGP structures, provide information on their construction and integrity, and characterize the nature of materials contained within and near them. The test pits were excavated using a rubber-tired backhoe. A geologist observed the excavations and recorded notes describing the soils and physical structures encountered. While excavating the test pits, soils observed were described and screened for volatile compounds using a PID, as described in the RI work plans. The descriptions, PID screening results and other observations made during the test pitting are contained in the test pit logs included in Appendix A. Soil samples were also collected from the test pits and analyzed as described in Section 2.2.3, below. Table 2.2 summarizes the location and rationale for the test pits.

**Table 2.3. RI Test Pit Summary**

| Test Pit ID | Location | Rationale |
|---|---|---|
| TP-04-01, TP-04-02 and TP-04-03 | Vacant area of site to the east | Characterize potentially impacted fill material in this area. |
| TP-04-04 and TP-04-05 | North and adjacent to collision shop | Locate the foundation of the former purifier house and assess the potential presence of MGP residuals associated with this structure. |
| TP-04-06 and TP-04-07 | North of collision shop, near bank of Outlet | Locate the foundation of the former gas holder and assess the potential presence of MGP residuals associated with this structure. |

| Test Pit ID | Location | Rationale |
|---|---|---|
| TP-04-08 and TP-04-09 | Between collision shop and Auburn Tank building | Locate the foundation of the former retorts and assess the potential presence of MGP residuals associated with these structures. |
| TP-04-10, TP-04-11 and TP-04-12 | Southwest of collision shop | Locate the foundation of the former coke sheds and assess the potential presence of MGP residuals associated with these structures. |
| TP-06-13 and TP-06-14 | Northwest of Auburn Tank building | Evaluate the potential for the sanitary sewer line to convey NAPL. |
| TP-06-15 and TP-06-16 | Northwest of Auburn Tank building | Evaluate southern extent of NAPL observed in the area of MW-11R. |

Following excavation, the test pits were backfilled with the material removed from the pits. Soils were returned to approximately the same depth interval from which they were removed during excavation. After backfilling was completed, the ground surface at each location was restored to pre-excavation condition.

### 2.2.3 Soil Analyses for Soil Boring and Test Pit Samples

Soil samples were collected from borings and test pits to assess the nature and extent of MGP-related constituents in the overburden. The samples collected were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-VOCs (SVOCs), Target Analyte List (TAL) metals and total cyanide. Analytical methods, sample-handling procedures and laboratory protocols are outlined in the work plans. Sample analyses followed the most recent NYSDEC ASP analytical protocol and include quality assurance/quality control (QA/QC) samples as required by the Quality Assurance Sampling and Analysis Project Plan (QA/SAPP) included with the work plans. Table 1 lists the soil samples collected and the analyses run. DUSRs are included in the Electronic Attachments CD.

Sample intervals were chosen in the field on a case-by-case basis, depending on the subsurface conditions and data needs. At most locations, a sample was collected from the most impacted interval observed, if present. The field geologist inferred impacts if NAPL, sheens, or staining was observed, or if headspace readings were significantly above background. At selected locations, samples were also submitted from the first visibly unimpacted interval in order to delineate the vertical extent. If no impacts were noted at a particular location, samples were typically collected from the approximate elevation at which impacts were observed in neighboring borings or test pits.

### 2.2.4 Surface Soil Sampling

Ten surface-soil samples (SS-1 and SS-10) were collected during the RI. The locations of the surface soil samples were approved by the NYSDOH in a May 31, 2006 e-mail from Ms. Julia Guastella. Five of the samples (SS-1 through SS-5) were collected in representative background areas and the remaining samples (SS-6 through SS-10) were collected in the unpaved portion of the site. Samples were collected to determine the background concentrations of MGP constituents in surface soils and assess whether the former MGP impacted the quality of surface soils at the site. The samples collected were analyzed for TCL VOCs, TCL SVOCs, TAL metals and total cyanide. Analytical methods, sample-handling procedures and laboratory protocols are outlined in the work plans. Sample analyses followed the most recent NYSDEC ASP analytical protocol and include QA/QC samples as required by the QA/SAPP included with the work plans. DUSRs are included in the Electronic Attachments CD.

The surface-soil samples were composites of eight individual grab samples collected from the top 2 inches of soil within a 1-square-meter area. The vegetative sod layer, gravel, or sub-base material was removed prior to collecting the samples. Table 2.3 summarizes the location of each surface-soil sample:

**Table 2.4. Surface Soil Sample Summary**

| Sample ID | Background | Location |
|---|---|---|
| SS-1 | √ | Grassy area east of the site and adjacent to a parking lot for Curly's Restaurant and the railroad |
| SS-2 | √ | Grassy median southeast of the site, between the railroad and the Route 5 and 20 Arterial |
| SS-3 | √ | Grassy median south of the site, between the railroad and the Route 5 and 20 Arterial |
| SS-4 | √ | Grassy area south of Auburn Tank building |
| SS-5 | √ | Grassy area east of Auburn Tank building |
| SS-6 | | On site, between former gas holder and retorts |
| SS-7 | | On site, above footprint of former coke sheds |
| SS-8 | | On site, east of former gas holder and purifiers |
| SS-9 | | On site, in vegetated vacant area in eastern portion of site |
| SS-10 | | On site, in vegetated vacant area in eastern portion of site |

### 2.2.5 Soil Vapor Sampling

The purpose for the soil vapor investigation was to evaluate the potential for VOCs from the MGP to be present in on-site soil vapor and in soil vapor near the Auburn Tank building west of the site.

Temporary soil vapor probes were installed at 8 locations (locations SV-1 through SV-8, as shown on Figure 2) on February 12, 2008. Soil vapor samples were collected from the 6-inch interval located approximately 1 foot above the water table at each location. Each sampling interval was limited to approximately 6-inches to reduce potential sample dilution that could otherwise occur across a larger interval. The water table depth at each proposed soil vapor sampling location was evaluated prior to installation of sampling probes by using a direct-push (i.e., Geoprobe®) rig to advance a soil boring to a depth until groundwater was encountered.

A soil gas sampling summary, which identifies each soil gas sampling location, rationale, and interval, is presented in the table below.

| Sample ID | Sampling Location | Sampling Rationale | Sampling Interval /Water Depth (feet bgs) |
|---|---|---|---|
| SV-1 | Near previous soil sampling location TP-04-04, which exhibited elevated concentrations of BTEX compounds and PAHs and indications of coal tar | Evaluate potential “worst case” conditions in a potential source area; establish a site “source” signature that can be compared to other vapor sampling results | (3.5 – 4.0’)/(5.0’) |
| SV-2 | Along the site boundary, north of the former retort building | Establish an additional site “source” signature that can be compared to other vapor sampling results | (3.0 – 3.5’)/(4.5’) |
| SV-3 | Along the site boundary, south of the former retort building | Evaluate potential soil vapor migration from the area of identified soil and groundwater impacts | (2.5 – 3.0’)/(4.0’) |
| SV-4 | Near the MW-6 well cluster | Evaluate potential “background” soil vapor concentrations in an area upgradient from identified soil and groundwater impacts | (6.5 – 7.0’)/(7.0’) |

| Sample ID | Sampling Location | Sampling Rationale | Sampling Interval /Water Depth (feet bgs) |
|---|---|---|---|
| SV-5 | North, east, and south of the Auburn Tank building, respectively | To evaluate potential soil vapor migration and potential conditions near the building. | (3.5 – 4.0’)/(5.0’) |
| SV-6 | | | (2.5 – 3.0’)/(4.0’) |
| SV-7 | | | (3.0 – 3.5’)/(4.1’) |
| SV-8 | Near monitoring well MW-06-01 RI-/RD, where blebs of tar-like material were previously observed in the bedrock. | Evaluate potential “worst case” conditions in an area where tar-like material has been observed | (3.7 – 4.2’)/(5.2’) |

Soil vapor was sampled at each probe on February 13, 2008. Sample recovery at one location (SV-7) was limited by the surrounding soil conditions (i.e., soils were too tight) and analysis could not be performed because the SUMMA® canister exhibited too high a vacuum following sample collection. This location was revisited on February 25, 2008 and an additional temporary soil vapor probe was installed approximately 5 feet east of the original location and sampled successfully.

A description of the field activities performed during the soil vapor investigation is provided below.

### *2.2.5.1 Temporary Soil Vapor Probe Installation*

A Geoprobe® rig was used to install a temporary vapor probe at each soil vapor sampling location. This rig advanced an assembly of interconnected 3.25”-diameter steel rods to the desired sampling depth. After the target depth was reached, these rods were removed and a soil vapor sampling probe, consisting of a stainless-steel screen attached to Teflon-lined polyethylene tube was installed at the required depth. The probe hole was then backfilled with silica sand up to approximately 1-foot above the screen, followed by approximately 6-inches of dry bentonite, and a thick bentonite slurry throughout the remainder of the annulus to seal the sampling probe. A swagelock valve was connected to the sample delivery tube at the surface. The sampling probes were allowed to set for approximately one day prior to sample collection to let the bentonite seals set.

### *2.2.5.2 Soil Vapor Purge*

An initial vapor draw (purging) was performed prior to sampling to remove atmospheric gas from the system and charge the sampling apparatus with soil vapor in preparation for collection of a representative sample (as discussed below). At the ground surface, the swagelock valve was attached to an air sampling pump, and a minimum of one sample-point volume was evacuated. An electronic flow sensor was used to measure pump flow rate [which did not exceed 100 milliliters per minute (mL/min) during purging activities)], and the desired volume was purged from the sample point based on pumping duration. After at least one full purge volume was expelled from the sampling system, the pump was disconnected and a photoionization detector (PID) equipped with a 10.6 electron volt lamp was attached to the tubing to measure approximate total organic vapor levels. The swagelock valve was closed prior to disconnecting the pump and connecting the PID to prevent atmospheric air from entering the tubing.

#### *2.2.5.3 Tracer Gas Test*

A tracer gas (helium) was used in the field to evaluate the integrity of the seals around the soil vapor probes. The tracer gas provided a means to: (1) evaluate whether the soil vapor samples could be diluted by surface air; and (2) determine if improvements to the seals might be needed prior to sampling. A 5-gallon plastic pail (bucket) was inverted and then placed over each soil vapor sampling location following probe installation. Hydrated bentonite was used to create a seal around the rim of the inverted pail (as shown on Figure 2.4(b) of the NYSDOH document titled “Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York”, dated October 2006) and also around the penetration of the sample tubing through the bottom of the pail. Helium was then introduced into the pail through a swagelock fitting on the side of the pail.

Helium levels in the purge gas and inside the pail (prior to and immediately after sampling) were measured in the field using a gas detector. Field measurements of helium made in connection with the sample collection activities are presented on the sample collection logs included in Appendix B.

#### *2.2.5.4 Soil Vapor and Ambient Air Sample Collection*

Following purging, soil vapor sample collection was conduced in accordance with United States Environmental Protection Agency (USEPA) Compendium Method TO-15, titled “Determination of VOCs in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).” One soil vapor sample was collected from each location using a batch certified, pre-cleaned stainless-steel canister (a 6-liter SUMMA® canister) with an attached flow regulator set to a rate of 200 mL/min. The pre-cleaned canisters were provided by the laboratory with an initial vacuum of approximately 30 inches of mercury (in of Hg). Each soil vapor sample was collected over an approximate 8 hour period. After 8 hours, or when the SUMMA® canister vacuum reached approximately 2 in. of Hg, the regulator valve was closed, leaving a vacuum in the canister as a means for the laboratory to verify that the canister did not leak while in transit. Vacuum readings obtained prior to and at the end of sampling are presented on the soil vapor sample collection logs included in Appendix B.

After the soil vapor samples were collected at each location, a PID equipped with a 10.6 electron volt lamp was attached to the sample delivery tubing to measure approximate total organic vapor levels in the effluent. PID effluent readings obtained after sampling are presented on the sample collection logs included in Appendix A. As indicated on the logs, organic vapors were identified in the effluent at each location except sampling location SV-4. PID effluent readings ranged from 7 parts per billion (ppb) (SV-7) to 253 ppb (SV-1).

One blind duplicate soil vapor sample was collected during the soil vapor investigation. The duplicate sample, FD-021308, was collected at soil vapor sampling location SV-2.

The soil vapor samples were submitted to Alpha Analytical Laboratories (Alpha) located in Mansfield, Massachusetts and analyzed for VOCs using a modified EPA Method TO-15. Sample analysis was performed using a purge and trap concentrator connected to a GC/MS operated in simultaneous scanning mode and selected ion monitoring mode (PT/GC/MS/Scan/SIM). The target analytes in this modified method include paraffins, isoparaffins, aromatics, naphthenes, and olefins (collectively referred to as PIANO), as well as thiophenes, oxygenates, and additives (NewFields, 2008).

The results of the soil vapor investigation are summarized in Section 3. The NYSDEC/NYSDOH-approved Soil Vapor Investigation Report is provided in Appendix B.

### 2.2.6 Water-Level Measurement

Several rounds of groundwater levels were measured during the RI. The gauging rounds included surface-water levels measured at four staff gauges (SG-1 through SG-4) that were established along the Outlet adjacent to and upstream and downstream of the site. The most comprehensive round was measured on April 11, 2007, after monitoring wells MW-06-01RI/RD, MW-06-06RI/RD, MW-07-16RI/RD and MW-07-17RI/RD were installed during the latest phase of RI fieldwork. The round measured on

April 11, 2007 was used as the basis for water level information provided on several of the figures presented in Section 3. Locations of the gauging points are shown on Figure 2. During the gauging events, the field staff measured the depth to water, depth to NAPL (if present) and total depth at each monitoring well. The water-level measurements are summarized in Table 9.

### 2.2.7 Groundwater Sampling

Two types of groundwater samples were collected during the RI. Groundwater samples were collected from monitoring wells using traditional purging and sampling techniques. Groundwater samples were also collected while conducting packer tests at several bedrock drilling locations.

#### *2.2.7.1 Monitoring Wells*

Groundwater samples were collected from monitoring wells to evaluate on- and off-site groundwater quality. The RI groundwater sampling was conducted during three separate events, as summarized in Table 2.4.

**Table 2.5. Groundwater Sampling Summary**

| **Sampling Date(s)** | **Wells Sampled** | **TCL VOCs** | **TCL SVOCs** | **TAL Metals** | **Total Cyanide** | **BTEX** | **PAHs** |
|---|---|---|---|---|---|---|---|
| April 2005 | MW-04-01, MW-04-02, MW-04-02R, MW-04-03, MW-04-04, MW-04-05, MW-04-06, MW-05-07, MW-05-07R, MW-05-08, MW-05-08R | X | X | X | X | | |
| August 2006 | MW-04-01, MW-04-02, MW-04-02R, MW-04-03, MW-04-04, MW-04-05, MW-04-06, MW-05-07, MW-05-07R, MW-05-08, MW-05-08R | | | | | X | X |
| | MW-06-06R, MW-06-09, MW-06-09R, MW-06-10, MW-06-10R, MW-06-12R, MW-06-13R, MW-06-14R, MW-06-15R | X | X | X | X | | |
| April 2007 | MW-06-01RI, MW-06-01RD, MW-06-06RI, MW-06-06RD, MW-07-16RI, MW-07-16RD, MW-07-17RI, MW-07-17RD | X | X | X | X | | |

Prior to groundwater sampling, groundwater elevations were measured at each monitoring well using a water level probe. The presence of DNAPL was also measured at wells suspected to have DNAPL using an oil-water interface meter. After groundwater elevations were measured and DNAPL was determined not to be present, the wells were purged and sampled. Groundwater samples were obtained using low-flow purging and sampling procedures described in the work plan. Sample analyses followed the most recent NYSDEC ASP analytical protocol and included QA/QC samples as required by the QAPP included with the work plans. Groundwater was not sampled from monitoring well MW-06-11R because it contained measurable NAPL during sampling events.

#### *2.2.7.2 Packer Tests*

Packer testing was performed while drilling several bedrock monitoring wells to evaluate the hydraulic conductivity of the test intervals and to collect screening-level groundwater quality data. Screening-level samples were collected at the following locations/intervals (all intervals reported in feet bgs):

**Table 2.6. Summary of Packer Test Intervals**

| Well Cluster ID | Interval Tested/Sampled |
|---|---|
| **MW-06-01RI/RD** | 17 to 26<br>26 to 35<br>35 to 45<br>45 to 55<br>55 to 65<br>65 to 75<br>75 to 80 |
| **MW-06-06RI/RD** | 39.5 to 49.8<br>49.8 to 59.8<br>59.8 to 69.8<br>69.8 to 79.8 |
| **MW-07-16RI/RD** | 14 to 24<br>24 to 34<br>34 to 44<br>44 to 54<br>54 to 64<br>64 to 74<br>74 to 79 |

| Well Cluster ID | Interval Tested/Sampled |
|---|---|
| **MW-07-17RI/RD** | 14 to 24<br>24 to 34<br>34 to 44<br>44 to 54<br>54 to 64<br>64 to 74<br>74 to 79 |

Each screening-level sample was shipped to STL of Buffalo, New York for expedited analysis. Samples were analyzed for BTEX following the most recent NYSDEC ASP analytical protocols. The results of the analyses were evaluated in conjunction with the hydraulic conductivity data and observations made during coring to determine where to screen each bedrock well. Table 4 presents the screening-level analytical results.

### 2.2.8 Hydraulic Conductivity Testing

Two types of hydraulic conductivity testing were performed during the RI. Hydraulic testing was conducted on open bedrock coreholes during packer testing and at installed monitoring wells during groundwater sampling. The purpose of the testing was to provide a gross estimate of the bulk hydraulic conductivity of the test interval. This section summarizes how the different testing was performed.

#### *2.2.8.1 Packer Testing*

Packer testing of bedrock was performed at monitoring wells MW-06-01RI/RD, MW-06-06RI/RD, MW-07-16RI/RD and MW-07-17RI/RD during drilling. The purposes of this testing were to estimate the hydraulic conductivity of the interval tested and to collect screening-level groundwater samples.

Packer testing was performed continuously every approximately 10 feet using a single packer system. The general procedure for this packer testing method involves coring 10 feet of bedrock, inserting the packer assembly and isolating the test interval[2], conducting the test of that interval, and repeating the procedure until the boring is completed. Packer testing was conducted using a submersible pump to purge water

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[2] The packer assembly consists of an inflatable packer that is used to isolate the test section, a submersible pump mounted below the packer (i.e., in the test section), and discharge piping to route the water pumped from the test section to the surface. The assembly is designed so that the depths to water above the packer and also within the test interval can be monitored.

from the packer interval. Specific-capacity test data were collected throughout the purging process so that the hydraulic conductivity of the bedrock interval could be estimated. These data were evaluated according to the method described by Walton (1962). The estimated hydraulic conductivity values based on the packer testing data are presented in Table 10.

#### *2.2.8.2 Monitoring Well Specific-Capacity Testing*

Specific-capacity test data were collected at each monitoring well during at least one sampling event. These data were used to estimate the hydraulic conductivity of the material screened by each well according to the method described by Walton (1962). The estimated hydraulic conductivity values are summarized in Table 10. The input parameters used in the calculations are provided on the attached CD.

### 2.2.9 Borehole Geophysical Logging

David Eckhardt of the USGS' Ithaca, New York office logged three open coreholes using a suite of geophysical logging tools. The three coreholes were: MW-06-01RI/RD, MW-06-06RI/RD and MW-06-17RI/RD. The borehole logging consisted of acoustic televiewing (ATV), caliper logging, fluid temperature and resistivity logging, heat-pulse flow measurements, and gamma logging. The information provided by the borehole logging included:

- bedrock fracture orientations (dip angle and down-dip compass azimuth) relative to magnetic north

- depths where water was preferentially entering or exiting the corehole

- locations of enlargements in corehole diameter that often occur when a drill bit passes through a fracture zone/solution cavity

- locations of clay particle enrichment which can be used to distinguish geologic formations

This information was used to help understand the structure of the bedrock and how the structure relates to groundwater flow and potential NAPL migration at and near the site. Copies of the borehole geophysical logs prepared by the USGS are provided on the attached CD.

## 2.3 Owasco Outlet Investigation

To characterize the Outlet, four types of investigations were performed:

- Reconnaissance and Probing
- Surficial Sediment Sampling
- Bank Soil and Deeper Stream Channel Sediment Investigations
- Surface-Water Sampling

A discussion of these investigations is provided below.

### 2.3.1 Reconnaissance and Probing

A reconnaissance of the stream channel was conducted on February 9, 2005 prior to initiating the sediment probing work. The reconnaissance consisted of walking the Outlet upstream, adjacent to and downstream from the site to observe general stream characteristics and to identify any existing outfalls. The reconnaissance covered an area of approximately 500 feet upstream of the site to 500 feet downstream of the site. The results of the reconnaissance are discussed in Section 3.7.

Systematic sediment probing was conducted along a series of transects in the Outlet between June 23, 2005 and June 28, 2005. Transects were established beginning approximately 500 feet upstream from the site and ending approximately 500 feet downstream of the site (Figure 4). The distance between upstream transects was 50 feet and the distance between adjacent and downstream transects was 25 feet, for a total of 46 transects (T-1 through T-46). The stream bottom was systematically probed with a ½-inch metal rod, calibrated in 0.1-foot increments, at approximate 10-foot intervals along each transect. This equated to approximately six to nine stations along each transect, depending on the width of the Outlet. All transect locations were surveyed. A total of 338 probing stations were investigated along the 46 transects.

While probing, soft sediment thickness and water depths were recorded; the composition of the sediments were described; and the presence of odors, sheens, stains, NAPLs and/or anthropogenic materials were noted. In addition, soft sediment deposits, including those located between transects, were probed to determine their horizontal and vertical extent.

### 2.3.2 Surficial Sediment Sampling

Information from the site reconnaissance and sediment probing was used to select locations for sampling surficial (upper 0.5 feet) sediment. Surficial sediment sampling was conducted on June 29, 2005 and 30, 2005. Sampling locations were selected to include depositional areas and areas near outfall discharges to the Outlet. Specific sampling locations upstream, adjacent and downstream of the site were located where surficial sediment deposits were observed and to target areas where potential site-related impacts would most likely be present. The surficial sediment sampling locations and locations of outfalls are shown on Figure 4.

A total of 20 surficial sediment core samples were collected from four general depositional areas listed below:

**Table 2.7. Summary of Sediment Core Locations**

| Depositional Area | Samples Collected |
|---|---|
| **Outfall pipe samples** | OO-SED-6<br>OO-SED-13<br>OO-SED-16<br>OO-SED-17<br>OO-SED-19<br>OO-SED-20 |
| **Edge of water/bank samples** | OO-SED-2<br>OO-SED-4<br>OO-SED-5<br>OO-SED-7<br>OO-SED-10 |
| **Flood plains (dry at time of sampling, but submerged at times of high water**) | OO-SED-9<br>OO-SED-11<br>OO-SED-12<br>OO-SED-14<br>OO-SED-15 |
| **Depositional pockets near obstructions** | OO-SED-1(wooden dam)<br>OO-SED-3(concrete dam)<br>OO-SED-8(steel pipe)<br>OO-SED-18(bedrock shelf) |

Sediment cores were collected by driving a 2-inch Lexan® tube into the sediment until refusal and subsequently segmenting the core to include a sample of the upper 6 inches, a sample segment from 6 to 12 inches below sediment surface (bss) and additional 1-foot core segments (or increments defined by notable changes in stratigraphy) to the bottom of the recovered core. Sediment cores were segmented and described with respect to predominant sediment types, texture, color and moisture content, and headspace screened using a PID. In addition, the presence of odors, sheens, staining, NAPLs and/or anthropogenic materials were noted.

From the 20 cores (OO-SED-1 through OO-SED-20) collected, 12 samples were from the upper 6-inches and 1 sample was from deeper than 6-inches. Each sample was analyzed for total organic carbon (TOC), TCL VOCs, TCL SVOCs, TAL metals and cyanide. Sediment sample analyses followed the most recent version of the NYSDEC ASP analytical protocol and included QA/QC samples (i.e., field duplicates and matrix spikes) at frequencies required by the QA/SAPP contained in the work plans. Because only dedicated disposable Lexan® was used to collect sediment samples, no equipment rinse blanks were submitted for analysis.

### 2.3.3 Bank Soil and Deeper Stream Channel Sediment Investigation

The bank soil and deeper stream channel sediment investigation was conducted adjacent to the site in the Outlet between August 8, 2006 and August 15, 2006. The purpose of this investigation was to characterize unconsolidated material beneath the surficial sediment deposits previously sampled during the surficial sediment investigations (discussed above) and to further characterize the extent of NAPL observed beneath the southern bank of the Outlet adjacent to the site. This work was prompted by subsurface data gathered during drilling of well MW-06-11R, where NAPL was observed near the soil/bedrock interface, about the same elevation as the Outlet bottom. In addition, the results of the surficial sediment sampling suggested that sample OOSED-10 (collected adjacent to the site from 1 to 1.2 feet bss) contained MGP-related constituents. The components of this investigation are summarized in the bullets below:

- The shoreline of the Outlet between existing transects T-18 and T-38 was investigated using shovels and probe rods. The area investigated along this stretch included the bank material along the southern bank and the entire width of the Outlet (entire stream bed). The bank and creek bed material was investigated by manually overturning rocks and other large encumbrances to look for apparent MGP-related impacts beneath these structures and digging into the base of the Outlet (with a shovel) to the extent practicable. Sediment and water depths were measured and the characteristics of creek bed material and bank material (including observations of potentially impacted material) were recorded. The locations of each observation point are shown on Figure 2. The locations designated as “BO” represent the bank observations and the locations designated with “SO” represent stream channel observations (i.e., locations under water).

- Apparent MGP-related impacts (as denoted by sheen, NAPL and/or hardened tar-like material) on the bank and in the Outlet were delineated to the extent practicable by digging and probing outward from the initially observed impacted area in a radial manner until unimpacted materials were encountered.

- A total of 15 bank soil samples (designated as SED-BO-#) and 8 deep stream channel samples (designated as SED-SO-#) were collected from bank observation and stream channel observation locations the Outlet. Most of the samples were generally collected from bank soil and deep stream channel sediments that appeared to be impacted; however, some samples were collected to provide horizontal delineation of observed impacts. Samples were analyzed for TCL VOCs and TCL SVOCs. Bank soil and deep sediment sampling locations are listed in Table 1 and shown on Figure 2.

### 2.3.4 Surface-Water Sampling

Surface-water sampling was conducted on August 26, 2005. Surface-water samples were collected from 10 locations, as shown in Table 2.5.

**Table 2.8. Surface-Water Sample Summary**

| Sample ID | Location |
|---|---|
| SW-OOSED-01 | Collected adjacent to sediment sample OOSED-01, approximately 500 feet downstream from the site |
| SW-OOSED-06 | Collected adjacent to sediment sample OOSED-06, approximately 220 feet downstream from the site |
| SW-OOSED-07 | Collected adjacent to sediment sample OOSED-07, approximately 180 feet downstream from the site |
| SW-OOSED-10 | Collected adjacent to sediment sample OOSED-10, adjacent to downstream end of the site |
| SW-OOSED-13 | Collected adjacent to sediment sample OOSED-13, adjacent to site and Outfall 16 on south bank |
| SW-OOSED-16 | Collected adjacent to sediment sample OOSED-16, approximately 60 feet upstream from the site and adjacent to Outfall 12 on north bank |
| SW-OOSED-19 | Collected adjacent to sediment sample OOSED-19, approximately 240 feet upstream from the site and near Outfall 08 on south bank |
| SW-OOSED-20 | Collected adjacent to sediment sample OOSED-20, approximately 450 feet upstream from the site and near Outfall 01 on north bank |

| Sample ID | Location |
|---|---|
| SW-OO-Upstream | Midstream sample collected upstream, near the State Street Bridge |
| SW-OO-Downstream | Midstream sample collected at the downstream edge of the site |

Surface-water samples were collected by submerging and filling unpreserved sample containers. Preserved sample containers were filled by transferring water from the unpreserved containers. The samples were collected from approximately the middle of the water column (i.e., half of the distance between the water surface and the river bottom). The samples collected were analyzed for TCL VOCs, TCL SVOCs, TAL metals and total cyanide. Analytical methods, sample handling procedures and laboratory protocols are outlined in the work plans. Sample analyses followed the most recent NYSDEC ASP analytical protocol and include QA/QC samples as required by the QA/SAPP included with the work plans.

### 2.4 Fish and Wildlife Resources Impact Analysis

A Fish and Wildlife Resource Impact Analysis (FWRIA) was conducted in accordance with NYSDEC guidance documents including *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (NYSDEC, 1994) and *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2002a). The objectives of the FWRIA were to identify the fish and wildlife resources that exist on and in the vicinity of the site, and to evaluate the potential for exposure of these resources to site-related constituents in environmental media. Results of the FWRIA are generally used to aid in remedial decision-making.

In accordance with NYSDEC (1994; 2002a) guidance, FWRIAs are conducted in a step-wise manner. Specifically, this FWRIA consisted of Part 1 (Resource Characterization). The resource characterization consisted of the following five steps: 1) identification of fish and wildlife resources; 2) identification of contaminant migration pathways and fish and wildlife exposure pathways; 3) description of resources on site and within 0.5-mile radius of the site; 4) identification of contaminants of ecological concern (i.e., comparison of environmental data to Standards, Criteria, and Guidance [SCGs]); and 5) conclusions regarding the actual or potential adverse impacts to fish and wildlife resources. If no resources or exposure pathways are present, impact to resources are considered minimal and no additional analyses are required.

Details of the FWRIA are presented in Section 4.

### 2.5 Human Health Exposure Evaluation

A qualitative human health exposure evaluation (HHEE) was conducted at the site to evaluate the potential for human exposure to potentially site-related constituents. The HHEE was conducted consistent with the New York State Department of Health (NYSDOH) guidance as presented in *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDOH, 2002). The HHEE uses information regarding current and foreseeable land uses and available site data to evaluate the potential for exposure of human receptors. The HHEE includes a characterization of the environmental setting of the site, identification of constituents of interest and complete exposure pathways, and an evaluation of contaminant fate and transport. The results of this qualitative HHEE will be used, in part, to help evaluate proposed remedial actions for the site. Details of the HHEE are presented in Section 4

### 2.6 Decontamination

All equipment was decontaminated following the procedures outlined in the Field Sampling Plan (FSP) included in the work plans. In general, all nondisposable equipment (including all drilling tools, groundwater sampling equipment and sediment sampling equipment) was decontaminated prior to first use on site, between each investigation location and prior to demobilization. The integrity of the decontamination procedures was checked periodically with equipment rinse blanks, as required by the work plans. The results of the rinse blank samples are included in the DUSRs on the attached CD.

### 2.7 Waste Handling

All investigation-derived waste (IDW) was contained on site in a secure area for appropriate characterization and disposal. Soil cuttings, PPE and spent disposable sampling materials were segregated by waste type and placed in New York State Department of Transportation- (NYSDOT-) approved steel 55-gallon drums. All decontamination water and purged groundwater water was stored in polyethylene tanks. All storage vessels were labeled with the contents, generator, location and date. IDW was characterized and properly disposed off site by NYSEG.

### 2.8 Survey

The NYSEG Engineering Services Department surveyed the locations and elevations of all test pits, monitoring wells, sediment transect endpoints (along the shoreline), sediment samples, surface-water samples and stream gauges. Survey data for the monitoring wells are shown on the logs included in Appendix A. Surface coordinates refer to the New York State Plane Central (3102) coordinate system (North American Datum [NAD] 83) and elevations are referenced to North American Vertical Datum (NAVD) 88.

### 2.9 Data Usability Summary Report

ARCADIS prepared DUSRs of the soil, groundwater, surface-water, and sediment sample analytical results following the RI field activities. QA/QC information is contained and examined in the DUSR. Based on the results of the completed DUSRs, the data collected during the RI is determined generally usable for the purposes of the RI. The analytical summary tables include the data qualifiers identified in the DUSR. Electronic copies of the DUSRs are provided on the attached CD.

# 3. Remedial Investigation Findings

## 3.1 Overview

This section reports the cumulative findings of site investigations into the nature and condition of the soil, bedrock, groundwater, surface water and sediments at and near the McMaster Street Former MGP Site. The discussion is divided into the following sections:

- Geology and physical setting (Section 3.2).
- Groundwater flow (Section 3.3).
- NAPL evaluation (Section 3.4).
- Soil-quality evaluation (Section 3.5).
- Soil vapor evaluation (Section 3.6)
- Groundwater-quality evaluation (Section 3.7).
- Owasco Outlet sediment evaluation (Section 3.8).
- Owasco Outlet surface-water evaluation (Section 3.9).

Findings of the Fish and Wildlife Resource Impact Analysis (FWRIA) and Human Health Exposure Evaluation (HHEE) are reported in Section 4.

## 3.2 Geology and Physical Setting

The following discussion of the geology and hydrogeology of the site and surroundings is divided into three subsections. The first two subsections (3.2.1 and 3.2.2) provide an overview of the regional and site-specific geologic settings. The third subsection (3.2.3) identifies and describes the site stratigraphy in terms of hydrostratigraphic units.

### 3.2.1 Regional Geologic Setting

The site is located on the northern edge of the Appalachian Uplands, the most extensive physiographic province of New York State. The bedrock in this province dips gently to the south with a slope of less than 50 feet per mile near the site. This general southerly dip results in the exposure of progressively older bedrock formations from south to north. In Auburn and its surrounding areas, unconsolidated glacial deposits are underlain by Devonian age (approximately 395 to 345 million years ago [mya]) and Silurian age (approximately 435 to 395 mya) limestones, dolostones, shales and sandstones. Further classification is provided in Table 3.1.

**Table 3.1. Bedrock Stratigraphy in the Auburn Area**

| Age | Group or Formation |
|---|---|
| Devonian (395 to 345 mya) | Canadaway Shale |
| | Chemung Shale and Sandstone |
| | Naples Shale and Sandstone |
| | Genesee Shale |
| | Tully Limestone |
| | Hamilton Shale and Sandstone |
| | Onondaga Limestone |
| | Oriskany Sandstone |
| | Kalkberg Limestone |
| | Coeymans Limestone |
| | Manlius Limestone |
| Silurian (435 to 395 mya) | Rondout Dolostone |
| | Cobleskill-Akron Dolostone |
| | Bertie Dolostone |
| | Salina Group (shales) |
| | Lockport Dolostone |
| | Decew Dolostone |
| | Clinton Group (shales, limestones and conglomerate) |

Fluvial and glacial erosion have resulted in dissection and development of east-west trending escarpments which are marked by outcrops of more resistant layers of bedrock. The topographic scarp marking the northern boundary of the Appalachian Uplands is known as the Onondaga Escarpment. The Onondaga Escarpment is formed by the more resistant Devonian age strata (Onondaga Limestone represents the cap-rock) which overlie less resistant Silurian age strata. The Onondaga Escarpment is found just a few miles north of the site. The scarp traverses the landscape from just north of Auburn southwest to Union Springs, the latter located on the east side of Cayuga Lake. A portion of the Onondaga Escarpment is shown on Figure 1 – the escarpment is marked by the 600 and 700-foot contours shown on this figure.

During the Mesozoic Era (i.e., 195 to 65 mya), the Finger Lakes region was eroded to a surface of little of no relief, termed a peneplane. It is postulated that the peneplane was uplifted approximately 2000 feet about 30 mya (Von Engelin, 1961). This uplift brought on renewed erosion and dissection of the plateau-like region by streams. The eastern

Finger Lakes region, encompassing Seneca Lake and those lakes to the east, exhibited a preglacial river system that was established in the peneplane and maintained during the uplift of the region. Each of the north-south trending basins (i.e., Cayuga, Seneca, Owasco, Skaneateles and Otisco) carried a north flowing preglacial river which provided drainage for the area until the start of the Pleistocence Epoch (i.e., 1.8 mya to 10,000 years ago) when glaciers began to resculpture the region (Von Engelin, 1961).

There is evidence of at least two glacial advances in the Finger Lakes regions during the Pleistocence. The first advance is believed to have been initiated about one million years ago. The final retreat of glacial ice from the regions did not occur until about 10,000 years ago, with retreat of the Wisconsin Laurentide ice sheet. The Pleistocene Epoch modified the preexisting topography resulting in the distinctive landforms associated with the region today.

The geologic sediments in the region consist of primarily glacio-lacustrine deposits such as silt, clay and fine sand (New York State Museum/Geological Survey, 2000). Glacial ice contact and outwash deposits such as sand and gravel can also be locally found. These glacial deposits are believed to be related to the most recent glacial stage, the Wisconsin Episode. More recent sand and gravel deposits are found as alluvium in major river valleys.

### 3.2.2 Site Geologic Setting

Site investigations have identified three principal stratigraphic units beneath the site. These units, listed below, show a sequence of events, from the land surface down (youngest to oldest) specific to the site’s geologic and industrial history.

- Fill and the remnants of an assortment of man-made structures, originating from the site’s industrial history.
- Alluvial sands, silts, clay and trace amounts of gravel in the floodplain of the Outlet.
- Rock formations primarily consisting of Devonian and Silurian limestones and dolostones.

The generalized description of these units is provided in Table 3.2.

**Table 3.2. Generalized Geologic Column at the Site**

| Unit | | Thickness (feet) | Stratigraphic Description |
|---|---|---|---|
| Fill | | 4 to 14 | Sand with varying amounts of silt and gravel, cinders, slag, demolition debris, foundation remnants and buried utilities. Present across the site. |
| Alluvial Clay, Sand, Silt and Gravel | | 0 to 13 | Predominately sand, some clay and silt and trace amounts of gravel. Discontinuous and relatively thin. |
| BEDROCK | Onondaga Limestone – Moorehouse, Nedrow and Edgecliff Members | 41 to 43 | Medium to dark gray, fine to coarse grained argillaceous limestone, fossiliferrous (mainly brachiopods, rigose coral and crinoids), thinly bedded, shaley zones, pyrite observed, zones of bioturbation evident, cherty (Moorehouse), fractured. |
| | Oriskany Sandstone | 0.5 to 2 | Coarse grained quarzitic sandstone, large brachiopod fossils, contains black phosphate nodules on top of unit, top and bottom of unit is erosional contact with Onondaga (above) and Manlius (below). |
| | Manlius Limestone – Olney Member | > 26 | Bluish gray finely crystalline limestone with low fossil content, vuggy, thin to massively bedded, thick shale beds near base, fractured. |

The cross sections on Figures 5 and 6 show the vertical distribution of these units in the site area. The locations of the cross sections are shown on Figure 2.

### *3.2.2.1 Overburden*

Based on observations made during the subsurface investigations, the overburden (unconsolidated materials overlying the bedrock) in the site area comprises mostly fill material consisting of varying amounts of sand, gravel and silt with anthropogenic materials (e.g., slag, coal, wood, metal, piping, ash, concrete, brick and foundations from former MGP structures). The fill materials are underlain by native materials consisting of alluvial sand, silt, clay and gravel. These native deposits are discontinuous and thin (generally less than 2 to 3 feet thick when present). The native deposits thicken in the southern portion of the site, in the area of the MW-06-06 cluster and MW-06-09 cluster.

#### *3.2.2.2 Bedrock*

Three bedrock formations were investigated during this RI: the Onondaga Limestone, Oriskany Sandstone and Manlius Limestone. Data used to characterize the bedrock beneath the site were obtained from multiple sources, including: reconnaissance of local outcrops exposed along the Outlet, physical logging of recovered rock core, borehole geophysical logging and packer testing of selected boreholes, hydraulic conductivity testing, hydraulic head measurement, and analysis of groundwater samples. These data supplemented by information gleaned from various literature sources and discussions with staff of the local USGS office. At the end of this section, we briefly discuss several bedrock formations that underlie the three described above, based on available literature. These units merit discussion because they affect regional groundwater flow.

**Onondaga Limestone**

The Onondaga Limestone beneath the site consists of three members, in descending order: the Moorehouse, Nedrow and Edgecliff Members. The Moorehouse member is a medium to dark gray, very fine grained limestone with numerous shale partings and an abundance of various brachiopods. The Moorehouse is approximately 22 feet thick beneath the site with bedding ranging from 2 inches to 5 feet thick. The upper half of this member is less shaly and more fossiliferrous than the lower half. Dark gray chert is common throughout the Moorehouse and increases in abundance in the upper half. The chert nodules are aligned parallel to bedding planes and, where abundant, can form beds of anastomosing networks (Lindemann and Feldman, 1981). The Moorehouse Member gradually overlies the Nedrow Member and the contact is difficult to determine.

The Nedrow Member is a medium gray, very fine grained argillaceous limestone that is approximately 11 feet thick beneath the site. The clay content of the Nedrow Member can range up to approximately 25 percent (Lindemann, 1979). Though uncommon, the upper bed locally contains scattered medium to dark gray chert nodules (Lindemann and Feldman, 1981). Brachiopods are abundant in this member.

The contact between the Nedrow and overlying Edgecliff Member is sharp. The Edgecliff is a light gray, coarse-grained, crinoidal limestone with beds ranging from 0.5 to 3 feet thick. Light gray chert nodules are common in the upper portion of this member. The Edgecliff is characterized by abundant fauna of rugose and tabulate corals (Lindemann and Feldman, 1981). This member is approximately 8 feet thick beneath the site. The lower few inches of the Edgecliff contains sand grains apparently derived from reworking the deposits of the underlying Oriskany Sandstone.

### Oriskany Sandstone

The Oriskany Sandstone is a hard, coarse-grained, almost pure quartz sandstone. Large brachiopods have been observed in this formation. The Oriskany is discontinuous and in many areas is represented only by a concentration of phosphate-enriched sand grains in the lower portion of the overlying Edgecliff Member of the Onondaga (Rickard, 1963). Where these basal clastics occur, they are usually less than one foot thick and frequently grade upward into the Onondaga. Although not frequently observed in the Auburn area, the Oriskany was observed beneath the site, ranging in thickness from approximately 0.5 to 2 feet.

### Manlius Limestone

The Manlius Limestone underlies the Oriskany Sandstone unconformably. While regionally the Manlius contains five members — Jamesville, Clark Reservation, Elmwood, Olney and Thatcher — only the Olney Member is present beneath the site (Hecht, 1992). The Olney is a fine-grained, dark bluish gray, vuggy limestone with shale interbeds. The lower portion of this limestone is largely composed of thin, alternating layers of dark and dull gray limestone with increased thickness of shale beds. The upper portion of the Olney is more thickly bedded. Up to approximately 25 feet of the Olney were penetrated during the RI. The Olney is expected to be approximately 30 to 35 feet thick in the Auburn area (Eckhardt et al., 2004).

### Deeper Bedrock Formations

Although not investigated during this RI, several bedrock formations below the Manlius affect regional groundwater flow and therefore merit discussion herein. These deeper formations consist of the Rondout, Cobleskill and Bertie dolostones (carbonate rocks), and the underlying Camillus Shale Member of the Salina Group.

The Rondout formation consists of dolostone/dolomitic limestone and lies beneath the Manlius. The Roundout is approximately 35 feet thick in the Auburn area and layered with evaporite beds of gypsum and anhydrite (Eckhardt et al., 2004).

Beneath the Rondout, lies the Cobleskill (or Cobleskill-Akron) formation, which is also a dolostone. The Cobleskill is usually pitted and vuggy due to dissolution, and sometimes contains cavities lined with dolomite crystals. The Cobleskill is estimated to be approximately 12 feet in the Auburn area (Eckhardt et al., 2004).

The Bertie Group of dolostones lies beneath the Cobleskill. The Bertie is a mixture of grayish dolomitic shale, dolostone and impure limestone found to be approximately 70 to 80 feet thick in the Auburn area (Eckhardt et al., 2004). The Bertie also contains evaporite beds as well as caverns.

The Camillus Shale lies beneath the entire package of carbonate rocks, forming the base of the bedrock formations discussed in this RI Report. The Camillus consists of green and red shales with beds of dolomites and anhydrites. The Camillus is approximately 200 feet thick in the Auburn area (Hecht, 1992).

The effect of these deeper bedrock units on regional groundwater flow is discussed in Section 3.3.

### Bedding Planes

**Figure 3.1 – Photograph of Bedrock Outcrop Near Site.**

The bedding plane dip (i.e., direction in which the layers of rock tilt) of rock beneath the site, as determined by mapping of the top of the Manlius Formation (Figure 7), is approximately 70 feet per mile to the south-southeast, which is slightly higher than the regional dip of approximately 40 feet per mile to south. Such local variation in dip angle and direction between is not uncommon due to minor flexures in the rock. Based on review of bedrock cores obtained at the site, fairly extensive fracturing was observed along bedding planes in both the Onondaga and Manlius Limestones. As shown on the logs contained in Appendix A and the borehole geophysical logs contained on the attached CD, the spacing of the bedding-plane fractures generally ranged from an inch or less up to 1 to 2 feet. Rock Quality Designations (RQDs) (a measure of how fractured the rock is) for both formations were generally higher than 80; however, RQDs ranging from approximately 30 to 40 were observed in the upper portion of the Onondaga and lower portion of the Manlius at a few boring locations.

### Joints

As used in this RI Report, the term joint refers to a high-angle fracture that may extend across beds in the rock. Available information indicates that jointing is pervasive in the Onondaga and Manlius Formations (Hecht, 1992). Because carbonate bedrock is relatively soluble, joints near the bedrock surface may sometimes be widened by dissolution. Such joints usually become very tight with increased depth below grade due to lithostatic pressure (Hecht, 1992).

**Figure 3.2 – Photograph of Bedrock Surface in Owasco Outlet Upstream of Site (looking northwest).**

Jointing was observed in the Onondaga Limestone at several exposures in the Outlet near the site. Those joints appeared to be vertical/ near vertical with a horizontal spacing of approximately 2 to 4 feet. High-angle fractures in the Onondaga and Manlius Limestones were also observed in bedrock cores obtained at several boring locations.

Joint orientations in the Onondaga Limestone were measured by URS Corporation (URS) near NYSEG's former MGP site on Clark Street in Auburn, about ½- mile downstream from the McMaster Street site. This work was conducted as part of a RI that is being conducted at that site by URS on NYSEG's behalf. As noted in their Draft SRI Report (dated June 2006), URS identified two prominent joints sets that strike approximately N15º W and N 75º E. This is consistent with the regional joint sets that are reported in literature.

### Bedrock Surface

As shown on Figure 8, erosional processes have produced an irregular bedrock surface, with an observed relief of approximately 4 feet across the area investigated. The elevation of the bedrock surface is lower beneath the Outlet and also to the southeast of the site. Across much of the rest of the site, the rock surface is relatively flat. One notable feature on the map is evident in the area of the former gas holder.

Based on the depth of the gas holder determined by MW-04-4, it appears that the floor of the holder is approximately 3 to 4 feet lower than the surrounding bedrock. This suggests that the rock may have been quarried to facilitate construction of the holder.

### 3.2.3 Hydrostratigraphic Units

Hydrostratigraphic units comprise geologic units of similar hydrogeologic properties (e.g., hydraulic conductivity); therefore, several geologic units can be grouped together as one hydrostratigraphic unit. The concept of hydrostratigraphic units was introduced by Maxey (1964) and reassessed by Seaber (1988). The use of hydrostratigraphic units aids interpretation and simplifies the discussion of groundwater flow. The hydrostratigraphic units at the site are discussed individually below, and the relationship of these units to one another is depicted in cross-sections on Figures 5 and 6.

#### *3.2.3.1 Overburden Unit*

The overburden hydrostratigraphic unit comprises the uppermost unit at the site. This unit contains fill and the discontinuous, thin native soils (alluvial deposits of sand, silt, clay and trace amounts of gravel) that lie on top of the Onondaga Limestone. Due to relatively similar hydraulic properties and since the alluvial deposits are relatively sparse, these unconsolidated materials are combined and described as a single hydrostratigraphic unit.

The top of this unit is bounded by the water table which lies approximately 3 to 10 feet below grade, depending on location. The thickness of the overburden hydrostratigraphic unit ranges from approximately 2 to 10 feet and is thickest in the upgradient (southern) portion of the site. This unit is generally thinnest along the bank of the Outlet. The hydraulic conductivity of the unit, based on specific-capacity test results, was found to range from 0.43 to 183 ft/day, with a geometric mean of 3.53 ft/day (Table 10).

Beneath the site, this unit derives its water from:

- direct recharge of infiltrating rain water or snow-melt.
- horizontal flow through the overburden from upgradient sources.

- during brief periods from the Outlet, when the head of the Outlet is higher than the head in the overburden (i.e., during storm events or during controlled releases from Owasco Lake).

#### *3.2.3.2 Shallow Bedrock Unit*

The Onondaga Limestone, Oriskany Sandstone and Manlius Limestone comprise the shallow bedrock hydrostratigraphic unit, which makes up the upper approximately 65 to 70 feet of bedrock at the site. Given that the Oriskany is only several inches to 2 feet thick in the site area, this formation is likely relatively insignificant in terms of groundwater flow. As such, from here forward, the shallow bedrock unit focuses on the hydraulics of the Onondaga and Manlius Limestones.

The shallow bedrock unit is fully saturated in the site area. Groundwater in the unit is derived primarily from three sources:

- downward flow from the overburden unit
- horizontal flow within the Onondaga/Manlius fracture network, from upgradient sources
- downward leakage from the Outlet

Given its low expected primary intergranular porosity, groundwater flow in the unit occurs primarily through an interconnected network of fractures in the rock (i.e., the joints and bedding planes).

The hydraulic conductivity tests performed during packer testing and specific-capacity testing provided gross estimates of the bulk hydraulic conductivity of the unit. These hydraulic conductivity values ranged from $4.0 \times 10^{-4}$ to 4 ft/day, with a geometric mean of $8.0 \times 10^{-2}$ ft/day (Table 10). Care must be applied when using such data collected in fractured aquifers. The majority of groundwater moves through fractures, yet fractures only occupy a small percentage of the actual test interval; therefore, the hydraulic conductivity of individual fractures will be higher than the values derived above. Muldoon and Bradbury (2005) studied a densely fractured carbonate rock similar to that comprising the shallow bedrock unit. They found that such bulk hydraulic conductivity values, when used to estimate groundwater velocities, underestimate the maximum velocity of groundwater.

The highest hydraulic conductivity, 4 ft/day, is at MW-06-06RI/RD (70 to 80 feet below grade) where the well screen appears to intersect a relatively permeable fracture at approximately 72 feet below grade. Flow-meter testing conducted during the down-hole geophysical logging indicated that distinct fracture zones were located at approximately 25 feet below grade and 72 feet below grade at this location. The flow-meter results indicated that greater than 1.5 gallons per minute (gpm) of groundwater was entering the open corehole at 25 feet below grade and exiting the corehole at 72 feet below grade.

#### *3.2.3.3 Deep Bedrock Unit*

The deep bedrock unit consists of the package of carbonate rocks that lie between the Manlius Limestone and Camillus Shale. These are the Rondout, Cobleskill and Bertie dolostones, which contain varying amounts of evaporite deposits. The combined thickness of these bedrock formations is approximately 130 feet in the Auburn area (Hecht, 1992). Although investigation of this unit was not required during this RI, available information indicates these units are significant in terms of groundwater flow (Hecht, 1992). Based on review of this information, these units are karstic and can transport large volumes of water in a short period of time, with velocities much higher than competent bedrock regimes or typical porous media. As such, the hydraulic properties of these units are different than the overlying shallow bedrock at the site.

As discussed below, the degree of hydraulic communication between the deep and shallow units is slight.

The deep bedrock hydrostratigraphic unit beneath the site derives groundwater primarily from two sources:

- Downward leakage from the shallow unit through fractures (inferred to be primarily joints).

- Horizontal flow in the deep bedrock unit from upgradient sources.

## 3.3 Groundwater Flow

### 3.3.1 Regional Groundwater Flow

The USGS is currently studying groundwater flow in the region and has developed a conceptual model for regional groundwater flow (Eckhardt, et al., 2004), Regional groundwater flow is interpreted to be divided into two separate aquifers that appear to be separated by a confining unit that may be located near the base of the Manlius Limestone (Olney Member). Although the exact location of the confining unit is uncertain, down-hole geophysical logging conducted by the USGS in Cayuga County shows that shale beds become more frequent and thicken in the lower portion of the Manlius. The USGS postulates that these shale beds may separate groundwater flow into two separate aquifers. In addition, the USGS has observed that, on a regional basis, the hydraulic head a boring/well locations appears to be much lower once penetrating the confining unit.

Figure 9 shows a conceptual model for regional groundwater flow in the Auburn area. This figure was developed by modifying a figure presented in a USGS presentation (Eckhardt, et al., 2004) regarding their ongoing study.

As shown on Figure9, groundwater above the confining unit (i.e., above the lower Manlius) is interpreted to flow generally northward, while groundwater below the confining unit is interpreted to flow southwestward.

### 3.3.2 Site Groundwater Flow

Groundwater movement beneath the site can best be described in terms of the three distinct hydrostratigraphic units discussed above. The discussion draws from several sources of information including:

- Site-specific hydrogeologic data, including observations and analyses relating to the water-bearing properties of each unit.

- Literature review and discussions with Mr. David Eckhardt of the USGS. Mr. Eckhardt is leading a study of regional hydrogeology in the area (Eckhardt, et al., 2004).

- Water-level data collected at monitoring wells located at and near the site and stream gauges in the Outlet.

#### *3.3.2.1 Groundwater Flow in Overburden Unit*

To aid interpretation of groundwater flow in the overburden, water table contour maps for the overburden unit were prepared using water level data collected on September 26, 2006 and April 11, 2007 (Figure 10). A summary the measured groundwater elevation is provided in Table 9. Vertical hydraulic gradients were also calculated in overburden/shallow bedrock well clusters to help evaluate the potential for vertical groundwater flow between the overburden and shallow bedrock at the site (Table 3.3). To assess temporal changes, the vertical hydraulic gradients were calculated for the September 26, 2006 and April 11, 2007 measurement rounds.

Available water-level and bedrock elevation data indicate that the water table resides in the overburden across the site, with saturated thicknesses ranging from about 3 to 10 feet.

**Table 3.3. Vertical Hydraulic Gradients**

| Well ID | Screened Units | 9/26/06 | 4/11/07 |
|---|---|---|---|
| MW-04-2 | Overburden | 0.005 | -0.025 |
| MW-05-2R | Onondaga | | |
| MW-04-6 | Overburden | -0.89 | -0.60 |
| MW-06-6R | Onondaga | | |
| MW-05-7 | Overburden | -0.43 | -0.35 |
| MW-05-7R | Onondaga | | |
| MW-05-8 | Overburden | -0.008 | -0.02 |
| MW-05-8R | Onondaga | | |
| MW-06-9 | Overburden | -0.85 | -0.80 |
| MW-06-9R | Onondaga | | |
| MW-06-10 | Overburden | -0.23 | -0.21 |
| MW-06-10R | Onondaga | | |

**Note:**
Positive value = upward gradient.

Based on the water table maps depicted on Figure 10, vertical gradient information provided in Table 3.3 and discussions with the USGS (pers. com., June 2006), groundwater in the overburden unit is interpreted to move predominantly horizontally toward the north/northwest and discharge to the Outlet. A fraction of the groundwater in this unit also moves downward into the shallow bedrock unit through fractures in the rock before discharging to the Outlet. As shown by the April 2007 data set (Figure 10), there are times when water from the Outlet seeps into the bank (i.e., the water level elevation of the Outlet is higher than the elevation of groundwater in nearby monitoring wells.) This condition is confined to near the bank and is expected to occur for relatively short durations during seasonally wet periods and following storm events or release of water from the upstream dam. During these periods, overburden groundwater near the bank of the Outlet moves in the downstream direction (westward). Once the Outlet level drops (e.g., during seasonally dry periods or several hours-to-days after storm events), groundwater in the unit moves toward and discharges to the Outlet.

The saturated thickness and horizontal hydraulic gradient in the unit decrease from south to north (Figures 5 and 9, respectively), suggesting the hydraulic conductivity of the unit increases from south to north.

The average rate at which groundwater moves in the overburden near the Outlet, known as the average linear velocity (Fetter, 1994), is calculated to be approximately 0.18 feet/day using the geometric mean hydraulic conductivity of 3.53 feet/day, a horizontal hydraulic gradient of 0.01 and an assumed effective porosity of 20 percent. Note that this is an *average* velocity for groundwater movement in the overburden. Groundwater velocities could be much higher or lower within zones of higher or lower hydraulic conductivity.

### 3.3.3 Groundwater Flow in the Shallow Bedrock Unit

Groundwater movement in the shallow bedrock (Onondaga and Manlius Limestones) occurs almost exclusively through a fracture network formed by intersecting vertical joints and horizontal bedding-plane fractures. Based on the characteristics of the rock, including the observed fracture spacing at the site, and on work performed by Muldoon and Bradbury (2005) in a similar fractured-carbonate setting, it is not reasonable to assume the unit behaves as an *equivalent porous medium*. This means that groundwater movement is likely to be more complex and interpretations of flow in general will be less certain, than those made for the overburden. Similarly, the distribution of hydraulic head based on measurements from site monitoring wells will be an oversimplification of the true head distribution in the unit (Muldoon and Bradbury, 2005); therefore, a potentiometric surface map for the shallow bedrock has not been prepared.

As described under Regional Groundwater Flow (above), regional flow in the shallow bedrock unit is interpreted to be northward, toward the Outlet. In the area of the site, the majority of flow in this unit is interpreted to be focused toward a small gorge in the Outlet where the Outlet level drops approximately 40 feet. This gorge is located about 4,000 feet west of the site (Figure 11). A small amount of the groundwater in this unit may leak downward into the deep bedrock unit, across the confining interval postulated by the USGS.

The Onondaga Limestone has been found to be karstic in some areas of New York State (Hecht, 1992). Karst conditions can result in more rapid movement of groundwater through integrated networks of solution-widened openings or “conduits”, with focused discharge from springs into a discharge boundary (e.g., the Outlet). No direct evidence of a conduit network (e.g., cavities, springs, or sinking streams) was observed at the site or along the Outlet. Based on this information, if conduit porosity is present, it is expected to be poorly developed (i.e., infrequent and of small size) and not well integrated. This means that, if such porosity were present, groundwater in the shallow bedrock unit would be expected to discharge to the Outlet through relatively small fractures near the site, rather than from a more distant spring.

The data collected during this RI are consistent with the conceptual model for regional groundwater flow in bedrock described previously. Specifically, these data consist of the nature of the bedrock as observed in rock cores and local outcrops, rough bulk hydraulic conductivity estimates and hydraulic gradient information obtained from water-level measurements.

Information on the nature of fractures in the bedrock of the shallow unit (presented in Section 3.2.3.2) shows that the spacing of horizontal bedding plane fractures is greater than the spacing of joints. Assuming that the fracture aperture size is the same for both of these fracture types, the horizontal permeability of the unit is expected to be greater than the vertical permeability (i.e., anisotropic) based on fracture spacing. As such, groundwater movement in this unit is expected to be predominantly horizontal. Despite this, rather strong downward vertical hydraulic gradients exist across the unit, as demonstrated in Table 3.4.

**Table 3.4. Vertical Hydraulic Gradients**

| Well ID | Screened Units | 4/11/07 |
|---|---|---|
| **Upper Portion of Shallow Bedrock Unit** | | |
| MW-06-6R | Onondaga | -0.97 |
| MW-06-6RI | Onondaga | |
| MW-06-11R | Onondaga | -0.57 |
| MW-07-17RI | Onondaga/Manlius | |
| MW-06-2R | Onondaga | -1.41 |
| MW-06-1RI | Onondaga | |

**Notes:**
Positive value = upward gradient.
Negative value = downward gradient.

These downward gradients are interpreted to result chiefly from the hydraulic influence exerted by the modest bedrock gorge located about 4,000 feet west of the site. At this gorge, the Outlet drops about 40 feet in elevation over a horizontal distance of a few hundred feet. Consequently, the approximate elevation of the Outlet at the base of the gorge is about 580 feet amsl — roughly equivalent to the elevation of the screened intervals of the deepest bedrock wells at the site. Hydraulic heads in those deep wells ranged from about 625 to 635 feet amsl in April 2007. In a flow system dominated by horizontal fractures, a feature such as the gorge will tend to serve as drain; lowering hydraulic heads radially some distance away. Figure 11 shows the conceptual groundwater flowpath based on the information presented here.

A component of the downward gradient may also be due to lower hydraulic heads in the underlying deep bedrock unit. The strong downward gradient itself, both across the shallow bedrock unit, and between the shallow and deep bedrock units (as determined by the USGS and by URS at NYSEG’s nearby Clark Street Site [URS, 2006]) provides evidence that the degree of vertical hydraulic communication in the rock is poor. If the degree of hydraulic communication were good, the magnitude of vertical gradients would be expected to be less.

Examining the hydraulic heads (water-level elevations) observed in the bedrock monitoring wells and comparing them to the elevation of water in the adjacent Outlet provides insight into the reach of the Outlet that may receive groundwater from the shallow bedrock unit. For shallow bedrock (R-series wells), particularly those located along the Outlet, no clear trend in the direction of the hydraulic gradient is evident. In some cases during some monitoring events, there is a hydraulic gradient from a given well toward the Outlet, while in other cases the reverse is true. This suggests that the groundwater monitored by this series of wells (approximately the upper 20 feet of bedrock) discharges to the Outlet near and some distance downstream (west). Prior to the gorge, a smaller set of falls exists about 1,000 feet downstream of the site, based on the Auburn, NY 7.5 minute topographic map prepared by the USGS (Figure 11). Here the elevation of the Outlet drops about 10 feet, from elevation 640 to 630 feet MSL. Given that the heads in R-series monitoring wells are considerably higher than this (approximately between 640 and 653 feet MSL), it is likely that the groundwater monitored by these wells discharges to the Outlet at or upstream from these falls.

Hydraulic heads in the deeper (RI- and RD-series) wells are considerably lower than those in the R-series wells, ranging from about 625 to 635 feet MSL. Groundwater monitored by these wells would be expected to discharge to the Outlet between the small falls and the bedrock gorge.

In summary, groundwater in the shallow bedrock unit is interpreted to move primarily horizontally through bedding-plane fractures and discharge to the Outlet, predominantly downstream (west) of the site. Movement of groundwater in the shallow bedrock unit toward the Outlet is supported by:

- The nature of the rock and hydraulic gradients within it (described above).
- Information contained in Eckhardt, et al. (2004). In this ongoing study, which focuses on an area a few miles southwest of the site, groundwater in the shallow bedrock was found to be moving generally northward.
- Information provided by Dave Eckhardt (USGS Ithaca office) to ARCADIS. After discussing the relevant findings of this RI with Mr. Eckhardt, he agreed that, based on the detailed hydrogeological work that the USGS has been conducting in the area, water in the shallow bedrock unit most-likely discharges to the Outlet (pers. com., June 2006).
- Information contained in the draft SRI Report for the Auburn Clark Street site (URS, 2006).

### 3.3.4 Groundwater Flow in the Deep Bedrock Unit

Because the deep bedrock hydrostratigraphic unit was not directly investigated during the RI, this discussion of groundwater flow in the deep bedrock unit is based on review of available literature and conversations with Mr. David Eckhardt of the USGS office in Ithaca, New York. As previously mentioned the deep hydrostratigraphic unit is comprised of the Rondout, Cobleskill, and Bertie dolostones which contain various amounts of evaporite deposits. Groundwater flow in this unit is largely controlled by solution-widened features such as caves.

As discussed in Section 3.3.1, groundwater in this unit may move southwestward.

## 3.4 NAPL Evaluation

Due to their immiscible nature, NAPLs can persist for many years in the subsurface, where they act as continuing sources of constituents to groundwater as they slowly dissolve. This is particularly true with DNAPLs, which tend to migrate below the water table, rather than float on top of it. NAPLs can also diffuse into low-permeability zones, such as clay layers or bedrock matrix, which then also act as continuing sources of constituents to groundwater. For these reasons, characterizing the nature and extent of coal tar NAPLs at sites such as the McMaster Street site, is an important and challenging component of a remedial investigation.

### 3.4.1 NAPL Characterization

NAPL identified in site soil and bedrock was characterized using the information on the distribution of NAPL-containing soil/bedrock relative to the water table, observation of NAPL that accumulated in a well and the physical properties of that NAPL as determined by laboratory testing. The laboratory testing results are contained in Table 3.5. Based on this information, the NAPL identified in site soil/bedrock appears to be predominantly coal-tar DNAPL. We base this on the following information:

- The majority of NAPL-containing soil/bedrock occurs below the water table.
- Of the wells that screen across NAPL-containing soils or bedrock fractures (MW-06-11R, MW-06-12R, MW-06-15R), NAPL has accumulated in one well (MW-06-11R). The NAPL that accumulates in this well is a DNAPL.

The NAPL observed at most locations is dark brown to black in color, highly viscous and exhibits a distinct naphthalene-like odor. Based on the results shown in Table 3.5, the coal tar is a relatively light DNAPL, with a density only slightly above water at ambient groundwater temperatures. Approximately 9 feet of coal tar was measured in monitoring well MW-06-11R on April 11, 2007. An attempt was made to remove the accumulated coal tar using different types of bailers and pumps; but the tar proved too viscous for removal. The coal tar sample from MW-06-11R was collected by lowering a metal rod into the well, removing the rod, and then wiping the tar off the rod and into a container.

**Table 3.5. Physical Properties of DNAPL from MW-06-11R**

| | **Density g/mL** | **Viscosity cP** | **Interfacial Tension mN/m** |
|---|---|---|---|
| MW-06-11R | 1.160 | 38,362 | 23.87 |

**Notes:**
g/mL = grams per milliliter.
cP = centipoise.
mN/m = milliNewtons/meter.
Sample analyzed at a temperature of approximately 11°C.

### 3.4.2 NAPL Extent

Delineating the extent of NAPLs, particularly DNAPLs, often proves challenging at MGP sites. This is due to many factors, including:

- *Lack of information*. Information on plant operations and waste-handling practices is often scant or nonexistent.
- *Multiple NAPL-release points*. Typical MGP sites had numerous locations where DNAPL could have been released, many frequently undocumented.
- *Complicated behavior in the subsurface*. DNAPL often migrates in irregular ways and its migration can be influenced by man-made features and naturally occurring conditions.

Despite such complications, the geologic and analytical data generated by the numerous borings, test pits and wells at the site are sufficient to characterize the extent of coal tar DNAPL for this RI. The locations where coal tar DNAPL has been observed in soil and bedrock samples collected on site and off site are shown on Figure 12. As shown in this figure, coal tar DNAPL has been observed in the following general areas:

*Overburden:* At the base of the overburden (at/near the bedrock surface) predominately in the northern half of the site and west of the site, along the bank of the Outlet. A trace amount of DNAPL was observed at two locations (MW-05-08 and TP-05-12) in the overburden in the southern portion of the site.

*Owasco Outlet:* Approximately 1 to 2 feet bss of the Outlet, from near the west edge of the former holder to approximately 320 feet downstream (west) of the holder (Figure 10, location SO-44). Given the difficulties with investigating the deeper sediments below the Outlet caused by the deep and swift moving water, the bottom of the DNAPL-containing materials could not be reached in the Outlet.

*Bedrock:* In the upper approximately 15 to 20 feet of Onondaga Limestone primarily along the northern edge of the site, beneath the south bank of the Outlet. DNAPL was also observed in bedrock east of the former operations area of the MGP, during drilling of the MW-06-01RI/RD location. Trace amounts of DNAPL was observed in recovered rock core at depths between approximately 21 to 30 feet.

The balance of this section describes the conceptual model for DNAPL migration that resulted in the observed DNAPL distribution.

### 3.4.3 Conceptual Model for DNAPL Migration

Although it is not technically practicable to predict the exact paths that DNAPL will follow beneath the site, or identify every location where it is potentially pooled, it is possible, with the information in hand, to develop a reasonable model that explains DNAPL transport at the site sufficiently for remedial decision-making. This section provides such a model. First, the potential sources of DNAPL to the subsurface are described, and then the distribution of DNAPL in the subsurface and the mechanisms that likely governed its distribution are explained. The potential for ongoing DNAPL migration is discussed last.

#### *3.4.3.1 Explanation of Observed Distribution*

Many factors govern DNAPL movement, starting with where it is released to the subsurface. There are probably numerous DNAPL release points at the site, given its long history and the typically poor waste-handling practices of the era. Chief among the potential sources is the former gas holder in northern portion of the site. This holder is called out because holders are often found to be sources of DNAPLs at MGP sites. Also, as can be seen on Figure 12, DNAPL has been observed in the overburden and bedrock inside and near the holder. It should be noted that since the bottom of the holder lies directly on the bedrock surface, NAPL may have been released directly to the bedrock from the holder. Although not found during the RI, a tar well/separator likely existed at some point during the MGP operations.

DNAPL has moved downward from sources areas, due to gravitational forces, through the unsaturated zone (primarily fill) and reached the water table at several locations. At some locations, the DNAPL head was sufficient to allow it to penetrate the water table. Beneath the water table, a force in addition to gravity is exerted on the DNAPL body, specifically the hydraulic gradient. If the fill was homogeneous it would migrate north-northwest, in the direction of the horizontal hydraulic gradient, and downward, in the direction of the vertical hydraulic gradient and with the force of gravity. The fill is not homogeneous; therefore, DNAPL migration would also be influenced by changes in hydraulic conductivity, where it would tend to follow more conductive pathways. Upon reaching intervals of native alluvial fine sands, silts and clays, the DNAPL would tend to spread laterally on top of such deposits until reaching the edges (Cohen and Mercer, 1993). Since these deposits do not form a continuous layer beneath the site, they did not prevent DNAPL from migrating downward to the bedrock.

DNAPL has spread out laterally in the upper few feet of overburden immediately above bedrock (Figure 12). Some of this DNAPL moved north and westward, finding its way 1 to 2 feet below the bed of the Outlet. At some locations beneath the Outlet, the northern extent of the DNAPL could not be defined due to deep, swift-moving water. Migration beneath the Outlet would not be expected to extend much past the center of the Outlet, a hydraulic divide. North of the Outlet’s centerline, the horizontal component of groundwater flow in the overburden would be southward and would serve to discourage further northward movement of DNAPL. The bottom of the DNAPL could not be reached, again due to the deep, swift moving waters of the Outlet. With the exception of two locations (SO-40 and SO-41), DNAPL has generally not been observed in the upper approximately 1 foot of the Outlet sediments (consisting mostly of gravel and cobbles with sediment in interstitial spaces). Ledges of hardened tar (apparently immobile based on physical appearance) have been observed sporadically along the south bank of the Outlet, beneath the water level in the Outlet. This hardened tar found along the bank was stiff and fractured concoidally when broken apart. The tar observed below approximately 1-foot of Outlet sediments was viscous (less viscous than the hardened tar on the bank) and only produced sheen when vigorously agitated. The extent of DNAPL in the downstream direction (west) was found to be limited to approximately 320 feet downstream (Figure 10, SO-44) of the former holder.

The strength of the vertical hydraulic gradient between the deeper sediments beneath the Outlet (where the DNAPL was observed) and the water in the Outlet is expected to be negligible because of the relatively coarse grained nature (thus, high permeability) of the upper approximately 1 foot of Outlet sediments. As such, there is little-to-no driving force to move the DNAPL up into the waters of the Outlet. The magnitude of the vertical gradient required to move the DNAPL upward into the Outlet is equal to the difference between the density of the DNAPL (1.160 g/ml) and the density of the groundwater (1 g/ml), or 0.16. It is not reasonable to assume that an upward vertical gradient of this magnitude could exist between the deeper sediments immediately below the Outlet and the water in the Outlet.

Upon reaching the bedrock surface, DNAPL would again tend to spread and follow the bedrock surface, given the very low primary porosity of the rock. Given the observed joint spacing (approximately 2 to 4 feet), it is likely that DNAPL moving laterally along the bedrock surface would not have to migrate far before encountering one. Whether DNAPL would enter such a feature depends on several factors, including the height of the DNAPL pool above the joint, width of the joint aperture (opening), hydraulic gradient and properties of the DNAPL.

As is the case with groundwater, the movement and distribution of DNAPL in the bedrock fracture network is complex, and is dependent in part on the geometry and other aspects of the fracture network. The DNAPL would move downward along joints and laterally along bedding-plane fractures. Given the expected northwestward-westward direction of horizontal hydraulic gradients in the bedrock, lateral movement in that direction would be favored and is likely responsible for the DNAPL observed at monitoring well locations MW-06-11R, MW-06-13R, MW-06-15R and MW-07-RI/RD. The occurrence of DNAPL at well location MW-06-01RI/RD is anomalous and may be due to a sporadic migration pathway from the former operations area of the MGP, or more likely to a local source of DNAPL (e.g., the DNAPL present in the overburden in the area of TP-04-01).

Based on the observed depth of DNAPL (Figure 12), it appears that DNAPL has not migrated below the upper approximately 20 feet of bedrock. This is further supported by the lack of detectable MGP-related constituents in groundwater from all wells screened below this zone (as discussed in a later section). The lack of observed DNAPL below the upper 20 feet of rock can be explained by the:

- hydraulic influences of the Outlet
- presence of shale beds in the Moorehouse Member of the Onondaga Limestone which could impeded downward DNAPL movement
- likely decrease in fracture aperture due to lithostatic pressure
- extremely viscous nature of the coal tar

### *3.4.3.2 Potential for Ongoing Migration*

Continued migration of DNAPL at the site requires DNAPL to be present above *residual saturation* or “pooled”. Pooled DNAPL will enter a well screen that penetrates it and has the potential to be mobile. Residual DNAPL is comprised of blobs and ganglia that have been cut off and are disconnected from a continuous DNAPL body by water. Such DNAPL is not mobile and will not enter a well that is screened across it.

Pooled DNAPL in the overburden is possible; however, DNAPL has not entered overburden wells that screen across NAPL-containing intervals. DNAPL is pooled in the upper few feet of bedrock at MW-06-11R (hydraulically downgradient of the former holder). The best evidence that NAPL is moving is either when NAPL enters an established monitoring well that was previously NAPL-free, or when NAPL is observed repeatedly discharging to the land surface or to a body of surface water. There have been no clear cases at the site where NAPL was found in a well where previously there had been none. Sheens or NAPL-containing materials were identified in the deeper sediments beneath the Outlet. With the exception of two locations (SO-40 and SO-41), NAPL was not observed in the upper approximate 1-foot of sediments (consisting mostly of gravel and cobbles with sediment in interstitial spaces) in the Outlet. Trace amounts of NAPL were observed at approximately 0.5-feet bss at SO-40 and SO-41.

Recent coal-tar migration modeling performed by Kueper, et al. (2006) indicated that coal tar could migrate for significant periods of time (potentially decades) following its release. The physical properties of the MGP tar used in those simulations were similar to those of the tar measured for this site, except viscosity. The viscosity of the tar used by Kueper, et al. was considerable less than that measured for the sample analyzed from the site. Viscosity affects the rate at which the tar will move; the greater the viscosity, the slower the rate of tar movement. Based on this information, ongoing movement of tar at the site cannot be ruled out; however, the rate of movement is expected to be very slow, given its high viscosity.

## 3.5 Soil-Quality Evaluation

### 3.5.1 Overview

At MGP sites, two types of gas-production byproducts often account for the majority of affected soils: NAPLs (primarily MGP-tar DNAPL) and spent purifier wastes. Principal components of MGP tar that are routinely analyzed for at MGP sites are BTEX (which are VOCs) and PAHs (which are SVOCs). Analysis for these two classes of organic compounds is a useful way of identifying the nature and extent of soils affected by MGP tar. Because MGP tar contains these compounds, soil samples that contain MGP tar need not always be analyzed; rather it can be assumed that the levels of BTEX and PAHs will likely be above applicable Standards, Criteria, and Guidance (SCGs). The gas purification process commonly entailed running the unpurified gas through ground limestone or a mixture of wood chips/sawdust and iron filings. The spent purifier wastes were commonly disposed of on site or near the MGP and these wastes commonly contain cyanide in the form of stable iron cyanide complexes. The iron cyanide complexes are typically bright blue in color, making it easy to detect these materials in the field.

BTEX, PAHs and total cyanide are considered to be the constituents of concern (COCs) at most MGP sites; however, potentially cyanide-laden waste materials were not observed in any of the subsurface investigations completed during the RI, and only low levels of cyanide were detected in a few of the collected soil samples. None of the detected cyanide concentrations exceeded the Part 375 SCGs discussed below. As such, cyanide is not considered a COC at this site. To that end, the following two sets of criteria were used to evaluate the distribution of COCs in soil samples collected and observed during the RI:

- Soil samples having concentrations of COCs (BTEX and PAHs) exceeding the SCGs contained in NYSDEC's Part 375 Restricted Use Soil Cleanup Objectives (SCOs) for Protection of Public Health – Commercial Use as shown in Table 2. This criteria was chosen given the site setting (i.e., mixed industrial/commercial/ residential). Note that Table 2 also provides a comparison to Unrestricted Use SCOs presented in the NYSDEC's Part 375 regulations. This screening is provided for comparative purposes only based on a July 3, 2007 request of the NYSDEC.

- Soil samples observed to contain NAPL.

The following subsections describe the distribution of COCs in soil using these two criteria. Figure 13 shows the distribution of soil samples that meet the two criteria discussed above. Although not considered COCs at this site, for reasons noted below, a brief discussion of metals detected in soils is also presented.

Section 4 – Risk Evaluation evaluates the subsurface soil data with respect to potential risks posed to human health and the environment.

### 3.5.2 BTEX and PAHs in Subsurface Soil

During the investigations conducted at and near the site, 24 subsurface soil samples were collected and analyzed for BTEX and PAHs. These samples were collected in from borings and test pits generally from the lower approximately 3 to 5 feet of overburden material above bedrock. The samples were primarily collected from this interval because NAPL and/or sheen were most often observed in this interval.

Of the 24 collected subsurface samples, two samples exceeded the SCOs for BTEX compound(s) (at test pits TP-04-03 and TP-04-04) and 18 samples exceeded for PAHs. All but 5 of the samples that exceeded the SCOs also contained NAPL. Figure 13 shows the distribution of subsurface soil samples containing levels of BTEX and/or PAHs above SCOs and soil samples containing NAPL. Table 2 presents the analytical results for the subsurface soil samples.

The following table summarizes the statistics for samples containing concentrations of BTEX and PAHs:

**Table 3.6. Summary Statistics for Analytical Soil Samples**

| | **No. of Detections*** | **Minimum Detection** | **Maximum Detection** | **Location of Maximum Detection** | **Median Concentration** | **Average Concentration** | **Geometric Mean Concentration** |
|---|---|---|---|---|---|---|---|
| *Upland Soil Samples* | | | | | | | |
| Total BTEX | 19 | 0.0041 | 11,200 | TP-04-03 | 3.50 | 671 | 4.25 |
| Total PAHs | 23 | 0.047 | 11,200 | TP-06-15 | 180 | 1,680 | 177 |

**Notes:**
Concentrations given in milligrams per kilogram.
* At least one of the BTEX and/or PAH compounds were detected.

As expected, the highest concentrations of BTEX and PAHs are in soil samples which contain NAPL. As demonstrated in the table above, BTEX concentrations appear to be much lower than PAH concentrations.

Based on a review of Figure 13, and as discussed in the NAPL evaluation (above), NAPL in the overburden is present near a likely source (e.g., former holder) as well as several other areas of the site. The NAPL appears to be located predominately in the few feet of overburden that overlie bedrock. Most, if not all, of the soils containing NAPL and associated high BTEX/PAH concentrations are submerged below the water table.

### 3.5.3 Metals in Subsurface Soil

In addition to analyzing subsurface soils for VOCs, SVOCs and total cyanide, 19 upland subsurface soil samples were collected from test pits and borings for TAL metals analysis. The results for the metals analysis is shown in Table 2. As shown in this table, several metals were detected in the upland soil samples. Of the detected metals, arsenic, copper, mercury and lead were detected at concentrations exceeding the Part 375 SCOs (for Protection of Public Health-Commercial Use). These compounds are summarized below:

- Arsenic: Detected in 11 samples at a level above the SCO at a range of 19 to 73.9 milligrams per kilogram (mg/kg); these samples were collected on site and off site. No discernable distribution pattern is evident; therefore, the arsenic in these samples is not attributed to former MGP operations.

- Copper: Detected in soil samples at levels above the SCO from monitoring well locations MW-06-10, MW-06-11R and MW-06-13R. These wells are located on a property to the west of the site owned by Auburn Tank; therefore, the copper in these samples is not attributed to former MGP operations.

- Mercury: Detected in one sample (MW-06-13R) on Auburn Tank Property at a concentration above the SCO. Given the location of the sample, the mercury contained in the sample is not attributed to former MGP operations.

- Lead: Detected in one on-site sample (TP-04-03) at a concentration above the SCO; located immediately east of the collision shop in an area where car parts were/currently are stored. As such, the lead detected in this sample is not attributed to former MGP operations.

### 3.5.4 Forensic Evaluation of Soil and Sediment Data

ARCADIS conducted a chemical forensic evaluation of subsurface soil and deeper sediment samples collected during the RI. The purpose of the forensic evaluation was to assess the potential source of impacts observed in soil and sediment. The forensic evaluation focused on identifying potential sources for hydrocarbons and PAHs in the collected soil samples that exhibited potential petroleum impacts. In addition to the priority pollutant PAHs, information from the gas chromatograms (i.e., GC fingerprints) generated as part of the SVOC (PAH) analysis was used to help identify the general type of petroleum in the samples. In using the GC fingerprints as a tool in the evaluation, the presence of petroleum products in a sample is depicted by unresolved complex mixtures (UCMs) or humps in the GC fingerprint. Priority pollutant PAHs have limited usefulness in identifying sources of hydrocarbons in environmental samples. A more extensive list of PAHs is required to differentiate types and sources of hydrocarbons. However, a combination of priority pollutant PAH results, GC fingerprints, BTEX results and core field observations were used to evaluate potential sources of hydrocarbons in the selected site samples.

Based on the forensic evaluation the vast majority of visually impacted (with NAPL and/or sheen) samples collected on site and off site appeared to have a chemical composition resembling coal carbonization tar; however, several samples also had a signature consistent with a petroleum source. Samples having a petroleum composition are listed below:

- Outlet bank and deeper stream channel sediment samples at BO-6, BO-23, BO-29, BO-30, BO-34, SO-36, SO-38, SO-41, SO-45 and SO-50 (discussed in Section 3.8 – Owasco Outlet Sediment Evaluation)

- overburden upland soil samples TP-04-01, TP-04-02, TP-04-08, TP-04-12 and MW-04-04

These samples also contained varying degrees of an MGP-tar signature.

The presence of petroleum in these samples is evident in the signature of the gas chromatographs (GC fingerprints) from TPH-DRO analysis (TP samples) and Method 8270 analysis (BO, SO samples), as large UCM humps in the GC fingerprints. Using the 16 priority pollutant PAHs to differentiate petroleum PAHs from coal tar PAHs is generally inconclusive except when PAH concentrations are high (total PAH > 1,000 mg/kg), which usually indicates the dominance of coal tar PAHs. As a result, without forensic PAHs the GC fingerprints are invaluable to indicate the presence of petroleum in BO and SO samples. Estimates of petroleum PAHs are based on best professional judgment involving evaluation of the GC fingerprints of the samples and knowledge of expected petroleum PAHs with this type of petroleum (heavy oil) in the samples. Except for the samples with high PAH concentrations, more accurate estimates of petroleum PAHs in these samples require forensic PAH analysis of the samples.

Heavy oil-type petroleum (e.g., motor oil, No. 4 or 6 fuel oil) is present in varying relative degrees in the Outlet bank and deeper stream channel samples listed above. PAH concentrations are considerably high (total PAH > 10,000 mg/kg) in SO-36, SO-38, BO-34 and SO-41, which are located near/on the bank of the Auburn Tank Property, and indicate overwhelming dominance of coal tar PAHs compared to petroleum PAHs. The presence of a UCM in the heavy oil range of the GC fingerprint indicates the presence of petroleum, but the contribution of PAHs in these samples is small (petroleum PAHs are <1 percent). In samples SO-45 and SO-50, PAH concentrations are moderately high (total PAHs approximately 300 mg/kg) and indicate that the major source of PAHs is coal tar with trace petroleum PAHs (petroleum PAHs are <10 percent).

In the other samples, petroleum provides a more significant contribution. PAH concentrations are low (total PAH < 11 mg/kg) in BO-6, BO-23 and BO-30, and because of the UCM in the GC fingerprints, petroleum is probably the major source of PAHs in these samples with trace coal tar PAHs. These samples are scattered on the bank of the river between outfall OF16 and outfall OF20. PAH concentrations are low (total PAHs approximately 50 mg/kg) in BO-29 on the bank near OF20, and petroleum looks to be the major source of PAHs in the sample with probably more coal tar PAHs in this sample than the three samples with low total PAH concentrations.

From the GC fingerprints of the TPH-DRO analysis, petroleum was evident in only five upland soil samples. Soil samples TP-04-01, TP-04-02 and MW-04-03, which had TPAH concentrations ranging from 103 to 178 mg/kg, had at least minor contributions of petroleum PAHs in the samples. The petroleum in samples TP-04-08 and TP-04-12, which had higher TPAH concentrations of 837 mg/kg and 350 mg/kg, respectively, contributed no more than 10 percent petroleum PAHs in the samples. Coal tar PAHs dominated the priority pollutant PAHs in these soil samples.

#### 3.5.5 Surface Soil

Surface soils are often considered separately from other soils because surface soils pose a greater potential exposure risk to human health and the environment because they are more-readily accessible. For this reason, surface soil quality is discussed in Section 4 – *Risk Evaluation*.

### 3.6 Soil Vapor Evaluation

This section describes the results of the soil vapor investigation completed in February 2008. Laboratory analytical results for the soil vapor and ambient air samples were reported by Alpha, and NewFields Environmental Forensics Practice, LLC (NewFields) reviewed the data and performed a forensic evaluation. NewFields' forensic report, which includes the laboratory analytical data reports, is included as Appendix B. Soil vapor and ambient air analytical results for detected VOCs are also contained in Appendix B.

Several constituents were identified in the soil vapor and ambient air samples; however, New York State does not currently have standards, criteria, or guidance values (SCGs) for concentrations of compounds in subsurface vapors. NewFields evaluated the forensic hydrocarbon signatures of the samples and compared the compositional fingerprints and analyte ratios to develop conclusions regarding potential sources. Relevant findings of NewFields' forensic evaluation are summarized in the following bullets:

- Samples collected at locations SV-1 and SV-2 contain predominantly aromatic compounds with lower proportions of aliphatic paraffins, isoparaffins, and naphthenes. The high proportions of aromatics in these samples are consistent with a MGP-related source.

- The sample collected at location SV-3 contains predominantly paraffins and isoparaffins with lesser olefins and trace aromatics. This pattern is likely attributable to a petroleum product such as naphtha based gasoline or solvent.

- The sample collected at location SV-4 contains light molecular weight aromatics mixed with heavy molecular weight aliphatics. This pattern suggests the presence of middle to heavy petroleum with possible influences of MGP-related vapor.

- The samples collected at locations SV-5 and SV-6 contain similar mixtures of aliphatics with lesser amounts of aromatics attributable to gasoline and possibly other petroleum products.

- The sample collected at location SV-7 contains light molecular weight hydrocarbons with low proportions of aromatics, likely related to gasoline.

- The sample collected at location SV-8 contains a mixture of aliphatic and aromatic hydrocarbons with a slight enrichment of C6 to C8 aromatics. This pattern is attributable to petroleum with potential influence from MGP-related vapor.

- The ambient air samples exhibit mixtures of aliphatic and aromatic hydrocarbons consistent with vehicular traffic and fuel oil combustion.

### 3.6.1 Conclusions

A summary table of the soil vapor sampling results was provided to the NYSDEC and NYSDOH on April 10, 2008. A follow-up conference call was held with the NYSDEC and NYSDOH on May 2, 2008 to discuss the results. During the call, the NYSDOH indicated that the concentrations of VOCs detected in the soil vapor samples are at low levels within the typical range of an urban setting.

Based on review of the sampling data, MGP-related constituents do not appear to be migrating through soil vapor at elevated concentrations. The presence of MGP-related vapors at locations SV-1 and SV-2 is consistent with field observations, as coal tar was observed in subsurface soil at each of these locations. The remaining samples (SV-3 through SV-8) exhibit petroleum influences (primarily gasoline) and therefore the source of these vapors does not appear to be related to the former MGP. Soil vapor in samples SV-4 and SV-8 may also have a minor influence from the MGP. Based on discussions with the NYSDEC and NYSDOH, indoor air testing will not be required for the site or nearby area at this time. Accordingly, no further investigation concerning soil vapor quality is recommended at this time.

## 3.7 Groundwater-Quality Evaluation

This section discusses groundwater quality at and near the site, based on analytical results of groundwater samples collected at monitoring wells during the RI. For the same reasons as stated in the Soil Quality Evaluation (Section 3.5), this evaluation also focuses on the nature and extent of BTEX and PAHs, the COCs at this site. Analytical results are discussed in two groups, based on the screened intervals of the monitoring wells sampled:

1. Wells screened in the overburden.

2. Wells screened in the bedrock.

The analytical results presented in Table 3 are compared with NYSDEC TOGS 1.1.1 (June 1998) Class GA groundwater Standards and Guidance Values (referred to hereafter as “Class GA Standards or Guidance Values”). Note that NYSDEC has not determined groundwater quality Standards for certain inorganic and organic compounds that were analyzed during the site investigations, most significantly, some of the PAH compounds. Where available, NYSDEC Guidance Values are used for comparison. Because the quality of groundwater can change over time, the groundwater-quality evaluation is primarily focused on the most recent groundwater analytical results for individual monitoring wells. The distribution of groundwater samples with concentrations exceeding the Class GA Standards and Guidance Values is provided on Figure 14.

Section 4 – Risk Evaluation evaluates the groundwater data with respect to potential risks posed to human health and the environment.

### 3.7.1 Overburden Groundwater

This section describes the nature and extent of dissolved phase COCs in the overburden groundwater at and near the site based on the analytical results of the most recent samples (August 2006) collected from the 10 overburden groundwater monitoring wells (MW-04-01 through MW-06-10) and observations made during subsurface investigations (i.e., soil borings and test pits). The locations of the wells are shown on Figure 3.

As shown in Table 3 and on Figure 14, groundwater sampled from 5 of the 10 overburden monitoring wells contained concentrations of BTEX and/or PAH compounds at levels above Class GA Groundwater Standards or Guidance Values. These monitoring wells are MW-04-02, MW-04-03, MW-04-05, MW-05-07 and MW-05-08. As shown on Figure 12 and as discussed in Section 3.4, NAPL was encountered below the water table in numerous soil borings and test pits completed on site and west of the site (near the bank of the Outlet). As expected, and as also observed in soil samples, overburden groundwater appears to contain the highest levels of BTEX and PAHs in and near the areas observed to be most heavily impacted by NAPL (e.g., near MW-04-03 and MW-04-05). Unexpectedly, the groundwater sample collected from inside the former gas holder (i.e., MW-04-04) only contained trace levels of BTEX and PAHs.

Groundwater sampled from wells that are located upgradient from the site and/or upgradient of observed site-related impacts all contained low levels of COCs, or none at all. These wells are MW-04-01, MW-04-06, MW-06-09 and MW-06-10.

Based on this information, the extent of groundwater containing levels of MGP-related BTEX and/or PAHs above Standards and guidance values has been sufficiently delineated.

The following table summarizes the statistics for overburden groundwater samples containing concentrations of BTEX and PAHs:

**Table 3.7. Summary Statistics for Overburden Groundwater Samples**

| | No. of Detections* | Minimum Detection | Maximum Detection | Location of Maximum Detection | Median Concentration | Average Concentration | Geometric Mean Concentration |
|---|---|---|---|---|---|---|---|
| Total BTEX | 6 | 1.0 | 5,100 | MW-04-03 | 85.5 | 907 | 2,060 |
| Total PAHs | 9 | 1.0 | 5,100 | MW-04-03 | 11.0 | 681 | 1,680 |

**Notes:**
Statistics based on the most recent samples collected from individual wells.
Concentrations given in micrograms per liter.
* At least one of the BTEX and/or PAH compounds was detected.

### 3.7.2 Bedrock Groundwater

This section describes the nature and extent of dissolved phase COCs in the bedrock groundwater at and near the site based on the analytical results of the most recent samples (August 2006 or April 2007) collected from the 19 bedrock groundwater monitoring wells. The locations of the wells are shown on Figure 3.

As shown in Table 3 and on Figure 14, groundwater sampled from 6 of the 19 bedrock monitoring wells contained concentrations of COCs at levels above Class GA Groundwater Standards or Guidance Values. All six of these wells are shallow (R-series) wells, which are generally screened in the uppermost 20 to 25 feet of bedrock. When Figures 12 and 14 are compared, it becomes evident that the wells with the highest levels of BTEX and PAHs are those where NAPL was observed in bedrock fractures and return drilling water during drilling at intervals intersected by the well screens (i.e., MW-06-12R and MW-06-15R). The exception is monitoring well MW-06-13R where no impacts were observed during drilling in the screened interval (NAPL was observed in the bedrock approximately 10 feet above the screened interval).

Samples collected from the RI- and RD-series bedrock wells, which are screened deeper in the bedrock, contained no COCs above Class GA Standards or Guidance Values. These include monitoring well clusters MW-06-01RI/RD, MW-06-06RI/RD, MW-07-16RI/RD and MW-07-17RI/RD. It should be noted that MW-07-17RI/RD was installed immediately below the area of subsurface soil and shallow bedrock that appeared to be most heavily impacted with coal tar DNAPL, yet no COCs were detected above Class GA Standards or Guidance.

The following table summarizes the statistics for bedrock groundwater samples containing concentrations of BTEX and PAHs:

**Table 3.8. Summary Statistics for Bedrock Groundwater Samples**

| | No. of Detections* | Minimum Detection | Maximum Detection | Location of Maximum Detection | Median Concentration | Average Concentration | Geometric Mean Concentration |
|---|---|---|---|---|---|---|---|
| Total BTEX | 6 | 1.1 | 520 | MW-06-13R | 167 | 203 | 55.3 |
| Total PAHs | 10 | 0.3 | 2,000 | MW-06-15R | 3.20 | 246 | 9.01 |

**Notes:**
Statistics based on the most recent samples collected from individual wells.
Concentrations given in micrograms per liter.
* At least one of the BTEX and/or PAH compounds was detected.

Based on the above discussion, bedrock groundwater containing concentrations of COCs above Class GA Standards or Guidance Values is limited to the upper 25 feet of bedrock. The lateral extent to the north is bounded to the north by the Outlet; to the west by MW-06-14R; and to the south by wells MW-06-06R, MW-05-08R and MW-06-09R. To the east, the extent of groundwater containing COCs above Class GA Standards or Guidance Values appears to be generally bounded by well MW-05-02R, with one exception. Some DNAPL was identified in the shallow bedrock while drilling wells MW-06-01RI/RD. Although no well was screened across that interval, wells MW-06-01RI and RD were screened below this interval and samples collected from them were essentially clean. As noted in Section 3.4.3.1, the occurrence of DNAPL in the shallow bedrock at the MW-06-01RI/|RD location is interpreted to likely be a localized phenomenon.

Because groundwater flow in the fractured bedrock is complex and the interpretations of flow are less certain than in the overburden, the extents of groundwater that contains COCs above Class GA Standards or Guidance Values are also less certain.

### 3.8 Owasco Outlet Sediment Evaluation

This section summarizes the results of three phases of sediment investigation conducted in the Outlet in 2005 and 2006. These phases are:

1. Reconnaissance and Probing

2. Surficial Sediment Sampling

3. Bank Soil and Deeper Stream Chanel Sediment Investigations

The results of these phases of investigation are discussed below.

#### 3.8.1 Reconnaissance and Probing Results

In general, the bed of the Outlet near the site consists of unsorted sands and gravels with varying amounts of cobbles and boulders underlain by bedrock. Fine-grained sediment is limited to isolated pockets located around obstructions (e.g., behind and downstream from dams, behind debris located on the streambed, at the base of outfalls and behind bedrock shelves located on the streambed).

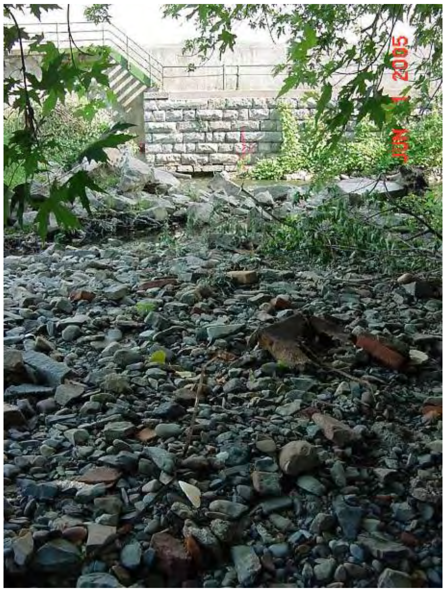

**Figure 3.3 – Photograph of Sediment Surface of Owasco Outlet Adjacent to Site During Dry Conditions. Notice prison wall on far side.**

The banks of Outlet in the site vicinity are relatively moderate to steeply sloped, moderately wooded and heavily vegetated. The wall of the Auburn Correctional Facility comprises the north bank of the Outlet from the State Street Bridge to 1,500 feet west of State Street. A floodplain area exists immediately adjacent to the site on the south bank of the Outlet (Figure 2). No evidence of MGP-related impacts was observed along the bank adjacent to the site during the initial reconnaissance and sediment probing phase of sediment investigations.

A total of 36 outfalls at 24 locations were identified during the reconnaissance and probing activities. Outfalls were designated as Outfalls (OF) 1 through 24 and included multiple outfalls at four locations that were designated as OF 9A through 9D, 10A through 10D (bridge abutment groundwater drains), OF 13A through 13D (prison walkway drains), and OF 22A through 22D (prison wall) (Figure 4). Of the 36 outfalls, effluent was observed (on February 9, 2005) flowing from 5 of the five outfalls listed below:

- **OF 1** —15-inch-diameter clay pipe on the left bank
- **OF 5** — 36-inch-diameter brick outfall on the left bank (possible storm sewer discharge)
- **OF 9A** — 4-inch steel pipe in right bridge abutment (State Street)
- **OF 12** — 14-inch clay pipe in left bank exiting prison walk wall
- **OF 16** — 36-inch steel pipe in the right bank (possible storm sewer discharge/sanitary sewer overflow)

**Figure 3.4 – Photograph of Outfall 16.**

Strong sewage-like odors were noticed at OF 5 and OF 16 during the reconnaissance, probing and sampling activities. A suspended solids plume, making the water appear grey, was also observed issuing from OF16.

As discussed in Section 2, systematic sediment probing was conducted along transects in the Outlet that were established beginning approximately 500 feet upstream from the site and ending approximately 500 feet downstream of the site (Figure 4). While probing along the transects, soft sediment thickness and water depths were recorded, the composition of the sediments were described, and the presence of odors, sheens, stains, NAPLs and/or anthropogenic materials (if any were present) were noted. In addition, sediment deposits, including those located between transects, were manually probed to determine their horizontal and vertical extent.

A summary of the probing results is provided below:

**Table 3.9. Summary of Probing Depths**

| Number of Stations | Average Stream Width (ft) | Average Probing Depth (ft) | Average Water Depth (ft) |
|---|---|---|---|
| **Entire Stream** | | | |
| 338 | 70.70 | 0.66 | 1.20 |
| **Upstream of Site (T1-T8)** | | | |
| 50 | 50.13 | 0.17 | 1.20 |
| **Adjacent to Site (T9-T26)** | | | |
| 135 | 81.44 | 0.32 | 1.01 |
| **Downstream from Site (T27-T46)** | | | |
| 153 | 69.20 | 0.42 | 1.37 |

Of the 338 sediment probes, a sheen was only observed at one station (T-33-1, located adjacent to the southern bank of the Outlet). No staining or NAPLs were observed at any of the 338 sediment probing stations. No observations of potentially MGP related impacts were observed in the 135 sediment probing stations located along transects T-9 through T-26 adjacent to the site. Anthropogenic materials were observed including brick (transect T-1), rip-rap (transects T-2, T-3, T-10, T-16 and T-17), and concrete (transect T-3). Observations made during sediment probing are summarized in Table 12.

### 3.8.2 Surficial Sediment Sampling Results

Information from the site reconnaissance and sediment probing was used to select locations for sampling surficial sediment (upper approximately 0.5-feet). Sampling locations were selected to include depositional areas and areas near outfall discharges to the Outlet. Specific sampling locations upstream, adjacent and downstream of the site were located where sediment deposits were observed and to target areas where potential site-related impacts would most likely be present.

A total of 20 sediment core samples were collected from the following four general depositional areas:

- ***Outfall pipe samples*** — OO-SED-6, OO-SED-13, OO-SED-16, OO-SED-17, OO-SED-19 and OO-SED-20

- ***Edge of water/bank samples*** — OO-SED-2, OO-SED-4, OO-SED-5, OO-SED-7 and OO-SED-10

- ***Flood plains (dry at time of sampling, but submerged at times of high water)*** — OO-SED-9, OO-SED-11, OO-SED-12, OO-SED-14 and OO-SED-15

- ***Depositional pockets near obstructions*** — OO-SED-1(wooden dam), OO-SED-3(concrete dam), OO-SED-8(steel pipe) and OO-SED-18(bedrock shelf)

No odors were observed, and no detectable PID headspace readings occurred during sediment sampling of the upper approximately 1-foot of sediment. Furthermore, no sheens, staining, or NAPLs were observed in the upper approximately 1 foot of sediment at any of the 20 sediment sampling locations. It should be noted that sampling interval from 1.0 to 1.2 feet bss from core OO-SED-10 exhibited a faint tar-like odor; this sample also had a PID headspace reading of 12.2 ppm. This location is just downstream of the site.

From the 20 cores (OO-SED-1 through OO-SED-20) collected, 12 surficial sediment samples (within the upper 6 inches) and one deeper sediment sample (from OO-SED-10) were analyzed for TOC, TCL VOCs, TCL SVOCs, TAL metals and total cyanide. The results of these analyses are provided in Tables 5 and 6, and total PAH concentrations are shown on Figure 18. The following summarizes data observations as they relate to delineation of potentially site-related impacts in the upper approximately 0.5-feet of sediment:

- The VOCs associated with MGP by-product wastes, as well as petroleum fuels, are typically BTEX compounds. BTEX compounds were detected in all samples except in sample OO-SED-20 (0-0.3 feet).

- The SVOCs most commonly associated with MGP by-product wastes are PAHs, and the heterocyclic compounds dibenzofuran and carbazole. PAHs are also associated with urban/industrial area runoff through accumulation of combustion by-products associated with soot, and particles/flakes of coal tar-based sealcoat that is commonly used in the repair and maintenance of asphalt-paved parking lots and roads. PAHs were observed in all the sediment samples. The highest PAH concentrations, 943 mg/kg total PAHs, were observed at OO-SED-16 which is located upstream and on the opposite bank of the site adjacent to OF 12. Relatively higher concentrations of PAHs were also observed in upstream locations OO-SED-19 (65 mg/kg total PAHs) and OO-SED-20 (133 mg/kg total PAHs). These same locations also had the highest concentrations of dibenzofuran and carbazole.

- Metals are not generally indicative of MGP by-product wastes. The relative distributions of metal concentrations follow no discernable patterns though distributions in sediments may be influenced by similar factors (e.g., high silt and clay content, and high TOC). Upstream sample OO-SED-16 (0 to 0.5 feet) had relatively higher concentrations of lead and zinc. Cyanide, which can be a constituent of some MGP by-product wastes, was not detected in any of the sediment samples.

A discussion of surficial sediment sampling results in relation to potential affects on human health and the environment is provided in Section 4.

### 3.8.3 Bank Soil and Deeper Stream Channel Sampling Results

Based on the observations made at sediment sampling location OO-SED-10 (i.e., faint tar-like odor) and observations made on land at nearby monitoring wells MW-04-05 and MW-06-11R, NYSEG conducted a more intensive investigation of the deeper sediments beneath the Outlet and along the bank of the Outlet adjacent to the site. This additional investigation was conducted approximately 1-year after the surficial sediment investigations discussed above. The results of these additional investigations revealed that coal tar was present at approximately 1 to 2 feet bss in the area of OO-SED-10 and beneath a larger area of the Outlet adjacent to the site. As discussed under the NAPL Evaluation (Section 3.4), the area where coal tar was observed below the Outlet extends from the former gas holder to approximately 320 feet downstream of the holder. Refer to Table 11 for a summary of the observations made while conducting the bank soil and deeper channel sediment sampling in the Outlet. The locations where NAPL was observed below the Outlet are shown on Figure 12.

During the bank soil and deeper stream channel investigations, 15 samples were collected from the banks and 8 samples were collected from the deeper sediments for analytical testing. These samples were collected from bank soil/deep sediment that contained NAPL, hardened tar and/or sheen. Additional samples were also collected to define the downstream extent of impacted deeper sediments. Table 1 lists the bank soil and deep sediment samples that were selected for analytical testing. Samples were analyzed for TCL VOCs and TCL SVOCs. Figure 18 shows the distribution of total PAHs in sediment samples and Table 5 presents the analytical results for the samples. The following table summarizes the statistics for samples containing concentrations of BTEX and PAHs:

**Table 3.10. Summary Statistics for Analytical Sediment Samples**

| | No. of Detections* | Minimum Detection | Maximum Detection | Location of Maximum Detection | Median Concentration | Average Concentration | Geometric Mean Concentration |
|---|---|---|---|---|---|---|---|
| *Owasco Outlet Deeper Sediment Samples* | | | | | | | |
| Total BTEX | 18 | 0.002 | 71 | SED-BO-10 | 9.90 | 16.8 | 2.08 |
| Total PAHs | 23 | 0.7 | 61,900 | SED-BO-10 | 13,100 | 18,500 | 1,770 |

**Notes:**
Concentrations given in milligrams per kilogram.
* At least one of the BTEX and/or PAH compounds was detected.

As expected, the highest concentrations of BTEX and PAHs are in sediment samples which contain NAPL. As demonstrated in the table above, BTEX concentrations appear to be much lower than PAH concentrations.

A discussion of bank soil and deeper sediment sampling results in relation to potential affects on human health and the environment is provided in Section 4.

**Figure 3.5 – Photograph of Owasco Outlet under High Flow Conditions. Picture taken from roughly the same vantage point as Figure 3.3.**

### 3.8.4 Sediment Investigations Summary

The streambed in the vicinity of the site contains unsorted sands and gravels with varying amounts of cobbles and boulders underlain by bedrock. Sediment in the Outlet near the site is sparse and limited to isolated pockets trapped by physical obstructions in the stream. The large number of outfalls and the use of dams to manage stream water levels creates a high energy waterway with a transient sediment environment, consistent with a streambed comprised of unsorted sands and gravels with varying amounts of cobbles and boulders underlain by bedrock.

Investigations of the Owasco Outlet sediments found the following:

- No ongoing coal tar seeps/sheens were observed along the southern bank or in the upper approximately 1-foot of sediments; however, trace amounts of tar were observed at approximately 0.5 feet below the sediment surface at two isolated locations, and hardened tar ledges were observed sporadically below the water level at the toe of the bank adjacent to the site.

- Coal tar was identified in deeper sediments (generally below 1 foot) below the Owasco Outlet. Tar was observed in the deeper sediments to approximately 250 feet west (downstream) of the site boundary.

- PAHs were present in surficial (upper 0.5 feet) sediment and bank soil samples. The highest concentrations of PAHs in surficial sediments and bank soils were in (1) surficial sediment samples collected upstream from the site at OO-SED-16, OO-SED-19, and OO-SED-20 (unrelated to the former MGP); (2) in bank soil samples located adjacent to the site at SED-BO-7, SED-BO-31, and SED-BO-34A (which are related to the MGP); and (3) surficial sediment sample SED-SO-41 located adjacent to the site (which is related to the MGP).

- With the exception of four samples, the majority of the surficial sediment and bank soil samples collected adjacent to and downstream from the site did not contain concentrations of total PAHs above 20 mg/kg. One surficial sediment sample (SED-SO-41) and three surficial bank soil samples (SED-BO-7, SED-BO-31, and SED-BO-34A) contained elevated levels of total PAHs.

- COCs in the form of BTEX and PAHs were present in the deeper sediments (below 1 foot) where coal tar was observed adjacent to and downstream of the site.

- Coal tar observed in the deeper sediments does not appear to be discharging upward and into the Owasco Outlet. Given the physical properties of the tar (i.e., denser than water and extremely viscous) and the lack of vertical hydraulic gradient between the coarse sediments and the water in the Outlet, this tar is expected to be largely or wholly immobile; however, physical forces, such as scouring, could potentially mobilize the tar.

The investigations of Outlet sediments did not find elevated MGP-related BTEX and/or PAHs in the upper approximately 6 inches of sediment adjacent to or downgradient from the site. Elevated PAH concentrations were measured in sediment samples at three locations upstream of the site, where surface land use includes parking lots and asphalt paved roads, which may account for the higher concentrations of PAHs from these samples. With total PAH concentrations in upstream outfall pipe sediments at 65 mg/kg, 133 mg/kg and 943 mg/kg, it is evident that PAHs from sources unrelated to the MGP are providing a significant ongoing contribution to the PAH loading of the Owasco Outlet sediments.

DNAPL (extremely viscous coal tar) has been observed in the deeper sediments and only a trace amount of DNAPL was observed at two isolated locations in the upper approximately 1-foot of sediments. As previously mentioned, the hydraulic gradients beneath the Outlet combined with the physical characteristics of the DNAPL (denser than water and extremely viscous) are not favorable for upward DNAPL migration to the surficial sediments; however, it should be recognized that physical forces, such as scouring caused by the waters of the Outlet, could potentially mobilize NAPL by eroding the coarse streambed (i.e., gravel, cobbles, boulders) that armors the base of the Outlet, thus exposing the deeper NAPL-impacted sediments. Although there is almost no evidence that this is occurring, one deeper sediment sample (SO-50) collected at the nearest downstream dam did contain concentrations of elevated PAHs (229 mg/kg) having a chemical signature consistent with the coal tar and petroleum impacts. This sample was collected from an interval at approximately 1.5 feet bss that exhibited a degraded petroleum-like odor but no sheen or NAPL.

NYSDEC, NYSEG, and ARCADIS held a conference call on March 24, 2008 to discuss the results of the Owasco Outlet sediment investigations that were presented in the July 2007 Draft RI Report. During that call, NYSDEC and NYSEG agreed that unrelated sources of elevated PAHs exist upstream of the site and that it would be difficult to definitively distinguish between site-related PAHs and those derived from other sources. As such, NYSDEC concluded that the extent of MGP-related NAPL and PAH impacts to the outlet has been sufficiently delineated for the purposes of the RI.

### 3.9 Owasco Outlet Surface-Water Evaluation

This section summarizes the results of surface-water sampling conducted in the Outlet on August 26, 2005. Surface-water samples were collected from 10 locations (Figure 4). These samples were analyzed for TCL VOCs, TCL SVOCs, TAL metals and total cyanide. The analytical results are presented in Table 7. As shown in Table 7, none of the surface-water samples contained MGP-related constituents (BTEX, PAHs and total cyanide). Surface-water results in relation to potential affects on human health and the environment are discussed in Section 4.

# 4. Fish and Wildlife Resource Impact Analysis

## 4.1 Introduction

This section presents the Fish and Wildlife Resource Impact Analysis (FWRIA) that was conducted as part of the RI. This FWRIA was conducted in accordance with NYSDEC guidance documents entitled *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (NYSDEC, 1994) and *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2002a). The objectives of the FWRIA were to identify the fish and wildlife resources that exist on and in the vicinity of the site, and to evaluate the potential for exposure of these resources to site-related constituents in environmental media. Results of the FWRIA are generally used to aid in remedial decision-making.

In accordance with NYSDEC (1994; 2002a) guidance, FWRIAs are conducted in a step-wise manner. Specifically, this FWRIA included Part 1 (Resource Characterization), which consists of the following five steps:

1) identification of fish and wildlife resources

2) identification of contaminant migration pathways and fish and wildlife exposure pathways

3) description of resources on site and within 0.5-mile radius of the site

4) identification of contaminants of ecological concern (i.e., comparison of environmental data to SCGs

5) conclusions regarding the actual or potential adverse impacts to fish and wildlife resources

If no resources or exposure pathways are present, impact to resources are considered minimal and no additional analyses are required.

### 4.1.1 Ecological Characterization

Topographic maps and aerial photographs were reviewed to identify the general physical and ecological features of the site and surrounding areas. A site visit was conducted to aid in the development of a covertype map for the site and surrounding areas within a 0.5-mile radius of the site. The covertype map (Figure 15) classifies these areas into ecological communities based on physical characteristics and vegetation (e.g., industrial/commercial/residential, urban vacant lot). As part of the ecological characterization, natural resources (i.e., rivers, lakes, wetlands) located within a 2-mile radius of the site were also identified. This information assisted in evaluating wildlife habitat value and human resource value for the site and surrounding areas.

#### *4.1.1.1 Vegetative Covertypes*

The western portion of the site is characterized by a gravel lot. An upland forest exists along the southern site boundary, adjacent to the railroad right-of-way. Lowland forest and the Outlet border the site to the north. Land use in the site vicinity is primarily industrial, commercial and residential. The Auburn Correctional Facility borders the Outlet north of the site. Ecological communities within a 0.5-mile radius of the site were generally classified according to the NYSDEC (2002b) document entitled *Ecological Communities of New York State, Second Edition*. Five major covertypes were identified within a 0.5-mile radius of the site, including:

1) industrial/commercial/residential

2) urban vacant lot

3) upland forest

4) lowland forest

5) Outlet

A map depicting the spatial distribution of these covertypes is presented on Figure 15. Individual covertypes are described below.

**Industrial/Commercial/Residential Covertype —** The surrounding areas to the north, south, east and west are characterized as an industrial/commercial/residential covertype (Figure 15). This covertype generally consists of industrial buildings, commercial businesses, single-family dwellings, apartment buildings, paved and gravel lots, public roads, and limited amounts of cultivated vegetation (i.e., lawns, ornamental trees and shrubs).

**Urban Vacant Lot — ** The urban vacant lot covertype is generally defined as an open site in a developed, urban area with large areas of exposed soil, sparse vegetation and often with rubble or other debris (NYSDEC, 2002b). The western half of the site is primarily characterized as urban vacant lot with a gravel substrate. There were abandoned vehicles as well as the former collision shop within this covertype.

**Upland Forest Covertype —** The upland forest covertype is characterized by a mixture of mature hardwood trees and herbaceous vegetation. This covertype exists along the southern boundary of the site, adjacent to the railroad right-of-way (Figure 15). The upland forest covertype is separated from the lowland forest covertype by a retaining wall and an elevation change of approximately 5 feet. Dominant tree species within this covertype include box elder (*Acer negundo*), glossy buckthorn (*Rhamnus frangula*), sugar maple (*Acer saccharum*) and staghorn sumac (*Rhus typhina*). Dominant herbaceous species include knotweed (*Polygonum cuspidatum*), black mustard (*Brassica nigra*), poison ivy (*Rhus radicans*), goldenrod (*Solidago* spp.) and false nettle (*Boehmaria cylindrica*). Some debris was located within this covertype, including concrete pipes, vehicle parts and plastic drums.

**Lowland Forest Covertype —** The lowland forest covertype is characterized by a mixture of mature hardwood trees and herbaceous vegetation. This covertype exists along the southern shore of the Outlet (Figure 15) and is approximately 5 feet lower in elevation as compared to the adjacent upland forest covertype. Dominant tree species within this covertype include eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*) and willow (*Salix* spp.). Dominant herbaceous vegetation within this covertype includes poison ivy, ground ivy (*Glechoma hederacea*) and violet (*Viola* spp.). This area appeared to be inundated on a seasonal basis (i.e., presence of drift lines).

**Outlet Covertype —** The Owasco Lake Outlet flows out of Owasco Lake. The Outlet flows in a western direction past the site, and consists of a relatively shallow, moderate-flowing channel characterized by a rocky substrate with pool and riffle sections. There was a small backwater area associated with the Outlet north of the site, located adjacent to the lowland forest. Rock bass (*Ambloplites rupestris*), white suckers (*Catostomus commersoni*) and zebra mussels (*Dreissena polymorpha*) were observed within the Outlet.

The backwater area of the Outlet was characterized by box elder, jewelweed (*Impatiens pallida*), goldenrod, milkweed (*Asclepias* spp.), tartarian honeysuckle

(*Lonicera tatarica*) and red osier dogwood (*Cornus stolonifera*). Fill material (e.g., rocks, concrete, metal) was present along the western border of the backwater area.

#### *4.1.1.2 Surface Waters*

The main surface-water body in the site vicinity is the Outlet (to the north). The NYSDEC best usage classification for this stretch of the Outlet is Class C. According to New York Regulations Title 6 §701.8, the best usage of Class C streams is fishing. These streams are suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. These waters are suitable for fish propagation and survival.

#### *4.1.1.3 Wetlands*

According to the NYSDEC Freshwater Wetlands Map for the Auburn quadrangle, there are two state wetlands within a 2-mile radius of the site (Figure 16). State wetland A-7 is located approximately 1.5 miles north of the site and state wetland A-9 is located approximately 2 miles south of the site. Neither of these wetlands appear to be hydraulically connected to the site or the Outlet.

The National Wetlands Inventory (NWI) Map for the Binghamton quadrangle identifies numerous wetlands within a 2-mile radius of the site (Figure 17), including palustrine open water, emergent, scrub-shrub and forested wetlands. The NWI wetland maps are generated by the U.S. Fish and Wildlife Service (USFWS) using stereoscopic analysis of high-altitude aerial photographs, and the majority of the mapped wetlands are not field verified. None of the mapped wetlands are located close to the site, and as such, are expected to be hydraulically isolated from the site.

### 4.1.2 Fish and Wildlife Resources

Due to the surrounding industrial/commercial/residential land use within the city of Auburn, wildlife usage of the site is expected to be minimal. In general, the wildlife species that may use the site are likely common species typical of urbanized and disturbed areas (e.g., small mammals, passerine birds). Table 13 lists biota that were observed in the site vicinity, as well as typical fish and wildlife species that may inhabit the site and/or surrounding areas based on the ecological communities present.

**Industrial/Commercial/Residential Covertype —** Surrounding land use is classified as an industrial/commercial/residential covertype (Figure 15). Wildlife species that use these covertypes generally consist of species that are capable of use habitats created by urban landscapes. Typical wildlife species that may use industrial/commercial/ residential areas include, but are not limited to, gray squirrel, mice, rock dove and house sparrow. The western portion of the site consists of a gravel lot and an abandoned commercial building. The eastern portion of the site consists of an upland forest, which is characterized by mature trees and herbaceous groundcover. The upland forest may offer wildlife habitat that would be conducive to foraging, nesting and/or shelter.

**Urban Vacant Lot Covertype —** The urban vacant lot covertype is present in the western portion of the site, and is characterized by a gravel lot and the former auto collision shop, currently used for storage. Due to the general lack of vegetation within this covertype, the urban vacant lot does not provide wildlife habitat that would be conducive to foraging, nesting and/or cover.

**Upland Forest Covertype —** The upland forest covertype is characterized by a mixture of mature hardwood trees and herbaceous vegetation. This covertype exists along the southern site boundary, adjacent to the railroad right-of-way. The upland forest most likely provides some limited habitat for passerine birds and small mammals. Large mammals such as whitetail deer and red fox most likely do not use this covertype due to the surrounding industrial/commercial/residential land use.

**Lowland Forest Covertype —** The lowland forest covertype is characterized by a mixture of mature hardwood trees and herbaceous vegetation. This covertype exists along the southern boundary of the Outlet. The lowland forest most likely provides some limited habitat for passerine and piscivorous birds, as well as small mammals. Large mammals most likely do not use this covertype due to the surrounding industrial/ commercial/residential land use.

**Outlet Covertype —** The Outlet is located adjacent to the north edge of the site. Fish community assemblages depend on several factors such as substrate type, stream velocity and presence of macrophytes. The portion of the Outlet adjacent to the site is characterized by moderate flow and pool, riffle and backwater sections. Fishes observed during the site visit included rock bass and white sucker; other fish species are likely present as well (e.g., pumpkinseed, bluegill).

#### *4.1.2.1 Threatened/Endangered Species and Significant Habitat*

Information requests for threatened/endangered species information were sent to both the USFWS and NYSDEC Natural Heritage Program to assist in evaluating sensitive species or habitats in the site vicinity. According to the NYSDEC (2006a), there are no recorded occurrences of threatened/endangered plant or animal species or significant habitat on site or in the immediate site vicinity. Likewise, the USFWS (2006) responded that there are no federally listed or proposed threatened or endangered species on site or in the immediate site vicinity.

#### *4.1.2.2 Observations of Stress*

During the site visit in May 2006, no evidence of stressed vegetation or negative impacts on wildlife was observed for the site or surrounding areas.

### 4.1.3 Fish and Wildlife Resources Values

As part of the FWRIA, a qualitative assessment was conducted to determine the general ability of the area to support fish and wildlife. The following subsections provide a qualitative evaluation of the value of the identified covertypes to wildlife and the value of these wildlife resources to humans.

#### *4.1.3.1 Value of Habitat to Associated Fauna*

The qualitative assessment of habitat value is based on field observations, research and professional judgment.

The site is described as a mixture of urban vacant lot and upland forest covertypes. The western portion of the site consists of a gravel lot with minimal vegetation, while the eastern portion of the site is characterized as an upland forest. Due to the general lack of vegetation within the urban vacant lot, this covertype is concluded to have no habitat value for wildlife. Similarly, the surrounding areas that are classified as industrial/ commercial/residential covertypes do not provide adequate food, shelter and/or nesting areas for most species.

The upland forest in the eastern portion of the site is characterized by mature hardwood trees and herbaceous groundcover, which most likely offer wildlife habitat to passerine birds, and small and arboreal mammals. This covertype is relatively small compared to surrounding covertypes, and the surrounding industrial/commercial/

residential land use may limit wildlife use of the area. However, the upland forest may serve as a travel corridor for local fauna, and as such, provides moderate value to wildlife.

The lowland forest covertype located along the Outlet to the north of the site most likely offers wildlife habitat for foraging, nesting and/or cover. Although wildlife use of this covertype is most likely limited due to the surrounding industrial/commercial/residential land use, the lowland forest may also be used as a travel corridor for local fauna, and as such, provides moderate value to wildlife.

The Outlet is located along the northern edge of the site. The substrate within the portion of the channel adjacent to the site consists of rocks and cobbles. The Outlet likely supports a variety of aquatic organisms, and may provide habitat for birds and semi-aquatic mammal species. Therefore, the Outlet provides moderate wildlife habitat value. Mallards were observed within the backwater area of the Outlet at the time of the site visit. However, due to the surrounding land use, use of the Outlet by terrestrial and semi-aquatic fauna may be limited.

#### *4.1.3.2 Value of Resources to Humans*

The site itself is relatively small and does not offer any natural resources that would encourage recreational use of the site. The upland and lowland forests are located within the city of Auburn and are most likely only used (if at all) for wildlife observation. Because these forests are within city limits, hunting is prohibited in these areas. The Outlet may be used for fishing and/or wildlife viewing, but may be too shallow for other human activities such as boating and swimming. These uses are likely to remain consistent in the future, and are not likely to be affected by activities or conditions at the site.

### 4.1.4 Fish and Wildlife Regulatory Criteria

The following New York State laws, rules, regulations and criteria are relevant to this FWRIA:

- Title 6 of the New York Codes, Rules and Regulations (6 NYCRR)
  - Part 608, Use and Protection of Waters
  - Part 663, Freshwater Wetlands Permit Requirements

  - Part 664, Freshwater Wetlands Maps and Classifications
  - Part 701, Classifications — Surface Waters and Groundwaters
  - Part 702, Derivation and Use of Standards and Guidance Values
  - Part 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards
  - Part 800 ff., Classes and Standards of Quality and Purity Assigned to Fresh Surface and Tidal Salt Waters
  - Part 898, Finger Lakes Drainage Basin

- Environmental Conservation Law — Chapter 43-B of the Consolidated Laws
  - Article 11, Fish and Wildlife:
    - §11-0503, Polluting Streams Prohibited
    - §11-0535, Endangered and Threatened Species
  - Article 15, Water Resources: Title 5, Protection of Water
  - Article 24, Freshwater Wetlands

- Criteria and Guidelines
  - NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1., *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (NYSDEC, 1998)
  - NYSDEC *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999)
  - Draft 6 NYCRR Part 375 Soil Cleanup Objectives for the protection of ecological resources (NYSDEC, 2006b)

### 4.1.5 Impact Assessment

The FWRIA includes an impact assessment to determine the impacts, if any, on fish and wildlife resources. This impact assessment includes a pathway analysis, which determines if there are complete or potentially complete ecological exposure pathways to site-related constituents, and a criteria-specific analysis, which compares site data to SCGs.

#### *4.1.5.1 Pathway Analysis*

The objective of the pathway analysis is to evaluate potential pathways by which fish and wildlife receptors may be exposed to site-related constituents in environmental media. A complete exposure pathway consists of the following five elements:

1) contaminant source

2) contaminant release and transport mechanisms

3) potential point of exposure

4) viable route of exposure

5) receptor population

If any one of these elements is missing, then the pathway is not considered to be complete and exposure cannot occur, irrespective of chemical concentrations in environmental media. Potential media of interest associated with the site include surface soils, subsurface soils and groundwater. Because the site is located close to the Outlet, sediment and surface water within the Outlet are also potential media of interest. Potential exposure pathways associated with these media are discussed below.

**Surface Soils**

The western portion of the site consists of a gravel lot and a former automotive collision shop that is currently owned by the NYSEG. There is a swath of natural habitat (i.e., upland forest) present along the southern site boundary, and a lowland forest exists along the Outlet to the north, beyond the retaining wall that forms the northern site boundary. Although the surrounding industrial/commercial/residential land use most likely limits wildlife use of these areas, they may be used by common wildlife species such as passerine birds and small mammals. Therefore, exposure to surface soils within this area is a potentially complete exposure pathway.

#### Subsurface Soils

As previously stated, the site is primarily characterized by a gravel lot and upland forest. The gravel lot provides no value to wildlife due to its general lack of natural vegetation, although the upland forest may provide foraging, nesting and/or cover to local wildlife. The NYSDEC (2002a) DER-10 guidance states that surface soil is defined as a depth of 0 to 6 inches below ground for a FWRIA. Although most wildlife are generally not exposed to subsurface soils (soils deeper than 0.5 feet bgs) during normal activities such as foraging and nesting, subsurface soils may be accessible to burrowing mammals and invertebrates.

#### Sediment and Surface Water

The portion of the Outlet adjacent to the site is most likely inhabited by several fish species and benthic invertebrates. Mallards were observed in the backwater area of the Outlet during the May 2006 site visit. The Outlet may also be used by a variety of semiaquatic and terrestrial fauna. The bioturbation zone of sediments (i.e., the depth of sediment to which ecological receptors may be exposed) is generally considered to include the top 6 inches. However, exposure to both surficial (0 to 0.5 feet) and subsurface (deeper than 0.5 ft) sediments within the Outlet is considered to be a potentially complete exposure pathway. Likewise, exposure to surface waters within the Outlet is a potentially complete exposure pathway.

As part of the RI, samples of non-native material (e.g., ledges of hardened tar) present sporadically on the bank of the Outlet were collected and submitted for chemical analyses (i.e., samples BO-7, BO-31, BO-32, BO-33 and BO-34). This material was solid in nature, generally covered in algae or other plant material, and was relatively inaccessible because it was buried within the bank itself. Although this material was present in only a few select locations along the Outlet bank, it is evaluated along with the sediment data (see Section 4.1.5.2) as requested by NYSDEC.

#### Groundwater

Groundwater investigations indicate that depth to groundwater ranges from approximately 3 to 10 feet bgs. There are no groundwater seeps identified at the site, and exposure of wildlife to groundwater would only occur if an animal were to burrow down to the water table, which is unlikely given the depth to groundwater. Based on these factors, exposure to groundwater is not considered to be a complete exposure pathway.

#### *4.1.5.2 Criteria-Specific Analysis*

The objective of the criteria-specific analysis is to assess potential ecological impact for those media that present potentially complete exposure pathways, by comparing site data to screening criteria.

**Surface Soils**

Ten surface soil samples (0 to 0.2 feet) were collected and analyzed for SVOCs, VOCs and inorganics (samples SS-1 through SS-10). Surface soil sampling locations are shown on Figure 2. These surface soil samples were collected on site (i.e., within the site boundary) or in the immediate site vicinity (e.g., within the railroad right-of-way). Specifically, samples SS-1 through SS-5 were collected off site (i.e., outside of the site boundary) and samples SS-7 through SS-10 were collected on site (i.e., within the site boundary). Surface soil data were compared to 6 NYCRR Part 375 SCOs for the Protection of Ecological Resources (NYSDEC, 2006b). Table 14 presents the comparison of surface soils data to ecological SCOs.

No VOCs were detected in the surface soil samples. Several PAHs were detected, but only one sample (SS-6) had exceedances of SCOs. Specifically, benzo(a)pyrene and dibenz(a,h)anthracene slightly exceeded their associated ecological SCOs in sample SS-6, which was collected from the gravel lot, just north of the former collision shop. Arsenic, copper, lead, mercury and zinc exceeded their associated SCOs in several surface soil samples collected on site. However, the majority of these exceedances were generally less than two-fold greater than the SCOs. Further, lead, mercury and zinc concentrations in samples collected from the upland forested area of the site (SS-8, SS-9 and SS-10) only slightly exceeded their respective SCOs; all other metal concentrations were below SCOs. Although off-site surface soil samples had detections of SVOCs (PAHs) and metals, none of the detected concentrations were greater than the ecological SCOs.

## Subsurface Soils

Although subsurface soils are not anticipated to be a source of significant exposure, subsurface soils data were compared to NYSDEC (2006b) Part 375 SCOs for the Protection of Ecological Resources. Specifically, subsurface soil samples that were collected from the upland and lowland forested areas were compared to SCOs (see Table 15). However, it should be noted that these samples were collected at depths that would not likely be accessible to ecological receptors (i.e., these soils are deeper than typical burrowing depths and in most instances, below the groundwater table, which ranges from 3 to 10 feet across the site). Table 15 presents the comparison of subsurface soils data to ecological SCOs. Figure 2 shows the soil sampling locations.

Benzene, toluene, and xylene were the only VOCs detected in subsurface soils at concentrations greater than their respective SCOs. Benzene only exceeded its SCO in two samples (TP-04-03 and TP-04-04), and toluene only exceeded its SCO in three samples (TP-04-03, TP-04-04, and MW-04-05). Of the 24 samples analyzed for xylenes, 13 exceeded the SCO. PAHs exceeded their respective SCOs in the majority of the samples. Several samples contained concentrations of arsenic, chromium, copper, lead, manganese, mercury, nickel, selenium, and/or zinc greater than SCOs.

### Sediment

Twelve surficial sediment samples (0 to 0.5 feet) were collected from the portion of the Outlet located adjacent to the site (including upstream and downstream samples), and analyzed for VOCs, SVOCs, inorganics and total organic carbon (TOC). Sediment sampling locations are shown on Figure 4. Deeper sediment samples (denoted by a prefix of SED-SO) and non-native material (denoted by a prefix of SED-BO) were also collected from the channel and bank, respectively, and analyzed for VOCs and SVOCs.

Sediment data were compared to benthic aquatic life chronic and acute toxicity criteria as presented in the NYSDEC's *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999). Total PAH sediment data were compared to the NYSDEC's sediment screening criteria of 4 mg/kg for total PAHs. Tables 5 and 6 present the comparison of VOC, SVOC and metals data, respectively, to sediment screening criteria. Consistent with NYSDEC (1999) guidance, organic screening criteria presented in micrograms per gram (µg/g) organic carbon were adjusted on a sample-specific basis for TOC. Metals data for surficial sediment samples were compared to Lowest Effects Levels (LELs) and Severe Effects Levels (SELs) from the NYSDEC (1999).

*Surficial Sediment*

Several VOCs, SVOCs and inorganics were detected in sediment samples. No VOCs exceeded their associated sediment criteria in surficial sediment samples. Two PAHs [benzo(a)anthracene and fluorene] and several metals (antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver and zinc) exceeded their associated sediment criteria in surficial sediment samples collected adjacent to or downstream of the site. However, several PAHs (2-methylnaphthalene, acenaphthene, anthracene, benzo[a]anthracene, fluoranthene, fluorene, naphthalene and phenanthrene) and several metals (cadmium, copper, iron, lead, mercury, nickel and zinc) exceeded their associated sediment criteria in surficial sediment samples collected upstream of the site (OO-SED-16, OO-SED-19 and OO-SED-20). The distribution of total PAHs detected in sediment is shown on Figure 18.

Benzo(a)anthracene and fluorene were the only PAHs that exceeded their associated NYSDEC acute sediment criteria in the surficial sediment samples, but only exceeded these values in one sample (OO-SED-16), which was collected upstream of the site. Total PAH concentrations exceeded the sediment screening criterion of 4 mg/kg in all surficial sediment samples (including upstream), except OO-SED-15. Copper, lead, nickel and zinc exceeded their associated SELs in several surficial sediment samples, including the upstream sediment samples (OO-SED-16, OO-SED-19 and OO-SED-20). The fact that several PAHs and metals exceeded their associated chronic and/or acute sediment criteria in upstream surficial sediment samples indicates that these constituents are likely associated with background sources and not the MGP.

*Subsurface Sediment and Bank Material*

BTEX exceeded sediment criteria in several deeper sediment samples (SED-SO-36, -38, -41, and -43) and bank samples (SED-BO- 7, -10, -17, -19, and -31). Several PAHs (acenaphthene, anthracene, benzo[a]anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) exceeded associated criteria in the subsurface sediment and bank samples. Total PAHs exceeded the NYSDEC's sediment screening criterion (4 mg/kg) in all but two of the subsurface and bank samples (SED-BO-11 and SED-SO-46). The distribution of total PAHs detected in sediment is shown on Figure 18.

**Surface Water**

Ten surface-water samples were collected from the portion of the Outlet near the site. Four were collected upstream from the site, two were collected adjacent to the site and four were collected downstream from the site. Surface-water sampling locations are shown on Figure 4. Surface-water samples were analyzed for VOCs, SVOCs and inorganics. Surface-water data were compared to NYSDEC Ambient Water Quality Standards and Guidance Values presented in NYSDEC (1998) TOGS 1.1.1. Inorganic surface-water SCGs were adjusted as appropriate for site-specific hardness. Table 3 compares surface-water data to these SCGs.

None of the constituents detected in surface water are typically associated with MGPs, and as such, they are not related to the site. SVOCs were nondetect in all of the surface-water samples, and VOCs were only detected in four of the samples (specifically, the upstream samples) at relatively low concentrations. Several metals were detected in the surface-water samples, but only mercury was present at concentrations above its associated SCG in surface-water samples collected adjacent to or downstream of the site (mercury exceedances were found in samples SW-OOSED07 and SW-OOSED10). Aluminum and copper exceeded their associated SCGs in three and two of the upstream surface-water samples, respectively.

### 4.1.6 Summary and Conclusions

The FWRIA for the site was conducted in accordance with NYSDEC (1994; 2002a) guidance. The site is a former MGP site characterized by a gravel lot and a former auto collision shop building (now used for storage), which provide no value to wildlife. The eastern portion of the site consists of an upland forest, which may provide limited wildlife habitat for foraging, nesting and/or cover. Exposures to on-site surface and subsurface soils, and sediments and surface water in the Outlet adjacent to the site, are identified as potentially complete exposure pathways.

Two PAHs (benzo[a]pyrene and dibenz[a,h]anthracene) exceeded their associated SCOs in one surface soil sample (SS-6), but this sample was collected from the gravel lot so it does not constitute a significant ecological exposure pathway. Arsenic, copper, lead, mercury and zinc exceeded their associated SCOs in several surface soil samples. However, the majority of these exceedances were generally less than two-fold greater than the SCOs and occurred in surface soil samples collected from the gravel lot. Lead, mercury and zinc were the only constituents in surface soil samples collected from the upland forest (SS-8, SS-9 and SS-10) that slightly exceeded their

SCOs. The limited amount of natural habitat on site and the surrounding land uses likely limit wildlife use of the site. Therefore, ecological exposures to surface soil are not considered to be significant.

The majority of the subsurface soils data were from samples collected deeper than would be considered accessible to ecological receptors. Further, the majority of the subsurface soil samples are deeper than the groundwater table, which ranges from 3 to 10 feet across the site. Benzene, toluene, and xylene were the only VOCs detected in subsurface soils at concentrations greater than their respective SCOs. Benzene only exceeded its SCO in two samples (TP-04-03 and TP-04-04), and toluene only exceeded its SCO in three samples (TP-04-03, TP-04-04, and MW-04-05). Xylenes and PAHs exceeded SCOs in several subsurface soil samples. Several samples contained concentrations of arsenic, chromium, copper, lead, manganese, mercury, nickel, selenium, and/or zinc above SCOs.

Two PAHs and several metals exceeded NYSDEC chronic criteria in surficial sediment samples collected from the portion of the Outlet located adjacent to or downstream of the site. However, several PAHs and metals also exceeded criteria in surficial sediment samples collected upstream of the site. Benzo(a)anthracene and fluorene were the only PAHs that exceeded NYSDEC acute sediment criteria, and only exceeded these values in one surficial sample (OO-SED-16), which was collected upstream of the site. Total PAH concentrations in all surficial samples (including upstream) except OO-SED-15 exceeded the chronic criterion of 4 mg/kg. Copper, lead, nickel and zinc exceeded their associated SELs in several surficial sediment samples. Copper and lead also exceeded their SELs in surficial samples collected upstream of the site (OO-SED-19 and OO-SED-20, respectively). Generally speaking, nickel and zinc concentrations in the upstream surficial sediment samples were not significantly different from downstream concentrations. The presence of PAHs and metals in the upstream surficial sediment samples indicates that these constituents may not be site related.

Several deeper sediment samples (SED-SO-36, -38, -41, and -43) and bank samples (SED-BO- 7, -10, -17, -19, and -31) contained BTEX concentrations above criteria. Several PAHs (acenaphthene, anthracene, benzo[a]anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene) exceeded criteria in the subsurface sediment and bank samples. Total PAHs exceeded the chronic criterion (4 mg/kg) in all but two of the subsurface and bank samples (SED-BO-11 and SED-SO-46).

Because the majority of the detected organics found in surficial sediment samples had limited exceedances of chronic screening criteria and most were less than acute screening criteria, these constituents most likely do not present a significant risk to ecological receptors that may be exposed to surficial sediments within the Outlet. Although several metals were present in Outlet surficial sediments (upstream, adjacent to and downstream of the site) at concentrations exceeding their screening criteria, these constituents do not present a site-related risk to ecological receptors because these metals are generally not indicative of MGP by-products. Although PAH concentrations in subsurface sediments and bank samples exceeded screening criteria, these media most likely are not significant ecological exposure pathways due to their limited accessibility to local fauna.

SVOCs were non-detect in all of the surface-water samples, and VOCs were only detected in four of the samples (specifically, the upstream samples) at relatively low concentrations. MGP-related compounds (e.g., BTEX) were not detected in any of the surface-water samples. Mercury was the only metal present at concentrations above its SCG in surface-water samples collected adjacent to or downstream of the site. Aluminum and copper exceeded SCGs in upstream surface-water samples. Due to the limited number of exceedances of surface-water criteria in samples collected adjacent to and downstream of the site, it is concluded that ecological exposure to surface water is not significant .

## 4.2 Human Health Exposure Evaluation

### 4.2.1 Introduction

This section presents a qualitative HHEE that describes the potential for human exposure to site-related constituents. This HHEE is conducted consistent with the New York State Department of Health (NYSDOH) guidance as presented in *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDOH, 2002) and uses information regarding current and foreseeable land uses and available site data to evaluate the potential for exposure of human receptors. The HHEE characterizes the environmental setting of the site, identifies constituents of interest and complete exposure pathways, and evaluates contaminant fate and transport. The results of this qualitative HHEE will be used, in part, to help evaluate proposed remedial actions for the site.

### 4.2.2 Constituents of Potential Concern

Analytical data for the site are available for surface soil, subsurface soil, sediment, surface water and groundwater. Data used in this evaluation were collected in 2004, 2005 and 2006. The majority of the samples were analyzed for TCL VOCs, TCL SVOCs, TAL organics and total cyanide. The following subsections briefly discuss the analytical data for each medium and the comparison of these data to cleanup objectives and/or screening criteria to identify constituents of potential concern (COPCs). Section 3 presents a more detailed discussion of the distribution of site-related constituents in the various media. As discussed in Section 3, the COCs identified for the site are BTEX and PAHs. For completeness, this section evaluates all detected compounds, including the site COCs and various metals (which are not considered COCs for this site). Combined, these compounds are referred to in this section as COPCs.

### Surface Soil

Ten surface soil samples (0 to 0.5 feet) were collected and analyzed for VOCs, SVOCs, TAL organics and cyanide. Surface soil samples consisted of SS-1 through SS-10; samples SS- 1 through SS-5 were collected off site (i.e., outside of the site boundary [e.g., from the railroad right-of-way]). Surface soil sampling locations are shown on Figure 2. Surface soil data were compared to 6 NYCRR Part 375 SCOs for commercial land use (NYSDEC, 2006b). These SCOs were developed to represent exposure of an adult worker and a child visitor to soils via ingestion, inhalation and dermal contact, and were deemed to be the most appropriate based on current and potential future use of the site. Table 14 compares surface soils data to SCOs.

Two PAHs [benzo(a)pyrene and dibenz(a,h)anthracene] and one metal (arsenic) were detected in the surface soil samples at concentrations that exceeded their associated SCOs. Specifically, benzo(a)pyrene exceeded its SCO in two of the five on-site samples (one of these exceedances was only slightly higher than the SCO). Benzo(a)pyrene exceeded its SCO in one of the five off-site samples (SS-3, which was located to the south of the railroad right-of-way). Dibenz(a,h)anthracene slightly exceeded its SCO in only one sample (SS-6), which was collected on site; this sample also had the highest concentration of benzo(a)pyrene. Likewise, arsenic exceeded its SCO in only one of 10 samples (SS-4); this sample was collected off site, from the parking lot south of the Auburn Tank & Manufacturing Company building.

### Subsurface Soil

Twenty-four subsurface soil samples were collected and analyzed for TCL VOCs, TCL SVOCs, TAL organics and cyanide. Subsurface soil data were compared to 6 NYCRR Part 375 SCOs for commercial land use (NYSDEC, 2006b). Table 2 presents the comparison of subsurface soils data to SCOs. Figure 13 shows the distribution of soil containing concentrations of BTEX and/or PAH compounds above the SCOs.

Several VOCs, SVOCs and metals were detected in some subsurface soil samples at concentrations that exceeded their associated SCOs. Specifically, benzene and xylene exceeded their associated SCOs in 2 of the 24 samples (TP-04-03 and TP-04-04). Ethylbenzene and toluene exceeded their associated SCOs in only one sample (TP-04-03). Several PAHs [acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene] exceeded their SCOs in multiple samples. These samples were primarily collected from the gravel lot along the northern site boundary (north of the former collision shop) and near the Auburn Tank & Manufacturing building to the west of the site.

Several metals (arsenic, copper, lead and mercury) also exceeded their SCOs. Metal exceedances generally occurred in the same samples as the PAH exceedances.

### Sediment

Twelve surficial sediment samples (0 to 0.5 feet) were collected from the Outlet near the site and analyzed for TCL VOCs, TCL SVOCs, TAL organics, total cyanide and TOC. Analytical sediment results were compared to human health screening criteria presented in the NYSDEC document entitled *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999). Screening criteria for organics (i.e., human health bioaccumulation) are presented in µg/g organic carbon and were adjusted on a sample-specific basis for TOC. Sediment sampling locations are shown on Figure 4 and sediment sampling results are presented in Table 16.

Of the constituents with available human health criteria, benzo(a)pyrene was the only constituent whose concentrations exceeded its associated human health bioaccumulation criteria in surficial sediment. Benzo(a)pyrene exceeded its sediment criterion in all the surficial sediment samples, including those collected upstream, adjacent to and downstream of the site. Because this compound was detected in upstream samples, it appears that its presence in sediment is possibly due to background sources.

Eight subsurface sediment samples and 15 bank samples were also collected from the Owasco Outlet, and analyzed for VOCs and SVOCs. Of the constituents with available criteria, benzene, TCE, vinyl chloride, and benzo(a)pyrene exceeded their criteria. Specifically, benzene exceeded its criterion in nine of the bank samples and four of the subsurface sediment samples. TCE and vinyl chloride only exceeded their criteria in one sample each (SED-BO-17 and SED-BO-21, respectively). Benzo(a)pyrene exceeded its criterion in all the bank samples and all but one of the subsurface sediment samples (SED-SO-46). Table 16 presents the comparison of analytical data for the subsurface sediment and bank samples to NYSDEC human health screening criteria.

There are no NYSDEC human health-based sediment criteria for metals.

### Surface Water

Ten surface-water samples were collected from the Outlet located near the site and analyzed for TCL VOCs, TCL SVOCs, TAL metals and total cyanide. Analytical surface-water results were compared to human health-based standards and guidance values presented in the NYSDEC Division of Water TOGS 1.1.1 document entitled *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (NYSDEC, 1998). Standards and guidance values for select metals (e.g., cadmium, chromium) are based on hardness and were adjusted accordingly using a site-wide average for surface-water hardness (140 mg $CaCo_3$/L). Surface-water sampling locations are shown on Figure 4 and the surface-water sampling results are presented in Table 7.

No VOCs or SVOCs were detected at concentrations above surface-water standards and/or guidance values. Aluminum and mercury were the only metals with concentrations that exceeded their associated standards. Specifically, aluminum exceeded its standard in three of the upstream surface-water samples (SW-OO-SED-16, SW-OO-SED-20 and SW-OO-Upstream); all other aluminum concentrations were nondetect. Mercury exceeded its standard in two of the surface-water samples collected downstream of the site (SW-OO-SED-07 and SW-OO-SED-10). None of the detected constituents in surface water are MGP-related.

### Groundwater

Thirty-nine groundwater samples were collected and analyzed for TCL VOCs, TCL SVOCs, TAL metals and total cyanide. Analytical results were compared to criteria presented in the NYSDEC Division of Water TOGS 1.1.1 document entitled *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*

(NYSDEC, 1998). Several VOCs, SVOCs (PAHs) and metals exceeded the NYSDEC standards and/or guidance values. The groundwater samples with exceedances of NYSDEC BTEX and PAH standards were primarily collected in the vicinity of the former gas holder and immediately downgradient from the holder. Arsenic, barium, iron and manganese were the only metals to exceed their associated NYSDEC standards. Specifically, arsenic exceeded its standard in only three of the 39 groundwater samples. Likewise, barium exceeded its standard in only one of the 39 samples, and manganese exceeded its standard in only five samples. Table 3 compares groundwater data to NYSDEC standards and/or guidance values. Figure 14 shows the distribution of groundwater in terms of total BTEX and PAHs, and identifies locations having groundwater exceedances for BTEX and/or PAH compounds.

### 4.2.3 Contaminant Fate and Transport

The following discussions of environmental fate and transport for identified COPCs are taken from the toxicological profiles provided by the Agency for Toxic Substances and Disease Registry (ATSDR).

**Benzene**

The environmental fate and transport of benzene is primarily attributed to its high volatility (ATSDR, 1997). In soil, benzene partitions to the atmosphere through volatilization, to surface water through runoff and to groundwater through leaching. Bioaccumulation of benzene in the aquatic food chain generally does not occur, and there is no scientific evidence of biomagnification. Aerobic biodegradation is the primary mechanism for degradation of BTEX in soils, surface water and groundwater.

**Toluene**

The majority of toluene released to the environment partitions to air, although rates of volatilization from soils depends on temperature, humidity and soil type (ATSDR, 2000a). Transport of toluene from soil to groundwater depends on the degree of adsorption to soil, which is mediated by the presence of organic matter. Toluene will be readily leached from soils with low organic content. The metabolism of toluene limits its biomagnification in the food chain. Degradation of toluene in surface water, soil and sediment occurs primarily by microbial action.

### Ethylbenzene

Ethylbenzene has a high vapor pressure and will partition into the atmosphere from surface soils and surface water; subsurface soil infiltration will also occur (ATSDR, 1999a). This chemical has a relatively high mobility in soils because sorption is not significant enough to prevent migration. Ethylbenzene will leach into groundwater, particularly in soils with low organic carbon content. Significant bioaccumulation does not occur in aquatic food chains. In surface water, ethylbenzene can be transformed via photo oxidation and biodegradation. In soils, aerobic soil microbes are responsible for biodegradation.

### Xylenes

Xylenes are highly volatile and readily partition into the atmosphere from surface water (ATSDR, 1995a). In soils, xylenes tend to adsorb to organic matter, and will leach into groundwater from subsurface soils with low organic carbon content. Volatilization and photo oxidation are the primary removal mechanisms in surface soil and surface water. Biodegradation is the primary removal mechanism in subsurface soils.

### PAHs

In surface waters, PAHs can volatilize, photolyze, oxidize, biodegrade, bind to particulate matter or sediments, or accumulate in aquatic organisms, although biomagnification of PAHs generally does not occur because many aquatic organisms are able to metabolize (and eliminate) these compounds readily (ATSDR, 1995b). Biodegradation is the primary mechanism for removal in sediments. In soils, PAHs can volatilize, undergo abiotic degradation, biodegrade, or bioaccumulate in plants. Some PAHs may leach into groundwater from subsurface soils. The transport and partitioning of PAHs in the environment are dependent on several chemical factors, such as water solubility, vapor pressure, Henry’s law constant, octanol-water partition coefficient and organic carbon partition coefficient. Due to their low solubility and high affinity for organic carbon, PAHs in aquatic systems are generally sorbed to bottom sediments or particulate matter suspended in the water column.

### Arsenic

Arsenic in soil may be transported by wind and runoff, and may leach into subsurface soil (ATSDR, 2000b). In sediments, arsenic may be sorbed to iron and manganese oxides and may be released under reducing conditions. Transport and partitioning of arsenic in water depends upon its chemical form (i.e., oxidation state) and other materials present (ATSDR, 2000b). Arsenic may be present in soluble form in the water column, or adsorbed onto sediments or soils. Groundwater arsenic concentrations are generally controlled by adsorption rather than mineral precipitation (ATSDR, 2000b). Bioconcentration of arsenic does occur in aquatic organisms, primarily in algae and lower invertebrates, although biomagnification in aquatic food chains does not appear to be significant (ATSDR, 2000b).

#### Copper

Copper is generally found adsorbed to particulate matter (e.g., organic matter, hydrous ion and manganese oxides, clay) in aquatic systems. In temperate soils, the pH, organic matter, concentrations of metal oxyhydroxides and ionic strength of the soil solutions are key factors affecting adsorption of copper (ATSDR, 2004). Copper has a low potential for bioconcentration.

#### Lead

The amount of lead that remains in solution in surface water depends on the pH of the water and the dissolved salt content (ASTDR, 1999b). In most surface waters and groundwater, the concentration of dissolved lead is low because lead forms compounds with anions in the water such as hydroxides, carbonates, sulfates and phosphates, and precipitates out of the water column. The environmental fate of lead in soil is affected by the specific or exchange adsorption at mineral interfaces, precipitation of sparingly soluble solid forms of the compound and formation of relatively stable organic-metal complexes or chelates with soil organic matter (ATSDR, 1999b). These processes are dependent on factors such as soil pH, soil type, particle size, organic matter content of the soil, presence of inorganic colloids and iron oxides, cation exchange capacity and amount of lead in the soil (ATSDR, 1999b). The accumulation of lead in most soils is primarily a function of the rate of deposition from the atmosphere (ASTDR, 1999b). Lead may bioconcentrate in plants and animals, although biomagnification is not expected (ATSDR, 1999b).

#### Manganese

The transport and partitioning of manganese in water is controlled by the solubility of the specific chemical form present, which is in turn determined by pH, redox potential and characteristics of the available anions. Manganese is generally transported in rivers as suspended sediments (ATSDR, 2000c). Manganese in water may be significantly bioconcentrated at lower trophic levels. The ability of soluble manganese compounds to adsorb to soils and sediments depends largely on the cation exchange capacity and organic composition of the soil (ATSDR, 2000c).

#### Mercury

In soils and surface water, mercury can exist in the mercuric ($Hg^{+2}$) and mercurous ($Hg^{+1}$) states as several complex ions with varying water solubilities (ATSDR, 1999c). The transport and partitioning of mercury in soil and surface water depends on the particular form of the compound. Methylmercury and other mercury fractions are strongly bound to organic matter in water and may be transported in runoff water (ATSDR, 1999c). Most of the mercury deposited on soil from atmospheric deposition is not expected to leach to groundwater due to its adsorption to soil. The sorption of mercury has been found to be related to the organic matter content of the soil or sediment (ATSDR, 1999c). Methylmercury in surface waters is rapidly accumulated by aquatic organisms and biomagnification is expected (ATSDR, 1999c). Terrestrial organisms have also been found to bioaccumulate mercury (ATSDR, 1999c).

### 4.2.4 Potential Exposure Points, Receptors and Route of Exposure

An initial step in evaluating potential human exposure is the identification of potentially complete exposure pathways. For an exposure pathway to be complete, the following five elements must exist:

1) contaminant source

2) contaminant release and transport mechanisms

3) point of exposure

4) route of exposure

5) receptor population

If all five elements exist, then that exposure pathway is considered to be complete (NYSDOH, 2002). Although many COPCs were identified, several of the COPCs are not considered to be site related because they are attributed to background sources or are not generally associated with MGP byproducts. This section evaluates the potential exposure points, receptors and routes of exposure, regardless of the whether the COPCs are site related.

As previously described, the PAHs benzo(a)pyrene and dibenz(a,h)anthracene and arsenic were identified as COPCs in surface soils. COPCs identified for subsurface soil include BTEX, PAHs and several metals (arsenic, copper, lead and mercury). Benzo(a)pyrene was the only constituent in surficial sediment samples collected from the Outlet that exceeded its NYSDEC human health bioaccumulation sediment criterion. Benzo(a)pyrene and benzene exceeded their sediment criteria in several subsurface sediment and bank samples. Aluminum and mercury exceeded their associated surface-water standards in samples collected from the Outlet. BTEX, PAHs and several metals exceeded their associated NYSDEC standards in groundwater.

The most likely current and future receptors at the site are on-site personnel, including commercial workers and construction workers. Trespassers may also represent a potential exposure group. The portion of the Outlet located adjacent to the site may be used for recreational activities such as fishing and wildlife observation. Therefore, recreational users are potential off-site receptors.

Potentially complete human exposure pathways for the site are evaluated below.

**Potential direct contact with soils** — The western portion of the site is characterized by a gravel lot. The eastern portion of the site is characterized by an upland forest, although use of this area is most likely limited due to its relatively small size and the fact the site is surrounded by properties primarily used for industrial/commercial purposes. Based on current land use, the site is only expected to be used by on-site workers (e.g., commercial and construction workers), although trespassers represent another potential receptor group. Potential exposure of trespassers, commercial workers and construction workers to COPCs in on-site surface soils could occur via incidental ingestion and dermal contact. Exposure of trespassers and commercial workers to subsurface soils is unlikely because these receptors are not expected to be involved in intrusive activities. However, construction workers may be exposed to subsurface soils during future construction/excavation activities.

**Potential inhalation of vapors and/or particulates** — Surface soil COPCs are primarily nonvolatile constituents (i.e., PAHs, metals). Workers and trespassers may be exposed to COPCs in surface soils via inhalation of particulates from areas of exposed soil within the gravel lot. However, the presence of a gravel layer most likely mitigates the potential for soil particulates to become airborne. Further, because there are limited ongoing activities at the site, there is likely little potential for dust generation. The presence of groundcover (i.e., vegetation) within the upland forest most likely precludes the generation of fugitive dust in this area of the site. Because VOCs (i.e., BTEX) were detected in subsurface soils at the site, there is potential for exposure of construction workers to COPCs via inhalation of vapors during construction/excavation activities. Potential exposures could be mitigated by use of PPE.

**Direct contact with groundwater** — The groundwater table beneath the site ranges from approximately 3 to 10 feet bgs, and generally flows in a north-northwesterly direction. Groundwater is not used as a potable source at the site, and depth to groundwater precludes potential direct exposures of trespassers and commercial workers to this medium. Construction workers may be exposed to site groundwater during intrusive activities, but potential exposures could be mitigated by use of PPE.

**Direct contact with sediments and surface water from the Owasco Outlet** — The portion of the Outlet located adjacent to the site may be used for recreational activities such as fishing and wildlife observation. However, this portion of the Outlet is most likely not conducive to boating due to the shallow water depth. The surrounding industrial/commercial land use most likely limit use of the Outlet for swimming and/or wading. Therefore, recreational users of the Outlet that may be exposed to sediments and surface water are most likely fishermen. Benzo(a)pyrene was the only constituent that exceeded its NYSDEC human health bioaccumulation sediment criterion in surficial sediment. Aluminum and mercury exceeded their respective surface-water standards in a few of the samples, including the upstream sample (aluminum only). Based on the limited recreational use of this portion of the Outlet, exposure to sediments and surface water are not expected to be significant exposure pathways. Food chain exposures (i.e., ingestion of fish) are not considered to be significant because sediment COPCs are not strongly bioaccumulative.

Benzo(a)pyrene and benzene exceeded their sediment criteria in several subsurface sediment and bank samples. Although COPCs are present in the non-native material (e.g., hardened tar) collected from the banks of the Outlet and in the subsurface sediment samples, these media do not represent significant exposure pathways because they are relatively inaccessible to the general public (e.g., trespassers and commercial workers) and appear to be nonmobile. Construction workers that may be exposed to these materials during intrusive activities would likely use appropriate protective equipment to mitigate potential exposures.

The magnitude of exposure to COPCs is dependent upon the type of worker activity, specific areas of the site used in daily activities and frequency and length of time spent at each area. Surface and subsurface soils represent the greatest potential for exposure (via all pathways). As stated above, potential exposure to COPCs in soils during intrusive activities could be mitigated by the use of PPE.

#### 4.2.5 Summary

Analytical data indicate that VOCs (BTEX), SVOCs (primarily PAHs) and several metals are present in subsurface soils at concentrations exceeding NYSDEC SCOs. The western portion of the site consists of a gravel lot, and the eastern portion of the site is characterized as an upland forest. As such, the potential for exposure to COPCs in subsurface soils is most likely limited to construction workers engaged in intrusive activities, although potential exposures could be mitigated through the use of PPE. Potential exposures of commercial workers and trespassers to constituents in subsurface soils are unlikely because these receptors would not be involved in intrusive activities.

Surface soils represent a complete exposure pathway for commercial workers, construction workers and trespassers. However, potential exposures to COPCs in surface soil [i.e., benzo(a)pyrene, dibenz(a,h)anthracene and arsenic] are most likely limited because these COPCs were primarily present in samples collected from the gravel lot (i.e., direct exposure to soils is likely mitigated by the presence of a gravel layer).

Groundwater beneath the site is not used as a potable source, and therefore exposure via ingestion of groundwater is unlikely. Likewise, there is relatively little potential for direct contact to groundwater for commercial workers and trespassers because these receptors would not be involved in intrusive activities. Construction workers may be exposed to groundwater during future intrusive activities, although these exposures could be mitigated with the use of PPE.

Benzo(a)pyrene was the only constituent that exceeded its NYSDEC human health bioaccumulation sediment criterion in surficial sediment, and exceedances were noted in surficial sediment samples collected upstream, adjacent to and downstream of the site. The ubiquitous presence of benzo(a)pyrene in surficial sediment could be due to background sources. Benzene, TCE, vinyl chloride, and benzo(a)pyrene exceeded their respective screening criteria in the subsurface sediment and/or bank samples; however, these media are not readily accessible to potential receptors. Benzene exceeded its criterion in nine of the bank samples and four of the subsurface sediment samples. TCE and vinyl chloride only exceeded their criteria in one sample each (SED-BO-17 and SED-BO-21, respectively). Benzo(a)pyrene exceeded its criterion in all the bank samples and all but one of the subsurface sediment samples (SED-SO-46). Aluminum and mercury were the only COPCs identified for surface water, but these constituents are not MGP related. Exposure to the Outlet located adjacent to the site is not expected to be significant because recreational use of this area of the Outlet is most likely limited due to surrounding land use and the physical characteristics of the river (e.g., shallow water depths). Food chain exposure (i.e., ingestion of fish) is not expected to be a significant exposure pathway because sediment COPCs are generally not bioaccumulative.

## 5. Summary and Conclusions

The site has been the subject of three investigations, starting in 1990 and culminating with the RI described in this RI Report. During these investigations, 29 monitoring wells were installed, 16 test pits were excavated, an extensive investigation of the Owasco Outlet was performed, a soil vapor investigation was conducted, and more than 150 samples of environmental media were analyzed. The primary objectives of this work were to characterize the nature and extent of site-related impacts to the environment and to evaluate the risk posed to human health and the environment by those impacts. These objectives have been satisfied by the work performed during these investigations, and the information gathered will enable an evaluation of remedial alternatives for the site.

This section summarizes the findings of the RI and presents relevant conclusions.

### 5.1 Site Setting

The site is located in a mixed commercial/residential area of the city of Auburn, in central Cayuga County, New York. The former MGP occupied an approximate 1-acre triangular slice of land that is presently bounded by the Outlet to the north, railroad right-of-way to the east and south, and asphalt parking lot and Auburn Tank Manufacturing Company Inc. to the west. The closest residence is greater than 300 feet south of the site. A New York State Correctional Facility is located across the Outlet to the north.

NYSEG purchased the property in 2005 from Mr. Frank Rizzo. Mr. Rizzo leased the building as an automotive collision shop and subsequently as storage space. Apart from the building that houses the collision shop, the site surface is sporadically covered with vegetation, gravel, weathered asphalt and large pieces of debris (e.g., automotive parts, metal and wood scraps, old railroad ties, empty drums, cement blocks, old commercial asphalt paver). A retaining wall used to support a railroad line is located along the southern site boundary. An electric transmission tower sits on the footprint of the former gas holder in the northern portion of the site, on the southern bank of the Outlet. The grade at the site ranges in elevation from 670 feet amsl along the southern boundary to approximately 660 feet amsl along the northern boundary. The eastern part of the site slopes more steeply toward the Outlet than the western part of the site (Figure 2).

There is no localized groundwater usage in the immediate area of the site; all businesses and residences near the site are supplied by city water. The city of Auburn receives potable water from Owasco Lake. Water is not withdrawn from the Outlet for potable use.

The McMaster Street MGP was first operated by the Auburn Gas Light Company in 1869 and provided coal gas by coal carbonization. The Auburn Gas Company acquired the Auburn Gas Light Company in 1901 and continued gas production until 1904. The plant ceased operations in 1904 when gas manufacturing was shifted to the Clark Street MGP, which was located 0.5 mile to the west (downstream) of the McMaster Street Site. The Auburn Gas Company was acquired by the Empire Gas and Electric Company circa 1911, which in turn was acquired by NYSEG in 1936 (Atlantic, 1991). According to NYSEG records, the gas plant was demolished prior to 1940, when the property was occupied by the Shoemaker Coal Company.

Gas production at the MGP was 35,000,000 cubic feet in 1889 and 30,000,000 cubic feet in 1899 (Atlantic, 1991). Based on review of Sanborn Maps, it is believed the site contained the following major structures: one gas holder, purifier house, two coke sheds and retorts. The Green Street former gas holder, which served as a gas distribution holder for the McMaster Street MGP and possibly the Clark Street MGP, is located to the south, across Routes 5 and 20.

### 5.2 Hydrogeology

The regional and site hydrogeology was evaluated by reviewing available literature sources, communications with Mr. David Eckhardt of the USGS review of data collected during NYSEG’s investigation of the Clark Street MGP site, and analyzing hydraulic and geologic data collected during the RI. This section summarizes the major findings of the evaluation and presents relevant conclusions regarding groundwater movement at and around the site.

### Hydrostratigraphic Units

The site is situated on relatively flat-lying land at an elevation of approximately 665 feet amsl. The RI has identified the following three principal hydrostratigraphic units beneath the site:

- **Overburden Unit** — The overburden materials comprise the uppermost hydrostratigraphic unit. This unit contains fill and the native soils (primarily alluvial fines) that lie on top of the Onondaga Limestone. The top of this unit is bounded by the water table, which lies approximately 3 to 10 feet bgs, depending on location. The thickness of this unit ranges from approximately 2 to 10 feet and is thickest in the upgradient (south) portion of the site and where the bedrock surface is depressed. This unit is thinnest generally along the bank of the Outlet. The hydraulic conductivity of the unit, based on specific-capacity test results, was found to range from 0.43 to 183 feet/day, with a geometric mean of 3.53 feet/day.

- **Shallow Bedrock Unit** — The Onondaga Limestone, Oriskany Sandstone and Manlius Limestone comprise the shallow bedrock hydrostratigraphic unit, which makes up the upper approximately 65 to 70 feet of bedrock at the site. Groundwater flow in the unit occurs primarily through fractures in the rock and discharges to the Owasco Outlet. The geometry and other characteristics of the fracture network, which govern groundwater movement, are complex. The permeability of the shallow bedrock, based on specific-capacity tests and packer tests, ranges from $4x10^{-4}$ to 4 feet/day, with a geometric mean of $8x10^{-2}$ feet/day; however, an estimated hydraulic conductivity of discrete fractures is likely much higher.

- **Deep Bedrock Unit** — The deep bedrock unit consists of the package of carbonate rocks that lie between the shallow bedrock unit and Camillus Shale. This unit is approximately 130 feet thick and consists of the Rondout, Cobleskill and Bertie dolostones, which contain varying amounts of evaporate deposits. Although these bedrock formations were not investigated during the RI, available information suggests these units are significant in terms of groundwater flow (Hecht, 1992; USGS, 2004). Based on this information, these units are karstic and can transport large volumes of water in a short period of time. As such, the hydraulic properties of these units are vastly different than the overlying shallow bedrock.

### Groundwater Flow

Groundwater in the overburden unit is interpreted to move predominantly horizontally toward the north/northwest and discharge to the Outlet. A fraction of the groundwater in this unit also moves downward into the shallow bedrock unit through fractures in the rock before discharging to the Outlet. There are times when water from the Outlet seeps into the bank. This condition is confined to near the bank and is expected to occur for relatively short durations during seasonally wet periods and following storm events or release of water from the upstream dam. During these periods, overburden groundwater near the bank of the Outlet moves in the downstream direction (westward). Once the Outlet level drops, groundwater in the unit moves toward and discharges to the Outlet.

Groundwater in the shallow bedrock unit is interpreted to move primarily horizontally through bedding-plane fractures and discharge to the Owasco Outlet, predominantly downstream (west) of the site. Movement of groundwater in the shallow bedrock unit toward the Outlet is supported by the nature of the rock and hydraulic gradients within it and information obtained from discussions with USGS staff that are conducting a study of groundwater flow in the area.

Groundwater flow in the deep bedrock unit is largely controlled by solution-widened features such as caves. Groundwater in this unit may move southwestward.

## 5.3 NAPL Evaluation

### 5.3.1 NAPL Extents

The geologic and analytical data generated by numerous subsurface investigations at the site are sufficient to characterize the extent of MGP coal tar DNAPL for this RI. The locations where DNAPL has been observed in soil, sediment, and bedrock samples collected on site and off site are shown on Figure 12. The following conclusions can be made based on the geologic and analytical data collected and DNAPL distribution shown on Figure 12:

- The vast majority of DNAPL-containing soils at and near the site occur below the water table.

- DNAPL has migrated to the lower portion of the overburden (on the bedrock surface) at the site and to the northwest of the site, within the deeper sediments of the Outlet.

- Beneath the Outlet, DNAPL was observed approximately 1 to 2 feet below the sediment surface, from near the west edge of the former holder to approximately 320 feet downstream (west) of the holder.

- DNAPL has also migrated in to the upper approximately 15 to 20 feet of bedrock (Onondaga Limestone) primarily along the northern edge of the site, below the bank of the Outlet. A trace amount of DNAPL was observed at one location at approximately 7 feet below the bedrock surface in the eastern corner of the site.

- The distribution of DNAPL in bedrock is a function of the DNAPL physical characteristics, hydraulic influences and the complex bedrock fracture network of jointing and horizontal bedding plane fractures in the bedrock.

### 5.3.2 NAPL Migration

Continued migration of DNAPL at the site requires DNAPL to be present above *residual saturation* or “pooled.” Pooled DNAPL will enter a well screen that penetrates it and has the potential to be mobile. Residual DNAPL comprises blobs and ganglia that have been cut off and are disconnected from a continuous DNAPL body by water. Such DNAPL is not mobile and will not enter a well that is screened across it.

Pooled DNAPL in the overburden is possible; however, DNAPL has not entered overburden wells that screen across NAPL-containing intervals. DNAPL is pooled in the upper few feet of bedrock at MW-06-11R (hydraulically downgradient of the former holder). The best evidence that NAPL is moving is either when NAPL enters an established monitoring well that was previously NAPL-free, or when NAPL is observed repeatedly discharging to the land surface or to a body of surface water. There have been no clear cases at the site where NAPL was found in a well where previously there had been none. Sheens or NAPL-containing materials were identified in the deeper sediments beneath the Outlet; however, NAPL was generally not observed in the upper approximate 1 foot of sediments.

Recent coal-tar migration modeling performed by Kueper, et al. (2006) indicated that coal tar could migrate for significant periods of time (potentially decades) following its release. The physical properties of the MGP tar used in those simulations were similar to those of the tar measured for this site, except viscosity. The viscosity of the tar used by Kueper, et al. was considerably less than that measured for the sample analyzed from the site. Viscosity affects the rate at which the tar will move; the greater the viscosity, the slower the rate of tar movement. Based on this information, ongoing movement of tar at the site cannot be ruled out; however, the rate of movement is expected to be very slow.

## 5.4 Soil-Quality Evaluation

The soil evaluation delineated the region of soils in the upland portion of the site and beneath the Outlet that contain concentrations of BTEX, PAHs and total cyanide exceeding SCOs. The distribution of soils exceeding SCOs is shown on Figure 13. The following general conclusions were made as a result of the soil evaluation:

- Low levels of total cyanide were detected in several subsurface soil samples, but at concentrations lower than the SCO. As such, cyanide is not considered a COC in subsurface soils at this site.

- Of the 24 collected subsurface samples, two samples exceeded the SCOs for BTEX compounds and 18 samples exceeded for PAHs. All but five of the samples that exceeded the SCOs also contained NAPL.

- As expected, the highest concentrations of BTEX and PAHs are in soil samples that contain NAPL. This includes the area in the overburden that is near a likely source (e.g., former holder), and beneath the southern bank of the Outlet just northwest of the site (in the area of MW-06-11R). NAPL appears to be located predominately below the water table in the lower few feet of overburden that lies directly on the bedrock surface.

- Four metals were also detected in the soil samples at concentrations exceeding SCOs, including: arsenic in 11 on- and off-site samples, copper in three samples on Auburn Tank Property, mercury in one sample on Auburn Tank Property and lead in one on-site sample located immediately east of the collision shop.

### 5.5 Soil Vapor Evaluation

This investigation evaluated whether VOCs from the MGP were present in soil vapor at the site and near the Auburn Tank building west of the site. Five samples were collected on site and three samples were collected near the Auburn Tank building. The investigation found that several VOCs were present in all eight soil vapor samples at low concentrations; however, the VOCs in only two of the samples, both collected on site, appeared to be related to the MGP. This is not surprising because these two samples were collected in areas where coal tar was previously observed. The NYSDOH concluded that the levels of VOCs detected in all of the samples were within the range that is typically observed in urban settings. Furthermore, the NYSDOH and NYSDEC have indicated that no further soil vapor investigations are warranted at the site at this time.

### 5.6 Groundwater-Quality Evaluation

Groundwater quality was evaluated by comparing analytical results from data collected during the RI to NYSDEC TOGS 1.1.1 Class GA Standards and Guidance Values. BTEX and PAHs were identified as the COCs for groundwater because these compounds were detected in groundwater above the Class GA Standards or Guidance Values (same rationale used for soil COCs). The approximate extent of groundwater exceeding Standards or Guidance Values is shown on Figure 14. Results of the groundwater evaluation have concluded that:

- The distribution of COCs in overburden and bedrock groundwater appears to be directly related to the presence of NAPL and/or purifier waste.

- The extent of COCs in overburden groundwater at levels exceeding Standards or Guidance Values has been delineated. The COC plume in overburden appears to be constrained primarily to the site property and to the west-northwest of the site, beneath the southern bank of the Outlet.

- The extent of COCs in bedrock groundwater at levels exceeding Standards and Guidance Values has been delineated. The COC plume in bedrock appears to be largely controlled by the presence of NAPL which, in turn, is controlled by the characteristics of bedrock fractures (i.e., orientation, frequency, sediment in-filling) and hydraulic gradients. The COC plume is constrained to the upper approximately 20 to 25 feet of bedrock. The bedrock plume roughly mimics the shape of the overburden plume — it appears to be constrained primarily to the site property and to the northwest of the site, along the southern bank of the Outlet.

- The northern extent of the COC plume in overburden and bedrock is bounded by the Outlet.

## 5.7 Owasco Outlet Sediment and Surface-Water Evaluation

### 5.7.1 Sediments

The streambed in the vicinity of the site contains unsorted sands and gravels with varying amounts of cobbles and boulders underlain by bedrock. Sediment in the Outlet near the site appears to be limited to isolated pockets trapped by physical obstructions in the stream. The large number of outfalls and the use of dams to manage stream water levels create a high energy waterway with a transient sediment environment, consistent with a streambed comprised of unsorted sands and gravels with varying amounts of cobbles and boulders underlain by bedrock.

Investigations of the Owasco Outlet sediments found the following:

- No ongoing coal tar seeps/sheens were observed along the southern bank or in the upper approximately 1-foot of sediments; however, trace amounts of tar were observed at approximately 0.5 feet below the sediment surface at two isolated locations, and hardened tar ledges were observed sporadically below the water level at the toe of the bank adjacent to the site.

- Coal tar was identified in deeper sediments (generally below 1 foot) below the Owasco Outlet. Tar was observed in the deeper sediments to approximately 250 feet west (downstream) of the site boundary.

- PAHs were present in surficial (upper 0.5 feet) sediment and bank soil samples. The highest concentrations of PAHs in surficial sediments and bank soils were in (1) surficial sediment samples collected upstream from the site at OO-SED-16, OO-SED-19, and OO-SED-20 (unrelated to the former MGP); (2) in bank soil samples located adjacent to the site at SED-BO-7, SED-BO-31, and SED-BO-34A (which are related to the MGP); and (3) surficial sediment sample SED-SO-41 located adjacent to the site (which is related to the MGP).

- With the exception of four samples, the surficial sediment and bank soil samples collected adjacent to and downstream from the site did not contain concentrations of total PAHs above 20 mg/kg. One surficial sediment sample (SED-SO-41) and three surficial bank soil samples (SED-BO-7, SED-BO-31, and SED-BO-34A) contained elevated levels of total PAHs.

- BTEX and PAHs were present in the deeper sediments (below 1 foot) where coal tar was observed adjacent to and downstream of the site.

- Coal tar observed in the deeper sediments does not appear to be discharging upward and into the Owasco Outlet. Given the physical properties of the tar (i.e., denser than water and extremely viscous) and the lack of vertical hydraulic gradient between the coarse sediments and the water in the Outlet, this tar is expected to be largely or wholly immobile; however, physical forces, such as scouring, could potentially mobilize the tar.

The investigations of Outlet sediments did not find elevated MGP-related BTEX and/or PAH concentrations in the upper approximately 6 inches of sediment adjacent to or downgradient from the site. Elevated PAH concentrations were measured in sediment samples at three locations upstream of the site, where the adjacent land contains potential sources of PAHs, including parking lots and asphalt paved roads. With total PAH concentrations in upstream outfall pipe sediments at 65 mg/kg, 133 mg/kg and 943 mg/kg, it is evident that PAHs from sources unrelated to the MGP are providing a significant ongoing contribution to the PAH loading of the Owasco Outlet sediments.

DNAPL (extremely viscous coal tar) has been observed in the deeper sediments and only a trace amount DNAPL was observed at two isolated locations in the upper approximately 1-foot of sediments. As previously mentioned, the hydraulic gradients beneath the Outlet combined with the physical characteristics of the DNAPL (denser than water and extremely viscous) are not favorable for upward DNAPL migration to the surficial sediments; however, it should be recognized that physical forces, such as scouring caused by the waters of the Outlet, could potentially mobilize NAPL by eroding the coarse streambed (i.e., gravel, cobbles, boulders) that armors the base of the Outlet, thus exposing the deeper NAPL-impacted sediments. Although there is almost no evidence that this is occurring, one deeper sediment sample (SO-50) collected at the nearest downstream dam did contain concentrations of elevated PAHs (229 mg/kg) having a chemical signature consistent with the coal tar and petroleum impacts. This sample was collected from an interval at approximately 1.5 feet bss and exhibited a degraded petroleum-like odor but no sheen or NAPL.

NYSDEC, NYSEG, and ARCADIS held a conference call on March 24, 2008 to discuss the results of the Owasco Outlet sediment investigations that were presented in the July 2007 Draft RI Report. During that call, NYSDEC and NYSEG agreed that unrelated sources of elevated PAHs exist upstream of the site and that it would be difficult to definitively distinguish between site-related PAHs and those derived from other sources. As such, NYSDEC concluded that the extent of MGP-related NAPL and PAH impacts to the outlet has been sufficiently delineated for the purposes of the RI.

### 5.7.2 Surface Water

Surface-water samples were collected from four upstream and three downstream locations and three locations adjacent to the site. Analytical results indicate that none of the surface-water samples contained detections of MGP-related constituents (BTEX, PAHs, or cyanide).

## 5.8 Risk Evaluation

A risk evaluation was performed by reviewing data collected during the RI. The risk evaluation included performing a FWRIA (through Part 1: Resource Characterization) and a qualitative HHEE. The summary and conclusions of the FWRIA and HHEE are discussed below.

### 5.8.1 Fish and Wildlife Resource Impact Analysis

No threatened or endangered plant or animal species were found to inhabit the site or the immediate surrounding areas. The site itself is a mixture of urban vacant lot and upland forest covertypes. The urban vacant lot is characterized by asphalt, gravel and sparse vegetation, which provide no value to wildlife. Use of the site by wildlife is further limited due to surrounding land use (i.e., residential/industrial/commercial).

The pathway analysis identified potentially complete exposure pathways for on-site surface and subsurface soils and sediments and surface water within the Outlet. For an exposure pathway to be complete, you must have the following five elements:

1) contaminant source

2) contaminant release and transport mechanisms

3) potential point of exposure

4) viable route of exposure

5) receptor population

The criteria-specific analysis found that PAHs were present in surface soils above SCOs, but at a location that provides no wildlife value (i.e., sample SS-6, located within the gravel lot). Several metals were also present at concentrations above SCOs in on-site surface soil samples, but the majority of these exceedances were less than two-fold higher than the SCOs and as such, most likely do not present a significant risk to ecological receptors. For surficial sediments (upper 6 inches) in the Outlet, PAH and metal concentrations exceeded the screening criteria in upstream and downstream samples. Although sediments represent a complete exposure pathway, the PAHs and metals detected in surficial sediment are possibly due to background sources because of their elevated concentrations detected in samples collected upstream of the site. No

MGP-related constituents were detected in surface water from the Outlet. Although PAH concentrations in subsurface sediments and bank samples exceeded screening criteria, these media most likely are not significant ecological exposure pathways due to their limited accessibility to local fauna.

### 5.8.2 Human Health Exposure Evaluation

Surface soils represent a complete exposure pathway for commercial workers, construction workers and trespassers. However, potential exposures to COPCs in surface soil are most likely limited because these COPCs were primarily present in samples collected from the gravel lot (i.e., direct exposure to soils is likely mitigated by the presence of a gravel layer). Further, trespassers would likely be spending their time in more attractive areas of the site (e.g., upland forest).

Potential human exposure to chemicals in subsurface soils is unlikely because receptors that may frequent the site (i.e., commercial workers, trespassers and recreational users of the Outlet) would generally not be involved in intrusive activities (e.g., excavation). Data collected as part of the RI indicate that BTEX, PAHs and several metals are present in subsurface soils at concentrations exceeding appropriate NYSDEC screening values. The potential for exposure to subsurface soils in these areas is most likely limited to workers engaged in construction/excavation activities. However, construction workers would likely mitigate potential exposures with the use of appropriate PPE.

Groundwater data collected as part of the RI indicate that BTEX, PAHs and several metals are present in groundwater at concentrations that exceed appropriate NYSDEC screening values. Groundwater beneath the site is not used as a potable source and therefore exposure via ingestion of groundwater is unlikely. Depth to groundwater at the site most likely precludes potential direct exposures of trespassers and commercial workers. There is, however, potential for direct contact with groundwater that may be encountered during excavation/construction activities. Potential exposure to COPCs in groundwater could be mitigated by using properly trained personnel and PPE.

Because the Outlet may be used for recreational activities such as fishing or wildlife observation, sediments and surface water within the Outlet represent potentially complete exposure pathways. Recreational use of the Outlet is most likely limited due to its relatively shallow channel and the surrounding residential/industrial/commercial land use. The most likely receptor population that may be exposed to sediments and surface water would be fishermen. Benzo(a)pyrene was the only constituent in sediment that exceeded its associated screening criterion in surficial sediment, and exceedances occurred in all samples (upstream, adjacent to and downstream of the site), indicating that this constituent is possibly due to background sources. Select metals were present in upstream and downstream surficial sediment samples, indicating that these constituents are also possibly due to background sources. Benzene, TCE, vinyl chloride, and benzo(a)pyrene exceeded their respective screening criteria in subsurface sediment and/or bank samples. However, these media are not readily accessible to potential receptors. No MGP-related constituents were detected in surface water. Based on the limited recreational use of this portion of the Outlet, exposure to sediments and surface water are not expected to be significant exposure pathways. Food chain exposures (i.e., ingestion of fish) are not considered to be significant because sediment COPCs are not strongly bioaccumulative.

### 5.9 Conclusion

With the findings presented in this RI Report, NYSEG has adequately characterized the nature and extent of the former MGP’s impacts on the environment and fulfilled the requirements of the Order on Consent. Based on the findings of the RI, no imminent threat to human health or the environment has been identified. Following approval of this RI Report by the NYSDEC, NYSEG will prepare a Feasibility Study to identify Remedial Action Objectives and select appropriate remedial measures for the site.

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# TABLES

## Table 1. Sample Summary Table, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Matrix | Location ID | Sample Depth Range (feet) | Date Sampled | VOCs | SVOCs | PAHs | BTEX | Metals | TOC | Cyanide |
|---|---|---|---|---|---|---|---|---|---|---|
| Groundwater | MW-04-01 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-01 | NA | 8/8/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-02 | NA | 8/7/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-02 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-02R | NA | 8/7/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-03 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-03 | NA | 8/8/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-04 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-04 | NA | 8/8/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-05 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-05 | NA | 8/10/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-04-06 | NA | 4/6/2005 | X | X | - - | - - | X | - - | - - |
| | MW-04-06 | NA | 8/9/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-05-02R | NA | 4/4/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-07 | NA | 4/5/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-07 | NA | 8/8/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-05-07R | NA | 4/4/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-07R | NA | 8/8/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-05-07R (DUP) | NA | 4/4/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-08 | NA | 4/6/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-08 | NA | 8/10/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-05-08R | NA | 4/4/2005 | X | X | - - | - - | X | - - | - - |
| | MW-05-08R | NA | 8/10/2006 | - - | - - | X | X | - - | - - | - - |
| | MW-06-01 | 17 - 26 | 12/13/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01 | 26 - 35 | 12/14/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01 | 35 - 45 | 12/14/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01RD | 45 - 55 | 12/15/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01RD | 55 - 65 | 12/15/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01RD | 65 - 75 | 12/18/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01RD | 75 - 80 | 12/18/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-01RD | NA | 4/13/2007 | X | X | - - | - - | X | - - | - - |
| | MW-06-01RI | NA | 4/12/2007 | X | X | - - | - - | X | - - | - - |
| | MW-06-06 | 39.5 - 49.8 | 12/20/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-06 | 49.8 - 59.8 | 12/20/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-06 | 59.8 - 69.8 | 12/21/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-06 | 69.8 - 79.8 | 12/21/2006 | - - | - - | - - | X | - - | - - | - - |
| | MW-06-06R | NA | 8/10/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-06RD | NA | 4/13/2007 | X | X | - - | - - | X | - - | - - |
| | MW-06-06RI | NA | 4/12/2007 | X | X | - - | - - | X | - - | - - |
| | MW-06-06RI (DUP) | NA | 4/12/2007 | X | X | - - | - - | X | - - | - - |
| | MW-06-09 | NA | 8/9/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-09R | NA | 8/9/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-10 | NA | 8/9/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-10R | NA | 8/10/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-12R | NA | 8/8/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-13R | NA | 8/10/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-13R (DUP) | NA | 8/10/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-14R | NA | 8/11/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-15R | NA | 8/9/2006 | X | X | - - | - - | X | - - | - - |
| | MW-07-16RD | 14 - 24 | 1/4/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 24 - 34 | 1/4/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 34 - 44 | 1/5/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 44 - 54 | 1/8/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 54 - 64 | 1/8/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 64 - 74 | 1/9/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | 74 - 79 | 1/9/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-16RD | NA | 4/11/2007 | X | X | - - | - - | X | - - | - - |
| | MW-07-16RI | NA | 4/11/2007 | X | X | - - | - - | X | - - | - - |
| | MW-07-17RD | 20 - 30 | 1/11/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | 30 - 40 | 1/15/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | 40 - 50 | 1/16/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | 50 - 60 | 1/18/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | 60 - 70 | 1/19/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | 70 - 80 | 1/19/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RD | NA | 4/13/2007 | X | X | - - | - - | X | - - | - - |
| | MW-07-17RD (DUP) | 30 - 40 | 1/15/2007 | - - | - - | - - | X | - - | - - | - - |
| | MW-07-17RI | NA | 4/12/2007 | X | X | - - | - - | X | - - | - - |

See Notes on Page 4.

## Table 1. Sample Summary Table, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Matrix | Location ID | Sample Depth Range (feet) | Date Sampled | VOCs | SVOCs | PAHs | BTEX | Metals | TOC | Cyanide |
|---|---|---|---|---|---|---|---|---|---|---|
| Soil | BO-6 | 2 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-7 | 0 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-10 | 1.5 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-11 | 0 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-16 | 1.5 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-16 (DUP) | 1.5 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-17 | 2 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-18 | 1 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-19 | 1.2 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-21 | 2.4 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-23 | 0.2 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-25 | 2.5 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-29 | 1.5 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-30 | 2 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-31 | 0 | 8/10/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-34 | 0 | 8/15/2006 | X | X | - - | - - | - - | - - | - - |
| | BO-34 (DUP) | 0 | 8/15/2006 | X | X | - - | - - | - - | - - | - - |
| | MW-04-02 | 12 - 14 | 12/1/2004 | - - | - - | X | X | - - | - - | X |
| | MW-04-03 | 10 - 10.5 | 12/1/2004 | - - | - - | X | X | - - | - - | X |
| | MW-04-04 | 12 - 13.7 | 12/1/2004 | - - | - - | X | X | - - | - - | X |
| | MW-04-05 | 8 - 9.7 | 12/2/2004 | - - | - - | X | X | - - | - - | X |
| | MW-04-05 (DUP) | 8 - 9.7 | 12/2/2004 | - - | - - | X | X | - - | - - | X |
| | MW-06-09 | 8 - 12 | 5/4/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-10 | 4 - 6 | 5/1/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-11 | 7 - 9.8 | 5/3/2006 | X | X | - - | - - | X | - - | - - |
| | MW-06-13R | 8 - 10 | 6/12/2006 | X | X | - - | - - | X | - - | - - |
| | 00-SED-10 | 1 - 1.2 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | SO-36 | 1 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-38 | 1.5 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-41 | 0.5 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-42 | 1 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-43 | 1 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-45 | 1.5 | 8/14/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-46 | 2.5 | 8/15/2006 | X | X | - - | - - | - - | - - | - - |
| | SO-50 | 1.5 | 8/15/2006 | X | X | - - | - - | - - | - - | - - |
| | TP-04-01 | 12 | 11/22/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-02 | 7 | 11/22/2004 | X | - - | - - | - - | - - | - - | - - |
| | TP-04-02 | 14 | 11/22/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-03 | 11 | 11/22/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-04 | 6 | 11/23/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-05 | 9 | 11/23/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-06 | 8.5 | 11/29/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-06 (DUP) | 8.5 | 11/29/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-07 | 9 | 11/29/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-08 | 5 | 11/24/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-09 | 7 | 11/24/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-10 | 9.8 | 11/24/2004 | X | X | - - | - - | X | - - | - - |
| | TP-04-11 | 1.7 | 11/24/2004 | - - | - - | - - | - - | - - | - - | X |
| | TP-04-12 | 10.2 | 11/24/2004 | X | X | - - | - - | X | - - | - - |
| | TP-06-13 | 7.5 | 6/13/2006 | X | X | - - | - - | X | - - | - - |
| | TP-06-14 | 9 | 6/13/2006 | X | X | - - | - - | X | - - | - - |
| | TP-06-15 | 6 | 6/14/2006 | X | X | - - | - - | X | - - | - - |
| | TP-06-16 | 8 | 6/14/2006 | X | X | - - | - - | X | - - | - - |
| Sediment | 00-SED-1 | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-6 | 0 - 0.4 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-7 | 0 - 0.3 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-10 | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-11 | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-12 | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-13 | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-13 (DUP) | 0 - 0.5 | 6/29/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-14 | 0 - 0.5 | 6/30/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-15 | 0 - 0.5 | 6/30/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-16 | 0 - 0.5 | 6/30/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-19 | 0 - 0.4 | 6/30/2005 | X | X | - - | - - | X | X | - - |
| | 00-SED-20 | 0 - 0.3 | 6/30/2005 | X | X | - - | - - | X | X | - - |

See Notes on Page 4.

## Table 1. Sample Summary Table, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Matrix | Location ID | Sample Depth Range (feet) | Date Sampled | VOCs | SVOCs | PAHs | BTEX | Metals | TOC | Cyanide |
|---|---|---|---|---|---|---|---|---|---|---|
| Surface Soil | SS-1 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-1 (DUP) | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-2 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-3 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-4 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-5 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-6 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-7 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-8 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-9 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| | SS-10 | 0 - 0.2 | 6/2/2006 | X | X | - - | - - | X | - - | - - |
| Surface Water | SW-00-Downstream | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-01 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-06 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-06 (DUP) | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-07 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-10 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-13 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00SED-16 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00-SED-19 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00-SED-20 | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |
| | SW-00-Upstream | NA | 8/26/2005 | X | X | - - | - - | X | - - | - - |

See Notes on Page 4.

## Table 1. Sample Summary Table, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**
NA = Not Available.
-- = Not Analyzed.
VOCs = Target Compound List (TCL) Volatile Organic Compounds.
SVOCs = TCL Semi-Volatile Organic Compounds.
PAHs = Polycyclic Aromatic Hydrocarbons.
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes.
Metals = Target Analyte List (TAL) Metals.
TOC = Total Organic Carbon.
Cyanide = Total Cyanide.

## Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:<br>Sample ID:<br>Sample Depth (Feet):<br>Date Collected:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **MW-04-02<br>MW-04-02<br>12 - 14<br>12/01/04** | **MW-04-03<br>MW-04-03<br>10 - 10.5<br>12/01/04** | **MW-04-04<br>MW-04-04<br>12 - 13.7<br>12/01/04** | **MW-04-05<br>MW-04-05<br>8 - 9.7<br>12/02/04** | **MW-06-09<br>MW-06-09<br>8 - 12<br>05/04/06** | **MW-06-10<br>MW-06-10<br>4 - 6<br>05/01/06** | **MW-06-11<br>MW-06-11<br>7 - 9.8<br>05/03/06** | **MW-06-13R<br>MW-06-13R<br>8 - 10<br>06/12/06** | **TP-04-01<br>TP-04-01<br>12<br>11/22/04** | **TP-04-02<br>TP-04-02<br>7<br>11/22/04** | **TP-04-02<br>TP-04-02<br>14<br>11/22/04** | **TP-04-03<br>TP-04-03<br>11<br>11/22/04** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 500 {b} | 0.68 {f} | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 1,1,2,2-Tetrachloroethane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| 1,1,2-Trichloroethane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0035 U | 0.33 U | 0.37 U | 160 U |
| 1,1-Dichloroethane | 240 | 0.27 {f} | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 1,1-Dichloroethene | 500 {b} | 0.33 {f} | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| 1,2-Dichloroethane | 30 | 0.02 {c} | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| 1,2-Dichloroethene (total) | - - | - - | - - | - - | - - | - - | 0.013 U | 0.012 U | 0.012 U | - - | - - | - - | - - | - - |
| 1,2-Dichloropropane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| 2-Butanone | 500 {b} | 0.12 | - - | - - | - - | - - | 0.032 U | 0.022 J | 0.012 J | 0.010 J | 0.0058 UJ | 0.55 U | 0.62 U | 260 U |
| 2-Hexanone | - - | - - | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | 0.029 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 4-Methyl-2-Pentanone | - - | - - | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | 0.029 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Acetone | 500 {b} | 0.05 | - - | - - | - - | - - | 0.035 | **0.11** | **0.089** | **0.055** | 0.090 U | 0.55 UJ | 0.62 UJ | 260 UJ |
| Benzene | 44 | 0.06 | 0.0029 | 0.13 U | 0.024 | **3.8 [7.0]** | 0.0060 U | 0.0060 U | **0.21** | 0.020 | 0.0027 | **3.6** | **0.36** | **1,500** |
| Bromodichloromethane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Bromoform | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0046 U | 0.44 U | 0.49 U | 210 U |
| Bromomethane | - - | - - | - - | - - | - - | - - | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Carbon Disulfide | - - | - - | - - | - - | - - | - - | 0.0060 UJ | 0.0060 U | 0.0060 UJ | 0.0010 J | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Carbon Tetrachloride | 22 | 0.76 {f} | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| Chlorobenzene | 500 {b} | 1.1 | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloroethane | - - | - - | - - | - - | - - | - - | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloroform | 350 | 0.37 | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloromethane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| cis-1,2-Dichloroethene | 500 {b} | 0.25 {f} | - - | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| cis-1,3-Dichloropropene | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Dibromochloromethane | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Ethylbenzene | 390 | 1 {f} | 0.057 | 0.24 J | 0.044 | **26 [61]** | 0.0060 U | 0.0060 U | **2.8 D** | 0.095 | 0.0036 J | 0.88 | 1.0 | **620** |
| Methylene Chloride | 500 {b} | 0.05 | - - | - - | - - | - - | 0.0060 U | 0.0020 J | 0.0060 U | 0.021 UJ | 0.0072 U | 0.33 U | 0.37 U | 160 U |
| Styrene | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 2.3 | 0.62 U | 810 |
| Tetrachloroethene | 150 | 1.3 | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0020 J | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Toluene | 500 {b} | 0.7 | 0.0015 J | 0.070 J | 0.011 | **23 J [53]** | 0.0060 UJ | 0.0060 UJ | **1.5 D** | 0.025 J | 0.0074 | **12** | 0.67 | **5,900** |
| trans-1,2-Dichloroethene | 500 {b} | 0.19 {f} | - - | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| trans-1,3-Dichloropropene | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Trichloroethene | 200 | 0.47 | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Vinyl acetate | - - | - - | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | - - | - - | - - | - - | - - |
| Vinyl Chloride | 13 | 0.02 {f} | - - | - - | - - | - - | 0.013 U | 0.012 U | 0.012 U | 0.012 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Xylene (Total) | 500 {b} | 0.26 | 0.0066 | **0.57 J** | 0.081 | **73 [180]** | 0.019 U | 0.018 U | **8.3 D** | 0.24 | 0.023 | **4.6** | **1.0** | **3,200** |
| Total BTEX | - - | - - | 0.068 J | 0.88 J | 0.16 | 130 J [300] | ND | ND | 13 | 0.38 J | 0.037 J | 21 | 3.0 | 11,000 |
| Total VOCs | - - | - - | 0.068 J | 0.88 J | 0.16 | 130 J [300] | 0.035 | 0.13 J | 13 J | 0.45 J | 0.037 J | 23 | 3.0 | 12,000 |

See Notes on Page 9.

## Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
| **Sample Depth (Feet):** | | | **12 - 14** | **10 - 10.5** | **12 - 13.7** | **8 - 9.7** | **8 - 12** | **4 - 6** | **7 - 9.8** | **8 - 10** | **12** | **7** | **14** | **11** |
| **Date Collected:** | | | **12/01/04** | **12/01/04** | **12/01/04** | **12/02/04** | **05/04/06** | **05/01/06** | **05/03/06** | **06/12/06** | **11/22/04** | **11/22/04** | **11/22/04** | **11/22/04** |
| **SVOCs** | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| 1,2-Dichlorobenzene | 500 {b} | 1.1 {f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 1,3-Dichlorobenzene | 280 | 2.4 {f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 1,4-Dichlorobenzene | 130 | 1.8 | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 2,4,5-Trichlorophenol | - - | - - | - - | - - | - - | - - | 0.99 U | 4.8 U | 9.9 U | - - | - - | - - | - - | - - |
| 2,4,6-Trichlorophenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dichlorophenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dimethylphenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dinitrophenol | - - | - - | - - | - - | - - | - - | 2.0 UJ | 9.6 UJ | 20 UJ | - - | - - | - - | - - | - - |
| 2,4-Dinitrotoluene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| 2,6-Dinitrotoluene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| 2-Chloronaphthalene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 2-Chlorophenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2-Methylnaphthalene | - - | - - | 0.044 J | 5.6 | 1.4 J | 570 [480] | 0.41 U | 5.5 | 1.5 J | 5.6 J | 1.2 J | - - | 0.25 J | 1,200 |
| 2-Methylphenol | 500 {b} | 0.33 {b, f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2-Nitroaniline | - - | - - | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 2-Nitrophenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 3,3'-Dichlorobenzidine | - - | - - | - - | - - | - - | - - | 2.0 U | 2.0 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 3-Nitroaniline | - - | - - | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 4,6-Dinitro-2-methylphenol | - - | - - | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | - - | - - | - - | - - | - - |
| 4-Bromophenyl-phenylether | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Chloro-3-methylphenol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 4-Chloroaniline | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Chlorophenyl-phenylether | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Methylphenol | 500 {b} | 0.33 {b, f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 4-Nitroaniline | - - | - - | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 4-Nitrophenol | - - | - - | - - | - - | - - | - - | 2.0 UJ | 9.6 U | 20 UJ | - - | - - | - - | - - | - - |
| Acenaphthene | 500 {b} | 20 | 0.35 J | 2.9 | 2.2 J | **360 [330]** | 0.41 U | 1.2 J | 7.0 | **50** | 5.4 | - - | 7.4 | **180** |
| Acenaphthylene | 500 {b} | 100 {a, f} | 0.22 J | 5.1 | 2.8 | **250 [200]** | 0.41 U | 2.0 U | 1.6 J | 7.9 J | 1.2 J | - - | 7.5 | **470** |
| Anthracene | 500 {b} | 100 {a, f} | 0.64 | 4.4 | 8.1 | **550 [470]** | 0.41 U | 0.81 J | 7.4 | 57 | 4.4 | - - | 8.8 | **290** |
| Benzo(a)anthracene | 5.6 | 1 {c, f} | 0.20 | **2.2** | **13** | **310 [290]** | 0.41 U | **1.3 J** | **12** | **40** | **3.8** | - - | **3.4** | **140** |
| Benzo(a)pyrene | 1 {f} | 1 {c} | 0.12 | **1.8** | **14** | **250 [240]** | 0.41 U | 0.94 J | **9.9** | **34** | **1.7** | - - | **2.2** | **87** |
| Benzo(b)fluoranthene | 5.6 | 1 {c, f} | 0.034 J | 0.94 | **10** | **170 [160]** | 0.41 U | **1.5 J** | **10** | **35** | 0.73 | - - | 0.78 | **22** |
| Benzo(g,h,i)perylene | 500 {b} | 100 {f} | 0.037 J | 0.75 J | 7.6 | **120 J [110]** | 0.41 U | 0.51 J | 4.4 | 17 J | 0.56 J | - - | 0.75 J | 28 J |
| Benzo(k)fluoranthene | 56 | 0.8 {c, f} | 0.090 | **1.8** | **16** | **260 [250]** | 0.41 U | **1.6 J** | **3.9 J** | **13** | **1.5** | - - | **1.4** | **76** |
| Benzoic acid | - - | - - | - - | - - | - - | - - | 6.0 UJ | 29 UJ | 59 UJ | - - | - - | - - | - - | - - |
| Benzyl alcohol | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| bis(2-Chloroethoxy)methane | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| bis(2-Chloroethyl)ether | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |

See Notes on Page 9.

**Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample Location:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
| **Sample Depth (Feet):** | | | **12 - 14** | **10 - 10.5** | **12 - 13.7** | **8 - 9.7** | **8 - 12** | **4 - 6** | **7 - 9.8** | **8 - 10** | **12** | **7** | **14** | **11** |
| **Date Collected:** | | | **12/01/04** | **12/01/04** | **12/01/04** | **12/02/04** | **05/04/06** | **05/01/06** | **05/03/06** | **06/12/06** | **11/22/04** | **11/22/04** | **11/22/04** | **11/22/04** |
| **SVOCs (Cont'd.)** | | | | | | | | | | | | | | |
| bis(2-chloroisopropyl)ether | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| bis(2-Ethylhexyl)phthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Butylbenzylphthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Carbazole | - - | - - | - - | - - | - - | - - | - - | - - | - - | 5.8 J | 3.9 U | - - | 4.2 U | 90 U |
| Chrysene | 56 | 1 {c, f} | 0.24 J | **2.2** | **14** | **290 [260]** | 0.41 U | **2.0** | **9.2** | **34** | **4.2** | - - | **4.1 J** | **150** |
| Cresols, Total | - - | - - | - - | - - | - - | - - | 0.82 U | 4.0 U | 8.1 U | - - | - - | - - | - - | - - |
| Dibenz(a,h)anthracene | 0.56 | 0.33 {b, f} | 0.015 J | 0.29 | **2.6** | **47 [46]** | 0.41 U | 0.24 J | **1.5 J** | **5.4 J** | **0.44** | - - | **0.49** | **21** |
| Dibenzofuran | 350 | 7 {f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 3.8 J | **32** | 3.9 U | - - | 4.2 U | 90 U |
| Diethylphthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Dimethylphthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Di-n-butylphthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Di-n-octylphthalate | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Fluoranthene | 500 {b} | 100 {a, f} | 0.29 J | 4.7 | 25 | **710 [700]** | 0.025 J | 1.3 J | 23 | 100 | 9.4 | - - | 4.5 | **180** |
| Fluorene | 500 {b} | 30 | 0.31 J | 4.3 | 4.1 | **490 [370]** | 0.41 U | 1.5 J | 5.8 | **48** | 3.6 J | - - | 5.2 | **210** |
| Hexachlorobenzene | 6 | 0.33 {b, f} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| Hexachlorobutadiene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| Hexachlorocyclopentadiene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 UJ | - - | 4.2 UJ | 90 UJ |
| Hexachloroethane | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| Indeno(1,2,3-cd)pyrene | 5.6 | 0.5 {c, f} | 0.034 J | **0.76** | **7.8** | **120 [120]** | 0.41 U | 0.48 J | **4.6** | **17** | **0.51** | - - | **0.76** | **27** |
| Isophorone | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Naphthalene | 500 {b} | 12 {f} | 0.071 J | **15** | 5.5 | **1,900 [1,600]** | 0.41 U | 1.8 J | 6.7 | **32** | 1.7 J | - - | 3.0 J | **1,900** |
| Nitrobenzene | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| N-Nitroso-di-n-propylamine | - - | - - | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| N-Nitrosodiphenylamine | - - | - - | - - | - - | - - | - - | 0.41 U | 2.1 | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Pentachlorophenol | 6.7 | 0.8 {b} | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | - - | - - | - - | - - | - - |
| Phenanthrene | 500 {b} | 100 {f} | 3.1 | 14 | 21 | **1,100 [1,000]** | 0.41 U | 2.4 | 23 | **150** | 48 | - - | 50 | **1,400** |
| Phenol | 500 {b} | 0.33 {b} | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| Pyrene | 500 {b} | 100 {f} | 0.76 | 4.9 | 23 | **610 [570]** | 0.022 J | 2.1 | 17 | 73 | 15 | - - | 12 | **430** |
| Pyridine | - - | - - | - - | - - | - - | - - | 0.99 U | 4.8 U | 9.9 U | - - | - - | - - | - - | - - |
| Total PAHs | - - | - - | 6.6 J | 72 J | 180 J | 8,100 J [7,200] | 0.047 J | 25 J | 150 J | 720 J | 100 J | - - | 110 J | 6,800 J |
| Total SVOCs | - - | - - | 6.6 J | 72 J | 180 J | 8,100 J [7,200] | 0.047 J | 27 J | 150 J | 760 J | 100 J | - - | 110 J | 6,800 J |
| **Metals** | | | | | | | | | | | | | | |
| Aluminum | - - | - - | - - | - - | - - | - - | 8,310 | 5,290 J | 2,220 | 3,280 | 5,940 | - - | 7,540 | 5,480 |
| Antimony | - - | - - | - - | - - | - - | - - | 17.0 U | 18.0 U | 18.0 U | 18.6 U | 14.1 UJ | - - | 15.1 UJ | 16.2 UJ |
| Arsenic | 16 {f} | 13 {c} | - - | - - | - - | - - | 4.00 | **20.0** | **55.0** | **22.6** | 10.6 | - - | **31.4** | 6.30 |
| Barium | 400 | 350 {c} | - - | - - | - - | - - | 73.0 | 102 | 48.0 U | 52.8 | 48.1 | - - | 55.0 | 78.3 |
| Beryllium | 590 | 7.2 | - - | - - | - - | - - | 1.00 U | 1.00 U | 1.00 U | 1.20 U | 0.420 B | - - | 0.590 | 0.270 B |
| Cadmium | 9.3 | 2.5 {c} | - - | - - | - - | - - | 1.00 U | 1.00 U | 1.00 U | 1.20 U | 1.20 U | - - | 1.30 U | 1.30 U |
| Calcium | - - | - - | - - | - - | - - | - - | 39,100 | 21,200 | 19,300 | 32,300 | 47,400 J | - - | 22,500 J | 62,200 J |

See Notes on Page 9.

**Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample Location:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
| **Sample Depth (Feet):** | | | **12 - 14** | **10 - 10.5** | **12 - 13.7** | **8 - 9.7** | **8 - 12** | **4 - 6** | **7 - 9.8** | **8 - 10** | **12** | **7** | **14** | **11** |
| **Date Collected:** | | | **12/01/04** | **12/01/04** | **12/01/04** | **12/02/04** | **05/04/06** | **05/01/06** | **05/03/06** | **06/12/06** | **11/22/04** | **11/22/04** | **11/22/04** | **11/22/04** |
| **Metals (Cont'd.)** | | | | | | | | | | | | | | |
| Chromium | - - | - - | - - | - - | - - | - - | 11.0 | 10.0 | 17.0 | 16.7 | 10.8 | - - | 15.1 | 9.00 |
| Cobalt | - - | - - | - - | - - | - - | - - | 11.0 U | 20.0 | 20.0 | 12.4 U | 7.50 B | - - | 11.1 B | 6.60 B |
| Copper | 270 | 50 | - - | - - | - - | - - | 19.0 | **282** | **284** | **280** | 36.9 | - - | 46.0 | 29.0 |
| Cyanide, Total | 27 {h} | 27 {e, f} | 0.500 U | 0.500 U | 0.500 U | 7.00 [5.50] | - - | - - | - - | - - | 0.500 U | - - | 0.500 U | 0.500 U |
| Iron | - - | - - | - - | - - | - - | - - | 14,500 | 124,000 | 48,900 | 18,700 | 18,700 | - - | 29,000 | 14,600 |
| Lead | 1,000 | 63 {c} | - - | - - | - - | - - | 16.0 | **217** | **343** | **312** | 43.0 J | - - | 39.9 J | **1,540 J** |
| Magnesium | - - | - - | - - | - - | - - | - - | 8,100 | 8,560 | 2,970 | 6,820 | 20,900 J | - - | 12,700 J | 22,700 J |
| Manganese | 10,000 {d} | 1,600 {c} | - - | - - | - - | - - | 292 | 538 | 134 | 143 | 218 | - - | 268 | 435 |
| Mercury | 2.8 {j} | 0.18 {c} | - - | - - | - - | - - | 0 | **2.00** | **1.00** | **2.90** | 0.110 J | - - | 0.100 J | 0.160 J |
| Nickel | 310 | 30 | - - | - - | - - | - - | 20.0 | 29.0 | 23.0 | 15.4 | 24.1 J | - - | **37.4 J** | 14.7 J |
| Potassium | - - | - - | - - | - - | - - | - - | 1,460 | 1,220 U | 1,200 U | 1,240 U | 861 B | - - | 966 B | 977 B |
| Selenium | 1,500 | 3.9 {c} | - - | - - | - - | - - | 4.00 U | 4.00 U | **6.00** | 5.00 U | 8.20 U | - - | 8.80 U | 9.40 U |
| Silver | 1,500 | 2 | - - | - - | - - | - - | 2.00 U | 2.00 U | 2.00 U | 2.50 U | 2.40 U | - - | 2.50 U | 2.70 U |
| Sodium | - - | - - | - - | - - | - - | - - | 1,170 U | 1,220 U | 1,200 U | 1,240 U | 252 B | - - | 114 B | 155 B |
| Thallium | - - | - - | - - | - - | - - | - - | 7.00 U | 7.00 U | 7.00 U | 7.40 U | 5.90 U | - - | 6.30 U | 6.70 U |
| Vanadium | - - | - - | - - | - - | - - | - - | 16.0 | 17.0 | 15.0 | 12.4 U | 16.0 | - - | 21.5 | 11.6 B |
| Zinc | 10,000 {d} | 109 {c} | - - | - - | - - | - - | 41.0 | 105 | **410** | **292** | 55.0 | - - | 78.0 | 38.2 |

See Notes on Page 9.

**Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample Location:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
| **Sample Depth (Feet):** | | | **6** | **9** | **8.5** | **9** | **5** | **7** | **9.8** | **1.7** | **10.2** | **7.5** | **9** | **6** | **8** |
| **Date Collected:** | | | **11/23/04** | **11/23/04** | **11/29/04** | **11/29/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **06/13/06** | **06/13/06** | **06/14/06** | **06/14/06** |
| **VOCs** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 500 {b} | 0.68 {f} | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1,2,2-Tetrachloroethane | - - | - - | 2.6 U | 0.14 U | 0.71 UJ [0.64 UJ] | 0.13 UJ | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1,2-Trichloroethane | - - | - - | 7.9 U | 0.42 U | 2.1 U [1.9 U] | 0.39 U | 0.0039 U | 0.34 U | 0.0038 U | - - | 0.36 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1-Dichloroethane | 240 | 0.27 {f} | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1-Dichloroethene | 500 {b} | 0.33 {f} | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,2-Dichloroethane | 30 | 0.02 {c} | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,2-Dichloroethene (total) | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 1,2-Dichloropropane | - - | - - | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 2-Butanone | 500 {b} | 0.12 | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 UJ | 0.57 U | 0.0063 UJ | - - | 0.60 U | 0.011 J | 0.016 J | 0.015 J | 0.0050 J |
| 2-Hexanone | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.030 U | 0.036 U | 0.033 U | 0.025 U |
| 4-Methyl-2-Pentanone | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.030 U | 0.036 U | 0.033 U | 0.025 U |
| Acetone | 500 {b} | 0.05 | 13 UJ | 0.69 UJ | 3.6 UJ [3.2 UJ] | 0.65 UJ | **0.15** | **0.57 J** | 0.037 U | - - | 0.60 UJ | 0.043 J | **0.068** | **0.058** | 0.029 |
| Benzene | 44 | 0.06 | **140** | **0.80** | **2.4 J [1.4 J]** | **1.1** | 0.0041 | 0.11 U | 0.0013 U | - - | **0.51** | **0.41 D** | 0.024 | **0.26** | 0.0050 U |
| Bromodichloromethane | - - | - - | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Bromoform | - - | - - | 10 U | 0.55 U | 2.8 U [2.5 U] | 0.52 U | 0.0051 U | 0.45 U | 0.0050 U | - - | 0.48 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Bromomethane | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Carbon Disulfide | - - | - - | 13 U | 0.69 U | 3.6 UJ [3.2 UJ] | 0.42 J | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0020 J | 0.0070 U | 0.0070 U | 0.0050 U |
| Carbon Tetrachloride | 22 | 0.76 {f} | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chlorobenzene | 500 {b} | 1.1 | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloroethane | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloroform | 350 | 0.37 | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloromethane | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| cis-1,2-Dichloroethene | 500 {b} | 0.25 {f} | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| cis-1,3-Dichloropropene | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Dibromochloromethane | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Ethylbenzene | 390 | 1 {f} | **62** | **11** | **100 J [86 J]** | **5.6** | 0.0051 U | 0.45 U | 0.0050 U | - - | 0.20 J | 0.73 D | 0.0060 J | 0.17 | 0.0050 U |
| Methylene Chloride | 500 {b} | 0.05 | 7.9 U | 0.42 U | 2.1 U [1.9 U] | 0.39 U | 0.0039 U | 0.34 U | 0.0038 U | - - | 0.36 U | 0.0060 UJ | 0.019 UJ | 0.0070 UJ | 0.0050 UJ |
| Styrene | - - | - - | 110 | 0.69 U | 3.6 U [3.2 U] | 0.99 | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Tetrachloroethene | 150 | 1.3 | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0031 | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0010 J | 0.0070 U | 0.0070 U | 0.0050 U |
| Toluene | 500 {b} | 0.7 | **330** | **3.0** | **14 J [1.8 J]** | **1.5** | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.20 J | 0.42 DJ | 0.0070 UJ | 0.39 DJ | 0.0050 UJ |
| trans-1,2-Dichloroethene | 500 {b} | 0.19 {f} | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| trans-1,3-Dichloropropene | - - | - - | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Trichloroethene | 200 | 0.47 | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Vinyl acetate | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Vinyl Chloride | 13 | 0.02 {f} | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.012 U | 0.014 U | 0.013 U | 0.010 U |
| Xylene (Total) | 500 {b} | 0.26 | **510** | **41** | **390 J [110 J]** | **61** | 0.0064 U | 0.57 U | 0.0063 U | - - | **0.28 J** | **1.9 D** | 0.0040 J | **3.3 D** | 0.015 U |
| Total BTEX | - - | - - | 1,000 | 56 | 510 J [200 J] | 69 | 0.0041 | ND | ND | - - | 1.2 J | 3.5 J | 0.034 J | 4.1 J | ND |
| Total VOCs | - - | - - | 1,200 | 56 | 510 J [200 J] | 71 J | 0.16 | 0.57 J | ND | - - | 1.2 J | 3.5 J | 0.12 J | 4.2 J | 0.034 J |

See Notes on Page 9.

## Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:<br>Sample ID:<br>Sample Depth (Feet):<br>Date Collected:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **TP-04-04<br>TP-04-04<br>6<br>11/23/04** | **TP-04-05<br>TP-04-05<br>9<br>11/23/04** | **TP-04-06<br>TP-04-06<br>8.5<br>11/29/04** | **TP-04-07<br>TP-04-07<br>9<br>11/29/04** | **TP-04-08<br>TP-04-08<br>5<br>11/24/04** | **TP-04-09<br>TP-04-09<br>7<br>11/24/04** | **TP-04-10<br>TP-04-10<br>9.8<br>11/24/04** | **TP-04-11<br>TP-04-11<br>1.7<br>11/24/04** | **TP-04-12<br>TP-04-12<br>10.2<br>11/24/04** | **TP-06-13<br>TP-06-13<br>7.5<br>06/13/06** | **TP-06-14<br>TP-06-14<br>9<br>06/13/06** | **TP-06-15<br>TP-06-15<br>6<br>06/14/06** | **TP-06-16<br>TP-06-16<br>8<br>06/14/06** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | - - | - - | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,2-Dichlorobenzene | 500 {b} | 1.1 {f} | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,3-Dichlorobenzene | 280 | 2.4 {f} | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,4-Dichlorobenzene | 130 | 1.8 | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2,4,5-Trichlorophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4,6-Trichlorophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dichlorophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dimethylphenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dinitrophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dinitrotoluene | - - | - - | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2,6-Dinitrotoluene | - - | - - | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2-Chloronaphthalene | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2-Chlorophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2-Methylnaphthalene | - - | - - | 360 | 220 | 550 J [91 J] | 34 | 4.7 J | 0.033 J | 0.032 J | - - | 1.0 J | 10 | 0.12 J | 580 | 1.3 |
| 2-Methylphenol | 500 {b} | 0.33 {b, f} | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2-Nitroaniline | - - | - - | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 2-Nitrophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 3,3'-Dichlorobenzidine | - - | - - | 220 U | 94 U | 98 UJ [44 UJ] | 44 UJ | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 3-Nitroaniline | - - | - - | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 4,6-Dinitro-2-methylphenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Bromophenyl-phenylether | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Chloro-3-methylphenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Chloroaniline | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Chlorophenyl-phenylether | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Methylphenol | 500 {b} | 0.33 {b, f} | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Nitroaniline | - - | - - | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 4-Nitrophenol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Acenaphthene | 500 {b} | 20 | **44 J** | **180** | **130 [110]** | 18 J | 3.9 J | 0.12 J | 0.047 J | - - | 11 | **26** | 2.1 | **510** | 0.29 J |
| Acenaphthylene | 500 {b} | 100 {a, f} | **260** | 55 | 31 J [22 U] | 42 | 8.1 J | 0.29 J | 0.18 J | - - | 13 | 3.3 J | 0.66 J | **370** | 0.12 J |
| Anthracene | 500 {b} | 100 {a, f} | **230** | **190** | 54 [60] | 59 | 29 | 0.28 J | 0.18 J | - - | 26 | 15 | 1.4 J | **600** | 0.064 J |
| Benzo(a)anthracene | 5.6 | 1 {c, f} | **140** | **120** | **43 [22]** | **44** | **57** | **1.3** | 0.80 | - - | **16** | **18** | **2.8** | **380** | 0.41 U |
| Benzo(a)pyrene | 1 {f} | 1 {c} | **88** | **82** | **23 [10]** | **33** | **48** | 1.0 | **1.1** | - - | **9.5** | **17** | **2.8** | **360** | 0.41 U |
| Benzo(b)fluoranthene | 5.6 | 1 {c, f} | **63** | **53** | **6.1 [4.4]** | **19** | **48** | 0.60 | 0.85 | - - | **2.7** | **18** | **3.3** | **390** | 0.41 U |
| Benzo(g,h,i)perylene | 500 {b} | 100 {f} | 41 J | 34 J | 5.4 J [2.2 J] | 11 J | 20 | 0.50 | 0.25 J | - - | 2.2 J | 9.2 J | 1.8 J | **260** | 0.41 U |
| Benzo(k)fluoranthene | 56 | 0.8 {c, f} | **94** | **83** | **20 [9.8]** | **38** | **55** | **1.1** | **1.4** | - - | **7.8** | **5.4 J** | **1.0 J** | **120** | 0.41 U |
| Benzoic acid | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Benzyl alcohol | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| bis(2-Chloroethoxy)methane | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| bis(2-Chloroethyl)ether | - - | - - | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |

See Notes on Page 9.

**Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample Location:**<br>**Sample ID:**<br>**Sample Depth (Feet):**<br>**Date Collected:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **TP-04-04**<br>**TP-04-04**<br>**6**<br>**11/23/04** | **TP-04-05**<br>**TP-04-05**<br>**9**<br>**11/23/04** | **TP-04-06**<br>**TP-04-06**<br>**8.5**<br>**11/29/04** | **TP-04-07**<br>**TP-04-07**<br>**9**<br>**11/29/04** | **TP-04-08**<br>**TP-04-08**<br>**5**<br>**11/24/04** | **TP-04-09**<br>**TP-04-09**<br>**7**<br>**11/24/04** | **TP-04-10**<br>**TP-04-10**<br>**9.8**<br>**11/24/04** | **TP-04-11**<br>**TP-04-11**<br>**1.7**<br>**11/24/04** | **TP-04-12**<br>**TP-04-12**<br>**10.2**<br>**11/24/04** | **TP-06-13**<br>**TP-06-13**<br>**7.5**<br>**06/13/06** | **TP-06-14**<br>**TP-06-14**<br>**9**<br>**06/13/06** | **TP-06-15**<br>**TP-06-15**<br>**6**<br>**06/14/06** | **TP-06-16**<br>**TP-06-16**<br>**8**<br>**06/14/06** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | | | | | | | |
| bis(2-chloroisopropyl)ether | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| bis(2-Ethylhexyl)phthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Butylbenzylphthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Carbazole | - - | - - | 83 J | 42 J | 49 UJ [0.93 J] | 16 J | 11 | 0.051 J | 0.055 J | - - | 0.76 J | 6.8 J | 0.50 J | 200 | 0.41 U |
| Chrysene | 56 | 1 {c, f} | **110 J** | **110** | **52 [22 J]** | **38** | **59** | **1.2** | 0.78 | - - | **18** | **14** | **2.7** | **310** | 0.41 U |
| Cresols, Total | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Dibenz(a,h)anthracene | 0.56 | 0.33 {b, f} | **23** | **19** | **4.2 J [2.2 U]** | **3.7** | **7.6** | 0.17 | 0.11 | - - | **1.0** | **2.7 J** | **0.44 J** | **52 J** | 0.41 U |
| Dibenzofuran | 350 | 7 {f} | **170** | **130** | **49 U [20 J]** | **46** | **10** | 0.099 J | 0.056 J | - - | 6.1 J | **14** | 0.96 J | **440** | 0.15 J |
| Diethylphthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Dimethylphthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Di-n-butylphthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Di-n-octylphthalate | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Fluoranthene | 500 {b} | 100 {a, f} | **320** | **300** | 41 J [45] | 100 | **150** | 2.6 | 0.93 | - - | 20 | 44 | 6.2 | **1,100 D** | 0.024 J |
| Fluorene | 500 {b} | 30 | **210** | **180** | **59 [60]** | **54** | 10 | 0.10 J | 0.037 J | - - | 16 | 18 | 1.6 J | **530** | 0.21 J |
| Hexachlorobenzene | 6 | 0.33 {b, f} | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachlorobutadiene | - - | - - | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachlorocyclopentadiene | - - | - - | 110 UJ | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachloroethane | - - | - - | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Indeno(1,2,3-cd)pyrene | 5.6 | 0.5 {c, f} | **44** | **36** | **4.1 J [2.3]** | **11** | **20** | **0.53** | 0.30 | - - | **2.0** | **8.9 J** | **1.7 J** | **220** | 0.41 U |
| Isophorone | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Naphthalene | 500 {b} | 12 {f} | **1,300** | **780** | **810 J [260 J]** | **270** | **16** | 0.14 J | 0.091 J | - - | 2.1 J | **71** | 1.6 J | **2,800 D** | 4.8 |
| Nitrobenzene | - - | - - | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| N-Nitroso-di-n-propylamine | - - | - - | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| N-Nitrosodiphenylamine | - - | - - | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Pentachlorophenol | 6.7 | 0.8 {b} | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Phenanthrene | 500 {b} | 100 {f} | **570** | **610** | **53 [370]** | **200** | **140** | 0.49 | 0.44 | - - | **140** | 57 | 4.7 | **1,700 D** | 0.29 J |
| Phenol | 500 {b} | 0.33 {b} | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Pyrene | 500 {b} | 100 {f} | **290** | **260** | 94 [61] | 100 | **140** | 2.8 | 1.1 | - - | 55 | 30 | 4.8 | **960** | 0.41 U |
| Pyridine | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Total PAHs | - - | - - | 4,200 J | 3,300 J | 2,000 J [1,100 J] | 1,100 J | 820 J | 13 J | 8.6 J | - - | 340 J | 370 J | 40 J | 11,000 J | 7.1 J |
| Total SVOCs | - - | - - | 4,400 J | 3,500 J | 2,000 J [1,200 J] | 1,100 J | 840 J | 13 J | 8.7 J | - - | 350 J | 390 J | 41 J | 12,000 J | 7.3 J |
| **Metals** | | | | | | | | | | | | | | | |
| Aluminum | - - | - - | 2,750 | 7,400 | 8,500 [6,970] | 8,310 | 5,300 | 4,280 | 8,040 | - - | 5,900 | 3,690 | 1,850 | 978 | 6,710 |
| Antimony | - - | - - | 16.0 UJ | 17.0 UJ | 17.6 UJ [15.9 UJ] | 15.9 UJ | 77.5 UJ | 14.1 UJ | 15.1 UJ | - - | 14.8 UJ | 33.2 | 14.8 U | 16.5 U | 18.2 U |
| Arsenic | 16 {f} | 13 {c} | **19.0** | **38.9** | **3.00 J [15.0 J]** | 6.10 J | **73.9** | **22.8** | 10.3 | - - | **22.1** | **34.1** | **20.3** | 12.7 | 3.20 |
| Barium | 400 | 350 {c} | 46.2 B | 102 | 50.8 B [80.7] | 57.7 | 74.3 B | 35.2 B | 76.7 | - - | 71.8 | 46.5 U | 39.5 U | 55.7 | 53.0 |
| Beryllium | 590 | 7.2 | 0.130 B | 0.620 | 0.270 B [0.620] | 0.490 B | 0.520 B | 0.350 B | 0.780 | - - | 0.430 B | 1.20 U | 0.990 U | 1.10 U | 1.20 U |
| Cadmium | 9.3 | 2.5 {c} | 1.30 U | 1.40 U | 1.50 U [1.30 U] | 1.30 U | 6.50 U | 0.110 B | 0.100 B | - - | 1.20 U | 1.20 U | 0.990 U | 1.10 U | 1.20 U |
| Calcium | - - | - - | 29,900 J | 53,200 J | 4,790 J [33,200 J] | 20,900 J | 18,500 J | 119,000 J | 16,600 J | - - | 43,900 J | 25,000 | 17,100 | 75,300 | 21,400 |

See Notes on Page 9.

**Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample Location:** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
| **Sample Depth (Feet):** | | | **6** | **9** | **8.5** | **9** | **5** | **7** | **9.8** | **1.7** | **10.2** | **7.5** | **9** | **6** | **8** |
| **Date Collected:** | | | **11/23/04** | **11/23/04** | **11/29/04** | **11/29/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **06/13/06** | **06/13/06** | **06/14/06** | **06/14/06** |
| **Metals (Cont'd.)** | | | | | | | | | | | | | | | |
| Chromium | - - | - - | 4.50 | 14.2 | 8.90 [14.3] | 12.0 | 16.9 | 8.60 | 13.7 | - - | 12.1 | 19.3 | 15.0 | 4.60 | 9.80 |
| Cobalt | - - | - - | 4.50 B | 10.6 B | 5.30 B [10.6 B] | 7.70 B | 16.4 B | 7.50 B | 8.60 B | - - | 13.0 | 11.6 U | 10.5 | 11.0 U | 12.1 U |
| Copper | 270 | 50 | 27.6 | 41.6 | **191 J [40.0 J]** | 27.5 J | **115** | 33.8 | 22.3 | - - | 20.5 | **89.5** | **206** | 28.6 | 17.0 |
| Cyanide, Total | 27 {h} | 27 {e, f} | 4.40 | 0.500 U | 0.500 U [0.500 U] | 0.500 U | 0.870 | 0.500 U | 1.10 | 5.40 | 0.630 | - - | - - | - - | - - |
| Iron | - - | - - | 19,500 | 26,700 | 12,900 [25,000] | 19,200 | 114,000 | 15,400 | 22,300 | - - | 18,700 | 27,900 | 61,800 | 14,900 | 14,600 |
| Lead | 1,000 | 63 {c} | 45.1 J | 25.1 J | 16.4 [18.6] | 55.2 | **385 J** | **66.9 J** | 23.0 J | - - | 19.9 J | **412** | **258** | **108** | 10.4 |
| Magnesium | - - | - - | 9,640 J | 20,100 J | 1,760 J [17,100 J] | 7,130 J | 2,640 BJ | 13,500 J | 7,020 J | - - | 20,300 J | 5,650 | 3,820 | 2,090 | 10,700 |
| Manganese | 10,000 {d} | 1,600 {c} | 180 | 600 | 145 [413] | 215 | 500 | 232 | 189 | - - | 420 | 145 | 193 | 258 | 261 |
| Mercury | 2.8 {j} | 0.18 {c} | **0.510 J** | 0.160 J | 0.0400 B [0.0500] | **0.240** | **0.740 J** | 0.0600 J | **1.90 J** | - - | 0.0500 J | **1.10** | **0.452** | **2.00** | 0.0220 J |
| Nickel | 310 | 30 | 10.0 BJ | **33.5 J** | **10.9 BJ [37.2 J]** | 17.2 J | **31.1 BJ** | 29.4 J | 25.7 J | - - | 29.8 J | 16.5 | 17.2 | 8.80 U | 13.9 |
| Potassium | - - | - - | 530 B | 1,220 B | 557 B [1,100 B] | 824 B | 809 B | 929 B | 784 B | - - | 1,100 B | 1,160 U | 987 U | 1,100 U | 1,210 U |
| Selenium | 1,500 | 3.9 {c} | **13.8** | 49.6 U | 10.3 U [1.10 B] | 1.60 | **9.60** | 41.2 UJ | 44.1 UJ | - - | 8.70 U | 4.60 U | **5.40** | 4.40 U | 4.90 U |
| Silver | 1,500 | 2 | 2.70 U | 2.80 U | 2.90 U [2.70 U] | 2.60 U | 12.9 U | 2.40 U | 2.50 U | - - | 2.50 U | 2.30 U | 2.00 U | 2.20 U | 2.40 U |
| Sodium | - - | - - | 1,340 U | 1,420 U | 145 B [118 B] | 109 B | 6,460 U | 137 B | 2,090 | - - | 117 B | 1,160 U | 987 U | 1,100 U | 1,210 U |
| Thallium | - - | - - | 6.70 U | 7.10 U | 7.30 U [6.60 U] | 6.60 U | 6.50 U | 5.90 U | 6.30 U | - - | 6.20 U | 7.00 U | 5.90 U | 6.60 U | 7.30 U |
| Vanadium | - - | - - | 8.70 B | 16.5 | 15.5 [18.9] | 16.9 | 34.5 B | 14.7 | 21.4 | - - | 12.6 | 11.6 U | 10.6 | 11.0 U | 13.9 |
| Zinc | 10,000 {d} | 109 {c} | 48.1 | 70.1 | 33.0 [49.9] | 56.8 | **146** | 48.5 | 51.1 | - - | 51.4 | **326** | **295** | 92.7 | 26.1 |

See Notes on Page 9.

## Table 2. Subsurface Soil Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**

All concentrations reported in milligrams per Kilogram (mg/Kg); equivalent to parts per million (ppm).

Detected concentrations are bolded.

[ ] Bracketed results represent the duplicate sample.

-- = Sample not analyzed for specified constituent/no criteria available.

Shaded vali indicate the result exceeded the NYSDEC Part 375-6.5 Soil Cleanup Objectives (SCOs) for Protection of Public Health - Commercial Use, December 14, 2006.

Values in **bold** font indicate the result exceeded the NYSDEC SCO for Unrestricted Use.

**Lab Qualifier Notes:**

| **Qualifier Type** | **Lab Qualifiers** | **Definition** |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | J = | Indicates an estimated value. |
| Organic | ND = | None detected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:** | **NYSDEC** | **MW-04-01** | **MW-04-01** | **MW-06-01RI** | **MW-06-01RD** | **MW-04-02** | **MW-04-02** | **MW-05-02R** | **MW-05-02R** | **MW-04-03** | **MW-04-03** | **MW-04-04** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date Collected:** | **TOGS** | **04/05/05** | **08/08/06** | **04/12/07** | **04/13/07** | **04/05/05** | **08/07/06** | **04/04/05** | **08/07/06** | **04/05/05** | **08/08/06** | **04/05/05** |
| **VOCs** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| 1,1,2,2-Tetrachloroethane | 5 | 1.0 U | NA | 5.0 U | 5.0 U | 2.0 U | NA | 1.0 U | NA | 10 U | NA | 1.0 U |
| 1,1,2-Trichloroethane | 1 | 3.0 U | NA | 5.0 U | 5.0 U | 6.0 U | NA | 3.0 U | NA | 30 U | NA | 3.0 U |
| 1,1-Dichloroethane | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| 1,1-Dichloroethene | 5 | 2.0 U | NA | 5.0 U | 5.0 U | 4.0 U | NA | 2.0 U | NA | 20 U | NA | 2.0 U |
| 1,2-Dichloroethane | 0.6 | 2.0 U | NA | 5.0 U | 5.0 U | 4.0 U | NA | 2.0 U | NA | 20 U | NA | 2.0 U |
| 1,2-Dichloropropane | 1 | 1.0 U | NA | 5.0 U | 5.0 U | 2.0 U | NA | 1.0 U | NA | 10 U | NA | 1.0 U |
| 2-Butanone | 50 | 5.0 U | NA | 25 U | 25 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| 2-Hexanone | 50 | 5.0 U | NA | 25 U | 25 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| 4-Methyl-2-Pentanone | - - | 5.0 U | NA | 25 U | 25 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Acetone | 50 | 5.0 UJ | NA | 25 U | 25 U | 10 UJ | NA | 5.0 UJ | NA | 50 UJ | NA | 5.0 UJ |
| Benzene | 1 | 1.0 U | 5.0 U | 5.0 U | 5.0 U | **4.4** | **12** | **14** | 5.0 U | **480** | **1,400 D** | **10** |
| Bromodichloromethane | 50 | 1.0 U | NA | 5.0 U | 5.0 U | 2.0 U | NA | 1.0 U | NA | 10 U | NA | 1.0 U |
| Bromoform | 50 | 4.0 U | NA | 5.0 UJ | 5.0 UJ | 8.0 U | NA | 4.0 U | NA | 40 U | NA | 4.0 U |
| Bromomethane | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Carbon Disulfide | 60 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Carbon Tetrachloride | 5 | 2.0 U | NA | 5.0 U | 5.0 U | 4.0 U | NA | 2.0 U | NA | 20 U | NA | 2.0 U |
| Chlorobenzene | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Chloroethane | 5 | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Chloroform | 7 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Chloromethane | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| cis-1,2-Dichloroethene | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| cis-1,3-Dichloropropene | 0.4 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Dibromochloromethane | 50 | 5.0 U | NA | NA | NA | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Ethylbenzene | 5 | 4.0 U | 5.0 U | 5.0 U | 5.0 U | **160** | **89** | 4.0 U | 5.0 U | **750** | **980 D** | **0.50 J** |
| Methylene Chloride | 5 | 3.0 U | NA | 5.0 UJ | 5.0 UJ | 6.0 U | NA | 3.0 U | NA | 30 U | NA | 3.0 U |
| Styrene | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | **19 J** | NA | 5.0 U |
| Tetrachloroethene | 5 | 1.0 U | NA | 5.0 U | 5.0 U | 2.0 U | NA | 1.0 U | NA | 10 U | NA | 1.0 U |
| Toluene | 5 | 5.0 U | 5.0 U | 5.0 U | 5.0 U | **26** | **7.0** | 5.0 U | 5.0 U | **360** | **710 D** | **0.30 J** |
| trans-1,2-Dichloroethene | 5 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| trans-1,3-Dichloropropene | 0.4 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Trichloroethene | 5 | 1.0 U | NA | 5.0 U | 5.0 U | 2.0 U | NA | 1.0 U | NA | 10 U | NA | 1.0 U |
| Vinyl Chloride | 2 | 5.0 U | NA | 5.0 U | 5.0 U | 10 U | NA | 5.0 U | NA | 50 U | NA | 5.0 U |
| Xylene (Total) | 5 | 5.0 U | 15 U | 15 U | 15 U | **200** | **51** | 5.0 U | 15 U | **1,800** | **2,000 D** | **1.6 J** |
| Total BTEX | - - | ND | ND | ND | ND | **390** | **160** | **14** | ND | **3,400** | **5,100** | **12 J** |
| Total VOCs | - - | ND | ND | ND | ND | **390** | **160** | **14** | ND | **3,400 J** | **5,100** | **12 J** |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:**<br>**Date Collected:** | **NYSDEC**<br>**TOGS** | **MW-04-01**<br>**04/05/05** | **MW-04-01**<br>**08/08/06** | **MW-06-01RI**<br>**04/12/07** | **MW-06-01RD**<br>**04/13/07** | **MW-04-02**<br>**04/05/05** | **MW-04-02**<br>**08/07/06** | **MW-05-02R**<br>**04/04/05** | **MW-05-02R**<br>**08/07/06** | **MW-04-03**<br>**04/05/05** | **MW-04-03**<br>**08/08/06** | **MW-04-04**<br>**04/05/05** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 | 1.0 U | NA | NA | NA | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| 1,2-Dichlorobenzene | 3 | 10 U | NA | NA | NA | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 1,3-Dichlorobenzene | 3 | 10 U | NA | NA | NA | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 1,4-Dichlorobenzene | 3 | 10 U | NA | NA | NA | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 2,4-Dinitrotoluene | 5 | 2.0 U | NA | 10 U | 10 U | 4.2 U | NA | 2.2 U | NA | 24 U | NA | 2.1 U |
| 2,6-Dinitrotoluene | 5 | 2.0 U | NA | 10 U | 10 U | 4.2 U | NA | 2.2 U | NA | 24 U | NA | 2.1 U |
| 2-Chloronaphthalene | 10 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 2-Methylnaphthalene | - - | 10 U | 10 U | 10 U | 10 U | **28** | **1.0 J** | 11 U | 10 U | **93 J** | **83** | **0.60 J** |
| 2-Nitroaniline | 5 | 20 U | NA | 49 U | 48 U | 42 U | NA | 22 U | NA | 240 U | NA | 21 U |
| 3,3'-Dichlorobenzidine | 5 | 20 U | NA | 20 U | 19 U | 42 U | NA | 22 U | NA | 240 U | NA | 21 U |
| 3-Nitroaniline | 5 | 20 U | NA | 49 U | 48 U | 42 U | NA | 22 U | NA | 240 U | NA | 21 U |
| 4-Bromophenyl-phenylether | - - | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 4-Chloroaniline | 5 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 4-Chlorophenyl-phenylether | - - | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| 4-Nitroaniline | 5 | 20 U | NA | 49 U | 48 U | 42 U | NA | 22 U | NA | 240 U | NA | 21 U |
| Acenaphthene | 20 | 10 U | 10 U | 10 U | 10 U | **20 J** | **28** | 11 U | 10 U | **47 J** | **78** | **3.3 J** |
| Acenaphthylene | - - | 10 U | 10 U | 10 U | 10 U | **48** | **40** | 11 U | 10 U | **74 J** | **97** | 11 U |
| Anthracene | 50 | 10 U | 10 U | 10 U | 10 U | **1.9 J** | **4.0 J** | 11 U | 10 U | 120 U | **7.0 J** | 11 U |
| Benzo(a)anthracene | 0.002 | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| Benzo(a)pyrene | ND | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| Benzo(b)fluoranthene | 0.002 | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| Benzo(g,h,i)perylene | - - | 10 U | 10 U | 10 U | 10 U | 21 U | 10 U | 11 U | 10 U | 120 U | 10 U | 11 U |
| Benzo(k)fluoranthene | 0.002 | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| bis(2-Chloroethoxy)methane | 5 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| bis(2-Chloroethyl)ether | 1 | 1.0 U | NA | 10 U | 10 U | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| bis(2-chloroisopropyl)ether | 5 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| bis(2-Ethylhexyl)phthalate | 5 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Butylbenzylphthalate | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Carbazole | - - | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | **30 J** | NA | 11 U |
| Chrysene | 0.002 | 10 U | 10 U | 10 U | 10 U | 21 U | 10 U | 11 U | 10 U | 120 U | 10 U | 11 U |
| Dibenz(a,h)anthracene | - - | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| Dibenzofuran | - - | 10 U | 10 U | 10 U | 10 U | 21 U | **1.0 J** | 11 U | 10 U | **16 J** | **26** | **0.80 J** |
| Diethylphthalate | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Dimethylphthalate | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Di-n-butylphthalate | 50 | 10 U | NA | 10 U | **0.30 J** | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Di-n-octylphthalate | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Fluoranthene | 50 | 10 U | 10 U | 10 U | 10 U | 21 U | **1.0 J** | 11 U | 10 U | 120 U | **3.0 J** | 11 U |
| Fluorene | 50 | 10 U | 10 U | 10 U | 10 U | **9.0 J** | **12** | 11 U | 10 U | **24 J** | **33** | **1.7 J** |
| Hexachlorobenzene | 0.04 | 1.0 U | NA | 10 U | 10 U | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| Hexachlorobutadiene | 0.5 | 2.0 U | NA | 10 U | 10 U | 4.2 U | NA | 2.2 U | NA | 24 U | NA | 2.1 U |
| Hexachlorocyclopentadiene | 5 | 10 UJ | NA | 44 U | 43 U | 21 UJ | NA | 11 UJ | NA | 120 UJ | NA | 11 UJ |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Date Collected: | NYSDEC<br>TOGS | MW-04-01<br>04/05/05 | MW-04-01<br>08/08/06 | MW-06-01RI<br>04/12/07 | MW-06-01RD<br>04/13/07 | MW-04-02<br>04/05/05 | MW-04-02<br>08/07/06 | MW-05-02R<br>04/04/05 | MW-05-02R<br>08/07/06 | MW-04-03<br>04/05/05 | MW-04-03<br>08/08/06 | MW-04-04<br>04/05/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | | | | |
| Hexachloroethane | 5 | 1.0 U | NA | 10 U | 10 U | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| Indeno(1,2,3-cd)pyrene | 0.002 | 1.0 U | 10 U | 10 U | 10 U | 2.1 U | 10 U | 1.1 U | 10 U | 12 U | 10 U | 1.1 U |
| Isophorone | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Naphthalene | 10 | 10 U | **1.0 J** | 10 U | 10 U | **420** | **58** | **1.0 J** | 10 U | **1,600** | **4,700 D** | **6.8 J** |
| Nitrobenzene | 0.4 | 1.0 U | NA | 10 U | 10 U | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| N-Nitroso-di-n-propylamine | - - | 1.0 U | NA | 10 U | 10 U | 2.1 U | NA | 1.1 U | NA | 12 U | NA | 1.1 U |
| N-Nitrosodiphenylamine | 50 | 10 U | NA | 10 U | 10 U | 21 U | NA | 11 U | NA | 120 U | NA | 11 U |
| Phenanthrene | 50 | 10 U | 10 U | 10 U | 10 U | **10 J** | **28** | 11 U | 10 U | **15 J** | **43** | **2.8 J** |
| Pyrene | 50 | 10 U | 10 U | 10 U | 10 U | 21 U | **2.0 J** | 11 U | 10 U | 120 U | **2.0 J** | 11 U |
| Total PAHs | - - | ND | **1.0 J** | ND | ND | **540 J** | **170 J** | **1.0 J** | ND | **1,900 J** | **5,100 J** | **15 J** |
| Total SVOCs | - - | ND | **1.0 J** | ND | **0.30 J** | **540 J** | **180 J** | **1.0 J** | ND | **1,900 J** | **5,100 J** | **16 J** |
| **Metals** | | | | | | | | | | | | |
| Aluminum | - - | **173 B** | NA | 200 U | 200 U | 200 U | NA | 200 U | NA | **366** | NA | 200 U |
| Antimony | 3 | 60.0 U | NA | 20.0 U | 20.0 U | 60.0 U | NA | 60.0 U | NA | 60.0 U | NA | 60.0 U |
| Arsenic | 25 | 15.0 U | NA | 10.0 U | 10.0 U | **43.4** | NA | **7.20** | NA | **17.2** | NA | **11.2** |
| Barium | 1,000 | **136 B** | NA | **236** | **180** | **200** | NA | **279** | NA | **365** | NA | **393** |
| Beryllium | 3 | 1.00 U | NA | 2.00 U | 2.00 U | 1.00 U | NA | 1.00 U | NA | 1.00 U | NA | 1.00 U |
| Cadmium | 5 | 1.00 U | NA | 1.00 U | 1.00 U | 1.00 U | NA | 1.00 U | NA | 1.00 U | NA | 1.00 U |
| Calcium | - - | **195,000** | NA | **117,000** | **102,000** | **167,000** | NA | **124,000** | NA | **100,000** | NA | **113,000** |
| Chromium | 50 | 10.0 U | NA | 4.00 U | 4.00 U | 10.0 U | NA | 10.0 U | NA | 10.0 U | NA | 10.0 U |
| Cobalt | - - | 50.0 U | NA | 4.00 U | 4.00 U | 50.0 U | NA | 50.0 U | NA | 50.0 U | NA | 50.0 U |
| Copper | 200 | **6.80 B** | NA | 10.0 U | 10.0 U | 25.0 U | NA | 25.0 U | NA | 25.0 U | NA | 25.0 U |
| Cyanide, Total | 200 | 10.0 U | NA | **13.0** | **28.0** | 10.0 U | NA | 10.0 U | NA | **13.0** | NA | **14.0** |
| Iron | 300 | **450** | NA | 50.0 U | **111** | **6,260** | NA | **5,920** | NA | **7,660** | NA | **16,200** |
| Lead | 25 | 5.00 U | NA | 5.00 U | 5.00 U | 5.00 U | NA | 5.00 U | NA | 5.00 U | NA | **3.70** |
| Magnesium | 35,000 | **34,100** | NA | **77,900** | **67,600** | **27,600** | NA | **38,800** | NA | **30,000** | NA | **38,800** |
| Manganese | 300 | **77.7** | NA | **8.30** | **13.6** | **239** | NA | **96.8** | NA | **548** | NA | **247** |
| Mercury | 0.7 | 0.200 U | NA | 0.200 U | 0.200 U | 0.200 U | NA | 0.200 U | NA | 0.200 U | NA | 0.200 U |
| Nickel | 100 | **5.90 B** | NA | 10.0 U | 10.0 U | **2.80 B** | NA | 40.0 U | NA | 40.0 U | NA | 40.0 U |
| Potassium | - - | **8,100** | NA | **6,980** | **6,600** | **3,900 B** | NA | **4,510 B** | NA | **6,040** | NA | **12,700** |
| Selenium | 10 | 35.0 U | NA | 15.0 U | 15.0 U | 35.0 U | NA | 35.0 U | NA | 35.0 U | NA | 35.0 U |
| Silver | 50 | 10.0 U | NA | 3.00 U | 3.00 U | 10.0 U | NA | 10.0 U | NA | 10.0 U | NA | 10.0 U |
| Sodium | 20,000 | **28,300** | NA | **35,000 J** | **29,600 J** | **33,400** | NA | **34,900** | NA | **21,600** | NA | **14,800** |
| Thallium | 0.5 | 25.0 U | NA | 20.0 U | 20.0 U | 25.0 U | NA | 25.0 U | NA | 25.0 U | NA | 25.0 U |
| Vanadium | - - | 50.0 U | NA | 5.00 U | 5.00 U | 50.0 U | NA | 50.0 U | NA | 50.0 U | NA | 50.0 U |
| Zinc | 2,000 | **14.2 B** | NA | 10.0 U | 10.0 U | **14.1 B** | NA | 60.0 U | NA | **8.40 B** | NA | **14.2 B** |

See Notes on Page 13.

**Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| Sample ID:<br>Date Collected: | NYSDEC TOGS | MW-04-04 08/08/06 | MW-04-05 04/05/05 | MW-04-05 08/10/06 | MW-04-06 04/06/05 | MW-04-06 08/09/06 | MW-06-06R 08/10/06 | MW-06-06RI 04/12/07 | MW-06-06RD 04/13/07 | MW-05-07 04/05/05 | MW-05-07 08/08/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| 1,1,2,2-Tetrachloroethane | 5 | NA | 1.0 U | NA | 1.0 U | NA | 5.0 UJ | 5.0 U [5.0 U] | 5.0 UJ | 1.0 U | NA |
| 1,1,2-Trichloroethane | 1 | NA | 3.0 U | NA | 3.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 3.0 U | NA |
| 1,1-Dichloroethane | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| 1,1-Dichloroethene | 5 | NA | 2.0 U | NA | 2.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 2.0 U | NA |
| 1,2-Dichloroethane | 0.6 | NA | 2.0 U | NA | 2.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 2.0 U | NA |
| 1,2-Dichloropropane | 1 | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 1.0 U | NA |
| 2-Butanone | 50 | NA | 5.0 U | NA | 5.0 U | NA | 25 U | 25 U [25 U] | 25 U | 5.0 U | NA |
| 2-Hexanone | 50 | NA | 5.0 U | NA | 5.0 U | NA | 25 U | 25 U [25 U] | 25 U | 5.0 U | NA |
| 4-Methyl-2-Pentanone | - - | NA | 5.0 U | NA | 5.0 U | NA | 25 U | 25 U [25 U] | 25 U | 5.0 U | NA |
| Acetone | 50 | NA | 5.0 UJ | NA | 5.0 UJ | NA | **2.6 J** | 25 U [25 U] | **12 J** | 5.0 UJ | NA |
| Benzene | 1 | **1.0 J** | 1.0 U | **42** | 1.0 U | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | **2.2** | **2.0 J** |
| Bromodichloromethane | 50 | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 1.0 U | NA |
| Bromoform | 50 | NA | 4.0 U | NA | 4.0 U | NA | 5.0 UJ | 5.0 UJ [5.0 UJ] | 5.0 UJ | 4.0 U | NA |
| Bromomethane | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Carbon Disulfide | 60 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Carbon Tetrachloride | 5 | NA | 2.0 U | NA | 2.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 2.0 U | NA |
| Chlorobenzene | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Chloroethane | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 UJ [5.0 UJ] | 5.0 UJ | 5.0 U | NA |
| Chloroform | 7 | NA | 5.0 U | NA | 5.0 U | NA | **1.1 J** | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Chloromethane | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| cis-1,2-Dichloroethene | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| cis-1,3-Dichloropropene | 0.4 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Dibromochloromethane | 50 | NA | 5.0 U | NA | 5.0 U | NA | NA | NA | NA | 5.0 U | NA |
| Ethylbenzene | 5 | 5.0 U | 4.0 U | **22** | 4.0 U | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | **2.0 J** | 5.0 U |
| Methylene Chloride | 5 | NA | 3.0 U | NA | 3.0 U | NA | 5.0 UJ | 5.0 UJ [5.0 UJ] | 5.0 UJ | 3.0 U | NA |
| Styrene | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Tetrachloroethene | 5 | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | **0.40 J** | NA |
| Toluene | 5 | 5.0 U | 5.0 U | **41** | 5.0 U | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | **0.90 J** | 5.0 U |
| trans-1,2-Dichloroethene | 5 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| trans-1,3-Dichloropropene | 0.4 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Trichloroethene | 5 | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 1.0 U | NA |
| Vinyl Chloride | 2 | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | NA |
| Xylene (Total) | 5 | 15 U | 5.0 U | **64** | 5.0 U | 15 U | 15 U | 15 U [15 U] | 15 U | **2.9 J** | 15 U |
| Total BTEX | - - | **1.0 J** | ND | **170** | ND | ND | ND | ND [ND] | ND | **8.0 J** | **2.0 J** |
| Total VOCs | - - | **1.0 J** | ND | **170** | ND | ND | **3.7 J** | ND [ND] | **12 J** | **8.4 J** | **2.0 J** |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:**<br>**Date Collected:** | **NYSDEC**<br>**TOGS** | **MW-04-04**<br>**08/08/06** | **MW-04-05**<br>**04/05/05** | **MW-04-05**<br>**08/10/06** | **MW-04-06**<br>**04/06/05** | **MW-04-06**<br>**08/09/06** | **MW-06-06R**<br>**08/10/06** | **MW-06-06RI**<br>**04/12/07** | **MW-06-06RD**<br>**04/13/07** | **MW-05-07**<br>**04/05/05** | **MW-05-07**<br>**08/08/06** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 | NA | 1.0 U | NA | 1.0 U | NA | NA | NA | NA | 1.0 U | NA |
| 1,2-Dichlorobenzene | 3 | NA | 10 U | NA | 10 U | NA | NA | NA | NA | 10 U | NA |
| 1,3-Dichlorobenzene | 3 | NA | 10 U | NA | 10 U | NA | NA | NA | NA | 10 U | NA |
| 1,4-Dichlorobenzene | 3 | NA | 10 U | NA | 10 U | NA | NA | NA | NA | 10 U | NA |
| 2,4-Dinitrotoluene | 5 | NA | 2.0 U | NA | 2.0 U | NA | 10 U | 10 U [10 U] | 10 U | 2.0 U | NA |
| 2,6-Dinitrotoluene | 5 | NA | 2.0 U | NA | 2.0 U | NA | 10 U | 10 U [10 U] | 10 U | 2.0 U | NA |
| 2-Chloronaphthalene | 10 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| 2-Methylnaphthalene | - - | 10 U | **5.4 J** | **20** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **1.1 J** | 9.0 U |
| 2-Nitroaniline | 5 | NA | 20 U | NA | 20 U | NA | 48 U | 48 U [48 U] | 49 U | 20 U | NA |
| 3,3'-Dichlorobenzidine | 5 | NA | 20 U | NA | 20 U | NA | 19 U | 19 U [19 U] | 20 U | 20 U | NA |
| 3-Nitroaniline | 5 | NA | 20 U | NA | 20 U | NA | 48 U | 48 U [48 U] | 49 U | 20 U | NA |
| 4-Bromophenyl-phenylether | - - | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| 4-Chloroaniline | 5 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| 4-Chlorophenyl-phenylether | - - | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| 4-Nitroaniline | 5 | NA | 20 U | NA | 20 U | NA | 48 U | 48 U [48 U] | 49 U | 20 U | NA |
| Acenaphthene | 20 | **3.0 J** | **33** | **66** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **3.2 J** | 9.0 U |
| Acenaphthylene | - - | 10 U | **18** | **14** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **2.5 J** | 9.0 U |
| Anthracene | 50 | **0.50 J** | **73** | **85** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **1.9 J** | 9.0 U |
| Benzo(a)anthracene | 0.002 | 10 U | **34** | **38** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| Benzo(a)pyrene | ND | 10 U | **27** | **29** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| Benzo(b)fluoranthene | 0.002 | 10 U | **17** | **23** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| Benzo(g,h,i)perylene | - - | 10 U | **13** | **16** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U | 9.0 U |
| Benzo(k)fluoranthene | 0.002 | 10 U | **24** | **20** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| bis(2-Chloroethoxy)methane | 5 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| bis(2-Chloroethyl)ether | 1 | NA | 1.0 U | NA | 1.0 U | NA | 10 U | 10 U [10 U] | 10 U | 1.0 U | NA |
| bis(2-chloroisopropyl)ether | 5 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| bis(2-Ethylhexyl)phthalate | 5 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Butylbenzylphthalate | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Carbazole | - - | NA | **12** | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | **2.4 J** | NA |
| Chrysene | 0.002 | 10 U | **40** | **40** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U | 9.0 U |
| Dibenz(a,h)anthracene | - - | 10 U | **4.8** | **6.0 J** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| Dibenzofuran | - - | **0.60 J** | **21** | **36** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **4.8 J** | 9.0 U |
| Diethylphthalate | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Dimethylphthalate | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Di-n-butylphthalate | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Di-n-octylphthalate | 50 | NA | 10 U | NA | 10 U | NA | **0.60 J** | 10 U [10 U] | 10 U | 10 U | NA |
| Fluoranthene | 50 | **0.90 J** | **100** | **95** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **3.1 J** | 9.0 U |
| Fluorene | 50 | **1.0 J** | **29** | **52** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **5.5 J** | 9.0 U |
| Hexachlorobenzene | 0.04 | NA | 1.0 U | NA | 1.0 U | NA | 10 U | 10 U [10 U] | 10 U | 1.0 U | NA |
| Hexachlorobutadiene | 0.5 | NA | 2.0 U | NA | 2.0 U | NA | 10 U | 10 U [10 U] | 10 U | 2.0 U | NA |
| Hexachlorocyclopentadiene | 5 | NA | 10 UJ | NA | 10 UJ | NA | 43 U | 43 U [43 U] | 44 U | 10 UJ | NA |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | NYSDEC | MW-04-04 | MW-04-05 | MW-04-05 | MW-04-06 | MW-04-06 | MW-06-06R | MW-06-06RI | MW-06-06RD | MW-05-07 | MW-05-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date Collected:** | **TOGS** | **08/08/06** | **04/05/05** | **08/10/06** | **04/06/05** | **08/09/06** | **08/10/06** | **04/12/07** | **04/13/07** | **04/05/05** | **08/08/06** |
| **SVOCs (Cont'd.)** | | | | | | | | | | | |
| Hexachloroethane | 5 | NA | 1.0 U | NA | 1.0 U | NA | 10 U | 10 U [10 U] | 10 U | 1.0 U | NA |
| Indeno(1,2,3-cd)pyrene | 0.002 | 10 U | **13** | **16** | 1.0 U | 10 U | 10 U | 10 U [10 U] | 10 U | 1.0 U | 9.0 U |
| Isophorone | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Naphthalene | 10 | **2.0 J** | **12** | **110** | 10 U | **0.70 J** | 10 U | 10 U [10 U] | 10 U | 10 U | **2.0 J** |
| Nitrobenzene | 0.4 | NA | 1.0 U | NA | 1.0 U | NA | 10 U | 10 U [10 U] | 10 U | 1.0 U | NA |
| N-Nitroso-di-n-propylamine | - - | NA | 1.0 U | NA | 1.0 U | NA | 10 U | 10 U [10 U] | 10 U | 1.0 U | NA |
| N-Nitrosodiphenylamine | 50 | NA | 10 U | NA | 10 U | NA | 10 U | 10 U [10 U] | 10 U | 10 U | NA |
| Phenanthrene | 50 | **3.0 J** | **61** | **110** | 10 U | **0.60 J** | 10 U | 10 U [10 U] | 10 U | **6.8 J** | **0.70 J** |
| Pyrene | 50 | **0.60 J** | **63** | **69** | 10 U | 10 U | 10 U | 10 U [10 U] | 10 U | **2.3 J** | 9.0 U |
| Total PAHs | - - | **11 J** | **570 J** | **810 J** | ND | **1.3 J** | ND | ND [ND] | ND | **26 J** | **2.7 J** |
| Total SVOCs | - - | **12 J** | **600 J** | **850 J** | ND | **1.3 J** | **0.60 J** | ND [ND] | ND | **34 J** | **2.7 J** |
| **Metals** | | | | | | | | | | | |
| Aluminum | - - | NA | 200 U | NA | **179 B** | NA | 200 U | **2,490 J [1,240 J]** | 200 U | 200 U | NA |
| Antimony | 3 | NA | 60.0 U | NA | 60.0 U | NA | 20.0 U | 20.0 U [20.0 U] | 20.0 U | 60.0 U | NA |
| Arsenic | 25 | NA | 15.0 U | NA | 15.0 U | NA | 10.0 U | **11.7 [10.2]** | 10.0 U | 15.0 U | NA |
| Barium | 1,000 | NA | **19.1 B** | NA | **69.7 B** | NA | **142** | **144 [128]** | **156** | **67.8 B** | NA |
| Beryllium | 3 | NA | 1.00 U | NA | 1.00 U | NA | 2.00 U | 2.00 U [2.00 U] | 2.00 U | 1.00 U | NA |
| Cadmium | 5 | NA | 1.00 U | NA | 1.00 U | NA | 1.00 U | 1.00 U [1.00 U] | 1.00 U | 1.00 U | NA |
| Calcium | - - | NA | **42,200** | NA | **110,000** | NA | **62,700** | **167,000 [164,000]** | **89,500** | **72,200** | NA |
| Chromium | 50 | NA | 10.0 U | NA | 10.0 U | NA | **17.0** | 4.00 U [4.00 U] | 4.00 U | 10.0 U | NA |
| Cobalt | - - | NA | 50.0 U | NA | 50.0 U | NA | 4.00 U | 4.00 U [4.00 U] | 4.00 U | 50.0 U | NA |
| Copper | 200 | NA | 25.0 U | NA | 25.0 U | NA | 10.0 U | 10.0 U [10.0 U] | 10.0 U | **5.20 B** | NA |
| Cyanide, Total | 200 | NA | 10.0 U | NA | 10.0 U | NA | 10.0 U | 10.0 U [10.0 U] | 10.0 U | **180** | NA |
| Iron | 300 | NA | 100 U | NA | **238** | NA | **98.5** | **2,620 [1,740]** | **722** | **1,760** | NA |
| Lead | 25 | NA | 5.00 U | NA | 5.00 U | NA | 5.00 U | 5.00 U [5.00 U] | 5.00 U | 5.00 U | NA |
| Magnesium | 35,000 | NA | **8,740** | NA | **25,500** | NA | **27,700** | **59,800 [59,700]** | **39,600** | **40,400** | NA |
| Manganese | 300 | NA | **2.70 B** | NA | **13.5 B** | NA | **4.60** | **130 [118]** | **74.8** | **251** | NA |
| Mercury | 0.7 | NA | 0.200 U | NA | 0.200 U | NA | 0.200 UJ | 0.200 U [0.200 U] | 0.200 U | 0.200 U | NA |
| Nickel | 100 | NA | 40.0 U | NA | 40.0 U | NA | 10.0 U | **10.3 [10.3]** | 10.0 U | 40.0 U | NA |
| Potassium | - - | NA | **1,400 B** | NA | **8,860** | NA | **8,770** | **10,800 [10,400]** | **9,800** | **5,110** | NA |
| Selenium | 10 | NA | 35.0 U | NA | 35.0 U | NA | 15.0 U | 15.0 U [15.0 U] | 15.0 U | 35.0 U | NA |
| Silver | 50 | NA | 10.0 U | NA | 10.0 U | NA | 3.00 UJ | 3.00 U [3.00 U] | 3.00 U | 10.0 U | NA |
| Sodium | 20,000 | NA | **12,300** | NA | **34,400** | NA | **31,500** | **99,900 J [91,100 J]** | **104,000 J** | **10,800** | NA |
| Thallium | 0.5 | NA | 25.0 U | NA | 25.0 U | NA | 20.0 U | 20.0 U [20.0 U] | 20.0 U | 25.0 U | NA |
| Vanadium | - - | NA | 50.0 U | NA | 50.0 U | NA | **14.4** | 5.00 U [5.00 U] | 5.00 U | 50.0 U | NA |
| Zinc | 2,000 | NA | **25.1 B** | NA | 60.0 U | NA | 10.0 U | 10.0 U [10.0 U] | 10.0 U | 60.0 U | NA |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:** | **NYSDEC** | **MW-05-07R** | **MW-05-07R** | **MW-05-08** | **MW-05-08** | **MW-05-08R** | **MW-05-08R** | **MW-06-09** | **MW-06-09R** | **MW-06-10** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Date Collected:** | **TOGS** | **04/04/05** | **08/08/06** | **04/06/05** | **08/10/06** | **04/04/05** | **08/10/06** | **08/09/06** | **08/09/06** | **08/09/06** |
| **VOCs** | | | | | | | | | | |
| 1,1,1-Trichloroethane | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,1,2,2-Tetrachloroethane | 5 | 1.0 U [1.0 U] | NA | 1.0 U | NA | 1.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,1,2-Trichloroethane | 1 | 3.0 U [3.0 U] | NA | 3.0 U | NA | 3.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,1-Dichloroethane | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,1-Dichloroethene | 5 | 2.0 U [2.0 U] | NA | 2.0 U | NA | 2.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,2-Dichloroethane | 0.6 | 2.0 U [2.0 U] | NA | 2.0 U | NA | 2.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,2-Dichloropropane | 1 | 1.0 U [1.0 U] | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| 2-Butanone | 50 | **7.3 [9.6]** | NA | 5.0 U | NA | 5.0 U | NA | 25 UJ | 25 UJ | 25 UJ |
| 2-Hexanone | 50 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 25 UJ | 25 UJ | 25 UJ |
| 4-Methyl-2-Pentanone | - - | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 25 UJ | 25 UJ | 25 UJ |
| Acetone | 50 | 5.0 UJ [5.0 UJ] | NA | 5.0 UJ | NA | 5.0 UJ | NA | 25 UJ | 25 UJ | 25 UJ |
| Benzene | 1 | **12 [15]** | **34** | **49** | **9.0** | **39** | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Bromodichloromethane | 50 | 1.0 U [1.0 U] | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Bromoform | 50 | 4.0 U [4.0 U] | NA | 4.0 U | NA | 4.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Bromomethane | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Carbon Disulfide | 60 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Carbon Tetrachloride | 5 | 2.0 U [2.0 U] | NA | 2.0 U | NA | 2.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Chlorobenzene | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Chloroethane | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Chloroform | 7 | **2.6 J [3.2 J]** | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Chloromethane | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| cis-1,2-Dichloroethene | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| cis-1,3-Dichloropropene | 0.4 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Dibromochloromethane | 50 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | NA | NA | NA |
| Ethylbenzene | 5 | 4.0 U [4.0 U] | 5.0 U | **6.5** | 5.0 U | 4.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Methylene Chloride | 5 | 3.0 U [3.0 U] | NA | 3.0 U | NA | 3.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Styrene | 5 | 5.0 U [5.0 U] | NA | **3.6 J** | NA | 5.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Tetrachloroethene | 5 | 1.0 U [1.0 U] | NA | 1.0 U | NA | 1.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Toluene | 5 | 5.0 U [5.0 U] | 5.0 U | **19** | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| trans-1,2-Dichloroethene | 5 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| trans-1,3-Dichloropropene | 0.4 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Trichloroethene | 5 | 1.0 U [1.0 U] | NA | 1.0 U | NA | 1.0 U | NA | 5.0 U | 5.0 U | 5.0 U |
| Vinyl Chloride | 2 | 5.0 U [5.0 U] | NA | 5.0 U | NA | 5.0 U | NA | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Xylene (Total) | 5 | 5.0 U [5.0 U] | 15 U | **58** | **2.0 J** | 5.0 U | 15 U | 15 U | 15 U | 15 U |
| Total BTEX | - - | **12 [15]** | **34** | **130** | **11 J** | **39** | ND | ND | ND | ND |
| Total VOCs | - - | **22 J [28 J]** | **34** | **140 J** | **11 J** | **39** | ND | ND | ND | ND |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | NYSDEC | MW-05-07R | MW-05-07R | MW-05-08 | MW-05-08 | MW-05-08R | MW-05-08R | MW-06-09 | MW-06-09R | MW-06-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Date Collected:** | **TOGS** | **04/04/05** | **08/08/06** | **04/06/05** | **08/10/06** | **04/04/05** | **08/10/06** | **08/09/06** | **08/09/06** | **08/09/06** |
| **SVOCs** | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 | 1.0 U [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | NA | NA | NA |
| 1,2-Dichlorobenzene | 3 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | NA | NA | NA |
| 1,3-Dichlorobenzene | 3 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | NA | NA | NA |
| 1,4-Dichlorobenzene | 3 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | 5 | 2.1 U [2.0 U] | NA | 4.0 U | NA | 2.0 U | NA | 10 U | 10 U | 9.0 U |
| 2,6-Dinitrotoluene | 5 | 2.1 U [2.0 U] | NA | 4.0 U | NA | 2.0 U | NA | 10 U | 10 U | 9.0 U |
| 2-Chloronaphthalene | 10 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| 2-Methylnaphthalene | - - | **0.40 J [0.40 J]** | **1.0 J** | **48** | 10 U | 10 U | 9.0 U | 10 U | 10 U | **8.0 J** |
| 2-Nitroaniline | 5 | 21 U [20 U] | NA | 40 U | NA | 20 U | NA | 48 U | 48 U | 47 U |
| 3,3'-Dichlorobenzidine | 5 | 21 U [20 U] | NA | 40 U | NA | 20 U | NA | 19 U | 19 U | 19 U |
| 3-Nitroaniline | 5 | 21 U [20 U] | NA | 40 U | NA | 20 U | NA | 48 U | 48 U | 47 U |
| 4-Bromophenyl-phenylether | - - | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| 4-Chloroaniline | 5 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| 4-Chlorophenyl-phenylether | - - | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| 4-Nitroaniline | 5 | 21 U [20 U] | NA | 40 U | NA | 20 U | NA | 48 U | 48 U | 47 U |
| Acenaphthene | 20 | 10 U [10 U] | **2.0 J** | **19 J** | **6.0 J** | **5.9 J** | **3.0 J** | 10 U | 10 U | **2.0 J** |
| Acenaphthylene | - - | 10 U [10 U] | **1.0 J** | **28** | **2.0 J** | **2.0 J** | **0.80 J** | 10 U | 10 U | 9.0 U |
| Anthracene | 50 | 10 U [10 U] | **2.0 J** | **3.6 J** | 10 U | 10 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Benzo(a)anthracene | 0.002 | 1.0 U [1.0 U] | **2.0 J** | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Benzo(a)pyrene | ND | 1.0 U [1.0 U] | **2.0 J** | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Benzo(b)fluoranthene | 0.002 | 1.0 U [1.0 U] | **1.0 J** | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Benzo(g,h,i)perylene | - - | 10 U [10 U] | **0.80 J** | 20 U | 10 U | 10 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Benzo(k)fluoranthene | 0.002 | 1.0 U [1.0 U] | **2.0 J** | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| bis(2-Chloroethoxy)methane | 5 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| bis(2-Chloroethyl)ether | 1 | 1.0 UJ [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | 10 U | 10 U | 9.0 U |
| bis(2-chloroisopropyl)ether | 5 | 10 U [10 UJ] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| bis(2-Ethylhexyl)phthalate | 5 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Butylbenzylphthalate | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Carbazole | - - | 10 U [10 U] | NA | **14 J** | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Chrysene | 0.002 | 10 U [10 U] | **2.0 J** | 20 U | 10 U | 10 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Dibenz(a,h)anthracene | - - | 1.0 U [1.0 U] | 10 U | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Dibenzofuran | - - | 10 U [10 U] | **2.0 J** | **16 J** | **2.0 J** | **0.50 J** | 9.0 U | 10 U | 10 U | **0.60 J** |
| Diethylphthalate | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Dimethylphthalate | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Di-n-butylphthalate | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Di-n-octylphthalate | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Fluoranthene | 50 | **1.4 J [10 U]** | **7.0 J** | 20 U | **0.60 J** | **0.40 J** | 9.0 U | 10 U | 10 U | 9.0 U |
| Fluorene | 50 | 10 U [10 U] | **3.0 J** | **17 J** | **2.0 J** | **3.1 J** | **1.0 J** | 10 UJ | 10 UJ | **1.0 J** |
| Hexachlorobenzene | 0.04 | 1.0 U [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | 10 U | 10 U | 9.0 U |
| Hexachlorobutadiene | 0.5 | 2.1 U [2.0 U] | NA | 4.0 U | NA | 2.0 U | NA | 10 U | 10 U | 9.0 U |
| Hexachlorocyclopentadiene | 5 | 10 UJ [10 UJ] | NA | 20 UJ | NA | 10 UJ | NA | 43 U | 43 U | 43 U |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Date Collected: | NYSDEC<br>TOGS | MW-05-07R<br>04/04/05 | MW-05-07R<br>08/08/06 | MW-05-08<br>04/06/05 | MW-05-08<br>08/10/06 | MW-05-08R<br>04/04/05 | MW-05-08R<br>08/10/06 | MW-06-09<br>08/09/06 | MW-06-09R<br>08/09/06 | MW-06-10<br>08/09/06 |
|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | | |
| Hexachloroethane | 5 | 1.0 U [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | 10 U | 10 U | 9.0 U |
| Indeno(1,2,3-cd)pyrene | 0.002 | 1.0 U [1.0 U] | **0.80 J** | 2.0 U | 10 U | 1.0 U | 9.0 U | 10 U | 10 U | 9.0 U |
| Isophorone | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Naphthalene | 10 | **3.8 J [3.8 J]** | **3.0 J** | **370** | 10 U | **2.5 J** | 9.0 U | 10 U | **1.0 J** | **10** |
| Nitrobenzene | 0.4 | 1.0 U [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | 10 U | 10 U | 9.0 U |
| N-Nitroso-di-n-propylamine | - - | 1.0 U [1.0 U] | NA | 2.0 U | NA | 1.0 U | NA | 10 U | 10 U | 9.0 U |
| N-Nitrosodiphenylamine | 50 | 10 U [10 U] | NA | 20 U | NA | 10 U | NA | 10 U | 10 U | 9.0 U |
| Phenanthrene | 50 | **1.0 J [0.80 J]** | **12** | **19 J** | 10 U | **0.30 J** | 9.0 U | 10 U | **0.60 J** | **1.0 J** |
| Pyrene | 50 | 10 U [10 U] | **6.0 J** | 20 U | 10 U | **0.40 J** | 9.0 U | 10 U | 10 U | 9.0 U |
| Total PAHs | - - | **6.6 J [5.0 J]** | **48 J** | **510 J** | **11 J** | **15 J** | **4.8 J** | ND | **1.6 J** | **22 J** |
| Total SVOCs | - - | **6.6 J [5.0 J]** | **50 J** | **540 J** | **13 J** | **15 J** | **4.8 J** | ND | **1.6 J** | **23 J** |
| **Metals** | | | | | | | | | | |
| Aluminum | - - | **1,160 [582]** | NA | **207** | NA | 200 U | NA | 200 U | 200 U | 200 U |
| Antimony | 3 | 60.0 U [60.0 U] | NA | 60.0 U | NA | 60.0 U | NA | 20.0 U | 20.0 U | 20.0 U |
| Arsenic | 25 | **4.40 B [3.30 B]** | NA | **37.7** | NA | **69.3** | NA | **24.2** | 10.0 U | **12.8** |
| Barium | 1,000 | **96.2 B [77.8 B]** | NA | **178 B** | NA | **229** | NA | **1,190** | **99.0** | **478** |
| Beryllium | 3 | 1.00 U [1.00 U] | NA | 1.00 U | NA | 1.00 U | NA | 2.00 U | 2.00 U | 2.00 U |
| Cadmium | 5 | 1.00 U [1.00 U] | NA | 1.00 U | NA | 1.00 U | NA | 1.00 U | 1.00 U | 1.00 U |
| Calcium | - - | **158,000 [122,000]** | NA | **148,000** | NA | **168,000** | NA | **191,000** | **86,500** | **122,000** |
| Chromium | 50 | **36.4 [31.7]** | NA | 10.0 U | NA | 10.0 U | NA | 4.00 U | 4.00 U | 4.00 U |
| Cobalt | - - | 50.0 U [50.0 U] | NA | 50.0 U | NA | 50.0 U | NA | 4.00 U | 4.00 U | 4.00 U |
| Copper | 200 | **6.90 B [4.90 B]** | NA | 25.0 U | NA | 25.0 U | NA | 10.0 U | 10.0 U | 10.0 U |
| Cyanide, Total | 200 | 10.0 U [10.0 U] | NA | **170** | NA | **78.0** | NA | **18.0** | 10.0 U | 10.0 U |
| Iron | 300 | **994 [553]** | NA | **6,960** | NA | **10,400** | NA | **19,600** | **170** | **37,400** |
| Lead | 25 | 5.00 U [5.00 U] | NA | 5.00 U | NA | 5.00 U | NA | 5.00 U | 5.00 U | 5.00 U |
| Magnesium | 35,000 | **17,100 [12,300]** | NA | **20,300** | NA | **25,700** | NA | **35,100** | **56,400** | **27,400** |
| Manganese | 300 | **30.2 [17.2]** | NA | **492** | NA | **496** | NA | **800** | **17.4** | **254** |
| Mercury | 0.7 | 0.200 U [0.200 U] | NA | 0.400 U | NA | 0.200 U | NA | 0.200 UJ | 0.200 UJ | 0.200 UJ |
| Nickel | 100 | **3.00 B [2.70 B]** | NA | 40.0 U | NA | 40.0 U | NA | 10.0 U | 10.0 U | 10.0 U |
| Potassium | - - | **9,050 [8,690]** | NA | **3,120 B** | NA | **5,260** | NA | **11,800** | **3,650** | **11,700** |
| Selenium | 10 | 35.0 U [35.0 U] | NA | 35.0 U | NA | 35.0 U | NA | 15.0 U | 15.0 U | 15.0 U |
| Silver | 50 | 10.0 U [10.0 U] | NA | 10.0 U | NA | 10.0 U | NA | 3.00 U | 3.00 U | 3.00 U |
| Sodium | 20,000 | **10,800 [10,600]** | NA | **12,600** | NA | **61,700** | NA | **697,000** | **14,000** | **76,800** |
| Thallium | 0.5 | 25.0 U [25.0 U] | NA | 25.0 U | NA | 25.0 U | NA | 20.0 U | 20.0 U | 20.0 U |
| Vanadium | - - | **11.3 B [7.50 B]** | NA | 50.0 U | NA | 50.0 U | NA | 5.00 U | 5.00 U | 5.00 U |
| Zinc | 2,000 | **22.6 B [16.5 B]** | NA | **9.00 B** | NA | 60.0 U | NA | 10.0 U | 10.0 U | 10.0 U |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:<br>Date Collected:** | **NYSDEC TOGS** | **MW-06-10R<br>08/10/06** | **MW-06-12R<br>08/08/06** | **MW-06-13R<br>08/10/06** | **MW-06-14R<br>08/11/06** | **MW-06-15R<br>08/09/06** | **MW-07-16RI<br>04/11/07** | **MW-07-16RD<br>04/11/07** | **MW-07-17RI<br>04/12/07** | **MW-07-17RD<br>04/13/07** |
|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | |
| 1,1,1-Trichloroethane | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 1,1,2,2-Tetrachloroethane | 5 | 5.0 U | 5.0 U | 5.0 UJ [5.0 U] | 5.0 U | 5.0 U | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| 1,1,2-Trichloroethane | 1 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 1,1-Dichloroethane | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 1,1-Dichloroethene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 1,2-Dichloroethane | 0.6 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 1,2-Dichloropropane | 1 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| 2-Butanone | 50 | 25 U | 25 U | 25 U [25 U] | 25 UJ | 25 UJ | 25 U | 25 U | 25 U | 25 U |
| 2-Hexanone | 50 | 25 U | 25 U | 25 U [25 U] | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U |
| 4-Methyl-2-Pentanone | - - | 25 U | 25 U | 25 U [25 U] | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U |
| Acetone | 50 | **3.9 J** | 25 U | 25 U [25 U] | 25 UJ | 25 UJ | **11 J** | **2.7 J** | 25 UJ | **8.6 J** |
| Benzene | 1 | **1.1 J** | **150 D** | **130 D [130 D]** | 5.0 U | **57** | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Bromodichloromethane | 50 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Bromoform | 50 | 5.0 UJ | 5.0 UJ | 5.0 UJ [5.0 UJ] | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Bromomethane | 5 | 5.0 UJ | 5.0 UJ | 5.0 UJ [5.0 UJ] | 5.0 UJ | 5.0 UJ | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Carbon Disulfide | 60 | **3.4 J** | 5.0 U | 5.0 U [5.0 U] | **0.87 J** | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Carbon Tetrachloride | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Chlorobenzene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Chloroethane | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 UJ | 5.0 U | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Chloroform | 7 | **0.86 J** | 5.0 U | 5.0 U [5.0 U] | **2.3 J** | **1.1 J** | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Chloromethane | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| cis-1,2-Dichloroethene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| cis-1,3-Dichloropropene | 0.4 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Dibromochloromethane | 50 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Ethylbenzene | 5 | 5.0 U | **34** | **67 [70]** | 5.0 U | **65** | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Methylene Chloride | 5 | 5.0 UJ | 5.0 UJ | 5.0 UJ [5.0 UJ] | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Styrene | 5 | 5.0 U | **2.0 J** | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Tetrachloroethene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Toluene | 5 | 5.0 U | **26 J** | **90 [94]** | 5.0 U | **56** | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| trans-1,2-Dichloroethene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| trans-1,3-Dichloropropene | 0.4 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Trichloroethene | 5 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Vinyl Chloride | 2 | 5.0 U | 5.0 U | 5.0 U [5.0 U] | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| Xylene (Total) | 5 | 15 U | **86** | **230 [240]** | 15 U | **170** | 15 U | 15 U | 15 U | 15 U |
| Total BTEX | - - | **1.1 J** | **300 J** | **520 [530]** | ND | **350** | ND | ND | ND | ND |
| Total VOCs | - - | **9.3 J** | **300 J** | **520 [530]** | **3.2 J** | **350 J** | **11 J** | **2.7 J** | ND | **8.6 J** |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Date Collected: | NYSDEC TOGS | MW-06-10R<br>08/10/06 | MW-06-12R<br>08/08/06 | MW-06-13R<br>08/10/06 | MW-06-14R<br>08/11/06 | MW-06-15R<br>08/09/06 | MW-07-16RI<br>04/11/07 | MW-07-16RD<br>04/11/07 | MW-07-17RI<br>04/12/07 | MW-07-17RD<br>04/13/07 |
|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2-Dichlorobenzene | 3 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,3-Dichlorobenzene | 3 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,4-Dichlorobenzene | 3 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 2,6-Dinitrotoluene | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 2-Chloronaphthalene | 10 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 2-Methylnaphthalene | - - | 10 U | **4.0 J** | **15 J [16 J]** | 10 U | **80** | 10 U | 9.0 U | 10 U | 10 U |
| 2-Nitroaniline | 5 | 48 U | 48 U | 100 U [98 U] | 48 U | 47 U | 49 U | 47 U | 48 U | 49 U |
| 3,3'-Dichlorobenzidine | 5 | 19 U | 19 U | 40 U [39 U] | 19 U | 19 U | 20 U | 19 U | 19 U | 20 U |
| 3-Nitroaniline | 5 | 48 U | 48 U | 100 U [98 U] | 48 U | 47 U | 49 U | 47 U | 48 U | 49 U |
| 4-Bromophenyl-phenylether | - - | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 4-Chloroaniline | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 4-Chlorophenyl-phenylether | - - | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| 4-Nitroaniline | 5 | 48 U | 48 U | 100 U [98 U] | 48 U | 47 U | 49 U | 47 U | 48 U | 49 U |
| Acenaphthene | 20 | 10 U | **21** | **9.0 J [10 J]** | 10 U | **74** | 10 U | 9.0 U | 10 U | 10 U |
| Acenaphthylene | - - | 10 U | **9.0 J** | **2.0 J [2.0 J]** | 10 U | **15** | 10 U | 9.0 U | 10 U | 10 U |
| Anthracene | 50 | 10 U | **8.0 J** | 20 U [20 U] | 10 U | **14** | 10 U | 9.0 U | 10 U | 10 U |
| Benzo(a)anthracene | 0.002 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Benzo(a)pyrene | ND | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Benzo(b)fluoranthene | 0.002 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Benzo(g,h,i)perylene | - - | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Benzo(k)fluoranthene | 0.002 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| bis(2-Chloroethoxy)methane | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| bis(2-Chloroethyl)ether | 1 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| bis(2-chloroisopropyl)ether | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| bis(2-Ethylhexyl)phthalate | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Butylbenzylphthalate | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Carbazole | - - | **0.50 J** | **4.0 J** | **10 J [10 J]** | 10 U | **78** | 10 U | 9.0 U | 10 U | 10 U |
| Chrysene | 0.002 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Dibenz(a,h)anthracene | - - | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Dibenzofuran | - - | 10 U | **18** | **3.0 J [3.0 J]** | 10 U | **47** | 10 U | 9.0 U | 10 U | 10 U |
| Diethylphthalate | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | **0.30 J** | 10 U | 10 U |
| Dimethylphthalate | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Di-n-butylphthalate | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | **0.30 J** | 10 U | 10 U |
| Di-n-octylphthalate | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Fluoranthene | 50 | 10 U | **5.0 J** | 20 U [20 U] | 10 U | **9.0** | 10 U | 9.0 U | 10 U | 10 U |
| Fluorene | 50 | 10 U | **30** | **3.0 J [3.0 J]** | 10 U | **43 J** | 10 U | 9.0 U | 10 U | 10 U |
| Hexachlorobenzene | 0.04 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Hexachlorobutadiene | 0.5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Hexachlorocyclopentadiene | 5 | 44 U | 43 U | 90 U [89 U] | 43 U | 43 U | 44 U | 42 U | 44 U | 44 U |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | NYSDEC | MW-06-10R | MW-06-12R | MW-06-13R | MW-06-14R | MW-06-15R | MW-07-16RI | MW-07-16RD | MW-07-17RI | MW-07-17RD |
|---|---|---|---|---|---|---|---|---|---|---|
| Date Collected: | TOGS | 08/10/06 | 08/08/06 | 08/10/06 | 08/11/06 | 08/09/06 | 04/11/07 | 04/11/07 | 04/12/07 | 04/13/07 |
| **SVOCs (Cont'd.)** | | | | | | | | | | |
| Hexachloroethane | 5 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Indeno(1,2,3-cd)pyrene | 0.002 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Isophorone | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Naphthalene | 10 | 10 U | **65** | **160 [170]** | **0.50 J** | **1,700 DJ** | **0.30 J** | 9.0 U | 10 U | **0.80 J** |
| Nitrobenzene | 0.4 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| N-Nitroso-di-n-propylamine | - - | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| N-Nitrosodiphenylamine | 50 | 10 U | 10 U | 20 U [20 U] | 10 U | 9.0 U | 10 U | 9.0 U | 10 U | 10 U |
| Phenanthrene | 50 | 10 U | **63** | **2.0 J [2.0 J]** | 10 U | **73** | 10 U | 9.0 U | 10 U | 10 U |
| Pyrene | 50 | 10 U | **4.0 J** | 20 U [20 U] | 10 U | **5.0 J** | 10 U | 9.0 U | 10 U | 10 U |
| Total PAHs | - - | ND | **210 J** | **190 J [200 J]** | **0.50 J** | **2,000 J** | **0.30 J** | ND | ND | **0.80 J** |
| Total SVOCs | - - | **0.50 J** | **230 J** | **200 J [220 J]** | **0.50 J** | **2,100 J** | **0.30 J** | **0.60 J** | ND | **0.80 J** |
| **Metals** | | | | | | | | | | |
| Aluminum | - - | 200 U | 200 U | 200 U [200 U] | 200 U | 200 U | 200 U | 200 U | 200 U | **920** |
| Antimony | 3 | 20.0 U | 20.0 U | 20.0 U [20.0 U] | 20.0 U | 20.0 U | 20.0 U | 20.0 U | 20.0 U | 20.0 U |
| Arsenic | 25 | 10.0 U | **16.9** | 10.0 U [10.0 U] | 10.0 UJ | **12.5** | 10.0 U | 10.0 U | 10.0 U | 10.0 U |
| Barium | 1,000 | **75.8** | **396** | **32.5 [31.8]** | **187** | **357** | **87.0** | **59.4** | **215** | **119** |
| Beryllium | 3 | 2.00 U | 2.00 U | 2.00 U [2.00 U] | 2.00 U | 2.00 U | 2.00 U | 2.00 U | 2.00 U | 2.00 U |
| Cadmium | 5 | 1.00 U | 1.00 U | 1.00 U [1.00 U] | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| Calcium | - - | **45,600** | **104,000** | **87,500 [85,600]** | **119,000** | **128,000** | **89,500** | **73,100** | **84,600** | **80,900** |
| Chromium | 50 | **20.7** | 4.00 U | 4.00 U [4.00 U] | 4.00 U | 4.00 U | 4.00 U | 4.00 U | 4.00 U | **6.70** |
| Cobalt | - - | 4.00 U | 4.00 U | 4.00 U [4.00 U] | 4.00 U | 4.00 U | 4.00 U | 4.00 U | 4.00 U | 4.00 U |
| Copper | 200 | 10.0 U | 10.0 U | 10.0 U [10.0 U] | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 10.0 U |
| Cyanide, Total | 200 | 10.0 U | **38.0** | 10.0 U [10.0 U] | 10.0 U | 10.0 UJ | 10.0 U | 10.0 U | 10.0 U | 10.0 U |
| Iron | 300 | **85.5** | **5,940** | **50.4 [50.0 U]** | **731** | **10,600** | **146** | **95.0** | **182** | **904** |
| Lead | 25 | 5.00 U | 5.00 U | 5.00 U [5.00 U] | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U |
| Magnesium | 35,000 | **9,140** | **48,200** | **56,000 [54,800]** | **39,500** | **25,300** | **31,700** | **26,600** | **36,600** | **35,200** |
| Manganese | 300 | **4.60** | **103** | **6.40 [6.30]** | **133** | **444** | **35.7** | **44.9** | **9.70** | **27.9** |
| Mercury | 0.7 | 0.200 UJ | 0.200 U | 0.200 UJ [0.200 UJ] | 0.200 U | 0.200 UJ | 0.200 U | 0.200 U | 0.200 U | 0.200 U |
| Nickel | 100 | 10.0 U | 10.0 U | 10.0 U [10.0 U] | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 10.0 U |
| Potassium | - - | **9,660** | **20,500** | **4,060 [3,990]** | **9,200** | **14,600** | **3,210** | **7,480** | **4,190** | **7,280** |
| Selenium | 10 | 15.0 U | 15.0 U | 15.0 U [15.0 U] | 15.0 U | 15.0 U | 15.0 U | 15.0 U | 15.0 U | 15.0 U |
| Silver | 50 | 3.00 UJ | 3.00 U | 3.00 U [3.00 U] | 3.00 U | 3.00 U | 3.00 U | 3.00 U | 3.00 U | 3.00 U |
| Sodium | 20,000 | **7,210** | **15,500** | **8,140 [7,920]** | **223,000** | **152,000** | **26,000 J** | **46,600 J** | **36,600 J** | **30,900 J** |
| Thallium | 0.5 | 20.0 U | 20.0 U | 20.0 U [20.0 U] | 20.0 U | 20.0 U | 20.0 U | 20.0 U | 20.0 U | 20.0 U |
| Vanadium | - - | **17.4** | 5.00 U | 5.00 U [5.00 U] | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U |
| Zinc | 2,000 | 10.0 U | 10.0 U | 10.0 U [10.0 U] | 10.0 U | 10.0 U | 10.0 U | 10.0 U | 10.0 U | **15.6** |

See Notes on Page 13.

## Table 3. Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**
Results reported in micrograms per liter (ug/L); equivalent to parts per billion (ppb).
NYSDEC TOGS = New York State Department of Environmental Conservation Division of Water Technical and Operations Guidance Series (TOGS) No. 1.1.1.
Revised March 12, 1998. Modified April 2000.
Values exceeding the NYSDEC TOGS Standards or Guidance Values are shaded.
Detected constituents are presented in bold font.
NA = Not Analyzed.
ND = Not Detected.
-- = Not Available/Not Applicable.
Data has been validated by ARCADIS-BBL.

**Data Qualifiers:**
B = The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
D = The reported concentration is based on a diluted sample analysis.
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
U = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

# Table 4. Packer Test Groundwater Analytical Results, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID | Depth Range (feet below grade) | Date Collected | Benzene | Ethylbenzene | Toluene | Xylene (Total) | Total BTEX |
|---|---|---|---|---|---|---|---|
| **NYSDEC TOGS:** | | | 1 | 5 | 5 | 5 | - - |
| MW-06-01 | 17 - 26 | 12/13/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 26 - 35 | 12/14/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 35 - 45 | 12/14/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| MW-06-01RD | 45 - 55 | 12/15/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 55 - 65 | 12/15/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 65 - 75 | 12/18/2006 | 5.0 U | 5.0 U | **8.0** | 15 U | **8.0** |
| | 75 - 80 | 12/18/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| MW-06-06 | 39.5 - 49.8 | 12/20/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 49.8 - 59.8 | 12/20/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 59.8 - 69.8 | 12/21/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 69.8 - 79.8 | 12/21/2006 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| MW-07-16RD | 14 - 24 | 1/4/2007 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 24 - 34 | 1/4/2007 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 34 - 44 | 1/5/2007 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 44 - 54 | 1/8/2007 | 5.0 U | 5.0 U | **23** | 15 U | **23** |
| | 54 - 64 | 1/8/2007 | 5.0 U | 5.0 U | **8.0** | 15 U | **8.0** |
| | 64 - 74 | 1/9/2007 | 5.0 U | 5.0 U | **20** | 15 U | **20** |
| | 74 - 79 | 1/9/2007 | 5.0 U | 5.0 U | **28** | 15 U | **28** |
| MW-07-17RD | 20 - 30 | 1/11/2007 | **1,400 D** | **490 D** | **640 D** | **1,400 D** | **3,900** |
| | 30 - 40 | 1/15/2007 | **100 [110]** | **130 [150]** | **28 [31]** | **420 [460]** | **680 [750]** |
| | 40 - 50 | 1/16/2007 | **27** | **26** | **12** | **81** | **150** |
| | 50 - 60 | 1/18/2007 | 5.0 U | 5.0 U | 5.0 U | 15 U | ND |
| | 60 - 70 | 1/19/2007 | **2.0 J** | 5.0 U | **33** | 15 U | **35 J** |
| | 70 - 80 | 1/19/2007 | 5.0 U | 5.0 U | **56** | 15 U | **56** |

**Notes:**

Results reported in micrograms per liter (ug/L); equivalent to parts per billion (ppb).

NYSDEC TOGS = New York State Department of Environmental Conservation Division of Water Technical and Operations Guidance Series (TOGS) No. 1.1.1. Revised March 12, 1998. Modified April 2000.

Values exceeding the NYSDEC TOGS Standards or Guidance Values are shaded.

Detected constituents are presented in bold font.

ND = Not Detected.

-- = Not Available/Not Applicable.

Data has been validated by ARCADIS-BBL.

**Data Qualifiers:**

D = The reported concentration is based on a diluted sample analysis.

J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

U = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Sample Depth (Feet):<br>Date Collected: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 |
|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | |
| 1,1,1-Trichloroethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| 1,1,2,2-Tetrachloroethane | - - | - - | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U |
| 1,1,2-Trichloroethane | - - | - - | 0.0033 U | 0.0038 U | 0.0036 U | 0.0036 U | 0.74 U | 0.0039 U | 0.005 U |
| 1,1-Dichloroethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| 1,1-Dichloroethene | - - | - - | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.5 U | 0.0026 U | 0.0033 U |
| 1,2-Dichloroethane | - - | - - | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.5 U | 0.0026 U | 0.0033 U |
| 1,2-Dichloropropane | - - | - - | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U |
| 2-Butanone | - - | - - | 0.0054 U | 0.0064 U | 0.012 | 0.0077 | 1.2 U | 0.014 | 0.012 |
| 2-Hexanone | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| 4-Methyl-2-Pentanone | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Acetone | - - | - - | 0.024 B | 0.034 B | 0.077 J | 0.006 UJ | 1.2 U | 0.088 J | 0.14 J |
| Benzene | 103 | 28 | 0.0011 U | 0.0007 J | 0.0012 J | 0.0005 J | 0.34 | 0.0013 U | 0.0008 J |
| Bromodichloromethane | - - | - - | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U |
| Bromoform | - - | - - | 0.0044 U | 0.0051 U | 0.0049 U | 0.0048 U | 0.99 U | 0.0053 U | 0.0067 U |
| Bromomethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 UJ | 0.0066 U | 0.0084 U |
| Carbon Disulfide | - - | - - | 0.0054 U | 0.0064 U | 0.004 J | 0.006 UJ | 1.2 UJ | 0.0071 | 0.0031 J |
| Carbon Tetrachloride | - - | - - | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.5 U | 0.0026 U | 0.0033 U |
| Chlorobenzene | 34.6 | 3.5 | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0009 J |
| Chloroethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Chloroform | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Chloromethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| cis-1,2-Dichloroethene | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| cis-1,3-Dichloropropene | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Dibromochloromethane | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Ethylbenzene | 212 | 24 | 0.0044 U | 0.0051 U | 0.0049 U | 0.0048 U | 1.1 | 0.0053 U | 0.0067 U |
| Methyl tert-butyl ether | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 UJ | 0.0066 U | 0.0084 U |
| Methylene Chloride | - - | - - | 0.0033 U | 0.011 B | 0.0036 U | 0.0036 U | 0.74 U | 0.0043 U | 0.005 U |
| Styrene | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 0.18 J | 0.0066 U | 0.0084 U |
| Tetrachloroethene | - - | - - | 0.0011 U | 0.0013 B | 0.0012 UJ | 0.0012 UJ | 0.18 J | 0.0013 UJ | 0.0017 UJ |
| Toluene | 235 | 49 | 0.0049 J | 0.0018 JB | 0.004 | 0.0027 J | 0.66 J | 0.0016 J | 0.0017 J |
| trans-1,2-Dichloroethene | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| trans-1,3-Dichloropropene | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Trichloroethene | - - | - - | 0.0011 U | 0.0016 | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U |
| Vinyl Chloride | - - | - - | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 1.2 U | 0.0066 U | 0.0084 U |
| Xylene (Total) | 833 | 92 | 0.0054 U | 0.0064 U | 0.0061 U | 0.006 U | 2.8 | 0.0066 U | 0.0084 U |
| Total BTEX | - - | - - | 0.0049 J | 0.0025 J | 0.0052 J | 0.0032 J | 4.9 J | 0.0016 J | 0.0025 J |
| Total VOCs | - - | - - | 0.0289 J | 0.0504 J | 0.0982 J | 0.0109 J | 5.26 J | 0.111 J | 0.159 J |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | 00-SED-1 | 00-SED-6 | 00-SED-7 | 00-SED-10 | 00-SED-10 | 00-SED-11 | 00-SED-12 |
|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | 0 - 0.5 | 0 - 0.4 | 0 - 0.3 | 0 - 0.5 | 1 - 1.2 | 0 - 0.5 | 0 - 0.5 |
| Date Collected: | | | 06/29/05 | 06/29/05 | 06/29/05 | 06/29/05 | 06/29/05 | 06/29/05 | 06/29/05 |
| **SVOCs** | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 910 | 91 | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| 1,2-Dichlorobenzene | 120 | 12 | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 1,3-Dichlorobenzene | 120 | 12 | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 1,4-Dichlorobenzene | 120 | 12 | 0.016 J | 0.027 J | 0.015 J | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2,4,5-Trichlorophenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2,4,6-Trichlorophenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2,4-Dichlorophenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2,4-Dimethylphenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2,4-Dinitrophenol | - - | - - | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U |
| 2,4-Dinitrotoluene | - - | - - | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U |
| 2,6-Dinitrotoluene | - - | - - | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U |
| 2-Chloronaphthalene | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2-Chlorophenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2-Methylnaphthalene | 304 | 34 | 0.077 J | 0.041 J | 0.026 J | 0.044 J | 2.6 J | 0.13 J | 0.014 J |
| 2-Methylphenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 2-Nitroaniline | - - | - - | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U |
| 2-Nitrophenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 3,3'-Dichlorobenzidine | - - | - - | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U |
| 3-Nitroaniline | - - | - - | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U |
| 4,6-Dinitro-2-methylphenol | - - | - - | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U |
| 4-Bromophenyl-phenylether | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 4-Chloro-3-methylphenol | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 4-Chloroaniline | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 4-Chlorophenyl-phenylether | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| 4-Methylphenol | - - | - - | 0.7 | 0.037 J | 0.18 J | 0.013 J | 0.14 J | 0.059 J | 0.016 J |
| 4-Nitroaniline | - - | - - | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U |
| 4-Nitrophenol | - - | - - | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U |
| Acenaphthene | - - | 140 | 0.2 J | 0.04 J | 0.04 J | 0.048 J | 10 | 0.39 J | 0.02 J |
| Acenaphthylene | - - | - - | 0.13 J | 0.084 J | 0.095 J | 0.084 J | 2.8 J | 0.026 J | 0.051 J |
| Anthracene | 986 | 107 | 0.4 | 0.27 J | 0.17 J | 0.28 J | 18 | 0.63 | 0.071 J |
| Benzo(a)anthracene | 94 | 12 | 0.76 | 0.45 | 0.47 | 0.86 | 8 | 1 | 0.24 |
| Benzo(a)pyrene | - - | - - | 0.98 | 0.62 | 0.68 | 0.88 | 10 | 1.2 | 0.36 |
| Benzo(b)fluoranthene | - - | - - | 0.96 | 0.52 | 0.7 | 0.93 | 6.2 | 1.1 | 0.27 |
| Benzo(g,h,i)perylene | - - | - - | 0.32 J | 0.19 J | 0.19 J | 0.26 J | 5.9 | 0.31 J | 0.22 J |
| Benzo(k)fluoranthene | - - | - - | 1.1 | 0.65 | 0.84 | 1.2 | 9.3 | 1.3 | 0.38 |
| bis(2-Chloroethoxy)methane | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| bis(2-Chloroethyl)ether | - - | - - | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| bis(2-chloroisopropyl)ether | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| bis(2-Ethylhexyl)phthalate | - - | 199.5 | 0.16 J | 0.095 J | 0.29 J | 0.4 J | 4.2 U | 0.46 U | 4.8 |
| Butylbenzylphthalate | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Sample Depth (Feet):<br>Date Collected: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 |
|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | |
| Carbazole | - - | - - | 0.2 J | 0.055 J | 0.094 J | 0.14 J | 3.5 J | 0.42 J | 0.066 J |
| Chrysene | - - | - - | 1.1 | 0.54 | 0.68 | 1 | 11 | 1.4 | 0.37 J |
| Dibenz(a,h)anthracene | - - | - - | 0.093 | 0.062 | 0.052 J | 0.11 J | 1.5 | 0.12 | 0.072 |
| Dibenzofuran | - - | - - | 0.13 J | 0.034 J | 0.042 J | 0.049 J | 6.1 | 0.24 J | 0.019 J |
| Diethylphthalate | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Dimethylphthalate | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Di-n-butylphthalate | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Di-n-octylphthalate | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Fluoranthene | - - | 1,020 | 2.9 | 1.3 | 1.5 | 1.4 | 37 | 3.3 | 0.76 |
| Fluorene | 73 | 8 | 0.23 J | 0.054 J | 0.076 J | 0.085 J | 7.3 | 0.4 J | 0.027 J |
| Hexachlorobenzene | 9,081 | 5,570 | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| Hexachlorobutadiene | 55 | 5.5 | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U |
| Hexachlorocyclopentadiene | 44 | 4.4 | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Hexachloroethane | - - | - - | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| Indeno(1,2,3-cd)pyrene | - - | - - | 0.32 | 0.2 | 0.19 J | 0.3 J | 5.2 | 0.31 | 0.2 |
| Isophorone | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Naphthalene | 258 | 30 | 0.19 J | 0.096 J | 0.05 J | 0.069 J | 11 | 0.26 J | 0.021 J |
| Nitrobenzene | - - | - - | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| N-Nitroso-di-n-propylamine | - - | - - | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U |
| N-Nitrosodiphenylamine | - - | - - | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U |
| Pentachlorophenol | 100 | 40 | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U |
| Phenanthrene | - - | 120 | 1.9 | 0.65 | 0.9 | 1 | 47 | 3.4 | 0.51 J |
| Phenol | - - | 0.5 | 0.093 J | 0.43 U | 0.05 J | 0.42 U | 4.2 U | 0.055 J | 0.57 U |
| Pyrene | 8,775 | 961 | 2.3 | 1.2 | 1.4 | 2 | 28 | 3.3 | 0.63 |
| Total PAHs | - - | 4 (a) | 14 J | 6.97 J | 8.06 J | 10.6 J | 221 J | 18.6 J | 4.22 J |
| Total SVOCs | - - | - - | 14.5 J | 7.18 J | 8.5 J | 11.1 J | 230 J | 19.2 J | 9.1 J |
| **Misc. Compounds** | | | | | | | | | |
| Total Organic Carbon | - - | - - | 74,200 | 62,500 | 54,300 | 46,200 | 79,400 | 43,300 | 49,000 |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | Units | 00-SED-13 | 00-SED-14 | 00-SED-15 | 00-SED-16 | 00-SED-19 | 00-SED-20 |
|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.4 | 0 - 0.3 |
| Date Collected: | | | | 06/29/05 | 06/30/05 | 06/30/05 | 06/30/05 | 06/30/05 | 06/30/05 |
| **VOCs** | | | | | | | | | |
| 1,1,1-Trichloroethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| 1,1,2,2-Tetrachloroethane | - - | - - | mg/kg | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U | 0.0014 U | 0.0012 U | 0.0012 U |
| 1,1,2-Trichloroethane | - - | - - | mg/kg | 0.0035 U [0.0037 U] | 0.0038 U | 0.004 U | 0.0043 U | 0.0036 U | 0.0036 U |
| 1,1-Dichloroethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| 1,1-Dichloroethene | - - | - - | mg/kg | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U | 0.0028 U | 0.0024 U | 0.0024 U |
| 1,2-Dichloroethane | - - | - - | mg/kg | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U | 0.0028 U | 0.0024 U | 0.0024 U |
| 1,2-Dichloropropane | - - | - - | mg/kg | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U | 0.0014 U | 0.0012 U | 0.0012 U |
| 2-Butanone | - - | - - | mg/kg | 0.0058 UJ [0.021 J] | 0.0076 | 0.014 | 0.027 | 0.036 | 0.006 U |
| 2-Hexanone | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| 4-Methyl-2-Pentanone | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Acetone | - - | - - | mg/kg | 0.0058 UJ [0.089 J] | 0.069 J | 0.1 J | 0.15 J | 0.18 J | 0.098 J |
| Benzene | 103 | 28 | mg/kg | 0.0012 U [0.0008 J] | 0.0021 | 0.0006 J | 0.0005 J | 0.0016 | 0.0012 U |
| Bromodichloromethane | - - | - - | mg/kg | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U | 0.0014 U | 0.0012 U | 0.0012 U |
| Bromoform | - - | - - | mg/kg | 0.0047 U [0.0049 U] | 0.005 U | 0.0054 U | 0.0057 U | 0.0047 U | 0.0048 U |
| Bromomethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Carbon Disulfide | - - | - - | mg/kg | 0.0009 J [0.0073] | 0.0017 J | 0.0018 J | 0.008 | 0.0085 | 0.006 U |
| Carbon Tetrachloride | - - | - - | mg/kg | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U | 0.0028 U | 0.0024 U | 0.0024 U |
| Chlorobenzene | 34.6 | 3.5 | mg/kg | 0.0058 U [0.0061 U] | 0.001 J | 0.0028 J | 0.0071 U | 0.0059 U | 0.006 U |
| Chloroethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Chloroform | - - | - - | mg/kg | 0.0058 U [0.001 J] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0008 J | 0.006 U |
| Chloromethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| cis-1,2-Dichloroethene | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| cis-1,3-Dichloropropene | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Dibromochloromethane | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Ethylbenzene | 212 | 24 | mg/kg | 0.0047 U [0.0049 U] | 0.005 U | 0.0054 U | 0.0057 U | 0.0047 U | 0.0048 U |
| Methyl tert-butyl ether | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Methylene Chloride | - - | - - | mg/kg | 0.0035 U [0.0037 U] | 0.0038 U | 0.004 U | 0.0043 U | 0.0036 U | 0.0036 U |
| Styrene | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Tetrachloroethene | - - | - - | mg/kg | 0.0027 J [0.0027 J] | 0.0012 UJ | 0.0014 UJ | 0.0014 UJ | 0.0012 UJ | 0.0012 U |
| Toluene | 235 | 49 | mg/kg | 0.001 J [0.012 J] | 0.006 J | 0.0042 J | 0.0039 J | 0.0081 | 0.006 U |
| trans-1,2-Dichloroethene | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| trans-1,3-Dichloropropene | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Trichloroethene | - - | - - | mg/kg | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U | 0.0014 U | 0.0012 U | 0.0012 U |
| Vinyl Chloride | - - | - - | mg/kg | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0059 U | 0.006 U |
| Xylene (Total) | 833 | 92 | mg/kg | 0.0058 U [0.0008 J] | 0.0063 U | 0.0068 U | 0.0071 U | 0.0016 J | 0.006 U |
| Total BTEX | - - | - - | mg/kg | 0.001 J [0.0136 J] | 0.0081 J | 0.0048 J | 0.0044 J | 0.0113 J | ND |
| Total VOCs | - - | - - | mg/kg | 0.0046 J [0.135 J] | 0.0874 J | 0.123 J | 0.189 J | 0.237 J | 0.098 J |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | Units | 00-SED-13 | 00-SED-14 | 00-SED-15 | 00-SED-16 | 00-SED-19 | 00-SED-20 |
|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.5 | 0 - 0.4 | 0 - 0.3 |
| Date Collected: | | | | 06/29/05 | 06/30/05 | 06/30/05 | 06/30/05 | 06/30/05 | 06/30/05 |
| **SVOCs** | | | | | | | | | |
| 1,2,4-Trichlorobenzene | 910 | 91 | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| 1,2-Dichlorobenzene | 120 | 12 | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 1,3-Dichlorobenzene | 120 | 12 | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 1,4-Dichlorobenzene | 120 | 12 | mg/kg | 0.018 J [0.027 J] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2,4,5-Trichlorophenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2,4,6-Trichlorophenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2,4-Dichlorophenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2,4-Dimethylphenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2,4-Dinitrophenol | - - | - - | mg/kg | 1.6 U [1.6 U] | 1.7 U | 1.9 U | 40 U | 8.5 U | 8.3 U |
| 2,4-Dinitrotoluene | - - | - - | mg/kg | 0.081 U [0.082 U] | 0.084 U | 0.094 U | 2 U | 0.42 U | 0.41 U |
| 2,6-Dinitrotoluene | - - | - - | mg/kg | 0.081 U [0.082 U] | 0.084 U | 0.094 U | 2 U | 0.42 U | 0.41 U |
| 2-Chloronaphthalene | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2-Chlorophenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2-Methylnaphthalene | 304 | 34 | mg/kg | 0.038 J [0.048 J] | 0.043 J | 0.023 J | 3.9 J | 0.1 J | 0.14 J |
| 2-Methylphenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 2-Nitroaniline | - - | - - | mg/kg | 0.81 U [0.82 U] | 0.84 U | 0.94 U | 20 U | 4.2 U | 4.1 U |
| 2-Nitrophenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 3,3'-Dichlorobenzidine | - - | - - | mg/kg | 0.81 U [0.82 U] | 0.84 U | 0.94 U | 20 U | 4.2 U | 4.1 U |
| 3-Nitroaniline | - - | - - | mg/kg | 0.81 U [0.82 U] | 0.84 U | 0.94 U | 20 U | 4.2 U | 4.1 U |
| 4,6-Dinitro-2-methylphenol | - - | - - | mg/kg | 1.6 U [1.6 U] | 1.7 U | 1.9 U | 40 U | 8.5 U | 8.3 U |
| 4-Bromophenyl-phenylether | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 4-Chloro-3-methylphenol | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 4-Chloroaniline | - - | - - | mg/kg | 0.069 J [0.074 J] | 0.42 U | 0.47 U | 0.52 J | 0.12 J | 2.1 U |
| 4-Chlorophenyl-phenylether | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| 4-Methylphenol | - - | - - | mg/kg | 0.19 J [0.24 J] | 0.034 J | 0.1 J | 10 U | 0.57 J | 2.1 U |
| 4-Nitroaniline | - - | - - | mg/kg | 0.81 U [0.82 U] | 0.84 U | 0.94 U | 20 U | 4.2 U | 4.1 U |
| 4-Nitrophenol | - - | - - | mg/kg | 1.6 U [1.6 U] | 1.7 U | 1.9 U | 40 U | 8.5 U | 8.3 U |
| Acenaphthene | - - | 140 | mg/kg | 0.051 J [0.028 J] | 0.046 J | 0.03 J | 16 | 0.85 J | 0.77 J |
| Acenaphthylene | - - | - - | mg/kg | 0.029 J [0.017 J] | 0.19 J | 0.043 J | 0.74 J | 2.1 U | 0.18 J |
| Anthracene | 986 | 107 | mg/kg | 0.13 J [0.047 J] | 0.24 J | 0.11 J | 31 | 2.2 | 2 J |
| Benzo(a)anthracene | 94 | 12 | mg/kg | 0.44 J [0.11 J] | 0.69 | 0.2 | **69** | 3 | 5.7 |
| Benzo(a)pyrene | - - | - - | mg/kg | 0.48 [0.2] | 1.2 | 0.29 | 80 | 4 | 10 |
| Benzo(b)fluoranthene | - - | - - | mg/kg | 0.61 [0.3] | 0.95 | 0.27 | 84 | 3.3 | 10 |
| Benzo(g,h,i)perylene | - - | - - | mg/kg | R [R] | 0.33 J | 0.1 J | 21 J | 1.6 J | 4.6 |
| Benzo(k)fluoranthene | - - | - - | mg/kg | 0.76 J [0.25 J] | 1.2 | 0.32 | 94 | 4.2 | 11 |
| bis(2-Chloroethoxy)methane | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| bis(2-Chloroethyl)ether | - - | - - | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| bis(2-chloroisopropyl)ether | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| bis(2-Ethylhexyl)phthalate | - - | 199.5 | mg/kg | 1.2 [0.96] | 0.42 U | 0.17 J | 2.7 J | 3.6 | 1 J |
| Butylbenzylphthalate | - - | - - | mg/kg | 0.12 J [0.11 J] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Sample Depth (Feet):<br>Date Collected: | Benthic Aquatic Life Acute Toxicity | Benthic Aquatic Life Chronic Toxicity | Units | 00-SED-13<br>0 - 0.5<br>06/29/05 | 00-SED-14<br>0 - 0.5<br>06/30/05 | 00-SED-15<br>0 - 0.5<br>06/30/05 | 00-SED-16<br>0 - 0.5<br>06/30/05 | 00-SED-19<br>0 - 0.4<br>06/30/05 | 00-SED-20<br>0 - 0.3<br>06/30/05 |
|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | |
| Carbazole | - - | - - | mg/kg | 0.12 J [0.04 J] | 0.098 J | 0.045 J | 22 | 1.5 J | 2 J |
| Chrysene | - - | - - | mg/kg | 0.71 [0.26 J] | 1.2 | 0.34 J | 74 | 4.5 | 12 |
| Dibenz(a,h)anthracene | - - | - - | mg/kg | R [R] | 0.11 | 0.049 | 8 J | 0.45 | 1.2 |
| Dibenzofuran | - - | - - | mg/kg | 0.04 J [0.016 J] | 0.069 J | 0.026 J | 11 | 0.5 J | 0.48 J |
| Diethylphthalate | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Dimethylphthalate | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Di-n-butylphthalate | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Di-n-octylphthalate | - - | - - | mg/kg | 0.17 J [0.18 J] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Fluoranthene | - - | 1,020 | mg/kg | 1.1 [0.4 J] | 2.5 | 0.6 | 140 | 14 | 30 |
| Fluorene | 73 | 8 | mg/kg | 0.07 J [0.024 J] | 0.097 J | 0.051 J | **20** | 1.2 J | 1.1 J |
| Hexachlorobenzene | 9,081 | 5,570 | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| Hexachlorobutadiene | 55 | 5.5 | mg/kg | 0.081 U [0.082 U] | 0.084 U | 0.094 U | 2 U | 0.42 U | 0.41 U |
| Hexachlorocyclopentadiene | 44 | 4.4 | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Hexachloroethane | - - | - - | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| Indeno(1,2,3-cd)pyrene | - - | - - | mg/kg | 0.17 J [0.073 J] | 0.35 | 0.11 | 26 J | 1.5 | 4.3 |
| Isophorone | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Naphthalene | 258 | 30 | mg/kg | 0.028 J [0.028 J] | 0.089 J | 0.037 J | 5.8 J | 0.1 J | 0.14 J |
| Nitrobenzene | - - | - - | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| N-Nitroso-di-n-propylamine | - - | - - | mg/kg | 0.041 U [0.041 U] | 0.042 U | 0.047 U | 1 U | 0.21 U | 0.21 U |
| N-Nitrosodiphenylamine | - - | - - | mg/kg | 0.41 U [0.41 U] | 0.42 U | 0.47 U | 10 U | 2.1 U | 2.1 U |
| Pentachlorophenol | 100 | 40 | mg/kg | 1.6 U [1.6 U] | 1.7 U | 1.9 U | 40 U | 8.5 U | 8.3 U |
| Phenanthrene | - - | 120 | mg/kg | 0.87 [0.24 J] | 1.3 | 0.4 J | 130 | 12 | 17 |
| Phenol | - - | 0.5 | mg/kg | 0.41 U [0.41 U] | 0.39 J | 0.81 | 10 U | 2.1 U | 2.1 U |
| Pyrene | 8,775 | 961 | mg/kg | 1.8 [0.64] | 2.1 | 0.57 | 140 | 12 | 23 |
| Total PAHs | - - | 4 (a) | mg/kg | 7.29 J [2.67 J] | 12.6 J | 3.54 J | 943 J | 65 J | 133 J |
| Total SVOCs | - - | - - | mg/kg | 9.02 J [4.07 J] | 12.8 J | 3.78 J | 980 J | 70.7 J | 137 J |
| **Misc. Compounds** | | | | | | | | | |
| Total Organic Carbon | - - | - - | mg/kg | 94,400 [87,900] | 45,400 | 51,400 | 55,100 | 61,700 | 87,500 |

See Notes on Page 7.

## Table 5. Comparison of Sediment Data to NYSDEC Organic Screening Criteria, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**

All concentrations reported in milligrams per Kilogram (mg/Kg); equivalent to parts per million (ppm).

[ ] Bracketed results represent the duplicate sample.

-- = Sample not analyzed for specified constituent/no criteria available.

Benthic aquatic life criteria are from NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments.

(a) Sediment criterion is the Effects-Range Low (ER-L) by Long et al. (1995) as cited in NYSDEC's Technical Guidance to Screening Contaminated Sediment. Criteria are not adjusted for TOC concentration.

Organics criteria are presented in ug/gOC and are adjusted on a sample-specific basis for total organic carbon.

Shaded values indicate the result exceeded the benthic aquatic life chronic toxicity criterion.

Bolded and shaded values indicate the result exceeded both the benthic aquatic life chronic and acute toxicity criteria.

**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | E = | Serial dilution results not within 10%. Applicable only if analyte concentration is at least 50X the IDL in original sample. |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | N = | Spike sample recovery not within control limits. |
| Inorganic | ND = | None detected. |
| Inorganic | R = | Rejected. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | B = | Analyte was also detected in the associated method blank. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | E = | Analyte exceeded calibration range. |
| Organic | J = | Indicates an estimated value. |
| Organic | N = | The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. |
| Organic | ND = | None detected. |
| Organic | R = | Rejected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | UJ = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

## Table 6. Fish and Wildlife Resource Impact Analysis, Comparison of Sediment Data to NYSDEC Inorganic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | Severe Effect Level | Lowest Effect Level | Units | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 | 00-SED-13<br>0 - 0.5<br>06/29/05 | 00-SED-14<br>0 - 0.5<br>06/30/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics** | | | | | | | | | | | | |
| Aluminum | - - | - - | mg/kg | 3,990 | 4,640 | 3,160 | 3,900 | 3,490 | 3,260 | 4,320 | 1,640 [1,470] | 2,760 |
| Antimony | 25 | 2 | mg/kg | 13.9 UJ | 15.5 UJ | 15.5 J | 15.1 UJ | 15.3 UJ | 16.5 UJ | 20.6 UJ | 14.7 UJ [14.7 UJ] | 15.1 UJ |
| Arsenic | 33 | 6 | mg/kg | 3.50 U | 13.3 | 3.90 U | 3.80 U | 11.3 | 4.10 U | 5.10 U | 3.70 U [3.70 U] | 3.80 U |
| Barium | - - | - - | mg/kg | 52.3 | 85.4 | 42.2 B | 49.4 | 281 | 82.8 | 140 | 19.5 B [14.7 B] | 61.0 |
| Beryllium | - - | - - | mg/kg | 0.290 B | 0.350 B | 0.250 B | 0.260 B | 0.390 B | 0.290 B | 0.330 B | 0.160 B [0.150 B] | 0.210 B |
| Cadmium | 9 | 0.6 | mg/kg | 0.390 B | 1.10 B | 0.740 B | 0.880 B | 1.10 B | 0.690 B | 0.820 B | 0.310 B [1.20 U] | 0.520 B |
| Calcium | - - | - - | mg/kg | 72,400 J | 97,800 J | 80,800 J | 74,500 J | 48,900 J | 62,000 J | 68,600 J | 213,000 J [228,000 J] | 86,200 J |
| Chromium | 110 | 26 | mg/kg | 10.1 | 19.2 | 15.0 | **612** | 54.7 | 12.4 | 17.2 | 5.10 [10.9] | 16.8 |
| Cobalt | - - | - - | mg/kg | 5.10 B | 8.10 B | 5.00 B | 14.4 | 5.30 B | 4.70 B | 6.50 B | 6.20 B [3.40 B] | 3.40 B |
| Copper | 110 | 16 | mg/kg | 52.6 | **159** | 104 | 100 | **131** | 74.3 | **127** | 41.6 [18.5] | 79.0 |
| Cyanide, Total | - - | - - | mg/kg | 0.500 U | 0.500 U | 0.500 U | 0.500 U | 0.500 U | 0.500 U | 0.500 U | 0.500 U [0.500 U] | 0.500 U |
| Iron | 40,000 | 20,000 | mg/kg | 17,900 | 32,000 | 27,500 | **45,800** | 35,200 | 19,900 | 22,600 | 36,400 [7,100] | 15,000 |
| Lead | 110 | 31 | mg/kg | 88.3 | **199** | **323** | **311** | **1,530** | **159** | **337** | 35.7 [40.7] | **318** |
| Magnesium | - - | - - | mg/kg | 11,100 J | 13,100 J | 21,600 J | 11,600 J | 9,710 J | 9,560 J | 19,700 J | 19,900 J [20,700 J] | 6,750 J |
| Manganese | 1,100 | 460 | mg/kg | 425 J | 793 J | 374 J | 455 J | 259 J | 199 J | 238 J | 385 J [269 J] | 161 J |
| Mercury | 1.3 | 0.15 | mg/kg | 0.120 J | 0.150 J | 0.460 J | 0.250 J | 1.30 J | 0.190 J | 0.460 J | 0.120 J [0.120 BJ] | 0.770 J |
| Nickel | 50 | 16 | mg/kg | 21.0 | 32.3 | 20.7 | **558** | 20.6 | 26.1 | **53.3** | 13.6 [8.20 B] | 12.9 |
| Potassium | - - | - - | mg/kg | 621 B | 751 B | 573 B | 657 B | 590 B | 848 B | 684 B | 456 B [495 B] | 403 B |
| Selenium | - - | - - | mg/kg | 8.10 U | 9.00 U | 9.10 U | 8.80 U | 8.90 U | 9.60 U | 12.0 U | 8.50 U [8.60 U] | 8.80 U |
| Silver | 2.2 | 1 | mg/kg | 2.30 U | 2.60 U | 2.60 U | 2.50 U | 1.40 B | 2.70 U | 3.40 U | 2.40 U [2.50 U] | 2.50 U |
| Sodium | - - | - - | mg/kg | 81.5 B | 125 B | 1,300 U | 1,260 U | 1,270 U | 1,370 U | 1,720 U | 1,220 U [91.9 B] | 1,260 U |
| Thallium | - - | - - | mg/kg | 5.80 U | 6.40 U | 6.50 U | 6.30 U | 6.40 U | 6.90 U | 8.60 U | 6.10 U [6.10 U] | 6.30 U |
| Vanadium | - - | - - | mg/kg | 13.9 | 17.8 | 12.1 B | 15.2 | 13.0 | 12.9 B | 14.6 B | 7.90 B [8.00 B] | 10.1 B |
| Zinc | 270 | 120 | mg/kg | 127 J | 269 J | 151 J | 180 J | **735 J** | 168 J | 190 J | 98.5 J [67.9 J] | 136 J |

See Notes on Page 5.

**Table 6. Fish and Wildlife Resource Impact Analysis, Comparison of Sediment Data to NYSDEC Inorganic Screening Criteria**
**New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York**

| Location ID: | Severe | Lowest | | 00-SED-15 | 00-SED-16 | 00-SED-19 | 00-SED-20 | SED-BO-6 | SED-BO-7 | SED-BO-10 | SED-BO-11 | SED-BO-16 | SED-BO-17 | SED-BO-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Depth (Feet):** | **Effect** | **Effect** | | **0 - 0.5** | **0 - 0.5** | **0 - 0.4** | **0 - 0.3** | **2** | **0** | **1.5** | **0** | **1.5** | **2** | **1** |
| **Date Collected:** | **Level** | **Level** | **Units** | **06/30/05** | **06/30/05** | **06/30/05** | **06/30/05** | **08/10/06** | **08/10/06** | **08/10/06** | **08/10/06** | **08/10/06** | **08/10/06** | **08/10/06** |
| **Inorganics** | | | | | | | | | | | | | | |
| Aluminum | - - | - - | mg/kg | 3,650 | 3,070 | 1,370 | 3,250 | NA | NA | NA | NA | NA | NA | NA |
| Antimony | 25 | 2 | mg/kg | 16.9 UJ | 18.1 UJ | 15.2 UJ | 14.9 UJ | NA | NA | NA | NA | NA | NA | NA |
| Arsenic | 33 | 6 | mg/kg | 4.20 U | 4.50 U | 3.80 U | 3.70 U | NA | NA | NA | NA | NA | NA | NA |
| Barium | - - | - - | mg/kg | 410 | 48.8 B | 27.3 B | 41.2 B | NA | NA | NA | NA | NA | NA | NA |
| Beryllium | - - | - - | mg/kg | 0.270 B | 0.170 B | 0.100 B | 0.240 B | NA | NA | NA | NA | NA | NA | NA |
| Cadmium | 9 | 0.6 | mg/kg | 0.460 B | 2.00 | 0.300 B | 0.760 B | NA | NA | NA | NA | NA | NA | NA |
| Calcium | - - | - - | mg/kg | 75,100 J | 165,000 J | 144,000 J | 103,000 J | NA | NA | NA | NA | NA | NA | NA |
| Chromium | 110 | 26 | mg/kg | 13.1 | 20.1 | 19.9 | 17.9 | NA | NA | NA | NA | NA | NA | NA |
| Cobalt | - - | - - | mg/kg | 3.90 B | 3.30 B | 2.40 B | 4.80 B | NA | NA | NA | NA | NA | NA | NA |
| Copper | 110 | 16 | mg/kg | 93.7 | **439** | **158** | 42.4 | NA | NA | NA | NA | NA | NA | NA |
| Cyanide, Total | - - | - - | mg/kg | 0.500 U | 0.500 U | 0.500 U | 0.500 U | NA | NA | NA | NA | NA | NA | NA |
| Iron | 40,000 | 20,000 | mg/kg | 17,700 | 12,700 | 22,500 | 21,300 | NA | NA | NA | NA | NA | NA | NA |
| Lead | 110 | 31 | mg/kg | **282** | **835** | 54.9 | **222** | NA | NA | NA | NA | NA | NA | NA |
| Magnesium | - - | - - | mg/kg | 10,200 J | 17,400 J | 13,800 J | 19,500 J | NA | NA | NA | NA | NA | NA | NA |
| Manganese | 1,100 | 460 | mg/kg | 286 J | 280 J | 327 J | 327 J | NA | NA | NA | NA | NA | NA | NA |
| Mercury | 1.3 | 0.15 | mg/kg | 0.650 J | 1.00 J | 0.620 J | 0.350 J | NA | NA | NA | NA | NA | NA | NA |
| Nickel | 50 | 16 | mg/kg | 27.5 | 18.3 | 12.8 | 16.0 | NA | NA | NA | NA | NA | NA | NA |
| Potassium | - - | - - | mg/kg | 669 B | 478 B | 293 B | 720 B | NA | NA | NA | NA | NA | NA | NA |
| Selenium | - - | - - | mg/kg | 9.80 U | 10.6 U | 8.90 U | 8.70 U | NA | NA | NA | NA | NA | NA | NA |
| Silver | 2.2 | 1 | mg/kg | 2.80 U | 3.00 U | 2.50 U | 2.50 U | NA | NA | NA | NA | NA | NA | NA |
| Sodium | - - | - - | mg/kg | 1,400 U | 1,510 U | 147 B | 1,240 U | NA | NA | NA | NA | NA | NA | NA |
| Thallium | - - | - - | mg/kg | 7.00 U | 7.60 U | 6.40 U | 6.20 U | NA | NA | NA | NA | NA | NA | NA |
| Vanadium | - - | - - | mg/kg | 12.6 B | 13.7 B | 5.60 B | 11.2 B | NA | NA | NA | NA | NA | NA | NA |
| Zinc | 270 | 120 | mg/kg | 146 J | **342 J** | 110 J | 230 J | NA | NA | NA | NA | NA | NA | NA |

See Notes on Page 5.

### Table 6. Fish and Wildlife Resource Impact Analysis, Comparison of Sediment Data to NYSDEC Inorganic Screening Criteria
### New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | Severe Effect Level | Lowest Effect Level | Units | SED-BO-19<br>1.2<br>08/10/06 | SED-BO-21<br>2.4<br>08/10/06 | SED-BO-23<br>0.2<br>08/10/06 | SED-BO-25<br>2.5<br>08/10/06 | SED-BO-29<br>1.5<br>08/10/06 | SED-BO-30<br>2<br>08/10/06 | SED-BO-31<br>0<br>08/10/06 | SED-BO-34<br>0<br>08/15/06 | SED-SO-36<br>1<br>08/14/06 | SED-SO-38<br>1.5<br>08/14/06 | SED-SO-41<br>0.5<br>08/14/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics** | | | | | | | | | | | | | | |
| Aluminum | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Antimony | 25 | 2 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Arsenic | 33 | 6 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Barium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Beryllium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cadmium | 9 | 0.6 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Calcium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | 110 | 26 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cobalt | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Copper | 110 | 16 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cyanide, Total | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Iron | 40,000 | 20,000 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Lead | 110 | 31 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Magnesium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Manganese | 1,100 | 460 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Mercury | 1.3 | 0.15 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nickel | 50 | 16 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Potassium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Selenium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Silver | 2.2 | 1 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sodium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Thallium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Vanadium | - - | - - | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | 270 | 120 | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

See Notes on Page 5.

## Table 6. Fish and Wildlife Resource Impact Analysis, Comparison of Sediment Data to NYSDEC Inorganic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | Severe Effect Level | Lowest Effect Level | Units | SED-SO-42<br>1<br>08/14/06 | SED-SO-43<br>1<br>08/14/06 | SED-SO-45<br>1.5<br>08/14/06 | SED-SO-46<br>2.5<br>08/15/06 | SED-SO-50<br>1.5<br>08/15/06 |
|---|---|---|---|---|---|---|---|---|
| **Inorganics** | | | | | | | | |
| Aluminum | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Antimony | 25 | 2 | mg/kg | NA | NA | NA | NA | NA |
| Arsenic | 33 | 6 | mg/kg | NA | NA | NA | NA | NA |
| Barium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Beryllium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Cadmium | 9 | 0.6 | mg/kg | NA | NA | NA | NA | NA |
| Calcium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Chromium | 110 | 26 | mg/kg | NA | NA | NA | NA | NA |
| Cobalt | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Copper | 110 | 16 | mg/kg | NA | NA | NA | NA | NA |
| Cyanide, Total | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Iron | 40,000 | 20,000 | mg/kg | NA | NA | NA | NA | NA |
| Lead | 110 | 31 | mg/kg | NA | NA | NA | NA | NA |
| Magnesium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Manganese | 1,100 | 460 | mg/kg | NA | NA | NA | NA | NA |
| Mercury | 1.3 | 0.15 | mg/kg | NA | NA | NA | NA | NA |
| Nickel | 50 | 16 | mg/kg | NA | NA | NA | NA | NA |
| Potassium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Selenium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Silver | 2.2 | 1 | mg/kg | NA | NA | NA | NA | NA |
| Sodium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Thallium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Vanadium | - - | - - | mg/kg | NA | NA | NA | NA | NA |
| Zinc | 270 | 120 | mg/kg | NA | NA | NA | NA | NA |

See Notes on Page 5.

## Table 6. Fish and Wildlife Resource Impact Analysis, Comparison of Sediment Data to NYSDEC Inorganic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

**Notes:**
All concentrations reported in milligrams per Kilogram (mg/Kg); equivalent to parts per million (ppm).
[ ] Bracketed results represent the duplicate sample.
-- = Sample not analyzed for specified constituent/no criteria available.
Metals criteria are from NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments.
Metals criteria represent Lowest Effect Levels and Severe Effect Levels.
Shaded values indicate the result exceeded the Lowest Effect Level.
Bolded and shaded values indicate the result exceeded both the Lowest Effect Level and Severe Effect Level.

**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | E = | Serial dilution results not within 10%. Applicable only if analyte concentration is at least 50X the IDL in original sample. |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | N = | Spike sample recovery not within control limits. |
| Inorganic | ND = | None detected. |
| Inorganic | R = | Rejected. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | B = | Analyte was also detected in the associated method blank. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | E = | Analyte exceeded calibration range. |
| Organic | J = | Indicates an estimated value. |
| Organic | N = | The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. |
| Organic | ND = | None detected. |
| Organic | R = | Rejected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | UJ = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Date Collected: | TOGS 1.1.1 Aquatic Wildlife | Units | SW-00-Downstream<br>08/26/05 | SW-00SED-01<br>08/26/05 | SW-00SED-06<br>08/26/05 | SW-00SED-07<br>08/26/05 | SW-00SED-10<br>08/26/05 |
|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | |
| 1,1,1-Trichloroethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| 1,1,2,2-Tetrachloroethane | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| 1,1,2-Trichloroethane | - - | ug/L | 3 U | 3 U | 3 U [3 U] | 3 U | 3 U |
| 1,1-Dichloroethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| 1,1-Dichloroethene | - - | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |
| 1,2-Dichloroethane | - - | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |
| 1,2-Dichloropropane | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| 2-Butanone | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| 2-Hexanone | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| 4-Methyl-2-Pentanone | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Acetone | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Benzene | 210 {G} | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Bromodichloromethane | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Bromoform | - - | ug/L | 4 U | 4 U | 4 U [4 U] | 4 U | 4 U |
| Bromomethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Carbon Disulfide | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Carbon Tetrachloride | - - | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |
| Chlorobenzene | 5 {S} | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Chloroethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Chloroform | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Chloromethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| cis-1,2-Dichloroethene | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| cis-1,3-Dichloropropene | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Dibromochloromethane | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Ethylbenzene | 17 {G} | ug/L | 4 U | 4 U | 4 U [4 U] | 4 U | 4 U |
| Methylene Chloride | - - | ug/L | 3 U | 3 U | 3 U [3 U] | 3 U | 3 U |
| Styrene | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Tetrachloroethene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Toluene | 100 {G} | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| trans-1,2-Dichloroethene | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| trans-1,3-Dichloropropene | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Trichloroethene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Vinyl Chloride | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Xylene (Total) | - - | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Total BTEX | - - | ug/L | ND | ND | ND [ND] | ND | ND |
| Total VOCs | - - | ug/L | ND | ND | ND [ND] | ND | ND |

See Notes on Page 7.

**Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| Sample ID: | TOGS 1.1.1 | | SW-00-Downstream | SW-00SED-01 | SW-00SED-06 | SW-00SED-07 | SW-00SED-10 |
|---|---|---|---|---|---|---|---|
| Date Collected: | Aquatic Wildlife | Units | 08/26/05 | 08/26/05 | 08/26/05 | 08/26/05 | 08/26/05 |
| **SVOCs** | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 {S} | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| 1,2-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 1,3-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 1,4-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 2,4-Dinitrotoluene | - - | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |
| 2,6-Dinitrotoluene | - - | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |
| 2-Chloronaphthalene | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 2-Methylnaphthalene | 4.7 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 2-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U [20 U] | 20 U | 20 U |
| 3,3'-Dichlorobenzidine | - - | ug/L | 20 U | 20 U | 20 U [20 U] | 20 U | 20 U |
| 3-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U [20 U] | 20 U | 20 U |
| 4-Bromophenyl-phenylether | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 4-Chloroaniline | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 4-Chlorophenyl-phenylether | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| 4-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U [20 U] | 20 U | 20 U |
| Acenaphthene | 5.3 {G} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Acenaphthylene | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Anthracene | 3.8 {G} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Benzo(a)anthracene | 0.03 {G} | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Benzo(a)pyrene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Benzo(b)fluoranthene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Benzo(g,h,i)perylene | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Benzo(k)fluoranthene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| bis(2-Chloroethoxy)methane | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| bis(2-Chloroethyl)ether | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| bis(2-chloroisopropyl)ether | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| bis(2-Ethylhexyl)phthalate | 0.6 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Butylbenzylphthalate | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Carbazole | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Chrysene | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Dibenz(a,h)anthracene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Dibenzofuran | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Diethylphthalate | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Dimethylphthalate | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Di-n-butylphthalate | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Di-n-octylphthalate | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Fluoranthene | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Fluorene | 0.54 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Hexachlorobenzene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Hexachlorobutadiene | 1 {S} | ug/L | 2 U | 2 U | 2 U [2 U] | 2 U | 2 U |

See Notes on Page 7.

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: Date Collected: | TOGS 1.1.1 Aquatic Wildlife | Units | SW-00-Downstream 08/26/05 | SW-00SED-01 08/26/05 | SW-00SED-06 08/26/05 | SW-00SED-07 08/26/05 | SW-00SED-10 08/26/05 |
|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | |
| Hexachlorocyclopentadiene | 0.45 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Hexachloroethane | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Indeno(1,2,3-cd)pyrene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Isophorone | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Naphthalene | 13 {G} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Nitrobenzene | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| N-Nitroso-di-n-propylamine | - - | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| N-Nitrosodiphenylamine | - - | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Phenanthrene | 5 {G} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Pyrene | 4.6 {G} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Total PAHs | - - | ug/L | ND | ND | ND [ND] | ND | ND |
| Total SVOCs | - - | ug/L | ND | ND | ND [ND] | ND | ND |
| **Metals** | | | | | | | |
| Aluminum | 100 {S} | ug/L | 200 U | 200 U | 200 U [200 U] | 200 U | 200 U |
| Antimony | - - | ug/L | 60 U | 60 U | 60 U [60 U] | 60 U | 60 U |
| Arsenic | 150 {S} | ug/L | 15 U | 15 U | 15 U [15 U] | 15 U | 15 U |
| Barium | - - | ug/L | **24.7 B** | **24.8 B** | **25.1 B [24 B]** | **25.1 B** | **25.3 B** |
| Beryllium | 1,100 {S} | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Cadmium | 2.7 {S} | ug/L | 1 U | 1 U | 1 U [1 U] | 1 U | 1 U |
| Calcium | - - | ug/L | **33,100** | **33,400** | **33,600 [33,200]** | **33,200** | **33,100** |
| Chromium | 97.6 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Cobalt | 5 {S} | ug/L | 50 U | 50 U | 50 U [50 U] | 50 U | 50 U |
| Copper | 11.9 {S} | ug/L | 25 U | 25 U | 25 U [25 U] | 25 U | 25 U |
| Cyanide, Total | 5.2 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Iron | 300 {S} | ug/L | 100 U | 100 U | 100 U [100 U] | 100 U | 100 U |
| Lead | 5.4 {S} | ug/L | 5 U | 5 U | 5 U [5 U] | 5 U | 5 U |
| Magnesium | - - | ug/L | **8,240** | **8,270** | **8,350 [8,360]** | **8,320** | **8,420** |
| Manganese | - - | ug/L | **3.2 B** | 15 U | 15 U [15 U] | 15 U | **2.9 B** |
| Mercury | 0.0026 {S} | ug/L | 0.2 U | 0.2 U | 0.2 U [0.2 U] | **0.14 B** | **0.18 B** |
| Nickel | 69.1 {S} | ug/L | 40 U | 40 U | 40 U [40 U] | 40 U | 40 U |
| Potassium | - - | ug/L | **1,200 B** | **1,190 B** | **1,220 B [1,150 B]** | **1,180 B** | **1,200 B** |
| Selenium | 4.6 {S} | ug/L | 35 U | 35 U | 35 U [35 U] | 35 U | 35 U |
| Silver | 0.1 {S} | ug/L | 10 U | 10 U | 10 U [10 U] | 10 U | 10 U |
| Sodium | - - | ug/L | **12,700** | **12,800** | **12,800 [12,600]** | **12,700** | **13,200** |
| Thallium | 8 {S} | ug/L | 25 U | 25 U | 25 U [25 U] | 25 U | 25 U |
| Vanadium | 14 {S} | ug/L | 50 U | 50 U | 50 U [50 U] | 1.5 U | 50 U |
| Zinc | 110 {S} | ug/L | 60 U | **6.9 B** | 60 U [60 U] | 5.8 U | **60 B** |
| Hardness | - - | mg CaCO$_3$/L | 117 | 117 | 118 | 117 | 117 |

See Notes on Page 7.

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:**<br>**Date Collected:** | **TOGS 1.1.1 Aquatic Wildlife** | **Units** | **SW-00SED-13**<br>**08/26/05** | **SW-00SED-16**<br>**08/26/05** | **SW-00-SED-19**<br>**08/26/05** | **SW-00-SED-20**<br>**08/26/05** | **SW-00-Upstream**<br>**08/26/05** |
|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | |
| 1,1,1-Trichloroethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| 1,1,2,2-Tetrachloroethane | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| 1,1,2-Trichloroethane | - - | ug/L | 3 U | 3 U | 3 U | 3 U | 3 U |
| 1,1-Dichloroethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| 1,1-Dichloroethene | - - | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |
| 1,2-Dichloroethane | - - | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |
| 1,2-Dichloropropane | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| 2-Butanone | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| 2-Hexanone | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| 4-Methyl-2-Pentanone | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Acetone | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Benzene | 210 {G} | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Bromodichloromethane | - - | ug/L | 1 U | **1.8** | 1 U | 1 U | 1 U |
| Bromoform | - - | ug/L | 4 U | 4 U | 4 U | 4 U | 4 U |
| Bromomethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Carbon Disulfide | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Carbon Tetrachloride | - - | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |
| Chlorobenzene | 5 {S} | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Chloroethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Chloroform | - - | ug/L | 5 U | **8.4** | **1 J** | **0.9 J** | **0.9 J** |
| Chloromethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| cis-1,2-Dichloroethene | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| cis-1,3-Dichloropropene | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Dibromochloromethane | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Ethylbenzene | 17 {G} | ug/L | 4 U | 4 U | 4 U | 4 U | 4 U |
| Methylene Chloride | - - | ug/L | 3 U | 3 U | 3 U | 3 U | 3 U |
| Styrene | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Tetrachloroethene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Toluene | 100 {G} | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| trans-1,2-Dichloroethene | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| trans-1,3-Dichloropropene | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Trichloroethene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Vinyl Chloride | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Xylene (Total) | - - | ug/L | 5 U | 5 U | 5 U | 5 U | 5 U |
| Total BTEX | - - | ug/L | ND | ND | ND | ND | ND |
| Total VOCs | - - | ug/L | ND | **10.2** | **1 J** | **0.9 J** | **0.9 J** |

See Notes on Page 7.

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID: Date Collected: | TOGS 1.1.1 Aquatic Wildlife | Units | SW-00SED-13 08/26/05 | SW-00SED-16 08/26/05 | SW-00-SED-19 08/26/05 | SW-00-SED-20 08/26/05 | SW-00-Upstream 08/26/05 |
|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | |
| 1,2,4-Trichlorobenzene | 5 {S} | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| 1,2-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 1,3-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 1,4-Dichlorobenzene | 5 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 2,4-Dinitrotoluene | - - | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |
| 2,6-Dinitrotoluene | - - | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |
| 2-Chloronaphthalene | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 2-Methylnaphthalene | 4.7 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 2-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U | 20 U | 20 U |
| 3,3'-Dichlorobenzidine | - - | ug/L | 20 U | 20 U | 20 U | 20 U | 20 U |
| 3-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U | 20 U | 20 U |
| 4-Bromophenyl-phenylether | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 4-Chloroaniline | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 4-Chlorophenyl-phenylether | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| 4-Nitroaniline | - - | ug/L | 20 U | 20 U | 20 U | 20 U | 20 U |
| Acenaphthene | 5.3 {G} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Acenaphthylene | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Anthracene | 3.8 {G} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Benzo(a)anthracene | 0.03 {G} | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Benzo(a)pyrene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Benzo(b)fluoranthene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Benzo(g,h,i)perylene | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Benzo(k)fluoranthene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| bis(2-Chloroethoxy)methane | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| bis(2-Chloroethyl)ether | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| bis(2-chloroisopropyl)ether | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| bis(2-Ethylhexyl)phthalate | 0.6 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Butylbenzylphthalate | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Carbazole | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Chrysene | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Dibenz(a,h)anthracene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Dibenzofuran | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Diethylphthalate | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Dimethylphthalate | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Di-n-butylphthalate | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Di-n-octylphthalate | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Fluoranthene | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Fluorene | 0.54 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Hexachlorobenzene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Hexachlorobutadiene | 1 {S} | ug/L | 2 U | 2 U | 2 U | 2 U | 2 U |

See Notes on Page 7.

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:** | **TOGS 1.1.1 Aquatic Wildlife** | **Units** | **SW-00SED-13** | **SW-00SED-16** | **SW-00-SED-19** | **SW-00-SED-20** | **SW-00-Upstream** |
|---|---|---|---|---|---|---|---|
| **Date Collected:** | | | **08/26/05** | **08/26/05** | **08/26/05** | **08/26/05** | **08/26/05** |
| **SVOCs (Cont'd.)** | | | | | | | |
| Hexachlorocyclopentadiene | 0.45 {S} | ug/L | 10 UJ | 10 U | 10 UJ | 10 U | 10 UJ |
| Hexachloroethane | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Indeno(1,2,3-cd)pyrene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Isophorone | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Naphthalene | 13 {G} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Nitrobenzene | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| N-Nitroso-di-n-propylamine | - - | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| N-Nitrosodiphenylamine | - - | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Phenanthrene | 5 {G} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Pyrene | 4.6 {G} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Total PAHs | - - | ug/L | ND | ND | ND | ND | ND |
| Total SVOCs | - - | ug/L | ND | ND | ND | ND | ND |
| **Metals** | | | | | | | |
| Aluminum | 100 {S} | ug/L | 200 U | **142 B** | 200 U | **191 B** | **144 B** |
| Antimony | - - | ug/L | 60 U | 60 U | 60 U | 60 U | 60 U |
| Arsenic | 150 {S} | ug/L | 15 U | 15 U | 15 U | 15 U | 15 U |
| Barium | - - | ug/L | **61.9 B** | **23.7 B** | **66.9 B** | **23.7 B** | **24.5 B** |
| Beryllium | 1,100 {S} | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Cadmium | 2.7 {S} | ug/L | 1 U | 1 U | 1 U | 1 U | 1 U |
| Calcium | - - | ug/L | **51,800** | **37,800** | **74,400** | **34,100** | **33,400** |
| Chromium | 97.6 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Cobalt | 5 {S} | ug/L | 50 U | 50 U | 50 U | 50 U | 50 U |
| Copper | 11.9 {S} | ug/L | 25 U | **6.4 B** | **10.8 B** | 25 U | 25 U |
| Cyanide, Total | 5.2 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Iron | 300 {S} | ug/L | **104 B** | 100 U | 100 U | 100 U | 100 U |
| Lead | 5.4 {S} | ug/L | 5 U | **2.8 B** | 5 U | 5 U | 5 U |
| Magnesium | - - | ug/L | **11,500** | **8,370** | **19,300** | **8,750** | **8,290** |
| Manganese | - - | ug/L | **28.8** | **4.9 B** | **5.4 B** | **7.2 B** | **6.1 B** |
| Mercury | 0.0026 {S} | ug/L | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.1 U |
| Nickel | 69.1 {S} | ug/L | 40 U | 40 U | 40 U | 40 U | 40 U |
| Potassium | - - | ug/L | **2,530 B** | **1,410 B** | **4,220 B** | **1,290 B** | **1,210 B** |
| Selenium | 4.6 {S} | ug/L | 35 U | 35 U | 35 U | 35 U | 35 U |
| Silver | 0.1 {S} | ug/L | 10 U | 10 U | 10 U | 10 U | 10 U |
| Sodium | - - | ug/L | **46,500** | **17,700** | **121,000** | **13,300** | **14,100** |
| Thallium | 8 {S} | ug/L | 25 U | 25 U | 25 U | 25 U | 25 U |
| Vanadium | 14 {S} | ug/L | 50 U | 50 U | 50 U | 50 U | 50 U |
| Zinc | 110 {S} | ug/L | **8.8 B** | **7.6 B** | **17.4 B** | 60 U | 60 U |
| Hardness | - - | mg CaCO$_3$/L | 177 | 129 | 265 | 121 | 118 |

See Notes on Page 7.

## Table 7. Comparison of Surface Water Data to NYSDEC Surface Water Standards, Remedial Investigation, New York State Electric Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**

All concentrations reported in micrograms per liter (ug/L); equivalent to parts per billion (ppb).

Detected concentrations are bolded.

[ ] Bracketed results represent the duplicate sample.

-- = Sample not analyzed for specified constituent/no criteria available.

Surface water criteria from NYSDEC (1998) Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Shaded values indicate the result exceeded the NYSDEC TOGS 1.1.1 freshwater standard/guidance value.

**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | E = | Serial dilution results not within 10%. Applicable only if analyte concentration is at least 50X the IDL in original sample. |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | N = | Spike sample recovery not within control limits. |
| Inorganic | ND = | None detected. |
| Inorganic | R = | Rejected. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | B = | Analyte was also detected in the associated method blank. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | E = | Analyte exceeded calibration range. |
| Organic | J = | Indicates an estimated value. |
| Organic | N = | The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. |
| Organic | ND = | None detected. |
| Organic | R = | Rejected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | UJ = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

**Table 8. Well Construction Details, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| Location ID | Date Completed | Northing Coordinate ft. | Easting Coordinate ft. | MP Elevation ft. AMSL | Ground Surface Elevation ft. AMSL | Well Diameter in. | Casing/ Screen Type | Screen Slot Size in. | Screen Length ft. | Sump Length ft. | Depth to Screened Interval ft. bgs | | Total Well Depth ft. bgs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Top | Bottom | |
| MW-04-01 | 11/30/04 | 1069011.47 | 823450.98 | 663.65 | 664.03 | 2 | PVC | 0.02 | 10.0 | 2.0 | 1.9 | 11.9 | 13.9 |
| MW-06-01RI | 12/18/2006 | 1069009.68 | 823446.15 | 663.82 | 664.09 | 1 | PVC | 0.02 | 10.0 | 4.0 | 35.0 | 45.0 | 49.0 |
| MW-06-01RD | 12/18/2006 | 1069009.68 | 823446.15 | 663.83 | 664.09 | 1 | PVC | 0.02 | 10.0 | 4.0 | 65.0 | 75.0 | 79.0 |
| MW-04-02 | 12/1/04 | 1068976.48 | 823356.78 | 663.38 | 663.82 | 2 | PVC | 0.02 | 10.0 | -- | 3.7 | 13.7 | 13.7 |
| MW-05-02R | 3/15/05 | 1068973.79 | 823365.97 | 663.30 | 663.63 | 2 | PVC | 0.02 | 10.0 | 2.0 | 18.0 | 28.0 | 30.0 |
| MW-04-03 | 12/1/04 | 1068962.79 | 823300.23 | 661.34 | 661.87 | 2 | PVC | 0.02 | 10.0 | -- | 2.0 | 12.0 | 12.0 |
| MW-04-04 | 12/1/04 | 1068976.67 | 823240.76 | 659.08 | 659.37 | 2 | PVC | 0.02 | 10.0 | -- | 3.8 | 13.8 | 13.8 |
| MW-04-05 | 12/2/04 | 1068999.68 | 823176.04 | 659.21 | 659.43 | 2 | PVC | 0.02 | 5.0 | -- | 4.7 | 9.7 | 9.7 |
| MW-04-06 | 11/30/04 | 1068753.36 | 823163.87 | 668.07 | 668.67 | 2 | PVC | 0.02 | 10.0 | -- | 4.9 | 14.9 | 14.9 |
| MW-06-06R | 5/9/2006 | 1068752.40 | 823156.09 | 667.62 | 668.01 | 2 | PVC | 0.02 | 10.0 | 2.0 | 28.0 | 38.0 | 40.0 |
| MW-06-06RI | 12/21/2006 | 1068756.64 | 823150.67 | 667.24 | 667.55 | 1 | PVC | 0.02 | 10.0 | 2.0 | 50.0 | 60.0 | 62.0 |
| MW-06-06RD | 12/21/2006 | 1068756.64 | 823150.67 | 667.22 | 667.55 | 1 | PVC | 0.02 | 10.0 | 2.0 | 68.0 | 78.0 | 80.0 |
| MW-05-07 | 3/18/05 | 1068984.18 | 823223.10 | 659.23 | 659.54 | 2 | PVC | 0.02 | 6.0 | 1.0 | 4.8 | 10.8 | 11.8 |
| MW-05-07R | 3/17/05 | 1068987.02 | 823220.16 | 659.27 | 659.56 | 2 | PVC | 0.02 | 10.0 | 2.0 | 18.0 | 28.0 | 30.0 |
| MW-05-08 | 3/18/05 | 1068835.10 | 823271.32 | 658.49 | 658.91 | 2 | PVC | 0.02 | 6.0 | 1.0 | 3.5 | 9.5 | 10.5 |
| MW-05-08R | 3/14/05 | 1068831.57 | 823266.35 | 658.70 | 659.09 | 2 | PVC | 0.02 | 10.0 | 2.0 | 18.0 | 28.0 | 30.0 |
| MW-06-09 | 5/4/2009 | 1068805.73 | 823405.30 | 662.34 | 662.65 | 2 | PVC | 0.02 | 10.0 | 0.0 | 5.2 | 15.2 | 15.2 |
| MW-06-09R | 5/10/2009 | 1068806.27 | 823401.31 | 662.18 | 662.6 | 2 | PVC | 0.02 | 10.0 | 2.0 | 28.0 | 38.0 | 40.0 |
| MW-06-10 | 5/1/2006 | 1068892.02 | 823127.29 | 657.76 | 658.16 | 2 | PVC | 0.02 | 5.0 | 0.0 | 3.0 | 8.0 | 8.0 |
| MW-06-10R | 5/8/2006 | 1068893.37 | 8231336.68 | 658.07 | 658.36 | 2 | PVC | 0.02 | 10.0 | 2.0 | 18.0 | 28.0 | 30.0 |
| MW-06-11R | 5/4/2006 | 1068998.38 | 823113.04 | 657.64 | 658.12 | 2 | PVC | 0.02 | 10.0 | 3.0 | 9.0 | 19.0 | 22.0 |
| MW-06-12R | 5/11/2006 | 1068981.80 | 823298.60 | 663.53 | 663.76 | 2 | PVC | 0.02 | 10.0 | 2.0 | 18.0 | 28.0 | 30.0 |
| MW-06-13R | 6/16/2006 | 1068974.52 | 823018.83 | 657.58 | 658.2 | 2 | PVC | 0.02 | 10.0 | 2.0 | 23.0 | 33.0 | 35.0 |
| MW-06-14R | 7/27/2006 | 1068931.36 | 822917.09 | 660.69 | 661.03 | 2 | PVC | 0.02 | 10.0 | 2.0 | 16.0 | 26.0 | 28.0 |
| MW-06-15R | 7/27/2006 | 1068967.01 | 823115.04 | 657.88 | 658.3 | 2 | PVC | 0.02 | 10.0 | 2.0 | 12.0 | 22.0 | 24.0 |
| MW-07-16RI | 1/9/2007 | 1068859.58 | 822765.76 | 661.54 | 661.84 | 1 | PVC | 0.02 | 10.0 | 4.0 | 44.0 | 54.0 | 58.0 |
| MW-07-16RD | 1/9/2007 | 1068859.58 | 822765.76 | 661.54 | 661.84 | 1 | PVC | 0.02 | 10.0 | 4.0 | 65.0 | 75.0 | 79.0 |
| MW-07-17RI | 1/19/2007 | 1068999.86 | 823118.78 | 657.92 | 658.19 | 1 | PVC | 0.02 | 10.0 | 2.0 | 50.0 | 60.0 | 62.0 |
| MW-07-17RD | 1/19/2007 | 1068999.86 | 823118.78 | 657.85 | 658.19 | 1 | PVC | 0.02 | 10.0 | 2.0 | 68.0 | 78.0 | 80.0 |

**Notes:**

Horizontal Datum = NAD 1983.

Vertical Datum = NAVD 1988.

## Table 9. Water Elevation Data, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Location ID | MP Elevation ft. AMSL | DTW (TIC) | | | | | | | Water Elevation - ft. AMSL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4/4/2005 | 4/6/2005 | 5/3/2005 | 8/7/2006 | 8/11/2006 | 9/26/2006 | 4/11/2007 | 4/4/2005 | 4/6/2005 | 5/3/2005 | 8/7/2006 | 8/11/2006 | 9/26/2006 | 4/11/2007 |
| MW-04-1 | 663.65 | 5.10 | 5.41 | 8.72 | 8.86 | -- | 9.35 | 8.47 | 658.55 | 658.24 | 654.93 | 654.79 | -- | 654.30 | 655.18 |
| MW-06-1RI | 663.82 | -- | -- | -- | -- | -- | -- | 34.40 | -- | -- | -- | -- | -- | -- | 629.42 |
| MW-06-1RD | 663.83 | -- | -- | -- | -- | -- | -- | 38.40 | -- | -- | -- | -- | -- | -- | 625.43 |
| MW-04-2 | 663.38 | 5.30 | 6.51 | 10.13 | 9.96 | -- | 10.24 | 9.45 | 658.08 | 656.87 | 653.25 | 653.42 | -- | 653.14 | 653.93 |
| MW-05-2R | 663.30 | 6.15 | 6.80 | 9.13 | 9.78 | -- | 10.10 | 9.65 | 657.15 | 656.50 | 654.17 | 653.52 | -- | 653.20 | 653.65 |
| MW-04-3 | 661.34 | 4.00 | 4.30 | 7.94 | 7.69 | 8.32 | 8.89 | 7.73 | 657.34 | 657.04 | 653.40 | 653.65 | 653.02 | 652.45 | 653.61 |
| MW-04-4 | 659.08 | 0.52 | 0.95 | 1.14 | 3.61 | 3.83 | 4.35 | 1.60 | 658.56 | 658.13 | 657.94 | 655.47 | 655.25 | 654.73 | 657.48 |
| MW-04-5 | 659.21 | 3.36 | 3.65 | 8.22 | 7.85 | 8.29 | 8.18 | 7.20 | 655.85 | 655.56 | 650.99 | 651.36 | 650.92 | 651.03 | 652.01 |
| MW-04-6 | 668.07 | 8.95 | 9.45 | 9.51 | 9.84 | -- | 9.85 | 9.79 | 659.12 | 658.62 | 658.56 | 658.23 | -- | 658.22 | 658.28 |
| MW-06-6R | 667.62 | -- | -- | -- | 19.21 | -- | 27.83 | 21.72 | -- | -- | -- | 648.41 | -- | 639.79 | 645.90 |
| MW-06-6RI | 667.24 | -- | -- | -- | -- | -- | -- | 42.72 | -- | -- | -- | -- | -- | -- | 624.52 |
| MW-06-6RD | 667.22 | -- | -- | -- | -- | -- | -- | 42.78 | -- | -- | -- | -- | -- | -- | 624.44 |
| MW-05-7 | 659.23 | 3.12 | 3.40 | 6.07 | 5.98 | 6.91 | 6.39 | 5.83 | 656.11 | 655.83 | 653.16 | 653.25 | 652.32 | 652.84 | 653.40 |
| MW-05-7R | 659.27 | 8.97 | 9.26 | 10.16 | 10.60 | 13.02 | 12.64 | 11.01 | 650.30 | 650.01 | 649.11 | 648.67 | 646.25 | 646.63 | 648.26 |
| MW-05-8 | 658.49 | 2.35 | 2.92 | 4.27 | 5.01 | -- | 5.08 | 4.85 | 656.14 | 655.57 | 654.22 | 653.48 | -- | 653.41 | 653.64 |
| MW-05-8R | 658.70 | 2.70 | 3.35 | 4.74 | 5.25 | -- | 5.42 | 5.36 | 656.00 | 655.35 | 653.96 | 653.45 | -- | 653.28 | 653.34 |
| MW-06-9 | 662.34 | -- | -- | -- | 6.23 | -- | 6.30 | 6.13 | -- | -- | -- | 656.11 | -- | 656.04 | 656.21 |
| MW-06-9R | 662.18 | -- | -- | -- | 23.49 | -- | 25.20 | 23.79 | -- | -- | -- | 638.69 | -- | 636.98 | 638.39 |
| MW-06-10 | 657.76 | -- | -- | -- | 4.12 | 4.52 | 4.24 | 3.99 | -- | -- | -- | 653.64 | 653.24 | 653.52 | 653.77 |
| MW-06-10R | 658.07 | -- | -- | -- | 7.69 | 19.26 | 8.53 | 7.92 | -- | -- | -- | 650.38 | 638.81 | 649.54 | 650.15 |
| MW-06-11R | 657.64 | -- | -- | -- | 6.16 | 7.69 | 6.92 | 5.69 | -- | -- | -- | 651.48 | 649.95 | 650.72 | 651.95 |
| MW-06-12R | 663.53 | -- | -- | -- | 10.92 | 10.96 | 10.84 | 9.75 | -- | -- | -- | 652.61 | 652.57 | 652.69 | 653.78 |
| MW-06-13R | 657.58 | -- | -- | -- | 15.12 | 16.82 | 18.44 | 16.95 | -- | -- | -- | 642.46 | 640.76 | 639.14 | 640.63 |
| MW-06-14R | 660.69 | -- | -- | -- | 8.67 | 8.80 | 8.67 | 8.68 | -- | -- | -- | 652.02 | 651.89 | 652.02 | 652.01 |
| MW-06-15R | 657.88 | -- | -- | -- | 5.62 | 6.69 | 6.16 | 5.38 | -- | -- | -- | 652.26 | 651.19 | 651.72 | 652.50 |
| MW-07-16RI | 661.54 | -- | -- | -- | -- | -- | -- | 26.69 | -- | -- | -- | -- | -- | -- | 634.85 |
| MW-07-16RD | 661.54 | -- | -- | -- | -- | -- | -- | 26.37 | -- | -- | -- | -- | -- | -- | 635.17 |
| MW-07-17RI | 657.92 | -- | -- | -- | -- | -- | -- | 29.20 | -- | -- | -- | -- | -- | -- | 628.72 |
| MW-07-17RD | 657.85 | -- | -- | -- | -- | -- | -- | 31.34 | -- | -- | -- | -- | -- | -- | 626.51 |
| SG-04-1 | 671.40 | 11.60 | 12.50 | 17.25 | 17.41 | 17.75 | 18.10 | 15.73 | 659.80 | 658.90 | 654.15 | 653.99 | 653.65 | 653.30 | 655.67 |
| SG-04-2 | 661.14 | 3.90 | 3.90 | dry | dry | -- | 7.40 (dry) | 7.60 | 657.24 | 657.24 | dry (<653.74) | dry (<653.74) | -- | dry (<653.74) | 653.54 |
| SG-04-3 | 656.04 | 10.45 | 10.60 | 13.10 | 13.09 | -- | 13.50 | 12.45 | 645.59 | 645.44 | 642.94 | 642.95 | -- | 642.54 | 643.59 |
| SG-06-4 | 655.14 | -- | -- | -- | -- | 4.18 | 4.45 | 2.00 | -- | -- | -- | -- | 650.96 | 650.69 | 653.14 |

**Notes:**

1. MP = Measuring point. Measuring point elevations surveyed by NYSEG.
2. Elevations given in feet Above Mean Sea Level (AMSL), 1988 North American Vertical Datum (NAVD).

## Table 10. Hydraulic Conductivity Values, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Well Location | Interval Tested (feet below grade) | Hydraulic Conductivity (feet/day) |
|---|---|---|
| **Overburden** | | |
| MW-04-01 | 5.4-11.9 | 182 |
| MW-04-02 | 9.96-13.7 | 0.84 |
| MW-04-03 | 8.17-12 | 1.92 |
| MW-04-04 | 3.61-13.8 | 28.3 |
| MW-04-05 | 3.5-9.7 | 49.1 |
| MW-04-06 | 9.45-15.3 | 0.70 |
| MW-05-07 | 6.63-10.8 | 2.02 |
| MW-05-08 | 5.31-9.5 | 0.43 |
| MW-06-09 | 6.41-17.4 | 0.92 |
| MW-06-10 | 4.34-8.3 | 1.33 |
| ***Geometric Mean Overburden*** | | ***3.53*** |
| **Bedrock** | | |
| MW-05-02R | 16-28 | 0.15 |
| MW-06-06R | 26-38 | 5.00E-03 |
| MW-05-07R | 16-28 | 3.90E-02 |
| MW-05-08R | 16-28 | 3.31 |
| MW-06-10R | 16-28 | 2.10E-02 |
| MW-06-12R | 16-28 | 1.94 |
| MW-06-13R | 20.7-33.25 | 0.31 |
| MW-06-14R | 14-26 | 0.20 |
| MW-06-15R | 10-22 | 1.03 |
| MW-06-01RI/RD* | 17.0-26.0 | 0.38 |
| | 26.0-35.0 | 5.00E-02 |
| | 35.0-45.0 | 6.00E-02 |
| | 45.0-55.0 | 3.00E-02 |
| | 55.0-65.0 | 0.17 |
| | 65.0-75.0 | 0.20 |
| | 75.0-80.0 | 8.00E-02 |
| MW-06-06RI/RD* | 39.5-49.8 | 1.21 |
| | 49.8-59.8 | 5.00E-02 |
| | 59.8-69.8 | 5.00E-02 |
| | 69.8-79.8 | 4.06 |
| MW-07-16RI/RD* | 14-24 | 0.53 |
| | 24-34 | 0.66 |
| | 34-44 | 0.12 |
| | 44-54 | 1.86E-03 |
| | 54-64 | 6.81E-03 |
| | 64-74 | 9.51E-03 |
| | 74-79 | 4.00E-04 |
| MW-07-17RI/RD* | 20-30 | 5.00E-03 |
| | 30-40 | 0.02 |
| ***Geometric Mean Bedrock*** | | ***0.08*** |

**Note:**

* Based on packer testing.

Hydraulic conductivity values based on evaluation of specific capacity test data using Walton's method (1962).

## Table 11. Owasco Outlet Bank & Stream Channel Observations, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Location ID | Date | Location | Description | PID |
|---|---|---|---|---|
| Bank Observation - 1 | 8/8/2006 | Located (+/-) 10 ft downstream from the Stone wall, near transect T-19 (south bank). | Excavated to +/- 2 ft on toe of south bank; No noticeable impacts. | ND |
| Bank Observation - 2 | 8/8/2006 | Located (+/-) at transect T-19 (south bank). | Asphalt dump on existing debris and rip-rap of south bank (appears to be construction debris). | ND |
| Bank Observation - 3 | 8/8/2006 | Located between T-19 and T-20 (south bank). | Excavated below eroded roots of downed tree near mid-bank; No noticeable impacts. | ND |
| Bank Observation - 4 | 8/8/2006 | Located at Outfall # 16. | Excavated along top and sides of Outfall pipe (OF-16); No noticeable impacts. | ND |
| Bank Observation - 5 | 8/8/2006 | Located (+/-) 7 ft upstream from transect T-21 (south bank). | Excavated 1.3 ft into bank at foot of stone retaining wall (south bank); Refusal encountered; No noticeable impacts. | ND |
| Bank Observation - 6 | 8/8/2006 | Located (+/-) 7 ft downstream from transect T-21 (south bank). | Excavated 2.0 ft into bank at foot of stone retaining wall (south bank); No noticeable impacts; ***Sample BS-1 collected*** . | ND |
| Bank Observation - 7 | 8/8/2006 | Located just upstream of transect T-22 (south bank). | Hardened black tar-like material observed on flat stone in base of retaining wall, below roots of tree; Brittle; Faint tar-like odor (south bank); ***Sample BS-2 collected*** . | 11.0 ppm |
| Bank Observation - 8 & 8A | 8/8/2006 | Located near transect T-22 (south bank). | Asphalt dump on south bank (appears to be construction debris). | ND |
| Bank Observation - 9 | 8/8/2006 | Located at transect T-22 (south bank). | Excavated 2.0 ft into sediment/ bank material at toe of slope/edge of water; Piece of tile pipe uncovered revealing black staining and organic/sewage-like odor. | ND |
| Bank Observation - 10 | 8/9/2006 | Located at Transect T-23 (near south bank). | Excavated 2 holes in stream bed approximately 6 ft from toe of south bank. Hardened tar-like substance observed 1.5 ft below stream bed; Tar-like odor; slightly pliable; sheen observed during digging; ***Sample BS-3 collected*** . | 4.6 ppm<br>Upon breaking |
| Bank Observation - 11→11G | 8/9/2006 | Located between transects T-23 and T-24 (south bank). | Tar fill observed throughout (on and in) bank between transect T-23 and T-24; Possible roofing tar odor; Roofing debris (shingles, tar paper) and tar buckets observed in this area; ***Sample BS-4 collected*** . | 6.7 ppm<br>Upon breaking |
| Bank Observation - 12 | 8/9/2006 | Located between transects T-24 and T-25 (south bank). | Excavated hole to 2.0 ft bgs at toe of slope, at waters edge; Observed black tar-like material below 1.5 ft bgs; tar-like odor. | NA |
| Bank Observation - 13 | 8/9/2006 | Located near transect T-25 & outfall OF-18 (south bank). | Excavated hole to 2.0 ft bgs at toe of slope, at waters edge; Observed black tar-like material below 1.5 ft bgs; tar-like odor. | 101 ppm |
| Bank Observation - 14 | 8/9/2006 | Located between transects T-25 & T-26 (south bank). | Excavated hole to 2.0 ft bgs at toe of slope, at waters edge; Observed black tar-like material below 1.5 ft bgs; tar-like odor. | 49.2 ppm |
| Bank Observation - 15 | 8/9/2006 | Located between transects T-25 & T-26 (south bank). | Excavated hole to 1.2 ft bgs at toe of slope, at waters edge; Refusal; No noticeable impacts observed. | ND |
| Bank Observation - 16 | 8/9/2006 | Located between transects T-25 & T-26 (south bank). | Excavated hole to 1.5 ft bgs at toe of slope, at waters edge; Refusal; Observed black tar-like material at 1.5 ft bgs; Tar-like odor; ***Sample BS-5 collected (Dup-1)*** . | 30.8 ppm |
| Bank Observation - 17 | 8/9/2006 | Located (+/-) 8 ft upstream from transect T-26 (near south bank). | Excavated hole 4 ft into stream from toe of slope (at low flow conditions); advanced hole 2.5 ft into stream floor; Observed black tar-like material below 1.5 ft bss; tar-like odor; ***Sample BS-6 collected*** . | 2.0 ppm |
| Bank Observation - 18 | 8/9/2006 | Located (+/-) 3 ft upstream of sampling location SED-10 (south bank). | Excavated hole to 1.4 ft bgs at toe of slope, at waters edge; very degraded odor observed, difficult to determine origin; ***Sample BS-7 collected*** . | 74.5 ppm |

## Table 11. Owasco Outlet Bank & Stream Channel Observations, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Location ID | Date | Location | Description | PID |
|---|---|---|---|---|
| Bank Observation - 19 | 8/9/2006 | Readvanced location SED-10 (south bank). | Excavated hole to 2.0 ft bgs at toe of slope, at waters edge; Observed black tar-like material (pliable) below 1.2 ft bgs; tar-like odor; ***Sample BS-8 collected.*** | 96.2 ppm |
| Bank Observation - 20 | 8/9/2006 | Location (+/-) 8 ft downstream of SED-10 (south bank) | Excavated hole 3 ft into stream from toe of slope (at low flow conditions); advanced hole 1.0 ft into stream floor; Refusal; Advanced in 1.5 ft of water; No noticeable impacts observed. | ND |
| Bank Observation - 21 | 8/9/2006 | Located (+/-) 25 ft downstream of SED-10 (south bank). | Excavated hole to 3.0 ft bgs at toe of slope, at waters edge; Observed black sediment below 2.4 ft bgs with degraded odor; Also observed black tar-like material with tar-like odor below 2.5 ft bgs; Sheen observed; ***Sample BS-9 collected.*** | 0.8 ppm |
| Bank Observation - 22 | 8/9/2006 | Located (+/-) 40 ft downstream of SED-10 (south bank) | Excavated hole to 2.3 ft bgs at toe of slope, at waters edge; Observed black sediment/soil below 2.0 ft bgs with possible degraded petroleum-like odor. | 3.4 ppm |
| Bank Observation - 23 | 8/9/2006 | Located at toe of slope adjacent NE corner of Auburn Tank Bldg (south bank). | Excavated hole to 0.5 ft bgs at toe of slope, at waters edge; Observed black sediment/soil below 0.2 ft bgs (below piece of sheet metal); possible degraded petroleum-like odor; ***Sample BS-10 collected.*** | 1.6 ppm |
| Bank Observation - 24 | 8/9/2006 | Located (+/-) 15 ft downstream from Bank Obs #23 (south bank). | Excavated hole to 0.8 ft bgs (refusal); No noticeable sheens or odors. | ND |
| Bank Observation - 25 | 8/9/2006 | Located near transect T-30 (south bank). | Excavated hole to 2.7 ft bgs at toe of slope, at waters edge; Observed black sediment/soil below 2.5 ft bgs with possible degraded petroleum-like odor; Sheen; Underlain by a white-pink-orange-tan clay-like material; ***Sample BS-11 collected.*** | 2.4 ppm |
| Bank Observation - 26 | 8/9/2006 | Located (+/-) 15 ft upstream from outfall OF-19 (south bank). | Excavated hole to 1.5 ft bgs (refusal) at toe of slope, at waters edge; Observed black sediment/soil below 1.3 ft bgs with possible degraded petroleum-like odor; Sheen. | 89.5 ppm |
| Bank Observation - 27 | 8/9/2006 | Located in stream bed on downstream side of outfall OF-19 (south bank). | Excavated hole to 2.0 ft bss; Produced moderate sheen. | NA |
| Bank Observation - 28 | 8/9/2006 | Located at toe of slope adjacent NW corner of Auburn Tank Bldg (south bank). | Excavated hole at toe of slope; Refusal at 1.5 ft bgs; Produced sheen in water. | |
| Bank Observation - 29 | 8/9/2006 | Located near transect T-34 (south bank). | Excavated hole to 2.0 ft bgs at toe of slope, at waters edge; Observed black sediment/soil with moderate degraded petroleum-like odor below 1.5 ft; Trace sheen observed; ***Sample BS-12 collected.*** | NA |
| Bank Observation - 30 | 8/9/2006 | Located at transect T-35 (south bank). | Excavated hole just into streambed from south bank to a depth of 2.5 ft bss; No noticeable impacts; ***Sample BS-13 collected.*** | ND |
| Bank Observation - 31 | 8/10/2006 | Located (+/-) 6 ft downstream from Bank Obs. #16, at waters edge (south bank). | Black hard tar at waters edge near toe of slope; Slightly pliable; Tar-like odor; ***Sample BS-14 collected*** . | NA |
| Bank Observation - 32 | 8/11/2006 | Located (+/-) 15 ft downstream from SED-10 (south bank). | Black hard tar at waters edge near toe of slope; Covered with moss; Slightly pliable; Tar-like odor. | 6.9 ppm |
| Bank Observation - 33 | 8/11/2006 | Located (+/-) 4 ft toward stream from SED-10 (south bank). | Black hard tar in 2 ft of water near toe of slope; Covered with moss; Slightly pliable; Tar-like odor. | 3.6 ppm |
| Bank Observation - 34 | 8/11/2006 | Located between (+/-) 14 and 20 ft downstream from outfall OF-19 (south bank). | Located 6 ft into stream from south bank, in 2.5 ft of water; Ledge of hardened tar-like material; Tar-like odor; Trace sheen; Possible petroleum-like odor also; ***Sample SC-23 collected (Dup-2).*** | 2.9 ppm |

## Table 11. Owasco Outlet Bank & Stream Channel Observations, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Location ID | Date | Location | Description | PID |
|---|---|---|---|---|
| Bank Observation - 35 | 8/11/2006 | Located adjacent upstream side of outfall OF-19. | Black coal-like material 2.5 ft into stream from south bank; Located in 0.5 ft of water; No noticeable odors or sheens. | ND |
| Stream Channel Observation - 36 | 8/14/2006 | Located (+/-) 11 ft downstream from Bank Obs. #25. | Located (+/-) 15 ft into streambed from south bank in deepest part of stream cross section (2.1 ft of water); Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; ***Sample SC-15 collected*** . | NA |
| Stream Channel Observation - 37 | 8/14/2006 | Located (+/-) 4 ft upstream from Bank Obs. #26. | Located (+/-) 17 ft into streambed from south bank, in deepest part of stream cross section; Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor. | NA |
| Stream Channel Observation - 38 | 8/14/2006 | Located (+/-) 3 ft downstream from Bank Obs. #26. | Located (+/-) 17 ft into streambed from south bank in deepest part of stream cross section (2.0 ft of water); Black tar observed, 1.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; ***Sample SC-16 collected*** . | NA |
| Stream Channel Observation - 39 | 8/14/2006 | Located adjacent upstream side of outfall OF-19. | Located (+/-) 14.5 ft into streambed from south bank in deepest part of stream cross section (2.0 ft of water); Black tar observed, 1.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor. | NA |
| Stream Channel Observation - 40 | 8/14/2006 | Located (+/-) 15 ft downstream from outfall OF-19. | Located (+/-) 15 ft into streambed from south bank in deepest part of stream cross section (2.2 ft of water); Black tar observed, 0.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; Sheen, Trace dark brown NAPL blebs; Possible faint degraded petroleum-like odor. | NA |
| Stream Channel Observation - 41 | 8/14/2006 | Located (+/-) 10.5 ft upstream from Bank Obs. #28. | Located (+/-) 22.5 ft into streambed from south bank in deepest part of stream cross section (2.3 ft of water); Black tar observed, 0.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; ***Sample SC-17 collected*** . | NA |
| Stream Channel Observation - 42 | 8/14/2006 | Located adjacent Bank Obs. # 29. | Located (+/-) 24 ft into streambed from south bank in deepest part of stream cross section (1.8 ft of water); Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; ***Sample SC-18 collected*** . | NA |
| Stream Channel Observation - 43 | 8/14/2006 | Located adjacent Bank Obs. # 30. | Located (+/-) 25 ft into streambed from south bank in deepest part of stream cross section (1.9 ft of water); Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; ***Sample SC-19 collected*** . | NA |
| Stream Channel Observation - 44 | 8/14/2006 | Located (+/-) 11 ft downstream from Bank Obs. #43. | Located (+/-) 25 ft into streambed from south bank in deepest part of stream cross section (2.0 ft of water); Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor. | NA |
| Stream Channel Observation - 45 | 8/14/2006 | Located between transects T-36 and T-37. | Located (+/-) 25 ft into streambed from south bank in deepest part of stream cross section (1.8 ft of water); Black stained sediment observed, 1.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Faint possible degraded petroleum-like odor; ***Sample SC-20 collected*** . | NA |
| Stream Channel Observation - 46 | 8/14/2006 | Located (+/-) 12 ft from prison wall at transect T-35. | Located in 0.5 ft of water; Black sediment observed, 2.5 ft below sediment (sand, gravel, cobbles, and boulders) surface; Faint possible degraded petroleum-like odor; trace to moderate sheen; ***Sample SC-22 collected*** . | NA |

## Table 11. Owasco Outlet Bank & Stream Channel Observations, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Location ID | Date | Location | Description | PID |
|---|---|---|---|---|
| Stream Channel Observation - 47 | 8/14/2006 | Located (+/-) 17 ft from prison wall at transect T-36. | Located in 1.4 ft of water; No noticeable impacts to 2.0 ft bss (refusal) | NA |
| Stream Channel Observation - 48 | 8/15/2006 | Located adjacent Bank Obs. # 22. | Located (+/-) 12 ft into streambed from south bank in deepest part of stream cross section (2.0 ft of water); Black tar observed, 1.0 ft below sediment (sand, gravel, cobbles, and boulders) surface; Tar-like odor; Easily pliable; Little sheen. | NA |
| Stream Channel Observation - 49 | 8/15/2006 | Located (+/-) 8 ft north of Stream Chan. Obs # 48. | Located in 1.0 ft of water; Moderate sheen observed at 1.5 ft into sediment (sand, gravel, cobbles, and boulders) surface (refusal). | NA |
| Stream Channel Observation - 50 | 8/15/2006 | Located (+/-) 6 ft from concrete dam; Downstream from transect T-46. | Located in the middle of the stream channel, in 1.0 ft of water; Observed grey sediment (sand, gravel, cobbles, and boulders) to 1.5 ft bss (refusal); Possible faint organic or degraded petroleum-like odor; ***Sample SC-21 collected*** . | NA |

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| **Upstream (T1-T8)** | | | | | |
| 1 | 49 | T-1-1 | 0.1 | 0.7 | f to c sand, gravel |
| | | T-1-2 | 1.7 | 0.1 | f to c sand, gravel, little brick |
| | | T-1-3 | 1 | 0.2 | f to c sand, gravel, little brick |
| | | T-1-4 | 1.2 | 0.3 | f to c sand, gravel, trace brick |
| | | T-1-5 | 1.5 | 0.1 | f to c sand, gravel, trace brick |
| | | T-1-6 | 0 | 0.5 | f to c sand, gravel, trace brick |
| 2 | 46 | T-2-1 | 0 | 0 | f to c gravel, cobbles |
| | | T-2-2 | 1.8 | 0.2 | f to c sand, gravel over bedrock |
| | | T-2-3 | 1.9 | 0.2 | f to c sand, gravel over bedrock |
| | | T-2-4 | 3 | 0 | bedrock |
| | | T-2-5 | 2.9 | 0 | bedrock |
| | | T-2-6 | 0 | 0 | rip-rap |
| 3 | 38 | T-3-1 | 0 | 0 | rip-rap, debris |
| | | T-3-2 | 2.2 | 0.3 | f to c sand, gravel over bedrock |
| | | T-3-3 | 2.5 | 0 | bedrock |
| | | T-3-4 | 2.2 | 0 | bedrock |
| | | T-3-5 | 1.8 | 0 | bedrock |
| | | T-3-6 | 0 | 0 | concrete debris |
| 4 | 36 | T-4-1 | 2.1 | 0 | bedrock |
| | | T-4-2 | 2.1 | 0 | bedrock |
| | | T-4-3 | 2 | 0 | bedrock |
| | | T-4-4 | 1.9 | 0 | bedrock |
| | | T-4-5 | 1.5 | 0 | bedrock |
| | | T-4-6 | 0.15 | 0.4 | f to c sand, f gravel |
| 5 | 42 | T-5-1 | 0 | 0.8 | f to c sand, little gravel |
| | | T-5-2 | 2 | 0.1 | f to c sand, gravel over bedrock |
| | | T-5-3 | 2.2 | 0 | bedrock |
| | | T-5-4 | 1.8 | 0 | bedrock |
| | | T-5-5 | 1.5 | 0 | bedrock |
| | | T-5-6 | 0 | 0.2 | f to c sand, silt, over bedrock |
| 6 | 70 | T-6-1 | 0 | 0.4 | f to c sand, f to m gravel |
| | | T-6-2 | 0.6 | 0.5 | f to c sand, some f to m gravel |
| | | T-6-3 | 1.9 | 0 | f to c gravel, cobbles |
| | | T-6-4 | 2.2 | 0 | bedrock |
| | | T-6-5 | 1.9 | 0 | bedrock |
| | | T-6-6 | 0.8 | 0.1 | f to c gravel, little f to c sand |
| | | T-6-7 | 0 | 0 | concrete footer for bridge |
| 7 | 70 | T-7-1 | 0 | 0.4 | f to c sand, gravel |
| | | T-7-2 | 0 | 0.9 | f to c sand, gravel |
| | | T-7-3 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-7-4 | 0.9 | 0.2 | f to c gravel, little f to c sand |
| | | T-7-5 | 1.5 | 0 | bedrock |
| | | T-7-6 | 1.5 | 0 | cobbles over bedrock |
| | | T-7-7 | 0.4 | 0 | c gravel |
| 8 | 50 | T-8-1 | 0 | 0.2 | f to c sand, gravel |
| | | T-8-2 | 1.8 | 0.7 | f to c sand, gravel |
| | | T-8-3 | 2 | 0.3 | f to c sand, gravel |
| | | T-8-4 | 2 | 0.1 | f to c sand, gravel |
| | | T-8-5 | 1.5 | 0.3 | f to c sand, gravel |
| | | T-8-6 | 0 | 0.1 | f to c sand, gravel |
| **Adjacent (T9-T26)** | | | | | |
| 9 | 40 | T-9-1 | 2 | 0 | f to c gravel, over bedrock |
| | | T-9-2 | 2.3 | 0 | f to c gravel, over bedrock |
| | | T-9-3 | 2.4 | 0 | bedrock |
| | | T-9-4 | 2.4 | 0 | bedrock |
| | | T-9-5 | 2.1 | 0 | bedrock |
| | | T-9-6 | 0 | 0 | f to c gravel |

See Notes on Page 6.

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| 10 | 79 | T-10-1 | 0 | 0.7 | f to c sand, little gravel |
| | | T-10-2 | 2.2 | 0 | f to c gravel, little f to c sand, cobbles |
| | | T-10-3 | 1.9 | 0 | f to c gravel, little f to c sand, cobbles |
| | | T-10-4 | 1.6 | 0.1 | f to c gravel, little f to c sand, cobbles |
| | | T-10-5 | 2 | 0 | f to c gravel, little f to c sand, cobbles |
| | | T-10-6 | 0.1 | 0.1 | f to c gravel, little f to c sand, cobbles |
| | | T-10-7 | 0 | 0 | boulders and rip-rap |
| | | T-10-8 | 0 | 1.1 | f to c sand, silt, some gravel, little vegetation at surface |
| | | T-10-9 | 0.1 | 2.3 | f to c sand, silt, little vegetation at surface |
| 11 | 55 | T-11-1 | 0.1 | 0.2 | f to c sand, gravel |
| | | T-11-2 | 1.9 | 0.1 | f to c sand, gravel |
| | | T-11-3 | 2.4 | 0.2 | f to c sand, gravel, over bedrock |
| | | T-11-4 | 2.5 | 0 | f to c gravel, cobbles, over bedrock |
| | | T-11-5 | 0.9 | 0.2 | f to c sand, gravel |
| | | T-11-6 | 0 | 1.3 | f to c sand, silt, over f to c sand, gravel, little vegetation at surface |
| | | T-11-7 | 0 | 1 | f to c sand, silt, over f to c sand, gravel, little vegetation at surface |
| 12 | 48 | T-12-1 | 0 | 0.4 | f to c sand, gravels |
| | | T-12-2 | 2.1 | 0 | f to c gravel, over bedrock |
| | | T-12-3 | 2.3 | 0 | f to c gravel, over bedrock |
| | | T-12-4 | 2.6 | 0 | f to c gravel, over bedrock |
| | | T-12-5 | 1.8 | 0.2 | f to c sand, gravel, cobbles |
| | | T-12-6 | 0 | 0.9 | f to c sand, silt, over gravel |
| | | T-12-7 | 0.1 | 1 | f to c sand, silt, over gravel |
| 13 | 45 | T-13-1 | 0.2 | 0.1 | f to c sand, gravels |
| | | T-13-2 | 0.2 | 0 | f to c gravel, cobbles |
| | | T-13-3 | 2.5 | 0 | f to c gravel, cobbles, over bedrock |
| | | T-13-4 | 2.2 | 0.2 | f to c sand, gravel, over bedrock |
| | | T-13-5 | 1.4 | 0.1 | f to c sand, gravel, cobbles |
| | | T-13-6 | 0.2 | 2.3 | f to c sand, gravel, over bedrock |
| 14 | 42 | T-14-1 | 0 | 0.1 | f to c sand, gravel |
| | | T-14-2 | 1.5 | 0.2 | f to c sand, gravel |
| | | T-14-3 | 2.5 | 0 | f to c gravel, over bedrock |
| | | T-14-4 | 3.1 | 0 | f to c gravel, over bedrock |
| | | T-14-5 | 1.6 | 0 | f to c gravel, cobbles |
| | | T-14-6 | 0 | 1.1 | f to c sand |
| 15 | 49 | T-15-1 | 0 | 0.2 | f to c sand, gravel |
| | | T-15-2 | 1.2 | 0.3 | f to c sand, gravel, little cobbles |
| | | T-15-3 | 1.8 | 0 | f to c gravel, cobbles |
| | | T-15-4 | 3.2 | 0 | bedrock |
| | | T-15-5 | 2.5 | 0 | f to c gravel, cobbles, over bedrock |
| | | T-15-6 | 0 | 0.1 | f to c sand, gravel |
| 16 | 60 | T-16-1 | 0 | 1 | f to c sand, gravel |
| | | T-16-2 | 0 | 0.5 | f to c sand, gravel |
| | | T-16-3 | 1 | 0.5 | f to c sand, gravel |
| | | T-16-4 | 1.4 | 0.2 | f to c gravel, little sand |
| | | T-16-5 | 2 | 0.2 | f to c gravel, little sand |
| | | T-16-6 | 2.3 | 0.2 | f to c gravel, little sand |
| | | T-16-7 | 0 | 0 | rip-rap |
| 17 | 85 | T-17-1 | 0 | 2.5 | f to c sand, trace gravel |
| | | T-17-2 | 0 | 0.1 | f to c gravel, little sand |
| | | T-17-3 | 0.5 | 0.1 | f to c gravel, little cobbles and f to c sand |
| | | T-17-4 | 0.5 | 0 | f to c gravel, cobbles |
| | | T-17-5 | 1.1 | 0 | f to c gravel, cobbles |
| | | T-17-6 | 2.5 | 0 | f to c gravel, cobbles |
| | | T-17-7 | 0 | 0 | rip-rap |

See Notes on Page 6.

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| 18 | 150 | T-18-1 | 0 | 1.2 | f to c sand, silt |
| | | T-18-2 | 0 | 0.5 | f to c sand, little gravel |
| | | T-18-3 | 0.2 | 0 | f to c gravel, little f to c sand |
| | | T-18-4 | 0 | 0.1 | f to c gravel, little f to c sand |
| | | T-18-5 | 0 | 0.1 | f to c gravel, little f to c sand |
| | | T-18-6 | 0 | 0 | f to c gravel, roots |
| | | T-18-7 | 1 | 0.1 | f to c gravel, sand, little cobbles |
| | | T-18-8 | 3 | 0 | f to c gravel, cobbles, trace sand |
| | | T-18-9 | 3 | 0 | bedrock |
| 19 | 145 | T-19-1 | 0 | 1.3 | f to c sand, little silt |
| | | T-19-2 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-19-3 | 0 | 0.5 | f to c sand, gravel |
| | | T-19-4 | 0 | 0.7 | f to c sand, little f to c gravel |
| | | T-19-5 | 0 | 0.5 | f to c sand, little silt and f to c gravel |
| | | T-19-6 | 0 | 2.5 | f to c sand, little silt and f to c gravel |
| | | T-19-7 | 0 | 0.2 | f to c sand, little silt and f to c gravel |
| | | T-19-8 | 5 | 0 | bedrock |
| | | T-19-9 | 3.2 | 0 | bedrock |
| 20 | 109 | T-20-1 | 0.5 | 0 | f to c sand, gravel, cobbles |
| | | T-20-2 | 1.1 | 0 | f to c gravel, cobbles |
| | | T-20-3 | 0 | 0.4 | f to c sand, gravel |
| | | T-20-4 | 0 | 0.5 | f to c sand, gravel |
| | | T-20-5 | 0 | 0.8 | f to c sand, over gravel |
| | | T-20-6 | 0 | 2.5 | f to c sand, over gravel |
| | | T-20-7 | 3.2 | 0.4 | f to c sand, over gravel |
| | | T-20-8 | 4 | 0 | bedrock |
| 21 | 106 | T-21-1 | 0.1 | 0.1 | f to c sand, gravel, cobbles |
| | | T-21-2 | 0 | 0.1 | f to c sand, gravel |
| | | T-21-3 | 0 | 0.1 | f to c sand, gravel |
| | | T-21-4 | 0 | 1.7 | f to c sand, over gravel |
| | | T-21-5 | 0 | 2.7 | f to c sand, over gravel |
| | | T-21-6 | 0 | 1 | f to c sand, over gravel |
| | | T-21-7 | 4.2 | 0 | bedrock |
| | | T-21-8 | 4 | 0 | bedrock |
| 22 | 105 | T-22-1 | 0.1 | 0.1 | f to c sand, gravel, cobbles |
| | | T-22-2 | 0.2 | 0 | f to c gravel, cobbles, little f to c sand |
| | | T-22-3 | 0 | 0.5 | f to c sand, gravel |
| | | T-22-4 | 0 | 0.4 | f to c sand, gravel |
| | | T-22-5 | 0 | 0.2 | f to c sand, over gravel |
| | | T-22-6 | 0.8 | 0.1 | f to c gravel, cobbles, little f to c sand |
| | | T-22-7 | 4 | 0 | bedrock |
| | | T-22-8 | 4.3 | 0 | bedrock |
| 23 | 100 | T-23-1 | 0 | 0 | f to c gravel, cobbles |
| | | T-23-2 | 0.5 | 0.1 | f to c gravel, some cobbles, little f to c sand |
| | | T-23-3 | 0.6 | 0.1 | f to c gravel, some cobbles, little f to c sand |
| | | T-23-4 | 0.5 | 0 | f to c gravel |
| | | T-23-5 | 0.6 | 0.2 | f to c gravel, little f to c sand |
| | | T-23-6 | 1.2 | 0 | cobbles, boulders |
| | | T-23-7 | 1.3 | 0 | cobbles, boulders |
| | | T-23-8 | 1.5 | 0 | cobbles, boulders |
| 24 | 84 | T-24-1 | 0.5 | 0.4 | f to c gravel, cobbles, little f to c sand |
| | | T-24-2 | 0.6 | 0 | f to c gravel, cobbles |
| | | T-24-3 | 0.6 | 0 | f to c gravel, cobbles |
| | | T-24-4 | 0.5 | 0.2 | f to c gravel, cobbles, trace sand |
| | | T-24-5 | 1 | 0 | f to c gravel, cobbles |
| | | T-24-6 | 0.6 | 0 | f to c gravel, cobbles |
| | | T-24-7 | 1.1 | 0.2 | f to c sand, gravel |
| | | T-24-8 | 1.2 | 0 | f to c sand, gravel |

See Notes on Page 6.

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| 25 | 82 | T-25-1 | 0.1 | 0.3 | f to c sand, gravel |
| | | T-25-2 | 1.6 | 0 | f to c gravel, cobbles |
| | | T-25-3 | 0.2 | 0.1 | f to c gravel, cobbles |
| | | T-25-4 | 0.5 | 0.1 | f to c gravel, cobbles |
| | | T-25-5 | 0.7 | 0 | f to c gravel, cobbles |
| | | T-25-6 | 0.9 | 0.1 | f to c sand, gravel |
| | | T-25-7 | 0.7 | 0.1 | f to c sand, gravel |
| | | T-25-8 | 0.2 | 0.6 | f to c sand, over gravel |
| 26 | 82 | T-26-1 | 0.1 | 0.2 | f to c sand, gravel |
| | | T-26-2 | 1.7 | 0 | f to c gravel, cobbles |
| | | T-26-3 | 1.2 | 0.2 | f to c sand, gravel |
| | | T-26-4 | 0.3 | 0.1 | f to c sand, gravel |
| | | T-26-5 | 0.2 | 0 | f to c sand, gravel, some cobbles |
| | | T-26-6 | 0.3 | 0.2 | f to c sand, gravel |
| | | T-26-7 | 0.9 | 0.2 | f to c sand, gravel |
| | | T-26-8 | 0.9 | 0.1 | f to c sand, gravel |
| **Downstream (T27-T46)** | | | | | |
| 27 | 72 | T-27-1 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-27-2 | 2.3 | 0 | f to c sand, gravel, some cobbles |
| | | T-27-3 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-27-4 | 0.2 | 0.2 | f to c sand, gravel |
| | | T-27-5 | 0.1 | 0.4 | f to c sand, over gravel |
| | | T-27-6 | 0.3 | 0 | f to c gravel, little sand |
| | | T-27-7 | 0.2 | 0.1 | f to c sand, gravel |
| 28 | 70 | T-28-1 | 0 | 0.7 | f to c sand, gravel |
| | | T-28-2 | 1.8 | 0 | f to c gravel, cobbles |
| | | T-28-3 | 1.8 | 0 | f to c gravel, cobbles |
| | | T-28-4 | 1.1 | 0.2 | f to c sand, gravel |
| | | T-28-5 | 0 | 0 | f to c gravel, little sand |
| | | T-28-6 | 0.1 | 0.1 | f to c gravel, little sand |
| | | T-28-7 | 0.4 | 0.1 | f to c sand, gravel |
| | | T-28-8 | 1 | 0.1 | f to c sand, gravel |
| 29 | 70 | T-29-1 | 0.1 | 0.9 | f to c sand, some gravel |
| | | T-29-2 | 1.6 | 0.1 | f to c sand, gravel |
| | | T-29-3 | 2 | 0.1 | f to c gravel, some sand |
| | | T-29-4 | 1.3 | 0.1 | f to c gravel, some sand |
| | | T-29-5 | 0 | 0 | f to c sand, gravel |
| | | T-29-6 | 0.3 | 0.1 | f to c sand, gravel |
| | | T-29-7 | 0 | 0.5 | f to c sand, gravel |
| | | T-29-8 | 0 | 0.7 | f to c sand, over gravel |
| 30 | 70 | T-30-1 | 0 | 0.6 | f to c sand, gravel |
| | | T-30-2 | 1.9 | 0 | f to c gravel, some sand |
| | | T-30-3 | 1.9 | 0.1 | f to c sand, gravel |
| | | T-30-4 | 0.9 | 0 | f to c gravel, some sand |
| | | T-30-5 | 0.5 | 0.2 | f to c gravel, some sand |
| | | T-30-6 | 0 | 1 | f to c gravel, some sand |
| | | T-30-7 | 0 | 0.2 | f to c sand, gravel |
| | | T-30-8 | 0 | 1 | f to c sand, little silt, over gravel |
| 31 | 70 | T-31-1 | 0 | 0.5 | f to c sand, some gravel |
| | | T-31-2 | 2.2 | 0 | f to c gravel, cobbles |
| | | T-31-3 | 2 | 0.2 | f to c gravel, some sand |
| | | T-31-4 | 1.2 | 0.1 | f to c gravel, some sand |
| | | T-31-5 | 0.5 | 0.1 | f to c sand, gravel |
| | | T-31-6 | 0.2 | 0.1 | f to c sand, gravel |
| | | T-31-7 | 0 | 0 | f to c gravel, cobbles |
| | | T-31-8 | 0 | 0.5 | f to c sand, over gravel |

See Notes on Page 6.

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| 32 | 71 | T-32-1 | 0 | 0 | f to c gravel, some sand |
| | | T-32-2 | 2.4 | 0.6 | f to c sand, gravel |
| | | T-32-3 | 2.2 | 0.1 | f to c sand, gravel |
| | | T-32-4 | 1.2 | 1.5 | f to c sand, gravel |
| | | T-32-5 | 0.6 | 0.2 | f to c sand, gravel |
| | | T-32-6 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-32-7 | 0 | 0.6 | f to c sand, little gravel |
| 33 | 71 | T-33-1 | 0 | 0.3 | f to c sand, gravel, trace sheen observed on right bank |
| | | T-33-2 | 2.7 | 0.3 | f to c sand, gravel |
| | | T-33-3 | 2.6 | 0.3 | f to c sand, gravel |
| | | T-33-4 | 1.9 | 0.2 | f to c sand, gravel |
| | | T-33-5 | 0.7 | 0.3 | f to c sand, gravel |
| | | T-33-6 | 0 | 0.8 | f to c sand, over gravel |
| | | T-33-7 | 0 | 0.6 | f to c sand, over gravel |
| 34 | 72 | T-34-1 | 0.1 | 0.5 | f to c sand, little gravel |
| | | T-34-2 | 2.4 | 1.1 | f to c sand, some gravel |
| | | T-34-3 | 2.2 | 0.2 | f to c sand, gravel |
| | | T-34-4 | 1.7 | 0.2 | f to c sand, gravel |
| | | T-34-5 | 0.3 | 0.1 | f to c gravel, some sand |
| | | T-34-6 | 0.8 | 0.6 | f to c sand, gravel |
| | | T-34-7 | 0.5 | 0.2 | f to c sand, gravel |
| 35 | 68 | T-35-1 | 0.1 | 0.9 | f to c sand, some gravel |
| | | T-35-2 | 2 | 0.1 | f to c sand, gravel |
| | | T-35-3 | 2.2 | 0 | f to c sand, gravel, some cobbles |
| | | T-35-4 | 2.2 | 0.1 | f to c sand, gravel |
| | | T-35-5 | 1.3 | 0.2 | f to c sand, gravel |
| | | T-35-6 | 1 | 0.3 | f to c sand, gravel |
| | | T-35-7 | 1 | 0.1 | f to c sand, gravel |
| | | T-35-8 | 0.4 | 0.4 | f to c sand, gravel |
| 36 | 56 | T-36-1 | 0 | 0.3 | f to c sand, gravel |
| | | T-36-2 | 2.4 | 0.1 | f to c sand, gravel |
| | | T-36-3 | 3.1 | 0.4 | f to c sand, gravel |
| | | T-36-4 | 2.9 | 1.1 | f to c sand, little gravel, over bedrock |
| | | T-36-5 | 2.2 | 2.3 | f to c sand, some gravel |
| | | T-36-6 | 1.8 | 0.3 | f to c sand, gravel |
| | | T-36-7 | 1.5 | 0.1 | f to c sand, gravel |
| | | T-36-8 | 1.5 | 0.2 | f to c sand, gravel |
| 37 | 54 | T-37-1 | 0.1 | 0.1 | f to c sand, gravel |
| | | T-37-2 | 3.4 | 1.2 | f to c sand, little gravel, over bedrock |
| | | T-37-3 | 3.8 | 0.3 | f to c sand, gravel, over bedrock |
| | | T-37-4 | 3.4 | 0.8 | f to c sand, gravel |
| | | T-37-5 | 2.7 | 0.2 | f to c sand, gravel |
| | | T-37-6 | 2.3 | 0.1 | f to c sand, gravel |
| | | T-37-7 | 2.2 | 0.3 | f to c sand, gravel |
| 38 | 54 | T-38-1 | 0.1 | 0.5 | f to c sand, gravel |
| | | T-38-2 | 3.7 | 0.3 | f to c sand, gravel, over bedrock |
| | | T-38-3 | 4.9 | 0 | bedrock |
| | | T-38-4 | 4.1 | 0.3 | f to c sand, gravel, over bedrock |
| | | T-38-5 | 2.7 | 0.1 | f to c sand, gravel |
| | | T-38-6 | 2.5 | 0 | f to c sand, gravel |
| | | T-38-7 | 2.2 | 0 | cobbles, boulders |
| 39 | 56 | T-39-1 | 0.5 | 0.4 | f to c sand, gravel |
| | | T-39-2 | 3 | 0.1 | f to c sand, gravel |
| | | T-39-3 | 3.4 | 0.6 | f to c sand, gravel |
| | | T-39-4 | 2.3 | 0.6 | f to c sand, gravel |
| | | T-39-5 | 2.4 | 0.2 | f to c sand, gravel |
| | | T-39-6 | 2.6 | 0.2 | f to c sand, gravel |
| | | T-39-7 | 2.2 | 0.7 | f to c sand, gravel |
| | | T-39-8 | 2.2 | 0.6 | f to c sand, gravel |

See Notes on Page 6.

## Table 12. Summary of Owasco Outlet Sediment Probing, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Transect | Width (ft) | Station | Water Depth (ft) | Sediment Depth (ft) | Description |
|---|---|---|---|---|---|
| 40 | 62 | T-40-1 | 0.8 | 3.6 | f to c sand, little silt |
| | | T-40-2 | 2 | 0.3 | f to c sand, gravel |
| | | T-40-3 | 2.3 | 1 | f to c sand, gravel |
| | | T-40-4 | 2.3 | 0.1 | f to c sand, gravel |
| | | T-40-5 | 2 | 0.4 | f to c sand, gravel |
| | | T-40-6 | 2.5 | 0.1 | f to c sand, gravel |
| | | T-40-7 | 2.8 | 0.1 | f to c sand, gravel |
| | | T-40-8 | 2.8 | 0.2 | f to c sand, gravel |
| 41 | 69 | T-41-1 | 0 | 3.8 | f to c sand, little silt, gravel |
| | | T-41-2 | 1.4 | 2.3 | f to c sand, gravel |
| | | T-41-3 | 2 | 0.2 | f to c sand, gravel |
| | | T-41-4 | 2.1 | 0.1 | f to c sand, gravel |
| | | T-41-5 | 1.8 | 0.4 | f to c sand, gravel |
| | | T-41-6 | 1.8 | 0.2 | f to c sand, gravel |
| | | T-41-7 | 2.9 | 0.1 | f to c sand, gravel |
| | | T-41-8 | 2.4 | 0.2 | f to c sand, gravel |
| 42 | 69 | T-42-1 | 0 | 3.5 | f to c sand, gravel, some silt |
| | | T-42-2 | 0.8 | 0.4 | f to c sand, gravel |
| | | T-42-3 | 1.2 | 0.2 | f to c sand, gravel |
| | | T-42-4 | 1.7 | 0.2 | f to c sand, gravel |
| | | T-42-5 | 1.8 | 0.2 | f to c sand, gravel |
| | | T-42-6 | 1.7 | 0.6 | f to c sand, gravel |
| | | T-42-7 | 2.3 | 0.1 | f to c sand, gravel |
| | | T-42-8 | 2.2 | 0.3 | f to c sand, some gravel |
| 43 | 70 | T-43-1 | 0 | 0.3 | f to c sand, little gravel |
| | | T-43-2 | 0.3 | 0.3 | f to c sand, little gravel |
| | | T-43-3 | 1.2 | 0.2 | f to c sand, little gravel |
| | | T-43-4 | 2 | 0.1 | f to c sand, little gravel |
| | | T-43-5 | 2.1 | 0.1 | f to c sand, gravel, some cobbles |
| | | T-43-6 | 1.8 | 0.2 | f to c sand, gravel, some cobbles |
| | | T-43-7 | 2.1 | 0.3 | f to c sand, gravel, some cobbles |
| | | T-43-8 | 0.9 | 0.6 | f to c sand, gravel, trace silt, cobbles |
| 44 | 75 | T-44-1 | 0 | 0.2 | f to c sand, silt, little gravel |
| | | T-44-2 | 1.1 | 0.2 | f to c sand, gravel, little cobbles |
| | | T-44-3 | 1.6 | 0.3 | f to c sand, gravel, little cobbles |
| | | T-44-4 | 2 | 0.2 | f to c sand, gravel, little cobbles |
| | | T-44-5 | 1.7 | 0.1 | f to c sand, gravel, little cobbles |
| | | T-44-6 | 1.6 | 0.2 | f to c sand, gravel, little cobbles |
| | | T-44-7 | 1 | 0.5 | f to c sand, gravel, little cobbles |
| 45 | 80 | T-45-1 | 0 | 0.3 | f to c sand, gravel, little silt |
| | | T-45-2 | 0.8 | 0.3 | f to c sand, gravel |
| | | T-45-3 | 0.8 | 0.3 | f to c sand, gravel |
| | | T-45-4 | 1.4 | 0.4 | f to c sand, gravel |
| | | T-45-5 | 2 | 0.3 | f to c sand, gravel |
| | | T-45-6 | 1.1 | 0.1 | f to c sand, gravel |
| | | T-45-7 | 1.4 | 0.3 | f to c sand, gravel |
| | | T-45-8 | 1.3 | 0.5 | f to c sand, some to little gravel, trace silt |
| 46 | 105 | T-46-1 | 0 | 0.5 | f to c sand |
| | | T-46-2 | 0.2 | 3.5 | f to c sand, some gravel |
| | | T-46-3 | 0.5 | 0.2 | f to c sand, gravel, some cobbles |
| | | T-46-4 | 0.7 | 0.2 | f to c sand, gravel, some cobbles |
| | | T-46-5 | 1.1 | 0.4 | f to c sand, gravel, some cobbles |
| | | T-46-6 | 1.7 | 0.4 | f to c sand, gravel, some cobbles |
| | | T-46-7 | 1.5 | 0.4 | f to c sand, gravel, some cobbles |
| | | T-46-8 | 1.5 | 1.1 | f to c sand, gravel, some cobbles |

**Notes:**
c - coarse.
f - fine.
m - medium.

## Table 13. Observed and Typical Biota Expected Onsite or in the Vicinity of the Site, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Common Name | Scientific Name |
|---|---|
| **Mammals** | |
| Shrews | *Sorex spp., Blarina spp.* |
| Raccoon* | *Procyon lotor* |
| Beaver* | *Castor canadensis* |
| Opossum | *Didelphis marsupialis* |
| Chipmunk | *Tamias striatus* |
| Woodchuck* | *Marmota monax* |
| Mice | *Peromyscus* spp., *Mus musculus* |
| Gray squirrel | *Sciurus carolinensis* |
| Eastern cottontail | *Sylvilagus floridanus* |
| **Birds** | |
| Chickadee | *Parus atricapillus* |
| American crow* | *Corvus brachyrhynchos* |
| American robin* | *Turdus migratorius* |
| Brown-headed cowbird* | *Molothrus ater* |
| Gray catbird* | *Dumetella carolinensis* |
| Common grackle* | *Quiscalus quiscula* |
| American goldfinch* | *Carduelis tristis* |
| Mourning dove* | *Zenaida macroura* |
| House sparrow* | *Passer domesticus* |
| Field sparrow* | *Spizella pusilla* |
| Song sparrow* | *Melospiza melodia* |
| Tree swallow* | *Iridoprocne bicolor* |
| Rufous-sided towhee* | *Pipilo erythrophthalmus* |
| European starling* | *Sturnus vulgaris* |
| Pigeon* | *Columba livia* |
| Mallard* | *Anas platyrhynchos* |
| **Herptiles** | |
| Eastern garter snake | *Thamnophis sirtalis sirtalis* |
| American toad | *Bufo americanus* |
| **Fish** | |
| White sucker* | *Catostomus commersoni* |
| Rock bass* | *Ambloplites rupestris* |
| Minnow spp. | *Cyprinidae* |
| Creek chub | *Semotilus artomaculatus* |
| Pumpkinseed | *Lepomis gibbosus* |
| Bluegill | *Lepomis macrochirus* |

**Note:**

*Observed during ARCADIS BBL site visit in May 2006. Observations included visual sighting, tracks, den, and/or scat.

### Table 14. Comparison of Surface Soil Data to NYSDEC Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample ID:<br>Sample Depth(Feet):<br>Date Collected: | Restricted Use SCOs Ecological | Restricted Use SCOs Commercial | Unrestricted Use SCOs | SS-1<br>0 - 0.2<br>06/02/06 | SS-2<br>0 - 0.2<br>06/02/06 | SS-3<br>0 - 0.2<br>06/02/06 | SS-4<br>0 - 0.2<br>06/02/06 | SS-5<br>0 - 0.2<br>06/02/06 | SS-6<br>0 - 0.2<br>06/02/06 | SS-7<br>0 - 0.2<br>06/02/06 | SS-8<br>0 - 0.2<br>06/02/06 | SS-9<br>0 - 0.2<br>06/02/06 | SS-10<br>0 - 0.2<br>06/02/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | - - | 500 {b} | 0.68 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,1,2,2-Tetrachloroethane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,1,2-Trichloroethane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,1-Dichloroethane | - - | 240 | 0.27 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,1-Dichloroethene | - - | 500 {b} | 0.33 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,2-Dichloroethane | 10 | 30 | 0.02 {c} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 1,2-Dichloropropane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| 2-Butanone | 100 {a} | 500 {b} | 0.12 | 0.027 U [0.028 U] | 0.031 U | 0.031 U | 0.031 U | 0.029 U | 0.032 U | 0.027 U | 0.033 U | 0.030 U | 0.029 U |
| 2-Hexanone | - - | - - | - - | 0.027 U [0.028 U] | 0.031 U | 0.031 U | 0.031 U | 0.029 U | 0.032 U | 0.027 U | 0.033 U | 0.030 U | 0.029 U |
| 4-Methyl-2-Pentanone | - - | - - | - - | 0.027 U [0.028 U] | 0.031 U | 0.031 U | 0.031 U | 0.029 U | 0.032 U | 0.027 U | 0.033 U | 0.030 U | 0.029 U |
| Acetone | 2.2 | 500 {b} | 0.05 | 0.027 U [0.028 U] | 0.031 U | 0.031 U | 0.031 U | 0.029 U | 0.032 U | 0.027 U | 0.033 U | 0.030 U | 0.029 U |
| Benzene | 70 | 44 | 0.06 | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Bromodichloromethane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Bromoform | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Bromomethane | - - | - - | - - | 0.0050 UJ [0.0060 UJ] | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0050 UJ | 0.0070 UJ | 0.0060 UJ | 0.0060 UJ |
| Carbon Disulfide | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Carbon Tetrachloride | - - | 22 | 0.76 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Chlorobenzene | 40 | 500 {b} | 1.1 | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Chloroethane | - - | - - | - - | 0.0050 UJ [0.0060 UJ] | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0050 UJ | 0.0070 UJ | 0.0060 UJ | 0.0060 UJ |
| Chloroform | 12 | 350 | 0.37 | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Chloromethane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| cis-1,2-Dichloroethene | - - | 500 {b} | 0.25 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| cis-1,3-Dichloropropene | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Dibromochloromethane | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Ethylbenzene | - - | 390 | 1 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Methylene Chloride | 12 | 500 {b} | 0.05 | 0.0050 UJ [0.0060 UJ] | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0050 UJ | 0.0070 UJ | 0.0060 UJ | 0.0060 UJ |
| Styrene | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Tetrachloroethene | 2 | 150 | 1.3 | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Toluene | 36 | 500 {b} | 0.7 | 0.0050 UJ [0.0060 UJ] | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0050 UJ | 0.0070 UJ | 0.0060 UJ | 0.0060 UJ |
| trans-1,2-Dichloroethene | - - | 500 {b} | 0.19 {f} | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| trans-1,3-Dichloropropene | - - | - - | - - | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Trichloroethene | 2 | 200 | 0.47 | 0.0050 U [0.0060 U] | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0050 U | 0.0070 U | 0.0060 U | 0.0060 U |
| Vinyl Chloride | - - | 13 | 0.02 {f} | 0.011 U [0.011 U] | 0.012 U | 0.012 U | 0.012 U | 0.012 U | 0.013 U | 0.011 U | 0.013 U | 0.012 U | 0.011 U |
| Xylene (Total) | 0.26 | 500 {b} | 0.26 | 0.016 U [0.017 U] | 0.018 U | 0.019 U | 0.018 U | 0.018 U | 0.019 U | 0.016 U | 0.020 U | 0.018 U | 0.017 U |
| Total BTEX | - - | - - | - - | ND [ND] | ND | ND | ND | ND | ND | ND | ND | ND | ND |

See Notes on Page 4.

**Table 14. Comparison of Surface Soil Data to NYSDEC Soil Cleanup Objectives, Remedial Investigation,
New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York**

| **Sample ID:**<br>**Sample Depth(Feet):**<br>**Date Collected:** | **Restricted Use SCOs Ecological** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **SS-1**<br>**0 - 0.2**<br>**06/02/06** | **SS-2**<br>**0 - 0.2**<br>**06/02/06** | **SS-3**<br>**0 - 0.2**<br>**06/02/06** | **SS-4**<br>**0 - 0.2**<br>**06/02/06** | **SS-5**<br>**0 - 0.2**<br>**06/02/06** | **SS-6**<br>**0 - 0.2**<br>**06/02/06** | **SS-7**<br>**0 - 0.2**<br>**06/02/06** | **SS-8**<br>**0 - 0.2**<br>**06/02/06** | **SS-9**<br>**0 - 0.2**<br>**06/02/06** | **SS-10**<br>**0 - 0.2**<br>**06/02/06** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 1,2-Dichlorobenzene | - - | 500 {b} | 1.1 {f} | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 1,3-Dichlorobenzene | - - | 280 | 2.4 {f} | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 1,4-Dichlorobenzene | 20 | 130 | 1.8 | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 2,4-Dinitrotoluene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 UJ | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 2,6-Dinitrotoluene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 2-Chloronaphthalene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 2-Methylnaphthalene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 0.13 J | 1.7 U | 1.5 U | 8.4 U | 0.041 J | 8.0 U | 0.76 U | 1.5 U |
| 2-Nitroaniline | - - | - - | - - | 6.9 U [3.5 U] | 2.0 U | 8.4 U | 8.4 U | 7.4 U | 41 U | 3.6 U | 39 U | 3.7 U | 7.5 U |
| 3,3'-Dichlorobenzidine | - - | - - | - - | 6.9 U [3.5 U] | 2.0 U | 8.4 U | 8.4 U | 7.4 U | 41 U | 3.6 U | 39 U | 3.7 U | 7.5 U |
| 3-Nitroaniline | - - | - - | - - | 6.9 U [3.5 U] | 2.0 U | 8.4 U | 8.4 U | 7.4 U | 41 U | 3.6 U | 39 U | 3.7 U | 7.5 U |
| 4-Bromophenyl-phenylether | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 4-Chloroaniline | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 4-Chlorophenyl-phenylether | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| 4-Nitroaniline | - - | - - | - - | 6.9 UJ [3.5 UJ] | 2.0 UJ | 8.4 UJ | 8.4 UJ | 7.4 UJ | 41 U | 3.6 UJ | 39 U | 3.7 UJ | 7.5 UJ |
| Acenaphthene | 20 | 500 {b} | 20 | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 0.080 J | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Acenaphthylene | - - | 500 {b} | 100 {a, f} | 0.10 J [0.15 J] | 0.40 U | 0.62 J | 0.11 J | 1.5 U | 1.2 J | 0.037 J | 8.0 U | 0.058 J | 0.21 J |
| Anthracene | - - | 500 {b} | 100 {a, f} | 1.4 U [0.11 J] | 0.022 J | 0.40 J | 0.094 J | 0.23 J | 0.80 J | 0.043 J | 8.0 U | 0.067 J | 0.15 J |
| Benzo(a)anthracene | - - | 5.6 | 1 {c, f} | 0.33 J [0.48 J] | 0.12 J | *1.6 J* | 0.42 J | 0.60 J | *4.0 J* | 0.21 J | 0.94 J | 0.31 J | 0.94 J |
| Benzo(a)pyrene | 2.6 | 1 {f} | 0 {c} | *0.35 J [0.47 J]* | *0.13 J* | ***1.8*** | *0.45 J* | *0.55 J* | ***4.2 J*** | *0.20 J* | ***1.1 J*** | *0.31 J* | *0.96 J* |
| Benzo(b)fluoranthene | - - | 5.6 | 1 {c, f} | *0.74 J [1.2 J]* | 0.20 J | *3.5 J* | 0.57 J | 0.68 J | *5.3 J* | 0.27 J | *1.7 J* | 0.38 J | *1.3 J* |
| Benzo(g,h,i)perylene | - - | 500 {b} | 100 {f} | 0.17 J [0.28 J] | 0.079 J | 0.97 J | 0.28 J | 0.40 J | 3.2 J | 0.14 J | 0.68 J | 0.17 J | 0.46 J |
| Benzo(k)fluoranthene | - - | 56 | 0.8 {c, f} | *0.78 J [1.2 J]* | 0.063 J | *3.7 J* | 0.30 J | 0.20 J | *1.6 J* | 0.10 J | *1.8 J* | 0.13 J | 0.40 J |
| bis(2-Chloroethoxy)methane | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| bis(2-Chloroethyl)ether | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| bis(2-chloroisopropyl)ether | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| bis(2-Ethylhexyl)phthalate | - - | - - | - - | 1.4 U [0.24 J] | 0.22 J | 0.45 J | 1.7 U | 1.5 U | 100 | 0.73 U | 84 | 0.76 U | 1.5 U |
| Butylbenzylphthalate | - - | - - | - - | 1.4 U [0.72 U] | 0.060 J | 1.7 U | 1.7 U | 0.22 J | 8.4 U | 0.13 J | 8.0 U | 0.76 U | 1.5 U |
| Carbazole | - - | - - | - - | 1.4 U [0.072 J] | 0.40 U | 0.17 J | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Chrysene | - - | 56 | 1 {c, f} | 0.41 J [0.59 J] | 0.13 J | *1.8* | 0.46 J | 0.58 J | *3.4 J* | 0.18 J | 0.89 J | 0.27 J | 0.84 J |
| Dibenz(a,h)anthracene | - - | 0.56 | 0.33 {b, f} | 1.4 U [0.087 J] | 0.40 U | 0.30 J | 1.7 U | 0.097 J | ***0.85 J*** | 0.73 U | 8.0 U | 0.055 J | 0.14 J |
| Dibenzofuran | - - | 350 | 7 {f} | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Diethylphthalate | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Dimethylphthalate | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Di-n-butylphthalate | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Di-n-octylphthalate | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Fluoranthene | - - | 500 {b} | 100 {a, f} | 0.53 J [0.67 J] | 0.21 J | 2.5 | 0.56 J | 0.95 J | 5.7 J | 0.24 J | 1.2 J | 0.37 J | 0.93 J |
| Fluorene | 30 | 500 {b} | 30 | 1.4 U [0.72 U] | 0.40 U | 0.089 J | 1.7 U | 0.094 J | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Hexachlorobenzene | - - | 6 | 0.33 {b, f} | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Hexachlorobutadiene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |

See Notes on Page 4.

## Table 14. Comparison of Surface Soil Data to NYSDEC Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample ID:**<br>**Sample Depth(Feet):**<br>**Date Collected:** | **Restricted Use SCOs Ecological** | **Restricted Use SCOs Commercial** | **Unrestricted Use SCOs** | **SS-1**<br>**0 - 0.2**<br>**06/02/06** | **SS-2**<br>**0 - 0.2**<br>**06/02/06** | **SS-3**<br>**0 - 0.2**<br>**06/02/06** | **SS-4**<br>**0 - 0.2**<br>**06/02/06** | **SS-5**<br>**0 - 0.2**<br>**06/02/06** | **SS-6**<br>**0 - 0.2**<br>**06/02/06** | **SS-7**<br>**0 - 0.2**<br>**06/02/06** | **SS-8**<br>**0 - 0.2**<br>**06/02/06** | **SS-9**<br>**0 - 0.2**<br>**06/02/06** | **SS-10**<br>**0 - 0.2**<br>**06/02/06** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd.)** | | | | | | | | | | | | | |
| Hexachlorocyclopentadiene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Hexachloroethane | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Indeno(1,2,3-cd)pyrene | - - | 5.6 | 0.5 {c, f} | 0.17 J [0.26 J] | 0.062 J | *0.98 J* | 0.22 J | 0.38 J | *2.6 J* | 0.11 J | *0.54 J* | 0.15 J | 0.44 J |
| Isophorone | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Naphthalene | - - | 500 {b} | 12 {f} | 1.4 U [0.72 U] | 0.40 U | 0.14 J | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Nitrobenzene | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| N-Nitroso-di-n-propylamine | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| N-Nitrosodiphenylamine | - - | - - | - - | 1.4 U [0.72 U] | 0.40 U | 1.7 U | 1.7 U | 1.5 U | 8.4 U | 0.73 U | 8.0 U | 0.76 U | 1.5 U |
| Phenanthrene | - - | 500 {b} | 100 {f} | 0.21 J [0.32 J] | 0.11 J | 1.3 J | 0.32 J | 1.0 J | 2.5 J | 0.14 J | 0.59 J | 0.20 J | 0.42 J |
| Pyrene | - - | 500 {b} | 100 {f} | 0.63 J [0.85] | 0.24 J | 2.8 | 0.72 J | 1.5 | 7.4 J | 0.33 J | 1.4 J | 0.53 J | 1.4 J |
| Total PAHs | - - | - - | - - | 4.4 J [6.7 J] | 1.4 J | 23 J | 4.5 J | 7.3 J | 43 J | 2.0 J | 11 J | 3.0 J | 8.6 J |
| **Metals** | | | | | | | | | | | | | |
| Aluminum | - - | - - | - - | 4,220 J [4,660 J] | 2,380 J | 5,990 J | 4,890 J | 3,940 J | 8,030 J | 4,400 J | 7,210 J | 5,200 J | 2,700 J |
| Antimony | - - | - - | - - | 15.7 UJ [16.7 UJ] | 17.7 UJ | 17.8 UJ | 19.1 UJ | 16.0 UJ | 19.4 UJ | 16.6 UJ | 18.0 UJ | 17.5 UJ | 17.1 UJ |
| Arsenic | 13 {f} | 16 {f} | 13 {c} | 7.60 [7.60] | 2.40 U | 12.3 | ***24.1*** | 5.30 | 11.2 | 4.40 | 7.10 | 4.90 | 5.70 |
| Barium | 433 | 400 | 350 {c} | 88.5 J [77.9 J] | 47.3 U | 114 J | 229 J | 67.5 J | 96.6 J | 78.6 J | 81.1 J | 58.1 J | 50.5 J |
| Beryllium | 10 | 590 | 7.2 | 1.00 U [1.10 U] | 1.20 U | 1.20 U | 1.30 U | 1.10 U | 1.30 U | 1.10 U | 1.20 U | 1.20 U | 1.10 U |
| Cadmium | 4 | 9.3 | 2.5 {c} | 1.00 U [1.10 U] | 1.20 U | 1.20 U | 1.30 | 1.10 U | 1.30 U | 1.10 U | 1.20 U | 1.20 U | 1.10 U |
| Calcium | - - | - - | - - | 129,000 [110,000] | 42,400 | 38,700 | 32,000 | 139,000 | 71,700 | 145,000 | 34,400 | 83,400 | 101,000 |
| Chromium | - - | - - | - - | 10.3 [10.1] | 5.20 | 18.0 | 17.2 | 21.7 | 18.9 | 15.7 | 14.1 | 8.00 | 6.50 |
| Cobalt | - - | - - | - - | 10.4 U [11.1 U] | 11.8 U | 11.9 U | 12.7 U | 10.7 U | 12.9 U | 11.1 U | 12.0 U | 11.7 U | 11.4 U |
| Copper | 50 | 270 | 50 | *59.0 J [47.3 J]* | 23.2 J | *98.2 J* | *76.7 J* | *57.7 J* | *109 J* | *51.7 J* | 35.6 J | 33.6 J | 26.7 J |
| Cyanide, Total | - - | 27 {h} | 27 {e, f} | 1.10 U [1.00 U] | 1.10 U | 1.20 U | 1.20 U | 0.980 U | 1.30 U | 5.40 | 1.10 U | 1.10 U | 1.00 U |
| Iron | - - | - - | - - | 11,900 J [12,500 J] | 5,980 J | 22,700 J | 53,300 J | 21,200 J | 19,000 J | 10,500 J | 14,500 J | 11,500 J | 9,340 J |
| Lead | 63 {f} | 1,000 | 63 {c} | *232 [234]* | 30.4 | *268* | *337* | *64.6* | *324* | *94.1* | *78.7* | 46.4 | 60.7 |
| Magnesium | - - | - - | - - | 16,000 [12,800] | 12,200 | 9,480 | 12,100 | 11,000 | 18,100 | 13,500 | 10,300 | 13,100 | 29,300 |
| Manganese | 1,600 {f} | 10,000 {d} | 1,600 {c} | 456 [492] | 219 | 375 | 337 | 387 | 374 | 289 | 452 | 438 | 281 |
| Mercury | 0.18 {f} | 2.8 {j} | 0.18 {c} | *0.326 [0.255]* | 0.0330 | *0.679* | *0.763* | 0.0620 | *0.376* | 0.0560 | 0.0950 | *0.190* | 0.0910 |
| Nickel | 30 | 310 | 30 | 16.1 [18.7] | 9.50 U | 16.8 | 24.6 | 29.0 | 15.0 | 17.3 | 17.1 | 13.4 | 10.0 |
| Potassium | - - | - - | - - | 1,040 UJ [1,110 UJ] | 1,180 U | 1,190 U | 1,270 U | 1,070 U | 1,290 U | 1,110 U | 1,260 J | 1,170 U | 1,140 U |
| Selenium | 3.9 {f} | 1,500 | 3.9 {c} | 4.20 U [4.40 U] | 4.70 U | 4.80 U | 5.10 U | 4.30 U | 5.20 U | 4.40 U | 4.80 U | 4.70 U | 4.60 U |
| Silver | 2 | 1,500 | 2 | 2.10 U [2.20 U] | 2.40 U | 2.40 U | 2.50 U | 2.10 U | 2.60 U | 2.20 U | 2.40 U | 2.30 U | 2.30 U |
| Sodium | - - | - - | - - | 1,040 U [1,110 U] | 1,180 U | 1,190 U | 1,270 U | 1,070 U | 1,290 U | 1,110 U | 1,200 U | 1,170 U | 1,140 U |
| Thallium | - - | - - | - - | 6.30 U [6.70 U] | 7.10 U | 7.10 U | 7.60 U | 6.40 U | 7.80 U | 6.60 U | 7.20 U | 7.00 U | 6.90 U |
| Vanadium | - - | - - | - - | 13.5 [13.5] | 11.8 U | 17.9 | 22.9 | 10.7 U | 25.8 | 14.8 | 16.0 | 11.7 U | 14.8 |
| Zinc | 109 {f} | 10,000 {d} | 109 {c} | *159 J [138 J]* | 33.8 J | *172 J* | *310 J* | *157 J* | *219 J* | *136 J* | *119 J* | 87.0 J | *111 J* |

See Notes on Page 4.

## Table 14. Comparison of Surface Soil Data to NYSDEC Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**
All concentrations reported in milligrams per Kilogram (mg/Kg); equivalent to parts per million (ppm).
Detected concentrations are bolded.
[ ] Bracketed results represent the duplicate sample.
-- = Sample not analyzed for specified constituent/no criteria available.
Shaded values indicate the result exceeded the NYSDEC Part 375 Ecological Soil Cleanup Objectives (SCOs), September 2006.
Values in **bold** font indicate the result exceeded the NYSDEC SCO for Commercial Use.
Values in *italicized* font indicate the result exceeded the NYSDEC SCO for Unrestricted Use.

**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | J = | Indicates an estimated value. |
| Organic | ND = | None detected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample Location: | Ecological SCOs | Number of SCO Exceedances | MW-04-02 | MW-04-03 | MW-04-04 | MW-04-05 | MW-06-09 | MW-06-10 | MW-06-11 | MW-06-13R | TP-04-01 | TP-04-02 | TP-04-02 | TP-04-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID: | | | MW-04-02 | MW-04-03 | MW-04-04 | MW-04-05 | MW-06-09 | MW-06-10 | MW-06-11 | MW-06-13R | TP-04-01 | TP-04-02 | TP-04-02 | TP-04-03 |
| Sample Depth (Feet): | | | 12 - 14 | 10 - 10.5 | 12 - 13.7 | 8 - 9.7 | 8 - 12 | 4 - 6 | 7 - 9.8 | 8 - 10 | 12 | 7 | 14 | 11 |
| Date Collected: | | | 12/01/04 | 12/01/04 | 12/01/04 | 12/02/04 | 05/04/06 | 05/01/06 | 05/03/06 | 06/12/06 | 11/22/04 | 11/22/04 | 11/22/04 | 11/22/04 |
| **VOCs** | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 1,1,2,2-Tetrachloroethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| 1,1,2-Trichloroethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0035 U | 0.33 U | 0.37 U | 160 U |
| 1,1-Dichloroethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 1,1-Dichloroethene | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| 1,2-Dichloroethane | 10 | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| 1,2-Dichloroethene (total) | -- | | - - | - - | - - | - - | 0.013 U | 0.012 U | 0.012 U | - - | - - | - - | - - | - - |
| 1,2-Dichloropropane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| 2-Butanone | 360 | | - - | - - | - - | - - | 0.032 U | 0.022 J | 0.012 J | 0.010 J | 0.0058 UJ | 0.55 U | 0.62 U | 260 U |
| 2-Hexanone | -- | | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | 0.029 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| 4-Methyl-2-Pentanone | -- | | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | 0.029 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Acetone | 2.2 | | - - | - - | - - | - - | 0.035 | 0.11 | 0.089 | 0.055 | 0.090 U | 0.55 UJ | 0.62 UJ | 260 UJ |
| Benzene | 70 | 2 | 0.0029 | 0.13 U | 0.024 | 3.8 [7.0] | 0.0060 U | 0.0060 U | 0.21 | 0.020 | 0.0027 | 3.6 | 0.36 | **1,500** |
| Bromodichloromethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Bromoform | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0046 U | 0.44 U | 0.49 U | 210 U |
| Bromomethane | -- | | - - | - - | - - | - - | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Carbon Disulfide | -- | | - - | - - | - - | - - | 0.0060 UJ | 0.0060 U | 0.0060 UJ | 0.0010 J | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Carbon Tetrachloride | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0023 U | 0.22 U | 0.25 U | 100 U |
| Chlorobenzene | 40 | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloroethane | -- | | - - | - - | - - | - - | 0.0060 UJ | 0.0060 UJ | 0.0060 UJ | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloroform | 12 | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Chloromethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| cis-1,2-Dichloroethene | -- | | - - | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| cis-1,3-Dichloropropene | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Dibromochloromethane | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Ethylbenzene | -- | | 0.057 | 0.24 J | 0.044 | 26 [61] | 0.0060 U | 0.0060 U | 2.8 D | 0.095 | 0.0036 J | 0.88 | 1.0 | 620 |
| Methylene Chloride | 12 | | - - | - - | - - | - - | 0.0060 U | 0.0020 J | 0.0060 U | 0.021 UJ | 0.0072 U | 0.33 U | 0.37 U | 160 U |
| Styrene | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 2.3 | 0.62 U | 810 |
| Tetrachloroethene | 2 | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0020 J | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Toluene | 36 | 3 | 0.0015 J | 0.070 J | 0.011 | **23 J [53]** | 0.0060 UJ | 0.0060 UJ | 1.5 D | 0.025 J | 0.0074 | 12 | 0.67 | **5,900** |
| trans-1,2-Dichloroethene | -- | | - - | - - | - - | - - | - - | - - | - - | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| trans-1,3-Dichloropropene | -- | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Trichloroethene | 2 | | - - | - - | - - | - - | 0.0060 U | 0.0060 U | 0.0060 U | 0.0060 U | 0.0012 U | 0.11 U | 0.12 U | 53 U |
| Vinyl acetate | -- | | - - | - - | - - | - - | 0.032 U | 0.030 U | 0.031 U | - - | - - | - - | - - | - - |
| Vinyl Chloride | -- | | - - | - - | - - | - - | 0.013 U | 0.012 U | 0.012 U | 0.012 U | 0.0058 U | 0.55 U | 0.62 U | 260 U |
| Xylene (Total) | 0.26 | 13 | 0.0066 | **0.57 J** | 0.081 | **73 [180]** | 0.019 U | 0.018 U | **8.3 D** | 0.24 | 0.023 | **4.6** | **1.0** | **3,200** |
| Total BTEX | -- | | 0.068 J | 0.88 J | 0.16 | 130 J [300] | ND | ND | 13 | 0.38 J | 0.037 J | 21 | 3.0 | 11,000 |
| Total VOCs | -- | | 0.068 J | 0.88 J | 0.16 | 130 J [300] | 0.035 | 0.13 J | 13 J | 0.45 J | 0.037 J | 23 | 3.0 | 12,000 |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:** | **Ecological SCOs** | **Number of SCO Exceedances** | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
| **Sample Depth (Feet):** | | | **12 - 14** | **10 - 10.5** | **12 - 13.7** | **8 - 9.7** | **8 - 12** | **4 - 6** | **7 - 9.8** | **8 - 10** | **12** | **7** | **14** | **11** |
| **Date Collected:** | | | **12/01/04** | **12/01/04** | **12/01/04** | **12/02/04** | **05/04/06** | **05/01/06** | **05/03/06** | **06/12/06** | **11/22/04** | **11/22/04** | **11/22/04** | **11/22/04** |
| **SVOCs** | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| 1,2-Dichlorobenzene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 1,3-Dichlorobenzene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 1,4-Dichlorobenzene | 20 | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 2,4,5-Trichlorophenol | -- | | - - | - - | - - | - - | 0.99 U | 4.8 U | 9.9 U | - - | - - | - - | - - | - - |
| 2,4,6-Trichlorophenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dichlorophenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dimethylphenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2,4-Dinitrophenol | -- | | - - | - - | - - | - - | 2.0 UJ | 9.6 UJ | 20 UJ | - - | - - | - - | - - | - - |
| 2,4-Dinitrotoluene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| 2,6-Dinitrotoluene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| 2-Chloronaphthalene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 2-Chlorophenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2-Methylnaphthalene | -- | | 0.044 J | 5.6 | 1.4 J | 570 [480] | 0.41 U | 5.5 | 1.5 J | 5.6 J | 1.2 J | - - | 0.25 J | 1,200 |
| 2-Methylphenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 2-Nitroaniline | -- | | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 2-Nitrophenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 3,3'-Dichlorobenzidine | -- | | - - | - - | - - | - - | 2.0 U | 2.0 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 3-Nitroaniline | -- | | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 4,6-Dinitro-2-methylphenol | -- | | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | - - | - - | - - | - - | - - |
| 4-Bromophenyl-phenylether | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Chloro-3-methylphenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 4-Chloroaniline | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Chlorophenyl-phenylether | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| 4-Methylphenol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| 4-Nitroaniline | -- | | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | 55 U | 7.8 U | - - | 8.4 U | 180 U |
| 4-Nitrophenol | -- | | - - | - - | - - | - - | 2.0 UJ | 9.6 U | 20 UJ | - - | - - | - - | - - | - - |
| Acenaphthene | 20 | 8 | 0.35 J | 2.9 | 2.2 J | **360 [330]** | 0.41 U | 1.2 J | 7.0 | **50** | 5.4 | - - | 7.4 | **180** |
| Acenaphthylene | -- | | 0.22 J | 5.1 | 2.8 | 250 [200] | 0.41 U | 2.0 U | 1.6 J | 7.9 J | 1.2 J | - - | 7.5 | 470 |
| Anthracene | -- | | 0.64 | 4.4 | 8.1 | 550 [470] | 0.41 U | 0.81 J | 7.4 | 57 | 4.4 | - - | 8.8 | 290 |
| Benzo(a)anthracene | -- | | 0.20 | 2.2 | 13 | 310 [290] | 0.41 U | 1.3 J | 12 | 40 | 3.8 | - - | 3.4 | 140 |
| Benzo(a)pyrene | 2.6 | 14 | 0.12 | 1.8 | **14** | **250 [240]** | 0.41 U | 0.94 J | **9.9** | **34** | 1.7 | - - | 2.2 | **87** |
| Benzo(b)fluoranthene | 2.6 | 14 | 0.034 J | 0.94 | **10** | **170 [160]** | 0.41 U | 1.5 J | **10** | **35** | 0.73 | - - | 0.78 | **22** |
| Benzo(g,h,i)perylene | 2.6 | 12 | 0.037 J | 0.75 J | **7.6** | **120 J [110]** | 0.41 U | 0.51 J | **4.4** | **17 J** | 0.56 J | - - | 0.75 J | **28 J** |
| Benzo(k)fluoranthene | 2.6 | 13 | 0.090 | 1.8 | **16** | **260 [250]** | 0.41 U | 1.6 J | **3.9 J** | **13** | 1.5 | - - | 1.4 | **76** |
| Benzoic acid | -- | | - - | - - | - - | - - | 6.0 UJ | 29 UJ | 59 UJ | - - | - - | - - | - - | - - |
| Benzyl alcohol | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| bis(2-Chloroethoxy)methane | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| bis(2-Chloroethyl)ether | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample Location: | Ecological SCOs | Number of SCO Exceedances | MW-04-02 | MW-04-03 | MW-04-04 | MW-04-05 | MW-06-09 | MW-06-10 | MW-06-11 | MW-06-13R | TP-04-01 | TP-04-02 | TP-04-02 | TP-04-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID: | | | MW-04-02 | MW-04-03 | MW-04-04 | MW-04-05 | MW-06-09 | MW-06-10 | MW-06-11 | MW-06-13R | TP-04-01 | TP-04-02 | TP-04-02 | TP-04-03 |
| Sample Depth (Feet): | | | 12 - 14 | 10 - 10.5 | 12 - 13.7 | 8 - 9.7 | 8 - 12 | 4 - 6 | 7 - 9.8 | 8 - 10 | 12 | 7 | 14 | 11 |
| Date Collected: | | | 12/01/04 | 12/01/04 | 12/01/04 | 12/02/04 | 05/04/06 | 05/01/06 | 05/03/06 | 06/12/06 | 11/22/04 | 11/22/04 | 11/22/04 | 11/22/04 |
| **SVOCs (Cont'd.)** | | | | | | | | | | | | | | |
| bis(2-chloroisopropyl)ether | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| bis(2-Ethylhexyl)phthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Butylbenzylphthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Carbazole | -- | | - - | - - | - - | - - | - - | - - | - - | 5.8 J | 3.9 U | - - | 4.2 U | 90 U |
| Chrysene | -- | | 0.24 J | 2.2 | **14** | **290 [260]** | 0.41 U | 2.0 | **9.2** | **34** | **4.2** | - - | **4.1 J** | **150** |
| Cresols, Total | -- | | - - | - - | - - | - - | 0.82 U | 4.0 U | 8.1 U | - - | - - | - - | - - | - - |
| Dibenz(a,h)anthracene | -- | | 0.015 J | 0.29 | 2.6 | 47 [46] | 0.41 U | 0.24 J | 1.5 J | 5.4 J | 0.44 | - - | 0.49 | 21 |
| Dibenzofuran | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 3.8 J | 32 | 3.9 U | - - | 4.2 U | 90 U |
| Diethylphthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Dimethylphthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Di-n-butylphthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Di-n-octylphthalate | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Fluoranthene | -- | | 0.29 J | **4.7** | **25** | **710 [700]** | 0.025 J | 1.3 J | **23** | **100** | **9.4** | - - | **4.5** | **180** |
| Fluorene | 30 | 8 | 0.31 J | 4.3 | 4.1 | **490 [370]** | 0.41 U | 1.5 J | 5.8 | **48** | 3.6 J | - - | 5.2 | **210** |
| Hexachlorobenzene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| Hexachlorobutadiene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.78 U | - - | 0.84 U | 18 U |
| Hexachlorocyclopentadiene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 UJ | - - | 4.2 UJ | 90 UJ |
| Hexachloroethane | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| Indeno(1,2,3-cd)pyrene | -- | | 0.034 J | 0.76 | 7.8 | 120 [120] | 0.41 U | 0.48 J | 4.6 | 17 | 0.51 | - - | 0.76 | 27 |
| Isophorone | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Naphthalene | -- | | 0.071 J | **15** | **5.5** | **1,900 [1,600]** | 0.41 U | 1.8 J | **6.7** | **32** | 1.7 J | - - | **3.0 J** | **1,900** |
| Nitrobenzene | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| N-Nitroso-di-n-propylamine | -- | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | 11 U | 0.39 U | - - | 0.42 U | 9.0 U |
| N-Nitrosodiphenylamine | -- | | - - | - - | - - | - - | 0.41 U | 2.1 | 4.1 U | 11 U | 3.9 U | - - | 4.2 U | 90 U |
| Pentachlorophenol | 0.27 | | - - | - - | - - | - - | 2.0 U | 9.6 U | 20 U | - - | - - | - - | - - | - - |
| Phenanthrene | -- | | **3.1** | **14** | **21** | **1,100 [1,000]** | 0.41 U | 2.4 | **23** | **150** | **48** | - - | **50** | **1,400** |
| Phenol | 30 | | - - | - - | - - | - - | 0.41 U | 2.0 U | 4.1 U | - - | - - | - - | - - | - - |
| Pyrene | 2.6 | 18 | 0.76 | **4.9** | **23** | **610 [570]** | 0.022 J | 2.1 | **17** | **73** | **15** | - - | **12** | **430** |
| Pyridine | -- | | - - | - - | - - | - - | 0.99 U | 4.8 U | 9.9 U | - - | - - | - - | - - | - - |
| Total PAHs | -- | | 6.6 J | 72 J | 180 J | 8,100 J [7,200] | 0.047 J | 25 J | 150 J | 720 J | 100 J | - - | 110 J | 6,800 J |
| Total SVOCs | -- | | 6.6 J | 72 J | 180 J | 8,100 J [7,200] | 0.047 J | 27 J | 150 J | 760 J | 100 J | - - | 110 J | 6,800 J |
| **Metals** | | | | | | | | | | | | | | |
| Aluminum | -- | | - - | - - | - - | - - | 8,310 | 5,290 J | 2,220 | 3,280 | 5,940 | - - | 7,540 | 5,480 |
| Antimony | -- | | - - | - - | - - | - - | 17.0 U | 18.0 U | 18.0 U | 18.6 U | 14.1 UJ | - - | 15.1 UJ | 16.2 UJ |
| Arsenic | 10 | 15 | - - | - - | - - | - - | 4.00 | **20.0** | **55.0** | **22.6** | **10.6** | - - | **31.4** | 6.30 |
| Barium | 433 | | - - | - - | - - | - - | 73.0 | 102 | 48.0 U | 52.8 | 48.1 | - - | 55.0 | 78.3 |
| Beryllium | 10 | | - - | - - | - - | - - | 1.00 U | 1.00 U | 1.00 U | 1.20 U | 0.420 B | - - | 0.590 | 0.270 B |
| Cadmium | 4 | | - - | - - | - - | - - | 1.00 U | 1.00 U | 1.00 U | 1.20 U | 1.20 U | - - | 1.30 U | 1.30 U |
| Calcium | -- | | - - | - - | - - | - - | 39,100 | 21,200 | 19,300 | 32,300 | 47,400 J | - - | 22,500 J | 62,200 J |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:** | **Ecological SCOs** | **Number of SCO Exceedances** | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **MW-04-02** | **MW-04-03** | **MW-04-04** | **MW-04-05** | **MW-06-09** | **MW-06-10** | **MW-06-11** | **MW-06-13R** | **TP-04-01** | **TP-04-02** | **TP-04-02** | **TP-04-03** |
| **Sample Depth (Feet):** | | | **12 - 14** | **10 - 10.5** | **12 - 13.7** | **8 - 9.7** | **8 - 12** | **4 - 6** | **7 - 9.8** | **8 - 10** | **12** | **7** | **14** | **11** |
| **Date Collected:** | | | **12/01/04** | **12/01/04** | **12/01/04** | **12/02/04** | **05/04/06** | **05/01/06** | **05/03/06** | **06/12/06** | **11/22/04** | **11/22/04** | **11/22/04** | **11/22/04** |
| **Metals (Cont'd.)** | | | | | | | | | | | | | | |
| Chromium | 0.4 | 19 | - - | - - | - - | - - | **11.0** | **10.0** | **17.0** | **16.7** | **10.8** | - - | **15.1** | **9.00** |
| Cobalt | -- | | - - | - - | - - | - - | 11.0 U | 20.0 | 20.0 | 12.4 U | 7.50 B | - - | 11.1 B | 6.60 B |
| Copper | 50 | 7 | - - | - - | - - | - - | 19.0 | **282** | **284** | **280** | 36.9 | - - | 46.0 | 29.0 |
| Cyanide, Total | -- | | 0.500 U | 0.500 U | 0.500 U | 7.00 [5.50] | 1.00 U | 1.00 U | 1.00 U | 1.30 U | 0.500 U | - - | 0.500 U | 0.500 U |
| Iron | -- | | - - | - - | - - | - - | 14,500 | 124,000 | 48,900 | 18,700 | 18,700 | - - | 29,000 | 14,600 |
| Lead | 50 | 10 | - - | - - | - - | - - | 16.0 | **217** | **343** | **312** | 43.0 J | - - | 39.9 J | **1,540 J** |
| Magnesium | -- | | - - | - - | - - | - - | 8,100 | 8,560 | 2,970 | 6,820 | 20,900 J | - - | 12,700 J | 22,700 J |
| Manganese | 500 | 2 | - - | - - | - - | - - | 292 | **538** | 134 | 143 | 218 | - - | 268 | 435 |
| Mercury | 0.1 | 13 | - - | - - | - - | - - | 0 | **2.00** | **1.00** | **2.90** | **0.110 J** | - - | 0.100 J | **0.160 J** |
| Nickel | 30 | 4 | - - | - - | - - | - - | 20.0 | 29.0 | 23.0 | 15.4 | 24.1 J | - - | **37.4 J** | 14.7 J |
| Potassium | -- | | - - | - - | - - | - - | 1,460 | 1,220 U | 1,200 U | 1,240 U | 861 B | - - | 966 B | 977 B |
| Selenium | 1 | 6 | - - | - - | - - | - - | 4.00 U | 4.00 U | **6.00** | 5.00 U | 8.20 U | - - | 8.80 U | 9.40 U |
| Silver | 2 | | - - | - - | - - | - - | 2.00 U | 2.00 U | 2.00 U | 2.50 U | 2.40 U | - - | 2.50 U | 2.70 U |
| Sodium | -- | | - - | - - | - - | - - | 1,170 U | 1,220 U | 1,200 U | 1,240 U | 252 B | - - | 114 B | 155 B |
| Thallium | -- | | - - | - - | - - | - - | 7.00 U | 7.00 U | 7.00 U | 7.40 U | 5.90 U | - - | 6.30 U | 6.70 U |
| Vanadium | -- | | - - | - - | - - | - - | 16.0 | 17.0 | 15.0 | 12.4 U | 16.0 | - - | 21.5 | 11.6 B |
| Zinc | 50 | 13 | - - | - - | - - | - - | 41.0 | **105** | **410** | **292** | **55.0** | - - | **78.0** | 38.2 |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample Location: | Ecological SCOs | Number of SCO Exceedances | TP-04-04 | TP-04-05 | TP-04-06 | TP-04-07 | TP-04-08 | TP-04-09 | TP-04-10 | TP-04-11 | TP-04-12 | TP-06-13 | TP-06-14 | TP-06-15 | TP-06-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
| **Sample Depth (Feet):** | | | **6** | **9** | **8.5** | **9** | **5** | **7** | **9.8** | **1.7** | **10.2** | **7.5** | **9** | **6** | **8** |
| **Date Collected:** | | | **11/23/04** | **11/23/04** | **11/29/04** | **11/29/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **06/13/06** | **06/13/06** | **06/14/06** | **06/14/06** |
| **VOCs** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1,2,2-Tetrachloroethane | -- | | 2.6 U | 0.14 U | 0.71 UJ [0.64 UJ] | 0.13 UJ | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1,2-Trichloroethane | -- | | 7.9 U | 0.42 U | 2.1 U [1.9 U] | 0.39 U | 0.0039 U | 0.34 U | 0.0038 U | - - | 0.36 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1-Dichloroethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,1-Dichloroethene | -- | | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,2-Dichloroethane | 10 | | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 1,2-Dichloroethene (total) | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 1,2-Dichloropropane | -- | | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| 2-Butanone | 360 | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 UJ | 0.57 U | 0.0063 UJ | - - | 0.60 U | 0.011 J | 0.016 J | 0.015 J | 0.0050 J |
| 2-Hexanone | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.030 U | 0.036 U | 0.033 U | 0.025 U |
| 4-Methyl-2-Pentanone | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.030 U | 0.036 U | 0.033 U | 0.025 U |
| Acetone | 2.2 | | 13 UJ | 0.69 UJ | 3.6 UJ [3.2 UJ] | 0.65 UJ | 0.15 | 0.57 J | 0.037 U | - - | 0.60 UJ | 0.043 J | 0.068 | 0.058 | 0.029 |
| Benzene | 70 | 2 | **140** | 0.80 | 2.4 J [1.4 J] | 1.1 | 0.0041 | 0.11 U | 0.0013 U | - - | 0.51 | 0.41 D | 0.024 | 0.26 | 0.0050 U |
| Bromodichloromethane | -- | | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Bromoform | -- | | 10 U | 0.55 U | 2.8 U [2.5 U] | 0.52 U | 0.0051 U | 0.45 U | 0.0050 U | - - | 0.48 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Bromomethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Carbon Disulfide | -- | | 13 U | 0.69 U | 3.6 UJ [3.2 UJ] | 0.42 J | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0020 J | 0.0070 U | 0.0070 U | 0.0050 U |
| Carbon Tetrachloride | -- | | 5.3 U | 0.28 U | 1.4 U [1.3 U] | 0.26 U | 0.0026 U | 0.23 U | 0.0025 U | - - | 0.24 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chlorobenzene | 40 | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloroethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloroform | 12 | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Chloromethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| cis-1,2-Dichloroethene | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| cis-1,3-Dichloropropene | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Dibromochloromethane | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Ethylbenzene | -- | | 62 | 11 | 100 J [86 J] | 5.6 | 0.0051 U | 0.45 U | 0.0050 U | - - | 0.20 J | 0.73 D | 0.0060 J | 0.17 | 0.0050 U |
| Methylene Chloride | 12 | | 7.9 U | 0.42 U | 2.1 U [1.9 U] | 0.39 U | 0.0039 U | 0.34 U | 0.0038 U | - - | 0.36 U | 0.0060 UJ | 0.019 UJ | 0.0070 UJ | 0.0050 UJ |
| Styrene | -- | | 110 | 0.69 U | 3.6 U [3.2 U] | 0.99 | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Tetrachloroethene | 2 | | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0031 | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0010 J | 0.0070 U | 0.0070 U | 0.0050 U |
| Toluene | 36 | 3 | **330** | 3.0 | 14 J [1.8 J] | 1.5 | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.20 J | 0.42 DJ | 0.0070 UJ | 0.39 DJ | 0.0050 UJ |
| trans-1,2-Dichloroethene | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| trans-1,3-Dichloropropene | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Trichloroethene | 2 | | 2.6 U | 0.14 U | 0.71 U [0.64 U] | 0.13 U | 0.0013 U | 0.11 U | 0.0013 U | - - | 0.12 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0050 U |
| Vinyl acetate | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Vinyl Chloride | -- | | 13 U | 0.69 U | 3.6 U [3.2 U] | 0.65 U | 0.0064 U | 0.57 U | 0.0063 U | - - | 0.60 U | 0.012 U | 0.014 U | 0.013 U | 0.010 U |
| Xylene (Total) | 0.26 | 13 | **510** | **41** | **390 J [110 J]** | **61** | 0.0064 U | 0.57 U | 0.0063 U | - - | **0.28 J** | **1.9 D** | 0.0040 J | **3.3 D** | 0.015 U |
| Total BTEX | -- | | 1,000 | 56 | 510 J [200 J] | 69 | 0.0041 | ND | ND | - - | 1.2 J | 3.5 J | 0.034 J | 4.1 J | ND |
| Total VOCs | -- | | 1,200 | 56 | 510 J [200 J] | 71 J | 0.16 | 0.57 J | ND | - - | 1.2 J | 3.5 J | 0.12 J | 4.2 J | 0.034 J |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample Location: | Ecological SCOs | Number of SCO Exceedances | TP-04-04 | TP-04-05 | TP-04-06 | TP-04-07 | TP-04-08 | TP-04-09 | TP-04-10 | TP-04-11 | TP-04-12 | TP-06-13 | TP-06-14 | TP-06-15 | TP-06-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID: | | | TP-04-04 | TP-04-05 | TP-04-06 | TP-04-07 | TP-04-08 | TP-04-09 | TP-04-10 | TP-04-11 | TP-04-12 | TP-06-13 | TP-06-14 | TP-06-15 | TP-06-16 |
| Sample Depth (Feet): | | | 6 | 9 | 8.5 | 9 | 5 | 7 | 9.8 | 1.7 | 10.2 | 7.5 | 9 | 6 | 8 |
| Date Collected: | | | 11/23/04 | 11/23/04 | 11/29/04 | 11/29/04 | 11/24/04 | 11/24/04 | 11/24/04 | 11/24/04 | 11/24/04 | 06/13/06 | 06/13/06 | 06/14/06 | 06/14/06 |
| **SVOCs** | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,2-Dichlorobenzene | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,3-Dichlorobenzene | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 1,4-Dichlorobenzene | 20 | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2,4,5-Trichlorophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4,6-Trichlorophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dichlorophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dimethylphenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dinitrophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2,4-Dinitrotoluene | -- | | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2,6-Dinitrotoluene | -- | | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2-Chloronaphthalene | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 2-Chlorophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2-Methylnaphthalene | -- | | 360 | 220 | 550 J [91 J] | 34 | 4.7 J | 0.033 J | 0.032 J | - - | 1.0 J | 10 | 0.12 J | 580 | 1.3 |
| 2-Methylphenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 2-Nitroaniline | -- | | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 2-Nitrophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 3,3'-Dichlorobenzidine | -- | | 220 U | 94 U | 98 UJ [44 UJ] | 44 UJ | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 3-Nitroaniline | -- | | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 4,6-Dinitro-2-methylphenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Bromophenyl-phenylether | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Chloro-3-methylphenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Chloroaniline | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Chlorophenyl-phenylether | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| 4-Methylphenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| 4-Nitroaniline | -- | | 220 U | 94 U | 98 U [44 U] | 44 U | 17 U | 0.78 U | 0.84 U | - - | 16 U | 49 U | 8.9 U | 300 U | 2.0 U |
| 4-Nitrophenol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Acenaphthene | 20 | 8 | **44 J** | **180** | **130 [110]** | 18 J | 3.9 J | 0.12 J | 0.047 J | - - | 11 | **26** | 2.1 | **510** | 0.29 J |
| Acenaphthylene | -- | | 260 | 55 | 31 J [22 U] | 42 | 8.1 J | 0.29 J | 0.18 J | - - | 13 | 3.3 J | 0.66 J | 370 | 0.12 J |
| Anthracene | -- | | 230 | 190 | 54 [60] | 59 | 29 | 0.28 J | 0.18 J | - - | 26 | 15 | 1.4 J | 600 | 0.064 J |
| Benzo(a)anthracene | -- | | 140 | 120 | 43 [22] | 44 | 57 | 1.3 | 0.80 | - - | 16 | 18 | 2.8 | 380 | 0.41 U |
| Benzo(a)pyrene | 2.6 | 14 | **88** | **82** | **23 [10]** | **33** | **48** | 1.0 | 1.1 | - - | **9.5** | **17** | **2.8** | **360** | 0.41 U |
| Benzo(b)fluoranthene | 2.6 | 14 | **63** | **53** | **6.1 [4.4]** | **19** | **48** | 0.60 | 0.85 | - - | **2.7** | **18** | **3.3** | **390** | 0.41 U |
| Benzo(g,h,i)perylene | 2.6 | 12 | **41 J** | **34 J** | **5.4 J [2.2 J]** | **11 J** | **20** | 0.50 | 0.25 J | - - | 2.2 J | **9.2 J** | 1.8 J | **260** | 0.41 U |
| Benzo(k)fluoranthene | 2.6 | 13 | **94** | **83** | **20 [9.8]** | **38** | **55** | 1.1 | 1.4 | - - | **7.8** | **5.4 J** | 1.0 J | **120** | 0.41 U |
| Benzoic acid | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Benzyl alcohol | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| bis(2-Chloroethoxy)methane | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| bis(2-Chloroethyl)ether | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| **Sample Location:** | **Ecological SCOs** | **Number of SCO Exceedances** | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | | **TP-04-04** | **TP-04-05** | **TP-04-06** | **TP-04-07** | **TP-04-08** | **TP-04-09** | **TP-04-10** | **TP-04-11** | **TP-04-12** | **TP-06-13** | **TP-06-14** | **TP-06-15** | **TP-06-16** |
| **Sample Depth (Feet):** | | | **6** | **9** | **8.5** | **9** | **5** | **7** | **9.8** | **1.7** | **10.2** | **7.5** | **9** | **6** | **8** |
| **Date Collected:** | | | **11/23/04** | **11/23/04** | **11/29/04** | **11/29/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **11/24/04** | **06/13/06** | **06/13/06** | **06/14/06** | **06/14/06** |
| **SVOCs (Cont'd.)** | | | | | | | | | | | | | | | |
| bis(2-chloroisopropyl)ether | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| bis(2-Ethylhexyl)phthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Butylbenzylphthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Carbazole | -- | | 83 J | 42 J | 49 UJ [0.93 J] | 16 J | 11 | 0.051 J | 0.055 J | - - | 0.76 J | 6.8 J | 0.50 J | 200 | 0.41 U |
| Chrysene | -- | | **110 J** | **110** | **52 [22 J]** | **38** | **59** | 1.2 | 0.78 | - - | **18** | **14** | **2.7** | **310** | 0.41 U |
| Cresols, Total | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Dibenz(a,h)anthracene | -- | | 23 | 19 | 4.2 J [2.2 U] | 3.7 | 7.6 | 0.17 | 0.11 | - - | 1.0 | 2.7 J | 0.44 J | 52 J | 0.41 U |
| Dibenzofuran | -- | | 170 | 130 | 49 U [20 J] | 46 | 10 | 0.099 J | 0.056 J | - - | 6.1 J | 14 | 0.96 J | 440 | 0.15 J |
| Diethylphthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Dimethylphthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Di-n-butylphthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Di-n-octylphthalate | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Fluoranthene | -- | | **320** | **300** | **41 J [45]** | **100** | **150** | 2.6 | 0.93 | - - | **20** | **44** | **6.2** | **1,100 D** | 0.024 J |
| Fluorene | 30 | 8 | **210** | **180** | **59 [60]** | **54** | 10 | 0.10 J | 0.037 J | - - | 16 | 18 | 1.6 J | **530** | 0.21 J |
| Hexachlorobenzene | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachlorobutadiene | -- | | 22 U | 9.4 U | 9.8 U [4.4 U] | 4.4 U | 1.7 U | 0.078 U | 0.084 U | - - | 1.6 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachlorocyclopentadiene | -- | | 110 UJ | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Hexachloroethane | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Indeno(1,2,3-cd)pyrene | -- | | 44 | 36 | 4.1 J [2.3] | 11 | 20 | 0.53 | 0.30 | - - | 2.0 | 8.9 J | 1.7 J | 220 | 0.41 U |
| Isophorone | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Naphthalene | -- | | **1,300** | **780** | **810 J [260 J]** | **270** | **16** | 0.14 J | 0.091 J | - - | 2.1 J | **71** | 1.6 J | **2,800 D** | **4.8** |
| Nitrobenzene | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| N-Nitroso-di-n-propylamine | -- | | 11 U | 4.7 U | 4.9 U [2.2 U] | 2.2 U | 0.86 U | 0.039 U | 0.042 U | - - | 0.82 U | 10 U | 1.8 U | 62 U | 0.41 U |
| N-Nitrosodiphenylamine | -- | | 110 U | 47 U | 49 U [22 U] | 22 U | 8.6 U | 0.39 U | 0.42 U | - - | 8.2 U | 10 U | 1.8 U | 62 U | 0.41 U |
| Pentachlorophenol | 0.27 | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Phenanthrene | -- | | **570** | **610** | **53 [370]** | **200** | **140** | 0.49 | 0.44 | - - | **140** | **57** | **4.7** | **1,700 D** | 0.29 J |
| Phenol | 30 | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Pyrene | 2.6 | 18 | **290** | **260** | **94 [61]** | **100** | **140** | **2.8** | 1.1 | - - | **55** | **30** | **4.8** | **960** | 0.41 U |
| Pyridine | -- | | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Total PAHs | -- | | 4,200 J | 3,300 J | 2,000 J [1,100 J] | 1,100 J | 820 J | 13 J | 8.6 J | - - | 340 J | 370 J | 40 J | 11,000 J | 7.1 J |
| Total SVOCs | -- | | 4,400 J | 3,500 J | 2,000 J [1,200 J] | 1,100 J | 840 J | 13 J | 8.7 J | - - | 350 J | 390 J | 41 J | 12,000 J | 7.3 J |
| **Metals** | | | | | | | | | | | | | | | |
| Aluminum | -- | | 2,750 | 7,400 | 8,500 [6,970] | 8,310 | 5,300 | 4,280 | 8,040 | - - | 5,900 | 3,690 | 1,850 | 978 | 6,710 |
| Antimony | -- | | 16.0 UJ | 17.0 UJ | 17.6 UJ [15.9 UJ] | 15.9 UJ | 77.5 UJ | 14.1 UJ | 15.1 UJ | - - | 14.8 UJ | 33.2 | 14.8 U | 16.5 U | 18.2 U |
| Arsenic | 10 | 15 | **19.0** | **38.9** | **3.00 J [15.0 J]** | 6.10 J | **73.9** | **22.8** | **10.3** | - - | **22.1** | **34.1** | **20.3** | **12.7** | 3.20 |
| Barium | 433 | | 46.2 B | 102 | 50.8 B [80.7] | 57.7 | 74.3 B | 35.2 B | 76.7 | - - | 71.8 | 46.5 U | 39.5 U | 55.7 | 53.0 |
| Beryllium | 10 | | 0.130 B | 0.620 | 0.270 B [0.620] | 0.490 B | 0.520 B | 0.350 B | 0.780 | - - | 0.430 B | 1.20 U | 0.990 U | 1.10 U | 1.20 U |
| Cadmium | 4 | | 1.30 U | 1.40 U | 1.50 U [1.30 U] | 1.30 U | 6.50 U | 0.110 B | 0.100 B | - - | 1.20 U | 1.20 U | 0.990 U | 1.10 U | 1.20 U |
| Calcium | -- | | 29,900 J | 53,200 J | 4,790 J [33,200 J] | 20,900 J | 18,500 J | 119,000 J | 16,600 J | - - | 43,900 J | 25,000 | 17,100 | 75,300 | 21,400 |

See Notes on Page 9.

### Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

| Sample Location: | Ecological SCOs | Number of SCO Exceedances | TP-04-04 | TP-04-05 | TP-04-06 | TP-04-07 | TP-04-08 | TP-04-09 | TP-04-10 | TP-04-11 | TP-04-12 | TP-06-13 | TP-06-14 | TP-06-15 | TP-06-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID: | | | TP-04-04 | TP-04-05 | TP-04-06 | TP-04-07 | TP-04-08 | TP-04-09 | TP-04-10 | TP-04-11 | TP-04-12 | TP-06-13 | TP-06-14 | TP-06-15 | TP-06-16 |
| Sample Depth (Feet): | | | 6 | 9 | 8.5 | 9 | 5 | 7 | 9.8 | 1.7 | 10.2 | 7.5 | 9 | 6 | 8 |
| Date Collected: | | | 11/23/04 | 11/23/04 | 11/29/04 | 11/29/04 | 11/24/04 | 11/24/04 | 11/24/04 | 11/24/04 | 11/24/04 | 06/13/06 | 06/13/06 | 06/14/06 | 06/14/06 |
| **Metals (Cont'd.)** | | | | | | | | | | | | | | | |
| Chromium | 0.4 | 19 | **4.50** | **14.2** | **8.90 [14.3]** | **12.0** | **16.9** | **8.60** | **13.7** | - - | **12.1** | **19.3** | **15.0** | **4.60** | **9.80** |
| Cobalt | -- | | 4.50 B | 10.6 B | 5.30 B [10.6 B] | 7.70 B | 16.4 B | 7.50 B | 8.60 B | - - | 13.0 | 11.6 U | 10.5 | 11.0 U | 12.1 U |
| Copper | 50 | 7 | 27.6 | 41.6 | **191 J [40.0 J]** | 27.5 J | **115** | 33.8 | 22.3 | - - | 20.5 | **89.5** | **206** | 28.6 | 17.0 |
| Cyanide, Total | -- | | 4.40 | 0.500 U | 0.500 U [0.500 U] | 0.500 U | 0.870 | 0.500 U | 1.10 | 5.40 | 0.630 | 1.10 U | 1.10 U | 14.5 | 1.20 U |
| Iron | -- | | 19,500 | 26,700 | 12,900 [25,000] | 19,200 | 114,000 | 15,400 | 22,300 | - - | 18,700 | 27,900 | 61,800 | 14,900 | 14,600 |
| Lead | 50 | 10 | 45.1 J | 25.1 J | 16.4 [18.6] | **55.2** | **385 J** | **66.9 J** | 23.0 J | - - | 19.9 J | **412** | **258** | **108** | 10.4 |
| Magnesium | -- | | 9,640 J | 20,100 J | 1,760 J [17,100 J] | 7,130 J | 2,640 BJ | 13,500 J | 7,020 J | - - | 20,300 J | 5,650 | 3,820 | 2,090 | 10,700 |
| Manganese | 500 | 2 | 180 | **600** | 145 [413] | 215 | 500 | 232 | 189 | - - | 420 | 145 | 193 | 258 | 261 |
| Mercury | 0.1 | 13 | **0.510 J** | **0.160 J** | 0.0400 B [0.0500] | **0.240** | **0.740 J** | 0.0600 J | **1.90 J** | - - | 0.0500 J | **1.10** | **0.452** | **2.00** | 0.0220 J |
| Nickel | 30 | 4 | 10.0 BJ | **33.5 J** | **10.9 BJ [37.2 J]** | 17.2 J | **31.1 BJ** | 29.4 J | 25.7 J | - - | 29.8 J | 16.5 | 17.2 | 8.80 U | 13.9 |
| Potassium | -- | | 530 B | 1,220 B | 557 B [1,100 B] | 824 B | 809 B | 929 B | 784 B | - - | 1,100 B | 1,160 U | 987 U | 1,100 U | 1,210 U |
| Selenium | 1 | 6 | **13.8** | 49.6 U | **10.3 U [1.10 B]** | **1.60** | **9.60** | 41.2 UJ | 44.1 UJ | - - | 8.70 U | 4.60 U | **5.40** | 4.40 U | 4.90 U |
| Silver | 2 | | 2.70 U | 2.80 U | 2.90 U [2.70 U] | 2.60 U | 12.9 U | 2.40 U | 2.50 U | - - | 2.50 U | 2.30 U | 2.00 U | 2.20 U | 2.40 U |
| Sodium | -- | | 1,340 U | 1,420 U | 145 B [118 B] | 109 B | 6,460 U | 137 B | 2,090 | - - | 117 B | 1,160 U | 987 U | 1,100 U | 1,210 U |
| Thallium | -- | | 6.70 U | 7.10 U | 7.30 U [6.60 U] | 6.60 U | 6.50 U | 5.90 U | 6.30 U | - - | 6.20 U | 7.00 U | 5.90 U | 6.60 U | 7.30 U |
| Vanadium | -- | | 8.70 B | 16.5 | 15.5 [18.9] | 16.9 | 34.5 B | 14.7 | 21.4 | - - | 12.6 | 11.6 U | 10.6 | 11.0 U | 13.9 |
| Zinc | 50 | 13 | 48.1 | **70.1** | 33.0 [49.9] | **56.8** | **146** | 48.5 | **51.1** | - - | **51.4** | **326** | **295** | **92.7** | 26.1 |

See Notes on Page 9.

## Table 15. Comparison of Subsurface Soil Data to NYSDEC Ecological Soil Cleanup Objectives, Remedial Investigation, New York State Electric & Gas Corporation, Auburn (McMaster Street) Former MGP Site, Auburn, New York

**Notes:**

All concentrations reported in milligrams per Kilogram (mg/Kg); equivalent to parts per million (ppm).
[ ] Bracketed results represent the duplicate sample.
-- = Sample not analyzed for specified constituent/no criteria available.
Bolded and shaded values indicate the result exceeded the NYSDEC Part 375-6.5 Ecological Soil Cleanup Objectives (ESCOs). December 14, 2006.

**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | J = | Indicates an estimated value. |
| Organic | ND = | None detected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

See Notes on Page 9.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 | 00-SED-13<br>0 - 0.5<br>06/29/05 | 00-SED-14<br>0 - 0.5<br>06/30/05 | 00-SED-15<br>0 - 0.5<br>06/30/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| 1,1,2,2-Tetrachloroethane | 0.3 | 0 | mg/kg | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U |
| 1,1,2-Trichloroethane | 0.6 | 0 | mg/kg | 0.0033 U | 0.0038 U | 0.0036 U | 0.0036 U | 0.74 U | 0.0039 U | 0.0050 U | 0.0035 U [0.0037 U] | 0.0038 U | 0.0040 U |
| 1,1-Dichloroethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| 1,1-Dichloroethene | -- | -- | mg/kg | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.50 U | 0.0026 U | 0.0033 U | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U |
| 1,2-Dichloroethane | 0.7 | 0 | mg/kg | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.50 U | 0.0026 U | 0.0033 U | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U |
| 1,2-Dichloropropane | -- | -- | mg/kg | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U |
| 2-Butanone | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.012 | 0.0077 | 1.2 U | 0.014 | 0.012 | 0.0058 UJ [0.021 J] | 0.0076 | 0.014 |
| 2-Hexanone | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| 4-Methyl-2-Pentanone | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Acetone | -- | -- | mg/kg | 0.024 B | 0.034 B | 0.077 J | 0.0060 UJ | 1.2 U | 0.088 J | 0.14 J | 0.0058 UJ [0.089 J] | 0.069 J | 0.10 J |
| Benzene | 0.6 | 14 | mg/kg | 0.0011 U | 0.00070 J | 0.0012 J | 0.00050 J | *0.34* | 0.0013 U | 0.00080 J | 0.0012 U [0.00080 J] | 0.0021 | 0.00060 J |
| Bromodichloromethane | -- | -- | mg/kg | 0.0011 U | 0.0013 U | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U |
| Bromoform | -- | -- | mg/kg | 0.0044 U | 0.0051 U | 0.0049 U | 0.0048 U | 0.99 U | 0.0053 U | 0.0067 U | 0.0047 U [0.0049 U] | 0.0050 U | 0.0054 U |
| Bromomethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 UJ | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Carbon Disulfide | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0040 J | 0.0060 UJ | 1.2 UJ | 0.0071 | 0.0031 J | 0.00090 J [0.0073] | 0.0017 J | 0.0018 J |
| Carbon Tetrachloride | 0.6 | 0 | mg/kg | 0.0022 U | 0.0026 U | 0.0024 U | 0.0024 U | 0.50 U | 0.0026 U | 0.0033 U | 0.0023 U [0.0024 U] | 0.0025 U | 0.0027 U |
| Chlorobenzene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.00090 J | 0.0058 U [0.0061 U] | 0.0010 J | 0.0028 J |
| Chloroethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Chloroform | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0010 J] | 0.0063 U | 0.0068 U |
| Chloromethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| cis-1,2-Dichloroethene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| cis-1,3-Dichloropropene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Dibromochloromethane | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Ethylbenzene | -- | -- | mg/kg | 0.0044 U | 0.0051 U | 0.0049 U | 0.0048 U | 1.1 | 0.0053 U | 0.0067 U | 0.0047 U [0.0049 U] | 0.0050 U | 0.0054 U |
| Methyl tert-butyl ether | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 UJ | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Methylene Chloride | -- | -- | mg/kg | 0.0033 U | 0.011 B | 0.0036 U | 0.0036 U | 0.74 U | 0.0043 U | 0.0050 U | 0.0035 U [0.0037 U] | 0.0038 U | 0.0040 U |
| Styrene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 0.18 J | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Tetrachloroethene | -- | -- | mg/kg | 0.0011 U | 0.0013 B | 0.0012 UJ | 0.0012 UJ | 0.18 J | 0.0013 UJ | 0.0017 UJ | 0.0027 J [0.0027 J] | 0.0012 UJ | 0.0014 UJ |
| Toluene | -- | -- | mg/kg | 0.0049 J | 0.0018 JB | 0.0040 | 0.0027 J | 0.66 J | 0.0016 J | 0.0017 J | 0.0010 J [0.012 J] | 0.0060 J | 0.0042 J |
| trans-1,2-Dichloroethene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| trans-1,3-Dichloropropene | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Trichloroethene | 2 | 1 | mg/kg | 0.0011 U | 0.0016 | 0.0012 U | 0.0012 U | 0.25 U | 0.0013 U | 0.0017 U | 0.0012 U [0.0012 U] | 0.0012 U | 0.0014 U |
| Vinyl Chloride | 0.07 | 1 | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 1.2 U | 0.0066 U | 0.0084 U | 0.0058 U [0.0061 U] | 0.0063 U | 0.0068 U |
| Xylene (Total) | -- | -- | mg/kg | 0.0054 U | 0.0064 U | 0.0061 U | 0.0060 U | 2.8 | 0.0066 U | 0.0084 U | 0.0058 U [0.00080 J] | 0.0063 U | 0.0068 U |
| Total BTEX | -- | -- | mg/kg | 0.0049 J | 0.0025 J | 0.0052 J | 0.0032 J | 4.9 J | 0.0016 J | 0.0025 J | 0.0010 J [0.014 J] | 0.0081 J | 0.0048 J |
| Total VOCs | -- | -- | mg/kg | 0.029 J | 0.050 J | 0.098 J | 0.011 J | 5.3 J | 0.11 J | 0.16 J | 0.0046 J [0.14 J] | 0.087 J | 0.12 J |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 | 00-SED-13<br>0 - 0.5<br>06/29/05 | 00-SED-14<br>0 - 0.5<br>06/30/05 | 00-SED-15<br>0 - 0.5<br>06/30/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | -- | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| 1,2-Dichlorobenzene | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 1,3-Dichlorobenzene | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 1,4-Dichlorobenzene | -- | -- | mg/kg | 0.016 J | 0.027 J | 0.015 J | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.018 J [0.027 J] | 0.42 U | 0.47 U |
| 2,4,5-Trichlorophenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2,4,6-Trichlorophenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2,4-Dichlorophenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2,4-Dimethylphenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2,4-Dinitrophenol | -- | -- | mg/kg | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U | 1.6 U [1.6 U] | 1.7 U | 1.9 U |
| 2,4-Dinitrotoluene | -- | -- | mg/kg | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U | 0.081 U [0.082 U] | 0.084 U | 0.094 U |
| 2,6-Dinitrotoluene | -- | -- | mg/kg | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U | 0.081 U [0.082 U] | 0.084 U | 0.094 U |
| 2-Chloronaphthalene | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2-Chlorophenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2-Methylnaphthalene | -- | -- | mg/kg | 0.077 J | 0.041 J | 0.026 J | 0.044 J | 2.6 J | 0.13 J | 0.014 J | 0.038 J [0.048 J] | 0.043 J | 0.023 J |
| 2-Methylphenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 2-Nitroaniline | -- | -- | mg/kg | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U | 0.81 U [0.82 U] | 0.84 U | 0.94 U |
| 2-Nitrophenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 3,3'-Dichlorobenzidine | -- | -- | mg/kg | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U | 0.81 U [0.82 U] | 0.84 U | 0.94 U |
| 3-Nitroaniline | -- | -- | mg/kg | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U | 0.81 U [0.82 U] | 0.84 U | 0.94 U |
| 4,6-Dinitro-2-methylphenol | -- | -- | mg/kg | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U | 1.6 U [1.6 U] | 1.7 U | 1.9 U |
| 4-Bromophenyl-phenylether | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 4-Chloro-3-methylphenol | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 4-Chloroaniline | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.069 J [0.074 J] | 0.42 U | 0.47 U |
| 4-Chlorophenyl-phenylether | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| 4-Methylphenol | -- | -- | mg/kg | 0.70 | 0.037 J | 0.18 J | 0.013 J | 0.14 J | 0.059 J | 0.016 J | 0.19 J [0.24 J] | 0.034 J | 0.10 J |
| 4-Nitroaniline | -- | -- | mg/kg | 0.77 U | 0.86 U | 0.87 U | 0.84 U | 8.5 U | 0.92 U | 1.1 U | 0.81 U [0.82 U] | 0.84 U | 0.94 U |
| 4-Nitrophenol | -- | -- | mg/kg | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U | 1.6 U [1.6 U] | 1.7 U | 1.9 U |
| Acenaphthene | -- | -- | mg/kg | 0.20 J | 0.040 J | 0.040 J | 0.048 J | 10 | 0.39 J | 0.020 J | 0.051 J [0.028 J] | 0.046 J | 0.030 J |
| Acenaphthylene | -- | -- | mg/kg | 0.13 J | 0.084 J | 0.095 J | 0.084 J | 2.8 J | 0.026 J | 0.051 J | 0.029 J [0.017 J] | 0.19 J | 0.043 J |
| Anthracene | -- | -- | mg/kg | 0.40 | 0.27 J | 0.17 J | 0.28 J | 18 | 0.63 | 0.071 J | 0.13 J [0.047 J] | 0.24 J | 0.11 J |
| Benzo(a)anthracene | -- | -- | mg/kg | 0.76 | 0.45 | 0.47 | 0.86 | 8.0 | 1.0 | 0.24 | 0.44 J [0.11 J] | 0.69 | 0.20 |
| Benzo(a)pyrene | 1.3 | 34 | mg/kg | *0.98* | *0.62* | *0.68* | *0.88* | *10* | *1.2* | *0.36* | *0.48 [0.20]* | *1.2* | *0.29* |
| Benzo(b)fluoranthene | -- | -- | mg/kg | 0.96 | 0.52 | 0.70 | 0.93 | 6.2 | 1.1 | 0.27 | 0.61 [0.30] | 0.95 | 0.27 |
| Benzo(g,h,i)perylene | -- | -- | mg/kg | 0.32 J | 0.19 J | 0.19 J | 0.26 J | 5.9 | 0.31 J | 0.22 J | R [R] | 0.33 J | 0.10 J |
| Benzo(k)fluoranthene | -- | -- | mg/kg | 1.1 | 0.65 | 0.84 | 1.2 | 9.3 | 1.3 | 0.38 | 0.76 J [0.25 J] | 1.2 | 0.32 |
| bis(2-Chloroethoxy)methane | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| bis(2-Chloroethyl)ether | 0.03 | 0 | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| bis(2-chloroisopropyl)ether | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| bis(2-Ethylhexyl)phthalate | -- | -- | mg/kg | 0.16 J | 0.095 J | 0.29 J | 0.40 J | 4.2 U | 0.46 U | 4.8 | 1.2 [0.96] | 0.42 U | 0.17 J |
| Butylbenzylphthalate | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.12 J [0.11 J] | 0.42 U | 0.47 U |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-1<br>0 - 0.5<br>06/29/05 | 00-SED-6<br>0 - 0.4<br>06/29/05 | 00-SED-7<br>0 - 0.3<br>06/29/05 | 00-SED-10<br>0 - 0.5<br>06/29/05 | 00-SED-10<br>1 - 1.2<br>06/29/05 | 00-SED-11<br>0 - 0.5<br>06/29/05 | 00-SED-12<br>0 - 0.5<br>06/29/05 | 00-SED-13<br>0 - 0.5<br>06/29/05 | 00-SED-14<br>0 - 0.5<br>06/30/05 | 00-SED-15<br>0 - 0.5<br>06/30/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd)** | | | | | | | | | | | | | |
| Carbazole | -- | -- | mg/kg | 0.20 J | 0.055 J | 0.094 J | 0.14 J | 3.5 J | 0.42 J | 0.066 J | 0.12 J [0.040 J] | 0.098 J | 0.045 J |
| Chrysene | -- | -- | mg/kg | 1.1 | 0.54 | 0.68 | 1.0 | 11 | 1.4 | 0.37 J | 0.71 [0.26 J] | 1.2 | 0.34 J |
| Dibenz(a,h)anthracene | -- | -- | mg/kg | 0.093 | 0.062 | 0.052 J | 0.11 J | 1.5 | 0.12 | 0.072 | R [R] | 0.11 | 0.049 |
| Dibenzofuran | -- | -- | mg/kg | 0.13 J | 0.034 J | 0.042 J | 0.049 J | 6.1 | 0.24 J | 0.019 J | 0.040 J [0.016 J] | 0.069 J | 0.026 J |
| Diethylphthalate | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Dimethylphthalate | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Di-n-butylphthalate | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Di-n-octylphthalate | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.17 J [0.18 J] | 0.42 U | 0.47 U |
| Fluoranthene | -- | -- | mg/kg | 2.9 | 1.3 | 1.5 | 1.4 | 37 | 3.3 | 0.76 | 1.1 [0.40 J] | 2.5 | 0.60 |
| Fluorene | -- | -- | mg/kg | 0.23 J | 0.054 J | 0.076 J | 0.085 J | 7.3 | 0.40 J | 0.027 J | 0.070 J [0.024 J] | 0.097 J | 0.051 J |
| Hexachlorobenzene | 0.15 | 0 | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| Hexachlorobutadiene | 0.3 | 0 | mg/kg | 0.077 U | 0.086 U | 0.087 U | 0.084 U | 0.85 U | 0.092 U | 0.11 U | 0.081 U [0.082 U] | 0.084 U | 0.094 U |
| Hexachlorocyclopentadiene | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Hexachloroethane | -- | -- | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| Indeno(1,2,3-cd)pyrene | -- | -- | mg/kg | 0.32 | 0.20 | 0.19 J | 0.30 J | 5.2 | 0.31 | 0.20 | 0.17 J [0.073 J] | 0.35 | 0.11 |
| Isophorone | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Naphthalene | -- | -- | mg/kg | 0.19 J | 0.096 J | 0.050 J | 0.069 J | 11 | 0.26 J | 0.021 J | 0.028 J [0.028 J] | 0.089 J | 0.037 J |
| Nitrobenzene | -- | -- | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| N-Nitroso-di-n-propylamine | -- | -- | mg/kg | 0.038 U | 0.043 U | 0.043 U | 0.042 U | 0.42 U | 0.046 U | 0.057 U | 0.041 U [0.041 U] | 0.042 U | 0.047 U |
| N-Nitrosodiphenylamine | -- | -- | mg/kg | 0.38 U | 0.43 U | 0.43 U | 0.42 U | 4.2 U | 0.46 U | 0.57 U | 0.41 U [0.41 U] | 0.42 U | 0.47 U |
| Pentachlorophenol | -- | -- | mg/kg | 1.5 U | 1.7 U | 1.7 U | 1.7 U | 17 U | 1.8 U | 2.3 U | 1.6 U [1.6 U] | 1.7 U | 1.9 U |
| Phenanthrene | -- | -- | mg/kg | 1.9 | 0.65 | 0.90 | 1.0 | 47 | 3.4 | 0.51 J | 0.87 [0.24 J] | 1.3 | 0.40 J |
| Phenol | -- | -- | mg/kg | 0.093 J | 0.43 U | 0.050 J | 0.42 U | 4.2 U | 0.055 J | 0.57 U | 0.41 U [0.41 U] | 0.39 J | 0.81 |
| Pyrene | -- | -- | mg/kg | 2.3 | 1.2 | 1.4 | 2.0 | 28 | 3.3 | 0.63 | 1.8 [0.64] | 2.1 | 0.57 |
| Total PAHs | -- | -- | mg/kg | 14 J | 7.0 J | 8.1 J | 11 J | 220 J | 19 J | 4.2 J | 7.3 J [2.7 J] | 13 J | 3.5 J |
| Total SVOCs | -- | -- | mg/kg | 15 J | 7.2 J | 8.5 J | 11 J | 230 J | 19 J | 9.1 J | 9.0 J [4.1 J] | 13 J | 3.8 J |
| **Misc. Compounds** | | | | | | | | | | | | | |
| Total Organic Carbon | -- | -- | mg/kg | 74,200 | 62,500 | 54,300 | 46,200 | 79,400 | 43,300 | 49,000 | 94,400 [87,900] | 45,400 | 51,400 |
| Total Organic Carbon | -- | -- | gOC/kg | 74.2 | 62.5 | 54.3 | 46.2 | 79.4 | 43.3 | 49 | 48.65 | 45.4 | 51.4 |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-16<br>0 - 0.5<br>06/30/05 | 00-SED-19<br>0 - 0.4<br>06/30/05 | 00-SED-20<br>0 - 0.3<br>06/30/05 | SED-BO-6<br>2<br>08/10/06 | SED-BO-7<br>0<br>08/10/06 | SED-BO-10<br>1.5<br>08/10/06 | SED-BO-11<br>0<br>08/10/06 | SED-BO-16<br>1.5<br>08/10/06 | SED-BO-17<br>2<br>08/10/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,1,2,2-Tetrachloroethane | 0.3 | 0 | mg/kg | 0.0014 U | 0.0012 U | 0.0012 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,1,2-Trichloroethane | 0.6 | 0 | mg/kg | 0.0043 U | 0.0036 U | 0.0036 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,1-Dichloroethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,1-Dichloroethene | -- | -- | mg/kg | 0.0028 U | 0.0024 U | 0.0024 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,2-Dichloroethane | 0.7 | 0 | mg/kg | 0.0028 U | 0.0024 U | 0.0024 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 1,2-Dichloropropane | -- | -- | mg/kg | 0.0014 U | 0.0012 U | 0.0012 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| 2-Butanone | -- | -- | mg/kg | 0.027 | 0.036 | 0.0060 U | 0.034 U | 6.7 UJ | 7.2 UJ | 0.62 UJ | 39 UJ [8.2 UJ] | 1.4 UJ |
| 2-Hexanone | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.034 U | 6.7 U | 7.2 U | 0.62 U | 39 U [8.2 U] | 1.4 U |
| 4-Methyl-2-Pentanone | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.034 U | 6.7 U | 7.2 U | 0.62 U | 39 U [8.2 U] | 1.4 U |
| Acetone | -- | -- | mg/kg | 0.15 J | 0.18 J | 0.098 J | 0.034 UJ | 6.7 UJ | 7.2 UJ | 1.8 UJ | 39 UJ [8.2 UJ] | 2.4 UJ |
| Benzene | 0.6 | 14 | mg/kg | 0.00050 J | 0.0016 | 0.0012 U | 0.0070 U | *2.7* | *24* | *0.051 J* | *7.7 U [1.6]* | *3.1* |
| Bromodichloromethane | -- | -- | mg/kg | 0.0014 U | 0.0012 U | 0.0012 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Bromoform | -- | -- | mg/kg | 0.0057 U | 0.0047 U | 0.0048 U | 0.0070 U | 1.3 UJ | 1.4 UJ | 0.12 UJ | 7.7 UJ [1.6 UJ] | 0.29 UJ |
| Bromomethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 UJ | 1.3 UJ | 1.4 UJ | 0.12 UJ | 7.7 UJ [1.6 UJ] | 0.29 UJ |
| Carbon Disulfide | -- | -- | mg/kg | 0.0080 | 0.0085 | 0.0060 U | 0.0070 U | 1.3 U | 6.1 | 0.12 U | 7.7 U [0.66 J] | 0.39 |
| Carbon Tetrachloride | 0.6 | 0 | mg/kg | 0.0028 U | 0.0024 U | 0.0024 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Chlorobenzene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Chloroethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 UJ | 1.4 UJ | 0.12 UJ | 7.7 UJ [1.6 UJ] | 0.29 UJ |
| Chloroform | -- | -- | mg/kg | 0.0071 U | 0.00080 J | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Chloromethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 UJ |
| cis-1,2-Dichloroethene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 0.67 J | 0.12 U | 7.7 U [1.6 U] | 0.55 |
| cis-1,3-Dichloropropene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Dibromochloromethane | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Ethylbenzene | -- | -- | mg/kg | 0.0057 U | 0.0047 U | 0.0048 U | 0.0070 U | 1.3 U | 2.8 | 0.12 U | 7.7 U [1.4 J] | 2.0 |
| Methyl tert-butyl ether | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | NA | NA | NA | NA | NA | NA |
| Methylene Chloride | -- | -- | mg/kg | 0.0043 U | 0.0036 U | 0.0036 U | 0.0070 UJ | 1.8 J | 0.62 J | 0.12 UJ | 11 J [2.6 J] | 0.22 UJ |
| Styrene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 0.98 J | 3.7 | 0.12 U | 7.7 U [1.6 U] | 1.6 |
| Tetrachloroethene | -- | -- | mg/kg | 0.0014 UJ | 0.0012 UJ | 0.0012 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Toluene | -- | -- | mg/kg | 0.0039 J | 0.0081 | 0.0060 U | 0.0020 J | 4.3 | 14 | 0.12 U | 7.7 U [1.7] | 4.1 |
| trans-1,2-Dichloroethene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| trans-1,3-Dichloropropene | -- | -- | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Trichloroethene | 2 | 1 | mg/kg | 0.0014 U | 0.0012 U | 0.0012 U | 0.0070 U | 1.3 U | 1.4 U | 0.12 U | 7.7 U [1.6 U] | 0.29 U |
| Vinyl Chloride | 0.07 | 1 | mg/kg | 0.0071 U | 0.0059 U | 0.0060 U | 0.014 U | 2.7 U | 2.9 U | 0.25 U | 15 U [3.3 U] | *0.77* |
| Xylene (Total) | -- | -- | mg/kg | 0.0071 U | 0.0016 J | 0.0060 U | 0.021 U | 7.8 | 30 | 0.37 U | 23 U [4.1 J] | 3.6 |
| Total BTEX | -- | -- | mg/kg | 0.0044 J | 0.011 J | ND | 0.0020 J | 15 | 71 | 0.051 J | ND [8.8 J] | 13 |
| Total VOCs | -- | -- | mg/kg | 0.19 J | 0.24 J | 0.098 J | 0.0020 J | 18 J | 82 J | 0.051 J | 11 J [12 J] | 16 |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-16 | 00-SED-19 | 00-SED-20 | SED-BO-6 | SED-BO-7 | SED-BO-10 | SED-BO-11 | SED-BO-16 | SED-BO-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | | 0 - 0.5 | 0 - 0.4 | 0 - 0.3 | 2 | 0 | 1.5 | 0 | 1.5 | 2 |
| Date Collected: | | | | 06/30/05 | 06/30/05 | 06/30/05 | 08/10/06 | 08/10/06 | 08/10/06 | 08/10/06 | 08/10/06 | 08/10/06 |
| **SVOCs** | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | -- | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 1,2-Dichlorobenzene | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 1,3-Dichlorobenzene | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 1,4-Dichlorobenzene | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 2,4,5-Trichlorophenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2,4,6-Trichlorophenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2,4-Dichlorophenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2,4-Dimethylphenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrophenol | -- | -- | mg/kg | 40 U | 8.5 U | 8.3 U | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | -- | -- | mg/kg | 2.0 U | 0.42 U | 0.41 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 2,6-Dinitrotoluene | -- | -- | mg/kg | 2.0 U | 0.42 U | 0.41 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 2-Chloronaphthalene | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 2-Chlorophenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2-Methylnaphthalene | -- | -- | mg/kg | 3.9 J | 0.10 J | 0.14 J | 0.88 U | 320 J | 1,000 J | 53 U | 100 J [260 J] | 340 U |
| 2-Methylphenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 2-Nitroaniline | -- | -- | mg/kg | 20 U | 4.2 U | 4.1 U | 4.3 U | 3,500 U | 7,800 U | 260 U | 3,600 U [4,100 U] | 1,700 U |
| 2-Nitrophenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 3,3'-Dichlorobenzidine | -- | -- | mg/kg | 20 U | 4.2 U | 4.1 U | 4.3 U | 3,500 U | 7,800 U | 260 U | 3,600 U [4,100 U] | 1,700 U |
| 3-Nitroaniline | -- | -- | mg/kg | 20 U | 4.2 U | 4.1 U | 4.3 U | 3,500 U | 7,800 U | 260 U | 3,600 U [4,100 U] | 1,700 U |
| 4,6-Dinitro-2-methylphenol | -- | -- | mg/kg | 40 U | 8.5 U | 8.3 U | NA | NA | NA | NA | NA | NA |
| 4-Bromophenyl-phenylether | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 4-Chloro-3-methylphenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| 4-Chloroaniline | -- | -- | mg/kg | 0.52 J | 0.12 J | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 4-Chlorophenyl-phenylether | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| 4-Methylphenol | -- | -- | mg/kg | 10 U | 0.57 J | 2.1 U | NA | NA | NA | NA | NA | NA |
| 4-Nitroaniline | -- | -- | mg/kg | 20 U | 4.2 U | 4.1 U | 4.3 U | 3,500 U | 7,800 U | 260 U | 3,600 U [4,100 U] | 1,700 U |
| 4-Nitrophenol | -- | -- | mg/kg | 40 U | 8.5 U | 8.3 U | NA | NA | NA | NA | NA | NA |
| Acenaphthene | -- | -- | mg/kg | 16 | 0.85 J | 0.77 J | 0.88 U | 110 J | 1,600 | 53 U | 880 [1,200] | 470 |
| Acenaphthylene | -- | -- | mg/kg | 0.74 J | 2.1 U | 0.18 J | 0.057 J | 350 J | 1,700 | 53 U | 160 J [220 J] | 120 J |
| Anthracene | -- | -- | mg/kg | 31 | 2.2 | 2.0 J | 0.22 J | 970 | 3,400 | 53 U | 840 [1,000] | 680 |
| Benzo(a)anthracene | -- | -- | mg/kg | 69 | 3.0 | 5.7 | 0.77 J | 1,400 | 3,200 | 53 U | 760 [890] | 640 |
| Benzo(a)pyrene | 1.3 | 34 | mg/kg | *80* | *4.0* | *10* | *0.74 J* | *1,000* | *3,100* | 53 U | *730 J [810 J]* | *490* |
| Benzo(b)fluoranthene | -- | -- | mg/kg | 84 | 3.3 | 10 | 0.62 J | 890 | 2,700 | 53 U | 600 J [680 J] | 410 |
| Benzo(g,h,i)perylene | -- | -- | mg/kg | 21 J | 1.6 J | 4.6 | 0.48 J | 610 J | 2,600 | 53 U | 560 J [630 J] | 280 J |
| Benzo(k)fluoranthene | -- | -- | mg/kg | 94 | 4.2 | 11 | 0.60 J | 760 | 1,700 | 53 U | 430 J [480 J] | 310 J |
| bis(2-Chloroethoxy)methane | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| bis(2-Chloroethyl)ether | 0.03 | 0 | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| bis(2-chloroisopropyl)ether | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| bis(2-Ethylhexyl)phthalate | -- | -- | mg/kg | 2.7 J | 3.6 | 1.0 J | 0.25 J | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Butylbenzylphthalate | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | 00-SED-16<br>0 - 0.5<br>06/30/05 | 00-SED-19<br>0 - 0.4<br>06/30/05 | 00-SED-20<br>0 - 0.3<br>06/30/05 | SED-BO-6<br>2<br>08/10/06 | SED-BO-7<br>0<br>08/10/06 | SED-BO-10<br>1.5<br>08/10/06 | SED-BO-11<br>0<br>08/10/06 | SED-BO-16<br>1.5<br>08/10/06 | SED-BO-17<br>2<br>08/10/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd)** | | | | | | | | | | | | |
| Carbazole | -- | -- | mg/kg | 22 | 1.5 J | 2.0 J | 0.086 J | 130 J | 1,000 J | 53 U | 130 J [220 J] | 38 J |
| Chrysene | -- | -- | mg/kg | 74 | 4.5 | 12 | 0.83 J | 1,200 | 2,900 | 53 U | 690 J [770 J] | 530 |
| Dibenz(a,h)anthracene | -- | -- | mg/kg | 8.0 J | 0.45 | 1.2 | 0.23 J | 230 J | 650 J | 53 U | 170 J [170 J] | 100 J |
| Dibenzofuran | -- | -- | mg/kg | 11 | 0.50 J | 0.48 J | 0.88 U | 480 J | 1,800 | 53 U | 500 J [670 J] | 340 |
| Diethylphthalate | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Dimethylphthalate | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Di-n-butylphthalate | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Di-n-octylphthalate | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Fluoranthene | -- | -- | mg/kg | 140 | 14 | 30 | 1.7 | 3,400 | 9,500 | 53 U | 2,300 [2,700] | 1,500 |
| Fluorene | -- | -- | mg/kg | 20 | 1.2 J | 1.1 J | 0.075 J | 520 J | 2,300 | 53 U | 650 J [820 J] | 520 |
| Hexachlorobenzene | 0.15 | 0 | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Hexachlorobutadiene | 0.3 | 0 | mg/kg | 2.0 U | 0.42 U | 0.41 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Hexachlorocyclopentadiene | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Hexachloroethane | -- | -- | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Indeno(1,2,3-cd)pyrene | -- | -- | mg/kg | 26 J | 1.5 | 4.3 | 0.44 J | 590 J | 2,000 | 53 U | 470 J [530 J] | 270 J |
| Isophorone | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Naphthalene | -- | -- | mg/kg | 5.8 J | 0.10 J | 0.14 J | 0.88 U | 360 J | 3,700 | 53 U | 570 J [1,100] | 58 J |
| Nitrobenzene | -- | -- | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| N-Nitroso-di-n-propylamine | -- | -- | mg/kg | 1.0 U | 0.21 U | 0.21 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| N-Nitrosodiphenylamine | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | 0.88 U | 720 U | 1,600 U | 53 U | 740 U [840 U] | 340 U |
| Pentachlorophenol | -- | -- | mg/kg | 40 U | 8.5 U | 8.3 U | NA | NA | NA | NA | NA | NA |
| Phenanthrene | -- | -- | mg/kg | 130 | 12 | 17 | 0.95 | 3,400 | 12,000 | 53 U | 3,200 [3,700] | 2,200 |
| Phenol | -- | -- | mg/kg | 10 U | 2.1 U | 2.1 U | NA | NA | NA | NA | NA | NA |
| Pyrene | -- | -- | mg/kg | 140 | 12 | 23 | 1.4 | 2,500 | 7,800 | 53 U | 1,800 [2,000] | 1,100 |
| Total PAHs | -- | -- | mg/kg | 940 J | 65 J | 130 J | 9.1 J | 19,000 J | 62,000 J | ND | 15,000 J [18,000 J] | 9,700 J |
| Total SVOCs | -- | -- | mg/kg | 980 J | 71 J | 140 J | 9.5 J | 19,000 J | 65,000 J | ND | 16,000 J [19,000 J] | 10,000 J |
| **Misc. Compounds** | | | | | | | | | | | | |
| Total Organic Carbon | -- | -- | mg/kg | 55,100 | 61,700 | 87,500 | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | -- | -- | gOC/kg | 55.1 | 61.7 | 87.5 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-BO-18<br>1<br>08/10/06 | SED-BO-19<br>1.2<br>08/10/06 | SED-BO-21<br>2.4<br>08/10/06 | SED-BO-23<br>0.2<br>08/10/06 | SED-BO-25<br>2.5<br>08/10/06 | SED-BO-29<br>1.5<br>08/10/06 | SED-BO-30<br>2<br>08/10/06 | SED-BO-31<br>0<br>08/10/06 | SED-BO-34<br>0<br>08/15/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,1,2,2-Tetrachloroethane | 0.3 | 0 | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,1,2-Trichloroethane | 0.6 | 0 | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,1-Dichloroethane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,1-Dichloroethene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,2-Dichloroethane | 0.7 | 0 | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 1,2-Dichloropropane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| 2-Butanone | -- | -- | mg/kg | 0.049 J | 7.9 UJ | 0.86 UJ | 0.0070 J | 0.033 U | 0.0080 J | 0.029 U | 7.4 UJ | 7.2 UJ [0.76 UJ] |
| 2-Hexanone | -- | -- | mg/kg | 0.17 U | 7.9 U | 0.86 U | 0.031 U | 0.033 U | 0.036 U | 0.029 U | 7.4 U | 7.2 U [0.76 U] |
| 4-Methyl-2-Pentanone | -- | -- | mg/kg | 0.17 U | 7.9 U | 0.86 U | 0.031 U | 0.033 U | 0.036 U | 0.029 U | 7.4 U | 7.2 U [0.76 U] |
| Acetone | -- | -- | mg/kg | 0.17 | 7.9 UJ | 2.3 UJ | 0.039 J | 0.032 J | 0.034 J | 0.029 UJ | 7.4 UJ | 7.2 UJ [3.2 UJ] |
| Benzene | 0.6 | 14 | mg/kg | 0.021 J | *2.2* | *0.57* | 0.0060 U | 0.0020 J | 0.0070 U | 0.0060 U | *8.9* | *1.4 U [0.36]* |
| Bromodichloromethane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Bromoform | -- | -- | mg/kg | 0.034 U | 1.6 UJ | 0.17 UJ | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 UJ | 1.4 UJ [0.15 UJ] |
| Bromomethane | -- | -- | mg/kg | 0.034 UJ | 1.6 UJ | 0.17 UJ | 0.0060 UJ | 0.0070 UJ | 0.0070 UJ | 0.0060 UJ | 1.5 UJ | 1.4 UJ [0.15 UJ] |
| Carbon Disulfide | -- | -- | mg/kg | 0.010 J | 0.79 J | 0.11 J | 0.0020 J | 0.0070 U | 0.0070 U | 0.0060 U | 1.4 J | 1.4 U [0.26] |
| Carbon Tetrachloride | 0.6 | 0 | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Chlorobenzene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Chloroethane | -- | -- | mg/kg | 0.034 U | 1.6 UJ | 0.17 UJ | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 UJ | 1.4 UJ [0.15 UJ] |
| Chloroform | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Chloromethane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 UJ | 0.0070 UJ | 0.0070 UJ | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| cis-1,2-Dichloroethene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.11 J | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| cis-1,3-Dichloropropene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Dibromochloromethane | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Ethylbenzene | -- | -- | mg/kg | 0.015 J | 3.5 | 0.19 | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.4 J | 1.4 U [0.16] |
| Methyl tert-butyl ether | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Methylene Chloride | -- | -- | mg/kg | 0.034 UJ | 1.6 UJ | 0.17 UJ | 0.0060 UJ | 0.0080 UJ | 0.0070 UJ | 0.0070 UJ | 1.5 UJ | 1.7 UJ [0.15 UJ] |
| Styrene | -- | -- | mg/kg | 0.034 U | 0.92 J | 0.10 J | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.6 | 1.4 U [0.12 J] |
| Tetrachloroethene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Toluene | -- | -- | mg/kg | 0.028 J | 2.8 | 0.61 | 0.0060 UJ | 0.0040 J | 0.0070 UJ | 0.0060 UJ | 6.3 | 1.4 U [0.39 U] |
| trans-1,2-Dichloroethene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| trans-1,3-Dichloropropene | -- | -- | mg/kg | 0.034 U | 1.6 U | 0.17 U | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Trichloroethene | 2 | 1 | mg/kg | 0.034 U | 1.6 U | *0.27* | 0.0060 U | 0.0070 U | 0.0070 U | 0.0060 U | 1.5 U | 1.4 U [0.15 U] |
| Vinyl Chloride | 0.07 | 1 | mg/kg | 0.069 U | 3.2 U | 0.34 U | 0.012 U | 0.013 U | 0.014 U | 0.011 U | 3.0 U | 2.9 U [0.30 U] |
| Xylene (Total) | -- | -- | mg/kg | 0.022 J | 10 | 0.35 J | 0.018 U | 0.020 U | 0.021 U | 0.017 U | 14 | 4.3 U [0.36 J] |
| Total BTEX | -- | -- | mg/kg | 0.086 J | 19 | 1.7 J | ND | 0.0060 J | ND | ND | 31 J | ND [0.88 J] |
| Total VOCs | -- | -- | mg/kg | 0.32 J | 20 J | 2.3 J | 0.048 J | 0.038 J | 0.042 J | ND | 34 J | ND [1.3 J] |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-BO-18<br>1<br>08/10/06 | SED-BO-19<br>1.2<br>08/10/06 | SED-BO-21<br>2.4<br>08/10/06 | SED-BO-23<br>0.2<br>08/10/06 | SED-BO-25<br>2.5<br>08/10/06 | SED-BO-29<br>1.5<br>08/10/06 | SED-BO-30<br>2<br>08/10/06 | SED-BO-31<br>0<br>08/10/06 | SED-BO-34<br>0<br>08/15/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs** | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 1,2-Dichlorobenzene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 1,3-Dichlorobenzene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 1,4-Dichlorobenzene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 2,4,5-Trichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4,6-Trichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dimethylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 2,6-Dinitrotoluene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 2-Chloronaphthalene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 2-Chlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Methylnaphthalene | -- | -- | mg/kg | 860 U | 1,000 | 97 U | 0.059 J | 0.55 J | 0.46 J | 0.096 J | 1,100 | 680 J [330 J] |
| 2-Methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Nitroaniline | -- | -- | mg/kg | 4,200 U | 4,000 U | 470 U | 1.9 U | 21 U | 20 U | 1.8 U | 4,100 U | 8,400 U [8,600 U] |
| 2-Nitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 3,3'-Dichlorobenzidine | -- | -- | mg/kg | 4,200 U | 4,000 U | 470 U | 1.9 U | 21 U | 20 U | 1.8 U | 4,100 U | 8,400 U [8,600 U] |
| 3-Nitroaniline | -- | -- | mg/kg | 4,200 U | 4,000 U | 470 U | 1.9 U | 21 U | 20 U | 1.8 U | 4,100 U | 8,400 U [8,600 U] |
| 4,6-Dinitro-2-methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Bromophenyl-phenylether | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 4-Chloro-3-methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Chloroaniline | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 4-Chlorophenyl-phenylether | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| 4-Methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Nitroaniline | -- | -- | mg/kg | 4,200 U | 4,000 U | 470 U | 1.9 U | 21 U | 20 U | 1.8 U | 4,100 U | 8,400 U [8,600 U] |
| 4-Nitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Acenaphthene | -- | -- | mg/kg | 220 J | 1,800 | 68 J | 0.097 J | 0.63 J | 0.58 J | 0.090 J | 1,400 | 3,700 [3,000] |
| Acenaphthylene | -- | -- | mg/kg | 49 J | 310 J | 19 J | 0.16 J | 0.34 J | 0.39 J | 0.066 J | 1,500 | 320 J [240 J] |
| Anthracene | -- | -- | mg/kg | 370 J | 1,500 | 130 | 0.30 J | 1.7 J | 1.1 J | 0.14 J | 2,400 | 2,900 [2,600] |
| Benzo(a)anthracene | -- | -- | mg/kg | 330 J | 1,000 | 130 | 1.0 | 2.6 J | 3.3 J | 0.52 | 2,200 | 2,500 [2,100] |
| Benzo(a)pyrene | 1.3 | 34 | mg/kg | *290 J* | *910* | *110* | *1.0* | *2.2 J* | *3.2 J* | *0.51* | *2,200* | *2,500 [2,200]* |
| Benzo(b)fluoranthene | -- | -- | mg/kg | 240 J | 680 J | 84 J | 1.0 | 1.8 J | 3.1 J | 0.61 | 1,600 | 2,700 [2,200] |
| Benzo(g,h,i)perylene | -- | -- | mg/kg | 210 J | 710 J | 75 J | 0.47 | 1.5 J | 2.7 J | 0.26 J | 1,800 | 1,600 J [1,400 J] |
| Benzo(k)fluoranthene | -- | -- | mg/kg | 160 J | 600 J | 75 J | 0.87 | 1.7 J | 2.3 J | 0.43 | 1,400 | 980 J [1,000 J] |
| bis(2-Chloroethoxy)methane | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| bis(2-Chloroethyl)ether | 0.03 | 0 | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| bis(2-chloroisopropyl)ether | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| bis(2-Ethylhexyl)phthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.91 | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Butylbenzylphthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-BO-18<br>1<br>08/10/06 | SED-BO-19<br>1.2<br>08/10/06 | SED-BO-21<br>2.4<br>08/10/06 | SED-BO-23<br>0.2<br>08/10/06 | SED-BO-25<br>2.5<br>08/10/06 | SED-BO-29<br>1.5<br>08/10/06 | SED-BO-30<br>2<br>08/10/06 | SED-BO-31<br>0<br>08/10/06 | SED-BO-34<br>0<br>08/15/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVOCs (Cont'd)** | | | | | | | | | | | | |
| Carbazole | -- | -- | mg/kg | 860 U | 420 J | 13 J | 0.096 J | 0.41 J | 0.57 J | 0.064 J | 920 | 500 J [420 J] |
| Chrysene | -- | -- | mg/kg | 280 J | 930 | 110 | 1.0 | 2.4 J | 3.8 J | 0.57 | 2,000 | 2,000 [1,800] |
| Dibenz(a,h)anthracene | -- | -- | mg/kg | 60 J | 200 J | 22 J | 0.19 J | 0.57 J | 0.90 J | 0.098 J | 410 J | 340 J [270 J] |
| Dibenzofuran | -- | -- | mg/kg | 130 J | 1,000 | 46 J | 0.063 J | 0.95 J | 0.47 J | 0.052 J | 1,500 | 2,000 [1,600 J] |
| Diethylphthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Dimethylphthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Di-n-butylphthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Di-n-octylphthalate | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 UJ [1,800 UJ] |
| Fluoranthene | -- | -- | mg/kg | 860 | 3,000 | 330 | 1.9 | 6.0 | 7.7 | 1.2 | 7,000 | 7,800 [6,500] |
| Fluorene | -- | -- | mg/kg | 190 J | 1,200 | 72 J | 0.11 J | 1.1 J | 0.62 J | 0.069 J | 1,800 | 2,400 [2,100] |
| Hexachlorobenzene | 0.15 | 0 | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Hexachlorobutadiene | 0.3 | 0 | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Hexachlorocyclopentadiene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Hexachloroethane | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Indeno(1,2,3-cd)pyrene | -- | -- | mg/kg | 170 J | 580 J | 68 J | 0.46 | 1.4 J | 2.2 J | 0.26 J | 1,400 | 1,400 J [1,300 J] |
| Isophorone | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Naphthalene | -- | -- | mg/kg | 86 J | 3,800 | 21 J | 0.21 J | 2.5 J | 2.7 J | 0.50 | 5,100 | 2,000 [1,200 J] |
| Nitrobenzene | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| N-Nitroso-di-n-propylamine | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| N-Nitrosodiphenylamine | -- | -- | mg/kg | 860 U | 820 U | 97 U | 0.39 U | 4.4 U | 4.0 U | 0.38 U | 840 U | 1,700 U [1,800 U] |
| Pentachlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Phenanthrene | -- | -- | mg/kg | 1,100 | 4,700 | 380 | 0.92 | 5.9 | 5.5 | 0.61 | 8,900 | 10,000 [8,800] |
| Phenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Pyrene | -- | -- | mg/kg | 680 J | 2,400 | 250 | 1.5 | 4.6 | 6.5 | 0.90 J | 5,500 | 5,500 [4,700] |
| Total PAHs | -- | -- | mg/kg | 5,300 J | 25,000 J | 1,900 J | 11 J | 38 J | 47 J | 6.9 J | 48,000 J | 49,000 J [42,000 J] |
| Total SVOCs | -- | -- | mg/kg | 5,400 J | 27,000 J | 2,000 J | 12 J | 39 J | 48 J | 7.1 J | 50,000 J | 52,000 J [44,000 J] |
| **Misc. Compounds** | | | | | | | | | | | | |
| Total Organic Carbon | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | -- | -- | gOC/kg | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID:<br>Sample Depth (Feet):<br>Date Collected: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-SO-36<br>1<br>08/14/06 | SED-SO-38<br>1.5<br>08/14/06 | SED-SO-41<br>0.5<br>08/14/06 | SED-SO-42<br>1<br>08/14/06 | SED-SO-43<br>1<br>08/14/06 | SED-SO-45<br>1.5<br>08/14/06 | SED-SO-46<br>2.5<br>08/15/06 | SED-SO-50<br>1.5<br>08/15/06 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,1,2,2-Tetrachloroethane | 0.3 | 0 | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,1,2-Trichloroethane | 0.6 | 0 | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,1-Dichloroethane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,1-Dichloroethene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,2-Dichloroethane | 0.7 | 0 | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 1,2-Dichloropropane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| 2-Butanone | -- | -- | mg/kg | 7.0 UJ | 7.4 UJ | 10 UJ | 1.7 UJ | 7.0 UJ | 0.82 UJ | 0.67 UJ | 0.12 U |
| 2-Hexanone | -- | -- | mg/kg | 7.0 U | 7.4 U | 10 U | 1.7 U | 7.0 U | 0.82 U | 0.67 U | 0.12 U |
| 4-Methyl-2-Pentanone | -- | -- | mg/kg | 7.0 U | 7.4 U | 10 U | 1.7 U | 7.0 U | 0.82 U | 0.67 U | 0.12 U |
| Acetone | -- | -- | mg/kg | 7.0 UJ | 7.4 UJ | 10 UJ | 6.5 UJ | 7.0 UJ | 2.2 UJ | 1.7 UJ | 0.12 U |
| Benzene | 0.6 | 14 | mg/kg | *2.2* | *2.4* | 2.1 U | *0.30 J* | *0.67 J* | 0.16 U | 0.13 U | 0.024 U |
| Bromodichloromethane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Bromoform | -- | -- | mg/kg | 1.4 UJ | 1.5 UJ | 2.1 UJ | 0.34 UJ | 1.4 UJ | 0.16 UJ | 0.13 UJ | 0.024 U |
| Bromomethane | -- | -- | mg/kg | 1.4 UJ | 1.5 UJ | 2.1 UJ | 0.34 UJ | 1.4 UJ | 0.16 UJ | 0.13 UJ | 0.024 UJ |
| Carbon Disulfide | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.18 J | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Carbon Tetrachloride | 0.6 | 0 | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Chlorobenzene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Chloroethane | -- | -- | mg/kg | 1.4 UJ | 1.5 UJ | 2.1 UJ | 0.34 UJ | 1.4 UJ | 0.16 UJ | 0.13 UJ | 0.024 U |
| Chloroform | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Chloromethane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| cis-1,2-Dichloroethene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| cis-1,3-Dichloropropene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Dibromochloromethane | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Ethylbenzene | -- | -- | mg/kg | 5.2 | 8.0 | 6.3 | 0.18 J | 1.8 | 0.10 J | 0.13 U | 0.024 U |
| Methyl tert-butyl ether | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| Methylene Chloride | -- | -- | mg/kg | 1.8 UJ | 1.9 UJ | 2.5 UJ | 0.34 UJ | 1.7 UJ | 0.16 UJ | 0.13 UJ | 0.024 U |
| Styrene | -- | -- | mg/kg | 2.8 | 3.8 | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Tetrachloroethene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Toluene | -- | -- | mg/kg | 7.7 | 8.0 | 3.9 U | 0.50 | 2.5 U | 0.16 U | 0.13 U | 0.024 U |
| trans-1,2-Dichloroethene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| trans-1,3-Dichloropropene | -- | -- | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.13 U | 0.024 U |
| Trichloroethene | 2 | 1 | mg/kg | 1.4 U | 1.5 U | 2.1 U | 0.34 U | 1.4 U | 0.16 U | 0.094 J | 0.024 U |
| Vinyl Chloride | 0.07 | 1 | mg/kg | 2.8 U | 2.9 U | 4.1 U | 0.67 U | 2.8 U | 0.33 U | 0.27 U | 0.048 U |
| Xylene (Total) | -- | -- | mg/kg | 31 | 41 | 18 | 0.35 J | 8.1 | 0.49 U | 0.40 U | 0.073 U |
| Total BTEX | -- | -- | mg/kg | 46 | 59 | 24 | 1.3 J | 11 J | 0.10 J | ND | ND |
| Total VOCs | -- | -- | mg/kg | 49 | 63 | 24 | 1.5 J | 11 J | 0.10 J | 0.094 J | ND |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-SO-36 | SED-SO-38 | SED-SO-41 | SED-SO-42 | SED-SO-43 | SED-SO-45 | SED-SO-46 | SED-SO-50 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | | 1 | 1.5 | 0.5 | 1 | 1 | 1.5 | 2.5 | 1.5 |
| Date Collected: | | | | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/15/06 | 08/15/06 |
| **SVOCs** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 1,2-Dichlorobenzene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 1,3-Dichlorobenzene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 1,4-Dichlorobenzene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 2,4,5-Trichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4,6-Trichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dichlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dimethylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 2,6-Dinitrotoluene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 2-Chloronaphthalene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 2-Chlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Methylnaphthalene | -- | -- | mg/kg | 2,200 D | 1,600 D | 2,100 D | 1,100 J | 810 J | 2.8 J | 0.34 U | 0.81 J |
| 2-Methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Nitroaniline | -- | -- | mg/kg | 370 U | 380 U | 450 U | 9,000 U | 7,500 U | 42 U | 1.6 U | 33 U |
| 2-Nitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 3,3'-Dichlorobenzidine | -- | -- | mg/kg | 370 U | 380 U | 450 U | 9,000 U | 7,500 U | 42 U | 1.6 U | 33 U |
| 3-Nitroaniline | -- | -- | mg/kg | 370 U | 380 U | 450 U | 9,000 U | 7,500 U | 42 U | 1.6 U | 33 U |
| 4,6-Dinitro-2-methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Bromophenyl-phenylether | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 4-Chloro-3-methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Chloroaniline | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 4-Chlorophenyl-phenylether | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| 4-Methylphenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Nitroaniline | -- | -- | mg/kg | 370 U | 380 U | 450 U | 9,000 U | 7,500 U | 42 U | 1.6 U | 33 U |
| 4-Nitrophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| Acenaphthene | -- | -- | mg/kg | 2,800 D | 2,100 D | 2,900 D | 2,000 | 1,300 J | 7.1 J | 0.017 J | 1.6 J |
| Acenaphthylene | -- | -- | mg/kg | 760 | 860 | 240 | 200 J | 250 J | 2.3 J | 0.34 U | 2.5 J |
| Anthracene | -- | -- | mg/kg | 2,700 D | 2,200 D | 1,400 | 1,300 J | 950 J | 9.8 | 0.34 U | 7.4 |
| Benzo(a)anthracene | -- | -- | mg/kg | 2,000 D | 1,700 D | 1,300 | 1,100 J | 790 J | 26 | 0.048 J | 24 |
| Benzo(a)pyrene | 1.3 | 34 | mg/kg | *1,800 D* | *1,200* | *1,000* | *1,000 J* | *750 J* | *22* | 0.049 J | *20* |
| Benzo(b)fluoranthene | -- | -- | mg/kg | 1,900 D | 2,400 D | 1,100 | 1,100 J | 780 J | 28 | 0.096 J | 23 |
| Benzo(g,h,i)perylene | -- | -- | mg/kg | 780 | 710 | 500 | 700 J | 500 J | 12 | 0.34 U | 9.2 |
| Benzo(k)fluoranthene | -- | -- | mg/kg | 410 | 340 | 340 | 460 J | 330 J | 8.3 J | 0.10 J | 7.4 |
| bis(2-Chloroethoxy)methane | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| bis(2-Chloroethyl)ether | 0.03 | 0 | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| bis(2-chloroisopropyl)ether | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| bis(2-Ethylhexyl)phthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 1.5 J | 0.34 U | 6.9 U |
| Butylbenzylphthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

| Location ID: | NYSDEC Human Health Bioaccumulation Criteria | Number of Criteria Exceedances | Units | SED-SO-36 | SED-SO-38 | SED-SO-41 | SED-SO-42 | SED-SO-43 | SED-SO-45 | SED-SO-46 | SED-SO-50 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Depth (Feet): | | | | 1 | 1.5 | 0.5 | 1 | 1 | 1.5 | 2.5 | 1.5 |
| Date Collected: | | | | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/14/06 | 08/15/06 | 08/15/06 |
| **SVOCs (Cont'd)** | | | | | | | | | | | |
| Carbazole | -- | -- | mg/kg | 790 | 550 | 460 | 330 J | 270 J | 4.7 J | 0.34 U | 6.9 U |
| Chrysene | -- | -- | mg/kg | 1,700 D | 1,200 | 960 | 940 J | 680 J | 22 | 0.049 J | 19 |
| Dibenz(a,h)anthracene | -- | -- | mg/kg | 180 | 160 | 140 | 160 J | 120 J | 3.7 J | 0.34 U | 3.0 J |
| Dibenzofuran | -- | -- | mg/kg | 1,800 D | 1,200 | 1,200 | 910 J | 720 J | 4.6 J | 0.34 U | 0.84 J |
| Diethylphthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Dimethylphthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Di-n-butylphthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Di-n-octylphthalate | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 UJ | 6.9 U |
| Fluoranthene | -- | -- | mg/kg | 5,900 D | 5,400 D | 4,500 D | 3,500 | 2,500 | 62 | 0.12 J | 47 |
| Fluorene | -- | -- | mg/kg | 2,000 D | 1,700 D | 1,300 | 1,200 J | 890 J | 5.9 J | 0.34 U | 3.1 J |
| Hexachlorobenzene | 0.15 | 0 | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Hexachlorobutadiene | 0.3 | 0 | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Hexachlorocyclopentadiene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Hexachloroethane | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Indeno(1,2,3-cd)pyrene | -- | -- | mg/kg | 730 | 660 | 500 | 570 J | 430 J | 12 | 0.036 J | 9.2 |
| Isophorone | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Naphthalene | -- | -- | mg/kg | 10,000 D | 7,800 D | 7,900 D | 3,500 | 3,300 | 12 | 0.34 U | 4.8 J |
| Nitrobenzene | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| N-Nitroso-di-n-propylamine | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| N-Nitrosodiphenylamine | -- | -- | mg/kg | 76 U | 78 U | 93 U | 1,800 U | 1,600 U | 8.7 U | 0.34 U | 6.9 U |
| Pentachlorophenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| Phenanthrene | -- | -- | mg/kg | 8,600 D | 7,700 D | 6,500 D | 5,100 | 3,600 | 53 | 0.082 J | 13 |
| Phenol | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| Pyrene | -- | -- | mg/kg | 4,400 D | 4,000 D | 3,200 D | 2,600 | 1,800 | 43 | 0.10 J | 34 J |
| Total PAHs | -- | -- | mg/kg | 49,000 | 42,000 | 36,000 | 27,000 J | 20,000 J | 330 J | 0.70 J | 230 J |
| Total SVOCs | -- | -- | mg/kg | 52,000 | 44,000 | 38,000 | 28,000 J | 21,000 J | 340 J | 0.70 J | 230 J |
| **Misc. Compounds** | | | | | | | | | | | |
| Total Organic Carbon | -- | -- | mg/kg | NA | NA | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | -- | -- | gOC/kg | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 | 58.4 |

See Notes on Page 13.

## Table 16. Qualitative Human Health Exposure Evaluation Comparison of Sediment Data to NYSDEC Human Health Organic Screening Criteria
## New York State Electric Gas Former MGP Site, McMaster Street, Auburn, New York

**Notes:**

NYSDEC human health bioaccumulation criteria are from NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments.

Organics criteria are presented in ug/gOC and are adjusted on a sample-specific basis for total organic carbon.

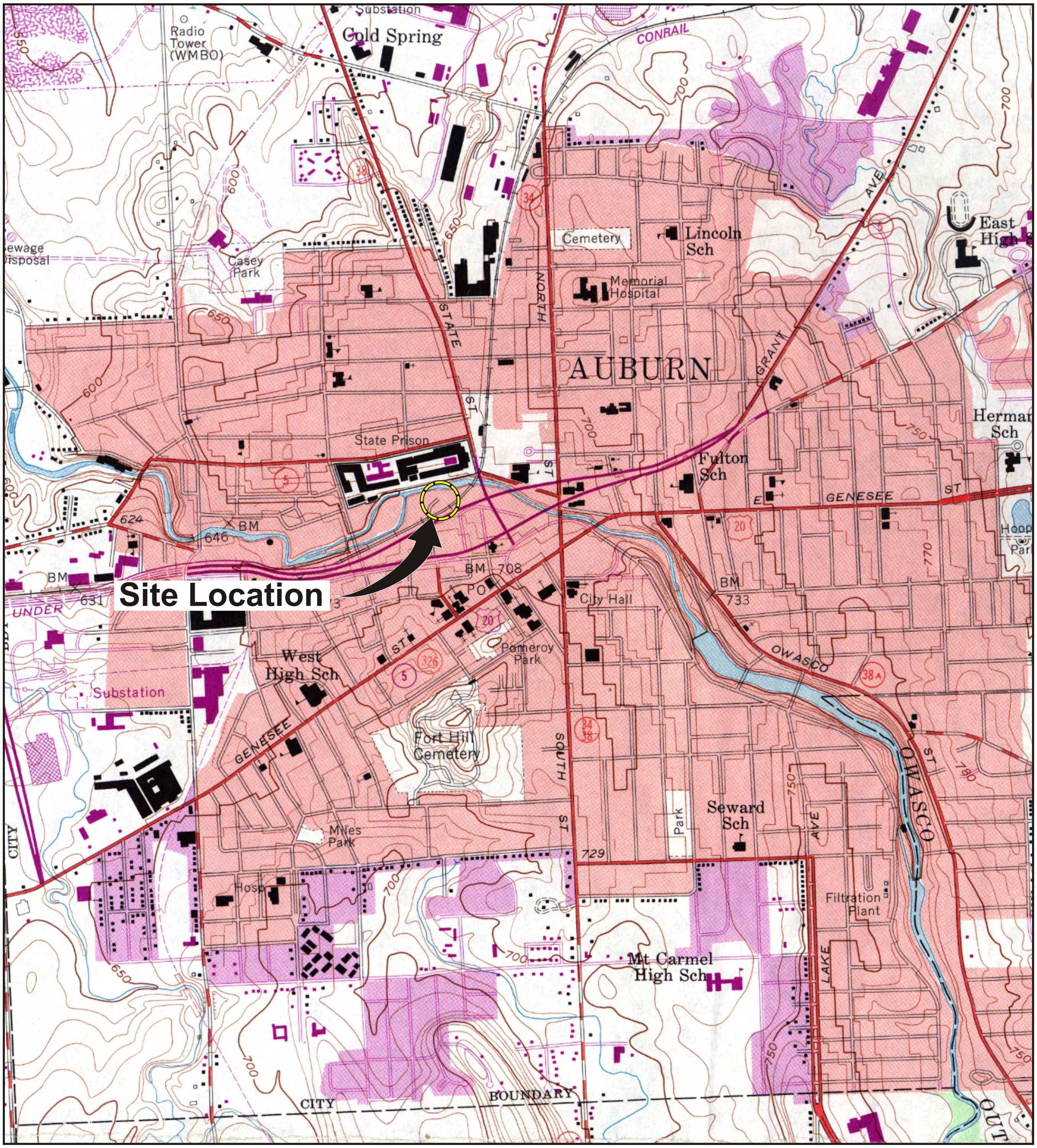
Total organic carbon data were not available for 2006. The arithmetic mean of 2005 TOC concentrations were used for 2006 adjusted criteria.

Italicized and shaded values exceed human health bioaccumulation criteria.

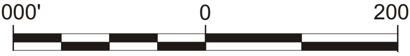
**Lab Qualifier Notes:**

| Qualifier Type | Lab Qualifiers | Definition |
|---|---|---|
| Inorganic | B = | Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL). |
| Inorganic | J = | Indicates an estimated value. |
| Inorganic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |
| Organic | D = | Compound quantitated using a secondary dilution. |
| Organic | J = | Indicates an estimated value. |
| Organic | ND = | None detected. |
| Organic | U = | The compound was analyzed for but not detected. The associated value is the compound quantitation limit. |

# FIGURES



**REFERENCE:** BASE MAP USGS 7.5 MIN. QUAD., AUBURN, NY, 1954, PHOTOREVISED 1980.



**Approximate Scale: 1" = 2000'**

**Area Location**

NEW YORK STATE ELECTRIC & GAS
AUBURN (MCMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

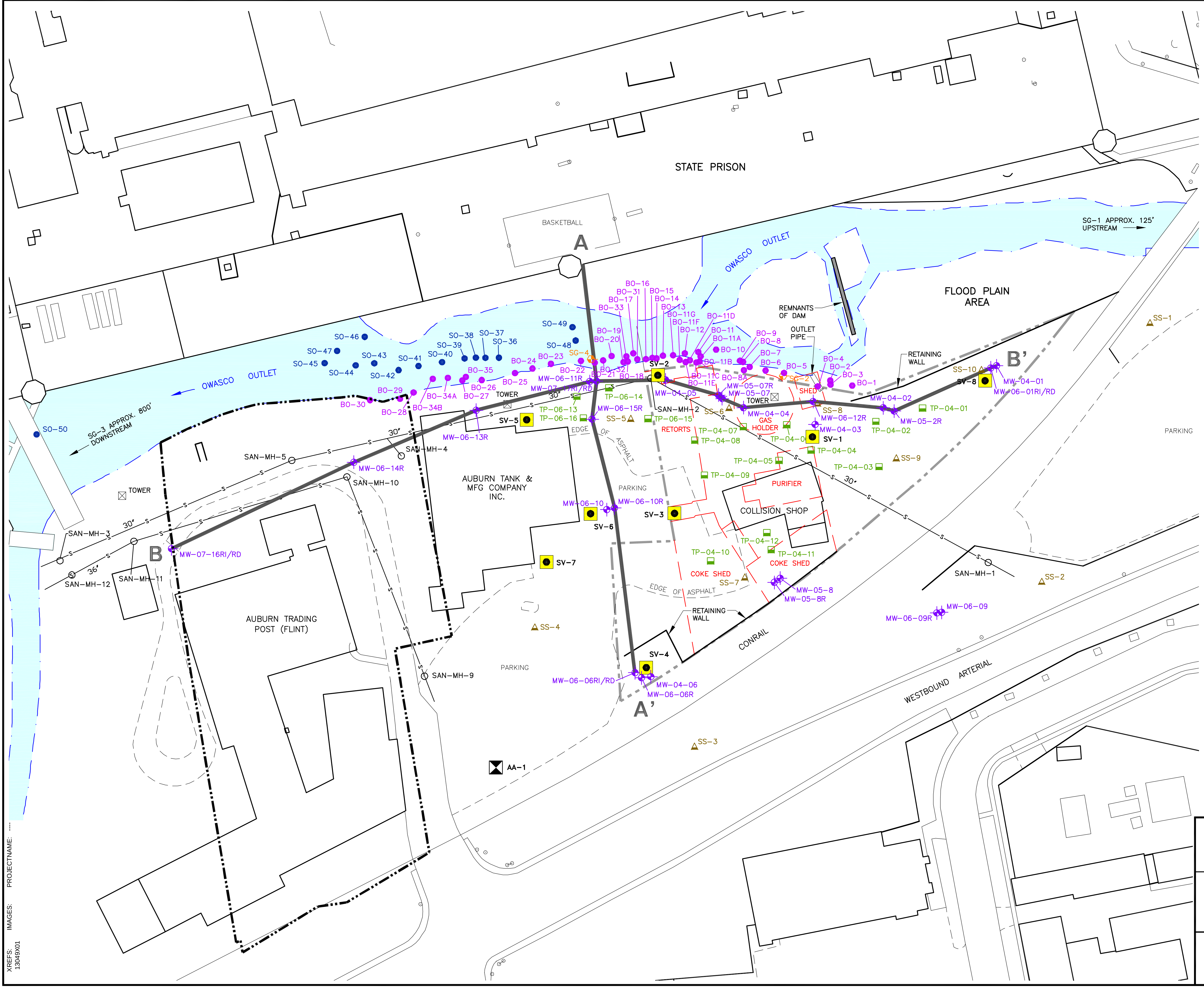
## SITE LOCATION MAP

ARCADIS BBL
*Infrastructure, environment, facilities*

**FIGURE**
**1**

06/12/07 SYR-D85-DJH
13049006/13049n01.cdr

CITY:SYRACUSE DIV/GROUP:141 DB:NJR WLJ RCA LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:ON=*;OFF=*REF*
G:\CAD\ACT\B0013049\0000\00006\DWG\RI\13049B02.DWG LAYOUT: 2 SAVED: 5/28/2008 11:35 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/28/2008 11:36 AM BY: ALLEN, ROYCE
XREFS: 13049X01 IMAGES: PROJECTNAME: ----



LEGEND:

| | |
|---|---|
| ■ SV-5 | SOIL VAPOR SAMPLING LOCATION |
| ☒ AA-1 | AMBIENT AIR SAMPLING LOCATION |
| ⊕ MW-04-01 | MONITORING WELL |
| ▣ TP-04-01 | TEST PIT |
| △ SS-1 | SURFACE SOIL SAMPLE |
| ⬡ SG-1 | STAFF GAUGE |
| ● SO-47 | STREAM CHANNEL OBSERVATION |
| ● BO-1 | BANK OBSERVATION |
| — · — | WATER EDGE |
| — · · — | SITE BOUNDARY |
| ▭ | HISTORICAL MGP STRUCTURE |
| —s— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| A — A' | CROSS-SECTION LOCATION |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.
3. PROPERTY LINES FOR AUBURN TANK AND AUBURN TRADING POST PROPERTY DIGITIZED FROM TAX MAP 115.52-1, PROVIDED BY NYSEG ON 10/18/06.
4. HORIZONTAL DATUM = NAD 83.
5. SEE FIGURE 4 FOR SURFICIAL SEDIMENT SAMPLING LOCATIONS.

0 80' 160'

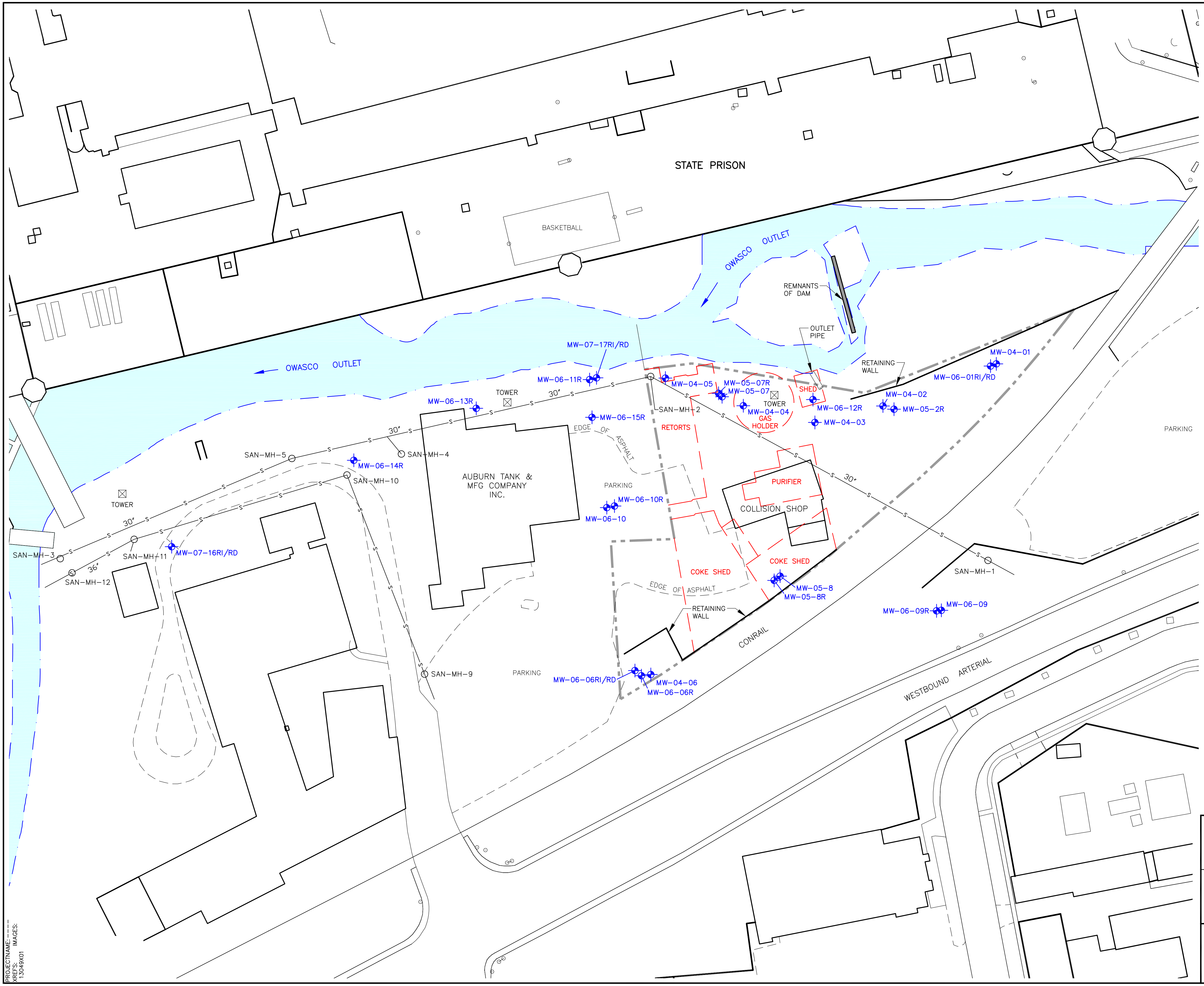
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

# INVESTIGATION LOCATIONS

ARCADIS

FIGURE
2



LEGEND:

MW-04-01 ⌖ MONITORING WELL

— · — — WATER EDGE

— · — · — SITE BOUNDARY

▭ HISTORICAL MGP STRUCTURE

——s—— SANITARY PIPELINE

○ SAN-MH-1 SANITARY MANHOLE

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.

0 80' 160'
GRAPHIC SCALE

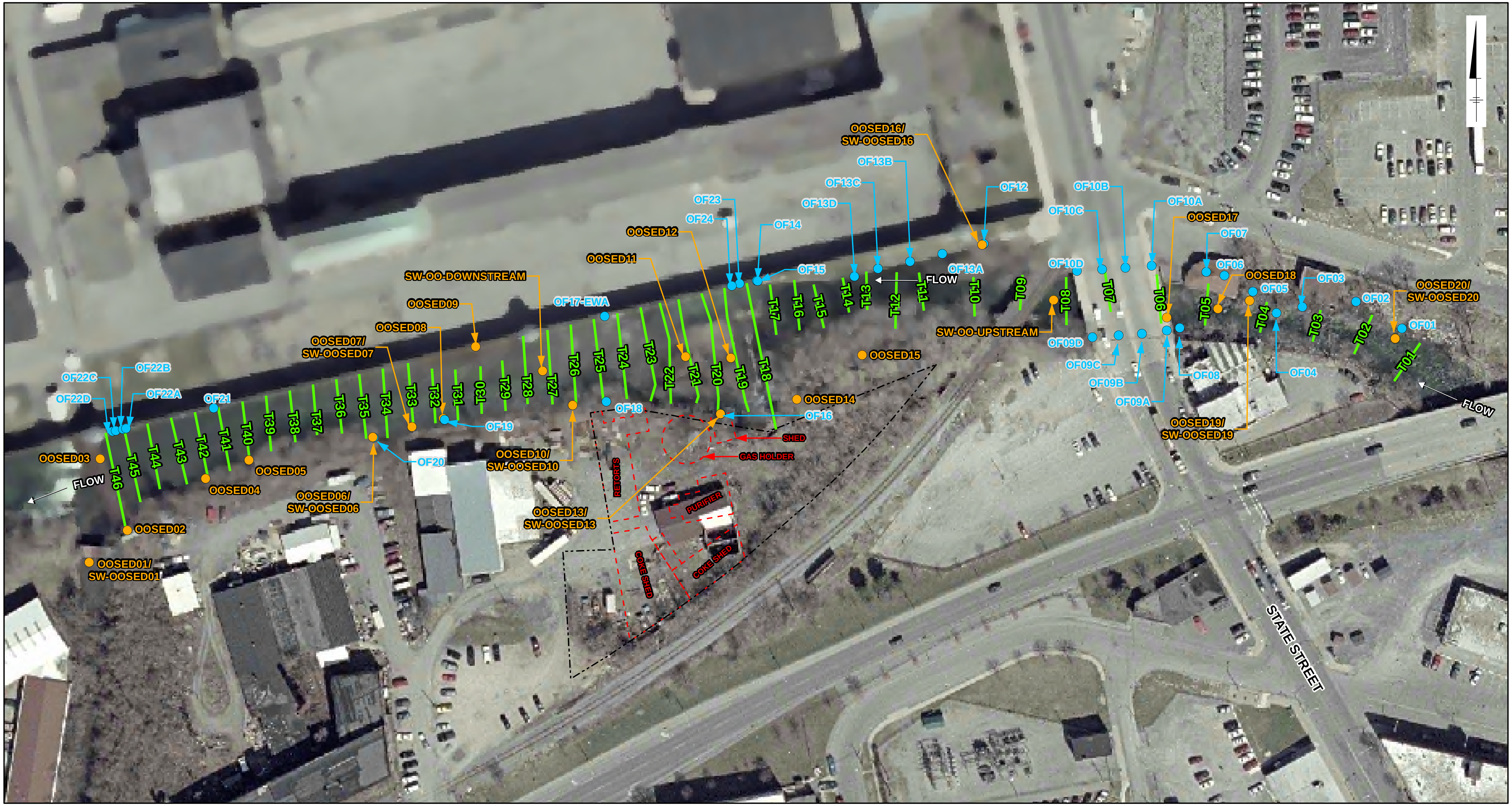
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## MONITORING WELL LOCATIONS

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
**3**

SYR-85-NJR RCA WLJ LAYER: ON=*, OFF=REF (FRZ)
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049B03.DWG SAVED: 7/2/2007 1:50 PM LAYOUT: Layout1 PAGESETUP: ---- PENTABLE: PLTFULL.CTB PRINTED: 7/9/2007 10:02 AM BY: RALLEN
PROJECTNAME: ----
XREFS: IMAGES:
13049X01



NOTES:

1. AERIAL PHOTOGRAPHY PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. AERIAL PHOTOGRAPHY FLOWN IN APRIL 2003.

0 100 200
Feet
GRAPHIC SCALE

LEGEND:

- ● OUTFALL
- ● SEDIMENT AND/OR SURFACE WATER SAMPLE LOCATION
- — SEDIMENT PROBING TRANSECT
- ◁— FLOW DIRECTION
- ▭ HISTORIC MGP STRUCTURES
- ▭ SITE BOUNDARY

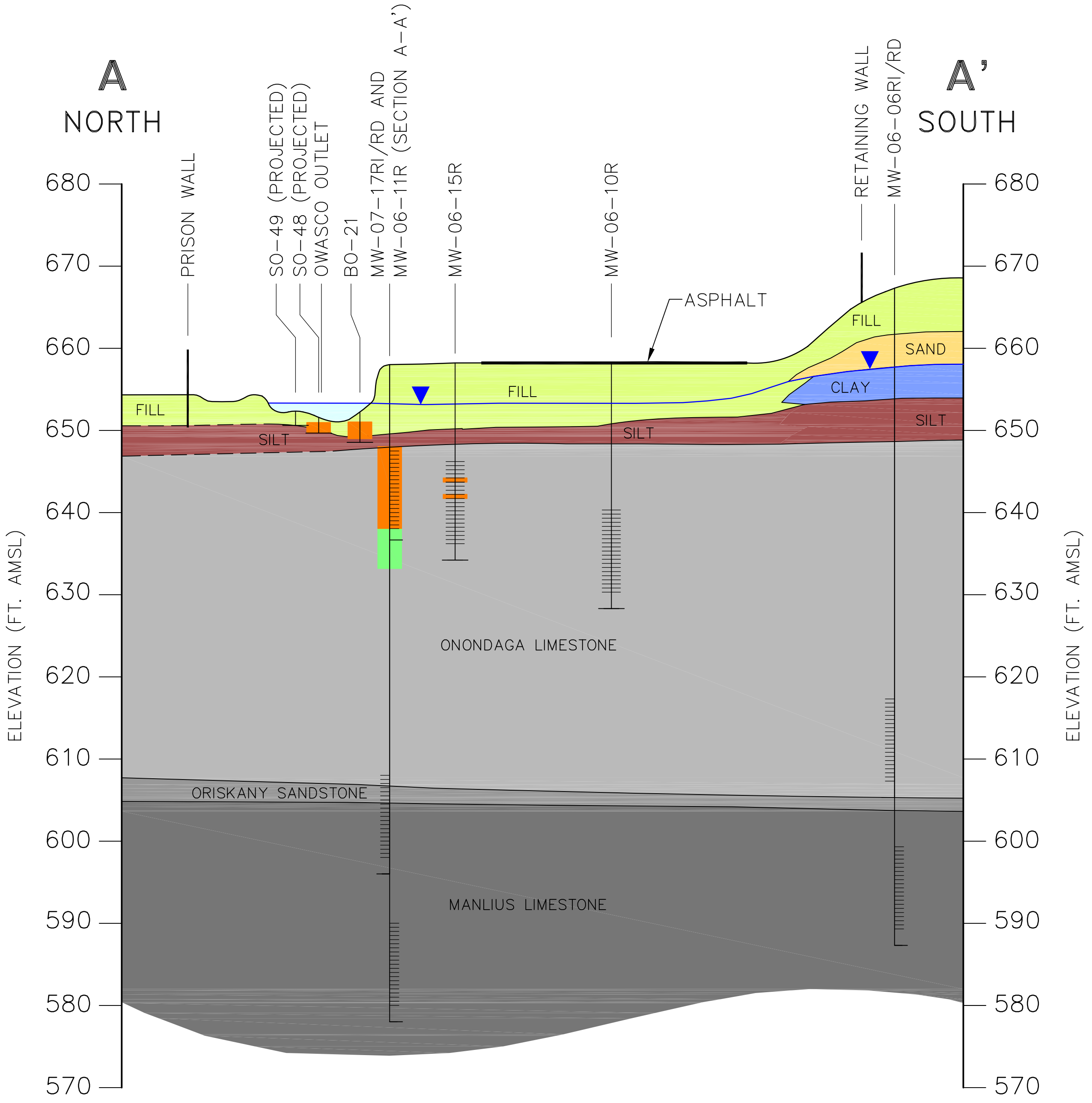
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

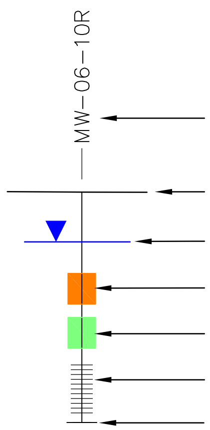
## SEDIMENT PROBING TRANSECTS AND SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
4

SYR-85 MTK KEW PGL
NYSEG (13049.006)
Q:\NYSEG\AuburnMGP\RI_WorkPlan\mxd\Survey Points Inc SW_v5.mxd - 6/18/2007 @ 1:12:46 PM





LEGEND:

WELL/STREAM CHANNEL OBSERVATION ID

GROUND SURFACE

INFERRED WATER TABLE (4/11/07)

NAPL

SHEEN

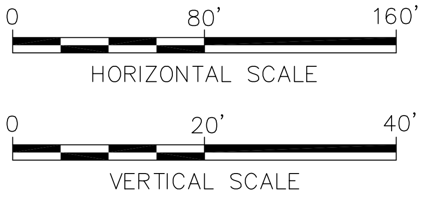
SCREEN INTERVAL

BOTTOM OF BORING

| | |
|---|---|
| 🟩 | FILL |
| 🟨 | SAND |
| 🟦 | CLAY |
| 🟥 | SILT |
| ▨ | ONONDAGA LIMESTONE |
| ▨ | ORISKANY SANDSTONE |
| ▨ | MANLIUS LIMESTONE |

NOTES:

1. GROUNDWATER ELEVATION DATA COLLECTED ON APRIL 11, 2007.
2. VERTICAL DATUM = NAVD 1988.
3. FT. AMSL = FEET ABOVE MEAN SEA LEVEL.
4. VERTICAL EXAGGERATION = 4X.



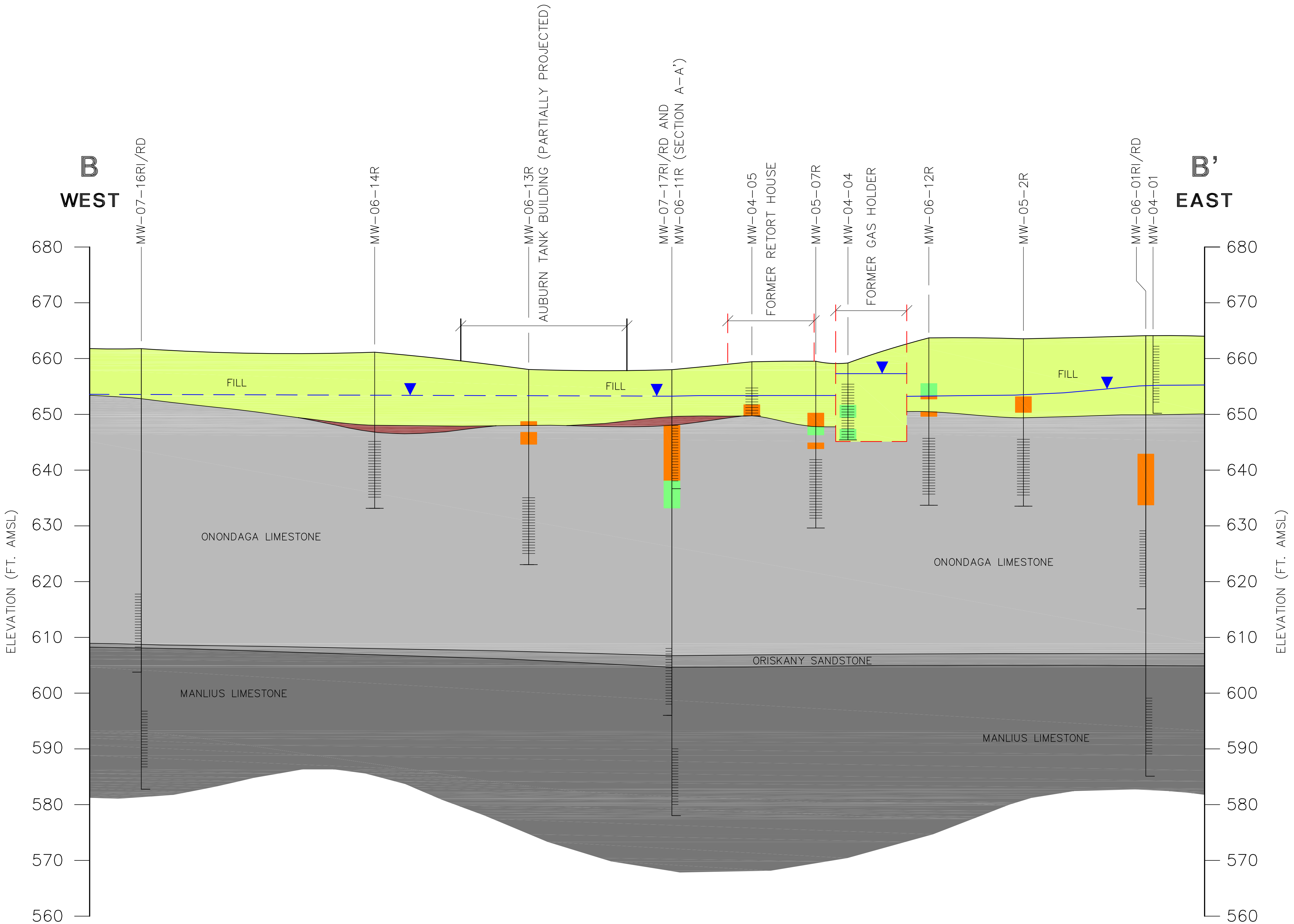
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## A-A' CROSS SECTION

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
**5**

SYR-85-NJR WLJ RCA LAYER: ON=*, OFF=REF (FRZ)
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049V01.DWG SAVED: 7/9/2007 10:22 AM LAYOUT: Layout1 PAGESETUP: ---- PENTABLE: PLTFULL.CTB PRINTED: 7/9/2007 10:22 AM BY: RALLEN
PROJECTNAME: ----
XREFS: IMAGES:
13049X01



LEGEND:

MW-05-2R ← WELL ID
← GROUND SURFACE
▼ ← INFERRED WATER TABLE (4/11/07)
🟧 ← NAPL
🟩 ← SHEEN
← SCREEN INTERVAL
← BOTTOM OF BORING
🟩 FILL
🟥 SILT
▨ ONONDAGA LIMESTONE
▨ ORISKANY SANDSTONE
▨ MANLIUS LIMESTONE

NOTES:

1. GROUNDWATER ELEVATION DATA COLLECTED ON APRIL 11, 2007.
2. VERTICAL DATUM = NAVD 1988.
3. FT. AMSL = FEET ABOVE MEAN SEA LEVEL.
4. VERTICAL EXAGGERATION = 4X.

0 80' 160'
HORIZONTAL SCALE

0 20' 40'
VERTICAL SCALE

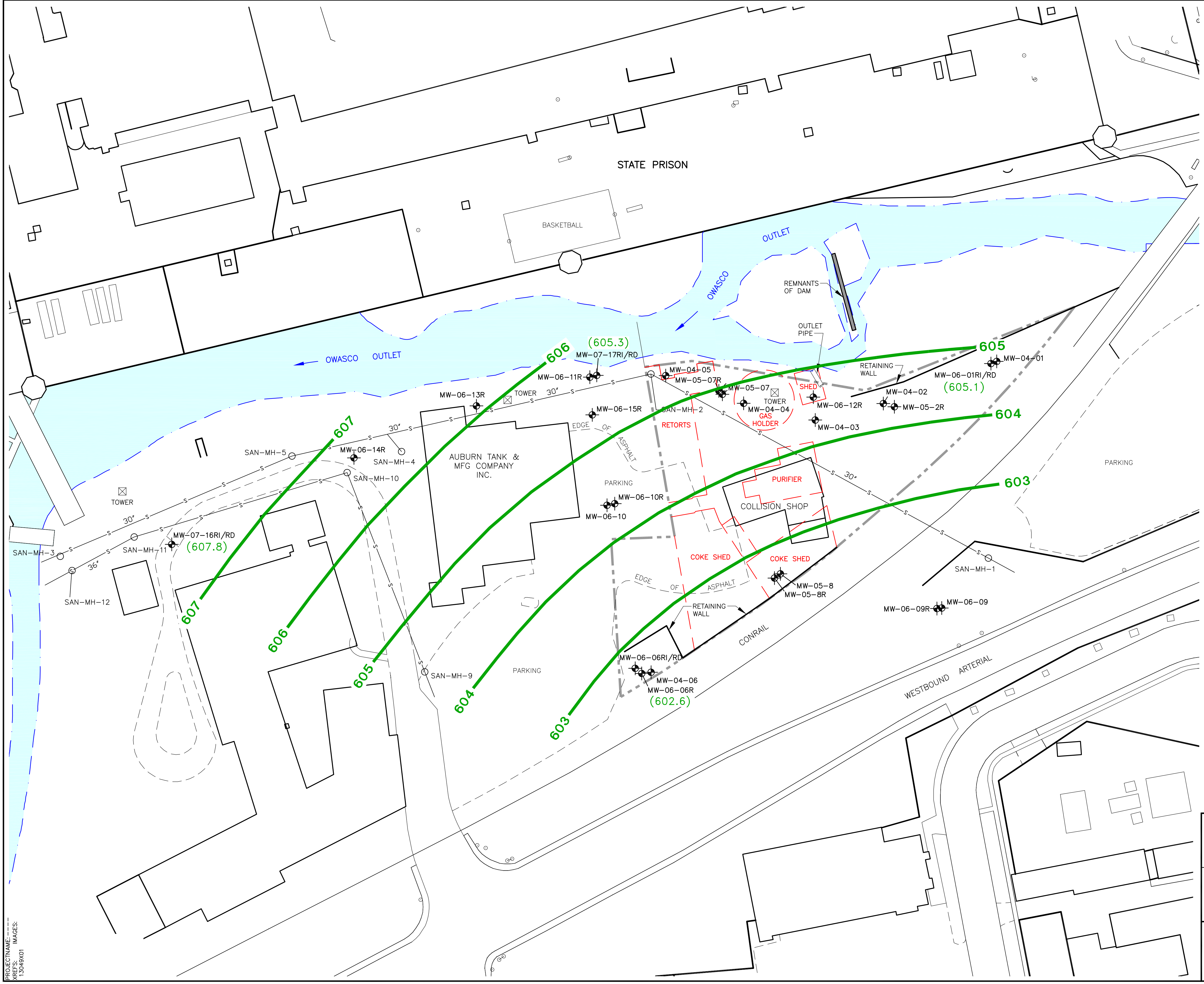
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## B-B' CROSS SECTION

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
**6**

SYR-85-NJR WLJ RCA LAYER: ON=*, OFF=REF (FRZ) SAVED: 7/9/2007 10:16 AM LAYOUT: Layout1 PAGESETUP: ---- PENTABLE: PLTFULL.CTB PRINTED: 7/9/2007 10:17 AM BY: RALLEN
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049V02.DWG
PROJECTNAME: ----
XREFS: IMAGES:
13049X01



LEGEND:

| | |
|---|---|
| MW-04-01 ⌖ | MONITORING WELL |
| — · — | WATER EDGE |
| — · · — | SITE BOUNDARY |
| 🟥 | HISTORICAL MGP STRUCTURE |
| ——s—— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| (605.1) | ELEVATION-TOP OF MANLIUS FORMATION (NAVD 1988) |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.

0 80' 160'

GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## TOP OF MANLIUS FORMATION

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
**7**

SYR-85-NJR RCA JHR RCA LAYER: ON=*, OFF=REF (FRZ)
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049T01.DWG SAVED:6/20/2007 1:20 PM LAYOUT:Layout1 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:7/9/2007 10:27 AM BY:RALLEN
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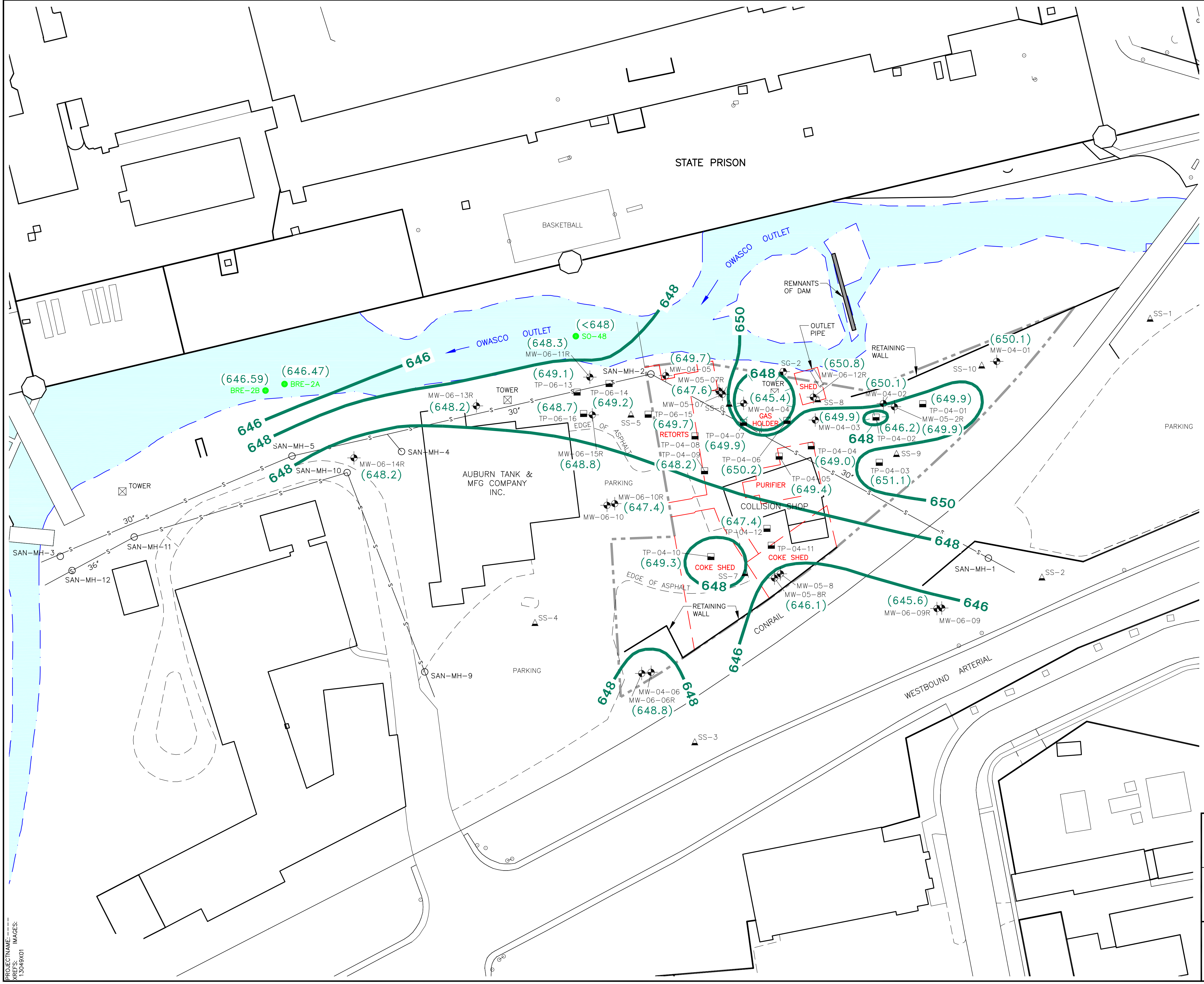
13049X01



LEGEND:

| | |
|---|---|
| MW-04-01 | MONITORING WELL |
| TP-04-01 | TEST PIT |
| SS-1 | TEST PIT |
| SG-1 | STAFF GAUGE |
| ● SO-48 | STREAM CHANNEL OBSERVATION |
| ● BRE-2A | BEDROCK EXPOSED IN STREAM BED. ELEVATION SURVEYED BY NYSEG |
| — · — | WATER EDGE |
| — · · — | SITE BOUNDARY |
| ⌐ ¬ | HISTORICAL MGP STRUCTURE |
| —s— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| (649.9) | BEDROCK SURFACE ELEVATION (NAVD 88) |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.
3. STREAM CHANNEL OBSERVATIONS LOCATED IN THALWAG OF STREAM. THE ELEVATION OF THIS LOCATION WAS SURVEYED TO BE 648.93. A SAMPLE WAS COLLECTED AT APPROXIMATELY 1.5 FEET BELOW THE SEDIMENT SURFACE AND BEDROCK WAS NOT ENCOUNTERED.

0 80' 160'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## BEDROCK SURFACE MAP

ARCADIS BBL
*infrastructure, environment, facilities*

FIGURE
**8**

[SYR-85-LEAD] SYR-54-NJR KEW RCA LAYER: ON=*, OFF=*REF*
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049T02.DWG SAVED:6/20/2007 1:25 PM LAYOUT:Layout1 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:7/9/2007 10:29 AM BY:RALLEN
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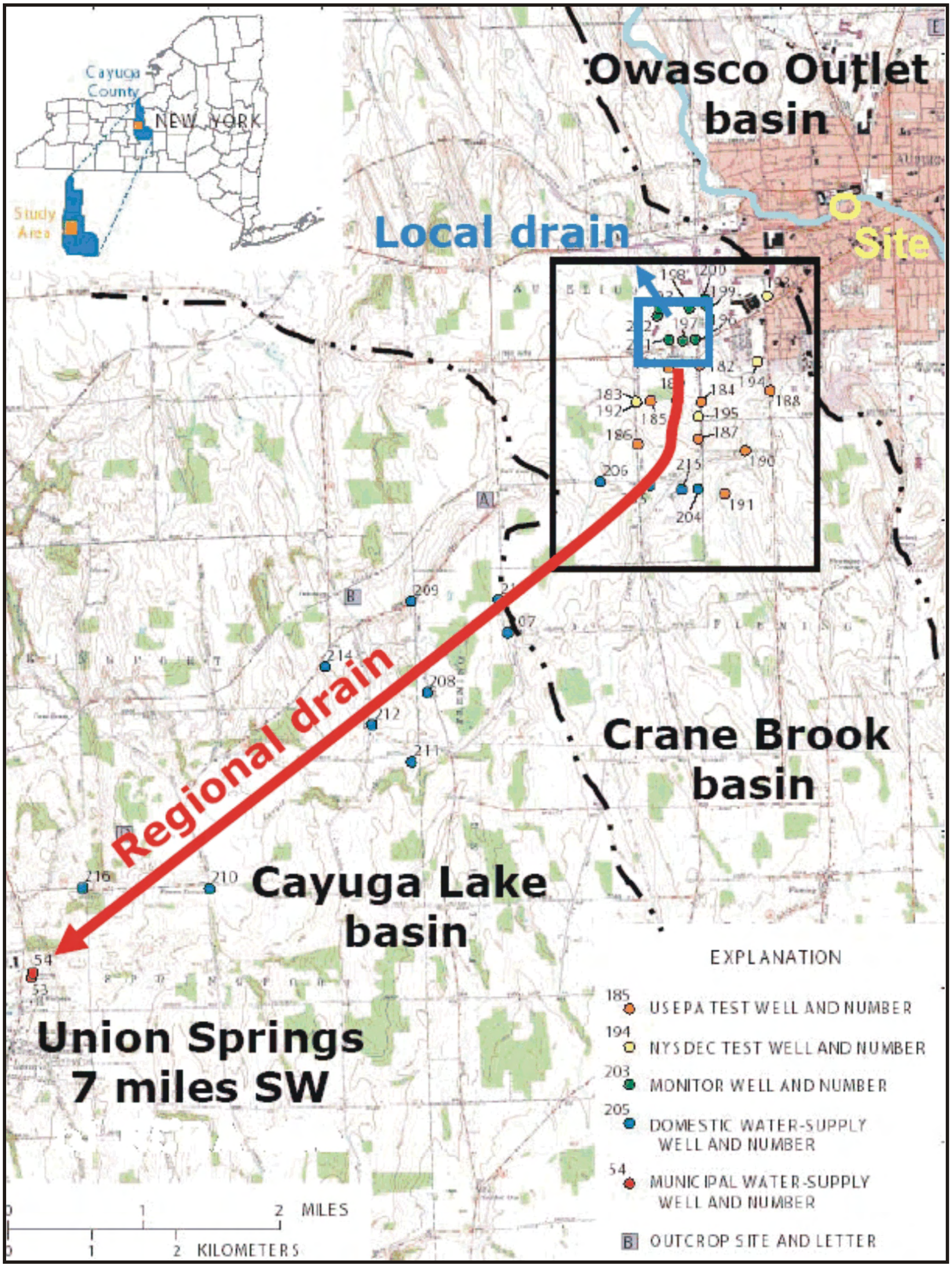


**LEGEND:**

➡ = FLOW ABOVE CONFINING UNIT

➡ = FLOW BELOW CONFINING UNIT

**REFERENCE:**
FIGURE MODIFIED FROM A USGS PRESENTATION ENTITLED HYDROGEOLOGIC APPRAISAL OF THE CAYUGA COUNTY GROUND-WATER CONTAMINATION SUPERFUND SITE NEAR AUBURN, NY. THIS PRESENTATION CAN BE FOUND AT: HTTP://WWW.EPA.GOV/TIO/TSP/DOWNLOAD/2003_MEETING_FALL/ECKHARDT.PDF.

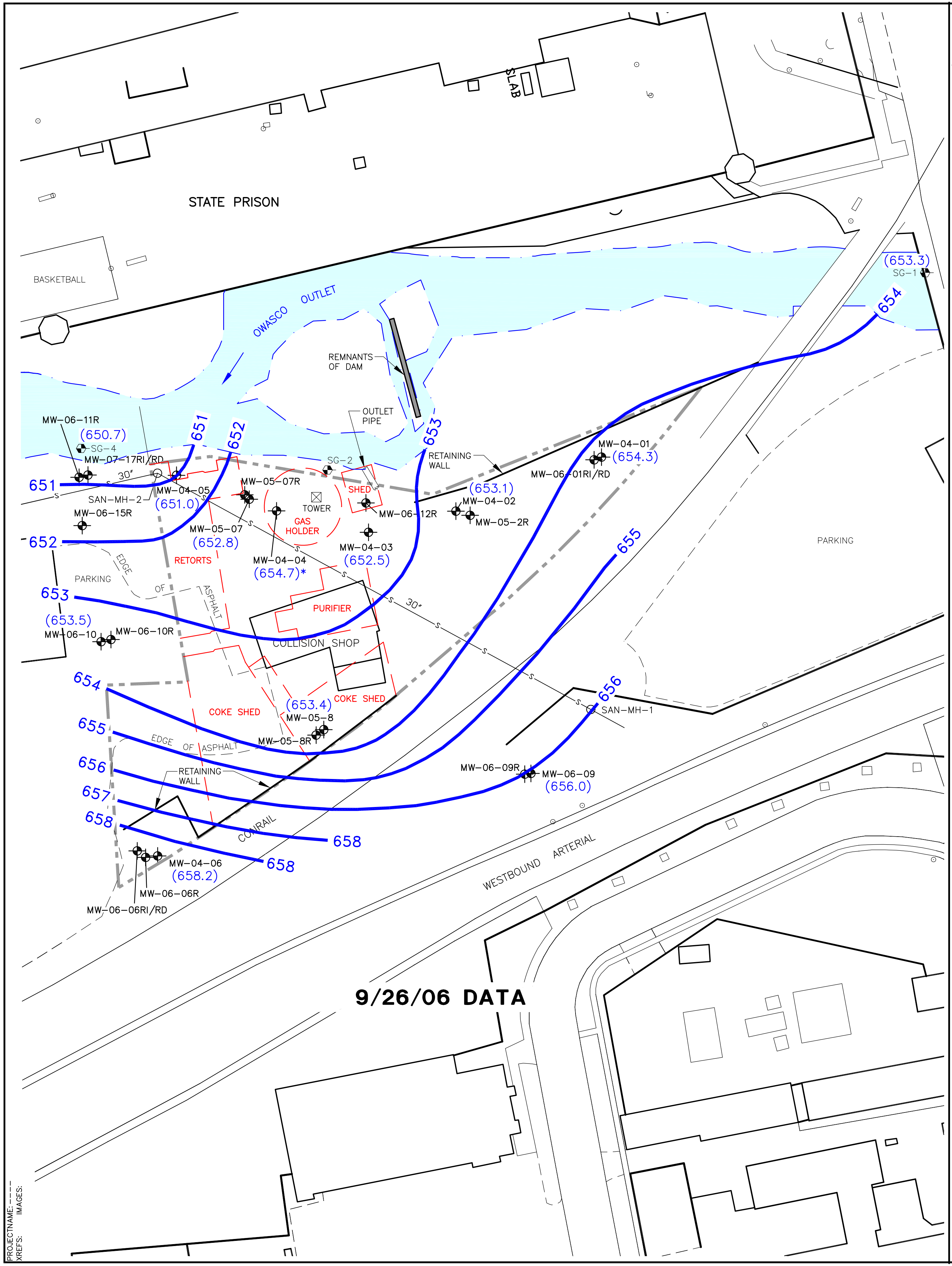
NEW YORK STATE ELECTRIC & GAS
AUBURN (MCMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## REGIONAL GROUNDWATER FLOW DIRECTION

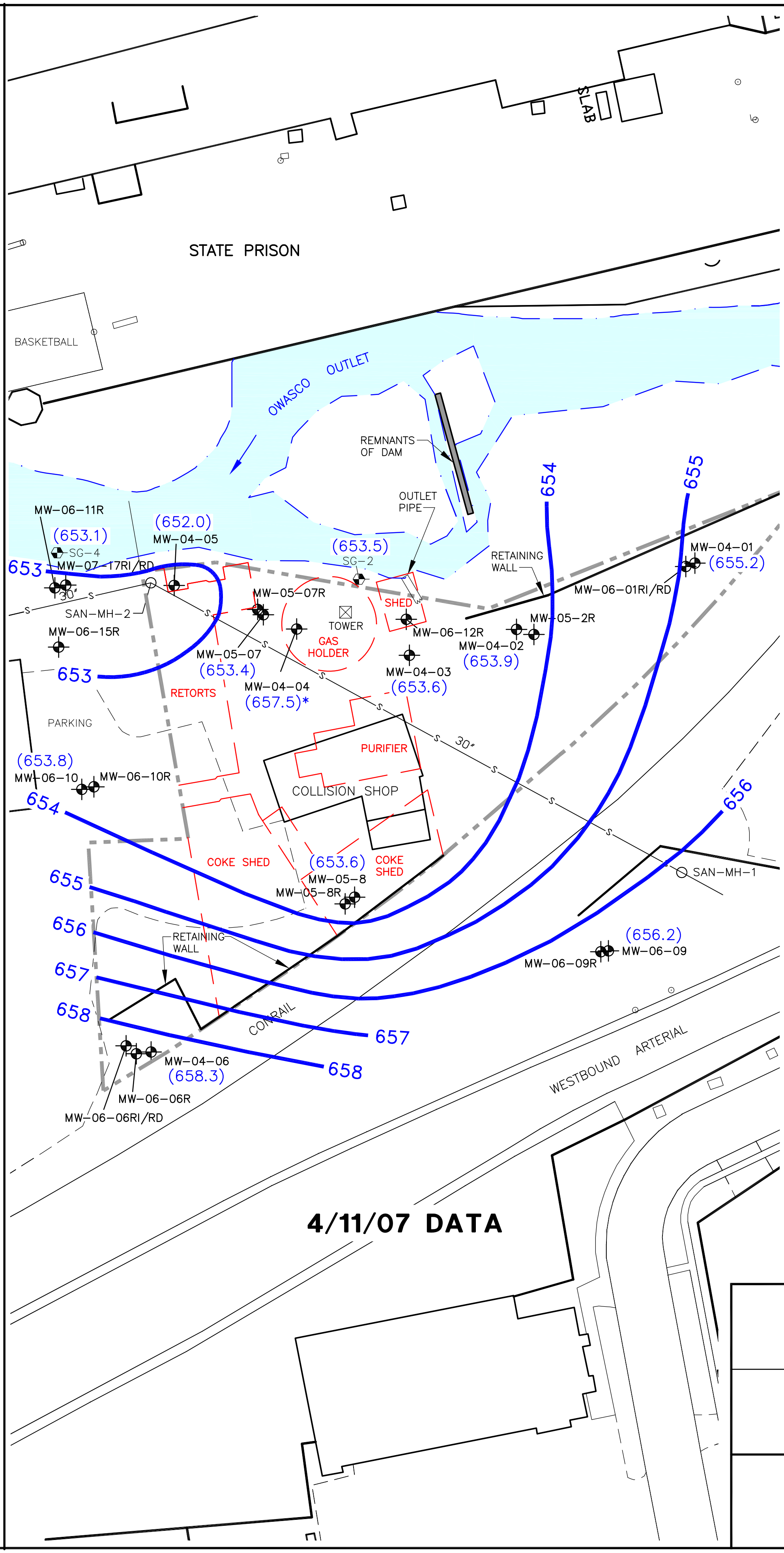
ARCADIS BBL
*Infrastructure, environment, facilities*

**FIGURE**
**9**

06/29/07 SYR-D85
13049006/13049n03.cdr



**9/26/06 DATA**



**4/11/07 DATA**

LEGEND:

| | |
|---|---|
| MW-04-01 ⌖ | MONITORING WELL |
| ⌖ SG-1 | STAFF GAUGE |
| — · — | WATER EDGE |
| — · — · | SITE BOUNDARY |
| ⌐ ¬ | HISTORICAL MGP STRUCTURE |
| ——s—— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| 654 —— | INFERRED WATER TABLE ELEVATION CONTOUR |
| (653.5) | MEASURED WATER TABLE ELEVATION |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.
3. * WATER LEVEL IN MW-04-04 IS NOT REFLECTIVE OF THE WATER TABLE. THIS WELL IS INSTALLED INSIDE OF THE FORMER GAS HOLDER. AVAILABLE DATA SHOW THAT THE WATER LEVEL INSIDE THE HOLDER IS SEVERAL FEET HIGHER THAN OUTSIDE THE HOLDER, SUGGESTING THAT THE WALLS AND FLOOR OF THE GAS HOLDER ARE LIKELY RELATIVELY IMPERMEABLE.

0 80' 160'

GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

**WATER TABLE ELEVATION**
**SEPTEMBER 26, 2006**
**AND APRIL 11, 2007**

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
**10**

SYR-85-NJR WJJ RCA LAYER: ON=*, OFF=REF (FRZ)
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049W02.DWG SAVED: 7/9/2007 10:41 AM PAGESETUP: ---- LAYOUT: Layout1 PRINTED: 7/9/2007 10:41 AM PENTABLE: PLTFULL.CTB BY: RALLEN
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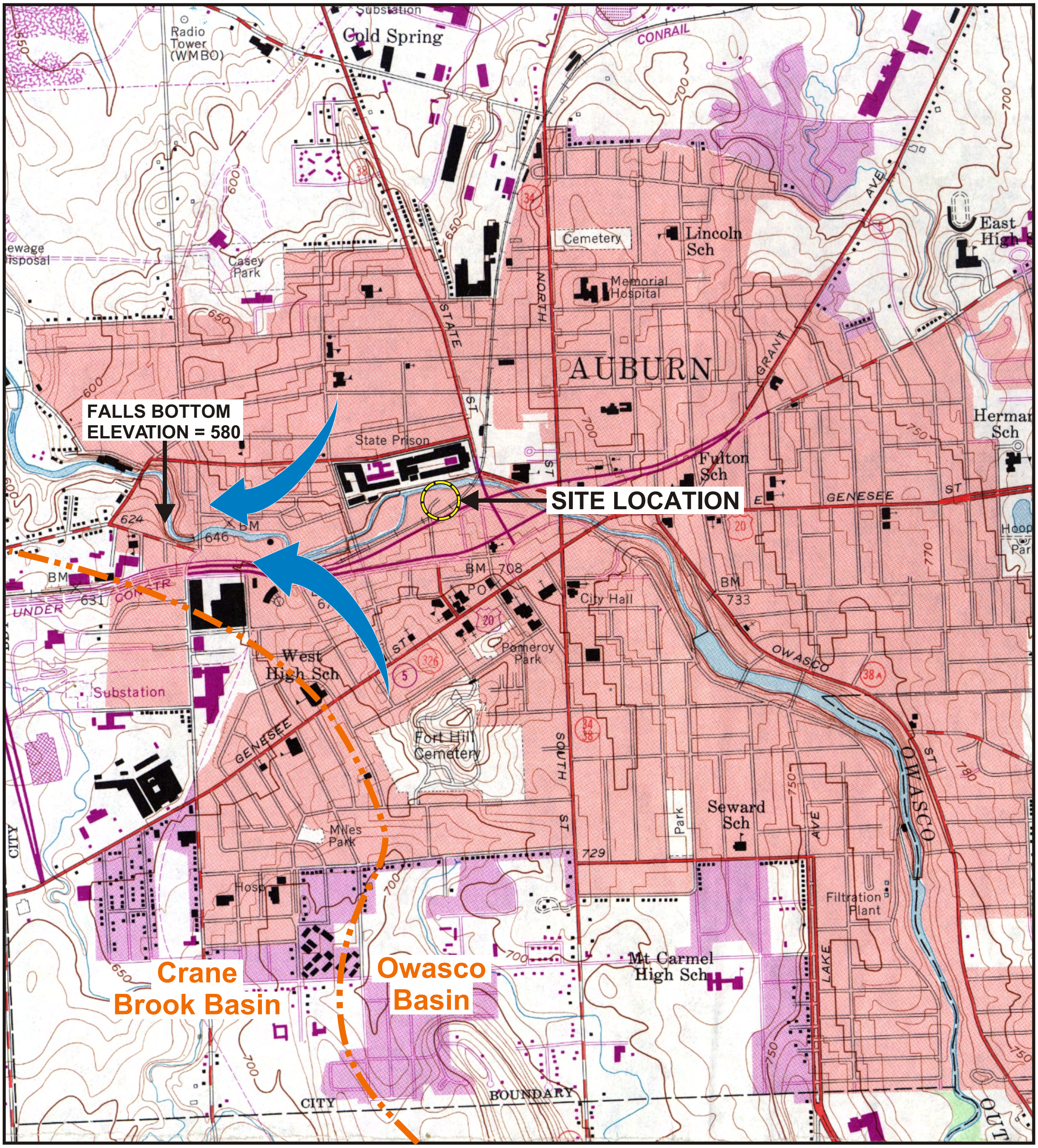
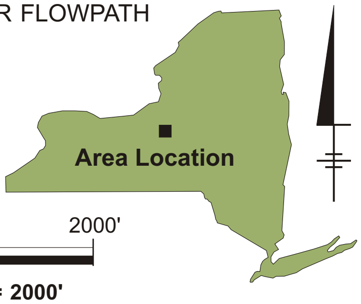


**REFERENCE:** BASE MAP USGS 7.5 MIN. QUAD., AUBURN, NY, 1954, PHOTOREVISED 1980.

**LEGEND:**

➘ = GROUNDWATER FLOWPATH



2000' 0 2000'

**Approximate Scale: 1" = 2000'**

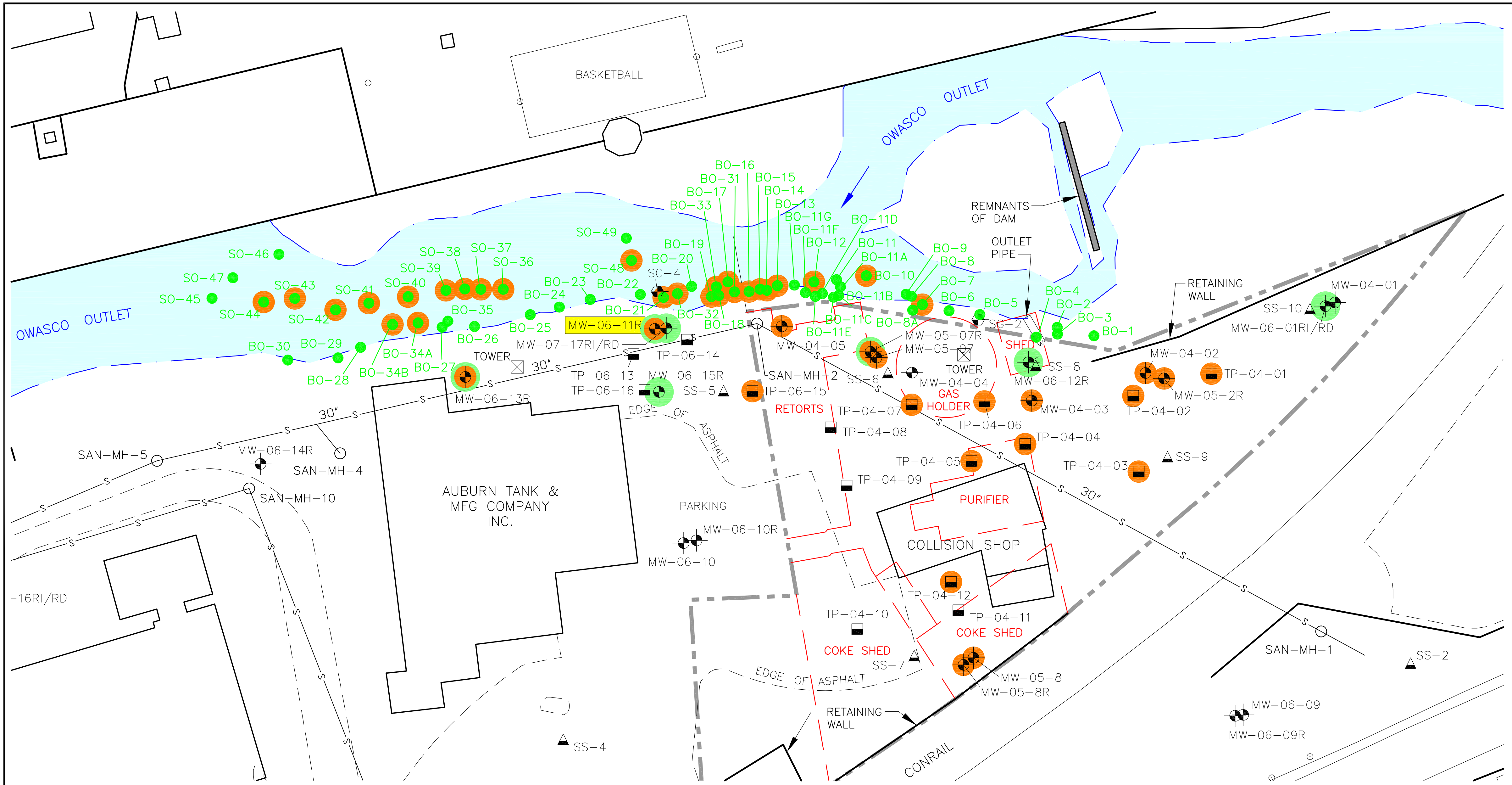
NEW YORK STATE ELECTRIC & GAS
AUBURN (MCMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## CONCEPTUAL GROUNDWATER FLOW IN SHALLOW BEDROCK UNIT

ARCADIS BBL
*Infrastructure, environment, facilities*

**FIGURE**
**11**

06/29/07 SYR-D85-DJH
13049006/13049n02.cdr



LEGEND:

- MW-04-01 MONITORING WELL
- TP-04-01 TEST PIT
- △ SS-1 SURFACE SOIL SAMPLE
- SG-1 STAFF GAUGE
- ● SO-47 STREAM CHANNEL OBSERVATION
- ● BO-1 BANK OBSERVATION
- WATER EDGE
- SITE BOUNDARY
- HISTORICAL MGP STRUCTURE
- SANITARY PIPELINE
- ○ SAN-MH-1 SANITARY MANHOLE
- ● COAL TAR NAPL/SHEEN OBSERVED IN BEDROCK
- ● COAL TAR NAPL OBSERVED IN OVERBURDEN
- 🟨 MEASURABLE COAL TAR NAPL OBSERVED IN WELL

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/18/04, NAMED AUBMCMAS.DWG. INTO FILE NAMED BASE_MAP.DWG, ALSO PROVIDED BY NYSEG ON 2/18/04. LAST REVISION DATE AND COORDINATE POSITIONING OF THESE FILES UNKNOWN.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.

### UPLAND INVESTIGATION LOCATIONS

| BORING / TEST PIT ID | OBSERVED NAPL AND/OR SHEEN INTERVAL (FEET BELOW GRADE) |
|---|---|
| MW-06-11R | 9 to 11.8, 13.4 to 13.9, 17.5 to 18.2 |
| MW-06-12R | 13 to 14.2, 17.5 |
| MW-06-13R | 11.5, 13 |
| MW-06-15R | 8 to 10', 13.5 to 14.3, 16.7 to 17 |
| MW-06-01RI/RD | 21 to 30 |
| MW-07-17RI/RD | 11.7, 13 to 15, 18 |
| MW-04-02 | 13 to 13.7 |
| MW-05-02R | 10 to 13.4 |
| MW-04-03 | 10 to 10.5 |
| MW-04-05 | 8 to 9.7 |
| MW-05-07R | 8.4 to 11.5, 12.8 to 16 |
| MW-05-08R | 2.8 to 4 |
| TP-04-01 | 12 to 14 |
| TP-04-02 | 11 to 14.5 |
| TP-04-03 | 10 to 11.5 |
| TP-04-04 | 6 to 8 |
| TP-04-05 | 6 to 11 |
| TP-04-06 | 8 to 11 |
| TP-04-07 | 7 to 9.5 |
| TP-04-12 | 9 to 11.8 |
| TP-06-15 | 5 to 8.7 |

NAPL AND/OR SHEEN IN BEDROCK WAS OBSERVED ON FRACTURE SURFACES AND/OR DRILLING RETURN WATER IN THE SPECIFIED INTERVAL.

### OWASCO OUTLET INVESTIGATION LOCATIONS

| BANK OR STREAM CHANNEL SAMPLING ID | OBSERVED NAPL AND/OR HARDENED TAR INTERVAL (FEET BELOW GRADE) |
|---|---|
| BO-7 | Hardened Tar* |
| BO-10 | 1.0 to 2.0* |
| BO-12 | 1.5 to 2.0* |
| BO-13 | 1.5 to 2.0* |
| BO-14 | 1.5 to 2.0* |
| BO-16 | 1.5* |
| BO-17 | 1.5 to 2.5* |
| BO-18 | 1.0 to 1.4* |
| BO-19 | 1.2 to 2.0* |
| BO-21 | 2.4 to 3.0* |
| BO-31 | Hardened Tar* |
| BO-32 | Hardened Tar* |
| BO-33 | Hardened Tar* |
| BO-34 | Hardened Tar* |
| SO-36 | 1.0 to 1.5* |
| SO-37 | 1.0 to 1.5* |
| SO-38 | 1.5 to 2.0* |
| SO-39 | 1.5 to 2.0* |
| SO-40 | 0.5 to 1.0* |
| SO-41 | 0.5 to 1.0* |
| SO-42 | 1.0 to 1.5* |
| SO-43 | 1.0 to 1.5* |
| SO-44 | 1.0 to 1.5* |
| SO-48 | 1.0 to 1.5* |

* SAMPLING METHOD UNABLE TO REACH BOTTOM OF OBSERVED NAPL INTERVAL.

0 30' 60'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## NAPL/SHEEN OBSERVATIONS

ARCADIS BBL
*Infrastructure, environment, facilities*

FIGURE
**12**

SYR-85-NJR WLJ RCA LAYER: ON=*, OFF=REF (FRZ)
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049B01.DWG SAVED: 7/10/2007 1:15 PM LAYOUT: Layout1 PAGESETUP: ---- PENTABLE: PLTFULL.CTB PRINTED: 7/10/2007 1:15 PM BY: RALLEN
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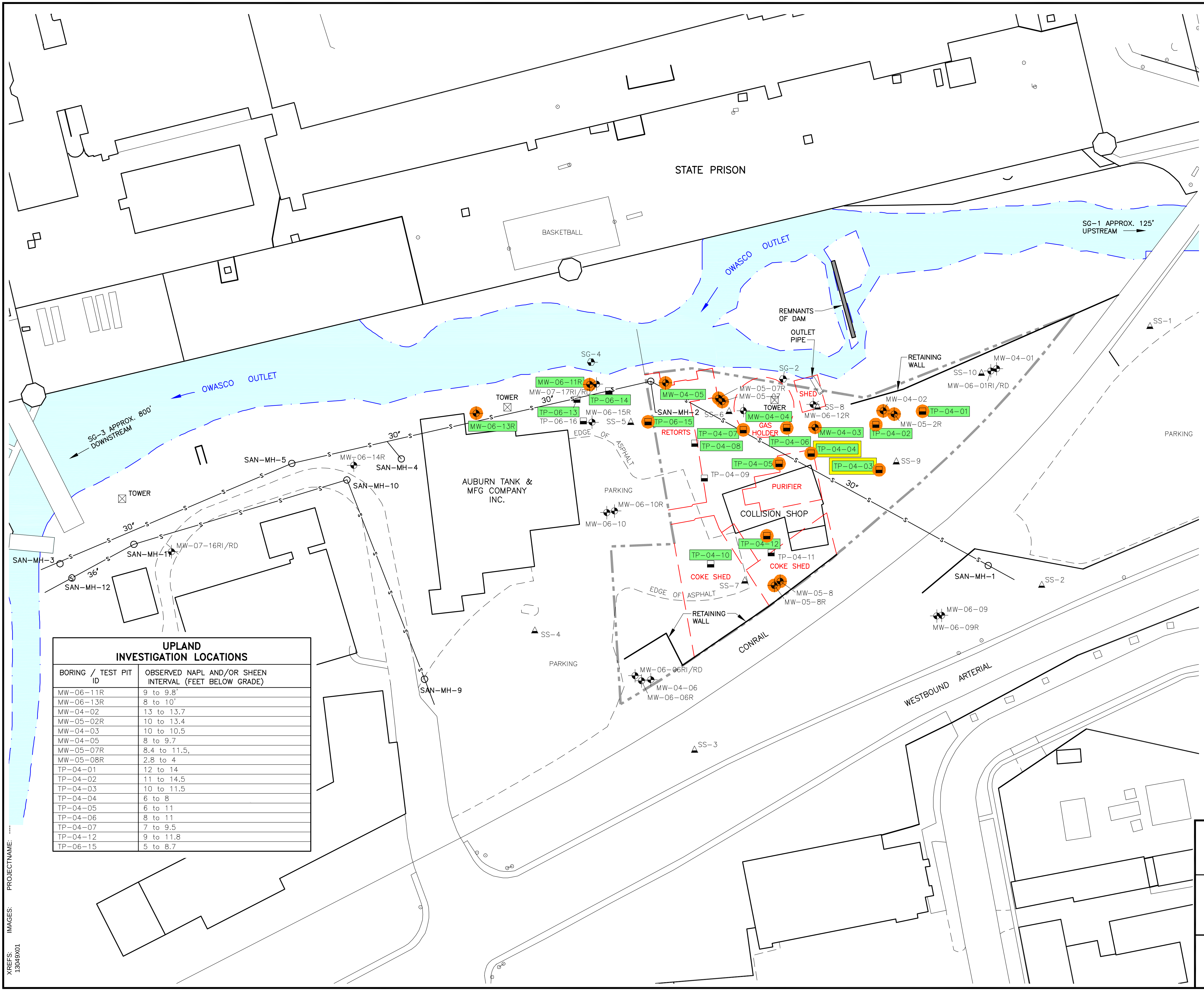


## UPLAND INVESTIGATION LOCATIONS

| BORING / TEST PIT ID | OBSERVED NAPL AND/OR SHEEN INTERVAL (FEET BELOW GRADE) |
|---|---|
| MW-06-11R | 9 to 9.8' |
| MW-06-13R | 8 to 10' |
| MW-04-02 | 13 to 13.7 |
| MW-05-02R | 10 to 13.4 |
| MW-04-03 | 10 to 10.5 |
| MW-04-05 | 8 to 9.7 |
| MW-05-07R | 8.4 to 11.5, |
| MW-05-08R | 2.8 to 4 |
| TP-04-01 | 12 to 14 |
| TP-04-02 | 11 to 14.5 |
| TP-04-03 | 10 to 11.5 |
| TP-04-04 | 6 to 8 |
| TP-04-05 | 6 to 11 |
| TP-04-06 | 8 to 11 |
| TP-04-07 | 7 to 9.5 |
| TP-04-12 | 9 to 11.8 |
| TP-06-15 | 5 to 8.7 |

LEGEND:

| | |
|---|---|
| MW-04-01 | MONITORING WELL |
| TP-04-01 | TEST PIT |
| SS-1 | SURFACE SOIL SAMPLE |
| SG-1 | STAFF GAUGE |
| — · — | WATER EDGE |
| — · — · | SITE BOUNDARY |
| [ ] | HISTORICAL MGP STRUCTURE |
| ——s—— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| ● | COAL TAR NAPL OBSERVED IN OVERBURDEN (DEPTH BELOW GRADE) |
| 🟩 | SUBSURFACE SOIL SAMPLE FROM THIS LOCATION EXCEEDED THE PART 375 RESTRICTED USE SCOs FOR PROTECTION OF PUBLIC HEALTH-COMMERCIAL USE FOR ONE OR MORE PAHs |
| 🟨 | SUBSURFACE SOIL SAMPLE FROM THIS LOCATION EXCEEDED THE PART 375 RESTRICTED USE SCOs FOR PROTECTION OF PUBLIC HEALTH-COMMERCIAL USE FOR ONE OR MORE BTEX COMPOUNDS |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/18/04, NAMED AUBMCMAS.DWG. INTO FILE NAMED BASE_MAP.DWG, ALSO PROVIDED BY NYSEG ON 2/18/04. LAST REVISION DATE AND COORDINATE POSITIONING OF THESE FILES UNKNOWN.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06

0 80' 160'

GRAPHIC SCALE

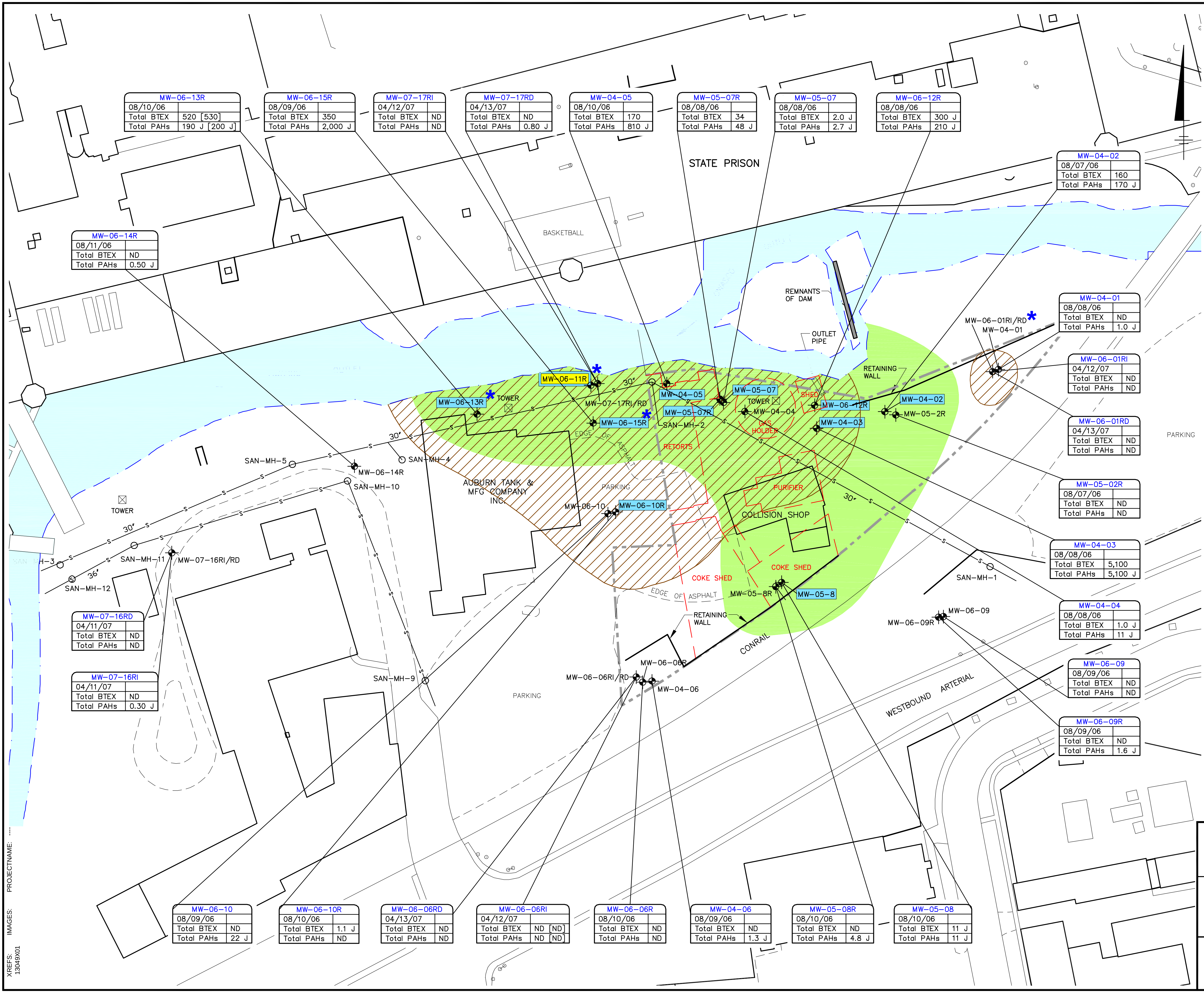
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

**SUBSURFACE SOIL - NAPL OBSERVATIONS AND BTEX/PAH EXCEEDENCES**

ARCADIS

FIGURE
**13**

CITY:SYRACUSE DIV/GROUP:141 DB:NJR JHR RCA LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR: ON=*;OFF=*REF*
G:\CAD\ACT\B0013049\0000\00006\DWG\RI\13049C01.DWG LAYOUT: 13 SAVED: 5/28/2008 12:55 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/28/2008 12:55 PM BY: ALLEN, ROYCE
XREFS: 13049X01 IMAGES: PROJECTNAME: ----



LEGEND:

| | |
|---|---|
| MW-04-01 ⊕ | MONITORING WELL |
| — · — | WATER EDGE |
| — · · — | SITE BOUNDARY |
| ▭ | HISTORICAL MGP STRUCTURE |
| —s— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |
| 🟦 | MOST RECENT GROUNDWATER SAMPLE EXCEEDS THE NYSDEC CLASS GA GROUNDWATER STANDARD OR GUIDANCE VALUE (TOGS 1.1.1.) FOR ONE OR MORE BTEX OR PAH CONSTITUENTS. |
| 🟨 | NAPL PRESENT IN WELL. GROUNDWATER SAMPLE WAS NOT COLLECTED. |
| ▨ | SHALLOW BEDROCK WITH GROUNDWATER EXCEEDING STANDARDS OR GUIDANCE VALUES. |
| 🟩 | OVERBURDEN GROUNDWATER EXCEEDING STANDARDS OR GUIDANCE VALUES. |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.
3. J = THE COMPOUND WAS POSITIVELY IDENTIFIED IN ONE OR MORE CONSTITUENTS, HOWEVER, THE ASSOCIATED NUMERIC VALUE IS AN ESTIMATED CONCENTRATION ONLY.
4. ND = NOT DETECTED.
5. ANALYTICAL RESULTS EXPRESSED AS MICROGRAMS PER LITER (ug/L).
6. * WHERE GROUNDWATER ANALYTICAL DATA DOES NOT EXIST, EXCEEDANCE OF GROUNDWATER STANDARDS OR GUIDANCE VALUES IN OVERBURDEN OR BEDROCK IS INFERRED BASED ON VISUAL OBSERVATIONS OF SAMPLES COLLECTED FROM THE OVERBURDEN OR BEDROCK. THE EXCEEDANCE IS NOT BASED ON ANALYTICAL DATA FROM GROUNDWATER SAMPLES.

0 80' 160'

GRAPHIC SCALE

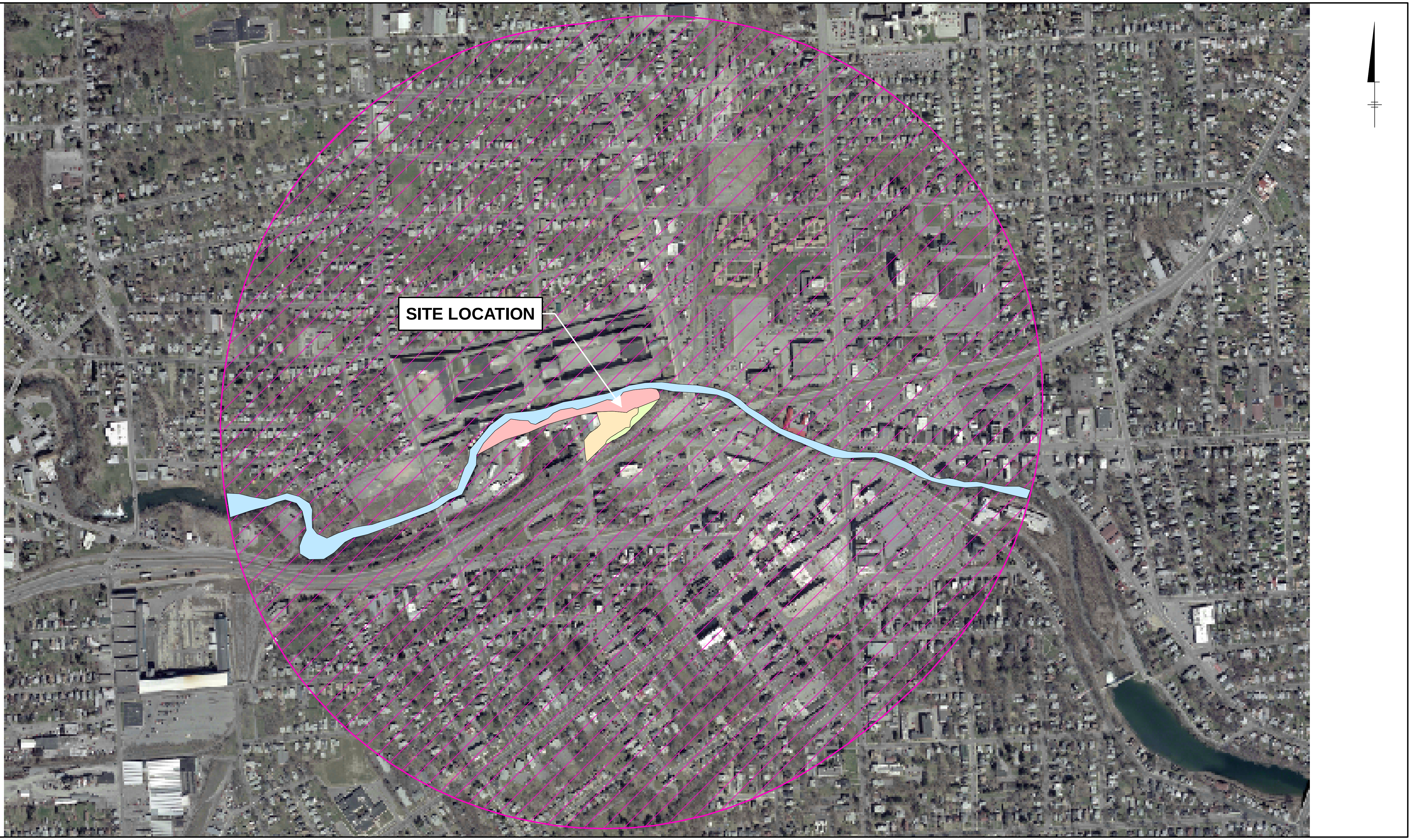
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## GROUNDWATER SAMPLING RESULTS

ARCADIS

FIGURE
**14**

CITY:SYRACUSE DIV/GROUP:141 DB:NJR WLJ RCA LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:ON=*;OFF=*REF*
G:\CAD\ACT\B0013049\0000\00006\DWG\RI\13049C02.DWG LAYOUT: 14 SAVED: 7/24/2008 10:40 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/24/2008 10:41 AM BY: ALLEN, ROYCE
XREFS: 13049X01 IMAGES: PROJECTNAME: ----



LEGEND:

- 🟦 OUTLET
- 🟥 LOWLAND FOREST
- 🟩 UPLAND FOREST
- 🟨 URBAN VACANT LOT
- ▨ RESIDENTIAL/COMMERCIAL/INDUSTRIAL

NOTES:

1. AERIAL PHOTOGRAPHY PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. AERIAL PHOTOGRAPHY FLOWN IN APRIL 2003.

0 700 1,400 Feet

GRAPHIC SCALE

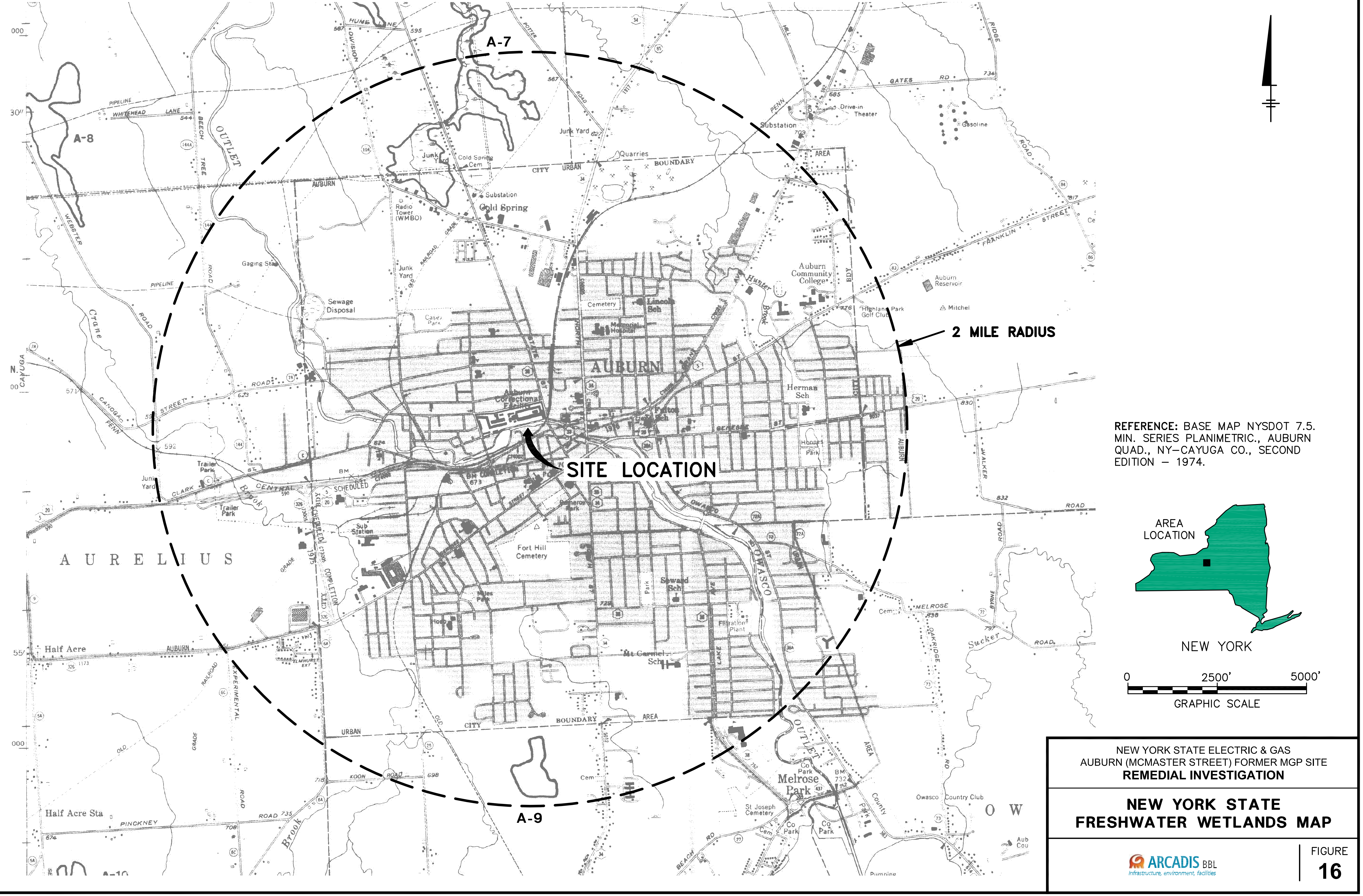
NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## COVERTYPE MAP

ARCADIS BBL
*Infrastructure, environment, facilities*

**FIGURE**
**15**

SYR-85 KEW PGL
NYSEG (13049.006)
Q:\NYSEG\AuburnMGP\RI_WorkPlan\mxd\CoverTypeMap.mxd - 7/2/2007 @ 3:38:15 PM



REFERENCE: BASE MAP NYSDOT 7.5. MIN. SERIES PLANIMETRIC., AUBURN QUAD., NY–CAYUGA CO., SECOND EDITION – 1974.

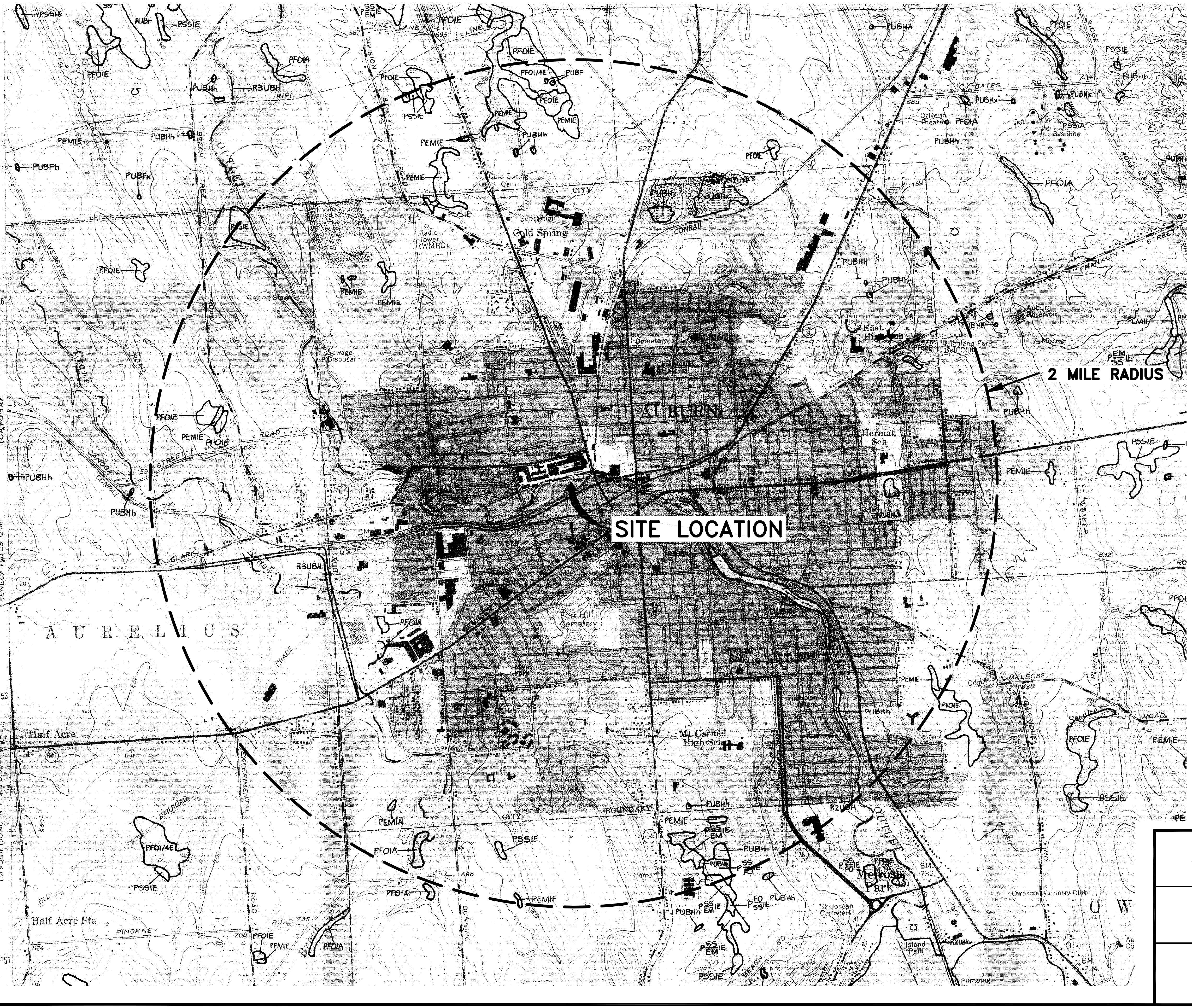
NEW YORK STATE ELECTRIC & GAS
AUBURN (MCMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## NEW YORK STATE FRESHWATER WETLANDS MAP

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
**16**

SYR-85-GHS KLS WLJ LAYER: ON=*, OFF=*REF*
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049B04.DWG SAVED: 7/2/2007 3:37 PM LAYOUT:2 PAGESETUP:RBL-PDF PENTABLE:PLTFULL.CTB PRINTED: 7/9/2007 1:11 PM BY: RALLEN
PROJECTNAME: ----
XREFS: IMAGES:
13049X00 13049X03.tif



0 2500' 5000'

GRAPHIC SCALE

**REFERENCE:** BASE MAP U. S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE. BASE MAP PROVIDED BY USGS., ELMIRA NE., AUBURN. NY, 1995.

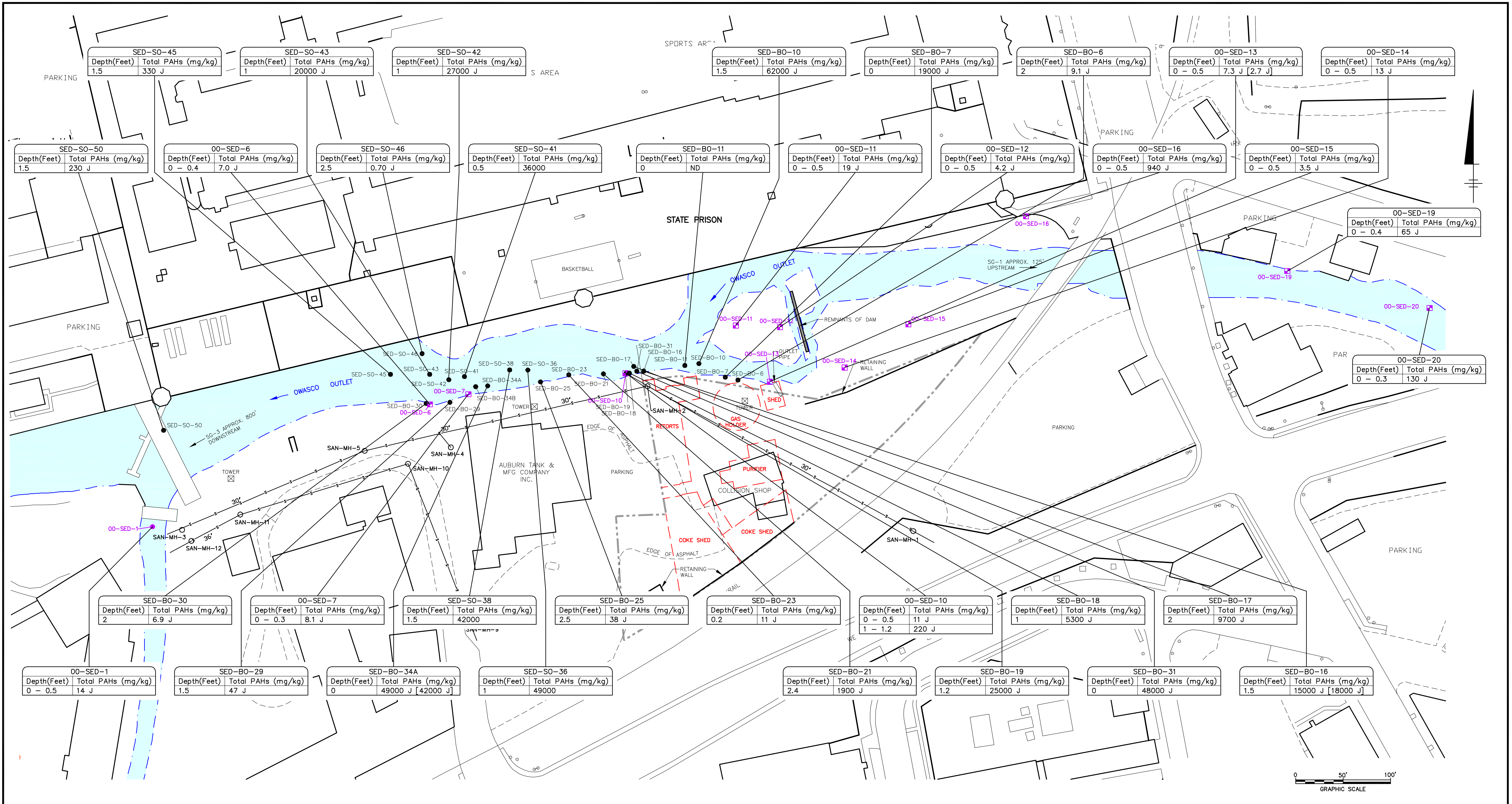
NEW YORK STATE ELECTRIC & GAS
AUBURN (MCMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## NATIONAL WETLANDS INVENTORY MAP

ARCADIS BBL
*infrastructure, environment, facilities*

FIGURE
**17**

SYR-85-GHS KLS WLJ LAYER: ON=*, OFF=*REF*
G:\CAD\ACTIVE\-DWG\ACT\13049006\RI\13049B05.DWG SAVED:7/2/2007 3:24 PM LAYOUT:3 PAGESETUP:RBL-PDF PENTABLE:PLTFULL.CTB PRINTED:7/9/2007 1:12 PM BY:RALLEN
PROJECTNAME:----
XREFS: IMAGES:
13049X00 13049X02.tif



SED-SO-45

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 330 J |

SED-SO-43

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1 | 20000 J |

SED-SO-42

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1 | 27000 J |

SED-BO-10

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 62000 J |

SED-BO-7

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 | 19000 J |

SED-BO-6

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2 | 9.1 J |

00-SED-13

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 7.3 J [2.7 J] |

00-SED-14

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 13 J |

SED-SO-50

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 230 J |

00-SED-6

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.4 | 7.0 J |

SED-SO-46

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2.5 | 0.70 J |

SED-SO-41

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0.5 | 36000 |

SED-BO-11

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 | ND |

00-SED-11

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 19 J |

00-SED-12

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 4.2 J |

00-SED-16

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 940 J |

00-SED-15

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 3.5 J |

00-SED-19

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.4 | 65 J |

00-SED-20

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.3 | 130 J |

SED-BO-30

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2 | 6.9 J |

00-SED-7

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.3 | 8.1 J |

SED-SO-38

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 42000 |

SED-BO-25

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2.5 | 38 J |

SED-BO-23

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0.2 | 11 J |

00-SED-10

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 11 J |
| 1 – 1.2 | 220 J |

SED-BO-18

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1 | 5300 J |

SED-BO-17

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2 | 9700 J |

00-SED-1

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 – 0.5 | 14 J |

SED-BO-29

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 47 J |

SED-BO-34A

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 | 49000 J [42000 J] |

SED-SO-36

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1 | 49000 |

SED-BO-21

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 2.4 | 1900 J |

SED-BO-19

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.2 | 25000 J |

SED-BO-31

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 0 | 48000 J |

SED-BO-16

| Depth(Feet) | Total PAHs (mg/kg) |
|---|---|
| 1.5 | 15000 J [18000 J] |

**LEGEND:**

00-SED-11 ▣ SURFICIAL SEDIMENT SAMPLING LOCATION
SED-SO-47 ● DEEP SEDIMENT SAMPLING LOCATION
— — — WATER EDGE
—·— SITE BOUNDARY
[‾‾] HISTORICAL MGP STRUCTURE
——— SANITARY PIPELINE
○ SAN-MH-1 SANITARY MANHOLE

**NOTES:**

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/18/04, NAMED AUBMCMAS.DWG. INTO FILE NAMED BASE_MAP.DWG, ALSO PROVIDED BY NYSEG ON 2/18/04. LAST REVISION DATE AND COORDINATE POSITIONING OF THESE FILES UNKNOWN.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**REMEDIAL INVESTIGATION**

## TOTAL PAH CONCENTRATIONS IN SEDIMENT

ARCADIS

FIGURE
**18**

CITY: SYRACUSE DIV/GROUP: 141 DB: RCA LAF LD: PIC: PM: M. FRACKLETON TM: LYR: ON=*;OFF=*REF*
G:\CAD\ACT\B0013049\0000\00006\DWG\RI\13049C03.DWG LAYOUT: 18 SAVED: 5/28/2008 1:30 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/28/2008 1:30 PM BY: ALLEN, ROYCE
XREFS: 13049X01 IMAGES: PROJECTNAME: ----

# APPENDICES

# Appendix A

## Test Pit Logs and Monitoring Well Completion Logs

**Date Start/Finish:** 11/30/04
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1069011.47
**Easting:** 823450.98

**Casing Elevation:** 663.65' AMSL
**Surface Elevation:** 664.03' AMSL
**Borehole Depth:** 13.6' bgs

**Geologist:** Kristina Gross

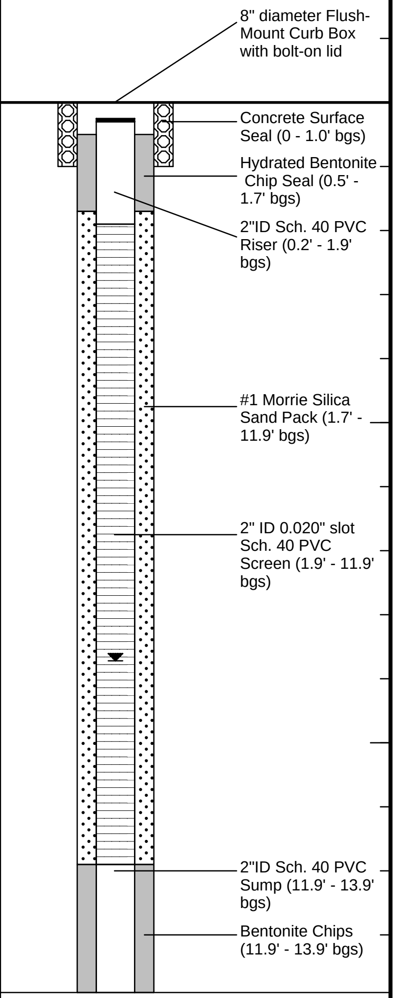
**Well ID:** **MW-04-01**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 665 |  |  |  |  |  |  |  |  |
| 0 |  | 1 | 0-2 | 2<br>5<br>12<br>23 | 17 | 1.6 | 1.0 |  | Brown SILT, little fine Sand and Organics (Leaves, Roots, Wood), stiff, dry.<br>Dark brown fine SAND, trace medium to coarse Sand and Coal fragments, medium dense, dry. |
|  |  | 2 | 2-4 | 5<br>18<br>12<br>23 | 30 | 0.7 | 2.0 |  | Little fine Gravel below 2.0' bgs. |
| 5 | 660 | 3 | 4-6 | 5<br>12<br>14<br>16 | 26 | 0.7 | 1.5 |  | Brown fine SAND, some to little Silt, trace fine Gravel and Coal fragments, medium dense, dry to moist. |
|  |  | 4 | 6-8 | 2<br>3<br>2<br>4 | 5 | 0.1 | 1.5 |  | Pinkish brown SILT, some Clay and fine Sand, trace Coal and Ceramic fragments, slightly plastic, very soft, moist to wet. |
|  | 655 | 5 | 8-10 | WOR<br>WOR<br>2<br>4 | NA | >0.1 | NA |  | Wet at 8.8' bgs. |
| 10 |  | 6 | 10-12 | 10<br>5<br>6<br>8 | 11 | 0.2 | 8.2 |  | Pink SILTY CLAY, trace fine Gravel, trace black mottling, moderately plastic, stiff, wet. |
|  |  | 7 | 12-13.6 | 10<br>12<br>22<br>50/0.1 | 34 | 1.7 | 2.5 |  | Pink CLAY, little Silt and fine Gravel, hard, moist.<br>Refusal at 13.6' bgs. Possible Bedrock.<br>Auger refusal at 13.9' bgs. |
|  | 650 |  |  |  |  |  |  |  |  |
| 15 |  |  |  |  |  |  |  |  |  |

Well Construction



ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level; WOR = Weight of Rod.

**Water Level Data**

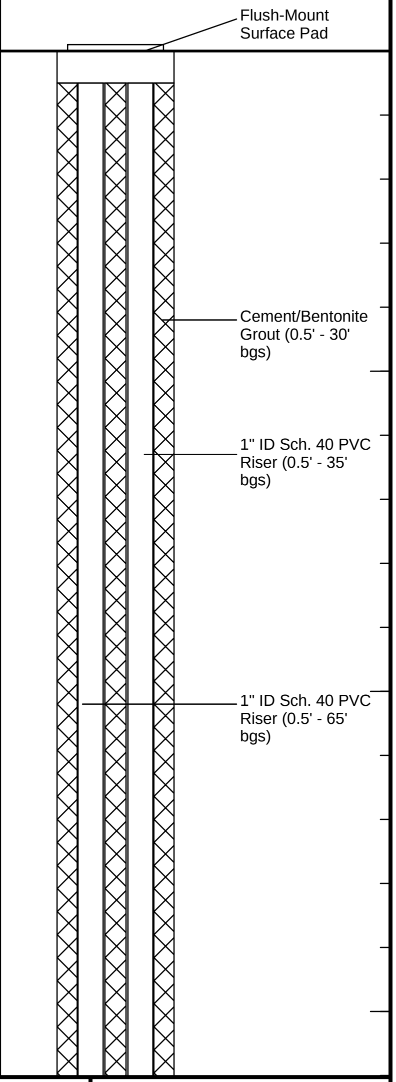
| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 8.72' | 654.93' |
| 4/11/07 | 8.47' | 655.18' |

Depth measured from top of casing.

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 12/11-12/18/06 | **Northing:** | 1069009.68 | **Well ID:** | **MW-06-01RI/RD** |
| **Drilling Company:** | Parratt Wolff | **Easting:** | 823446.15 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Glen/Joel | **Casing Elevation:** | 663.82' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 664.09' AMSL | | |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 80 ' bgs | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Ricardo Jaimes | | |
| **Rig Type:** | ATV Mounted Dierich D-120 | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 665 | | | | | | | | | |
| 0 | | | | | | | | | | For soil descriptions (0-17' bgs) refer to MW-04-01. |
| | | NA | NA | NA | NA | NA | NA | | | |
| | 660 | | | | | | | | | |
| 5 | | | | | | | | | | |
| | | NA | NA | NA | NA | NA | NA | | | |
| | 655 | | | | | | | | | |
| 10 | | | | | | | | | | |
| | | NA | NA | NA | NA | NA | NA | | | |
| | 650 | | | | | | | | | |
| 15 | | NA | NA | NA | NA | NA | NA | | | |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 36.60' | 629.42' |
| 4/11/07-RD | 38.40' | 625.43' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

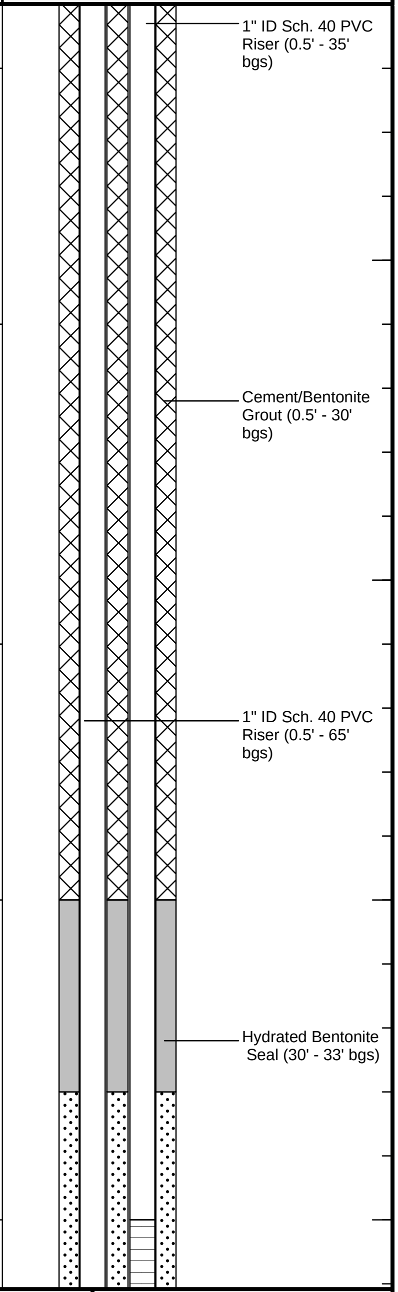
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-01RI/RD**

**Borehole Depth:** 80 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | For soil descriptions (0-17' bgs) refer to MW-04-01. |
| 20 | 645 | 1 | 17-21 | NA | 93 | 3.8 | 0.0 | | ha/m<br>hz/sw | Bluish gray LIMESTONE, laminated, Styolites. [Onondaga] |
| 25 | 640 | 2 | 21-26 | NA | 94 | 4.98 | 0.0 | | hz/sw<br>hz/sw<br>ha/sw<br>hz/m | Bluish dark gray LIMESTONE, laminated, Styolites, isloated blebs of Tar like material. |
| 30 | 635 | 3 | 26-30 | NA | 97.5 | 4.0 | 0.1 | | hz/sw<br>hz/sw<br>hz/sw<br>hz/sw | Bluish dark gray LIMESTONE, laminated, Styolites (vertical), trace Nodules, miniscule blebs of Tar like material. |
| 35 | 630 | 4 | 30-35 | NA | 89.8 | 5.0 | 0.0 | | hz/sw<br>ha/m<br>hz<br>hz<br>hz | Bluish dark gray LIMESTONE, laminated, trace Fossils and Pyrite concretions, Styolites. |
| | | | | | | | | | | Bluish gray LIMESTONE, laminated, Styolites. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 36.60' | 629.42' |
| 4/11/07-RD | 38.40' | 625.43' |

Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-01RI/RD.dat Date: 2/22/07

**Client:**
New York State Electric and Gas

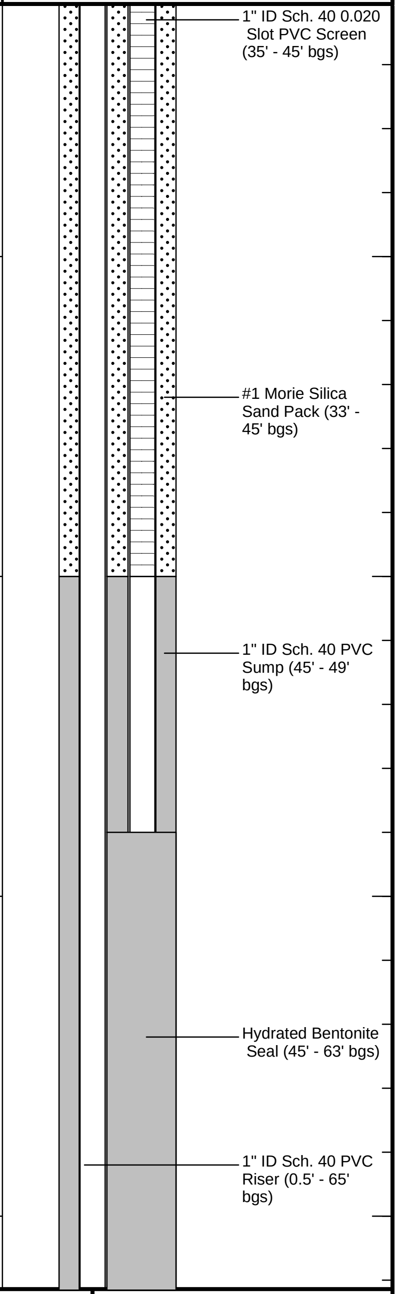
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-01RI/RD**

**Borehole Depth:** 80 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 625 | 5 | 35-40 | NA | 88.9 | 5.0 | 0.0 |  | hz/m<br>hz/sw<br>hz/m | Bluish gray LIMESTONE, laminated, Styolites. |
| 40 | 620 | 6 | 40-45 | NA | 99 | 4.58 | 0.0 |  | hz<br>hz<br>hz<br>la | Bluish gray LIMESTONE, laminated, some laminations with Nodules, trace Fossils. |
| 45 | 615 | 7 | 45-50 | NA | 93.4 | 5.2 | 0.0 |  | la/m<br>m<br>m<br>la/f | Bluish gray, LIMESTONE, laminated, trace Fossils. |
| 50 | 610 | 8 | 50-55 | NA | 86.6 | 5.1 | 0.0 |  | la/f<br>hz/m<br>hz/sw<br>hz/ff<br>hz/f | Gray coarse LIMESTONE, trace to no Fossils, Styolites |
| 55 |  |  |  |  |  |  |  |  |  | Dark gray coarse LIMESTONE, Fossils and Styolites. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 36.60' | 629.42' |
| 4/11/07-RD | 38.40' | 625.43' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

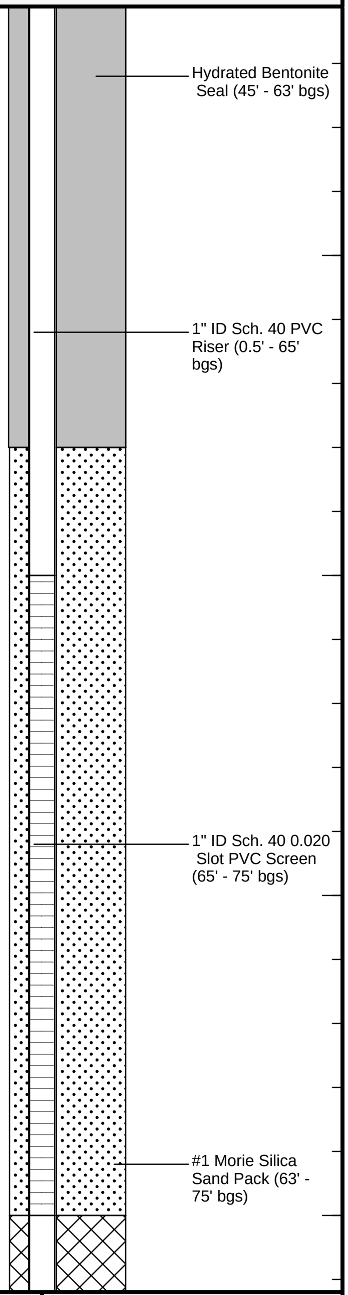
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-01RI/RD**

**Borehole Depth:** 80 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 60 | 605 | 9 | 55-60 | NA | 95.2 | 5.0 | 0.0 | | | Dark gray coarse LIMESTONE, Fossils and Styolites.<br>Dark gray Calcareous SANDSTONE, black ?Nodules?, Fossils. [Oriskany Formation]<br>Dark gray LIMESTONE, laminations and seams of darker Limestone, some laminations with small Fossils, Styolites, micro folding. |
| 65 | 600 | 10 | 60-65 | NA | 100 | 5.0 | 0.0 | | ha<br>hz/f<br>hz/f | Dark gray fossiliferous microcrystalline LIMESTONE, coral Fossils, some laminations and Styolites. |
| 70 | 595 | 11 | 65-70 | NA | 93 | 5.0 | 0.0 | | hz<br>hz/f<br>hz/f<br>hz/f<br>hz/f<br>la/sw<br>la/f | Dark gray LIMESTONE, some darker laminations, Styolites. |
| 75 | 590 | 12 | 70-75 | NA | 100 | 5.0 | 0.0 | | ha/f<br>hz/m<br>hz/f<br>hz/f<br>la/f<br>hz/f/sw | Gray LIMESTONE with seams of darker color, Fossils, Styolites.<br>Increase seams of darker color and unconformity or miso folding between 73.5 - 75' bgs. |
| | | | | | | | | | | Dark gray LIMESTONE, laminations and seams of darker Limestone, some laminations with small Fossils, Styolites, micro folding |

**Well Construction**



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 36.60' | 629.42' |
| 4/11/07-RD | 38.40' | 625.43' |
| | | |

Depth measured from top of casing.

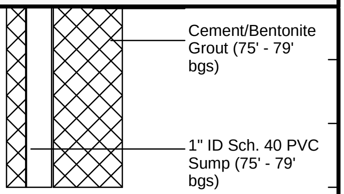
**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-01RI/RD**

**Borehole Depth:** 80 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 585 | 13 | 75-80 | NA | 77.6 | 5.0 | 0.0 | | hz/f<br>hz/f<br>v/m<br>ha/f<br>la/f<br>ha/f<br>la/f<br>hz/f<br>ha/f | Dark gray LIMESTONE, laminations and seams of darker Limestone, some laminations with small Fossils, Styolites, micro folding | Cement/Bentonite Grout (75' - 79' bgs)<br>1" ID Sch. 40 PVC Sump (75' - 79' bgs) |
| 85 | 580 | | | | | | | | | | |
| 90 | 575 | | | | | | | | | | |
| 95 | 570 | | | | | | | | | | |



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 36.60' | 629.42' |
| 4/11/07-RD | 38.40' | 625.43' |

Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-01RI/RD.dat Date: 2/22/07

**Date Start/Finish:** 12/1/04
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068976.48
**Easting:** 823356.78

**Casing Elevation:** 663.38' AMSL
**Surface Elevation:** 663.82' AMSL
**Borehole Depth:** 13.7' bgs

**Geologist:** Kristina Gross

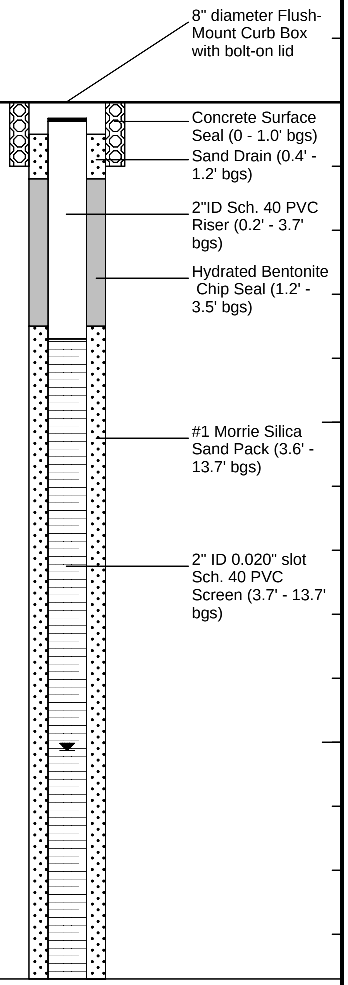
**Well ID:** **MW-04-02**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 665 |  |  |  |  |  |  |  |  |
| 0 |  | 1 | 0-2 | 2<br>9<br>11<br>12 | 20 | 1.7 | 0.8 |  | Brown SILT, little fine Sand, some Organics (Grass, Roots, Wood), medium stiff, dry.<br>Blackish brown fine SAND, little Coal fragments, tan Brick, and Silt, loose, dry. |
|  | 660 | 2 | 2-4 | 6<br>4<br>4<br>2 | 8 | 0.9 | 4.4 |  | Little red Brick from 2.0' - 4.0' bgs. |
| 5 |  | 3 | 4-6 | 1<br>1<br>2<br>2 | 3 | 0.7 | 2.8 |  | Trace Ceramic fragments from 4.0' - 6.0' bgs. |
|  |  | 4 | 6-8 | 2<br>4<br>5<br>4 | 9 | 0.5 | 4.0 |  | Trace black staining below 6.0' bgs. |
|  | 655 | 5 | 8-10 | 1<br>1<br>2<br>2 | 3 | 1.2 | 2.8 |  | Pinkish brown SILT, some fine Sand, trace Coal fragments, little to trace black staining, soft, moist.<br>Black staining increases with depth, from little to some. |
| 10 |  | 6 | 10-12 | 6<br>6<br>2<br>3 | 8 | 0.4 | 2.8 |  | Gray ASH and SILT, some fine Sand, loose, moist. |
|  |  | 7 | 12-13.7 | WOR/2'<br>10<br>25 | NA | 0.4 | 10.6 |  | Pinkish brown SILT, some fine to coarse Sand and fine to medium Gravel, trace Clay, very soft, wet, slight to moderate MGP-type odor, slight rainbow sheen, trace pin-prick sized brown NAPL blebs. Moderate to heavy rainbow sheen and little brownish-black sticky NAPL at bottom of spoon.<br>Refusal at 13.7' bgs. Possible Bedrock. |
| 15 | 650 |  |  |  |  |  |  |  |  |

Well Construction



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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level; WOR = Weight of Rod.

Sample TW-04-02-12-14' (1020) collected for BTEX, PAH's, and Cyanide.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 10.13' | 653.25' |
| 4/11/07 | 9.45' | 653.93' |

Depth measured from top of casing.

**Date Start/Finish:** 3/7,9,10,15/05
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068973.79
**Easting:** 823365.97

**Casing Elevation:** 663.30' AMSL
**Surface Elevation:** 663.63' AMSL
**Borehole Depth:** 30.0' bgs

**Geologist:** Kristina Gross

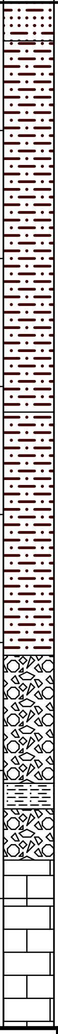
**Well ID:** **MW-05-02R**

**Client:** New York State Electric and Gas

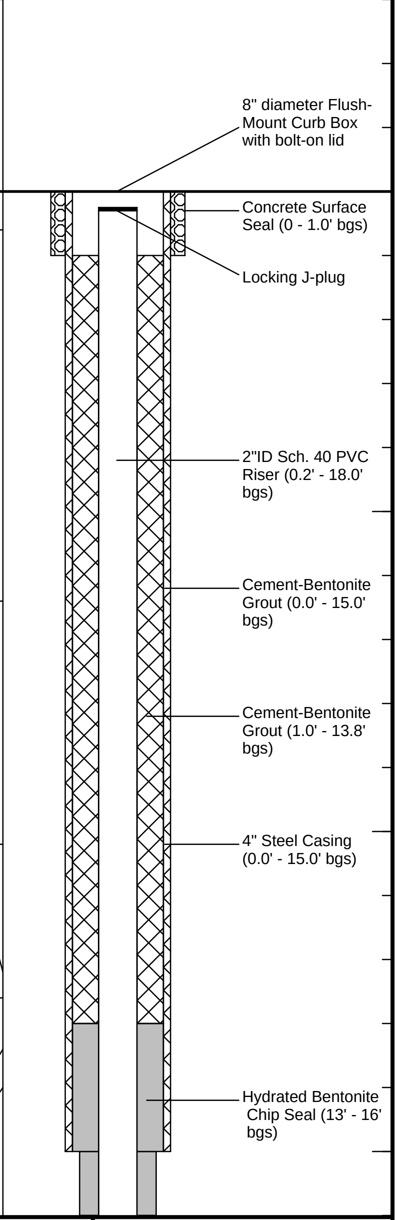
**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 665 |  |  |  |  |  |  |  |  |
| 0 |  | 1 | 0-2 | 4<br>7<br>10<br>11 | 17 | 1.1 | 0.1 |  | Brown fine SAND and SILT, little Organics, frozen.<br>Dark brown SILT, some fine Sand, little Coal and red Brick fragments, medium dense, dry. |
|  | 660 | 2 | 2-4 | 12<br>12<br>6<br>7 | 18 | 0.4 | 0.2 |  |  |
| 5 |  | 3 | 4-6 | 10<br>9<br>14<br>9 | 23 | 1.1 | 0.5 |  | Refusal at 4.0' bgs. Possible concrete slab, move 3' east and continue boring. |
|  |  | 4 | 6-8 | 6<br>6<br>4<br>5 | 10 | 0.8 | 0.5 |  | Some black staining below 6.0' bgs.<br>Orangish-brown SILT, some fine Sand, little Coal fragments, little black staining, slightly plastic, wet. |
|  | 655 | 5 | 8-10 | 1<br>1<br>8<br>7 | 9 | 0.6 | 10.4 |  | Trace medium Gravel, some black staining below 8.0' bgs.<br>Trace goldish-brown oily NAPL blebs, slight MGP-type odor. |
| 10 |  | 6 | 10-12 | 1<br>1<br>11<br>4 | 12 | 0.5 | 101 |  | Black stained fine GRAVEL, little Silt and fine to coarse Sand, heavy MGP-type odor, slight rainbow sheen, some goldish-brown oily NAPL, loose, wet.<br>Pink CLAYEY SILT, little fine Gravel, heavy rainbow sheen, little goldish-brown oily NAPL, heavy black staining, strong MGP-type odor. [FILL] |
|  | 650 | 1 | 12-14 | 11<br>30<br>50/0.4 | 0.0 | 0.8 | 59.3 | BKZ<br>LA<br>HZ | Break zone from 12.0' - 12.7' bgs.<br>Gray LIMESTONE fragments and TILL, heavy rainbow sheen, little goldish-brown oily NAPL (possibly from above), moderate MGP-type boring.<br>Medium gray LIMESTONE, finely laminated. |
| 15 |  | 2 | 14-17 | NA | 27 | 3.0 | 0.0 | LA<br>LA<br>LA<br>LA<br>BKZ<br>HZ HA | Medium gray LIMESTONE.<br>Vertical break zone from 14.1' - 15.75' bgs.<br>Break zone from 12.2' - 12.6' bgs. |

**Geologic Column**



**Well Construction**



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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
Run 3 is off-set slightly from run 2, so they overlapped.
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; VB = Vertical Break; V = Vertical Fracture.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 9.13' | 654.17' |
| 4/11/07 | 9.65' | 653.65' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

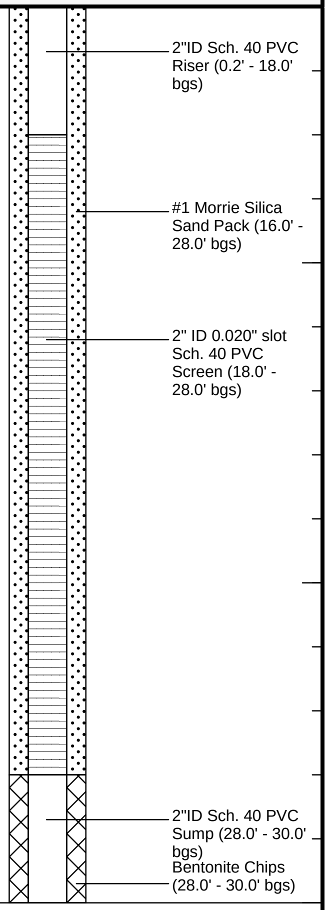
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-05-02R**

**Borehole Depth:** 30.0' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | 2 | 14-17 | NA | 27 | 3.0 | 0.0 |  | HA | Medium gray LIMESTONE. |
|  | 645 | 3 | 15-20 | NA | 71 | 4.6 | 0.0 |  | VB<br>HZ<br>LA<br>BKZ | Gray LIMESTONE, laminated, fresh to slightly weathered, hard.<br>Silt and very fine Gravel in seam.<br>Break zone from 18.9' - 19.0' bgs |
| 20 | 640 | 4 | 20-24.5 | NA | 65 | 5.2 | 0.0 |  | HZ<br>HZ<br>HZ&V<br>HZ<br>LA<br>HA | Gray LIMESTONE.<br>Several solution filled hairline fractures from 22.55' - 22.65' bgs.<br>Silt seam from 23.4' - 23.45' bgs. |
| 25 |  | 5 | 24.5-27 | NA | 78 | 2.75 | 0.0 |  | HZ<br>HZ<br>HZ<br>HZ | Gray LIMESTONE, some Chert inclusions ranging in size from coarse Gravel to softball sized, hard. |
| 30 | 635 | 6 | 27-30 | NA | 100 | 2.9 | 0.0 |  | HZ<br>HZ<br>HZ<br>HZ | Gray LIMESTONE, little fine Gravel sized Chert nodules, very hard.<br>Green mineral at 28' bgs.<br>0.25" BKZ in fracture. |
| 35 | 630 |  |  |  |  |  |  |  |  |  |

Well Construction



ARCADIS BBL
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
Run 3 is off-set slightly from run 2, so they overlapped.
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; VB = Vertical Break; V = Vertical Fracture.

**Water Level Data**

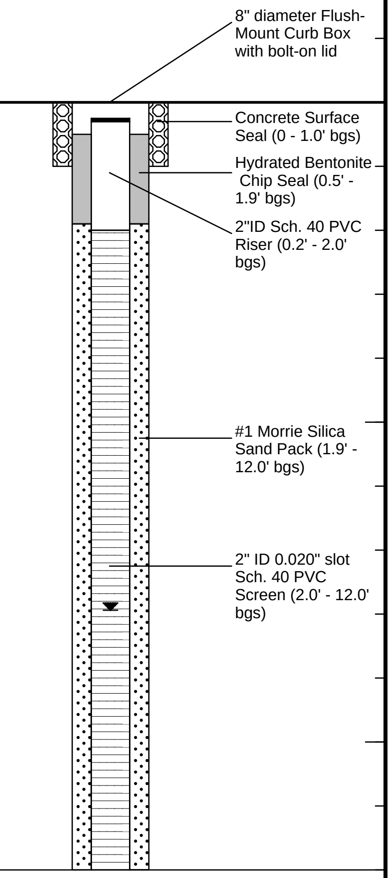
| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 9.13' | 654.17' |
| 4/11/07 | 9.65' | 653.65' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-05-02R.dat Date: 3/24/05

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 12/1/04 | **Northing:** | 1068962.79 | **Well ID:** | **MW-04-03** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823300.23 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 661.34' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger | **Surface Elevation:** | 661.87' AMSL | | |
| **Sampler Size:** | 2" Split Spoon | **Borehole Depth:** | 12.0' bgs | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Kristina Gross | | |
| **Rig Type:** | CME-55 Truck Mount | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 660 | 1 | 0-2 | 4<br>4<br>7<br>4 | 11 | 1.1 | 1.0 | | Brown SILT, some Organics (Grass, Leaves, Roots, Wood) and fine Sand, loose, dry.<br>Brown fine to coarse SAND, some red and tan Brick fragments, Coal fragments, Slag, loose, dry. | |
| | | 2 | 2-4 | 3<br>3<br>3<br>2 | 6 | 0.8 | 1.3 | | | |
| 5 | | 3 | 4-6 | 6<br>6<br>6<br>10 | 12 | 0.6 | 1.7 | | Light brown SILT, little Clay and fine Sand, trace Coal fragments, medium dense, slightly plastic, dry. | |
| | 655 | 4 | 6-8 | 2<br>2<br>2<br>1 | 4 | 0.6 | 1.3 | | Trace red Brick fragments, moist, trace black staining, below 6.0' bgs.<br>Black staining increasing with depth, from trace to heavy. | |
| | | 5 | 8-10 | 1<br>4<br>4<br>2 | 8 | 0.9 | 12.9 | | Black stained SILT, little Clay and fine to coarse Sand, wet, slight MGP-type odor, moderate rainbow sheen. | |
| 10 | 650 | 6 | 10-12 | 1<br>1<br>8<br>50/0.1 | 9 | 1.4 | 48.4 | | Moderate to strong MGP-type odor, moderate rainbow sheen, little black sticky NAPL in fine Sand seams, from 10' - 10.5' bgs.<br>Pink CLAY, little fine Gravel and Silt, hard, moist, moderate MGP-type odor.<br>Refusal at 12.0' bgs. Possible Bedrock. | |
| 15 | | | | | | | | | | |



**ARCADIS BBL**
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

Sample TW-04-03-10-10.5' (1320) collected for BTEX, PAH's, and Cyanide.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 7.94' | 653.40' |
| 4/11/07 | 7.73' | 653.61' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Div 11\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-04-03.dat Date: 12/13/04

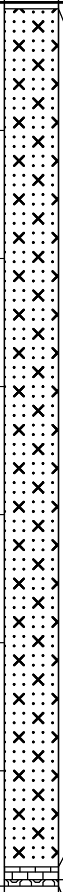
| | |
|---|---|
| **Date Start/Finish:** | 12/1/04 |
| **Drilling Company:** | Lyon Drilling |
| **Driller's Name:** | Harry Lyon |
| **Drilling Method:** | Hollow Stem Auger |
| **Sampler Size:** | 2" Split Spoon |
| **Auger Size:** | 4 1/4" ID |
| **Rig Type:** | CME-55 Truck Mount |

| | |
|---|---|
| **Northing:** | 1068976.67 |
| **Easting:** | 823240.76 |
| **Casing Elevation:** | 659.08' AMSL |
| **Surface Elevation:** | 659.37' AMSL |
| **Borehole Depth:** | 13.8' bgs |
| **Geologist:** | Kristina Gross |

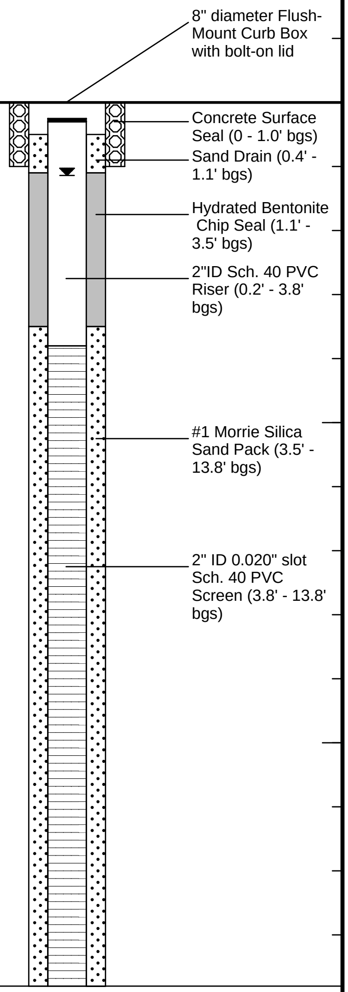
| | |
|---|---|
| **Well ID:** | **MW-04-04** |
| **Client:** | New York State Electric and Gas |
| **Location:** | McMaster Street<br>Auburn, NY |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | |
| 0 | | 1 | 0-2 | 4<br>4<br>3<br>2 | 7 | 1.1 | 0.0 | Brown SILT and ORGANICS (Grass, Leaves, Wood), medium soft, dry.<br>Brownish-black fine to coarse SAND, COAL Fragments, red and tan BRICK, and SLAG, very loose to loose, dry. |
| | | 2 | 2-4 | 2<br>1<br>2<br>2 | 3 | 1.0 | 0.1 | |
| 5 | 655 | 3 | 4-6 | 4<br>4<br>2<br>1 | 6 | 0.4 | 0.7 | Wet at 5.0' bgs. |
| | | 4 | 6-8 | 1<br>WOH<br>1<br>1 | NA | 0.2 | 1.2 | Trace black stained Wood at 6.0' bgs. |
| | 650 | 5 | 8-10 | 2<br>WOR<br>1<br>WOH | NA | 0.2 | 2.7 | Slight MGP-type odor, trace rainbow sheen, from 8.0' - 10.0' bgs. |
| 10 | | 6 | 10-12 | 3<br>WOH<br>1<br>1 | NA | 0.2 | 0.5 | |
| | | 7 | 12-13.8 | 7<br>18<br>7<br>21 | 25 | 1.8 | 17.7 | Slight MGP-type odor, little rainbow sheen, from 12.0' - 13.5' bgs.<br>Red BRICK, moderate MGP-type odor, moderate rainbow sheen. |
| | | | | | | | | MORTAR. Likely floor of former gas holder. |
| 15 | 645 | | | | | | | |

Geologic Column



Well Construction



ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level; WOH/R = Weight of Hammer/Rod.

Sample TW-04-04-12-13.7' (1605) collected for BTEX, PAH's, and Cyanide.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 1.14' | 657.94' |
| 4/11/07 | 1.60' | 657.48' |

Depth measured from top of casing.

**Date Start/Finish:** 12/2/04
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068999.68
**Easting:** 823176.04

**Casing Elevation:** 659.21' AMSL
**Surface Elevation:** 659.43' AMSL
**Borehole Depth:** 9.7' bgs

**Geologist:** Kristina Gross

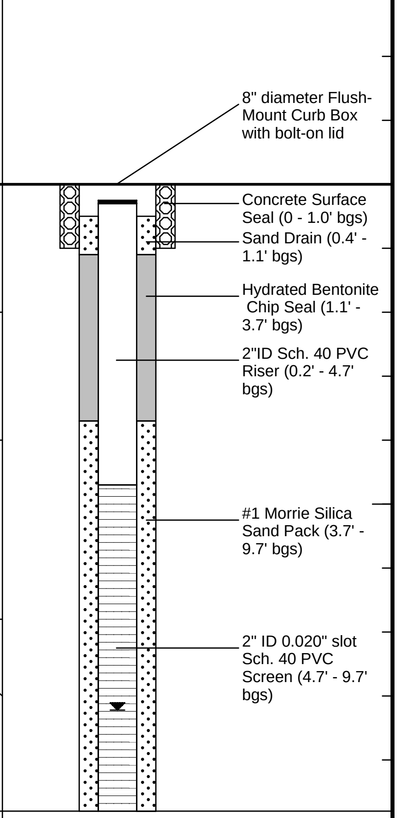
**Well ID:** **MW-04-05**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | |
| 0 | | 1 | 0-2 | 2<br>3<br>3<br>3 | 6 | 0.6 | 0.0 | | Brown SILT, some Organics (Grass, Leaves, Wood), trace Glass, soft, dry. |
| | | 2 | 2-4 | 1<br>1<br>1<br>2 | 2 | 0.2 | 0.0 | | Brown fine to medium SAND, little crushed tan Brick, trace Slag, very loose, dry. |
| 5 | 655 | 3 | 4-6 | 3<br>7<br>11<br>7 | 18 | 0.3 | 0.0 | | Brown fine SAND, little fine Gravel and red Brick fragments, trace Coal fragments, medium dense, dry. |
| | | 4 | 6-8 | 2<br>2<br>2<br>3 | 4 | 1.6 | 2.7<br>0.8 | | Little Silt, slight MGP-type odor, moderate black staining, from 6.0' - 6.8' bgs.<br>Brown SILT, trace fine Gravel and Clay, soft, moist, trace black staining, no odor. |
| | 650 | 5 | 8-9.7 | 3<br>1<br>WOH<br>50/0.1 | NA | 1.2 | 80.2 | | Black stained, partially decomposed, WOOD, trace Silt and fine Sand, wet, moderate MGP-type odor, very heavy black staining, little rainbow sheen, trace sticky black NAPL coating Wood surfaces. Moderate to heavy sheen on rods.<br>Refusal at 9.7' bgs. Possible Bedrock. |
| 10 | | | | | | | | | |
| | 645 | | | | | | | | |
| 15 | | | | | | | | | |

Well Construction



ARCADIS BBL
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level; WOH/R = Weight of Hammer/Rod.

Sample TW-04-05-8.0-9.7' (1130) collected for BTEX, PAH's, and Cyanide.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 8.22' | 650.99' |
| 4/11/07 | 7.20' | 652.01' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Div 11\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-04-05.dat Date: 12/13/04

| | | | |
|---|---|---|---|
| **Date Start/Finish:** | 11/30/04 | **Northing:** | 1068753.36 |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823163.87 |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 668.07' AMSL |
| **Drilling Method:** | Hollow Stem Auger | **Surface Elevation:** | 668.67' AMSL |
| **Sampler Size:** | 2" Split Spoon | **Borehole Depth:** | 15.3' bgs |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Kristina Gross |
| **Rig Type:** | CME-55 Truck Mount | | |

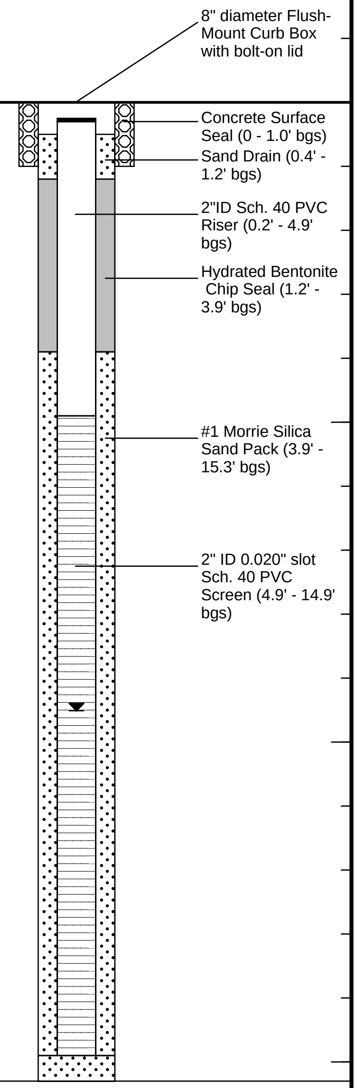
**Well ID:** **MW-04-06**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | 670 | | | | | | | | |
| 0 | | 1 | 0-2 | 2<br>2<br>15<br>36 | 17 | 1.7 | 2.3 | | Brown fine SAND, some Silt, medium dense, dry.<br>CONCRETE Fragments and medium GRAVEL, loose, dry. |
| | 665 | 2 | 2-4 | 7<br>10<br>10<br>7 | 20 | 0.8 | 1.1 | | |
| 5 | | 3 | 4-6 | 2<br>3<br>3<br>4 | 6 | 0.0 | 1.6 | | No Recovery. |
| | | 4 | 6-8 | 4<br>4<br>2<br>1 | 6 | 0.6 | 1.6 | | Brown fine SAND, some fine to medium Gravel, loose, dry. |
| | 660 | 5 | 8-10 | 4<br>3<br>10<br>20 | 13 | 0.4 | 0.3 | | Some Concrete and red Brick, below 8.0' bgs. |
| 10 | | 6 | 10-12 | 4<br>4<br>10<br>6 | 14 | 1.0 | 1.3 | | Pink CLAY, some Silt, little fine Sand and fine Gravel, medium dense, slightly plastic, moist. |
| | 655 | 7 | 12-14 | 4<br>8<br>13<br>20 | 21 | 0.9 | 2.0 | | |
| | | 8 | 14-14.8 | 11<br>50/0.3 | NA | 0.1 | NA | | ROCK Fragments.<br>Refusal at 14.8' bgs. Possible Bedrock. |
| 15 | | | | | | | | | Auger refusal at 15.3' bgs. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

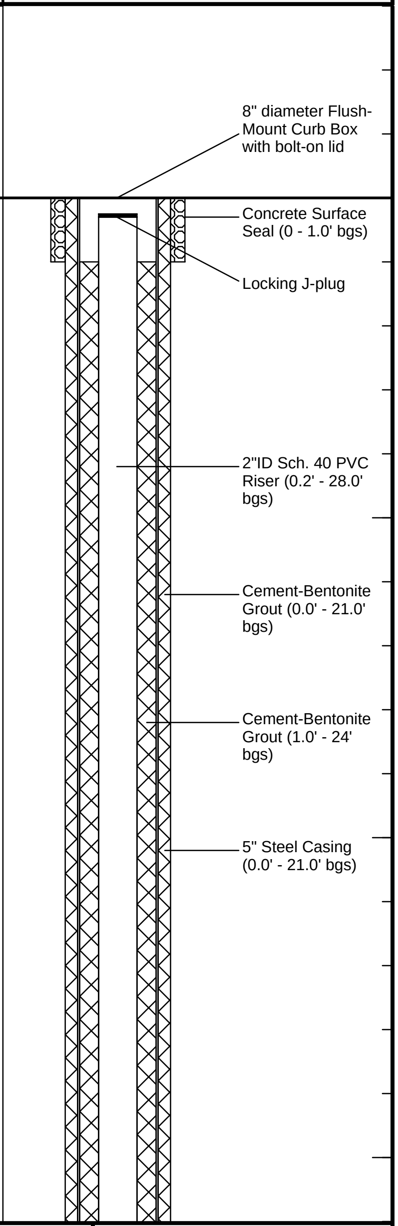
| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 9.51' | 658.56' |
| 4/11/07 | 9.79' | 658.28' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Div 11\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-04-06.dat Date: 12/13/04

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 5/2,8,9/06 | **Northing:** | 1068752.40 | **Well ID:** | **MW-06-6R** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823156.09 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 667.62' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 668.01' AMSL | | |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 40' bgs | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Jennifer Sandorf | | |
| **Rig Type:** | CME-55 Truck Mount | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 670 | | | | | | | | | | |
| 0 | | | | | | | | | | See MW-04-06 for soil descriptions. No sampling conducted to 18' bgs. | |
| | 665 | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| | 660 | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| | 655 | | | | | | | | | | |
| 15 | | | | | | | | | | | |



ARCADIS BBL
Infrastructure, environment, facilities

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NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 21.72' | 645.90' |
| | | |
| | | |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-6R.dat Date: 5-17-06

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

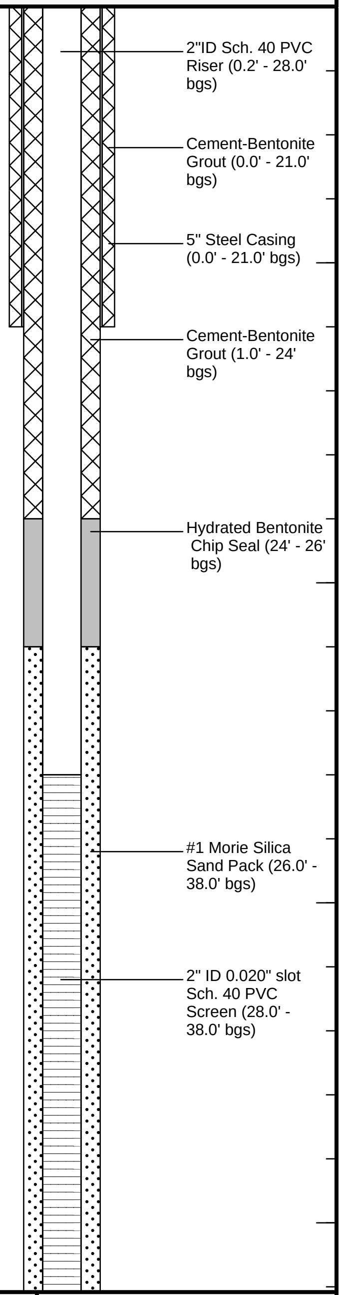
**Well ID:** **MW-06-6R**

**Borehole Depth:** 40' bgs

Depth (ft. bgs): 20, 25, 30, 35
Elevation (ft. AMSL): 650, 645, 640, 635

| Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | See MW-04-06 for soil descriptions. No sampling conducted to 18' bgs. |
| 1 | 18-19 | 8<br>12<br>42<br>50/0.2 | 54 | 1.2 | 0.1 | | Gray brown SILT, little Clay, trace fine to coarse sub-angular Gravel, slightly plastic, stiff, wet. |
| 2 | 19-21 | NA | 0.0 | 1.5 | 0.0 | ha/f<br>v/f | Gray ROCK fragments (Limestone), some Silt, little fine Sand, moderately dense, loose at bottom, wet.<br>Blue gray LIMESTONE, slightly laminated with dark gray and white bands, fresh to slightly weathered, hard. Broken zones from 19' - 19.3' bgs and 19.9' - 20.1' bgs. |
| 3 | 21-25.2 | NA | 52 | 4.2 | 0.0 | la/f<br>hz/f<br>hz/f<br>la/f<br>v<br>hz/f<br>la/f | Blue gray LIMESTONE, laminated, hard. Broken zone from 21.5' - 21.6' bgs.<br>Pieces of >2" fresh and slightly weathered from 23.9' - 24.8' bgs, sediment on weathered hz at bottom of core. |
| 4 | 25.2-30 | NA | 82 | 5.0 | 0.0 | hz/f<br>hz/f<br>hz/f<br>la/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, hard. Broken zone from 25.2' - 25.6' bgs. |
| 5 | 30-35 | NA | 96 | 5.0 | 0.0 | hz/f<br>hz/f<br>hz/sw<br>hz/f<br>hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, hard. |
| 6 | 35-40 | NA | 95 | 5.0 | 0.0 | hz/f | Blue gray LIMESTONE, laminated, hard. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 21.72' | 645.90' |
| | | |
| | | |

Depth measured from top of casing.

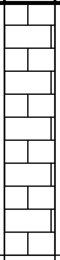
Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-6R.dat Date: 5-17-06

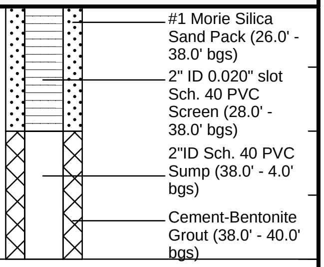
**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** MW-06-6R

**Borehole Depth:** 40' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 630 | 6 | 35-40 | NA | 95 | 5.0 | 0.0 |  | hz/f<br>hz/f<br>la/f<br>hz/f | Blue gray LIMESTONE, laminated, hard. | |
| 40 | | | | | | | | | | | |
| | 625 | | | | | | | | | | |
| 45 | | | | | | | | | | | |
| | 620 | | | | | | | | | | |
| 50 | | | | | | | | | | | |
| | 615 | | | | | | | | | | |
| 55 | | | | | | | | | | | |



ARCADIS BBL
Infrastructure, environment, facilities

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NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 21.72' | 645.90' |
| | | |
| | | |

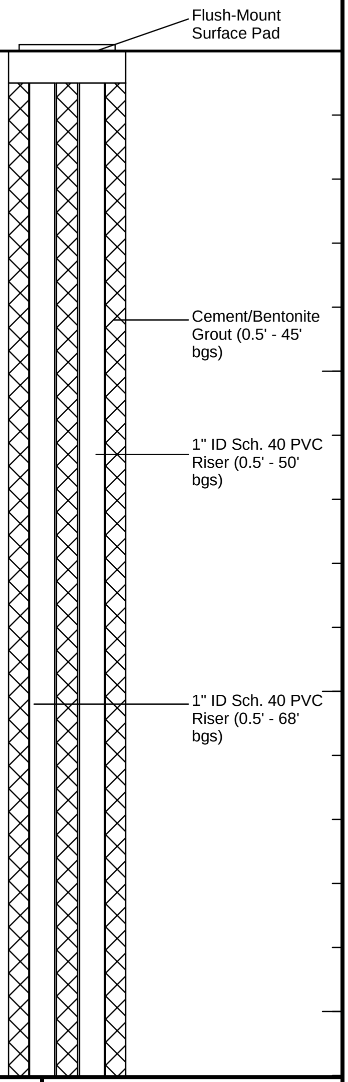
Depth measured from top of casing.

**Date Start/Finish:** 12/20 - 12/21/06
**Drilling Company:** Parratt Wolff
**Driller's Name:** Glen/Joel
**Drilling Method:** Hollow Stem Auger/ Rock Coring
**Sampler Size:** 2" Split Spoon/HQ Core Barrel
**Auger Size:** 4 1/4" ID
**Rig Type:** ATV Mounted Dierich D-120

**Northing:** 1068756.64
**Easting:** 823150.67
**Casing Elevation:** 667.23' AMSL
**Surface Elevation:** 667.55' AMSL
**Borehole Depth:** 79.8 ' bgs
**Geologist:** Ricardo Jaimes

**Well ID:** **MW-06-06RI/RD**
**Client:** New York State Electric and Gas
**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 670 | | | | | | | | | | |
| 0 | | | | | | | | | | For soil descriptions (0-15.3' bgs) refer to MW-04-06. | |
| | 665 | | | | | | | | | | |
| | | NA | NA | NA | NA | NA | NA | | | | |
| 5 | | | | | | | | | | | |
| | | NA | NA | NA | NA | NA | NA | | | | |
| | 660 | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| | | NA | NA | NA | NA | NA | NA | | | | |
| | 655 | | | | | | | | | | |
| 15 | | NA | NA | NA | NA | NA | NA | | | | |



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hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 42.72' | 624.52' |
| 4/11/07-RD | 42.72' | 624.44' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

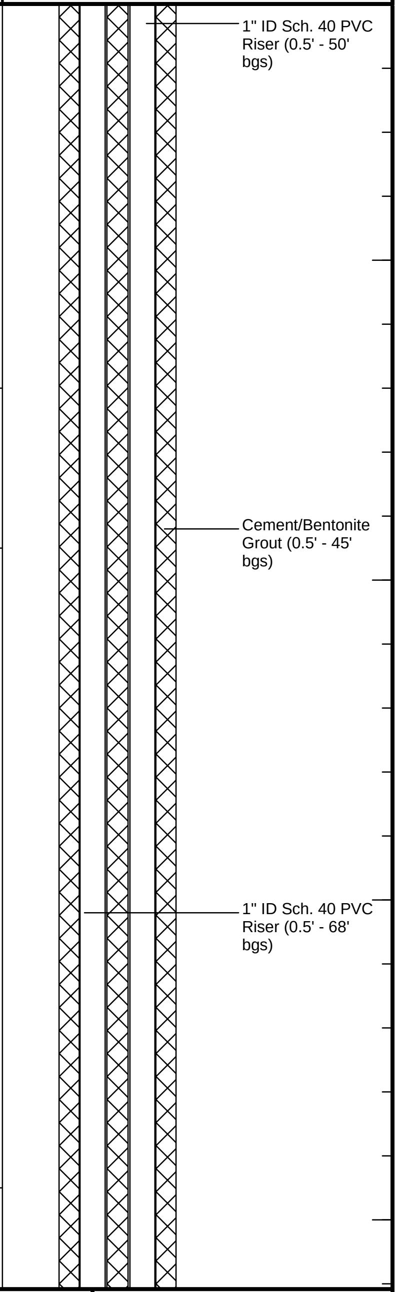
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-06RI/RD**

**Borehole Depth:** 79.8 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 18-22 | 650 | NA | NA | NA | NA | NA | NA | | For soil and core descriptions (18-22' bgs) refer to MW-06-6R. |
| 20 | | | | | | | | | |
| 22-24.5 | 645 | 1 | 22-24.5 | NA | 74 | 2.5 | 0.0 | hz/hw | Bluish gray LIMESTONE, laminated, some Fossils and Styolites, very fragmented.<br>Angular fragments of LIMESTONE (22.7-24.5' bgs). |
| 24.5-29.5 | 640 | 2 | 24.5-29.5 | NA | 92 | 4.6 | 0.0 | hz/f<br>hz/f<br>hz/sw<br>hz/sw | Bluish dark gray LIMESTONE, laminated, some Fossils and Styolites. |
| 25 | | | | | | | | | |
| 29.5-34.5 | 635 | 3 | 29.5-34.5 | NA | 98 | 5.0 | 0.8 | hz/f<br>hz/sw<br>hz/f<br>hz/w<br>hz/sw | |
| 30 | | | | | | | | | |
| 34.5- | | | | | | | | hz/sw<br>hz/sw | Bluish dark gray LIMESTONE, some laminations, abundant Fossils. |
| 35 | | | | | | | | | |

**Well Construction**



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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 42.72' | 624.52' |
| 4/11/07-RD | 42.72' | 624.44' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-06RI/RD**

**Borehole Depth:** 79.8 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) |
|---|---|---|---|---|---|---|---|
| | 630 | 4 | 34.5-39.5 | NA | 98 | 5.0 | 0.0 |
| 40 | 625 | 5 | 39.5-44.5 | NA | 76.2 | 5.0 | 0.0 |
| 45 | | 6 | 44.5-46.6 | NA | 100 | 2.1 | 0.0 |
| | 620 | 7 | 46.6-49.8 | NA | 100 | 3.21 | 0.1 |
| 50 | 615 | 8 | 49.8-54.8 | NA | 81.2 | 5.0 | 0.0 |
| 55 | | | | | | | |

Bedrock Fractures:
la/f
hz/f
hz/f
ha/f
hz/f
hz/f
ha/f
hz/f
hz/f
hz/f
hz/m
hz/f
hz/sw
hz/f
hz/f
hz/f
hz/f
hz/m
hz/m
ha/f
hz/m
hz/m
hz/sw
hz/f
hz/sw
hz/sw
hz/f
hz/f

Stratigraphic Description

Bluish dark gray LIMESTONE, some laminations, abundant fossils.
Fossils, laminations and seams of darker material (weak reaction to HCL) possibly black Shale, increase below 36.3' bgs.

Dark gray to black nodules.

Bluish dark gray LIMESTONE, laminated. More Fossiliferous than layer above.

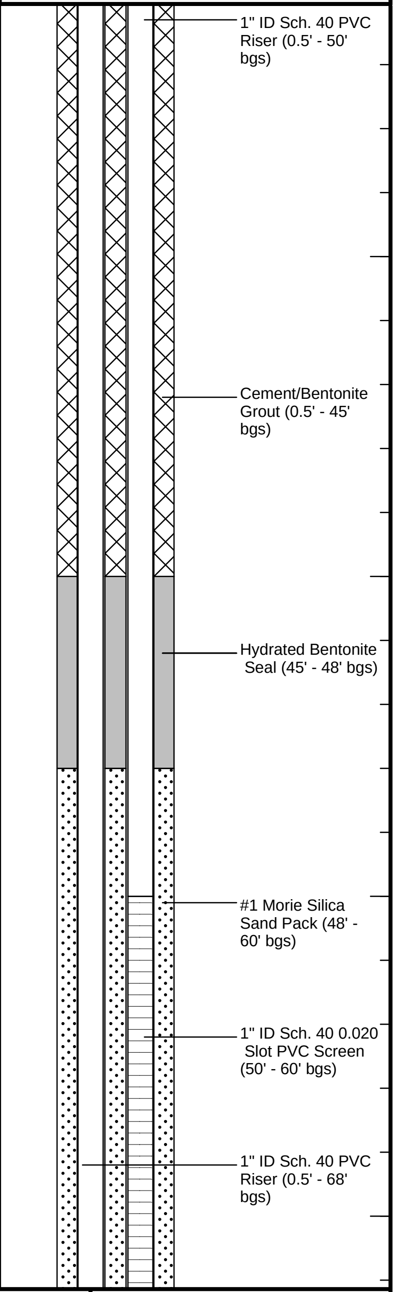
Dark gray to black LIMESTONE, laminated.
Fragmented rock (43.05-44.5' bgs).

Dark gray LIMESTONE, laminated, abundant Worm tracks, less fractured.

Dark gray LIMESTONE, some darker color seams, abundant Fossils, micro-folding, trace Styolites.

Dark gray LIMESTONE, some laminations of darker color seams and seperate structures, more fractured.

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

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hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 42.72' | 624.52' |
| 4/11/07-RD | 42.72' | 624.44' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

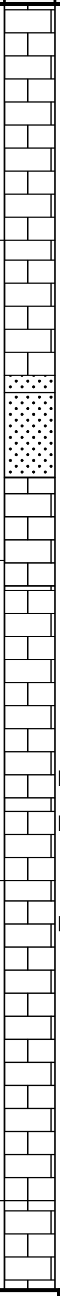
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-06RI/RD**

**Borehole Depth:** 79.8 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) |
|---|---|---|---|---|---|---|---|
| | 610 | 9 | 54.8-59.8 | NA | 69 | 5.0 | 0.0 |
| 60 | | | | | | | |
| | 605 | 10 | 59.8-64.8 | NA | 67.4 | 5.0 | 0.0 |
| 65 | | | | | | | |
| | 600 | 11 | 64.8-69.8 | NA | 88.6 | 5.0 | 0.0 |
| 70 | | | | | | | |
| | 595 | 12 | 69.8-74.8 | NA | 18 | 5.0 | 0.0 |
| 75 | | | | | | | |

Geologic Column



Bedrock Fractures

hz/f
hz/f
hz
hz/f
la/f
ha/f
hz/f
la/f
la/f
ha/f
hz/f
la/f
ha/f
hz/f
la/f
la/sw
hz/f
hz/sw
hz/sw
hz/f
hz/f
hz/sw
hz/f
hz/f
la/f
ha/f
hz
hz
la/f
hz/m
hz/f

Stratigraphic Description

Dark gray LIMESTONE, some laminations of darker color seams and sepatarian structures, more fractured.

Gray coarse grained LIMESTONE, abundant short Styolites, graduated contact with [Oriskany Formation.]

Gray fine to medium SANDSTONE with black Nodules? Fossils. [Oriskany Formations.]

Gray fine to medium SANDSTONE with dark color laminations and Fossils, [Oriskany Formation], Styolites, no fractures.

Dark gray medium grain LIMESTONE, some Fossils (possibly Stromatolites), fragmented.

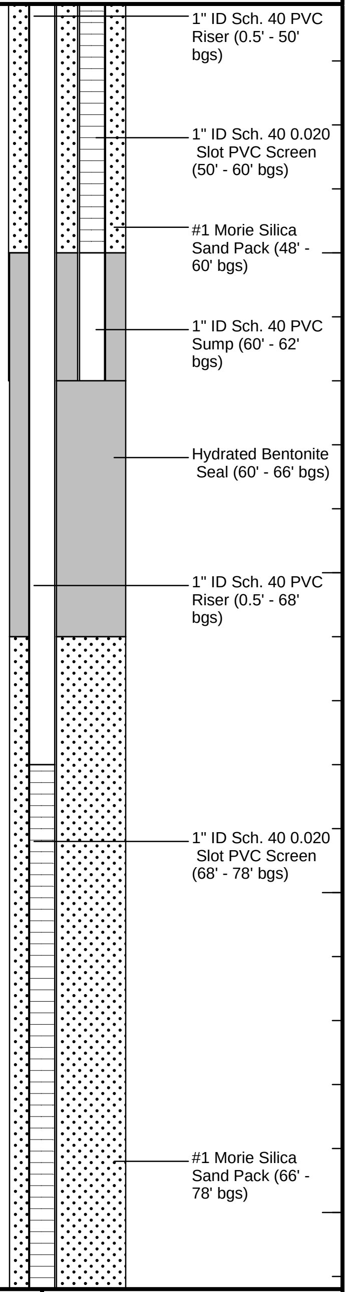
Dark gray LIMESTONE, abundant Fossils, Styolites.

Dark gray LIMESTONE, some darker laminations, some Fossils, Styolites.

Dark gray LIMESTONE, very fractured, Styolites.

Dark gray LIMESTONE, some darker laminations, abundant Styolites, two fragmented zones.

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

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hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 42.72' | 624.52' |
| 4/11/07-RD | 42.72' | 624.44' |

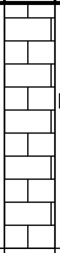
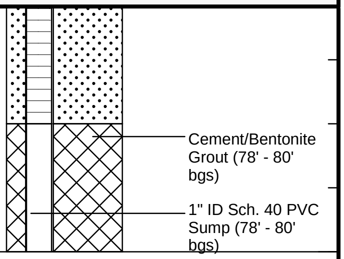
Depth measured from top of casing.

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-06RI/RD**

**Borehole Depth:** 79.8 ' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 590 | 13 | 74.8-79.8 | NA | 74.4 | 5.0 | 0.0 |  | hz/f<br>hz/sw<br>hz/f<br>hz | Dark gray LIMESTONE, some darker laminations, abundant styolites, two fragmented zones. |  |
| 80 | | | | | | | | | | | |
| | 585 | | | | | | | | | | |
| 85 | | | | | | | | | | | |
| | 580 | | | | | | | | | | |
| 90 | | | | | | | | | | | |
| | 575 | | | | | | | | | | |
| 95 | | | | | | | | | | | |

ARCADIS BBL
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 42.72' | 624.52' |
| 4/11/07-RD | 42.72' | 624.44' |
| | | |

Depth measured from top of casing.

**Date Start/Finish:** 3/18/05
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068984.18
**Easting:** 823223.10

**Casing Elevation:** 659.23' AMSL
**Surface Elevation:** 659.54' AMSL
**Borehole Depth:** 12.0' bgs

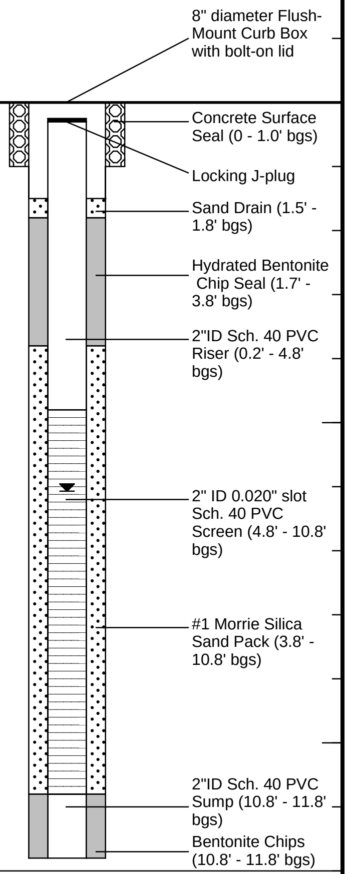
**Geologist:** Kristina Gross

**Well ID:** **MW-05-07**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | | |
| 0 | | | | | | | | | See MW-05-07R for descriptions from 0.0' - 8.0' bgs. | |
| | 655 | | | | | | | | | |
| 5 | | | | | | | | | | |
| | | 1 | 8-10 | 1<br>2<br>2<br>12 | 4 | 0.7 | 2.4 | | Brown SILT, little fine Sand and tan and red Brick fragments, slight MGP-type odor, some staining, soft, wet.<br>Grayish-black stained fine SAND, little Silt, slight to moderate MGP-type odor, wet. 0.2" Wood in spoon tip, chemical odor and slight MGP-type odor. | |
| 10 | 650 | | | | | | | | | |
| | | 2 | 10-12 | 43<br>50/0.1 | NA | 0.4 | 25.4 | | Pink CLAYEY SILT, little medium Gravel, dense, wet. [TILL]<br>Gray LIMESTONE fragments. | |
| | 645 | | | | | | | | | |
| 15 | | | | | | | | | | |



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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 6.07' | 653.16' |
| 4//11/07 | 5.83' | 653.40' |

Depth measured from top of casing.

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 3/11,16,17/05 | **Northing:** | 1068987.02 | **Well ID:** | **MW-05-07R** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823220.16 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 659.27' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger | **Surface Elevation:** | 659.56' AMSL | | |
| **Sampler Size:** | 2" Split Spoon | **Borehole Depth:** | 30.0' below grade | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Kristina Gross | | |
| **Rig Type:** | CME-55 Truck Mount | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures |
|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | |
| 0 | | 1 | 0-2 | 8<br>4<br>6<br>2 | 10 | 0.2 | 202 | | |
| | | 2 | 2-4 | 3<br>2<br>3<br>2 | 5 | 0.4 | 245 | | |
| 5 | 655 | 3 | 4-6 | 1<br>4<br>3<br>2 | 7 | 0.8 | 9.2 | | |
| | | 4 | 6-8 | 2<br>2<br>10<br>4 | 12 | 0.6 | 50.0 | | |
| | 650 | 5 | 8-10 | 1<br>4<br>8<br>13 | 12 | 0.9 | 60.2 | | |
| 10 | | 6 | 10-12 | 17<br>17<br>40<br>50 | 37 | 1.8 | 175 | | |
| 15 | 645 | 1 | 12-17 | NA | 60 | 5.0 | 15.0 | | BKZ<br>HZ<br>HA<br>HZ<br>HA<br>HA<br>HZ<br>HZ<br>HA<br>HA |

## Stratigraphic Description

Brown fine to coarse SAND, little red Brick, medium Gravel, frozen.

Orangish-brown SILT, some fine to coarse Sand, little red and tan Brick fragments, some pockets of black staining, slight to moderate MGP-type odor, slightly hard, moist.

Black stained SILT, little fine Sand, trace fine Gravel, strong MGP-type odor, very heavy black staining, little rainbow sheen, trace sticky black NAPL, slightly hard, wet.

Moderate to heavy rainbow sheen, little sticky black NAPL, trace goldish-brown oily NAPL blebs below 10.0' bgs.

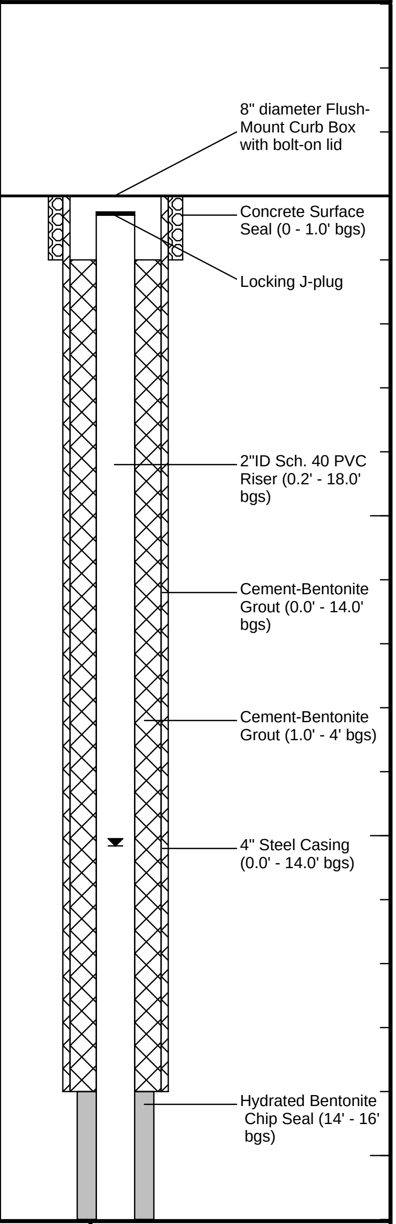
Black stained SILT and gray thinly laminated LIMESTONE, heavy rainbow sheen, black sticky NAPL staining, some goldish-brown oily NAPL blebs, strong MGP-type odor.

Gray LIMESTONE.
Break zone from 12.0' - 12.5' bgs.

Trace rainbow sheen and Silt in fractures at 12.8', 13.0', 13.4', 13.7', 15.6' and 15.95' bgs.
0.5" break zone between break at 13.2' bgs.

Hairline 90 degree fracture filled in with solution from 14.5' - 15.2' bgs.
0.05" Break zone at 15.2' bgs, 50% of surfaces coated with oily gold NAPL and heavy rainbow sheens.
Silty Clay lens, faces coated with goldish-brown oily NAPL from 15.6' - 15.7' bgs.
Trace Silt, 60% of surfaces coated with goldish/brown oily NAPL.

## Well Construction



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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; V = Vertical Fracture; MB = Mechanical Break

### Water Level Data

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 10.16' | 649.11' |
| 4/11/07 | 11.01' | 648.26' |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

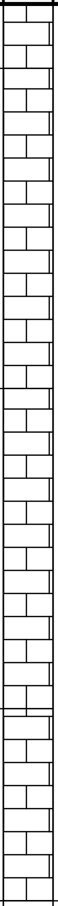
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-05-07R**

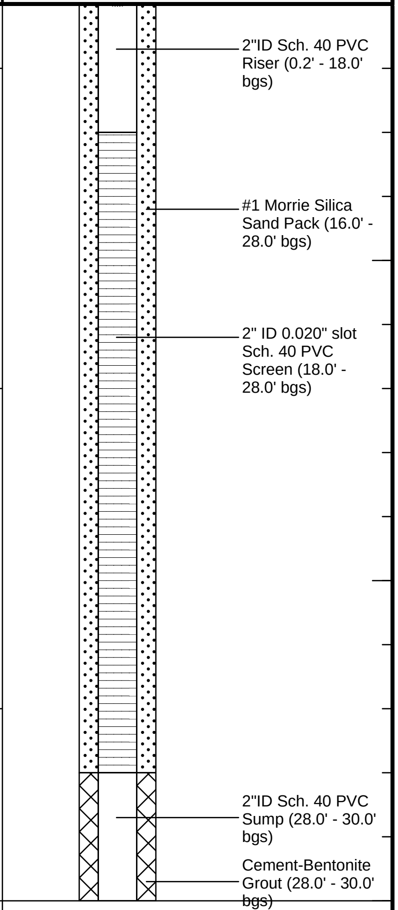
**Borehole Depth:** 30.0' below grade

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 12-17 | NA | 60 | 5.0 | 15.0 | | Gray LIMESTONE. |
| 20 | 640 | 2 | 17-22 | NA | 48 | 5.2 | 0.0 | HZ<br>HZ<br>HZ<br>HZ<br>HZ<br>HZ<br>HA<br>HZ<br>LA | Gray LIMESTONE, large Chert nodules, hard below 20.0' bgs.<br>High Angle fracture from 19.7' - 22.0' bgs. |
| 25 | 635 | 3 | 22-27 | NA | 50 | 5.0 | 0.0 | HA<br>HZ<br>V<br>HZ<br>HZ<br>HZ<br>HZ<br>MB<br>MB<br>HZ | Gray LIMESTONE, hard.<br>Horizontal break from 22.0' - 22.55' bgs.<br>Vertical break from 22.0' - 23.85' bgs. |
| | | 4 | 27-30 | NA | 55 | 3.0 | 0.0 | HZ<br>HZ<br>HA<br>HZ | Gray LIMESTONE, hard.<br>Horizontal fracture from 28.45' - 29.0' bgs. |
| 30 | 630 | | | | | | | | |
| 35 | 625 | | | | | | | | |

Geologic Column



Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; V = Vertical Fracture; MB = Mechanical Break

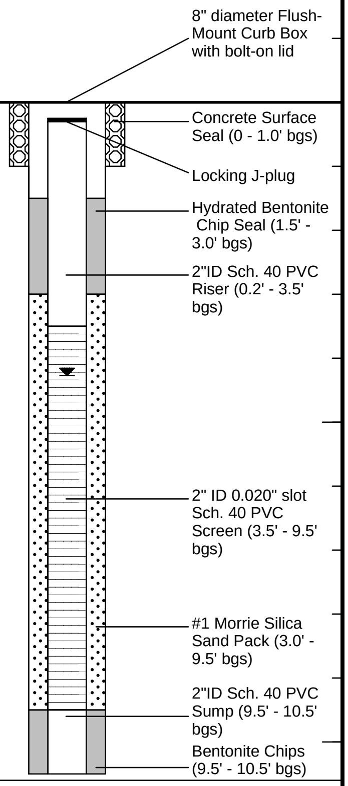
**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 10.16' | 649.11' |
| 4/11/07 | 11.01' | 648.26' |

Depth measured from top of casing.

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 3/18/05 | **Northing:** | 1068835.10 | **Well ID:** | **MW-05-08** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823271.32 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 658.49' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger | **Surface Elevation:** | 658.91' AMSL | | |
| **Sampler Size:** | 2" Split Spoon | **Borehole Depth:** | 10.6' bgs | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Kristina Gross | | |
| **Rig Type:** | CME-55 Truck Mount | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | | |
| 0<br>5 | 655 | | | | | | | | See MW-05-08R from stratigraphic descriptions from 0.0' - 8.0' bgs. | |
| | 650 | 1 | 8-10 | 3<br>4<br>5<br>50/0.2 | NA | 0.5 | 4.4 | | Black (stained) SILT and WOOD, moderate to strong MGP-type odor, medium dense, wet. | |
| 10 | | 2 | 10-10.6 | 50<br>50/0.1 | NA | 0.6 | 3.1 | | Black (stained) WOOD and medium GRAVEL/ROCK fragments, gray Limestone, moderate MGP-type odor, wet. | |
| 15 | 645 | | | | | | | | | |



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 4.27' | 654.22' |
| 4/11/07 | 4.85' | 653.64' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf

Data File:MW-05-08.dat Date: 3/28/05

**Date Start/Finish:** 3/7,14/05
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068831.57
**Easting:** 823266.35

**Casing Elevation:** 658.70' AMSL
**Surface Elevation:** 659.09' AMSL
**Borehole Depth:** 30.0' below grade

**Geologist:** Kristina Gross

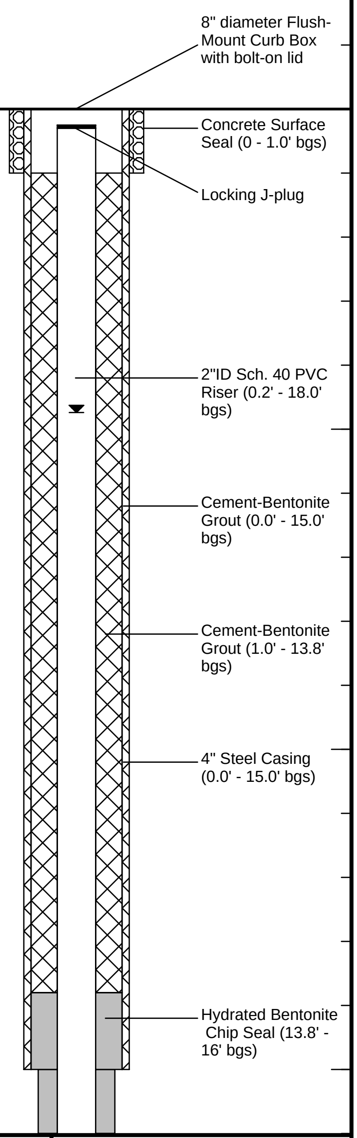
**Well ID:** **MW-05-08R**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | | |
| 0 | | 1 | 0-2 | 6<br>5<br>6<br>9 | 11 | 0.6 | 1.9 | | | Brown fine to medium GRAVEL and fine to coarse SAND, little Silt, loose, wet from snow melt.<br>Blackish-brown fine to medium SAND, some fine to medium sand-sized Coal chips, loose, moist from snow melt. |
| | | 2 | 2-4 | 3<br>6<br>2<br>3 | 7 | 0.9 | 24.8 | | | WOOD, weak MGP-type odor increasing to moderate with depth, moist.<br>Black (stained) fine to medium SAND, little Silty Wood (slightly degraded), trace sticky tar-like NAPL in matrix, moderate MGP-type odor. |
| 5 | 655 | 3 | 4-6 | 10<br>20<br>8<br>8 | 28 | 0.0 | NA | | | No Recovery. |
| | | 4 | 6-8 | 6<br>10<br>10<br>15 | 20 | 0.2 | 17.2 | | | Black (stained) SILT and WOOD, little fine Sand, moderate MGP-type odor, medium dense, moist to wet.<br>3" Spoon for 8.0' - 10.0' bgs in hopes of improving recovery. |
| | 650 | 5 | 8-10 | 9<br>12<br>10<br>12 | 22 | 0.8 | 61.2 | | | Black (stained) SILT and WOOD, moderate to strong MGP-type odor, medium dense, wet.<br>Black (stained) WOOD and medium GRAVEL/ROCK fragments, Rock pieces up to diameter of spoon, Rock chips 0.5" - 1.0" thick, gray Limestone, moderate MGP-type odor, wet. |
| 10 | | 6 | 10-11.5 | 12<br>50/0.2 | NA | 0.4 | 40.9 | | | Augered to 11.5' bgs, possible top of Bedrock. |
| | | 7 | 11.5-13 | 22<br>26<br>50/0.4 | NA | 0.4 | 4.5 | | | Pinkish CLAYEY SILT and ROCK fragments (medium gravel-sized), slight to moderate MGP-type odor, wet.<br>Auger refusal at 11.7' bgs.<br>Spoon refusal at 12.9' bgs.<br>Rollerbit to 13' bgs. |
| | 645 | 1 | 13-15 | NA | NA | 2.0 | ND | | | Gray LIMESTONE. |
| 15 | | 2 | 15-20 | NA | 76 | 4.6 | 0.0 | | HZ<br>HZ | Medium bluish-gray LIMESTONE, laminated, fresh to slightly weathered, slightly hard.<br>Moderately weathered Zone at 15.25' and from 15.45' - 15.6' bgs. |

Well Construction



**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
3" x 2' Split spoon used for intervals 8.0' - 10.0' and 10.0' - 11.5' bgs.
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; V = Vertical Fracture.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 4.74' | 653.96' |
| 4/11/07 | 5.36' | 653.34' |

Depth measured from top of casing.

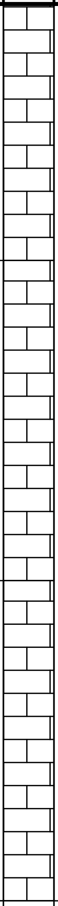
**Client:**
New York State Electric and Gas

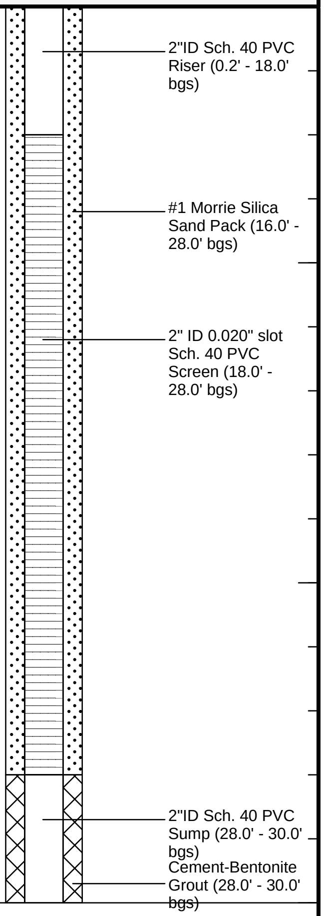
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-05-08R**

**Borehole Depth:** 30.0' below grade

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 640 | 2 | 15-20 | NA | 76 | 4.6 | 0.0 | | HZ<br>HA<br>HZ<br>HA<br>HZ | Medium bluish-gray LIMESTONE, laminated, fresh to slightly weathered, slightly hard.<br>Slightly weathered at 16.9' and from 17.7' - 17.9' bgs. | |
| 25 | 635 | 3 | 20-25 | NA | 45 | 5.0 | 0.0 | | HZ<br>BKZ<br>HZ<br>V<br>HZ<br>V<br>HZ<br>HZ<br>HZ | Medium bluish-gray LIMESTONE, laminated, partings to 25' bgs becoming massive, some Chert nodules below 25' bgs raining in size from 0.25' - 1.5', soft from 20.0' - 21.0' bgs, slightly hard to moderately hard.<br>Vertical fracture from 20.6' - 21.35' bgs.<br>Vertical fracture from 21.35' - 22.66' bgs. | |
| 30 | 630 | 4 | 25-30 | NA | 57 | 5.0 | 0.0 | | V<br>HZ<br>HZ<br>HA<br>HZ<br>HZ<br>HZ<br>HZ | Medium bluish-gray LIMESTONE, laminated, fresh to slightly weathered, slightly hard, some Chert nodules ranging from 0.25" to 1.25", trace green mineral in 0.25" clusters.<br>Vertical fracture from 25.0' - 26.9' bgs.<br>Vertical fracture from 29.1' - 29.9' bgs. | |
| 35 | 625 | | | | | | | | | | |





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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level;
3" x 2' Split spoon used for intervals 8.0' - 10.0' and 10.0' - 11.5' bgs.
BKZ = Break Zone; LA = Low Angle fracture; HZ = Horizontal Fracture; HA = High Angle Fracture; V = Vertical Fracture.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 5/3/05 | 4.74' | 653.96' |
| 4/11/07 | 5.36' | 653.34' |
| | | |

Depth measured from top of casing.

**Date Start/Finish:** 5/4/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068806.73
**Easting:** 823405.30

**Casing Elevation:** 662.34' AMSL
**Surface Elevation:** 662.65' AMSL
**Borehole Depth:** 15.2' bgs

**Geologist:** Jennifer Sandorf

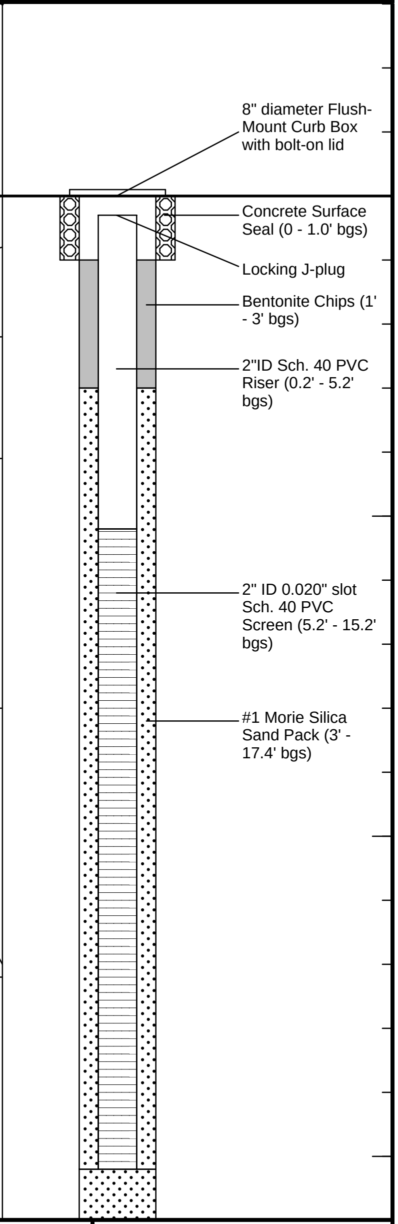
**Well ID:** **MW-06-9**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|
|  | 665 |  |  |  |  |  |  |  |
| 0 |  | 1 | 0-2 | 5<br>14<br>43<br>16 | 57 | 1.2 | 0.0 | Brown fine to medium SAND, some fine to coarse Gravel, trace Roots, dense, dry.<br>Gray CONCRETE fragments, dry. |
|  | 660 | 2 | 2-4 | 10<br>11<br>11<br>9 | 22 | 0.9 | 0.0 | Brown fine to coarse SAND, some brown to gray fine to coarse sub-angular Gravel, medium dense, dry. |
| 5 |  | 3 | 4-6 | 1<br>1<br>3<br>3 | 4 | 0.9 | 0.0 | Gray brown SILT, little Clay, trace fine sub-angular Gravel, plastic, moderately soft, dry to moist. |
|  | 655 | 4 | 6-8 | 2<br>2<br>3<br>4 | 5 | 1.4 | 0.0 | Brown to dark brown color, trace fine to coarse Gravel, trace Shell, moist to wet below 6' bgs. |
|  |  | 5 | 8-10 | WOR<br>1<br>2<br>10 | 3 | 0.6 | 0.0 | Brown to gray brown very fine SAND and SILT, little medium to coarse Gravel, slightly plastic, medium stiff, wet. |
| 10 |  | 6 | 10-12 | 1<br>6<br>3<br>6 | 9 | 0.4 | 0.0 | Gray Limestone fragments at bottom of Spoon, medium soft below 10' bgs.<br>Gray ROCK fragments, loose. |
|  | 650 | 7 | 12-14 | 6<br>10<br>12<br>18 | 22 | 1.0 | 0.0 | Pink gray SILT, little fine to medium sub-angular Gravel, very dense, little dark gray Rock fragments (possible Till). |
| 15 |  | 8 | 14-15.5 | 7<br>33<br>35<br>14 | 68 | 0.8 | 0.0 | Brown gray color, little to some Gravel below 14' bgs. |
|  |  | 9 | 15.5-17 | 8 | 25 | 0.6 | 0.0 |  |

Well Construction



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**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 6.13' | 656.21' |
|  |  |  |
|  |  |  |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-06-9.dat Date: 5-15-06

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-9**

**Borehole Depth:** 15.2' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 9 | 15.5-17 | 13<br>12 | 25 | 0.6 | 0.0 | | Pink gray SILT, little fine to medium sub-angular Gravel, very dense, little dark gray Rock fragments.<br>Little fine to medium Sand below 17' bgs, dark gray Rock fragments at bottom of spoon. | #1 Morie Silica Sand Pack (3' - 17.4' bgs) |
| | | 10 | 17-17.4 | 50/0.4 | NA | 0.5 | 0.0 | | | |
| | 645 | | | | | | | | | |
| 20 | | | | | | | | | | |
| | 640 | | | | | | | | | |
| 25 | | | | | | | | | | |
| | 635 | | | | | | | | | |
| 30 | | | | | | | | | | |
| | 630 | | | | | | | | | |
| 35 | | | | | | | | | | |

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**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

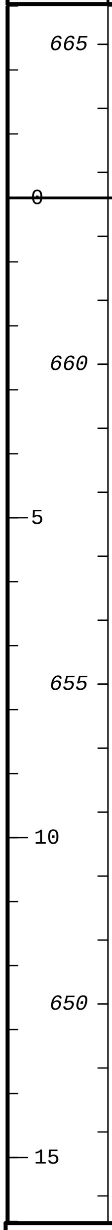
| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 6.13' | 656.21' |
| | | |
| | | |

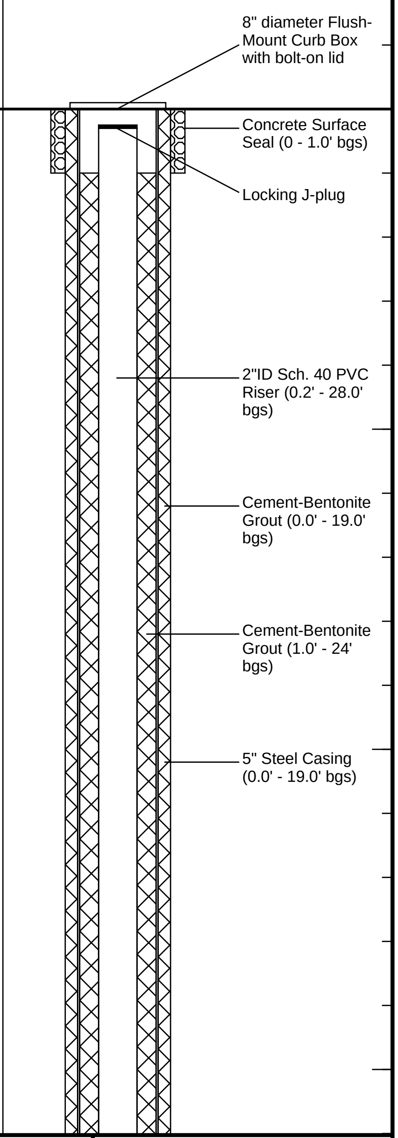
Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-06-9.dat Date: 5-15-06

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 5/4,10/06 | **Northing:** | 1068806.27 | **Well ID:** | **MW-06-9R** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823401.31 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 662.18' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 662.60' AMSL |  |  |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 40' bgs |  |  |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Jennifer Sandorf |  |  |
| **Rig Type:** | CME-55 Truck Mount |  |  |  |  |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  | See MW-06-09 for soil descriptions. No sampling conducted to 17' bgs. |  |





ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 23.79' | 638.39' |
|  |  |  |
|  |  |  |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

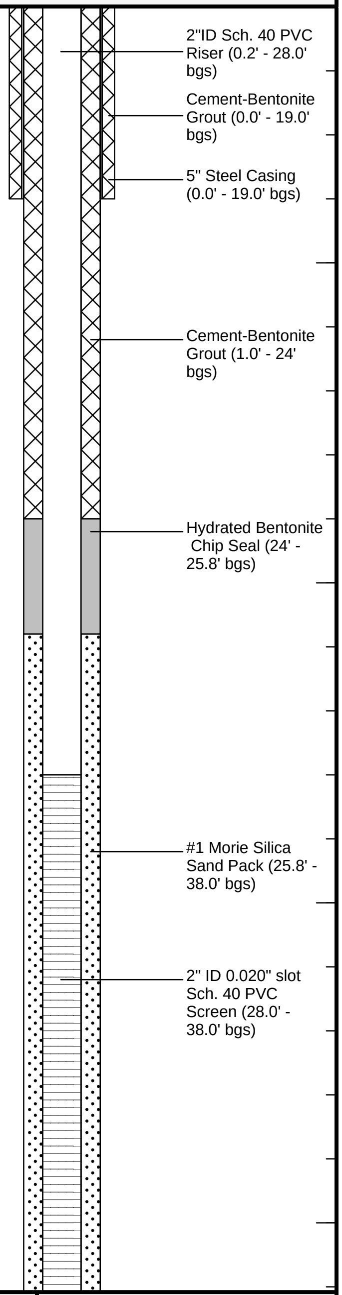
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-9R**

**Borehole Depth:** 40' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | See MW-06-09 for soil descriptions. No sampling conducted to 17' bgs. |
| | 645 | 1 | 17-19 | NA | 63 | 1.9 | 0.0 | hz/sw<br>hz/sw<br>la/f | Blue gray slightly laminated LIMESTONE, fresh to slightly weathered, hard.<br>Broken zone from 17.5' - 17.6' bgs and 17.9' - 18.4' bgs. |
| 20 | 640 | 2 | 19-23 | NA | 88 | 3.3 | 0.0 | hz/f<br>la/f<br>hz<br>la/f<br>hz/f<br>hz/f<br>hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, hard. |
| 25 | 635 | 3 | 23-28 | NA | 94 | 5.0 | 0.0 | hz/f<br>la/f<br>la/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, hard.<br>Small broken pieces at 27' bgs.<br>Mud seam on hz, highly weathered at 27.1' bgs. |
| 30 | 630 | 4 | 28-33 | NA | 94 | 5.1 | 0.0 | hz/f<br>hz/f<br>hz/f<br>v<br>hz/f | Blue gray LIMESTONE, laminated, hard.<br>Broken pieces from 30' - 30.2' bgs.<br>Weathered hz mud seam at 31.3' bgs. |
| 35 | | 5 | 33-35.5 | NA | 70 | 2.3 | 0.0 | hz/sw<br>hz/f<br>ha<br>hz/f<br>hz/f<br>la<br>hz/f | Blue gray LIMESTONE, laminated, hard. |
| | | 6 | 35.5-40 | NA | 91 | 4.7 | 0.0 | | Blue gray LIMESTONE, laminated, hard. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 23.79' | 638.39' |
| | | |
| | | |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf

Data File:MW-06-9R.dat Date: 5-17-06

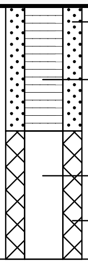
**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-9R**

**Borehole Depth:** 40' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 625 | 6 | 35.5-40 | NA | 91 | 4.7 | 0.0 | | hz/f<br>hz<br>hz/f<br>hz/f<br>la | Blue gray LIMESTONE, laminated, hard.<br>Weathered zone from 36.8' - 36.9' bgs. | |
| 40 | | | | | | | | | | | |
| | 620 | | | | | | | | | | |
| 45 | | | | | | | | | | | |
| | 615 | | | | | | | | | | |
| 50 | | | | | | | | | | | |
| | 610 | | | | | | | | | | |
| 55 | | | | | | | | | | | |



#1 Morie Silica Sand Pack (25.8' - 38.0' bgs)

2" ID 0.020" slot Sch. 40 PVC Screen (28.0' - 38.0' bgs)

2"ID Sch. 40 PVC Sump (38.0' - 4.0' bgs)

Cement-Bentonite Grout (38.0' - 40.0' bgs)

ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 23.79' | 638.39' |
| | | |
| | | |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf

Data File:MW-06-9R.dat Date: 5-17-06

**Date Start/Finish:** 5/1/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger

**Sampler Size:** 2" Split Spoon
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068892.02
**Easting:** 823127.29

**Casing Elevation:** 675.76' AMSL
**Surface Elevation:** 658.16' AMSL
**Borehole Depth:** 8.3' bgs

**Geologist:** Jennifer Sandorf

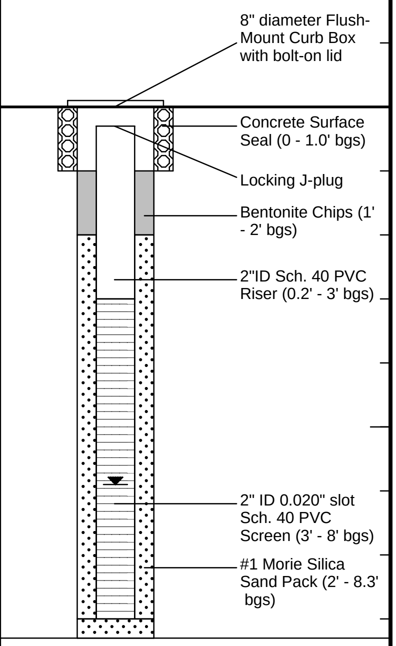
**Well ID:** **MW-06-10**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | | |
| 0 | | 1 | 0-2 | 24<br>26<br>13<br>9 | 39 | 0.8 | 0.1 | | Dark to light brown fine to medium SAND, little fine to medium Gravel, trace light orange Brick fragments, moderately loose, dry.<br>Trace Silt below 2.0' bgs. |
| | 655 | 2 | 2-4 | 7<br>14<br>16<br>16 | 30 | 1.2 | 45.4 | | Black fine to medium SAND, trace fine Gravel, trace Silt, faint fuel oil odor, dense, dry to moist. |
| 5 | | 3 | 4-6 | 2<br>2<br>4<br>7 | 6 | 0.7 | 59.1 | | Brown with black mottling SILT, little Clay, trace to little medium to coarse Sand, trace Wood fragments, moderate odor, slightly plastic, moderately soft, moist to wet. |
| | | 4 | 6-8 | 9<br>10<br>3<br>3 | 13 | 0.6 | 17.7 | | Brown gray SILT, some medium to coarse angular Gravel, trace Wood fragments, no odor, slightly plastic, soft, wet. |
| | 650 | 5 | 8-8.3 | 2 | NA | 0.2 | 11.9 | | Gray ROCK fragments (Limestone), little Silt, wet. |
| 10 | | | | | | | | | |
| | 645 | | | | | | | | |
| 15 | | | | | | | | | |

Well Construction



ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 3.99' | 653.77' |
| | | |
| | | |

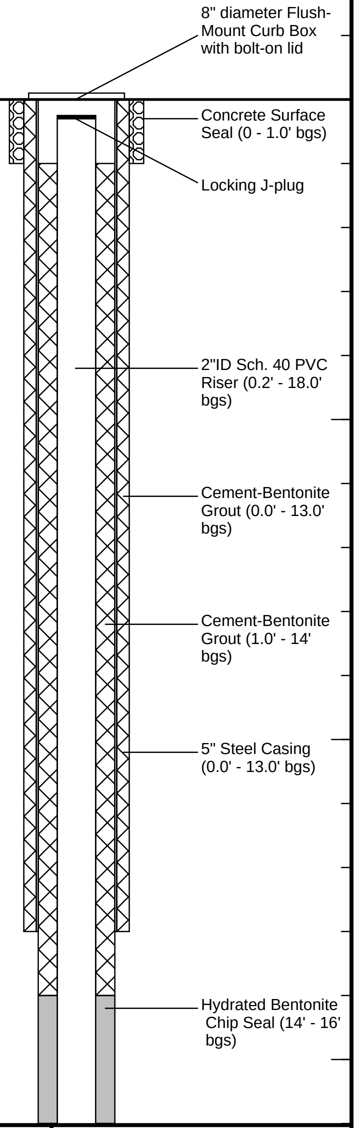
Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2004_ABBL.ldf
Data File:MW-06-10.dat Date: 5-15-06

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 5/1,5,8/06 | **Northing:** | 1068893.37 | **Well ID:** | **MW-06-10R** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823133.68 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 658.07' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 658.36' AMSL |  |  |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 30' bgs |  |  |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Jennifer Sandorf |  |  |
| **Rig Type:** | CME-55 Truck Mount |  |  |  |  |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 660 |  |  |  |  |  |  |  |  |  |
| 0<br>5 | 655 |  |  |  |  |  |  |  |  | See MW-06-10 for soil descriptions. No sampling conducted to 8' bgs. |
|  | 650 | 1 | 8-10 | WOR<br>8<br>9.5<br>8 | 17.5 | 0.4 | 6.7 |  |  | Dark gray fine to coarse SAND, little Silt, faint fuel oil odor, dense, wet.<br>Trace light brown coarse sub-angular Gravel at bottom. |
| 10 |  | 2 | 10-11 | 14<br>39 | 39 | 0.5 | 0.1 |  |  | Light gray brown ROCK fragments (Limestone), trace Silt, no odor, moderately loose, wet. |
|  |  | 3 | 11-13 | NA | 41 | 1.7 | 0.0 |  | hz/f | Broken zone from 11' - 11.7' bgs.<br>Medium blue gray LIMESTONE, slightly fractured, fresh to slightly weathered, slightly hard.<br>Broken zone. |
| 15 | 645 | 4 | 13-18 | NA | 51 | 4.7 | 0.0 |  | hz/sw<br>hz/sw<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated with light gray and dark gray bands, hard.<br>Broken zone from 13.4' - 13.9' bgs. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; f = fresh; sw = slightly weathered.

## Water Level Data

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 7.92' | 650.15' |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-10R.dat Date: 5-15-06

**Client:**
New York State Electric and Gas

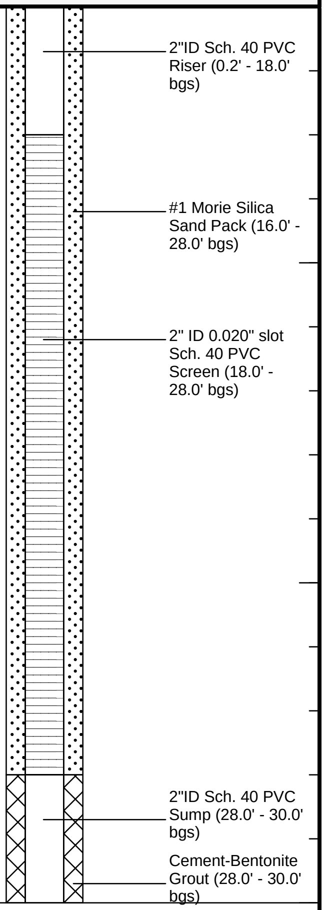
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** MW-06-10R

**Borehole Depth:** 30' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| | | 4 | 13-18 | NA | 51 | 4.7 | 0.0 | v/f<br>v/f<br>hz | Blue gray LIMESTONE, laminated with light gray and dark gray bands, hard. |
| 20 | 640 | 5 | 18-23 | NA | 98 | 4.7 | 0.0 | hz<br>hz<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated with light gray and dark gray bands, hard.<br>Broken zone from 18.5' - 18.6' bgs.<br>Possible mechanical break along un-opened vertical fracture, fresh. |
| 25 | 635 | 6 | 23-28 | NA | 85 | 5.4 | 0.0 | hz/f<br>hz/f<br>hz/f<br>hz/sw<br>hz/sw<br>hz/f | Blue gray LIMESTONE, slightly laminated, hard.<br>Broken zone from 26.4' - 26.5' bgs.<br>Top of vertical fracture. |
| 30 | 630 | 7 | 28-30 | NA | 81 | 1.85 | 0.0 | hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, slightly laminated, hard.<br>Broken zone from 28' - 28.2' bgs. |
| 35 | 625 | | | | | | | | |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 7.92' | 650.15' |

Depth measured from top of casing.

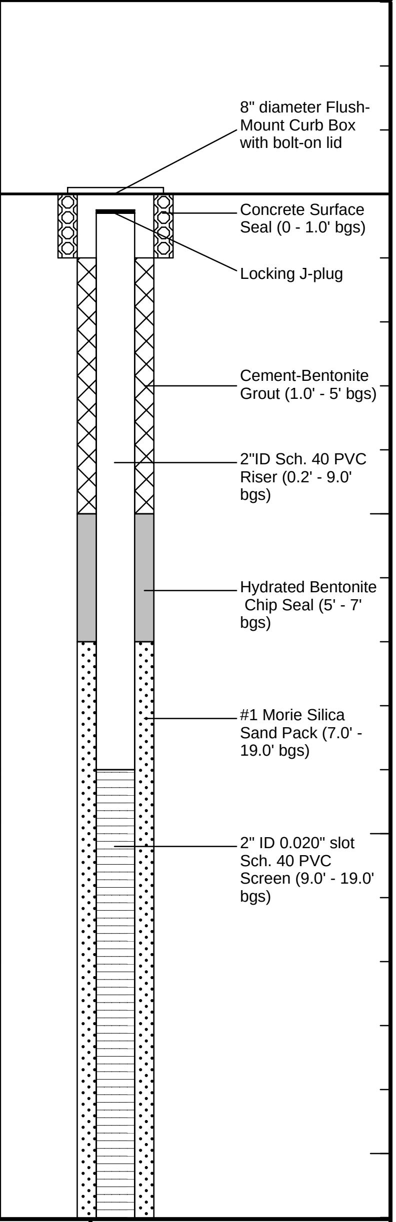
**Date Start/Finish:** 5/3-4/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger/ Rock Coring
**Sampler Size:** 2" Split Spoon/HQ Core Barrel
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068998.38
**Easting:** 823113.04
**Casing Elevation:** 657.64' AMSL
**Surface Elevation:** 658.12' AMSL
**Borehole Depth:** 22' bgs
**Geologist:** Jennifer Sandorf

**Well ID:** **MW-06-11R**
**Client:** New York State Electric and Gas
**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Hand auger to 5' bgs. Fill includes yellow furnace Brick, Wire cable, Wood and Concrete. |
| 5 | | 1 | 5-7 | 5<br>4<br>3<br>5 | 7 | 0.9 | 0.0 | | Dark gray fine to coarse SAND, some fine to medium Gravel, little Silt, trace Slag, red discoloration at 5.5' bgs, orange brown discoloration at 5.6' bgs, medium loose, moist to wet. |
| | 650 | 2 | 7-9 | 1<br>3<br>3<br>4 | 6 | 0.3 | 1.3 | | Trace red and orange brown discoloration, no slag, very faint odor, below 7' bgs.<br>Dark gray SILT, some fine to medium Sand, moderately loose, wet. |
| | | 3 | 9-9.8 | WOR<br>22/<br>0.3 | 22/<br>0.3 | 0.3 | 4.4 | | Gray ROCK fragments (Limestone), trace blebs of tar-like NAPL (<10% pore space) and silver sheen, loose, wet. |
| 10 | | 4 | 9.8-12 | NA | 44 | 2.5 | 0.0 | hz<br>hz<br>hz | Blue gray LIMESTONE, slightly laminated, fresh to moderately weathered, slight odor, hard.<br>Broken zone from 9.8' - 10.1' bgs.<br>1'-3' long fragments, sheen observed on fractured surface from 10.6' - 11.8' bgs.<br>Blebs of brown oily tar-like NAPL on surface at 11.8' bgs. |
| 15 | 645 | 5 | 12-17 | NA | 75 | 4.8 | 16.4 | la<br>hz<br>la<br>la<br>hz<br>hz/sw<br>hz/f<br>hz<br>hz/f<br>hz/f | Blue gray LIMESTONE, slightly laminated, fresh to weathered, odor in tar-like NAPL zones, hard.<br>30 deg. fresh fracture no sheen or NAPL at 12.3' bgs.<br>No NAPL on fracture surface 13.9' - 16.8' |

Well Construction



ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface; WOR = weight of rod
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 5.69' | 651.95' |
| | | |
| | | |

Depth measured from top of casing.

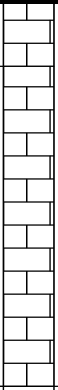
**Client:**
New York State Electric and Gas

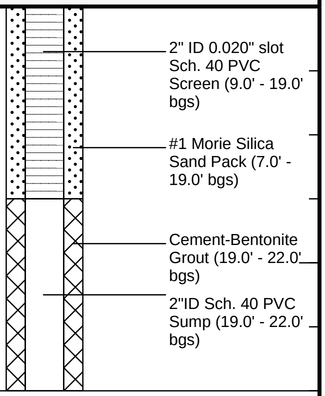
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-11R**

**Borehole Depth:** 22' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 | 12-17 | NA | 75 | 4.8 | 16.4 | | hz/f | Blue gray LIMESTONE, slightly laminated, fresh to weathered, odor in NAPL zones, hard. | |
| | 640 | | | | | | | | hz<br>hz | Dark gray to light gray laminated LIMESTONE, fresh to slightly weathered, hard, No NAPL observed in unfractured zones sheen on hz, trace NAPL<br>Sheen on hz, trace NAPL | |
| 20 | | 6 | 17-22 | NA | 100 | 4.7 | 1.6 | | | | |
| | 635 | | | | | | | | | | |
| 25 | | | | | | | | | | | |
| | 630 | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| | 625 | | | | | | | | | | |
| 35 | | | | | | | | | | | |





ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface; WOR = weight of rod
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 5.69' | 651.95' |
| | | |
| | | |

Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-11R.dat Date: 5-15-06

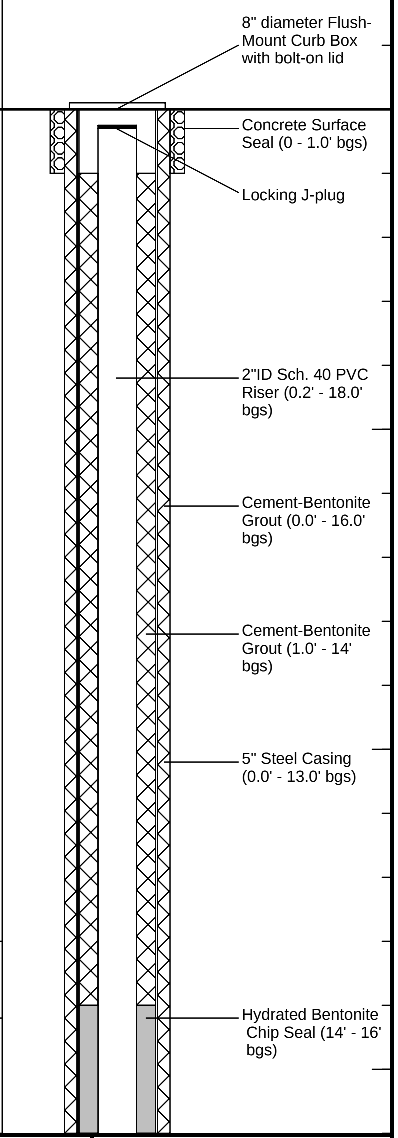
**Date Start/Finish:** 5/9-11/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger/ Rock Coring
**Sampler Size:** 2" Split Spoon/HQ Core Barrel
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068981.80
**Easting:** 823298.60
**Casing Elevation:** 663.53' AMSL
**Surface Elevation:** 663.76' AMSL
**Borehole Depth:** 30' bgs
**Geologist:** Jennifer Sandorf

**Well ID:** **MW-06-12R**
**Client:** New York State Electric and Gas
**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 665 |  |  |  |  |  |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  | See MW-04-03 for soil descriptions. No sampling conducted to 13' bgs. |
|  | 660 |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |
|  | 655 |  |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |  |  |
|  | 650 | 1 | 13-14.2 | 8<br>13<br>24<br>20/0.2 | 37 | 0.5 | 13.9 |  |  | Gray ROCK fragments (Limestone), some Silt, trace sheen and brown oily NAPL (coal-tar like), slight odor. |
| 15 |  | 2 | 14.2-16 | NA | 0.0 | 1.2 | 0.4 |  |  | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard.<br>All pieces are less than 3". |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 9.75' | 653.78' |
|  |  |  |
|  |  |  |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

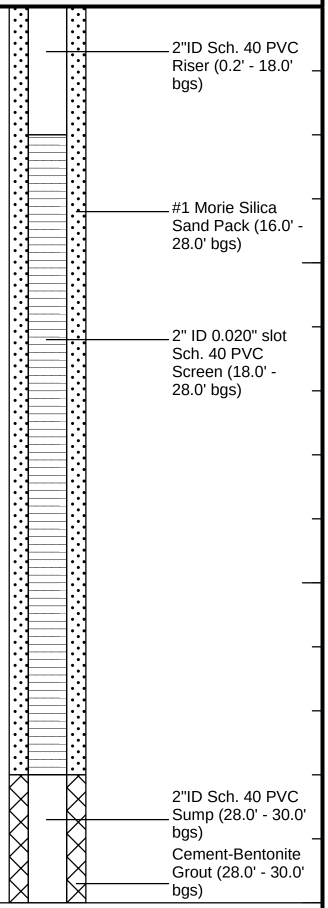
**Well ID:** **MW-06-12R**

**Borehole Depth:** 30' bgs

Depth (ft. bgs): 20, 25, 30, 35
Elevation (ft. AMSL): 645, 640, 635, 630

| Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|
| 3 | 16-19 | NA | 13 | 2.3 | 0.3 | | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard. Drilling down vertical fracture, mostly small broken pieces, one section approx. 4", slight odor, little sheen, trace blebs of brown oily NAPL (coal-tar like) at approx. 17.5' bgs. |
| 4 | 19-23.8 | NA | 44 | 5.2 | 0.2 | hz/f<br>hz/f<br>hz/f<br>hz/f<br>v<br>hz/f | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard. Drilling down vertical fracture, no NAPL or sheen.<br>Broken zone from 19' - 19.4' bgs.<br>Broken pieces along vertical fracture from 21.7' - 22.5' bgs.<br>Weathered hz fracture with mud seam at 23.25' bgs. |
| 5 | 23.8-25 | NA | 25 | 1.2 | 0.0 | la/f<br>hz/f<br>ha/f<br>la/f | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard.<br>Broken zone from 23.8' - 24' bgs. |
| 6 | 25-30 | NA | 96 | 5.0 | 0.0 | hz/f<br>hz/f<br>hz/f<br>hz/f<br>hz | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard.<br>Broken zone from 25' - 25.2' bgs. |

Well Construction



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**Remarks:**
bgs = below ground surface;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 9.75' | 653.78' |

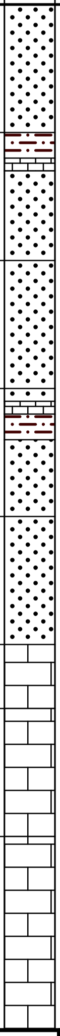
Depth measured from top of casing.

Project: 13049.003 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-12R.dat Date: 5-17-06

| | | | | | |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 6/12/06 - 6/16/06 | **Northing:** | 1068974.52 | **Well ID:** | **MW-06-13R** |
| **Drilling Company:** | Lyon Drilling | **Easting:** | 823018.83 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Harry Lyon | **Casing Elevation:** | 657.58' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 658.20' AMSL | | |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 35' bgs | | |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Jennifer Sandorf | | |
| **Rig Type:** | CME-55 Truck Mount | | | | |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures |
|---|---|---|---|---|---|---|---|---|
| | 660 | | | | | | | |
| 0 | | 1 | 0-2' | 2<br>3<br>2<br>2 | 5 | 0.7 | 0.0 | |
| | 655 | 2 | 2-4' | 2<br>10<br>10<br>12 | 20 | 0.8 | 0.0 | |
| 5 | | 3 | 4-6' | 4<br>5<br>13<br>9 | NA | 1.1 | 0.0 | |
| | | 4 | 6-8' | WOR<br>5<br>3<br>1 | 8 | 0.9 | 0.0 | |
| | 650 | 5 | 8-10' | 1<br>WOH<br>6<br>18 | 6 | 0.9 | 0.0 | |
| 10 | | 6 | 10-11' | 50/<br>0.2 | NA | 0.2 | 0.0 | |
| | | 7 | 11-13' | NA | 0% | 1.1 | 0.0 | |
| | 645 | 8 | 13-18' | NA | 89.2% | 4.8 | 0.0 | hz/f<br>hz/f |
| 15 | | | | | | | | |

**Geologic Column**



**Stratigraphic Description**

Dark brown to brown fine to medium SAND, some Silt, trace fine to medium Gravel, trace Roots, moderately loose, dry.

Light brown SILT, little fine to medium Sand, trace Clay, stiff, very slightly plastic, dry.

Pale red BRICK fragments.

Reddish-brown fine to coarse SAND, trace Silt, trace Slag, moderately loose, dry to moist.

Brown fine to coarse SAND, little fine to coarse Gravel, trace Silt, trace reddish-brown Slag, trace crumbly white rock fragment, trace Roots, moist to wet.

Dark gray-brown fine to coarse SAND, loose, wet.

Red BRICK fragments, loose, wet.

Light brownish-gray SILT, trace red Brick fragments, little fine to medium Sand, slightly stiff, slightly plastic, wet.

Gray fine to coarse SAND, trace Silt, loose, wet.

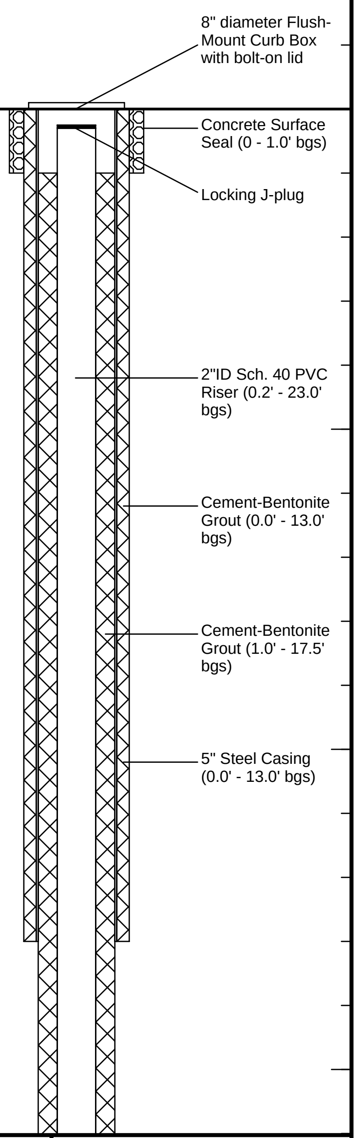
Dark brown-gray to dark gray fine to coarse SAND, trace weathered red Brick fragments, trace black stained sticky material with odor at bottom of spoon, just above gray broken rock fragments, moderately loose, wet.

Dark gray ROCK fragments (Limestone), little Silt, little fine to medium Sand, dense to very dense, faint coal tar-like odor, wet. Spoon refusal at 10.2' bgs. Augered through to 11' bgs.

Blue gray LIMESTONE, laminated with light gray and dark gray bands, fresh to moderately weathered fractures, hard.
All pieces are less than 4".
Trace spots (~eraser head-size) of brown oily NAPL at approx. 11.5' bgs.

Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard. Slight sheen and brown oily NAPL at 13' bgs, but no visible sheen or NAPL below.
Vertical fractures 13.3-13.8', 15.1-15.9', 16.2-16.3'.

**Well Construction**



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## Remarks:

bgs = below ground surface; WOH = Weight of Hammer; WOR = Weight of Rods;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 16.95' | 640.63' |
| | | |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

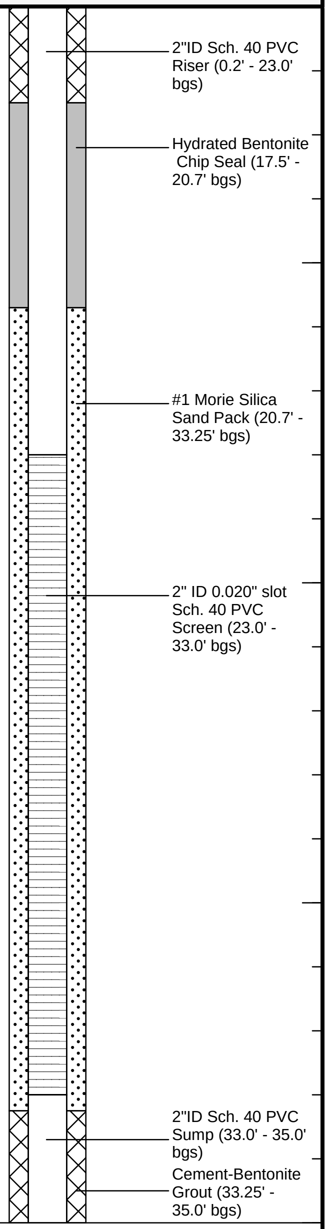
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** MW-06-13R

**Borehole Depth:** 35' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8 | 13-18' | NA | 89.2% | 4.8 | 0.0 | | hz/f<br>hz/f<br>hz/f<br>hz/f<br>la/f | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard.<br>Vertical fractures 13.3-13.8', 15.1-15.9', 16.2-16.3'. |
| 20 | 640 | 9 | 18-23' | NA | 96% | 5.0 | 0.0 | | hz/f<br>hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard, no NAPL or sheen. |
| 25 | 635 | 10 | 23-28' | NA | 99% | 5.2 | 0.0 | | hz<br>hz<br>hz<br>hz | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard, no NAPL or sheen.<br>Near-vertical fracture 25.35-26.3'. |
| 30 | 630 | 11 | 28-33' | NA | 72% | 5.0 | 0.0 | | hz<br>hz<br>hz<br>hz<br>hz<br>hz<br>hz<br>hz<br>hz | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard, no NAPL or sheen.<br>45 degree fracture 29.45-29.7'.<br>Broken zone 32-32.25'.<br>Unopened hz fracture at 32.65'. |
| 35 | 625 | 12 | 33-35' | NA | 81.5% | 1.9 | 0.0 | | hz<br>hz<br>hz<br>hz | Blue gray LIMESTONE, laminated, fresh to moderately weathered fractures, hard, no NAPL or sheen.<br>45 degree fracture 34.55-34.75'. |

**Well Construction**



ARCADIS BBL
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**Remarks:**
bgs = below ground surface; WOH = Weight of Hammer; WOR = Weight of Rods;
NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 16.95' | 640.63' |
| | | |
| | | |

Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-13R.dat Date: 6/20/06

**Date Start/Finish:** 7/24/06 - 7/27/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger/ Rock Coring
**Sampler Size:** 2" Split Spoon/HQ core barrel
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

**Northing:** 1068931.36
**Easting:** 822917.09

**Casing Elevation:** 660.69' AMSL
**Surface Elevation:** 661.03' AMSL
**Borehole Depth:** 28' bgs

**Geologist:** Jennifer Sandorf

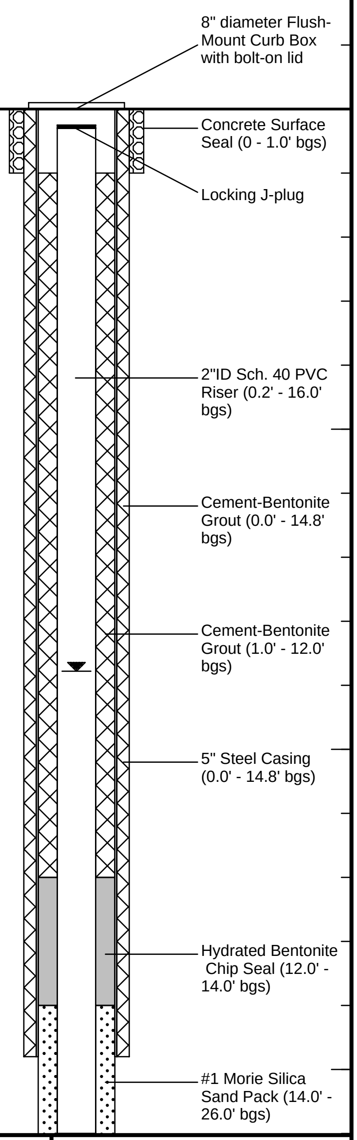
**Well ID:** **MW-06-14R**

**Client:** New York State Electric and Gas

**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 0 | 660 | 1 | 0-2' | NA<br>15<br>29<br>12 | 44 | 0.0 | NA | | | ASPHALT. Auger through Asphalt and subbase to 0.5' bgs.<br>No recovery. |
| | | 2 | 2-4' | 3<br>2<br>3<br>3 | 5 | 1.0 | 0.0 | | | Dark brown fine to medium SAND, little coarse Sand and fine to medium Gravel, trace Silt, trace Ash and red Brick fragments, trace black Coal fragments, loose, moist. |
| 5 | | 3 | 4-6' | 2<br>4<br>3<br>3 | 7 | 1.6 | 0.0 | | | Red Silty fine SAND, trace Brick and Coal fragments, loose, moist. |
| | 655 | 4 | 6-8' | 2<br>14<br>9<br>4 | 23 | 1.2 | 15.8 | | | Light brown CLAY, stiff, slightly plastic, dry.<br>Black fine to coarse SAND, trace fine to medium Gravel, trace Coal fragments, trace fragments of dry crumbly material (like dried rubber?), loose, dry to moist, slight odor.<br>As above, no odor. |
| | | 5 | 8-10' | 1<br>1<br>3<br>2 | 4 | 0.8 | 0.0 | | | Light gray-brown Silty CLAY, little medium to coarse subangular Gravel, moderately soft, plastic, moist to wet. |
| 10 | 650 | 6 | 10-12' | 2<br>1<br>1<br>1 | 2 | 1.5 | 0.0 | | | As above, moderately soft to slightly stiff.<br>Brown very fine to medium SAND, little Silt, trace natural Organics (wood), loose, moist to wet. |
| | | 7 | 12-12.8' | 2<br>50/ 0.3 | 50/ 0.3 | 1.6 | 0.0 | | | As above, increasing Silt with depth, very fine Rootlets but no wood observed, soft, wet. Weathered broken Rock fragments at bottom of spoon. |
| | | 8 | 12.8-14.8 | NA | 64% | 1.1 | 0.0 | | hz/f<br>la/f<br>v | Blue gray LIMESTONE, laminated with light gray and dark gray bands, freshly weathered fractures, hard.<br>vertical fracture 13.6-13.9' bgs. |
| 15 | 645 | 9 | 15-20' | NA | 89% | 4.4 | 0.0 | | hz/f<br>hz/f | Blue gray LIMESTONE, laminated, freshly weathered fractures, hard.<br>Vertical fracture 16.2-16.6'. |

Well Construction



ARCADIS BBL
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 8.68' | 652.01' |
| | | |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

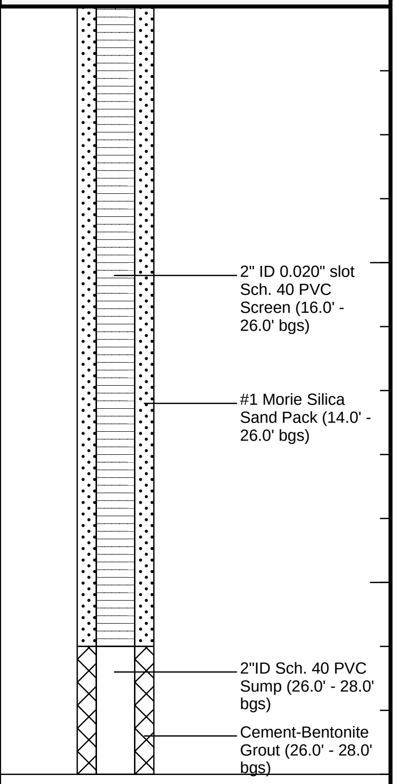
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** MW-06-14R

**Borehole Depth:** 28' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | | 9 | 15-20' | NA | 89% | 4.4 | 0.0 | | hz/f<br>hz/f<br>hz/f<br>la/f | Blue gray LIMESTONE, laminated, freshly weathered fractures, hard.<br>Vertical fracture 16.2-16.6'. |
| 20 | 640 | 10 | 20-25' | NA | 92% | 4.8 | 0.0 | | hz/f<br>la/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, freshly weathered fractures, hard.<br>Broken zone 20-20.4' bgs.<br>High angle fracture 24.15-24.4' bgs. |
| 25 | 635 | 11 | 25-28' | NA | 100% | 3.45 | 0.0 | | hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, freshly weathered fractures, hard. |
| 30 | 630 | | | | | | | | | |
| 35 | | | | | | | | | | |

Well Construction



ARCADIS BBL
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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 8.68' | 652.01' |
| | | |
| | | |

Depth measured from top of casing.

**Date Start/Finish:** 7/25/06 - 7/27/06
**Drilling Company:** Lyon Drilling
**Driller's Name:** Harry Lyon
**Drilling Method:** Hollow Stem Auger/ Rock Coring
**Sampler Size:** 2" Split Spoon/HQ Core Barrel
**Auger Size:** 4 1/4" ID
**Rig Type:** CME-55 Truck Mount

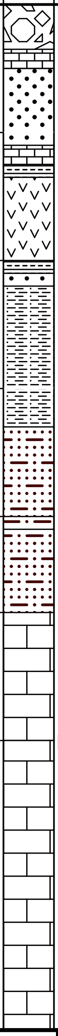
**Northing:** 1068967.01
**Easting:** 823115.04
**Casing Elevation:** 657.88' AMSL
**Surface Elevation:** 658.30' AMSL
**Borehole Depth:** 24' bgs
**Geologist:** Jennifer Sandorf

**Well ID:** **MW-06-15R**
**Client:** New York State Electric and Gas
**Location:** McMaster Street
Auburn, NY

| Depth (ft. bgs) | Elevation (ft. AMSL) |
|---|---|
| | 660 |
| 0 | |
| | 655 |
| 5 | |
| | 650 |
| 10 | |
| | 645 |
| 15 | |

| Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) |
|---|---|---|---|---|---|
| 1 | 0-2' | 11<br>16<br>13<br>14 | 29 | 1.2 | 0.0 |
| 2 | 2-4' | 3<br>4<br>50/ 0.5 | 54 | 0.9 | 18.7 |
| 3 | 4-6' | 1<br>2<br>1<br>2 | 3 | 0.7 | 7.7 |
| 4 | 6-8' | 2<br>2<br>1<br>2 | 3 | 1.0 | 24.5 |
| 5 | 8-9.4' | 1<br>1<br>50/ 0.4 | 51/0.4 | 0.6 | 0.5 |
| 6 | 9.5-11.5' | NA | 62% | 1.85 | 0.0 |
| 7 | 11.5-16.5' | NA | 92% | 4.8 | 6.7 |

Geologic Column



Bedrock Fractures

hz/f
hz/f
hz/sw
ha
hz/f
hz/f
hz/f

Stratigraphic Description

Light gray-brown fine to coarse angular GRAVEL FILL, some fine to coarse Sand, medium dense, dry.

Red BRICK fragments.

Brown fine to coarse SAND, little Silt, trace fine to medium Gravel, trace black Coal fragments, medium dense, dry.

As above, no Coal fragments.

Red BRICK fragments, dry.

Light brown Silty CLAY, slightly stiff, plastic, dry.

Gray to black CINDERS, BRICK, ASH, and GRAVEL, moist, slight odor. Refusal on Concrete - moved to another location.

Brown Silty CLAY, trace red Brick fragments, trace Wood, slightly plastic, moderately soft, dry.

Brown fine to coarse SAND, little Cinders, moderately loose, moist to wet, faint odor.

Light gray-brown Clayey SILT, slightly plastic, moderately soft, moist.

As above, lens from 6.3-6.5' bgs of fine to coarse SAND, moderately loose, wet.

Gray-brown fine SAND and SILT, moderately loose, faint odor (fuel oil-like), wet.

Brown SILT, trace red Brick fragments, trace Wood, trace fine Gravel, plastic, soft, wet.

Brown fine SAND and SILT, trace Rock fragments at bottom of spoon, moderately loose, wet.

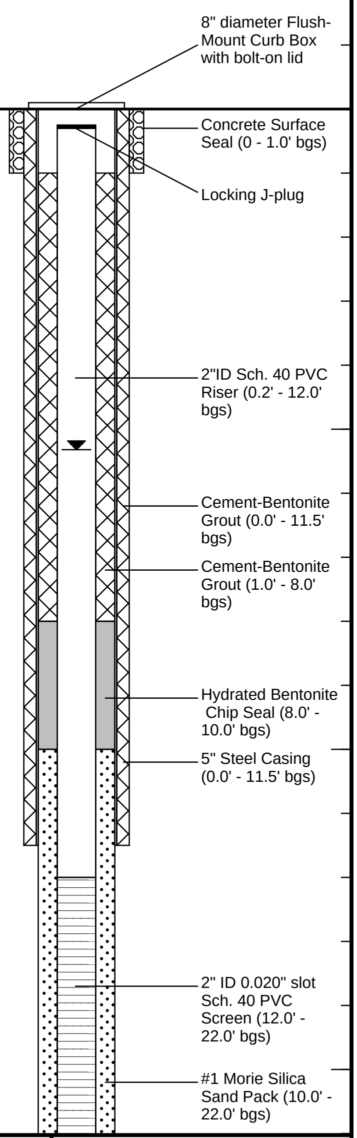
Blue gray LIMESTONE, laminated, fresh to slightly weathered fractures, hard.
High angle fractures 9.5-9.7' and 9.7-9.8' bgs.

Blue gray LIMESTONE, laminated, fresh to weathered fractures, hard.
Vertical fracture 11.5-13' bgs.

Broken zone 13.5-13.8' bgs with trace coal tar-like material on surfaces

Slight trace tar-like NAPL on fracture at 14.3'.

Well Construction



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## Remarks:
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
Seven attempts made to penetrate this area. Possible dry well or buried tank here. Well located in test pit TP-06-16.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

## Water Level Data

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 5.38' | 652.50' |
| | | |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

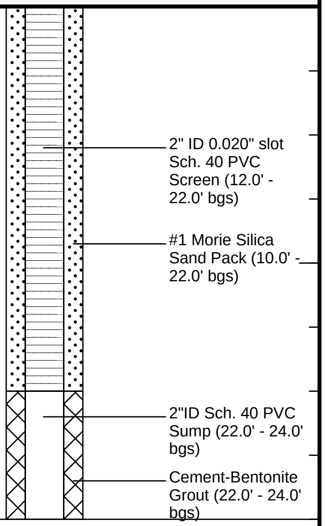
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-06-15R**

**Borehole Depth:** 24' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 7 | 11.5-16.5' | NA | 92% | 4.8 | 6.7 | | hz/f | Blue gray LIMESTONE, laminated, fresh to weathered fractures |
| 20 | 640 | 8 | 16.5-21.5' | NA | 78% | 5.1 | 4.1 | | hz/f<br>ha<br>hz/f<br>hz/f<br>hz/f<br>hz/f<br>hz/sw<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, fresh to slightly weathered fractures, hard.<br>Vertical fracture 16.7-17' bgs with slight trace tar-like NAPL on surface. |
| | 635 | 9 | 21.5-24' | NA | 86% | 2.5 | 0.0 | | hz/sw<br>hz/f<br>hz/f<br>hz/f<br>hz/f | Blue gray LIMESTONE, laminated, freshly weathered fractures, hard.<br>Broken zone 22.8-22.9' bgs. |
| 25 | | | | | | | | | | |
| | 630 | | | | | | | | | |
| 30 | | | | | | | | | | |
| | 625 | | | | | | | | | |
| 35 | | | | | | | | | | |

**Well Construction**



ARCADIS BBL
*Infrastructure, environment, facilities*

**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.
Seven attempts made to penetrate this area. Possible dry well or buried tank here. Well located in test pit TP-06-16.
hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; sw = slightly weathered.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07 | 5.38' | 652.50' |
| | | |
| | | |

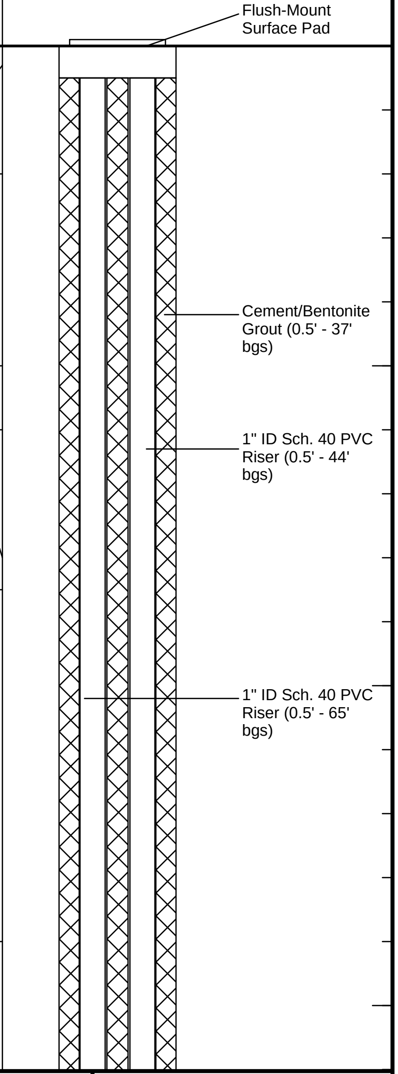
Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-06-15R.dat Date: 8/2/06

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **Date Start/Finish:** | 1/2-1/9/07 | **Northing:** | 1068859.58 | **Well ID:** | **MW-07-016RI/RD** |
| **Drilling Company:** | Parratt Wolff | **Easting:** | 822765.76 | **Client:** | New York State Electric and Gas |
| **Driller's Name:** | Glen/Joel | **Casing Elevation:** | 661.54' AMSL | **Location:** | McMaster Street<br>Auburn, NY |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring | **Surface Elevation:** | 661.54' AMSL |  |  |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel | **Borehole Depth:** | 79' bgs |  |  |
| **Auger Size:** | 4 1/4" ID | **Geologist:** | Ronald Kuhn |  |  |
| **Rig Type:** | ATV Mounted Dierich D-120 |  |  |  |  |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 660 | 1 | 0-2 | 15<br>13<br>9<br>11 | 22 | 0.8 | 0.0 |  | Light gray GRAVEL.<br>Dark brown Silty fine SAND, trace medium to coarse SAND, orange Brick in the tip of shoe. [FILL]. |
|  |  | 2 | 2-4 | 5<br>6<br>6<br>8 | 12 | 1.2 | 0.0 |  | Brown SILT, some Coal, Slag, Cinders, trace fine Sand, damp to moist. [FILL]. |
| 5 |  | 3 | 4-6 | 5<br>2<br>2<br>3 | 4 | 1.4 | 0.0 |  | Brown Silty CLAY, medium plasticity, moderately soft, moist. [FILL]. |
|  | 655 | 4 | 6-8 | 50<br>22<br>8<br>10 | 30 | 0.6 | 0.0 |  | Dark gray fine SAND and SILT, little to some, black Coal, trace yellowish brown Brick, very dense, damp to moist. [FILL].<br>Dark grayish brown fine SAND and SILT, little Clay, trace medium to coarse Sand, fine Gravel, Coal, and Brick, Limestone in tip of shoe, moist. [FILL]. |
|  |  | 5 | 8-10 | 4<br>14<br>50/0.3<br>NA | ref | 0.5 | 0.0 |  | Used a roller bit to create a hole for a continuous outer casing. (9-14' bgs) |
| 10 | 650 | NA | NA | NA | NA | NA | NA |  |  |
| 15 |  |  |  |  |  |  |  | hz/i<br>i | Dark bluish gray LIMESTONE, slightly fossiliferous, hard, slightly weathered.<br>Broken Zone between 14.9-15.1' bgs. |

Well Construction



**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments; i = irregular; l = laminations; BkN = broken; Z = zone.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 26.69' | 634.85' |
| 4/11/07-RD | 26.37' | 635.17' |
|  |  |  |

Depth measured from top of casing.

ARCADIS BBL
Infrastructure, environment, facilities

**Client:**
New York State Electric and Gas

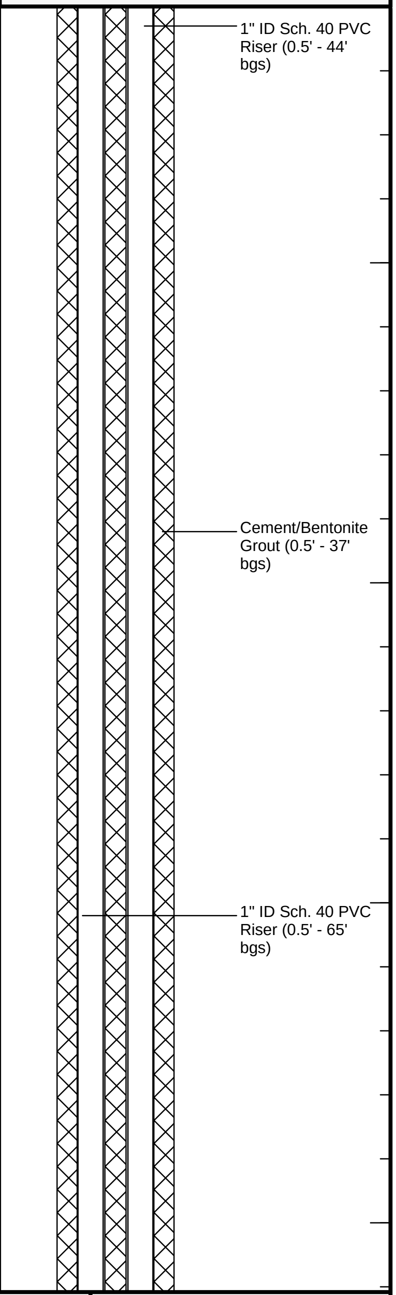
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** MW-07-016RI/RD

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 645 | 6 | 14-19 | NA | 95 | 4.9 | 0.0 | hz/sw<br>hz/sw<br>hz/sw<br>v<br>hz/sw<br>hz/m | Dark bluish gray LIMESTONE, slightly fossiliferous, hard, slightly weathered. Fractures filled with Silt or Clay between 16.05-17.1' bgs.<br>Vertical hairline fracture 17.5-18' bgs. |
| 20 | 640 | 7 | 19-24 | NA | 92 | 4.9 | 0.0 | la/m |  |
| 25 | 635 | 8 | 24-29 | NA | 100 | 5.2 | 0.0 | hz/sw<br>hz/m<br>hz/sw<br>hz/m<br>v | Dark bluish gray LIMESTONE, trace laminations of dark gray Rock (Shale), and Fossils, hard, competent, few fractures. Fracture at 24.6' bgs filled with Silt or Clay.<br>Vertical hairline fracture (27.7-29' bgs) with secondary mineralization. |
| 30 | 630 | 9 | 29-34 | NA | 98 | 5.0 | 0.0 | hz/m<br>hz/m<br>hz/m<br>hz/m<br>hz/i | Dark bluish gray LIMESTONE, trace dark gray laminations, and Fossils, hard, competent, few fractures.<br>Broken Zone at 33.7' bgs. |
| 35 |  |  |  |  |  |  |  | hz/sw<br>hz/sw<br>hz/sw<br>hz/sw | Dark bluish gray LIMESTONE, moderate fossils, slightly laminated with dark gray Limestone or Shale, mostly competent, hard, abundant Fossils (36.2-36.4') |

**Well Construction**



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 26.69' | 634.85' |
| 4/11/07-RD | 26.37' | 635.17' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

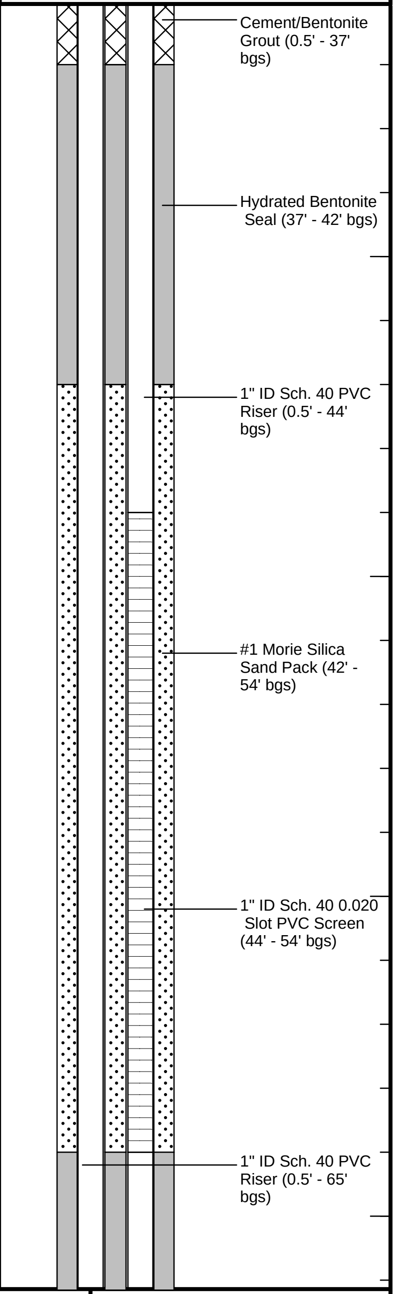
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-016RI/RD**

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 625 | 10 | 34-39 | NA | 93 | 5.0 | 0.0 | | hz<br>ha/m<br>hz<br>hz/m | Dark bluish gray LIMESTONE, moderate fossils, slightly laminated with dark gray Limestone or Shale, mostly competant, hard, abundant Fossils (36.2-36.4')<br>Fractures filled with Silt or Clay at 37.3' bgs. |
| 40 | 620 | 11 | 39-44 | NA | 86 | 5.0 | 0.0 | | hz/m<br>hz/m<br>i/m<br>la/m<br>hz/sw<br>hz/sw<br>hz/i/m<br>hz/m | Dark gray LIMESTONE, fossiliferous, mostly competent, hard. |
| 45 | 615 | 12 | 44-49 | NA | 88 | 4.95 | 0.0 | | hz/m<br>hz/m<br>hz/m<br>hz/i/m<br>hz/m<br>hz/m/i<br>v<br>hz/i | Bluish gray LIMESTONE, slightly laminated, moderate Fossil concentration, hard.<br>Vertical fracture between 47.1-48.4' bgs |
| 50 | 610 | 13 | 449-54 | NA | 58 | 5.0 | 0.0 | | hz/i<br>hz/m<br>hz/i/f<br>hz/i<br>hz/i/f | Bluish gray grading to dark gray LIMESTONE, moderate Fossil concentration, hard, abundant vertical fractures, Phosphate nodules. Vertical fracture, fresh, between 49.55-50.3' bgs, 50.3-51' bgs and 51-51.7' bgs. Onondaga Formation (bottom approximately 52.8-53' bgs) and Oriskany Formation (top 53-53.3' bgs). |
| 55 | | | | | | | | | BkNZ<br>ha/i/m | Dark gray LIMESTONE, Fossiliferous (concentrated between 56-57' bgs), hard, competant. Broken Zone between 54-54.4' bgs. |

**Well Construction**



ARCADIS BBL
Infrastructure, environment, facilities

**Remarks:**
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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 26.69' | 634.85' |
| 4/11/07-RD | 26.37' | 635.17' |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

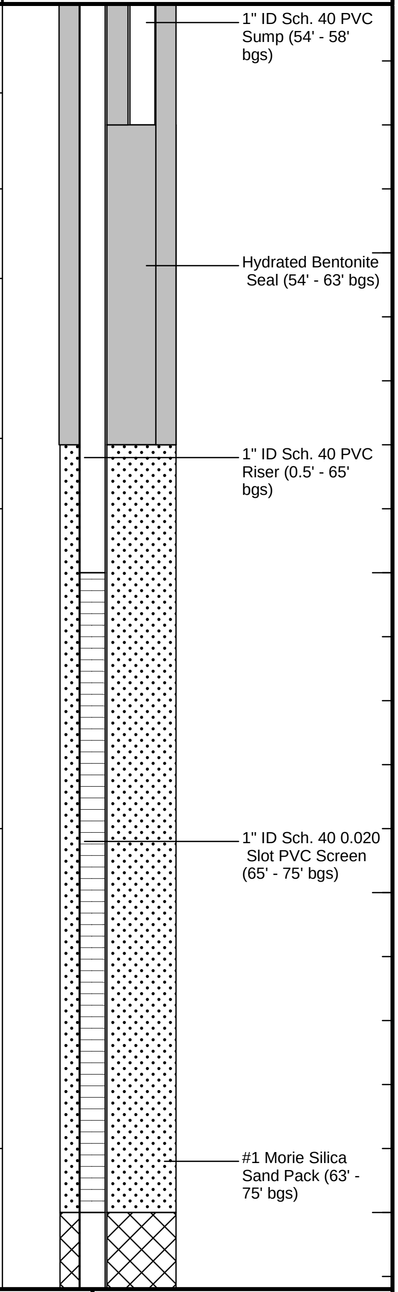
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-016RI/RD**

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 605 | 14 | 54-59 | NA | 93 | 5.0 | 0.0 | | hz/i/m | Dark gray LIMESTONE, Fossiliferous (concentrated between 56-57' bgs), hard, competant. |
| | | | | | | | | | hz/i/m | Dark gray LIMESTONE, hard, competent. |
| 60 | | 15 | 59-64 | NA | 48 | 4.8 | 0.0 | | hz/m<br>hz/f | Dark gray LIMESTONE, trace Fossils and Calcite or Quartzite filled fractures.<br>Broken Zone between 60.4-62.55' bgs. |
| | 600 | | | | | | | | hz<br>BkNZ | Dark gray LIMESTONE, vuggy, abundant Quartzite or Calcite, poor RQD% possible Sandstone or Conglomerate. |
| | | | | | | | | | hz/i<br>hz/i | Dark gray LIMESTONE, trace Quartzite filled fractures. |
| 65 | 595 | 16 | 64-69 | NA | 32 | 5.0 | 0.0 | | hz<br>hz<br>hz<br>hz/i<br>hz/i<br>hz/i<br>hz/f<br>BkNZ<br>hz<br>hz<br>v<br>BkNZ | Dark gray LIMESTONE, moderately laminated, abundant Quartzite or Calcite crystals between (67-69' bgs). Broken Zone between (67.63-67.8' bgs). Vertical fracture between 67.8-68.4' bgs.<br>Vertical fracture between 66.45-67' bgs.<br>Broken Zone between 68.4-69.2' bgs. |
| 70 | 590 | 17 | 69-74 | NA | 43 | 5.0 | 0.0 | | BkNZ<br>i/f<br>w<br>hz/i<br>hz/i<br>hz/sw<br>hz/sw<br>hz/sw<br>hz/sw<br>hz/sw<br>v<br>ha/f<br>i/f<br>BkNZ<br>hz | Dark gray DOLOSTONE, Quartzite or Calcite rich, abundant Quartzite or Quartz crystals as secondary mineralization in fractures, slightly vuggy, moderate laminations with darker gray Limestone or Dolostone, micro fractures throughout. Vertical fracture between 69.55-69.7' bgs.<br>Vertical fracture between 71.7-72.5' bgs.<br>Broken Zone between 73.1-73.5' bgs. |
| 75 | | | | | | | | | hz/f<br>hz/f<br>hz/f<br>hz/i<br>hz/i<br>hz/f<br>hz/f | Dark gray DOLOSTONE, moderately laminated, trace Quartzite or Calcite, secondary mineralization of fractures, highly fractured. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 26.69' | 634.85' |
| 4/11/07-RD | 26.37' | 635.17' |
| | | |

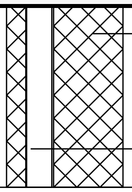
Depth measured from top of casing.

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-016RI/RD**

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 585 | 18 | 74-79 | NA | 30 | 5.0 | 0.0 | | hz/sw<br>hz/f<br>hz/f | Dark gray DOLOSTONE, moderately laminated, trace Quartzite or Calcite, secondary mineralizationof fractures, highly fractured. |  Cement/Bentonite Grout (75' - 79' bgs)<br>1" ID Sch. 40 PVC Sump (75' - 79' bgs) |
| | | 19 | | NA | | | | | hz/f<br>hz/i<br>v/f<br>hz/f<br>v/f<br>hz/f | Light gray DOLOSTONE, moderate to highly fractured, trace Clay filling fractures.<br>Vertical fracture between 77.53-78.3' bgs.<br>Vertical fracture between 78.3-78.6' bgs. | |
| 80 | | | | | | | | | | | |
| | 580 | | | | | | | | | | |
| 85 | | | | | | | | | | | |
| | 575 | | | | | | | | | | |
| 90 | | | | | | | | | | | |
| | 570 | | | | | | | | | | |
| 95 | | | | | | | | | | | |

ARCADIS BBL
Infrastructure, environment, facilities

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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 26.69' | 634.85' |
| 4/11/07-RD | 26.37' | 635.17' |
| | | |

Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf
Data File:MW-07-016RI/RD.dat Date: MW-07-016RI/RD.dat

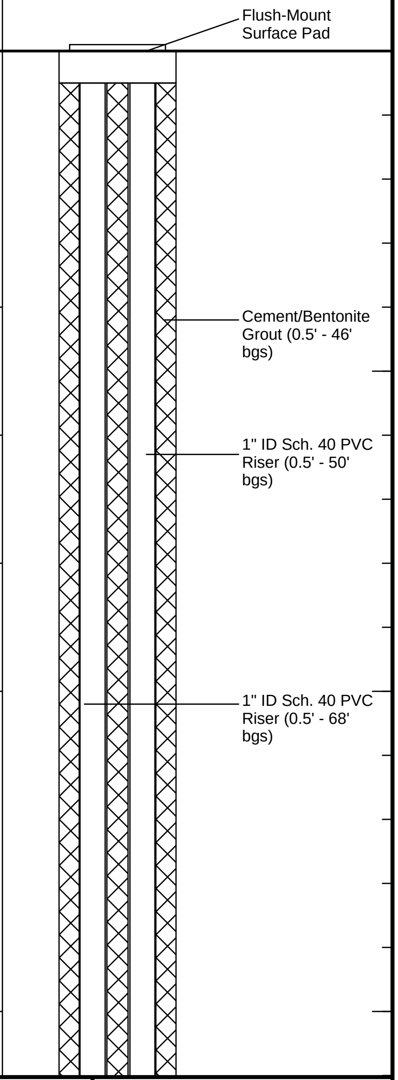
|  |  |
|---|---|
| **Date Start/Finish:** | 1/10-1/19/07 |
| **Drilling Company:** | Parratt Wolff |
| **Driller's Name:** | Glen/John |
| **Drilling Method:** | Hollow Stem Auger/<br>Rock Coring |
| **Sampler Size:** | 2" Split Spoon/HQ Core Barrel |
| **Auger Size:** | 4 1/4" ID |
| **Rig Type:** | ATV Mounted Dierich D-120 |

|  |  |
|---|---|
| **Northing:** | 1068999.86 |
| **Easting:** | 823118.78 |
| **Casing Elevation:** | 657.92' AMSL |
| **Surface Elevation:** | 658.19' AMSL |
| **Borehole Depth:** | 79' bgs |
| **Geologist:** | Ronald Kuhn |

|  |  |
|---|---|
| **Well ID:** | **MW-07-17RI/RD** |
| **Client:** | New York State Electric and Gas |
| **Location:** | McMaster Street<br>Auburn, NY |

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 660 |  |  |  |  |  |  |  |  |  |
| 0 |  | 1 | 0-2 | 3<br>4<br>6<br>8 | 10 | 0.4 | 0.0 |  |  | Dark brown SILT, trace fine Sand and fine to medium Gravel, moist. |
|  | 655 | 2 | 2-4 | 11<br>7<br>4<br>3 | 11 | 0.3 | 0.0 |  |  |  |
| 5 |  | 3 | 4-6 | 2<br>5<br>4<br>3 | 9 | 0.8 | 0.0 |  |  | Dark brown SILT, trace fine Sand, fine to medium Gravel, Brick, wet to saturated. |
|  |  | 4 | 6-8 | 2<br>6<br>3<br>6 | 9 | 0.0 | NA |  |  | No recovery. |
|  | 650 | 5 | 8-10 | 7<br>27 |  | 0.8 | 0.0 |  |  | Dark brown SILT, trace fine Sand and Brick, Limestone fragments in shoe, loose, saturated. |
| 10 | 645 | 6 | 10-15 | 8<br>6<br>6<br>6<br>6 | 43 | 4.9 | 51.6 |  | hz/i<br>hz/i<br>hz/BknZ<br>la/BknZn<br>hz<br>hz<br>hz/i<br>hz/i/BknZ<br>BknZ<br>la<br>hz/i<br>hz/i<br>hz/i<br>hz/i | Dark gray LIMESTONE, moderately fractured, NAPL (coal tar) common with in fractures.<br>Broken Zone 11.1-11.3' bgs.<br>Broken Zone 12.3-12.57' bgs. |
| 15 |  |  |  | 6 |  |  |  |  |  | Dark gray LIMESTONE, minor fracturing, trace Fossils, competant, hard, NAPL. |

Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 29.20' | 628.72' |
| 4/11/07-RD | 31.34' | 626.51' |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-17RI/RD**

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description | Well Construction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 640 | 7 | 15-20 | 4<br>4<br>4<br>4 | 84 | 4.7 | 0.0 | | | Dark gray LIMESTONE, minor fracturing, trace Fossils, competant, hard, NAPL. | 1" ID Sch. 40 PVC Riser (0.5' - 50' bgs) |
| 20 | 635 | 8 | 20-25 | 5<br>5<br>5<br>5<br>5 | 100 | 5.0 | 0.0 | | hz/i/f<br>m/i<br>b/i/hz<br>Bkhz<br>hz/f | Dark gray LIMESTONE, few darker gray Limestone laminations, slight micro folding, trace Fossils, hard, comeptant, trace sheen. | Cement/Bentonite Grout (0.5' - 46' bgs) |
| 25 | 630 | 9 | 25-30 | 6<br>6<br>6<br>6<br>6 | 98 | 5.0 | 0.0 | | hz/i/f<br>la/i/f<br>hz/i/f<br>hz/f<br>hz/f<br>m | Dark gray slightly laminated LIMESTONE, trace irregular hareline fractures, secondary mineralization with dark Limestone, trace fossils, hard. | |
| 30 | 625 | 10 | 30-35 | 5<br>5<br>5<br>5<br>5 | 83 | 4.8 | 0.0 | | hz/f<br>hz/f<br>ha/f<br>hz/f<br>hz/l<br>hz/f<br>hz/f<br>hz/m | Bluish gray grading to dark gray slightly laminated LIMESTONE, trace fossils, hard.<br>High angel fracture 32.3-32.55' bgs. | 1" ID Sch. 40 PVC Riser (0.5' - 68' bgs) |
| 35 | | | | 7 | | | | | | Dark gray moderately laminated LIMESTONE, trace fossils throughout, hard. | |

ARCADIS BBL
Infrastructure, environment, facilities

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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 29.20' | 628.72' |
| 4/11/07-RD | 31.34' | 626.51' |
| | | |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

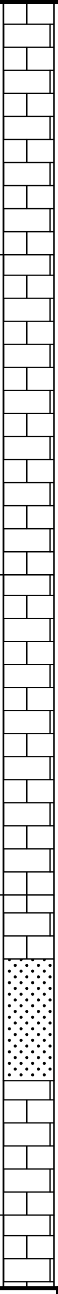
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-17RI/RD**

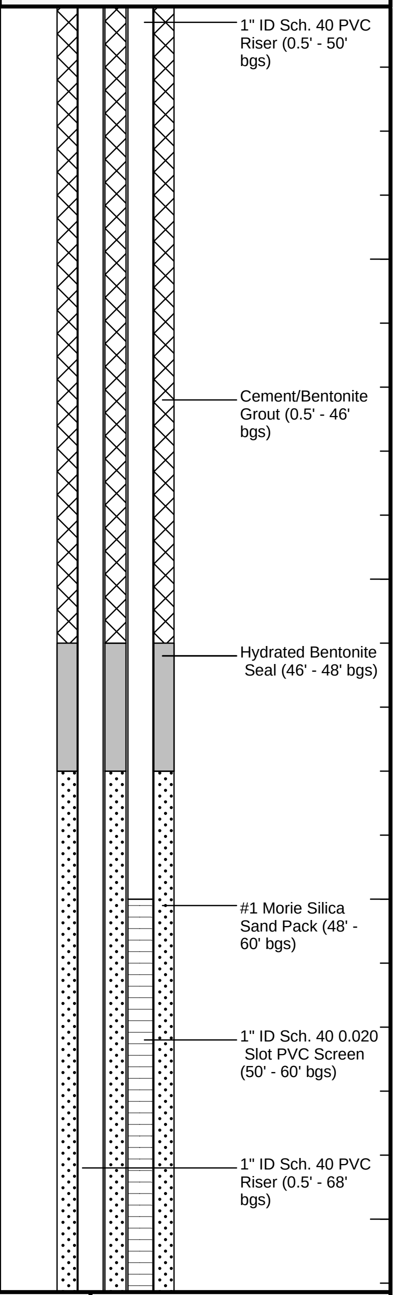
**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 620 | 11 | 35-40 | 7<br>6<br>5<br>5 | 85 | 5.2 | 0.0 | hz<br>la/f<br>hz<br>hz<br>la<br>la<br>hz<br>hz | Dark gray moderately laminated LIMESTONE, trace fossils throughout, hard. |
| 40 | 615 | 12 | 40-45 | 5<br>5<br>5<br>5<br>5 | 82 | 4.9 | 0.0 | hz/f<br>hz/f<br>la/s<br>hz/f<br>hz/i<br>la | Bluish gray moderately laminated LIMESTONE, trace hairline fractures with dark gray secondary mineralization throughout, trace Fossils throughout, hard. |
| 45 | 610 | 13 | 45-50 | 6<br>6<br>5<br>5<br>5 | 86 | 5.0 | 0.0 | hz/i<br>hz<br>hz/i<br>f<br>hz/i<br>hz/i<br>ha/m<br>ha/m<br>hz | Gray to light gray moderately laminated LIMESTONE, trace hairline fractures with dark gray secondary mineralization throughout, trace fossils throughout, hard.<br>High angel fracture 47.95-48.6' bgs.<br>High angel fracture 48.6-49.3' bgs. |
| 50 | 605 | 14 | 50-55 | 7<br>7<br>7<br>7<br>7 | 58 | 5.0 | 0.0 | v/m<br>hz<br>hz/m<br>la/f<br>ha/f | Light gray LIMESTONE, slight micro folding, hairline fractures with dark gray secondary mineralization.<br>Dark gray SANDSTONE, hard, brittle (Oriskany Formation).<br>Phosphate Nodules with coarse grain Sandstone ( marks the bottom of the Onondaga Formation) 50.85-51' bgs.<br>Vertical fracture 52.2-52.9' bgs.<br>Gray slightly laminated LIMESTONE, hard (Manlius Formation), trace hairline vertical fractures with dark gray secondary mineralization. |
| 55 |  |  |  | 7 |  |  |  | ha/m<br>la/m | Dark gray slightly laminated LIMESTONE, evidence of micro Fossils, slightly fractured, hard. |

Geologic Column



Well Construction



ARCADIS BBL
Infrastructure, environment, facilities

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**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 29.20' | 628.72' |
| 4/11/07-RD | 31.34' | 626.51' |

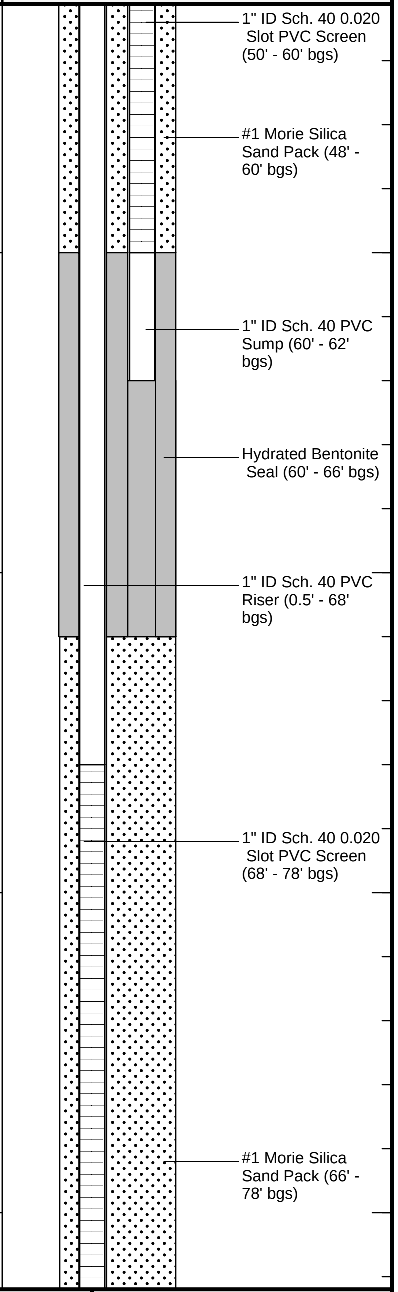
Depth measured from top of casing.

Project: 13049.005 Template: G:\Rockware\LogPlot 2001\LogFiles\13049\Well2005BR_ABBL.ldf

Data File:MW-07-17RI/RD.dat Date: 3/09/07

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|
|  | 600 | 15 | 55-60 | 7<br>7<br>7<br>7 | 73 | 5.0 | 0.0 | la/m<br>la/m<br>hz/i<br>la/m<br>hz/m<br>hz/i/m<br>hz/i | Dark gray slightly laminated LIMESTONE, evidence of micro Fossils, slightly fractured, hard. |
| 60 | 595 | 16 | 60-65 | 5<br>5<br>6<br>6<br>6 | 83 | 5.0 | 0.0 | la/f<br>hz/i<br>hz/f/sw<br>hz/i/f<br>hz/m<br>m<br>hz/sw<br>hz/i | Dark gray slightly laminated LIMESTONE, evidence of micro Fossils, slighty fractured, hard. |
| 65 | 590 | 17 | 65-70 | 7<br>7<br>6<br>6<br>6 | 87 | 5.0 | 0.0 | la/f<br>hz/i<br>hz/i<br>hz/f<br>hz/i<br>hz/i<br>hz/f<br>hz<br>hz<br>hz | Gray to dark gray moderately laminated LIMESTONE, possible Shale interbedding, moderately fractured, hard. |
| 70 | 585 | 18 | 70-75 | 5<br>5<br>5<br>5<br>5 | 92 | 5.0 | 0.0 | hz<br>hz/i<br>hz<br>hz/i<br>hz/m<br>hz<br>hz<br>hz<br>hz | Dark gray moderately laminated LIMESTONE, dark gray to black laminationsof Limestone/Shale prevalent throughout, slight micro folding, slightly fractured, hard. |
| 75 |  |  |  | 5 |  |  |  | v<br>BknZ<br>BknZ<br>la<br>ha/i | Dark gray moderately laminated LIMESTONE.<br>Vertical fracture 75-75.4' bgs. |

**Well Construction**



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## Remarks:
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments; i = irregular; l = laminations; BkN = broken; Z = zone.

## Water Level Data

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 29.20' | 628.72' |
| 4/11/07-RD | 31.34' | 626.51' |
|  |  |  |

Depth measured from top of casing.

**Client:**
New York State Electric and Gas

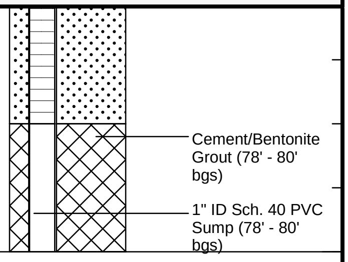
**Site Location:**
McMaster Street
Auburn, NY

**Well ID:** **MW-07-17RI/RD**

**Borehole Depth:** 79' bgs

| Depth (ft. bgs) | Elevation (ft. AMSL) | Sample Run Number | Sample/Int/Type | Blows per 6 Inches | N - Value / RQD (%) | Recovery (feet) | PID Headspace (ppm) | Geologic Column | Bedrock Fractures | Stratigraphic Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 | | | | | ha/i | Dark gray moderately laminated LIMESTONE. |
| | | 19 | 75-80 | 5 | 68 | 5.0 | 0.0 | | | Gray DOLOMITE (HCL), trace mixing with Limestone (77.7-79.6' bgs), hard. |
| | 580 | | | 5 | | | | | hz<br>hz<br>la | Horizontal fractures 78.65-79.2' bgs. |
| 80 | | | | 5 | | | | | ha/i<br>BknZ<br>BknZ | Dark gray LIMESTONE, broken. |
| | 575 | | | | | | | | | |
| 85 | | | | | | | | | | |
| | 570 | | | | | | | | | |
| 90 | | | | | | | | | | |
| | 565 | | | | | | | | | |
| 95 | | | | | | | | | | |

Well Construction



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**Remarks:**
bgs = below ground surface; NA = Not Applicable/Not Available; AMSL = Above Mean Sea Level.

hz = horizontal; v = vertical; la = low angle; ha = high angle; f = fresh; m = mechanical; sw = slightly weathered; w = weathered; hw = highly weathered; ff = fractured fragments; i = irregular; l = laminations; BkN = broken; Z = zone.

**Water Level Data**

| Date | Depth | Elev. |
|---|---|---|
| 4/11/07-RI | 29.20' | 628.72' |
| 4/11/07-RD | 31.34' | 626.51' |

Depth measured from top of casing.

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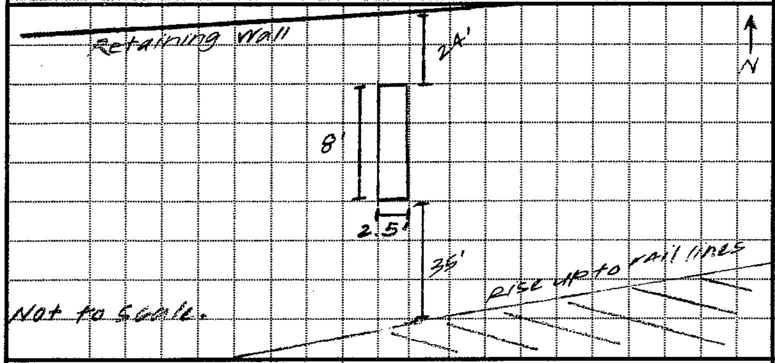
# Test Pit Log

## Test Pit ID: TP-04-01

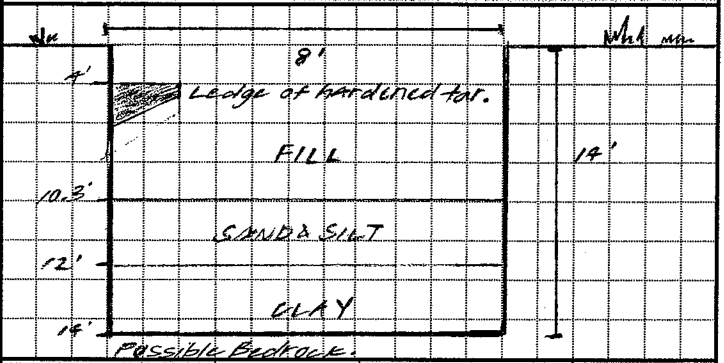
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/22/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Sunny |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

### Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 8' x 2.5' | **Total Depth:** | 14.0' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 10.3' | 0.0 | Brown fine to coarse SAND, little fine to coarse Gravel, trace Cobbles, loose, dry.<br>1.5' – 1.9': Ash.<br>Some Brick, Cinders, and Slag, below 2' bgs.<br>Moist at 5' bgs. | None |
| 10.3' – 12.0' | 57.0 | Orangish-brown fine SAND and SILT, trace Wood, soft, very moist. | None |
| 12.0' – 14.0' | 1.2 | Pink SILT, some Clay and fine to coarse Gravel, trace fine to coarse Sand, slight MGP-type odor, trace rainbow sheen and oily blackish-brown NAPL in sand and gravel pockets.<br>Wood planks at 12.5' bgs.<br>Refusal at 14' bgs. Possible Bedrock. | Soil sample TP-04-01(12–14') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |

### Notes:

bgs = below ground surface; NA = Not Available/Not Applicable.

Trace pipe debris at 7.0' bgs.

Approximate 1" water accumulated in northwestern portion of TP-04-01 after 1 hour. Bottom of TP-04-01 at 14.0' bgs.

### Photograph Summary:

| | |
|---|---|
| #1 | Disk 1-9: Ash and Brick at ~2' bgs. |
| #2 | Disk 1-10: During excavation (west sidewall). |
| #3 | |
| #4 | |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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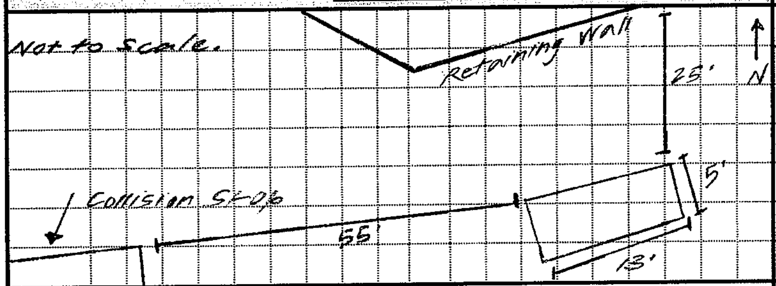
# Test Pit Log

**Test Pit ID: TP-04-02**

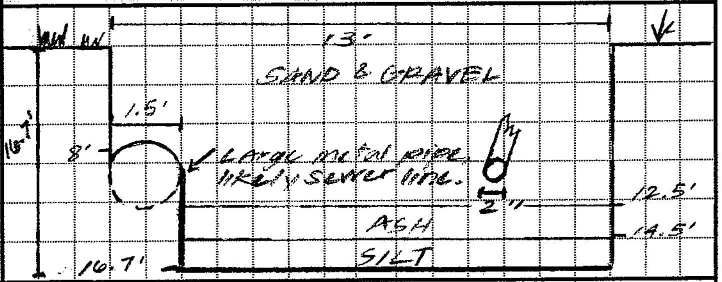
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/22/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Sunny |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

## Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 13' x 5' | **Total Depth:** | 16.7' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 12.5' | 3.5' – 390<br>7' – 1091<br>11' – 271 | Dark blackish-brown fine to coarse SAND and fine to coarse GRAVEL, little Cobbles, Bricks, Coal fragments, Slag, and Silt, dry, loose to very loose.<br>6' – 9': Little to trace pebble to cobble sized blue stained porous brick-like material.<br>10' – 11': Weak MGP-type odor, slight rainbow sheen, moist.<br>11' – 12.5': Pockets of very loose, wet, tan fine Sand and Ash. Moderate MGP-type odor. Trace yellowish-brown oily NAPL observed as NAPL saturated pockets of sand and gravel. | Soil sample TP-04-02(7') for TCL VOCs. |
| 12.5' – 14.5' | 14' – 36 | Tan ASH, little to trace fine Sand, with trace fine to coarse Sand and fine Gravel seams, moist to very moist. Trace yellowish brown oily NAPL observed as NAPL saturated seams of sand and gravel. | Soil sample TP-04-02(14') for TCL VOCs, SVOCs, Inorganics, and Cyanide. |
| 14.5' – 16.7' | NA | Pink SILT, some Clay, little fine to coarse Gravel, dry, very dense. Slight MGP-type odor. No staining/sheens/NAPL observed.<br>Refusal at 16.7' bgs. Possible Bedrock. | None. |

**Notes:**

bgs = below ground surface; NA = Not Available/Not Applicable.

Large metal pipe encountered in the western portion of the test pit approximately 8' bgs. Test pitting activities moved 2' east.

Broken piping (2" diameter) observed entering test pit from the South side wall at approximately 8.5' bgs.

**Photograph Summary:**

| | |
|---|---|
| #1 | |
| #2 | |
| #3 | |
| #4 | |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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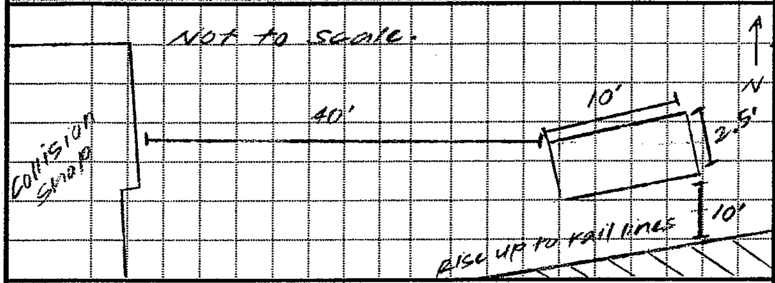
# Test Pit Log

## Test Pit ID: TP-04-03

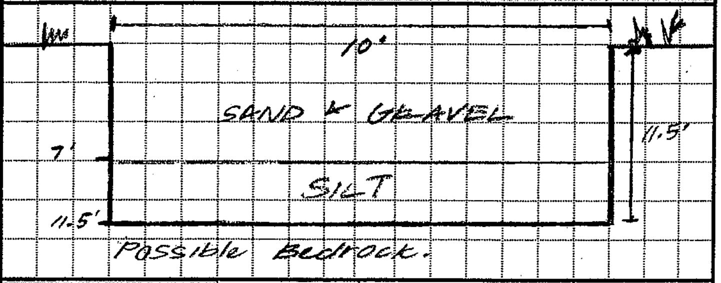
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/22/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Sunny |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Sketch of Test Pit Layout:**

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 10' x 2.5' | **Total Depth:** | 11.5' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 7.0' | 0' - 2' – 3.5<br>2' - 4' – 0.7 | Dark brownish-black fine to coarse SAND and fine to coarse GRAVEL, little Silt, Bricks, Coal fragments, Wood, Ceramic fragments, and Slag, loose, dry. | None |
| 7.0' – 11.5' | 8' – 3.0<br>9' – 18.4<br>10' – 639<br>11.5' – 2678 | Pink SILT, some Clay, little fine to coarse Gravel, trace fine to coarse Sand, moist, very hard.<br>Weak MGP-type odor at 9' bgs.<br>10' – 11': Trace thin brownish-gold and black oily NAPL in sand and gravel seams.<br>11' – 11.5': Little to some thin brownish-gold and black oily NAPL in sand and gravel seams, in western portion of test pit. Some black staining and moderate MGP-type odor and sweeter hydrocarbon-type odor.<br>Refusal at 11.5' bgs. Possible Bedrock. | Soil sample TP-04-03(10-11.5') for TCL VOCS, SVOCS, Inorganics, Cyanide. |

**Notes:**

bgs = below ground surface; NA = Not Available/Not Applicable.

Water slowly trickling into TP-04-03 at 11.5' bgs.

**Photograph Summary:**

| | |
|---|---|
| #1 | |
| #2 | |
| #3 | |
| #4 | |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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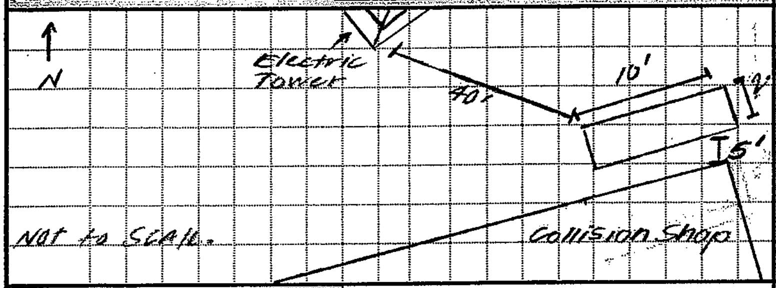
# Test Pit Log

## Test Pit ID: TP-04-04

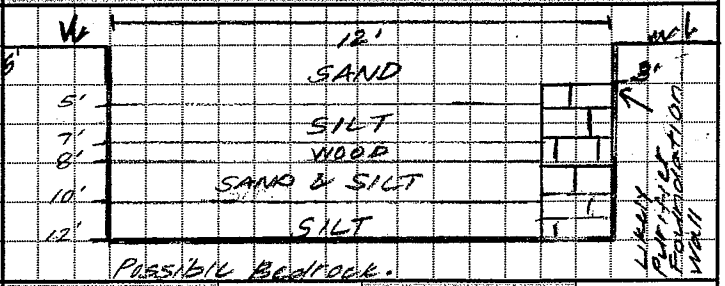
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/23/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Sunny |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

### Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 12' x 2.5' | **Total Depth:** | 12.0' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 5.0' | 2' – 4.2 | Dark blackish-brown fine to coarse SAND, some fine to coarse Gravel, little to trace Brocks, Coal fragments, Cobbles, and Wood, loose, dry. | None. |
| 5.0' – 6.5' | 5' – 174<br>6' – 356 | Black stained SILT, little fine to coarse Gravel, Clay, and fine Sand, loose, moist. Slight to moderate MGP-type odor, slight rainbow sheen, trace slightly sticky black NAPL on gravel. MGP-type odor being stronger with depth.<br>NAPL seep visible on south sidewall of test pit at ~6' bgs. | Soil sample TP-04-04(6') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |
| 6.5' – 7.0' | NA | Brown SILT, little fine Sand, trace Wood, loose, wet. | None. |
| 7.0' – 8.0' | NA | WOOD planks, moderate MGP-type odor, planks spotted with some black sticky NAPL. | None. |
| 8.0' – 10.0' | 8' – 106 | Brown fine SAND and SILT, trace Wood and Organics, soft, moist to very moist, weak to moderate MGP-type odor, some black staining. | None. |
| 10.0' – 12.0' | 11' – 48.9 | Pink SILT, some Clay and fine to coarse Gravel.<br>Refusal at 12.0' bgs. Possible Bedrock. | None. |

### Notes:

bgs = below ground surface; NA = Not Available/Not Applicable.

Likely former purifier foundation wall encountered in eastern portion of test pit at 3' bgs.

NAPL seep layer, approx. 4" thick, visible along the length of the south sidewall of the test pit at 6.0' bgs.

1-2" of water/NAPL mixture accumulated in northwest corner of test pit.

### Photograph Summary:

| | |
|---|---|
| #1 | Disk 2-3: Brick wall, 1.3' bgs. |
| #2 | Disk 2-4: Black sticky NAPL at 6' bgs. |
| #3 | Disk 2-5: Water trickling into test pit from under brick wall, at 5' bgs. |
| #4 | Disk 2-7: NAPL seep, south sidewall, at 6' bgs. |
| #5 | Disk 2-8: NAPL seep, south sidewall, at 6' bgs. |
| #6 | Disk 2-9: Sticky NAPL in north west corner of test pit at 6' bgs. |
| #7 | Disk 2-10: East sidewall of test pit, water/NAPL mixture trickling in. |
| #8 | |
| #9 | |
| #10 | |

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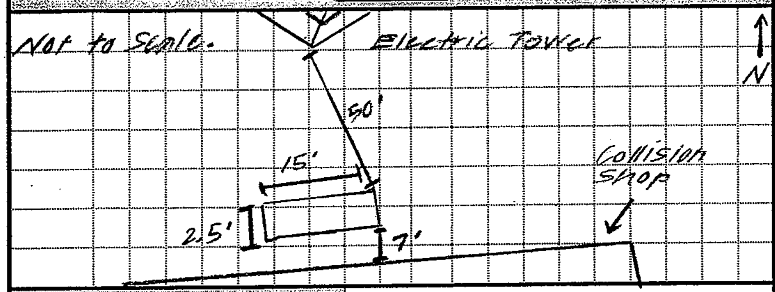
# Test Pit Log

**Test Pit ID:** TP-04-05

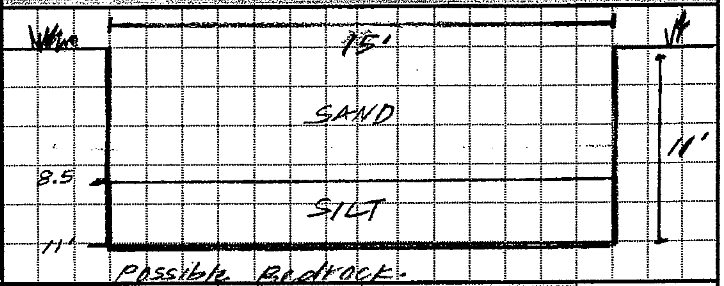
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/23/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Sunny |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

## Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 15' x 2.5' | **Total Depth:** | 11.0' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 8.0' | 3.5' – 5.1<br>6' – 27.7 | Brown fine to coarse SAND, some Silt, little fine to coarse Gravel, Bricks, Cobbles, and Organics, loose, dry.<br>4' – 6': Moist, slight MGP-type odor, little black staining.<br>6' – 7': Strong MGP-type odor, heavy black staining, trace black slightly sticky NAPL on gravel, water/NAPL mixture trickling into test pit.<br>7' – 8': Very strong MGP-type odor, very heavy black staining, some black sticky NAPL on gravel pieces. | None. |
| 8.0' – 8.5' | 8' – 55.9 | Brown fine to coarse SAND, some Silt and Wood, little fine to coarse Gravel, trace Bricks, loose, moist to very moist. Very strong MGP-type odor, very heavy black staining, black sticky NAPL coating most gravel pieces. | None. |
| 8.5' – 11.0' | 9' – 136<br>10' – 70.4 | Black stained SILT, some fine to coarse Sand, little fine to coarse Gravel, very strong MGP-type odor, heavy rainbow sheen, some black sticky NAPL on gravel pieces.<br>Refusal at 11' bgs. Possible Bedrock. | Soil sample TP-04-05(9') for TCL VOCs, SVOCs, Inorganics, and Cyanide. |

## Notes:

bgs = below ground surface; NA = Not Available/Not Applicable.

Three test pit attempts were made to locate the former purifier foundation. The former foundation was not located.

A 1" PVC piezometer screened from 1.0' – 11.0' bgs was installed in the test pit prior to backfilling of the hole.

## Photograph Summary:

| | |
|---|---|
| #1 | Disk 3-1: During excavation, water/NAPL mixture at ~6' bgs. |
| #2 | Disk 3-3: Completed excavation, south sidewall. |
| #3 | |
| #4 | |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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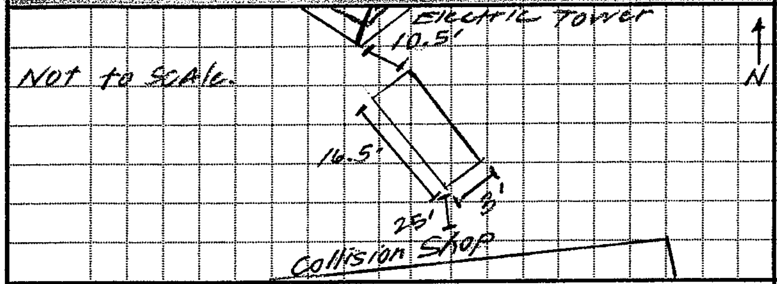
# Test Pit Log

**Test Pit ID: TP-04-06**

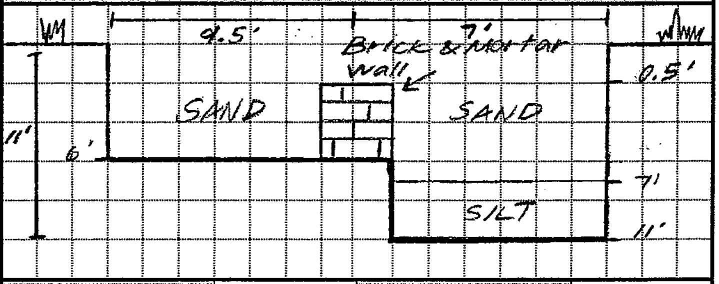
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/29/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Cloudy |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Sketch of Test Pit Layout:**

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | **Inside Likely Former Holder:<br>9.5' x 3'<br>Outside Likely Former Holder:<br>7' x 3'** | **Total Depth:** | **Inside:<br>6'<br>Outside:<br>11'** | **Depth to Water:** | **NA** |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 6.0' | 5' – 0.1 | Inside likely former gas holder:<br>Brown fine to coarse SAND, little fine to coarse Gravel, trace Bricks (red and tan), Metal Springs, and Cinders, loose, dry.<br>Fine to coarse Sand pocket, approx. 2' tall by 4' wide, of black staining, visible on west sidewall.<br>Moist to wet at 5.5' bgs. Trace black staining and very slight MGP-type odor.<br>Water rushing into test pit at 6.0' bgs. | None |
| -- | -- | -- | -- |
| 0.0' – 7.0' | 0.0 | Outside likely former gas holder:<br>Brown fine to coarse SAND, little fine to coarse Gravel, trace Bricks (red and tan) and Rock fragments, loose, dry.<br>Moist at 6.0' bgs. | None |
| 7.0' – 8.0' | 7' – 2.6 | Orangish-brown SILT, little fine Sand, trace fine to medium Gravel and Cinders, moist, slight MGP-type odor. | None |
| 8.0' – 11.0' | 8' – 241<br>8.5' – 364<br>9' – 110<br>10' – 231 | Black stained SILT with fine Sand seams, moist, very strong MGP-type odor, trace to little tar-like black NAPL in sand seams, NAPL content increasing to some with depth.<br>Yellowish-brown oily NAPL in Sand and Gravel seams, and pockets of oily and tar-like NAPL, at 10.0' bgs.<br>Refusal at 11.0' bgs. Possible Bedrock. | Soil sample TP-04-06(8.5') and DUP-1 for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |

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# Test Pit Log

## Test Pit ID: TP-04-06

| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/29/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Cloudy |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze. |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

### Comments:

bgs = below ground surface; NA = Not Available/Not Applicable.

Possible former gas holder brick and mortar wall at 0.5' bgs, approx. 2.5' wide, 20' southeast of tower.

### Photograph Summary:

| | |
|---|---|
| #1 | Disk 4-7: Brick and mortar wall. |
| #2 | Disk 4-8: North sidewall within likely former gas holder. |
| #3 | Disk 4-10: Black stained Silt, sample TP-04-06(8.5'), from outside likely former gas holder. |
| #4 | Disk 4-11: Bucket of Silt with pockets of tar-like NAPL and oily NAPL in sand and gravel seams, at 10.0' bgs, outside likely former gas holder. |
| #5 | Disk 4-12: Oily NAPL in sand and gravel seams, outside likely former gas holder. |
| #6 | Disk 4-13: Completed excavation, outside likely former gas holder. |

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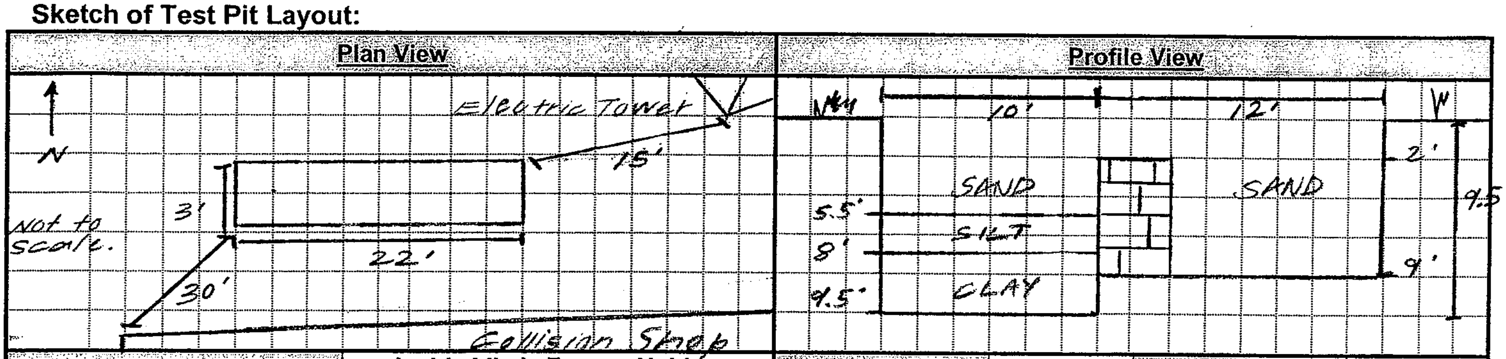
# Test Pit Log

## Test Pit ID: TP-04-07

| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/29/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Cloudy |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Sketch of Test Pit Layout:**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | **Inside Likely Former Holder:**<br>**12' x 3'**<br>**Outside Likely Former Holder:**<br>**10' x 3'** | **Total Depth:** | **Within:**<br>**9'**<br>**Outside:**<br>**9.5'** | **Depth to Water:** | **NA** |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – ~9.0' | NA | Inside likely former gas holder:<br>Brown fine to coarse SAND, little fine to medium Gravel, little to trace Bricks (red and tan), Cinders, and Ash, loose, dry.<br>Water trickling into hole in eastern half of hole with little to some sheen at 4.7' bgs.<br>Some Glass and fine to coarse Gravel, trace Ceramics, at 5.2' bgs.<br>Water rushing into test pit at 6' bgs.<br>Backhoe teeth scratching something hard at ~9' bgs. | None |
| -- | -- | -- | -- |
| 0.0' – 5.5' | 2' – 0.3 | Outside likely former gas holder:<br>Brown fine to coarse SAND, little fine to medium Gravel, trace Bricks (red and tan), Coal fragments, loose, dry.<br>Water trickling into hole from east sidewall. | None |
| 5.5' – 8.0' | 7' – 27.3<br>7.5' – 32.8 | Orangish-brown SILT, little fine to coarse Gravel, fine to coarse Sand, and Clay, moist to wet, slight MGP-type odor.<br>Some to little black staining, trace rainbow sheen on Gravel faces, at 6.5' bgs.<br>Water/NAPL mixture trickling into hole at 7' bgs.<br>Moderate MGP-type odor, some black staining, trace rainbow sheen in Gravel seams, some Wooden planks stained black with trace black sticky NAPL, at 7.5' bgs. | None |
| 8.0' – 9.5' | 9' – 87.8 | Pinkish CLAY, little fine to coarse Sand and Gravel, little Silt, moist, moderately plastic, moderate to strong MGP-type odor, little black staining, rainbow sheen and trace black sticky NAPL in Sand and Gravel seams. Refusal at 9.5' bgs. Possible bedrock. | Soil sample TP-04-07(9') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |

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# Test Pit Log

**Test Pit ID: TP-04-07**

| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/29/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Cloudy |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Comments:**

bgs = below ground surface; NA = Not Available/Not Applicable.

Possible former gas holder brick and mortar wall at 2' bgs, ~2.5' wide.

**Photograph Summary:**

| | |
|---|---|
| #1 | Disk 4-1: Brick and mortar wall. |
| #2 | Disk 4-2: North sidewall within likely former gas holder. |
| #3 | Disk 4-3: Water observed at ~6' bgs within likely former gas holder. |
| #4 | Disk 4-4: Water/NAPL mixture observed at ~7' bgs outside likely former gas holder. |
| #5 | Disk 4-6: Black staining and trace sticky NAPL observed at 8.0' bgs. |
| #6 | |

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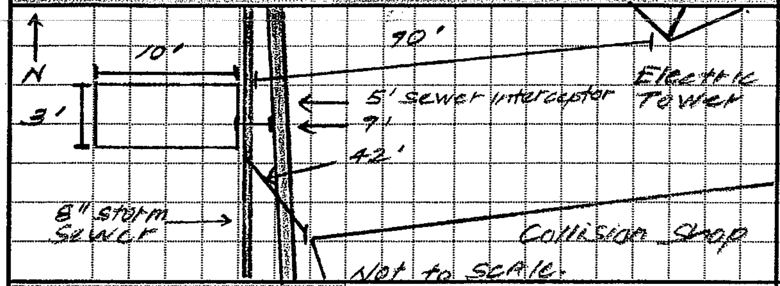
# Test Pit Log

**Test Pit ID:** TP-04-08

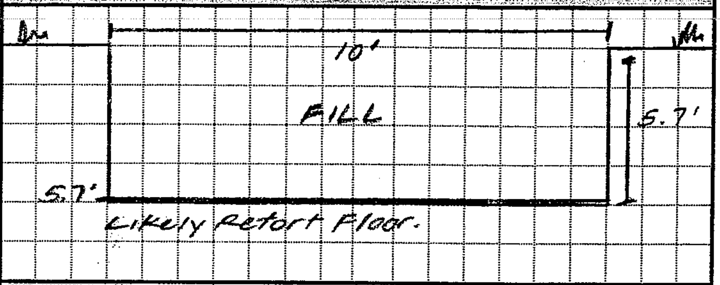
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

## Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 10' x 3' | **Total Depth:** | 5.7' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 0.9' | NA | Dark brown fine to coarse SAND, little fine to coarse Gravel and Silt, loose, dry. | None. |
| 0.9' – 1.3' | NA | BRICK, some fine to coarse Sand and Silt, little Ash, loose, dry. | None. |
| 1.3' – 1.5' | NA | Black ASH, trace fine to coarse Sand and Silt, loose, dry. | None. |
| 1.5' – 5.5' | 5' – 4.6 | BRICK, COAL, CINDERS, ASH, SLAG, brown fine to coarse SAND, fine to coarse GRAVEL, and SILT, loose, dry. | Soil sample TP-04-08(5') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |
| 5.5' – 5.7' | 5.6' – 3.8 | Refusal at 5.7' bgs. Cast Iron (1" layer) on CONCRETE. | None. |

**Comments:**

bgs = below ground surface; NA = Not Available/Not Applicable.

**Photograph Summary:**

| | |
|---|---|
| #1 | |
| #2 | |
| #3 | |
| #4 | |
| #5 | |
| #6 | |

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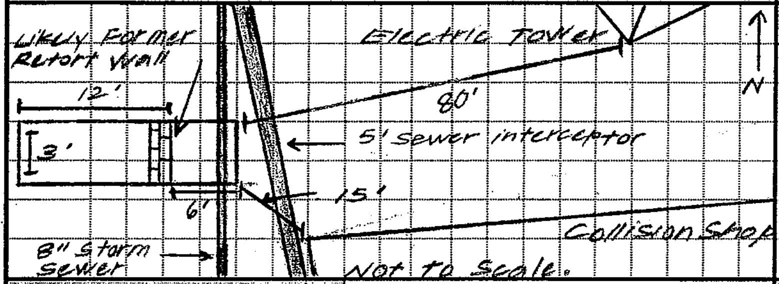
# Test Pit Log

**Test Pit ID: TP-04-09**

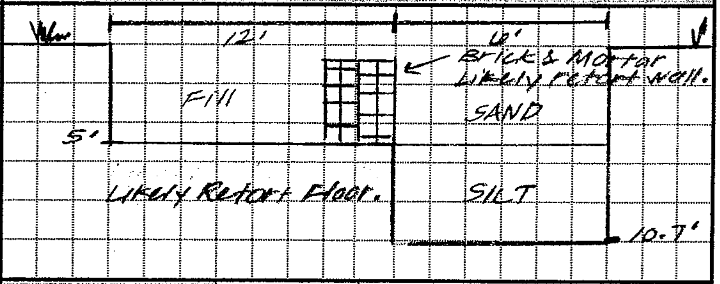
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

## Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | **Inside Likely Former Retort:**<br>**12' x 3'**<br>**Outside Likely Former Retort:**<br>**6' x 3'** | **Total Depth:** | **Inside:**<br>**5.0'**<br>**Outside:**<br>**10.7'** | **Depth to Water:** | **NA** |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 1.4' | NA | Inside likely former retort:<br>Brown fine to coarse SAND, little fine to medium Gravel, trace Brick, loose, dry. Grading to black Sand, little Coal, at 1' bgs. | None |
| 1.4' – 5.0' | NA | Red and tan BRICK, CINDERS, COAL, and black fine SAND.<br>Likely former retort brick wall at 3' bgs.<br>Likely former retort floor at 5' bgs. | None |
| -- | -- | -- | -- |
| 0.0' – 1.4' | NA | Outside likely former retort:<br>Brown fine to coarse SAND, little fine to medium Gravel, trace Brick, loose, dry. Grading to black Sand, little Coal, at 1' bgs. | None |
| 1.4' – 5.0' | 4' – 1.2 | Light reddish-brown very fine to fine SAND, little to trace red and tan Brick and fine to coarse Gravel, moist.<br>Slight fuel-type odor and slight grayish-black staining at 5' bgs. | None |
| 5.0' – 10.7' | 6' – 35.7<br>7' – 69.9<br>9' – 59.8 | Gray SILT, some fine to coarse Gravel and Cobbles, little fine to coarse Sand, loose to very loose, moist to wet at 7' bgs.<br>Moderate fuel-type odor and heavy grayish-black staining at 6' bgs.<br>Strong fuel-type odor and heavy grayish-black staining, very heavy metallic sheen, trace rainbow sheen, at 7' bgs.<br>Loose and soupy below 8' bgs.<br>Refusal at 10.7' bgs. Possible Bedrock. ~2" of water in test pit. | Soil sample TP-04-09(7') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |

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# Test Pit Log

**Test Pit ID:** TP-04-09

| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

## Comments:

bgs = below ground surface; NA = Not Available/Not Applicable.

8" storm sewer observed at 1.5' bgs.

## Photograph Summary:

| | |
|---|---|
| #1 | Disk 3-11: Brick wall at 3' bgs. |
| #2 | Disk 3-12: Brick wall at 3' bgs. |
| #3 | Disk 3-13: Silt sample TP-04-09(7') with metallic sheen, at 7' bgs. |
| #4 | Disk 3-14: Metallic sheen, 7' bgs. |
| #5 | Disk 3-15: Metallic sheen, 7' bgs. |
| #6 | Disk 3-16: Completed excavation, north side wall, with temporary piezometer. |

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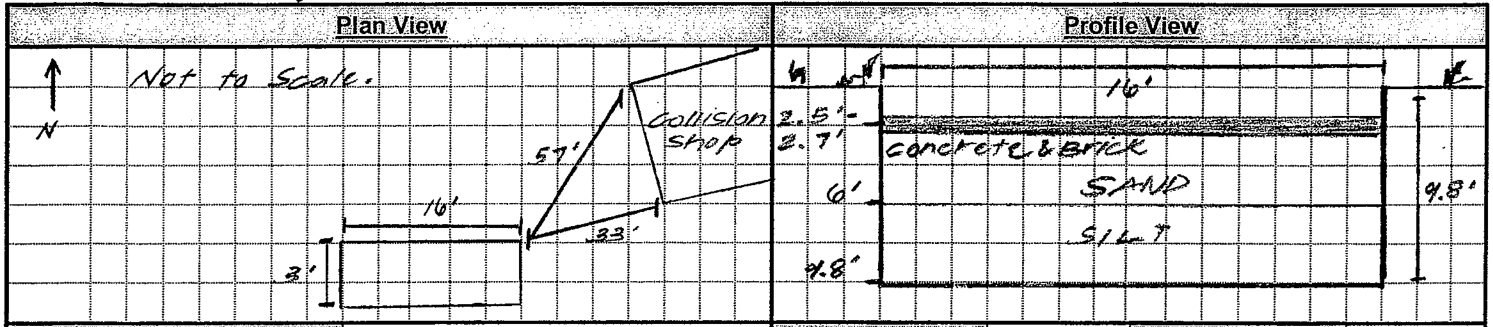
# Test Pit Log

**Test Pit ID:** TP-04-10

| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Sketch of Test Pit Layout:**



Plan View

Profile View

| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 16' x 3' | **Total Depth:** | 9.8' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 2.5' | NA | Brown fine to coarse SAND, some fine to medium Gravel, trace Silt, Bricks, and Organics, loose, dry. Becoming dark brownish-black with depth. | None. |
| 2.5'- 2.7' | 0.9 | CONCRETE & BRICK. | None. |
| 2.7' – 6.0' | 6.0 | Dark brownish-black fine to coarse SAND, some fine to medium Gravel, trace Silt and Bricks, loose, moist.<br>Water running into test pit at 6' bgs. | None. |
| 6.0'- 7.8' | 9.9 | Gray SILT, some fine to coarse Sand, little fine to coarse Gravel, soft, moist to wet, slight MGP-type odor. | Soil sample TP-04-10(7.8') for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |
| 7.8' – 9.2' | NA | Orangish-brown SILT, some fine Sand, little fine to coarse Gravel, stiff to very stiff, moist, no odor. | None. |
| 9.2' – 9.8' | 3.4 | Pink SILT, some Clay, fine to coarse Gravel, and fine to coarse Sand, hard, moist.<br>Refusal at 9.8' bgs. Possible Bedrock. Water trickling into test pit on top of bedrock. | None. |

**Comments:**

bgs = below ground surface; NA = Not Available/Not Applicable.

**Photograph Summary:**

| | |
|---|---|
| #1 | Disk 3- 8: During excavation, south sidewall. |
| #2 | Disk 3-9: Excavation complete, south sidewall. |
| #3 | |
| #4 | |
| #5 | |
| #6 | |

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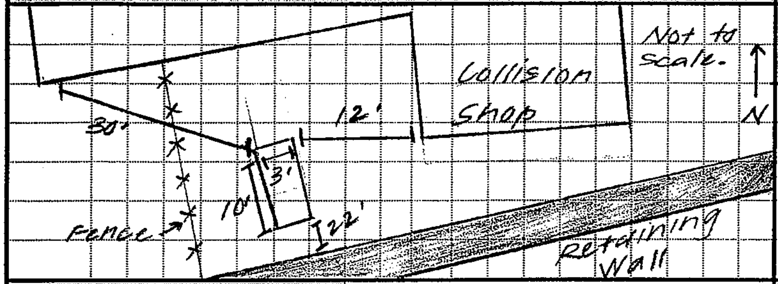
# Test Pit Log

## Test Pit ID: TP-04-11

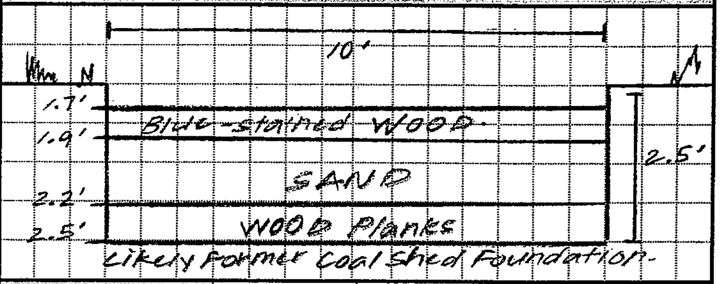
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

### Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 10' x 3' | **Total Depth:** | 2.5' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 1.7' | NA | Dark brownish-black fine to coarse SAND, some Silt, trace fine to coarse Gravel, Wood, and Bricks, loose, dry. | None. |
| 1.7' – 1.9' | 6.1 | Blue stained WOOD chips, slight chemical odor, loose, dry. | Soil sample TP-04-11(1.7') for total Cyanide. |
| 1.9' – 2.2' | NA | Dark brownish-black fine to coarse SAND, some Silt, trace fine to coarse Gravel, Wood, and Bricks, loose, dry. | None. |
| 2.2' – 2.5' | NA | WOOD planks, one major beam-like plank running north-south, and smaller planks running east-west.<br>Refusal at 2.5' bgs. Possible Concrete footprint of former Coke shed. | None. |

### Comments:

bgs = below ground surface; NA = Not Available/Not Applicable.

### Photograph Summary:

| | |
|---|---|
| #1 | Disk 3-4: Blue stained wood at 1.7' bgs. |
| #2 | Disk 3-5: During excavation, east sidewall. |
| #3 | Disk 3-6: During excavation, east sidewall. |
| #4 | Disk 3-7: Refusal at 2.5' bgs. |
| #5 | |
| #6 | |

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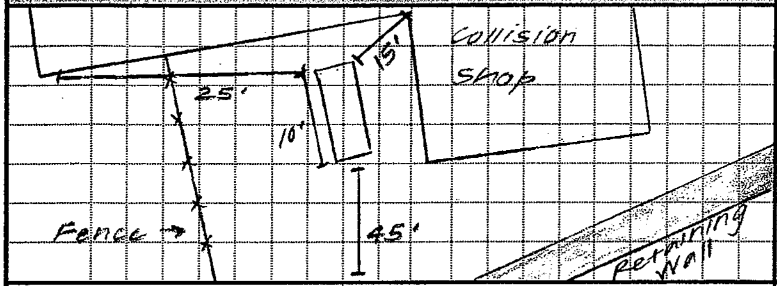
# Test Pit Log

## Test Pit ID: TP-04-12

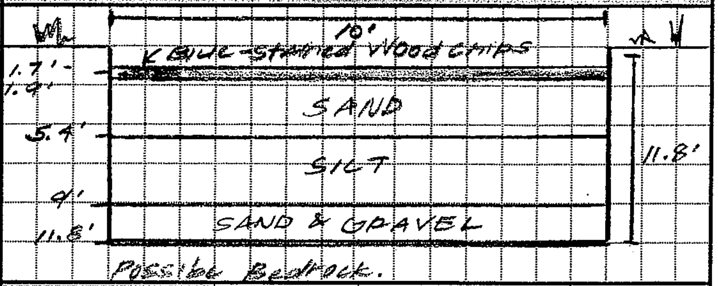
| | | | |
|---|---|---|---|
| **Client:** | New York State Electric and Gas | **Date:** | 11/24/04 |
| **Project:** | McMaster Street Former MGP | **Weather:** | Rain, heavy at times |
| **Location:** | McMaster Street, Auburn, New York | **Temperature:** | 30°s to 40°s |
| **Project #:** | 13049.003 | **Wind:** | Slight breeze |
| **Geologist:** | Kristina Gross | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere Backhoe |

**Sketch of Test Pit Layout:**

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 10' x 3' | **Total Depth:** | 11.8' | **Depth to Water:** | NA |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0.0' – 1.7' | NA | Dark brown fine to coarse SAND, little fine to coarse Gravel and Silt, trace Brick and Wood, loose, dry. | None |
| 1.7' -1.9' | NA | Blue stained WOOD chips, slight chemical odor, loose, dry. | None |
| 1.9' – 5.4' | NA | Dark brown fine to coarse SAND, little fine to coarse Gravel and Silt, trace Brock and Wood, loose, dry. | None |
| 5.4' – 9.0' | 5.7' – 2.1<br>7' – 20.9<br>8' – 368 | Olive-green SILT, little fine to coarse Gravel, trace fine to coarse Sand, stiff, slightly plastic, dry to moist.<br>5.9' – 7.4': Slight MGP-type odor, some black staining.<br>7.4' – 8.0': Strong MGP-type odor, heavy black staining.<br>8.0' – 9.0': Very strong MGP-type odor, heavy black staining, water dripping into test pit. | None |
| 9.0' – 11.8' | 792 | Black stained fine to coarse SAND, fine to coarse GRAVEL, and COBBLES, trace Boulders, loose, wet. Very strong MGP-type odor, heavy black staining, very heavy rainbow sheen, little brownish-black oily NAPL.<br>Refusal at 11.8' bgs. Possible Bedrock. | Soil sample TP-04-12-10.2' for TCL VOCs, SVOCs, Inorganics, and Total Cyanide. |

**Comments:**

bgs = below ground surface; NA = Not Available/Not Applicable.

Very heavy rainbow sheen and little to some brownish-black oily NAPL on surface of water in backhoe bucket.

**Photograph Summary:**

| | |
|---|---|
| #1 | Refer to photos for TP-04-11. |
| #2 | |
| #3 | |
| #4 | |
| #5 | |
| #6 | |

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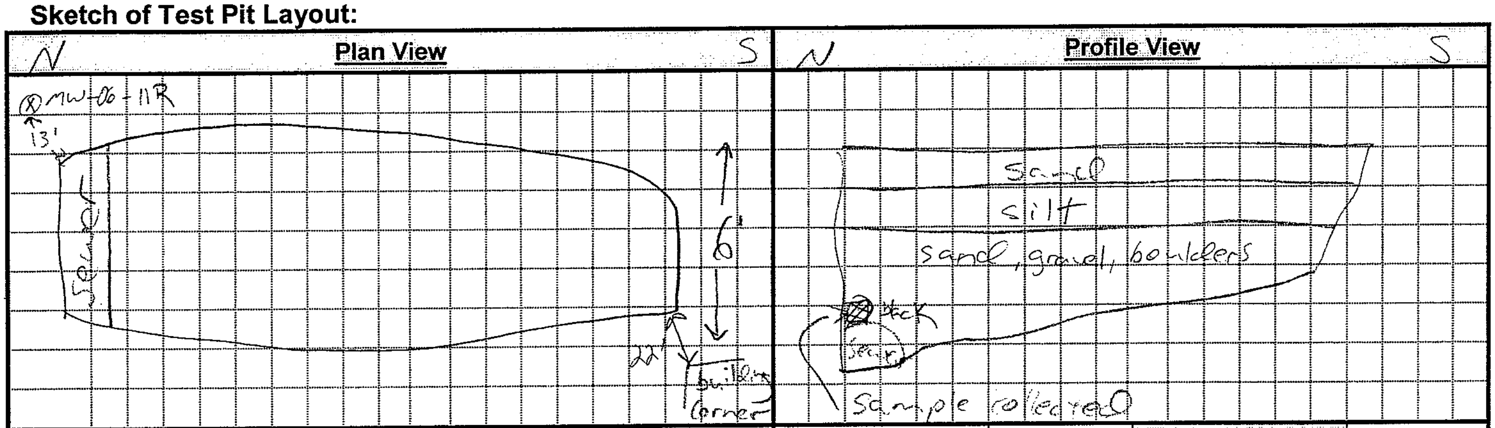
# Test Pit Log

**Test Pit ID:** TP-06-13

| | | | |
|---|---|---|---|
| **Client:** | NYSEG | **Date:** | 6/13/06 |
| **Project:** | McMaster St | **Weather:** | Cloudy |
| **Location:** | Auburn, NY | **Temperature:** | 60's |
| **Project #:** | 13049.005 | **Wind:** | Light breeze |
| **Geologist:** | Jennifer Sandorf | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere 310G backhoe |

**Sketch of Test Pit Layout:**


**Plan View**

**Profile View**

| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 17' x 6' | **Total Depth:** | 8.6' | **Depth to Water:** | 8.0' |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0-1.5' | 0.0 | Brown to dark brown fine to coarse SAND, trace Concrete fragments, trace red Bricks, dry. | |
| 1.5-3.5' | 0.0 | Red-brown SILT, trace Bricks, moist. | |
| 3.5-8.6' | 0.0 | Dark brown, large Cobbles and Boulders, Wood timers, fine to coarse Sand and Gravel, moist to wet. Water coming in at 8' bgs. Black-stained material located approx. 0.5' above sewer pipe, saturated. Bedrock refusal at NE corner at approx. 9' bgs. | Collect sample at 7.5' bgs of black-stained material with coal tar-like odor. |

**Notes:**

bgs = below ground surface; NA = Not Available/Not Applicable.

**Photograph Summary:**

| | |
|---|---|
| #1 | Shows sewer line at N end of TP. |
| #2 | Close-up of photo #1. |
| #3 | Water at bottom of TP on top of sewer line. Sewer line not visible beneath water surface. |
| #4 | NW side of TP |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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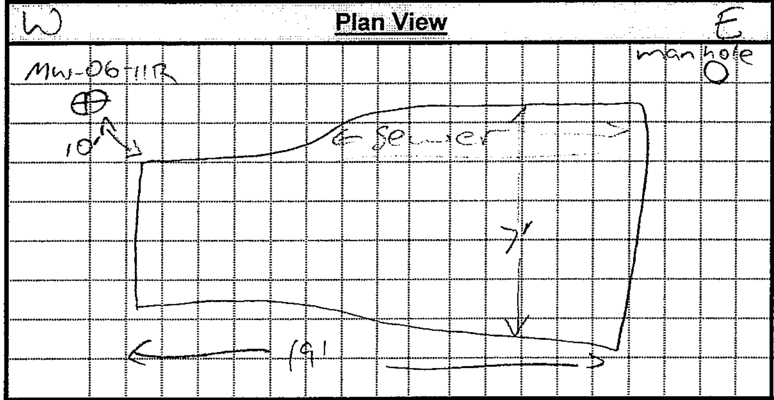
# Test Pit Log

## Test Pit ID: TP-06-14

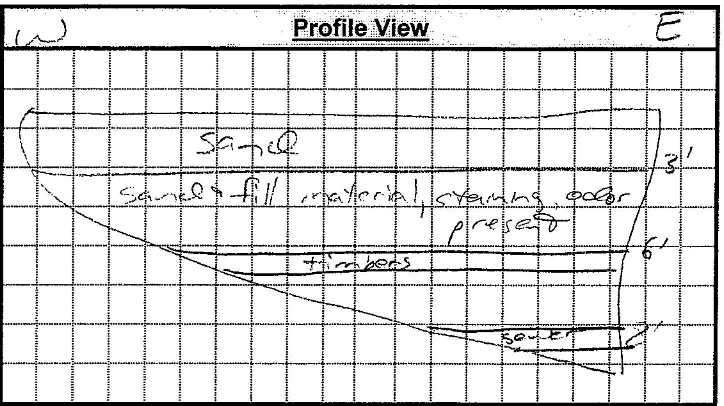
| | | | |
|---|---|---|---|
| **Client:** | NYSEG | **Date:** | 6/13/06 |
| **Project:** | McMaster St | **Weather:** | Mostly cloudy |
| **Location:** | Auburn, NY | **Temperature:** | Upper 60's |
| **Project #:** | 13049.005 | **Wind:** | Light breeze |
| **Geologist:** | Jennifer Sandorf | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere 310G backhoe |

### Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | |
|---|---|---|---|
| **Test Pit Dimensions:** | 19' x 7' | **Total Depth:** 9' | **Depth to Water:** 8.0' |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0-3' | 0.0 | Brown fine to coarse SAND, some Silt, little Concrete boulder-size fragments, Timbers, red Bricks (fill), dry to moist. | |
| 3-8 | 0.0 | At 3', begin to see some black staining, slight MGP-type odor in fill material (as above). Trace roots (possible former ground surface). | |
| 8-9 | 0.0 | Water coming in on top of sewer pipe at 8' bgs. Approx. 8.5' bgs, top of boulders (just to S of sewer line).<br>Trace sheen at 9' bgs, bedrock. | Collect sample at 9' bgs. |

### Notes:

bgs = below ground surface; NA = Not Available/Not Applicable.

### Photograph Summary:

| | |
|---|---|
| #1 | Layer at ~3' bgs, begin to see impacted material. |
| #2 | Hole left from large timber lying across TP. |
| #3 | Water coming in just above sewer line, shows large timbers above sewer pipe at approx. 6' bgs. |
| #4 | Close-up of sewer line at N end of TP. |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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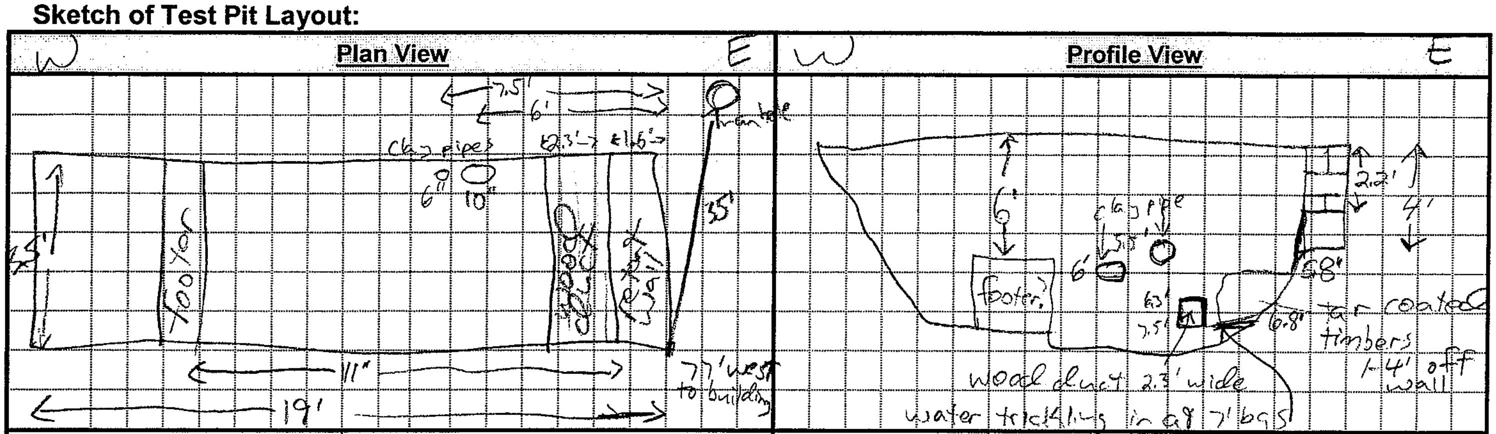
# Test Pit Log

**Test Pit ID: TP-06-15**

| | | | |
|---|---|---|---|
| **Client:** | NYSEG | **Date:** | 6/14/06 |
| **Project:** | McMaster St | **Weather:** | Sunny |
| **Location:** | Auburn, NY | **Temperature:** | 60's |
| **Project #:** | 13049.005 | **Wind:** | Calm |
| **Geologist:** | Jennifer Sandorf | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere 310G backhoe |

**Sketch of Test Pit Layout:**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 19' x 3.5' | **Total Depth:** | 9' | **Depth to Water:** | 7' |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0-1' | 0.0 | Gray-brown SAND and GRAVEL, some egg-sized Cobbles. | |
| 1-3.5' | 0.0 | Dark brown SAND and SILT, trace Bricks, misc. fill (concrete, ash, metal, wood). | |
| 3.5-5.8' | 0.0 | Yellow-brown SILT, trace Clay, trace medium to coarse Gravel, slightly plastic. | |
| 5.8-7' | 28.8 | Tar-coated WOOD boards on E side of TP, just above possible wooden duct. Nothing observed inside duct.<br>Concrete footer structure observed on W side of TP. | Collect sample at 6' bgs of black tarry material. |
| 7-9' | 28.8 | Dark gray to black-stained SILT, some fine to coarse Sand, little Gravel and Cobbles, trace to little Wood, moderate coal tar-type odor, wet. Possible bedrock at ~9' bgs. | |

**Notes:**

bgs = below ground surface; NA = Not Available/Not Applicable.

After photographing footer structure, backfilled west side of TP for safety and extended TP to east.
Wall at E side of TP is approx, 1,6' wide.
Masonry section of wall is 2.2' tall, exposed approx. 4' total of footer.

**Photograph Summary:**

| | |
|---|---|
| #1 | Concrete structure – east side, approx. 6' bgs, possible footer |
| #2 | West side of photo 1 |
| #3 | Straight down view of photo 1 |
| #4 | Retort wall structure on E end of TP. |
| #5 | Closeup of masonry |
| #6 | .tar coated boards |
| #7 | N end, clay tile pipe filled with black-stained sand |
| #8 | S end of clay tile pipe, approx. 5.5' bgs. |
| #9 | Now view 2 clay tile pipes |
| #10 | Possible wooden duct pipe |

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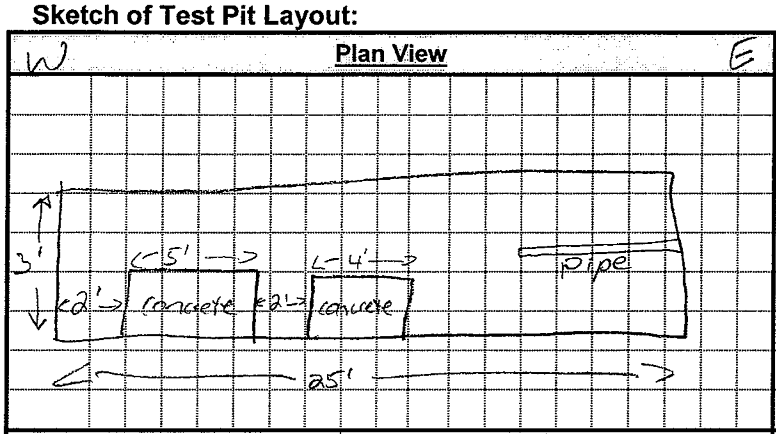
# Test Pit Log

**Test Pit ID:** TP-06-16

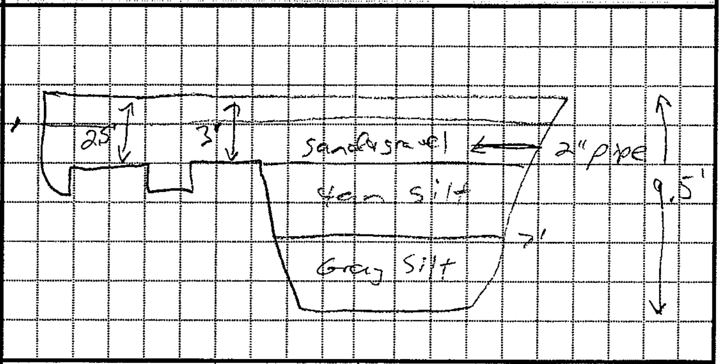
| | | | |
|---|---|---|---|
| **Client:** | NYSEG | **Date:** | 6/14/06 |
| **Project:** | McMaster St | **Weather:** | Mostly cloudy |
| **Location:** | Auburn, NY | **Temperature:** | ~70 |
| **Project #:** | 13049.005 | **Wind:** | Calm |
| **Geologist:** | Jennifer Sandorf | **Subcontractor:** | Lyon Drilling |
| **Coordinates:** | NA | **Equipment:** | John Deere 310G backhoe |

## Sketch of Test Pit Layout:

**Plan View**



**Profile View**



| | | | | | |
|---|---|---|---|---|---|
| **Test Pit Dimensions:** | 25' x 3' | **Total Depth:** | 9.5' | **Depth to Water:** | 9' |

| Depth Interval (feet) | PID Screening Result (ppm) | Description of Soil/Material | Samples Collected |
|---|---|---|---|
| 0-1' | 0.0 | Gravel base – light gray SAND and GRAVEL, dense. | |
| 1-3' | 0.0 | Brown SAND and GRAVEL, little red and pale orange Bricks, 2" pipe at 3' bgs coming in from E wall, plugged. | |
| 3-7' | 0.0 | Tan, grading to gray, SILT. | |
| 7-9.5' | 7.8 | Gray-stained SILT, wet, soft, moderate fuel oil-type odor. Possible bedrock at 9.5' bgs. | Collect sample at 8' bgs of gray material. |

**Notes:**

bgs = below ground surface; NA = Not Available/Not Applicable.

**Photograph Summary:**

| | |
|---|---|
| #1 | E end of TP. |
| #2 | Length of TP looking E – hole collapsed. |
| #3 | Close-up of pipe area on E end. |
| #4 | |
| #5 | |
| #6 | |
| #7 | |
| #8 | |
| #9 | |
| #10 | |

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# Appendix B

Soil Vapor Investigation Report

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Infrastructure, environment, facilities

Imagine the result

**New York State Electric & Gas Corporation**

# Soil Vapor Investigation Report

Auburn (McMaster Street) Former Manufactured Gas Plant Site

August 2008

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# Soil Vapor Investigation Report

## Auburn (McMaster Street) Former MGP Site

Keith A. White

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Our Ref.:
B0013049

Date:
August 2008

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## INTRODUCTION

This report is submitted on behalf of NYSEG (New York State Electric & Gas Corporation) and presents the results of a soil vapor investigation performed at the McMaster Street former Manufactured Gas Plant (MGP) site (the “site”) located in Auburn, New York. The investigation was performed in accordance with the Soil Vapor Investigation Work Plan (ARCADIS BBL, 2008), which was reviewed and approved by New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). Relevant background information is presented below, followed by a discussion of sampling activities, results, and findings.

## BACKGROUND

The site is located in a mixed commercial/residential area of the city of Auburn, in central Cayuga County, New York. The former MGP occupied a triangular-shaped parcel of land that is approximately 1-acre in size and is bounded by the Owasco Outlet (outlet) to the north, railroad right-of-way to the east and south, and an asphalt parking lot and Auburn Tank Manufacturing Company Inc. to the west. A 3,000-square-foot (sf) single-story building currently occupies the site. The closest residence is greater than 300 feet south of the site. A New York State Correctional Facility is located across the outlet to the north (Figure 1).

NYSEG purchased the property in 2005 from Mr. Frank Rizzo. Mr. Rizzo formerly leased the on-site building for use as an auto collision shop. The building was subsequently and is currently leased as storage space. Apart from the building, the site surface is sporadically covered with vegetation, gravel, weathered asphalt and large pieces of debris (e.g., automotive parts, metal and wood scraps, old railroad ties, empty drums, cement blocks, old commercial asphalt paver). A retaining wall used to support a railroad line is located along the southern site boundary. An electric transmission tower stands on the footprint of the former gas holder in the northern portion of the site, on the southern bank of the outlet.

Soil vapor sampling was performed in response to findings of the Preliminary Site Assessment (PSA) and Remedial Investigation (RI) conducted at the site[1]. These investigations identified an areas of soils in the upland portion of the site and sediments beneath the Owasco Outlet that contain elevated concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs). These investigations also identified a region of groundwater in

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[1] Details of the PSA and RI are presented in the Draft RI Report (ARCADIS, 2007).

the soil and underlying bedrock that similarly contains elevated concentrations of BTEX and PAHs. This affected groundwater appears to be constrained to the site property and to the west-northwest of the site, along the southern bank of the Outlet. The western extent of affected soil and groundwater is proximate to the Auburn Tank building located west of the site (Figure 1).

## SOIL VAPOR INVESTIGATION ACTIVITIES

ARCADIS installed temporary soil vapor probes at 8 sampling locations (locations SV-1 through SV-8, as shown on Figure 1) on February 12, 2008. The sampling locations were selected to provide coverage across the site, including the area near the Auburn Tank building west of the site, and areas of identified soil and/or groundwater impacts.

Soil vapor samples were collected from the 6-inch interval located approximately 1 foot above the water table at each location. Each sampling interval was limited to approximately 6-inches to reduce potential sample dilution that could otherwise occur across a larger interval. The water table depth at each proposed soil vapor sampling location was evaluated prior to installation of sampling probes by using a direct-push (i.e., Geoprobe®) rig to advance a soil boring to a depth until groundwater was encountered.

A soil gas sampling summary, which identifies each soil gas sampling location, rationale, and interval, is presented in the table below.

| Sample ID | Sampling Location | Sampling Rationale | Sampling Interval/Water Depth (feet bgs) |
|---|---|---|---|
| SV-1 | Near previous soil sampling location TP-04-04, which exhibited elevated concentrations of BTEX compounds and PAHs and indications of coal tar | Evaluate potential “worst case” conditions in a potential source area; establish a site “source” signature that can be compared to other vapor sampling results | (3.5 – 4.0’)/(5.0’) |
| SV-2 | Along the site boundary, north of the former retort building | Establish an additional site “source” signature that can be compared to other vapor sampling results | (3.0 – 3.5’)/(4.5’) |
| SV-3 | Along the site boundary, south of the former retort building | Evaluate potential soil vapor migration from the area of identified soil and groundwater impacts | (2.5 – 3.0’)/(4.0’) |

| Sample ID | Sampling Location | Sampling Rationale | Sampling Interval/Water Depth (feet bgs) |
|---|---|---|---|
| SV-4 | Near the MW-6 well cluster | Evaluate potential “background” soil vapor concentrations in an area upgradient from identified soil and groundwater impacts | (6.5 – 7.0’)/(7.0’) |
| SV-5 | North, east, and south of the Auburn Tank building, respectively | To evaluate potential soil vapor migration and potential conditions near the building. | (3.5 – 4.0’)/(5.0’) |
| SV-6 | | | (2.5 – 3.0’)/(4.0’) |
| SV-7 | | | (3.0 – 3.5’)/(4.1’) |
| SV-8 | Near monitoring well MW-06-01 RI-/RD, where blebs of tar-like material were previously observed in the bedrock. | Evaluate potential “worst case” conditions in an area where tar-like material has been observed | (3.7 – 4.2’)/(5.2’) |

Soil vapor sampling was performed at each probe by ARCADIS on February 13, 2008. Sample recovery at one location (SV-7) was limited by the surrounding soil conditions (e.g., soils were too tight) and analysis could not be performed because the SUMMA® canister exhibited too high a vacuum following sample collection. This location was revisited on February 25, 2008 and an additional temporary soil vapor probe was installed approximately 5 feet east of the original location and sampled successfully.

This section presents a description of the field activities performed during the soil vapor investigation, including:

- Temporary Soil Vapor Probe Installation.
- Soil Vapor Purge Activities.
- Tracer Gas Test Activities.
- Soil Vapor and Ambient Air Sample Collection.

### Temporary Soil Vapor Probe Installation

A Geoprobe® rig was used to install a temporary vapor probe at each soil vapor sampling location. This rig advanced an assembly of interconnected 3.25”-diameter steel rods to the desired sampling depth. After the target depth was reached, these rods were removed and a soil vapor sampling probe, consisting of a stainless-steel screen attached to Teflon-lined polyethylene tube was installed at the required depth. The probe hole was then backfilled with silica sand up to approximately 1-foot above the screen, followed by approximately 6-inches of dry bentonite, and a thick bentonite slurry throughout the remainder of the annulus to seal the sampling probe. A swagelock valve was connected to the sample delivery tube at the surface. The sampling probes were allowed to set for approximately one day prior to sample collection to let the bentonite seals set.

### Soil Vapor Purge

An initial vapor draw (purging) was performed prior to sampling to remove atmospheric gas from the system and charge the sampling apparatus with soil vapor in preparation for collection of a representative sample (as discussed below). At the ground surface, the swagelock valve was attached to an air sampling pump, and a minimum of one sample-point volume was evacuated. An electronic flow sensor was used to measure pump flow rate [which did not exceed 100 milliliters per minute (mL/min) during purging activities)], and the desired volume was purged from the sample point based on pumping duration. After at least one full purge volume was expelled from the sampling system, the pump was disconnected and a photoionization detector (PID) equipped with a 10.6 electron volt lamp was attached to the tubing to measure approximate total organic vapor levels. The swagelock valve was closed prior to disconnecting the pump and connecting the PID to prevent atmospheric air from entering the tubing.

### Tracer Gas Test

A tracer gas (helium) was used in the field to evaluate the integrity of the seals around the soil vapor probes. The tracer gas provided a means to: (1) evaluate whether the soil vapor samples could be diluted by surface air; and (2) determine if improvements to the seals might be needed prior to sampling. A 5-gallon plastic pail (bucket) was inverted and then placed over each soil vapor sampling location following probe installation. Hydrated bentonite was used to create a seal around the rim of the inverted pail (as shown on Figure 2.4(b) of the NYSDOH document titled “Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York”, dated October 2006) and also around the penetration of the sample tubing through the bottom of the pail. Helium was then introduced into the pail through a swagelock fitting on the side of the pail.

Helium levels in the purge gas and inside the pail (prior to and immediately after sampling) were measured in the field using a gas detector. Field measurements of helium made in connection with the sample collection activities are presented on the sample collection logs included in Appendix A.

### Soil Vapor and Ambient Air Sample Collection

Following purging, soil vapor sample collection was conduced in accordance with United States Environmental Protection Agency (USEPA) Compendium Method TO-15, titled “Determination of VOCs in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).” One soil vapor sample was collected from each location using a batch certified, pre-cleaned stainless-steel canister (a 6-liter SUMMA® canister) with an attached flow regulator set to a rate of 200 mL/min. The pre-cleaned canisters were provided by the laboratory with an initial vacuum of approximately 30 inches of mercury (in of Hg). Each soil vapor sample was collected over an approximate 8 hour period. After 8 hours, or when the SUMMA® canister vacuum reached approximately 2 in. of Hg, the regulator valve was closed, leaving a vacuum in the canister as a means for the laboratory to verify that the canister did not leak while in transit. Vacuum readings obtained prior to and at the end of sampling are presented on the soil vapor sample collection logs included in Appendix A.

After the soil vapor samples were collected at each location, a PID equipped with a 10.6 electron volt lamp was attached to the sample delivery tubing to measure approximate total organic vapor levels in the effluent. PID effluent readings obtained after sampling are presented on the sample collection logs included in Appendix A. As indicated on the logs, organic vapors were identified in the effluent at each location except sampling location SV-4. PID effluent readings ranged from 7 parts per billion (ppb) (SV-7) to 253 ppb (SV-1).

One blind duplicate soil vapor sample was collected during the soil vapor investigation. The duplicate sample, FD-021308, was collected at soil vapor sampling location SV-2.

The soil vapor samples were submitted to Alpha Analytical Laboratories (Alpha) located in Mansfield, Massachusetts and analyzed for VOCs using a modified EPA Method TO-15. Sample analysis was performed using a purge and trap concentrator connected to a GC/MS operated in simultaneous scanning mode and selected ion monitoring mode (PT/GC/MS/Scan/SIM). The target analytes in this modified method include paraffins, isoparaffins, aromatics, naphthenes, and olefins (collectively referred to as PIANO), as well as thiophenes, oxygenates, and additives (NewFields, 2008).

## SOIL VAPOR INVESTIGATION RESULTS

The soil vapor and ambient air results (Table 1) were provided to the NYSDEC and NYSDOH on April 10, 2008, and a follow-up conference call was held with the NYSDEC and NYSDOH on May 2, 2008 to discuss the results. During the call, the

NYSDOH indicated that the concentrations of VOCs detected in the soil vapor samples are at low levels within the typical range of an urban setting. NYSDOH and NYSDEC further concluded that additional soil vapor investigations are not warranted at the site or nearby area at this time.

NewFields Environmental Forensics Practice, LLC (NewFields) was contracted to review the soil vapor and ambient air results and perform a forensic evaluation. NewFields' forensic report, including the laboratory analytical data reports, is included as Appendix B. Soil vapor and ambient air analytical results for detected VOCs are presented in Table 1.

NewFields evaluated the forensic hydrocarbon signatures of the samples and compared the compositional fingerprints and analyte ratios to develop conclusions regarding potential sources. Relevant findings of NewFields' forensic evaluation are summarized in the following bullets:

- Samples collected at locations SV-1 and SV-2 contain predominantly aromatic compounds with lower proportions of aliphatic paraffins, isoparaffins, and naphthenes. The high proportions of aromatics in these samples are consistent with a MGP-related source.

- The sample collected at location SV-3 contains predominantly paraffins and isoparaffins with lesser olefins and trace aromatics. This pattern is likely attributable to a petroleum product such as naphtha based gasoline or solvent.

- The sample collected at location SV-4 contains light molecular weight aromatics mixed with heavy molecular weight aliphatics. This pattern suggests the presence of middle to heavy petroleum with possible influences of MGP-related vapor.

- The samples collected at locations SV-5 and SV-6 contain similar mixtures of aliphatics with lesser amounts of aromatics attributable to gasoline and possibly other petroleum products.

- The sample collected at location SV-7 contains light aliphatic hydrocarbons with low proportions of aromatics, likely related to gasoline.

- The sample collected at location SV-8 contains a mixture of aliphatic and aromatic hydrocarbons with a slight enrichment of C6 to C8 aromatics. This pattern is attributable to petroleum with potential influence from MGP-related vapor.

- The ambient air samples exhibit mixtures of aliphatic and aromatic hydrocarbons consistent with vehicular traffic and fuel oil combustion.

Details of NewFields' evaluation and findings were presented in a letter from NewFields to ARCADIS dated May 1, 2008, which is included as Appendix B.

## CONCLUSIONS

During a May 2, 2008 conference call with the NYSDEC and NYSDOH, the NYSDOH indicated that the concentrations of VOCs detected in the soil vapor samples are at low levels within the typical range of an urban setting. Based on discussions with the NYSDEC and NYSDOH, additional soil vapor investigations will not be required for the site or nearby area at this time.

Based on review of the sampling data, MGP-related constituents do not appear to be migrating through soil vapor at elevated concentrations. The presence of MGP-related vapors at locations SV-1 and SV-2 is consistent with field observations, as coal tar was observed in subsurface soil at each of these locations. The remaining samples (SV-3 through SV-8) exhibit petroleum influences (primarily gasoline) and therefore the source of these vapors does not appear to be related to the former MGP. Soil vapor in samples SV-4 and SV-8 may also have a minor influence from the MGP.

# Tables

# Figures

# Appendix A

Soil Gas and Ambient Air Sample Collection Logs

ARCADIS

# Appendix B

NewFields Forensic Evaluation
Summary Report

# Tables

## Table 1. Soil Vapor & Ambient Air VOC Analytical Results (ug/m3)
## Soil Vapor Investigation, New York State Electric & Gas Corporation, McMaster Street Former MGP Site, Auburn, New York

| | Ambient (Outdoor) Air | | Soil Vapor | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Location ID:** | **AA-1** | **AA-1** | **SV-1** | **SV-2** | **SV-3** | **SV-4** | **SV-5** | **SV-6** | **SV-7** | **SV-8** |
| **Date Collected:** | **02/13/08** | **02/25/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/25/08** | **02/13/08** |
| **Detected VOCs (ug/m3)** | | | | | | | | | | |
| 1,2,4,5-Tetramethylbenzene | 0.071 J | <0.14 | 3.5 | 0.16 [0.15] | <0.14 | 0.27 | 0.093 J | <0.14 | 0.088 J | 0.060 J |
| 1,2,4-Trimethylbenzene | 0.22 | 0.19 | 29 | 0.50 [0.49] | 0.12 J | 1.3 | 0.57 | 0.53 | 1.1 | 0.48 |
| 1,2-Dichloroethane | 0.057 J | 0.044 J | <0.10 | <0.10 [<0.10] | <0.10 | <0.10 | <0.10 | <0.10 | 0.15 | <0.10 |
| 1,2-Diethylbenzene | <0.14 | <0.14 | 1.9 | <0.14 [<0.14] | <0.14 | <0.14 | <0.14 | 0.17 | <0.14 | <0.14 |
| 1,2-Dimethyl-3-ethylbenzene | <0.14 | <0.14 | 5.0 | <0.14 [<0.14] | <0.14 | 0.14 | 0.055 J | <0.14 | <0.14 | <0.14 |
| 1,2-Dimethyl-4-ethylbenzene | <0.14 | <0.14 | 19 | 0.10 J [0.10 J] | <0.14 | 0.29 | 0.13 J | <0.14 | 0.10 J | 0.093 J |
| 1,3,5-Trimethylbenzene | 0.069 J | 0.069 J | 17 | 0.27 [0.27] | 0.059 J | 0.32 | 0.21 | 0.30 | 0.33 | 0.14 |
| 1,3-Butadiene | 0.033 J | 0.038 J | <0.055 | <0.055 [<0.055] | 0.40 | <0.055 | 0.11 | 0.25 | 0.42 | 0.071 |
| 1,3-Dimethyl-2-ethylbenzene | <0.14 | <0.14 | 2.8 | <0.14 [<0.14] | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| 1,3-Dimethyl-4-ethylbenzene | <0.14 | <0.14 | 7.5 | <0.14 [<0.14] | <0.14 | 0.22 | 0.066 J | 0.088 J | 0.071 J | 0.071 J |
| 1,3-Dimethyl-5-ethylbenzene | <0.14 | <0.14 | 15 | 0.093 J [0.093 J] | <0.14 | 0.36 | 0.12 J | 0.22 | 0.15 | 0.13 J |
| 1,4-Dimethyl-2-ethylbenzene | <0.14 | <0.14 | 8.2 | 0.060 J [<0.14] | <0.14 | 0.24 | 0.071 J | 0.17 | 0.093 J | 0.082 J |
| 1-Decene | <0.14 | <0.14 | 0.34 | <0.14 [<0.14] | 1.9 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| 1-Ethyl-1-methylcyclopentane | <0.12 | <0.12 | <0.12 | <0.12 [<0.12] | <0.12 | <0.12 | 0.055 J | 1.6 | 0.42 | <0.12 |
| 1-Heptene | 0.12 | 0.10 | 0.43 | 0.55 [0.52] | 18 | 0.064 J | 1.5 | 5.2 | 2.0 | 0.32 |
| 1-Hexene | <0.086 | <0.086 | 0.14 | <0.086 [<0.086] | 5.2 | <0.086 | 0.23 | 0.42 | 0.21 | 0.13 |
| 1-Methyl-2-ethylbenzene | 0.079 J | 0.059 J | 17 | 0.054 J [0.059 J] | <0.12 | 0.24 | 0.11 J | 0.43 | 0.25 | 0.14 |
| 1-Methyl-2-isopropylbenzene | <0.14 | <0.14 | 3.1 | <0.14 [<0.14] | <0.14 | <0.14 | <0.14 | 0.11 J | <0.14 | <0.14 |
| 1-Methyl-2-propylbenzene | <0.14 | <0.14 | 3.3 | <0.14 [<0.14] | <0.14 | 0.099 J | <0.14 | 0.22 | <0.14 | <0.14 |
| 1-Methyl-3-ethylbenzene | 0.17 | 0.12 | 53 | 0.12 J [0.12] | 0.049 J | 0.58 | 0.30 | 0.46 | 0.64 | 0.32 |
| 1-Methyl-3-isopropylbenzene | <0.14 | <0.14 | 470 D | <0.14 [0.060 J] | <0.14 | 0.071 J | <0.14 | 0.093 J | 0.066 J | 0.32 |
| 1-Methyl-3-propylbenzene | <0.14 | <0.14 | 13 | <0.14 [<0.14] | <0.14 | 0.20 | 0.077 J | 0.17 | 0.099 J | 0.093 J |
| 1-Methyl-4-ethylbenzene | 0.11 J | 0.083 J | 11 | 0.079 J [0.079 J] | 0.059 J | 0.31 | 0.18 | 0.28 | 0.32 | 0.17 |
| 1-Methyl-4-isopropylbenzene | <0.14 | <0.14 | 58 | 0.060 J [0.055 J] | <0.14 | 0.32 | 0.088 J | 0.13 J | 0.077 J | 0.088 J |
| 1-Methyl-4-propylbenzene | <0.14 | <0.14 | 4.0 | <0.14 [<0.14] | <0.14 | 0.12 J | <0.14 | 0.20 | 0.055 J | <0.14 |
| 1-Methylnaphthalene | 1.6 | <0.15 | 2.6 | 0.60 [0.66] | 0.33 | 0.65 | 0.20 | 0.13 J | 0.070 J | 0.11 J |
| 1-Nonene | <0.13 | <0.13 | <0.13 | <0.13 [<0.13] | 6.7 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 |
| 1-Octene | <0.12 | 0.087 J | <0.12 | <0.12 [<0.12] | 21 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| 1-Pentene | 0.037 J | 0.054 J | 0.12 | <0.072 [<0.072] | 3.3 | 0.034 J | 0.34 | 0.79 | 0.76 | 0.30 |
| 2,2,4-Trimethyl pentane | 0.22 | 0.15 | 0.089 J | <0.12 [<0.12] | <0.12 | <0.12 | 0.66 | 1.3 | 0.57 | 0.11 J |
| 2,2-Dimethylpentane | <0.10 | <0.10 | <0.10 | <0.10 [<0.10] | 0.68 | <0.10 | 0.086 J | 0.88 | 0.15 | <0.10 |
| 2,3,3-Trimethylpentane | 0.084 J | 0.056 J | 0.14 | <0.12 [<0.12] | <0.12 | <0.12 | 0.44 | 1.5 | 1.3 | 0.15 |
| 2,3,4-Trimethylpentane | 0.070 J | <0.12 | <0.12 | <0.12 [<0.12] | 3.2 | <0.12 | 0.53 | 2.0 | 0.92 | <0.12 |
| 2,3-Dimethylbutane | 0.11 | 0.081 J | 0.14 | 0.11 [0.099] | 9.0 | <0.088 | 0.51 | 1.9 | 1.6 | 0.13 |
| 2,3-Dimethylhexane | <0.12 | <0.12 | 0.047 J | <0.12 [<0.12] | 31 | <0.12 | 0.41 | 0.94 | 3.6 | 0.11 J |
| 2,3-Dimethylpentane | 0.11 | 0.082 J | 0.13 | 0.13 [0.13] | 42 | <0.10 | 0.87 | 4.2 | 3.1 | 0.22 |
| 2,4-Dimethyhexane / 2,2,3-TMP | 0.056 J | <0.23 | 0.056 J | <0.23 [<0.23] | 17 | <0.23 | 0.33 | 2.3 | 2.4 | 0.079 J |
| 2,4-Dimethylpentane | 0.070 J | 0.049 J | 0.061 J | <0.10 [<0.10] | 8.0 | <0.10 | 0.22 | 2.3 | 0.80 | 0.061 J |
| 2,5-Dimethylhexane | <0.12 | <0.12 | 0.047 J | <0.12 [<0.12] | 11 | <0.12 | 0.33 | 3.0 | 2.0 | 0.061 J |
| 2-Methyl-1-butene | 0.040 J | 0.043 J | 0.13 | <0.072 [<0.072] | 3.2 | <0.072 | 0.36 | 1.3 | 1.0 | 0.32 |
| 2-Methylheptane | 0.17 | 0.075 J | 0.18 | 0.061 J [0.051 J] | 88 | 0.075 J | 0.64 | 1.4 | 5.7 | 0.54 |
| 2-Methylhexane | 0.25 | 0.16 | 0.21 | 0.057 J [0.057 J] | 120 | <0.10 | 1.9 | 3.9 | 5.6 | 0.44 |
| 2-Methylnaphthalene | 1.2 | 0.064 J | 2.0 | 0.80 [0.92] | 0.33 | 0.76 | 0.23 | 0.14 J | 0.12 J | 0.15 |
| 2-Methylpentane | 0.63 | 0.43 | 0.60 | 0.18 [0.19] | 74 | 0.067 J | 2.2 | 5.5 | 14 | 0.81 |

See Notes on Page 3.

## Table 1. Soil Vapor & Ambient Air VOC Analytical Results (ug/m3)
## Soil Vapor Investigation, New York State Electric & Gas Corporation, McMaster Street Former MGP Site, Auburn, New York

| | Ambient (Outdoor) Air | | Soil Vapor | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Location ID:** | **AA-1** | **AA-1** | **SV-1** | **SV-2** | **SV-3** | **SV-4** | **SV-5** | **SV-6** | **SV-7** | **SV-8** |
| **Date Collected:** | **02/13/08** | **02/25/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/13/08** | **02/25/08** | **02/13/08** |
| **Detected VOCs (ug/m3)** | | | | | | | | | | |
| 2-Pentene (cis) | <0.072 | <0.072 | 0.040 J | <0.072 [<0.072] | 1.8 | <0.072 | 0.21 | 0.38 | 0.25 | 0.11 |
| 2-Pentene (trans) | <0.072 | 0.040 J | 0.060 J | <0.072 [<0.072] | 4.4 | <0.072 | 0.63 | 0.81 | 0.53 | 0.13 |
| 3-Ethylhexane | <0.12 | <0.12 | <0.12 | <0.12 [<0.12] | 47 | <0.12 | 0.26 | 0.60 | 4.6 | 0.11 J |
| 3-Methylheptane | 0.13 | 0.070 J | 0.17 | 0.047 J [<0.12] | 160 | <0.12 | 0.72 | 1.4 | 7.9 | 0.52 |
| 3-Methylhexane | 0.31 | 0.39 | 0.33 | <0.10 [0.14] | 330 D | 0.21 | 2.5 | 5.2 | 12 | 0.77 |
| 3-Methylpentane | 0.34 | 0.25 | 0.36 | 0.13 [0.14] | 86 | 0.081 J | 2.0 | 5.2 | 15 | 0.79 |
| Benzene | 1.1 | 0.64 | 21 | 0.56 [0.50] | 0.39 | 0.33 | 0.88 | 2.5 | 5.1 | 1.0 |
| Benzothiophene | 0.27 J | <0.55 | 0.24 J | 0.66 [0.62] | 0.22 J | 0.088 J | 0.055 J | 0.077 J | <0.55 | <0.55 |
| Cyclohexane | 0.13 | 0.055 J | 0.76 | 0.47 [0.44] | 1.8 | <0.086 | 1.4 | 2.2 | 0.97 | 0.17 |
| Cyclopentane | 0.083 | 0.034 J | 0.11 | <0.072 [<0.072] | <0.072 | <0.072 | 0.26 | 0.92 | 0.40 | 0.089 |
| Decane | 0.19 | 0.26 | 1.8 | 0.22 [0.20] | 6.4 | 0.28 | 0.43 | <0.15 | 3.6 | 0.73 |
| Dodecane | 1.8 | 0.27 | 8.7 | 0.74 [0.55] | 0.16 J | 1.5 | 0.49 | 5.5 | 0.59 | 0.41 |
| Ethylbenzene | 0.39 | 0.18 | 5.4 | 0.14 [0.14] | 0.10 J | 0.27 | 0.74 | 1.2 | 0.45 | 1.3 |
| Indan | 0.048 J | <0.12 | 6.4 | 0.097 J [0.097 J] | <0.12 | 0.30 | 0.092 J | 0.20 | 0.19 | 0.10 J |
| Indene | <0.12 | <0.12 | 0.92 | 0.89 [0.90] | <0.12 | 0.11 J | 0.047 J | <0.12 | <0.12 | <0.12 |
| Isopentane | 1.5 | 1.1 | 1.7 | 0.38 [0.38] | 27 | <0.074 | 3.3 | 9.1 | 8.6 | 1.6 |
| Isopropylbenzene | <0.12 | <0.12 | 37 | 0.23 [0.21] | 0.22 | 6.5 | 0.20 | 2.6 | 13 | 0.093 J |
| m&p-Xylene | 0.86 | 0.46 | 14 | 0.67 [0.65] | 0.27 | 1.1 | 2.6 | 3.0 | 1.6 | 4.2 |
| Methylcyclohexane | 0.12 | 0.080 J | 1.3 | 1.4 [1.3] | 3.7 | 0.056 J | 4.1 | 6.3 | 2.8 | 0.39 |
| Methylcyclopentane | 0.21 | 0.13 | 0.32 | 0.12 [0.12] | 3.0 | <0.086 | 0.73 | 2.4 | 19 | 0.20 |
| Naphthalene | 0.26 | 0.24 | 9.0 | 12 [12] | 0.20 | 1.2 | 0.93 | 0.14 | 0.17 | 0.27 |
| n-Butylbenzene | <0.14 | <0.14 | 0.12 J | <0.14 [<0.14] | <0.14 | 0.077 J | <0.14 | <0.14 | <0.14 | <0.14 |
| n-Heptane | 0.40 | 0.27 | 0.46 | 0.13 B [0.11 B] | 360 D | 0.13 B | 2.6 | 3.4 | 5.0 | 0.75 |
| n-Hexane | 0.50 | 0.35 | 0.59 | 0.12 [0.12] | 150 | 0.11 | 3.6 | 7.1 | 61 | 1.1 |
| Nonane | 0.14 | 0.17 | 0.36 | 0.094 J [0.11 J] | 49 | 0.18 | 0.70 | 5.9 | 5.0 | 1.4 |
| n-Propylbenzene | 0.074 J | <0.12 | 1.7 | <0.12 [<0.12] | <0.12 | 0.16 | 0.093 J | <0.12 | 0.22 | 0.088 J |
| Octane | 0.18 B | 0.21 B | 0.60 | 0.11 JB [0.098 JB] | 160 | 0.15 B | 0.74 | 1.5 | 4.0 | 2.3 |
| o-Xylene | 0.36 | 0.20 | 9.9 | 0.28 [0.27] | 0.095 J | 0.45 | 0.74 | 0.97 | 0.65 | 1.0 |
| Pentane | 1.0 | 0.62 | 0.93 | 0.24 [0.19] | 47 | 0.14 B | 4.8 | 11 | 9.0 | 1.6 |
| Pentylbenzene | 0.085 J | <0.15 | 0.24 | <0.15 [<0.15] | <0.15 | 0.085 J | <0.15 | 0.25 | <0.15 | <0.15 |
| sec-Butylbenzene | <0.12 | <0.12 | 2.0 | <0.12 [<0.12] | <0.12 | <0.12 | <0.12 | 0.79 | 0.064 J | <0.12 |
| Styrene | <0.11 | 0.077 J | 0.43 | 0.064 J [0.060 J] | <0.11 | 0.043 J | 0.047 J | <0.11 | 0.11 | 0.089 J |
| t-Butyl alcohol | 0.085 | 0.11 | 0.55 | 0.29 [0.25] | 0.091 | 0.67 | 0.22 | 0.16 | 0.70 | 0.95 |
| Thiophene | <0.086 | <0.086 | 0.51 | <0.086 [<0.086] | <0.086 | <0.086 | <0.086 | <0.086 | <0.086 | <0.086 |
| Toluene | 1.8 | 1.4 | 5.9 | 0.84 [0.75] | 0.39 | 0.63 | 4.3 | 6.1 | 3.0 | 7.9 |
| Tridecane | 1.5 | <0.19 | 3.4 | 1.2 [1.3] | 0.81 | 3.7 | 2.0 | 6.7 | <0.19 | 0.86 |
| Undecane | 0.33 | 0.36 | 5.1 | 0.47 [0.32] | 0.35 | 0.55 | 0.69 | 6.2 | 0.79 | 0.67 |

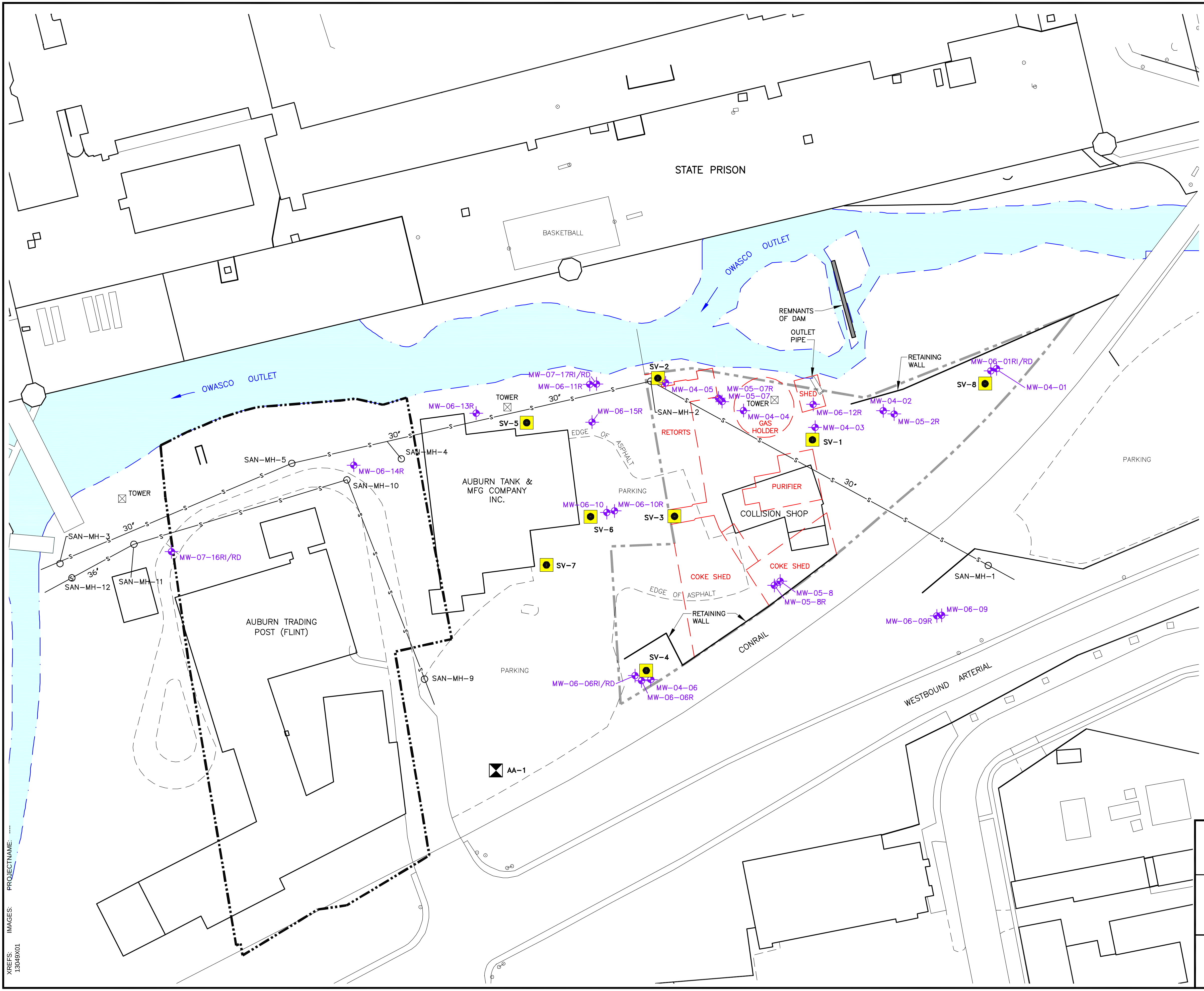
See Notes on Page 3.

## Table 1. Soil Vapor & Ambient Air VOC Analytical Results (ug/m3)
## Soil Vapor Investigation, New York State Electric & Gas Corporation, McMaster Street Former MGP Site, Auburn, New York

**Notes:**

1. Samples were collected by ARCADIS on February 13 and 25, 2008.
2. Samples were analyzed for volatile organic compounds (VOCs) by Alpha Analytical Laboratories (Alpha) using Forensic TO-15 analysis, which is a modification of the United States Environmental Protection Agency (USEPA) Compendium Method TO-15.
3. Sample designations indicate the following:
    - "SV" = soil vapor sample
    - "AA" = ambient air sample
4. Concentrations reported in micrograms per cubic meter (ug/$m^3$).
5. < = Not detected at or above the associated reporting limit.
6. J - Indicates an estimated value.
7. -- = Comparison value not available.
8. Field duplicate sample results are presented in brackets.
9. Results have been validated by NewFields.

# Figures



LEGEND:

| | |
|---|---|
| ● SV-5 | SOIL VAPOR SAMPLING LOCATION |
| ☒ AA-1 | AMBIENT AIR SAMPLING LOCATION |
| ⌖ MW-04-01 | MONITORING WELL |
| — · · — | SITE BOUNDARY |
| [ ] | HISTORICAL MGP STRUCTURE |
| ——s—— | SANITARY PIPELINE |
| ○ SAN-MH-1 | SANITARY MANHOLE |

NOTES:

1. BASE MAP PREPARED BY MERGING SITE HISTORICAL LOCATIONS FROM ELECTRONIC CADD FILE PROVIDED BY NYSEG ON 2/07/07, NAMED AUBMACMAS2.DWG.
2. SANITARY LINE AND MANHOLE LOCATIONS BASED ON SURVEY PROVIDED BY NYSEG ON 5/31/06.
3. PROPERTY LINES FOR AUBURN TANK AND AUBURN TRADING POST PROPERTY DIGITIZED FROM TAX MAP 115.52-1, PROVIDED BY NYSEG ON 10/18/06.
4. HORIZONTAL DATUM = NAD 83.

0 80' 160'

GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
AUBURN (McMASTER STREET) FORMER MGP SITE
**SOIL VAPOR INVESTIGATION REPORT**

## SOIL VAPOR SAMPLING LOCATIONS

ARCADIS

FIGURE
1

CITY:SYR DIV/GROUP:85 DB:NJR RCA DMW LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:ON=*;OFF=*REF*
G:\CAD\ACT\B0013049\0000\00007\DWG\13049B06.DWG LAYOUT: 1 SAVED: 4/30/2008 3:15 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/30/2008 3:15 PM BY: WODARCZYK, DAVID
XREFS: 13049X01 IMAGES: PROJECTNAME: ----

ARCADIS

# Appendix A

Soil Gas and Ambient Air Sample Collection Logs

**NEWFIELDS** Tel: (781) 681-5040

**Environmental Forensics Practice, LLC**

## Air Analysis Chain of Custody

**Ship samples to:**
Alpha Woods Hole Labs
320 Forbes Blvd.
Mansfield, MA 02048
Attn: Liz Porta
Tel: 508-822-9300

1 of 1 COCs

Date Rec'd at Lab:

**Client Information**
**Company:** ARCADIS
**Address:** 6723 TOWPATH RD
**City:** SYRACUSE
**State/Zip:** NY 13214
**Phone:** (315) 671-9456
**Contact:** SCOTT POWLIN

Project Name: NYSEG McMASTER ST SVI
Location: AUBURN NY
**Samplers Name(s)** SHAWN P SKELLY

**Analysis Turnaround Time**
Standard (Specify)__________
Rush (Specify)__________

| | | | | | | | | | | Analysis | | | | Matrix | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Identification (Lab Use Only) | **Sample Identification** | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field ("Hg) (Start) | Canister Pressure in Field ("Hg) (Stop) | Can ID | Flow Reg. ID | Incoming Canister Pressure ("Hg) (Lab) | FORENSIC TO-15 | TO-15 | OTHER | OTHER | Indoor Air | Ambient Air | Soil Gas | Sample Comments |
| | AA-1 (022508) | 02/25/08 | 0820 | 1620 | -26.0 | -2.0 | 644 | 0384 | | | X | | | | X | | |
| | SV-7 (022508) | ↓ | 0825 | 1625 | > -30 | -4.0 | ~~66~~1556 | 0097 | | | X | | | | | X | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |

**Temperature (Fahrenheit)**

| | **Ambient** | **Maximum** | **Minimum** | |
|---|---|---|---|---|
| **Start** | 26°F | | | |
| **Stop** | 37°F | | | |

**Pressure (inches of Hg)**

| | **Ambient** | **Maximum** | **Minimum** | |
|---|---|---|---|---|
| **Start** | 29.89 | | | |
| **Stop** | 29.83 | | | |

**Additional Comments:**

| | | | |
|---|---|---|---|
| Samples Relinquished by: | Date/Time: 02/25/08 1700 | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |

**NEWFIELDS**

Tel: (781) 681-5040

**Environmental Forensics Practice, LLC**

## Air Analysis Chain of Custody

**Ship samples to:**
Alpha Woods Hole Labs
320 Forbes Blvd.
Mansfield, MA 02048
Attn: Liz Porta
Tel: 508-822-9300

1 of 1 COCs

Date Rec'd at Lab:

**Client Information**

**Company:** ARCADIS
**Address:** 6723 TOWPATH RD
**City:** SYRACUSE
**State/Zip:** NY 13214
**Phone:** (315) 671-9456
**Contact:** SCOTT POWLIN

Project Name: NYSEG - McMASTER ST. SVI
Location: AUBURN, NY
**Samplers Name(s)** SHAWN P. SKELLY

**Analysis Turnaround Time**
Standard (Specify)__________
Rush (Specify)__________

| Lab Identification (Lab Use Only) | **Sample Identification** | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field ("Hg) (Start) | Canister Pressure in Field ("Hg) (Stop) | Can ID | Flow Reg. ID | Incoming Canister Pressure ("Hg) (Lab) | Analysis: FORENSIC TO-15 | Analysis: TO-15 | Analysis: OTHER | Analysis: OTHER | Matrix: Indoor Air | Matrix: Ambient Air | Matrix: Soil Gas | Sample Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SV-3 | 02/13/08 | 0940 | 1610 | -22.0 | -2.0 | 1595 | 0008 | | | X | | | | | X | |
| | SV-6 | | 0925 | 1655 | -27.0 | -2.0 | 774 | 0206 | | | X | | | | | X | |
| | AA-1 | | 0947 | 1747 | -28.0 | -4.0 | 1527 | 0200 | | | X | | | | X | | |
| | SV-4 | | 0955 | 1755 | -28.0 | -5.0 | 1550 | 0203 | | | X | | | | | X | |
| | SV-5 | | 1015 | 1815 | >-30.0 | -11.5 | 1060 | 0146 | | | X | | | | | X | |
| | SV-2 | | 1025 | 1825 | -29.0 | -4.5 | 1541 | 0364 | | | X | | | | | X | |
| | SV-1 | | 1035 | 1835 | -28.0 | -5.5 | 767 | 0376 | | | X | | | | | X | |
| | SV-8 | | 1045 | 1845 | -27.0 | -4.0 | 601 | 0241 | | | X | | | | | X | |
| | SV-7 | | 1435 | 1905 | -29.5 | -26.5 | 693 | 0396 | | | X | | | | | X | |
| | FD-021308 | | 0000 | 0800 | >-30.0 | -10.0 | 630 | 0367 | | | X | | | | | X | |

**Temperature (Fahrenheit)**

| | **Ambient** | **Maximum** | **Minimum** | |
|---|---|---|---|---|
| **Start** | 30°F | | | |
| **Stop** | 22.5°F | | | |

**Pressure (inches of Hg)**

| | **Ambient** | **Maximum** | **Minimum** | |
|---|---|---|---|---|
| **Start** | 29.63 | | | |
| **Stop** | 29.72 | | | |

**Additional Comments:**

| | | | |
|---|---|---|---|
| Samples Relinquished by: | Date/Time: 02/14/08 1200 | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |
| Relinquished by: | Date/Time: | Received by: | Date/Time: |

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*engineers, scientists, economists*

# Indoor/Ambient Air Sample Collection Log

**Sample ID:** AA-1

| | | | |
|---|---|---|---|
| **Client:** | NYSEG | **Outdoor/Indoor:** | OUTDOOR |
| **Project:** | AUBURN | **Sample Intake Height:** | 4' |
| **Location:** | McMASTER ST | **Miscellaneous Equipment:** | |
| **Project #:** | B0013049 | **Time On/Off:** | 0947 |
| **Samplers:** | SPS / RK | **Subcontractor:** | |

## Instrument Readings:

| Time | Canister Pressure (inches of HG) | Temperature (F or C) | Relative Humidity (%) | Air Speed (ft/min) | Pressure Differential (inches of H20) | PID (~~ppm or~~ ppb) |
|---|---|---|---|---|---|---|
| 0947 | -28.0 | 30 °F | 100 | 0-5mph | 29.63 | 0.0 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1747 | -4.0 | 22.5 | 84 | 7mph | 29.72 | 0.0 |

## SUMMA Canister Information:

Size (circle one): 1 L [✓ 6 L]

Canister ID: 1527

Flow Controller ID: 0200

## General Observations/Notes:

Please record current weather information including wind speed and direction, ambient temperature, barometric pressure, and relative humidity via suitable information source (e.g., weatherunderground.com).

# Soil Vapor (Canister) Sample Collection Field Form

Project # NYSEG AUBURN

Project Name

Consultant ARCADIS

Collector SPS / RK

---

**Sample ID** SV-1

Start Date/Time 02/13/08 1035

End Date/Time ↓ 1835

Canister ID 767

Flow controller ID 03716

Associated ambient air sample ID AA-1

Vacuum gauge "zero" ("Hg)

Start Pressure ("Hg) -28.0

End Pressure ("Hg) -5.5

End pressure > "zero"?

Sampling duration (intended) 8 hr

Depth of sample point below grade 3.5'-4.0'

---

Tubing type used 1/4" TEFLON LINED

Length of tubing 10'

Tubing volume 100 cc

Volume purged 100 cc @ 5 min

1 to 3 volumes purged @ < 200cc/min? 500 ml

Chamber tracer gas conc. 50.1%

Tracer gas conc. during purging 0

---

Weather Conditions during Probe Installation:

Air temperature (°F)

Rainfall

Wind direction

Barometric pressure

Wind speed (mph)

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

Air temperature (°F) 32.4

Rainfall 0.07"

Wind direction SW

Barometric pressure 29.63

Wind speed (mph) 0-5

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

---

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging - 0.0 ppb
* ppb Conc. after sampling - 253 ppb

* He - 22.2% after sampling (bucket)
* He - 0.0 after sampling (sample line)

# Soil Vapor (Canister) Sample Collection Field Form

Project # NYSEG AUBURN
Project Name
Consultant ARCADIS
Collector SPS / RK

**Sample ID** SV-2
Vacuum gauge "zero" ("Hg)
Start Date/Time 02/13/08 1025
Start Pressure ("Hg) -29.0
End Date/Time ↓ 1825
End Pressure ("Hg) -4.5
Canister ID 1541
End pressure > "zero"?
Flow controller ID 0364
Sampling duration (intended) 8 hr
Associated ambient air sample ID AA-1
Depth of sample point below grade 3.0'-3.5'

Tubing type used 1/4" TEFLON TUBING Length of tubing 12' Tubing volume 120 cc
Volume purged 100 cc @ 5 min
1 to 3 volumes purged @ < 200cc/min? 500 ml
Chamber tracer gas conc. 51.3%
Tracer gas conc. during purging 0.0

Weather Conditions during Probe Installation:
Air temperature (°F)
Rainfall
Wind direction
Barometric pressure
Wind speed (mph)
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:
Air temperature (°F) 32.4
Rainfall 0.07"
Wind direction SW
Barometric pressure 29.63
Wind speed (mph) 0-5
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging - 0.0 ppb
* ppb Conc after sampling - 11 ppb

* He - 10.9% after sampling (bucket)
* He - 0.0 after sampling (sampleline)

# Soil Vapor (Canister) Sample Collection Field Form

Project # NYSEG AUBURN

Consultant ARCADIS

Project Name

Collector SPS / RK

**Sample ID** FD.021308 (SV-2)

Vacuum gauge "zero" ("Hg)

Start Date/Time 02/13/08 1025

Start Pressure ("Hg) >-30

End Date/Time ↓ 1825

End Pressure ("Hg) -10.0

Canister ID 630

End pressure > "zero"?

Flow controller ID 0367

Sampling duration (intended) 8 hr

Associated ambient air sample ID AA-1

Depth of sample point below grade 3.0'-3.5'

Tubing type used 1/4" TEFLON LINED

Length of tubing 12'

Tubing volume 120 cc

Volume purged 100 cc @ 5 min

1 to 3 volumes purged @ < 200cc/min? 500 ml

Chamber tracer gas conc. 51.3%

Tracer gas conc. during purging 0.0

Weather Conditions during Probe Installation:

Air temperature (°F)

Rainfall

Wind direction

Barometric pressure

Wind speed (mph)

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

Air temperature (°F) 32.4

Rainfall 0.07"

Wind direction SW

Barometric pressure 29.63

Wind speed (mph) 0-5

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging - 0.0 ppb

# Soil Vapor (Canister) Sample Collection Field Form

| | | | |
|---|---|---|---|
| Project # | NYSEG Auburn | Consultant | Arcadis |
| Project Name | | Collector | SPS / RK |

| | | | |
|---|---|---|---|
| **Sample ID** | SV-3 | Vacuum gauge "zero" ("Hg) | -29.5 |
| Start Date/Time | 02/13/08 0940 | Start Pressure ("Hg) | -22.0 |
| End Date/Time | ↓ 1610 | End Pressure ("Hg) | -2.0 |
| Canister ID | 1595 | End pressure > "zero"? | 0.0 |
| Flow controller ID | 0008 | Sampling duration (intended) | 8 hr |
| Associated ambient air sample ID | AA-1 | Depth of sample point below grade | 2.5'-3.0' |

Tubing type used 1/4" ID Teflon Lined Length of tubing 8' Tubing volume 80 cc

Volume purged 100 cc @ 4 min 1 to 3 volumes purged @ < 200cc/min? 400

Chamber tracer gas conc. 37.9% Tracer gas conc. during purging 0

Weather Conditions during Probe Installation:

Air temperature (°F) ______ Rainfall ______ Wind direction ______

Barometric pressure ______ Wind speed (mph) ______

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

Air temperature (°F) 32.4 Rainfall 0.07" Wind direction SW

Barometric pressure 29.63 Wind speed (mph) 0-5

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ~~ppb~~ Conc. during purging - ~~0.0 ppb~~ 404 ppb
** ~~ppb~~ Conc. after sample collection - 225 ppb

* He Conc. after sample collection in sample tubing -0.0
** He Conc. in trap after sample collection - 3.7%

# Soil Vapor (Canister) Sample Collection Field Form

---

Project # NYSEG AUBURN

Consultant ARCADIS

Project Name

Collector SPS/RK

---

**Sample ID** SV-4

Vacuum gauge "zero" ("Hg) -29.5

Start Date/Time 02/13/08 ~~0845~~ 0955

Start Pressure ("Hg) ~~-29.55~~ -28.0

End Date/Time ↓ 1755

End Pressure ("Hg) -5.0

Canister ID ~~997~~ 1550

End pressure > "zero"? 0

Flow controller ID ~~0202~~ 0203

Sampling duration (intended) 8hr

Associated ambient air sample ID AA-1

Depth of sample point below grade 6.5'-7.0'

---

Tubing type used 1/4" ID TEFLON LINED

Length of tubing 13 ft. cm

Tubing volume 130 cc

Volume purged ~~[illegible]~~ 100 cc @ 5 min

1 to 3 volumes purged @ < 200cc/min? 500 cc

Chamber tracer gas conc. 45%

Tracer gas conc. during purging 0.0 ppm

---

Weather Conditions during Probe Installation:

Air temperature (°F)

Rainfall

Wind direction

Barometric pressure

Wind speed (mph)

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

---

Weather Conditions at Start of Sampling:

Air temperature (°F) 32.4°

Rainfall 0.07"

Wind direction SW

Barometric pressure 29.63

Wind speed (mph) 0-5

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

---

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: @ 0945 CANISTER PRESSURE @ 7" Hg.

* WILL RESTART w/ NEW CANISTER & FLOW CONTROLLER

** ppb conc. during purging: 0.0 ppb

* He - 12.8% after sampling (in trap)

* ppb conc after sampling - 0.0

* He in sample line after sampling - 0.0

## Soil Vapor (Canister) Sample Collection Field Form

Project # NYSEG AUBURN
Consultant ARCADIS
Project Name
Collector SPS / RK

**Sample ID** SV-5
Vacuum gauge "zero" ("Hg)
Start Date/Time 02/13/08 1015
Start Pressure ("Hg) >-30.0
End Date/Time ↓ 1815
End Pressure ("Hg) -11.5
Canister ID 1060
End pressure > "zero"?
Flow controller ID 0146
Sampling duration (intended) 8 hr
Associated ambient air sample ID AA-1
Depth of sample point below grade 3.5'-4.0'

Tubing type used 1/4" TEFLON
Length of tubing 12'
Tubing volume 120 cc
Volume purged 100 cc @ 5 min
1 to 3 volumes purged @ < 200cc/min? 500 ml
Chamber tracer gas conc. 40.6%
Tracer gas conc. during purging 0

Weather Conditions during Probe Installation:
Air temperature (°F)
Rainfall
Wind direction
Barometric pressure
Wind speed (mph)
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:
Air temperature (°F) 32.4°
Rainfall 0.07"
Wind direction SW
Barometric pressure 29.63
Wind speed (mph) 0-5
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc during purging - 0.0 ppb
* ppb Conc. after sampling ~ 29 ppb

* He ~6.9% after sampling (bucket)
* He~0.0 after sampling (sample line)

# Soil Vapor (Canister) Sample Collection Field Form

| | | | |
|---|---|---|---|
| Project # | NYSEG AUBURN | Consultant | ARCADIS |
| Project Name | | Collector | SPS/RK |

| | | | |
|---|---|---|---|
| **Sample ID** | SV-6 | Vacuum gauge "zero" ("Hg) | -29.5 |
| Start Date/Time | 02/13/08 0925 | Start Pressure ("Hg) | -27.0 |
| End Date/Time | ↓ 1655 | End Pressure ("Hg) | -2.0 |
| Canister ID | 774 | End pressure > "zero"? | 0 |
| Flow controller ID | 0206 | Sampling duration (intended) | 8 hr |
| Associated ambient air sample ID | AA-1 | Depth of sample point below grade | 2.5'-3.0' |

Tubing type used 1/4" TEFLON LINED Length of tubing 10' Tubing volume 100 cc

Volume purged 100 cc @ 5 min 1 to 3 volumes purged @ < 200cc/min? 500

Chamber tracer gas conc. 30.1% Tracer gas conc. during purging 0

Weather Conditions during Probe Installation:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | | Rainfall | | Wind direction | |
| Barometric pressure | | | | Wind speed (mph) | |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | 32.4 | Rainfall | 0.07" | Wind direction | SW |
| Barometric pressure | 29.63 | | | Wind speed (mph) | 0-5 |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging - 0.0ppb
* ppb after sampling - 94 ppb

He Purge Line after Sampling - 0.0
He Bucket after sampling - 20.6%

# Soil Vapor (Canister) Sample Collection Field Form

| | | | |
|---|---|---|---|
| Project # | NYSEG AUBURN | Consultant | ARCADIS |
| Project Name | | Collector | SPS / RK |

| | | | |
|---|---|---|---|
| **Sample ID** | SV - 7 (SV-7(R)) | | |
| | | Vacuum gauge "zero" ("Hg) | |
| Start Date/Time | 02/13/08 0915 (1435) | Start Pressure ("Hg) | -30.0 (-29.5) |
| End Date/Time | ~~1905~~ 1905 | End Pressure ("Hg) | -26.5 (-26.5) |
| Canister ID | 693 (0212) | End pressure > "zero"? | |
| Flow controller ID | 0396 (965) | Sampling duration (intended) | |
| Associated ambient air sample ID | AA-1 | Depth of sample point below grade | 3.0' - 3.5' |

Tubing type used 1/4 ID" TEFLON LINED Length of tubing 10' Tubing volume 100 cc

Volume purged 100 cc @ 5 min 1 to 3 volumes purged @ < 200cc/min? 500

Chamber tracer gas conc. 36.2% Tracer gas conc. during purging 0

Weather Conditions during Probe Installation:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | | Rainfall | | Wind direction | |
| Barometric pressure | | | | Wind speed (mph) | |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | 32.4 | Rainfall | 0.07" | Wind direction | SW |
| Barometric pressure | 29.63 | | | Wind speed (mph) | 0-5 |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging : 0.0
* ppb Conc. after sampling - 7

* He - 6.2% after sampling (bucket)
* He - 0.0 after sampling (~~aft~~ sample line)

# Soil Vapor (Canister) Sample Collection Field Form

| | | | |
|---|---|---|---|
| Project # | NYSEG AUBURN | Consultant | ARCADIS |
| Project Name | | Collector | SPS / RK |

| | | | |
|---|---|---|---|
| **Sample ID** | SN-8 | Vacuum gauge "zero" ("Hg) | |
| Start Date/Time | 02/13/08 1045 | Start Pressure ("Hg) | -27.0 |
| End Date/Time | ↓ 1845 | End Pressure ("Hg) | -4.0 |
| Canister ID | 601 | End pressure > "zero"? | |
| Flow controller ID | 0241 | Sampling duration (intended) | 8 hr |
| Associated ambient air sample ID | AA-1 | Depth of sample point below grade | 3.7'-4.2' |

Tubing type used 1/4" TEFLON LINED Length of tubing 9' Tubing volume 90 cc

Volume purged 100 cc @ 4.5 min 1 to 3 volumes purged @ < 200cc/min? 450 ml

Chamber tracer gas conc. 39.7% Tracer gas conc. during purging 0

Weather Conditions during Probe Installation:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | | Rainfall | | Wind direction | |
| Barometric pressure | | | | Wind speed (mph) | |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Weather Conditions at Start of Sampling:

| | | | | | |
|---|---|---|---|---|---|
| Air temperature (°F) | 32.4 | Rainfall | 0.07" | Wind direction | SW |
| Barometric pressure | 29.63 | | | Wind speed (mph) | 0-5 |

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: * ppb Conc. during purging -0.0 ppb

* ppb Conc. after sampling - 18 ppb

* He - 16.5% after sampling (bucket)

* He - 0.0 after sampling (sample line

# Appendix B

NewFields Forensic Evaluation
Summary Report

NEWFIELDS

May 1, 2008

Mr. Scott Powlin
ARCADIS
6723 Towpath Road
P.O. Box 66
Syracuse, New York 13214-0066

***Subject:*** ***Forensic Soil Gas Investigation***
***McMaster Street Former MGP, Auburn, N.Y.***
***Final Report***

Dear Mr. Powlin:

Please find following a letter report detailing the chemical characterization of two (2) ambient air samples and eight (8) soil vapor samples as part of a soil gas investigation at the McMaster Street Former MGP site in Auburn, N.Y. (Site).

## Background

The McMaster Street former MGP generated coal gas from 1869 to 1904 on a 1 acre triangular property abutting a flowing waterbody known as the Owaso Outlet (Figure 1). The MGP was demolished before 1940 when the Shoemaker Coal Company occupied the Site. The Site was subsequently used for storage. The following items were observed at the site: weathered asphalt, automotive parts, metal and wood scraps, old railroad ties, empty drums, cement blocks and an old commercial asphalt paver. The nature and extent compounds of potential concern (COPCs) are currently being delineated and assessed. This forensic air investigation focused on the likely origins of detected COPCs potentially associated with MGP sites. This report is part of a more comprehensive site assessment involving a formal characterization of nature, extent, and risk to which the observations and conclusions herein are subservient.

## Sample Information

Arcadis BBL personnel collected eight (8) soil vapor samples, one (1) field duplicate, and one (1) ambient air sample on February 13, 2008 (Table 1). The samples were shipped via overnight courier to the Alpha Analytical Laboratories (Alpha) in Mansfield, Massachusetts. The samples arrived in good condition on February 15, 2008 with one exception. Sample SV-7 exhibited high vacuum. Arcadis re-collected soil gas from the SV-7 in additional to one (1) ambient air sample on February 25, 2008 (Table 1). These samples were shipped via overnight courier to Alpha and received in good condition on February 26, 2008.

## Methods

The air samples were analyzed for volatile compounds (VOCs) using a modified EPA Method TO-15. The sample analysis employed a purge and trap concentrator connected to a gas chromatograph equipped with a mass spectrometer operated in simultaneous scanning mode and selected ion monitoring mode (PT/GC/MS/Scan/SIM). The instrument was calibrated for VOC analytes used for environmental compliance monitoring. The target analytes of interest in this modified method included paraffins, isoparaffins, aromatics, naphthenes, and olefins (collectively referred to as PIANO), as well as thiophenes, oxygenates, and additives.

The tiered forensic interpretation[1] for this project included three primary steps. First, the data were reviewed for compliance with the data quality objectives (DQOs) for the project. Second, the results were used to evaluate the complexity of the subsurface soil gas and the general types of product releases evident therein. Third, significance of the hydrocarbon compositional signatures was evaluated in the context of the benzene and naphthalene concentration to generally assess which impacts were likely significant for the overall investigation. A summary of the tiered analysis follows.

## Results

Attachment 1 presents the measured concentrations of PIANO TO-15 analytes and associated quality control (QC) results. Table 2 provides a summary of these data.

## Data Review and Audit

The laboratory reported the target analyte concentrations, surrogate and internal standard recoveries, and additional QC sample results in an electronic data report (Attachment 1). NewFields performed an independent review of these data to ensure that DQOs were satisfied, that the analyses met the project objectives, and that the results were traceable to the raw data. NewFields also reviewed the data for compliance with the laboratory's documented procedures and established laboratory quality objectives. These data satisfied the DQOs of this forensics investigation (Attachment 2).

## Results

The soil gas samples contain complex mixtures of hydrocarbons. SV-1 (Figure 2a) and SV-2 (Figure 2b) contain predominantly aromatic compounds with lower proportions of aliphatic paraffins, isoparaffins, and naphthenes. The high proportions of aromatics in these samples are consistent with MGP impacts. SV-3 (Figure 2c) contain predominantly paraffins and isoparaffins with lesser olefins and trace aromatics attributable to petroleum products, like naphtha based gasoline or solvent. SV-4 (Figure 2d) contains light molecular weight aromatics (C6 to C8 > C9 to C12) mixed with heavy molecular weight aliphatics (C10 to C13 > C5 to C9). This pattern

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[1] Douglas, D.S., S.D. Emsbo-Mattingly, S.A. Sout, A.D. Uhler, and K.J. McCarthy (2007) "Chemical Fingerprinting Methods." In: Introduction to Environmental Forensics Second Edition Eds: B. Murphy and R. Morrison. Academic Press, Burlington, MA.

suggested the potential presence of tar mixed with middle to heavy petroleum. SV-5 (Figure 2e) and SV-6 (Figure 2f) contain similar mixtures of aliphatics with lesser amounts of aromatics attributable to gasoline and possibly other petroleum products. SV-7 (Figure 2g) contains light molecular weight aliphatic hydrocarbons with low proportions of aromatics. This mixture is likely gasoline. SV-8 (Figure 2h) contains a mixture of aliphatic and aromatic hydrocarbons with a slight enrichment of C6 to C8 aromatics. This pattern is attributable to petroleum with potential influence from MGP tar. The field duplicate (Figure 2i) closely resembles SV-2.

The ambient air samples collected on 2/13/08 (Figure 2j) and 2/25/08 (Figure 2k) exhibit very similar mixtures aliphatic and aromatic hydrocarbons which demonstrated general continuity over time. The pattern of declining C5 to C9 paraffins and aromatics plus the presence of light molecular weight isoparaffins, olefins, and naphthenes is attributable to gasoline. The pattern of rising C10 to C13 paraffins and aromatics is attributable to diesel or fuel oil. Collectively, these ambient air samples indicate the presence of light (gasoline) and heavy (diesel) vehicular traffic plus likely contributions from fuel oil combustion.

The use of analyte ratios helps evaluate the hydrocarbon patterns in the soil gas samples. A scatter plot of benzene concentrations verses the concentration ratio of total aromatics relative to total PIANO analytes (Figure 3a) suggests that samples SV-1, SV-6, and SV-7 may serve as a source of benzene in excess of ambient air. Similarly, a plot of naphthalene concentrations verses the concentration ratio of total aromatics relative to total PIANO analytes (Figure 3b) suggests that SV-1, SV-2, SV-4, and SV5 may serve as a source of naphthalene in excess of ambient air. The presence of the concentration ratio of aromatics : total PIANO analytes helps benchmark the compositional differences among the soil gas samples as discussed in the following figure. The general proportions of aromatic and aliphatic hydrocarbons (Figure 3c) indicate that samples SV-3, SV-5, SV-6, and SV-7 are derived from petroleum while SV-1, SV-2, SV-4, and possibly SV-8 are derived from MGP tar or biodegraded petroleum. The enriched proportions of benzene relative to hexane and naphthalene relative dodecane (Figure 3d) demonstrate MGP tar influences in the SV-1 and SV-2 samples. The enrichment of isoparaffins, naphthenes, and paraffins (Figure 3e) suggest the presence of alkylated gasoline in SV-6 (upper left) and straight run petroleum in SV-2, SV-3, and SV-4 (bottom right and left). This plot reveals the likely presence of some form of petroleum in SV-1, SV-5, SV-7, and SV-8; however, the exact origin is not particularly clear beyond what is discussed above.

## Summary

Eight soil gas samples from the former MGP located on McMaster Street in Auburn, N.Y. contain complex mixtures of hydrocarbons. The forensic analyses of these air samples help characterize the likely origins of these hydrocarbons. A summary follows:

- The aromatic hydrocarbons in SV-1 and SV-2 are likely from MGP tar. Soil gas collected at these locations may convey aromatics in excess of aromatics associated with ambient air.
- The aromatic hydrocarbons in SV-5, SV-6, and SV-7 are likely from petroleum. Soil gas collected at these locations may convey aromatics in excess of aromatics associated with ambient air.
- The aromatic hydrocarbon concentrations in SV-3 and SV-8 are too low to present a likely impact in excess of ambient air. Both samples likely contain gasoline vapors. SV-8 may contain some MGP vapors.
- SV-4 is an ambiguous sample. It contains aromatics slightly above ambient air whose origin is petroleum with possible influences of MGP vapor.
- Ambient air collected on 2/13/08 and 2/25/08 exhibited mixtures of aliphatic and aromatic hydrocarbons consistent with vehicular traffic and fuel oil combustion.

A forensic review of the available soil, groundwater, and NAPL data associated with the Site might help clarify any outstanding ambiguities discussed in this report.

Please do not hesitate to contact me with questions about this report.

Sincerely,

Stephen Emsbo-Mattingly, M.S.
Senior Scientist

cc: M. Mitchell, NewFields

# Table 1. Sample Inventory.

| Client ID | Abbrv. | Lab ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|---|
| SV-1 | SV1 | 0802064-07 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-2 | SV2 | 0802064-06 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-3 | SV3 | 0802064-01 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-4 | SV4 | 0802064-04 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-5 | SV5 | 0802064-05 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-6 | SV6 | 0802064-02 | Soil Vapor | 2/13/08 | 2/15/08 |
| SV-7 (022508) | SV7 | 0802115-02 | Soil Vapor | 2/25/08 | 2/26/08 |
| SV-8 | SV8 | 0802064-08 | Soil Vapor | 2/13/08 | 2/15/08 |
| FD-021308 | FD | 0802064-10 | Soil Vapor | 2/13/08 | 2/15/08 |
| AA-1 | AA1a | 0802064-03 | Ambient Air | 2/13/08 | 2/15/08 |
| AA-1 (022508) | AA1b | 0802115-01 | Ambient Air | 2/25/08 | 2/26/08 |

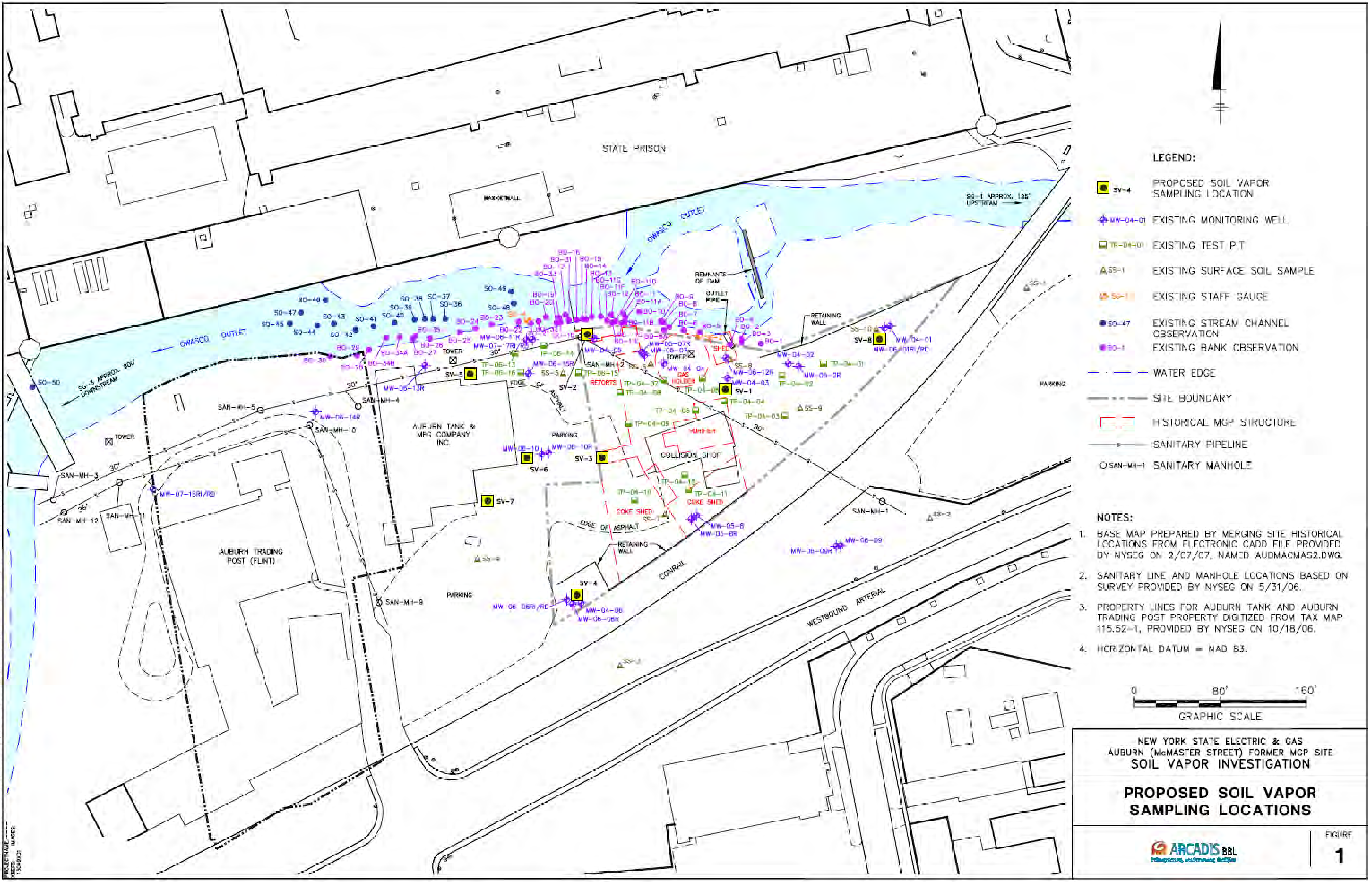
# Table 2. TO15 PIANO Results Summary.

| | Client ID | | SV-1 | SV-2 | SV-3 | SV-4 | SV-5 | SV-6 | SV-7 (022508) | SV-8 | FD-021308 | AA-1 | AA-1 (022508) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Matrix | | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Ambient Air | Ambient Air |
| | Reporting Limit | | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 |
| Class | Analytes | Abbrev | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv | Result - ppbv |
| P | Pentane | C5 | 0.314 | 0.080 | 16.0 | 0.047 | 1.61 | 3.64 | 3.07 | 0.546 | 0.065 | 0.340 | 0.209 |
| P | Hexane | C6 | 0.168 | 0.034 | 42.9 | 0.031 | 1.02 | 2.02 | 17.4 | 0.311 | 0.034 | 0.141 | 0.100 |
| P | Heptane | C7 | 0.112 | 0.031 | 87.2 | 0.031 | 0.642 | 0.819 | 1.22 | 0.182 | 0.026 | 0.097 | 0.067 |
| P | Octane | C8 | 0.129 | 0.023 | 34.8 | 0.031 | 0.158 | 0.328 | 0.846 | 0.496 | 0.021 | 0.038 | 0.044 |
| P | Nonane | C9 | 0.069 | 0.018 | 9.26 | 0.034 | 0.133 | 1.12 | 0.955 | 0.269 | 0.020 | 0.027 | 0.032 |
| P | Decane | C10 | 0.308 | 0.038 | 1.10 | 0.048 | 0.074 | | 0.616 | 0.125 | 0.034 | 0.032 | 0.044 |
| P | Undecane | C11 | 0.803 | 0.074 | 0.055 | 0.086 | 0.108 | 0.966 | 0.124 | 0.105 | 0.050 | 0.052 | 0.056 |
| P | Dodecane | C12 | 1.25 | 0.106 | 0.023 | 0.210 | 0.071 | 0.786 | 0.085 | 0.059 | 0.079 | 0.265 | 0.039 |
| P | Tridecane | C13 | 0.448 | 0.161 | 0.108 | 0.485 | 0.264 | 0.888 | | 0.114 | 0.173 | 0.192 | |
| I | Isopentane | IP | 0.561 | 0.129 | 9.18 | | 1.12 | 3.08 | 2.91 | 0.527 | 0.129 | 0.511 | 0.373 |
| I | 2,3-Dimethylbutane | 23DMB | 0.039 | 0.032 | 2.57 | | 0.144 | 0.542 | 0.460 | 0.036 | 0.028 | 0.032 | 0.023 |
| I | 2-Methylpentane | 2MP | 0.169 | 0.051 | 21.1 | 0.019 | 0.630 | 1.55 | 4.02 | 0.229 | 0.053 | 0.180 | 0.121 |
| I | 3-Methylpentane | 3MP | 0.101 | 0.038 | 24.5 | 0.023 | 0.563 | 1.47 | 4.27 | 0.225 | 0.040 | 0.095 | 0.071 |
| I | 2,2-Dimethylpentane | 22DMP | | | 0.165 | | 0.021 | 0.216 | 0.036 | | | | |
| I | 2,4-Dimethylpentane | 24DMP | 0.015 | | 1.96 | | 0.054 | 0.569 | 0.196 | 0.015 | | 0.017 | 0.012 |
| I | 2-Methylhexane | 2MH | 0.050 | 0.014 | 30.0 | | 0.474 | 0.949 | 1.37 | 0.108 | 0.014 | 0.061 | 0.038 |
| I | 2,3-Dimethylpentane | 23DMP | 0.031 | 0.032 | 10.3 | | 0.213 | 1.02 | 0.745 | 0.053 | 0.032 | 0.026 | 0.020 |
| I | 3-Methylhexane | 3MH | 0.080 | | 80.2 | 0.050 | 0.620 | 1.28 | 2.82 | 0.187 | 0.035 | 0.076 | 0.094 |
| I | Isooctane | ISO | 0.019 | | | | 0.142 | 0.283 | 0.123 | 0.023 | | 0.048 | 0.031 |
| I | 2,5-Dimethylhexane | 25DMH | 0.010 | | 2.26 | | 0.070 | 0.640 | 0.436 | 0.013 | | | |
| I | 2,4-Dimethyhexane / 2,2,3-TMP | 24DMH/223TMP | 0.012 | | 3.69 | | 0.071 | 0.487 | 0.516 | 0.017 | | 0.012 | |
| I | 2,3,4-Trimethylpentane | 234TMP | | | 0.695 | | 0.113 | 0.426 | 0.198 | | | 0.015 | |
| I | 2,3,3-Trimethylpentane | 233TMP | 0.029 | | | | 0.095 | 0.319 | 0.276 | 0.033 | | 0.018 | 0.012 |
| I | 2,3-Dimethylhexane | 23DMH | 0.010 | | 6.62 | | 0.088 | 0.201 | 0.778 | 0.024 | | | |
| I | 3-Ethylhexane | 3EH | | | 10.1 | | 0.055 | 0.129 | 0.989 | 0.023 | | | |
| I | 2-Methylheptane | 2MHEP | 0.039 | 0.013 | 18.8 | 0.016 | 0.137 | 0.302 | 1.23 | 0.115 | 0.011 | 0.036 | 0.016 |
| I | 3-Methylheptane | 3MHEP | 0.037 | 0.010 | 33.3 | | 0.155 | 0.292 | 1.70 | 0.111 | | 0.027 | 0.015 |
| A | Benzene | B | 6.48 | 0.174 | 0.123 | 0.104 | 0.276 | 0.777 | 1.61 | 0.318 | 0.157 | 0.338 | 0.200 |
| A | Toluene | T | 1.57 | 0.222 | 0.104 | 0.167 | 1.13 | 1.62 | 0.786 | 2.09 | 0.200 | 0.475 | 0.375 |
| A | Ethylbenzene | EB | 1.25 | 0.032 | 0.024 | 0.061 | 0.170 | 0.275 | 0.103 | 0.306 | 0.031 | 0.089 | 0.041 |
| A | p/m-Xylene | MPX | 3.20 | 0.154 | 0.062 | 0.252 | 0.598 | 0.683 | 0.359 | 0.968 | 0.149 | 0.199 | 0.106 |
| A | Styrene | STY | 0.101 | 0.015 | | 0.010 | 0.011 | | 0.025 | 0.021 | 0.014 | | 0.018 |
| A | o-Xylene | OX | 2.28 | 0.065 | 0.022 | 0.103 | 0.171 | 0.224 | 0.150 | 0.233 | 0.061 | 0.082 | 0.046 |
| A | Isopropylbenzene | IPB | 7.56 | 0.047 | 0.044 | 1.32 | 0.040 | 0.538 | 2.68 | 0.019 | 0.042 | | |
| A | n-Propylbenzene | PROPB | 0.354 | | | 0.033 | 0.019 | | 0.045 | 0.018 | | 0.015 | |
| A | 1-Methyl-3-ethylbenzene | 1M3EB | 10.7 | 0.024 | 0.010 | 0.117 | 0.060 | 0.093 | 0.131 | 0.066 | 0.025 | 0.034 | 0.025 |
| A | 1-Methyl-4-ethylbenzene | 1M4EB | 2.19 | 0.016 | 0.012 | 0.063 | 0.036 | 0.057 | 0.065 | 0.034 | 0.016 | 0.022 | 0.017 |
| A | 1,3,5-Trimethylbenzene | 135TMB | 3.52 | 0.055 | 0.012 | 0.065 | 0.043 | 0.061 | 0.068 | 0.029 | 0.054 | 0.014 | 0.014 |
| A | 1-Methyl-2-ethylbenzene | 1M2EB | 3.40 | 0.011 | | 0.049 | 0.023 | 0.088 | 0.050 | 0.028 | 0.012 | 0.016 | 0.012 |
| A | 1,2,4-Trimethylbenzene | 124TMB | 5.84 | 0.101 | 0.024 | 0.267 | 0.116 | 0.108 | 0.230 | 0.097 | 0.099 | 0.044 | 0.039 |
| A | sec-Butylbenzene | SECBUT | 0.399 | | | | | 0.160 | 0.013 | | | | |
| A | 1-Methyl-3-isopropylbenzene | 1M3IPB | 85.6 | | | 0.013 | | 0.017 | 0.012 | 0.059 | 0.011 | | |
| A | 1-Methyl-4-isopropylbenzene | 1M4IPB | 10.6 | 0.011 | | 0.059 | 0.016 | 0.024 | 0.014 | 0.016 | 0.010 | | |
| A | 1-Methyl-2-isopropylbenzene | 1M2IPB | 0.561 | | | | | 0.020 | | | | | |
| A | Indan | IN | 1.33 | 0.020 | | 0.063 | 0.019 | 0.042 | 0.039 | 0.021 | 0.020 | 0.010 | |
| A | Indene | INE | 0.194 | 0.188 | | 0.024 | 0.010 | | | | 0.189 | | |
| A | 1-Methyl-3-propylbenzene | 1M3PB | 2.40 | | | 0.037 | 0.014 | 0.030 | 0.018 | 0.017 | | | |
| A | 1-Methyl-4-propylbenzene | 1M4PB | 0.721 | | | 0.021 | | 0.037 | 0.010 | | | | |
| A | n-Butylbenzene | BUTB | 0.022 | | | 0.014 | | | | | | | |
| A | 1,2-Dimethyl-4-ethylbenzene | 12DM4EB | 3.50 | 0.019 | | 0.052 | 0.023 | | 0.019 | 0.017 | 0.019 | | |
| A | 1,2-Diethylbenzene | 12DEB | 0.354 | | | | | 0.031 | | | | | |
| A | 1-Methyl-2-propylbenzene | 1M2PB | 0.609 | | | 0.018 | | 0.040 | | | | | |
| A | 1,4-Dimethyl-2-ethylbenzene | 14DM2EB | 1.49 | 0.011 | | 0.043 | 0.013 | 0.031 | 0.017 | 0.015 | | | |
| A | 1,3-Dimethyl-4-ethylbenzene | 13DM4EB | 1.36 | | | 0.040 | 0.012 | 0.016 | 0.013 | 0.013 | | | |
| A | 1,3-Dimethyl-5-ethylbenzene | 13DM5EB | 2.77 | 0.017 | | 0.066 | 0.021 | 0.040 | 0.028 | 0.023 | 0.017 | | |
| A | 1,3-Dimethyl-2-ethylbenzene | 13DM2EB | 0.510 | | | | | | | | | | |
| A | 1,2-Dimethyl-3-ethylbenzene | 12DM3EB | 0.912 | | | 0.025 | 0.010 | | | | | | |
| A | 1,2,4,5-Tetramethylbenzene | 1245TMP | 0.643 | 0.029 | | 0.050 | 0.017 | | 0.016 | 0.011 | 0.027 | 0.013 | |
| A | Pentylbenzene | PENTB | 0.039 | | | 0.014 | | 0.041 | | | | 0.014 | |
| A | Naphthalene | N | 1.72 | 2.35 | 0.039 | 0.220 | 0.177 | 0.026 | 0.032 | 0.052 | 2.23 | 0.049 | 0.045 |
| A | 2-Methylnaphthalene | 2MN | 0.338 | 0.137 | 0.057 | 0.131 | 0.039 | 0.024 | 0.021 | 0.025 | 0.159 | 0.209 | 0.011 |
| A | 1-Methylnaphthalene | 1MN | 0.439 | 0.103 | 0.057 | 0.111 | 0.035 | 0.022 | 0.012 | 0.019 | 0.114 | 0.277 | |
| N | Cyclopentane | CYP | 0.038 | | | | 0.089 | 0.321 | 0.138 | 0.031 | | 0.029 | 0.012 |
| N | Methylcyclopentane | MCYP | 0.093 | 0.036 | 0.857 | | 0.213 | 0.693 | 5.62 | 0.059 | 0.034 | 0.062 | 0.037 |
| N | Cyclohexane | CH | 0.221 | 0.136 | 0.529 | | 0.398 | 0.648 | 0.283 | 0.048 | 0.127 | 0.039 | 0.016 |
| N | Methylcyclohexane | MCYH | 0.334 | 0.350 | 0.918 | 0.014 | 1.01 | 1.57 | 0.689 | 0.096 | 0.333 | 0.031 | 0.020 |
| N | 1-Ethyl-1-methylcyclopentane | 1E1MCP | | | | | 0.012 | 0.357 | 0.092 | | | | |
| O | 1,3-Butadiene | 13B | | | 0.181 | | 0.050 | 0.111 | 0.192 | 0.032 | | 0.015 | 0.017 |
| O | 1-Pentene | 1P | 0.043 | | 1.16 | 0.012 | 0.120 | 0.276 | 0.266 | 0.103 | | 0.013 | 0.019 |
| O | 2-Methyl-1-butene | 2M1B | 0.046 | | 1.11 | | 0.125 | 0.469 | 0.348 | 0.111 | | 0.014 | 0.015 |
| O | 2-Pentene (trans) | T2P | 0.021 | | 1.55 | | 0.221 | 0.281 | 0.185 | 0.045 | | | 0.014 |
| O | 2-Pentene (cis) | C2P | 0.014 | | 0.617 | | 0.073 | 0.132 | 0.087 | 0.038 | | | |
| O | 1-Hexene | 1HEX | 0.041 | | 1.50 | | 0.068 | 0.123 | 0.061 | 0.038 | | | |
| O | 1-Heptene | 1H | 0.107 | 0.137 | 4.39 | 0.016 | 0.375 | 1.29 | 0.497 | 0.079 | 0.129 | 0.030 | 0.025 |
| O | 1-Octene | 1O | | | 4.66 | | | | | | | | 0.019 |
| O | 1-Nonene | 1N | | | 1.29 | | | | | | | | |
| O | 1-Decene | 1D | 0.059 | | 0.322 | | | | | | | | |
| S | Thiophene | THIO | 0.147 | | | | | | | | | | |
| S | 2-Methylthiophene | 2MTHIO | | | | | | | | | | | |
| S | 3-Methylthiophene | 3MTHIO | | | | | | | | | | | |
| S | 2-Ethylthiophene | 2ETHIO | | | | | | | | | | | |
| S | Benzothiophene | BT0 | 0.044 | 0.121 | 0.040 | 0.016 | 0.010 | 0.014 | | | 0.113 | 0.050 | |
| OX | Tertiary butanol | TBA | 0.182 | 0.097 | 0.030 | 0.221 | 0.073 | 0.054 | 0.230 | 0.315 | 0.084 | 0.028 | 0.036 |
| OX | MTBE | MTBE | | | | | | | | | | | |
| OX | Diisopropyl Ether (DIPE) | DIPE | | | | | | | | | | | |
| OX | Ethyl Tertiary Butyl Ether (ETBE) | ETBE | | | | | | | | | | | |
| OX | TAME | TAME | | | | | | | | | | | |
| ADD | 1,2-Dichloroethane | 12DCA | | | | | | | 0.036 | | | 0.014 | 0.011 |
| ADD | 1,2-Dibromoethane | 12DBE | | | | | | | | | | | |
| ADD | MMT | MMT | | | | | | | | | | | |
| | Total | | 171 | 6 | 467 | 5 | 15 | 36 | 63 | 9 | 5 | 5 | 3 |
| | Surrogates (% Recovery) | | | | | | | | | | | | |
| | 4-Bromofluorobenzene | | 99 | 101 | 93 | 98 | 92 | 97 | 100 | 100 | 96 | 98 | 98 |
| | Toluene-d8 | | 101 | 105 | 100 | 101 | 95 | 99 | 100 | 104 | 101 | 101 | 101 |
| | 1,2-Dichloroethane-d4 | | 95 | 103 | 98 | 97 | 89 | 93 | 95 | 98 | 101 | 98 | 106 |

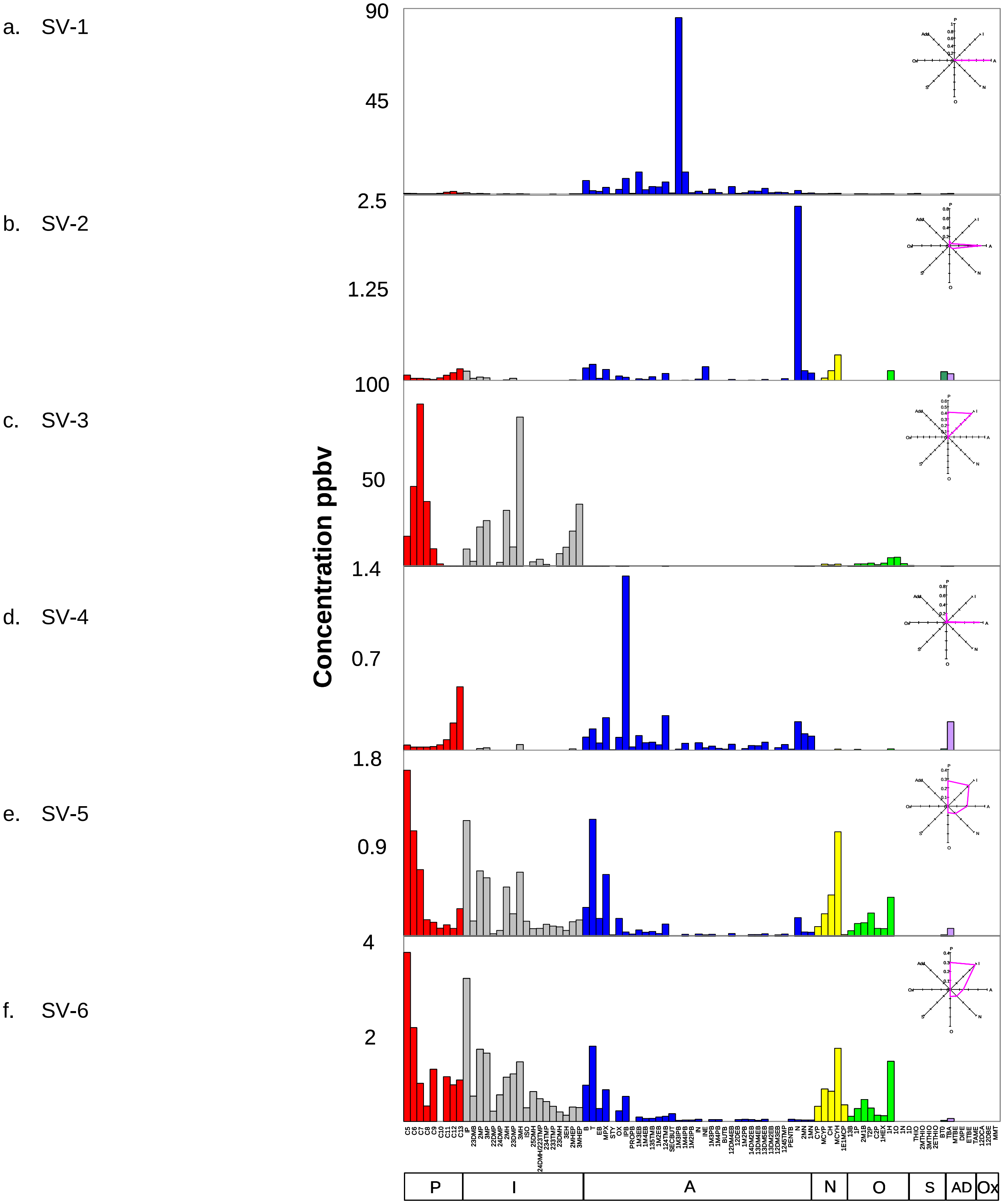
# Table 2. TO15 PIANO Results Summary (continued).

| | Client ID | | Laboratory Blank | Laboratory Blank | Laboratory Control Sample | SV-3D | SV-7 (022508) |
|---|---|---|---|---|---|---|---|
| | Matrix | | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor | Soil Vapor |
| | Reporting Limit | | 0.055 | 0.055 | 0.055 | 0.055 | 0.055 |
| Class | Analytes | Abbrev | Result - ppbv | Result - ppbv | % Rec | RPD | RPD |
| P | Pentane | C5 | 0.010 | | | 1 | 4 |
| P | Hexane | C6 | | | 97 | 4 | 4 |
| P | Heptane | C7 | 0.010 | | 119 | | 3 |
| P | Octane | C8 | 0.011 | | | 9 | 4 |
| P | Nonane | C9 | | | | 10 | 1 |
| P | Decane | C10 | | | | 12 | 4 |
| P | Undecane | C11 | | | | 14 | 4 |
| P | Dodecane | C12 | | | | 24 | 2 |
| P | Tridecane | C13 | | | | 23 | |
| I | Isopentane | IP | 0.015 | 0.013 | | 1 | 2 |
| I | 2,3-Dimethylbutane | 23DMB | | | | 2 | 2 |
| I | 2-Methylpentane | 2MP | | | | 3 | 4 |
| I | 3-Methylpentane | 3MP | | | | 3 | 4 |
| I | 2,2-Dimethylpentane | 22DMP | | | | 4 | 0 |
| I | 2,4-Dimethylpentane | 24DMP | | | | 5 | 1 |
| I | 2-Methylhexane | 2MH | | | | 8 | 2 |
| I | 2,3-Dimethylpentane | 23DMP | | | | 8 | 4 |
| I | 3-Methylhexane | 3MH | | | | 8 | 3 |
| I | Isooctane | ISO | | | 111 | | 5 |
| I | 2,5-Dimethylhexane | 25DMH | | | | 7 | 3 |
| I | 2,4-Dimethyhexane / 2,2,3-TMP | 24DMH/223TMP | | | | 7 | 4 |
| I | 2,3,4-Trimethylpentane | 234TMP | | | | 7 | 4 |
| I | 2,3,3-Trimethylpentane | 233TMP | | | | | 9 |
| I | 2,3-Dimethylhexane | 23DMH | | | | 8 | 3 |
| I | 3-Ethylhexane | 3EH | | | | 9 | 4 |
| I | 2-Methylheptane | 2MHEP | | | | 8 | 4 |
| I | 3-Methylheptane | 3MHEP | | | | 8 | 4 |
| A | Benzene | B | 0.010 | | 97 | 8 | 5 |
| A | Toluene | T | 0.010 | | 98 | 9 | 6 |
| A | Ethylbenzene | EB | | | 108 | 13 | 1 |
| A | p/m-Xylene | MPX | | | 117 | 14 | 2 |
| A | Styrene | STY | | | 116 | | 4 |
| A | o-Xylene | OX | | | 114 | 20 | 1 |
| A | Isopropylbenzene | IPB | | | | 12 | 2 |
| A | n-Propylbenzene | PROPB | | | 131 | | 2 |
| A | 1-Methyl-3-ethylbenzene | 1M3EB | | | | | 2 |
| A | 1-Methyl-4-ethylbenzene | 1M4EB | | | 129 | | 3 |
| A | 1,3,5-Trimethylbenzene | 135TMB | | | 121 | 18 | 4 |
| A | 1-Methyl-2-ethylbenzene | 1M2EB | | | | | 2 |
| A | 1,2,4-Trimethylbenzene | 124TMB | | | 120 | 18 | 2 |
| A | sec-Butylbenzene | SECBUT | | | | | 0 |
| A | 1-Methyl-3-isopropylbenzene | 1M3IPB | | | | | 18 |
| A | 1-Methyl-4-isopropylbenzene | 1M4IPB | | | | | 7 |
| A | 1-Methyl-2-isopropylbenzene | 1M2IPB | | | | | |
| A | Indan | IN | | | | | 11 |
| A | Indene | INE | | | | | |
| A | 1-Methyl-3-propylbenzene | 1M3PB | | | | | 6 |
| A | 1-Methyl-4-propylbenzene | 1M4PB | | | | | 0 |
| A | n-Butylbenzene | BUTB | | | | | |
| A | 1,2-Dimethyl-4-ethylbenzene | 12DM4EB | | | | | 5 |
| A | 1,2-Diethylbenzene | 12DEB | | | | | |
| A | 1-Methyl-2-propylbenzene | 1M2PB | | | | | |
| A | 1,4-Dimethyl-2-ethylbenzene | 14DM2EB | | | | | 13 |
| A | 1,3-Dimethyl-4-ethylbenzene | 13DM4EB | | | | | 0 |
| A | 1,3-Dimethyl-5-ethylbenzene | 13DM5EB | | | | | 4 |
| A | 1,3-Dimethyl-2-ethylbenzene | 13DM2EB | | | | | |
| A | 1,2-Dimethyl-3-ethylbenzene | 12DM3EB | | | | | |
| A | 1,2,4,5-Tetramethylbenzene | 1245TMP | | | | | 0 |
| A | Pentylbenzene | PENTB | | | | | |
| A | Naphthalene | N | | | | 106 | 17 |
| A | 2-Methylnaphthalene | 2MN | | 0.017 | | 121 | 21 |
| A | 1-Methylnaphthalene | 1MN | | 0.014 | | 135 | 18 |
| N | Cyclopentane | CYP | | | | | 4 |
| N | Methylcyclopentane | MCYP | | | | 4 | 4 |
| N | Cyclohexane | CH | | | 100 | 1 | 4 |
| N | Methylcyclohexane | MCYH | | | | 6 | 5 |
| N | 1-Ethyl-1-methylcyclopentane | 1E1MCP | | | | | 4 |
| O | 1,3-Butadiene | 13B | | | | 5 | 2 |
| O | 1-Pentene | 1P | | | | 0 | 1 |
| O | 2-Methyl-1-butene | 2M1B | | | | 1 | 5 |
| O | 2-Pentene (trans) | T2P | | | | 3 | 7 |
| O | 2-Pentene (cis) | C2P | | | | 2 | 7 |
| O | 1-Hexene | 1HEX | | | | 9 | 10 |
| O | 1-Heptene | 1H | | | | 4 | 6 |
| O | 1-Octene | 1O | | | | 4 | |
| O | 1-Nonene | 1N | | | | 10 | |
| O | 1-Decene | 1D | | | | 10 | |
| S | Thiophene | THIO | | | | | |
| S | 2-Methylthiophene | 2MTHIO | | | | | |
| S | 3-Methylthiophene | 3MTHIO | | | | | |
| S | 2-Ethylthiophene | 2ETHIO | | | | | |
| S | Benzothiophene | BT0 | | | | | |
| OX | Tertiary butanol | TBA | | | | 11 | 5 |
| OX | MTBE | MTBE | | | 103 | | |
| OX | Diisopropyl Ether (DIPE) | DIPE | | | | | |
| OX | Ethyl Tertiary Butyl Ether (ETBE) | ETBE | | | | | |
| OX | TAME | TAME | | | | | |
| ADD | 1,2-Dichloroethane | 12DCA | | | 97 | | 5 |
| ADD | 1,2-Dibromoethane | 12DBE | | | 108 | | |
| ADD | MMT | MMT | | | | | |
| | Total | | 0 | 0 | 111 | 15 | 5 |
| | Surrogates (% Recovery) | | | | | | |
| | 4-Bromofluorobenzene | | 99 | 99 | 107 | 4 | 1 |
| | Toluene-d8 | | 116 | 113 | 103 | 5 | 1 |
| | 1,2-Dichloroethane-d4 | | 133 | 126 | 97 | 6 | 3 |

## Figure 1. Site Map.

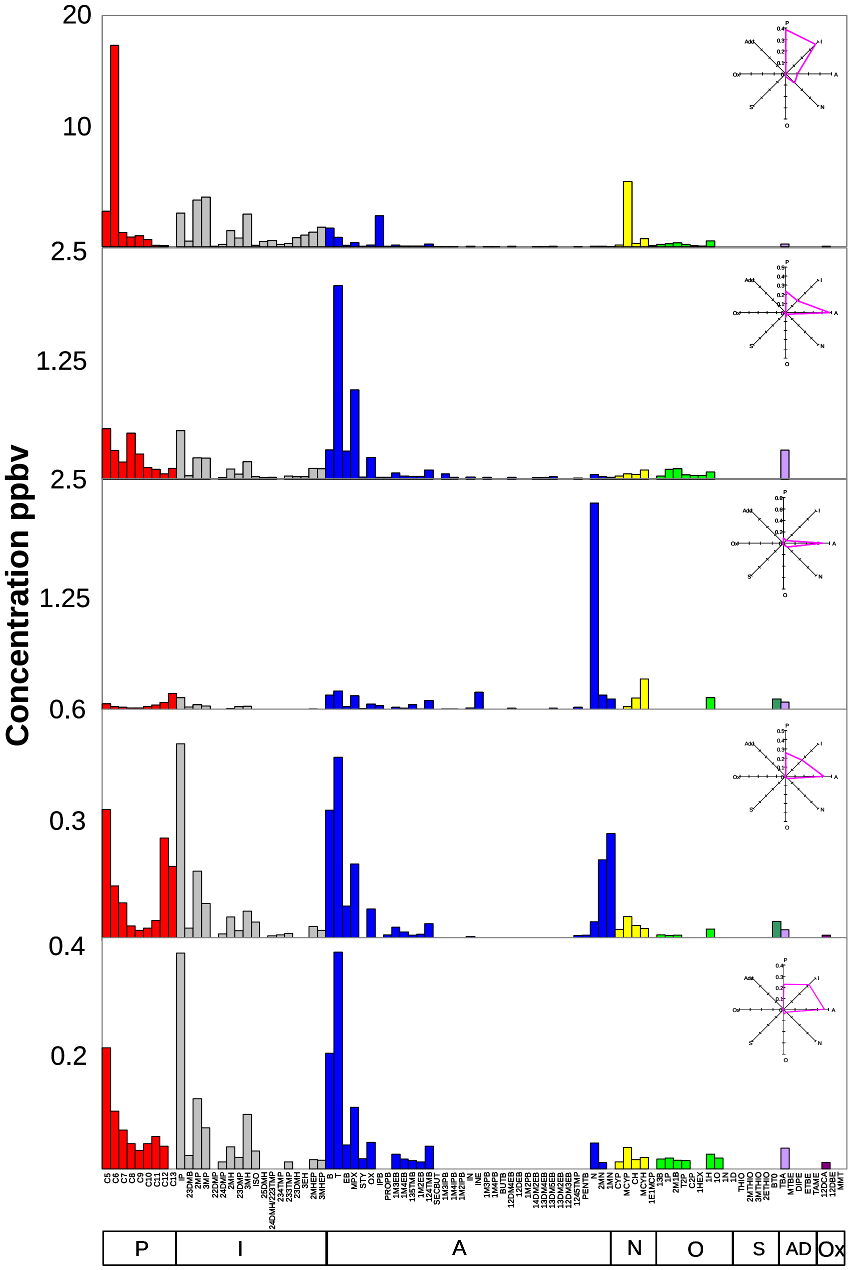


# Figure 2. TO15 PIANO Histograms.



See Table 2 for Analyte IDs

# Figure 2. TO15 PIANO Histograms (cont'd).



g. SV-7 (022508)

h. SV-8

i. FD 021308

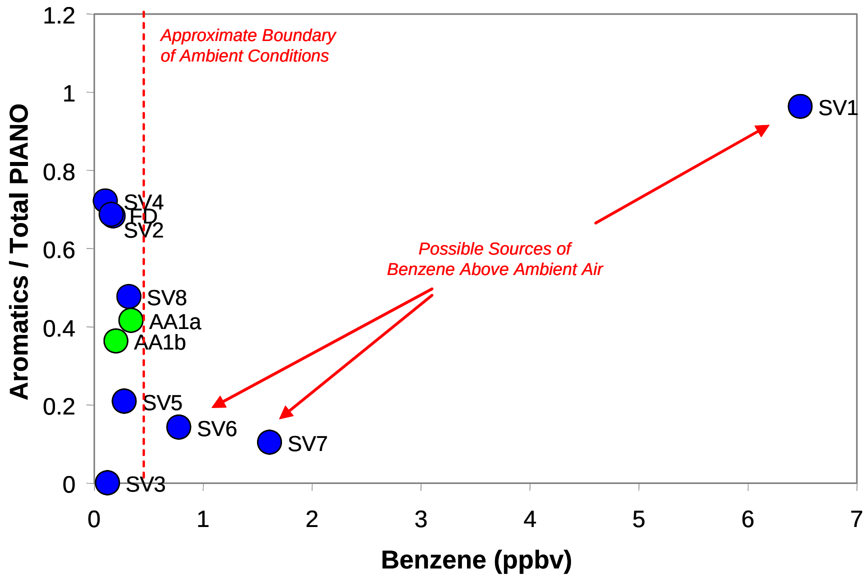
j. AA-1

k. AA-1 (022508)

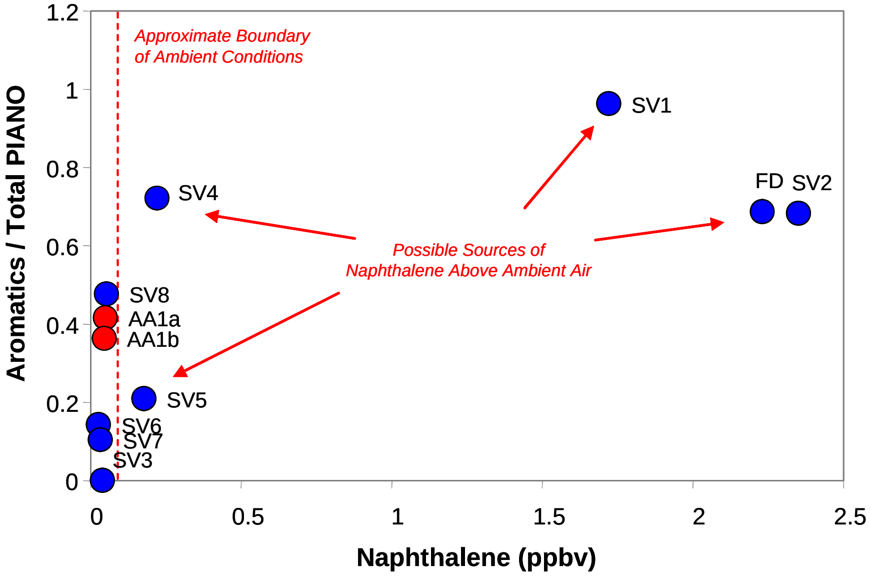
See Table 2 for Analyte IDs

# Figure 3. Ratio Plots.

a. Possible Benzene Sources.

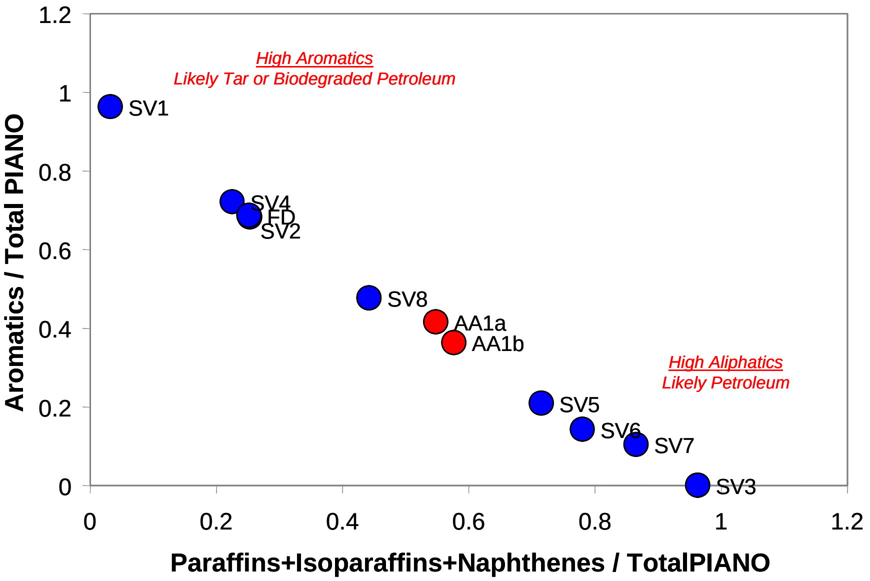


b. Possible Naphthalene Sources.

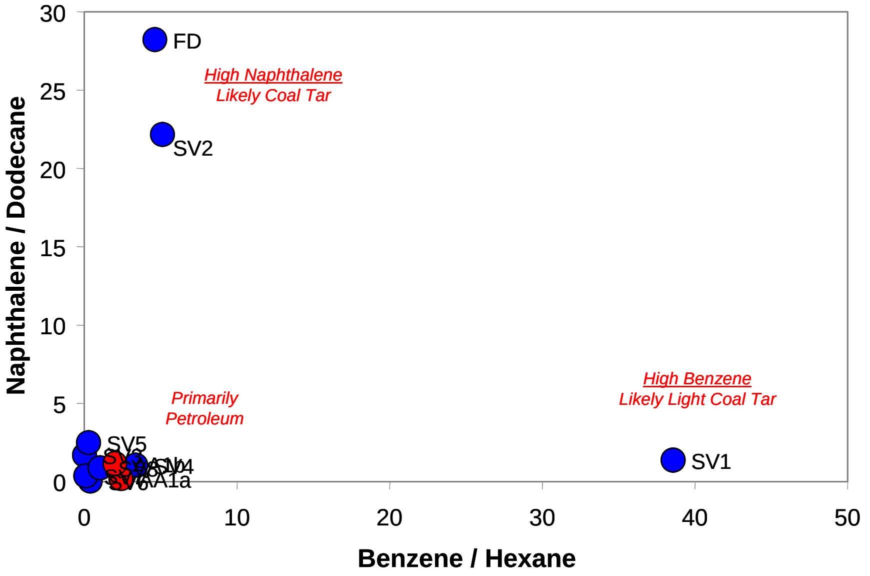


## Figure 3. Ratio Plots (cont'd).

c. General Compositional Features.

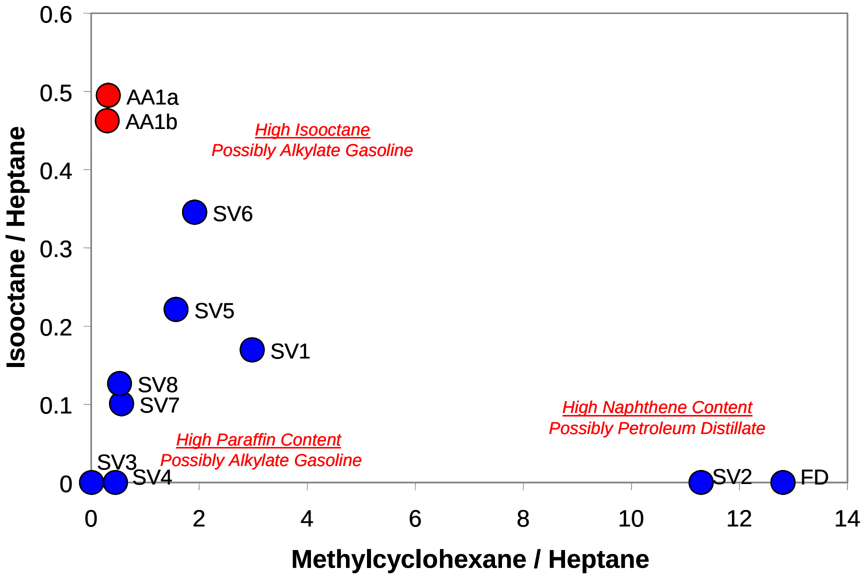


d. Samples with Likely Tar Vapor.



# Figure 3. Ratio Plots (cont'd).

e. Character of Petroleum Vapors.



# ELECTRONIC ATTACHMENTS
(Data CD)

# MANUFACTURED GAS PLANT
# SITE SCREENING REPORT
# MCMASTER STREET SITE
# AUBURN, NEW YORK

**PREPARED FOR:**

**NEW YORK STATE ELECTRIC AND GAS**

**NYSEG**

**PREPARED BY:**

**ATLANTIC ENVIRONMENTAL SERVICES, INC.**
**188 Norwich Avenue**
**Colchester, Connecticut 06415**

**ATLANTIC PROJECT NO.: 1284-02-22**

**SEPTEMBER 1991**

# MANUFACTURED GAS PLANT
# SITE SCREENING REPORT
# MCMASTER STREET SITE
# AUBURN, NEW YORK

**PREPARED FOR:**

NEW YORK STATE ELECTRIC AND GAS
4500 Vestal Parkway, East
Binghamton, New York 13903

**PREPARED BY:**

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188 Norwich Avenue
Colchester, Connecticut 06415

**ATLANTIC PROJECT NO.: 1284-02-22**

**SEPTEMBER 1991**

**PROJECT MANAGER:**
Dennis Unites
Dennis Unites, P.G.

**REVIEWED BY:**
Paul Burgess
Paul Burgess, Project Engineer

PAUL LEWIS BURGESS
# 067038

**PREPARED BY:**
Anna Sullivan
Anna Sullivan, Hydrogeologist

Anna Sullivan for
Peter Georgetti - Civil Engineer

# NEW YORK STATE ELECTRIC & GAS CORPORATION
# MANUFACTURED GAS PLANT SITE INVESTIGATION
# MCMASTER STREET SITE

---

**NYSEG Auburn Office:**
73 Wright Avenue
Auburn, NY 13021

**Project Coordinators:**
J.C. Hylind - Corporate
A. Kruppenbacher - Area Contact

## Site Location Section

**Site Address:** Tax Map #115.52, Block #1, Parcel 3; McMaster Street, Auburn; Cayuga County, NY

**Site Description:** The site is bordered by the Owasco Lake Outlet to the north, a railroad right-of-way to the east and south, and a gravel lot and Gibraltar Energy Manufacturing to the west.

**Property Owners/Land Use:** Property owned by Frank Rizzo and unknown (Parcel A). Currently occupied by Austin Collision Shop.

## Site History-Operations Section

**Years of Operation:** 1869-1904 (approx.); most structures were demolished by 1940.

**Predecessor Companies:**
1869-1901, Auburn Gas Light Co.
1901-1911, Auburn Gas Co.
1911-1936, Empire Gas & Electric
1936-1982, New York State Electric & Gas Corp.

**Operations Summary:** Produced coal gas by coal carbonization. Annual gas production was 35,000,000 cf in 1889 and 30,000,000 cf in 1899.

## Site History-Environmental Investigations Section

**Contractors Retained:** 1990-Present-
Atlantic Environmental Services, Inc.
Colchester, Connecticut (203) 537-0751
Contact: Dennis Unites

**Work Activities to Date:**
Historical research
Site reconnaissance
Surface soil sampling and analysis
Streambed sediment sampling and analysis
Surface water sampling and analysis

## Findings Section

**Materials Present:**
Semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs) (some are considered carcinogenic)
Cyanide compounds
Metals, including arsenic, mercury, nickel, calcium, beryllium, chromium, iron and cadmium

**Location of Materials:**
PAHs and metals found in streambed sediments and surface soils.
Cyanide compounds detected in one surface soil sample.

## General Conclusions

Slightly elevated levels of polycyclic aromatic hydrocarbons and metals, were detected at the McMaster Street Site. These concentrations may be attributable to MGP residues or to current or past land use in the site vicinity. No risk assessment can be developed without further study, including subsurface investigations and ground water quality analysis.

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Appendix D: S.Y. Kim Land Surveyor, P.C. Field Data
Appendix E: Health and Safety Plan
Appendix F: Quality Assurance/Quality Control Document
Appendix G: Atlantic Environmental Services, Inc. Technical Procedures
Appendix H: Laboratory Analyses

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# EXECUTIVE SUMMARY

The purpose of this program is to prioritize a number of former manufactured gas plant (MGP) sites for New York State Electric and Gas Corporation (NYSEG). The site evaluated in this report is the McMaster Street former MGP site in Auburn, New York. The intent of the program is to determine if there is any imminent threat to human health or the environment at this site and to establish a relative ranking of sites. The Site Screening and Priority Setting System (SSPS) developed by the Electric Power Research Institute (EPRI) specifically for use with MGP sites was used to prioritize the NYSEG sites.

MGPs were the primary source of producing combustible gas for heating, cooking and illumination at 1,500 to 2,500 sites in the United States between 1816 and the 1950s. Gas was manufactured from coke, coal and oil and had certain by-products and residues associated with the processes. Coal tar was one of the by-products associated with the coal carbonization method of gas production at the McMaster Street Site. The McMaster Street MGP was established circa 1869 and produced coal gas by coal carbonization until 1904.

The general approach used to investigate MGP residues at the McMaster Street Site was to identify routes of exposure which may result in direct contact with MGP residues and to chemically characterize the media associated with the exposure routes to evaluate potential health risks. The SSPS calculates indicators of actual and perceived risks for each site evaluated. The actual risk is determined from surface water, ground water, air, and direct contact exposure routes. It predicts an estimate of the imminent threat at the site based on available data. The perceived risk reflects economic risks, public image impacts, and similar effects on the previously identified exposure routes. The perceived risk score focuses on the single pathway of greatest risk.

The SSPS scores evaluate several site characteristics which include site size and current land use, waste containment efforts, nearby ground water and surface water use, soil and hydrological conditions, precipitation, chemical characteristics, and potential receptors. Site surveys, historical data, state and federal publications as well as a field sampling and analysis program provided the information needed to complete the SSPS analysis. The media sampled at the McMaster Street Site in Auburn, New York included surface water, streambed sediments and surficial soils.

Analyses performed on the surface water samples did not detect any residues associated with MGP processes in the Owasco Lake Outlet bordering the McMaster Street Site.

All of the streambed sediment samples (upstream SE-1, along site SE-2, and downstream SE-3), had elevated levels of several metals when compared to background levels of metals in surficial materials in the Auburn area as described by Shacklette and Boerngen (1984). Arsenic, calcium, beryllium, chromium, and iron showed slight increases from upstream to downstream samples, which could result from a variety of sources; the specific source is unknown (complete analytical results are tabulated in Appendix H). All of the streambed sediment samples (SE-1, SE-2, and SE-3) contained carcinogenic polycyclic aromatic hydrocarbons (C-PAHs) at total concentrations of 2.08 parts per million (ppm), 12.6 ppm and 3.87 ppm, respectively (total concentrations include estimated (J) values). Other non-carcinogenic polycyclic aromatic hydrocarbons (PAHs) were detected in streambed sediment samples SE-1, SE-2, and SE-3 at levels of 3.51 ppm, 18.22 ppm and 11.04 ppm, respectively (total concentrations include estimated (J) values). Bis(2-ethylhexyl)phthalate, dibenzofuran and 2-methylnaphthalene (SVOCs) were detected in SE-3 at concentrations of 0.26 ppm, 0.15 ppm and 0.12 ppm, respectively. Bis-(2-ethylhexyl)phthalate is ubiquitous in the environment. Cyanide was analyzed for but was not detected in any of the streambed sediment samples. The PAH and C-PAH concentrations detected in the along-site sediment sample (SE-2) are slightly greater than the maximum C-PAH concentration (13.2 ppm) detected in typical coastal and estuarine sediments (Menzie, et al., 1991). The levels of PAHs and C-PAHs detected in the upstream and downstream sediment samples are less than the maximum C-PAH concentration detected in typical coastal and estuarine sediments (Menzie, et al., 1991). The C-PAHs, PAHs, dibenzofuran, and 2-methylnaphthalene may be related to former MGP residues, current/former land use practices, or current/former adjacent land use practices.

All of the surface soil samples (SS-1, SS-2, SS-3 and SS-4) contained C-PAHs at total concentrations of 4.87 ppm, 149.60 ppm, 5.45 ppm and 2.49 ppm, respectively (total concentrations include estimated (J) values). PAHs (non-carcinogenic) were detected at 4.27 ppm, 117.90 ppm, 6.37 ppm and 2.05 ppm in SS-1, SS-2, SS-3 and SS-4, respectively (total concentrations include estimated (J) values). All of the detected concentrations of C-PAHs, except at sample location SS-2, are similar to the upper range of typical urban background occurrences of C-PAHs (Menzie, et al., 1991). A small quantity of 2-methylnaphthalene (SVOC) was detected in sample SS-1. Samples SS-1, SS-2, and SS-3 contained 0.42 ppm, 600.00 ppm, and 0.24 ppm bis(2-ethylhexyl)phthalate (SVOC), respectively. The high concentration of bis(2-ethylhexyl)phthalate detected in sample SS-2 may be associated with plasticizers. Concentrations of arsenic, cadmium, chromium, mercury, and nickel were noted to be higher than background concentrations of metals in the Auburn area as described by Shacklette and Boerngen (1984). Cyanide was detected in surface soil sample SS-2 at a concentration of 9.6 ppm. The C-PAHs, PAHs, and 2-methylnaphthalene, and cyanide may be related to former MGP residues, current/former land use or adjacent land use practices. The elevated levels of metals in the surface soils could have originated from several sources and do not necessarily indicate association with MGP residues. Soil samples were collected to assess former MGP residues and were not taken in visually stained areas where contamination could be directly attributed to current land use activities at the McMaster Street Site.

The McMaster Street Site in Auburn, New York received actual and perceived risk scores of 23.3 and 29.7, respectively. The SSPS scores reflect the assumption that subsurface MGP residues exist at the McMaster Street Site, although no subsurface investigations were conducted. The answers to and assumptions used to answer specific SSPS questions in order to ensure consistency between sites are detailed in Appendix A. The breakdown of exposure route and individual question scores also are listed in Appendix A.

The major route of exposure to MGP residues at the McMaster Street Site, based on available data, was identified as direct contact with surficial soils. Streambed sediments and surficial soils at the McMaster Street Site contained PAHs and C-PAHs which can be associated with MGP operations, as well as combustion by-products and/or fuel oils. Only one sample contained cyanide at relatively low concentrations. Cyanides at MGP sites are associated with purifier residue and are complex cyanides which are stable under normal environmental conditions. Due to the history of site use, it is very difficult to discriminate the source of the surface soil contamination.

The SSPS scores reflect the detection of PAHs, C-PAHs, and cyanide in surficial soils and streambed sediments. However, the residues detected at the McMaster Street Site may be attributable to the current practices at the site, which include auto body repair, or the adjacent Gibraltar Energy Manufacturing. Other possible contributors include former site occupants Shoemaker Coal and F. Rizzo Construction and former adjacent occupants Auburn Iron Works, C.W. Tuttle and Company Rolling Mill, City Fuel Company, and Auburn Tank Manufacturing Company. Urban runoff may also have contributed to the compounds detected in the stream adjacent to the McMaster Street Site. The areas of the site from which these samples were collected are not restricted from public access due to the nature of the current land use.

It is recommended that additional sampling and further investigation be performed at the McMaster Street Site to determine the source of contamination. Present and past site occupants, adjacent site occupants, and any other possible contributors should be taken into consideration when evaluating laboratory analyses and possible sources. In the future, if changes in land use at the McMaster Street Site are proposed, including excavation or construction, a focused site investigation should be conducted prior to any development action. These investigations might include ground water and subsurface soil studies focusing in areas where former MGP structures existed, and where contaminants were detected during the site screening evaluation.

## 1.0 INTRODUCTION

Combustible gas for heating, cooking, and illumination was manufactured from coke, coal, and oil at 1,500 to 2,500 sites in the United States between 1816 and the 1950s. Manufactured gas was the major gas fuel available during this period for the majority of the country. During the 1940s and 1950s, the manufactured gas industry encountered severe competition from natural gas. Natural gas was being made more readily available through interstate pipelines, was less expensive and had a higher Btu content than manufactured gas. Natural gas became the major base fuel. Eventually manufactured gas processes were phased out and the plants were decommissioned.

The three major processes used to manufacture gas were coal carbonization, carburetted water gas and oil gas. In the coal carbonization process, bituminous coal was heated in a sealed chamber causing the distillation of gas from coal and the formation of coke. Carburetted water gas, containing hydrogen and carbon monoxide, was produced by passing steam through a bed of incandescent coke (or coal). The resultant "blue gas" was then passed through two chambers containing hot firebrick in which oil was sprayed and the oil cracked into gaseous hydrocarbons and tar. The oil gas process cracked oil alone into gaseous hydrocarbons, tar, and carbon. The carburetted water gas and the oil gas processes used a variety of oil-based feedstocks such as naphtha, gas oil, fuel oil, and residual oils.

The three processes produced similar by-products however, important differences exist which affect the current character and toxicity of the wastes. Tars produced during coal carbonization were high in phenols and base neutral organics. Tars produced by carburetted water gas and oil gas processes contain lower amounts of these compounds. Substantial amounts of cyanide and ammonia were produced by coal carbonization but only trace amounts of cyanide were produced during carburetted water gas and oil gas processes.

A number of former MGP sites, operated by NYSEG or its predecessor companies, have been investigated for potential risk to human health and/or the environment. If residues of the MGP remain at the sites, they may pose health risks to the surrounding populations and the environment. The sites were screened for size, current use, waste containment, nearby ground water and surface water use, soil and hydrological conditions, rainfall, chemical characteristics, and potential receptors. The information gathered through the screening effort was entered in the SSPS program in order to assign risk-based priorities among sites. The goal of the screening is to identify and prioritize former MGP sites that may then require further investigation.

During the priority setting, no attempt was made to determine the ultimate level of site remediation which might be required. Site prioritization was conducted in order to enable NYSEG to develop plans of action and resource allocation so that any potential risks posed by these sites can be adequately addressed.

## 2.0 METHODOLOGY

The SSPS (Site Screening and Priority Setting System) is a menu-driven program designed for IBM-compatible PCs. The Electric Power Research Institute (EPRI) developed SSPS to help utilities manage former MGP sites, but it is a general tool that can be applied efficiently to many types of sites. The SSPS assigns scores to individual site characteristics. The individual scores are used to calculate risks associated with four potential routes of exposure, namely surface water, ground water, direct contact and air. The scores are combined to produce final scores which are indicators of actual risk and perceived risk at each site.

The SSPS is simple to use and requires information that is relatively straightforward to obtain. It can screen and rank a large number of MGP sites for further investigation and analysis. It has been tested with a number of MGP sites where complete risk analyses have been conducted and has produced reliable rankings with a strong correlation between the SSPS risk scores and the results of the remedial investigation risk analyses. The system does not attempt to determine the ultimate level of site remediation.

The SSPS requires information regarding the site and the surrounding areas including site size and current use, waste containment efforts, nearby ground water and surface water use, soil and hydrological conditions, rainfall, chemical characteristics, and potential receptors. Initial site surveys were conducted at the NYSEG Western Area and North Central Area sites on October 23 and 24, 1990. During these surveys, information regarding site size, current use, surface water use, general soil conditions, waste containment, and potential receptors was recorded. Historical data, U.S. Geological Survey (USGS), New York State Department of Environmental Conservation (NYSDEC), Department of Health (DOH), National Oceanic Atmospheric Administration (NOAA), and Soil Conservation Service (SCS) files and publications provided insights to nearby ground water and surface water use, soil and hydrological conditions, rainfall, and waste containment.

The sampling program consisted of surface soil, surface water, and streambed sediment samples collected on November 28, 1990. These media sampling points were chosen to assess the chemical concentration at the potential exposure pathways that are present at the site. No wells for ground water sampling exist at the site. Subsurface investigations were not conducted as part of the site evaluation. The potential effects of MGP residues on ground water and subsurface soils at the site were estimated for purposes of completing the SSPS forms. The quantities of potential MGP residues in the subsurface at the McMaster Street Site were estimated by applying the geometric mean concentration of residues associated with MGPs to a percentage of the average annual volume of tar produced during the operational years of the plant. The geometric mean concentrations of residues associated with MGPs were derived from the GRI-EPRI data base compiled by Atlantic Environmental Services, Inc. The percentage of tar produced was estimated from the Radian Report. The quantities of potential MGP residues in the subsurface at the McMaster Street Site and the methods used to derive them are listed in Appendix A, questions 18 and 23.

## 3.0 SCOPE OF WORK

The following sections describe the information gathered concerning site history, current land use, physiography, hydrogeology, ground water and surface water use, sensitive habitats, and field activities relating to the McMaster Street Site evaluation.

### 3.1 Site History

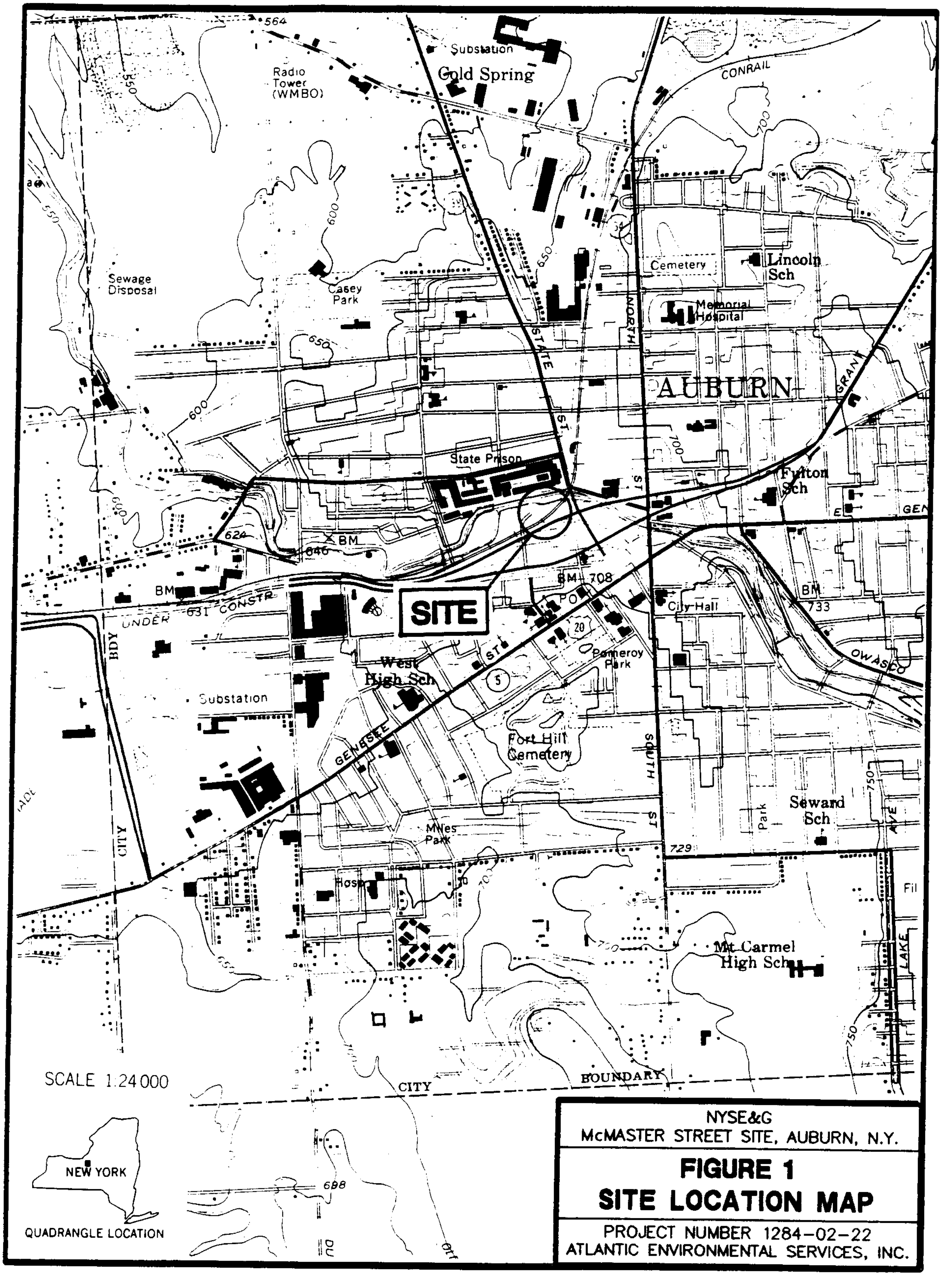
The McMaster Street Site is the location of the former McMaster Street MGP located in Auburn, New York. The following site history is summarized on a Fact Sheet following the Title Page of this report. The McMaster Street Site acquisition, organization, history, and available historical maps (Figures B-1 through B-4), which were researched and compiled by NYSEG, are included in Appendix B.

The site location is indicated on the Auburn, New York USGS Quadrangle map (Figure 1). The McMaster Street MGP, first operated by Auburn Gas Light Company in 1869, provided coal gas by coal carbonization, according to records provided by NYSEG. The Auburn Gas Company acquired the Auburn Gas Light Company in 1901 and continued gas production until 1904. Figure 2 illustrates the existence and configuration of structures at the McMaster Street Site from 1886 to 1982. The 1886 Sanborn Map (Figure B-1) illustrates the plant configuration, which consisted of coal sheds adjacent to the rail lines, a retort (furnace) building next to the Owasco Lake Outlet, a purifier building/meter house and a gas holder. The Auburn Iron Works was located immediately southwest of the site. The site configuration remained essentially unchanged throughout the operational life of the plant, according to the 1898 and 1904 Sanborn Maps (Figures B-2 and B-3). However, the adjacent Auburn Iron Works became the C.W. Tuttle and Company Rolling Mill in 1904 and in 1941 was the site of City Fuel, according to Sanborn Maps (Figures B-3 and B-4). Gas production was 35,000,000 cubic feet in 1889 and 30,000,000 cubic feet in 1899 (Radian Corporation, Unpublished). The plant ceased operations in 1904 when gas manufacturing was shifted to the Clark Street MGP, which was located 1/2 mile (0.8 km) to the west (downstream) of the McMaster Street Site. The Auburn Gas Company was acquired by the Empire Gas and Electric Company circa 1911, which in turn was acquired by NYSEG in 1936. According to NYSEG records, the gas plant was demolished prior to 1940 as illustrated on the 1941 Sanborn Map (Figure B-4), when the property was occupied by the Shoemaker Coal Company. According to NYSEG records, the property owners in 1982 included Auburn Tank Manufacturing Company, F. Rizzo Construction Company, and an unknown owner (Parcel A).

### 3.2 Site Reconnaissance

#### 3.2.1 Current Use

The McMaster Street Site is located in a mixed commercial/residential area in the downtown section of Auburn, New York (Figure 1). The closest residence is greater than 300 feet (100 meters) from the site. The site is roughly triangular in shape and is bordered by the Owasco Lake Outlet to the north, a railroad right-of-way to the east and south, and a gravel lot and Gibraltar Energy Manufacturing to the west. The New York State Prison is located across the river to the north. The Green Street former gas holder, which served as a gas distribution holder for the McMaster Street MGP and possibly for the Clark Street MGP, is located to the south, across Routes 5 and 20. An adjacent land use map is provided as Figure 3.



NYSE&G
McMASTER STREET SITE, AUBURN, N.Y.

**FIGURE 1**
**SITE LOCATION MAP**

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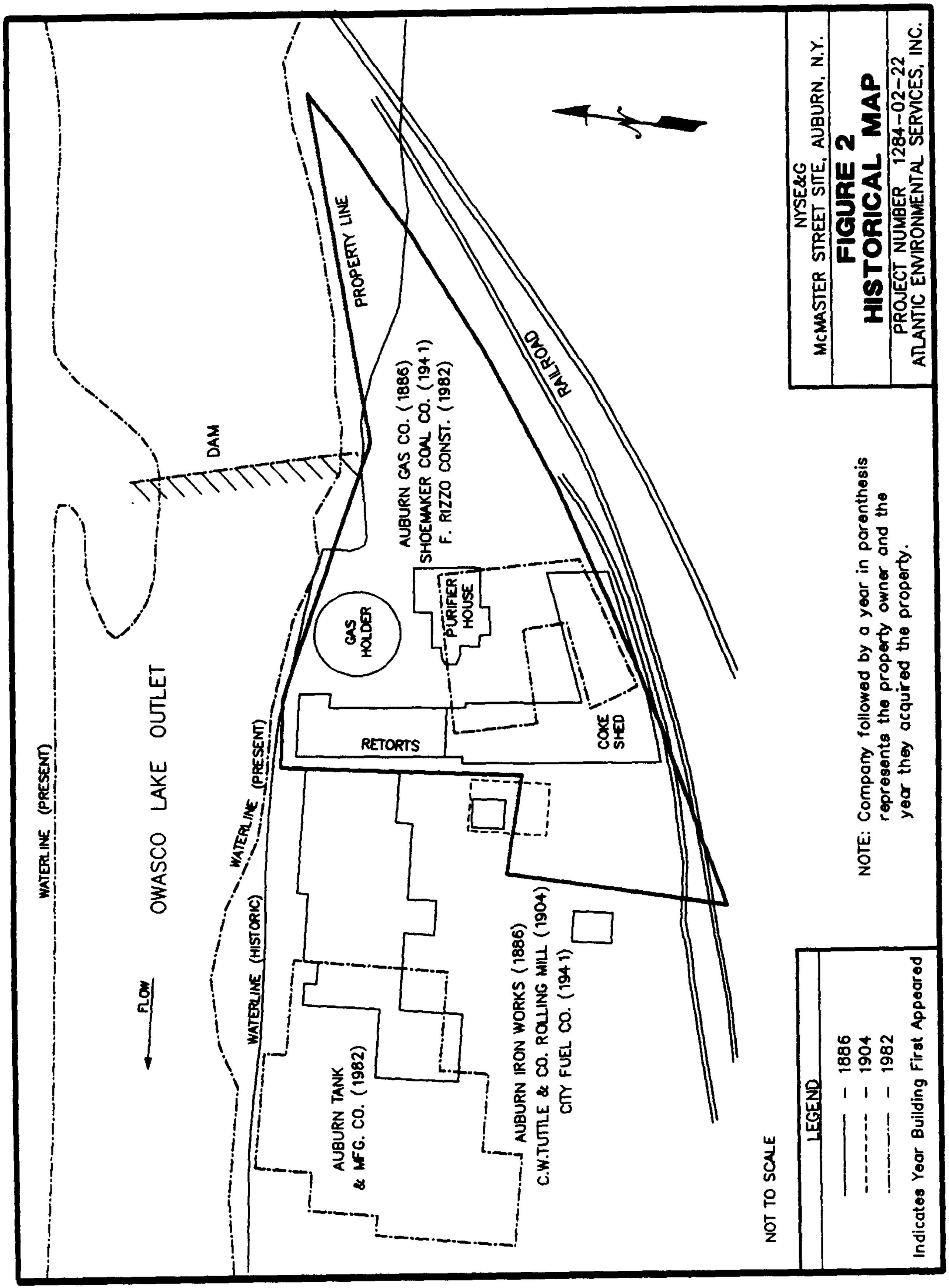

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**FIGURE 2**
**HISTORICAL MAP**

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NOTE: Company followed by a year in parenthesis represents the property owner and the year they acquired the property.

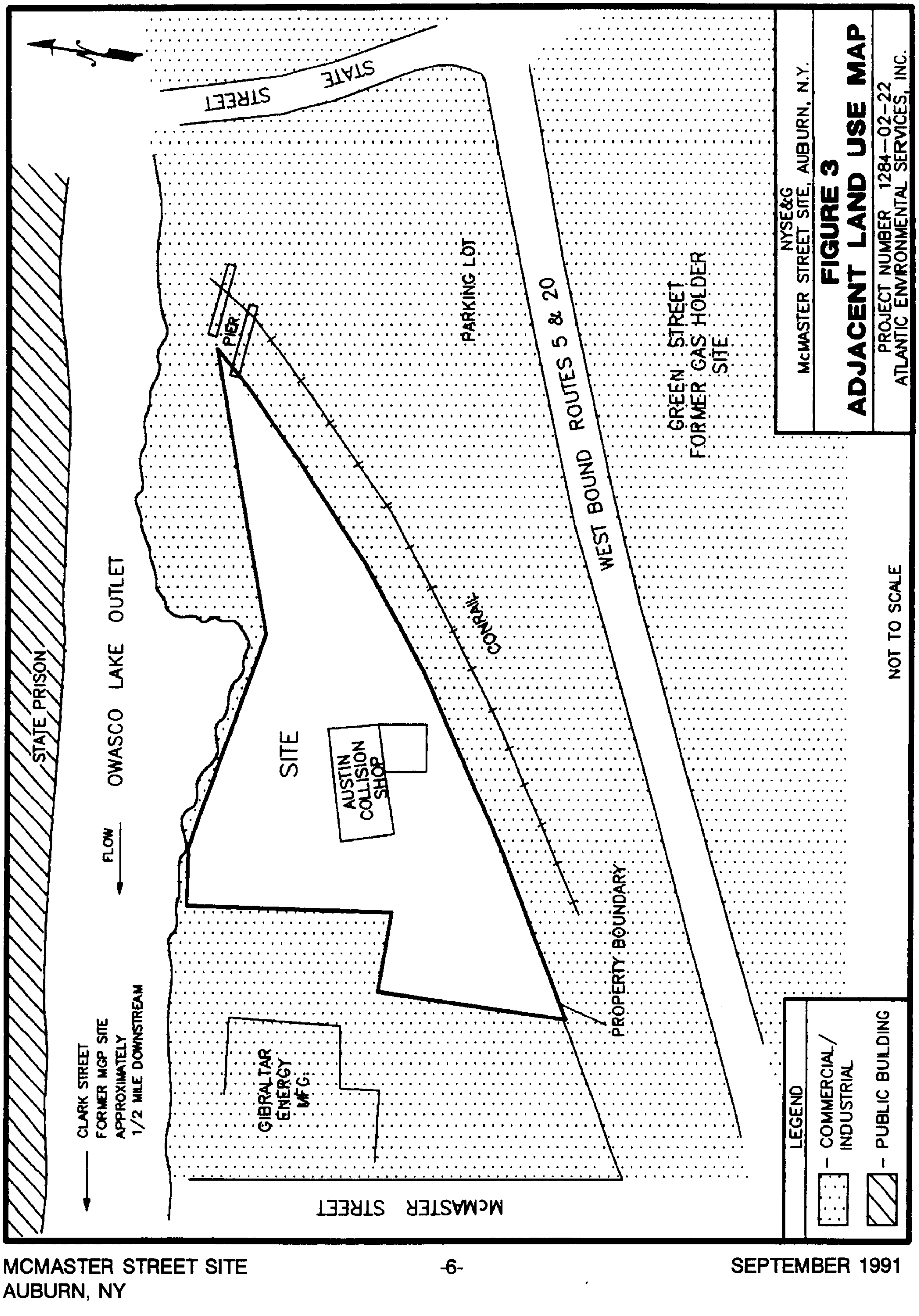

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FIGURE 3
ADJACENT LAND USE MAP

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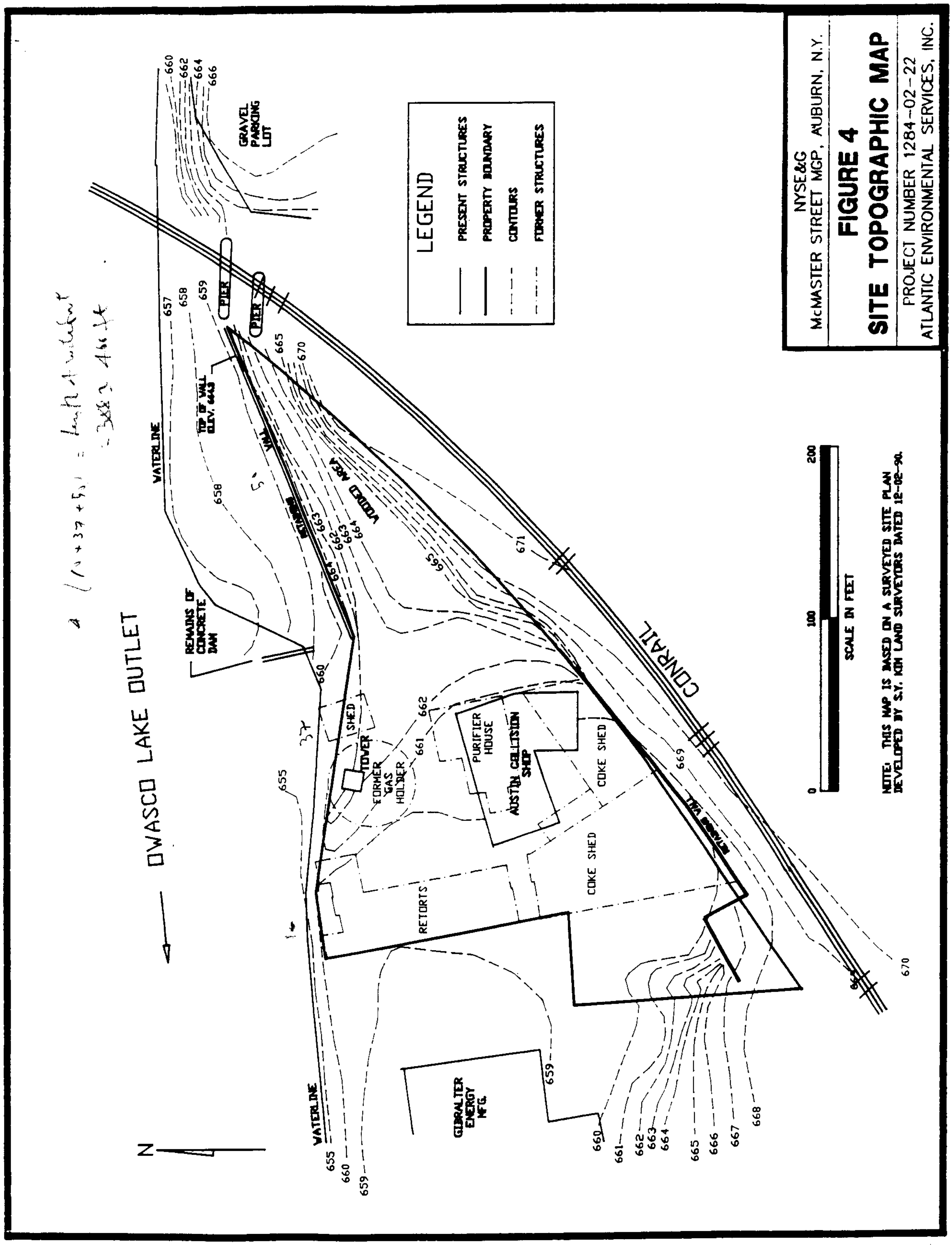
The site is presently occupied by Austin Collision, an auto body repair and painting shop, and is surrounded by open vegetated and gravel-covered land which is sporadically covered with various types of debris. A large pile of PVC and corrugated plastic pipes and rusted metal scraps exists west of and adjacent to the steel truss, electrical tower in the northwest portion of the site. Old railroad ties were stacked along the retaining wall in the southwest corner of the site. Empty drums used as construction markers by road construction crews were stacked along the southern retaining wall, east of the stacked railroad ties. The ground and gravel around the tower debris and the railroad tie debris contained oil spots, probably originating from cars previously parked in the vicinity. A few empty drums, cement blocks, and wood pallets were observed in the wooded area in the eastern part of the site. The former contents of the drums is unknown. One broken-down piece of construction equipment is located in the vegetated area in the eastern part of the site. Brick rubble and asphalt were dumped along the bank just west of the former dam. No odors, purifier wastes or tars associated with MGP operations were observed on the ground or in the surface water at the site. No tar seeps were observed along the Owasco Lake Outlet streambed, however, large boulders inhibited observations west of the former dam. Public access to the site is not restricted. Evidence of public usage was observed along the piers and the railroad tracks along the eastern border of the site and along the flood plain north of the site and east of the former dam. Austin Collision and Gibraltar Energy personnel work onsite. It is not a likely gathering place for children due to its industrial use. The site is separated from the prison wall bordering the north side of the McMaster Street Site by the Owasco Lake Outlet. Xerox copies of aerial photos of the McMaster Street Site are included in the field data section of this report (Appendix C).

### 3.2.2 Physiography

The McMaster Street Site was surveyed by S.Y. Kim Land Surveyors, P.C., Latham, New York. Figure 4 is a reduced topographic map of the site. The McMaster Street Site base map is included in the pocket at the end of this report. Surveyor field notes are located in Appendix D.

The McMaster Street Site ranges in elevation from 670 feet above mean sea level (MSL) along the southern boundary to approximately 660 feet MSL along the northern boundary. The eastern part of the site slopes more steeply towards the Owasco Lake Outlet than the western part of the site. There is a two-foot increase in elevation within 10 feet of the northern retaining wall in the eastern part of the site. There is a minimum five-foot drop in elevation from the retaining wall along the eastern half of the northern site boundary to the floodplain bordering the Owasco Lake Outlet below.

The maximum 24 hour rainfall recorded in Skaneateles (approximately six miles northeast of Auburn) in 1989 was 2.6 inches (Hadlen, 1989). Rainfall data for Auburn is incomplete for 1989. Surface water runoff from the McMaster Street Site flows unrestricted to the Owasco Lake Outlet in the western half of the site. The retaining wall and the two-foot increase in elevation along the southern side of the northern retaining wall in the eastern part of the site restricts surface water runoff from the eastern portion of the site. Ponding of rainwater was observed in the area behind the collision shop during the initial site survey on October 23, 1990. Precipitation infiltration is restricted by relatively impermeable surficial soils and by the fill covering emplaced at the site, however, ponding creates the potential for infiltration. The wind speed at the site can be greater than 4 meters per second, however the vegetative cover reduces airborne dust particles.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McMASTER STREET MGP, AUBURN, N.Y.

FIGURE 4

SITE TOPOGRAPHIC MAP

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NOTE: THIS MAP IS BASED ON A SURVEYED SITE PLAN DEVELOPED BY S.Y. KIM LAND SURVEYORS DATED 12-02-90.

≃ 0.4 - 1.25 ft/day

### 3.2.3 Hydrogeology

Preliminary geologic and hydrogeologic information on the McMaster Street Site has been obtained from Hutton (1971). The soils at the McMaster Street Site are mapped as fill and disturbed soils within the industrial area occupying the valley along the Owasco Lake Outlet in central Auburn. The existence of fill was verified during the surface soil sampling. According to Hutton, the closest undisturbed soils are mapped as the Cazenovia Silt Loam, a moderately well drained to well drained soil derived from reddish till with high lime content. These soils were probably present at the site during MGP operations and are characterized by a moderately fine texture and typically contain twenty-eight to thirty-five percent (28-35%) clay. The permeability of the soils are reported to range from 0.20 to 0.63 inches per hour ($1.4^{-4}$ to $4.4^{-4}$ centimeters per second). The soils are typically thin, with bedrock present within ten feet of the surface. The bedrock underlying the site is the Onondaga Limestone.

The depth to shallow ground water at the site is unknown. The Owasco Lake Outlet is approximately six feet (at an elevation of 656 feet MSL) below the average elevation of the site (662 feet MSL). Shallow unconfined ground water probably discharges to the Owasco Lake Outlet, indicating that the depth to shallow ground water at the site is within 6 feet of the surface. MGP structures, mainly gas holders, were commonly constructed below grade and are assumed to be at least within 3 feet (1 meter) of the shallow aquifer at the site. Information on other aquifers in the site vicinity is unknown.

### 3.2.4 Ground Water and Surface Water Use

The McMaster Street Site in Auburn, New York is bordered by the Owasco Lake Outlet. NYSDEC has classified the Owasco Lake Outlet as a Class D surface water body. According to NYSDEC Water Quality Rules and Regulations, Class D surface waters are suitable for fishing and for primary and secondary contact recreation. Water is not withdrawn from the Owasco Lake Outlet for potable use. The City of Auburn receives its potable water supply from Owasco Lake. The City intake is approximately 3.5 miles (5.6 km) upstream of the McMaster Street Site. The water supply system served approximately 32,550 people in the early 1980s (Axelrod, 1984).

There is a city ordinance in Auburn which forbids homeowners to drill wells on their properties. USGS well records indicate that four domestic wells are located within 3.11 miles (5 km) of the site. It is unknown if the wells are currently in use. According to Ted Medrek (Cayuga County DOH employee of 20 years) there are no wells which are used in the Auburn City area.

### 3.2.5 Sensitive Habitats

One federally regulated wetland is located within 2.5 miles (4 km) of the site (NYSDEC Fish and Wildlife Branch Wetland Maps). No endangered species are known to exist within 2 miles (3.2 km) of the McMaster Street Site (NYSDEC Natural Heritage Files and Maps).

## 3.3 Field Activities

Prior to the performance of any field activities, a work plan, quality assurance/quality control document and health and safety plan were submitted to and approved by NYSEG. The Health and Safety Plan and the Quality Assurance/Quality Control Document are included in Appendices E and F, respectively.

The general approach used to investigate MGP residues at the McMaster Street Site was to identify routes of exposure which may result in direct contact with MGP residues and to chemically characterize the media associated with the exposure routes to evaluate potential health risks associated with the site.

Exposure routes with the potential for direct contact identified at the McMaster Street Site include:

- dermal contact/incidental ingestion of surface soils potentially contaminated by tars, fuel oil, coal pile leachate or purifier residues; and
- dermal contact/incidental ingestion of surface water and sediments in the Owasco Lake Outlet potentially contaminated by runoff or direct discharge.

Surface water, streambed sediment, and surface soils were sampled at the site. No wells for ground water sampling are present at the site. Subsurface investigations were not conducted as part of this study. The potential effects of MGP residues on ground water and subsurface soils at the site were estimated using geometric mean concentrations of selected parameters commonly found in the subsurface at MGP sites and the average annual volume of gas produced at the McMaster Street MGP for purposes of completing the SSPS forms (see Appendix A, question 18 and 23 for details). Sample locations and rationale are presented in Table 1.

### 3.3.1 Surface Water and Streambed Sediment Samples

A total of three (3) surface water samples were collected from the Owasco Lake Outlet at the McMaster Street Site on November 28, 1990. Sampling locations are indicated on Figure 5. Surface water samples were obtained from upstream (SW-1, between the railroad bridge and the State Street bridge), mid-site (SW-2, along the former dam), and downstream (SW-3, by the ramp between Austin Collision Shop and Gibraltar Energy Manufacturing) locations. These locations were selected to evaluate the changes in water quality potentially attributable to ground water discharge or surface water runoff from the McMaster Street Site into the Owasco Lake Outlet. Surface water samples were collected according to Atlantic Procedure 1022 (Appendix G).

Surface water samples were analyzed for volatile organic compounds (VOCs) using EPA Method 624, semi-volatile organic compounds (SVOCs) using EPA Method 625, metals using EPA Method 200.7, lead using EPA Method 7191, chromium using EPA Method 7421, and cyanide using EPA Method 335.

A total of three (3) streambed sediment samples were collected from the Owasco Lake Outlet on November 28, 1990. Downstream SE-3 and along site sample SE-2 locations are coincident with the surface water sample locations, while upstream sample SE-1 is located 50 feet west (downstream) of surface water sample SW-1, due to the lack of sediment near SW-1 (see Figure 5). Sediment samples were collected in accordance with Atlantic Procedure No. 1022 (Appendix G).

Sediment samples were analyzed for VOCs using EPA Method 8240, SVOCs using EPA Method 8270, metals using EPA Method 6010, lead using EPA Method 7191, chromium using EPA Method 7421, and cyanide using EPA Method 9010.

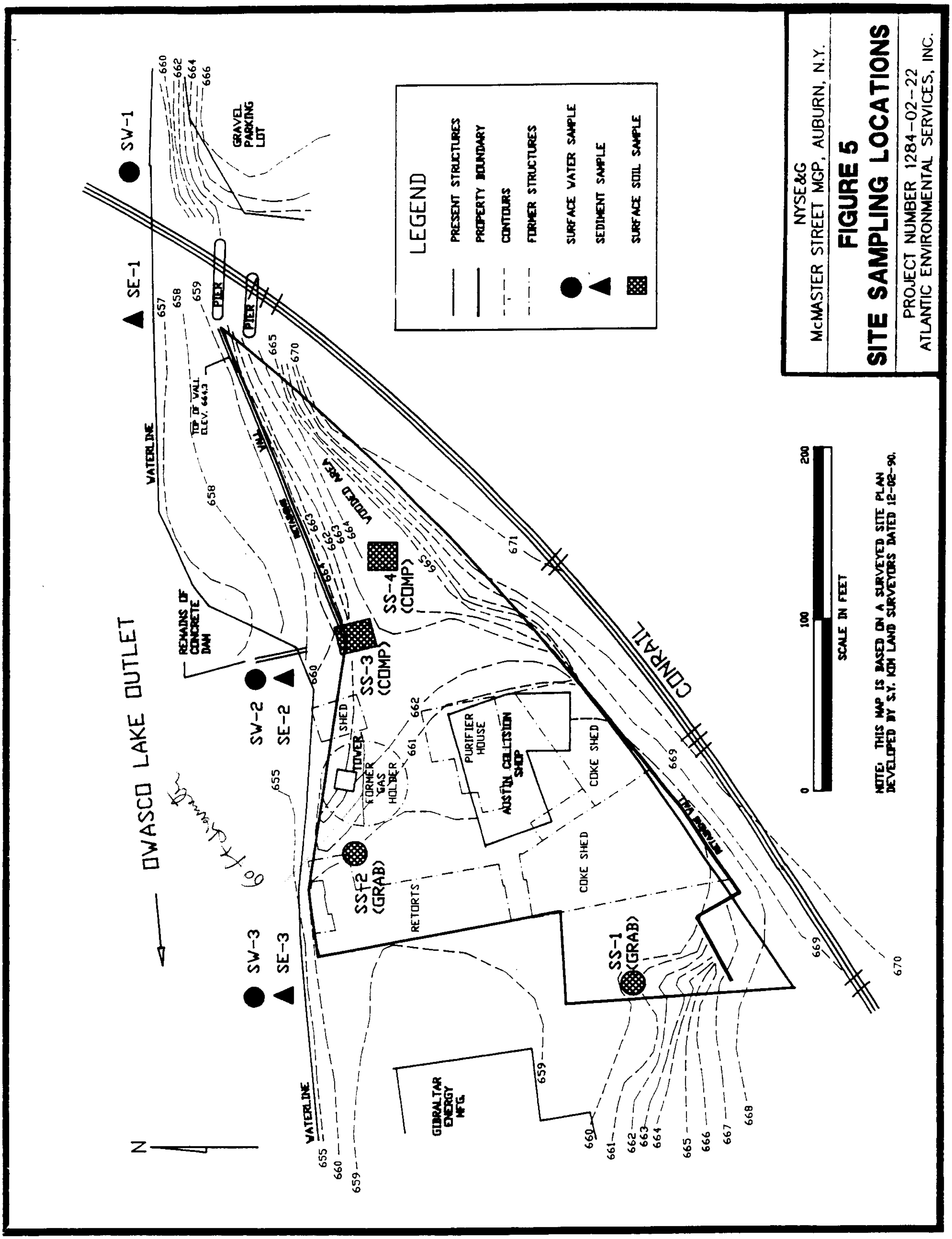
## TABLE 1

## SAMPLING LOCATIONS AND RATIONALE AT THE MCMASTER STREET SITE, AUBURN, NEW YORK

| SAMPLE ID | LOCATION AND RATIONALE | | ANALYSES |
|---|---|---|---|
| ***SURFACE WATER*** | | | |
| SW-1 | Upstream | To evaluate potential changes in surface water quality which may be attributable to the discharge of ground water or runoff of surface water from the McMaster Street Site into the Owasco Lake Outlet. | VOCs-EPA Method 624<br>SVOCs-EPA Method 625<br>Metals-EPA Method 200.7<br>Lead-EPA Method 7191<br>Chromium-EPA Method 7421<br>Cyanide-EPA Method 335 |
| SW-2 | Mid-site | | |
| SW-3 | Downstream | | |
| ***STREAMBED SEDIMENT*** | | | |
| SE-1 | Upstream | To evaluate potential changes in streambed sediment quality which may be attributable to the discharge of ground water or runoff of surface water from the McMaster Street Site into the Owasco Lake Outlet. | VOCs-EPA Method 8240<br>SVOCs-EPA Method 8270<br>Metals-EPA Method 6010<br>Lead-EPA Method 7191<br>Chromium-EPA Method 7421<br>Cyanide-EPA Method 9010 |
| SE-2 | Mid-site | | |
| SE-3 | Downstream | | |
| ***SURFACE SOILS*** | | | |
| SS-1 | West of the former coke shed area to evaluate potential contamination from potential spills or the coke sheds. | | VOCs-EPA Method 8240<br>SVOCs-EPA Method 8270<br>Metals-EPA Method 6010<br>Lead-EPA Method 7191<br>Chromium-EPA Method 7421<br>Cyanide-EPA Method 9010 |
| SS-2 | West and downgradient of the former holder to evaluate potential contamination from former holder contents. | | |
| SS-3 | East of the former gas plant where debris was observed to evaluate potential contamination from former MGP disposal practices. | | |
| SS-4 | Behind the former gas plant buildings where debris was observed to evaluate potential contamination from former MGP disposal practices. | | |

### 3.3.2 Surface Soil Samples

A total of four (4) surface soil samples were collected at the McMaster Street Site on November 28, 1990. Sampling locations are illustrated on the sampling locations map (Figure 5). Surface soils were collected from 0.0 to 0.5 foot depth using dedicated stainless steel sampling spoons. Surface soil samples SS-1 and SS-2 were grab samples. These sample areas could not be gridded due to the abundance of debris in the sample area. Surface soil samples SS-3 and SS-4 are composite samples. These sample areas were not gridded due to scattered debris and dense vegetation. Representative locations were chosen within each sample area. Sample areas are detailed in the field data section, Appendix C of this report. Sample collection procedures are outlined in Atlantic Procedure 1020 (Appendix G).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McMASTER STREET MGP, AUBURN, N.Y.

FIGURE 5

SITE SAMPLING LOCATIONS

PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.

NOTE: THIS MAP IS BASED ON A SURVEYED SITE PLAN DEVELOPED BY S.Y. KIM LAND SURVEYORS DATED 12-02-90.

Surface soil sample SS-1 was collected west of the former coke shed area. The gravel cover prevented sampling in the former coke shed area. Surface soil sample SS-2 was located west of the electrical tower, downgradient of the former gas holder. The debris pile prevented sampling over the former holder location. Surface soil sample SS-3 was taken along the bank near the former dam, east of the former purifier house. Surface soil sample SS-4 was located in the vegetated area behind the former gas plant and the current car shop. Soil samples were collected to assess former MGP residues, and were not taken in visually stained areas where contamination could be directly attributed to current practices at the McMaster Street Site.

Surface soil samples were analyzed for the same parameters, using the same EPA methods, as the streambed sediment samples.

## 4.0 ANALYTICAL RESULTS

This section summarizes the analytical results of the sampling program conducted at the McMaster Street Site in Auburn, New York. Appendix H lists the results of the analyses performed by Wadsworth/Alert Labs on the samples collected from the various media at the site.

### 4.1 Surface Water Analytical Results

No volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), or cyanides were detected in any of the surface water samples collected from the Owasco Lake Outlet at the McMaster Street Site. Elevated levels of zinc (0.032 ppm and 0.05 ppm) were detected in sediment samples SE-1 and SE-2 (duplicate) when compared to the New York State Water Quality Standards and Guidance Values (Zambrano, 1990). Zinc is not generally indicative of former MGP residues.

### 4.2 Streambed Sediment Analytical Results

The streambed sediment samples did not contain any VOCs. All of the streambed sediment samples contained carcinogenic polycyclic aromatic hydrocarbons (C-PAHs) and non-carcinogenic polycyclic aromatic hydrocarbons (PAHs) as summarized in Table 2. Complete analytical analyses from which Table 2 is derived are tabulated in Appendix H. Appendix H includes field blank and trip blank results. Sediment sample SE-1 (upstream) had a total of 3.51 ppm PAHs and 2.08 ppm C-PAHs. Sample SE-2 (adjacent to the site) contained 12.6 ppm C-PAHs and 18.22 ppm PAHs. Sample SE-3 (downstream) C-PAH concentration was 3.87 ppm and the PAH concentration was 11.04 ppm (total concentrations include estimated (J) values). Bis(2-ethylhexyl)phthalate, dibenzofuran, and 2-methylnaphthalene (SVOCs) were detected in SE-3 at concentrations of 0.26 ppm, 0.15 ppm, and 0.12 ppm, respectively. Bis(2-ethylhexyl)phthalate is ubiquitous in the environment. The C-PAHs, PAHs, dibenzofuran and 2-methylnaphthalene may be associated with former MGP operations or current/former land use and adjacent land use. All of the streambed sediment samples contained elevated levels of several metals when compared to background concentrations which are summarized in Table 2. The background concentration of each metal was derived from the background concentrations listed for the sampling location closest to Auburn, New York in Shacklette and Boerngen (1984). Cyanide was not detected in any of the streambed sediment samples collected at the McMaster Street Site.

The PAHs and C-PAHs detected in the McMaster Street Site streambed sediments showed an increase between along-site and downstream samples. The upstream sample (SE-1) contained the lowest concentration of PAHs and C-PAHs. This may be indicative of streambed contamination by the McMaster Street Site, but is not necessarily attributable to the former MGP operations. Contamination could have originated from several sources including past and current site activities, such as MGP operations, Shoemaker Coal Company, F. Rizzo Construction and Austin Collision. Other sources may include urban runoff or past and present adjacent site activities, including Auburn Iron Works, C.W. Tuttle Company Rolling Mill, City Fuel Company, Auburn Tank Manufacturing Company, and Gibraltar Energy Manufacturing (see Figures 2 and 3).

### 4.3 Surface Soil Sample Results

Surface soil analyses are summarized in Table 3. Complete analytical analyses from which Table 3 is derived are tabulated in Appendix H. All of the surface soil samples (SS-1, SS-2, SS-3 and SS-4) contained C-PAHs at total concentrations of 4.87 ppm, 149.60 ppm, 5.45 ppm and 2.49 ppm, respectively (total concentrations include estimated (J) values). PAHs were detected at 4.27 ppm,

# TABLE 2

## SEMI-VOLATILE ORGANIC AND INORGANIC COMPOUNDS DETECTED IN [redacted] AT THE MCMASTER STREET SITE, AUBURN, NEW YORK

F/P= 1,40 1,30 1,50

| ELEMENT | (CONCENTRATIONS IN PPM) SE-1 | SE-2 | SE-3 | TYPICAL BACKGROUND CONCENTRATION AT SIMILAR SITES |
|---|---|---|---|---|
| ***SEMI-VOLATILE ORGANICS*** | | | | |
| Bis(2-ethylhexyl)phthalate | -- | -- | 0.26J | |
| Dibenzofuran | -- | -- | 0.15J | |
| 2-Methylnaphthalene | -- | -- | 0.12J | |
| **NON-CARCINOGENIC PAHS** | | | | |
| Anthracene | 0.17J | 0.72J | 0.58J | |
| Fluoranthene | 1.30 | 6.90 | 4.50 | |
| Fluorene | -- | -- | 0.14J | |
| Naphthalene | 0.11J | -- | 0.12J | |
| Phenanthrene | 1.00 | 5.30 | 2.70 | |
| Pyrene | 0.93 | 5.30 | 3.00 | |
| TOTAL | 3.51 | 18.22 | 11.04 | 10.00(1) |
| **CARCINOGENIC PAHS** | | | | |
| Benzo(a)anthracene | 0.55J | 2.40J | -- | |
| Benzo(b)fluoranthene | 0.38J | 2.20J | 0.93 | |
| Benzo(k)fluoranthene | 0.32J | 1.20J | 0.89J | |
| Benzo(a)pyrene | 0.24J | 1.20J | 0.55J | |
| Chrysene | 0.59J | 2.90J | 1.50J | |
| Indeno(1,2,3-cd)pyrene | -- | 2.70J | -- | |
| TOTAL | [redacted] | [redacted] | [redacted] | 10.00(1) |
| ***INORGANICS*** | | | | **BACKGROUND CONCENTRATIONS** |
| Arsenic | 12.00 | 13.00 | 14.00 | 2.60(2) |
| Beryllium | * | * | 1.80 | <1.00(2) |
| Calcium | 94,000 | 100,000 | 110,000 | 5,200(2) |
| Chromium | * | * | 65.00 | 30.00(2) |
| Iron | * | * | 76,000 | 30,000(2) |
| Mercury | 0.15 | -- | 0.14 | 0.13(2) |
| Nickel | 35.00 | 22.00 | 89.00 | 15.00(2) |

-- None detected
* Detected, but below background concentration.
J Detected, but below quantification limit (estimated value).
(1) Level based on typical background concentrations at similar sites.
(2) Shacklette and Boerngen (1984)

# TABLE 3

## SEMI-VOLATILE ORGANIC AND INORGANIC COMPOUNDS DETECTED I[redacted] AT THE MCMASTER STREET SITE, AUBURN, NEW YORK

| | (CONCENTRATIONS IN PPM) | | | | |
|---|---|---|---|---|---|
| **ELEMENT** | **SS-1** | **SS-2** | **SS-3** | **SS-4** | **TYPICAL BACKGROUND CONCENTRATION AT SIMILAR SITES** |
| ***SEMI-VOLATILE ORGANICS*** | | | | | |
| Bis(2-ethylhexyl)phthalate | 0.42J | 600 | 0.24J | | |
| 2-Methylnaphthalene | 0.31J | – | – | | |
| **NON-CARCINOGENIC PAHS** | | | | | |
| Acenaphthene | – | – | 0.09J | – | |
| Anthracene | 0.15J | 4.90J | 0.25J | 0.09J | |
| Fluoranthene | 1.90 | 62.00 | 2.80 | 1.00 | |
| Naphthalene | 0.17J | – | 0.13J | – | |
| Phenanthrene | 0.75J | 19.00J | 1.10 | 0.35J | |
| Pyrene | 1.30 | 32.00J | 2.00 | 0.61 | |
| TOTAL | 4.27 | 117.90 | 6.37 | 2.05 | 10.00(1) |
| **CARCINOGENIC PAHS** | | | | | |
| Benzo(a)anthracene | 0.70J | 22.00J | 1.00 | 0.41J | |
| Benzo(b)fluoranthene | 0.77J | 27.00J | 1.10 | 0.35J | |
| Benzo(k)fluoranthene | 0.86 | 27.00J | 1.10 | 0.35J | |
| Benzo(g,h,i)perylene | 0.42J | 8.60 | – | 0.21J | |
| Benzo(a)pyrene | 0.46J | 20.00J | 0.79J | 0.25J | |
| Chrysene | 1.20 | 30.00J | 1.40 | 0.74J | |
| Indeno(1,2,3-cd)pyrene | 0.46J | 15.00J | 0.06J | 0.18J | |
| TOTAL | [redacted] | [redacted] | [redacted] | [redacted] | 10.00(1) |
| ***INORGANICS*** | | | | | **BACKGROUND CONCENTRATIONS** |
| Arsenic | 12.00 | 26.00 | 5.30 | 3.60 | 2.60(2) |
| Cadmium | – | 0.64 | 0.84 | – | NA |
| Calcium | 83,000 | 55,000 | 74,000 | 22,000 | 5,200(2) |
| Chromium | * | * | 78.00 | * | 30.00(2) |
| Mercury | 0.32 | 1.90 | 0.24 | 0.16 | 0.13(2) |
| Nickel | 19.00 | 15.00 | 300.00 | * | 15.00(2) |
| Cyanide | – | 9.60 | – | – | 500.00(1) |

– None detected
* Detected, but below background concentration.
J Detected, but below quantification limit (estimated value).
(1) Level based on typical background concentrations at similar sites.
(2) Shacklette and Boerngen (1984)
NA - Not available

117.90 ppm, 6.37 ppm and 2.05 ppm in SS-1, SS-2, SS-3 and SS-4, respectively (total concentrations include estimated (J) values). A small quantity (0.31 ppm) of 2-methylnaphthalene (SVOC) was detected in sample SS-1. Samples SS-1, SS-2, and SS-3 contained 0.42 ppm, 600 ppm, and 0.24 ppm bis(2-ethylhexyl)phthalate, respectively. The high concentration of bis(2-ethylhexyl)phthalate detected in sample SS-2 may be associated with plasticizers. All of the surface soil sediments contained elevated levels of the various metals shown in Table 3. The background levels of metals are derived from Shacklette and Boerngen (1984). Cyanide was detected in surface soil sample SS-2 at a concentration of 9.60 ppm.

The PAHs, C-PAHs, cyanide and 2-methylnaphthalene detected in the McMaster Street Site surficial soils may be related to former MGP residues and/or former/current site and adjacent site activities. The elevated levels of metals in the surface soils could have originated from several sources and do not necessarily indicate association with MGP residues. Bis(2-ethylhexyl)phthalate is ubiquitous in the environment, and is not associated with MGP residues. Soil samples were collected to assess former MGP residues and were not taken in visually stained areas where contamination could be directly attributed to current practices at the McMaster Street Site.

## 5.0 SCREENING RESULTS

The McMaster Street MGP produced gas using the coal carbonization gas process. Residuals commonly produced by coal carbonization were coal tar, coke, ash and clinker, purifier residues, ammoniacal liquors, and phenolic compounds. PAHs and C-PAHs which can be associated with MGP operations, combustion by-products, and/or fuel oils were detected in surficial soils and streambed sediments at the McMaster Street Site. Cyanide was detected in one surface soil sample at the McMaster Street Site. MGP residues were not detected in surface water bordering the site.

The McMaster Street Site in Auburn, New York received an actual risk score of 23.3 and a perceived risk score of 29.7 from the SSPS program. Direct contact with surficial soils containing constituents associated with MGP residues was identified as the major route of exposure to MGP residues at the McMaster Street Site. The SSPS scores reflect the assumptions that subsurface MGP residues exist at the McMaster Street Site, although no subsurface investigations were conducted. The answers to and the assumptions used to answer specific SSPS questions in order to ensure consistency between sites are detailed in Appendix A. The breakdown of exposure route and individual question scores is also listed in Appendix A.

## 6.0 RECOMMENDATIONS

The major route of exposure to MGP residues at the McMaster Street Site, based on available information, was identified as direct contact with surficial soils. Streambed sediments and surficial soils at the McMaster Street Site contained PAHs and C-PAHs which can be associated with MGP operations, combustion by-products, and/or fuel oils. PAHs and C-PAHs can be harmful if ingested or through direct contact for extended periods of time. No subsurface investigations were performed at the site. Due to the history of site use, it is very difficult to discriminate the source(s) of the surface soil contamination.

It is recommended that additional sampling and further investigation be performed at the McMaster Street Site to determine the source of contamination. Current and former site occupants and adjacent site occupants, and any other possible contributors should be taken into consideration when evaluating laboratory analyses and possible sources. In the future, if changes in land use at the McMaster Street Site are proposed, including excavation or construction, a focused site investigation should be conducted prior to any development. This investigation should include ground water and subsurface soil studies focusing in areas where former MGP structures existed, and where contaminants were detected during the site screening evaluation.

## 7.0 REFERENCES

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# APPENDIX A

## SSPS SCORES, ANSWERS AND ASSUMPTIONS QUESTIONNAIRE

# SSPS DATA ENTRY FORM

Site Name: AUBURN-MCMASTER STREET SITE  Actual Risk: 23.3

Type of Site: MGP SITE  Perceived Risk: 29.7

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| | | | | | |
|---|---|---|---|---|---|
| ACTUAL RISK: | | | | | 23.3 |
| | Surface Water: | | | | 2.8 |
| | | Target: | | | 31.6 |
| | | Runoff Potential: | | | 1.7 |
| | | | Near-surface Contamination: | | 17.1 |
| | | | Containment: | | 25.0 |
| | | | Mobility: | | 38.9 |
| | | Subsurface Release Potential: | | | 9.0 |
| | | | Subsurface Contamination: | | 17.1 |
| | | | Containment: | | 100.0 |
| | | | Mobility: | | 52.4 |
| | | Observed Release: | | | 0.0 |
| | Ground Water: | | | | 0.0 |
| | | Target: | | | 0.0 |
| | | Release Potential: | | | 4.8 |
| | | | Subsurface Contamination: | | 17.1 |
| | | | Containment: | | 100.0 |
| | | | Mobility: | | 27.8 |
| | | Observed Release: | | | 75.0 |
| | Direct Contact: | | | | 46.3 |
| | | Target: | | | 67.5 |
| | | | Surface Contamination: | | 68.6 |
| | Air: | | | | 5.1 |
| | | Target: | | | 41.6 |
| | | Release Potential: | | | 12.3 |
| | | | Subsurface Contamination: | | 68.6 |
| | | | Containment: | | 30.0 |
| | | | Mobility: | | 60.0 |
| | | Observed Release: | | | 0.0 |
| PERCEIVED RISK: | | | | | 29.7 |
| | Site Characteristics: | | | | 67.5 |
| | | Surface Water: | | | 21.1 |
| | | | Target: | | 31.6 |
| | | | Runoff Potential: | | 10.4 |
| | | | | Near-surface Contamination: | 100.0 |
| | | | | Containment: | 25.0 |
| | | | | Mobility: | 41.7 |
| | | | Subsurface Release Potential: | | 66.7 |
| | | | | Subsurface Contamination: | 100.0 |
| | | | | Containment: | 100.0 |
| | | | | Mobility: | 66.7 |
| | | | Observed Release: | | 0.0 |

| | |
|---|---|
| Ground Water: | 0.0 |
| Target: | 0.0 |
| Release Potential: | 50.0 |
| Subsurface Contamination: | 100.0 |
| Containment: | 100.0 |
| Mobility: | 50.0 |
| Observed Release: | 100.0 |
| Direct Contact: | 67.5 |
| Target: | 67.5 |
| Surface Contamination: | 100.0 |
| Air: | 7.5 |
| Target: | 41.6 |
| Release Potential: | 18.0 |
| Subsurface Contamination: | 100.0 |
| Containment: | 30.0 |
| Mobility: | 60.0 |
| Observed Release: | 0.0 |
| Community Characteristics: | 0.4 |

---

Q1) Site Description: AUTO REPAIR AND JUNK YARD - FORMER MGP SITE

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Q2) Service Region: North Central
Service Division: Auburn
Neighborhood Type: Commercial

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Q3) How is the surface water used?

___ Not currently used (score = 1)
___ Industrial (2)
___ Recreational (3)
_X_ Irrigation, food preparation, or fishing (4)
___ Drinking water (5)

Select the appropriate answer with the highest score.

> Based on NYSDEC stream classifications. The Owasco Lake Outlet bordering the McMaster Street Site is classified as a Class D surface water body which is used for fishing and recreation.

Score: 4.0

Q4) For each distance, check the appropriate row to indicate the number of people using the downstream surface water for the highest scoring purpose above.

| | Distance | | | |
|---|---|---|---|---|
| Population | Within 5 km | Within 3 km | Within 1 km | Within 1/2 km |
| 0 | (0) | (0) | (0) | (0) |
| 1 to 100 | (1) | (2) | (3) | (4) |
| 101 to 1,000 | (2) | (3) | x (4) | X (6) |
| 1,001 to 10,000 | x (3) | x (4) | (6) | (8) |
| 10,001 to 100,000 | (4) | (6) | (8) | (10) |
| 100,001 and up | (6) | (8) | (10) | (12) |

Based on Donnelly Demographic Data.

Score: 6.0

Q5) Check the appropriate downstream distance from the site to the nearest of each type of sensitive surface water environment:

| | Distance | | | | |
|---|---|---|---|---|---|
| Target | Outside 4 km | Within 4 km | Within 2 km | Within 1 km | Within 1/2 km |
| Coastal wetland | X (0) | (1) | (6) | (12) | (16) |
| Freshwater wetland | x (0) | (1) | (3) | (7) | (16) |
| Endangered species | x (0) | (1) | (3) | (8) | (16) |

Based on NYSDEC regulated wetlands and federally designated endangered species.

Score: 0.0

Q6) What is the slope of the terrain near the site:

| | Slope of Terrain Between Site and Nearest Surface Water | | | | |
|---|---|---|---|---|---|
| Onsite slope | Less than 3% | 3% or greater | 5% or greater | 8% or greater | No intervening terrain |
| Less than 3% | (0) | (1) | (1) | X (2) | (9) |
| Less than 5% | (0) | (1) | (2) | (2) | (9) |
| Less than 8% | (0) | (2) | (2) | (3) | (9) |
| 8% or greater | (0) | (2) | (3) | (3) | (9) |

Based on site observations and the USGS 7.5 Minute Quadrangle Map of Auburn.

Score: 2.0

---

Q7) What is the expected maximum 24-hour rainfall over a year?

___ Less than 2 cm (0)
___ Less than 5 cm (1)
X Less than 8 cm (2)
___ 8 cm or greater (3)

Based on the greatest of 24-hour rainfall in 1989 for Skaneateles (approximately six miles northeast of Auburn), referenced in NOAA Climatological Data Annual Summary New York, 1989.

Score: 2.0

---

Q8) What is the distance to the nearest body of surface water?

___ Greater than 2 km (0)
___ Less than 2 km (1)
___ Less than 1/2 km (2)
X Less than 100 meters (3)

Based on site observations and the Auburn Quadrangle map.

Score: 3.0

---

Q9) What is the physical state of the wastes within one-tenth of one meter (10 cm) of the site surface?

X Solid, consolidated and stabilized (0)
___ Solid, unconsolidated and unstabilized (1)
___ Powder or fine material (2)
___ Liquid, gas, or sludge (3)

Default value - solid, consolidated, and stabilized because the only waste observed at the site fell into this category.

Score: 0.0

---

Q10) How well is the site designed to reduce runoff?

___ Runoff blocked by high terrain (0)
X Waste covered (1)
___ Exposed waste, sound diversion system (2)
___ Exposed waste, poor diversion system (3)
___ Site in surface water (4)

Select the appropriate answer with the highest score.

Based on site observations made by Atlantic Environmental Services, Inc.

Score: 1.0

---

Q11) Fill out the table below describing the wastes present within one-tenth of a meter (10 cm) of the surface of the site. If data is not known exactly, approximations must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppm) | Established Values (ppm) | Persistence (0-3) | Quantity (kg) |
|---|---|---|---|---|
| Arsenic | 26.0 | 2.6 | 3 | 0.354 |
| Cyanide | 9.6 | 500 | 3 | 0.096 |
| Lead | 570.0 | 700 | 3 | 7.46 |
| C-PAH | 149.6 | 10 | 3 | 1.578 |
| PAH | 118.3 | 10 | 3 | 1.265 |
| Nickel | 300.0 | 15 | 3 | 3.158 |

Chemical Waste: Types of wastes were determined by mutual consent. They are defined below with C-PAHs and PAHs broken down into the specific compound detected in the surface soils at the Auburn site.
Arsenic
Cyanide
Lead
C-PAHs: Benzo(a)anthracene, benzo(b) fluoranthene, benzo(k) fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, indeno(1,2,3-cd) pyrene
PAHs: Acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene
Metals (exceeding background concentrations)

Concentration: The highest concentration detected in any of the samples was used. If none was detected, concentration = 0.

| | |
|---|---|
| Concentration: | C-PAHs: Concentration represents the sum of the highest concentrations of all C-PAHs detected.<br>PAHs: Concentration represents the sum of the highest concentrations of all PAHs detected, not including C-PAHs. |
| Established Values: | Arsenic, Lead, and Nickel - Used the background concentrations for arsenic, lead and nickel from Shacklette and Boerngen (1984).<br>Cyanide, C-PAHs, PAHs - Used default values:<br>Cyanide - 50 ppm (domestic land use)<br>500 ppm (industrial land use)<br>C-PAHs - 10 ppm<br>PAHs - 10 ppm |
| Persistence: | Based on values supplied in the SSPS help screen. |
| Quantity: | The quantity of waste represents the summation of the concentration of waste detected in each surface soil sample multiplied by the volume of soil contaminated. For samples SS-2 through SS-4, this volume was assumed to be 10 $m^3$ (10m x 10m x 10cm). For SS-1, the extent of the soil sampled was visually estimated to be 0.4 $m^3$ (2m x 2m x 10cm). |

Score: 6.0

Q12) What is the physical state of all of the wastes at the site surface?

X Solid, consolidated and stabilized (0)
___ Solid, unconsolidated and unstabilized (1)
___ Powder or fine material (2)
___ Liquid, gas, or sludge (3)

Default value - solid, consolidated and stabilized.

Score: 0.0

Q13) What is the distance from the bottom of the site to the top of the water table?

___ Greater than 15 m (0)
___ Less than 15 m (1)
___ Less than 5 m (2)
_X_ Less than 1 m (3)
___ Site in water table (6)

> Default value - less than 1m as established by mutual consent. Assumed former MGP structures were below land surface, placing the bottom of the site below grade and therefore closer to the water table.

Score: 3.0

---

Q14) What is the expected annual net precipitation?

___ Less than -25 cm (0)
___ Greater than -25 cm (1)
___ Greater than 10 cm (2)
_X_ Greater than 25 cm (3)

> Default value - greater than 25 cm as established by mutual consent.

Score: 3.0

---

Q15) What is the permeability of the soil between the site and the water table?

___ Less than 1 x $10^{-7}$ (0)
___ Greater than 1 x $10^{-7}$ (1)
_X_ Greater than 1 x $10^{-5}$ (2)
___ Greater than 1 x $10^{-3}$ (3)

> Value based on Soil Conservation Survey data for HmA - Cazenovia Silt Loam (the nearest undisturbed soil type to the Auburn Site).

Score: 2.0

Q16) What is the mobility of the primary chemicals in the saturated zone?

- ☒ Greater than 10,000 (0)
- ☐ Less than 10,000 (1)
- ☐ Less than 100 (2)
- ☐ Less than 1 (3)

Default value of greater than 10,000 - assuming the primary chemical to be benzene as established by mutual consent.

Score: 0.0

---

Q17) How well is the site designed to reduce leaching and subsurface release?

- ☐ Non-permeable barrier and no ponding (0)
- ☐ Non-permeable barrier and ponding (1)
- ☐ Inadequate barrier and no ponding (2)
- ☒ Inadequate barrier and ponding (3)

Based on site observations made by Atlantic Environmental Services, Inc. in 1990.

Score: 3.0

---

Q18) Fill out the table below describing all of the wastes present at the site. If data is not known exactly, approximations must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppm) | Established Values (ppm) | Persistence (0-3) | Quantity (kg) |
|---|---|---|---|---|
| VOCs | 706.6 | 1.0 | 2 | 36.96 |
| PAH | 52,889.0 | 10 | 3 | 2766.3 |
| Cyanide | 9.6 | 500 | 3 | 0.096 |
| Arsenic | 12.0 | 2.6 | 3 | 0.354 |
| Nickel | 300.0 | 15.0 | 3 | 3.158 |
| Mercury | 1.9 | 0.1 | 3 | 0.023 |

Chemical Waste: Determined to be volatile organics, PAHs, cyanide, and metals (exceeding background concentrations) as arrived at by mutual consent.

| | |
|---|---|
| Concentration: | For VOCs and PAHs, used the geometric mean concentrations for tar waste, and conversion factor for tar (gallons) to tar (weight in kilograms) from the GRI EPRI data base. Cyanide concentration represents level detected in surface soil samples. Metals concentration represents the highest level detected in surface soil samples. |
| Established Values: | Determined by mutual consent as follows:<br>Volatile Organics - 1 ppm<br>PAHs - 10 ppm<br>Cyanide - 50 ppm (domestic land use)<br>500 ppm (industrial land use)<br>Metals - Background concentrations (Shacklette and Boerngen, 1984). |
| Persistence: | Based on values supplied in the SSPS help screen. |
| Quantity: | For VOCs and PAHs, used the radian report to determine the average gas production for the years that the McMaster Street MGP was in operation to be 52 MCF. This average was multiplied by the years of operation (35) and then by a constant (7.3) representing the assumption that 730 gallons of tar are produced for every 1,000,000 $ft^3$ of gas manufactured (radian report) and approximately 1% is lost as waste onsite. 52,304 kg of tar was estimated to have been disposed onsite. For cyanides and metals, quantity was calculated using the same method as Question 11. |

Score: 6.0

Q19) Fill out the table below describing wastes that have been detected in the nearest body of surface water. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppb) | Government Standard (ppb) |
|---|---|---|
| -- | -- | -- |

Chemical Waste: Determined to be volatile organics, C-PAHs, PAHs, metals, and cyanide.

Concentration: Determined from Surface Water Sample Analysis.

Government Standard: Based on NYSDEC surface water classifications or as a default, drinking water standards. ONLY considered elements which exceeded NYSDEC ambient water quality standards and guidance values for Class C surface waters.

Score: 0.0

---

Q20) How is the ground water used?

X Not currently used (score = 1)
___ Industrial with alternative (2)
___ Drinking water with alternative or industrial with no alternative (6)
___ Drinking water with no alternative (9)

Select the appropriate answer with the highest score.

The selection is based on USGS well records, Cayuga County DOH Officials, and the following DOH publications:

1) Report on Ground Water Dependence in New York State, NYSDOH Division of Environmental Health Bureau of Public Water Supply, 1981.

2) Inventory of Community Water Systems - New York State Vol. 1 - Municipal, NYSDOH - Bureau of Public Water Supply, 1984.

3) Inventory of Community Water Systems - New York State Vol. 2 - Non-Municipal, NYSDOH - Bureau of Public Water Supply, 1984.

Score: 1.0

---

Q21) For each distance, check the appropriate row to indicate the number of people using the downgradient drinking water for the highest scoring purpose above:

| | Distance | | | | |
|---|---|---|---|---|---|
| Population | Within 5 km | Within 3 km | Within 1 km | Within 1/2 km | Onsite |
| 0 | X (0) | x (0) | x (0) | x (0) | x (0) |
| 1 to 100 | ___ (4) | ___ (6) | ___ (8) | ___ (10) | ___ (20) |
| 101 to 1,000 | ___ (8) | ___ (12) | ___ (16) | ___ (20) | ___ (30) |
| 1,001 to 10,000 | ___ (12) | ___ (18) | ___ (24) | ___ (30) | ___ (40) |
| 10,001 to 100,000 | ___ (16) | ___ (24) | ___ (32) | ___ (35) | ___ (45) |
| 100,001 and up | ___ (20) | ___ (30) | ___ (35) | ___ (40) | ___ (50) |

Downgradient is defined as being within 45 degrees of the gradient. If the ground water direction is not known, assume the worst possible direction.

> Assumed ground water was not used within Auburn City Limits (5 km). Estimated population figure based on USGS well records, Donnelly Demographics data, and the NYSDOH publications referenced in Question 20.

Score: 0.0

---

Q22) What is the distance from the bottom of the site to the top of the aquifer in use?

X Greater than 50 m (0)
___ Less than 50 m (1)
___ Less than 25 m (2)
___ Less than 5 m (3)
___ Site in aquifer (6)

> If ground water is not used in area, greater than 50 m is the default value.

Score: 0.0

Q23) Fill out the table below describing wastes that have been detected in the ground water. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppb) | Government Standard (ppb) |
|---|---|---|
| Benzene | 195.6 | 0.0 |
| Xylene | 214.1 | 5.0 |
| Toluene | 94.1 | 5.0 |
| Cyanide | 106.1 | 100.0 |
| Naphthalene | 237.6 | 10.0 |
| Benzo(a)pyrene | 32.9 | 0.0 |

| | |
|---|---|
| Chemical Waste: | Benzene, xylene, toluene, cyanide, naphthalene, benzo(a)pyrene as determined by mutual consent. |
| Concentration: | Geometric mean concentration derived from the GRI EPRI data base. |
| Government Standard: | NYSDEC Class GA standards for ground water quality and NYSDOH MCLs. |

Score: 75.0

---

Q24) Indicate the distance from the site to the nearest instance of each of the land uses below:

| | Distance | | | | | |
|---|---|---|---|---|---|---|
| Land Use | Outside 4 km | Within 4 km | Within 2 km | Within 1 km | Within 1/2 km | Onsite |
| Commercial/ Industrial | ____ (0) | ____ (1) | ____ (2) | ____ (3) | X (6) | x (9) |
| National Parks | x (0) | ____ (1) | ____ (1) | ____ (2) | ____ (3) | ____ (4) |
| Agriculture | ____ (0) | x (1) | ____ (1) | ____ (2) | ____ (4) | ____ (6) |
| Residential | ____ (0) | ____ (1) | ____ (3) | x (5) | ____ (8) | ____ (15) |

Based on USGS 7.5 Minute Quadrangle Maps and site observations made by Atlantic Environmental Services, Inc.

Score: 9.0

Q25) Indicate the number of people living or working within each of the specified distances.

| | Distance | | | | |
|---|---|---|---|---|---|
| Population | Within 5 km | Within 3 km | Within 1 km | Within 1/2 km | Onsite |
| 0 | ____ (0) | ____ (0) | ____ (0) | ____ (0) | ____ (0) |
| 1 to 100 | ____ (9) | ____ (12) | ____ (15) | ____ (18) | X (28) |
| 101 to 1,000 | ____ (12) | ____ (15) | ____ (18) | ____ (21) | ____ (31) |
| 1,001 to 10,000 | ____ (15) | ____ (18) | x (21) | x (24) | ____ (34) |
| 10,001 to 100,000 | x (18) | x (21) | ____ (24) | ____ (27) | ____ (37) |
| 100,001 and up | ____ (21) | ____ (24) | ____ (27) | ____ (30) | ____ (40) |

Based on information from Donnelly Demographics.

Score: 28.0

---

Q26) Check the appropriate distance from the site to the nearest of each type of sensitive environments, without regard to direction:

| | Distance | | | | |
|---|---|---|---|---|---|
| Target | Outside 2 km | Within 2 km | Within 1 km | Within 1/2 km | Onsite |
| Coastal wetland | x (0) | ____ (1) | ____ (2) | ____ (3) | ____ (6) |
| Freshwater wetland | ____ (0) | X (0) | ____ (1) | ____ (2) | ____ (6) |
| Endangered species | x (0) | ____ (0) | ____ (1) | ____ (2) | ____ (6) |

Based on NYSDEC regulated wetlands and federally designated endangered species.

Score: 0.0

---

Q27) What is the vapor pressure of the primary wastes?

___ 1 x $10^{-5}$ mm Hg or less (0)
___ Greater than 1 x $10^{-5}$ mm Hg (1)
___ Greater than 1 x $10^{-3}$ mm Hg (2)
X Greater than 10 mm Hg (3)

Used default value for benzene assumed to be onsite.

Score: 3.0

Q31) Fill out the table below describing the wastes present at the surface of the site. If the data is not known exactly, approximations must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppm) | Established Values (ppm) | Persistence (0-3) | Contaminated Area ($m^2$) |
|---|---|---|---|---|
| Arsenic | 26.0 | 2.6 | 3 | 304.0 |
| Cyanide | 9.6 | 500 | 3 | 100.0 |
| Lead | 570.0 | 700 | 3 | 304.0 |
| C-PAH | 149.6 | 10 | 3 | 304.0 |
| PAH | 118.3 | 10 | 3 | 304.0 |
| Nickel | 300.0 | 15 | 3 | 204.0 |

| | |
|---|---|
| Chemical Waste: | Wastes are defined below with C-PAHs and PAHs broken down into the specific compound detected in the surface soils at the McMaster Street Site.<br>Arsenic<br>Cyanide<br>Lead<br>Other: Metals over background concentration.<br>C-PAHs: Benzo(a)anthracene, benzo(b) fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, indeno(1,2,3-cd) pyrene<br>PAHs: Acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene |
| Concentration: | The highest concentration detected in any of the samples was used. If none was detected, concentration = 0.<br>C-PAHs: Concentration represents the sum of the highest concentrations of all C-PAHs detected.<br>PAHs: Concentration represents the sum of the highest concentrations of all PAHs detected (not including C-PAHs). |
| Established Values: | Arsenic, lead, and nickel - Used the background concentrations for arsenic, lead and nickel from Shacklette and Boerngen (1984).<br>Cyanide, C-PAHs, PAHs - Used default values as arived at by mutual consent.<br>Cyanide - 50 ppm (domestic land use)<br>500 ppm (industrial land use)<br>C-PAHs - 10 ppm<br>PAHs - 10 ppm |

| | |
|---|---|
| Persistence: | Based on values supplied in the SSPS help screen. |
| Contaminated Area: | Assumed 100 square meters for composite samples (SS-2 through SS-4). Used visually estimated extent for Sample SS-1 (4 square meters). |

Score: 24.0

---

Q32) Fill out the table below describing wastes that have been detected in the air. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals.

| Chemical Waste Name | Concentration (ppm) | Government Standard (ppm) |
|---|---|---|
| None detected | 0 | -- |

No wastes were detected in the air.

Score: 0.0

---

Q33) What steps have been taken to reduce public access to the site?

___ Full barrier and guard (0)
___ Full barrier (1)
___ Guard (2)
___ Incomplete barrier (3)
X No barrier, no guard (4)

Based on site observations made by Atlantic Environmental Services, Inc.

Score: 4.0

---

Q34) What is the distance from the site to the nearest residence or gathering point for children?

X 100 m or more (1)
___ 10 m to 100 m (2)
___ 0 to 10 meters (5)
___ Onsite (10)

Based on site observations made by Atlantic Environmental Services, Inc.

Score: 1.0

---

Q35) What is the distance from the site to the nearest ground water well in use?

10 km or more (1)
[✓ 1 km to 10 km (3)]
100 m to 1 km (6)
less than 100 m (10)

Based on USGS well records.

Score: 3.0

---

Q36) What are the characteristics of the site wastes?

Other types of wastes (1)
Acute, deadly toxins (4)
[✓ Carcinogens (7)]
Radioactive wastes (10)

Select the appropriate answer with the highest score.

Used carcinogenic PAHs as default value.

Score: 7.0

---

Q37) Is offsite contamination evident?

No (1)
[✓ Yes, has been measured (7)]
Yes, is visible (9)
Yes, has been smelled (10)

Select the appropriate answer with the highest score.

Used default value of no, unless wastes were detected in streambed sediment samples.

Score: 7.0

Q38) Describe the area near the site:

___ Rural (1)
___ Agricultural (2)
___ Industrial (3)
_X_ Commercial (4)
___ Residential/Commercial (8)
___ Residential (9)
___ Urban (10)

Based on site observations made by Atlantic Environmental Services, Inc.

Score: 4.0

---

Q39) What is the total volume of soil that is contaminated above regulatory limits?

_X_ Less than 10 $m^3$ (1)
___ More than 10 $m^3$ (2)
___ More than 100 $m^3$ (3)
___ More than 1,000 $m^3$ (4)
___ More than 10,000 $m^3$ (5)

Use default of less than 10 $m^3$. No applicable regulatory limit for soils in New York state.

Score: 1.0

---

Q40) How is onsite land used?

___ Other (1)
___ Agricultural (2)
___ Residential (6)
_X_ Industrial (9)

Based on site observations made by Atlantic Environmental Services, Inc.

Score: 9.0

# APPENDIX B

## SITE CHRONOLOGY AND HISTORICAL MAPS

## AUBURN, NY
## McMASTER STREET MGP SITE

Location: 200 feet east of north end McMaster Street
Owner: Unknown, Parcel A; Frizzo Construction Co.; Auburn Tank & Mfg. Co.

### Acquisition and Organization

NYSEG

**to**

Empire Gas & Electric Co.
Organized: April 11, 1911
Acquired: December 31, 1936

**to**

Auburn Gas Company
Organized: December 18, 1901
Acquired: August 11, 1911(?)

**to**

Auburn Gas Light Company
Organized: January 28, 1850
Acquired: December 28, 1901

**and**

Citizens Light & Power Company
of Auburn, NY (gas Department)
Organized: May 7, 1900
Acquired: October 9, 1905

### Remarks:

Operated from circa 1869 to 1905 by Citizens LIght and Power and successors.

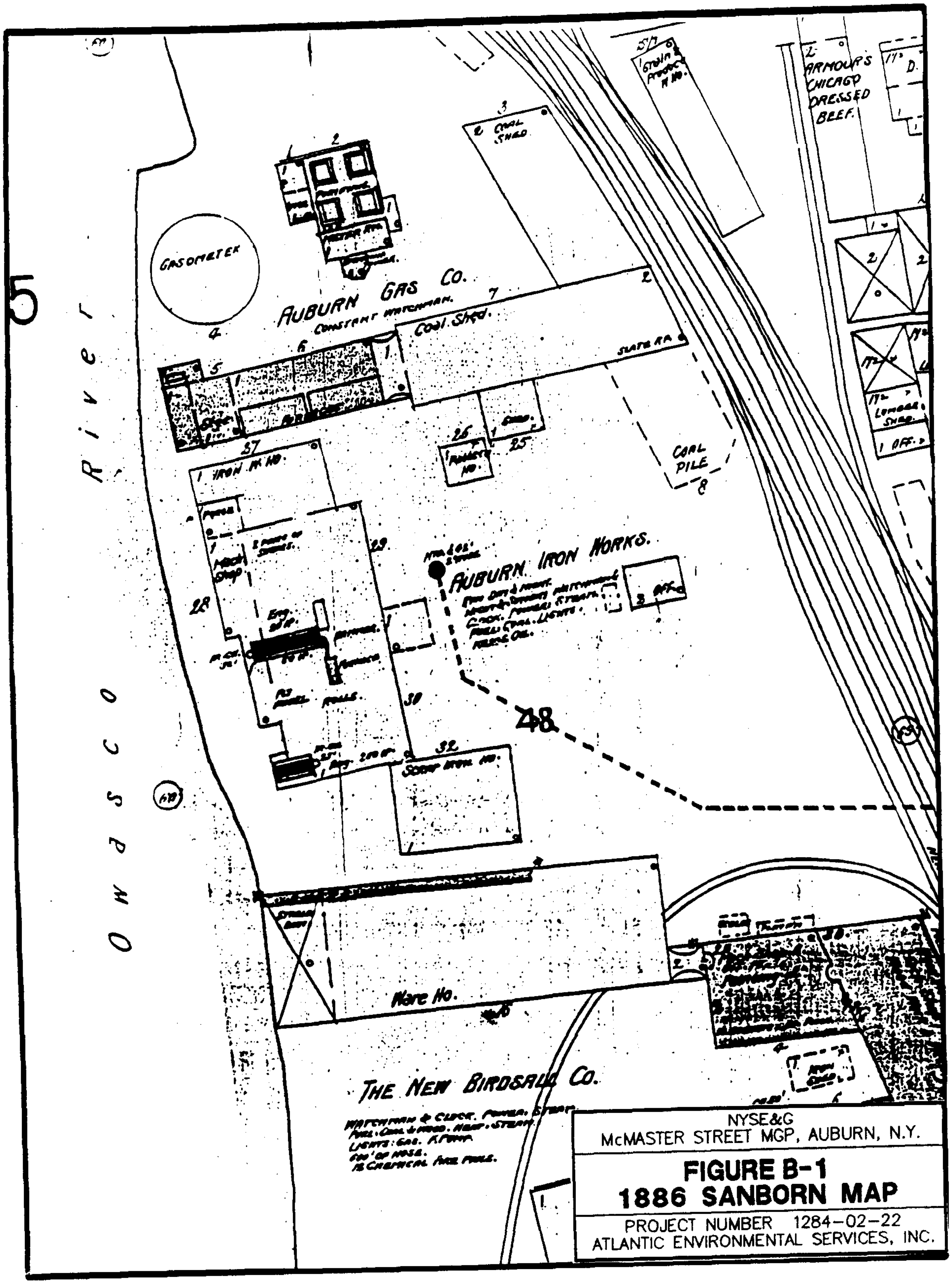
### Real Estate Divestments or Acquisitions:

1982 Owners:
Auburn Tank and Manufacturing Co.
Frizzo Construction Co.
Unknown (Parcel A, 1982 map)

# TABLE 1

## CHRONOLOGICAL SEQUENCE OF EVENTS AT THE McMASTER SITE

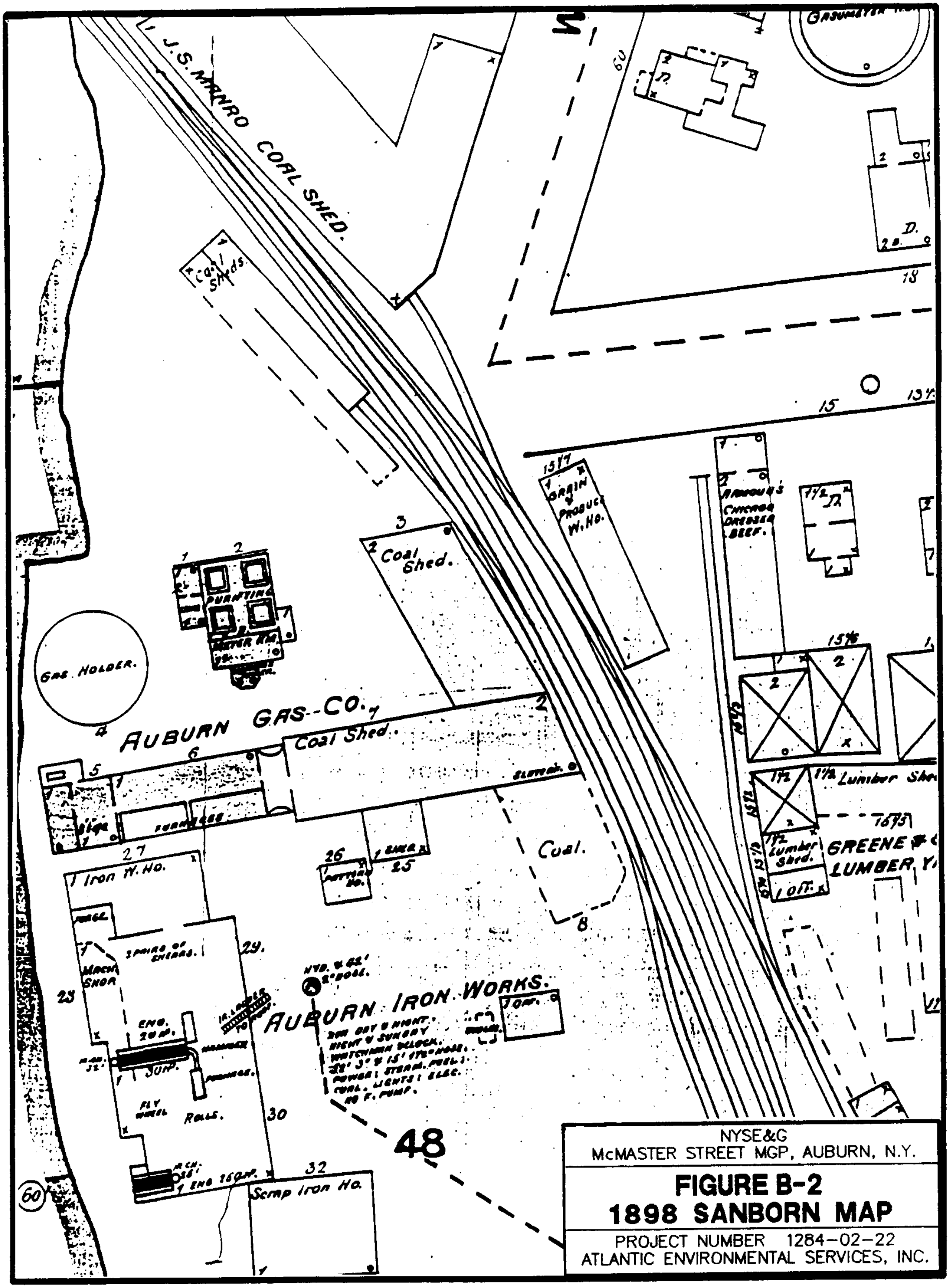
| | |
|---|---|
| 1869 | Coal gas manufacturing begins (Auburn Gas Co.) |
| circa 1904 | Coal gas manufacturing shifted to newer Clark Street plant; McMaster Street plant placed on standby. |
| post 1904 | Plant demolished, some debris pushed into Owasco River. |
| 1940 | Eastern (triangular) section of site sold to Shoemaker Coal Company. |
| Present | Site now vacant land owned by F. Rizzo Construction. |



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

**FIGURE B-1**
**1886 SANBORN MAP**

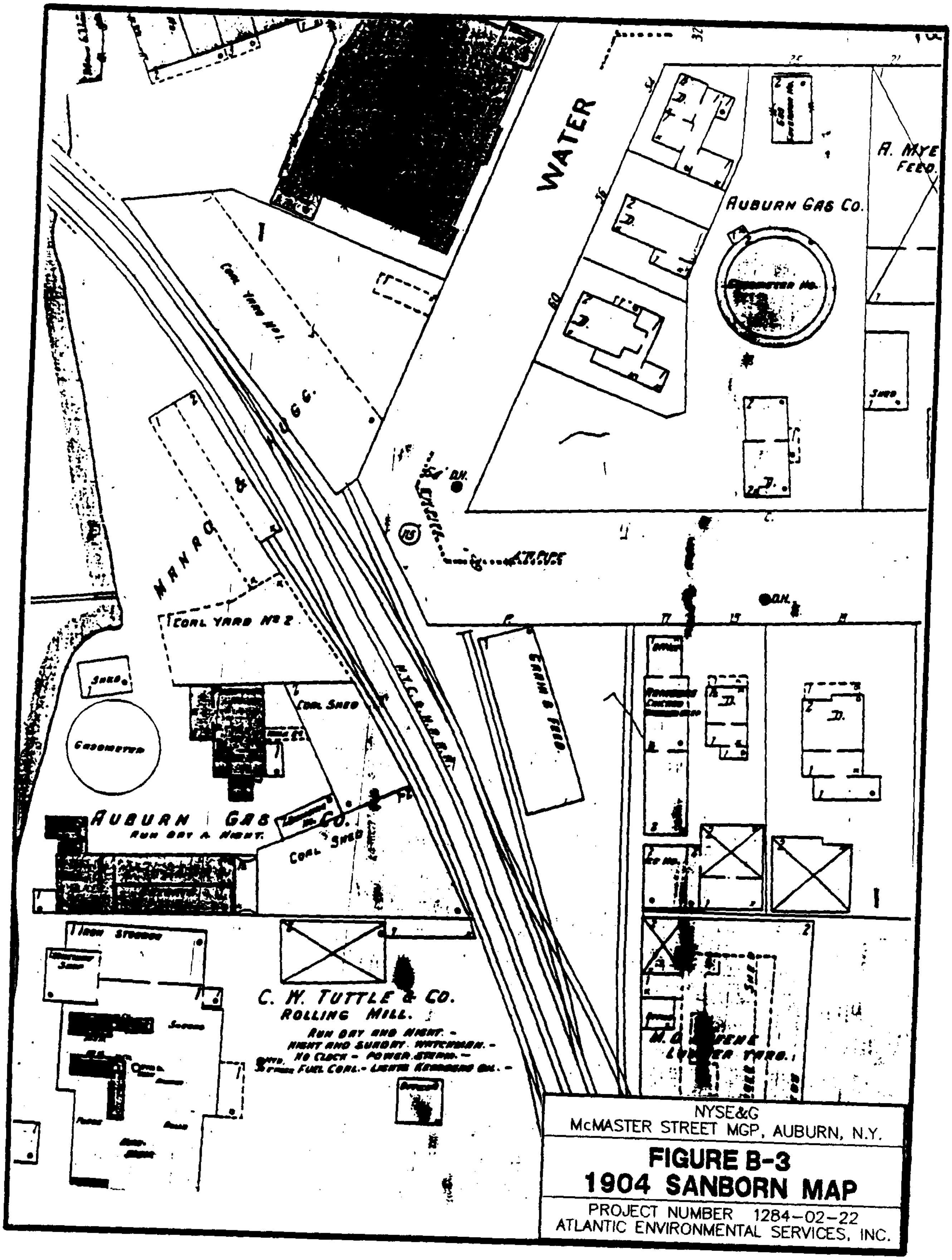
PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

**FIGURE B-2**
**1898 SANBORN MAP**

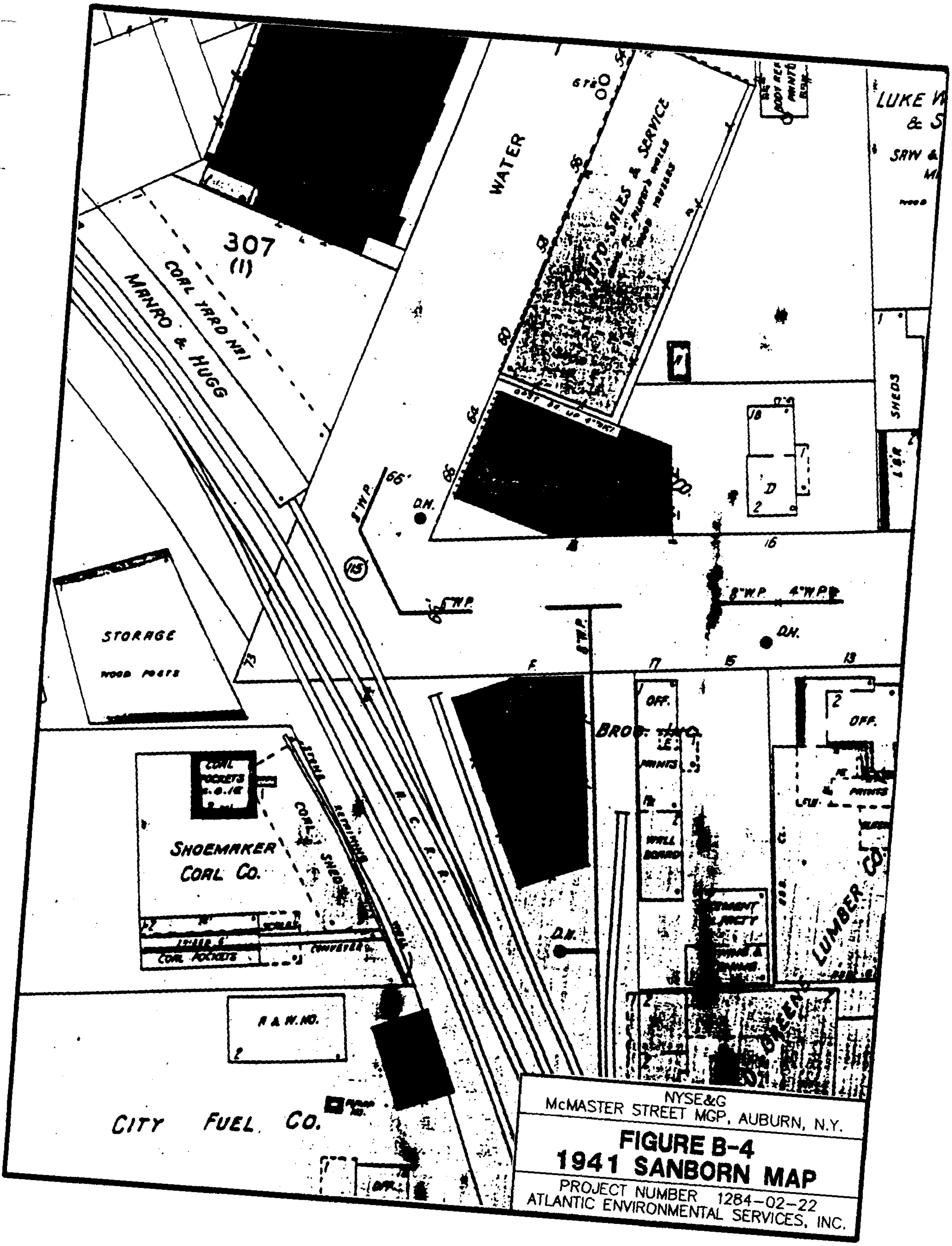
PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

**FIGURE B-3**
**1904 SANBORN MAP**

PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

## FIGURE B-4
## 1941 SANBORN MAP

PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.

# APPENDIX C

## ATLANTIC ENVIRONMENTAL SERVICES, INC.
## SITE SURVEYS, SAMPLING FIELD DATA, AND AERIAL PHOTOGRAPHS

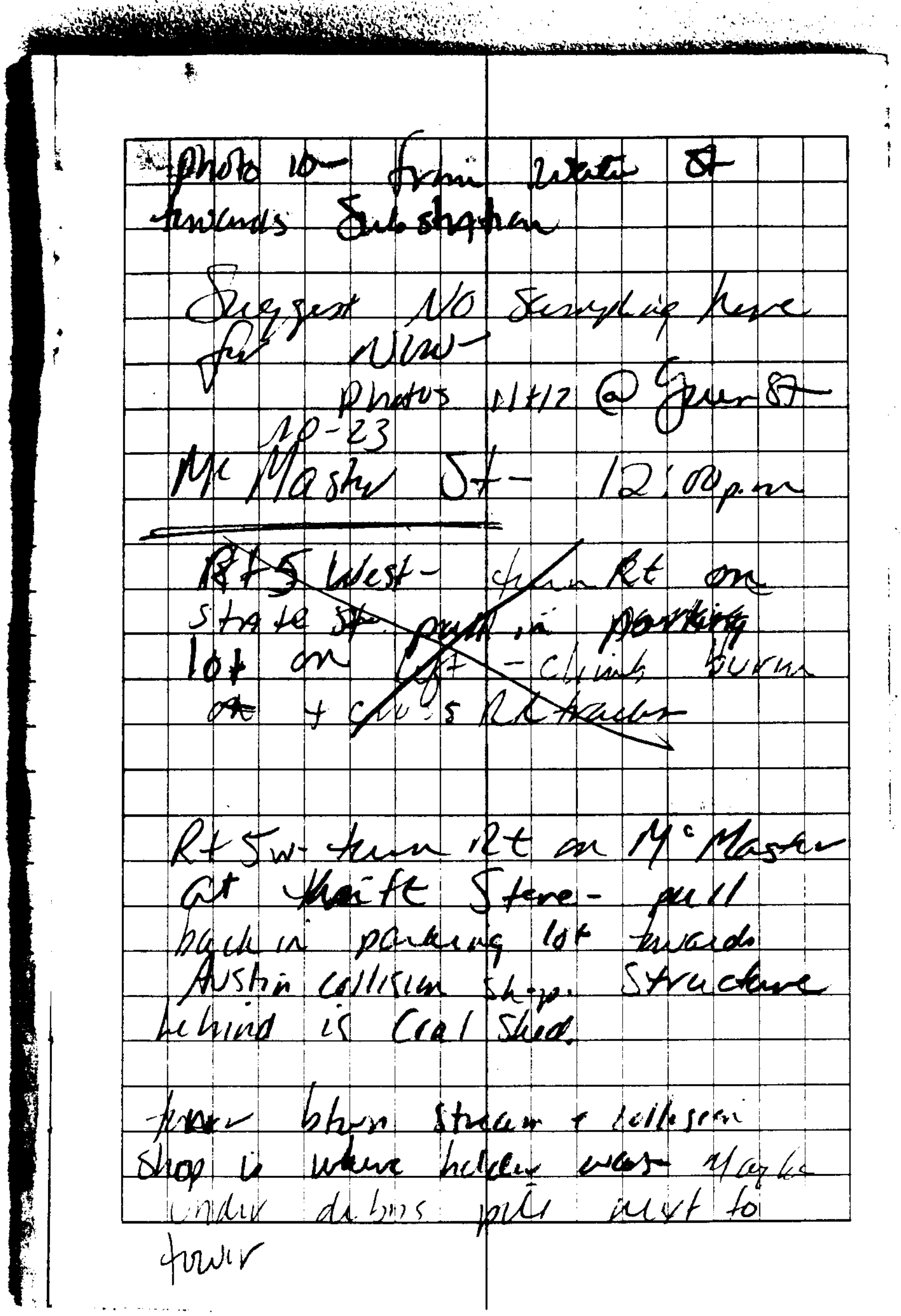


Photo 10 – from State St
towards Substation

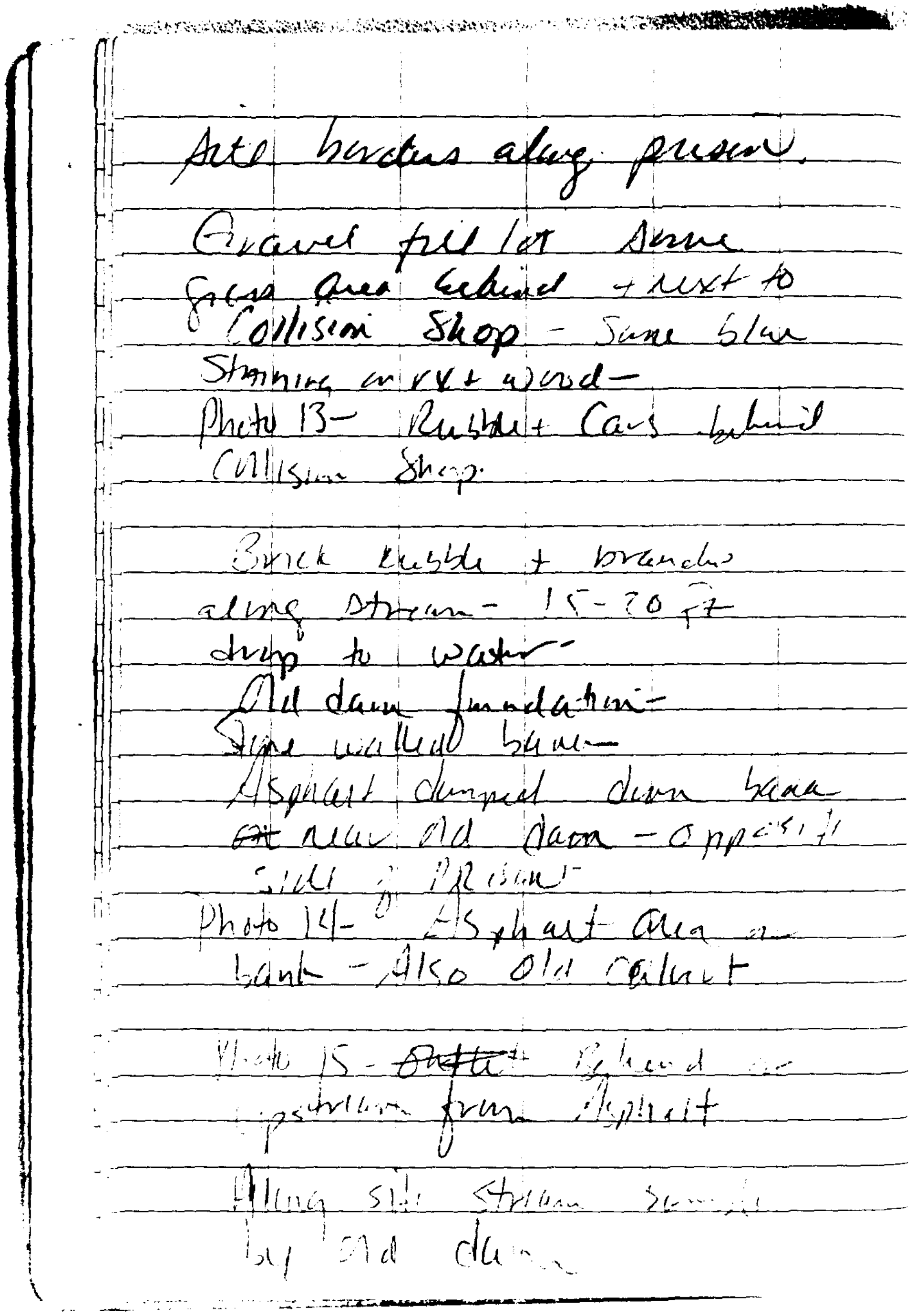
Suggest NO Sampling here
for now –
Photos 11+12 @ Green St
10-23
McMaster St – 12:00 p.m.

~~Rt 5 West – turn Rt on~~
~~State St. pull in parking~~
~~lot on left – climb berm~~
~~[illegible] + cross RR tracks~~

Rt 5 W – turn Rt on McMaster
at Thrift Store – pull
back in parking lot towards
Austin collision shop. Structure
behind is Coal Shed.

tower btwn stream + collision
shop is where holder was maybe
under debris pile next to
tower

INITIAL SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN



Site borders along prison.

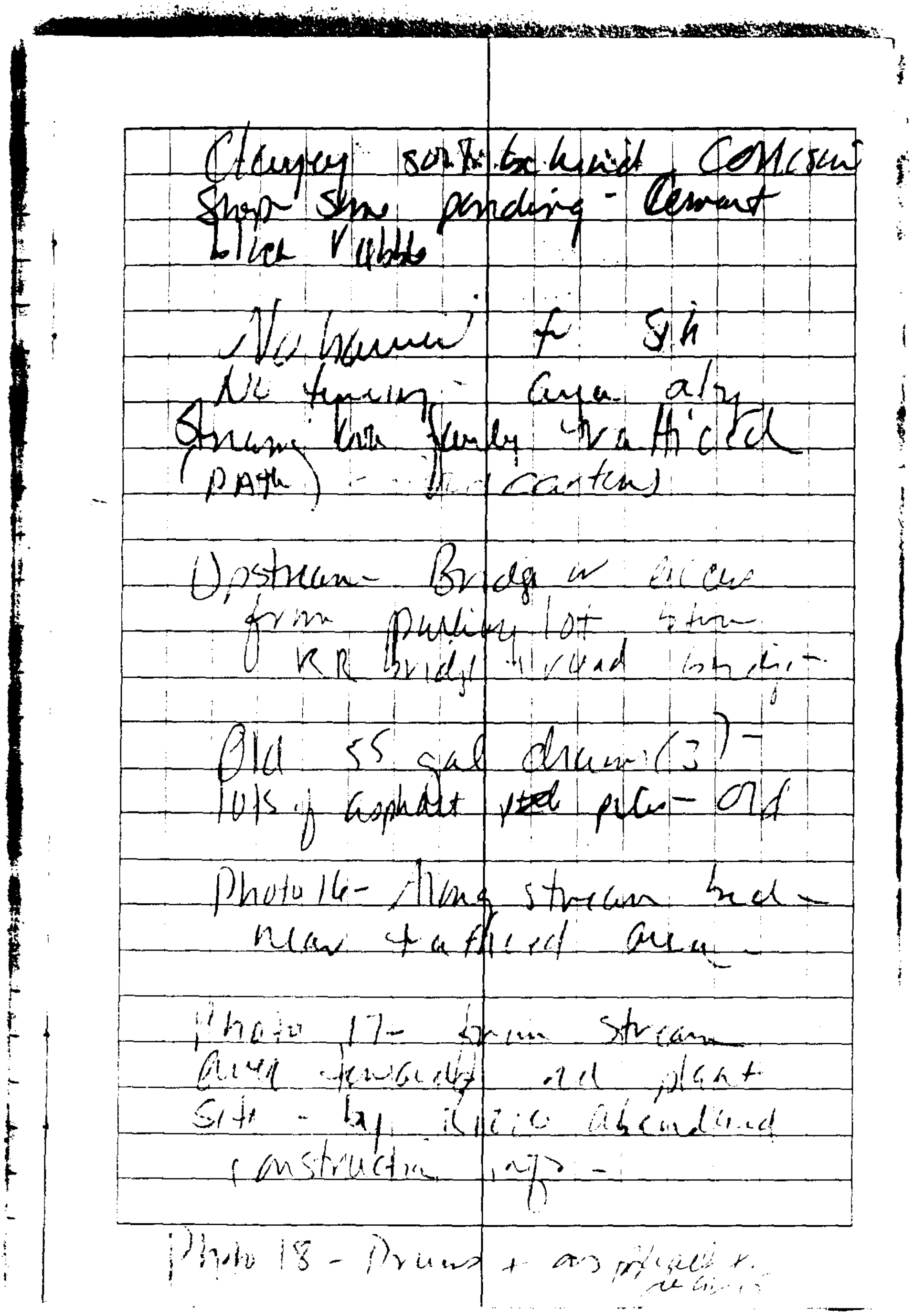
Gravel fill lot Some
grass area behind + next to
Collision Shop - Some blue
Staining on rock + wood -
Photo 13 - Rubble + Cars behind
Collision Shop.

Brick rubble + branches
along Stream - 15-20 ft
drop to water -
Old dam foundation -
Stone walled bank -
Asphalt dumped down bank
~~at~~ near Old dam - opposite
side of Prison
Photo 14 - Asphalt area on
bank - Also Old Culvert

Photo 15 - ~~Outfall~~ Behind on
upstream from Asphalt

Along side Stream Sample
by Old dam

INITIAL SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN



Clayey soil - to [illegible] concern
Stop sign pending - Cement
block rubble

No [illegible] of Site
No fencing - area along
Stream bank freely accessed
(PATH) - [illegible] cartons

Upstream - Bridge w/ access
from parking lot & from
RR bridge & road bridge -

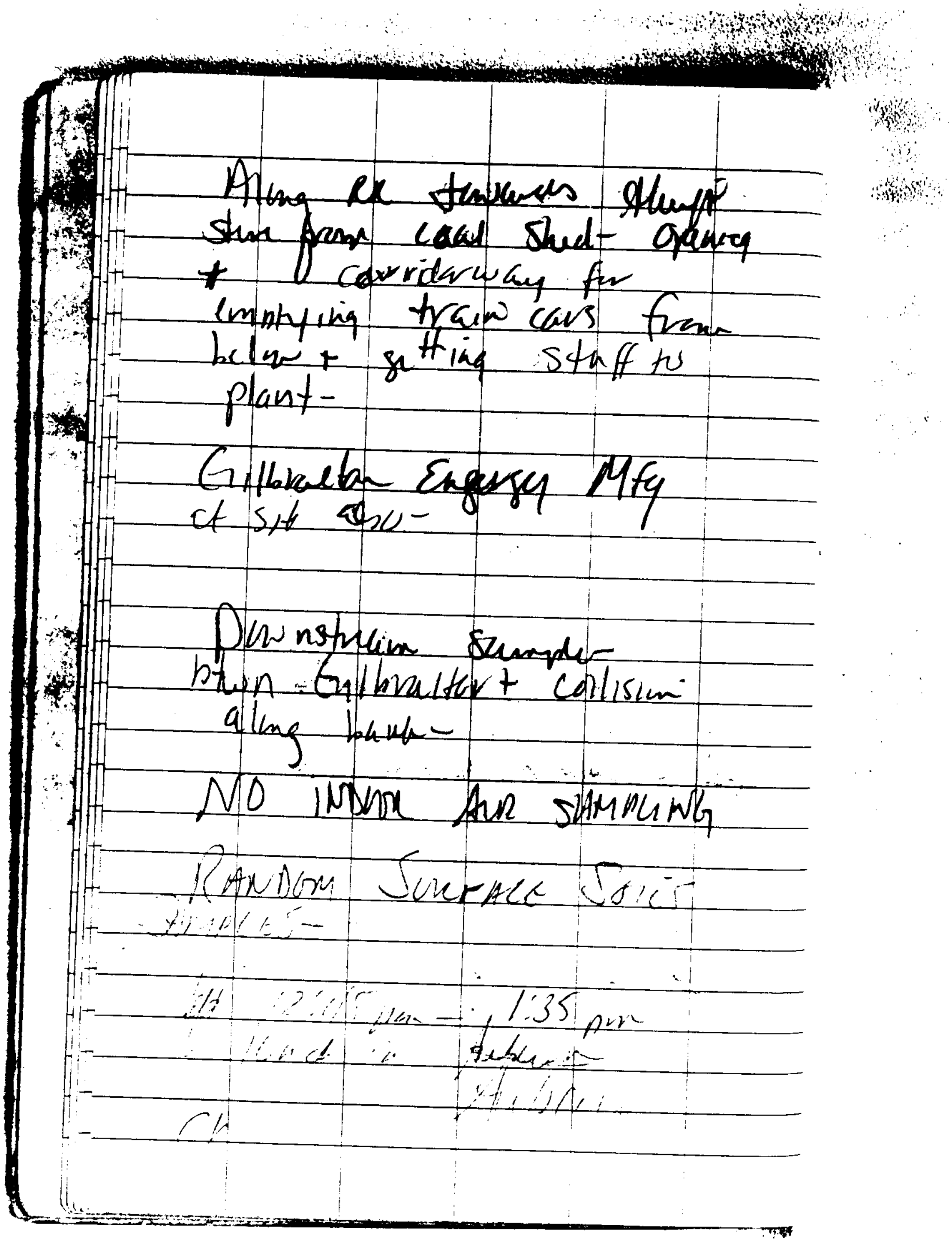
Old 55 gal drums (3) -
lots of asphalt ~~steel~~ piles - old

Photo 16 - Along stream bed -
near tarfilled area -

Photo 17 - from stream
area towards old plant
site - bldg [illegible] abandoned
construction eqp -

Photo 18 - Drums + asphalt + [illegible]

INITIAL SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN



Along RR tracks [illegible]
Stuff from coal Shed- opening
+ corridorway for
emptying train cars from
below + getting stuff to
plant-

Gilbralter Energy Mfg
at site [illegible]-

Downstream Sample
btwn Gilbralter + Collision
along bank-

NO INDOOR AIR SAMPLING

RANDOM SURFACE SOIL
SAMPLES-

[illegible] 12:05 pm - 1:35 pm
[illegible] in [illegible]
[illegible]

Cl[illegible]

INITIAL SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN

1:35 → 1:45 -

Chamber of Commerce -
36 Seneca St
(Map of town + Hospital
location - 1 7 Lansing

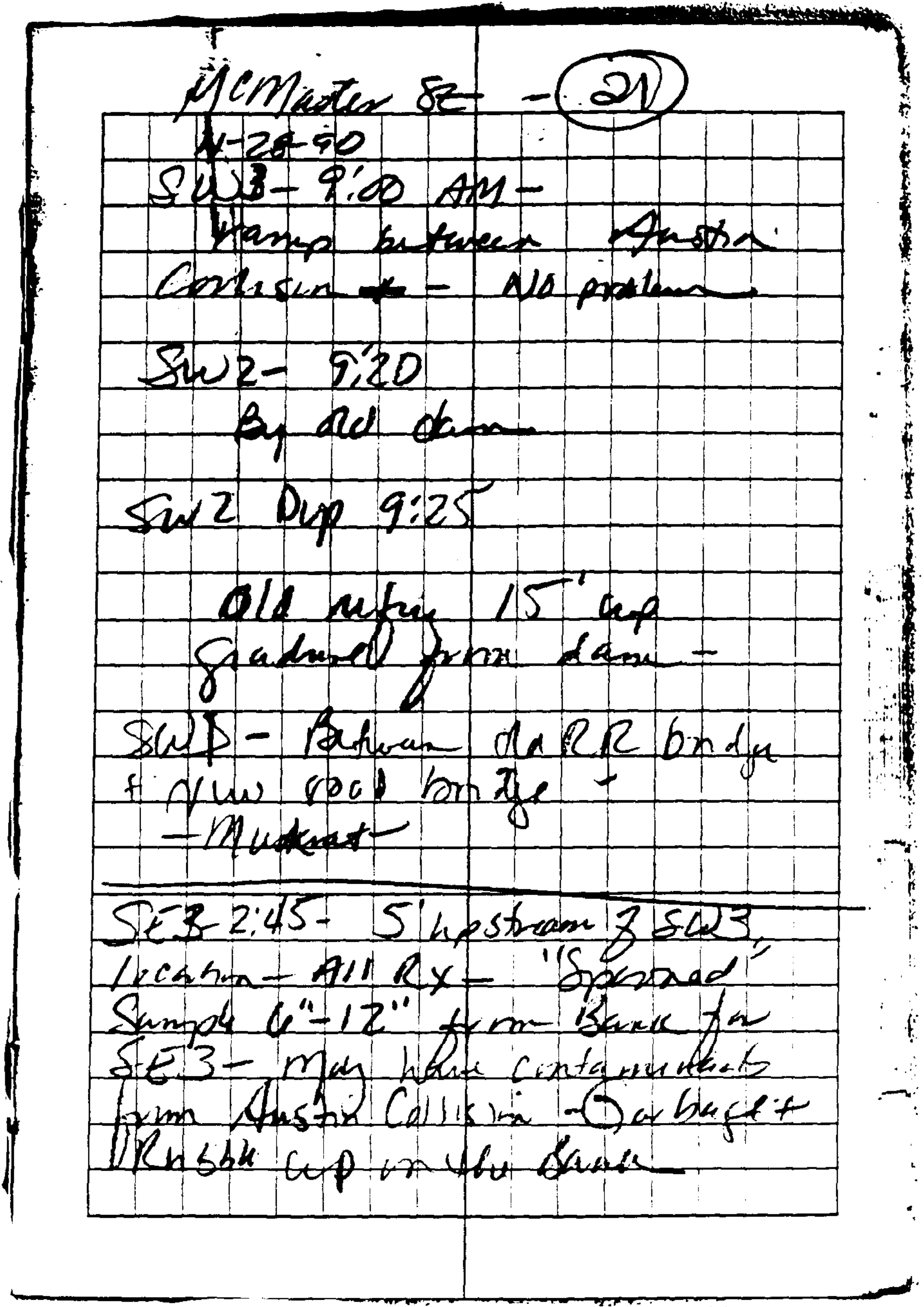
1:45 - Head to Seneca Falls

5 + 20 W - (Fall St)
turn left at Byrne Dairy

A+K Roofing is now located at
old Gas Plant site - fenced
in front - Can probably access
site from rear behind Homes -
Residential + Commercial
173-175 Fall street
Chiropractor office + 2 homes +

Need better location to
find old MGP to pick
Sampling locations
Think it's behind 177 Fall St
DR R.W. ROUBIC Chiropractor

INITIAL SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN



McMaster 8E – (21)
11-28-90
SW3 – 9:00 AM –
Ramp between Austin
Collision ~~+~~ – No problem

SW2 – 9:20
By old dam

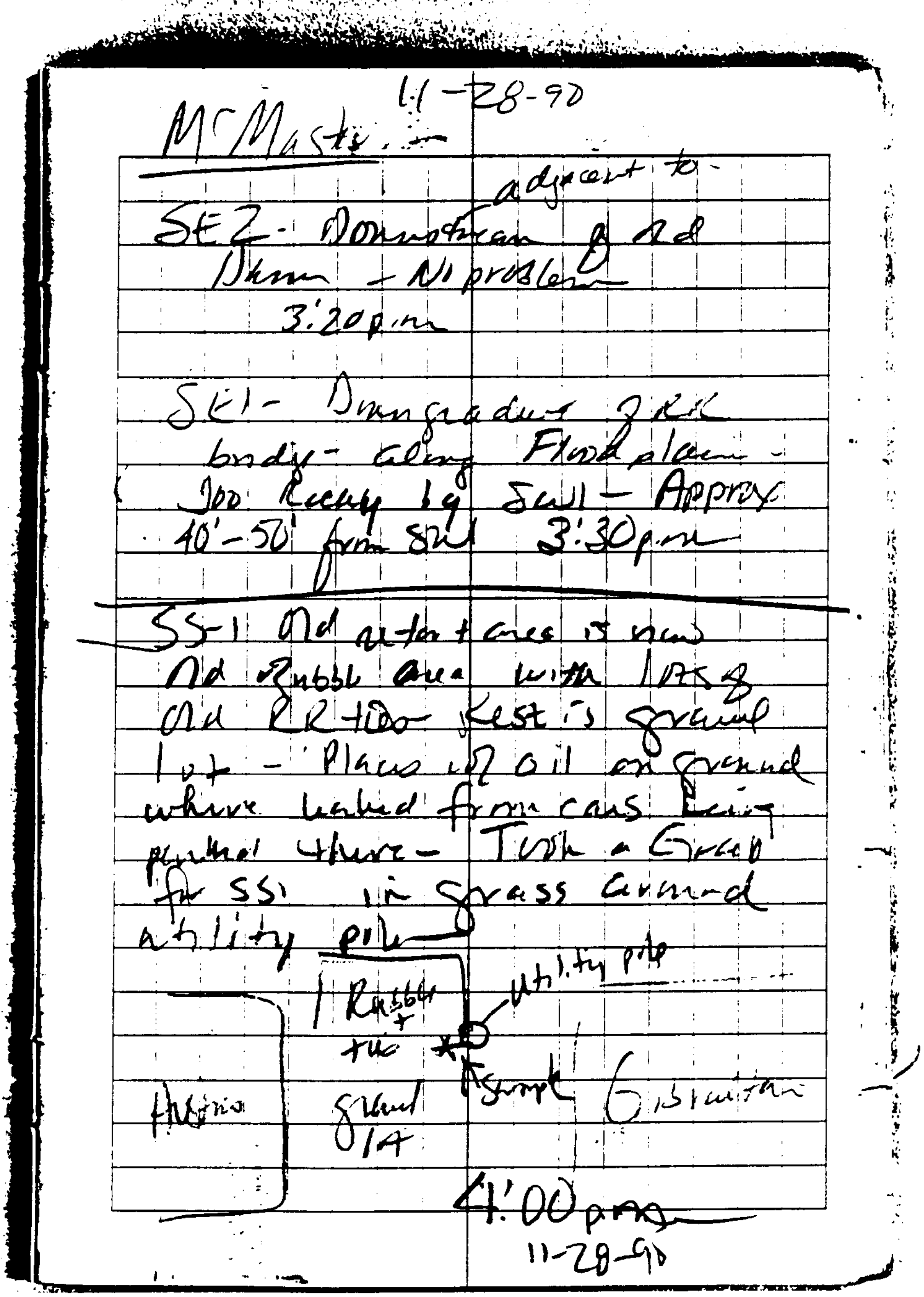
SW2 Dup 9:25

Old refuse 15' up
gradual from dam –

SW1 – Between old RR bridge
& new road bridge –
– Muskrat –

SE3 2:45 – 5' upstream of SW3
location – All Rx – "Spooned"
Sample 6"–12" from Bank for
SE3 – May have contaminants
from Austin Collision – Garbage &
Rubble up on the bank

SURFACE WATER SAMPLE 3, 2 AND 1
SEDIMENT SAMPLE 3
SAMPLING FIELD WATER
RECORDED BY ANNA SULLIVAN



McMaster... 11-28-90

adjacent to

SE2 - Downstream of old Dam - No problem

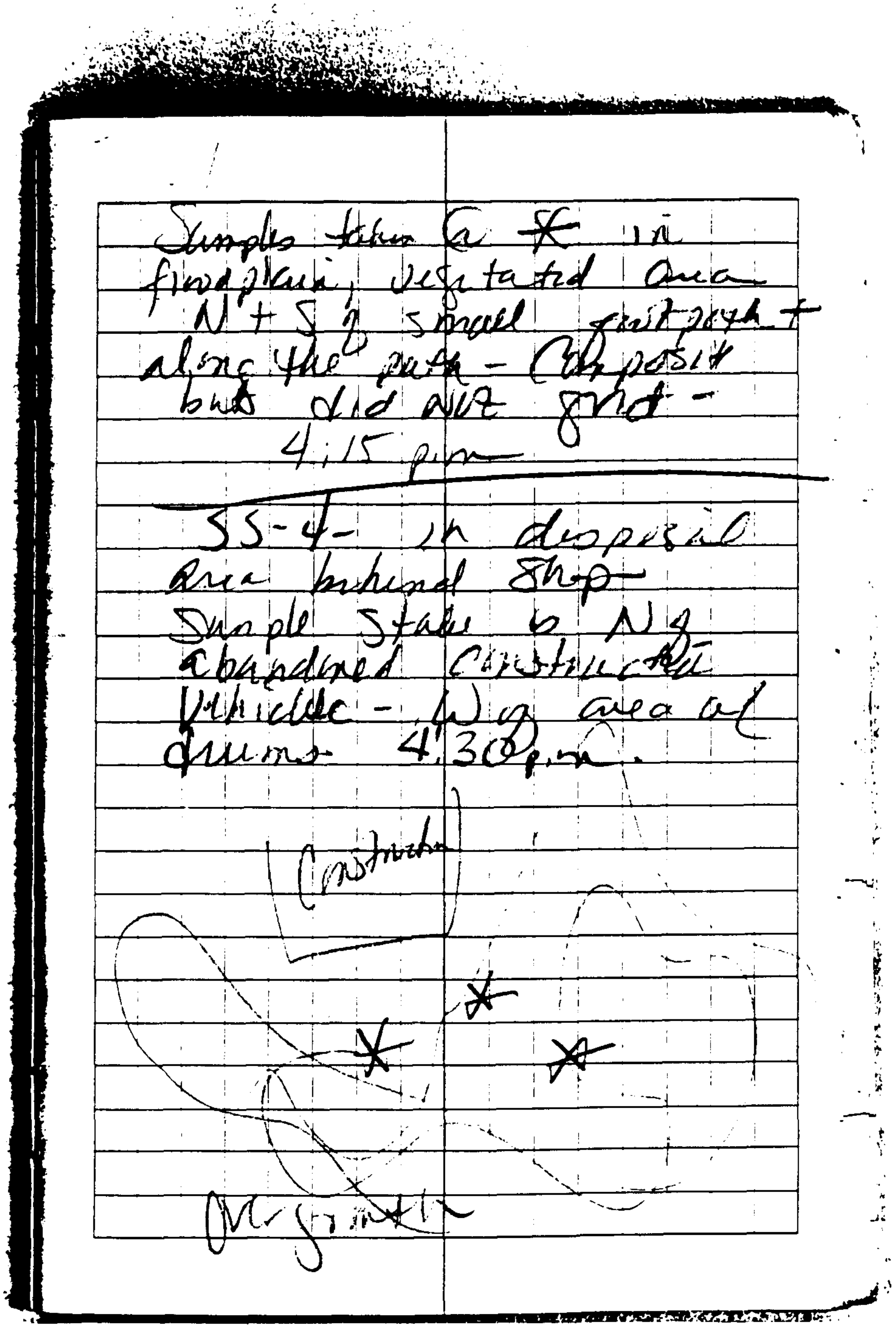
3:20 p.m.

SE1 - Downgradient of RR body - along Flood plain - Too Rocky for Soil - Approx 40'-50' from SE2 3:30 p.m.

SS-1 Old retort area is now Old Rubble area with lots of Old RR ties - Rest is gravel lot - Places of oil on ground where leaked from cars being parked there - Took a Grab for SS1 in grass around utility pole

4:00 p.m.
11-28-90

SEDIMENT SAMPLES 2 AND 1
AND SURFACE SOIL SAMPLE 1 SAMPLING FIELD NOTES
RECORDED BY ANNA SULLIVAN

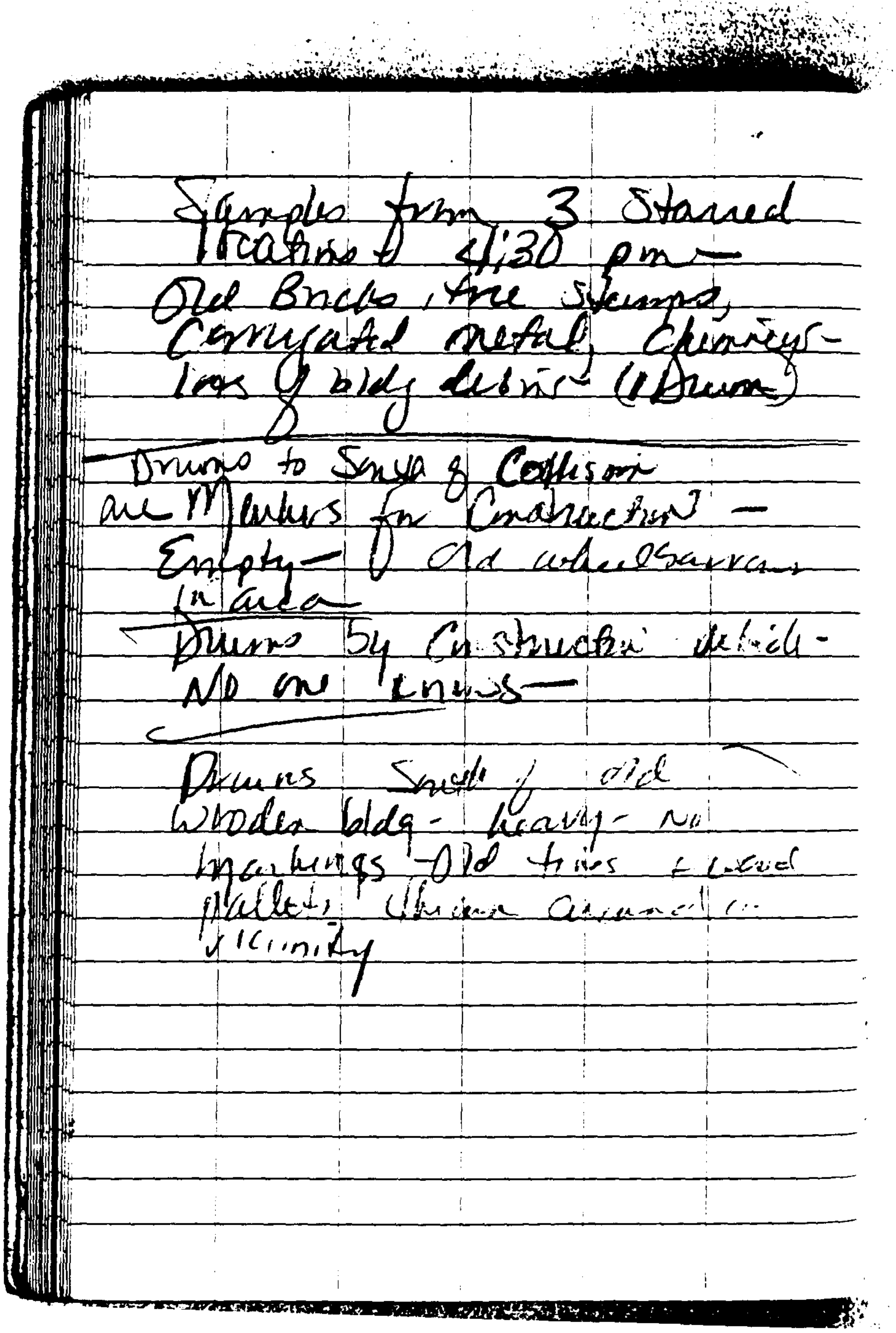


Samples taken @ ✱ in floodplain, vegetated area N + S of small footpath + along the path - Composit but did not grind - 4:15 pm

---

SS-4 - in disposal area behind shop Sample taken 6' N of abandoned construction vehicle - W of area of drums 4:30 p.m.

SURFACE SOIL SAMPLE 4
SAMPLING FIELD NOTES
RECORDED BY ANNA SULLIVAN



Samples from 3 Starred
locations @ 4:30 pm —
Old Bricks, tree stumps,
Corrugated metal, Chimney —
lots of bldg debris (1 Drum)

Drums to South of Collison
are Markers for Construction —
Empty — Old wheelbarrows
in area

Drums by Construction vehicle —
No one knows —

Drums South of old
Wooden bldg - heavy - no
markings - Old tires & wood
pallets, [illegible] around in
vicinity

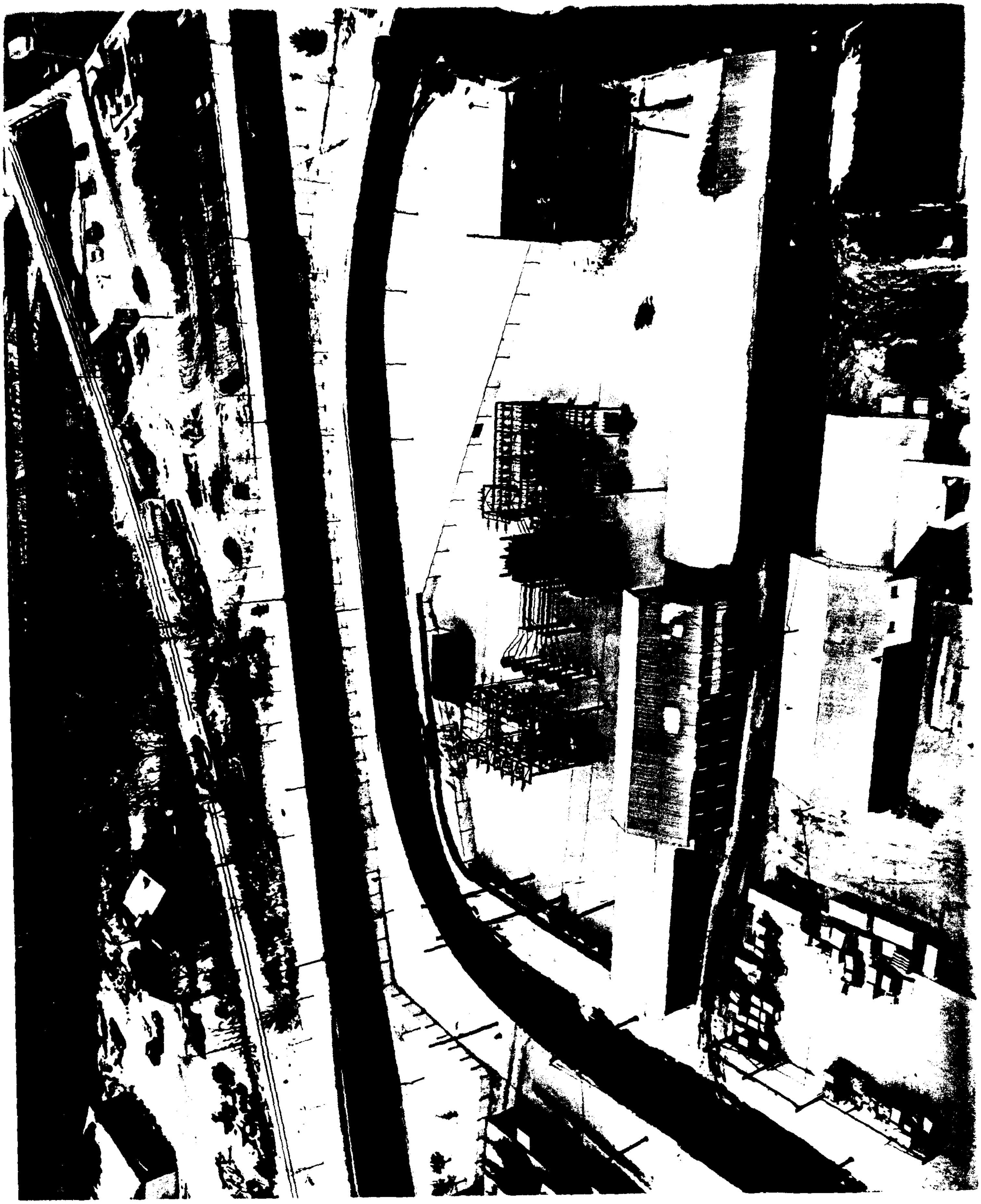
SITE SURVEY NOTES
RECORDED BY ANNA SULLIVAN

AUSTIN COLLISION SHOP AND DEBRIS AT THE MCMASTER STREET SITE

ABANDONED ROAD CONSTRUCTION EQUIPMENT AND DRUMS BEHIND AUSTIN COLLISION SHOP AT THE MCMASTER STREET SITE

MCMASTER STREET, AUBURN, NEW YORK

MCMASTER STREET, AUBURN, NEW YORK



MCMASTER STREET, AUBURN, NEW YORK

# APPENDIX D

## S.Y. KIM LAND SURVEYOR, P.C.
## FIELD DATA

12-11-90

N.Y.S. AUBURN N.Y.

GAS & ELECTRIC CO.

MCMASTER

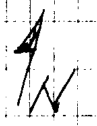
(92-2)

⊼ @ PZ 12 0°00" 10 (288.818 )
to: PZ 13 1) 214°08'45"
2) 68°17'30"
AVG: 214°08'45"
12 to 13: 347.148

| STA | B.S | HI | F.S. | ELEV | DESC |
|---|---|---|---|---|---|
| TBM #2 | +4.879 | 673.281 | | 678.16 | |
| TBM #3 | | | -1.568 | 671.713 | |
| | -1.570 | 673.283 | | | |
| TBM #2 | | | +4.877 | 678.16 | ✓ |

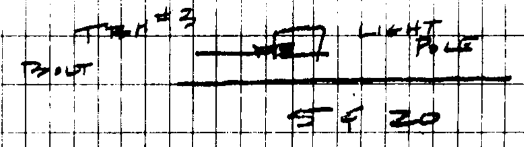
20° CLOUDY

VA
MF
JV



← RR SPIKE IN P.P. #5

← SOUTH WEST BOLT ON LIGHT POLE
NORTH SIDE OF RT 5 & 20 WEST BOUND



MF
JV

12-11-90 N.Y.S. Gas & Electric Co.

McMaster St

⊼ @ ℞ 13 0°-00" on ℞ 12 (347.142)

to: Aux ℞ 16 1) 226° 33' 35"

2) 93° 06' 00"

Avg 226° 33' 30"

13-16 = 221.322

HI @ ⊼ (Tam #6 669.803) - (+4.183) = 665.620

to:

| STA | ∡ | DIST | D/E | ELEV | DESC |
|---|---|---|---|---|---|
| ✕ Iron Fnd | 61°-10-20 | 49.852 | | | 127 |
| I.P.F. | 234-28-00 | 77.552 | -6.3 | | 128 |
| I.P.F. | 255-33-35 | 138.835 | -6.3 | | 129 |
| IPF | 270-19-35 | 92.733 | -5.8 | | 130 |
| IPF | 245-45-05 | 219.708 | | | 131 |
| Adj. Bldg. Cor | 225-59 | 180.9 | -7.0 | | 132 |
| — " — | 221-10 | 102.3 | -7.4 | | 133 |
| — " — | 192-24 | 94.8 | -5.7 | | 134 |
| BOS (Gravel) | 194-13 | 55.2 | -5.0 | | 135 |
| TOS | 163-35 | 33.7 | 0.2 | | 136 |
| Grade | 99-53 | 40.6 | 2.9 | | 137 |
| ℄ Tracks | 68-31 | 101.1 | 3.7 | | 138 |
| — " — | 47-48 | 82.8 | 3.8 | | 139 |
| Cor T.O.B. | 43-01 | 19.3 | 2.0 | | END € HS<br>Conc Rewall |
| TOB | 303-04 | 6.1 | -0.8 | | 141 |
| Pole 8.2 | 242-05 | 38.0 | -4.8 | | 142 |

⊼ @ ℞ 13 00-00 on ℞ 12 (Con't)

| STA | ∡ | DIST | D/E | ELEV | DESC |
|---|---|---|---|---|---|
| Grade | 240-04 | 85.1 | -6.5 | | 143 |
| CGAM-SS-1 | 245-25 | 39.2 | | | 144<br>Stake |
| Grade | 237-10 | 179.3 | -6.9 | | 145 |
| TOB | 237-14 | 221.5 | -6.2 | | 146<br>R Wall |
| Grade | 247-06 | 181.2 | +6.8 | | 147 |
| — " — | 256-53 | 116.8 | -6.2 | | 148 |
| — " — | 281-20 | 54.5 | +6.0 | | 149 |
| Grade Cor R# Wall | 328-16 | 41.0 | -6.1 | | 150<br>Bottom |
| BOS | 357-57 | 18.7 | -5.6 | | 151 |
| Top of Wall | 329-32 | 40.7 | 0.5 | | 152 |
| Pole | 171-29 | 73.5 | -1.8 | | 153 |
| Cor R# Walls | 354-05 | 59.8 | 1.9 | | 154 |
| ℄ Tracks | 04-13 | 84.7 | 4.0 | | 155 |
| — " — | 337-28 | 119.4 | 4.2 | | 156 |
| Grade | 329-04 | 109.1 | 2.9 | | 157 |
| ℄ Top Conc Wall | 324-23 | 107.6 | 0.0 | | 158 |
| Bottom — " — | — " — | — " — | -6.1 | | 159 |
| Bldg Cor | 287-55 | 131.2 | -5.9 | | 160 |
| — " — | 275-11 | 149.5 | -5.7 | | 161 |
| Grade | 257-37 | 204.9 | -5.7 | | 162 |
| TOB | 255-08 | 231.9 | -5.3 | | 163 |
| — " — | 265-08 | 238.9 | -3.5 | | 164 |

12/11/90

NYSEG
McMaster St

UA
JU
MF

⊼@ 13 00-00 B 12
(HI = 665.62)

| STA | ∡ | DIST. | DIF | ELEV | DESC |
|---|---|---|---|---|---|
| SS-2 | 262-49 | 214.4 | -5.6 | | 165 |
| GRADE | 269-00 | 215.6 | -5.3 | | 166 |
| -"- | 296-39 | 162.0 | -5.9 | | 167 |
| BLDG COR | 302-46 | 161.4 | -6.1 | | OLD WOOD FRAME 168 |
| -"- | 305-24 | 192.2 | -4.3 | | 169 |
| B.O.S. | 309-12 | 190.1 | -0.5 | | 875 * 1FEET |
| T.O.S | 309-32 | 192.3 | +0.2 | | END CONC RE-WALL 171 |
| ℄ TRACKS | 317-41 | 205.1 | 4.8 | | 172 |
| I.P.F | 143-56-00 | 138.589 | -0.9 | | 173 |
| 3 IRON FND | 143-09-45" | 150.515 | | | 174 |

⊼@ 13-00-00 B 12
to B 14 1) 311-44-20
2) 263-29-05
ANG 311-44-32.5"
13-14 = 286.449'

⊼@ AUX 14 00-00 B 13 (221.822)
HI@ 16 (TANK 6 669.803) - (+10.125) = 657.678

| to: | ∡ | DIST | | | |
|---|---|---|---|---|---|
| BOS | 127-38 | 14.7' | -6.2 | | (EDGE WATER) 175 |
| CGAM SE SW 3 | 276-39 | 50.8 | -0.5 | | STAKE 176 |
| BOS | 271-33 | 51.1 | -5.8 | | EDGE WATER 177 |
| RIM M.H. | 282-04 | 77.2 | -0.1 | | (T.O.B) 178 |
| BOS | 274-20" | 87.4 | -5.8 | | EDGE WATER 179 |
| T.O.S | 280-12 | 158.3 | 5.2 | | 12 3/32' 2 PE 180 |
| ℄ TOWER | 288-01 | 178.9' | 2.5 | | STEEL TOWER 12'x12' 181 |
| GRADE | 294-04 | 173.2 | 3.0 | 662.48 | 182 |
| -"- | 308-49 | 184.0 | 0.5 | | 183 |
| ℄ TOWER | 75-49 | 47.2 | -0.9 | | 3x5' 184 |

⊼@ B 14 00-00 B 13 14-13 = 286.446
to B 15 1) 145°-11'-25"
2) 290°-22'-45
ANG 145-11-22.5
14-15 = 251.610

(CONT)

12/11/90

NYSG&E
McMaster St
Site

⊼ @ 14 00.00 B 13

HI @ B 14 = (670.883) TBM 4 - (+0.161) = 670.722

to:

| Sta | ∡ | Dist | DIE | Elev | Desc | |
|---|---|---|---|---|---|---|
| ¢ Tracks | 352-32 | 35.7' | 0.00 | | | 185 |
| TOB | 53°-35 | 44.8' | -1.7 | | | 186 |
| BOS | 59-25 | 48.3 | -2.0 | 664.92 | (8.75) # 1 FE | 187 |
| CGAM - SS-3 | 78-19 | 116.9' | -0.7 | 664.16 | # 2 FE Stake (12.8) | 188 |
| Top of Wall ¢ | 78-30 | 127.2 | -6.0 Bot<br>0.1 Top | | @ ¢ DAM (12.23) # 2 FE | 189 |
| CGAM SW SE 2 | 80-35 | 139.6 | -4.1 | | 12.23 # 2 FE | 190 |
| CGAM SS 4 | 98-37 | 98.7 | -2.5 | | # 1 FE | 191 |
| BOB | 112-49 | 85.2 | -6.0 | | | 192 |
| TOB | 127-42 | 66.1 | +0.1 | | | 193 |
| ¢ Tracks | 148-08 | 57.9 | -0.8 | | | 194 |
| —"— | 150-10 | 130.8 | -1.2 | | | 195 |
| TOB | 136-56 | 142.9' | 0.7 | | | 196 |
| Grav. Mon | 226-01-20 | 23.50' | | | | 197 |

⊼ @ B 15 00.00 B 14 251.564

to HI @ B 15 = (672.803) TBM 5 - (-0.190) = 672.993

to

| | ∡ | Dist | ΔE | Elev | | |
|---|---|---|---|---|---|---|
| BOS | 17-34 | 97.8 | -8.9 | | | 198 |
| Top End ¢ Wall | 19-33 | 29.4 | -10.0 Bot -<br>-5.0 Top | | (8.75) # 1 FE @ Bridge Pier | 199 |
| CGAM SW SE 1 | 217-45 | 64.5 | -4.8 | 201 | (15.70) # 3 FE | 200 |
| BOS | 215-01 | 65.5 | -5.5 | | (15.90) edge water # 3 FE | 202 |
| —"— | 224-51 | 97.3 | -12.6 | 201 | (8.75) # 1 FE | 203 |
| TOB | 239-01 | 89.0 | -6.2 | 202 | | 204 |
| Edge Gravel | 240-18 | 91.4 | -5.5 | | | 205 |
| TOB | 237-38 | 60.6 | -9.4 | | | 206 |
| TOB | 246-37 | 37.2 | -9.2 | | | 207 |
| Edge Gravel | 278-40 | 47.5 | -9.4 | | | 208 |
| Grade | 298-49 | 74.3 | -9.4 | | | 209 |
| —"— | 256-17 | 60.2 | -7.3 | | | 210 |
| Edge Water | 86°46' | 33.6 | -16.1 | | | 211 |
| ¢ End Pier | 273°41 | 27.9 | -2.7 | | | 212 |
| —"— | 320°32 | 36.1 | -2.7 | | | 213 |
| —"— | 08°17' | 48.4 | -2.7 | | | 214 |
| Abut Conc | 64°11' | 67.9 | -2.8 | 670.19 | | 215 |

12-11

NYS G&E
McMaster St
Site

⊼ @ B̲ 15 0°-00' on B̲ 14 (251.564)
to: B̲ 10 1) 302-35-~~35~~
2) 245-11-30 (1:22)
Avg- 302-35-45
15-10 = 473.382

⊼ @ B̲ 15 0°-00' on B̲ 14 (251.504)
to: Aux. B̲ 17 1) 47°-33'-20"
2) 95-06-40
Avg = 47-33-20
15-17 = 182.496'

⊼ @ Aux B̲ 17 0°00' on B̲ 15 (182.486)
to

HI @ ⊼ (Tiem #5) (672.803) - (15.285) = 657.518

| STA | ∡ | DIST | DIE | ELEV | DESC |
|---|---|---|---|---|---|
| Top of Wall | 33-52 | 72.2 | 2.3 Bot<br>6.8 Top | | Prison Edge 210 |
| — " — | 15.32 | 105.4 | 1.8 Bot<br>6.8 Top | | — " — 211 |
| Edge Water | 211-14 | 14' | ~~[illegible]~~ | | 218 |
| — " — | 274-35 | 18' | 1.0 | | 219 |
| — " — | 326-11 | 55' | -1.0 | | 220 |

30°

VA
NF
TJ

12-11-90

N.Y.S
Gas & Electric Co.

1

20° Cloudy

MF
JV

| STA | + | HI | − | ELEV | DESC |
|---|---|---|---|---|---|
| TBM#3 | 0.91 | 672.623 | | 671.713 | |
| TBM#4 | | | 1.74 | 670.883 | ← RxR spike on RxR tracks near ℞ 14 |
| | 5.99 | 676.873 | | | |
| TBM#5 | | | 4.07 | 672.803 | ← T Bolt on RxR tracks. near ℞ 15 |
| | 2.82 | 675.623 | | | |
| TBM#6 | | | 5.82 | 669.803 | ← RxR spike on RxR tracks |
| | 4.92 | 674.723 | | | |
| TBM#3 | | | 3.00 | 671.723 | (0.01)✓ |

# APPENDIX E

## HEALTH AND SAFETY PLAN

## HEALTH AND SAFETY PLAN

This Health and Safety Plan (HASP) addresses the health and safety practices that will be employed by all site workers participating in the preliminary investigation of the NYSEG manufactured gas plant sites. The HASP takes into account the specific hazards inherent to the sites and presents procedures to be followed by Atlantic Environmental Services, Inc. (Atlantic) and its subcontractors in order to avoid and, if necessary, deal with potential health and/or safety problems. All activities performed under this HASP will comply with OSHA Regulations 29 CFR Part 1926 and 1910, particularly 1910.26.

This plan is based on an initial assessment of health and safety risks associated with the sites. The plan will be updated if necessary as additional information is obtained on the materials present at the sites and their associated health and safety risks. For example, additional hazardous substance data sheets may need to be included as more data are gathered.

### Medical Surveillance Program

Atlantic maintains a continuous in-house medical surveillance program designed specifically for field personnel engaged in work at sites where hazardous or toxic materials may be present. Atlantic employs a company physician, Dr. Martin Cherniak, who is a specialist in occupational health. Yearly comprehensive examinations are conducted on all field personnel on Atlantic's staff.

Dr. Cherniak's address and telephone number are:

Office:

Lawrence & Memorial Occupational Health Center
Suite 2B, 404 Thames Street
Groton, Connecticut 06340

Telephone: 203-445-4551

Upon employment with Atlantic and prior to performing any major site investigation activities, all field personnel undergo a complete physical examination, including a detailed medical and occupational history. The following tests are performed as part of the examination:

- Complete blood workup (38 analyses), including screens for particular toxicants anticipated at various types of sites (see Exhibit E-1 for list of recommended blood tests).
- Urine analysis, including screens for metals and indicators of proper kidney and liver function.
- Pulmonary Function
- Electrocardiogram
- Chest X-ray
- Hearing and eye exam

Upon completion of these tests, the physician certifies whether personnel are fit for field work in general, and fit to use all levels of respiratory protection, in particular.

In the event that an employee of Atlantic or any other member of the field team is exposed to some form of hazardous substance or wishes to be rechecked because he shows symptoms of exposure, he must inform the site safety supervisor who will send the employee for an examination. The company's physician also acts as a consultant to all subcontractors participating in the field effort and will provide information on health risks associated with various chemical substances when needed. Material Safety Data Sheets for potential site contaminants are presented in Exhibit E-2.

## Preparation for Medical Emergencies

Before field work on the site commences, each person who will be working there or observing the operations will complete a medical data sheet that includes the following information:

1. Name, address, home phone
2. Age, height, weight
3. Name of person to be notified in case of emergency
4. All prescription and non-prescription medications currently being used
5. Allergies
6. Particular sensitivities
7. Does he/she wear contact lenses
8. Short medical history including list of previous illnesses
9. Name of personal physician and phone

These data sheets will be filled out before any work begins on the site. Their maintenance will be the responsibility of the designated site safety supervisor (see Exhibit E-3 for sample data sheet).

In the event of an incident where a team member becomes exposed to or suffers from an acute symptom of exposure to site materials, a copy of his/her medical data sheet will be presented to the attending physician upon arrival at the hospital.

## First Aid for Injuries Incurred During Field Work

All injuries, no matter how slight, will be reported to the site safety supervisor immediately. An accident report (Exhibit E-4) will be completed by the safety supervisor for all accidents.

First-aid equipment will be available onsite under the control of the site safety supervisor.

When possible, site workers will refrain from administering first aid for serious injury or illness and await the arrival of professional paramedics at the site to take the appropriate action. Unless they are in immediate danger, injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

### First Aid Equipment List

The first aid kit that will be kept at the site will consist of a weatherproof container with individually sealed packages for each type of item. The kit will include at least the following items:

- Gauze roller bandages, 1 inch and 2 inch
- Gauze compress bandages, 4 inch
- Gauze pads, 2 inch
- Adhesive tape, 1 inch
- Bandaids, 1 inch
- Butterfly bandages
- Triangular bandages, 40 inch
- Ampules of ammonia inhalants
- Antiseptic applicators or swabs
- Burn dressing and sterilized towels
- Surgical scissors
- Eye dressing
- Emergency eye wash
- Tourniquet
- Alcohol
- Hydrogen peroxide

## Record of Injuries Incurred Onsite

### Occupational Injuries and Illnesses Form (OSHA 200)

All occupational injuries and illnesses that are required to be recorded under the Occupational Safety and Health Act will be registered on OSHA Form 200 (Exhibit E-5). Occupational injuries and illnesses will be recorded by the site safety supervisor within 48 hours of occurrence as required by statute.

### Employer's First Report of Injury

This form (Exhibit E-6) will be completed by the site safety supervisor for all accidents involving worker injury at the site. Follow-up procedures will include investigation of each accident or near-miss by the safety engineer to assure that no similar accidents that may lead to injuries occur.

## Training Programs

Formal health and safety training and specific onsite training are essential aspects of any successful investigation of a site suspected of containing hazardous or potentially hazardous materials. The following subsections address both formal health and safety training requirements and a specific onsite training program.

### Health and Safety Training

All of Atlantic's field personnel have attended a health and safety training course in which they were taught the potential hazards of site work and how to avoid and deal with them. A list of Atlantic personnel who may work at the NYSEG sites are provided below with the titles and dates of the most recent safety courses they attended.

| ATLANTIC PERSONNEL | COURSE | DATE |
|---|---|---|
| James Gould | Health and Safety Training for Hazardous Waste Activities - Geraghty and Miller | 9/16/88 |
| Anna Sullivan | Health and Safety Training for Hazardous Waste Activities - Geraghty and Miller | 8/13/90 |
| Peter Georgetti | Health and Safety Operations at Hazardous Materials Sites - Geo-Environmental Consultants | 10/19/90 |

The training courses consist of classroom instruction, field demonstrations, use of respirators, use of appropriate protective clothing, and written and field tests. The training covers the OSHA and HAZWOPER requirements. They cover the following topics:

1. Identification of hazardous substances
2. Properties of hazardous substances
3. Routes of exposure
4. Toxicity of different substances and their synergistic effects
5. Practical considerations in health and safety management
6. Physical properties of chemicals
7. References for threshold limit values (TLV), lower explosion limits (LEL), toxicity data, cross references

8. Technical assistance organization
9. Air monitoring and survey instruments
10. Site entry and egress procedures
11. Heat stress monitoring
12. Levels of personal protection
13. Controlling access to work zones and other contaminated areas
14. Personnel decontamination
15. Equipment decontamination
16. Site/area safety planning

Everyone attending the courses was tested for the fit of their personal respirator and was trained in using self-contained breathing apparatus and Level B equipment. The courses also emphasized the importance and procedures of decontamination.

Health and safety training is an ongoing activity at Atlantic. Yearly refresher courses or site-specific training programs are presented as needed to keep field personnel up to date with proper health and safety practices.

**Levels of Protection for Site Workers**

Levels of protection specified by the EPA refer largely to requirements for respiratory protection. The lists below stipulate equipment for respiratory, clothing, and other types of protection that will be required for different tasks during the NYSEG site investigation. The designated levels of protection are based on evaluation of potential hazards and risks associated with work at the NYSEG site, and Atlantic's experience on other MGP sites.

Based on HNu (PID) readings in the work zone for each site activity, the criteria for maintaining or revising levels of protection are as follows:

| | |
|---|---|
| Background (ambient) | Level D - Splash suit, rubber boots and goggles |
| 5-50 ppm above ambient | Level C - Facepiece respirator, splash suit, rubber boots, gloves and goggles |
| 50-500 ppm above ambient | Level B - Positive Pressure SCBA, hooded disposable coveralls, rubber boots, gloves and radio. |
| 500-1000 ppm above ambient | Level A - Positive Pressure SCBA, chemical resistant encapsulated suit, inner and outer gloves and two-way radio. |

If HNu (PID) readings greater than 50 ppm are detected, work will be stopped and workers will retreat and call for advice.

## Anticipated Levels of Protection for Specific Site Activities

| Site Activity | Health Risk | Level of Protection |
|---|---|---|
| 1. Topographic Survey | Low | Modified D |
| 2. Surface Soil Sampling | Low | Modified D |
| 3. Surface Water Sampling | Low | Modified D |
| 4. Sediment Sampling | Low | Modified D |
| 5. Air Sampling | Low | Modified D |

Modified Level D protection consists of long pants and shirts, and gloves and goggles (if needed) when sampling.

## Signatures of Field Team Members and Observers

THIS SITE HEALTH AND SAFETY PLAN HAS BEEN READ BY:

(Signatures of site investigation team members and observers who have been through site safety briefing and have read this health and safety plan.)

| Name | Signature | Date | Firm | Phone |
|---|---|---|---|---|
| Anna Sullivan | ______________ | 11/1/90 | Atlantic Env. | (203)537-0751 |
| Peter Georgetti | ______________ | 11/13/90 | Atlantic Env. | (203)537-0751 |

## Anticipated Levels of Protection for Specific Site Activities

| Site Activity | Health Risk | Level of Protection |
|---|---|---|
| 1. Topographic Survey | Low | Modified D |
| 2. Surface Soil Sampling | Low | Modified D |
| 3. Surface Water Sampling | Low | Modified D |
| 4. Sediment Sampling | Low | Modified D |
| 5. Air Sampling | Low | Modified D |

Modified Level D protection consists of long pants and shirts, and gloves and goggles (if needed) when sampling.

## Signatures of Field Team Members and Observers

THIS SITE HEALTH AND SAFETY PLAN HAS BEEN READ BY:

(Signatures of site investigation team members and observers who have been through site safety briefing and have read this health and safety plan.)

| Name | Signature | Date | Firm | Phone |
|---|---|---|---|---|
| Anna Sullivan | Anna Sullivan | 11/1/90 | Atlantic Env. | (203)537-0751 |
| Peter Georgetti | | 11/13/90 | Atlantic Env. | (203)537-0751 |

# EXHIBIT E-1

# RECOMMENDED BLOOD TESTS

EXHIBIT E-1 RECOMMENDED BLOOD TESTS

| MEDICAL SURVEILLANCE PROGRAM | | |
|---|---|---|
| **FUNCTION** | **TEST** | **EXAMPLE** |
| Liver: | Blood Tests | Total protein, albumin globulin, total bilirubin (direct bilirubin if total is elevated). |
| Kidney: | Blood Tests | Blood urea nitrogen (BUN), creatinine, uric acid. |
| Blood-Forming Function: | Blood Tests | Complete blood count (CBC) with differential and platelet evaluation, including white cell count (WBC), red blood count (RBC), hemoglobin (HGB), hematocrit or packed cell volume (HCT), and desired erythrocyte indices. Reticulocyte count may be appropriate if there is a likelihood of exposure to hemolytic chemicals. |

NOTE: From *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*; October 1985; DHHS (NIOSH) Publication No. 85-115.

# EXHIBIT E-2

# MATERIAL DATA SAFETY SHEETS

# Material Safety Data Sheet

From Genium's Reference Collection

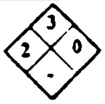
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

No. 316

BENZENE
(Revision D)
Issued: November 1978
Revised: April 1988

## SECTION 1. MATERIAL IDENTIFICATION

25



**Material Name:** BENZENE

**Description (Origin/Uses):** Used in the manufacture of medicinal chemicals, dyes, linoleum, airplane dopes, varnishes, and lacquers; and as a solvent for waxes, resins, and oils.

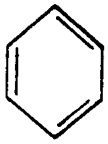
**Other Designations:** Benzol; Phene; Phenylhydride; $C_6H_6$; NIOSH *RTECS* No. CY1400000; CAS No. 0071-43-2

**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

| HMIS | | | |
|---|---|---|---|
| H | 2 | | |
| F | 3 | R | 1 |
| R | 0 | I | 4 |
| PPG* | | S | 2 |
| *See sect. 8 | | K | 4 |

## SECTION 2. INGREDIENTS AND HAZARDS

| | % |
|---|---|
| Benzene, CAS No. 0071-43-2 | Ca 100 |



*See NIOSH, *RTECS*, for additional data with references to irritative, mutagenic, tumorigenic, and reproductive effects.

### EXPOSURE LIMITS

**OSHA PEL**

8-Hr TWA: 1 ppm
15-Min Ceiling: 5 ppm
Action Level: 0.5 ppm

**ACGIH TLV, 1987-88**

TLV-TWA: 10 ppm, 30 mg/m$^3$

**Toxicity Data***

Human, Inhalation, $LC_{Lo}$: 2000 ppm/5 Min
Human, Oral, $TD_{Lo}$: 130 mg/kg
Human, Inhalation, $TC_{Lo}$: 210 ppm

## SECTION 3. PHYSICAL DATA

**Boiling Point:** 176°F (80°C)
**Melting Point:** 42°F (5.5°C)
**Vapor Pressure:** 75 Torrs at 68°F (20°C)
**Vapor Density (Air = 1):** >1

**Water Solubility (%):** Slight
**% Volatile by Volume:** 100
**Molecular Weight:** 78 Grams/Mole
**Specific Gravity ($H_2O$ = 1):** 0.87865 at 68°F (20°C)

**Appearance and Odor:** A colorless liquid; characteristic aromatic odor.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temperature | Flammability Limits in Air | LOWER | UPPER |
|---|---|---|---|---|
| 12°F (-11.1°C) CC | 928°F (498°C) | % by Volume | 1.3% | 7.1% |

**Extinguishing Media:** Use dry chemical, foam, or carbon dioxide to put out benzene fires. Water may be ineffective as an extinguishing agent because it can scatter and spread the fire. Use water 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 vapor is heavier than air and can collect in low-lying areas such as sumps or wells. Eliminate all sources of ignition there to prevent a dangerous flashback to the original liquid benzene. **Danger:** Explosive and flammable benzene vapor-air mixtures can easily form at room temperature; always use this material in a way that minimizes dispersion of its vapor into general work areas.
**Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

Benzene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

**Chemical Incompatibilities:** Hazardous chemical reactions involving benzene and the following materials are reported in Genium reference 84: bromine pentafluoride, chlorine, chlorine trifluoride, chromic anhydride, nitryl perchlorate, oxygen, ozone, perchlorates, perchloryl fluoride and aluminum chloride, permanganates and sulfuric acid, potassium peroxide, silver perchlorate, and sodium peroxide.

**Conditions to Avoid:** Avoid all exposure to sources of ignition and to incompatible chemicals.

**Hazardous Products of Decomposition:** Toxic gases like carbon monoxide (CO) may be produced during benzene fires.

## SECTION 6. HEALTH HAZARD INFORMATION

Benzene is listed as a suspected human carcinogen by the ACGIH.

**Summary of Risks:** Prolonged skin contact with benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. Continued exposure can cause collapse, bronchitis, and pneumonia. The most important health hazards are cancer (leukemia), bone marrow effects, and injuries to the blood-forming tissue from chronic low-level exposure.

**Medical Conditions Aggravated by Long-Term Exposure:** Ailments of the heart, lungs, liver, kidneys, blood, and central nervous system (CNS) may be worsened by exposure. Administer preplacement and periodic medical exams emphasizing these organs' functions and reassign workers who test positive. **Target Organs:** Blood, CNS, bone marrow, eyes, and upper respiratory tract (URT). **Primary Entry:** Skin contact, inhalation. **Acute Effects:** Dizziness, mental dullness, nausea, headache, fatigue, and giddiness. **Chronic Effects:** Possible cancer (leukemia).

**FIRST AID**

**Eyes:** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.

**Skin:** Immediately wash the affected area with soap and water.

**Inhalation:** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed.

**Ingestion:** Never give anything by mouth to someone who is unconscious or convulsing. Do not induce vomiting because of the possibility of aspiration.

**GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.**

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Cleanup personnel need protection against contact with and inhalation of vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.

**Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations for disposal. Follow Federal, state, and local regulations.

**OSHA Designations**

Air Contaminant (29 CFR 1910.1000 Subpart Z)

**EPA Designations (40 CFR 302.4)**

RCRA Hazardous Waste, No. U019

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg)

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow the eye- and face-protection guidelines in 29 CFR 1910.133. **Respirator:** Wear a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. For emergency or nonroutine use (e.g., cleaning reactor vessels or storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., to prevent any possibility of skin contact with this suspected human carcinogen. **Ventilation:** Install and operate general and local ventilation systems powerful enough to maintain airborne levels of benzene below the OSHA PEL standard cited in section 2.

**Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in use and handling areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale benzene vapor!

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage/Segregation:** Store benzene in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals.

**Special Handling/Storage:** Protect containers from physical damage. Electrically ground and bond all metal containers used in shipping or transferring operations. Follow all parts of 29 CFR 1910.1028.

**Engineering Controls:** All engineering systems (production, transportation, etc.) must be of maximum explosion-proof design (non-sparking, electrically grounded and bonded, etc.)

**Comments:** If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if it is absolutely essential.

**Transportation Data (49 CFR 172.101-2)**

**DOT Shipping Name:** Benzene

**DOT Class:** Flammable Liquid

**DOT Label:** Flammable Liquid

**DOT ID No.** UN1114

**IMO Label:** Flammable Liquid

**IMO Class:** 3.2

**References:** 1, 2, 12, 73, 84-94, 100, 103.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

# Material Safety Data Sheet

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

No. 317
TOLUENE
(Revision D)

Issued: August 1979
Revised: April 1986

## SECTION 1. MATERIAL IDENTIFICATION

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MATERIAL NAME TOLUENE

OTHER DESIGNATIONS: Methyl Benzene, Methyl Benzol, Phenylmethane, Toluol, $C_7H_8$, CAS #0108-88-3

MANUFACTURER/SUPPLIER: Available from many suppliers, including:
Allied Corp., PO Box 2064R, Morristown, NJ 07960; Telephone: (201) 455-4400
Ashland Chemical Co., Industrial Chemicals & Solvents Div., PO Box 2219, Columbus, OH; Telephone: (614) 889-3844

HMIS
H: 2
F: 3
R: 0
PPE*
*See sect. 8

R 1
I 3
S 2
K 4

## SECTION 2. INGREDIENTS AND HAZARDS

| | % | HAZARD DATA |
|---|---|---|
| Toluene<br><br>CH3 | ca 100 | 8-hr TLV: 100 ppm, or 375 $mg/m^3$* (Skin)**<br>Man, Inhalation, TCLo: 100 ppm: Psychotropic***<br>Rat, Oral, $LD_{50}$: 5000 mg/kg<br>Rat, Inhalation, LCLo: 4000 ppm/4 hrs.<br>Rabbit, Skin, $LD_{50}$: 14 gm/kg<br>Human, Eye: 300 ppm |

* Current (1985-86) ACGIH TLV. The OSHA PEL is 200 ppm with an acceptable ceiling concentration of 300 ppm and an acceptable maximum peak of 500 ppm/10 minutes.

** Skin designation indicates that toluene can be absorbed through intact skin and contribute to overall exposure.

*** Affects the mind.

## SECTION 3. PHYSICAL DATA

Boiling Point ... 231°F (111°C)
Vapor Pressure @ 20°C, mm Hg ... 22
Water Solubility @ 20°C, wt. % ... 0.05
Vapor Density (Air = 1) ... 3.14

Evaporation Rate (BuAc = 1) ... 2.24
Specific Gravity ($H_2O$ = 1) ... 0.866
Melting Point ... -139°F (-95°C)
Percent Volatile by Volume ... ca 100
Molecular Weight ... 92.15

Appearance and odor: Clear, colorless liquid with a characteristic aromatic odor. The odor is detectable to most individuals in the range of 10 to 15 ppm. Because olfactory fatigue occurs rapidly upon exposure to toluene, odor is not a good warning property.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temp. | Flammability Limits In Air | LOWER | UPPER |
|---|---|---|---|---|
| 40°F (4°C) CC | 896°F (480°C) | % by Volume | 1.27 | 7.1 |

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol foam. Do not use a solid stream of water because the stream will scatter and spread the fire. Use water spray to cool tanks/containers that are exposed to fire and to disperse vapors.

UNUSUAL FIRE/EXPLOSION HAZARDS: This OSHA class IB flammable liquid is a dangerous fire hazard. It is a moderate fire hazard when exposed to oxidizers, heat, sparks, or open flame. Vapors are heavier than air and may travel a considerable distance to an ignition source and flash back.

SPECIAL FIRE-FIGHTING PROCEDURES: Fire fighters should wear self-contained breathing apparatus with full facepiece operated in a positive-pressure mode when fighting fires involving toluene.

## SECTION 5. REACTIVITY DATA

CHEMICAL INCOMPATIBILITIES: Toluene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material is incompatible with strong oxidizing agents, dinitrogen tetraoxide, silver perchlorate, tetranitromethane, and uranium hexafluoride. Contact with these materials may cause fire or explosion. Nitric acid and toluene, especially in the presence of sulfuric acid, will produce nitrated compounds that are dangerously explosive.

CONDITIONS TO AVOID: Avoid exposure to sparks, open flame, hot surfaces, and all sources of heat and ignition. Toluene will attack some forms of plastics, rubber, and coatings. Thermal decomposition or burning produces carbon dioxide and/or carbon monoxide.

## SECTION 6. HEALTH HAZARD INFORMATION |TLV

Toluene is not considered a carcinogen by the NTP, IARC, or OSHA. SUMMARY OF RISKS: Vapors of toluene may cause irritation of the eyes, nose, upper respiratory tract, and skin. Exposure to 200 ppm for 8 hours causes mild fatigue, weakness, confusion, lacrimation (tearing) and paresthesia (a sensation of prickling, tingling, or creeping on the skin that has no objective cause). Exposure to higher concentrations may cause headache, nausea, dizziness, dilated pupils, and euphoria, and, in severe cases, may cause unconsciousness and death. The liquid is irritating to the eyes and skin. Contact with the eyes may cause transient corneal damage, conjunctival irritation, and burns if not promptly removed. Repeated and/or prolonged contact with the skin may cause drying and cracking. It may be absorbed through the skin in toxic amounts. Ingestion causes irritation of the gastrointestinal tract and may cause effects resembling those from inhalation of the vapor. Chronic overexposure to toluene may cause reversible kidney and liver injury. FIRST AID: EYE CONTACT: Immediately flush eyes, including under eyelids, with running water for at least 15 minutes. Get medical attention if irritation persists.* SKIN CONTACT: Immediately flush skin (for at least 15 minutes) while removing contaminated shoes and clothing. Wash exposed area with soap and water. Get medical attention if irritation persists or if a large area has been exposed.* INHALATION: Remove victim to fresh air. Restore and/or support breathing as required. Keep victim warm and quiet. Get medical help.* INGESTION: Give victim 1 to 2 glasses of water or milk. Contact a poison control center. Do not induce vomiting unless directed to do so. Transport victim to a medical facility. Never give anything by mouth to a person who is unconscious or convulsing. * GET MEDICAL ASSISTANCE = In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid, if indicated.

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Limit access to spill area to necessary personnel only. Remove leaking containers to safe place if feasible. Cleanup personnel need protection against contact with liquid and inhalation of vapor (see sect. 8).
WASTE DISPOSAL: Absorb small spills with paper towel or vermiculite. Contain large spills and collect if feasible, or absorb with vermiculite or sand. Place waste solvent or absorbent into closed containers for disposal using nonsparking tools. Liquid can be flushed with water to an open holding area for handling. Do not flush to sewer, watershed, or waterway.
COMMENTS: Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Consider reclaiming by distillation. Contaminated absorbent can be buried in a sanitary landfill. Follow all Federal, state, and local regulations. TLm 96: 100-10 ppm. Toluene is designated as a hazardous waste by the EPA. The EPA (RCRA) HW No. is U220 (40 CFR 261). The reportable quantity (RQ) is 1000 lbs/454 kg (40 CFR 117).

## SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Ventilation fans and other electrical service must be nonsparking and have an explosion-proof design. Exhaust hoods should have a face velocity of at least 100 lfm (linear feet per minute) and be designed to capture heavy vapor. For emergency or nonroutine exposures where the TLV may be exceeded, use an organic chemical cartridge respirator if concentration is less than 200 ppm and an approved canister gas mask or self-contained breathing apparatus with full facepiece if concentration is greater than 200 ppm.
Safety glasses or splash goggles should be worn in all work areas. Neoprene gloves, apron, face shield, boots, and other appropriate protective clothing and equipment should be available and worn as necessary to prevent skin and eye contact. Remove contaminated clothing immediately and do not wear it until it has been properly laundered.

Eyewash stations and safety showers should be readily available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store in a cool, dry, well-ventilated area away from oxidizing agents, heat, sparks, or open flame. Storage areas must meet OSHA requirements for class IB flammable liquids. Use metal safety cans for handling small amounts. Protect containers from physical damage. Use only with adequate ventilation. Avoid contact with eyes, skin, or clothing. Do not inhale or ingest. Use caution when handling this compound because it can be absorbed through intact skin in toxic amounts. SPECIAL HANDLING/STORAGE: Ground and bond metal containers and equipment to prevent static sparks when making transfers. Do not smoke in use or storage areas. Use nonsparking tools. ENGINEERING CONTROLS: Preplacement and periodic medical exams emphasizing the liver, kidneys, nervous system, lungs, heart, and blood should be provided. Workers exposed to concentrations greater than the action level (50 ppm) should be examined at least once a year. Use of alcohol can aggravate the toxic effects of toluene.
COMMENTS: Emptied containers contain product residues. Handle accordingly!
Toluene is designated as a hazardous substance by the EPA (40 CFR 116). DOT Classification: Flammable liquid. UN1294.
Data Source(s) Code: 1-9, 12, 16, 20, 21, 24, 26, 34, 81, 82. CR

Approvals J.O. Accacia, 11/86.
Indust. Hygiene/Safety DW 10-86
Medical Review Oct 86

# Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 318

XYLENE (Mixed Isomers)
(Revision D)
Issued: November 1980
Revised: August 1988

## SECTION 1. MATERIAL IDENTIFICATION

26

**Material Name:** XYLENE (Mixed Isomers)
**Description (Origin/Uses):** Used as a raw material for the production of benzoic acid, phthalic anhydride, isophthalic and terephthalic acids and their dimethyl esters in the manufacture of polyester fibers; in sterilizing catgut; with Canadian balsam as oil-immersion in microscopy; and as a cleaning agent in microscopic techniques.
**Other Designations:** Dimethylbenzene; Xylol; $C_8H_{10}$; CAS No. 1330-20-7
**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.
**Comments:** Although there are three different isomers of xylene (*ortho*, *meta*, and *para*), the health and physical hazards of all three isomers are very similar. This MSDS is written for a xylene mixture of all three isomers, which is usually commercial xylene.

3
2 0
-
**NFPA**

HMIS
H 2
F 3
R 0
PPG*
*See sect. 8

R 1
I 3
S 2
K 3

| SECTION 2. INGREDIENTS AND HAZARDS | % | EXPOSURE LIMITS |
|---|---|---|
| Xylene (Mixed Isomers), CAS No. 1330-20-7*<br>*$o$-Xylene, CAS No. 0095-47-6<br>$m$-Xylene, CAS No. 0108-38-3<br>$p$-Xylene, CAS No. 0106-42-3<br>**Check with your supplier to determine if there are additions, contaminants, or impurities (such as benzene) that are present in reportable quantities per 29 CFR 1910.<br>***Immediately dangerous to life and health.<br>**** See NIOSH, *RTECS* (No. ZE2100000), for additional data with references to reproductive, irritative, and mutagenic effects. | ** | IDLH*** Level: 1000 ppm<br>**OSHA PEL**<br>8-Hr TWA: 100 ppm, 435 mg/m³<br>**ACGIH TLVs, 1987-88**<br>TLV-TWA: 100 ppm, 435 mg/m³<br>TLV-STEL: 150 ppm, 655 mg/m³<br>**Toxicity Data******<br>Human, Inhalation, $TC_{Lo}$: 200 ppm<br>Man, Inhalation, $LC_{Lo}$: 10000 ppm/6 Hrs<br>Rat, Oral, $LD_{50}$: 4300 mg/kg |

## SECTION 3. PHYSICAL DATA

**Boiling Point:** 275°F to 293°F (135°C to 145°C)*
**Melting Point:** -13°F (-25°C)
**Evaporation Rate:** 0.6 Relative to BuAc = 1
**Specific Gravity ($H_2O$ = 1):** 0.86

**Water Solubility (%):** Insoluble
**Molecular Weight:** 106 Grams/Mole
**% Volatile by Volume:** Ca 100
**Vapor Pressure:** 7 to 9 Torrs at 68°F (20°C)
**Vapor Density (Air = 1):** 3.7

**Appearance and Odor:** A clear liquid; aromatic hydrocarbon odor.

*Materials with wider and narrower boiling ranges are commercially available.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temperature | Flammability Limits in Air | LOWER | UPPER |
|---|---|---|---|---|
| 81°F to 90°F (27°C to 32°C) | 867°F (464°C) | % by Volume | 1% | 7% |

**Extinguishing Media:** Use foam, dry chemical, or carbon dioxide. Use water sprays to reduce the rate of burning and to cool containers.

**Unusual Fire or Explosion Hazards:** Xylene vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back.

**Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

Xylene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

**Chemical Incompatibilities:** This material may react dangerously with strong oxidizers.

**Conditions to Avoid:** Avoid any exposure to sources of ignition and to strong oxidizers.

**Hazardous Products of Decomposition:** Carbon monoxide (CO) may be evolved during xylene fires.

## SECTION 6. HEALTH HAZARD INFORMATION

Xylene is not listed as a carcinogen by the IARC, NTP, or OSHA.

**Summary of Risks:** Liquid xylene is a skin irritant and causes erythema, dryness, and defatting; prolonged contact may cause blistering. Inhaling xylene can depress the central nervous system (CNS), and ingesting it can result in gastrointestinal disturbance; and possibly hematemesis (vomiting blood). Effects on the eyes, kidneys, liver, lungs, and the CNS are also reported. **Medical Conditions Aggravated by Long-Term Exposure:** Problems with eyes, skin, central nervous system, kidneys, and liver may be worsened by exposure to xylene. **Target Organs:** CNS, eyes, gastrointestinal tract, blood, liver, kidneys, skin. **Primary Entry:** Inhalation, skin contact/absorption. **Acute Effects:** Dizziness; excitement; drowsiness; incoordination; staggering gait; irritation of eyes, nose, and throat; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; and dermatitis. **Chronic Effects:** Reversible eye damage, headache, loss of appetite, nervousness, pale skin, and skin rash.

**FIRST AID:** **Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. **Skin.** Immediately wash the affected area with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have a trained person administer oxygen. **Ingestion.** Never give anything by mouth to someone who is unconscious or convulsing. Vomiting may occur spontaneously, but do not induce it. If vomiting should occur, keep exposed person's head below his or her hips to prevent aspiration (breathing the liquid xylene into the lungs). Severe hemorrhagic pneumonitis with grave, possibly fatal, pulmonary injury can occur from aspiring very small quantities of xylene.

**GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid. If exposure is severe, hospitilization for at least 72 hours with careful monitoring for delayed onset of pulmonary edema is recommended.**

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Cleanup personnel need protection against contact with and inhalation of xylene vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.

**Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**

Air Contaminant (29 CFR 1910.1000 Subpart Z)

**EPA Designations (40 CFR 302.4)**

RCRA Hazardous Waste, No. U239

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), section 311 (b) (9)

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield as a supplementary protective measure. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., as required by the specifics of the work operation to prevent prolonged or repeated skin contact with xylene. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of xylene below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of xylene into general work areas by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make eyewash stations, safety/quick-drench showers, and washing facilities available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean xylene from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale xylene vapor.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage/Segregation:** Store xylene in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage.

**Special Handling/Storage:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, producing, and sampling operations.

**Transportation Data (49 CFR 172.101-2)**

| | | |
|---|---|---|
| **DOT Shipping Name:** Xylene | **DOT Label:** Flammable Liquid | **IMO Label:** Flammable Liquid |
| **DOT ID No.** UN1307 | **DOT Hazard Class:** Flammable Liquid | **IMO Class:** 3.2 or 3.3 |

**References:** 1, 2, 12, 73, 84-94, 100, 103.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

# Occupational Health Guideline for Coal Tar Pitch Volatiles

## INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

## SUBSTANCE IDENTIFICATION

### Anthracene

- Formula: $C_{14}H_{10}$
- Synonyms: None
- Appearance and odor: Pale green solid with a faint aromatic odor.

### Phenanthrene

- Formula: $C_{14}H_{10}$
- Synonyms: None
- Appearance and odor: Colorless solid with a faint aromatic odor.

### Pyrene

- Formula: $C_{16}H_{10}$
- Synonyms: None
- Appearance: Bright yellow solid

### Carbazole

- Formula: $C_{12}H_{9}N$
- Synonyms: None
- Appearance and odor: Colorless solid with a faint aromatic odor.

### Benzo(a)pyrene

- Formula: $C_{20}H_{12}$
- Synonyms: BaP, 3,4-benzopyrene
- Appearance and odor: Colorless solid with a faint aromatic odor.

## PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for coal tar pitch volatiles is 0.2 milligram of coal tar pitch volatiles per cubic meter of air (mg/m$^3$) averaged over an eight-hour work shift. NIOSH has recommended that the permissible exposure limit for coal tar products be reduced to 0.1 mg/m$^3$ (cyclohexane-extractable fraction) averaged over a work shift of up to 10 hours per day, 40 hours per week, and that coal tar products be regulated as occupational carcinogens. The NIOSH Criteria Document for Coal Tar Products and NIOSH Criteria Document for Coke Oven Emissions should be consulted for more detailed information.

## HEALTH HAZARD INFORMATION

- **Routes of exposure**

Coal tar pitch volatiles can affect the body if they are inhaled or if they come in contact with the eyes or skin.

- **Effects of overexposure**

Repeated exposure to coal tar pitch volatiles has been associated with an increased risk of developing bronchitis and cancer of the lungs, skin, bladder, and kidneys. Pregnant women may be especially susceptible to exposure effects associated with coal tar pitch volatiles. Repeated exposure to these materials may also cause sunlight to have a more severe effect on a person's skin. In addition, this type of exposure may cause an allergic skin rash.

- **Reporting signs and symptoms**

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to coal tar pitch volatiles.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to coal tar pitch volatiles at potentially hazardous levels:

---

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service    Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

1. *Initial Medical Examination:*

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the oral cavity, respiratory tract, bladder, and kidneys should be stressed. The skin should be examined for evidence of chronic disorders, for premalignant and malignant lesions, and evidence of hyperpigmentation or photosensitivity.

—Urinalysis: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. A urinalysis should be obtained to include at a minimum specific gravity, albumin, glucose, and a microscopic on centrifuged sediment, as well as a test for red blood cells.

—Urinary cytology: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. Employees having 5 or more years of exposure or who are 45 years of age or older should have a urinary cytology examination.

—Sputum cytology: Coal tar pitch volatiles are associated with an excess of lung cancer. Employees having 10 or more years of exposure or who are 45 years of age or older should have a sputum cytology examination.

—14" x 17" chest roentgenogram: Coal tar pitch volatiles are associated with an excess of lung cancer. Surveillance of the lungs is indicated.

—FVC and FEV (1 sec): Coal tar pitch volatiles are reported to cause an excess of bronchitis. Periodic surveillance is indicated.

—A complete blood count: Due to the possibility of benzene exposure associated with coal tar pitch volatiles, a complete blood count is considered necessary to search for leukemia and aplastic anemia.

—Skin disease: Coal tar pitch volatiles are defatting agents and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of these agents.

2. *Periodic Medical Examination:* The aforementioned medical examinations should be repeated on an annual basis, and semi-annually for employees 45 years of age or older or with 10 or more years' exposure to coal tar pitch volatiles.

- **Summary of toxicology**

Coal tar pitch volatiles (CTPV) are products of the destructive distillation of bituminous coal and contain polynuclear aromatic hydrocarbons (PNA's). These hydrocarbons sublime readily, thereby increasing the amounts of carcinogenic compounds in working areas. Epidemiologic evidence suggests that workers intimately exposed to the products of combustion or distillation of bituminous coal are at increased risk of cancer at many sites. These include cancer of the respiratory tract, kidney, bladder, and skin. In a study of coke oven workers, the level of exposure to CTPV and the length of time exposed were related to the development of cancer. Coke oven workers with the highest risk of cancer were those employed exclusively at topside jobs for 5 or more years, for whom the increased risk of dying from lung cancer was 10-fold; all coke oven workers had a 7-½-fold increase in risk of dying from kidney cancer. Although the causative agent or agents of the cancer in coke oven workers is unidentified, it is suspected that several PNA's in the CTPV generated during the coking process are involved. Certain industrial populations exposed to coal tar products have a demonstrated risk of skin cancer. Substances containing PNA's which may produce skin cancer also produce contact dermatitis; examples are coal tar, pitch, and cutting oils. Although allergic dermatitis is readily induced by PNA's in guinea pigs, it is only rarely reported in humans from occupational contact with PNA's; these have resulted largely from the therapeutic use of coal tar preparations. Components of pitch and coal tar produce cutaneous photosensitization; skin eruptions are usually limited to areas exposed to the sun or ultraviolet light. Most of the phototoxic agents will induce hypermelanosis of the skin; if chronic photodermatitis is severe and prolonged, leukoderma may occur. Some oils containing PNA's have been associated with changes of follicular and sebaceous glands which commonly take the form of acne. There is evidence that exposures to emissions at coke ovens and gas retorts may be associated with an increased occurrence of chronic bronchitis. Coal tar pitch volatiles may be associated with benzene, an agent suspected of causing leukemia and known to cause aplastic anemia.

## CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data—Anthracene**

1. Molecular weight: 178.2
2. Boiling point (760 mm Hg): 340 C (644 F)
3. Specific gravity (water = 1): 1.24
4. Vapor density (air = 1 at boiling point of anthracene): 6.15
5. Melting point: 217 C (423 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Phenanthrene**

1. Molecular weight: 178.2
2. Boiling point (760 mm Hg): 340 C (644 F)
3. Specific gravity (water = 1): 1.18
4. Vapor density (air = 1 at boiling point of phenanthrene): 6.15
5. Melting point: 100.5 C (213 F)
6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Pyrene**

1. Molecular weight: 202.3
2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)

3. Specific gravity (water = 1): 1.28

4. Vapor density (air = 1 at boiling point of pyrene): 6.9

5. Melting point: 150.4 C (303 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Carbazole**

1. Molecular weight: 167.2

2. Boiling point (760 mm Hg): 355 C (671 F)

3. Specific gravity (water = 1): Greater than 1

4. Vapor density (air = 1 at boiling point of carbazole): 5.8

5. Melting point: 246 C (475 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Benzo(a)pyrene**

1. Molecular weight: 252.3

2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)

3. Specific gravity (water = 1): Greater than 1

4. Vapor density (air = 1 at boiling point of benzo(a)pyrene): 8.7

5. Melting point: 179 C (354 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

1. Conditions contributing to instability: None hazardous

2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.

3. Hazardous decomposition products: None

4. Special precautions: None

- **Flammability**

1. Flash point: Anthracene: 121 C (250 F) (closed cup); Others: Data not available

2. Autoignition temperature: Anthracene: 540 C (1004 F); Others: Data not available

3. Flammable limits in air, % by volume: Anthracene: Lower: 0.6; Others: Data not available

4. Extinguishant: Foam, dry chemical, and carbon dioxide

- **Warning properties**

Grant states that "coal tar and its various crude fractions appear principally to cause reddening and squamous eczema of the lid margins, with only small erosions of the corneal epithelium and superficial changes in the stroma, which disappear in a month following exposure. Chronic exposure of workmen to tar fumes and dust has been reported to cause conjunctivitis and discoloration of the cornea in the palpebral fissure, either near the limbus or, in extreme cases, across the whole cornea. Occasionally, epithelioma of the lid margin has been attributed to contact with coal tar."

## MONITORING AND MEASUREMENT PROCEDURES

- **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Method**

Coal tar products may be sampled by collection on a glass fiber filter with subsequent ultrasonic extraction and weighing. An analytical method for coal tar pitch volatiles is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 1, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00267-3).

## RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.
- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

## PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with condensed coal tar pitch volatiles, where skin contact may occur.
- If employees' clothing may have become contaminated with coal tar pitch volatiles, employees should change into uncontaminated clothing before leaving the work premises.
- Clothing contaminated with coal tar pitch volatiles

should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of coal tar pitch volatiles from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the coal tar pitch volatiles, the person performing the operation should be informed of coal tar pitch volatiles's hazardous properties.

- Employees should be provided with and required to use splash-proof safety goggles where condensed coal tar pitch volatiles may contact the eyes.

## SANITATION

- Workers subject to skin contact with coal tar pitch volatiles should wash with soap or mild detergent and water any areas of the body which may have contacted coal tar pitch volatiles at the end of each work day.
- Employees who handle coal tar pitch volatiles should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.
- Areas in which exposure to coal tar pitch volatiles may occur should be identified by signs or other appropriate means, and access to these areas should be limited to authorized persons.

## COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to coal tar pitch volatiles may occur and control methods which may be effective in each case:

| Operation | Controls |
|---|---|
| Liberation from extraction and packaging from coal tar fraction of coking | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use as a binding agent in manufacture of coal briquettes used for fuel; use as a dielectric in the manufacture of battery electrodes, electric-arc furnace electrodes, and electrodes for alumina reduction | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use in manufacture of roofing felts and papers and roofing | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use for protective coatings for pipes for underground conduits and drainage; use as a coating on concrete as waterproofing and corrosion-resistant material; use in road paving and sealing | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use in manufacture and repair of refractory brick; use in production of foundry cores; use in manufacture of carbon ceramic items | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |

## EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

- **Eye Exposure**

If condensed coal tar pitch volatiles get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with these chemicals.

- **Skin Exposure**

If condensed coal tar pitch volatiles get on the skin, wash the contaminated skin using soap or mild detergent and water. Be sure to wash the hands before eating or smoking and to wash thoroughly at the close of work.

- **Breathing**

If a person breathes in large amounts of coal tar pitch volatiles, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

- **Rescue**

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

## SPILL AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of releases until cleanup has been completed.
- If coal tar pitch volatiles are released in hazardous concentrations, the following steps should be taken:

1. Ventilate area of spill.

2. Collect released material in the most convenient and safe manner for reclamation or for disposal in sealed containers in a secured sanitary landfill.

- Waste disposal method:

Coal tar pitch volatiles may be disposed of in sealed containers in a secured sanitary landfill.

## REFERENCES

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## RESPIRATORY PROTECTION FOR COAL TAR PITCH VOLATILES

| Condition | Minimum Respiratory Protection* Required Above 0.2 mg/m$^3$ |
|---|---|
| Particulate and Vapor Concentration | |
| 2 mg/m$^3$ or less | A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high-efficiency filter.<br>Any supplied-air respirator.<br>Any self-contained breathing apparatus. |
| 10 mg/m$^3$ or less | A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter.<br>A gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter.<br>Any supplied-air respirator with a full facepiece, helmet, or hood.<br>Any self-contained breathing apparatus with a full facepiece. |
| 200 mg/m$^3$ or less | A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.<br>A powered air-purifying respirator with an organic vapor cartridge and a high-efficiency particulate filter. |
| 400 mg/m$^3$ or less | A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. |
| Greater than 400 mg/m$^3$ or entry and escape from unknown concentrations | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.<br>A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. |
| Fire Fighting | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. |
| Escape | Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class.<br>Any escape self-contained breathing apparatus. |

*Only NIOSH-approved or MSHA-approved equipment should be used.

# Occupational Health Guideline for Naphtha (Coal Tar)

## INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

## SUBSTANCE IDENTIFICATION

- Formula: $C_7H_8 - C_8H_{10}$ (approximately)
- Synonyms: Naphtha, 49 degrees Be-coal tar type; crude solvent coal tar naphtha; high-solvent coal tar naphtha
- Appearance and odor: Reddish-brown, mobile liquid with an aromatic odor.

## PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for coal tar naphtha is 100 parts of coal tar naphtha per million parts of air (ppm) averaged over an eight-hour work shift. This may also be expressed as 400 milligrams of coal tar naphtha per cubic meter of air (mg/m³).

## HEALTH HAZARD INFORMATION

- **Routes of exposure**

Coal tar naphtha can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed.

- **Effects of overexposure**

*1. Short-term Exposure:* Overexposure to coal tar naphtha can cause lightheadedness, drowsiness, and unconsciousness. It also may cause mild irritation of the eyes, nose, and skin.

*2. Long-term Exposure:* Prolonged overexposure to coal tar naphtha may cause irritation of the skin.

*3. Reporting Signs and Symptoms:* A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to coal tar naphtha.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to coal tar naphtha at potentially hazardous levels:

*1. Initial Medical Screening:* Employees should be screened for history of certain medical conditions (listed below) which might place the employee at increased risk from coal tar naphtha exposure.

—Skin disease: Coal tar naphtha is a defatting agent and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of this agent.

—Liver disease: Although coal tar naphtha is not known as a liver toxin in humans, the importance of this organ in the biotransformation and detoxification of foreign substances should be considered before exposing persons with impaired liver function.

—Kidney disease: Although coal tar naphtha is not known as a kidney toxin in humans, the importance of this organ in the elimination of toxic substances justifies special consideration in those with impaired renal function.

—Chronic respiratory disease: In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of coal tar naphtha might cause exacerbation of symptoms due to its irritant properties.

*2. Periodic Medical Examination:* Any employee developing the above-listed conditions should be referred for further medical examination.

- **Summary of toxicology**

Coal tar naphtha vapor is narcotic. Rats survived continuous exposure at 3200 ppm for two months; at 1800 ppm some animals showed damage to the liver and kidneys; above 1000 ppm there was evidence of narcotic action. Rats exposed at 567 ppm and 312 ppm for 18 to 20 hours a day for 7 days had some reduction in blood leukocytes, possibly the result of the presence of benzene. There are few if any well documented reports of industrial injury resulting from the inhalation of

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service    Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

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naphtha. However, exposure to high concentrations might be expected to cause lightheadedness, drowsiness, and possibly irritation of the eyes, nose, and throat. Repeated or prolonged contact with the liquid may result in drying and cracking skin due to defatting action. Coal tar (naphtha) is a non-uniform mixture of aromatic hydrocarbons and may contain benzene.

## CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data**

1. Molecular weight: 110 (approximately)
2. Boiling point (760 mm Hg): 110 to 190 C (230 to 374 F)
3. Specific gravity (water = 1): 0.97
4. Vapor density (air = 1 at boiling point of coal tar naphtha): 3 (approximately)
5. Melting point: Data not available
6. Vapor pressure at 20 C (68 F): Less than 5 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Greater than 1

- **Reactivity**

1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with strong oxidizing agents may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving coal tar naphtha.
4. Special precautions: Coal tar naphtha will attack some forms of plastics, rubber, and coatings.

- **Flammability**

1. Flash point: 38 to 43 C (100 to 109 F) (closed cup)
2. Autoignition temperature: 482 to 510 C (900 to 950 F)
3. Flammable limits in air, % by volume: Data not available
4. Extinguishant: Dry chemical, foam, carbon dioxide

- **Warning properties**

1. Odor Threshold: Since the odor thresholds of the main constituents of coal tar naphtha are below their permissible exposure limits, the odor threshold of coal tar naphtha is assumed to be below the permissible exposure limit.
2. Eye Irritation Level: According to Grant, Gafafer states that the naphthas cause conjunctival irritation. Two of the main constituents of coal tar naphtha, xylene and toluene, cause noticeable eye irritation at concentrations of 200 and 300 ppm, respectively.
3. Evaluation of Warning Properties: Since the odor threshold of the main constituents of coal tar naphtha are well below their permissible exposure limits, coal tar naphtha is treated as a material with adequate warning properties.

## MONITORING AND MEASUREMENT PROCEDURES

- **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Method**

Sampling and analyses may be performed by collection of coal tar naphtha vapors using an adsorption tube with subsequent desorption with carbon disulfide and gas chromatographic analysis. Also, detector tubes certified by NIOSH under 42 CFR Part 84 or other direct-reading devices calibrated to measure coal tar naphtha may be used. An analytical method for coal tar naphtha is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 3, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00261-4).
026).

## RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.
- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

## PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with liquid coal tar naphtha.
- Clothing wet with liquid coal tar naphtha should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of

coal tar naphtha from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the coal tar naphtha, the person performing the operation should be informed of coal tar naphtha's hazardous properties.

- Non-impervious clothing which becomes wet with liquid coal tar naphtha should be removed promptly and not reworn until the coal tar naphtha is removed from the clothing.
- Employees should be provided with and required to use splash-proof safety goggles where liquid coal tar naphtha may contact the eyes.

## SANITATION

- Skin that becomes wet with liquid coal tar naphtha should be promptly washed or showered with soap or mild detergent and water to remove any coal tar naphtha.

## COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to coal tar naphtha may occur and control methods which may be effective in each case:

| Operation | Controls |
|---|---|
| Use in preparation of coal-tar paints | Process enclosure; general dilution ventilation; personal protective equipment |
| Use in preparation of coumarone and indene | General dilution ventilation; personal protective equipment |
| Use as a solvent in rubber industry in manufacture of water-proof cloth, shoe adhesives, and rubber tires | Process enclosure; general dilution ventilation; local exhaust ventilation; personal protective equipment |
| Use as a solvent, diluent, or thinner in paint, varnish, and lacquer industries | General dilution ventilation; local exhaust ventilation; personal protective equipment |
| Use in formulations of nitrocellulose and ethylcellulose | General dilution ventilation; local exhaust ventilation; personal protective equipment |
| Use as a solvent for polymerized styrol, short-oil phenolic varnishes, urea, resins, melamine, and other synthetic resins; use as a solvent for pesticides as DDT and Gammexane | General dilution ventilation; local exhaust ventilation; personal protective equipment |

## EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

- **Eye Exposure**

If coal tar naphtha gets into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation persists after washing, get medical attention. Contact lenses should not be worn when working with this chemical.

- **Skin Exposure**

If coal tar naphtha gets on the skin, promptly wash the contaminated skin using soap or mild detergent. If coal tar naphtha soaks through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent. If irritation persists after washing, get medical attention.

- **Breathing**

If a person breathes in large amounts of coal tar naphtha, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

- **Swallowing**

If coal tar naphtha has been swallowed, do not induce vomiting. Get medical attention immediately.

- **Rescue**

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

## SPILL, LEAK, AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of spills or leaks until cleanup has been completed.
- If coal tar naphtha is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill or leak.
3. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely

clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Large quantities can be collected and atomized in a suitable combustion chamber. Coal tar naphtha should not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

- Waste disposal methods:

Coal tar naphtha may be disposed of:

1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a secured sanitary landfill.
2. By atomizing in a suitable combustion chamber.

## REFERENCES

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## RESPIRATORY PROTECTION FOR NAPHTHA (COAL TAR)

| Condition | Minimum Respiratory Protection* Required Above 100 ppm |
|---|---|
| Vapor Concentration | |
| 1000 ppm or less | A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s). |
| 5000 ppm or less | A gas mask with a chin-style or a front- or back-mounted organic vapor canister.<br>Any supplied-air respirator with a full facepiece, helmet, or hood.<br>Any self-contained breathing apparatus with a full facepiece. |
| 10,000 ppm or less | A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. |
| Greater than 10,000 ppm or entry and escape from unknown concentrations | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.<br>A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. |
| Fire Fighting | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. |
| Escape | Any gas mask providing protection against organic vapors.<br>Any escape self-contained breathing apparatus. |

*Only NIOSH-approved or MSHA-approved equipment should be used.

# Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
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GENIUM PUBLISHING CORP.

No. 351

## STYRENE MONOMER

(Revision C)
Issued: August 1979
Revised: November 1988

## SECTION 1. MATERIAL IDENTIFICATION 27

**Material Name:** STYRENE MONOMER

**Description (Origin/Uses):** Used widely in making polystyrene plastics, protective coatings, styrenated polyesters, copolymer resins, and as a chemical intermediate. Styrene-butadiene rubber (SBR) is the most extensively used type of synthetic rubber.

NFPA

**Other Designations:** Phenyl Ethylene; Vinyl Benzene; Cinnamene; Ethylenylbenzene; Styrol; $C_6H_5CH=CH_2$; CAS No. 0100-42-5

**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

| HMIS | | | |
|---|---|---|---|
| H | 2 | R | 1 |
| F | 3 | I | 3 |
| R | 2 | S | 2 |
| PPG* | | K | 0 |

*See sect. 8

## SECTION 2. INGREDIENTS AND HAZARDS

| | % |
|---|---|
| Styrene, CAS No. 0100-42-5 | Ca 100 |

*This material can be absorbed through intact skin, which contributes to overall exposure.
**See NIOSH, *RTECS* (WL3675000), for additional data with references to reproductive, mutagenic, tumorigenic, and irritative effects.

### EXPOSURE LIMITS

**OSHA PELs**
8-Hr TWA: 50 ppm, 215 mg/m³
15-Min STEL: 100 ppm, 425 mg/m³

**ACGIH TLVs (Skin*), 1988-89**
TLV-TWA: 50 ppm, 215 mg/m³
TLV-STEL: 100 ppm, 425 mg/m³

**Toxicity Data****
Human, Inhalation, $LC_{Lo}$: 10000 ppm (30 Mins)
Human, Inhalation, $TC_{Lo}$: 600 ppm

## SECTION 3. PHYSICAL DATA

**Boiling Point:** 293°F (145°C)
**Melting Point:** -23.08°F (-30.6°C)
**Vapor Density (Air = 1):** 3.6
**Vapor Pressure:** 4.3 Torrs at 59°F (15°C) and 10 Torrs at 87.44°F (30.8°C)
**Evaporation Rate (n-Butylacetate = 1):** 0.5
**Molecular Weight:** 104 Grams/Mole
**Solubility in Water (%):** Slight
**Specific Gravity ($H_2O$ = 1):** 0.9059 at 68°F (20°C)
**% Volatile by Volume:** Ca 100

**Appearance and Odor:** A colorless-to-yellow, oily liquid; sweet, pleasant aromatic odor at low concentrations and unpleasant odor at high concentrations. The odor recognition threshold (100% of test panel, unfatigued) is 0.15 ppm in air.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method: 88°F (31°C) CC | Autoignition Temperature: 914°F (490°C) | LEL: 1.1% v/v | UEL: 6.1% v/v |
|---|---|---|---|

**Extinguishing Media:** Use foam, dry chemical, or carbon dioxide. Use water spray to cool fire-exposed containers, to disperse the styrene vapor, and to protect personnel who are attempting to stop a styrene leak. In the case of large fires the fire-fighting should be done from a distance or from a remote, explosion-proof position. **Unusual Fire or Explosion Hazards:** Styrene vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back to its origin. Violent polymerization inside heated containers of styrene can occur at elevated temperatures; explosive rupturing of these containers is possible. Styrene vapor is uninhibited and can form polymers that will block the vents or flame arresters of storage tanks. **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

**Stability/Polymerization:** Styrene is stable in closed containers during routine operations. Hazardous polymerization can occur if the inhibitor fails or if the styrene monomer is exposed to excessive heat, light, or catalytic materials such as peroxides and strong acids. **Chemical Incompatibilities:** Styrene reacts dangerously with oxidizing materials such as chlorosulfonic acid, oleum, and sulfuric acid. Additionally, it can self-polymerize if the inhibitor becomes depleted, is removed, or is otherwise rendered ineffective. **Conditions to Avoid:** Avoid any exposure to sources of ignition and to incompatible chemicals, especially catalytic materials that can initiate or promote hazardous polymerization. **Hazardous Products of Decomposition:** Toxic gases such as carbon monoxide are formed by the thermal-oxidative decomposition of styrene during fires.

## SECTION 6. HEALTH HAZARD INFORMATION

**Carcinogenicity:** Styrene is not listed as a carcinogen by the NTP, IARC, or OSHA. Some studies indicate that styrene may be mutagenic and teratogenic. **Summary of Risks:** Workers exposed to styrene vapor at 200 to 700 ppm experienced drowsiness, nausea, headache, fatigue, dizziness, and possibly a metallic taste in their mouths. Exposures above 800 ppm are immediately irritating to the eyes, nose, and the respiratory system. Repeated or prolonged skin contact with liquid styrene can cause defatting, dermatitis, and irritation. Excessive exposure through inhalation can cause narcotic effects and even death. A death has been reported from a 30-minute exposure at 10000 ppm. "Styrene sickness" has been described with symptoms of nausea, vomiting, and an intoxicated sensation. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, respiratory system, and the central nervous sytem (CNS). **Primary Entry:** Inhalation, skin contact and absorption. **Acute Effects:** Skin and eye irritation; depression of the CNS symptomized by drowsiness,

## SECTION 6. HEALTH HAZARD INFORMATION, cont.

unsteady gait, weakness, and loss of coordination. **Chronic Effects:** None reported. **FIRST AID: Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. **Skin.** Rinse the affected area with flooding amounts of water and then wash it with soap and water. If large skin areas are involved, continue to carefully monitor the exposed person for signs of developing depression of the CNS, because liquid styrene can penetrate intact skin rapidly by absorption. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. **Ingestion.** Unlikely. Should this type of exposure occur, slowly give the exposed person 4 to 8 glasses of milk or water to dilute the material, but do *not* induce vomiting. Never give anything by mouth to someone who is unconscious or convulsing. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** Treat CNS effects symptomatically. Styrene is excreted as hippuric acid; urine levels of this metabolite can be useful in determining the level of exposure to the styrene.

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate ventilation. Cleanup personnel need protection against skin or eye contact with this liquid as well as inhalation of its vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. **Waste Disposal:** Dispose of contaminated styrene promptly; do not store contaminated liquid styrene for any length of time. Reclamation of spilled liquid styrene is not recommended; its reactivity and the possibility of contaminant-induced polymerization make reclamation unattractive. Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**
Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).
**EPA Designations (40 CFR 302.4)**
CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), § 311 (b) (4).

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with this material. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale its vapor.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage/Segregation:** Store styrene in closed containers in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Keep them out of direct sunlight. Protect containers from physical damage. Outside, isolated, or detached storage is recommended. **Special Handling/Storage:** Contamination of storage facilities, especially with polymerization initiators, must not occur. Store styrene in its original containers and remove from the storage area only the amount that is immediately needed. Control inventory carefully. Prolonged storage is strongly discouraged, and a first-in, first-out rotation system may be useful for proper stock rotation requirements. Check the styrene at least weekly to determine the inhibitor and polymer content if the material is being stored for any period of time in excess of 30 days at 90°F (32°C). Large tanks of styrene should be stored under a nitrogen blanket. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Ground and bond all containers and pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent static sparks. **Other:** Inhibited styrene can polymerize from frictional heat in a running centrifugal pump if the flow of the liquid is stopped.

**Transportation Data (49 CFR 172.101-2)**

**DOT Shipping Name:** Styrene Monomer, Inhibited
**DOT Hazard Class:** Flammable Liquid
**ID No.** UN2055
**DOT Label:** Flammable Liquid
**DOT Packaging Exceptions:** 49 CFR 173.118

**IMO Shipping Name:** Styrene Monomer, Inhibited
**IMO Label:** Flammable Liquid
**IMO Hazard Class:** 3.3
**IMDG Packaging Group:** II

**References:** 1, 38, 84-94, 100, 116, 117, 120, 122.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

# MATERIAL SAFETY DATA SHEET

**GENIUM PUBLISHING CORPORATION**

**1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854**

**From Genium's MSDS Collection, to be used as a reference.**

**MSDS #** 355

PHENOL (Revision B)

**Issued:** September, 1980
**Revised:** September, 1985

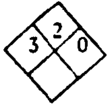
## SECTION 1. MATERIAL IDENTIFICATION

17

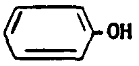
**MATERIAL NAME:** PHENOL

OTHER DESIGNATIONS: Carbolic Acid, Hydrobenzene, Oxybenzene, Phenic acid, Phenyl Hydrate, Phenyl hydroxide, Phenylic acid, Phenyl alcohol, CAS #000 108 952, $C_6H_5OH$

MANUFACTURER/SUPPLIER: Available from many suppliers, including:
Dow Chemical USA
2020 Dow Center
Midland MI 48640 (517) 636-1000



## SECTION 2. INGREDIENTS AND HAZARDS

| SECTION 2. INGREDIENTS AND HAZARDS | % | HAZARD DATA |
|---|---|---|
| PHENOL  | ca 100 | 8 hr TWA: 5 ppm, 19 mg/m$^3$ (Skin)<br>STEL: 10 ppm, 38 mg/m$^3$*<br>Human, Oral LDLo: 140 mg/kg<br>Rat, oral LDLo: 414 mg/kg<br>Rat, skin LD50: 669 mg/kg |

* Current OSHA PEL and ACGIH TLV/STEL (1984-85) (Skin) notation indicates a potential contribution to overall exposure via absorption through the skin.

NIOSH recommends a 10 hr. TWA of 20 mg/m$^3$ with a ceiling of 60 mg/m$^3$ for any 15 minute period.

## SECTION 3. PHYSICAL DATA

Boiling Point @ 1 atm ............ 359.4°F (181.9°C)
Vapor pressure @ 25°C ............ 0.35
Vapor density (Air=1) ............ 3.24
Solubility in water (% by wt.) ... 8.4 @ 20°C
(Sol. in all proportion @ temp. >66°C)

APPEARANCE & ODOR: White crystalline solid with a characteristic sharp medicinal sweet, tangy odor which is detectable above 0.05 ppm. Phenol turns pink or red if it contains impurities or if it is exposed to heat or light.

Specific Gravity ($H_2O$=1):
Solid: 1.017 @ 25/4°C
Liquid: 1.0576 @ 41/4°C
Melting point ............... 109.4°F (43°C)
Volatiles, % by vol @ 20°C .. ca 100
Evaporation rate (BuAc=1) ... <0.03
Viscosity, CPS, @ 80°C ...... 1.51
Molecular weight ............ 94.12

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temp. | Flammability Limits in Air | Lower | Upper |
|---|---|---|---|---|
| 175°F (79°C) C.C. | 1319°F (715°C) | % by volume | 1.5 | 8.6 |

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, or alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers. Phenol presents a moderate fire hazard when exposed to heat, flame, or oxidizers. When heated, it remits toxic fumes and vapors which will form explosive mixtures with air. Solid phenol burns with difficulty, giving off a heavy smoke.

Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving phenol. NOTE: Water containing phenol can cause severe chemical burns.

## SECTION 5. REACTIVITY DATA

This material is stable at room temperature under normal handling and storage conditions. It does not undergo hazardous polymerization. Phenol is incompatible with strong oxidizing agents and halogens. Reaction with calcium hypochlorite is exothermic and produces toxic fumes which may ignite. Hot phenol is corrosive to many metals, including aluminum, lead, magnesium, and zinc. Reaction with these materials causes phenol to become discolored. Do not heat phenol above 122°F (90°C).

Thermal decomposition or burning produces oxides of carbon and water.

Revised 9/85

MSDS # 355 Issued: 9/80 PHENOL (Rev. B)

## SECTION 6. HEALTH HAZARD INFORMATION

**TLV** 5 ppm or 19 mg/m$^3$ (Skin)

Phenol is a general protoplasmic poison which is corrosive to body tissue. Poisoning can occur via skin absorption, vapor inhalation, or ingestion. Vapors of phenol are irritating to the eyes, nose, and throat. The liquid is rapidly absorbed through the skin. Contact with the skin causes a white wrinkled discoloration followed by a severe burn or systemic poisoning if not properly removed. Intense burning and pain from skin contact may be delayed. Absorption of phenol through skin may cause sudden collapse, or death. Symptoms develop rapidly. When ingested, phenol causes burning of the gastrointestinal tract, and blotches on the lips and in the mouth. Headache, nausea, dizziness, dyspnea, shock, convulsions, and death may follow exposures by any route. Chronic exposure to low concentrations of phenol may cause digestive disturbances, nervous disorders, skin eruptions, and death due to liver and kidney damage. The TLV is set to prevent systemic poisoning.

FIRST AID: EYE CONTACT: Immediately flush eyes, including under eyelids, with copious amounts of running water for at least 30 minutes. Get medical attention! (Inplant, community, paramedic). SKIN CONTACT: Immediately flush skin for at least 30 minutes while removing contaminated clothing and shoes. Get medical attention! INHALATION: Remove victim to fresh air. Restore and/or support breathing as necessary. Keep person warm and quiet. Transport to a medical facility. INGESTION: Give victim large quantities of milk or water as quickly as possible. Induce vomiting by touching back of throat with finger. Do not give fluids or induce vomiting if victim is unconscious or is having convulsions. Contact a physician or Poison Control Center and transport to a medical facility.

## SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from area, except for those involved in clean-up. Close the leak immediately, if possible. Absorb small spills on paper, vermiculite or other absorbent and place in a closed metal container for disposal. Dike large spills and allow material to cool and solidify. Shovel solid into steel containers for disposal. Flush spill area thoroughly with water and collect flushings and wash water for disposal. Do not allow phenol to enter sewer, watersheds, or waterways! Notify proper authorities including the National Response Center (800-424-8802). Clean-up personnel must wear a self-contained breathing apparatus and full personal protective clothing and equipment. DISPOSAL: Burn contaminated waste in an approved incinerator. Phenol may be recovered by charcoal absorption, solvent extraction or steam stripping. A concentration of 1% by weight is required for economical recovery. Phenol is water soluble and is amenable to biological or chemical oxidation. Solutions can be chemically oxidized by chlorine, chlorine dioxide, or other oxidants. Phenol content of water supply not to exceed 0.001 mg/L. (DO NOT flush phenol down drains.) RCRA Hazardous Waste # U188 Reportable Spill Quantity ... 1000 lbs.

## SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion-proof) to meet TLV requirements. When phenol is heated, vapor inhalation can be a serious hazard without proper precaution. For emergency or nonroutine exposures where the TLV may be exceeded, use an appropriate NIOSH-approved full face respirator. Fume hoods should maintain a minimum face velociry of 100 lfm. All electrical service in use or storage areas should have an explosion-proof design.

DANGER! Avoid any contact with this material. Full protective equipment, including splash goggles, faceshield impervious gloves, apron, boots, impervious shirt and trousers, hard hat with brim, acid suit and respirator should be available and worn as appropriate. Remove contaminated clothing immediately and do not reuse until it has been properly laundered.

Eyewash stations and safety showers should be readily available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from heated surfaces, open flame and ignition sources. Outside or detached storage is preferred. Protect containers from physical damage.

Phenol is a very dangerous compound. Do not breathe vapor or allow liquid to come in contact with the skin. Wear appropriate protective equipment and remove contaminated clothing immediately. Use extreme caution when transporting phenol to prevent leaks. Vent containers before heating and do not heat above 140°F (60°C). Do not eat or smoke in areas where this material is being used or handled. Do not allow employees who have diseases of the central nervous system, liver, kidney, or lungs to work in area of phenol exposure. Provide preplacement and periodic medical exams to employees working with phenol. Do not allow untrained workers to handle this material (see also ASTM D2286-Sampling and Handling Phenol).

ICC & DOT - Class B Poison. LABEL: POISON

DATA SOURCE(S) CODE (See Glossary) 2-12, 15, 19, 23-24, 31, 34, 37, 38, 59, 79, R.

APPROVALS 11/85

INDUST. HYGIENE/SAFETY 11-85

MEDICAL REVIEW: Dec 85

GENIUM PUBLISHING

# Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
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GENIUM PUBLISHING CORP.

No. 385

ETHYL BENZENE
(Revision A)
Issued: August 1978
Revised: November 1988

## SECTION 1. MATERIAL IDENTIFICATION

27

**Material Name:** ETHYL BENZENE

**Description (Origin/Uses):** Used as a solvent and as an intermediate in the production of styrene monomer.

**Other Designations:** Phenylethane; Ethylbenzol; $C_2H_5C_6H_5$; CAS No. 0100-41-4

**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

3
2 0
-
NFPA

| HMIS | | | |
|---|---|---|---|
| H | 2 | R | 1 |
| F | 3 | I | 3 |
| R | 0 | S | 2 |
| PPG* | | K | 4 |

*See sect. 8

| SECTION 2. INGREDIENTS AND HAZARDS | % | EXPOSURE LIMITS |
|---|---|---|
| Ethyl Benzene, CAS No. 0100-41-4<br>*See NIOSH, *RTECS* (DA0700000), for additional data with references to reproductive, irritative, and mutagenic effects. | Ca 100 | **OSHA PELs**<br>8-Hr TWA: 100 ppm, 435 mg/m³<br>15- Min STEL: 125 ppm, 545 mg/m³<br>**ACGIH TLVs, 1988-89**<br>TLV-TWA: 100 ppm, 435 mg/m³<br>TLV-STEL: 125 ppm, 545 mg/m³<br>**Toxicity Data***<br>Human, Inhalation, $TC_{Lo}$: 100 ppm (8 Hrs)<br>Rat, Oral, $LD_{50}$: 3500 mg/kg |

## SECTION 3. PHYSICAL DATA

**Boiling Point:** 277°F (136°C)
**Melting Point:** -139°F (-95°C)
**Vapor Pressure:** 7.1 Torrs at 68°F (20°C)
**Vapor Density (Air = 1):** 3.7
**% Volatile by Volume:** Ca 100

**Molecular Weight:** 106 Grams/Mole
**Solubility in Water (%):** Slight
**Specific Gravity ($H_2O$ = 1):** 0.86258 at 77°F (25°C)

**Appearance and Odor:** A clear, colorless, flammable liquid; characteristic aromatic hydrocarbon odor.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method: 64°F (18°C) CC | Autoignition Temperature: 810°F (432.22°C) | LEL: 1% v/v | UEL: 6.7% v/v |
|---|---|---|---|

**Extinguishing Media:** Use foam, dry chemical, or carbon dioxide to put out ethyl benzene fires. A water spray may be ineffective in extinguishing the fire, because it can scatter and spread the burning liquid. Use water spray to cool fire-exposed containers of ethyl benzene, to disperse ethyl benzene vapor, and to protect personnel attempting to stop an ethyl benzene leak. **Unusual Fire or Explosion Hazards:** This liquid can readily form explosive vapor-air mixtures, especially when heated. Ethyl benzene vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back to its origin. **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

**Stability/Polymerization:** Ethyl benzene is stable in closed containers during routine operations. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** Hazardous chemical reactions can occur between ethyl benzene and strong oxidizing agents, acids, ammonia, and bases. **Conditions to Avoid:** Avoid any exposure to sources of ignition such as heat, sparks, open flame, and lighted tobacco products, etc., and to incompatible chemicals. Use caution when entering confined spaces, particularly low-lying areas where explosive concentrations of ethyl benzene vapor may be present. Provide good ventilation to such areas to prevent the concentration of this vapor. **Hazardous Products of Decomposition:** Thermal-oxidative degradation can include toxic gases such as carbon monoxide and/or aromatic hydrocarbon gases.

## SECTION 6. HEALTH HAZARD INFORMATION

**Carcinogenicity:** Ethyl benzene is not listed as a carcinogen by the NTP, IARC, or OSHA.
**Summary of Risks:** Ethyl benzene vapor is severely irritating to the eyes and to the mucous membranes of the respiratory system. Sustained inhalation of excessive levels can cause depression of the central nervous system (CNS) characterized by dizziness, headache, narcosis, and coma. Skin contact with liquid ethyl benzene causes irritation; dermatitis and defatting can also develop. The acute oral toxicity of ethyl benzene is low; however, ingestion of it presents a serious aspiration hazard. Aspirating even a small amount into the lungs can result in extensive edema (lungs filled with fluid) and hemorrhaging of the lung tissue. No systemic effects are expected at the levels that produce pronounced, unignorable, disagreeable skin and eye irritation. The TLVs cited in section 2 are set to prevent this intolerable irritation. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, respiratory system, and CNS. **Primary Entry:** Inhalation, skin contact **Acute Effects:** Irritation of the skin, eyes, and respiratory system. Also, cardiac-rhythm disturbance due to sensitization; acute bronchitis, bronchospasm, pulmonary and laryngeal edema; euphoria; headache; giddiness; dizziness; and incoordination, as well as possible depression; confusion; and coma. **Chronic Effects:** None reported. **First Aid:** Eyes. Immediately

## SECTION 6. HEALTH HAZARD INFORMATION, cont.

flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. **Skin.** Rinse the affected area with plenty of water, then wash it with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. **Ingestion.** Unlikely. Should this type of exposure occur, the aspiration hazard must be considered. Do not induce vomiting unless directed to do so by a physician. To prevent aspiration by spontaneous vomiting, keep the victim's head low (between his or her knees). **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** Professional judgment is required as to whether or not to induce vomiting because of the possibility of aspiration. A gastric lavage may be administered, followed by saline catharsis, if this procedure is appropriate to the specific incident. Monitor cardiac and pulmonary functions.

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate explosion-proof ventilation. Cleanup personnel need protection against skin or eye contact with this liquid as well as inhalation of its vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**
Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).
**EPA Designations (40 CFR 302.4)**
CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with this material. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale ethyl benzene vapor.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage/Segregation:** Store ethyl benzene in closed containers in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage. **Special Handling/Storage:** Outside, isolated, detached, or remote storage is recommended for large quantities of ethyl benzene. Isolate bulk storage areas from acute fire hazards. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. To prevent static sparks, electrically ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations. **Other:** Use safety cans for transferring small amounts of ethyl benzene.

**Transportation Data (49 CFR 172.101-2)**

**DOT Shipping Name:** Ethyl Benzene
**DOT Hazard Class:** Flammable Liquid
ID No. UN1175
**DOT Label:** Flammable Liquid
**DOT Packaging Exceptions:** 49 CFR 173.118
**DOT Packaging Requirements:** 49 CFR 173.119

**IMO Shipping Name:** Ethylbenzene
**IMO Hazard Class:** 3.2
**IMO Label:** Flammable Liquid
**IMDG Packaging Group:** II

**References:** 1, 26, 38, 84-94, 100, 116, 117, 120, 122.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Prepared by PJ Igoe, BS
Industrial Hygiene Review: DJ Wilson, CIH
Medical Review: W Silverman, MD

# Material Safety Data Sheet

From Genium's Reference Collection
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GENIUM PUBLISHING CORP.

No. 409

CRESOL
(Revision A)
Issued: December 1978
Revised: August 1988

## SECTION 1. MATERIAL IDENTIFICATION

26

**Material Name:** CRESOL*

**Description (Origin/Uses):** Used as a solvent, disinfectant, fumigant; in photographic developers and explosives; and to make synthetic resins.

**Other Designations:** Cresylic Acid; $CH_3C_6H_4OH$; CAS No. 1319-77-3

**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.
*See Genium Industrial MSDS 560 for data specific to *ortho*-cresol.
**Fire diamond for Cresol mixture Not Found.

*ortho***
NFPA

*meta* and *para***
NFPA

HMIS
H 3
F 2
R 1
PPG*
*See sect. 8

R 1
I 4
S 4
K 1

## SECTION 2. INGREDIENTS AND HAZARDS

| | % |
|---|---|
| Cresol, CAS No. 1319-77-3 | * |
| *ortho*-Cresol, CAS No. 0095-48-7 | * |
| *meta*-Cresol, CAS No. 0108-39-4 | * |
| *para*-Cresol, CAS No. 0106-44-5 | * |

*Cresol is a commercial mixture of three isomers (*ortho*, *meta*, and *para*). Contact your supplier to determine the percent by weight of each isomer and to determine if hazardous ingredients/contaminants such as phenol, xylene, or benzene are present in reportable quantities.
**This material can be absorbed through intact skin, which contributes to overall exposure.
***See NIOSH, *RTECS* (GO5950000, mixed cresol; GO6125000, *meta*; GO6300000, *ortho*; GO6475000, *para*), for additional data with references to reproductive, tumorigenic, mutagenic, and irritative effects.

### EXPOSURE LIMITS

**OSHA PEL (Skin**)**
8-Hr TWA: 5 ppm, 22 mg/m³ (All Isomers)

**ACGIH TLV (Skin**), 1987-88**
TLV-TWA: 5 ppm, 22 mg/m³

**Toxicity Data*****
Rat, Oral, $LD_{50}$: 1454 mg/kg
Mouse, Oral, $LD_{50}$: 760 mg/kg
Rabbit, Skin, $LD_{50}$: 2000 mg/kg

## SECTION 3. PHYSICAL DATA

**Boiling Point***
**Specific Gravity ($H_2O$ = 1):** 1.1
**Vapor Pressure***

**Water Solubility (%):** Slight
**Molecular Weight:** 108 Grams/Mole
**pH:** Acidic

**Appearance and Odor:** A colorless, yellowish, brownish yellow, or pinkish liquid that darkens upon exposure to air and light; phenolic odor. Appearance and odor depend upon the supplier and the exact composition of the purchased cresol.

*Contact your supplier to determine the specific physical properties of the cresol product.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temperature | Flammability Limits in Air | LOWER | UPPER |
|---|---|---|---|---|
| * | * | % by Volume | * | * |

**Extinguishing Media:** *Contact your supplier for this data. Cresol burns; treat it as a moderate fire hazard and a slight explosion hazard when exposed to heat or flame. Use foam, dry chemical, carbon dioxide, and water spray to extinguish cresol fires.

**Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

Cresol is stable in closed containers at room temperature under normal storage and handling conditions. It cannot undergo hazardous polymerization.

**Chemical Incompatibilities:** This material reacts dangerously with chlorosulfonic acid, nitric acid, oleum, and strong oxidizing agents.

**Conditions to Avoid:** Hot cresol can attack copper, aluminum, magnesium, zinc, and lead. Stainless steel is recommended for use with cresol. Avoid direct contact with incompatible chemicals or exposure to sources of ignition. Many organic polymers will dissolve or soften when exposed to hot cresol.

**Hazardous Products of Decomposition:** Toxic gases such as carbon monoxide and heated cresol and/or cresol derivatives like phenol may be produced during fires.

## SECTION 6. HEALTH HAZARD INFORMATION

Cresol is not listed as a carcinogen by the NTP, IARC, or OSHA.

**Summary of Risks:** Cresol is corrosive to any body tissue it touches. Skin absorption can occur and may lead to delayed, possibly fatal, systemic poisoning. Absorption of cresol causes central nervous system (CNS) depression characterized by mental confusion, depression, dyspnea, irregular and rapid respiration, and weak pulse. Damage to the liver, kidneys, lungs, skin, and eyes are also expected from exposure to cresol. Exposures to cresol are emergencies; immediately consult a qualified physician.

**Medical Conditions Aggravated by Long-Term Exposure:** Preexisting kidney or hepatic (liver) problems.

**Primary Entry:** Skin absorption/contact, inhalation. **Acute Effects:** Skin and eye burns, difficulty in breathing, and respiratory failure. **Chronic Effects:** Infrequently, prolonged skin contact with cresol results in a chronic disorder called ochronosis, which is a darkening of the skin, conjunctiva, and cartilage of the nose and ears.

**FIRST AID: Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Treat for eye burns. **Skin.** Immediately wash the affected area with soap and water because of the increased exposure hazard from skin absorption. Watch for chemical skin burns and treat them accordingly. If contact is gross, remove contaminated clothes and shoes *under* the safety shower. Further washing of skin with isopropyl alcohol or 20% glycerine in water, followed by a water rinse, may be useful. **Inhalation.** Remove exposed person to fresh air; restore and/or support his or her breathing as needed. Have trained personnel administer oxygen. **Ingestion.** Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing. If he or she is responsive, give exposed person 1 to 2 glasses of milk or water to drink to dilute the material. Induce vomiting with emetic.

**GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid. NOTE TO PHYSICIAN: Wash the affected skin area with a mixture of polyethylene glycol 300/industrial methylated spirits (PEG 300/IMS-2:1 by volume) or a similar preparation that will absorb the phenolic component. Personnel administering this treatment should wear rubber gloves. Hospitalize persons with serious exposures to monitor acidosis, shock, convulsions, and fluid balance. Thorough cleaning of the exposed person is required, especially matted hair, skin folds, and underneath fingernails, where the cresol may concentrate.**

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Limit access to the spill area to necessary personnel only. Cleanup personnel need protection against contact with and inhalation of cresol (see sect. 8). Contain large spills and collect waste. Use water spray to direct cresol away from incompatible chemicals (see sect. 5). Absorb the waste with sand, earth, or vermiculite and place it into containers suitable for eventual disposal or reclamation. Do not flush waste to a sewer.

**Waste Disposal:** Consider reclamation, recycling, or destruction rather than disposal in a landfill. Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**

Air Contaminant (29 CFR 1910.1000 Subpart Z)

**EPA Designations (40 CFR 302.4)**

RCRA Hazardous Waste; No. U052

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), Section 311 (b) (4) and the Resource Conservation and Recovery Act (RCRA), Section 3001

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield as a supplementary protective measure. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133).

**Respirator:** Wear a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., to prevent skin contact with cresol. **Ventilation:** Install and operate both general and local exhaust ventilation systems powerful enough to maintain airborne concentrations of cresol below the OSHA PEL standard cited in section 2. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area.

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage/Segregation:** Store cresol in a cool, dry, well-ventilated area away from incompatible chemicals (see sect. 5) and sources of ignition.

**Special Handling/Storage:** Preplan for routine use and emergency response. Build all storage facilities of nonflammable materials that are resistant to chemical attack by cresol. Protect containers from physical damage. Avoid using alloys of zinc, copper, or brass in storage and processing equipment that could be in contact with cresol.

**Transportation Data (49 CFR 172.101-2)**

| | | |
|---|---|---|
| **DOT Shipping Name:** Cresol | **DOT Label:** Corrosive | **IMO Class:** 6.1 |
| **DOT Hazard Class:** Corrosive Material | **DOT ID No.** UN2076 | **IMO Label:** Poison |

**References:** 1, 2, 26, 38, 84-94, 100, 112, 113, 114.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

# Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
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GENIUM PUBLISHING CORP.

No. 624

NAPHTHALENE

Issued: November 1987

## SECTION 1. MATERIAL IDENTIFICATION

24

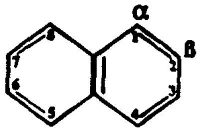
**Material Name:** NAPHTHALENE

**Description (Origin/Uses):** Used as a moth repellant and in many industrial processes.

**Other Designations:** Naphthalin; Naphthene; Tar Camphor; $C_{10}H_8$;
NIOSH *RTECS* No. QJ0525000; CAS No. 0091-20-3

**Manufacturer:** Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyer's Guide* (Genium ref. 73) for a list of suppliers.

| HMIS | | | |
|---|---|---|---|
| H | 2 | | |
| F | 2 | R | 1 |
| R | 0 | I | 4 |
| PPG* | | S | 1 |
| *See sect. 8 | | K | 2 |

| SECTION 2. INGREDIENTS AND HAZARDS | % | EXPOSURE LIMITS |
|---|---|---|
| Naphthalene, CAS No. 0091-20-3<br> <br>*Immediately dangerous to life and health<br>**See NIOSH *RTECS* for additional data with references to irritative, mutagenic, reproductive, and tumorigenic effects. | ca 100 | IDLH* Level: 500 ppm<br>**ACGIH TLVs, 1987-88**<br>TLV-TWA: 10 ppm, 50 $mg/m^3$<br>**OSHA PEL**<br>8-Hr TWA: 10 ppm, 50 $mg/m^3$<br>**Toxicity Data****<br>Child, Oral, $LD_{Lo}$: 100 mg/kg<br>Man, Unknown, $LD_{Lo}$: 74 mg/kg<br>Rat, Oral, $LD_{50}$: 1250 mg/kg |

## SECTION 3. PHYSICAL DATA

**Boiling Point:** 424°F (218°C)
**Vapor Density (Air = 1):** 4.4
**Vapor Pressure:** 0.087 Torr at 77°F (25°C)
**Water Solubility:** Insoluble

**Specific Gravity ($H_20$ = 1):** 1.162 at 68°F (20°C)
**Melting Point:** 176°F (80°C)
**Molecular Weight:** 128 Grams/Mole
**% Volatile by Volume:** ca 100

**Appearance and Odor:** White crystalline flakes; strong coal tar odor.

## SECTION 4. FIRE AND EXPLOSION DATA

| Flash Point and Method | Autoignition Temperature | Flammability Limits in Air | LOWER | UPPER |
|---|---|---|---|---|
| 174°F (79°C) OC; 190°F (88°C) CC | 979°F (526°C) | % by Volume | 0.9 | 5.9 |

**Extinguishing Media:** Use water spray, dry chemical, or carbon dioxide to fight fires involving naphthalene. **Caution:** Foam or direct water spray applied to molten naphthalene may cause extensive foaming.

**Unusual Fire or Explosion Hazards:** Naphthalene is a volatile solid that gives off flammable vapor when heated (as in fire situations). This vapor is much denser than air and will collect in enclosed or low-lying areas like sumps. In these areas an explosive air-vapor mixture may form, and extra caution is required to prevent any ignition sources from starting an explosion or fire.

**Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5. REACTIVITY DATA

Naphthalene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

**Chemical Incompatibilities:** Naphthalene is incompatible with strong oxidizing agents, chromic anhydride, and mixtures of aluminum trichloride and benzoyl chloride.

**Conditions to Avoid:** Ignition sources like open flame, unprotected heaters, excessive heat, lighted tobacco products, and electric sparks must not occur in work areas where naphthalene vapor may become concentrated.

**Hazardous Products of Decomposition:** Toxic gases like carbon monoxide are produced during fire conditions. Irritating, flammable vapor forms below the melting point because even solid naphthalene has a significant vapor pressure.

## SECTION 6. HEALTH HAZARD INFORMATION

Naphthalene is not listed as a carcinogen by the NTP, IARC, or OSHA.
**Summary of Risks:** Renal shutdown (kidney failure), hemolytic effects (breakdown of red blood cells), hematuria (blood in the urine), oliguria (low volume of urine), jaundice, eye damage, and depression of the central nervous system (CNS) are the primary health concerns associated with exposure to naphthalene. The ACGIH TLVs in section 2 are set to prevent eye damage. These recommended exposure limits may not be low enough to prevent blood changes in genetically hypersensitive individuals.
**Medical Conditions Aggravated by Long-Term Exposure:** Diseases of the blood, liver, and kidneys. Administer medical exams emphasizing these organs. **Target Organs:** Eyes, skin, kidneys, liver, blood (red blood cell effects), and CNS.
**Primary Entry:** Inhalation, skin contact. **Acute Effects:** Inhalation of naphthalene vapor causes excitement, confusion, headache, nausea, and loss of appetite. **Chronic Effects:** Increased incidence of cataracts.

**FIRST AID**

**Eye Contact:** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes to remove particles.
**Skin Contact:** Immediately wash the affected area with soap and water.
**Inhalation:** Remove victim to fresh air; restore and/or support his breathing as needed.
**Ingestion:** Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing. Administer a gastric lavage followed by saline catharsis. Monitor blood and electrolytic balance. Other sources recommend giving the victim several glasses of water to drink.

**GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.**

## SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

**Spill/Leak:** Notify safety personnel, provide ventilation, and eliminate all ignition sources immediately. Cleanup personnel need protection against contact and inhalation of vapor (see sect. 8). Contain large spills and collect waste. Use nonsparking tools to place naphthalene into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.
**Waste Disposal:** Consider reclamation, recycling, or destruction rather than disposal in a landfill. Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**
Air Contaminant (29 CFR 1910.1000, Subpart Z)
**EPA Designations (40 CFR 302.4)**
RCRA Hazardous Waste, No. U165
CERCLA Hazardous Substance, Reportable Quantity: 100 lbs (45.4 kg)

## SECTION 8. SPECIAL PROTECTION INFORMATION

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Follow the eye- and face-protection guidelines of 29 CFR 1910.133. **Respirator:** Use a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Respirator usage must be in accordance with the OSHA regulations of 29 CFR 1910.134. IDLH or unknown concentrations require an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres.
**Other Equipment:** Wear impervious gloves, boots, aprons, gauntlets, etc., as required by the specific work environment to prevent skin contact. **Ventilation:** Install and operate general and local maximum explosion-proof ventilation systems of sufficient power to maintain airborne levels of naphthalene below the OSHA PEL standard cited in section 2. **Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove and launder contaminated clothing before wearing it again; clean this material from shoes and equipment.
**Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep this material off of your clothing and equipment. Avoid transferring this material from hands to mouth while eating, drinking, or smoking. Do *not* smoke, eat, or drink in any immediate work area. Avoid inhalation of vapor!

## SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

**Storage Segregation:** Store naphthalene in a cool, dry, well-ventilated area away from chemical incompatibles (see sect. 5).
**Special Handling/Storage:** Protect containers from physical damage. All bulk storage facilities must be built with an explosion-proof design. All containers used in shipping/transferring operations must be electrically grounded to prevent static sparks. Use monitoring equipment to measure the extent of vapor present in any storage facility containing naphthalene because of potential fire and explosion hazards.
**Comments:** All operations with naphthalene must be done carefully to prevent accidental ignition of its flammable/explosive vapor. If the weather is warm, more naphthalene vapor forms and the potential for explosion increases. Do *not* smoke in any use or storage area!

**Transportation Data (49 CFR 172.101-2)**
**DOT Shipping Name:** Naphthalene
**DOT Hazard Class:** ORM-A
**IMO Class:** 4.1
**DOT ID No.** UN1334
**IMO Label:** Flammable Solid
**DOT Label:** None

**References:** 1, 2, 12, 73, 84-94, 103 PH

**Approvals**
**Indust. Hygiene/Safety**
**Medical Review**

# Occupational Health Guideline for Cyanide

## INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

## APPLICABILITY

The general guidelines contained in this document apply to all cyanides. Physical and chemical properties of two specific compounds are provided for illustrative purposes.

## SUBSTANCE IDENTIFICATION

### Potassium cyanide

- Formula: KCN
- Synonyms: None
- Appearance and odor: White solid with a faint almond odor.

### Sodium cyanide

- Formula: NaCN
- Synonyms: None
- Appearance and odor: White solid with a faint almond odor.

## PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for cyanide is 5 milligrams of cyanide per cubic meter of air ($mg/m^3$) averaged over an eight-hour work shift. NIOSH has recommended that the permissible exposure limit be changed to a ceiling of 5 milligrams cyanide per cubic meter of air averaged over a 10-minute period. The NIOSH Criteria Document for Hydrogen Cyanide and Cyanide Salts should be consulted for more detailed information.

## HEALTH HAZARD INFORMATION

- **Routes of exposure**

Cyanide can affect the body if it is inhaled, if it comes in contact with the eyes or skin, or if it is swallowed. Sufficient cyanide may be absorbed through the skin, especially if there are cuts to cause fatal poisoning.

- **Effects of overexposure**

*1. Short-term Exposure:* Inhalation or ingestion of cyanide salts may be rapidly fatal. Larger doses by inhalation or swallowing may cause the person to rapidly lose consciousness, stop breathing, and die. In some cases, there are convulsions. At lower levels of exposure, the earlier symptoms include weakness, headache, confusion, nausea, and vomiting. These symptoms may be followed by unconsciousness and death. Occasionally, convulsions occur. Milder forms of intoxication may result only in weakness, dizziness, headache, and nausea. The dust of cyanide salts is irritating to the eyes. In the presence of tears, it may cause the symptoms of poisoning described above. The dust of cyanide salts may produce irritation of the nose and skin. Strong solutions of cyanide salts are corrosive and may produce ulcers.

*2. Long-term Exposure:* Effects from chronic exposure to cyanide are non-specific and rare.

*3. Reporting Signs and Symptoms:* A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to cyanide.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to cyanide at potentially hazardous levels:

*1. Initial Medical Examination:*

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Persons with a history of fainting spells, such as occur in various types of cardiovascular and nervous disorders,

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Occupational Safety and Health Administration

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and those unusually susceptible to effects of anoxia or with anemia would be expected to be at increased risk from exposure. Examination of the cardiovascular, nervous, and upper respiratory systems, and thyroid should be stressed. The skin should be examined for evidence of chronic disorders.

—Skin disease: Cyanide is a defatting agent and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of this agent.

—14" x 17" chest roentgenogram: Cyanide causes human lung damage. Surveillance of the lungs is indicated.

—FVC and FEV (1 sec): Cyanide is a respiratory irritant. Persons with impaired pulmonary function may be at increased risk from exposure. Periodic surveillance is indicated.

2. *Periodic Medical Examination:* The aforementioned medical examinations should be repeated on an annual basis.

3. *First Aid Kits:* First aid kits should be readily available in workplaces where there is a potential for the release of cyanide. These kits should contain a minimum of 48 ampules, each of 0.3 ml amyl nitrate, and complete instructions for use. In addition, 2 physician's kits should be immediately available to trained medical personnel. These kits should contain the above quantity of amyl nitrate as well as sterile sodium nitrite solution (3%) and sterile sodium thiosulfate solution (25%). All of the above drugs should be replaced at least biannually to ensure their potency.

- **Summary of toxicology**

The dust of cyanide salts, a source of cyanide ion, is an asphyxiant due to an inhibitory action on metabolic enzyme systems and can be rapidly fatal. Cyanide exerts this effect because it inactivates certain enzymes by forming very stable complexes with the metal in them. Cytochrome oxidase is probably the most important of these, since it occupies a fundamental position in the respiratory process and is involved in the ultimate electron transfer to molecular oxygen. Since cytochrome oxidase is present in practically all cells that function under aerobic conditions, and since the cyanide ion diffuses easily to all parts of the body, it is capable of suddenly bringing to a halt practically all cellular respiration. In the presence of even weak acids, hydrocyanic acid (HCN) gas is liberated from cyanide salts; a few inhalations of higher concentrations of HCN may be followed by almost instantaneous collapse and cessation of respiration; 270 ppm HCN is immediately fatal to humans, 181 ppm is fatal after 10 minutes, 135 ppm after 30 minutes, and 110 ppm may be fatal in 1 hour. The ingestion by humans of 50 to 100 mg of sodium or potassium cyanide may also be fatal. At lower levels of exposure to HCN, the earliest symptoms of intoxication may include weakness, headache, confusion, and occasionally nausea and vomiting; respiratory rate and depth is usually increased initially and at later stages becomes slow and gasping; if cyanosis is present, it usually indicates that respiration has either ceased or has been very inadequate for a few minutes. Humans tolerate 45 to 54 ppm for ½ to 1 hour without immediate or delayed effects, while 18 to 36 ppm may result in some symptoms after an exposure of several hours. Sodium cyanide dust is irritating to the eyes; in the presence of tears it may liberate HCN, which can be absorbed and cause systemic intoxication. Skin contact with dust may be irritating; strong solutions on the skin produce ulcers which are slow in healing. Cyanide is one of the few toxic materials for which an antidote exists; it functions as follows: First, amyl nitrite (inhalation) and sodium nitrite (intravenously) are administered to form methemoglobin, which binds firmly with free cyanide ions. This traps any circulating cyanide ions. The formation of 10 to 20% methemoglobin usually does not involve appreciable risk, yet provides a large amount of cyanide-binding substance. Second, sodium thiosulfate is administered intravenously to increase the rate of conversion of cyanide to the less toxic thiocyanate. Methylene blue should not be administered, because it is a poor methemoglobin former and, moreover, promotes the conversion of methemoglobin back to hemoglobin.

## CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data—Potassium cyanide**

1. Molecular weight: 65.1
2. Boiling point (760 mm Hg): Data not available
3. Specific gravity (water = 1): 1.55
4. Vapor density (air = 1 at boiling point of potassium cyanide): Not applicable
5. Melting point: 635 C (1175 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 71.6
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Sodium cyanide**

1. Molecular weight: 49
2. Boiling point (760 mm Hg): 1500 C (2732 F) (extrapolated)
3. Specific gravity (water = 1): 1.6
4. Vapor density (air = 1 at boiling point of sodium cyanide): Not applicable
5. Melting point: 560 C (1040 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 58
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

1. Conditions contributing to instability: None. Hazardous if kept in closed containers. It may form toxic concentrations of hydrogen cyanide gas when in prolonged contact with air in a closed area.
2. Incompatibilities: Contact with strong oxidizers such as nitrates and chlorates may cause fires and

explosions. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen cyanide and carbon monoxide) may be released when cyanide decomposes.

4. Special precautions: Cyanide may react with carbon dioxide in ordinary air to form toxic hydrogen cyanide gas.

- **Flammability**

1. Not combustible

- **Warning properties**

1. Odor Threshold: No quantitative information is available concerning the odor threshold of sodium or potassium cyanide. HCN, however, is evolved from these substances in the presence of moisture. The Manufacturing Chemists Association states that "although HCN has a characteristic odor, its toxic action at hazardous concentrations is so rapid that it is of no value as a warning property."

2. Eye Irritation Level: Cyanide (as CN) is not known to be an eye irritant. However, according to Grant, HCN can produce eye irritation after chronic exposures.

3. Evaluation of Warning Properties: Although cyanide (as CN) has a negligible vapor pressure, in the presence of moisture HCN can be given off. HCN does not have adequate warning properties.

## MONITORING AND MEASUREMENT PROCEDURES

- **Eight-Hour Exposure Evaluation**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Ceiling Evaluation**

Measurements to determine employee ceiling exposure are best taken during periods of maximum expected airborne concentrations of cyanide. Each measurement should consist of a ten (10) minute sample or series of consecutive samples totalling ten (10) minutes in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). A minimum of three (3) measurements should be taken on one work shift and the highest of all measurements taken is an estimate of the employee's exposure.

- **Method**

Sampling and analyses may be performed by collection of cyanide with a cellulose membrane filter and an impinger containing sodium hydroxide, followed by analysis by direct potentiometry. An analytical method for cyanide is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 3, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00261-4).

## RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.
- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

## PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with cyanide or liquids containing cyanide.
- If employees' clothing has had any possibility of being contaminated with cyanide, employees should change into uncontaminated clothing before leaving the work premises.
- Clothing which has had any possibility of being contaminated with cyanide should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of cyanide from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the cyanide, the person performing the operation should be informed of cyanide's hazardous properties.
- Where there is any possibility of exposure of an employee's body to cyanide or liquids containing cyanide, facilities for quick drenching of the body should be provided within the immediate work area for emergency use.
- Non-impervious clothing which becomes contaminated with cyanide should be removed immediately and not reworn until the cyanide is removed from the clothing.
- Employees should be provided with and required to use dust- and splash-proof safety goggles where there is any possibility of cyanide or liquids containing cyanide contacting the eyes.

- Where there is any possibility that employees' eyes may be exposed to cyanide or liquids containing cyanide, an eye-wash fountain should be provided within the immediate work area for emergency use.

## SANITATION

- Skin that becomes contaminated with cyanide should be immediately washed or showered with soap or mild detergent and water to remove any cyanide.
- Workers subject to skin contact with cyanide should wash with soap or mild detergent and water any areas of the body which may have contacted cyanide at the end of each work day.
- Eating and smoking should not be permitted in areas where cyanide or liquids containing cyanide are handled, processed, or stored.
- Employees who handle cyanide or liquids containing cyanide should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

## COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to cyanide may occur and control methods which may be effective in each case:

| Operation | Controls |
|---|---|
| Use as fumigants and pesticides in greenhouses, ships, mills, and warehouses; use of cyanogen chloride as a warning agent in fumigant gases | Local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use in metal treatment in nitriding, tempering, and case hardening steel; coloring of metals by chemical or electrolytic process; cleaning and coating metals; welding and cutting of heat-resistant metals; liberation during ore extraction and metal purification | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use of calcium cyanamid in fertilizer on soil; during chemical synthesis for manufacture of intermediates in pharmaceuticals, dyes, vitamins, plastics, and sequestering agents; preparation of nitriles, carbylamines, cyano fatty acids, and inorganic cyanides | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use in cellulose technology; paper manufacture; in dyeing; as cement stabilizers; use in photography as fixatives, and in blueprinting and process engraving; liberation in blast furance gases or in handling of illuminating gas | Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment |

## EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

- **Eye Exposure**

If cyanide gets into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with cyanides.

- **Skin Exposure**

If cyanide gets on the skin, immediately wash the contaminated skin using soap or mild detergent and water. If cyanide penetrates through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Get medical attention immediately.

- **Breathing**

If a person breathes in large amounts of cyanide, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

- **Swallowing**

When cyanide has been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

- **Rescue**

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

## SPILL AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.
- If cyanide is spilled, the following steps should be taken:

1. Ventilate area of spill.
2. Collect spilled material in the most convenient and safe manner for reclamation, or for treatment in a cyanide disposal system.

- Waste disposal method:

After treatment as in above, cyanide may be disposed of in a secured sanitary landfill.

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# RESPIRATORY PROTECTION FOR CYANIDE

| **Condition** | **Minimum Respiratory Protection*<br>Required Above 5 mg/m³** |
|---|---|
| Particulate Concentration | |
| 50 mg/m³ or less | Any supplied-air respirator.<br>Any self-contained breathing apparatus. |
| Greater than 50 mg/m³ or entry and escape from unknown concentrations | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.<br>A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. |
| Fire Fighting | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. |
| Escape | Any gas mask providing protection against hydrogen cyanide and particulates.<br>Any escape self-contained breathing apparatus. |

*Only NIOSH-approved or MSHA-approved equipment should be used.

# EXHIBIT E-3

# SAMPLE MEDICAL DATA SHEET

**CONFIDENTIAL**

THE FOLLOWING INFORMATION IS REQUESTED TO DETERMINE YOUR CURRENT MEDICAL STATUS

Date

1. Name (Last, First, Middle Initial)

3. Social Security Number

2. Employee Address (Number & Street) City - State Zip Code

4. Telephone Number

5. Sex* ☐ M ☐ F

6. Birth Date*

7. Name and Address of Person to Notify in an Emergency

8. Telephone Number

9. Personal Physician

Address

Telephone Number

11. Type of Examination
☐ Pre-Placement
☐ Periodic
☐ Other (Specify)

10. Which Division or Facility

Position

12. I.D. or Clock No.

13. Work Location

14. Please Check if You Have Been Immunized For:

| | | | |
|---|---|---|---|
| ☐ Tetanus | ☐ Smallpox | ☐ Polio | ☐ Others |
| ☐ Don't Know | ☐ Don't Know | ☐ Don't Know | ☐ Don't Know |
| LAST DATE | LAST DATE | LAST DATE | LAST DATE |

15. Are You:
☐ Right Handed
☐ Left Handed
☐ Ambidextrous

## 16. Family History*

| RELATION | AGE | STATE OF HEALTH | IF DEAD, CAUSE AND AGE | CHECK EACH BOX (If answer is yes, state blood relationship). | YES | NO | RELATION |
|---|---|---|---|---|---|---|---|
| Father | | | | Cancer | | | |
| Mother | | | | Diabetes | | | |
| Spouse | | | | Stomach Trouble | | | |
| Grandparents | | | | Kidney Trouble | | | |
| | | | | Heart Trouble | | | |
| | | | | Tuberculosis | | | |
| | | | | Mental Disorder | | | |
| Brothers and Sisters | | | | Convulsions | | | |
| | | | | Arthritis | | | |
| | | | | Allergies | | | |
| | | | | Other | | | |
| Children | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## 17. Personal History*

DO YOU HAVE, OR HAVE YOU EVER HAD ANY OF THE FOLLOWING. (Check Each Box)

| | YES | NO | | YES | NO | | YES | NO |
|---|---|---|---|---|---|---|---|---|
| nemia | | | Female Disorders | | | Malaria | | |
| sthma | | | Foot Trouble | | | Nervous Breakdown | | |
| Cancer, Cyst, Tumor or Growth | | | Frequent Indigestion or Heartburn | | | Nervous Trouble of Any Sort | | |
| Chest Pain or Shortness of Breath | | | Frequent or Painful Urination | | | Numbness, Weakness | | |
| hills, Fever, Night Sweats | | | Frequent Trouble Sleeping | | | Palpitation or Pounding Heart | | |
| Chronic Cough or Colds | | | Gall Bladder Trouble | | | Prostate Trouble | | |
| Convulsions, Fits, | | | Goiter or Thyroid Problem | | | Reaction from Medicines | | |
| or Falling Sickness | | | Hayfever or Allergies | | | Recent Gain or Loss of Weight | | |
| oughing Up, Spitting, or | | | Headaches, Frequent or Severe | | | Rheumatism or Arthritis | | |
| Vomiting Blood | | | Heart Trouble | | | Scarlet Fever or Rheumatic Fever | | |
| epression or Excessive Worry | | | Hemorrhoids or Rectal Trouble | | | Skin Rash or Hives | | |
| iabetes, or Sugar in Urine | | | Hernia or Rupture | | | Stomach Trouble, Ulcers | | |
| Dizziness | | | High Blood Pressure | | | Swelling of Ankles or Feet | | |
| Ear, Nose, or Throat Trouble | | | Jaundice or Hepatitis | | | Swollen or Painful Joints | | |
| Epilepsy | | | Kidney Trouble or Blood in Urine | | | Tuberculosis or Pleurisy | | |
| Eye Trouble | | | Liver Trouble | | | Varicose Veins | | |
| Fainting | | | "Locked" Knee or "Trick Joint" | | | Veneral Disease | | |
| atigue, Chronic or Frequent | | | Loss of Appetite, Chronic | | | Other | | |

18. Injuries: Please Check Any Injuries You Have Had

☐ Fractures/Broken Bones
☐ Severe Burns
☐ Other Injury
☐ Severe Cuts
☐ Dislocations
☐ None
☐ Loss of Consciousness
☐ Low Back Pain
☐ Back Injury
☐ Loss of Arm, Leg, Finger, Toe

19. Check Yes or No. If Yes, Give Details in Blank Area.

| | YES | NO | |
|---|---|---|---|
| a. Any Time Loss From Work Past Two Years Due to Illness. | | | |
| b. Any Brace or Support Worn | | | |
| c. Discharged or Disqualified From Armed Services for Any Reason. | | | |
| d. Military Service - Dates and Locations. | | | |
| e. Applied for, or Received Workmen's Compensation. | | | |
| f. Been Exposed to Work With Dusts, Radiation, Excessive Noise, Chemicals. | | | |
| g. Have You Been Unable to Hold a Job Because of: | | | |
| 1. Sensitivity to Chemicals, Dust, Sunlight, etc. | | | |
| 2. Inability to Perform Certain Motions. | | | |
| 3. Inability to Assume Certain Positions. | | | |
| 4. Other Medical Reasons. | | | |
| h. Been a Patient in a Hospital or Sanitarium. | | | |
| i. Had Surgery Recommended or Performed Date and Type. | | | |
| j. Are You Taking Medicines Now. | | | |
| k. Have You Been Turned Down on a Physical Examination or Been Informed of Any Abnormal Findings From a Physical Examination. | | | |
| l. Do You Smoke - If Yes, Quantity Per Day. | | | |
| m. Do You Use Alcoholic Beverages - If Yes, Quantity Per Day. | | | |
| n. Have You Lived or Travelled Outside the Continental U.S.A. | | | |
| o. Allergies. | | | |

# EXHIBIT E-4

# ACCIDENT REPORT FORM

# ACCIDENT REPORT

Report No. ________

SITE: ______________________________ PROJECT NO.: __________________

Location: ____________________________________________________________

Date of Report: ____________ Preparers Name: ______________________

Name and Address of Injured: ________ SSN: ___________ Age: _______

____________________________________ Sex: _______

Years of Service: ___ Time on Present Job: ____ Title/Classification: __

Division/Department: _______ Date of Accident: ________ Time: ________

Accident Category: ___ Motor Vehicle ____ Property Damage ____ Fire

___ Chemical Exposure ____ Near Miss ____ Other

Severity of Injury or Illness: ____ Non-disabling ____ Disabling

____ Medical Treatment ____ Fatality

Amount of Damage: $___________________ Property Damaged: ____________

Estimated Number of Days Away from Job: ______________________________

Nature of Injury or Illness: _________________________________________

CLASSIFICATION OF INJURY:

____ Fractures
____ Dislocations
____ Sprains
____ Abrasions
____ Lacerations
____ Punctures
____ Bites

_____ Heat Burns
_____ Chemical Burns
_____ Radiation Burns
_____ Bruises
_____ Blisters
_____ Toxic Respiratory Exposure
_____ Toxic Ingestion

______ Cold Exposure
______ Frostbite
______ Heat Stroke
______ Heat Exhaustion
______ Concussion
______ Faint/Dizziness
______ Toxic Respiratory Allergy
______ Dermal Allergy

Part of Body Affected: _______________________________________________

Degree of Disability: ________________________________________________

Date Medial Care was Received: ______________________________

Where Medical Care was Received: ______________________________

Address (if off-site): ______________________________

ACCIDENT LOCATION: ______________________________

Was weather a factor: ______________________________

Unsafe act by injured and/or others contributing to the accident (Be specific, must be answered):

______________________________

______________________________

______________________________

Personal factors (Improper attitude, lack of knowledge of skill, slow reaction, fatigue):

______________________________

______________________________

______________________________

Level of personal protection equipment required in Site Safety Plan: _____

______________________________

Modifications: ______________________________

Was injured using required equipment: ______________________________

If not, how did actual equipment use differ from plan: ______________________________

______________________________

Detailed narrative description (How did accident occur, why; objects, equipment, tools used, circumstance assigned duties) (Be specific):

______________________________

______________________________

______________________________

(Use back of sheet, as required)

Witnesses to accident: ______________________________________________

______________________________________________________________________

Signature of Preparer ____________________________

Signature of Site Leader ____________________________

## EXHIBIT E-5

## OSHA FORM 200

Bureau of Labor Statistics
Log and Summary of Occupational
Injuries and Illnesses

# U.S. Department of Labor

For Calendar Year 19 ______ Page ___ of ___

Form Approved
O M B No 1220-0029
See OMB Disclosure
Statement on reverse

**NOTE:** ***This form is required by Public Law 91-596 and must be kept in the establishment for 5 years. Failure to maintain and post can result in the issuance of citations and assessment of penalties.*** *(See posting requirements on the other side of form.)*

**RECORDABLE CASES:** You are required to record information about every occupational death, every nonfatal occupational illness, and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid). *(See definitions on the other side of form.)*

Company Name

Establishment Name

Establishment Address

| Case or File Number | Date of Injury or Onset of Illness | Employee's Name | Occupation | Department | Description of Injury or Illness |
|---|---|---|---|---|---|
| Enter a nonduplicating number which will facilitate comparisons with supplementary records. | Enter Mo./day. | Enter first name or initial, middle initial, last name. | Enter regular job title, not activity employee was performing when injured or at onset of illness. In the absence of a formal title, enter a brief description of the employee's duties. | Enter department in which the employee is regularly employed or a description of normal workplace to which employee is assigned, even though temporarily working in another department at the time of injury or illness. | Enter a brief description of the injury or illness and indicate the part or parts of body affected.<br>Typical entries for this column might be: Amputation of 1st joint right forefinger; Strain of lower back; Contact dermatitis on both hands; Electrocution -body |
| (A) | (B) | (C) | (D) | (E) | (F) |
|  |  |  |  |  | **PREVIOUS PAGE TOTALS** → |
|  |  |  |  |  | **TOTALS** (Instructions on other side of form.) → |

**Extent of and Outcome of INJURY**

| Fatalities | Nonfatal Injuries |  |  |  |  |
|---|---|---|---|---|---|
| Injury Related | Injuries With Lost Workdays |  |  |  | Injuries Without Lost Workdays |
| Enter DATE of death.<br>Mo./day/yr. | Enter a CHECK if injury involves days away from work, or days of restricted work activity, or both | Enter a CHECK if injury involves days away from work. | Enter number of DAYS away from work. | Enter number of DAYS of restricted work activity. | Enter a CHECK if no entry was made in columns 1 or 2 but the injury is recordable as defined above. |
| (1) | (2) | (3) | (4) | (5) | (6) |

**Type, Extent of, and Outcome of ILLNESS**

| Type of Illness |  |  |  |  |  |  | Fatalities | Nonfatal Illnesses |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHECK Only One Column for Each Illness *(See other side of form for terminations or permanent transfers.)* |  |  |  |  |  |  | Illness Related | Illnesses With Lost Workdays |  |  |  | Illnesses Without Lost Workdays |
| Occupational skin diseases or disorders | Dust diseases of the lungs | Respiratory conditions due to toxic agents | Poisoning (systemic effects of toxic materials) | Disorders due to physical agents | Disorders associated with repeated trauma | All other occupational illnesses | Enter DATE of death.<br>Mo./day/yr. | Enter a CHECK if illness involves days away from work, or days of restricted work activity, or both | Enter a CHECK if illness involves days away from work | Enter number of DAYS away from work. | Enter number of DAYS of restricted work activity. | Enter a CHECK if no entry was made in columns 8 or 9. |
| (7) |  |  |  |  |  |  | (8) | (9) | (10) | (11) | (12) | (13) |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |  |  |  |  |  |  |

NO INJURIES

OSHA No. 200

FOLD

Certification of Annual Summary Totals By ______________ Title ______________ Date ______________

OSHA No. 200

**POST ONLY THIS PORTION OF THE LAST PAGE NO LATER THAN FEBRUARY 1.**

## OMB DISCLOSURE STATEMENT

**We estimate that it will take from 4 minutes to 30 minutes to complete a line entry on this form, including time for reviewing instructions; searching, gathering and maintaining the data needed; and completing and reviewing the entry. If you have any comments regarding this estimate or any other aspect of this recordkeeping system, send them to the Bureau of Labor Statistics, Division of Management Systems (1220-0029), Washington, D.C. 20212 and to the Office of Management and Budget, Paperwork Reduction Project (1220-0029), Washington, D.C. 20503.**

### I. Log and Summary of Occupational Injuries and Illnesses

Each employer who is subject to the recordkeeping requirements of the Occupational Safety and Health Act of 1970 must maintain for each establishment a log of all recordable occupational injuries and illnesses. This form (OSHA No. 200) may be used for that purpose. A substitute for the OSHA No. 200 is acceptable if it is as detailed, easily readable, and understandable as the OSHA No. 200.

Enter each recordable case on the log within six (6) workdays after learning of its occurrence. Although other records must be maintained at the establishment to which they refer, it is possible to prepare and maintain the log at another location, using data processing equipment if desired. If the log is prepared elsewhere, a copy updated to within 45 calendar days must be present at all times in the establishment.

Logs must be maintained and retained for five (5) years following the end of the calendar year to which they relate. Logs must be available (normally at the establishment) for inspection and copying by representatives of the Department of Labor, or the Department of Health and Human Services, or States accorded jurisdiction under the Act. Access to the log is also provided to employees, former employees and their representatives.

### II. Changes in Extent of or Outcome of Injury or Illness

If, during the 5 year period the log must be retained, there is a change in an extent and outcome of an injury or illness which affects entries in columns 1, 2, 6, 8, 9, or 13, the first entry should be lined out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays away from work, the check in column 6 should be lined out, and checks entered in columns 2 and 3 and the number of lost workdays entered in column 4.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then died of the illness, any entries in columns 9 through 12 should be lined out and the date of death entered in column 8.

The entire entry for an injury or illness should be lined out if later found to be nonrecordable. For example, an injury which is later determined not to be work related, or which was initially thought to involve medical treatment but later was determined to have involved only first aid.

### III. Posting Requirements

A copy of the totals and information following the fold line of the last page for the year must be posted at each establishment in the place or places where notices to employees are customarily posted. This copy must be posted no later than ***February 1 and must remain in place until March 1.***

Even though there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.

The person responsible for the ***annual summary totals*** shall certify that the totals are true and complete by signing at the bottom of the form.

### IV. Instructions for Completing Log and Summary of Occupational Injuries and Illnesses

Column A – CASE OR FILE NUMBER. Self-explanatory.

Column B – DATE OF INJURY OR ONSET OF ILLNESS.
For occupational injuries, enter the date of the work accident which resulted in injury. For occupational illnesses, enter the date of initial diagnosis of illness, or, if absence from work occurred before diagnosis, enter the first day of the absence attributable to the illness which was later diagnosed or recognized.

Columns C through F – Self-explanatory.

Columns 1 and 8 – INJURY OR ILLNESS-RELATED DEATHS.
Self-explanatory.

Columns 2 and 9 – INJURIES OR ILLNESSES WITH LOST WORKDAYS.
Self-explanatory.

Any injury which involves days away from work, or days of restricted work activity, or both must be recorded since it always involves one or more of the criteria for recordability.

Columns 3 and 10 – INJURIES OR ILLNESSES INVOLVING DAYS AWAY FROM WORK. Self-explanatory.

Columns 4 and 11 – LOST WORKDAYS – DAYS AWAY FROM WORK.
Enter the number of workdays (consecutive or not) on which the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

NOTE: For employees not having a regularly scheduled shift, such as certain truck drivers, construction workers, farm labor, casual labor, part time employees, etc., it may be necessary to estimate the number of lost workdays. Estimates of lost workdays shall be based on prior work history of the employee AND days worked by employees, not ill or injured, working in the department and/or occupation of the ill or injured employee.

Columns 5 and 12 – LOST WORKDAYS – DAYS OF RESTRICTED WORK ACTIVITY.
Enter the number of workdays (consecutive or not) on which because of injury or illness:

(1) the employee was assigned to another job on a temporary basis, or
(2) the employee worked at a permanent job less than full time, or
(3) the employee worked at a permanently assigned job but could not perform all duties normally connected with it.

**The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.**

Columns 6 and 13 – INJURIES OR ILLNESSES WITHOUT LOST WORKDAYS. Self-explanatory.

Columns 7a through 7g – TYPE OF ILLNESS.
Enter a check in only *one* column for each illness.

**TERMINATION OR PERMANENT TRANSFER**—Place an asterisk to the right of the entry in columns 7a through 7g (type of illness) which represented a termination of employment or permanent transfer.

### V. Totals

Add number of entries in columns 1 and 8.
Add number of checks in columns 2, 3, 6, 7, 9, 10, and 13.
Add number of days in columns 4, 5, 11, and 12.
Yearly totals for each column (1-13) are required for posting. Running or page totals may be generated at the discretion of the employer.

If an employee's loss of workdays is continuing at the time the totals are summarized, estimate the number of future workdays the employee will lose and add that estimate to the workdays already lost and include this figure in the annual totals. No further entries are to be made with respect to such cases in the next year's log.

### VI. Definitions

**OCCUPATIONAL INJURY** is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from an exposure involving a single incident in the work environment.

NOTE: Conditions resulting from animal bites, such as insect or snake bites or from one time exposure to chemicals, are considered to be injuries.

**OCCUPATIONAL ILLNESS** of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact.

The following listing gives the categories of occupational illnesses and disorders that will be utilized for the purpose of classifying recordable illnesses. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered the complete listing of the types of illnesses and disorders that are to be counted under each category.

7a. **Occupational Skin Diseases or Disorders**
Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants, oil acne, chrome ulcers, chemical burns or inflammations, etc.

7b. **Dust Diseases of the Lungs (Pneumoconioses)**
Examples: Silicosis, asbestosis and other asbestos related diseases, coal worker's pneumoconiosis, byssinosis, siderosis, and other pneumoconioses.

7c. **Respiratory Conditions Due to Toxic Agents**
Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes, farmer's lung, etc.

7d. **Poisoning (Systemic Effect of Toxic Materials)**
Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals, poisoning by carbon monoxide, hydrogen sulfide, or other gases, poisoning by benzol, carbon tetrachloride, or other organic solvents, poisoning by insecticide sprays such as parathion, lead arsenate, poisoning by other chemicals such as formaldehyde, plastics, and resins, etc.

7e. **Disorders Due to Physical Agents (Other than Toxic Materials)**
Examples: Heatstroke, sunstroke, heat exhaustion, and other effects of environmental heat, freezing, frostbite, and effects of exposure to low temperatures, caisson disease, effects of ionizing radiation (isotopes, X-rays, radium), effects of nonionizing radiation (welding flash, ultraviolet rays, microwaves, sunburn), etc.

7f. **Disorders Associated With Repeated Trauma**
Examples: Noise induced hearing loss, synovitis, tenosynovitis and bursitis, Raynaud's phenomena, and other conditions due to repeated motion, vibration, or pressure.

7g. **All Other Occupational Illnesses**
Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors, food poisoning, histoplasmosis, coccidioidomycosis, etc.

**MEDICAL TREATMENT** includes treatment (other than first aid) administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does NOT include first aid treatment (one time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

**ESTABLISHMENT**: A single physical location where business is conducted or where services or industrial operations are performed (for example: a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office). Where distinctly separate activities are performed at a single physical location, such as construction activities operated from the same physical location as a lumber yard, each activity shall be treated as a separate establishment.

For firms engaged in activities which may be physically dispersed, such as agriculture; construction; transportation; communications; and electric, gas, and sanitary services, records may be maintained at a place to which employees report each day.

Records for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., shall be maintained at the location from which they are paid or the base from which personnel operate to carry out their activities.

**WORK ENVIRONMENT** is comprised of the physical location, equipment, materials processed or used, and the kinds of operations performed in the course of an employee's work, whether on or off the employer's premises.

# EXHIBIT E-6

# FIRST REPORT OF INJURY FORM

1. INSURER FILE NUMBER/LARS Loc. Code

2. EMPLOYER FILE NUMBER:

3. EMPLOYER'S CONNECTICUT REGISTRATION NUMBER (CRN):

## WORKERS' COMPENSATION COMMISSION OF CONNECTICUT

## EMPLOYER'S FIRST REPORT OF OCCUPATIONAL INJURY OR DISEASE

(Please type or print in ink)

4. WCC FILE NUMBER

5. REASON FOR REPORT CHECK ALL THAT APPLY
- LOST TIME — ONE OR MORE DAYS ☐
- MEDICAL/HEALTH CARE ☐
- OCCUPATIONAL DISEASE (Note item 41 below) ☐
- CORRECT PRIOR REPORT ☐

### EMPLOYER INFORMATION

6. EMPLOYER NAME:

7. EMPLOYER MAILING ADDRESS AND PHONE, Including Town

8. LOCATION IF DIFFERENT FROM MAILING ADDRESS:

9. NATURE OF BUSINESS:

10. NAME OF WC INSURER:

11. POLICY NUMBER: POLICY PERIOD

### EMPLOYEE INFORMATION

12. LAST NAME: FIRST NAME: M. I.

13. SOCIAL SECURITY NUMBER:

14. ADDRESS — NUMBER AND STREET:

15. CITY: STATE: ZIP:

16. HOME PHONE:

17. DATE OF BIRTH:

18. AGE:

19. SEX: MALE ☐ FEMALE ☐

20. OCCUPATION:

21. DEPARTMENT:

22. DATE OF HIRE:

23. DATE CURRENT DUTIES BEGAN:

24. WEEKLY WAGE AT TIME OF INJURY:

### INJURY OR EXPOSURE INFORMATION

25. DATE AND TIME OF INJURY: : AM ☐ PM ☐

26. DID INJURY OR EXPOSURE OCCUR ON EMPLOYER'S PREMISES SHOWN ABOVE? YES ☐ NO ☐

27. IF NO, PLACE WHERE INJURY OR EXPOSURE OCCURRED, INCLUDING TOWN

28. DESCRIBE THE EVENTS WHICH RESULTED IN THE INJURY OR DISEASE. (GIVE FULL DETAILS ON ALL FACTORS THAT LED OR CONTRIBUTED TO THE INJURY OR THE ONSET OF DISEASE.)

N

P

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A

29. NAME THE OBJECT, SUBSTANCE, OR EXPOSURE WHICH DIRECTLY BROUGHT ABOUT THE INJURY OR DISEASE.

30. DESCRIBE THE INJURY OR DISEASE AND INDICATE PART OF BODY AFFECTED.

31. PHYSICIAN (NAME AND ADDRESS):

32. ☐ FIRST AID ☐ HOSPITAL ☐ EMERGENCY ROOM ☐ OUT-PATIENT

33. HOSPITAL (NAME AND ADDRESS):

34. DATE EMPLOYER NOTIFIED:

35. TIME EMPLOYEE'S WORKDAY BEGAN: AM ☐ PM ☐

36. DID EMPLOYEE LOSE ONE OR MORE DAYS WORK? YES ☐ NO ☐ IF NO, SKIP BOXES 38, 39, 40, AND 41.

37. EXTENT OF ACCIDENT/HEALTH AND LIFE INSURANCE COVERAGE FOR EMPLOYEE:

38. DATE INCAPACITY BEGAN:

39. HAS EMPLOYEE RETURNED TO WORK? YES ☐ NO ☐ IF YES, GIVE DATE:

40. DID EMPLOYEE DIE? YES ☐ NO ☐ IF YES, GIVE DATE:

41. FOR OCCUPATIONAL DISEASE DATE OF LAST EXPOSURE: DATE OF DIAGNOSIS AS OCCUPATIONALLY RELATED:

### PREPARER INFORMATION

42. PREPARER'S NAME AND TITLE (TYPE OR PRINT):

SIGNATURE (FORM MUST BE SIGNED)

DATE:

Form WCC-15 (10-85) SEE REVERSE SIDE FOR WAGE STATEMENT Form LC-4706-2 Printed in U.S.A.

# EXHIBIT E-7

# RECORD OF SAFETY MEETINGS

# SAFETY MEETING RECORD

Safety Meeting Date/Time: 11/1/90 10:00 a.m.

Given By: Dennis Unites

Topics Discussed: Routes to hospitals for each site, sampling protocol, decontamination measures, and level of protection.

Present at Safety Meeting (signature):

1.
2. Anna Sullivan
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
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16.
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19.
20.

# APPENDIX F

## QUALITY ASSURANCE/QUALITY CONTROL DOCUMENT

## QUALITY ASSURANCE PROJECT PLAN

This section presents those elements of project control which are necessary to ensure quality of the overall preliminary investigation at the NYSEG MGP Sites and outlines the procedures and guidelines Atlantic will follow to ensure the reliable collection and handling of sampling and analysis data. This basic elements normally included in an EPA Quality Assurance Plan and/or Quality Assurance Project Management Plan are addressed in this section.

### Brief Description of Field Activities

The field investigation program will consist of the following subtasks:

- Topographic and Property Survey
- Surface Soil Sampling
- Surface Water Sampling
- Sediment Sampling
- Air Sampling

Each of these subtasks is discussed in detail in Section 2.0 of this Work Plan.

### Field Procedures

Atlantic Environmental Services has developed a number of technical procedures which have been applied to site investigations including work performed at CERCLA sites. A list of relevant Atlantic procedures for the NYSEG MGP Sites field investigation are as follows.

| Procedure Number | Procedure Title |
|---|---|
| 1020 | Field Procedures for Collection of Surface Soil Samples |
| 1022 | Field Procedures for Collection of Surface Water and Sediment Samples for Hazardous Waste Determination |

| | |
|---|---|
| 1040NY | Sample Preservation for Solid and Liquid Matrices for Work Conducted in New York State |
| 1041 | Sample Chain-of-Custody Procedure |
| 1042 | Shipping Procedures for Environmental Field Samples |
| 1051 | Operation and Calibration of the HNu Systems Photoionizer Model PI-101 |
| 1060 | Cleaning Procedure for Sampling Devices Used in Environmental Site Investigations |

Each of these listed Atlantic Technical Procedures are presented in Appendix F.

## Project Organization and Responsibility

Atlantic will perform the quality assurance elements described in this section in accordance with EPA guidance to assure consistency throughout the program. Specific personnel have been identified who are responsible for implementing the quality control aspects of the project. Primary responsibility rests with the Project Manager.

The following is a list of personnel responsible for various aspects of the project.

| Function | Person Responsible |
|---|---|
| Sample Collection | Anna Sullivan (Atlantic) |
| QA/QC Coordinator | Robert Breeding (Atlantic) |
| Data Quality Review | Robert Breeding (Atlantic) |
| Data Processing QA | James Gould (Atlantic) |
| Sample QA | Anna Sullivan (Atlantic) |
| Lab Analysis | John Flaherty (Wadsworth) |
| Lab QA | Renee Gigliotti (Wadsworth) |
| Overall Project Coordination | Dennis Unites (Atlantic) |

The Project Manager, Dennis Unites, P.G., will assume prime responsibility for technical, financial and scheduling matters. He will be Atlantic's principal point of contact with NYSEG and the DEC. James Gould, P.E., will be the Senior Technical Review for the project, responsible for overall technical content of

Atlantic's work. Robert Breeding will coordinate the overall project QA/QC program. Anna Sullivan will oversee all aspects of the field investigation.

## Quality Assurance and Quality Control

This section describes the QA/QC requirements for the field activities.

### Field Instrument Calibration and Preventative Maintenance

Atlantic procedure 1051 (HNu P1-101/Organic Vapor Meter) describes calibration and maintenance procedures for HNu P1-101.

A master calibration/maintenance file will be maintained which will include the following information:

- device/instrument serial and/or I.D. number;
- frequency of calibration;
- date of calibration;
- results of calibration;
- name of person performing the calibration; and
- identification of calibration gas.

### QA/QC Sample Collection and Frequency

#### Trip Blanks

A trip blank is an aliquot of deionized organic-free water that is sealed in a sample bottle prior to initiation of field work. Glass vials (40 ml) will be used for VOA Trip Blanks. These sealed bottles are subsequently placed within a cooler and accompany field personnel during the sampling activities. For each day of aqueous sampling, a trip blank will also be sent for analysis. In this manner, any possible cross-contamination occurring among samples during shipment can be assessed. A trip blank will be taken for each day of aqueous volatile organics sampling.

### Field Blanks

A field blank is an aliquot of deionized, organic free water which has been used to rinse the field sampling equipment after decontamination. A field blank will be taken for each media sampled (i.e., for each type of equipment used) at a frequency of one field blank per day per media. In this manner, any possible cross-contamination occurring among samples due to the repeated use of the same sampling equipment can be assessed.

### Replicate Samples

Replicate samples will be analyzed to check laboratory reproducibility of analytical data from two aliquots of a sample taken at one location. Approximately ten percent of the total number of aqueous samples will be replicated in order to evaluate the precision of the methods used.

### Sample Identification System

Each sample will be designated by alphanumeric code which will identify the project site, sample type, sampling location, sample depth, and addition designation if needed. Replicates will not be specifically identified as such in the sample number, but will have a different (sequential) number which will be noted in the sample logbook.

The sample code will use the following format: Lockport-CGLS

- Date of Sampling
- Sample Type: SS (surface soil), SW (surface water), SE (sediment), A (air)
- Sample Number

Where: CGLS-111290-SS3

Indicates: CGLS - Lockport State Road Site
111290 - November 12, 1990
SS - Surface Soil
3 - Sample Number 3

### Sample Holding Times

Sample holding times are specified in Atlantic Procedure No. 1040NY.

### Sampling Packaging and Shipping

Samples should be packaged and shipped according to Atlantic Procedure No. 1042. When sample shipments are to be sent, the receiving laboratory will be telephoned on that day or the following morning, and notified of the shipment date, airbill number, and number and type of samples being shipped. All samples will be shipped in the afternoon (the end) of each day to ensure that samples will be shipped within twenty-four (24) hours of sampling. Samples will be labeled as per 40 CFR 261.4, "Research Samples" or "Environmental Samples".

### Sample and Field Activity Documentation

Custody of samples must be maintained and documented at all times. Chain-of-custody begins with the collection of the samples in the field. Procedures are detailed in Atlantic Procedure No. 1041.

A bound/weatherproof master sample log shall be maintained by the field team. The Field Operations Leader, or designee, shall record information related to sampling or field activities. The information will include sample number, sample time, shipping information, sample location, sample description, sample method used, weather conditions, field measurements, sampler's name, unusual events, etc.

A site logbook will be maintained by the Field Operations Leader or designee. The book will contain a summary of the day's activities, including site visitors, daily telephone contacts, and decision points.

### QA Objectives for Precision, Accuracy and Completeness

Environmental measurements have inherent limitations arising from equipment problems, procedural deviations, and changes in ambient conditions. Most environmental measurements are analyses made for extremely low concentrations of constituents and are subject to chemical interferences, instrument limitation and uncertainties that affect the accuracy of the determination. It is essential to minimize these factors so that the measurements accurately reflect the character of the sample collected.

All data gathered during the course of the NYSEG MGP Site study by Atlantic or processed by the laboratory will meet objectives of accuracy, precision, completeness, representativeness, and comparability, as referenced in Stanley and Verner (1983). These characteristics are defined below:

- Accuracy - the degree of agreement of a measurement, X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value, 100 (X-T)/T. Accuracy is a measure of the bias in a system.
- Precision - a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the "prescribed similar conditions".
- Completeness - a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.
- Representativeness - expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.
- Comparability - expresses the confidence with which one data set can be compared to another.

# APPENDIX G

## ATLANTIC ENVIRONMENTAL SERVICES, INC.
## TECHNICAL PROCEDURES

# ATLANTIC PROCEDURE NO. 1020

## FIELD PROCEDURES FOR COLLECTION OF SURFACE SOIL SAMPLES

**Prepared By:** John A. Ripp — Principal
JOHN A. RIPP — TITLE

**Reviewed By:** Edmund J. Burke — Q.A. Manager
EDMUND J. BURKE, P.E. — TITLE

**Approved By:** Paul Burgess — Chief Engineer
PAUL BURGESS, P.E. — TITLE

**REVISIONS**

| NO. | DATE | PREPARED BY | REVIEWED BY | APPROVED BY |
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ATLANTIC ENVIRONMENTAL SERVICES, INC.
COLCHESTER, CONNECTICUT

Procedure No. 1020
Revision No. 1
Date April 21, 1989
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## SECTION 1.0: PURPOSE

To insure a standard procedure for collection of surface soil samples for the identification of chemical parameters.

## SECTION 2.0: SCOPE

The following procedure describes the logistics, chain-of-events, collection techniques and documentation requirements for collecting surface soil samples designated for chemical analysis.

## SECTION 3.0: RESPONSIBILITY

Project Manager - First

Field Chemist, Geologist or Engineer - Second

## SECTION 4.0: SUPPORTING PROCEDURES

Atlantic Procedure No. 1041 Sample Chain-of-Custody Procedure

## SECTION 5.0: REQUIRED FORMS

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington

## SECTION 6.0: PROCEDURE

### 6.1 Selection of Sampling Locations

The selection of sampling locations in and around a project site will be based on a review of existing site data, the site topography and surface features, results of preliminary site surveys using portable geophysical and air monitoring equipment and the initial estimates as to the extent of and migration pathways of the waste present. At the start of the investigation, a number of surface soil samples are usually allocated. Only after initial field reconnaissance are the final locations selected. At a minimum, the following should be included as sampling points:

- Upgradient soil surfaces to determine background levels.
- Soil surfaces within the immediate area of contamination.
- Downgradient soil surfaces to determine any spread of contamination resulting from storm water runoff.

Sampling locations may be selected in the following areas at the site:

- Areas where chemicals may have been stored, handled or disposed.
- Areas where motor vehicles hauling chemicals may have traveled on the site.
- Areas where water may have ponded during storm events.

### 6.2 Equipment List

The following is to be considered a minimum listing of required field equipment for collecting soil samples. Other tools required for accessing soils beneath paved area, etc. should be included when necessary.

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Sample container - 1 each 1 liter glass jar with a teflon lined cap.
- Teflon coated or stainless steel sample spoons.
- Wooden stakes and spray paint (highly visible)
- Field notebook
- Sample bottle labels
- Chain-of-custody forms

### 6.3 Order of Samples

Surface soil samples should be taken in all locations prior to all other site sampling events. This is to prevent the possibility of cross-contamination between sampling points by site personnel or equipment (backhoe, drill rigs, equipment vehicles, etc. . . ). For consistency with other sampling programs, the upgradient samples should be collected first.

## 6.4 Location and Collection of Samples

Surface soils, depending upon the contaminants of interest, can be either individual or composite samples. Composites represent samples taken from a number of individual locations which are equally blended to form a sample representing a larger area. Certain state agencies are discouraging the use of composite samples when looking for aromatic volatile and halogenated volatile organic compounds because of dilution and the difficulty of forming a "true" composite. Therefore prior to sampling, the use of composites should be checked with the agency which will have final approval of actions regarding a site in which surface soil samples are used in developing certain actions regarding clean up.

If statistical techniques are to be employed in collecting surface soil samples using a random grid, the procedure provided in Chapter 5 of Methods of Soil Analysis, Part I by C.A. Black et al, American Society of Agronomy, Academic Press, N.Y. 1965 and Section I of EPA-SW 846 Test Methods for Evaluating Solid Waste. Physical Chemical/Methods are suggested protocols.

Once the general locations have been chosen, sampling can begin. Normally a sample representing the top 3 to 6 inches of soil is taken. Samples are collected using a dedicated, precleaned stainless steel or Teflon spoon and immediately stored in the glass jar. Organic debris (ie.

leaves, twigs, bark) along with large pieces of gravel should be avoided. The sample should be representative of the area soil; it is best represented by the finer grains of the topsoil. The jars must be filled completely so as to avoid creating a head space where volatiles may escape. After each jar is filled the threads should be wiped clean so that the cap can be threaded on without creating an air gap.

Latex or rubber gloves should be worn to protect the sampling person and to avoid cross contamination through handling.

All filled jars must be labelled with the following as a minimum:

- project number
- sampling time and date
- sample number
- analysis
- collector's initials

The sample chain-of-custody form is then immediately filled out and kept with the sample. The sample is then stored in a refrigerated container until delivery to the analytical lab.

The location, depth of sample, sample type, time of sample, and other associated data (ie. organic vapor readings, color of the ground, odors, texture, etc.) will be documented in the field notebook when the sample is taken. If sampling is performed under a paved area or in fill, a description of these unique areas will also be included.

### 6.5 Sample Verification

After each sample of soil is taken, an indicator should be used to mark the location in the event it will be surveyed at a later time. Once all the surface soil samples are collected, the sample numbers and locations should be reviewed before leaving the site or progressing to other tasks in a program. All used sampling devices will be kept together, separate from clean tools, so that they can be cleaned according to appropriate decontamination and cleaning procedure. In no event will a used sampling device be used for two or more samples without full cleaning between samples.

# ATLANTIC PROCEDURE NO. 1022

# FIELD PROCEDURES FOR COLLECTION OF SURFACE WATER AND SEDIMENT SAMPLES FOR HAZARDOUS WASTE DETERMINATION

**Prepared By:** John A. Ripp Principal
JOHN A. RIPP TITLE

**Reviewed By:** Edmund J Burke Q.A. Manager
EDMUND J. BURKE, P.E. TITLE

**Approved By:** Paul Burgess Chief Engineer
PAUL BURGESS, P.E. TITLE

**REVISIONS**

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ATLANTIC ENVIRONMENTAL SERVICES, INC.
COLCHESTER, CONNECTICUT

Procedure No. 1022
Revision No.
Date July 1, 1986
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## 1.0 PURPOSE

To insure a standard procedure for collection of surface water (streams, ponds, lakes, impoundments) and sediments for the identification of chemical composition.

## 2.0 SCOPE

The following procedure describes the logistics, chain-of-events, collection techniques and documentation requirements for collecting surface water and sediment samples designated for chemical analysis.

## 3.0 RESPONSIBILITY

Project Manager - First

Field Supervisor - Second

Field Sampling Technicians - Third

## 4.0 SUPPORTING PROCEDURES

Atlantic Procedure No. 1060 Decontamination Procedure for Sampling Devices

Atlantic Procedure No. 1041 Sample Chain-of-Custody Procedure.

## 5.0 REQUIRED FORMS

Field Notebook No. 351, published by J.L. Darling Corp.,
Tacoma, Washington

## 6.0 PROCEDURE

### 6.1 Selection of Sampling Locations

The selection of sampling locations in and around an project site will be based on a review of existing site data, the site topography and surface features, results of preliminary site surveys using portable geophysical and air monitoring equipment and the initial estimates as to the extent of the waste. At the start of the investigation, a number of surface water and sediment samples are usually allocated. Only after initial field reconnaissance are the final locations selected. At a minimum the following should be included as sampling points.

- Upstream and upgradient of the waste site to determine background levels of pollutants.
- In leachate, runoff or intermittent flow paths passing through or from the site.
- In downgradient streams, swales, runoff channels or sewers draining the site to determine limits of surficial deposition.

### 6.2 Equipment List

The following lists are examples of equipment to be used for sampling. Site specific checklists of equipment should be designed based on the characteristics of each sample and location.

### 6.2.1 Surface Water Sampling

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Sample containers (depending on sample requirements of the analytical laboratory) may include for each location:
  - 4 each 1 liter glass jars with teflon lined caps.
  - 8 each 40 ml. glass vials with teflon lined septas.
  - 1 each 500 ml. plastic containers for metals analysis.
  - 1 each 500 ml. plastic containers for mercury analysis.
- Wooden stakes and spray paint.
- Stainless steel Kemmerer bottle, Van Dorn bottle or sterile glass samplers (if required)
- Remote samplers
- Field Notebook
- Sample bottle labels
- Chain-of-custody forms

### 6.2.2 Sediment Sampling

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Dedicated stainless steel spoons (tablespoon size)
- Dedicated teflon spoons (if required)
- Sample containers for each sample
  - 1 each 1 liter glass jars with teflon lined caps
- Wooden stakes and spray paint.

- Field Notebook
- Sample bottle labels
- Chain-of-custody forms

## 6.3 Order of Samples

If both stream sediment and water samples are to be collected concurrently, the water samples should be taken first in order to avoid introducing pollutants in the water column from sediment collection activities.

In flowing streams or runoff channels samples should be collected from the furthest downstream point first. The remaining samples will be taken progressing upstream.

## 6.4 Sample Collection

### 6.4.1 Surface Water Samples

Surface water samples are collected in a manner to be representative of the water column from which the samples are taken. A two man team is required for the collection as a safety precaution. The person collecting the samples in most cases will have entered the water body. For flowing streams this will necessitate the donning of boots or waders and wearing latex inner gloves and chemical resistant outer gloves. All samples in flowing water bodies will be taken facing upstream. Samples taken from small lakes or ponds should be taken from a small boat using a Kemmerer or teflon lined Van Dorn bottle. Samples taken from standing puddles, pools, drainage ditches should be taken without disturbing the sediments. This may be accomplished by the use of a remote sampler, e.g. a sample bottle held on along pole with a gimballed yoke.

For pre-preserved sample containers the following procedure will be followed:

- Prior to collecting any water samples place a waterproof sample label on each container which specifies the following:

  Sample number
  Date
  Time
  Analysis
  Preservative
  Project number
  Initials of the collector

  Fill in the information with a waterproof ink pen. This will prevent difficulty in filling out the labels on a wet jar after it is filled.
- Face upstream, wearing gloves, take a 1 liter glass container with no preservative and submerge it closed to mid-depth.
- Open the jar with the mouth facing upstream; fill it and; close it while submerged.
- Take the filled jar and use it to fill the 40 ml. vials making sure no air is trapped in the vials.

- o Repeat steps 1 and 2 with the same container and fill those containers having preservative avoiding any overflow since this will dilute the preservative.
- o Repeat steps 1 and 2 with the same container and fill the remaining sample containers. The last container filled, will be the original container used to fill the other jars.
- o If dissolved metals analysis are required, an extra bottle (no preservative) will be filled and the metals container (pre-preserved with nitric acid) will remain empty. Only after the water sample is field filtered will it be poured into the pre-preserved metals container.
- o Place all sample containers into a sample shipping container, cool with ice packs and fill in the chain-of-custody form.
- o Detail in the field notebook the following:
    - sample identification number
    - location of the sample (sketch of the sample point)
    - time and date sample was taken
    - personnel performing the task
    - visual or sensory description of the sample (color, odor, turbidity, etc.)
    - weather conditions during sampling
    - runoff conditions
    - other pertinent observations

- o Place a wooden stake at the edge of the stream or near the sample point with sample number on it. The stake may be located by survey for inclusion on a site map.

Note:

- o It is understood that all sample containers and collection devices will be cleaned prior to field use following the appropriate cleaning procedures depending on the type of analysis to be performed.
- o If sampling devices are to be dedicated to a particular sample location, they will be placed in a plastic bag after its use and marked or tagged "DEDICATED TO PROJECT NO. ______ SAMPLE LOCATION NO. _________".

### 6.4.2 Sediment Samples

Stream sediment samples are collected in a manner to be representative of deposits of sediment carried off of a site. Again the use of protective boots, and gloves will be necessary. All priority pollutant and organic analysis of sediments can be performed on a 1 liter sample. The following procedure will be followed:

- o Select a sample location that is representative of sediment depositional areas. This might mean a sandbar in the middle of a stream, the inside corner of a stream bed in a meander, or a deep pool where water velocities are reduced.

- o Place a waterproof sample label on the glass container which specifies the following:

  Sample number
  Date
  Time
  Preservative
  Project number
  Initials of the collector

  Fill in the information with a waterproof ink pen prior to collecting the sample.
- o Use either a pre-cleaned dedicated stainless steel spoon or teflon coated spoon, that will fit inside the sample jar, to collect a sample.
- o All samples should be taken within the top 3 inches of the stream bed. Remove any vegetation debris (leaves, roots, bark) along with any large stones from the sample so that only the finer soil material is collected.
- o Fill out the chain-of-custody form and place the sediment sample into the shipping container. Cool as required.
- o Detail in the field notebook the following:
  - sample identification number
  - location of the sample (sketch of the sample point)
  - time and date sample was taken
  - personnel performing the task

  - visual or sensory description of the sample
  - brief sediment descriptions (color, texture, appearance)
  - weather conditions during sampling
  - runoff or flow conditions
  - other pertinent observations

- Place a wooden stake at the edge of the stream or near the sample point with the sample number on it. This stake will be located by survey for inclusing on a site map.

6.4.3 <u>General Site Rules</u>

Surface water and sediment samples, depending on the particular site, can be collected from a variety of locations. Instead of having a procedure for each type of location, the following general rules should be used for any site.

- The sample must be representative of the water body or sediments deposited in an area.
- Avoidance of cross contamination between sampling points can be accomplished by the use of dedicated sampling devices.
- Care must be taken to not disturb the sample location conditions or chemistry, e.g. facing upstream in a river, collecting sediments from areas not stepped on by the collectors.

- In lakes or ponds, samples of the water column, at a minimum, will be a composite of surface, mid-depth and bottom (1 foot above floor) samples. Sediments need only be sampled by grab method.
- Only pre-cleaned sampling devices and sample containers are to be used.
- Proper field documentation and chain-of-custody procedures must be followed.

# ATLANTIC PROCEDURE NO. 1040-NY

# SAMPLE PRESERVATION FOR SOLID AND LIQUID MATRICES FOR PROGRAMS CONDUCTED IN NEW YORK STATE

Prepared By: John A. Ripp — Principal
JOHN A. RIPP — TITLE

Reviewed By: James E. Gould — Engineer
JAMES E. GOULD — TITLE

Approved By: Paul Burgess — Principal
PAUL BURGESS, P.E. — TITLE

**REVISIONS**

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ATLANTIC ENVIRONMENTAL SERVICES, INC.
COLCHESTER, CONNECTICUT

Procedure No. 1040-NY
Revision No.
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TABLE

6-1 Sample Preservation and Holding Time Requirements 7

## SECTION 1.0: PURPOSE

To insure a standard procedure for preservation of solid and liquid samples collected at a site for hazardous waste determination.

## SECTION 2.0: SCOPE

The following procedure is established to provide a set of standards which follow recommended NYSDEC preservation techniques and holding times for various analytical groups as per the NYSDEC Analytical Services Protocol (ASP) published in 1989.

## SECTION 3.0: RESPONSIBILITY

Project Manager - First

Field Operations Manager - Second

Field Staff - Third

## SECTION 4.0: SUPPORTING PROCEDURES

Atlantic Procedure No. 1020 Field Procedures for Collection of Surface Soil Samples

Atlantic Procedure No. 1021 Field Procedures for Collection of Subsurface Soils

Atlantic Procedure No. 1022 Field Procedures for Collection of Surface Water and Sediment Samples for Hazardous Waste Determination

Atlantic Procedure No. 1023 Field Procedures for Collection of Groundwater Samples for Hazardous Waste Determination

Atlantic Procedure No. 1042 Shipping Procedure for Environmental Field Samples

## SECTION 5.0: REQUIRED FORMS

1. Field Notebook No. 351. Published by the J.L. Darling Corp., Tacoma, Washington
2. Master Sample Log

## SECTION 6.0: PROCEDURE

### 6.1 General Procedure

All sample preservations will be performed in the field as soon after sample collection as possible. In many instances sample containers supplied by the analytical laboratory will be pre-preserved so that no additional preservations will be required. In the event preservations are required, Atlantic personnel will use the following format:

1. For those water samples requiring target compound list (TCL), the procedures in Table 6-1 will be followed.

2. All glass or plastic containers must be cleaned prior to sampling according to appropriate cleaning procedures. In no case will sample containers be rinsed with a sample before the actual sample is containerized.

3. In no case shall methylene chloride or acetone be used as a cleaning agent in any glassware or field equipment used on a site investigation. Methylene chloride and acetone are listed wastes and if used, cleaning may cause errors in evaluating field data.

4. All soils samples collected for TCL analysis be placed in a one liter glass jar with teflon lined cap. This jar also must be cleaned prior to sampling according to appropriate cleaning procedure. To avoid losing volatile organics to the head space within a jar, all soil jars will be filled completely. Care must be taken to avoid getting soil on the threads of a sample jar. This can cause a faulty seal.

5. All samples will be held in insulated shipping containers and kept cool to a temperature of 4°C until they are delivered to the analytical laboratory.

6. When samples are preserved in the field, the type of preservation will be listed on the label along with all other appropriate label information. Also the details of each sample will be logged in the Master Sample Log, maintained at the field office.

7. If Atlantic personnel plan to perform field preservations the analytical laboratory must be consulted to verify those particular procedures to be followed. In some instances different laboratories may require more sample volume than those listed or wish no preservative be used.

8. Table 6-1 is taken directly from the NYSDEC ASP. Soils rarely require preservation and the laboratory should always be consulted before collecting soil samples. Occasionally the NYSDEC may update the holding times and this can be found by calling the NYSDEC headquarters in Albany, New York.

9. All field preservations should be performed using proper safety precautions especially when handling acids and caustics. A reference for proper chemical handling techniques is found in <u>Basic Laboratory Skills</u> for Water and Wastewater Analysis by

Douglas W. Clark, New Mexico Water Resources Research Institute, Report No. 125, 1980. Also latex or chemical resistant gloves should be worn during all field preservations. Proper ventilation is necessary when performing preservations in enclosed areas.

## 6.2 Sample Preservation and Holding Time Requirements

Table 6-1 provides a schedule for sampling, preservation, and holding times for samples being analyzed for convention parameters and target compound list (TCL) parameters.

The laboratory shall adhere to the preservation procedures and holding times listed in Table 6-1 below unless specifically directed otherwise by the Bureau of Technical Services and Research. All holding times are from Verified Time of Sample Receipt (VTSR) at the laboratory.

The laboratory shall provide all necessary preservatives to properly stabilize the samples. The laboratory must adhere to all analytical holding times. Failure to do so will result in the imposition of any contract specified penalties.

## TABLE 6-1

## REQUIRED CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

| PARAMETER NAME | CONTAINER(1) | PRESERVATIVE(2),(3) | MAXIMUM HOLDING TIME(4) |
|---|---|---|---|
| AQUEOUS SAMPLES | | | |
| Bacteriological Tests: | | | |
| Total Coliform | Sterilized P,G | Cool, 4°C, 0.008% $Na_2S_2O_3$ (5) | 6 hours |
| Fecal Coliform | Sterilized P,G | Cool, 4°C, 0.008% $Na_2S_2O_3$ (5) | 6 hours |
| Fecal Streptococci | Sterilized P,G | Cool, 4°C, 0.008% $Na_2S_2O_3$ (5) | 6 hours |
| Inorganic and Conventionals Tests: | | | |
| Acidity | P,G | Cool, 4°C | 12 days |
| Alkalinity | P,G | Cool, 4°C | 12 days |
| Ammonia | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| $BOD_5$ | P,G | Cool, 4°C | 24 hours |
| $BOD_{20}$ | P,G | Cool, 4°C | 24 hours |
| Bromide | P,G | Cool, 4°C | 26 days |
| $CBOD_5$ | P,G | Cool, 4°C | 24 hours |
| COD | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Chloride | P,G | Cool, 4°C | 26 days |
| Color | P,G | Cool, 4°C | 24 hours |
| Cyanide, Total | P,G | Cool, 4°C<br>NaOH to pH>12 | 12 days |

## TABLE 6-1 (CONTINUED)

## REQUIRED CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

| PARAMETER NAME | CONTAINER(1) | PRESERVATIVE(2),(3) | MAXIMUM HOLDING TIME(4) |
|---|---|---|---|
| AQUEOUS SAMPLES (continued) | | | |
| Cyanide, Amenable to Chlorination | P,G | Cool, 4°C<br>NaOH to pH>12,<br>0.6 g ascorbic acid(5) | 12 days(6) |
| Fluoride | P only | Cool, 4°C | 26 days |
| Hardness | P,G | $HNO_3$ to pH<2 | 6 months |
| Kjeldahl Nitrogen | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Organic Nitrogen | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Metals(7), except Chromium+6 and Mercury | P,G | $HNO_3$ to pH<2 | 6 months |
| Chromium+6 | P,G | Cool, 4°C | 24 hours |
| Mercury | P,G | $HNO_3$ to pH<2 | 26 days |
| Nitrate + Nitrite | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Nitrate | P,G | Cool, 4°C | 24 hours |
| Nitrite | P,G | Cool, 4°C | 24 hours |
| Oil and Grease | G only | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Total Organic Carbon | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Orthophosphate | P,G | Cool, 4°C | 24 hours |
| Total Phenols | G only | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |

## TABLE 6-1 (CONTINUED)

## REQUIRED CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

| PARAMETER NAME | CONTAINER(1) | PRESERVATIVE(2),(3) | MAXIMUM HOLDING TIME(4) |
|---|---|---|---|
| AQUEOUS SAMPLES (continued) | | | |
| Phosphorous, Total | P,G | Cool, 4°C<br>$H_2SO_4$ to pH<2 | 26 days |
| Residue, Total | P,G | Cool, 4°C | 5 days |
| Residue, Filterable | P,G | Cool, 4°C | 24 hours |
| Residue, Non-Filterable | P,G | Cool, 4°C | 5 days |
| Residue, Settleable | P,G | Cool, 4°C | 24 hours |
| Residue, Volatile | P,G | Cool, 4°C | 5 days |
| Silca | P only | Cool, 4°C | 26 days |
| Specific Conductance | P,G | Cool, 4°C | 26 days |
| Sulfate | P,G | Cool, 4°C | 26 days |
| Sulfide | P,G | Cool, 4°C, add zinc acetate plus NaOH to pH>9 | 5 days |
| Surfactants (MBAS) | P,G | Cool, 4°C | 24 hours |
| Turbidity | P,G | Cool, 4°C | 24 hours |
| Organic Tests(8): | | | |
| Purgeable Halocarbons | G, teflon lined septa | Cool, 4°C | 7 days |
| Purgeable Aromatics | G, teflon lined septa | Cool, 4°C | 7 days |
| Acrolein and Acrylonitrile | G, teflon lined septa | Cool, 4°C, 0.008% $Na_2S_2O_3$(s) adjust to pH 4-5(9) | 7 days |

## TABLE 6-1 (CONTINUED)

## REQUIRED CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

| PARAMETER NAME | CONTAINER(1) | PRESERVATIVE(2),(3) | MAXIMUM HOLDING TIME(4) |
|---|---|---|---|
| AQUEOUS SAMPLES (continued) | | | |
| Polynuclear Aromatic Hydrocarbons(10) | G, teflon lined septa | Cool, 4°C<br>0.008% $Na_2S_2O_3$ (5)<br>Store in dark | 5 days after VTSR until extraction; 40 days for analysis(12) |
| Haloethers(10) | G, teflon lined septa | Cool, 4°C<br>0.008% $Na_2S_2O_3$ (5) | 5 days after VTSR until extraction; 40 days for analysis(12) |
| Chlorinated Hydrocarbons(10) | G, teflon lined septa | Cool, 4°C<br>0.008% $Na_2S_2O_3$ (5) | 5 days after VTSR until extraction; 40 days for analysis(12) |
| Chlorinated Dioxins and Furans(10) | G, teflon lined septa | Cool, 4°C<br>0.008% $Na_2S_2O_3$ (5) | 5 days after VTSR until extraction; 40 days for analysis(12) |
| Pesticides(10) | G, teflon lined septa | Cool, 4°C<br>Adjust pH to 5-9(14) | 5 days after VTSR until extraction; 40 days for analysis(12) |
| Radiological Tests: | | | |
| Alpha, beta and Radium | P,G | $HNO_3$ to pH<2 | 6 months |

SOIL/SEDIMENT/SOLID SAMPLES

The same containers and holding times as listed for aqueous samples are to be used for soil/sediment/solid samples. Preservation for all analyses is limited to cooling to 4 C.

## Footnotes for Table 6-1

1. Polyethylene (P) or Glass (G).

2. Sample preservation should be performed immediately upon collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at $4^{o}C$ until compositing and sample splitting is completed.

3. When any samples is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For preservation requirements of Table 6-1, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric Acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric Acid ($HNO_3$) in water solutions at concentrations

of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric Acid ($H_2SO_4$) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium Hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the monitoring laboratory has data on file to show that specific types of samples under study are stable for the longer time, and has received written permission prior to analysis form the Regional Administrator under 40 CFR Part 136.3(e) AND from the Bureau of Technical Services and Research. Some samples may not be stable for the maximum time period given in the table. A monitoring laboratory is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability.

5. Should only be used in the presence of residual chlorine.

6. Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

7. Samples should be filtered immediately onsite before adding preservative for dissolved metals.

8. Guidance applies to samples to be analyzed by GC, LC or GC/MS for specific compounds.

9. The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

10. When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to

$4^{o}C$, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for five days before extraction and for 40 days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analysis of benzidine).

11. If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0±0.2 to prevent rearrangement of benzidine.

12. This does not supercede the contract requirement of a 30 day reporting time.

13. Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

14. For the analysis of diphenylnitrosamine, add 0.008% sodium thiosulfate and adjust the pH to 7-10 with NaOH within 24 hours of sampling.

15. The pH adjustment may be preformed upon receipt in the laboratory and may be omitted if the samples are extracted with 72 hours of collection. For the analysis of aldrin, add 0.008% sodium thiosulfate.

# ATLANTIC PROCEDURE NO. 1041

# SAMPLE CHAIN-OF-CUSTODY PROCEDURE

Prepared By: John A. Ripp — Principal
JOHN A. RIPP — TITLE

Reviewed By: Edmund J. Burke — Q A Manager
EDMUND J. BURKE, P.E. — TITLE

Approved By: Paul Burgess — Chief Engineer
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**REVISIONS**

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ATLANTIC ENVIRONMENTAL SERVICES, INC.
COLCHESTER, CONNECTICUT

Procedure No. 1041
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FIGURE

1041 Atlantic's Chain-Of-Custody Form . . . . . . . . . 5

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## SECTION 1.0: PURPOSE

To provide the project manager with a record of the custody of any environmental field sample from time of collection to final analysis. Once a sample has been submitted to the laboratory, internal laboratory chain-of-custody will take over in the form of "Request for Analysis" forms, analytical notebooks, and "Reports of Analysis" forms.

## SECTION 2.0: SCOPE

This procedure details how a sample is traced through the Chain-of-Custody-Form.

## SECTION 3.0: RESPONSIBILITY

Project Manager - First

Field Supervisor - Second

Field Technician - Third

## SECTION 4.0: SUPPORTING PROCEDURES

None

## SECTION 5.0: REQUIRED FORMS

Atlantic Chain-of-Custody Form No. 1041

## SECTION 6.0: PROCEDURE

This procedure describes the use of a Chain-of-Custody Form to accompany all sample containers from the time of collection to submission to the analytical laboratory.

For sampling programs where a large number of samples are to collected or where various laboratories will be receiving the samples, a Chain-of-Custody Form is to accompany each group of samples (see attached form). This form presents general sample information in tabular form listing sample number, date and time of sampling, whether the sample was a composite or grab and information regarding the number of containers, size of container and preservative used for each. If for instance a sample consisted of two 40 ml. vials with no preservation and one 500 ml vial preserved with nitric acid, the number of containers box would designate three while the first diagonal box would list 40 ml vial/PRSV.-NONE and the box beneath listing two and the second diagonal box listing 500 ml glass jar/PRSV.-$HNO_3$ and the box beneath listing one.

The bottom of the form is the chain-of-custody with dates and times of transfer indicated with the appropriate signatures. The sample collector is always the first signature while the analytical laboratory is the final. Theoretically all individuals handling the samples between collection and laboratory should sign the form. However if a common carrier (ie. Federal Express, Purolator) are used for shipping only one signature is required.

This form can be used as a legal document to guarantee samples were not mishandled and that they were delivered to the laboratory within the time frame necessary to start analysis.

On occasion, the analytical laboratory will provide their own Chain-of-Custody form. Usually the same information is included but in a different format from the Atlantic form. Chain-of-Custody forms from the analytical laboratories are acceptable documentation.

Since these forms are basically sample transmittal documents a copy of the form should remain with the sampling personnel. Upon completion of the analysis the laboratory will provide a complete set of all Chain-of-Custody forms for inclusion with analytical reports.

**ATLANTIC**
ENVIRONMENTAL SERVICES, INC.

FORM NO. [illegible]41

# CHAIN OF CUSTODY FORM

PROJECT NO.:
**PROJECT NAME:**
SAMPLERS (SIGNATURE):

| SAMPLE NO.* | DATE | TIME | COMP | GRAB | NO. OF CONTAINERS | PRSV. | PRSV. | PRSV. | PRSV. | PRSV. | PRSV. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
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***SOURCE CODES:**
Test Pit Soil...(TP)
Ground Water...(GW)
Boring Hole Soil...(BH)
Surface Water...(SW)
Surface Soil...(SS)
Sediment...(SD)
Waste...(W)
Waste Water...(WW)

| | | | | | |
|---|---|---|---|---|---|
| RELINQUISHED BY (SIGNATURE): | DATE/TIME: | RECEIVED BY (SIGNATURE): | RELINQUISHED BY (SIGNATURE): | DATE/TIME: | RECEIVED BY (SIGNATURE): |
| RELINQUISHED BY (SIGNATURE): | DATE/TIME: | RECEIVED BY (SIGNATURE): | RELINQUISHED BY (SIGNATURE): | DATE/TIME: | RECEIVED BY (SIGNATURE): |
| RELINQUISHED BY (SIGNATURE): | DATE/TIME: | RECEIVED FOR LABORATORY BY (SIGNATURE): | DATE/TIME: | REMARKS: | |

Distribution: Original accompanies shipment; copy to coordinator field files.

# ATLANTIC PROCEDURE NO. 1042

## SHIPPING PROCEDURES FOR ENVIRONMENTAL FIELD SAMPLES

**Prepared By:** John A. Ripp — Principal
JOHN A. RIPP — TITLE

**Reviewed By:** Edmund J. Burke — Q.A. Manager
EDMUND J. BURKE, P.E. — TITLE

**Approved By:** Paul Burgess — Chief Engineer
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## SECTION 1.0: PURPOSE

To insure a standard procedure for shipment of water, soil and other environmental samples that are controlled by chain-of-custody and strict analytical starting times.

## SECTION 2.0: SCOPE

The following procedure is established to avoid mishandling, delays and mislabeling of samples normally collected and shipped from a field site to a designated analytical laboratory.

## SECTION 3.0: RESPONSIBILITY

Project Manager - First

Field Supervisor - Second

Field Technicians - Third

## SECTION 4.0: SUPPORTING PROCEDURES

Atlantic Procedure No. 1040 Sample Preservation for Solid and Liquid Matrices

Atlantic Procedure No. 1041 Sample Chain-Of-Custody Procedure

## SECTION 5.0: REQUIRED FORMS

Receipt of Airweigh Bill or Weighbill Forms

Chain-of-Custody Form Standard Form No. 1041

SECTION 6.0: PROCEDURE

6.1 Prior to mobilization to a field site, the field operations manager or his designee will select a shipper based on proximity to the site and ability to ship overnight.

6.2 Upon selection of a shipper the following information will be gathered before any samples are shipped. This can be done over the phone or by correspondence.

1. Location of the shipping depot or local pickup office in case samples are to be delivered directly to the depot by the field team.
2. Name and phone number of a contact at the shipper.
3. Rates of shipping per package size and weight
4. Special instructions as to container sizes and weights.
5. A set of weighbills for the field team.
6. A copy of the shipper's brochure which will provide information on the format for the various types of weigh bills.
7. Times for calling in a pickup from the job site and normal pickup times.

6.3 The Atlantic field manager will give the shipper a street address where samples can be picked up by the courier near the job site.

6.4 Once all samples have been collected, preserved and containerized for shipment, the field supervisor will call the shipper to arrange for pick up.

6.5 All samples, unless so designated for ground transportation, will be shipped by air express for overnight delivery. This is the standard method since samples collected for Method 625 organics have only a 72-hour holding time between collection and the start of analysis.

6.6 The following steps will be followed in the field to prepare the sample shipping containers for pick up.

1. A standard chain-of-custody form will be filled-out, signed by the courier as a custodian, and placed inside each shipping container before final sealing.
2. The Atlantic field supervisor or his designee will insure that all weighbills have been filled-in properly for air express. If the contract laboratory is within ground transportation distance for overnight delivery, then the weighbills should reflect guaranteed overnight delivery.
3. A copy of all weighbills must be kept by the field supervisor and the weighbill number associated with each group of samples logged into the Master Sample Log. The name of courier must be written in this log also in case there is a problem in tracing samples.
4. If possible, to save shipping fees, the sample shipping containers can be strapped together.

5. An estimated time of delivery for the samples will be logged in the Master Sample Log, (e.g., ETA 12 noon 3/14/83).

6.7 Once the samples have been shipped, the field supervisor will call the analytical laboratory and provide a listing of samples to be delivered, the shipping company's name, and the weighbill numbers. As soon as the samples are delivered, the contract laboratory will inform Atlantic of their arrival and report, any damage associated with the samples or whether any sample containers are missing.

# ATLANTIC PROCEDURE NO. 1051

## OPERATION AND CALIBRATION OF THE HNu SYSTEMS PHOTOIONIZER MODEL PI-101

**Prepared By:** John A. Ripp — JOHN A. RIPP — Principal — TITLE

**Reviewed By:** Edmund J. Burke — EDMUND J. BURKE, P.E. — Q.A. Manager — TITLE

**Approved By:** Paul Burgess — PAUL BURGESS, P.E. — Chief Engineer — TITLE

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ATLANTIC ENVIRONMENTAL SERVICES, INC.
COLCHESTER, CONNECTICUT

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## SECTION 1.0: PURPOSE

To insure a standard procedure for the calibration and operation of the HNu Systems Photoionizer Model PI-101.

## SECTION 2.0: SCOPE

The following procedure details those steps necessary for the collection and operation in the survey mode of the HNu Photoionizer. A listing of calibration data needed for proper documentation is supplied at the end of this procedure.

## SECTION 3.0: RESPONSIBILITY

Project Manager - First

Field Operations Manager - Second

Field Staff - Third

## SECTION 4.0: SUPPORTING PROCEDURES

None

## SECTION 5.0: REQUIRED FORMS

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington (or equivalent), or a conventional paper, bound laboratory notebook (Nalge 6301 or equivalent).

## SECTION 6.0: PROCEDURE

### 6.1 General Description

The HNu Photoionizer is a survey tool for determining general levels of organic vapors in air. The instrument is comprised of a readout module which contains all controls and the battery power supply and a photoionizer probe which contains the photo-cell. The readout module also contains terminals for connection to a recorder. This module is carried by a strap held across the shoulder while the probe is held by hand.

### 6.2 Instrument Startup

First connect the probe unit to the readout module by attaching and turning the connector terminal. Note this fitting is "keyed" and must be attached in only one orientation.

Second turn the main switch to battery. The needle should deflect to the upper end of the green scale. If it doesn't deflect into the green area or is at the low end of the scale, the instrument needs to be charged. A battery charger is located in the instrument cover and it plugs into the side of the readout module. For a full day's operation the battery should be charged overnight.

Third turn on the main switch to any range (ie. 0-2,000 ppm, 0-200 ppm or 0-20 ppm). Look into the probe through the sample tube and observe the violet light of the photo cell. If the light is not on, check the following:

1. Make sure the probe is attached properly to the readout module.
2. An etch mark should be scribed on the probe where it can be unscrewed to replace the photo cell. This mark shows the exact position that the top of the probe takes so that the air inlet ports are lined up. If not lined up,unscrew the probe and assemble it properly.
3. Check the photo cell lamp and replace it if necessary.

Once the battery and photo cell are operating, perform a calibration.

### 6.3 Calibration

The PI 101 Analyzer is designed for trace gas analysis in ambient air and is calibrated at HNu with certified standards of benzene, vinyl chloride and isobutylene.

Some general points to consider when calibrating the PI 101 are that the analyzer is designed for operation at ambient conditions and therefore the gas standards used for calibration should be delivered to the analyzer at ambient temperatures and pressure and at the proper flow rates. The PI 101 is a non-destructive analyzer; calibrations using toxic or hazardous gases must be done in a well ventilated area.

The frequency of calibration should be twice daily as a minimum. The instrument should be calibrated at the beginning of the day (or when the instrument is first turned on) and at the end of the day (or when use of the instrument is completed). If the instrument is turned off during the day for any significant length of time, it should be calibrated when turned on. An accurate and reliable method of calibration check is to use analyzed gas cylinders of "hydrocarbon-free" air and isobutylene (prepared by HNu).

Step 1. Zero set - Turn the function switch to STANDBY. In this position the lamp is OFF and no signal is generated. Set the zero point with the ZERO set control. The zero can also be set with the function switch on the X1 position and using a "Hydrocarbon-free" air. In this case "negative" readings are possible if the analyzer measures a cleaner sample when in service.

Step 2. 0-20 or 0-200 range - For calibrating on the 0-20 or 0-200 range only one gas standard is required. Turn the function switch to the range position and note the meter reading. Adjust the SPAN control setting as required to read the ppm concentration of the standard. Recheck the zero setting (Step 1). If readjustment is needed, repeat Step 2. This gives a two-point calibration; zero and the gas standard point.

## 6.4 Documentation

In the field notebook, or in the bound laboratory notebook, at the start of the project (or if there is a change in instruments), record the following:

1. Site name
2. Instrument model and serial number S/N
3. Types of calibration gases
4. Note the size of the photo cell lamp used in the particular probe. This is useful to know which organic compounds the HNu is sensitive toward.

In the field notebook, or in the bound laboratory notebook, at the start of each calibration, record the following:

1. Date
2. Time
3. Name of person performing the calibration
4. Span setting before beginning calibration
5. That the instrument was zeroed, and whether the instrument was on standby or if "hydrocarbon-free" air was used.
6. The new span setting, if necessary, to calibrate instrument reading
7. Repeat Step 5 if span was adjusted during Step 6
8. Note that the second calibration reading was correct

# APPENDIX H

## LABORATORY ANALYSES

PERFORMED BY:

Wadsworth/Alert Laboratories, Inc.
450 William Pitt Way
Pittsburgh, PA 15238

Thomas Tomayko
Project Manager

John M. Flaherty
Laboratory Manager - Pittsburgh

PROPERTY OF

**NEW YORK STATE DEPARTMENT OF HEALTH**

**DAVID AXELROD, M.D.** ***COMMISSIONER***

Expires 12:01 AM April 1, 1991
ISSUED September 26, 1990

# INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

***(Issued in accordance with the Laws of New York State)***

pursuant to Section 502 of the Public Health Law

Laboratory ID. Number 11182

Laboratory Name: Wadsworth Alert Lab - PA
Number & Street: 450 William Pitt Way
City,State,Zip : Pittsburgh PA 15238

Director: Mr. John H Flaherty

VALID AT THIS ADDRESS ONLY

is hereby APPROVED as an Environmental Laboratory for the category

NON-POTABLE WATER

All approved subcategories and analytes are listed on the attached addendum

Herbert W. Dickerman

Herbert W. Dickerman, M.D., Ph.D.
Director
Wadsworth Center for Laboratories and Research

FORM LR 23.F

7445

PROPERTY OF

NEV  OR  ITA  IDE  RTN  IT C. HE..TH

**DAVID AXELROD, M.D.** ***COMMISSIONER***

Expires 12:01 AM April 1, 1991
ISSUED September 28, 1990

INTERIM

# CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

***(Issued in accordance with the Laws of New York State)***

pursuant to Section 502 of the Public Health Law

Laboratory ID. Number 11182

Director: Mr. John Flaherty

Laboratory Name: Wadsworth Alert Lab - PA
Number & Street: 450 William Pitt Way
City,State,Zip : Pittsburgh PA 15238
VALID AT THIS ADDRESS ONLY

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/SOLID AND HAZARDOUS WASTE

All approved subcategories and/or analytes are listed below:

Characteristic Testing :
  Corrosivity
  Ignitability
  Toxicity
Haloethers (ALL)
Nitroaromatics Isophorone (ALL)
Phthalate Esters (ALL)
Purgeable Aromatics (ALL)

Miscellaneous :
  Cyanide, Total
  Hydrogen Ion (pH)
  Sulfide (as S)
Metals I (ALL)
Polynuclear Aromatic Hydrocarbons (ALL)
Priority Pollutant Phenols (ALL)
Purgeable Halocarbons (ALL)

Acrolein and Acrylonitrile (ALL)
Chlorophenoxy Acid Pesticides (ALL)
Chlorinated Hydrocarbon Pesticides (ALL)
Chlorinated Hydrocarbons (ALL)
Metals II (ALL)
Polychlorinated Biphenyls (ALL)

Herbert W. Dicke

**Herbert W. Dickerman, M.D., Ph.D.**
**Director**
**Wadsworth Center for Laboratories and Research**

FORM LR 23.F

7446

The following list correlates Atlantic Environmental Services, Inc. sample identification number with NYSEG's Manufactured Gas Plant Sampling Identification Protocol.

## SAMPLE IDENTIFICATION

| Atlantic Codes | NYSEG Codes |
|---|---|
| CGAM-SW1 | AMCUSS9001G |
| CGAM-SW2 | AMCISS9002G |
| CGAM-SW2-Dup. | AMCISS9002G-Dup. |
| CGAM-SW3 | AMCDSS9003G |
| CGAM-SE1 | AMTUSS9001G |
| CGAM-SE2 | AMTISS9002G |
| CGAM-SE3 | AMTDSS9003G |
| CGAM-SS1 | AMEISF9001G |
| CGAM-SS2 | AMEISF9002G |
| CGAM-SS3 | AMEISF9003L |
| CGAM-SS4 | AMEISF9004L |

## ANALYTICAL RESULTS – AUBURN/MCMASTER STREET
## NOVEMBER 28, 1990

| | SURFACE WATER | | | | | | SEDIMENT | | | | SURFACE SOIL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CGAM–SW1 | CGAM–SW2 | CGAM–SW2–DUP | CGAM–SW3 | FIELD BLANK | TRIP BLANK | CGAM–SE1 | CGAM–SE2 | CGAM–SE3 | FIELD BLANK | CGAM–SS1 | CGAM–SS2 | CGAM–SS3 | CGAM–SS4 |
| ***VOLATILE ORGANICS (CAS NO.) (ppb)*** | | | | | | | | | | | | | | |
| Acetone (67–64–1) | <50 | <50 | <50 | <50 | – – | <50 | <82 | <84 | <84 | – – | <74 | <77 | <78 | <78 |
| Benzene (71–43–2) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Bromodichloromethane (108–88–1) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Bromoform (THM)(75–27–4) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Bromomethane (74–95–3) | <10 | <10 | <10 | <10 | – – | <10 | <16 | <17 | <17 | – – | <15 | <15 | <16 | <16 |
| 2–Butanone (78–93–3) | <50 | <50 | <50 | <50 | – – | <50 | <82 | <84 | <84 | – – | <74 | <77 | <78 | <78 |
| Carbon disulfide (75–15–0) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Carbon tetrachloride (56–23–5) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Chlorobenzene (108–90–7) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Chloroethane (75–00–3) | <10 | <10 | <10 | <10 | – – | <10 | <16 | <17 | <17 | – – | <15 | <15 | <16 | <16 |
| Chloroform (67–66–3) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Chloromethane (74–87–3) | <10 | <10 | <10 | <10 | – – | <10 | <16 | <17 | <17 | – – | <15 | <15 | <16 | <16 |
| Dibromochloromethane (124–48–1) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,1–Dichloroethane (75–34–3) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,2–Dichloroethane (107–06–2) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,1–Dichloroethene (75–34–3) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,2–Dichloroethene (Total) (540–59–0) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,2–Dichloropropane (78–87–5) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| cis–1,3–Dichloropropene | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| trans–1,3–Dichloropropene | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Ethylbenzene (100–41–4) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 2–Hexanone (591–78–6) | <50 | <50 | <50 | <50 | – – | <50 | <82 | <84 | <84 | – – | <74 | <77 | <78 | <78 |
| Methylene chloride (75–09–2) | <10 | <10 | <10 | <10 | – – | <10 | <16 | <17 | <17 | – – | <15 | <15 | <16 | <16 |
| 4–Methyl–2–pentanone (108–10–1) | <50 | <50 | <50 | <50 | – – | <50 | <82 | <84 | <84 | – – | <74 | <77 | <78 | <78 |
| Styrene (100–42–5) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,1,2,2–Tetrachloroethane (79–34–5) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Tetrachloroethene (127–18–4) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Toluene (108–88–3) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,1,1–Trichloroethane (71–55–6) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| 1,1,2–Trichloroethane (79–00–5) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Trichloroethene (79–01–6) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |
| Vinyl acetate (108–05–4) | <50 | <50 | <50 | <50 | – – | <50 | <82 | <84 | <84 | – – | <74 | <77 | <78 | <78 |
| Vinyl chloride (75–01–4) | <10 | <10 | <10 | <10 | – – | <10 | <16 | <17 | <17 | – – | <15 | <15 | <16 | <16 |
| Total xylenes (1330–20–7) | <5 | <5 | <5 | <5 | – – | <5 | <8.2 | <8.4 | <8.4 | – – | <7.4 | <7.7 | <7.8 | <7.8 |

## ANALYTICAL RESULTS – AUBURN/MCMASTER STREET

## NOVEMBER 28, 1990

| | SURFACE WATER | | | | | | SEDIMENT | | | | SURFACE SOIL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CGAM–SW1 | CGAM–SW2 | CGAM–SW2–DUP | CGAM–SW3 | FIELD BLANK | TRIP BLANK | CGAM–SE1 | CGAM–SE2 | CGAM–SE3 | FIELD BLANK | CGAM–SS1 | CGAM–SS2 | CGAM–SS3 | CGAM–SS4 |
| ***SEMI–VOLATILE ORGANICS (ppb)*** | | | | | | | | | | | | | | |
| Acenaphthene (83–32–9) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | 88J | <840 |
| Acenaphthylene (83–32–9) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Anthracene (120–12–7) | <10 | <10 | <10 | <10 | <11 | -- | 170J | 720J | 580J | <10 | 150J | 4900J | 250J | 88J |
| Benzo(a)anthracene | <10 | <10 | <10 | <10 | <11 | -- | 550J | 2400J | <910 | <10 | 700J | 22000J | 1000 | 410J |
| Benzo(b)fluoranthene (205–99–2) | <10 | <10 | <10 | <10 | <11 | -- | 380J | 2200J | 930 | <10 | 770J | 27000J | 1100 | 350J |
| Benzo(k)fluoranthene (207–08–9) | <10 | <10 | <10 | <10 | <11 | -- | 320J | 1200J | 890J | <10 | 860 | 27000J | 1100 | 350J |
| Benzo(ghi)perylene | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | 420J | 8600J | <840 | 210J |
| Benzo(a)pyrene (50–32–8) | <10 | <10 | <10 | <10 | <11 | -- | 240J | 1200J | 550J | <10 | 460J | 20000J | 790J | 250J |
| Benzyl alcohol (100–51–6) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Bis(2–chloroethoxy)methane | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Bis(2–chloroethyl)ether (111–44–4) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Bis(2–chloroisopropyl)ether | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Bis(2–ethylhexyl)phthalate (117–81–7) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | 260J | <10 | 420J | 600000 | 240J | <840 |
| 4–Bromophenyl phenyl ether | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Butyl benzyl phthalate (85–68–7) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 4–Chloroaniline (106–47–8) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2–Chloronaphthalene (91–58–7) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 4–Chlorophenyl phenyl ether | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Chrysene (218–01–9) | <10 | <10 | <10 | <10 | <11 | -- | 590J | 2900J | 1500J | <10 | 1200 | 30000J | 1400 | 740J |
| Dibenzo(a,h)anthracene (53–70–3) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Dibenzofuran | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | 150J | <10 | <800 | <41000 | <840 | <840 |
| Di–n–butyl phthalate (84–74–2) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 1,2–Dichlorobenzene (95–50–1) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 1,3–Dichlorobenzene (541–73–1) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 1,4–Dichlorobenzene (106–46–7) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 3,3'–Dichlorobenzidine (91–94–1) | <50 | <50 | <50 | <50 | <55 | -- | <4400 | <22000 | <4500 | <50 | <4000 | <200000 | <4200 | <4200 |
| Diethyl phthalate (84–66–2) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Dimethyl phthalate (131–11–3) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4–Dinitrotoluene | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,6–Dinitrotoluene (606–20–2) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Di–n–octyl phthalate (117–84–0) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Fluoranthene (206–44–0) | <10 | <10 | <10 | <10 | <11 | -- | 1300 | 6900 | 4500 | <10 | 1900 | 62000 | 2800 | 1000 |
| Fluorene (86–73–7) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | 140J | <10 | <800 | <41000 | <840 | <840 |
| Hexachlorobenzene (118–74–1) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Hexachlorobutadiene (87–68–3) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Hexachlorocyclopentadiene (77–47–4) | <10 | <10 | <10 | <10 | <11 | -- | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |

## ANALYTICAL RESULTS – AUBURN/MCMASTER STREET

## NOVEMBER 28, 1990

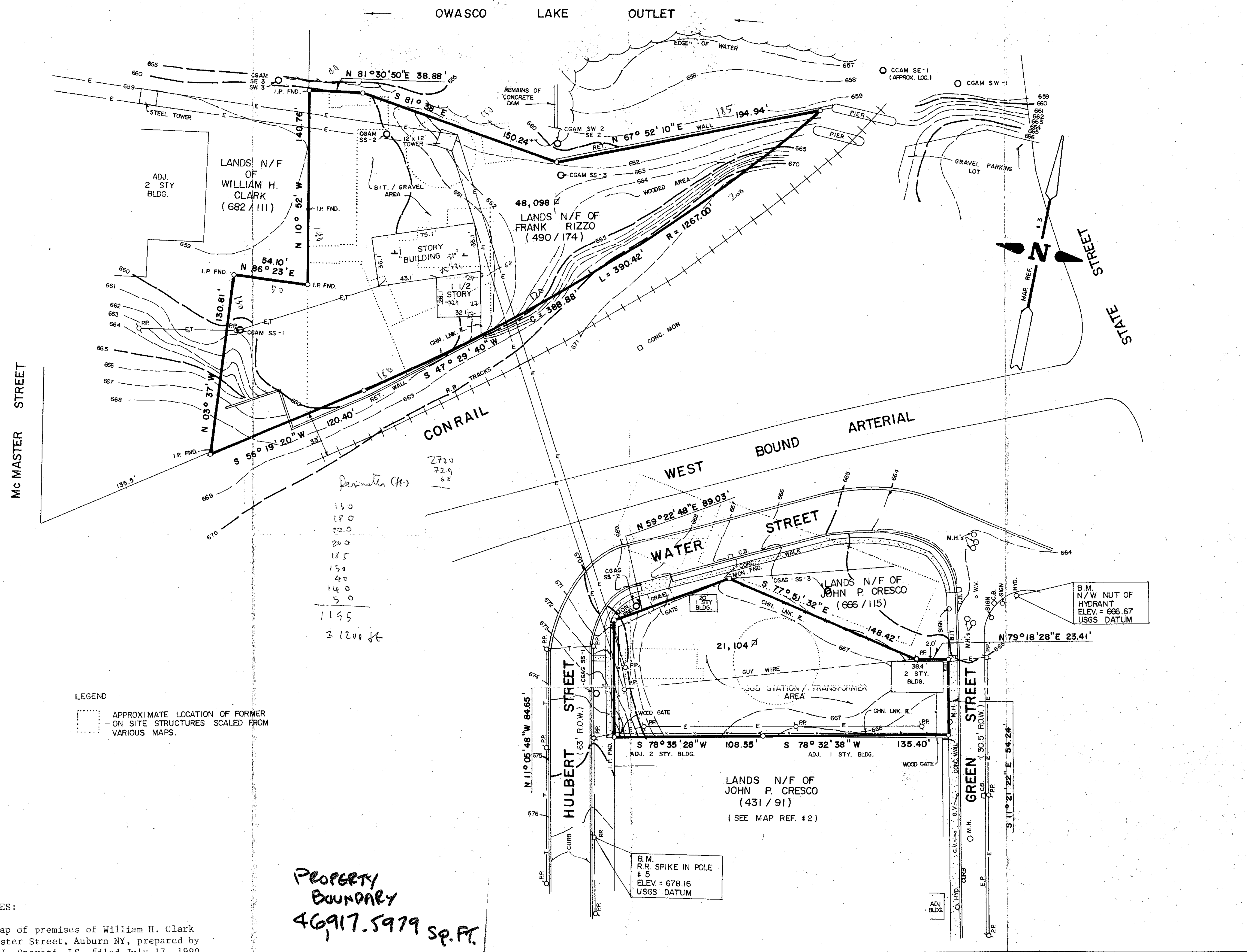
| | SURFACE WATER | | | | | | SEDIMENT | | | | SURFACE SOIL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CGAM–SW1 | CGAM–SW2 | CGAM–SW2–DUP | CGAM–SW3 | FIELD BLANK | TRIP BLANK | CGAM–SE1 | CGAM–SE2 | CGAM–SE3 | FIELD BLANK | CGAM–SS1 | CGAM–SS2 | CGAM–SS3 | CGAM–SS4 |
| Hexachloroethane (67–72–1) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Indeno(1,2,3–cd)pyrene (193–39–5) | <10 | <10 | <10 | <10 | <11 | –– | <880 | 2700J | <910 | <10 | 460J | 15000J | 63J | 180J |
| Isophorone (78–59–1) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2–Methylnaphthalene | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | 120J | <10 | 310J | <41000 | <840 | <840 |
| Naphthalene (91–20–3) | <10 | <10 | <10 | <10 | <11 | –– | 110J | <4400 | 120J | <10 | 170J | <41000 | 130J | <840 |
| Nitrobenzene (98–95–3) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2–Nitroaniline (88–74–4) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| 3–Nitroaniline (99–09–2) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| 4–Nitroaniline (100–01–6) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| N–Nitrosodiphenylamine (86–30–6) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| N–Nitrosodi–n–propylamine (85–01–8) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Phenanthrene (85–01–8) | <10 | <10 | <10 | <10 | <11 | –– | 1000 | 5300 | 2700 | <10 | 750J | 19000J | 1100 | 350J |
| Pyrene (129–00–0) | <10 | <10 | <10 | <10 | <11 | –– | 930 | 5300 | 3000 | <10 | 1300 | 32000J | 2000 | 610 |
| 1,2,4–Trichlorobenzene (120–82–1) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| Benzoic Acid (65–85–0) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| 4–Chloro–3–methylphenol (59–50–7) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2–Chlorophenol (95–57–8) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4–Dichlorophenol (120–83–2) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4–Dimethylphenol | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4–Dinitrophenol (51–28–5) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| 2–Methyl–4,6–dinitrophenol (534–42–1) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| 2–Methylphenol (95–48–7) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 4–Methylphenol (106–44–5) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2–Nitrophenol (88–75–5) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 4–Nitrophenol (100–02–7) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| Pentachlorophenol (87–86–5) | <50 | <50 | <50 | <50 | <55 | –– | <4400 | <22000 | <4500 | <10 | <4000 | <200000 | <4200 | <4200 |
| Phenol (108–86–5) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4,5–Trichlorophenol (95–95–4) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| 2,4,6–Trichlorophenol (88–06–2) | <10 | <10 | <10 | <10 | <11 | –– | <880 | <4400 | <910 | <10 | <800 | <41000 | <840 | <840 |
| ***METALS (ppm)*** | | | | | | | | | | | | | | |
| Silver (7440–22–4) | <10 | <10 | <10 | <10 | –– | –– | <1.3 | <1.4 | <1.4 | –– | <1.2 | <1.2 | <1.2 | <1.2 |
| Aluminum (7429–90–5) | <200 | <200 | <200 | <200 | –– | –– | 4800 | 4000 | 2700 | –– | 3200 | 4600 | 4100 | 5400 |
| Arsenic (7440–38–2) | <10 | <10 | <10 | <10 | –– | –– | 12 | 13 | 14 | –– | 12 | 29 | 5.3 | 3.6 |
| Barium (7440–39–3) | <200 | <200 | <200 | <200 | –– | –– | 66 | 54 | 59 | –– | 67 | 160 | 60 | 36 |
| Beryllium (7440–41–7) | <5 | <5 | <5 | <5 | –– | –– | 0.76 | 0.84 | 1.8 | –– | 0.9 | 0.85 | 0.86 | <0.63 |
| Calcium (7440–70–2) | 44000 | 46000 | 46000 | 46000 | –– | –– | 94000 | 100000 | 110000 | –– | 83000 | 55000 | 74000 | 22000 |
| Cadmium (7440–43–9) | <5 | <5 | <5 | <5 | –– | –– | <0.66 | <0.68 | <0.68 | –– | <0.59 | 0.64 | 0.84 | <0.63 |

## ANALYTICAL RESULTS – AUBURN/MCMASTER STREET
## NOVEMBER 28, 1990

| | SURFACE WATER | | | | | | SEDIMENT | | | | SURFACE SOIL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CGAM–SW1 | CGAM–SW2 | CGAM–SW2–DUP | CGAM–SW3 | FIELD BLANK | TRIP BLANK | CGAM–SE1 | CGAM–SE2 | CGAM–SE3 | FIELD BLANK | CGAM–SS1 | CGAM–SS2 | CGAM–SS3 | CGAM–SS4 |
| Cobalt (7440–48–4) | <50 | <50 | <50 | <50 | -- | -- | 6.9 | <6.8 | 12 | -- | 8.8 | 6 | <6.2 | <6.3 |
| Chromium (7440–47–3) | <5 | <5 | <5 | <5 | -- | -- | 8.1 | 16 | 65 | -- | 9.5 | 11 | 76 | 5.7 |
| Copper (7440–40–8) | <25 | <25 | <25 | <25 | -- | -- | 56 | 73 | 180 | -- | 49 | 140 | 110 | 29 |
| Iron (7439–89–6) | 190 | 110 | 100 | 110 | -- | -- | 21000 | 28000 | 76000 | -- | 28000 | 22000 | 16000 | 11000 |
| Mercury (7439–97–6) | <0.2 | <0.2 | <0.2 | <0.2 | -- | -- | 0.15 | <0.12 | 0.14 | -- | 0.32 | 1.9 | 0.24 | 0.16 |
| Potassium (7440–09–7) | <5000 | <5000 | <5000 | <5000 | -- | -- | <660 | 730 | <680 | -- | <590 | 680 | <620 | 630 |
| Magnesium (7439–95–4) | 9200 | 9500 | 9600 | 9700 | -- | -- | 8100 | 13000 | 12000 | -- | 13000 | 12000 | 7500 | 5600 |
| Manganese (7439–96–5) | <15 | <15 | <15 | <15 | -- | -- | 970 | 950 | 580 | -- | 910 | 900 | 430 | 840 |
| Sodium | 8200 | 8400 | 8700 | 8700 | -- | -- | <660 | <680 | <680 | -- | <590 | <620 | <620 | <630 |
| Nickel (7440–02–0) | <40 | <40 | <40 | <40 | -- | -- | 35 | 22 | 89 | -- | 19 | 15 | 300 | 11 |
| Lead (7439–92–1) | <3 | <3 | <3 | <3 | -- | -- | 84 | 110 | 480 | -- | 150 | 570 | 130 | 40 |
| Antimony (7440–36–0) | <60 | <60 | <60 | <60 | -- | -- | <7.9 | <8.2 | <8.1 | -- | <7.1 | <7.4 | <7.5 | <7.5 |
| Selenium (7782–49–2) | <5 | <25 | <25 | <5 | -- | -- | <3.3 | <3.3 | <3.4 | -- | <2.9 | <3 | <3.1 | <3.1 |
| Thallium (7440–28–0) | <10 | <10 | <10 | <10 | -- | -- | <1.3 | <1.3 | <1.3 | -- | <1.2 | <1.2 | <1.3 | <1.2 |
| Vanadium (7440–62–2) | <50 | <50 | <50 | <50 | -- | -- | 13 | 13 | 14 | -- | 12 | 19 | 11 | 8.9 |
| Zinc (7440–66–6) | 32 | <20 | 50 | <20 | -- | -- | 130 | 160 | 170 | -- | 210 | 390 | 240 | 72 |
| CYANIDE (ppm) | <0.01 | <0.01 | <0.01 | <0.01 | -- | -- | <0.67 | <0.64 | <0.61 | -- | <0.59 | 9.6 | <0.6 | 0.62 |

All concentrations in ppb. Sediment and surface soil metal concentrations and all cyanide concentrations are in ppm.
< None detected, lower detectable limit.
-- Not analyzed.
J – Detected, but below quantitation limit; estimated value.
Shaded areas indicate detected concentrations.
Laboratory: Wadsworth/Alert Laboratories, Inc.
Sample locations shown on Figure 5.

# PLATE 1



Perimeter (ft)

2700
729
68

130
180
120
200
165
150
40
140
50

1195

≈ 1200 ft

LEGEND

☐ – APPROXIMATE LOCATION OF FORMER ON SITE STRUCTURES SCALED FROM VARIOUS MAPS.

PROPERTY BOUNDARY
46,917.5979 Sq. Ft.

BUILDING
3,638.2033 Sq. Ft.

MAP REFERENCES:

1) Survey map of premises of William H. Clark #25 McMaster Street, Auburn NY, prepared by Patrick J. Sperati, LS, filed July 17, 1990 in file 90-163.

2) Map of survey of property of Luke Williams and Son, No.'s 19-22 Green Street and No. 14 Hulbert Street, Auburn NY, prepared by J.J. Tenan, filed April 15, 1942 in Cabinet 6, Map H-16.

3) N.Y.S.D.O.T. Appropriation Map, City of Auburn, East-West Arterial, Map No. 68, parcel No. 72, dated May 26, 1970.

UNAUTHORIZED ADDITIONS OR ALTERATIONS TO THIS MAP IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-PARAGRAPH 2 OF NEW YORK STATE EDUCATION LAW.

BOUNDARY & TOPOGRAPHIC SURVEY
FOR GREEN STREET HOLDER SITE AND
McMASTER STREET MGP SITE

| | |
|---|---|
| CITY OF AUBURN | CAYUGA CO. NY |
| SCALE : 1" = 50' | DECEMBER 2, 1990 |
| S.Y. KIM LAND SURVEYOR P.C. | JOB NO. 5C-210-90 |

**USGS**
*science for a changing world*

Company USGS Site ID 425602076341601 Station name

Other ID MW-06-1R Date of log 1/11/2007 Start time of log

County/State Cayuga/NY Office/logging unit Troy

Logging operator JAA Observer DAVE

Description of log-measuring point(LMP) LAND SURFACE

Height of LMP above/below LSD 0.0 Altitude of LMP 664.0

Log orientation Mag declination Logging direction

Logging speed Depth error after logging

Logging probe manufacturer

Logging probe model

Logging probe serial number

Description of calibration/standardization

Date of calibration/standardization

Standard(Low) Response(Low)

Standard(High) Response(High)

Borehole depth/diameter/type 79.2ft/4in/open

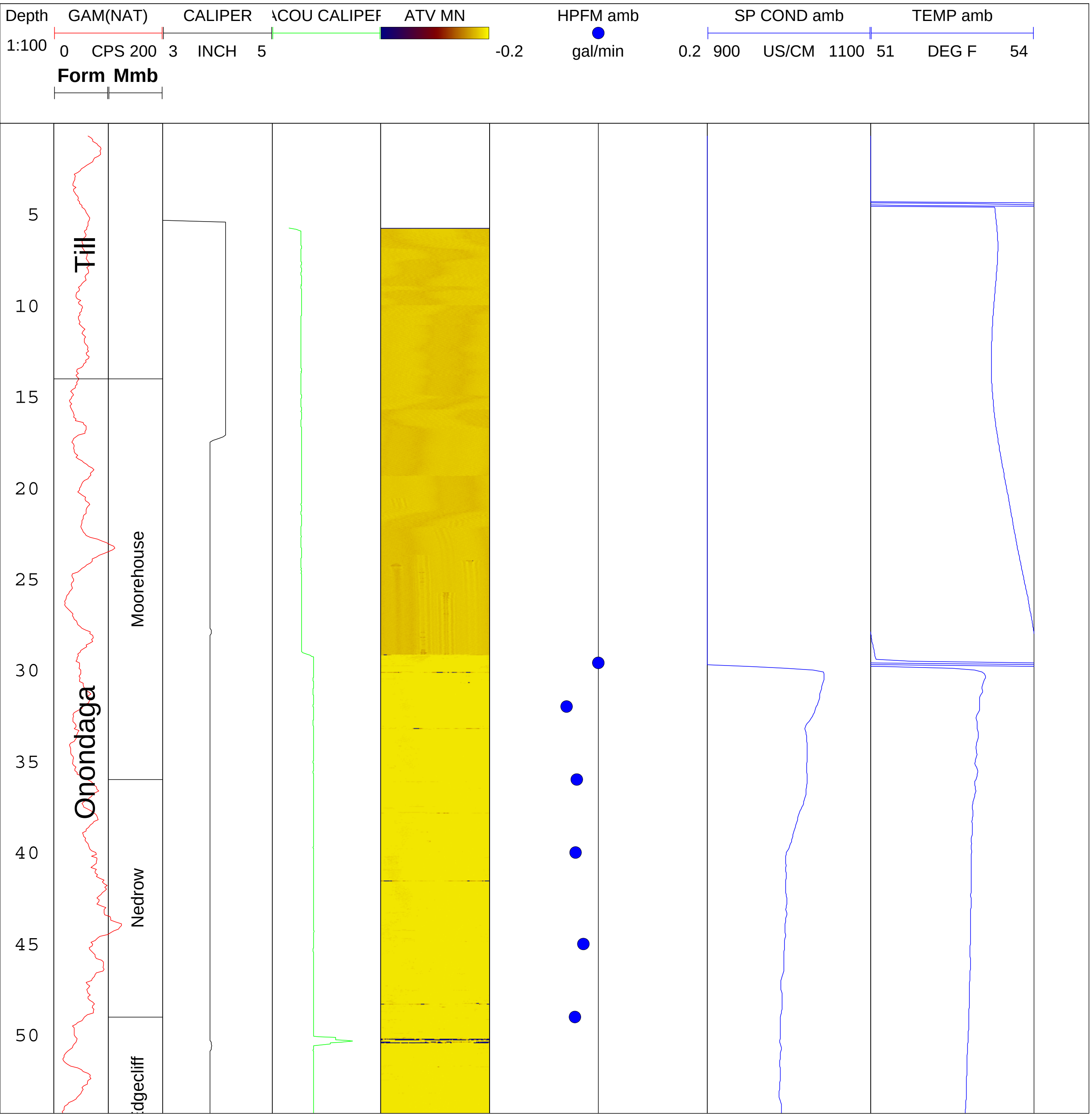
Casing depth/diameter/type 17.2ft/4in/steel

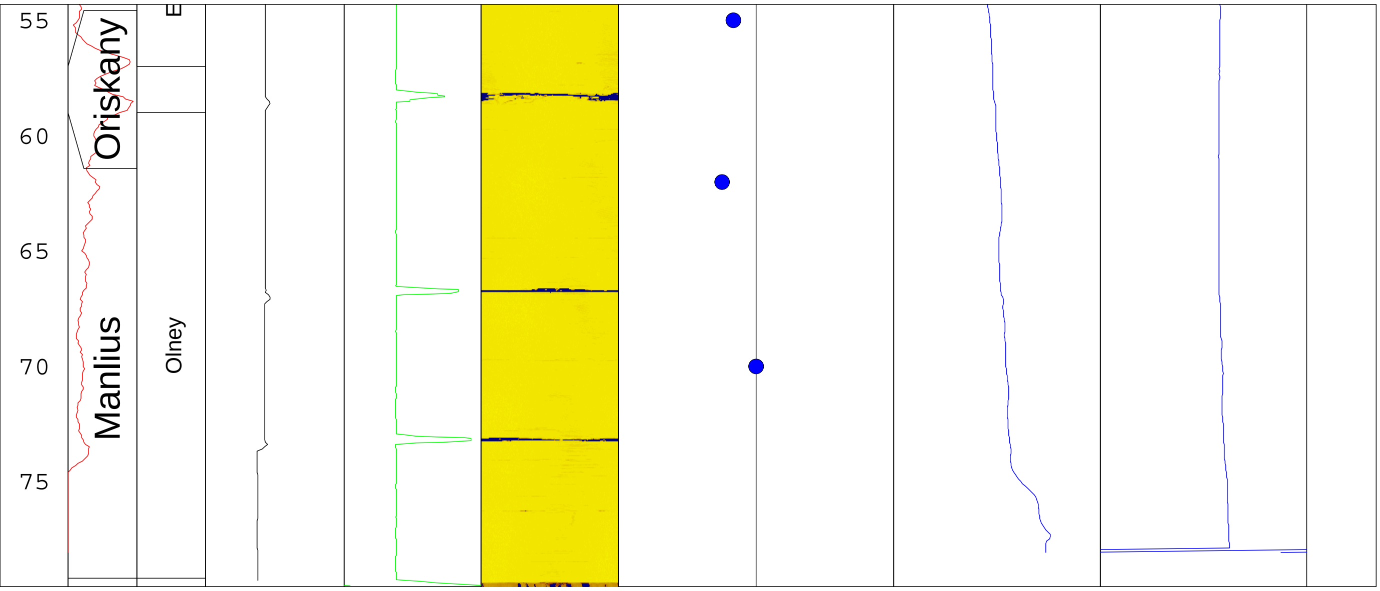
Borehole fluid type WATER Borehole fluid depth 29.30

Borehole fluid res/cond Borehole fluid temp

Hydrologic conditions ambient

Remarks stickup=0.0




55
60
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75
Oriskany
Manlius
E
Olney

Company USGS Site ID 425560076342001 Station name

Other ID MW-06-6R Date of log 1/11/2007 Start time of log

County/State Cayuga/NY Office/logging unit Troy

Logging operator JAA Observer DAVE

Description of log-measuring point(LMP) LAND SURFACE

Height of LMP above/below LSD 0.0 Altitude of LMP 668.7ft

Log orientation Mag declination Logging direction

Logging speed Depth error after logging

Logging probe manufacturer

Logging probe model

Logging probe serial number

Description of calibration/standardization

Date of calibration/standardization

Standard(Low) Response(Low)

Standard(High) Response(High)

Borehole depth/diameter/type 79.8ft/4in/open

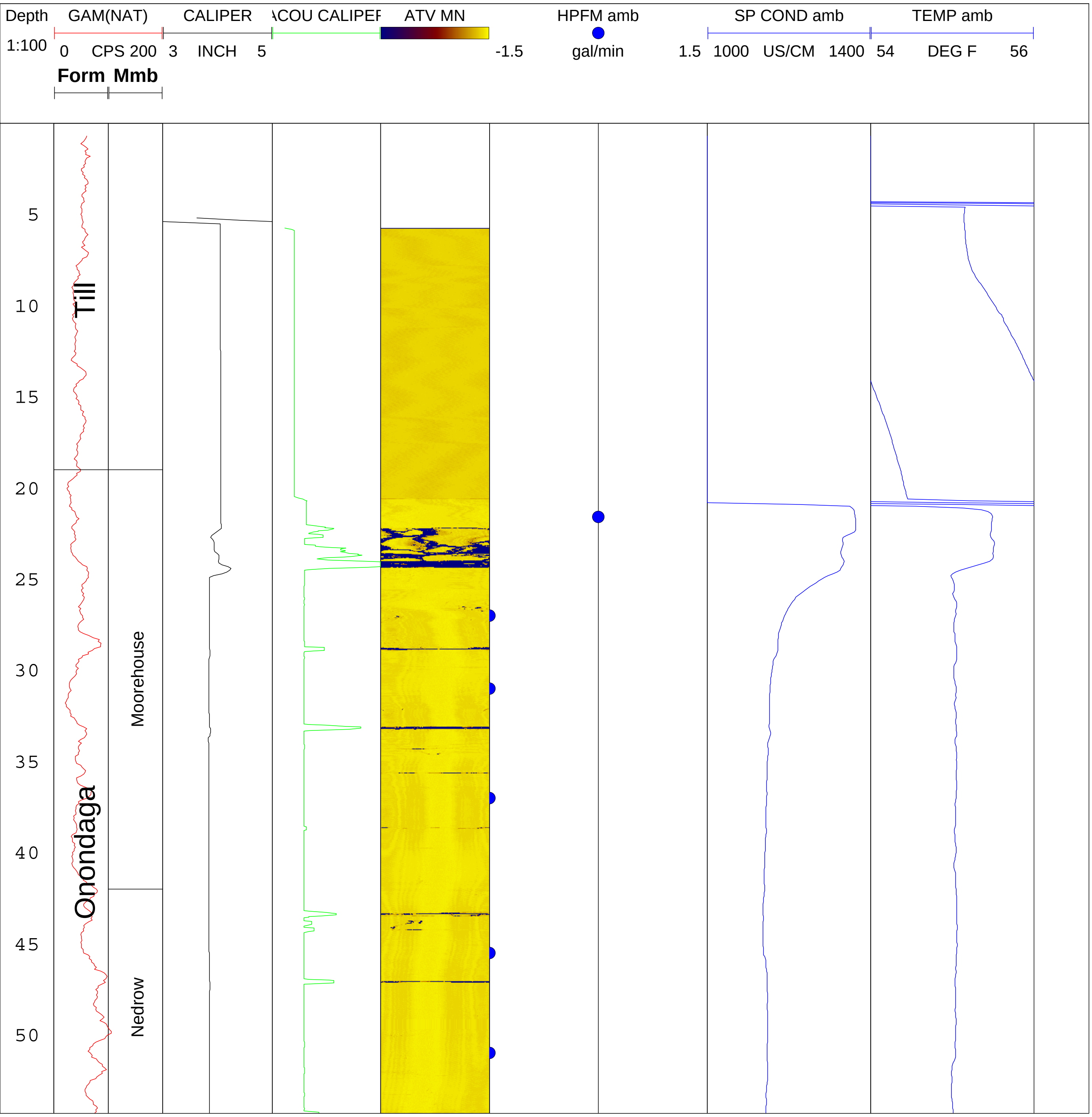
Casing depth/diameter/type 22.5/4in/steel

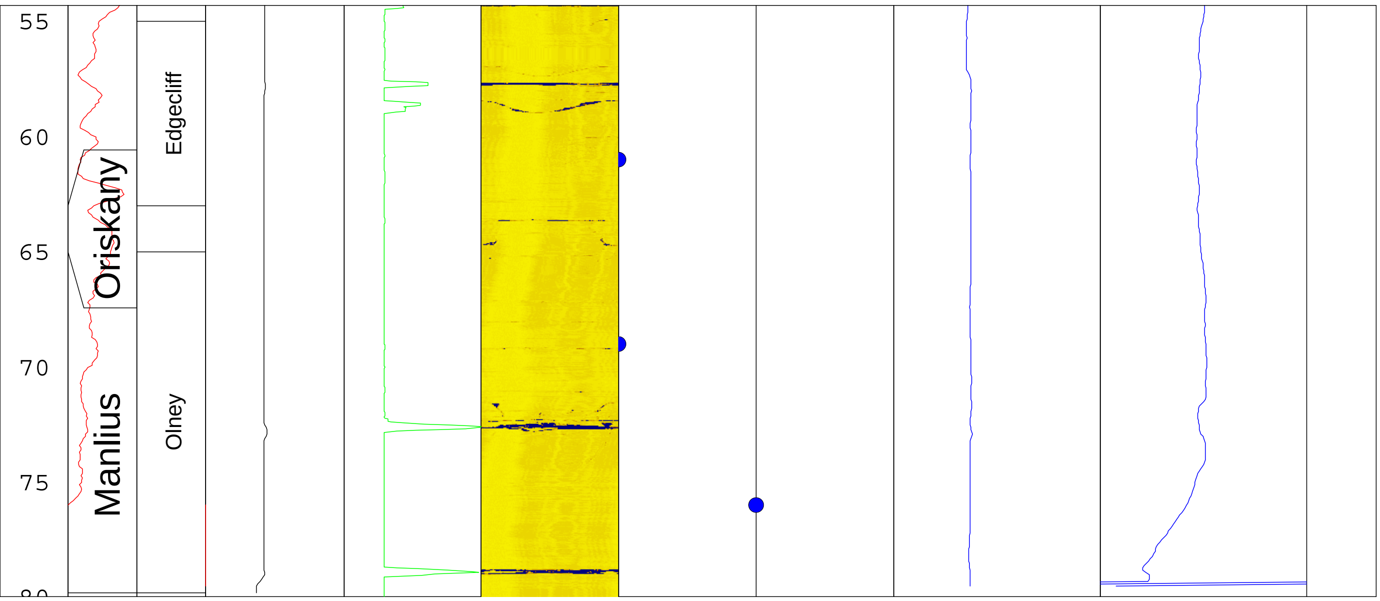
Borehole fluid type WATER Borehole fluid depth 20.65

Borehole fluid res/cond Borehole fluid temp

Hydrologic conditions ambient

**Remarks** stickup= 0, HPFM flooded below 31ft, unable to get EMFM past 25ft

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Oriskany
Manlius
Edgecliff
Olney

**USGS**

*science for a changing world*

Company USGS Site ID 425601076342601 Station name

Other ID MW06-16R Date of log 1/12/2007 Start time of log

County/State Cayuga/NY Office/logging unit Troy

Logging operator JAA Observer DAVE

Description of log-measuring point(LMP) LAND SURFACE

Height of LMP above/below LSD 0.0 Altitude of LMP 660est.

Log orientation Mag declination Logging direction

Logging speed Depth error after logging

Logging probe manufacturer

Logging probe model

Logging probe serial number

Description of calibration/standardization

Date of calibration/standardization

Standard(Low) Response(Low)

Standard(High) Response(High)

Borehole depth/diameter/type 79.4ft/4in/open

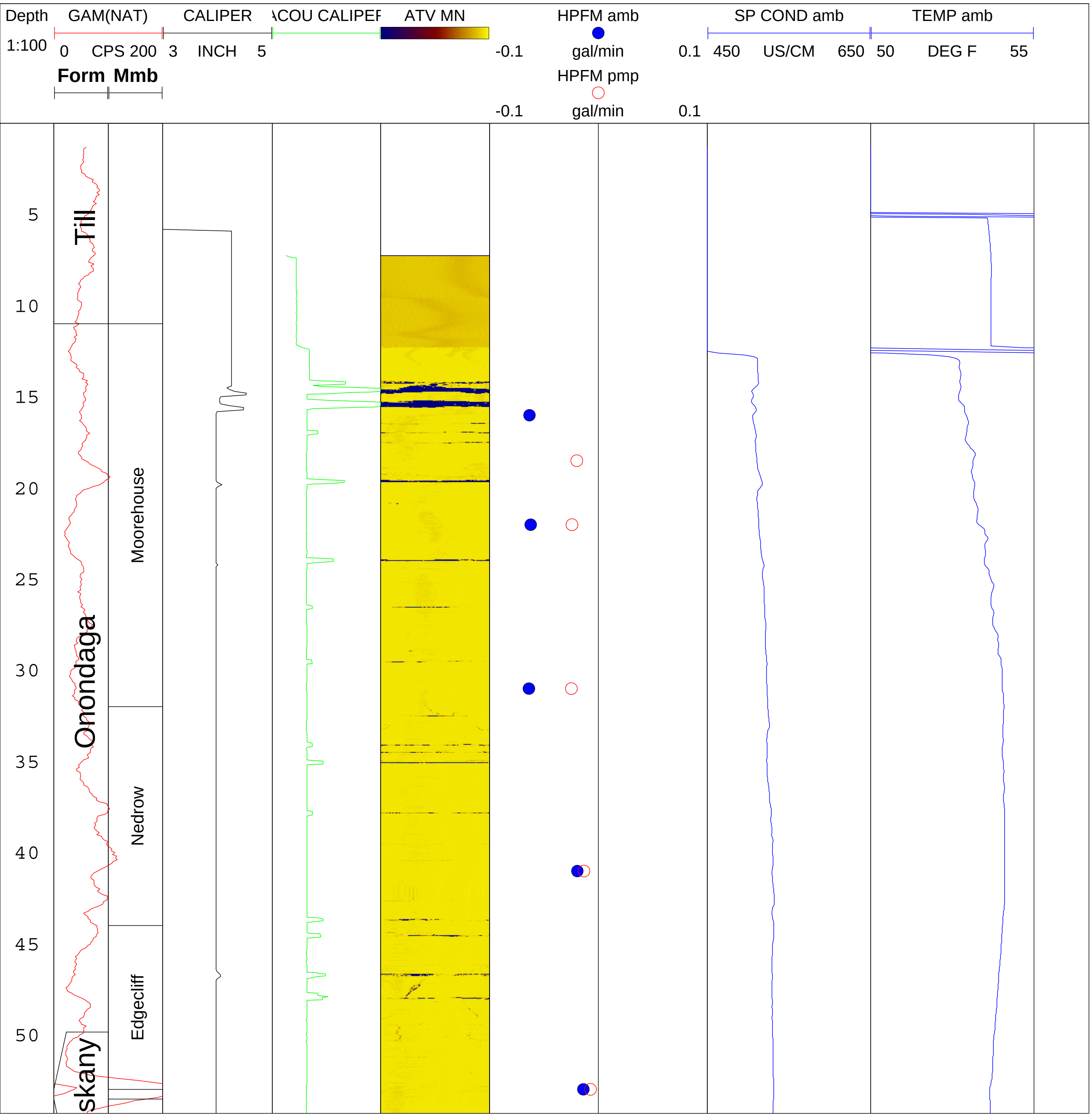
Casing depth/diameter/type 14ft/4in/steel

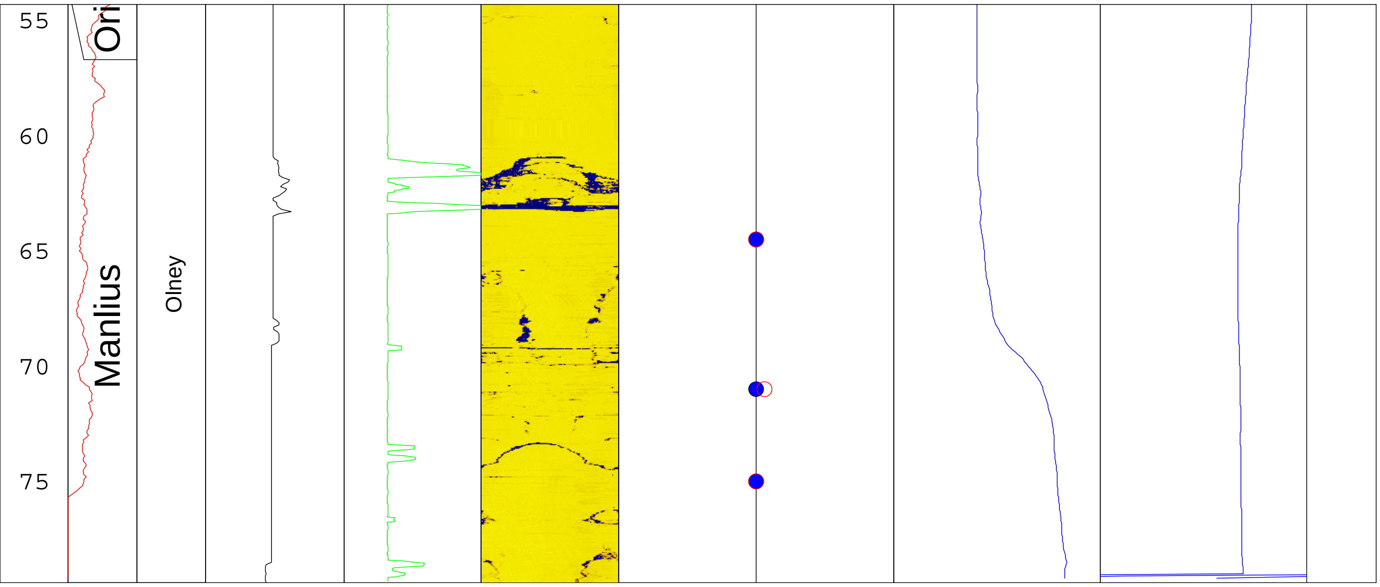
Borehole fluid type WATER Borehole fluid depth 11.74

Borehole fluid res/cond Borehole fluid temp

Hydrologic conditions ambient/ pump 0.75gal/min

Remarks   stickup=-0.6ft, drawdown= 1.21ft

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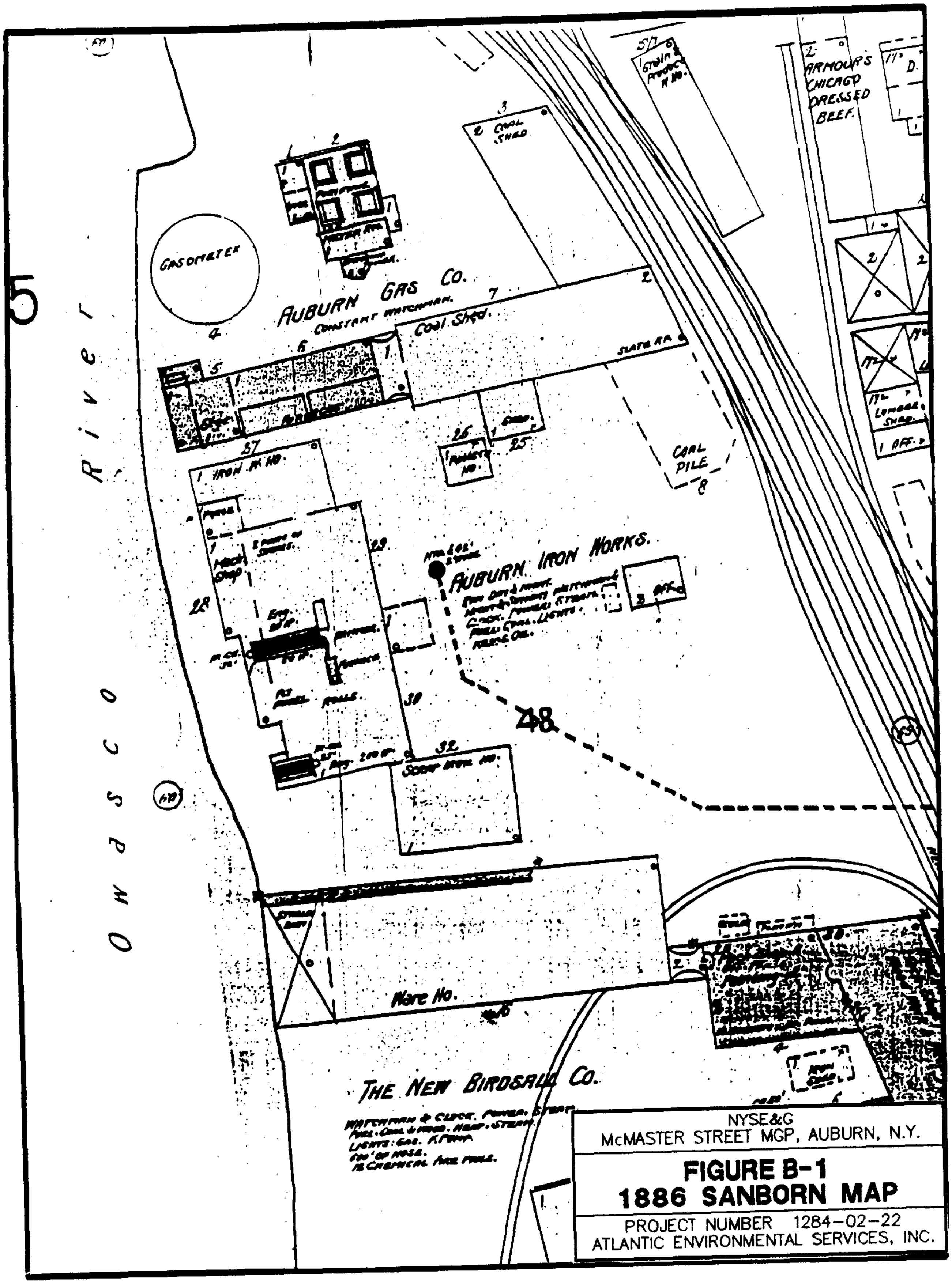
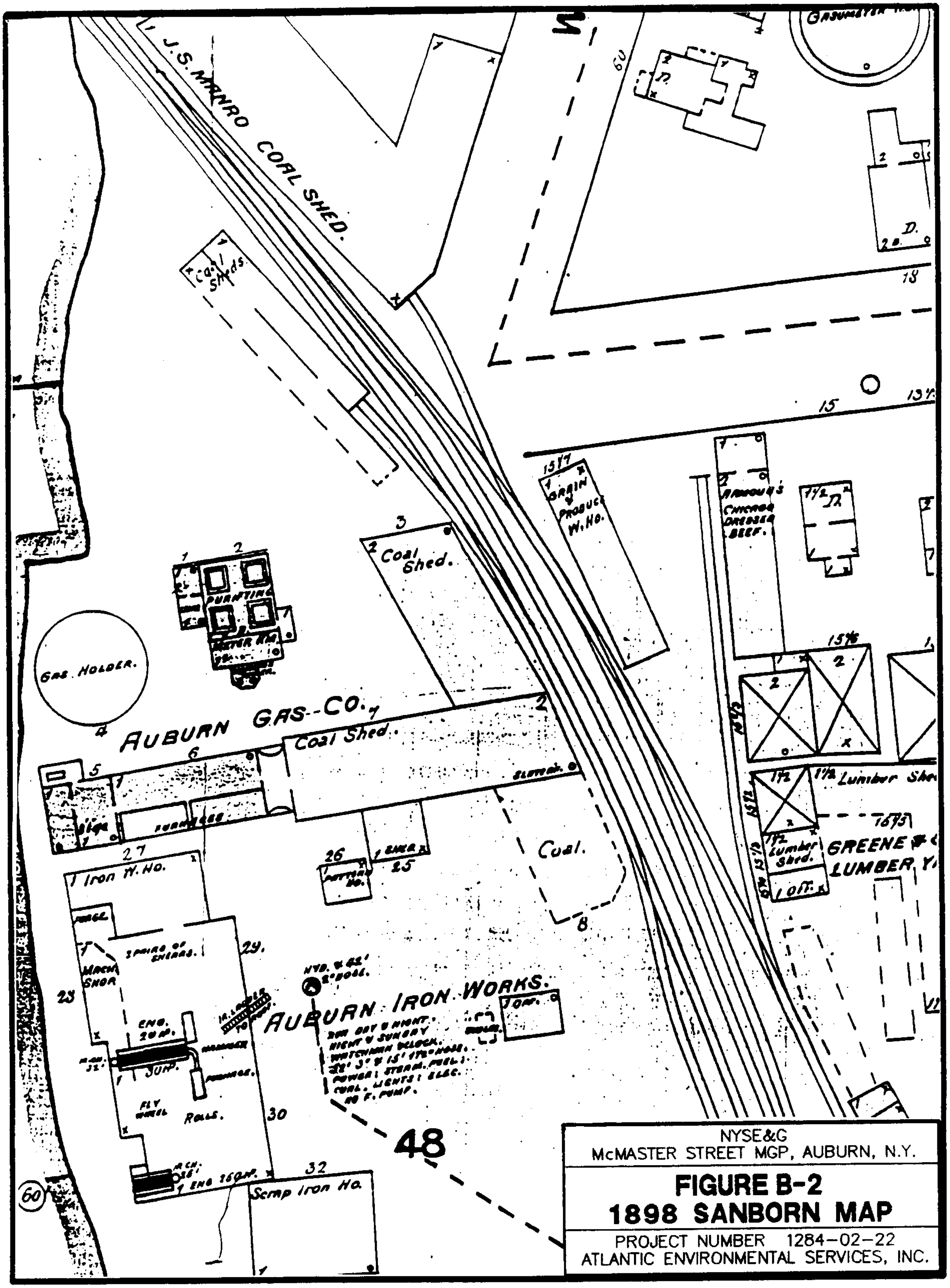
Manlius
Olney



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

## FIGURE B-1
## 1886 SANBORN MAP

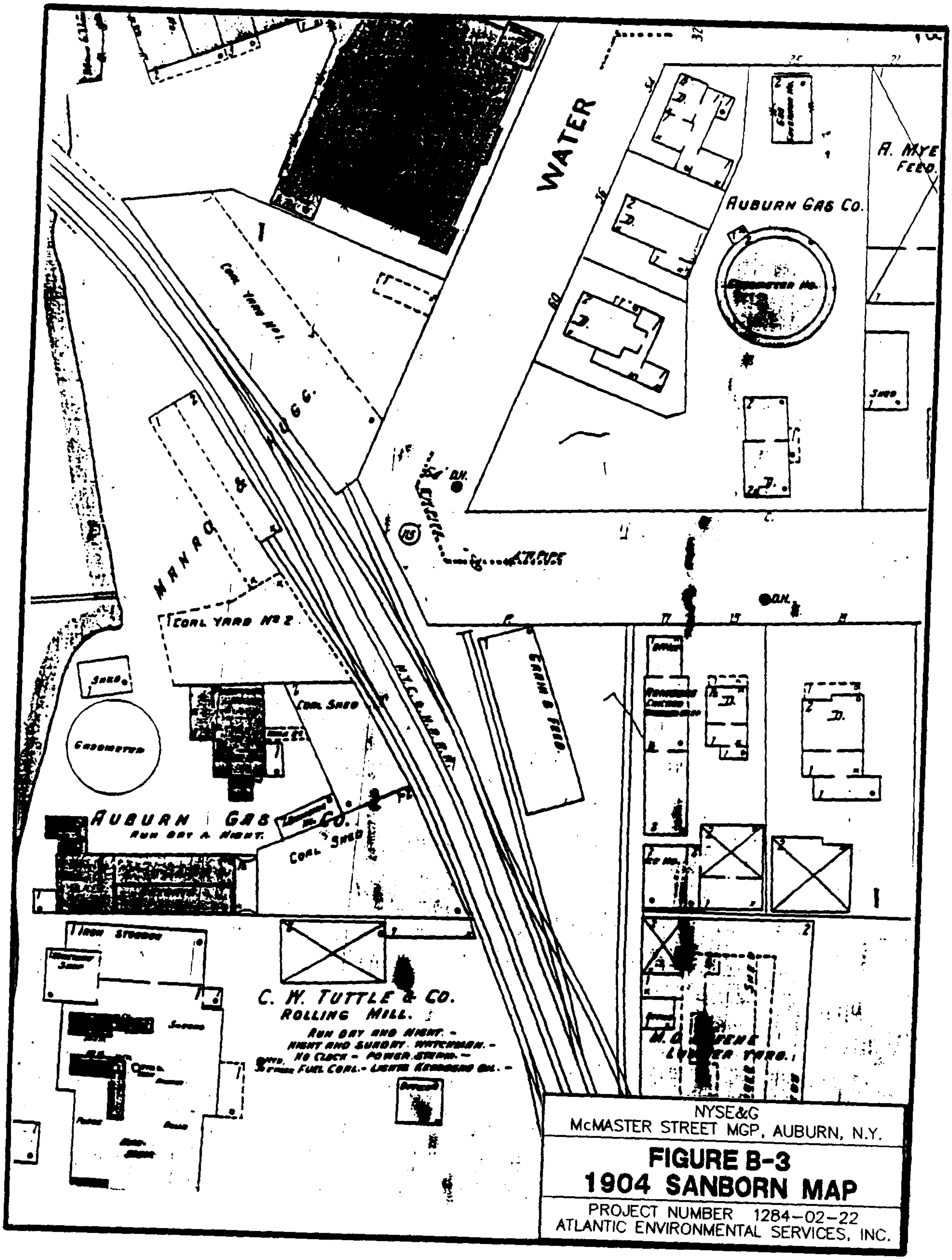
PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

## FIGURE B-2
## 1898 SANBORN MAP

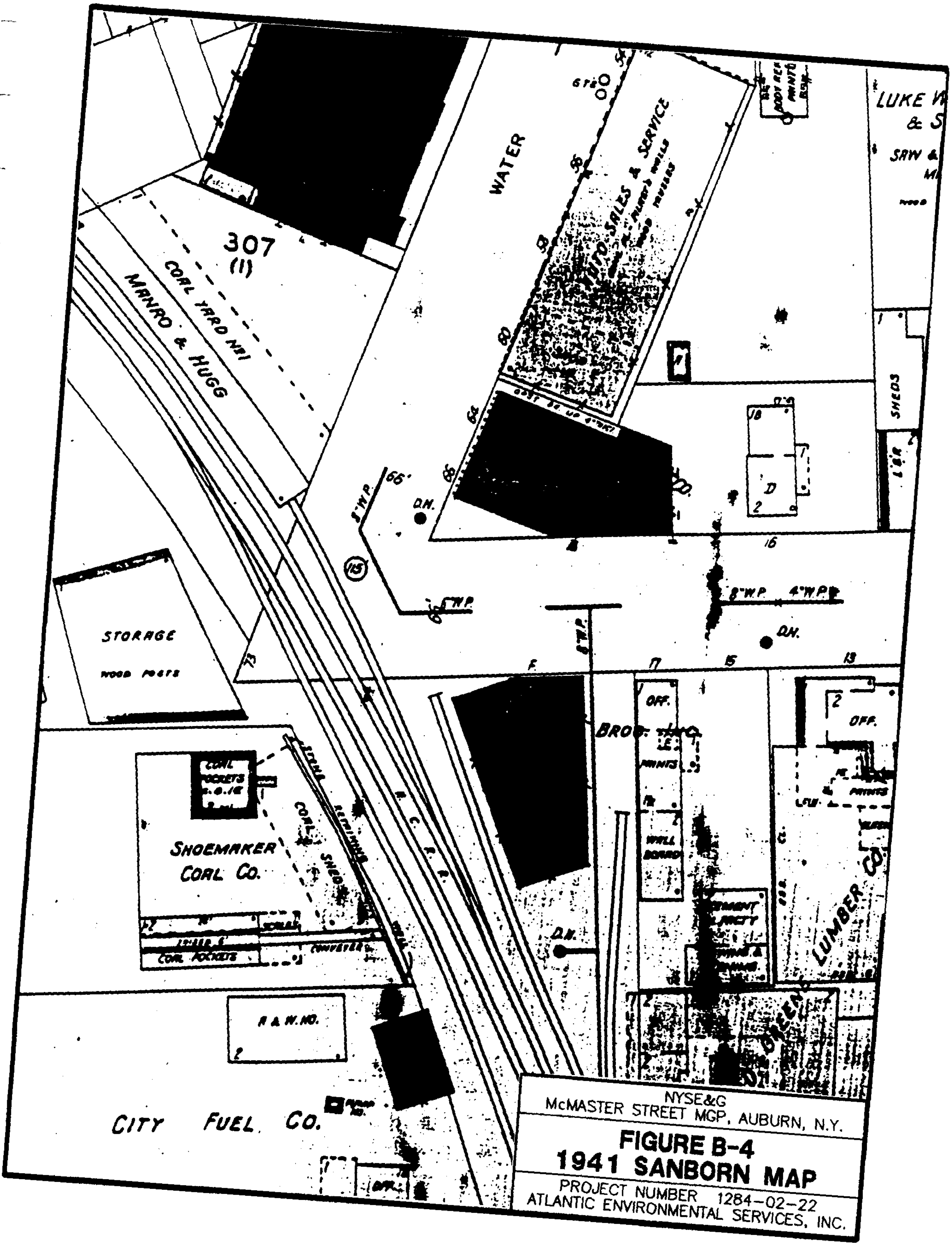
PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

## FIGURE B-3
## 1904 SANBORN MAP

PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NYSE&G
McMASTER STREET MGP, AUBURN, N.Y.

FIGURE B-4
1941 SANBORN MAP

PROJECT NUMBER 1284-02-22
ATLANTIC ENVIRONMENTAL SERVICES, INC.

## Summary of Hydraulic Conductivity Results Based on Specific Capacity Tests during Packer Tests.

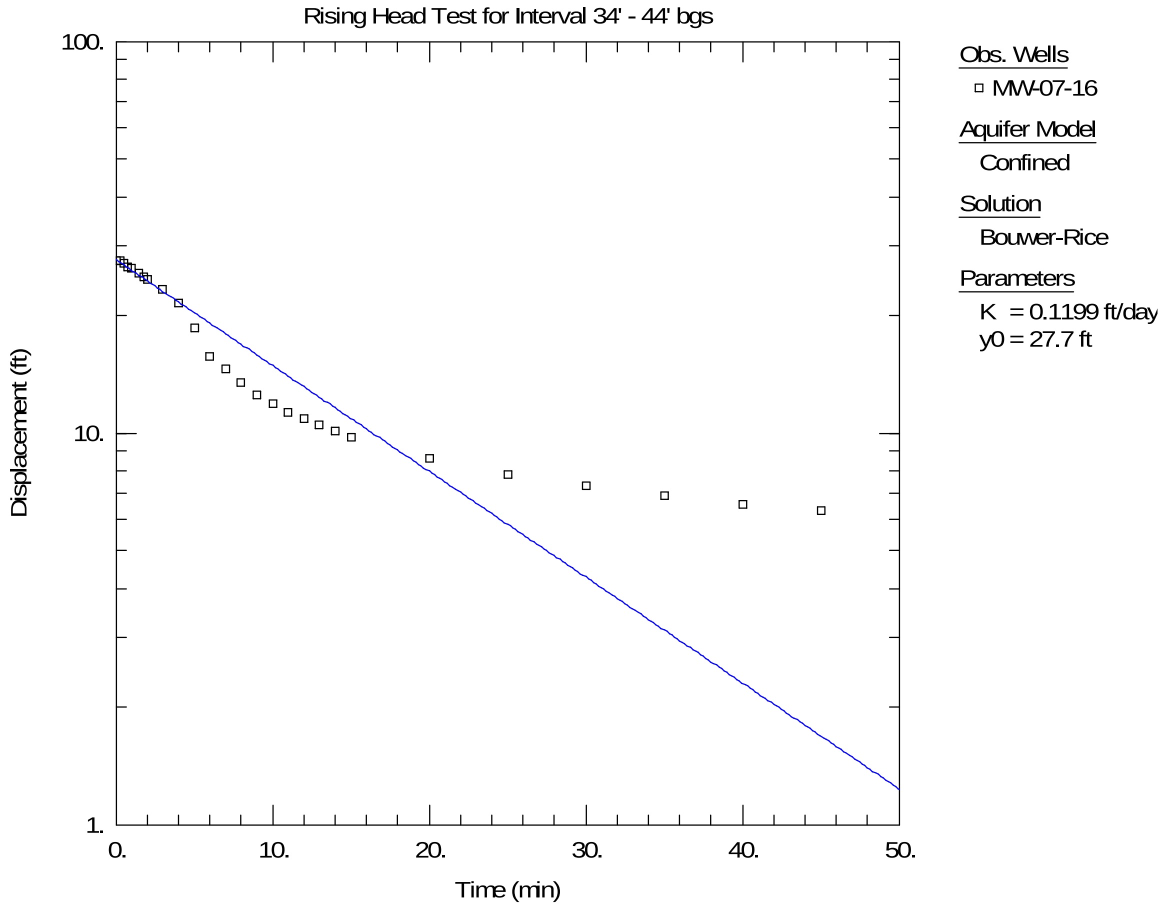
| Wells | Tested Interval (ft, bgs) | Assumed Storativity | Pumping Period (minute) | Water Removed (liter) | Water Removed (gallon) | Initial Water Level (ft, btoc) | Final Water Level (ft, btoc) | Water Removed from Well Storage (gallon) | Water Removed from Aquifer (gallon) | K (ft/day) |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-06-06 | 69.8-79.8 | 0.0001 | 30 | 74 | 19.55 | 48.31 | 51.87 | 0.58 | 18.97 | 4.06 |
| MW-06-06 | 59.8-69.8 | 0.0001 | 30 | 33 | 8.72 | 23.88 | 57.42 | 5.47 | 3.25 | 0.05 |
| MW-06-06 | 49.8-59.8 | 0.0001 | 30 | 31 | 8.19 | 26.62 | 57.62 | 5.06 | 3.13 | 0.05 |
| MW-06-06 | 39.5-49.8 | 0.0001 | 30 | 30 | 7.93 | 30.79 | 34.88 | 0.67 | 7.26 | 1.21 |
| MW-06-01 | 75-80 | 0.0001 | 30 | 25.5 | 6.74 | 26.14 | 54.49 | 4.63 | 2.11 | 0.08 |
| MW-06-01 | 65-75 | 0.0001 | 30 | 25 | 6.61 | 37.89 | 51.19 | 2.17 | 4.44 | 0.20 |
| MW-06-01 | 55-65 | 0.0001 | 30 | 30 | 7.93 | 40.65 | 58.66 | 2.94 | 4.99 | 0.17 |
| MW-06-01 | 45-55 | 0.0001 | 30 | 19.2 | 5.07 | 10.93 | 33.18 | 3.63 | 1.44 | 0.03 |
| MW-06-01 | 35-45 | 0.0001 | 30 | 12 | 3.17 | 9.46 | 21.1 | 1.90 | 1.27 | 0.06 |
| MW-06-01 | 26-35 | 0.0001 | 30 | 14.4 | 3.80 | 8.68 | 23.98 | 2.50 | 1.31 | 0.05 |
| MW-06-01 | 17-26 | 0.0001 | 30 | 18 | 4.76 | 9.04 | 15.82 | 1.11 | 3.65 | 0.38 |
| MW-07-16 | 14-24 | 0.0001 | 40 | 41.6 | 11 | 15.32 | 24.4 | 1.48 | 9.52 | 0.53 |
| MW-07-16 | 24-34 | 0.0001 | 45 | 28.4 | 7.5 | 22.3 | 26.96 | 0.76 | 6.74 | 0.66 |

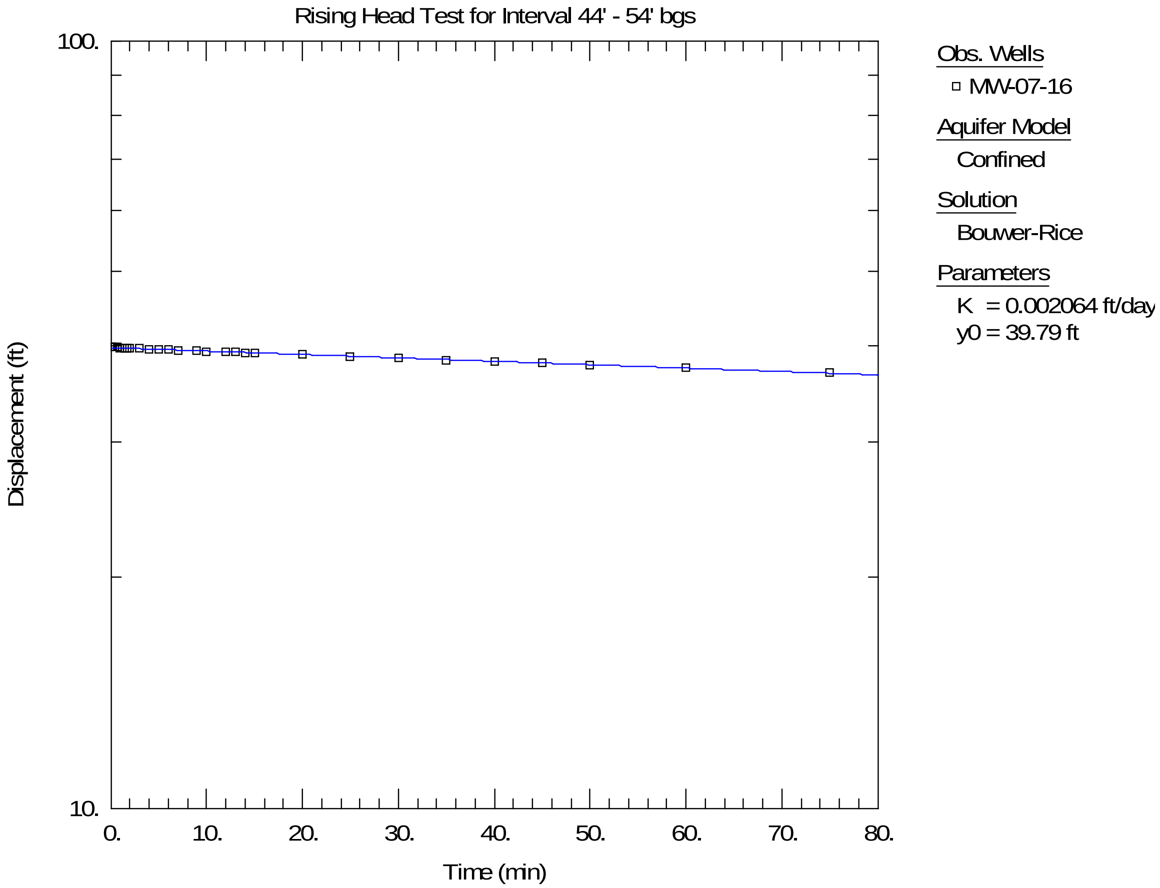
**Note:**
btoc = below top of casing.

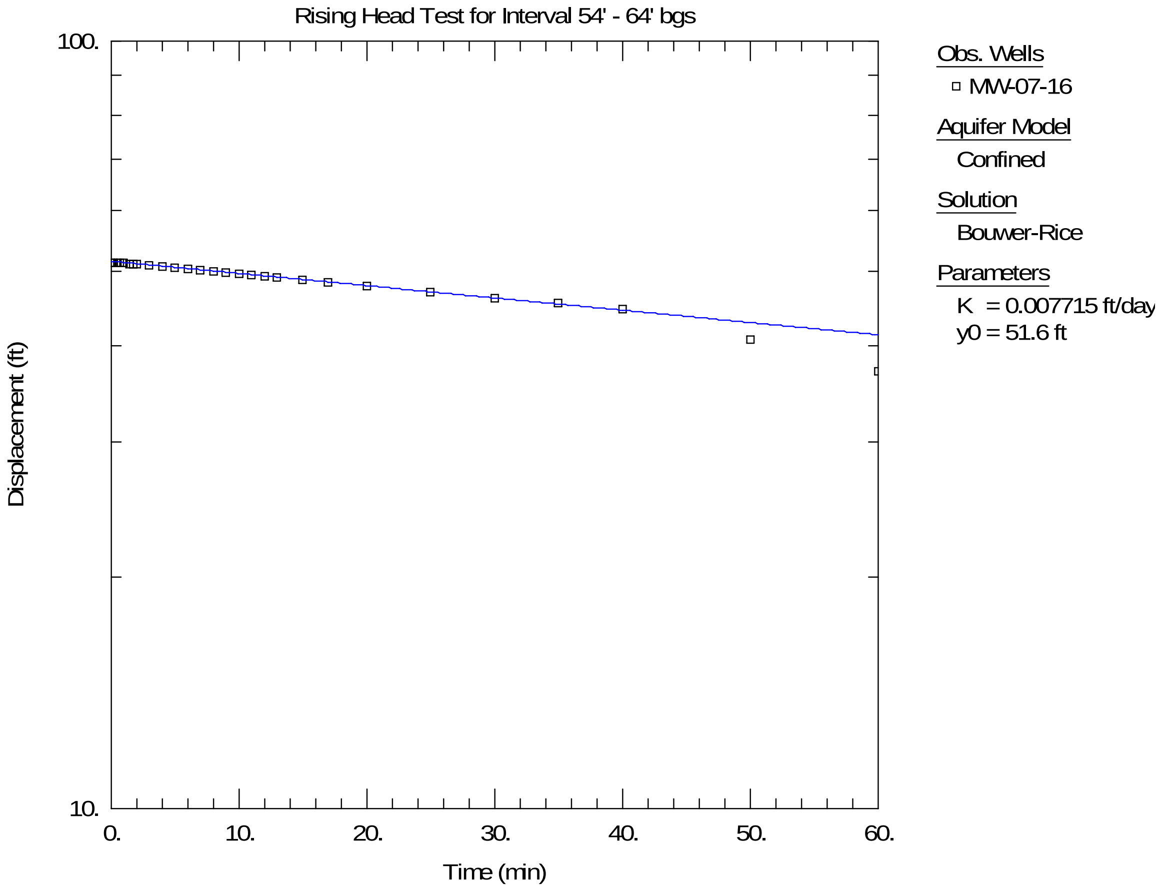
## Summary of Hydraulic Conductivity Results Based on Specific Capacity Tests.

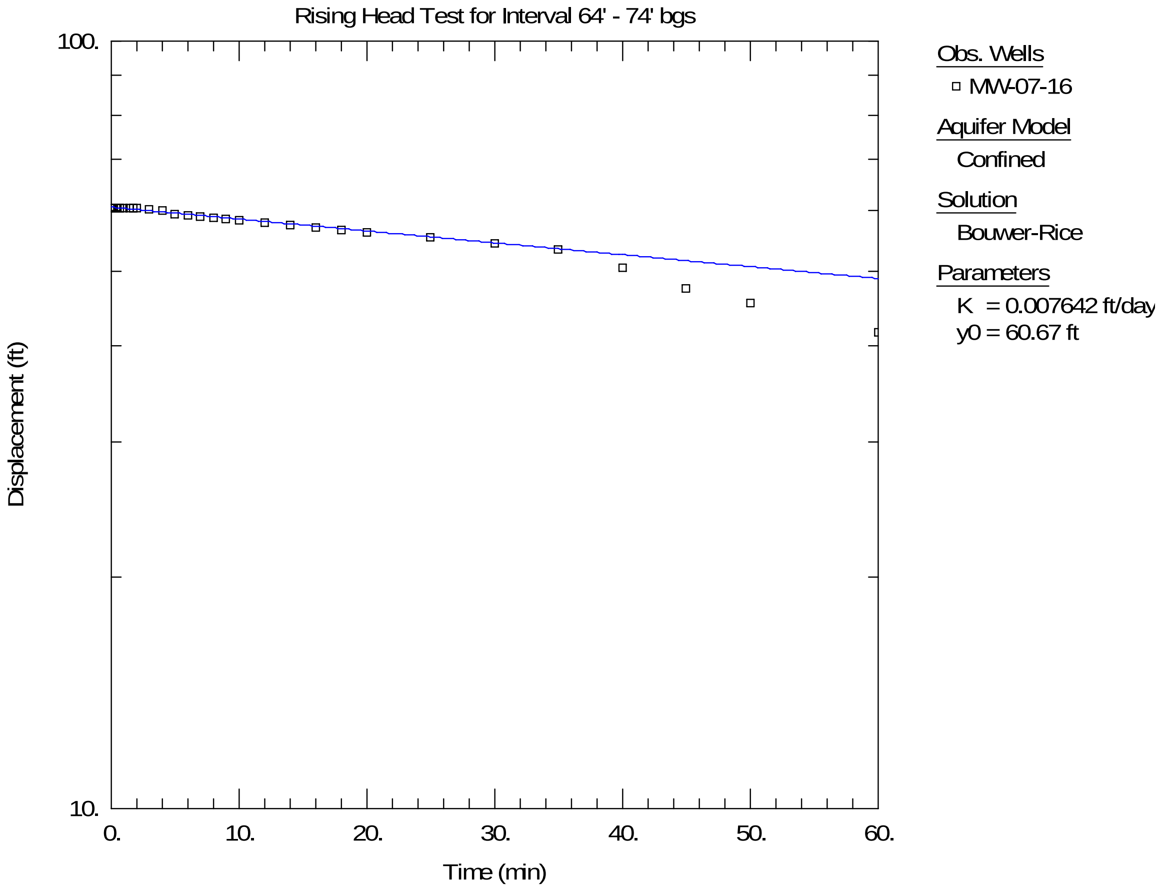
| Well ID | Assumed Storativity | Pumping Period (minute) | Water Removed (gallon) | Initial Water Level (ft, btoc) | Final Water Level (ft, btoc) | Sand Pack Top (ft, bgs) | Sand Pack Bottom (ft, bgs) | Assumed Sand Pack Porosity | Well Casing Diameter (inch) | Well Borehole Diameter (inch) | Water Removed from Well Storage (gallon) | Water Removed from Sandpack (gallon) | Water Removed From Aquifer (gallon) | K (ft/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-04-01 | 0.01 | 40 | 2.67 | 5.4 | 5.41 | 1.7 | 11.9 | 0.3 | 2 | 8.25 | 1.63E-03 | 7.84E-03 | 2.66E+00 | 1.82E+02 |
| MW-04-02 | 0.001 | 65 | 3.5 | 9.96 | 11.36 | 3.6 | 13.7 | 0.3 | 2 | 8.25 | 2.28E-01 | 1.10E+00 | 2.17E+00 | 8.36E-01 |
| MW-04-03 | 0.001 | 48 | 2.5 | 8.17 | 8.89 | 1.9 | 12 | 0.3 | 2 | 8.25 | 1.17E-01 | 5.64E-01 | 1.82E+00 | 1.92E+00 |
| MW-04-04 | 0.01 | 89 | 12.5 | 3.61 | 3.69 | 3.5 | 13.8 | 0.3 | 2 | 8.25 | 1.31E-02 | 6.27E-02 | 1.24E+01 | 2.83E+01 |
| MW-04-05 | 0.01 | 60 | 7.93 | 3.5 | 3.57 | 3.7 | 9.7 | 0.3 | 2 | 8.25 | 1.14E-02 | 5.49E-02 | 7.86E+00 | 4.91E+01 |
| MW-04-06 | 0.001 | 60 | 5.15 | 9.45 | 11.35 | 3.9 | 15.3 | 0.3 | 2 | 8.25 | 3.10E-01 | 1.49E+00 | 3.35E+00 | 6.99E-01 |
| MW-05-02R | 0.0001 | 70 | 5 | 6.31 | 10.86 | 16 | 28 | 0.3 | 2 | 3.79 | 7.42E-01 | 0 | 4.26E+00 | 1.54E-01 |
| MW-05-07 | 0.001 | 40 | 2 | 6.63 | 7.22 | 3.8 | 10.8 | 0.3 | 2 | 8.25 | 9.63E-02 | 4.62E-01 | 1.44E+00 | 2.02E+00 |
| MW-05-07R | 0.0001 | 75 | 3.75 | 10.51 | 18.03 | 16 | 28 | 0.3 | 2 | 3.79 | 1.23E+00 | 2.95E-01 | 2.23E+00 | 3.90E-02 |
| MW-05-08 | 0.001 | 45 | 2 | 5.31 | 6.52 | 3 | 9.5 | 0.3 | 2 | 8.25 | 1.97E-01 | 9.49E-01 | 8.54E-01 | 4.28E-01 |
| MW-05-08R | 0.0001 | 55 | 4.5 | 5.59 | 5.96 | 16 | 28 | 0.3 | 2 | 3.79 | 6.04E-02 | 0 | 4.44E+00 | 3.31E+00 |
| MW-06-06R | 0.0001 | 59 | 1.5 | 19.93 | 26.64 | 26 | 38 | 0.3 | 2 | 3.79 | 1.09E+00 | 1.19E-01 | 2.86E-01 | 5.01E-03 |
| MW-06-09 | 0.001 | 40 | 2 | 6.41 | 7 | 3 | 17.4 | 0.3 | 2 | 8.25 | 9.63E-02 | 4.62E-01 | 1.44E+00 | 9.23E-01 |
| MW-06-10 | 0.001 | 40 | 2 | 4.34 | 5.16 | 2 | 8.3 | 0.3 | 2 | 8.25 | 1.34E-01 | 6.43E-01 | 1.22E+00 | 1.33E+00 |
| MW-06-10R | 0.0001 | 90 | 4.5 | 7.4 | 18.75 | 16 | 28 | 0.3 | 2 | 3.79 | 1.85E+00 | 3.87E-01 | 2.26E+00 | 2.06E-02 |
| MW-06-12R | 0.0001 | 70 | 5.5 | 10.95 | 11.54 | 16 | 28 | 0.3 | 2 | 3.79 | 9.63E-02 | 0 | 5.40E+00 | 1.94E+00 |
| MW-06-13R | 0.0001 | 60 | 2.5 | 16.1 | 17.53 | 20.7 | 33.25 | 0.3 | 2 | 3.79 | 2.33E-01 | 0 | 2.27E+00 | 3.11E-01 |
| MW-06-14R | 0.0001 | 46 | 2.2 | 8.8 | 11.04 | 14 | 26 | 0.3 | 2 | 3.79 | 3.65E-01 | 0 | 1.83E+00 | 2.02E-01 |
| MW-06-15R | 0.0001 | 63 | 3.5 | 6.85 | 7.57 | 10 | 22 | 0.3 | 2 | 3.79 | 1.17E-01 | 0 | 3.38E+00 | 1.03E+00 |

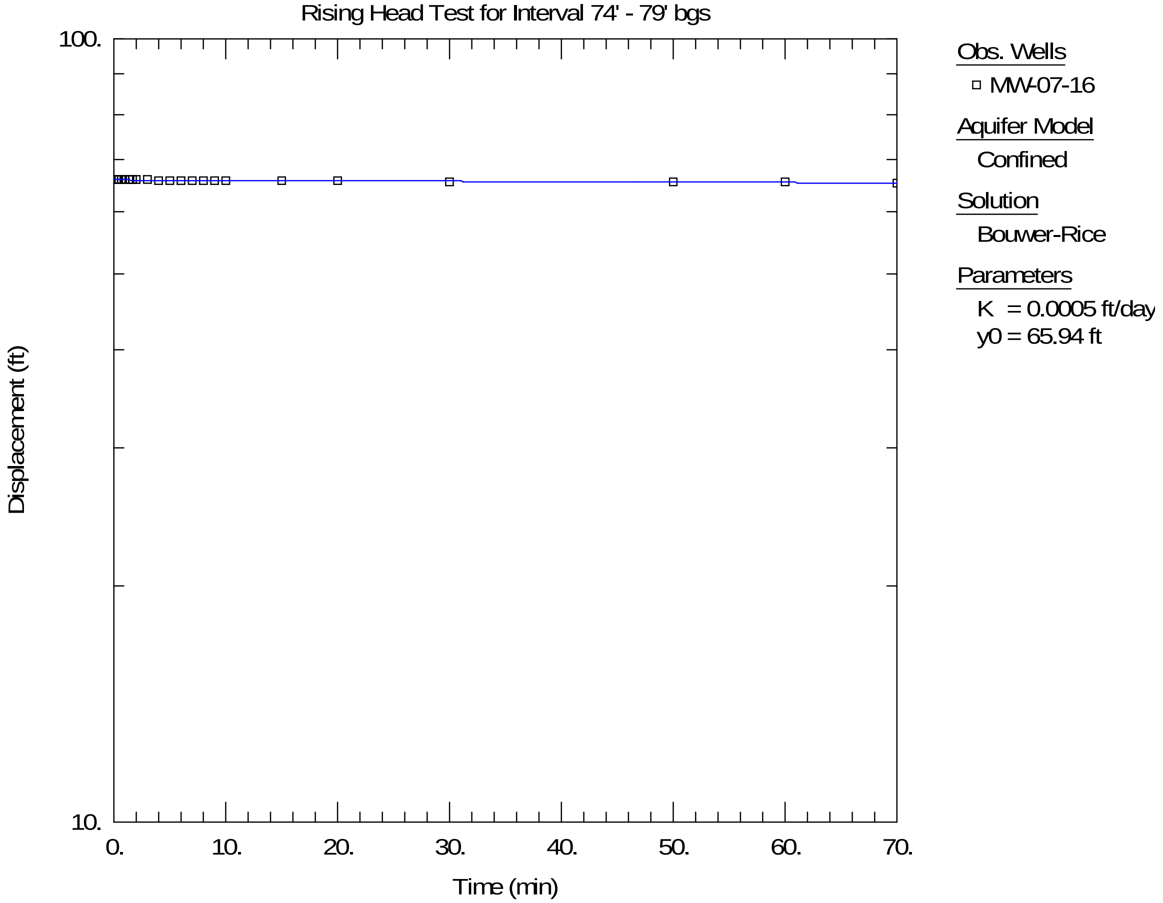
**Note:**
btoc = below top of casing.

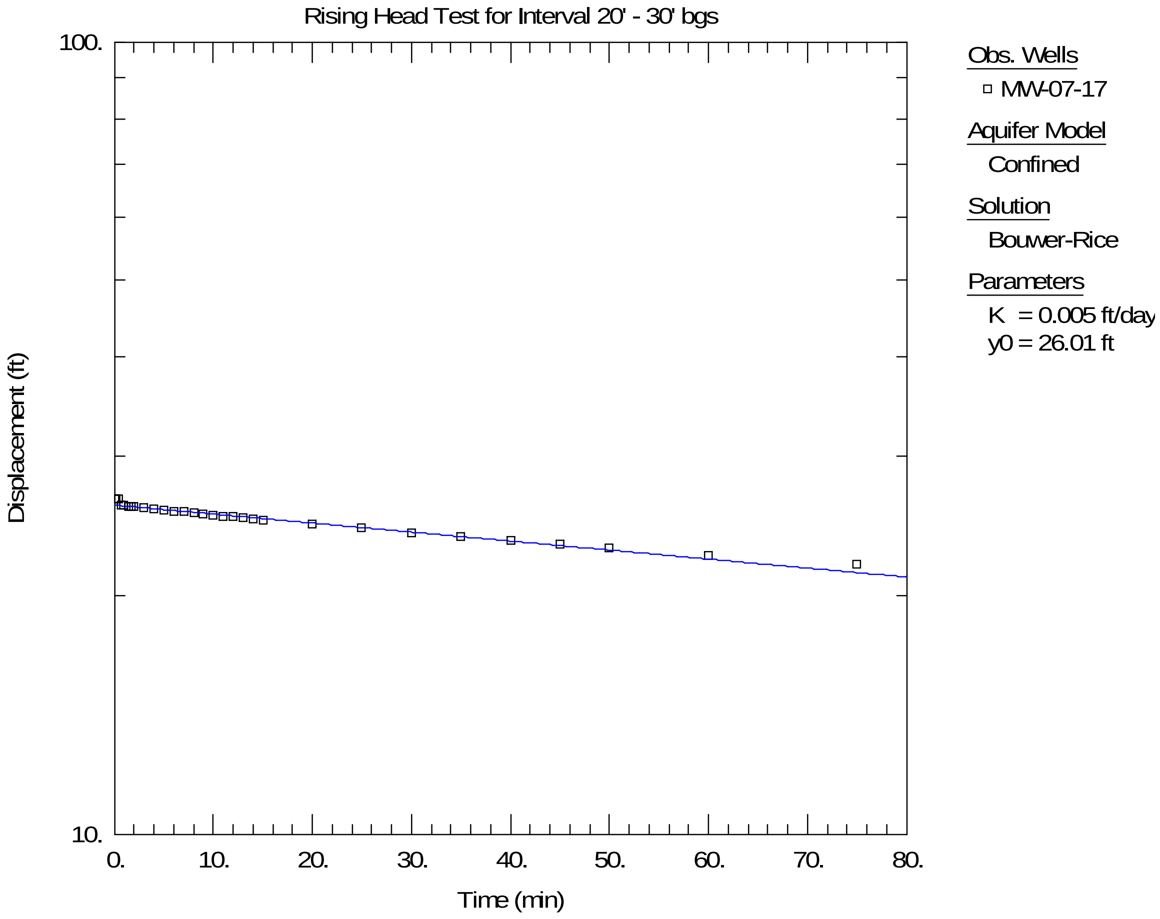

Rising Head Test for Interval 34' - 44' bgs
Displacement (ft)
100.
10.
1.
0.
10.
20.
30.
40.
50.
Time (min)
Obs. Wells
MW-07-16
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.1199 ft/day
y0 = 27.7 ft

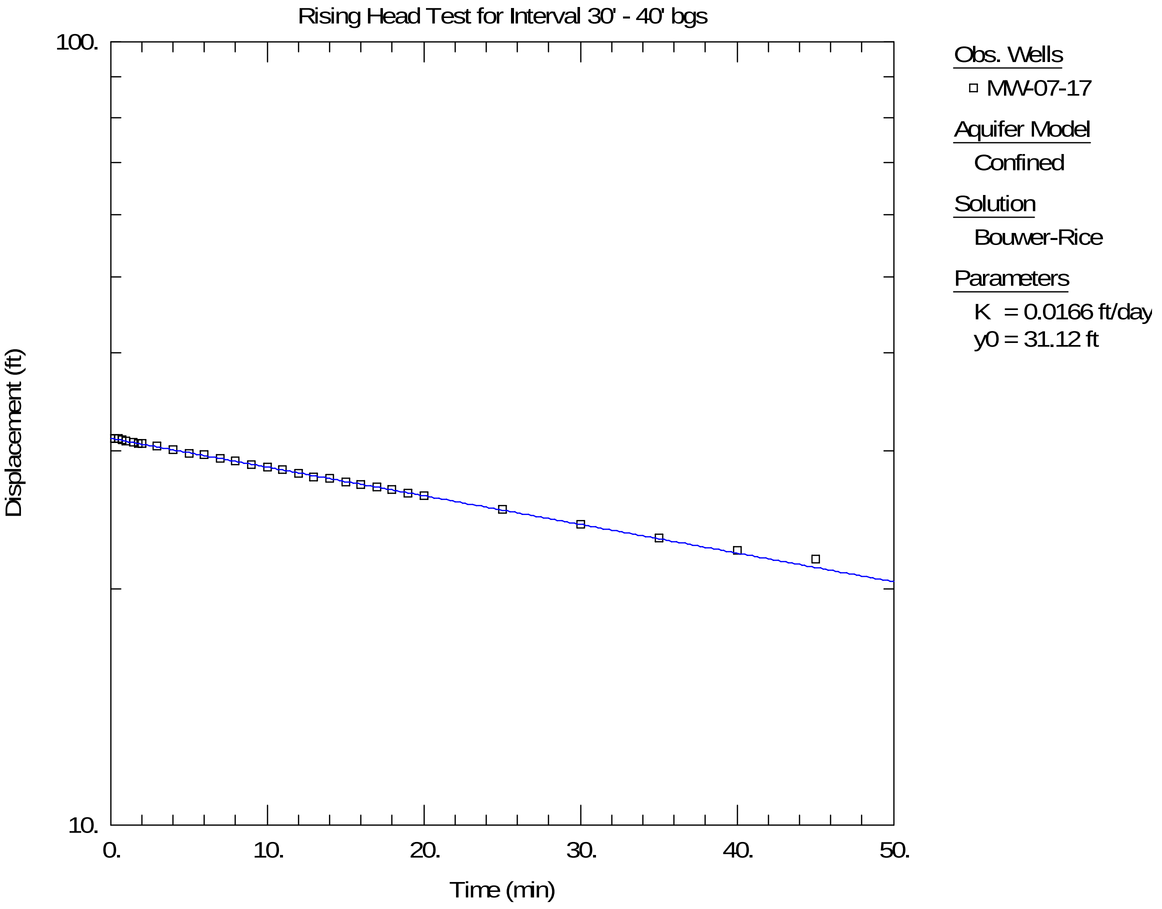

Rising Head Test for Interval 44' - 54' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
60.
70.
80.
Time (min)
Obs. Wells
MW-07-16
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.002064 ft/day
y0 = 39.79 ft

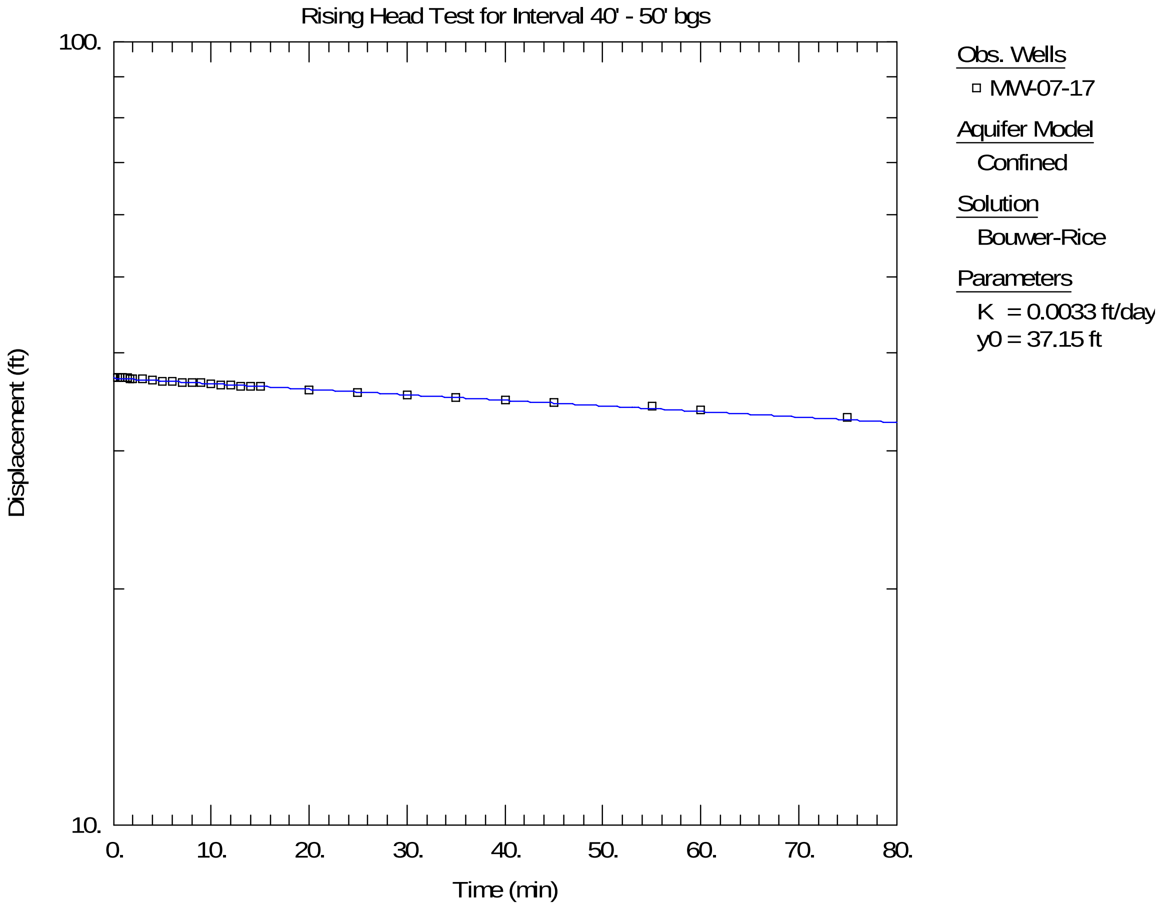

Rising Head Test for Interval 54' - 64' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
60.
Time (min)
Obs. Wells
□ MW-07-16
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.007715 ft/day
y0 = 51.6 ft

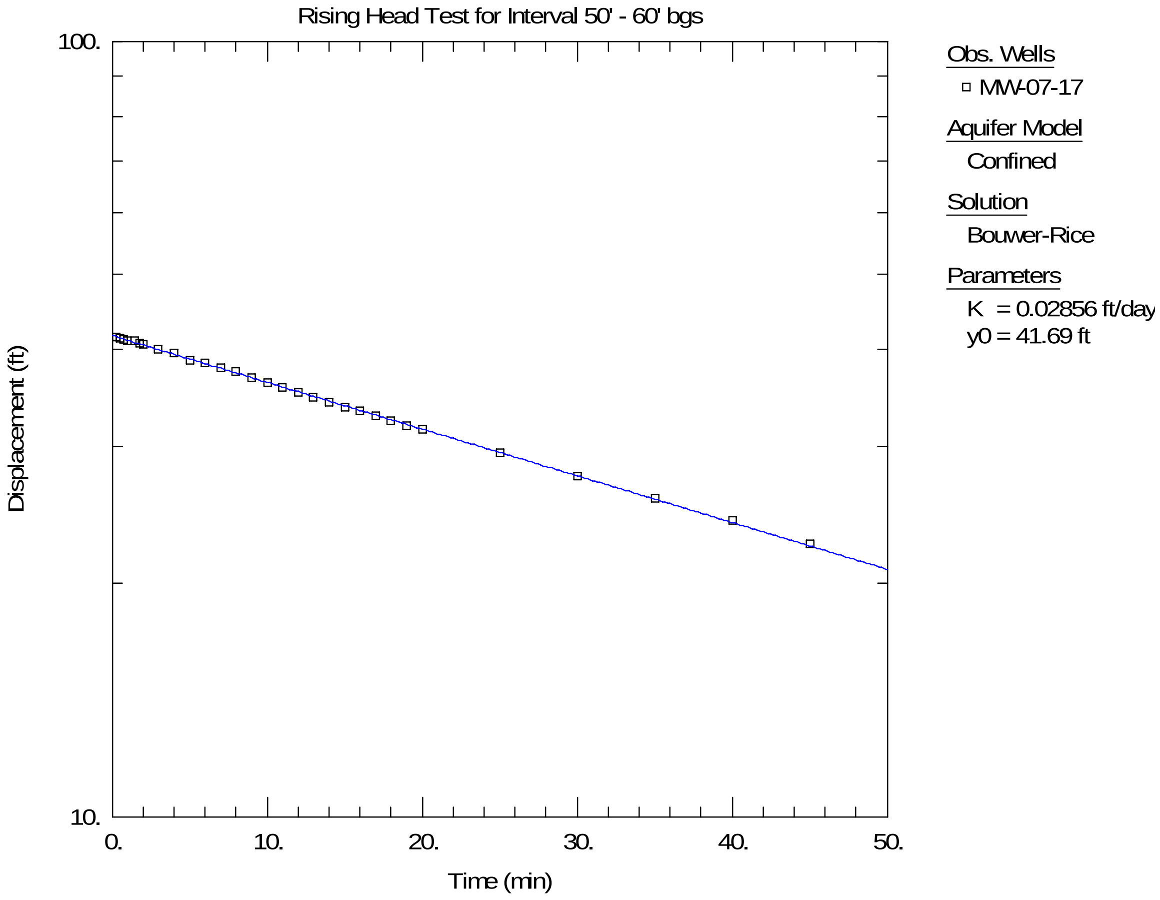

Rising Head Test for Interval 64' - 74' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
60.
Time (min)
Obs. Wells
□ MW-07-16
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.007642 ft/day
y0 = 60.67 ft

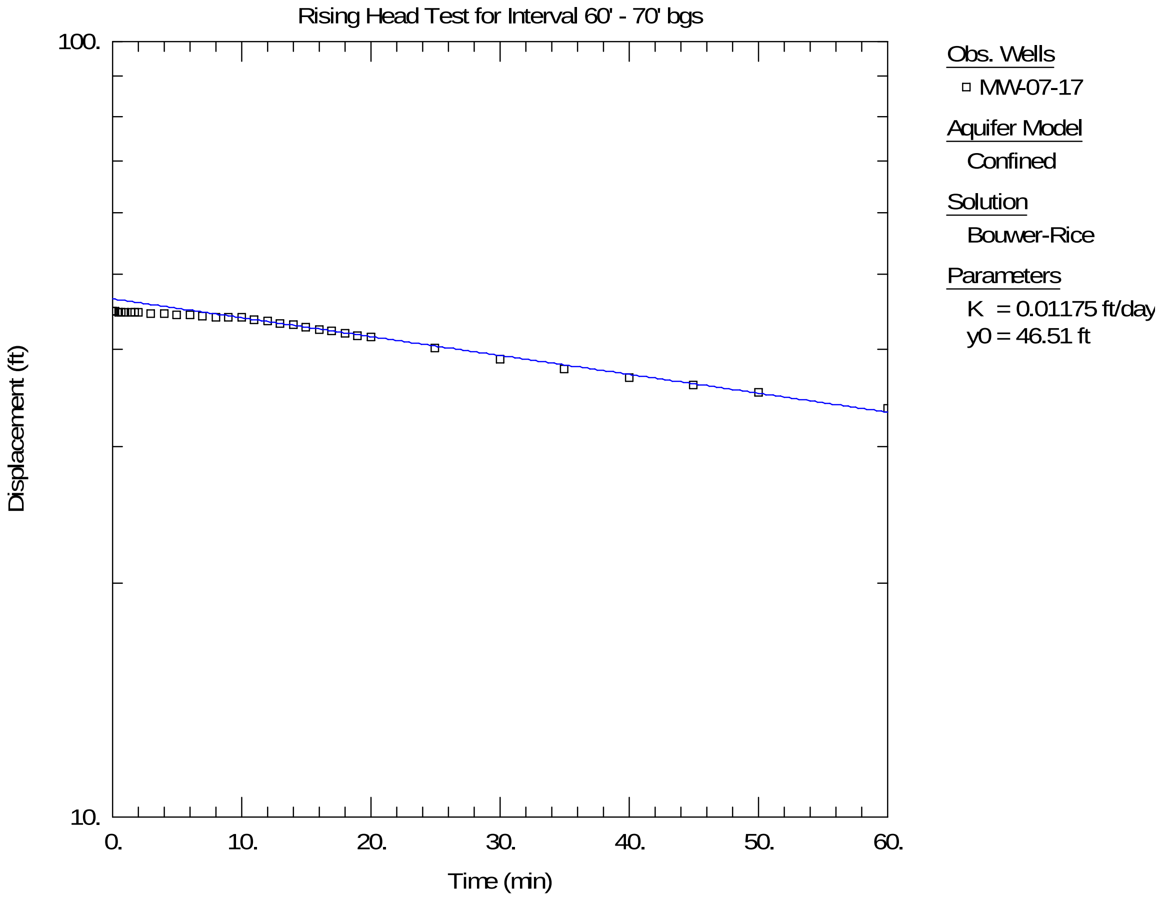

Rising Head Test for Interval 74' - 79' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
60.
70.
Time (min)
Obs. Wells
□ MW-07-16
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.0005 ft/day
y0 = 65.94 ft

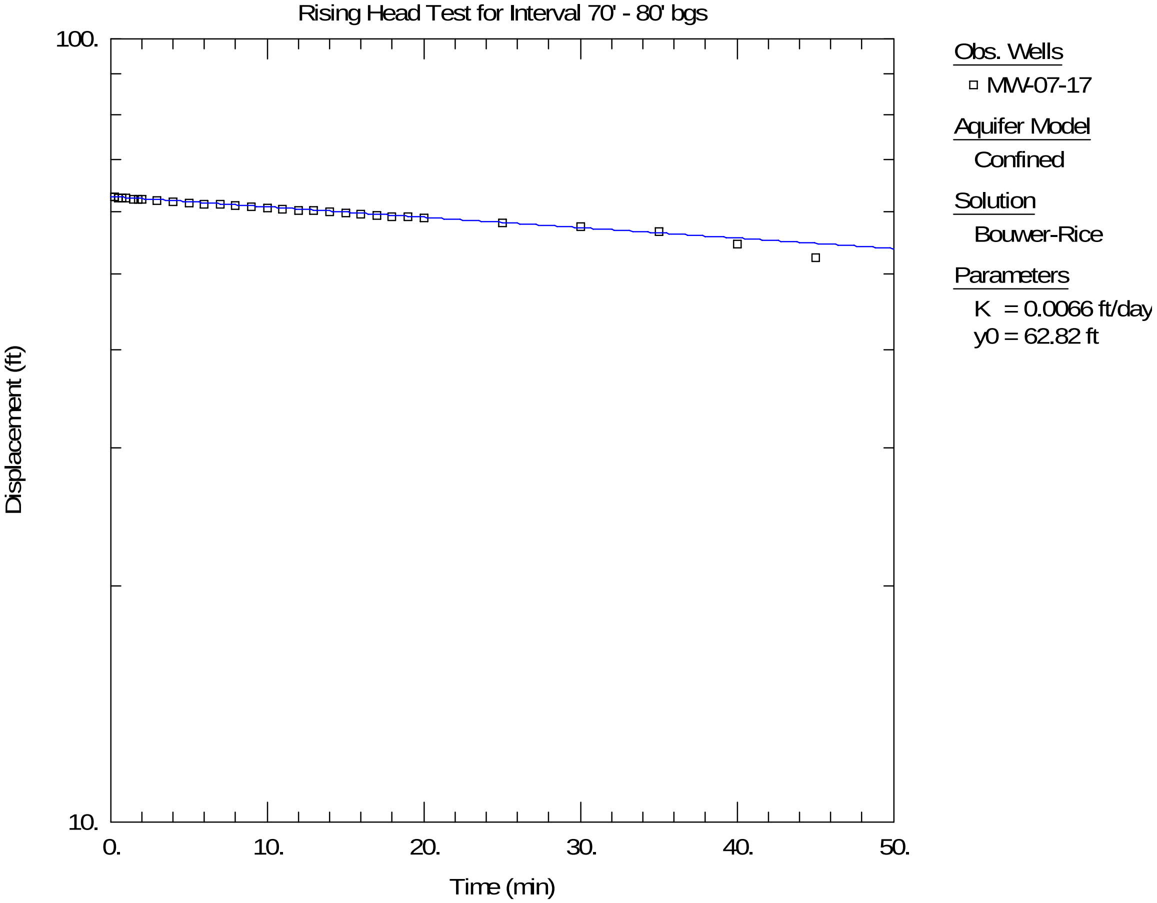

Rising Head Test for Interval 20' - 30' bgs
Displacement (ft)
100.
10.
0.
10.
20.
30.
40.
50.
60.
70.
80.
Time (min)
Obs. Wells
MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.005 ft/day
y0 = 26.01 ft


Rising Head Test for Interval 30' - 40' bgs
100.
10.
0.
10.
20.
30.
40.
50.
Time (min)
Displacement (ft)
Obs. Wells
MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.0166 ft/day
y0 = 31.12 ft


Rising Head Test for Interval 40' - 50' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
60.
70.
80.
Time (min)
Obs. Wells
MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.0033 ft/day
y0 = 37.15 ft


Rising Head Test for Interval 50' - 60' bgs
100.
10.
0.
10.
20.
30.
40.
50.
Time (min)
Displacement (ft)
Obs. Wells
□ MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.02856 ft/day
y0 = 41.69 ft


Rising Head Test for Interval 60' - 70' bgs
100.
10.
0.
10.
20.
30.
40.
50.
60.
Time (min)
Displacement (ft)
Obs. Wells
□ MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.01175 ft/day
y0 = 46.51 ft


Rising Head Test for Interval 70' - 80' bgs
100.
10.
Displacement (ft)
0.
10.
20.
30.
40.
50.
Time (min)
Obs. Wells
□ MW-07-17
Aquifer Model
Confined
Solution
Bouwer-Rice
Parameters
K = 0.0066 ft/day
y0 = 62.82 ft