# Final Site Characterization Report
# Former Loohns Cleaners
# Site Number 8-51-024
# Steuben County, New York

**November 2006**

**Prepared for:**

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**
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# List of Acronyms

| | |
|---|---|
| ADR | Automated Data Review |
| ASP | Analytical Services Protocol |
| bgs | below ground surface |
| BTEX | benzene, toluene, ethylbenzene, xylenes |
| Chemtech | Chemtech Environmental Laboratory |
| COC | chain-of-custody |
| DER | (NYSDEC) Division of Environmental Remediation |
| DPT | direct push technology |
| DUSR | Data Usability Summary Report |
| EDD | electronic data deliverable |
| EDR | Environmental Data Resources, Inc. |
| EEEPC | Ecology and Environment Engineering, P.C. |
| ELAP | Environmental Laboratory Approval Program |
| EPA | (U.S.) Environmental Protection Agency |
| FTL | field team leader |
| GIS | geographic information system |
| HASP | Health and Safety Plan |
| ID | inner diameter |
| IDL | instrument detection limit |
| IDW | investigation-derived waste |

## List of Acronyms (Cont.)

| | |
|---|---|
| LCS | laboratory control sample |
| MDL | method detection limit |
| mL | milliliter |
| MS/MSD | matrix spike/matrix spike duplicate |
| MTBE | methyl-tert butyl ether |
| NAD | North American Datum |
| NAVD | North American Vertical Datum |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| PCE | tetrachloroethylene |
| PID | photoionization detector |
| ppbv | parts per billion by volume |
| ppb | parts per billion |
| ppm | parts per million |
| PQL | practical quantitation level |
| PRT | post-run tubing |
| PVC | polyvinyl chloride |
| QA | quality assurance |
| QA/QC | quality assurance/quality control |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| RPD | relative percent difference |
| SDG | sample delivery group |
| TAGM | Technical Administrative Guidance Memorandum |
| TCE | trichloroethylene |

## List of Acronyms (Cont.)

| | |
|---|---|
| TIC | tentatively identified compound |
| USGS | U.S. Geological Survey |
| VOC | volatile organic compound |

# 1 Introduction

Pursuant to Work Assignment No. D003493-57 accepted on September 6, 2005, Ecology and Environment Engineering, P.C. (EEEPC) has prepared this site characterization report on behalf of the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), for site characterization services performed from January 9 through 11, 2006, at the former Loohns Cleaners (Site No. 8-51-024), formerly located at 126 - 130 West Morris Street in the Village of Bath, Steuben County, New York (see Figure 1-1).

The objectives of the site characterization were to:

- Evaluate existing subsurface conditions at and in the vicinity of the site for contamination attributable to past uses of the property that may have impacted municipal supply wells in the area;
- Identify interim remedial measures that may be needed to address specific issues recognized at and in the vicinity of the site; and
- Generate a site characterization report.

To accomplish the objectives, the investigation described herein has been designed in accordance with DER's December 2002 draft guidance document "DER-10 Technical Guidance for Site Investigation and Remediation" (New York State Department of Environmental Conservation 2000).

\\BUFSDL4\GIS\Buffalo\Steuben_County_RIFS\Maps\MXD\Site_Locations\Site_Location_Maps\Fig 1-1 Loohan Site.mxd 9/14/2005


**Figure 1-1 Site Location Map**
**Bath, New York**

0 250 500 1,000
Feet

# 2 Background Information

## 2.1 Site Description and History

The former Loohns Cleaners was located at 126 - 130 West Morris Street in the Village of Bath, New York, and is currently occupied by a retail/gift store. The site is located within a densely populated residential neighborhood to the south-west of the downtown area, approximately 1,200 feet northwest of the Village of Bath public supply well number 4. Since 1993 the New York State Department of Heath (NYSDOH) has required quarterly sampling of public supply well no. 4 due to the continued detection of low levels of trichloroethylene (TCE) in the ground-water.

A review of available historical Sanborn® Fire Insurance maps (Sanborn Maps) obtained for the site indicate that the property was used for private residences prior to 1949, at which time an auto sales and service shop was in operation. A database search of available city directories indicated that Myers Automotive was in operation from 1966 through at least 1974, and Loohns Cleaners & Laundry and Kirkum's Automotive Machine were in operation on-site from 1987 to at least 1990. The exact dates of operation of the dry cleaners are unknown.

## 2.2 Conceptual Site Model

The Village of Bath currently obtains groundwater from municipal wellfields for use in the public water system. Recent quarterly sampling of the Village of Bath municipal well no. 4 has indicated that low levels of TCE are present in the groundwater.

Based on collected data, contaminants originating from the site could have been dispersed into the groundwater and ultimately could have reached the impacted municipal well.

## 2.3 Subsurface Conditions

The Village of Bath is situated above valley-fill aquifers cut by pre-glacial streams, which were subsequently eroded deeper and wider by glaciers. The aqui-fer typically consists of 20 to 40 feet of highly permeable, stratified, well- sorted, saturated outwash sand and gravel of glaciofluvial origin and subordinate amounts of alluvium. The aquifers are underlain by glaciolacustrine units of fine sand and

silt that is typically more than 150 feet thick and are of low permeability. Groundwater in the aquifers was first encountered at between 14 and 16 feet below ground surface (bgs) and is unconfined (USGS 1984a; 1984b). Bedrock beneath the village consists of Devonian shale and sandstone of the Canadaway group.

# 3 Site Characterization Activities

The tasks and requirements of this work assignment are specified in EEEPC's contract, number D003493, and Work Assignment No. D003493-57 (September 2, 2005). The following is a summary of the work assignment scope.

## 3.1 Work Plan Development

EEEPC reviewed site records and conducted a site visit with the NYSDEC project manager on September 21 and 22, 2005. After reviewing existing site documentation, EEEPC held discussions with NYSDEC regarding the work scope.

### 3.1.1 Background Research

EEEPC reviewed existing information made available by NYSDEC and reviewed available files at the Steuben County Clerk's and Tax Assessor's offices.

A database search was performed by Environmental Data Resources, Inc. (EDR) for the site in accordance with ASTM E 1527-00, "Standard Practice for Environmental Site Assessments." The database search included review of Sanborn Maps,historical topographic maps, city directories, and historic aerial photos. The information was presented in Appendix C of the work plan (Ecology and Environment Engineering, P.C. 2005). The data assisted in selection of site characterization sample locations.

### 3.1.2 Health and Safety Plan Preparation

A site-specific health and safety plan (HASP) pertaining to this investigation was prepared and was included in Appendix A of the work plan.

### 3.1.3 Quality Assurance Project Plan Preparation

EEEPC completed a master Quality Assurance Program Plan that was approved by NYSDEC under previous site characterization projects under this contract. EEEPC is currently updating the master Quality Assurance Program Plan and will submit it for review under separate cover. A project-specific Quality Assurance Project Plan (QAPP) was prepared and was included in Appendix B of the work plan.

### 3.1.4 Base Map Development

A site base map illustrating proposed sampling locations was created for the site using the geographic information system (GIS)-based aerial imagery available from the New York State GIS Clearinghouse. Property ownership data obtained from county/town records also were used. The site base map illustrating sample locations is included as Figure 3-1. In Section 4, groundwater flow direction contours are included on the base map and presented as Figure 4.1.

## 3.2 Field Investigation

The site characterization conducted for the former Loohns Dry Cleaner Site included subsurface soil, groundwater, and soil gas investigations. Subsurface soil, groundwater, and soil gas samples were collected using direct push technology (DPT). Groundwater samples also were collected from existing wells when available. In addition to the environmental sampling effort, three piezometers were installed at the site to assist in evaluating groundwater flow direction. Fieldwork was conducted by one field team consisting of a field team leader (FTL) and a health and safety officer/sampler. A summary of the samples collected onsite and a list of sample identifications is provided in Table 3-1.

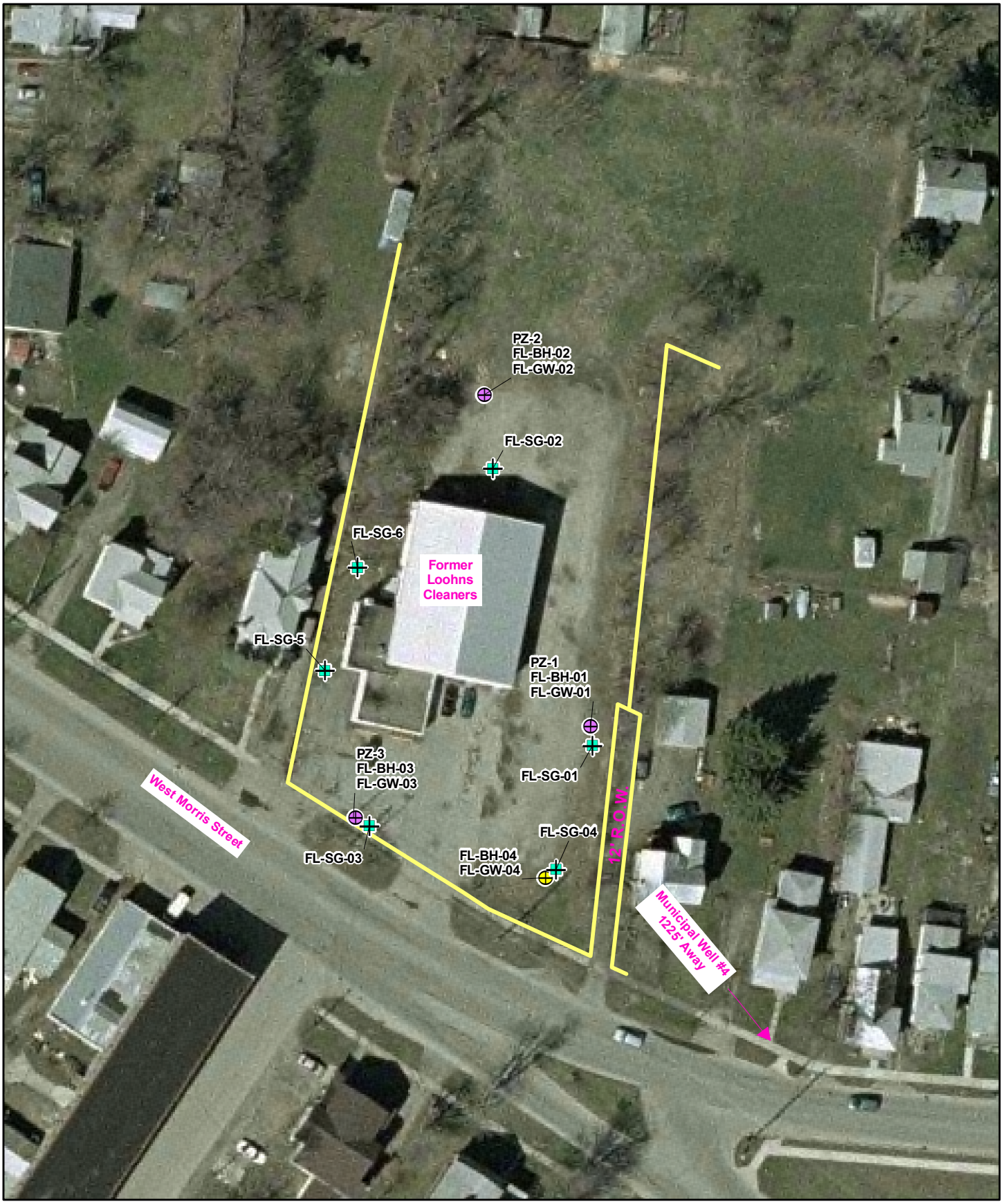
**Table 3-1 Summary of Samples Collected, Steuben County, New York**

| | | | Sample Count and Sample IDs | | |
|---|---|---|---|---|---|
| Site Name | Date Range Collected | | Soil Gas | Groundwater | Soil |
| **Former Loohns Cleaner** | 1/9/2006 | 1/11/2006 | 6 | 12 | 12 |
| | | | FL-SG-01 | FL-GW-01(20) | FL-BH-01(17-18) |
| | | | FL-SG-02 | FL-GW-01(29) | FL-BH-01(28-29) |
| | | | FL-SG-03 | FL-GW-01(39) | FL-BH-01(35-36) |
| | | | FL-SG-04 | FL-GW-02(16) (FD) | FL-BH-02(15-16.9) |
| | | | FL-SG-05 | FL-GW-02(29) | FL-BH-02(25-27) (FD) |
| | | | FL-SG-06 | FL-GW-02(39) | FL-BH-02(37-38) |
| | | | | FL-GW-03(19) | FL-BH-03(15-15.3) |
| | | | | FL-GW-03(29) | FL-BH-03(24-25) |
| | | | | FL-GW-03(39) | FL-BH-03(41-42) |
| | | | | FL-GW-04(20) | FL-BH-04(16-17) |
| | | | | FL-GW-04(29) | FL-BH-04(26-27) |
| | | | | FL-GW-04(39) | FL-BH-04(37-38) |

Key:

(##) = Sample depth collected.
(FD) = Field duplicate collected at this location.
- = No sample collected.

Laboratory analysis of environmental samples was conducted by Chemtech Environmental Laboratory (Chemtech). Chemtech is certified by the NYSDOH Environmental Laboratory Approval Program (ELAP) for the U.S. Environmental Protection Agency (EPA) solid and hazardous waste methods and meets NYSDEC Analytical Services Protocol (ASP) deliverable requirements. A table listing sample containers, preservatives, holding times, and analyte list was presented in the site-specific QAPP that was submitted in the work plan as Appendix B.




Soil Gas Sampling Location
Geoprobe Sampling Location
Geoprobe Sampling W/ Piezometer
Approximate Property Boundary

**Figure 3-1**
**Former Loohns Cleaner**
**Sample Locations**

N
W E
S

0 50 100 200
Feet

### 3.2.1 Literature Search

EEEPC personnel visited the Steuben County Historical Society Office in September 2005 to obtain historical aerial photographs and visited the tax assessor's office to obtain property line data. EEEPC also conducted a literature search to obtain surface water body class and flow data. Information from these efforts were used to refine the sample locations.

### 3.2.2 Subsurface Soil Characterization

The purpose of the subsurface soil sampling program was to determine if volatile organic compound (VOC) contamination related to past uses of the site is present and to assess the subsurface soil conditions beneath the site.

A total of 4 boreholes were drilled at the site (see Figure 3-1). A copy of the boring logs is provided as Appendix A to this report. Borings were installed via DPT using Geoprobe Model 66DT driving a 5-foot macro-core sampler with dedicated acetate sleeves. Continuous soil cores were collected at each location from ground surface to depths ranging from 25 to 40 feet bgs. Borings were completed to a depth of 40 feet bgs. Groundwater was generally encountered between 14 and 16 feet bgs.

EEEPC screened soil cores for organic vapors using a photoionization detector (PID) using a RAE Systems MiniRAE 2000 with a 10.6 eV lamp. EEEPC's field geologist recorded physical observations of soil cores and selected intervals for sampling and laboratory analysis based on either the observations (i.e., staining) or elevated PID readings above background. Subsurface soil samples were collected for analysis from zones exhibiting the highest PID reading. Elevated PID readings were only encountered at FL-BH02, -03 and -04. In the remaining boreholes with no elevated PID readings, subsurface soils were collected from the bottom, middle, and top of the saturated soil zone. Three subsurface soil samples were collected per Geoprobe location and sent to the laboratory for VOC analysis using method SW8260. VOC samples were collected using a 5-gram soil plug transferred into two pre-tared vials. An additional sample was collected into methanol for potential higher concentration analysis.

Upon completion, boreholes that were not being converted into piezometers (see Section 3.2.3.3) were backfilled with non-contaminated soil cuttings, based on PID readings, and/or a cement/bentonite grout. Borings drilled through asphalt were patched with "cold patch" or equivalent.

A minimal amount of investigation-derived waste (IDW) was generated due to the Geoprobe technique and was handled in accordance with the work plan or as directed by NYSDEC. (Tables 4-1a through 4-1c in Section 4 below provides a summary of the samples collected, including sample number, date, depth and positive analytical results screened against NYSDEC criteria.)

### 3.2.3 Groundwater Characterization

The purpose of the groundwater sampling program was to determine if VOC contamination present in the Village Bath municipal well may have originated from the site.

Up to three vertical profiling groundwater samples were collected from each Geoprobe boring location for VOC analysis using method SW8260 (see Figure 3-1).

#### 3.2.3.1 Vertical Profiling Groundwater Sample Collection

A Geoprobe SP15 groundwater sampler was driven into the subsurface at a depth close to the maximum depth of the corresponding borehole using Geoprobe Model 66DT. Vertical profile samples were collected at each borehole location. EEEPC collected up to three discrete groundwater samples using a check valve and dedicated tubing.

EEEPC encountered groundwater at depths ranging from 14 to 16 feet bgs at the locations. The SP15 GW sampler was driven close to the maximum depth of the corresponding borehole (see depths indicated in parentheses on Table 3-1) and the first groundwater sample was collected by EEEPC. The profiler was backed out into the middle of the water table and at least one volume of groundwater was purged through the sampler before the next groundwater sample was collected. The profiler was backed out to approximately 5 feet below the water table and at least one volume of groundwater was purged through the sampler before the last groundwater sample was collected. Groundwater sample depths were chosen based on the soil borehole screening results and sample collection depths. After groundwater sampling was completed, the borehole was backfilled with clean, chemically inert, non-carbonated, sorted silica sand to 2 feet bgs, followed by bentonite to just below grade. The borehole was then capped with an appropriate material to return the site to its original condition (i.e., asphalt, gravel, topsoil, etc.).

Groundwater samples were submitted for VOC analysis by EPA method SW8260B. Purged water was managed as described in the work plan.

#### 3.2.3.2 Piezometer Installation and Water Level Survey

Once subsurface soil sampling was completed, three boreholes at the site were converted into piezometers (see Figure 3-1). The purpose of the piezometers was to assess the groundwater flow direction in the vicinity of the site and to provide groundwater sampling locations for possible future use. The piezometers were installed by driving the Geoprobe casing down the borehole (to depths determined in the field) and installing the piezometer through the casing. Each piezometer was constructed using a 5-foot segment of 1-inch inner diameter (ID) polyvinyl chloride (PVC) screen having a 0.10-inch slot size, followed by 1-inch ID Schedule 40 PVC riser to approximately 0.1 to 0.3 feet below grade. The screen was set from approximately 10 feet to 15 feet below the water table. A threaded PVC cap was placed on the bottom of the screen. All PVC connections were flush-threaded. A sand pack of Morie #0 sand (or equivalent size) extended from the

bottom of the screen to a height of generally 10 to 15 feet above the screen. The sand pack generally was capped with a 2-foot to 5-foot-thick bentonite seal. After the bentonite seal was hydrated, bentonite grout was installed to approximately 1 foot below grade. Each piezometer was completed with a flush-mount steel protective casing set in concrete and a concrete anti-percolation pad.

### Water Level Survey

Subsequent to piezometer installation, but not within 24 hours of completion, static groundwater level measurements were collected from the piezometers onsite in accordance with procedures described in the work plan. A summary of piezometer construction and groundwater elevation data is presented in Table 3-2.

## 3.2.4 Soil Gas Sampling

The purpose of the soil gas sampling program was to determine if VOC contamination is present in the unsaturated zone above the water table, which could potentially affect the public.

Six soil gas samples (see Table 3-1) were collected (at the locations shown on Figure 3-1) with a Geoprobe rig using the post-run tubing (PRT) system. The PRT system consisted of using a Geoprobe to drive a clean drive-point adaptor and new expendable point approximately 8 feet bgs (or 2 feet above the water table, whichever was shallower) and pulling the rods back 6 inches to create a void, allowing soil gas to migrate into the bottom of the drive-point adaptor. A clean, dedicated, and unused piece of 0.25-inch ID food-grade polyethylene tubing was attached to the stainless-steel adaptor. The tubing was inserted into the probe rod and extended to the bottom of the rod. Using a counter-clockwise circular motion, the tubing was threaded to the drive-point adaptor and tightened to compress the "O-ring" seal. To ensure the integrity of the connections, a vacuum check was performed on the system prior to purging and collecting a sample. After connecting the tubing to the down-hole drive-point adaptor, the line was purged by drawing a measured volume (at least one tubing volume) of soil gas/vapor through the tubing using the vacuum system mounted on the Geoprobe unit. A tubing pinch valve was used to seal the end of the tube while the connection to the sample canister was made.

Sample canisters were cleaned at the laboratory and shipped under vacuum to the site. Sample canisters were checked prior to sampling to verify the vacuum. Sample canisters were fitted with controllers set to draw air in over a 1-hour period. Once the canisters were placed in the appropriate locations, the canister valve was opened and then closed after the 1-hour time period. An identification tag attached to the canister was completed with the sampling information and location, a chain-of-custody (COC) form was completed, and the canisters were transported back to Chemtech for analysis.

Upon completion of sampling, the Geoprobe rods were removed from the ground and the hole was backfilled with bentonite chips to just below grade. The hole was topped off with asphalt/topsoil, as appropriate.

**Table 3-2 Summary of Piezometer Construction and Groundwater Elevation Data, Steuben County, New York**

| Piezometer Identification | Screened Interval (ft bgs) | Ground Elevation (ft above MSL) | Depth to Top of Screen (ft bgs) | Top of Screen Elevation (ft above MSL) | Top of Riser Elevation (ft above MSL) | Depth to Groundwater (ft below top of riser) | Groundwater Elevation (ft above MSL) |
|---|---|---|---|---|---|---|---|
| **Former Loohns Cleaners** | | | | | | | |
| FL-PZ-1 | 24.5 - 29.5 | 1104.42 | 24.5 | 1079.92 | 1104.24 | 16.14 | 1088.10 |
| FL-PZ-2 | 24.6 - 29.6 | 1103.94 | 24.6 | 1079.34 | 1103.82 | 15.61 | 1088.21 |
| FL-PZ-3 | 25.1 - 30.1 | 1103.46 | 25.1 | 1078.36 | 1103.29 | 15.15 | 1088.14 |

Key:

bgs = below ground surface.
ft = feet.
MSL = Mean sea level.
NA = Not available.

### 3.2.5 Site Survey

Popli Consulting Engineers of Penfield, New York, conducted a site survey that included:

- Horizontal locations and vertical elevations of Geoprobe soil borings;
- Horizontal locations and vertical elevations of new piezometers, including the ground elevation and the elevation of the inner PVC riser of each piezometer;
- Horizontal locations of soil gas sampling locations; and
- Establishment of the horizontal location of key site features.

Vertical control was established to the nearest ±0.1 foot for ground surface elevations. Piezometer inner casing elevations were reported to the nearest 0.01 foot. Elevations were determined relative to a North American Vertical Datum of 1988 (NAVD 88). Coordinates were given in the State Plane East Zone (feet), North American Datum (NAD) 1983 to an accuracy of ±0.5 foot. The survey data was used to update the site base map which is presented as Figure 3-1.

### 3.2.6 Air Monitoring

The site safety officer performed air monitoring during all intrusive site activities (subsurface soil borings, groundwater vertical profiling, and soil gas sampling) to characterize airborne contaminant concentrations, including organic vapors and explosive gases. Air monitoring was conducted for the protection of site workers and the community and to characterize environmental samples. The HASP was presented in Appendix A of the work plan and specified the monitoring equipment that was used for contaminants of interest and the frequency with which the monitoring was to be performed.

## 3.3 Quality Assurance/Quality Control

The quality assurance/quality control (QA/QC) procedures utilized for the project are described in the QAPP, presented as Appendix B to the work plan. These procedures were implemented for all activities in the project. This section presents the outcome of the QA/QC program and provides an opportunity to review the completeness and quality of the data collected. Any data usability concerns are summarized below and are incorporated in the data assessment summarized in Section 4. Laboratory data reports and the details of the data review are provided as pdf. files on a CD in Appendix C.

### 3.3.1 Field QC Samples

Field QC samples provide a means to check ways that sample quality can be compromised in the field or through shipping and to also document overall sampling precision. The following sections describe field QC samples collected during the

site characterization and any potential concerns regarding sample collection and handling procedures on data usability.

### Trip Blanks

Trip blanks check for the possible introduction of VOCs from the time the samples are collected to the time they are analyzed. Trip blanks were supplied by the laboratory. They were prepared by filling 40-milliliter (mL) glass vials with organic-free deionized water. They were handled like field samples; however, they were not opened once prepared. A total of three trip blanks were submitted for analysis during this site characterization. One trip blank sample accompanied each shipment containing aqueous samples to be analyzed for VOCs. No volatile compounds were detected in the trip blanks from the former Loohns Dry Cleaners site. However acetone, a common laboratory contaminant, was detected in several laboratory method blanks. The results do not indicate any concerns with sample handling or transport procedures.

Trip blanks consisting of a closed, sealed summa canister were also provided by the laboratory and accompanied each shipment containing soil gas samples to be analyzed for VOCs. One trip blank was submitted from the site. Methylene chloride 1,1,1-trichloroethane, tetrachloroethene, and toluene were detected in FL-SG-TB-01. 1,1,1-trichloroethane was detected in associated laboratory method blanks. The outlier report lists specific sample results qualified based on the associated trip blank values. Since the blank canisters were not opened once they had been prepared until they were opened at the laboratory for analysis, the level of contaminants detected indicates that a review of the canister cleaning procedure is recommended. Trip blanks are reported with the groundwater and soil gas samples on the summary tables in Section 4 and in Appendix C.

### Duplicate Samples

Consistency in both sample collection and sample analysis is checked through analysis of duplicate samples. Duplicate samples consist of aliquots of sample media placed in separate sample containers and labeled as separate samples. Duplicate samples were collected at a rate of approximately 1 per 20 field samples. Table 3-1 lists the original samples that were duplicated. Duplicate sample analytical data are presented in Table 4 of the Data Usability Summary Report (DUSR) in Appendix C and are included on the summary tables in Section 4.

In general, the field duplicate results indicated good precision. Volatile compounds detected at trace levels demonstrated higher variability. The results do not indicate any concerns with the sampling or sample handling procedures.

### Rinseate Samples

Rinseate samples were not collected because all samples were collected using dedicated disposable sampling equipment.

### 3.3.2 Laboratory QC Samples

Data quality was evaluated based on sample integrity, holding times, method blank results, spike recoveries, surrogate recoveries, and duplicate precision. A complete sample listing for the samples analyzed is provided in the associated DUSR (see Appendix C). The DUSR includes attached outlier reports from the automated data validation. The outlier reports list specific analytes outside control limits and associated samples. Many results were reported below reporting limits and flagged "J" as estimated by the laboratory. The results below the reporting limit also are listed as an attachment to the DUSR.

The following sections describe laboratory QC samples reported with the sample data and any potential concerns with sample analysis procedures on data usability.

#### Holding Times

Holding times are established and monitored to ensure that analytical results accurately represent analyte concentrations in a sample at the time of collection. Exceeding the holding time for a sample generally results in a loss of the analyte due to a variety of mechanisms, e.g., deposition on the sample container walls or precipitation. Holding times were established in the QAPP based on NYSDEC's ASP requirements. All samples were analyzed within these project-specified holding times except for those listed on Table 3-3. Most VOCs for soil gas analysis can be recovered from canisters near their original concentrations after storage of up to 30 days, as allowed by the method. If the method holding times are applied there are no air sample violations and therefore they are not listed below. Results for the affected samples are qualified "UJ" or "J."

**Table 3-3 Summary of Samples Exceeding Hold Time**

| Client Sample ID | Matrix | Method | Sample Date | Analysis Date | Analysis Type |
|---|---|---|---|---|---|
| FL-GW-02(16) | AQ | 8260B | 01/10/2006 15:40 | 01/20/2006 6:59 | RES |
| FL-GW-02(29) | AQ | 8260B | 01/10/2006 15:20 | 01/20/2006 6:18 | RES |
| FL-GW-02(39) | AQ | 8260B | 01/10/2006 15:07 | 01/19/2006 21:43 | RES |
| FL-GW-02D(16) | AQ | 8260B | 01/10/2006 15:40 | 01/20/2006 7:40 | RES |
| FL-GW-03(19) | AQ | 8260B | 01/11/2006 11:56 | 01/20/2006 17:07 | RES |
| FL-GW-03(19)MS | AQ | 8260B | 01/11/2006 11:56 | 01/19/2006 23:04 | RES |
| FL-GW-03(19)MSD | AQ | 8260B | 01/11/2006 11:56 | 01/19/2006 23:45 | RES |
| FL-GW-03(29) | AQ | 8260B | 01/11/2006 11:45 | 01/20/2006 9:02 | RES |
| FL-GW-03(39) | AQ | 8260B | 01/11/2006 11:36 | 01/20/2006 8:21 | RES |
| FL-TB-02 | AQ | 8260B | 01/10/2006 15:05 | 01/19/2006 15:34 | RES |

#### Method Blanks

Laboratory blank samples are analyzed and evaluated to determine the existence and magnitude of possible contamination during the sampling and analysis process. Analyte concentrations in the blanks are generally below the practical quantitation level (PQL). If the analyte is present in the sample at similar trace levels, then the analyte is likely a common background contaminant from some phase of the sampling, extraction, or analytical procedure, and associated low-level sample

concentrations are not considered to be site-related. If the analyte concentration is above the PQL, then there is a potential contamination problem and sample results may be biased high or the data unusable. The analytes found in the method blanks and associated qualified results are reported as an outlier in the attachments to the DUSR (if applicable).

All blanks were performed at the required frequency. 1,1,1-trichloroethene was detected in the soil gas method blanks. Methylene chloride and acetone were detected in the aqueous method blanks. Methylene chloride, acetone, 2-butanone, cyclohexane, xylenes, and methylcyclohexane were detected in soil method blanks. The associated sample results were qualified "U" as non-detect at the PQL or with elevated reporting limits. The results do not have a significant impact on data usability as most of the qualified sample data were below the PQL. The only results with significantly elevated reporting limits were 1,1,1-trichloroethane in the soil gas samples.

### Surrogate Spikes

Laboratory performance for individual samples analyzed for organic compounds is established by the use of surrogate spikes in which samples are spiked with surrogate compounds prior to preparation and analysis. Unusually low or high surrogate recovery values may indicate some deficiency in the analytical system or that some matrix effects exist, resulting in low or high sample results for target compounds. The surrogate results outside quality control (QC) limits are presented as an outlier reported in the attachments to the DUSR (if applicable).

Many samples for volatile organics had surrogate recoveries outside of control limits. The majority of the recoveries were high. All affected samples were reanalyzed and matrix effects substantiated. Results have been flagged to reflect any bias as determined by surrogate recoveries (see the DUSR in Appendix C).

### Matrix Spike and Matrix Spike Duplicate Analysis

MS/MSD analyses are intended to provide information about the effects that the sample matrix exerts on the digestion/extraction and measurement methodology. MS recovery values that do not meet laboratory QC criteria may indicate that sample analyte results are being attenuated in the analysis procedure. The potential sample bias may be estimated by noting the degree to which the MS concentration was elevated or lowered in the spike analysis. However, this bias should serve only as an approximation; sample-specific problems may be the cause of the discrepancy, particularly in soil samples. Recoveries of a post-digestion spike or a laboratory control sample (LCS) are used to verify that the analytical methodology is acceptable and that MS recoveries are due to matrix effects. An MSD analysis is performed to evaluate the precision of the sample results. Precision is measured as the relative percent difference (RPD) between analytical results for duplicate samples. The laboratory's failure to produce similar results for MSD samples may indicate that the samples were non-homogeneous (particularly in soil samples), or that method defects may exist in the laboratory's techniques. The MS

results outside QC limits are reported as an outlier in the attachments to the DUSR (if applicable).

The MS/MSD sample analyses were performed at the required frequency. The MS/MSD recoveries and RPD values indicate potential matrix problems for the VOC analyses. The associated parent sample results are qualified "J" as estimated or "UJ" as an estimated reporting limit. The MS/MSD recoveries do not indicate any analytical issues and the impacts from matrix effects do not appear to significantly affect data usability.

### Laboratory Control Sample Analysis

The LCS is analyzed to monitor the efficiency of the digestion/extraction procedure and analytical instrument operation. The ability of the laboratory to successfully analyze an LCS demonstrates that there are no analytical problems related to the digestion/sample preparation procedures and/or instrument operations. The LCS results outside QC limits are presented as an outlier in the attachments to the DUSR (if applicable). Sporadic and marginal QC failures for multiple component methods do not indicate an analytical concern. If recoveries are high and the compounds are not detected in the samples, then no data qualification is required. All recoveries should be above 10% or the non-detect results flagged "UR," as rejected.

All LCS analyses were performed at the required frequency. Numerous LCS recoveries were high but no data qualification was required as the compounds were not detected in the associated samples. Other results are qualified "UJ," estimated non-detect, or "J," estimated with a positive or negative sign designating bias based on sporadic LCS failures.

### Other QC Analysis

The following deviations from QC specifications not addressed elsewhere were noted:

- **Initial Calibration.** In a number of cases, where the RPD for a chemical was found to have exceeded the specified limit of 30%, the associated sample results were qualified as estimated, either J for positive results or UJ for non-detectable results.

- **Continuing Calibration.** In a number of cases where the percent difference for a chemical was found to have exceeded the specified limit of 25%, the associated sample results were qualified as estimated, either J for positive results or UJ for non-detectable results.

- **Internal Standards.** In instances where internal standard response was outside control limits, matrix effects were substantiated by reanalysis or dilution. Positive VOC results and some non-detect results in the sample with internal standard responses outside of control limits were qualified estimated (J or UJ).

- **Dilution.** Results for analytes reported with the "E" flag during the initial analyses were derived from the dilution analyses. The E flags were converted to "J" flags to indicate the sample results are estimated.

### 3.3.3 Data Review

EEEPC performed data review and validation of Steuben Co. dry cleaner sites samples in accordance with the work plan and QAPP. The data review tasks completed for this project include:

- **Automated Data Review (ADR) Set-up.** EEEPC set up the ADR software for all analytical parameters and QC criteria according to the QAPP. EEEPC provided the libraries to the project laboratory, Chemtech, for pre-validation of their electronic data deliverable (EDD) submittals.

- **Completeness.** EEEPC performed a completeness check on all EDDs and compared the data with the hard copy deliverable to verify the data were reported consistently.

- **Compliance.** EEEPC processed EDDs using the ADR software to verify the data reported are compliant with the QAPP requirements. EEEPC performed an automated data validation of EDDs and generated reports of qualified data. EEEPC reviewed the ADR reports, checked the hard copy reports and case narratives, verified the automated qualifiers assigned by the program, reviewed calibration information, and developed a DUSR for each sample delivery group (SDG).

- **Reporting.** EEEPC assigned data qualifiers and flagged all reportable data. EEEPC generated summary tables of final qualified data and revised the data tables per NYSDEC comments for inclusion in this report. Complete data tables are provided in Appendix C.

- **Data Management.** EEEPC developed a project-specific database with all validated data stored in Microsoft Access format. Data in several electronic formats are provided in Appendix C.

The data review was limited to the target compounds listed in the QAPP. In addition, the laboratory reported non-target compounds as tentatively identified compound (TICs) unknowns. The TICs are listed with the laboratory data in Appendix C. The TICs generally confirm the presence of petroleum-related contamination.

The samples were grouped by the Chemtech laboratory into SDGs of 20 samples. The SDGs are listed in Table 3-4. A DUSR was generated for each SDG reported and is included in Appendix C.

**Table 3-4 Summary of Work Orders**

| Lab Report Batch | Lab Report Date | Lab ID | Data Review Co. |
|---|---|---|---|
| X1242 | 16-Mar-06 | CCGE | EEEPC |
| X1018 | 08-Feb-06 | CCGE | EEEPC |
| X1126 | 18-Apr-06 | CCGE | EEEPC |
| X1136 | 18-Mar-06 | CCGE | EEEPC |
| X1145 | 10-Feb-06 | CCGE | EEEPC |
| X1203 | 27-Feb-06 | CCGE | EEEPC |
| X1217 | 16-Mar-06 | CCGE | EEEPC |
| X1218 | 12-Mar-06 | CCGE | EEEPC |
| X1015 | 18-Mar-06 | CCGE | EEEPC |
| X1222 | 21-Feb-06 | CCGE | EEEPC |
| X1432 | 16-Mar-06 | CCGE | EEEPC |

Any deviations from acceptable QC specifications are discussed in the DUSRs (see Appendix C). Qualifiers were added to the data to indicate potential concerns with data usability. These qualifiers were transferred to the data presented on the summary tables in Section 4, below. For the site characterization data, the following qualifiers were added:

J - The qualifier indicates an estimated value because the associated QC data indicated a potential laboratory or matrix problem or interference. A "+" sign indicates a positive bias and a "-" indicates a negative bias. In addition, J flags assigned by the laboratory indicate the results are below the PQL but above the instrument detection limit (IDL) or method detection limit (MDL).

U - The result is considered non-detected. The laboratory assigned this flag to analytes not present at detectable concentrations (above the IDL or MDL). The data validator assigned this flag when an analyte was considered non-detect due to blank contamination. If the result is above the PQL, the PQL is considered elevated.

R - The result is rejected due to significant QC sample results outside control limits. The results are not usable for site characterization and represent a data gap.

### 3.3.4 Data Usability Summary Report Findings

The data review is documented in the DUSRs provided in Appendix C. The reports were completed as specified in NYSDEC's *Guidance for the Development of DUSRs* (July 1999). Overall, the data quality was acceptable and the laboratory analysis and reporting procedures representative of appropriate methodology for the samples collected. Table 3-5 summarizes the qualified data records for the samples report. Only one sample result was rejected for an overall completeness above 99%.

**Table 3-5 Summary of Sample Completeness**

| Sample Matrix | Lab Method ID | Unqualified | J | J- | J+ | U | UJ | R |
|---|---|---|---|---|---|---|---|---|
| AIR | TO-15 | 53 | 62 | 21 | | 347 | 353 | |
| AQ | 8260B | 69 | 139 | 6 | 39 | 3422 | 1176 | |
| SO | 8260B | 24 | 197 | 45 | 2 | 1681 | 2117 | 1 |

### Reporting Limits

Based on the QC criteria, all of the data are usable for site characterization. However, the comparison with screening criteria can be affected by elevated reporting limits. About 10 soils samples were analyzed at dilutions due to the level of target compounds. However, the laboratory analyzed several samples at the medium level using only the methanol extract. The samples have elevated reporting limits, which reduce the comparability of the results to other results from other samples and the screening criteria. The affected samples are listed below and the reporting limits need to be considered as part of the data assessment. In some cases the laboratory attempted to re-analyze the low-level sample, but the analysis was about two weeks past holding time and could not be used.

FL-BH-03(41-42)
FL-BH-04(26-27)
FL-BH-04(37-38)

Soil gas results were reported in µg/$m^3$ as required by the NYSDOH Soil Vapor Guidance (New York State Department of Health 2005). However, the laboratory performed all calibration and reporting in parts per million by volume (ppbv). In the final report, the laboratory calculated µg/$m^3$ and printed the results on a separate sheet. The laboratory performed this calculation on the final ppbv results that were already rounded and reported to the correct significant figures. The laboratory did not correct the µg/$m^3$ to the correct significant figures and should have performed the calculation on the raw data. The effect is to make the soil gas values appear to be more precise than the true value and also make the low concentration data appear to be similar to some reporting limits. EEEPC rounded the values reported in Table 4-1c in Section 4 below to two significant figures. The laboratory data reports in Appendix C remain as reported by the laboratory.

# 4 Site Contamination Assessment

## 4.1 Introduction

This section presents the results of site characterization field activities in order to develop an understanding of the nature and extent of contamination at the site. The information was used to assess whether the TCE detected at the Village of Bath municipal well no. 4 can be attributed to the former Loohns Cleaners. PCE and TCE are both indicative of dry cleaner sources and methyl-tert butyl ether (MTBE) indicates a potential gasoline source. It is likely that MTBE will be found with compounds typically associated with petroleum products such as benzene, toluene, ethylbenzene, and xylenes (BTEX). For comparison of potential sources, the total BTEX concentration was determined and presented on the data summary tables.

### Screening

Analytical results (see Tables 4-1a through 4-1c) were screened against the NYSDEC and NYSDOH standards and guidance values described below to determine if the contaminant of concern (i.e., TCE) was present at concentrations sufficient to cause the contamination detected in the municipal well. Groundwater analytical data were compared with the NYSDEC Class GA Ambient Water Quality Standards and Guidance Values (June 1998); and subsurface soils data were compared to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 Soil Cleanup Objectives (January 1994). Total BTEX results were compared with an average of the screening criteria. In addition, soil gas sample results were evaluated in accordance with NYSDOH's guidelines for volatile chemicals in air presented in *Draft Guidance for Evaluating Soil Vapor Intrusion* (New York State Department of Health 2005).

The analytical results obtained from the site are summarized in the following sections.

**Table 4-1a Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners Subsurface Soils**

| Analyte | Screening Criteria[1] | FL-BH-01 (17-18) 01/09/2006 | FL-BH-01 (28-29) 01/09/2006 | FL-BH-01 (35-36) 01/09/2006 | FL-BH-02 (15-16.9) 01/10/2006 | FL-BH-02 (25-27) 01/10/2006 | FL-BH-02-D (25-27) 01/10/2006 | FL-BH-02 (37-38) 01/10/2006 |
|---|---|---|---|---|---|---|---|---|
| **Volatiles - SW8260B (ug/Kg)** | | | | | | | | |
| 2-Butanone | 300 | 8.4 U | 15 U | 14 UJ | 14 UJ | 16 U | 15 UJ | 16 UJ |
| Benzene | 60 | **0.49 J** | 3.1 U | **1.5 J** | 2.7 UJ | 3.1 U | **0.55 J** | 3.2 UJ |
| Carbon disulfide | 2700 | 1.7 U | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| Cyclohexane | NA | 1.7 U | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| Methyl Acetate | NA | 1.7 U | 3.1 U | 2.7 UJ | **130 J** | 3.1 U | 3.0 UJ | 3.2 UJ |
| Methylcyclohexane | NA | 1.7 U | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| Methylene Chloride | 100 | 1.7 U | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| o-Xylene | 1200 | **0.20 J** | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| Styrene | NA | 1.7 U | 3.1 U | 2.7 UJ | 2.7 UJ | 3.1 U | 3.0 UJ | 3.2 UJ |
| Toluene | 1500 | **0.97 J** | **0.32 J** | **2.5 J** | 2.7 UJ | **0.47 J** | **0.75 J** | 3.2 UJ |
| **Total BTEX (ug/Kg)** | | | | | | | | |
| BTEX | 2000 [2] | **2.4** | **0.3** | **4.6** | ND | **0.5** | **1.3** | ND |

**Table 4-1a Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners Subsurface Soils**

| Analyte | Screening Criteria[1] | FL-BH-03 (15-15.3) 01/11/2006 | FL-BH-03 (24-25) 01/11/2006 | FL-BH-03 (41-42) 01/11/2006 | FL-BH-04 (16-17) 01/11/2006 | FL-BH-04 (26-27) 01/11/2006 | FL-BH-04 (37-38) 01/11/2006 |
|---|---|---|---|---|---|---|---|
| **Volatiles - SW8260B (ug/Kg)** | | | | | | | |
| 2-Butanone | 300 | **3800 J** | **2600 J** | 16000 UJ | 1800 U | 1500 UJ | 1600 UJ |
| Benzene | 60 | **430 J** | **310 J** | 3200 UJ | 350 U | 310 UJ | 310 UJ |
| Carbon disulfide | 2700 | 2700 UJ | 2900 U | 3200 UJ | 350 U | 310 UJ | **240 J** |
| Cyclohexane | NA | 2700 UJ | 2900 U | 3200 UJ | **420** | **170 J** | **180 J** |
| Methyl Acetate | NA | 2700 UJ | 2900 U | 3200 UJ | 350 U | 310 UJ | 310 UJ |
| Methylcyclohexane | NA | **16000 J-** | **1000 J** | **570 J** | 350 U | 310 UJ | **55 J** |
| Methylene Chloride | 100 | 3600 UJ | 4100 U | **5300 J-(3)** | 350 UJ | 310 UJ | 310 UJ |
| o-Xylene | 1200 | **640 J** | 2900 U | 3200 UJ | 350 U | 310 UJ | 310 UJ |
| Styrene | NA | 2700 UJ | 2900 U | **330 J** | 350 U | 310 UJ | 310 UJ |
| Toluene | 1500 | **1300 J** | **620 J** | 3200 UJ | **58 J** | 310 UJ | **35 J** |
| **Total BTEX (ug/Kg)** | | | | | | | |
| BTEX | 2000 [2] | **2400** | **930** | ND | **150** | ND | **35** |

**Table 4-1b Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners Groundwater**

| Analyte | Screening Criteria[1] | FL-GW-01(20) 01/10/2006 | FL-GW-01(29) 01/10/2006 | FL-GW-01(39) 01/10/2006 | FL-GW-02(16) 01/10/2006 | FL-GW-02(29) 01/10/2006 | FL-GW-02(39) 01/10/2006 | FL-GW-02D(16) 01/10/2006 | FL-GW-03(19) 01/11/2006 |
|---|---|---|---|---|---|---|---|---|---|
| **Volatiles - SW8260B (ug/L)** | | | | | | | | | |
| 2-Butanone | 50 | 5.0 U | 5.0 U | 5.0 U | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ | 5.0 UJ |
| Benzene | 1 | 1.0 U | 1.0 U | **0.33 J** | 1.0 UJ | 1.0 UJ | **0.52 J** | 1.0 UJ | 1.0 UJ |
| Chloromethane | 5 | 1.0 U | 1.0 U | **0.63 J** | 1.0 UJ | 1.0 UJ | **1.2 J-** | 1.0 UJ | 1.0 UJ |
| Cyclohexane | NA | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ | **0.34 J** | 1.0 UJ | 1.0 UJ |
| Methylcyclohexane | NA | **0.44 J** | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ |
| Tetrachloroethene | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ | 1.0 UJ | **0.41 J** | 1.0 UJ |
| Toluene | 5 | **0.45 J** | **0.64 J** | **0.92 J** | **0.54 J** | **0.46 J** | **1.4 J-** | **0.41 J** | 1.0 UJ |
| Trichloroethene | 5 | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ | 1.0 UJ |
| **Total BTEX (ug/L)** | | | | | | | | | |
| BTEX | 4[2] | **0.4** | **1** | **1.9** | **0.9** | **0.8** | **2.9** | **0.7** | ND |

**Table 4-1b Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners Groundwater**

| Analyte | Screening Criteria[1] | FL-GW-03(29) 01/11/2006 | FL-GW-03(39) 01/11/2006 | FL-GW-04(20) 01/12/2006 | FL-GW-04(29) 01/12/2006 | FL-GW-04(39) 01/12/2006 | FL-TB-1 01/10/2006 | FL-TB-02 01/10/2006 | FL-TB-03 01/12/2006 |
|---|---|---|---|---|---|---|---|---|---|
| **Volatiles - SW8260B (ug/L)** | | | | | | | | | |
| 2-Butanone | 50 | 5.0 UJ | **3.7 J** | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 UJ | 5.0 UJ |
| Benzene | 1 | 1.0 UJ | **0.44 J** | 1.0 U | **0.35 J** | **0.51 J** | 1.0 U | 1.0 UJ | 1.0 UJ |
| Chloromethane | 5 | 1.0 UJ | **1.3 J-** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ |
| Cyclohexane | NA | 1.0 UJ | 1.0 UJ | 1.0 U | 1.0 U | **0.36 J** | 1.0 UJ | 1.0 UJ | 1.0 UJ |
| Methylcyclohexane | NA | 1.0 UJ | **0.52 J** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ |
| Tetrachloroethene | 5 | 1.0 UJ | 1.0 UJ | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ |
| Toluene | 5 | 1.0 UJ | **0.68 J** | 1.0 U | **0.55 J** | **1.0** | 1.0 U | 1.0 UJ | 1.0 UJ |
| Trichloroethene | 5 | **0.95 J** | 1.0 UJ | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 UJ | 1.0 UJ |
| **Total BTEX (ug/L)** | | | | | | | | | |
| BTEX | 4[2] | ND | **1.5** | ND | **0.9** | **2.3** | ND | ND | ND |

**Table 4-1c Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners Soil Gas**

| Analyte | FL-SG-01 01/09/2006 | FL-SG-02 01/09/2006 | FL-SG-03 01/09/2006 | FL-SG-04 01/10/2006 | FL-SG-05 01/09/2006 | FL-SG-06 01/10/2006 | FL-SG-TB-01 01/10/2006 |
|---|---|---|---|---|---|---|---|
| **Volatiles - TO-15 (ug/m3)*** | | | | | | | |
| 1,1,1-Trichloroethane | 2.7 U | 2.7 U | **17** | **16** | 6.5 U | 0.54 U | 1.6 U |
| Benzene | **45** | **17** | **230** | **380** | **19** | **3.8** | 0.32 U |
| Dichlorodifluoromethane | 2.5 U | 2.5 U | 9.9 U | 9.9 U | 4.9 U | **2.0** | 0.50 U |
| Ethyl Benzene | **12** | **4.8** | **34** | **91** | **5.2** | **0.87 J** | 0.43 U |
| m/p-Xylenes | **78** | **26** | **250** | **610** | **25** | **3.5 J** | 0.87 U |
| Methylene Chloride | 3.5 U | 3.5 U | 14 U | 14 U | 7.0 U | 0.70 U | **8.0** |
| o-Xylene | **24** | **8.2** | **78** | **170** | **8.7** | **1.3 J** | 0.43 U |
| Tetrachloroethene | **4.1** | **580** | 14 U | 14 U | 6.8 U | **26** | **1.4** |
| Toluene | **130** | **45** | **560** | **1100** | **45** | **7.9** | **1.5** |
| Trichloroethene | 2.7 U | 2.7 U | 11 U | 11 U | 5.4 U | **1.6** | 0.54 U |
| **Total BTEX ($ug/m^3$)** | | | | | | | |
| BTEX | **290** | **100** | **1200** | **2400** | **110** | **17** | ND |

# Table 4-1 Key Summary of Positive Results for Steuben County, New York, Former Loohns Cleaners

**Comprehensive Table Key:**

(1a) Soils - NYSDEC, Technical and Administrative Guidance and Memorandum, # 4046, Revised Jan. 24, 1994 Determination of Soil Cleanup Objectives and Cleanup Levels.

(1b) Groundwater - NYSDEC, Technical and Operational Guidance #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998 Table 1, Class GA, Source of Drinking Water.

(2) Total BTEX uses the average screening criteria.

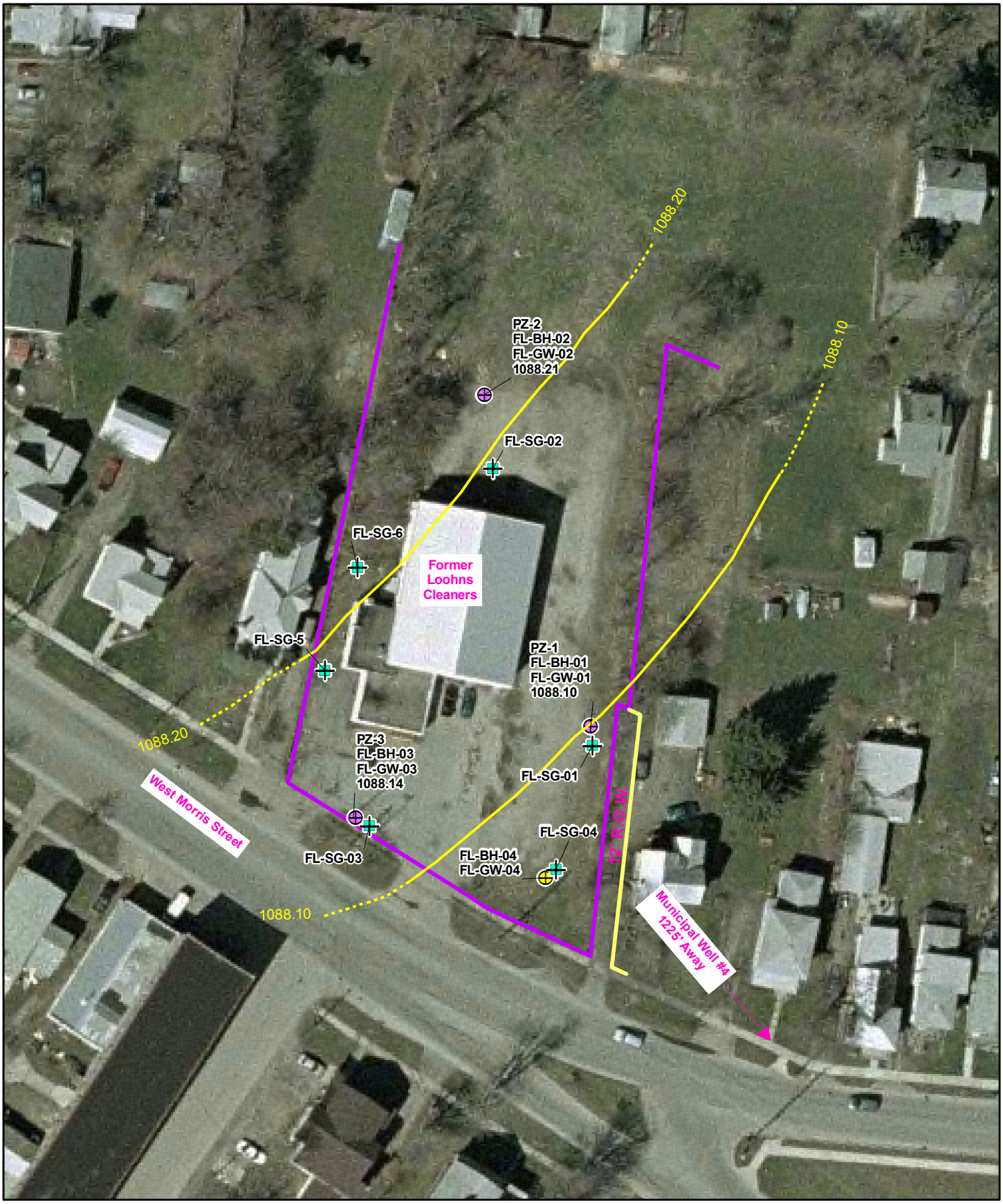
(3) Methylene chloride was attributable to laboratory in the result reported from re-analysis that was well past holding time.

(*) Soil gas results were rounded and reported to two signfiicant figures. The raw laboraotry data in Appendix C was incorrectly reported.

Note: Sample collection Dates are listed under the Sample Identifications

J = Estimated.
J- = Estimated low.
J+ = Estimated high.
U = Not detected at the value reported.
NA = Not applicable.
ND = Not detected at the value reported.
ug/Kg = microgram per kilogram.
ug/L = microgram per liter.
ug/$m^3$ = microgram per cubic meter.
UJ = Estimated/Not detected.
**Bold** = analyte detected.
**Bold/Highlighted** = result exceedes criteria.
BTEX = Benzene, Toluene, Ethylbenzene, and Xylene.
NYSDEC = New York State Department of Environmental Conservation.

BH = Borehole.
GW = Groundwater.
SG = Soil Gas.
TB = Trip Blank.
(?) = Indicates Collection Depth.




Soil Gas Sampling Location
Geoprobe Sampling Location
Geoprobe Sampling w/ Piezometer
Approximate Property Boundary
Groundwater Elevation Contour
(Dashed when inferred)

**Figure 4-1**
**Former Loohns Cleaners**
**Sample Locations and Groundwater Contours**

0 50 100 200
Feet

N
W E
S

## 4.2 Former Loohns Cleaners

### 4.2.1 Subsurface Soil

Four borings, FL-BH-01 through FL-BH-04, were installed on the former Loohns Cleaners site (see Figure 4-1). Subsurface soil samples collected from each boring did not contain detectable concentrations of TCE, the contaminant detected in the Village of Bath municipal supply well no.4. However, compounds typically associated with petroleum products (i.e., BTEX) were detected in soil samples (see Table 4-1a).

Soil collected from FL-BH-03 contained the greatest concentrations of contaminants detected on-site. Boring FL-BH-03 is south of the former Loohns Cleaners building, along West Morris Street. Total BTEX concentrations detected in soil collected from FL-BH-03 ranged from 2,400 ppb (15 ft to 15.3 ft bgs) to 930 ppb (24 ft to 25 ft bgs). The benzene concentration detected in soil collected from FL-BH-03 (15 to 15.3 ft bgs) and FL-BH-03 (24 to 25 ft bgs) was 430 ppb and 310 ppb, respectively, exceeding the NYSDEC screening criteria of 60 ppb.

Additionally, soil collected from boring FL-BH-03 contained 2-butanone (methyl ethyl ketone [MEK]) and methylene chloride at concentrations exceeding NYSDEC screening criteria. MEK was detected at 3,800 ppb in soil collected from 15 ft to 15.3 ft bgs and at 2,600 ppb in soil collected from 24 ft to 25 ft bgs. The NYSDEC screening criteria for MEK is 300 ppb.

Methylene chloride was detected at 5,300 ppb in soil collected from FL-BH-03 at 41 ft to 42 ft bgs, which exceeded the NYSDEC screening criteria of 100 ppb for methylene chloride. However, methylene chloride is a common laboratory contaminant that was found in many of the laboratory method blanks. The sample was re-analyzed well past holding times and the methylene chloride was present but flagged “U” as non-detected at 2,300 ppb.

Methylcyclohexane and cyclohexane were detected in soil collected from FL-BH-03 and FL-BH-04. NYSDEC does not provide screening criteria these compounds, but they also were detected at trace levels in the groundwater.

### 4.2.2 Groundwater

Groundwater samples were collected from each boring on the former Loohns Cleaners site using an SP15 GW sampler (see Section 3.2.3.1). Groundwater collected from the site did not contain concentrations of TCE greater than 1 ppb and contained only trace concentrations (i.e., < 0.50 ppb) of PCE (see Table 4-1b).

Groundwater levels were measured in the three installed piezometers and existing well MW-1, as noted on Figure 4-1. Groundwater flow at the site is toward the southeast at a horizontal gradient of 0.0008 feet per foot. Regional groundwater flow is probably toward the Cohocton River, which is toward the south. The low magnitude of the groundwater gradient indicates that localized variation in groundwater flow direction would be easily affected. Factors that could influence

the localized direction of groundwater flow include buildings, building foundations, and pavement. These man-made structures could have a large impact on local infiltration rates and flow directions.

### 4.4.3 Soil Gas

Soil gas samples were collected from six locations on the former Loohns Cleaners site using the PRT system described in Section 3.2.4 (see Figure 4-1).

Soil gas samples contained compounds indicative of the dry cleaning industry (i.e., chlorinated solvents) and compounds associated with petroleum products (i.e., BTEX).

PCE was detected in soil gas collected from locations FL-SG-01, FL-SG-02, and FL-SG-06 at concentrations of 4.1 µg/$m^3$, 580 µg/$m^3$, and 26 µg/$m^3$, respectively. The NYSDOH screening guidance value for PCE is 100 µg/$m^3$. TCE was detected in soil gas collected from FL-SG-06 at 1.6 µg/$m^3$ which is less than the 5 µg/$m^3$ NYSDOH screening guidance value (see Table 4-1c). FL-SG-01, -02 and -06 surround the former Loohns Cleaners building to the southeast, north and west, respectively (see Figure 4-1).

Contaminants typically associated with gasoline (i.e., BTEX) were detected in soil gas collected from each soil gas sample location on-site. Total BTEX concentrations ranged from 17 µg/$m^3$ at FL-SG-06 (west of the former Loohns Cleaners building) to 2,400 µg/$m^3$ at FL-SG-04 (at the southeast corner of the former Loohns Cleaners property). Soil gas collected from FL-SG-03 contained a total BTEX concentration of 1,200 µg/$m^3$ (see Table 4-1c). FL-SG-03 is south of the former Loohns Cleaners building. NYSDOH does not provide screening guidance values for BTEX compounds in soil vapor.

# 5 Conclusions

## 5.1 General Conclusions

Groundwater, soil, and soil gas collected from the site contains compounds indicative of petroleum products, particularly gasoline (i.e., BTEX). The BTEX compounds were generally detected at greater concentrations than chlorinated compounds typically associated with the dry cleaning industry. Chlorinated solvent concentrations were generally detected at concentrations < 5 ppb, which are substantially below levels representative of a source area (i.e., 1 part per million [ppm]). In addition, data obtained from the site characterization has not conclusively attributed municipal well contamination to the site.

The following is a summary of conclusions derived from the site characterization:

- TCE, the contaminant detected in the Village of Bath municipal well no.4, was not detected in soil collected from the former Loohns Cleaner site but was detected in on-site groundwater. However, TCE was detected in groundwater collected from only one boring location and only in trace concentrations (< 1 ppb).

- Soil gas collected from the northern and eastern portions of the former Loohns Cleaner site contained PCE, a “parent compound” of TCE.

- A localized area of petroleum-related contamination exists in soil and soil gas collected from the southern portion of the site.

- Based on the lack of significant contamination detected in on-site media, it is unlikely that municipal well contamination originates from the site.

# 6 References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# A Boring Logs

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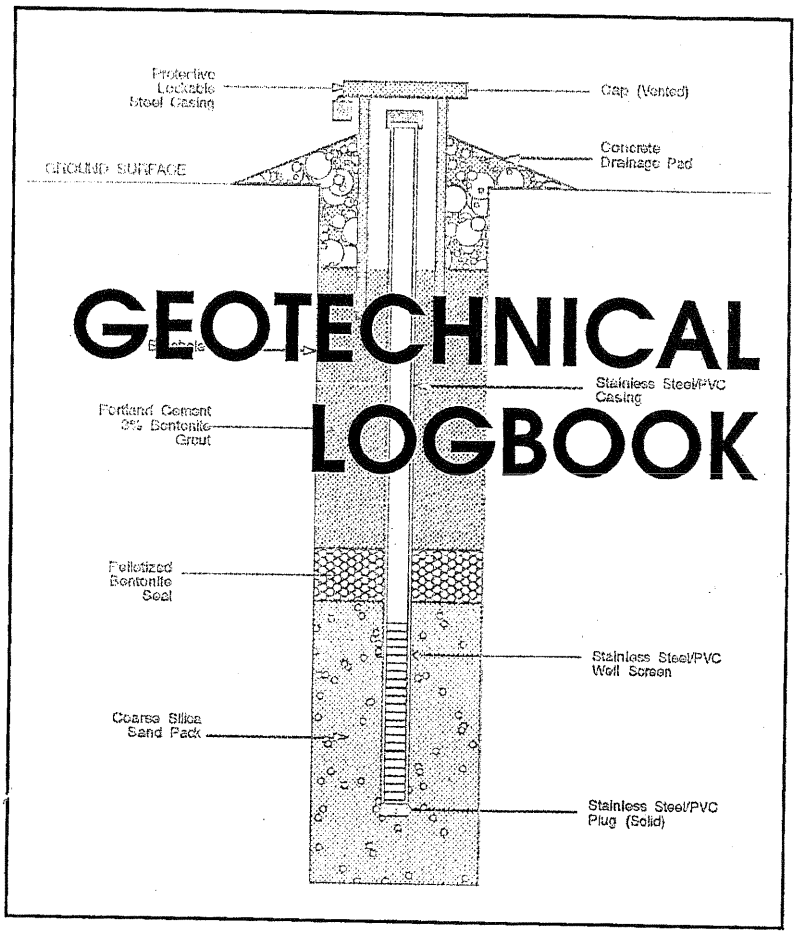



# GEOTECHNICAL LOGBOOK

PROJECT NUMBER: 000699.NV32.04

CLIENT/SITE NAME: NYSDEC / Former Loohns Cleaner

DRILLING COMPANY: Zebra

DATE OF FIELD ACTIVITIES: 1-9-06

HOLES LOGGED IN BOOK:

CLIENT: NYSDEC

JOB NUMBER: 000699.NV32.04

SITE NAME: Former Loohns Cleaner

DRILLER: Dom Pino, Zebra

LOCATION: CITY/TOWN: Bath

STATE: NY

PROJECT MANAGER: Bob Meyers

FIELD TEAM LEADERS: —

SITE SAFETY OFFICER(S): Jim Mays

TEAM MEMBERS:

JOB START/FINISH DATE: 1-9-06

BOOK 1 OF 1

E&E CORPORATE: (716) 684-8060 FAX (716) 684-0844

E&E EMERGENCY RESPONSE CENTER: (716) 684-8940

E&E ANALYTICAL SERVICE CENTER: (716) 685-8080 FAX (716) 685-0852

E&E EQUIPMENT SERVICE CENTER: (716) 685-8080 FAX (716) 685-0852

FEDERAL EXPRESS TOLL FREE: (800) 238-5355

AIRBORNE EXPRESS: (716) 685-5040

| PROJECT/CLIENT CONTACT(S) | AFFILIATION | PHONE |
|---|---|---|
| | | |
| | | |
| | | |

For inquires regarding the distribution, scope, and/or organization of the Geotechnical Logbook please contact: Manager, Environmental Services Division, Buffalo Corporate Office. Your comments and suggestions are welcomed and will be considered in future revisions.



DAILY LOGS

BOREHOLE RECORDS

BOREHOLE NO. BH-01

BOREHOLE NO. BH-02

# Borehole Record for BH-01

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

BOREHOLE NO. BH-02

BOREHOLE NO. BH-03

*Note: All BH locations are also GW locations

DRILLING LOG FOR BH-01 Former Loohns Cleaner

Project Name Steuben Site Char.

Site Location Former Loohns Cleaner
Bath NY

Date Started/Finished 1-9-06

Drilling Company Zebra

Driller's Name Dom Pino

Geologist's Name Robert Meyers

Geologist's Signature Robert A Meyers

Rig Type (s) Geoprobe 6620DT

Drilling Method (s) Direct Push-Geoprobe

Bit Size (s) 2 1/8" Auger Size (s) _____

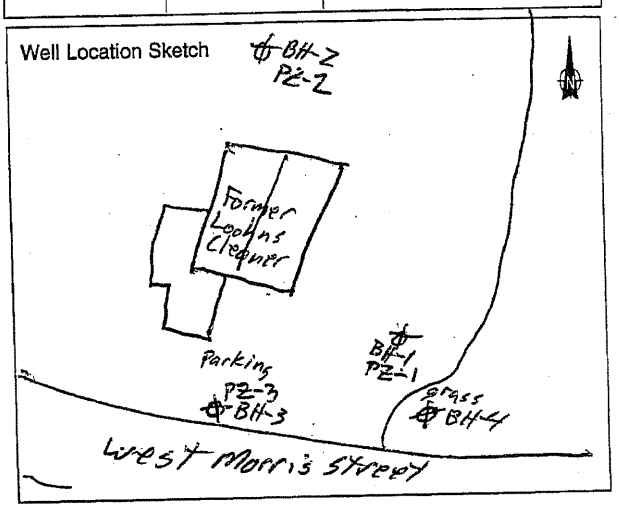
Auger/Split Spoon Refusal _____

Total Depth of Borehole Is _____

Total Depth of Corehole Is _____

| Water Level (TOIC) | | |
|---|---|---|
| Date | Time | Level( Feet) |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

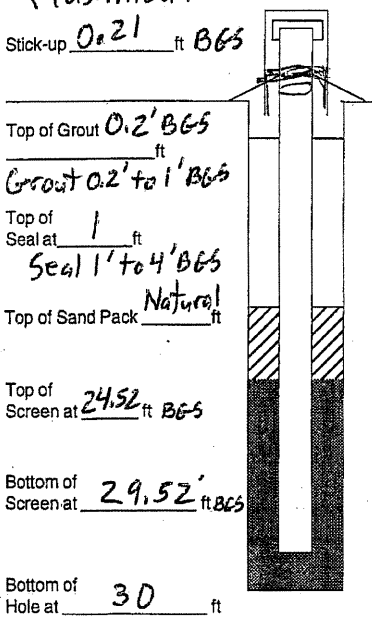
Well Location Sketch




| Depth(Feet) | Sample Number | Blows on Sampler | Soil Components Rock Profile CL SL S GR | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | PID HNu/~~OVA~~ (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 1 | 3.2' | | | 0ppm | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | 2 | 1.9 | | | 0ppm | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | 0.3 @ Bottom | |
| 10 | | | | 1413 | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | 3 | 3.1 | | | 0ppm | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | 1420 | | | | | | |

PZ-1

**SCREENED WELL**



Flushmount

Stick-up 0.21 ft BGS

Top of Grout 0.2' BGS

_____ ft

Grout 0.2' to 1' BGS

Top of Seal at 1 ft

Seal 1' to 4' BGS

Top of Sand Pack Natural ft

Top of Screen at 24.52 ft BGS

Bottom of Screen at 29.52' ft BGS

Bottom of Hole at 30 ft

Bottom of Sandpack at _____

Lock Number NA

Inner Casing Material _____

Inner Casing Inside Diameter ____ inches

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets _____

Cement _____

Borehole _____ inches Diameter

Cement/ Bentonite _____

Grout _____

Screen Slot Size _____

Screen Type _____

☐ PVC _____

☐ Stainless Steel ____

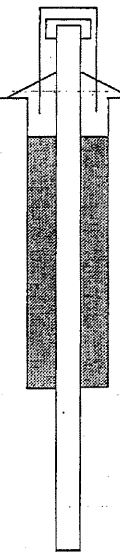
Pack Type/Size:

☐ Sand _____

☐ Gravel _____

☐ Natural _____

**OPEN-HOLE WELL**



Stick-up _____ ft

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

NOTE: See pages 136 and 137 for well construction diagrams

| Depth-ft. | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 1 | 0'-0.6', Med/dark brown silt & fine-Med. gravel | ○ | ⊗ | ○ |
| 2 | 0.6'-2.2', Fine light brown Sand w/ little silt & rounded | ○ | ⊗ | ○ |
| 3 | Fine-Med. gravel | ○ | ⊗ | ○ |
| 4 | 2.2' to 3.2', Med. to dark brown Silt and VF to | ○ | ⊗ | ○ |
| 5 | coarse pebbles (rounded to angular) | ⊗ | ⊗ | ○ |
| 6 | 5' to 6.9' Rounded Fine-Coarse pebbles With | ⊗ | ⊗ | ○ |
| 7 | VF Sand & Silt | ⊗ | ⊗ | ○ |
| 8 | | ⊗ | ○ | ○ |
| 9 | | ⊗ | ○ | ○ |
| 10 | | ⊗ | ○ | ○ |
| 11 | 10'-13.1', Fine to Very Coarse rounded pebbles & | ⊗ | ○ | ○ |
| 12 | Small cobbles with little Silt & VF-Coarse | ⊗ | ○ | ○ |
| 13 | Sand | ⊗ | ○ | ○ |
| 14 | | ⊗ | ⊗ | ○ |
| 15 | | ○ | ⊗ | ○ |

BOREHOLE NO. BH-02

BOREHOLE NO. BH-03

| Depth(feet) | Sample Number | Blows on Sampler | Soil Components CL SL S GR | Rock Profile | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | HNu/OVA (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | | | | | | | | | | |
| 17 | | | | | | 4 | 3.6 | | | 0.1 ppm | Water @ 17' BGS |
| 18 | | | | | | | | | | | 1440 Collect Sample FL-BH-01 (17'-18') |
| 19 | | | | | | | | | | | |
| 20 | | | | | 1432 | | | | | | |
| 21 | | | | | | | | | | | |
| 22 | | | | | | 5 | 3.2 | | | 0.1 ppm | |
| 23 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 25 | | | | | 1451 | | | | | | |
| 26 | | | | | | | | | | | |
| 27 | | | | | | 6 | 5.0' | | | 0.3 ppm | |
| 28 | | | | | | | | | | | 1515 Collect |
| 29 | | | | | | | | | | 0.4 ppm | FL-BH-01 (28'-29') |
| 30 | | | | | 1514 | | | | | 0.3 ppm | |
| 31 | | | | | 1600 | | | | | ↑ | |
| 32 | | | | | | 7 | 1.2' | | | | |
| 33 | | | | | | | Go to Closed System @ 35' BGS | | | 0.3 ppm | |
| 34 | | | | | | | | | | ↓ | |
| 35 | | | | | 1604 | | | | | | |
| 36 | | | | | 1624 | | | | | RAL | 1645 Collect FL-BH-01 (35-36) |
| 37 | | | | | | | | | | 0.8 | |
| 38 | | | | | | 8 | 1.7' | | | RAL | |
| 39 | | | | | | | | | | | |
| 40 | | | | | 1630 | | | | | | |
| 41 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 43 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |

| Depth(feet). | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 16 | 15' to 18.6', Gravel/Pebbles as above with | ○ | ⊗ | ○ |
| 17 | water @ 17' BGS. | ○ | ⊗ | ○ |
| 18 | | ○ | ○ | ⊗ |
| 19 | | ○ | ○ | ⊗ |
| 20 | | ○ | ○ | ⊗ |
| 21 | 20' to 23.2', VF to Coarse pebbles, Saturated | ○ | ○ | ⊗ |
| 22 | with little Silt & VF-Coarse Sand. | ○ | ○ | ⊗ |
| 23 | | ○ | ○ | ⊗ |
| 24 | | ○ | ○ | ⊗ |
| 25 | | ○ | ○ | ⊗ |
| 26 | 25' to 27.4', Pebbles as above | ○ | ○ | ⊗ |
| 27 | 27.4' to 30', VF Gray/brown Sand, Uniform | ○ | ○ | ⊗ |
| 28 | with trace fine rounded pebbles from 29.9'-30'BGS | ○ | ○ | ⊗ |
| 29 | | ○ | ○ | ⊗ |
| 30 | | ○ | ○ | ⊗ |
| 31 | 30'-31.2', VF Gray Sand & Silt, Uniform | ○ | ○ | ⊗ |
| 32 | | ○ | ○ | ⊗ |
| 33 | | ○ | ○ | ⊗ |
| 34 | | ○ | ○ | ⊗ |
| 35 | | ○ | ○ | ⊗ |
| 36 | 35'-36.7', VF Gray Sand & Silt as above | ○ | ○ | ⊗ |
| 37 | | ○ | ○ | ○ |
| 38 | | ○ | ○ | ○ |
| 39 | B.O.H @ 40' BGS. | ○ | ○ | ○ |
| 40 | | ○ | ○ | ○ |
| 41 | | ○ | ○ | ○ |
| 42 | | ○ | ○ | ○ |
| 43 | | ○ | ○ | ○ |
| 44 | | ○ | ○ | ○ |
| 45 | | ○ | ○ | ○ |

BOREHOLE NO. BH-02

BOREHOLE NO. BH-03

# Borehole Record for BH-02 / PZ-2

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

BOREHOLE NO. BH-03

DRILLING LOG FOR BH-02

Project Name Steuben Site Characterizations

Site Location Former Loohns Cleaner
Bath NY

Date Started/Finished 1-10-06

Drilling Company Zebra

Driller's Name Dom Pino

Geologist's Name Robert Meyers

Geologist's Signature Robert A Meyers

Rig Type (s) Geoprobe 6620DT

Drilling Method (s) _____

Bit Size (s) _____ Auger Size (s) _____

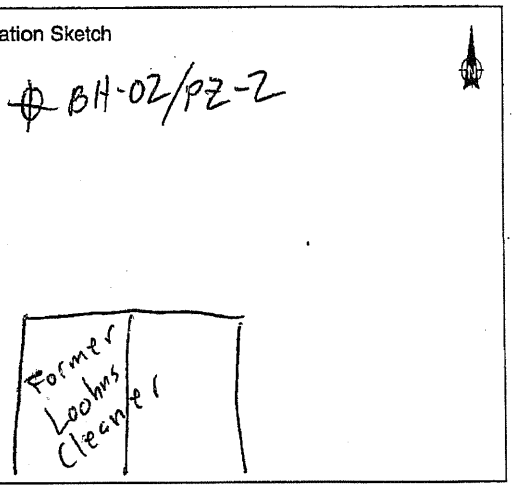
Auger/Split Spoon Refusal _____

Total Depth of Borehole Is _____

Total Depth of Corehole Is _____

| Water Level (TOIC) | | |
|---|---|---|
| Date | Time | Level( Feet) |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Well Location Sketch




| Depth(Feet) | Sample Number | Blows on Sampler | Soil Components Rock Profile CL SL S GR | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | HNu/OVA (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1047 | | | | | | |
| 2 | | | | | 1 | 1.7' | | | 0 ppm | |
| 3 | | | | | | | | | | |
| 4 | | | | 1048 | | | | | | |
| 5 | | | | 1051 | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | 3.7' | | | | |
| 8 | | | | | | | | | 0.4 ppm | |
| 9 | | | | | | | | | | |
| 10 | | | | 1052 | | | | | | |
| 11 | | | | 1058 | | | | | | |
| 12 | | | | | | 3.2' | | | | Water @ 12.6' BGS |
| 13 | | | | | | | | | 0.2 ppm | |
| 14 | | | | | | | | | | |
| 15 | | | | 1059 | | | | | | |

PZ-2

**SCREENED WELL**

Stick-up 1.3' BGS ft

Top of Grout 0.2' BGS ft

Top of Seal at 5.35 ft

Top of Sand Pack 10.7' ft

Top of Screen at 24.65 ft

Bottom of Screen at 29.65 ft

Bottom of Hole at 30' ft

Bottom of Sandpack at 30'

Lock Number _____

Inner Casing Material _____

Inner Casing Inside Diameter ____ inches

GROUND SURFACE

Quantity of Material Used:
Bentonite Pellets _____

Cement _____

Borehole _____ inches Diameter

Cement/ Bentonite _____

Grout _____

Screen Slot Size _____

Screen Type _____
- ☐ PVC _____
- ☐ Stainless Steel ____

Pack Type/Size:
- ☐ Sand _____
- ☐ Gravel _____
- ☐ Natural _____

**OPEN-HOLE WELL**

Stick-up _____ ft

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

NOTE: See pages 136 and 137 for well construction diagrams

| Depth-ft. | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 1 | 0'-0.4', Dark brown Silt & Fine to Med. rounded pebbles, Moist | ○ | ⊗ | ○ |
| 2 | 0.4' to 1.7' Tan to light Gray silt with some rounded gravel (Fine to V. Coarse) & little V. Fine Sand, moist | ○ | ⊗ | ○ |
| 3 | | ○ | ⊗ | ○ |
| 4 | | ○ | ⊗ | ○ |
| 5 | 5'-8.7', Rounded V. Fine to V. Coarse Pebbles and | ○ | ⊗ | ○ |
| 6 | Silt w/little V. Fine-Coarse sand, | ⊗ | ⊗ | ○ |
| 7 | moist 5' to 6.6', Dry 6.6' to 8.7' | ⊗ | ○ | ○ |
| 8 | | ⊗ | ○ | ○ |
| 9 | | ⊗ | ○ | ○ |
| 10 | | ⊗ | ○ | ○ |
| 11 | 10'-13.2' Pebbles/Gravel as above, Water @ 12.6 BGS | ⊗ | ○ | ○ |
| 12 | | ○ | ○ | ⊗ |
| 13 | | | | |
| 14 | | ○ | ○ | ○ |
| 15 | | ○ | ○ | ○ |

BOREHOLE NO. BH-03

| Depth(feet) | Sample Number | Blows on Sampler | Soil Components CL SL S GR | Rock Profile | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | HNu/OVA (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | | | | 1109 | | | | | | |
| 17 | | | | | | 4 | 1.9' | | | 0.4 ppm | 1120 Collect FL-BH-02(15'-16.8') |
| 18 | | | | | | | | | | | Picked through Gravel for Sample |
| 19 | | | | | | | | | | | |
| 20 | | | | | 1110 1131 | | | | | | |
| 21 | | | | | | | | | | | |
| 22 | | | | | | 5 | 2.1' | | | 0.16 ppm | |
| 23 | | | | | | | | | | | |
| 24 | | | | | | | | | | | 1150 Collect FL-BH-02(25-27) plus Duplicate |
| 25 | | | | 1 | 1132 | | | | | | |
| 26 | | | | | 1135 | | | | | | |
| 27 | | | | | | 6 | 2.4' | | | 0.4 ppm | 25'-26' |
| 28 | | | | | | | | | | 0.16 ppm | 26'-27.4' |
| 29 | | | | | | | | | | | |
| 30 | | | | | 1136 1206 | | | | | | |
| 31 | | | | | | | | | | | |
| 32 | | | | | | 7 | 2.4' | | | 0.4 ppm | |
| 33 | | | | | | | | | | | |
| 34 | | | | | | | | | | | |
| 35 | | | | | 1207 1224 | | | | | | |
| 36 | | | | | | | | | | | 1230 collect FL-BH-02(37-38) with MS/MSD |
| 37 | | | | | | 8 | 3.2' | | | | |
| 38 | | | | | | | | | | 0.8 ppm | |
| 39 | | | | | | | | | | | |
| 40 | | | | | 1225 | | | | | | |
| 41 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 43 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |

| Depth(feet). | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 16 | 15'-16.9', Rounded Gravel w/little silt & VF Sand (as above) | ○ | ○ | ⊗ |
| 17 | | ○ | ○ | ⊗ |
| 18 | | ○ | ○ | ⊗ |
| 19 | | ○ | ○ | ⊗ |
| 20 | | ○ | ○ | ⊗ |
| 21 | 20'-20.7', Same as above | ○ | ○ | ⊗ |
| 22 | 20.7' to 22.1', VF medium brown sand (Uniform) | ○ | ○ | ⊗ |
| 23 | | ○ | ○ | ⊗ |
| 24 | | ○ | ○ | ⊗ |
| 25 | | ○ | ○ | ⊗ |
| 26 | 25'-27.4' VF to Medium grained brown sand | ○ | ○ | ⊗ |
| 27 | with trace fine rounded gravel | ○ | ○ | ⊗ |
| 28 | | ○ | ○ | ⊗ |
| 29 | | ○ | ○ | ⊗ |
| 30 | | ○ | ○ | ⊗ |
| 31 | 30'-32.4 VF to Med. Sand as above, little Silt. | ○ | ○ | ⊗ |
| 32 | | ○ | ○ | ⊗ |
| 33 | | ○ | ○ | ⊗ |
| 34 | | ○ | ○ | ⊗ |
| 35 | | ○ | ○ | ⊗ |
| 36 | 35'-38.2' Sand & Silt as above | ○ | ○ | ⊗ |
| 37 | | ○ | ○ | ⊗ |
| 38 | B.O.H @ 40' BGS | ○ | ○ | ⊗ |
| 39 | | ○ | ○ | ⊗ |
| 40 | | ○ | ○ | ○ |
| 41 | | ○ | ○ | ○ |
| 42 | | ○ | ○ | ○ |
| 43 | | ○ | ○ | ○ |
| 44 | | ○ | ○ | ○ |
| 45 | | | | |

BOREHOLE NO. BH-03

BOREHOLE NO. BH-04

# Borehole Record for BH-03 / PZ-3

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR BH-03

Project Name Steuben Site Characterizations

Site Location Former Loohns Cleaner
Bath, NY

Date Started/Finished 1-11-06

Drilling Company Zebra

Driller's Name Dom Pino

Geologist's Name Robert Meyers

Geologist's Signature Robert A Meyers

Rig Type (s) Geoprobe 6620 DT

Drilling Method (s) Direct Push-Macrocore

Bit Size (s) 2 1/8" OD Auger Size (s) NA

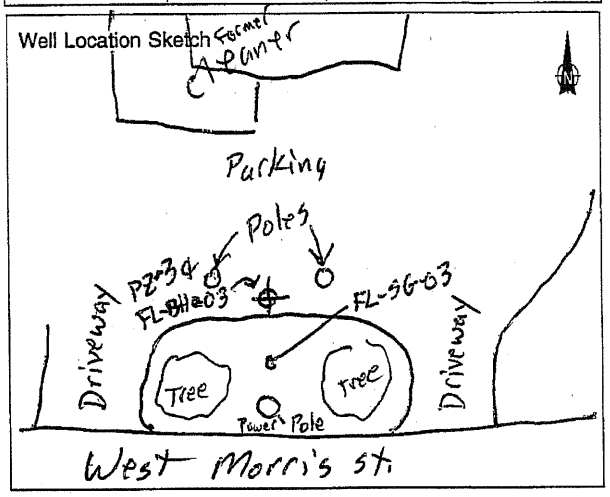
Auger/Split Spoon Refusal NA

Total Depth of Borehole Is 42'

Total Depth of Corehole Is NA

| Water Level (TOIC) | | |
|---|---|---|
| Date | Time | Level( Feet) |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Well Location Sketch




| Depth(Feet) | Sample Number | Blows on Sampler | Soil Components Rock Profile CL SL S GR | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | PID HNu/~~OVA~~ (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 0747 | | | | | | |
| 2 | | | | | 1 | 2.25' | | | 0ppm | |
| 3 | | | | | | | | | | |
| 4 | | | | 0748 | | | | | | |
| 5 | | | | 0804 | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | 2 | 2.45' | | | 0ppm | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | 0805 | | | | | | |
| 11 | | | | 0809 | | | | | | |
| 12 | | | | | 3 | 2.9' | | | | |
| 13 | | | | | | | | | 0.3 ppm | |
| 14 | | | | | | | | | | |
| 15 | | | | 0811 | | | | | | |

PZ-3

Lock Number NA

**SCREENED WELL**

Flushmount

Stick-up 0.15' ft BGS

Top of Grout 0.4 ft

Top of Seal at 3 ft

Top of Sand Pack 6 ft

Top of Screen at 25.15' ft

Bottom of Screen at 30.15' ft

Bottom of Hole at 31 ft

Bottom of Sandpack at 30.15'

Inner Casing Material _____

Inner Casing Inside Diameter ____ inches

GROUND SURFACE

Quantity of Material Used:
Bentonite Pellets _____
Cement _____
Borehole _____ inches Diameter
Cement/ Bentonite _____
Grout _____
Screen Slot Size _____
Screen Type _____
☐ PVC _____
☐ Stainless Steel ____
Pack Type/Size:
☐ Sand _____
☐ Gravel _____
☐ Natural _____

**OPEN-HOLE WELL**

Stick-up _____ ft

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

NOTE: See pages 136 and 137 for well construction diagrams

| Depth-ft. | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 1 | 0'-1.2', Blacktop (Parking Lot) & Gravel base with | ⊗ | ○ | ○ |
| 2 | Some fine silt/Sand | ⊗ | ⊗ | ○ |
| 3 | 1.2'-2.25', Moist, Rounded fine to V. Coarse gravel | ○ | ⊗ | ○ |
| 4 | and Silt | ○ | ⊗ | ○ |
| 5 | | ○ | ⊗ | ○ |
| 6 | 5'-7.45', Moist, Rounded fine to V. Coarse gravel | ○ | ⊗ | ○ |
| 7 | & silt with little VF-Med Sand and | ○ | ⊗ | ○ |
| 8 | trace clay | ○ | ⊗ | ○ |
| 9 | | ○ | ⊗ | ○ |
| 10 | | ⊗ | ○ | ○ |
| 11 | 10'-12.9', Dry, Same as above | ⊗ | ○ | ○ |
| 12 | | ⊗ | ○ | ○ |
| 13 | | ⊗ | ○ | ○ |
| 14 | | ⊗ | ○ | ○ |
| 15 | | ⊗ | ⊗ | ○ |

BOREHOLE NO. BH-04 BOREHOLE NO. ____ BOREHOLE NO. ____ BOREHOLE NO. ____ BOREHOLE NO. ____

# Borehole Record for BH-04

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

BOREHOLE NO. ____

BOREHOLE NO. ____

BOREHOLE NO. ____

BOREHOLE NO. ____

DRILLING LOG FOR BH-04

Project Name Steuben Site Characterizations

Site Location Former Loohns Cleaner
Bath, NY

Date Started/Finished 1-11-06

Drilling Company Zebra

Driller's Name Dom Pino

Geologist's Name Robert Meyers

Geologist's Signature Roberta Meyer

Rig Type (s) Geoprobe 6620 DT

Drilling Method (s) Direct Push

Bit Size (s) 2 1/8" Auger Size (s) _____

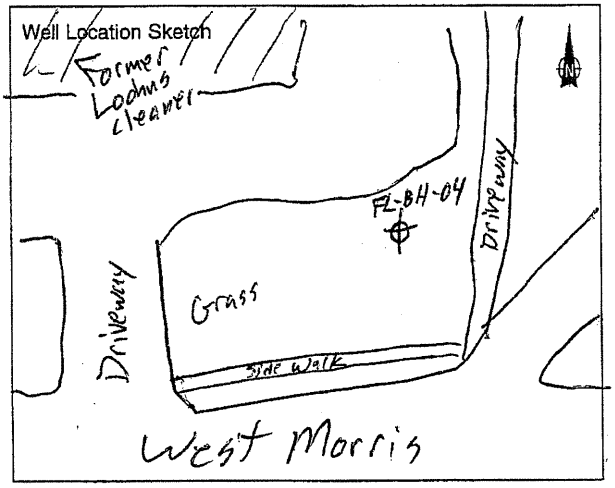
Auger/Split Spoon Refusal _____

Total Depth of Borehole Is _____

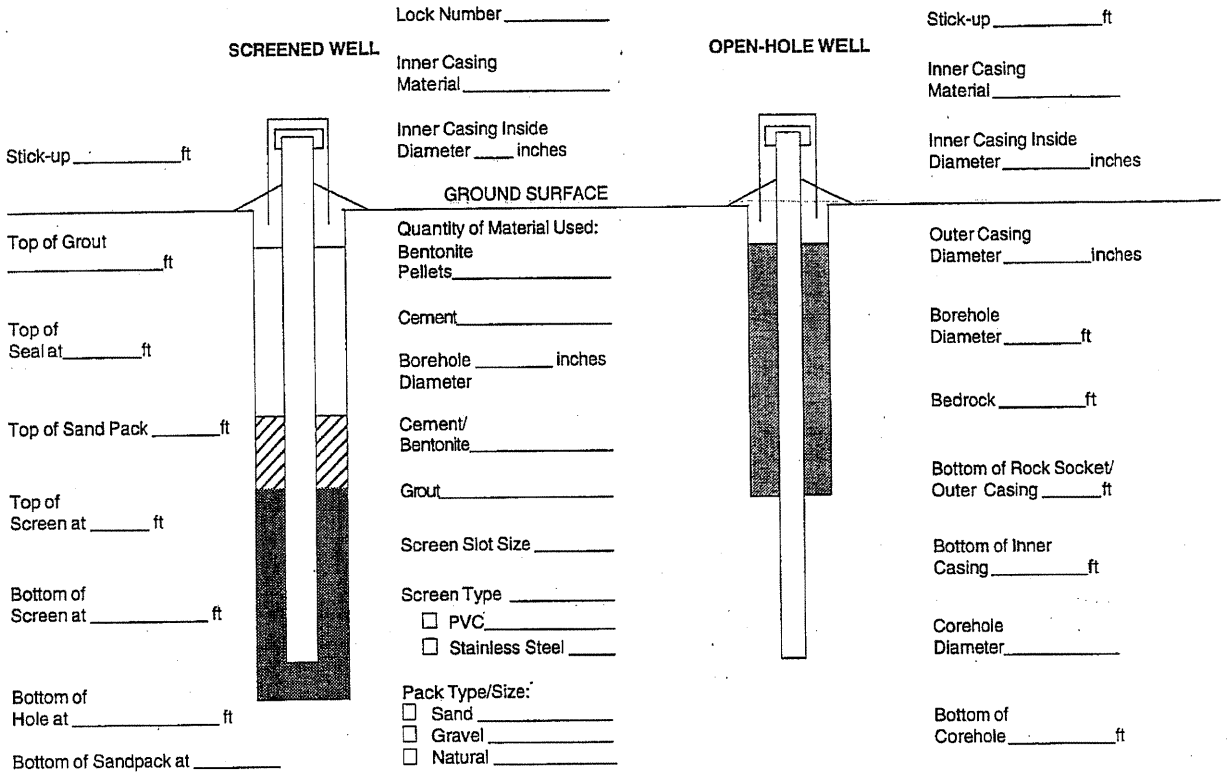
Total Depth of Corehole Is _____

| Water Level (TOIC) | | |
|---|---|---|
| Date | Time | Level( Feet) |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Well Location Sketch




| Depth(Feet) | Sample Number | Blows on Sampler | Soil Components Rock Profile CL SL S GR | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | PID HNu/~~OVA~~ (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1330 | | | | | | |
| 2 | | | | | 1 | 2.7' | | | 0ppm | |
| 3 | | | | | | | | | | |
| 4 | | | | 1331 | | | | | | |
| 5 | | | | 1333 | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | 2 | 3.6' | | | 0.4 ppm | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | 1334 | | | | | | |
| 11 | | | | 1356 | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | 3 | 3.9' | | | 0.9 ppm | |
| 14 | | | | | | | | | | |
| 15 | | | | 1358 | | | | | | |




NOTE: See pages 136 and 137 for well construction diagrams

| Depth-ft. | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 1 | 0'-0.4', Dark brown silt loam (Topsoil), moist | ○ | ⊗ | ○ |
| 2 | 0.4'-2.7', Rounded fine- V. Coarse gravel & silt with little VF-Coarse sand & trace clay, Moist to dry | ⊗ | ⊗ | ○ |
| 3 | | ⊗ | ⊗ | ○ |
| 4 | | ⊗ | ⊗ | ○ |
| 5 | 5' to 8.6', Same as above | ⊗ | ⊗ | ○ |
| 6 | | ⊗ | ○ | ○ |
| 7 | | ⊗ | ○ | ○ |
| 8 | | ⊗ | ○ | ○ |
| 9 | | ⊗ | ○ | ○ |
| 10 | | ⊗ | ○ | ○ |
| 11 | 10'-13.9', Rounded med. to V. Coarse Gravel with little Silt, V. Fine to Coarse Sand & Fine Gravel Dry | ⊗ | ○ | ○ |
| 12 | | ⊗ | ○ | ○ |
| 13 | | | | |
| 14 | | ⊗ | ○ | ○ |
| 15 | | ⊗ | ○ | ○ |

BOREHOLE NO. ____ BOREHOLE NO. ____ BOREHOLE NO. ____ BOREHOLE NO. ____

| Depth(feet) | Sample Number | Blows on Sampler | Soil Components CL SL S GR | Rock Profile | Penetration Times | Run Number | Core Recovery | RQD | Fracture Sketch | PID HNu/~~OVA~~ (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | | | | 1400 | | | | | | 1408 Collect FL-BH-04(16-17) |
| 17 | | | | | | 4 | 3.2' | | | 1.5 ppm | |
| 18 | | | | | | | | | | | Water @ 16.5' BGS |
| 19 | | | | | | | | | | | |
| 20 | | | | | 1401 | | | | | | |
| 21 | | | | | 1414 | | | | | | |
| 22 | | | | | | 5 | 2.7' | | | 0.3 ppm | |
| 23 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 25 | | | | | 1415 | | | | | | |
| 26 | | | | | 1427 | | | | | | 1430 Collect FL-BH-04(26-27') |
| 27 | | | | | | 6 | 2.9' | | | 0.4 ppm | |
| 28 | | | | | | | | | | | |
| 29 | | | | | | | | | | | |
| 30 | | | | | 1428 | | | | | | |
| 31 | | | | | 1437 | | | | | | |
| 32 | | | | | | 7 | 2.7' | | | 0 ppm | |
| 33 | | | | | | | | | | | |
| 34 | | | | | | | | | | | |
| 35 | | | | | 1438 | | | | | | |
| 36 | | | | | 1504 | | | | | | |
| 37 | | | | | | 8 | 3.2' | | | 0 ppm | 1510 Collect FL-BH-04(37-38) |
| 38 | | | | | | | | | | | |
| 39 | | | | | | | | | | | |
| 40 | | | | | 1505 | | | | | | |
| 41 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 43 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |

| Depth(feet). | NARRATIVE LITHOLOGIC DESCRIPTION | Moisture Content: Dry | Moist | Wet |
|---|---|---|---|---|
| 16 | 15' to 18.2', Gravel as above with VF-Coarse sand & silt, Water @ 16.5' BGS | ⊗ | ⊗ | ○ |
| 17 | | ○ | ○ | ⊗ |
| 18 | | ○ | ○ | ⊗ |
| 19 | | ○ | ○ | ⊗ |
| 20 | | ○ | ○ | ⊗ |
| 21 | 20'-22.7' Gravel, rounded to subrounded, fine to Coarse with few silt & sand | ○ | ○ | ⊗ |
| 22 | | ○ | ○ | ⊗ |
| 23 | | ○ | ○ | ⊗ |
| 24 | | ○ | ○ | ⊗ |
| 25 | | ○ | ○ | ⊗ |
| 26 | 25' to 25.8' Gravel as above | ○ | ○ | ⊗ |
| 27 | 25.8' to 27.9' Gray/brown VF Sand, Uniform | ○ | ○ | ⊗ |
| 28 | | ○ | ○ | ⊗ |
| 29 | | ○ | ○ | ⊗ |
| 30 | | ○ | ○ | ⊗ |
| 31 | 30'-32.7', Uniform, VF Gray Sand | ○ | ○ | ⊗ |
| 32 | | ○ | ○ | ⊗ |
| 33 | | ○ | ○ | ⊗ |
| 34 | | ○ | ○ | ⊗ |
| 35 | | ○ | ○ | ⊗ |
| 36 | 35'-38.2' Sand as above | ○ | ○ | ⊗ |
| 37 | | ○ | ○ | ⊗ |
| 38 | | ○ | ○ | ⊗ |
| 39 | | ○ | ○ | ⊗ |
| 40 | B.O.H @ 40' BGS | ○ | ○ | ⊗ |
| 41 | | ○ | ○ | ○ |
| 42 | | ○ | ○ | ○ |
| 43 | | ○ | ○ | ○ |
| 44 | | ○ | ○ | ○ |
| 45 | | ○ | ○ | ○ |

# B Photo Logs

| | |
|---|---|
| Date: 1/24/06<br>Photographer: Robert Meyers | Subject: Direct-Push activities at the Canisteo Town Garage Site boring TG-BH-03 |

| | |
|---|---|
| Date: 1/24/06<br>Photographer: Stephanie Reynolds Smith | Subject: Direct-Push activities at the Canisteo Town Garage Site boring TG-BH-04 |

| | |
|---|---|
| Date: 1/24/06<br>Photographer: Stephanie Reynolds Smith | Subject: Direct-Push activities at the Canisteo Town Garage Site boring TG-BH-01 |

| | |
|---|---|
| Time/Date: 1/26/06<br>Photographer: Stephanie Reynolds Smith | Subject: Direct-Push activities at the Former Depot Street Dry Cleaner Site boring DS-BH-06 |

| | |
|---|---|
| Date: 1/26/06<br>Photographer: Stephanie Reynolds Smith | Subject: Direct-Push activities at the Former Depot Street Dry Cleaner Site boring DS-BH-02 |


| | |
|---|---|
| Date: 1/23/06<br>Photographer: Robert Meyers | Subject: Direct-Push activities at the Former Liberty Street Dry Cleaners Site boring LS-BH-06 |

| | |
|---|---|
| Date: 1/23/06<br>Photographer: Robert Meyers | Subject: Direct-Push activities at the Former Liberty Street Dry Cleaners Site boring LS-BH-05 |

| | |
|---|---|
| Date: 1/23/06<br>Photographer: Robert Meyers | Subject: Direct-Push activities at the Former Liberty Street Dry Cleaners Site boring LS-BH-01 |

| | |
|---|---|
| Date: 1/23/06 | Subject: Direct-Push activities at the Former Liberty Street Dry Cleaners Site boring LS-BH-03 |
| Photographer: Robert Meyers | |

| | |
|---|---|
| Date: 1/17/06 | Subject: Direct-Push activities at the Band Box Cleaners Site boring BB-BH-03 |
| Photographer: Jim Mays | |

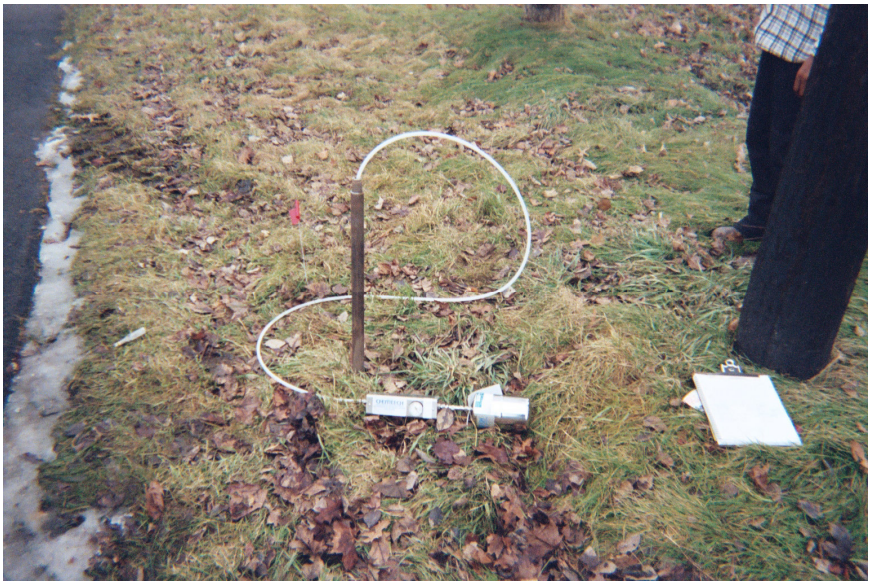
| | |
|---|---|
| Date: 1/16/06 | Subject: Direct-Push activities at the Band Box Cleaners Site boring BB-BH-04 |
| Photographer: Jim Mays | |


| | |
|---|---|
| Date: 1/13/06 | Subject: Direct-Push activities at the Band Box Cleaners Site boring BB-BH-02 |
| Photographer: Jim Mays | |


| | |
|---|---|
| Date: 1/11/06 | Subject: Direct-Push activities at the Former Loohns Cleaners Site boring FL-BH-03 |
| Photographer: Jim Mays | |

| | |
|---|---|
| Date: 1/11/06 | Subject: Direct-Push activities at the Former Loohns Cleaners Site boring FL-BH-03 |
| Photographer: J. Mays | |

| | |
|---|---|
| Date: 1/9/06 | Subject: Direct-Push activities at the Former Loohns Cleaners Site boring FL-BH-01 |
| Photographer: Jim Mays | |



| | |
|---|---|
| Date: 1/4/06 | Subject: Typical soil gas sample collection set-up |
| Photographer: Stephanie Reynolds Smith | |

# C Laboratory and Data Usability Summary Report

See enclosed CD