LIMITED SITE DATA

CARROLL TOWN LANDFILL

TOWN OF CARROLL, CHAUTAUQUA COUNTY, NEW YORK

SITE NO. 907017

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Report

Remedial Investigation Report Remedial Investigation/Feasibility Study - Town of Carroll Landfill Site #9-07-017 Frewsburg, New York

New York State Department of Environmental Conservation

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Remedial Investigation Report

Remedial Investigation/Feasibility Study
Town of Carroll Landfill
Site #9-07-017
Frewsburg, New York

New York State Department of Environmental Conservation

Douglas M. Crawford, P.E.
Vice President

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O'BRIEN & GERE ENGINEERS, INC.

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1. Introduction

This document presents the Phase I Remedial Investigation (RI) report for the Town of Carroll Landfill (Site) located in Frewsburg, New York. The Site is listed as a Class 2 site on the New York State Registry of Inactive Hazardous Waste Disposal Sites (Site #9-07-017). A Site location plan is included as Figure 1. The RI/FS was performed in accordance with State Superfund Work Assignment #D004090-14 (NYSDEC, 2003) and the RI/FS Work Plan (O'Brien & Gere, June 2004).

1.1. Remedial investigation objectives

The objectives of the RI were to:

- Collect data necessary to evaluate and characterize the nature and extent of Site-related constituents resulting from historic use of the Site
- Evaluate potential exposure pathways between fish and wildlife resources and Site-related constituents
- Evaluate potential exposure pathways between human receptors and Site-related constituents
- Gather sufficient data to support the Feasibility Study to select a remedial alternative that provides protection to human health and the environment, complies to the extent practicable with potentially applicable standards, criteria and guidance (SCGs), and reduces the mobility and/or toxicity of Site-related constituents.

1.2. RI report format

This report contains the following sections:

Section 1 – Introduction
Section 2 – Background
Section 3 – RI field investigation methods
Section 4 – RI field investigation results

Section 5 – Nature and extent of contamination
Section 6 – Fish and wildlife impact analyses (FWIA)
Section 7 – Exposure pathway analysis
Section 8 – Conceptual site model
Section 9 – Conclusion and recommendations

2. Background

2.1. Site location and description

The Town of Carroll Landfill was a former municipal and C&D debris landfill, and solid waste transfer station. The landfill is located at the end of an unnamed gravel road, approximately 1,700 feet north of NYS Route 62 (also known as Ivory Road) in the Village of Frewsburg, Town of Carroll, Chautauqua County, New York (Figure 1). The landfill is located on a 305-acre lot, although the landfill occupies only approximately 25 acres of the property. The surrounding area includes active and inactive farmland, wooded areas, wetlands, and private homes. Conewango Creek lies to the north, northwest, and west of the site within a broad flood plain (NYSDEC, 2003).

The Site is located on a northwest-facing, gently sloping hillside and is composed of two roughly rectangular landfill cells, each surrounded by drainage ditches and swales. Based on the field activities conducted at the Site, the western landfill cell is approximately 900-ft from north to south and 450-ft from east to west. The eastern landfill cell is approximately 750-ft from north to south and 300-ft from east to west. The ground surface of the eastern cell is estimated to range from 1 to 4 feet above surrounding ditches on the east, north and west. The topography of the western cell is more uneven, ranging from approximately 1 to 10 feet above the surrounding ditches with several flat areas. A narrow drainage area, approximately 70-ft wide, separates the two landfill cells and eventually drains to the northwest into a wetland area before reaching Conewango Creek (NYSDEC, 2003).

Approximately 700 feet west of the site is the Town of Carroll Public Works Garage area and the Frewsburg Water District including a water supply well and pump station. The Public Works Garage and Water District are located on the same lot, but are accessed from Wahlgren Road off NYS Route 62. The nearest homes are approximately 1200 feet to the west and south and uphill from the site (NYSDEC, 2003).

2.2. Site history

The Site is a former municipal landfill that operated from the early 1960's to 1979. A Part 360 Permit for landfill operation expired in 1976. In June 1979, the Town of Carroll filed a permit application to operate a transfer station at the site. Following the issuance of a Consent Order on October 2, 1979 to address several solid waste violations including failure to provide a complete application for the landfill operation, the Town operated the site as a C&D debris landfill and transfer station. The western disposal area was closed in 1980 (NYSDEC, 2003).

Information provided in Section 2 of Work Assignment #D004090-14 indicated that during public meetings for the remedial investigation of the Vac Air Alloys site (Site No. 907016), citizens attending the meeting alleged that Vac Air Alloys disposed industrial waste at the Town of Carroll Landfill. Allegations included citizen's reports of having witnessed drums of waste labeled as "trichloroethene" being disposed at the landfill. NYSDEC records indicated that industrial waste was allegedly disposed in the landfill during its operation. These records indicated that Vac Air Alloys allegedly disposed drums containing metal debris and metal turnings. Inspections by NYSDEC indicated the presence of partially buried 55-gallon drums in April 1992. Subsequent sampling results indicated that volatile organic compounds (VOCs) in leachate may have been migrating from the Site. This lead to a listing of the Site on June 9, 1992 as a potential hazardous waste disposal site. A Preliminary Site Assessment (PSA) completed in February 1997 led the NYSDEC to list the Site as a Class P site (potential hazardous waste site) in 1998 (NYSDEC, 2003).

2.3. Previous investigations

2.3.1. NYSDEC sample collection - 1992

Following allegations of industrial waste disposal at the landfill by Vac Air Alloys Corporation at a hearing for the Vac Air Alloys site, NYSDEC conducted a site inspection in April 1992 during which three samples of leachate and one drum sample of brown, granular solids were collected. Several VOCs were detected in the leachate samples including vinyl chloride at 960 ug/l, and cis-l,2-dichloroethene at 380 ug/l and 1,400 ug/l. The drum sample was analyzed for hazardous waste characteristics using the Toxicity Characteristic Leaching Procedure (TCLP). The results indicated the contents of the drum were not characteristic hazardous wastes. The inspection and samples were sufficient to proceed with a more detailed Preliminary Site Assessment (PSA) (NYSDEC, 2003).

2.3.2. Moody and Associates, Inc. – 1992/1993

Between December 1992 and March 1993, Moody and Associates, Inc. performed a hydrogeologic investigation for the Frewsburg Water District to locate a water supply well. After identifying the Town of Carroll Public Works site, adjacent to the landfill, as the probable site for the new water supply well, water quality testing was performed to characterize the aquifer. Ground water samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), iron, manganese, dissolved solids, hardness, and chloride. At that time, test parameters indicated the water quality was good, except for chloride, which was attributed to runoff from the road salt storage pile and brine storage tank at the Public Works Garage (NYSDEC, 2003).

2.3.3. ABB Environmental Services - 1996

During late 1996, ABB Environmental Services conducted a PSA. The PSA included the following sample collection:

- Two surface water samples were collected from the northern drainage swale at the Site. One sample was collected from the upstream side and one was collected from the downstream side of the Site. VOCs were not detected in the surface water samples, however some inorganic constituents including lead, selenium and cyanide were detected above NYSDEC Class C Surface Water Standards in both samples.

- Six leachate samples and one duplicate were collected during PSA field activities and submitted for laboratory analysis for Target Compound List (TCL) VOCs and Total Analyte List (TAL) inorganics. One of the samples was also analyzed for TCL SVOCs, pesticides, and polychorinated biphenyls (PCBs). Laboratory analysis showed the presence of twelve VOCs with the majority of contamination from samples LT-106, LT-107, and LT-109 near the center portion of the western disposal area. Analysis also indicated eight TCL SVOCs and one pesticide in the sample analyzed for SVOCs. Several inorganic analytes including cadmium, lead, selenium, and cyanide, and a few organic compounds were detected above Class C Surface Water Standards.

- Nine test pit soil/waste samples and a duplicate were collected from excavated test pits within the limits of the disposal area and analyzed for TCL VOCs and SVOCs; pesticides; PCBs; TAL inorganics; TCLP VOCs, SVOCs, and inorganics; and the hazardous characteristics of ignitability, corrosivity, and reactivity. In the analyses, nine VOCs, twenty-two SVOCs and eight pesticides were detected. Seventeen inorganic analytes were detected in samples including cadmium, mercury, silver and thallium. While none of the testing indicated the soil/waste samples to be characteristic hazardous waste, concentrations of certain analytes were detected at several locations above NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) #4046 recommended soil cleanup objectives. The results of five surface and subsurface soil samples taken outside disposal limits were not indicative of hazardous waste.

- As part of the PSA, four ground water monitoring wells (MW-101, MW-102, MW-103, and MW-104) were installed at the Site. In addition, three wells, including Supply Well #5 on the Frewsburg Water District site, were sampled for TCL VOCs and TAL inorganics. Well MW-l02 was also sampled for TCL SVOCs. Results of analysis of the ground water samples from the monitoring wells on the Site included detectable concentrations of vinyl chloride, 1,2-DCE, acetone, methylene chloride, and chlorobenzene in some samples. MW-102 generally had the highest concentrations of VOCs. SVOCs were not detected in MW-102. VOCs were not detected in samples from Supply Well #5 (NYSDEC, 2003).

2.3.4. Chautauqua County Department of Health

The Chautauqua County Department of Health has been conducting sampling of the Frewsburg Water District Supply Well #5 and MW-13 on an almost monthly basis. It has also been sampling landfill monitoring wells on a less frequent basis. Concentrations of cis-l,2-dichloroethene and vinyl chloride have been detected in Supply Well #5 in the more recent samples. The detected concentrations have been below NYS Class GA ground water standards. Concentrations of the same contaminants have also been detected in MW-13 over a greater period of time. MW-13 is downgradient of the disposal area, and upgradient of Supply Well #5.

Testing on an approximate quarterly basis at MW-102, located downgradient of the western disposal area, has consistently indicated concentrations of dichlorodifluoromethane, vinyl chloride, chloroethane, and cis-l,2-dichloroethene. The concentrations appear to have increased over time. Periodic testing of MW-104 located downgradient of the landfill has indicated similar contaminants. The concentrations have generally been within an order of magnitude above or below the NYS Class GA ground water standards (NYSDEC, 2003).

3. RI field investigation methods

This section describes the RI field investigation methods conducted at the Site as part of the Phase I RI. Consistent with the RI/FS Work Plan, the field investigations included the collection of samples from the following environmental media:

- soil vapor
- surface soil
- surface water
- sediment
- subsurface soil
- leachate seep
- ground water

The main RI field sampling effort during which samples from the above environmental media were collected was conducted between August 16, 2004 and November 10, 2004. A second ground water sampling event was conducted between March 7 and March 11, 2005. Sample locations are shown on Figure 2.

3.1. Ground water sampling using passive diffusion bags

One of the initial RI field sampling tasks was the collection of ground water samples from discrete intervals within monitoring well MW-13. Monitoring well MW-13 was installed as part of a field investigation associated with siting of a supply well (Supply Well #5) for the Village of Frewsburg. MW-13 was installed to a depth of approximately 75-ft below grade and constructed with a 40-ft long well screen. MW-13 is located approximately 185 feet to the northeast of Supply Well #5 between the western landfill cell and the supply well. The location of MW-13 is shown on Figure 2. Prior sampling of MW-13 by NYSDOH indicated the presence of low levels (*i.e.* below ground water standards) of vinyl chloride. As MW-13 is located upgradient of Supply Well #5, there was a concern regarding potential impact to the supply well.

Passive diffusion bags (PDBs) were installed in existing monitoring well MW-13. The total depth of MW-13 is approximately 75 feet below grade. Monitoring well construction data for MW-13 indicates that this well is screened from approximately 35 feet to 75 feet below grade. The purpose of the PDB sampling was to evaluate potential stratification of VOCs within the 40-ft screened interval of MW-13.

The PDB samplers that were installed were 24-inches in length and 1.25-inches in diameter. The PDBs were positioned at depths of approximately 40-ft, 50-ft, 60-ft, and 70-ft within the well on August 20, 2004. Ground water samples were collected on September 3, 2004 from these four intervals for analysis.

The four ground water samples collected from MW-13 were submitted to O'Brien & Gere Laboratories for VOC analysis using USEPA Method OLM04.2.

3.2. Soil vapor sample collection

Thirty-seven soil vapor points were installed for VOC and methane screening purposes. The locations of the soil vapor sampling points are shown on Figure 2. Based on the results of VOC levels detected during the screening step, four soil vapor samples were collected for laboratory analysis. A description of the sample locations, procedures used to implement soil vapor screening and sample collection, and laboratory analysis follow.

For each sample, a soil vapor sample probe was installed manually to an approximate depth of 1 to 2 feet below grade, which was estimated to be the thickness of the landfill cover material at each respective location. The probe consisted of a three-quarter inch hollow stainless-steel rod manually driven by a sledge hammer.

The opening at the top of the probe was fitted to tubing that was connected to a ppb range photoionization detector (PID) for measurement of total VOCs. The sensitivity of the PID was calibrated to optimize sensitivity for vinyl chloride. Although a wide range of VOCs would be measured at this calibration setting, the PID would also exhibit high sensitivity to similar chlorinated aliphatic hydrocarbons (CAHs), ammonia (NH4), hydrogen sulfide (H_2S), and other sulfated volatile compounds within this sensitivity range.

For each location, the initial measurement was recorded and a second measurement was recorded after the meter readings had stabilized at the estimated equilibrium point for total VOC concentration.

Following the measurement of total VOCs, landfill gas levels were measured as a percentage of the total gases detected using a landfill gas meter. Measurements were recorded when a stable meter reading was observed. Measured gas levels included oxygen, carbon dioxide, methane and the balance of gases present. The subsequent collection of soil vapor samples for laboratory analysis is described below.

Based on the results of the soil vapor screening measurements, four locations were selected to collect soil vapor samples for laboratory analysis. Although VOC levels were relatively low at the soil vapor screening locations in the northern portions of the landfill cells, higher levels of VOCs were measured at sampling locations SV-16, SV-19, SV-22, SV-31, and SV-34 located in the southern portions of the landfill cells. Based on the VOC levels, locations SV-16, SV-19, SV-31, and SV-34 were selected to represent the highest overall VOC levels in the landfill.

For each sample collected for laboratory analysis, a soil vapor sample probe was installed manually to an approximate depth of 3 feet below grade such that the inlet of the sample tubing was below the landfill cover materials. The probe consisted of a three-quarter inch hollow stainless-steel rod driven by a sledge hammer. The steel rod contained one-eighth inch tubing, which was inserted into a slotted aluminum vapor point at the bottom end of the hollow rod. The hollow rod was removed after the sampling point and tubing was installed to the selected sampling depth.

After removal of the hollow rod, a minimum of 3-inches of crushed stone was placed in the probe hole to cover the vapor point and allow a permeable zone for soil vapor to collect around the vapor probe. Following the installation of crushed stone, concrete grout was installed to seal the probe hole.

To remove stagnant or ambient air from the sample string (consisting of the vapor point, stone pack, and tubing) and to provide samples that were representative of subsurface conditions, one to three sample-string volumes were purged. Sampling points were purged with a 60-ml syringe.

After the sample point was purged, the tubing was connected to the flow controller of a 6-Liter Silonite® coated stainless steel vacuum canister. The flow controller was calibrated to collect the sample over a 4-hour period. The valve on the canister was then opened to collect the soil vapor sample. It should be noted that the flow regulator for sample SV-19 was defective and the sample was collected over only a one-minute time period. Quality control samples (trip blank, duplicate, and MS/MSD samples) were not collected for this screening-level sampling event.

When sample collection was completed, the canisters were packaged and sent under chain-of-custody to Lancaster Laboratories for analysis of VOCs using USEPA Method TO-15.

3.3. Surface soil sample collection

Ten surface soil samples (SS-01 to SS-10) were collected on September 16, 2004. Surface soil samples SS-01, SS-02, SS-03, SS-05, SS-09, and SS-10 were collected around the eastern landfill cell and samples SS-04, SS-06, SS-07, and SS-08 were collected around the western landfill cell. The selection of the soil sample locations included considerations based on visual observation of the site, such as impacted soils, stressed vegetation, and soils close to drums and metal cuttings. The locations of the surface soil samples are presented on Figure 2.

Surface soil samples were collected using disposable plastic scoops. If the selected sampling location was in a vegetated area, the vegetation was removed prior to sample collection. The soil samples were collected from within the top 2-inches of the exposed ground surface or below vegetative cover. The samples were obtained by digging into the soil with a disposable scoop and transferring a sufficient amount of the soil to a plastic bag. The soil within the plastic bag was then homogenized. Finally, the soil sample was transferred from the plastic bag to the appropriate sample containers.

Five surface soil samples (SS-06 to SS-10) were analyzed for the following: TAL metals including mercury and cyanide using USEPA Method ILM04.0 and pesticides/PCB using USEPA Method OLM04.2. At the direction of NYSDEC, five surface soil samples (SS-01 to SS-05) were reserved for analysis at a later date, if deemed necessary.

O'Brien & Gere Laboratories in Syracuse, New York analyzed the TAL metals and pesticide/PCB samples.

3.4. Surface water sample collection

Five surface water samples (SW-1, SW-2, SW-3, SW-4, and SW-5) were collected on September 23, 2004 from the drainage and wet areas around the western and northern portions of the landfill cells. Surface water samples were co-located with the sediment samples. The objective of the sampling was to evaluate potential areas of constituent loading to the wetland areas adjacent to the western and northern portions of the landfill cells. The locations of the surface water samples are shown on Figure 2.

Surface water samples SW-1 and SW-2 were collected from a drainage swale north of the landfill cells. Surface water sample SW-3 was collected from the wetland area west of the western landfill cell. Surface water samples SW-4 and SW-5 were collected in the drainage area that separates the two landfill cells. Some sheen was observed on the surface water around sampling locations SW-2 and SW-3.

Surface water depths were generally observed to be less than 2-ft. The water samples were collected facing upstream in flowing surface water systems and by submerging a sample bottle below the water surface. Surface water samples were analyzed in the field for temperature, pH, and conductivity.

The surface water samples were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. Analyses included TCL SVOCs using USEPA Method OLM04.2, and TAL metals including mercury and cyanide using USEPA Method ILM04.0.

Surface water sample SW-4 was also analyzed for pesticides/PCBs using USEPA Method OLM04.2. The PCB/pesticide surface water sample was collected from the same location from which a PCB/pesticide sample was collected from the associated sediment sample SED-4.

3.5. Sediment sample collection

Five sediment samples (SED-01, SED-02, SED-03, SED-04, and SED-05) were collected which were co-located with the surface water samples. The locations of the sediment samples are shown on Figure 2.

Sediment samples SED-01 and SED-02 were collected from a drainage swale north of the landfill cells. Sediment sample SED-03 was collected from the wetland area west of the western landfill cell. Sediment samples SED-04 and SED-05 were collected in the drainage area that separates both landfill cells.

The sediment samples were collected using push core techniques. Push core sampling techniques consist of manual penetration of sediment using a polycarbonate tube to collect the sediment core. For the sediment collection, 3-inch diameter, dedicated polycarbonate tubes were used. The push core was manually advanced to depths of approximately 0.5-ft.

The sample portion to be analyzed for VOCs was the first sample collected, and was obtained from the center of the core and placed in sample containers with as little headspace as practicable. The remainder of the 0.5-ft interval was extruded from the core. The sample was homogenized in a dedicated stainless steel mixing bowl and portioned to the appropriate sample jars.

The sediment samples were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. Analyses included VOCs and SVOCs using USEPA Method OLM04.2 and inorganics including cyanide using USEPA Method OLM04.0. In addition, samples were analyzed by Ecology & Environment for total organic carbon using the Lloyd Kahn method.

3.6. Subsurface soil sample collection

Subsurface soil samples were analyzed from selected test pit locations and from areas beneath observed leachate seeps. The test pit and subsurface soil sample locations are shown on Figure 2.

3.6.1. Test pits

Five soil samples were collected from five test pits from the western landfill (TP-04/SS-1, TP-07/SS-2, TP-08/SS-5, TP-10/SS-4, and TP-11/SS-3). Sample TP-04/SS-1 was collected from visually impacted soil. Samples TP-07/SS-2, TP-08/SS-5, TP-10/SS-4, and TP-11/SS-3 were collected adjacent to drum carcasses present in each of the test pits. Test pit logs are provided in Appendix A.

To collect soil samples, the backhoe operator removed a representative portion of soil with the bucket of the backhoe. The field sampler then transferred the soil to be sampled from the bucket to the appropriate sample containers.

The test pit soil samples were analyzed by O'Brien & Gere Laboratories in Syracuse, New York for TCL VOCs and SVOCs using USEPA Method OLM04.2, Target Analyte List (TAL) metals, including mercury and cyanide using USEPA Method OLM04.0, and pesticides/PCBs using USEPA Method OLM04.2.

3.6.2. Leachate seep soils

Three soil samples (SOIL-01, SOIL-02, and SOIL-03) were collected between September 22 and 23, 2004 from areas where leachate seeps were observed. The locations of the soil samples are shown on Figure 2.

Soil samples SOIL-01 and SOIL-02 were collected in the drainage area between the two landfill cells and sample SOIL-03 was collected off the northwest corner of the western landfill. Soil samples SOIL-01 and SOIL-02 were collected from discolored soils adjacent to leachate seeps that exhibited sheens.

Soil samples for VOC analyses were collected by manually grabbing the samples and transferring the soil to laboratory sample jars. Soil samples for the remaining parameters were collected by transferring additional soil from the sample location to a dedicated stainless steel mixing bowl for sample homogenization. After homogenization, the samples were portioned to the appropriate laboratory sample jars.

Soil samples were analyzed for TCL VOCs using USEPA Method OLM04.2 and TAL metals including mercury and cyanide using USEPA Method OLM04.0. In addition, soil sample SOIL-02 was analyzed for TCL SVOCs and PCB/pesticides using USEPA Method OLM04.2.

3.7. Leachate seep sample collection

Three leachate seep samples (LT-01, LT-02, and LT-03) were collected between September 22 and 23, 2004. The leachate samples were co-located with the leachate seep soil samples. The locations of the leachate seep samples are shown on Figure 2.

Samples LT-01 and LT-02 were collected in the drainage area between the two landfill cells and sample LT-03 was collected off the northwest corner of the western landfill. Leachate samples were collected from areas containing sheen and discolored water. Leachate seep samples were collected directly into the laboratory sample bottles.

Leachate seep samples were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. Samples were analyzed for TCL VOCs using USEPA Method OLM04.2 and TAL metals including mercury and cyanide using USEPA Method OLM04.0. One leachate sample, LT-02, was also analyzed for TCL SVOCs and pesticides/PCB using USEPA Method OLM04.2. The pesticide/PCB leachate sample was collected from the same location from which a pesticide/PCB sample was collected from the associated leachate seep soil sample SOIL-02.

3.8. Temporary well installation

Three temporary wells (TW-TP-02, TW-TP-06, and TW-TP-22) were installed at test pit locations TP-02, TP-06, and TP-22. Temporary wells TW-TP-02 and TW-TP-06 were installed on August 17, 2004. Temporary well TW-TP-22 was installed on August 19, 2004. Temporary wells were installed at these locations as they contained the most visibly impacted water at the test pit locations.

Each temporary well consisted of an appropriate length of 2-inch diameter, 0.010-in slot well screen. The well screen was placed into the test pits, and the excavated test pit materials were backfilled around the temporary wells.

The purpose of the temporary well installations was to allow collection of water present from the test pits, while minimizing the amount of sediment in these water samples. Subsequent to installation, the temporary wells were allowed to equilibrate with the surrounding materials for approximately 2 weeks prior to collecting water samples. Water samples were collected from the temporary wells on September 2, 2004. Disposable polyethylene bailers were used to collect the samples. Water samples were collected directly from the temporary wells with no prior purging to minimize the amount of sediment in each sample.

Temporary wells TW-TP-06 and TW-TP-22 only contained sufficient water to allow collection of VOC samples. Temporary well TW-TP-02 contained sufficient water to collect VOC, SVOC, pesticide/PCB, and inorganic samples.

The water samples collected from the temporary wells were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. VOC, SVOC, and pesticide/PCB samples were analyzed using USEPA Method OLM04.2. Inorganic samples were analyzed using USEPA Method OLM04.0.

3.9. Monitoring wells

A total of fourteen monitoring wells were installed at the Site between August 30 and September 14, 2004. Seven shallow wells were installed with the screened interval positioned at depths of approximately 10-ft to 20-ft below grade. Six intermediate wells were installed with the screened interval positioned at depths of approximately 35-ft to 45-ft below grade. One deep monitoring well was installed with the screened interval positioned at depths of approximately 60-ft to 70-ft below grade. The locations of the monitoring wells are shown on Figure 2.

Monitoring wells were installed such that the ground water quality associated with the shallow, intermediate, and deep portions of the water-bearing formation could be evaluated. Seven shallow monitoring wells and six intermediate monitoring wells were installed around the western and eastern landfill cells. Three shallow wells MW-109S, MW-110S, and MW-111S and four intermediate wells MW-102I, MW-109I, MW-110I, and MW-111I were installed west of the western landfill cell in a wet and vegetated area. Three shallow wells MW-106S, MW-107S, and MW-108S and two intermediate wells MW-107I and MW-108I were situated between the western and eastern landfill cells close to the drainage area that separates the two landfill cells. One shallow monitoring well MW-105S was located east of the eastern landfill cell, close to the property line. This monitoring well was relocated from its original location due to drill equipment accessibility problems. NYSDEC's representative agreed with the monitoring well MW-105S relocation.

The shallow and intermediate wells were installed to approximate depths of 20 and 45-ft below grade, respectively. The shallow monitoring wells were installed below the fill material. Most of the shallow wells were located within a silt and clay material, with some fine to medium grained sand at the bottom of the well. Shallow monitoring well MW-108S was installed within a fine to medium grained sand and silt. The intermediate monitoring wells were installed within a medium to coarse sand and gravel unit.

One deep monitoring well MW-109D was installed west of the western landfill cell in a cluster with monitoring well MW-109S and MW-109I.

The deep monitoring well MW-109D was installed to an approximate depth of 70-ft within a medium to coarse grained sand.

Boreholes for the monitoring wells were advanced using hollow-stem auger drilling methods. During advancement of each borehole, soil samples were obtained continuously and described as to color, moisture content, density, grain-size distribution, and recovery.

Soil samples from the borings were screened for the presence of VOCs using a portable PID. The PID screening was conducted by placing a representative portion of the sample in a glass jar, covering the jar with aluminum foil, capping the jar, and allowing the sample to equilibrate. After the equilibration time, usually at the end of the well boring, the jar was uncapped and the aluminum foil pierced. The headspace within the jar was then screened using the PID. The PID screening information was recorded on the Test Boring Log.

Upon completion of each borehole, a 2-inch diameter, schedule 40 PVC monitoring well was constructed. Each monitoring well was constructed using a 10-ft long, 0.010-inch slotted PVC well screen flush-threaded to lengths of PVC riser casing. The well materials were installed through the auger string. The driller verified the total depth of the borehole prior to installation of the well by sounding the bottom with a weighted tape.

A sandpack compatible for use with a 0.010-inch slotted screen was installed within the annular space between the well and the borehole wall. The sandpack materials were installed such that sandpack extended a minimum of two feet above the top of the well screen. A bentonite seal was installed on top of the sandpack. A cement/bentonite grout was tremied on top of the bentonite seal. A 4-inch diameter protective steel casing was installed over the well and set in a concrete well pad.

Monitoring well specifications are summarized on Table 1. Boring logs associated with the monitoring wells are included in Appendix B.

Following the completion of the monitoring well installations, each monitoring well was developed to remove fine-grained materials from the sand pack and formation to restore the hydraulic connection between the well and the water-bearing formation. The wells were developed using either disposable bailers or a submersible pump. Measurements of water quality parameters such as pH, conductivity, temperature, and turbidity were monitored and recorded subsequent to the removal of each well volume. Well development water was relatively clear from the shallow monitoring wells MW-107S and MW-110S, the intermediate wells, and deep well after the removal of five well volumes. Ten well volumes were removed from monitoring wells MW-105S and 102I, however the development water remained turbid. Development of monitoring wells MW-106S, MW-108S, MW-109S, and MW-111S was considered complete after removal of two to four well volumes as each of these wells went dry.

3.10. Ground water sample collection

Ground water samples were collected during two events. The first event was during October 2004 and the second event was during March 2005. During the October 2004 ground water sampling event, samples were collected using low-flow purge and sample methods in accordance with the RI Work Plan from the fourteen newly installed monitoring wells. In addition, five existing monitoring wells (MW-101, MW-102, MW-103, MW-104, MW-13) were included in this ground water sampling effort.

Prior to initiation of the ground water sampling, a complete round of ground water elevations was recorded from the entire site monitoring well network. An electronic water level probe was used to measure the depth to water in each well. The depth to water was measured to the nearest 0.01 foot from the surveyed points on the well casings. The depth to water measurements were recorded in the field log book.

Prior to commencing sampling activities, the ground water quality monitoring probes/meters including pH, conductivity, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity were calibrated daily in accordance with the manufacturer's instructions. Calibration results were recorded in the field log notebook. During the purging process the flow rate did not exceed 500 ml/min.

Measurements of pH, conductivity, temperature, ORP, dissolved oxygen, turbidity, depth to water, and flow rate were recorded at approximately 5-minute interval. This allowed at least one full volume of the flow-through cell to be evacuated between each measurement event.

Ground water samples were collected after equilibration of the water quality parameters. Equilibration was defined as follows:

Temperature	+/-3 % of measurement
pH	+/-0.1 pH units
Specific conductance	+/-3 % of measurement
Redox	+/-10 mV
DO	+/-10 % of measurement
Turbidity	+/-10 % of measurement

During the second ground water sampling event (March 2005), ground water samples were collected from seventeen monitoring wells for VOCs, twelve monitoring wells for inorganics, and seven monitoring wells for methane/ethane/ethene analyses. Similar to the first ground water sampling event, low-flow purge and sample methods were used initially; however, purge and sample problems were encountered due to sub-freezing temperatures. The sampling problems were discussed with NYSDEC and an alternative sampling method using disposable bailers was proposed and subsequently accepted by NYSDEC.

Ground water sampling logs from the October 2004 and March 2005 ground water sampling events are provided in Appendix C. Ground water samples collected during the first ground water sampling event were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. Analyses included TCL VOCs and TAL metals from all nineteen wells, and TCL SVOCs and pesticides /PCB from four monitoring wells (MW-102S, MW-105S, MW-108I, MW-109D).

Ground water samples collected during the second ground water sampling event were analyzed by O'Brien & Gere Laboratories in Syracuse, New York. Analyses included TCL VOCs from seventeen monitoring wells, inorganics from twelve monitoring wells, and methane, ethane, and ethene from seven monitoring wells.

3.11. Hydraulic conductivity testing

In situ hydraulic conductivity tests were performed on the fourteen newly installed wells and the existing wells MW-101, MW-102, MW-103, and MW-104. The tests were performed to obtain data necessary to evaluate ground water flow velocities through the subsurface materials. The hydraulic conductivity testing consisted of rising and falling head tests at each well. During the falling head test, an initial change in water level was induced by lowering a solid slug below the water level. The decline in water levels toward the static level was then recorded using a pressure transducer. The rising head test was conducted by withdrawing the solid slug. The subsequent rise in water levels was recorded using a pressure transducer.

The static water level was recorded in each of the wells before the beginning of the test. Water level data generated during the hydraulic conductivity tests were collected using an automated pressure transducer. The transducer was installed in the wells and programmed to record data between 1 and 5 second intervals. At the end of the test, the water level data were downloaded to a computer and the transducer was removed from the well. Interpretation of the water level versus time data from the hydraulic conductivity tests was conducted using the Bower & Rice method using Aquifer^{Win32} software. The hydraulic conductivity test results are provided in Appendix D.

3.12. Decontamination and handling of IDW

The RI activities produced investigation-derived wastes (IDW) which required appropriate management. The management of these materials is discussed below.

Split spoon samplers were decontaminated after each use using a non-phosphate detergent wash followed by a potable water rinse. The decontamination water was periodically changed during the drilling program. These decontamination fluids were transferred to 55-gallon drums.

After the completion of each well borehole, the hollow stem augers, drill rods, and other miscellaneous drilling tools were decontaminated using a high-pressure steam cleaner. This decontamination process was conducted on a temporary decontamination pad. The decontamination fluids were collected and transferred to 55-gallon drums.

After the completion of each test pit, the bucket of the backhoe was decontaminated using a high-pressure steam cleaner. This decontamination process was conducted on a temporary decontamination pad. The decontamination fluids were collected and transferred to 55-gallon drums.

The only piece of non-dedicated ground water sampling equipment that was used was the bladder pump. To decontaminate the bladder pump, the pump was disassembled and the bladder was removed and discarded. The outside and inside of the pump were then washed with a non-phosphate detergent solution. The pump was then rinsed with potable water to remove the detergent solution. A new bladder was installed, and the pump reassembled.

Waters generated during decontamination, well development, and ground water sampling activities were containerized in 55-gallon drums. These drums were transported and staged at the Town of Carroll DPW property. The 55-gallon drums were labeled with the monitoring well identification and the date which the ground water was initially containerized. Based on the ground water analytical results from two sampling events (presented on Tables 23 through 26), the containerized water is not indicative of characteristic hazardous waste as defined by 40 C.F.R 261.24, other than potentially one drum that contained purge water from MW-107S. The ground water analytical data from MW-107S indicated the presence of vinyl chloride at concentrations of 600 ug/L and 250 ug/L during the October 2004 and March 2005 sampling events, respectively. These concentrations of vinyl chloride are above the 40 C.F.R 261.24 maximum concentration for vinyl chloride of 200 ug/L. However, the drum containing purge water from MW-107S also contained purge water from MW-104, MW-106, and MW-107I, which based on ground water analytical data did not contain contaminant concentrations that would be indicative of characteristic hazardous waste per 40 C.F.R 261.24. As such, the vinyl chloride concentration in this drum is likely not indicative of characteristic hazardous waste. Currently, it is anticipated that the containerized water will be discharged to the ground surface at the Site.

Soil cuttings generated during drilling activities were placed in two areas of the western landfill cell. These cuttings were covered with polyethylene sheeting to minimize the potential for contact with precipitation. The polyethylene sheeting was “keyed” into the existing cover material to keep the sheeting in place.

Used PPE and other general refuse were placed in trash bags and disposed of in appropriate waste receptacles.

3.13. Survey

Each of the newly-installed monitoring wells, test pits, surface water, sediment/soil sample locations, leachate seep locations, and surface soil sample locations were surveyed for horizontal and vertical control and incorporated into the site base map. The survey was conducted by a New York State licensed surveyor.

Benchmarks previously identified for control during the Preliminary Site Assessment conducted by ABB-ES were used. Horizontal positions were tied into the New York State Plane Coordinate System (North American Datum 1927). Horizontal accuracy was 0.01-ft. Vertical elevations were relative to mean sea level, 1929 General Adjustment. Monitoring wells were surveyed to the nearest 0.01 feet at the top of the riser pipe (measuring point) and top of protective steel casing. Ground surface at each location was surveyed to the nearest 0.1 feet.

4. RI field investigation results

4.1. Subsurface conditions

4.1.1. Fill

The uppermost material encountered within the boundaries of the landfill cells is fill. Fill materials around the edges of the western cell were observed to be mainly composed of wood debris, metal debris, metal turnings, plastic and glass bottles, plastic sheeting, paper, tires, and drum carcasses. Based on the types of wastes encountered around the perimeter and observed on the surface, the western landfill cell can generally be described as containing a mix of municipal and industrial wastes.

Fill materials around the edges of the southern portion of the eastern cell were observed to be mainly composed of municipal waste such as plastics, miscellaneous metallic debris, paper, and plastic toys. Fill materials around the edges of the northern portion of the eastern cell were observed to be mainly composed of brush and log materials.

Specific descriptions of fill materials and thickness encountered in the test pits completed around the perimeter of the landfill cells are provided on the test pit logs and test pit log summary table contained in Appendix A. Test pits completed around the edges of the landfill cells indicate that the depth of fill ranged from approximately 1-ft at TP-18, TP-20, and TP-23 to approximately 9-ft at TP-12. The top of the fill materials encountered in the perimeter test pits was observed between approximately 0.5-ft and 4-ft.

Some areas within the interior portions of the eastern and western landfill cells contained wastes exposed at or just below the surface. In general, these exposed wastes consisted of drum carcasses, tires and bottles. In addition, exposed wastes were observed between the landfill cells, as well as within the drainage channel that separates the landfill cells.

4.1.2. Geologic conditions

The site is located in the Allegany Plateau physiographic province of New York State near the Village of Frewsburg. The subsurface geologic conditions at the Site are described in the soil boring logs presented in Appendix B.

Subsurface soil information obtained during the advancement of the monitoring well borings was used to construct two cross-sections (A-A' and B-B') through the Site. Cross-sections A-A' and B-B' are shown on Figure 3. The cross-section locations are shown on Figure 2. The cross-section lines were generally oriented parallel to ground water flow in the shallow and intermediate ground water zones.

The following naturally-occurring hydrogeologic units can be differentiated at the Site: lacustrine sandy silt, lacustrine silty clay, sand and gravel, till, and bedrock.

Lacustrine sandy silt and silty clay

The uppermost naturally occurring material encountered outside of the boundaries of the landfill cells and underlying the fill consists of a yellowish brown, stiff, fine sandy silt with some clay. This sandy silt unit varies in thickness from 5-ft (southwest) to 10-ft (northeast). Underlying this unit is a medium gray, stiff, silty clay unit. This silty clay unit varies in thickness from about 3-ft to 10-ft (southwest) to about 8-ft (northeast). The total depth of these units range from 7-ft to 20-ft below ground surface.

Glacial outwash sand and gravel

An outwash sand and gravel was encountered underlying the lacustrine sandy silt and silty clay unit. The sand and gravel unit consists of yellowish brown, medium dense, fine to coarse sand and gravel with some silt. The total depth of this unit is approximately 45 ft below ground surface.

Till

Till was encountered at the MW-109D location underlying the outwash sand and gravel unit. The glacial till consists of olive gray, very dense, gravel and medium to coarse sand with few cobbles. This unit has a thickness of about 15 ft.

Bedrock

Bedrock was not encountered at the Site during this field investigation. The uppermost bedrock formations consist of upper Devonian age shale and siltstone of the Conneaut Group. The formations may also include limited beds of sandstone and conglomerate (Rickard and Fisher, 1970). Previous activities completed for the investigation for the Frewsburg Water District encountered weathered shale bedrock at 76 to 81 ft below ground surface (Moody & Associates, May 1993).

4.1.3. Hydrogeologic conditions

Ground water elevation data collected on October 11, 2004 and March 7, 2005 are summarized on Table 1. These data were used to generate shallow and intermediate ground water elevation contour maps. The October 14, 2004 shallow and intermediate ground water elevation contour maps are provided as Figures 4 and 5, respectively. The March

7, 2005 shallow and intermediate ground water elevation contour maps are provided as Figures 6 and 7, respectively.

As shown on the shallow ground water elevation contour maps (Figures 4 and 6), there is a flow component within the shallow ground water to the west-northwest towards Conewango Creek. However, during the October 14, 2004 monitoring event, there was also a flow component near monitoring wells MW-109S and MW-110S to the west-southwest, which was not evident based on the March 7, 2005 ground water elevation data. The Frewsburg Water District Supply Well #5 is located about 300-ft southwest of monitoring wells MW-109 and MW-102. It is likely that ground water flow direction is being influenced and redirected by initiation of pumping activities of the supply well in January 1995.

Ground water in the intermediate zone, as shown on Figures 5 and 7, flows to the southwest. Ground water in the intermediate zone is likely influenced, as well, by the pumping activities of the supply well.

Based on the October 14, 2004 ground water elevations in the shallow wells, the shallow hydraulic gradient was higher across the southern portion of the landfill cells compared to the hydraulic gradient across the northern portion of the landfill cells. The shallow hydraulic gradient ranged from approximately 0.006 ft/ft to 0.008 ft/ft across the southern portion of the eastern and western landfill cells, respectively, to 0.002 ft/ft to 0.003 ft/ft across the northern portion of the eastern and western landfill cells, respectively.

Similar to the October 14, 2004 monitoring event, the shallow hydraulic gradient was higher across the southern portion of the landfill cells compared to the hydraulic gradient across the northern portion of the landfill cells based on the March 7, 2005 shallow well ground water elevation data. The shallow hydraulic gradient ranged from approximately 0.009 ft/ft to 0.006 ft/ft across the southern portion of the eastern and western landfill cells, respectively, to 0.006 ft/ft to 0.0006 ft/ft across the northern portion of the eastern and western landfill cells, respectively.

Based on the October 14, 2004 ground water elevations in the intermediate wells, a fairly uniform hydraulic gradient of approximately 0.004 ft/ft, was evident across the western landfill cell. Based on the March 7, 2005 ground water elevations, the intermediate hydraulic gradient ranged from 0.004 ft/ft to 0.002 ft/ft across the northern and southern portions of the western landfill cell, respectively.

Ground water elevations of the shallow, intermediate and deep wells cluster were used to evaluate the vertical hydraulic gradients at the Site. The vertical hydraulic gradients based on the October 11, 2004 and March 7, 2005 monitoring events are summarized on Table 2.

As shown on Table 2, downward hydraulic gradients were evident at well pairs MW-107S/MW-107I, MW-108S/MW-108I, MW-110S/MW-110I, and MW-111S/MW-111I based on the October 14, 2004 ground water elevations. These downward hydraulic gradients ranged from 0.026 ft/ft at the MW-107S/MW-107I well pair to 0.101 ft/ft at the MW-108S/MW-108I well pair. An upward hydraulic gradient was evident at the MW-109S/MW-109I/MW-109D well cluster. Comparison of the vertical hydraulic gradient based on the October 14, 2004 ground water elevations to the hydraulic gradients based on the March 7, 2005 ground water elevations indicates that downward hydraulic gradients continued to be evident at well pairs MW-108S/MW-108I, MW-110S/MW-110I, and MW-111S/MW-111I. The hydraulic gradients at well pairs MW-107S/MW-107I and MW-109S/MW-109I showed a reversal from downward based on the October 14, 2004 ground water elevation data to upward based on the March 7, 2005 ground water elevation data. The hydraulic gradient at the MW-109I/MW-109D well pair which was upward based on the October 14, 2004 ground water elevation data showed no gradient based on the March 7, 2005 ground water elevation data.

In situ hydraulic conductivity tests were performed on eighteen shallow, intermediate, and deep monitoring wells. The hydraulic conductivity results are summarized on Table 3.

Results indicate that hydraulic conductivity of the shallow hydrogeologic unit range from 0.05 ft/day (MW-105S and MW-108S) to 0.5 ft/day (MW-101). The hydraulic conductivity of the intermediate zone of the sand and gravel is more variable. Hydraulic conductivity values from the intermediate wells range from 0.16 ft/day (MW-110I) to 9.72 ft/day (MW-109I). The hydraulic conductivity of the deep sand and gravel based on data from MW-109D is 2.85 ft/day.

The geometric mean hydraulic conductivity of the intermediate sand and gravel is approximately one order of magnitude higher than the hydraulic conductivity of the lacustrine silts and clay of the shallow hydrogeologic unit. The low hydraulic conductivity values from the shallow wells are representative of the finer grained surficial sandy silt and silty clay units at the Site. Conductivity values from the intermediate wells are representative of the coarser grained sand and gravel unit.

4.2. RI analytical results

The evaluation of the environmental data consisted of comparison of the analytical results with potentially applicable standards, criteria, and guidance values (SCGs) to screen the data for potential constituents of concern. The potentially applicable SCGs used for comparison to the RI analytical data are summarized on Table 4-1 below.

Table 4-1 *Standards, criteria, and guidance*

Sample Media	***Standards, criteria, and guidance reference***
Soil	NYSDEC Technical Administrative Guidance Memorandum Number 4046 (TAGM #4046) – Recommended Soil Cleanup Objectives (RSCOs)
Sediment	NYSDEC Technical Guidance for Screening Contaminated Sediments
Surface water	NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria
Leachate	NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria
Soil vapor	USEPA, 2002 - OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)
Surface soil	NYSDEC Technical Administrative Guidance Memorandum Number 4046 (TAGM #4046) – Recommended Soil Cleanup Objectives
Ground water	NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class GA Ground Water Criteria

Source: O'Brien & Gere Engineers, Inc.

Laboratory data sheets associated with the samples analyzed as part of the RI are provided in Appendix E.

4.2.1. Soil vapor

Each soil vapor monitoring point was screened for total VOCs using a PID. The initial measurements of total VOCs were relatively low and measurements recorded after stabilization of the meter readings were at, or close to, the general background levels for ambient air.

Landfill gases were also measured for oxygen (O_2), carbon dioxide (CO_2), and methane (CH_4). Many locations had detected concentrations that were consistent with normal atmospheric concentrations for O_2, CO_2, CH_4, and balance gases. For many other locations the distribution of gases was not consistent with atmospheric levels or well correlated among sample locations. Most of these locations had low levels of O_2 (less than 0.80 of atmospheric levels) corresponding to high levels of CO_2 (greater than 10 times atmospheric levels), which would indicate aerobic microbial activity. Detectable levels of CH_4 were recorded at soil vapor sample locations SV-09 (14 %), SV-21 (2.5 %), and SV-30 (3.8 %), which would indicate anaerobic microbial activity at these locations. Note that measured balance gases (primarily comprising nitrogen in ambient air) were also relatively low at two of the locations (SV-09 and SV-21) that had detected levels of CH_4. The results of the soil vapor field screening are presented in Table 4.

Based on the total VOC screening data, four soil vapor samples were collected for laboratory analysis (SV-16, SV-19, SV-31, and SV-34). Soil vapor analytical data are summarized on Table 5.

As indicated on Table 5, petroleum hydrocarbons, including BTEX, were detected in all four of the soil vapor samples analyzed. Benzene was detected at up to 6 $\mu g/m^3$ while toluene, ethylbenzene, and xylene were detected at up to 35 $\mu g/m^3$, 6 $\mu g/m^3$, and 21 $\mu g/m^3$, respectively. Trichloroethylene was detected in sample SV-16 at 18 $\mu g/m^3$ while tetrachlorothene was detected in samples SV-19 and SV-31 at estimated concentrations of 4 $\mu g/m^3$ and 0.3 $\mu g/m^3$, respectively.

Several constituents associated with refrigerants were detected. Dichlorodifluoromethane and trichlorofluoromethane were detected in all four of the soil vapor samples analyzed. The maximum detected concentrations of dichlorodifluoromethane and trichlorofluoromethane were in sample SV-16 and the maximum concentrations were 7,600 $\mu g/m^3$ and 56 $\mu g/m^3$, respectively.

As indicated on Table 5, relatively low levels of several other VOCs were detected in the soil vapor samples. A table summarizing the frequency of VOC detections is provided in Appendix F.

4.2.2. Surface soil

Five surface soil samples (SS-06, SS-07, SS-08, SS-09, and SS-10) were analyzed during the RI field investigation. Surface soil samples were analyzed for inorganics and pesticide/PCBs. The analytical data for inorganics and pesticide/PCBs are presented on Tables 6 and 7, respectively. A table summarizing the frequency of inorganic, pesticide/PCB, SVOC, and VOC constituents exceeding SCGs and frequency of detections of these constituents is provided in Appendix F.

Inorganics

As summarized on Table 6, eleven inorganic constituents were detected at concentrations exceeding TAGM 4046 Recommended Soil Cleanup Objectives (RSCOs). The majority of inorganic concentrations detected above TAGM 4046 RSCOs fall within, or are similar to the range of Eastern United States and/or New York State background concentration ranges provided in TAGM 4046.

Based on a review of the inorganic data provided on Table 6, the concentrations of the following inorganics fall outside the range of concentrations at other surface soil locations and may be related to the landfill:

- barium at SS-09
- cadmium at SS-09
- lead at SS-09 and SS10

- zinc at SS-09 and SS-10

Pesticides/PCBs
As summarized on Table 7, seven pesticide compounds were detected in the surface soil samples. Detected concentrations of pesticides ranged from 0.001 mg/Kg of alpha-Chlordane at SS-06 to 0.019 mg/Kg of endrin at SS-06. None of the detected pesticide concentrations exceeded the TAGM 4046 RSCOs.

One PCB aroclor (Aroclor-1260) was detected in surface soil samples SS-08 and SS-09 at concentrations of 0.044 mg/Kg and 0.05 mg/Kg, respectively. The detected concentrations are below the TAGM 4046 RSCO of 1 mg/Kg for surface soil. PCBs were not detected in the SS-06 or SS-07 samples. The Aroclor-1260 result from sample SS-10 was rejected during data validation.

4.2.3. Surface water

Five surface water samples (SW-1, SW-2, SW-3, SW-4, and SW-5) were analyzed during the RI field investigation. Surface water samples were analyzed for SVOCs and inorganics. Pesticide/PCBs were also analyzed from the SW-4 sample. The analytical data for SVOCs, inorganics, and pesticide/PCBs are presented on Tables 8, 9, and 10, respectively. A table summarizing the frequency of inorganic, pesticide, and SVOC constituents exceeding SCGs and frequency of detections of these constituents is provided in Appendix F.

SVOCs
As indicated on Table 8, SVOCs were only detected in surface water sample SW-1. Detected SVOCs included acetophenone, phenol, 2-methylphenol, and 4-methylphenol. Of these four SVOCs, only phenol was detected at a concentration that exceeded the NYS Class C water quality criteria. Surface water sample SW-1 was collected from the upstream section of the northern drainage swale north of the eastern landfill cell.

Inorganics
As indicated on Table 9, six inorganic constituents (aluminum, cobalt, iron, lead, vanadium, and zinc) were detected at concentrations exceeding NYS Class C water quality criteria.

Pesticide/PCBs
The surface water sample collected at SW-4 was analyzed for pesticides/PCBs in addition to SVOCs and inorganics. The SW-4 sample was collected in the northern portion of the drainage area that separates the two landfill cells. As indicated on Table 10, neither pesticides nor PCBs were detected in the SW-4 sample.

4.2.4. Sediment

Five sediment samples (SED-01, SED-02, SED-03, SED-04, and SED-05) co-located with the surface water samples were analyzed for VOCs, SVOCs, inorganics, and TOC. The analytical data for VOCs, SVOCs, inorganics, and TOC are presented on Tables 11, 12, 13, and 14, respectively. A table summarizing the frequency of inorganic, SVOC, and VOC constituent detections is provided in Appendix F.

VOCs

As indicated on Table 11, five VOCs (acetone, 2-butanone, cis-1,2-dichloroethene, toluene, and styrene) were detected in the sediment samples. The most prevalent VOC detected was acetone which was detected in the five sediment samples ranging in concentration from 2 ug/Kg at SED-03 to 39 ug/Kg at SED-05. As indicated on Table 11, the remaining detected VOCs were detected once in different sediment samples.

SVOCs

As indicated on Table 12, two SVOCs were detected in the sediment samples. Benzaldehyde was detected in SED-01 at a concentration of 61 ug/Kg and bis(2-ethylhexyl)phthalate was detected in SED-03 at concentration of 87 ug/Kg.

Sediment sample SED-01 was collected from a drainage swale north of the landfill cells and sediment sample SED-03 was collected from the wet area west of the western landfill cell. No indications of sheen were noted on the surface waters around these sampling locations.

Inorganics

As indicated on Table 13, inorganics were detected in each of the five sediment samples. Of the detected inorganics, iron in the SED-03 and SED-04 samples and manganese in the SED-03 sample were detected at concentrations exceeding the Severe Effect Level criteria.

Total organic carbon

Table 14 summarizes the total organic carbon data. These data were collected to allow normalization of constituent concentrations for comparison to NYSDEC criteria.

4.2.5. Subsurface soil

A total of eight subsurface soil samples were analyzed. Five subsurface soil samples (TP-04/SS-1, TP-07/SS-2, TP-08/SS-5, TP-10/SS-4, and TP-11/SS-3) were collected and analyzed from the test pits. These subsurface soil samples were analyzed for VOCs, SVOCs, and inorganics. In addition, subsurface soil samples collected from TP-11/SS-3, TP-10/SS-4, and TP-08/SS-5 were also analyzed for pesticides/PCBs.

Three subsurface soil samples (SOIL-01, SOIL-02, and SOIL-03) were collected and analyzed from locations co-located with the leachate seep samples. These subsurface soil samples were analyzed for VOCs and inorganics.

The analytical data for subsurface soil VOCs, SVOCs, inorganics, and pesticide/PCBs are presented on Tables 15, 16, 17, and 18, respectively. A table summarizing the frequency of inorganic, SVOC, and VOC constituents exceeding SCGs and frequency of detections of these constituents is provided in Appendix F.

VOCs

As indicated on Table 15, fifteen VOCs were detected in the subsurface soil samples. Detected VOC concentrations ranged from 1 ug/Kg of chlorobenzene in the SOIL-02 sample to 150 ug/Kg of 1,4-dichlorobenzene in the TP-07/SS-2 sample.

The highest number of VOCs (eight compounds) were detected in the SOIL-01 sample, which was collected from an area of discolored soil. The sample collected from SOIL-03 contained the highest detected VOC concentrations, 100 ug/Kg of cis-1,2-dichloroethene and 130 ug/Kg of trichloroethylene. However, none of the VOCs were detected at concentrations exceeding TAGM 4046 RSCOs.

SVOCs

As indicated on Table 16, ten SVOCs were detected in the subsurface soil samples. Detected SVOC concentrations ranged from 45 ug/Kg of benzyl butyl phthalate in the TP-11/SS-3 sample to 62,000 ug/Kg of bis(2-ethylhexyl)phthalate in the TP-07/SS-2 sample. Of the detected SVOCs, bis(2-ethylhexyl)phthalate in the TP-07/SS-2 sample was the only compound detected at a concentration exceeding TAGM 4046 RSCOs.

The subsurface soil sample collected at TP-11/SS-3 contained the highest number of detected SVOCs. This sample was collected from soil located adjacent to a drum carcass. Subsurface soil samples at TP-07/SS-2 and TP-11/SS-3 contained the highest SVOCs concentrations.

Inorganics

As indicated on Table 17, inorganics were detected in each of the subsurface soil samples. Eleven inorganics were detected at concentrations exceeding TAGM 4046 RSCOs. The majority of inorganic concentrations detected above TAGM 4046 RSCOs fall within, or are similar to the range of Eastern United States background concentration ranges.

Based on a review of the inorganic data provided on Table 17, the concentrations of the following inorganics fall outside the range of concentrations at other subsurface soil locations and may be related to the landfill:

- cadmium in the TP-07/SS-2 sample

- chromium in the TP-07/SS-2, TP-10/SS-4, and TP-11/SS-3 samples
- cobalt in the TP-07/SS-2, TP-10/SS-4, and TP-11/SS-3 samples
- copper in the TP-07/SS-2, TP-10/SS-4, and TP-11/SS-3 samples
- mercury in the TP-07/SS-2 sample
- nickel in the TP-07/SS-2, TP-10/SS-4, and TP-11/SS-3 samples
- zinc in the TP-07/SS-2 sample

As shown above, the subsurface soil sample collected from TP-07 contained the majority of inorganic constituents that may be considered as resulting from landfill impacts.

Pesticides/PCBs
As indicated on Table 18, pesticides were detected in two subsurface soil samples (TP-10/SS-4 and TP-11/SS-3). Detected pesticide concentrations ranged from 0.0014 mg/Kg of alpha-Chlordane in the TP-11/SS-3 sample to 0.02 mg/Kg of endrin in the TP-10/SS-4 sample. None of the detected pesticide concentrations exceeded the TAGM 4046 RSCOs.

As indicated on Table 18, PCBs were detected in two subsurface soil samples (TP-10/SS-4 and TP-11/SS-3). Detected PCB concentrations ranged from 0.12 mg/Kg of Aroclor-1260 in the TP-11/SS-3 sample to 0.81 mg/Kg of Aroclor-1260 in the TP-10/SS-4 sample. None of the detected PCB concentrations exceeded the TAGM 4046 RSCOs of 10 mg/Kg for subsurface soil.

4.2.6. Leachate seeps

Three leachate seep samples (LT-01, LT-02, and LT-03) were collected. The leachate seep samples were analyzed for VOCs and inorganics. In addition, the leachate seep sample collected at LT-02 was also analyzed for SVOCs and pesticides/PCBs.

The analytical data for leachate seep VOCs, SVOCs, inorganics, and pesticide/PCBs are presented on Tables 19, 20, 21, and 22, respectively. A table summarizing the frequency of inorganic and VOC constituent detections is provided in Appendix F.

VOCs
As indicated on Table 19, four VOCs (acetone, cis-1,2-dichloroethene, trichloroethene, and chlorobenzene) were detected in the leachate seep samples. Detected VOC concentrations ranged from 1 ug/L of chlorobenzene in the LT-01 sample to 24 ug/L of cis-1,2-dichloroethene in the LT-03 sample. VOCs were not detected in the LT-02 sample.

The highest detected VOC concentrations were in leachate sample LT-03, which was collected off the northwest corner of the western landfill from an area exhibiting a visible sheen.

The detected concentrations of trichloroethene and chlorobenzene are below the established NYS Class C water quality criteria. Criteria have not been established for NYS Class C water quality for acetone or cis-1,2-dichloroethene.

SVOCs
As indicated on Table 20, SVOCs were not detected in leachate seep sample collected from the LT-02 location.

Inorganics
As indicated on Table 21, twelve inorganic constituents were detected in the leachate seep samples at concentrations exceeding NYS Class C water quality criteria. The most numerous and highest detected concentrations of the inorganic constituents were from the leachate seep sample collected from the LT-03 location.

Pesticides/PCBs
As indicated on Table 22, neither pesticides nor PCBs were detected in the leachate seep sample collected from the LT-02 location.

4.2.7. Ground water

Passive diffusion bag sampling
Four passive diffusion bags (PDBs) were installed at four depths intervals (37-39-ft, 47-49-ft, 57-59-ft, and 67-69-ft) at monitoring well MW-13. Ground water samples collected using the PDBs were analyzed for VOCs. The purpose of this sampling was to evaluate potential vertical stratification of VOCs within the 40-ft screened interval of monitoring well MW-13. The VOC analytical data for the four discrete depth interval samples from MW-13 are provided on Table 23.

As indicated on Table 23, three VOCs (vinyl chloride, acetone, and cis-1,2-dichloroethene) were detected in the samples from the four discrete depth intervals within MW-13. As shown on Table 23, the magnitude of detected VOC concentrations from the four discrete depth intervals was similar. Vinyl chloride concentrations ranged from 0.8 ug/L to 1 ug/L, acetone ranged from 3 ug/L to 5 ug/L, and cis-1,2-dichloroethene concentrations ranged from 1 ug/L to 2 ug/L.

Temporary well sampling
Three temporary wells (TW-TP-02, TW-TP-06, TW-TP-22) were installed in three test pits to evaluate the quality of water that may be perched within the fill materials. The temporary well samples were analyzed for VOCs. In addition, the sample from TW-TP-02 was analyzed for SVOCs, inorganics, and pesticide/PCBs. The VOC, SVOC, inorganic, and pesticide/PCB analytical data are summarized on Tables 23, 24, 25, and 26, respectively.

VOCs
As indicated on Table 23, nine VOCs were detected in the temporary well samples. Benzene and xylene were detected in the TW-TP-02 sample at concentrations of 2 ug/L and 11 ug/L, respectively, which exceed the NYS Class GA ground water standards of 1 and 5 ug/kg, respectively. Other VOCs detected in the temporary well samples included acetone, carbon disulfide, cis-1,2-dichloroethene, toluene, chlorobenzene, ethylbenzene, and 1,4-dichlorobenzene. The concentrations of these VOCs were below the NYS Class GA ground water standards.

SVOCs
As indicated on Table 24, eight SVOCs were detected in the TW-TP-02 sample. Three constituents, 4-methylphenol (60 ug/L), 4-chloro-3-methylphenol (5 ug/L), and 4-nitrophenol (2 ug/L), were detected above the NYS Class GA ground water standards of 1 ug/L for each compound.

Inorganics
As indicated on Table 25, eight inorganic constituents were detected in the TW-TP-02 sample at concentrations exceeding NYS Class GA ground water standards. The eight constituents include arsenic, barium, chromium, iron, lead, magnesium, manganese, and thallium.

Pesticides/PCBs
As indicated on Table 26, neither pesticides nor PCBs were detected in the TW-TP-02 sample.

<u>Monitoring well sampling</u>
Ground water samples were collected during two events. The first event was during October 2004 and the second event was during March 2005. During the October 2004 ground water sampling event, samples were collected and analyzed for VOCs and inorganics from the nineteen monitoring wells. In addition, ground water samples were analyzed for SVOCs and pesticide/PCBs from monitoring wells MW-102, MW-105S, MW-108I, MW-109D. During the second ground water sampling event, ground water samples were collected from seventeen monitoring wells for VOCs, twelve monitoring wells for inorganics, and seven monitoring wells for methane/ethane/ethene analyses.

Based on installation depths and corresponding subsurface geologic conditions, the monitoring wells monitor ground water quality in shallow, intermediate, and deep zones. The shallow monitoring wells screen the silt and clay, and the upper 2-ft to 6-ft of the underlying sand and gravel, which will be described as the shallow zone. The intermediate and deep monitoring wells screen the intermediate and deep portion(s) of the sand and gravel, which will be described as the intermediate and deep zones. The monitoring wells are installed in the following zones:

<u>Shallow zone:</u> MW-101, MW-104, MW-105S, MW-106S, MW-107S, MW-108S, MW-109S, MW-110S, and MW-111S

Intermediate zone: MW-102, MW-102I, MW-103, MW-107I, MW-108I, MW-109I, MW-110I, MW-111I, and MW-13

Deep zone: MW-109D and MW-13

Note that monitoring well MW-13 was constructed with a 40-ft screened interval, which is positioned across the intermediate and deep zones.

The VOC, SVOC, inorganic, and pesticide/PCB analytical results are summarized on Tables 23, 24, 25, and 26, respectively. A table summarizing the frequency of inorganic, pesticide, SVOC, and VOC constituents exceeding SCGs and frequency of detections of these constituents is provided in Appendix F.

VOCs

As indicated on Table 23, a total of eleven VOCs were detected in the ground water samples. These eleven VOCs comprise dichlorodifluoromethane, vinyl chloride, chloroethane, carbon disulfide, trans-1,2-dichloroethene, 1,1-dichloroethane, cis-1,2-dichloroethene, 1,2-dichloroethane, benzene, toluene, and acetone. VOC concentrations were detected above NYS Class GA ground water standards in one shallow and one intermediate monitoring well as described below.

Within the shallow ground water zone, eight VOCs were detected. The results of the October 2004 sampling event indicated that four VOCs were detected in the MW-107S sample at concentrations exceeding NYS Class GA ground water standards. MW-107S is located hydraulically downgradient of the northern portion of the eastern landfill cell. The four VOCs detected in the MW-107S sample that exceeded ground water standards included dichlorodifluoromethane (9 ug/L), vinyl chloride (600 ug/L), cis-1,2-dichloroethene (69 ug/L), and 1,2-dichloroethane (2 ug/L). The results of the March 2005 ground water sampling event indicated that concentrations of vinyl chloride (250 ug/L) and cis-1,2-dichloroethene (25 ug/L) exceeded ground water standards in the MW-107S sample.

VOCs were detected in shallow monitoring wells MW-104, MW-106S, MW-108S, and MW-111S, but at concentrations below the NYS Class GA ground water standards. VOCs were not detected in shallow monitoring wells MW-101, MW-105S, MW-109S, or MW-110S.

Within the intermediate ground water zone, six VOCs were detected. The results of the October 2004 ground water sampling event indicated that three VOCs were detected in the MW-102I sample at concentrations exceeding NYS Class GA ground water standards. MW-102I is located hydraulically downgradient of the southern portion of the western landfill cell. The three VOCs detected in the MW-102I sample that exceeded ground water standards included vinyl chloride (5 ug/L), chloroethane (7 ug/L), and cis-1,2-dichloroethene (14 ug/L). The results of the March 2005 ground water sampling event indicated that concentrations of vinyl chloride (3 ug/L) and cis-1,2-dichloroethene (6 ug/L) exceeded ground water standards in the MW-102I sample.

In addition to the VOCs detected in MW-102I, VOCs were detected in intermediate monitoring wells MW-102, MW-107I, MW-108I, and MW-110I, but at concentrations below the NYS Class GA ground water standards. VOCs were not detected in intermediate monitoring wells MW-103, MW-109I, or MW-111I.

One monitoring well (MW-109D) is screened entirely within the deeper portion of the sand and gravel unit. Within this deep ground water zone, two VOCs were detected based on the results of the October 2004 sampling event. Vinyl chloride and toluene were detected at concentrations of 1 ug/L and 0.8 ug/L, respectively. Based on the results of the March 2005 sampling event, acetone, methylene chloride, and cis-1,2-dichloroethene were detected at concentrations of 3 ug/L, 0.7 ug/L, and 1 ug/L, respectively. None of the detected VOC concentrations in the MW-109D samples exceeded NYS Class GA ground water standards.

The Chautauqua County Department of Health (CCDOH) has been conducting ground water sampling of the Frewsburg Water District Supply Well # 5 and sentinel well MW-13 on a periodic basis. Available VOC analytical results from the CCDOH are summarized in Table 27.

Based on available data from the CCDOH, vinyl chloride and cis-1,2-DCE have been detected in the Town of Carroll supply well MW-5 since 2003. These detections range from 0.5 ug/L to 0.9 ug/L for vinyl chloride and 0.9 ug/L to 2.7 ug/L for cis-1,2- DCE. These detected concentrations were below drinking water standards.

Concentrations of Freon-12, vinyl chloride, chloroethane, and cis-1,2 DCE have been consistently detected in sentinel well MW-13 since July 2003. Vinyl chloride has been consistently detected above the New York State Class GA ground water standard of 2 ug/L since October 2002. Review of data provided on Table 27 indicate that concentrations of vinyl chloride have been slowly increasing between 2002 and 2005. Concentrations of cis-1,2-DCE have also been detected above the New York State Class GA ground water standard of 5 ug/L in samples collected during August and October 2004, and June 2005. Review of data provided on Table 27 indicate that concentrations of cis-1,2-DCE have been slowly increasing between 2003 and 2005.

SVOCs

As indicated on Table 24, ground water samples from four monitoring wells (MW-102, MW-105S, MW-108I, and MW-109D) were analyzed for SVOCs. One SVOC, bis(2-ethylhexyl)phthalate, was detected in one intermediate monitoring well (MW-108I at 1 ug/L) and one deep monitoring well (MW-109D at 2 ug/L). The detected bis(2-ethylhexyl)phthalate concentrations are below the NYS Class GA ground water standard. SVOCs were not detected in shallow monitoring well MW-105S or intermediate monitoring well MW-102.

Inorganics
As indicated on Table 25, several inorganic constituents were detected at concentrations exceeding NYS Class GA ground water standards.

Within the shallow ground water zone, inorganic constituents that exceeded ground water standards based on the results of the October 2004 sampling event included the following:

- arsenic at MW-101, MW-104, MW-105S, MW-110S, and MW-111S
- barium at MW-108S
- iron at MW-101, MW-104, MW-105S, MW-106S, MW-107S, MW-108S, MW-109S, MW-110S, and MW-111S
- lead at MW-110S
- magnesium at MW-107S
- manganese at MW-108S

Within the shallow ground water zone, inorganic constituents that exceeded ground water standards based on results of the March 2005 sampling event included the following:

- arsenic at MW-108S
- chromium at MW-108S
- iron at MW-104, MW-105S, MW-107S, MW-108S, MW-109S, and MW-110S
- magnesium at MW-104 and MW-107S
- sodium at MW-104

Within the intermediate ground water zone, inorganic constituents that exceeded ground water standards based on the results of the October 2004 sampling event included the following:

- arsenic at MW-110I
- beryllium at MW-110I
- chromium at MW-110I
- iron at MW-102I, MW-103, MW-107I, MW-108I, MW-109I, MW-110I, and MW-111I
- lead at MW-109I and MW-110I
- magnesium at MW-110I
- manganese at MW-110I
- thallium at MW-110I

Within the intermediate ground water zone, inorganic constituents that exceeded ground water standards based on the results of the March 2005 sampling event included the following:

- arsenic at MW-109I
- cadmium at MW-102
- iron at MW-102, MW-102I, MW-108I, MW-109I, and MW-110I
- lead at MW-109I
- manganese at MW-109I

- thallium at MW-109I

Within the deep ground water zone, inorganic constituents that exceeded ground water standards based on the results of the October 2004 sampling event included the following:

- iron at MW-109D and MW-13

Within the deep ground water zone, inorganic constituents that exceeded ground water standards based on the results of the March 2005 sampling event included the following:

- iron at MW-109D

Pesticides/PCBs
As indicated on Table 26, ground water samples from four monitoring wells (MW-102, MW-105S, MW-108I, MW-109D) were analyzed for pesticides/PCBs. Neither pesticides nor PCBs were detected in the ground water samples.

Methane, ethane, and ethene
Ground water samples were collected and analyzed for methane, ethane, and ethene during the March 2005 ground water sampling event. These constituents were analyzed to provide a preliminary indication as to whether vinyl chloride detected during the first ground water sampling event may be undergoing degradation. If suitable geochemical conditions are present, vinyl chloride may degrade to ethene, which in turn may degrade to ethane.

As indicated on Table 28, ethene was detected in monitoring wells MW-107S and MW-102I. Vinyl chloride was also detected in these monitoring wells at concentrations above the ground water standards. The presence of ethene at these locations suggests that geochemical conditions near these monitoring wells are serving to allow degradation of vinyl chloride. Also, ethane was detected in shallow monitoring wells MW-107S and MW-110S, and intermediate wells MW-102, MW-102I, MW-103, MW-107I, and MW-110I, suggesting that ethene is degrading to ethane.

4.3. Data usability

Certain analytical data collected as part of the RI were evaluated as to their usability. Data usability summary reports are provided in Appendix G. For the most part, the data are usable for the purposes of evaluating constituent concentrations in the environmental media analyzed. Some analytical results were rejected as follows:

Pesticides/PCBs:

- endrin and Aroclor-1260 in surface soil sample SS-10

- 4,4'-DDE, endosulfan II, 4,4'-DDD, endosulfan sulfate, methoxychlor, and endrin aldehyde in subsurface soil sample TP-10/SS-4
- gamma-chlordane in subsurface soil sample TP-11/SS-3
- methoxychlor in subsurface soil sample TP-8/SS-5

Inorganics:

- Lead in subsurface soil samples TP-04/SS-1, TP-07/SS-2, TP-10/SS-4, TP-11/SS-3, TP-8/SS-5
- Calcium in ground water samples MW-101, MW-102, MW-102I, MW-104, MW-105S, MW-106S, MW-107I, MW-108S, MW-108I, MW-109S, MW-109I, MW-109D, MW-110S, MW-111S, MW-111I, and MW-13
- Magnesium in ground water samples MW-101, MW-102, MW-102I, MW-104, MW-105S, MW-106S, MW-107I, MW-108S, MW-108I, MW-109S, MW-109I, MW-109D, MW-110S, MW-111S, MW-111I, and MW-13
- Sodium in ground water samples MW-101, MW-102, MW-102I, MW-103, MW-104, MW-105S, MW-106S, MW-107S, MW-107I, MW-108S, MW-108I, MW-109S, MW-109I, MW-109D, MW-110S, MW-110I, MW-111S, MW-111I, and MW-13

The rejections of the above data are explained in the data usability summary reports provided in Appendix G. While data associated with the second round of ground water sampling have not been validated, validatable data packages were received from the laboratory if validation is deemed necessary.

5. Nature and extent of contamination

The analytical results described above indicate that several VOC, SVOC, inorganic, and pesticides/PCB constituents were detected in environmental media at the Site. However, few constituents were detected above potentially applicable SCGs.

The following provides a summary of the VOCs, SVOCs, inorganics, and pesticides/PCBs that were detected at concentrations exceeding potentially applicable SCGs and the extent of those exceedances. The areal distribution of organic and inorganic constituents that were detected at concentrations exceeding potentially applicable SCGs in soil vapor, surface water and sediment, surface soil, subsurface soil, leachate, and ground water are shown on Figures 8, 9, 10, 11, 12, and 13, respectively.

5.1. Volatile organic compounds

VOCs were analyzed in samples from the following environmental media:

- sediment (5 samples)
- subsurface soil (8 samples)
- leachate seeps (3 samples)
- soil vapor (4 samples)
- ground water (25 samples)

VOCs were detected in each of the media sampled; however, concentrations within the sediment, subsurface soil, and leachate seep samples were below potentially applicable SCGs.

VOCs were detected in soil vapor within the boundaries of the landfill cells at concentrations that exceeded the generic screening levels for target shallow soil gas concentrations at a risk level of 10^{-4} (OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), USEPA, 2002). The soil vapor data were screened according to OSWER draft guidance to evaluate potential vapor impacts relative to potential future uses of the landfill property. However, occupied structures are not currently present in the immediate vicinity of the landfill, therefore the potential for vapor impacts are considered minimal.

Review of the soil vapor VOC data provided on Table 5 indicates that detected VOCs consist mainly of aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, and refrigerant compounds. The highest concentrations of VOCs were generally detected in the soil vapor sample collected at SV-16. The magnitudes of detected concentrations in the soil vapor samples are relatively low and do not appear indicative of the presence of a significant source at the soil vapor sample locations. Soil vapor samples werecollected within the waste limits. The potential for vapor detections outside waste limit boundaries was not assessed; however, it is assumed to be less than within the waste limits.

With respect to VOCs, ground water was the only environmental medium sampled from which concentrations exceeded potentially applicable SCGs. As shown on Figure 13, concentrations of dichlorodifluoromethane, vinyl chloride, cis-1,2-dichloroethene, and 1,2-dichloroethane were detected within the shallow ground water in one monitoring well (MW-107S) above the NYS Class GA ground water standards. Concentrations of dichlorofluoromethane and 1,2-dichloroethane were slightly elevated above the NYS Class GA ground water standards. The concentrations of vinyl chloride and cis-1,2-dichloroethene were more significantly elevated above the ground water standards.

MW-107S is located hydraulically downgradient of the northern portion of the eastern landfill cell and immediately adjacent to the western landfill cell. The source of the vinyl chloride and cis-1,2-dichloroethene concentrations detected in MW-107S is uncertain, but likely attributable to fill materials in the western landfill cell. As shown on Figure 13, VOC analytical data from monitoring well MW-106 (located hydraulically upgradient of MW-107S), monitoring wells MW-104 and MW-108S (located hydraulically cross-gradient of MW-107S), and monitoring wells MW-110S and MW-109S (located hydraulically downgradient of MW-107S) indicate low levels of VOCs, which suggests a localized area of VOC impacts at or near the MW-107S location.

As shown on Figure 13, VOC concentrations exceeded NYS Class GA ground water standards within the intermediate ground water at one monitoring well (MW-102I). The VOCs that exceeded the ground water standards were vinyl chloride, chloroethane, and cis-1,2-dichloroethene. The concentrations of each were slightly elevated above the NYS Class GA ground water standards.

MW-102I is located hydraulically downgradient of the southern portion of the western landfill cell. As shown on Figure 13, analytical data from monitoring wells MW-103 and MW-108I (located hydraulically upgradient of MW-102I), and monitoring well MW-109I (located hydraulically downgradient of MW-102I) indicate that VOCs were not detected. This suggests that the low levels of VOCs detected in MW-102I are representative of a localized area of VOC impacts at or near the MW-102I location.

Within the deep ground water zone, vinyl chloride, acetone, and cis-1,2-dichloroethene were detected in MW-109D and MW-13, and toluene was detected in MW-109D. None of the detected VOC concentrations exceeded the NYS Class GA ground water standards.

The results of the VOC samples collected during the RI indicate a slight impact to ground water. Localized areas of VOC impacts in the shallow and intermediate ground water were detected at the MW-107S and MW-102I locations, respectively. The detection of VOCs in the shallow, intermediate and deep monitoring wells suggest that VOCs have migrated from the landfill. However, based on the ground water analytical data, VOC concentrations appear to decrease with depth. This may suggest that the limited detection and low concentration of VOCs in the intermediate and deep sand and gravel unit are the result of attenuation of VOCs along the migration pathways.

5.2. Semivolatile organic compounds

SVOCs were analyzed in samples from the following environmental media:

- surface water (5 samples)
- sediment (5 samples)
- subsurface soil (6 samples)
- leachate seep (1 sample)
- ground water (5 samples)

SVOCs were detected in each of the media sampled other than leachate. SVOCs were detected at concentrations above potentially applicable SCGs within the surface water, subsurface soil, and perched ground water. Detected concentrations were below potentially applicable SCGs in the sediment samples.

As shown on Figure 9, phenol was detected in surface water sample SW-1 at a concentration of 11 ug/L, which is slightly above the NYS Class C water quality criteria of 5 ug/L. No other SVOCs were detected in the surface water samples at concentrations above NYS Class C water quality criteria.

While two SVOCs were detected in two sediment samples (benzaldehyde in SED-01 and bis(2-ethylhexyl)phthalate in SED-03) the detected concentrations did not exceed sediment criteria.

As shown on Figure 11, bis(2-ethylhexyl)phthalate was detected in subsurface soil sample TP-07/SS-2 at a concentration of 62,000 ug/Kg, which exceeds the TAGM 4046 RSCO of 50,000 ug/Kg. The presence of bis(2-ethylhexyl)phthalate in the TP-07/SS-2 sample is most likely attributable to fill materials containing plastics observed in this test pit. SVOCs were not detected in the other subsurface soil samples at concentrations exceeding TAGM 4046 RSCOs.

SVOCs were not detected in the one leachate sample analyzed. As shown on Figure 13, three SVOCs (4-methylphenol, 4-chloro-3-methylphenol, and 4-nitrophenol) were detected in the temporary well water sample collected from TW-TP-02 at concentrations exceeding NYS Class GA ground water standards. The water collected from the TW-TP-02 location was in contact with the fill materials. SVOCs were not detected in the ground water samples collected from the monitoring wells suggesting that the migration of SVOCs present within the fill materials to ground water is limited.

5.3. Inorganics

Inorganics were analyzed from the following environmental media at concentrations exceeding potentially applicable SCGs:

- surface soil (5 samples)
- surface water (5 samples)
- sediment (5 samples)
- subsurface soil (8 samples)
- leachate seeps (3 samples)
- ground water (5 samples)

Within surface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other surface soil sample concentrations include barium, cadmium, lead, and zinc at the SS-09 location, and lead and zinc at the SS-10 location. As shown on Figure 10, these surface soil samples were collected within the eastern landfill cell. Although barium and lead concentrations at SS-09 appear as though they could be related to landfill operations, their respective concentrations are within the range for Eastern United States background soils. Review of the analytical results for cadmium, lead, and zinc indicates that concentrations are within an order of magnitude of either the TAGM 4046 criteria and/or Eastern United States background concentrations ranges, indicating the overall inorganic impacts to surface soil are low.

Within surface water, inorganic constituents that were detected at concentrations exceeding NYS Class C water quality criteria included aluminum, cobalt, iron, lead, vanadium, and zinc. The inorganic constituents detected in the surface water samples are likely attributable to the migration of leachate from the landfill to drainage swales between the two landfill cells, which ultimately drain to the drainage swale to the north of the cells. Similar inorganic constituents were detected in the surface water samples as in the leachate samples. Whether the elevated concentrations of inorganics are adversely impacting Conewango Creek which is located approximately 4,000 feet to the west of the Site is not known. However, given the relatively large distance to Conewango Creek, potential for impacts is considered to be low.

Sediment samples were co-located with the surface water samples. In general, similar inorganic constituents were detected in the sediment samples as in the surface water samples. However, in almost all cases, constituent concentrations in the sediment were higher than those detected in surface water. Inorganic sediment concentrations were compared to the Lowest Effect Level and the Severe Effect Level. This comparison indicated that arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc exceeded the Lowest Effect Level, whereas iron in the SED-03 and SED-04 samples, and manganese in the SED-03 sample exceeded the Severe Effect Level. The highest concentrations of arsenic, copper, iron, manganese, and nickel were detected in the SED-03 sample. SED-03 is located within a drainage swale located west of the western landfill cell.

Within leachate, concentrations of aluminum, cadmium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc were detected at concentrations that exceeded NYS Class C water quality criteria. Review of the data on Table 21 indicates that the highest concentrations of these constituents were detected at the LT-03 location to the northwest of the western landfill cell. Concentrations of inorganics are generally one order of magnitude greater at the LT-03 location than the other leachate sampling locations. The LT-03 location was observed to have a sheen during sampling.

Within subsurface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other subsurface soil sample concentrations include cadmium, chromium, cobalt, copper, mercury, nickel, and zinc. As shown on Figure 11, these subsurface soil samples were from test pits installed at the northern, eastern and southern limits of the western landfill cell. The highest concentrations of these inorganic constituents were detected in the subsurface soil sample collected from the TP-07/SS-2 location.

Within ground water, arsenic, barium, beryllium, cadmium, chromium, iron, lead, magnesium, manganese, sodium, and thallium were detected at concentrations exceeding ground water standards. Of these constituents, iron was the only constituent that was detected consistently (30 of 31 samples) above ground water standards in the ground water samples. The frequency of detections of the other inorganic constituents that exceeded ground water standards are as follows:

- barium (MW-108S – one of two sampling rounds)
- beryllium (MW-110I – one of two sampling rounds)
- cadmium (MW-102 – one of two sampling rounds)
- sodium (MW-104 – one of two sampling rounds)
- chromium (MW-108S and MW-110I – one of two sampling rounds)
- thallium (MW-109I and MW-110I – one of two sampling rounds)
- manganese (MW-108S, MW-109I, and MW-110I – one of two sampling rounds)
- lead (MW-109I – both sampling rounds; MW-110S and MW-110I – one of two sampling rounds)

- magnesium (MW-107S – both sampling rounds, MW-104 and MW-110I – one of two sampling rounds)
- arsenic (MW-101, MW-104, MW-105S, MW-108S, MW-109I, MW-110S MW-110I, MW-111S – one of two sampling rounds)

As shown above, inorganic concentrations above the ground water standards were detected sporadically, both spatially and temporally, with the exception of iron. Review of the iron concentrations, combined with the frequency of detection suggests that the detected concentrations are likely representative of background ground water quality conditions.

5.4. Pesticides/PCBs

Pesticides/PCBs were analyzed from the following environmental media:

- surface soil (5 samples)
- surface water (1 sample)
- subsurface soil (3 samples)
- leachate seep (1 sample)
- ground water (5 samples)

Neither pesticides nor PCBs were detected above potentially applicable SCGs in the environmental media sampled.

6. Fish and wildlife impact analysis

A Fish and Wildlife Impact Analysis (FWIA) through Step IIA was completed for the Site. The FWIA was conducted according to the NYSDEC document entitled *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (NYSDEC 1994; Guidance). Step I - *Site Description* and Step IIA - *Contaminant-Specific Impact Assessment – Pathway Analysis* of the NYSDEC Guidance were addressed.

The specific objectives of the FWIA were to:

- Describe the ecology of the site and surrounding environs within a 0.5 mile radius of the site including fish and wildlife resources and associated fauna for each natural community within the study area

- Identify other natural resources in the vicinity of the site including significant habitats and endangered, threatened, or species of special concern (ETSC)

- Identify applicable criteria and guidance values

- Identify potential pathways of site stressors to ecological receptors.

The FWIA evaluated the physical and biological characteristics and potential ecological receptors. The results and conclusions of the assessment are summarized below:

- The terrestrial portion of the site consists of the landfill cells, dirt access roads, maintained fields/mowed areas, an old concrete loading bay area, and a small block structure. These features limit the use by resident and transient wildlife species.

- Aquatic areas existing on-site include a portion of the unnamed tributary of Conewango Creek, emergent and scrub-shrub wetlands and several drainage ways. The wetlands provide habitat for a variety of terrestrial and aquatic receptors. The unnamed tributary likely provides some habitat for a variety of fish and other wildlife species that frequent aquatic habitats. However, the relatively small size of the tributary limits the value of this habitat to some wildlife, particularly fish.

- The terrestrial areas surrounding the site and within the study area consists of a mixture of natural communities and areas exhibiting rural (predominantly agricultural and residential) land use. Approximately 45 percent of the areal extent of the study area consist of agricultural and residential land uses that may somewhat limit use by transient or residential wildlife species.

- Approximately 55 percent of the areal extent of the study area consists of natural covertypes such as coniferous and hardwood forest; freshwater wooded, scrub-shrub and emergent wetlands; and streams that provide appropriate habitat for a variety of fish and wildlife species.

- The USFWS has records of an endangered species, the clubshell, and a candidate species, the rayed bean within a 2-mile radius of the site. The New York Natural Heritage Program had no records of rare, threatened or endangered flora and fauna or significant natural communities within a two-mile radius of the site.

- Based on a review of the applicable state and federal mapping, several freshwater wetlands were identified in within 2-miles of the site. Although a wetland boundary delineation was not performed as part of this assessment, it appears that regulated wetland habitats exist on and adjacent to site.

- Due to the presence of chemical constituents in surface soil, surface water and sediment associated with the site, complete exposure pathways to terrestrial and aquatic receptors likely exist at and down gradient of the site. These pathways should be evaluated further.

The FWIA report is provided in full in Appendix H.

7. Human health exposure pathway analysis

A qualitative exposure pathway analysis was performed to evaluate the potential for human contact with site constituents and is documented in the exposure pathway analysis report (EPAR) included in Appendix I. The qualitative exposure pathway analysis consisted of identification of potentially complete exposure pathways.

Potentially complete exposure pathways identified in the EPAR for the Site were:

Current potential on-site exposure pathways

- Ingestion and dermal contact of surface soil by adult, adolescent, and child trespasser; and adult site worker
- Inhalation of ambient air by adult site worker
- Ingestion and dermal contact of subsurface soil by adult site worker
- Inhalation of outdoor air (trenches/excavations) by adult site worker.
- Ingestion and dermal contact with site ground water by adult site worker
- Ingestion of potable ground water by adult, adolescent, and child town residents

Future potential on-site exposure pathways

- Ingestion and dermal contact of surface soil by adult, adolescent, and child residents; adult site worker; adult commercial worker; adult, adolescent, and child trespasser
- Inhalation of ambient air by adult site worker
- Ingestion and dermal contact of subsurface soil by adult site worker
- Inhalation of outdoor air (trenches/excavations) by adult site worker
- Inhalation of indoor air (vapor intrusion) by adult commercial worker; adult office worker; and adult, adolescent, and child residents
- Ingestion and dermal contact with potable ground water by adult commercial worker; adult office worker; and adult, adolescent, and child residents.

Current/future potential off-site exposure pathways

- Inhalation of indoor air (vapor intrusion) by adult , adolescent, and child residents
- Ingestion and dermal contact with potable ground water by adult, adolescent, and child residents
- Ingestion and dermal contact with ground water by adult construction worker
- Ingestion and dermal contact of sediment by adult, adolescent, and child trespasser.

8. Conceptual site model

The following presents the current understanding of the geology, hydrogeology, ground water quality, and presence of potential sources based on the RI field sampling results.

8.1. Geology

The following five hydrogeologic units can be differentiated at the Site: fill, lacustrine sandy silt and silty clay, outwash sand and gravel, till, and bedrock.

Based on test pitting conducted during the RI field program, the fill boundaries of the eastern and western landfill cells have been approximately delineated. The uppermost unit within the boundaries of the landfill cells is fill. Fill materials around the edges of the western cell were observed to be mainly composed of wood pieces, metal debris, metal turnings, plastic and glass bottles, plastic sheeting, paper, tires, and drum carcasses. Fill materials around the edges of the southern portion of the eastern cell were observed to be mainly composed of municipal waste such as plastics, miscellaneous metallic debris, paper, and plastic toys. Fill materials around the edges of the northern portion of the eastern cell were observed to be mainly composed of brush and log materials. Test pits completed around the edges of the landfill cells indicate that the total depth of fill ranged from approximately 2-ft at TP-01, TP-11, and TP-18 to approximately 10-ft at TP-12. The top of the fill materials was encountered between approximately 1 and 5-ft within each test pit.

The uppermost natural material outside of the boundaries of the landfill cells, and underlying the fill consists of a yellowish brown, stiff, fine sandy silt with some clay. This unit varies in thickness from 5-ft (southwest) to 10-ft (northeast). Underlying this unit is a medium gray, stiff, silty clay unit. This unit varies in thickness from about 3-ft to 10-ft (southwest) to about 8-ft (northeast). The total depth of these units ranges from 7-ft to 20-ft below ground surface.

Glacial outwash sand and gravel
An outwash sand and gravel was encountered underlying the lacustrine sandy silt and silty clay unit. The sand and gravel unit consists of yellowish brown, medium dense, fine to coarse sand and gravel with some silt. The total depth of these this unit is approximately 45-ft below ground surface

Glacial till
Glacial till was encountered at the MW-109D location underlying the outwash sand and gravel unit. The glacial till consists of olive gray, very dense, gravel and medium to coarse sand with few cobbles. This unit has a thickness of about 15-ft.

Bedrock
The uppermost bedrock formations consist of upper Devonian age shale and siltstone of the Conneaut Group. The formations may also include limited beds of sandstone and conglomerate (Rickard and Fisher, 1970). Previous activities completed for the investigation for the Frewsburg Water District encountered weathered shale bedrock at 76 to 81 ft below ground surface (Moody & Associates, May 1993).

8.2. Hydrogeology

Water was encountered in the following test pit locations: TP-01, TP-02, TP-06, and TP-11. These test pits are located around the western landfill cell. The presence of water in these test pit locations is likely attributed to perched water at these locations. Comparison of the approximate bottom elevations of the test pits to shallow ground water elevations further suggests that this is perched water within the fill with no direct hydraulic connection to the water table during the water table elevation monitoring periods.

The nearest discharge for shallow ground water is likely Conewango Creek, which is located approximately 4,000 feet west of the landfill. The direction of ground water flow in the shallow water-bearing materials based on the October 14, 2004 elevation measurements was to the northeast toward Conewango Creek beneath the eastern landfill cell and to the west-southwest toward the Village of Frewsburg Supply Well #5 beneath the western landfill cell. Based on the March 7, 2005 ground water elevation measurements, ground water flow in the shallow water-bearing materials was to the northeast toward Conewango Creek. The western component of shallow ground water flow toward Supply Well #5 observed during the October 14, 2004 monitoring event may be reflective of pumping of Supply Well #5 or seasonal variations in ground water flow.

Based on the October 14, 2004 ground water elevations in the shallow wells, the shallow hydraulic gradient ranged from approximately 0.006 ft/ft to 0.008 ft/ft across the southern portion of the eastern and western landfill cells, respectively, to 0.002 ft/ft to 0.003 ft/ft across the northern portion of the eastern and western landfill cells, respectively. Based on the March 7, 2005 shallow well ground water elevation data, the shallow hydraulic gradient ranged from approximately 0.009 ft/ft to 0.006 ft/ft across the southern portion of the eastern and western landfill cells, respectively, to 0.006 ft/ft to 0.0006 ft/ft across the northern portion of the eastern and western landfill cells, respectively.

As with shallow ground water, the discharge for intermediate ground water is likely Conewango Creek. However, due to the initiation of pumping from Supply Well #5 the direction of ground water flow in the intermediate water-bearing materials based on the October 14, 2004 and March 7, 2005 monitoring events was to the southwest toward the supply well. The actual ground water flow direction(s) in the intermediate ground water prior to pumping is not known. Based on the October 14, 2004 ground water elevations in the intermediate wells, a fairly uniform hydraulic gradient of approximately 0.004 ft/ft, was evident across the western landfill cell. Based on the March 7, 2005 ground water elevations, the intermediate hydraulic gradient ranged from 0.004 ft/ft to 0.002 ft/ft across the northern and southern portions of the western landfill cell, respectively.

The estimated seepage velocity (V_s) of ground water flowing through the shallow water-bearing materials was computed using the following relationship:

$V_s = KI/n_e$ where:

K equals average hydraulic conductivity, I equals hydraulic gradient, and n_e equals effective porosity for the shallow water bearing materials.

The seepage velocity for the shallow ground water based on the October 14, 2004 hydraulic gradients was estimated to range from 9.29×10^{-4} feet/day (0.34 feet/year) to 2.60×10^{-3} feet/day (0.95 feet/year) assuming an estimated effective porosity of 0.35. Based on the hydraulic gradients from March 7, 2005, the seepage velocity for the shallow ground water was estimated to range from 1.23×10^{-3} feet/day (0.45 feet/year) to 2.79×10^{-3} feet/day (1.02 feet/year). The seepage velocity in the intermediate zone was estimated at 0.03 feet/day (11 feet/year) based on the October 14, 2004 hydraulic gradient and assuming an estimated effective porosity of 0.25. Based on the hydraulic gradient from March 7, 2005, the seepage velocity was estimated at 0.02 feet/day (7.3 feet/year)

Vertical hydraulic gradients based on ground water elevations measured in well pairs MW-107S/MW-107I, MW-108S/MW-108I, MW-109S/MW-109I/MW-109D, MW-110S/MW-110I, and MW-111S/MW-111I were predominantly downward during the October 2004 and March 2005 monitoring events. The exceptions were upward gradients between the MW-109I/MW-109D and MW-109S/MW-109I well pairs during October 2004, and between the MW-107S/MW-107I well pair during March 2005.

8.3. Contaminant migration

8.3.1. VOCs

VOCs were detected in each of the media sampled (sediment, subsurface soil, leachate seeps, soil vapor, and ground water). Migration mechanisms for VOCs to environmental media may include volatilization from landfill materials to soil vapor and the infiltration of precipitation through the fill materials generating leachate, which may in turn impact surface water, and potentially subsurface soil, sediment and ground water. However, VOC concentrations within the sediment, subsurface soil, and leachate seep samples were below potentially applicable SCGs, which may indicate that VOC concentrations in the fill materials are low, or are naturally attenuating. Soil vapor and ground water were the only environmental media sampled that contained VOCs at concentrations above potentially applicable SCGs.

Regarding soil vapor, detected VOCs consist of aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, and refrigerant compounds. The highest concentrations of VOCs were generally detected in the soil vapor sample collected at SV-16. The magnitudes of detected concentrations in the soil vapor samples are relatively low and do not appear indicative of the presence of a significant source at the soil vapor sample locations. However, the detection of VOCs in the soil vapor indicates that the fill materials contain VOCs.

VOC migration from the landfill to ground water may be from vertical ground water flow potentials, or due to density-driven mechanisms. Downward hydraulic gradients have been observed based on the two ground water elevation monitoring events; however, it is unclear whether these downward gradients are sufficient to transport VOCs, particularly to the depth of intermediate ground water over relatively small horizontal distances. Another migration mechanism for VOCs may be the downward flow of landfill leachate from the bottom of the landfill. The landfill leachate may be denser than water due to its chemical composition. If this is the case, leachate that may have migrated to depth, may be the source of VOCs in the intermediate and deep ground water.

Ground water samples collected from monitoring wells MW-107S and MW-102I were the only samples in which VOCs were detected above NYS Class GA ground water standards. MW-107S is a shallow monitoring well that monitors the shallow ground water in the fine-grained silt and clay and the upper five feet of the underlying sand and gravel. MW-102I is an intermediate monitoring well that monitors ground water in the intermediate portion of the sand and gravel underlying the silt and clay. Regardless of the specific migration mechanism(s), VOC concentrations in ground water are relatively low. Ground water samples collected from shallow monitoring wells upgradient (MW-106S), cross-gradient (MW-104 and MW-108S), and downgradient (MW-109S and MW-110S) of MW-107S indicate low levels of VOCs. The distribution and concentrations of VOCs in shallow ground water suggests a localized area of nominal impacts at or near the MW-107S location. Likewise, ground water samples collected from intermediate monitoring wells upgradient (MW-103 and MW-108I) and downgradient (MW-109I) of MW-102I indicate low levels of VOCs. The distribution and concentrations of VOCs in intermediate ground water suggests a localized area of nominal impacts at or near the MW-102I location.

Review of the ground water analytical data also indicates that VOC concentrations decline with depth. This suggests that the near surface fine-grained silts and clays of the shallow water-bearing materials are limiting transport of VOCs to the deeper and more permeable sands and gravels of the intermediate and deep water-bearing materials.

Based on data collected during the RI, VOCs present within the fill materials have minimally impacted ground water. The relatively low concentrations and number of VOCs detected in the ground water may be due to the following:

- VOC concentrations in the fill materials are low
- VOC migration from the fill materials to ground water is limited by the low permeability nature of soils believed to be underlying the fill
- VOCs migrating from the landfill to ground water are being naturally attenuated at rates sufficient to decrease concentrations, or
- a combination of the above.

Vinyl chloride and cis-1,2-dichloroethene were the predominant VOCs exhibiting concentrations above Class GA ground water standards that are contaminants of concern. These VOC constituents are common degradation products of trichloroethene, which was suspected as having been potentially disposed of in the landfill. During the second ground water sampling event, samples were collected from monitoring wells for methane, ethane, and ethene to provide a preliminary indication as to whether vinyl chloride detected during the first ground water sampling event may be undergoing degradation. Ethene was detected in monitoring wells MW-107S and MW-102I. Vinyl chloride was also detected in these monitoring wells at concentrations above the ground water standards. The presence of ethene at these locations suggests that geochemical conditions near these monitoring wells are serving to allow degradation of vinyl chloride. Also, ethane was detected in shallow monitoring wells MW-107S and MW-110S, and intermediate wells MW-102, MW-102I, MW-103, MW-107I, and MW-110I, suggesting that ethene is degrading to ethane.

Based on analytical data collected by NYSDOH, it is apparent that VOCs have migrated from the landfill to Supply Well #5. Pumping of Supply Well #5 was initiated in 1995. Cis-1,2-dichloroethene and vinyl chloride began to be detected in monitoring well MW-13, located approximately 670 feet west of the western landfill cell, during February 2002 and April

2003, respectively. It appears based on currently available data that vinyl chloride and cis-1,2-dichloroethene began to be detected in Supply Well #5, located approximately 185 feet to the west of MW-13, during February 2003 and March 2003, respectively. The most recent available analytical results, from samples collected during June 2005, indicate that cis-1,2-dichloroethene and vinyl chloride concentrations were 15 ug/L and 10 ug/L, respectively in MW-13, and 2.4 ug/L and 0.8 ug/L, respectively in Supply Well #5. Review of the NYSDOH sample data indicates that concentrations of cis-1,2-dichloroethene and vinyl chloride have generally increased over time. Although concentrations have not yet exceeded ground water quality standards in the supply well, they have exceeded the standards for cis-1,2-dichloroethene since August 2004 and vinyl chloride since October 2002 at MW-13. The detection of these constituents in the supply well approximately eight years after the initiation of pumping suggests that these constituents were drawn to the supply well due to the pumping and were not present in the area of the supply well prior to installation of the supply well.

8.3.2. SVOCs

At least one SVOC was detected in the following environmental media: surface water, sediment, subsurface soil, and ground water. The only SVOCs detected at concentrations exceeding potentially applicable SCGs were phenol in surface water sample SW-1, bis(2-ethylhexyl)phthalate in subsurface soil sample TP-07/SS-02, and 4-methylphenol, 4-chloro-3-methylphenol, and 4-nitrophenol in the water sample collected from TW-TP-02. SVOCs were not detected in the ground water samples collected from the monitoring wells. SVOCs were not detected in the one leachate sample collected.

8.3.3. Inorganics

Inorganics were detected in each of the environmental media sampled (surface soil, surface water, sediment, subsurface soil, leachate seeps, ground water). Several inorganics were detected at concentrations exceeding potentially applicable SCGs.

Review of the ground water data suggests that the inorganic detections may be indicative of background conditions for certain constituents. Within shallow ground water, arsenic, barium, iron, lead, magnesium, and manganese were detected at concentrations above NYS Class GA ground water standards. However, with the exception of barium, lead, and manganese, concentrations of inorganic constituents detected above the ground water standards (arsenic and iron) were within the same order of magnitude in the monitoring wells upgradient and downgradient of the landfill cells. Barium and manganese were detected in one shallow monitoring well (MW-108S), and lead was detected in one monitoring well (MW-110S) at concentrations above ground water standards. Barium, lead, and manganese were also detected at concentrations above ground water standards in the water sample collected from TW-TP-02 located along the western edge of the western landfill cell. As indicated previously, the water collected from the test pits is likely representative of perched water within the fill materials. However, the presence of barium, lead, and manganese in both the water within the fill, and shallow ground water at MW-108S and MW-110S may suggest impact from the fill. Regardless, these data suggest that inorganic impacts to shallow ground water are sporadic and limited in extent.

Ground water inorganic data indicates that there is a general decrease in concentrations with depth. The exceptions are the concentration of iron at the MW-109S/MW-109I well pair, and concentrations of arsenic, beryllium, chromium, iron, lead, manganese, and thallium at the MW-110S/MW-110I well pair. While the iron concentration increased with depth at the MW-109 well pair, the iron concentration detected in the MW-109I sample is generally within the same order of magnitude as the other intermediate wells. Beryllium, chromium, manganese, and thallium were only detected at concentrations above ground water standards in the MW-110I sample. The origin of the elevated concentrations of many inorganic constituents detected during the October 2004 ground water sampling event in the MW-110I sample is not known; however, inorganic concentrations decreased significantly in this well during the March 2005 sampling event.

Within leachate, concentrations of aluminum, cadmium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc were detected at concentrations that exceeded NYS Class C water quality criteria. The highest concentrations of these constituents were detected to the northwest of the western landfill cell from an area exhibiting a heavy sheen during sampling. Leachate from this area migrates to the northern drainage swale, which ultimately drains to Conewango Creek approximately 4,000 feet west of the landfill. Surface water samples have not been collected from the northern drainage swale downstream of where leachate was observed entering the swale.

The inorganic constituents detected in the surface water samples are likely attributable to the migration of leachate from the landfill to drainage swales between the two landfill cells, which ultimately drain to the drainage swale to the north of the cells. Similar inorganic constituents were detected in the surface water samples as in the leachate samples. Whether the elevated concentrations of inorganics are adversely impacting Conewango Creek which is located approximately 4,000 feet to the west of the Site is not known. However, given the relatively large distance to Conewango Creek, and that the drainage swales are relatively low flow systems for much of the time, potential for impacts is considered to be low.

In general, similar inorganic constituents were detected in the sediment samples as in the surface water samples. However, in almost all cases, constituent concentrations in the sediment were higher than those detected in surface water. As indicated in Section 5, arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc exceeded the Lowest

Effect Level. Iron and manganese also exceeded the Severe Effect Level. The highest concentrations of arsenic, copper, iron, manganese, and nickel were detected in the SED-03 sample. SED-03 is located within a drainage swale located west of the western landfill cell. The presence of elevated concentrations of inorganic constituents in sediment may be due to direct run-off and deposition of sediment material from the landfill to the drainage swales, or due to potentially more dense landfill leachate flowing to surface water areas, that may subsequently settle into the sediment. The drainage swales from which sediment samples were collected are believed to be low flow systems for much of the time. It is also possible that during certain times of the year, the surface water in the drainage swales evaporates which may potentially concentrate inorganic constituents in the underlying sediment.

Within surface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other surface soil sample concentrations include barium, cadmium, lead, and zinc at the SS-09 location, and lead and zinc at the SS-10 location. These surface soil samples were collected within the eastern landfill cell. Although barium and lead concentrations at SS-09 appear as though they could be related to landfill operations, their respective concentrations are within the range for Eastern United States background soils. Review of the analytical results for cadmium, lead, and zinc indicates that concentrations are within an order of magnitude of either the TAGM 4046 criteria and/or Eastern United States background concentrations ranges, indicating the overall inorganic impacts to surface soil are low.

Within subsurface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other subsurface soil sample concentrations include cadmium, chromium, cobalt, copper, mercury, nickel, and zinc. Subsurface soil samples were collected from test pits and below leachate seeps and are considered to represent worst-case subsurface soil quality.

8.3.4. Pesticides/PCBs

Neither pesticides nor PCBs were detected above potentially applicable SCGs in the environmental media sampled (surface soil, surface water, subsurface soil, leachate, and ground water).

8.4. Presence of residual source(s)

The source of VOCs, SVOCs, and inorganics in environmental media at the Site are attributed to the landfilling operations that have occurred in the past. The landfilling was conducted by initially excavating trenches, and then filling the trenches with municipal and/or industrial wastes. Based on visual examination, the western landfill cell was built up approximately 3 ft to 4 ft above the existing grade. The topography of the eastern landfill cell, based on a visual examination, is relatively flat. During the site inspection, drum carcasses were evident at the ground surface and partially buried within the western landfill cell. Also, the soil cover on the western landfill cell was noted to be eroded in places with a hummocky appearance.

The condition of the soil cover over the eastern and western landfill cells does not appear to be suitable for preventing infiltration of precipitation through the underlying fill materials. As indicated previously, perched water was encountered at various locations around the western landfill cell.

Based on the analytical data in comparison to potentially applicable SCGs, VOC impacts to soil vapor and VOC and SVOC impacts to surface water, leachate, sediment, subsurface soil, and ground water are relatively minor. It does not appear that there is a significant source of organics within the eastern or western landfill cells. The highest concentration of an organic constituent was vinyl chloride detected in the shallow ground water sample collected at MW-107S; however, organic concentrations at this location appear to be limited in horizontal and vertical extent. It is plausible that leachate that may be more dense than water has migrated downward into the intermediate and deep portions of the sand and gravel aquifer, that may act as a continuing source of VOCs.

The majority of impacts to environmental media may be from inorganic constituents. Some inorganics may be attributed to naturally occurring conditions. However, most appear to be related to the presence of fill materials. Inorganic impacts are evident in surface and subsurface soils, surface water and sediment, and shallow and intermediate ground water. Leachate migrating from the fill materials also contain elevated concentrations of inorganic constituents.

8.5. Data gaps

The data gaps within the current conceptual site model are summarized as follows:

- The relationship between the vertical extent of fill within the landfill cells and the water table is not fully understood. Based on an evaluation of the available data, it appears that the bottom of the fill materials around the perimeter of the landfill cells is above the water table. However, there is a lack of information regarding the depth to the bottom of fill in the central portions of the landfill cells. While water was present in fill materials at certain test pit locations, this water is believed to be perched within the fill and not in direct hydraulic connection with the water table.

- Ground water flow conditions beneath the landfill prior to the initiation of pumping from Supply Well #5 is unclear. Pumping was initiated from the supply well during 1995. Monitoring wells were initially installed to monitor ground water quality at the landfill during 1996. This RI added fourteen monitoring wells to the monitoring well network. However, a sufficient database of ground water elevations does not exist prior to pumping of the supply well to evaluate the affects of pumping on natural ground water flow conditions, nor is there sufficient temporal ground water elevation monitoring to evaluate seasonal fluctuations in ground water flow.

- The origin of inorganic constituents in ground water that exceed ground water standards is not fully understood. While it appears that some of these inorganics may be attributed to naturally occurring conditions, others may be attributed to the landfill. In general, inorganics, other than iron, were sporadically detected above ground water standards and are not considered to pose a significant threat to human health or the environment. However, the presence of inorganics exceeding ground water standards may be significant in terms of identifying potential remedial alternatives.

- Regarding surface and subsurface soils, samples were not collected from locations that can be considered representative of background conditions, such that site-specific comparisons of soil quality can be evaluated.

- Surface water quality within the northern drainage swale downstream of the leachate seep (LT-03) is not known, which limits evaluation of potential impacts to Conewango Creek, if required.

9. Conclusions

Subsurface geologic data collected as part of the RI field investigation indicate the presence of fine-grained soils consisting of sandy silt and silty clay from the ground surface to depths ranging from 7-ft to 20-ft below grade. These near surface soils appear to be limiting the migration of organic and inorganic constituents within shallow ground water, and further migration to intermediate and deep ground water at the Site.

Based on ground water elevation data collected during October 14, 2004, shallow ground water flow components were evident to the northwest toward Conewango Creek and to the southwest toward the Village of Frewsburg Supply Well #5. However, the March 7, 2005 ground water elevation data indicate consistent shallow ground water flow to the northwest toward Conewango Creek. This suggests seasonal variability in shallow ground water flow. Ground water flow in the intermediate ground water has shown a consistent flow direction to the southwest toward the Village of Frewsburg Supply Well #5 based on the October 14, 2004 and the March 7, 2005 ground water elevations. As indicated previously, prior to the initiation of pumping of Supply Well #5, ground water flow in the intermediate ground water was suspected to flow to the northwest toward Conewango Creek. Pumping of Supply Well #5 appears to have influenced ground water flow in the intermediate ground water, which now flows to the southwest toward the supply well. Pumping of Supply Well #5 appears to be influencing the migration of VOCs in the intermediate ground water.

VOCs, SVOCs, inorganics, and pesticide/PCBs were detected in environmental media sampled as part of the RI field investigation. The concentrations of VOCs and SVOCs detected in environmental media that exceeded potentially applicable SCGs appear to be isolated to small areas of the Site. While VOCs do not appear to be migrating from the landfill at elevated concentrations, the increasing VOC concentrations at MW-13 located near Supply Well #5 suggest that pumping of the supply well is influencing the migration of VOCs. Pesticides/PCBs, while detected in surface soil and subsurface soil at concentrations below potentially applicable SCGs, were not detected in surface water, leachate, or ground water. The majority of impacts to environmental media may be from inorganic constituents. Some inorganics may be attributed to naturally occurring conditions. However, most appear to be related to the presence of fill materials. Inorganic impacts are evident in surface and subsurface soils, surface water and sediment, and shallow and intermediate ground water. Leachate migrating from the fill materials also contain elevated concentrations of inorganic constituents.

Due to the presence of organic and inorganic constituents in surface soil, surface water and sediment associated with the site, complete exposure pathways to terrestrial and aquatic receptors likely exist at and downgradient of the site. These pathways should be evaluated further.

Potentially complete exposure pathways were identified in the EPAR for the Site as summarized in Section 7 and discussed in detail in Appendix I.

The analytical data collected as part of the RI field investigation are sufficient to move forward with development of the Feasibility Study. However, as indicated above, data gaps exist within the current conceptual site model. While these data gaps will not significantly alter the current understanding of the nature and extent of contamination, further data could be collected as a pre-design effort based on the development of remedial alternatives as part of the Feasibility Study.

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Table 1

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Monitoring Well Specifications/Ground Water Elevations

Monitoring Well ID	Ground Elevation (ft MSL)	Top of PVC Casing elevation (ft MSL)	Well Depth (ft BTOC)	Screen Interval (ft MSL)	Ground Water Elevation (ft MSL)	
Shallow					10/11/2004	3/7/2005
MW-101	1259.11	1261.24	17.8	1243.44 - 1253.44	1254.72	1257.26
MW-104	1252.36	1254.61	21.6	1233.01 - 1243.01	1249.15	1249.97
MW-105S	1252.63	1254.97	20	1234.97 - 1244.97	1250.41	1251.17
MW-106S	1252.71	1255.14	22.5	1232.64 - 1242.64	1249.54	1251.12
MW-107S	1252.39	1254.56	22.4	1232.16 - 1242.16	1249.75	1249.05
MW-108S	1255.07	1257.68	22.6	1235.08 - 1245.08	1251.28	1252.45
MW-109S	1255.2	1257.52	22.9	1234.62 - 1244.62	1245.84	1249.8
MW-110S	1249.72	1253.16	22.5	1230.66 - 1240.66	1247.85	1249.98
MW-111S	1251.4	1253.66	21.9	1231.76 - 1241.76	1248.86	1249.53
Intermediate						
MW-102	1254.56	1256.58	32	1224.56 - 1234.56	1245.82	1249.63
MW-102I	1254.92	1257.47	41.1	1216.37 - 1226.37	1245.74	1249.56
MW-103	1250.78	1253.21	34.2	1219.01 - 1229.01	1246.93	1250.33
MW-107I	1252.45	1254.87	45.2	1209.67 - 1219.67	1249.17	1251.37
MW-108I	1255.13	1257.59	47.2	1210.39 - 1220.39	1248.79	1251.31
MW-109I	1254.93	1257.25	43.8	1213.45 - 1223.45	1245.91	1249.56
MW-110I	1249.78	1252.03	44	1208.03 - 1218.03	1246.59	1249.14
MW-111I	1251.26	1253.71	48.1	1205.61 - 1215.61	1248.11	1250.31
Deep						
MW-109D	1255.00	1257.31	71.1	1186.21 - 1196.21	1246.03	1249.56

Notes: ft MSL - feet mean sea level
ft BTOC - feet below top of casing

Table 2

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Vertical Hydraulic Gradient
Summary

Well Nest I.D.	Screen Interval (ft m.s.l.)	Ground Water Elevation (ft m.s.l)		Vertical Hydraulic Gradient (ft/ft)	
		10/14/2004	3/7/2005	10/14/2004	3/7/2005
MW-107S	1232.6 – 1242.6	1249.75	1249.05	0.026	-0.103
MW-107I	1209.7 – 1219.7	1249.17	1251.37		
MW-108S	1235.1 – 1245.1	1251.28	1252.45	0.101	0.046
MW-108I	1210.4 – 1220.4	1248.79	1251.31		
MW-109S	1234.6 – 1244.6	1245.84	1249.8	-0.003	0.011
MW-109I	1213.5 – 1223.5	1245.91	1249.56		
MW-109I	1213.5 – 1223.5	1245.91	1249.56	-0.004	0
MW-109D	1186.2 – 1196.2	1246.03	1249.56		
MW-110S	1230.7 – 1240.7	1247.85	1249.98	0.056	0.037
MW-110I	1208.0 – 1218.0	1246.59	1249.14		
MW-111S	1231.8 – 1241.8	1248.86	1249.53	0.029	0.029
MW-111I	1205.6 – 1215.6	1248.11	1250.31		

Note: ft m.s.l – feet mean sea level
Positive gradient indicates downward flow potential
Negative gradient indicates upward flow potential

Source: O'Brien & Gere Engineers, Inc.

Table 3

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Hydraulic Conductivity Results
Summary

Well I.D.	Screened Material	Hydraulic Conductivity (ft/d)
Shallow Wells		
MW-101	Silt and Clay	0.5
MW-104	Silt and Clay	0.09
MW-105S	Silt and Clay	0.05
MW-106S	Silt and Clay	0.1
MW-107S	Silt and Clay	0.25
MW-108S	Silt and Clay	0.05
MW-109S	Sand and Silt	0.44
MW-110S	Silt and Clay	0.16
MW-111S	Silt and Clay	0.07
	Geometric Mean	**0.13**
Intermediate Wells		
MW-102	Sand and Gravel	5.95
MW-102I	Sand and Gravel	4.79
MW-103	Sand and Gravel	0.63
MW-107I	Sand and Gravel	1.6
MW-108I	Sand and Gravel	0.42
MW-109I	Sand and Gravel	9.72
MW-110I	Sand and Gravel	0.16
MW-111I	Sand and Gravel	2.93
	Geometric Mean	**1.65**
Deep Well		
MW-109D	Sand	2.85

Source: O’Brien & Gere Engineers, Inc.

Table 4

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Soil Vapor Field Screening Summary

Penetration Location Number	Depth (1) (feet bls)	PID Measurement (2, 3) (parts per million)		Balance Gases %	Methane %	CO2 %	Oxygen %	Date	Time	Notes
		Initial	Stabilized							
1	2	0.94	0.02	79.8	ND	**ND**	20.2	August 20, 2004	18:44	
2	2	1.65	0.12	79.9	ND	0.2	19.9	August 20, 2004	18:29	
3	2	1.27	0.17	79.7	ND	**1.3**	19.0	August 20, 2004	18:21	
4	2	0.85	0.85	79.3	ND	**6.2**	**14.5**	August 20, 2004	16:55	
5	2	1.71	1.71	78.2	ND	**7.5**	**14.3**	August 20, 2004	17:02	
6	2	1.01	1.01	78.8	ND	**8.2**	**13.0**	August 20, 2004	17:08	
7	1.6	4.09	0.4	80.3	ND	**4.0**	**15.7**	August 20, 2004	17:22	
8	2	1.18	0.9	81.0	ND	**15.1**	**3.9**	August 20, 2004	17:30	
9	2	3.52	1.75	65.5	**14.2**	**20.3**	**ND**	August 20, 2004	17:38	
10	2	2.95	1.1	81.0	ND	**10.0**	**9.0**	August 20, 2004	18:14	
11	2	0.75	ND	79.5	ND	**6.0**	**14.5**	August 20, 2004	18:54	
12	2	1.39	0.31	78.1	ND	**8.6**	**13.3**	August 21, 2004	7:07	
13	2	2.84	2.48	78.7	ND	**2.2**	19.1	August 21, 2004	7:15	
14	2	2.39	0.05	80.1	ND	**6.5**	**13.4**	August 21, 2004	7:29	
15	2	2.55	2.48	77.6	ND	**11.3**	**11.1**	August 21, 2004	7:39	
16	2	7.39	ND	79.6	ND	**7.6**	**12.8**	August 21, 2004	7:53	
17	2	0.74	0.02	71.9	ND	0.1	20.0	August 21, 2004	8:00	
18	2	1.2	0.5	78.8	ND	**2.9**	18.2	August 21, 2004	10:20	
19	2	12.7	1.7	79.1	ND	**1.3**	19.6	August 21, 2004	10:35	
20	2	6.87	1.8	79.5	ND	**13.6**	**6.9**	August 21, 2004	10:39	
21	2	0.45	ND	72.3	**2.5**	**21.2**	**3.0**	August 21, 2004	13:36	
22	2	179	0.5	79.0	ND	**7.2**	**13.8**	August 21, 2004	13:30	
23	1.6	0.95	0.1	79.0	ND	**2.2**	18.8	August 21, 2004	12:58	
24	2	0.62	0.28	79.8	ND	ND	20.2	August 21, 2004	12:32	
25	2	0.55	0.2	79.9	ND	ND	20.1	August 21, 2004	12:23	
26	2	0.63	0.3	79.9	ND	ND	20.1	August 21, 2004	12:16	
27	2	0.65	0.4	79.9	ND	ND	20.1	August 21, 2004	12:10	
28	2	2.65	1.0	79.3	ND	**2.5**	18.3	August 21, 2004	13:02	
29	2	2.64	1.0	79.4	ND	**10.5**	**10.1**	August 21, 2004	11:05	
30	2	6.84	1.3	80.6	**3.8**	**4.5**	**11.0**	August 21, 2004	11:13	
31	2	8.95	1.0	79.4	ND	**2.3**	18.3	August 21, 2004	11:22	
32	2	1.7	0.52	80.0	ND	ND	20.0	August 21, 2004	11:32	
33	2	2.44	0.6	79.0	ND	**4.1**	16.9	August 21, 2004	11:45	
34	2	10.5	0.8	79.8	ND	0.3	19.9	August 21, 2004	11:50	
35	2	2.5	0.73	78.6	ND	**4.3**	17.1	August 21, 2004	12:01	
36	2	2.97	0.5	79.5	ND	**5.1**	**15.4**	August 21, 2004	12:50	
37	1	0.3	ND	80.3	ND	0.1	19.6	August 21, 2004	14:14	
						Bold: Greater than 10 times Atmospheric Levels	**Bold: Less than 0.8 of Atmospheric Levels**			

Notes:

(1) Samples collected below the estimated depth of cover material.

(2) Parts per billion (ppb) range Photoinization detector (PID) was calibrated to optimize sensitivity for vinyl chloride.

(3) The PID sensitivity setting for vinyl chloride detect ammonia (NH4), hydrogen sulfide (H2S), or other sulfated volatile compounds, which could account for higher initial PID readings than stabilized readings (ION Science representative pers. Comm.).

(4) Ambient atmospheric gases at the surface of the earth include primarily about 78% nitrogen, 21% oxygen, and 0.03% carbon dioxide.

Table 5

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Soil Vapor Analytical Summary - VOCs

Chemical Name	CAS No	Soil Gas Screening Levels (ppbv)**	Location ID / Sample Date / Sample ID / Unit	SV-16 8/20/2004 SV-16LAB_08/20/04 ppbv	SV-19 8/20/2004 SV-19LAB_08/20/04 ppbv	SV-31 8/20/2004 SV-31LAB_08/20/04 ppbv	SV-34 8/20/2004 SV-34LAB_08/20/04 ppbv
Ethylbenzene	100-41-4	510		6 JD	5 JD	0.6 J	3
Styrene	100-42-5	2300		2 U	6 JD	0.2 U	0.2 U
cis-1,3-Dichloropropene	10061-01-5	N.L.		2 U	2 U	0.2 U	0.2 U
trans-1,3-Dichloropropene	10061-02-6	N.L.		2 U	2 U	0.2 U	0.2 U
1,4-Dichlorobenzene	106-46-7	1300		5 U	5 U	0.5 U	0.5 U
1,2-Dibromoethane	106-93-4	0.26		2 U	2 U	0.2 U	0.2 U
1,3-Butadiene	106-99-0	3.9		10 U	10 U	1 U	1 U
Acrolein	107-02-8	0.087		5 U	5 U	0.5 U	0.5 U
3-Chloropropene	107-05-1	N.L.		5 U	5 U	0.5 U	0.5 U
1,2-Dichloroethane	107-06-2	23		2 U	2 U	0.2 U	0.2 U
Acrylonitrile	107-13-1	9.2		5 U	5 U	0.5 U	0.5 U
Vinyl Acetate	108-05-4	570		2 U	2 U	0.2 U	0.2 U
4-Methyl-2-Pentanone	108-10-1	200		5 U	5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene	108-67-8	12		4 JD	2 U	0.2 U	1 J
Bromobenzene	108-86-1	N.L.		2 U	2 U	0.2 U	0.2 U
Toluene	108-88-3	1100		35 D	20 D	5	26
Chlorobenzene	108-90-7	130		2 U	2 U	0.2 U	0.2 U
Pentane	109-66-0	N.L.		17 D	20 D	1	3
Hexane	110-54-3	570		7 JD	8 JD	0.8 J	2
Octane	111-65-9	N.L.		400 D	280 D	27	180 D
Propene	115-07-1	N.L.		28 D	71 D	1 J	6
1,2,4-Trichlorobenzene	120-82-1	270		10 U	10 U	1 U	1 U
1,4-Dioxane	123-91-1	N.L.		2 U	2 U	0.2 U	0.2 U
Dibromochloromethane	124-48-1	12		2 U	2 U	0.2 U	0.2 U
Tetrachloroethene	127-18-4	120		2 U	4 JD	0.3 J	0.2 U
Xylene (Total)	1330-20-7	N.L.		21 D	12 D	2	13
Ethyl Acrylate	140-88-5	N.L.		2 U	2 U	0.2 U	0.2 U
Ethyl Acetate	141-78-6	8700		2 U	2 U	0.2 U	0.2 U
Heptane	142-82-5	N.L.		20 D	10 D	1	6
cis-1,2-Dichloroethene	156-59-2	88		2 U	2 U	0.2 U	0.2 U
trans-1,2-Dichloroethene	156-60-5	180		2 U	2 U	0.2 U	0.2 U
Methyl tert-Butyl ether	1634-04-4	8300		27 D	20 D	4	43
Isooctane	540-84-1	N.L.		2 U	2 U	0.2 J	1
1,3-Dichlorobenzene	541-73-1	170		5 U	5 U	0.5 U	0.5 U
Carbon Tetrachloride	56-23-5	26		2 U	2 U	0.2 U	0.2 U
2-Hexanone	591-78-6	N.L.		5 U	5 U	0.5 U	4
4-Ethyltoluene	622-96-8	N.L.		8 JD	2 U	0.2 U	2
1,1,1,2-Tetrachloroethane	630-20-6	48		2 U	2 U	0.2 U	0.2 U
Acetone	67-64-1	1500		60 D	67 D	7	38
Chloroform	67-66-3	22		2 U	2 U	9	0.2 U
Hexachloroethane	67-72-1	63		2 U	2 U	0.2 U	0.2 U
Benzene	71-43-2	98		8 JD	7 JD	2	6
1,1,1-Trichloroethane	71-55-6	4000		2 U	2 U	0.2 U	0.2 U
Bromomethane	74-83-9	13		2 U	2 U	0.2 U	0.2 U
Chloromethane	74-87-3	440		2 U	2 U	0.2 U	0.2 U
Methyl Iodide	74-88-4	N.L.		2 U	2 U	0.2 U	0.2 U
Dibromomethane	74-95-3	49		2 U	2 U	0.2 U	0.2 U
Chloroethane	75-00-3	38000		2 U	2 U	0.2 U	0.2 U
Vinyl Chloride	75-01-4	110		2 U	2 U	0.2 U	0.2 U
Acetonitrile	75-05-8	360		5 U	5 U	0.5 U	0.5 U
Methylene chloride	75-09-2	1500		5 U	5 U	0.5 U	0.6 J
Carbon Disulfide	75-15-0	2200		5 U	5 U	2	4
Bromoform	75-25-2	210		2 U	2 U	0.2 U	0.2 U
Bromodichloromethane	75-27-4	21		2 U	2 U	0.2 U	0.2 U
1,1-Dichloroethane	75-34-3	1200		2 U	2 U	0.2 U	0.2 U
1,1-Dichloroethene	75-35-4	500		2 U	2 U	0.2 U	0.2 U
Dichlorofluoromethane	75-43-4	N.L.		2 U	2 U	0.2 U	0.2 U
Chlorodifluoromethane	75-45-6	140000		53 D	10 U	1 U	1 U
tert-Butyl Alcohol	75-65-0	N.L.		3 JD	2 U	0.2 U	0.9 J
Trichlorofluoromethane	75-69-4	1200		56 D	9 JD	3	0.5 J
Dichlorodifluoromethane	75-71-8	400		**7600 D ***	46 D	18	0.6 J
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	39000		5 U	5 U	0.5 U	0.5 U
Freon 114	76-14-2	N.L.		2 U	2 U	21	0.2 U
1,2-Dichloropropane	78-87-5	8.7		2 U	2 U	0.2 U	0.2 U
2-Butanone	78-93-3	3400		5 U	5 U	0.5 U	9
1,1,2-Trichloroethane	79-00-5	28		2 U	2 U	0.2 U	0.2 U
Trichloroethylene	79-01-6	4.1		**18 D ***	2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane	79-34-5	6.1		2 U	2 U	0.2 U	0.2 U
Methyl Methacrylate	80-62-6	1700		2 U	2 U	0.2 U	0.2 U
Hexachlorobutadiene	87-68-3	10		5 U	5 U	0.5 U	0.5 U
o-Xylene	95-47-6	16000		7 JD	4 JD	0.7 J	4
1,2-Dichlorobenzene	95-50-1	330		5 U	5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	95-63-6	12		**19 D ***	2 U	0.6 J	4
1,2,3-Trichloropropane	96-18-4	8.1		2 U	2 U	0.2 U	0.2 U
Methyl Acrylate	96-33-3	300		2 U	2 U	0.2 U	0.2 U
Ethyl Methacrylate	97-63-2	680		2 U	2 U	0.2 U	0.2 U
Isopropylbenzene	98-82-8	810		180 D	2 U	0.2 U	0.2 U
Alpha Methyl Styrene	98-83-9	N.L.		2 U	2 U	0.2 U	0.2 U

** USEPA OSWER (2002): Table 2c: Question 4 Generic Screening Levels and Summary Sheet 1 Risk = 1 x 10-4
Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 Csoil-gas
U - Analyte not detected
J - Estimated concentration
D - Diluted result

Table 6

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Soil Analytical Summary - Inorganics

Chemical Name	CAS No	TAGM 4046 Rec. Soil Cleanup Objective (mg/Kg)	Eastern USA Background [1] (mg/Kg)	Location ID / Sample Date / Sample ID / Unit	SS-06 / 9/16/2004 / SS-6 / mg/kg	SS-07 / 9/16/2004 / SS-7 / mg/kg	SS-08 / 9/16/2004 / SS-8 / mg/kg	SS-09 / 9/16/2004 / SS-9 / mg/kg	SS-10 / 9/16/2004 / SS-10 / mg/kg
Aluminum	7429-90-5	SB	33,000		5920.	7820.	9800.	14400.	8490.
Antimony	7440-36-0	SB	NC		1.0 B	.81 B	1.0 B	2.0 B	1.4 B
Arsenic	7440-38-2	7.5 or SB	3 - 12 **		6.8	**9.2 ***	**11.7 ***	**12.1 ***	**9.2 ***
Barium	7440-39-3	300 or SB	15 - 600		81.3	89.8	107.	**448. ***	108.
Beryllium	7440-41-7	0.16 or SB	0 - 1.75		**.24 B ***	**.34 B ***	**.45 B ***	**.65 B ***	**.38 B ***
Cadmium	7440-43-9	1 or SB	0.1 - 1		.050 U	.21 B	.040 U	**2.9 ***	.66 B
Calcium	7440-70-2	SB	130 - 35,000		25600.	11300.	5830.	3520.	13500.
Chromium	7440-47-3	10 or SB	1.5 - 40 **		**12.7 ***	**24. ***	**14.1 ***	**24.2 ***	**19.3 ***
Cobalt	7440-48-4	30 or SB	2.5 - 60 **		5.7 B	11.6 B	9.1 B	14.9	8.5 B
Copper	7440-50-8	25 or SB	1 - 50		21.8	**39.4 ***	**26.7 ***	**89.3 ***	**46.7 ***
Iron	7439-89-6	2 or SB	2,000 - 550,000		**14400. ***	**24900. ***	**24500. ***	**71600. ***	**33900. ***
Lead	7439-92-1	SB	4 - 61		16.1	21.8	18.5	45.7	98.
Magnesium	7439-95-4	SB	100 - 5,000		4340.	5790.	4670.	3510.	5320.
Manganese	7439-96-5	SB	50 - 5,000		583.	1010.	685.	1000.	694.
Mercury	7439-97-6	0.1	0.001 - 0.2		.020 B	**.19 ***	**.14 ***	**.14 B ***	.05 B
Nickel	7440-02-0	13 or SB	0.5 - 25		**18.8 ***	**52.4 ***	**22.5 ***	**40.3 ***	**30.6 ***
Potassium	7440-09-7	SB	8,500 - 43,000 **		606. B	1060. B	1040. B	1050. B	1330. B
Selenium	7782-49-2	2 or SB	0.1 - 3.9		.65 U	1.0 B	.65 B	**2.7 ***	.85 U
Silver	7440-22-4	SB	NC		.68 B	.36 U	.32 U	.78 B	.47 U
Sodium	7440-23-5	SB	6,000 - 8,000		47.4 B	32.2 B	29.1 B	49.4 B	40. B
Thallium	7440-28-0	SB	NC		.89 UJ	1.4 BJ	1.5 BJ	4.8 J	1.2 UJ
Vanadium	7440-62-2	150 or SB	1 - 300		10.6 B	14.5	15.3	22.2	13.1 B
Zinc	7440-66-6	20 or SB	9 - 50		**42.8 ***	**87.7 ***	**68.3 ***	**229. ***	**381. ***
Cyanide	57-12-5	NC	NC		.60 U	.61 U	.53 U	.71 U	.79 U

SB - Site background
B - Value is greater than IDL but less than CRDL
U - Analyte not detected
J - Estimated concentration
[1] McGovern, 1990. Background Concentrations of 20 Elements in Soils with Special Regard for New York State. NYSDEC, Wildlife Resources Center. Delmar, New York
*** -** Concentration exceeds TAGM 4046 criteria
** - New York State Background

Table 7

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Soil Analytical Summary - Pesticides/PCBs

Chemical Name	CAS No	TAGM 4046 Rec. Soil Cleanup Objective						
			Location ID	SS-06	SS-07	SS-08	SS-09	SS-10
			Sample Date	9/16/2004	9/16/2004	9/16/2004	9/16/2004	9/16/2004
			Sample ID	SS-6	SS-7	SS-8	SS-9	SS-10
			Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
alpha-BHC	319-84-6	0.11 mg/kg		.0011 J	.002 U	.0018 U	.0024 U	.0026 U
Beta-BHC	319-95-7	0.2 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
delta-BHC	319-86-8	0.3 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
gamma-BHC (Lindane)	58-89-9	0.06 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
Heptachlor	76-44-8	0.1 mg/kg		0.0018 J	.002 U	.0018 U	.0024 U	.0026 U
Heptachlor Epoxide	1024-57-3	0.02 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
Aldrin	309-00-2	0.041 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
Endosulfan I	959-98-8	0.9 mg/kg		.002 U	.002 U	.0018 U	.0024 U	.0026 U
Dieldrin	60-57-1	0.044 mg/kg		.004 U	.004 U	.0035 U	.0048 U	.0052 U
4,4'-DDE	72-55-9	2.1 mg/kg		.004 U	.0011 JP	.0035 U	.0048 U	.0052 U
Endrin	72-20-8	0.1 mg/kg		.019	.004 U	.0035 U	.0048 U	R
Endosulfan II	33213-65-9	0.9 mg/kg		.004 U	.004 U	.0035 U	.0048 U	.0052 U
4,4'-DDD	72-54-8	2.9 mg/kg		.004 U	.004 U	.0035 U	.0048 U	.0052 U
Endosulfan Sulfate	1031-07-8	1 mg/kg		.004 U	.004 U	.0035 U	.0048 U	.0052 U
4,4'-DDT	50-29-3	2.1 mg/kg		.004 U	.0032 JP	.0035 U	.0039 J	.0052 U
Methoxychlor	72-43-5	NC		.02 U	.02 U	.0018 U	.024 U	.026 U
Endrin Ketone	53494-70-5	NC		.004 U	.004 U	.0035 U	.0048 U	.0052 U
Endrin Aldehyde	7421-36-3	NC		.004 U	.004 U	.0035 U	.0048 U	.0052 U
alpha-Chlordane	5103-71-9	NC		.001 JP	.002 U	.0018 U	.011 PJ	.0026 U
gamma-Chlordane	5103-74-2	0.54 mg/kg		.004 U	.002 U	.0018 U	.0098	.0026 U
Toxaphene	8001-35-2	NC		.2 U	.2 U	.18 U	.24 U	.26 U
Aroclor-1016	12674-11-2	1 mg/kg		.04 U	.04 U	.035 U	.048 U	.052 U
Aroclor-1221	11104-28-2	1 mg/kg		.08 U	.081 U	.071 U	.095 U	.1 U
Aroclor-1232	11141-16-5	1 mg/kg		.04 U	.04 U	.035 U	.048 U	.052 U
Aroclor-1242	53469-21-9	1 mg/kg		.04 U	.04 U	.035 U	.048 U	.052 U
Aroclor-1248	12672-29-6	1 mg/kg		.04 U	.04 U	.035 U	.048 U	.052 U
Aroclor-1254	11097-69-1	1 mg/kg		.04 U	.04 U	.035 U	.048 U	.052 U
Aroclor-1260	11096-82-5	1 mg/kg		.04 U	.04 U	.044	.05	R

Notes:

NC - No criteria
J - Estimated concentration
P - Greater than 25% difference for detected concentrations between the two GC columns
B - Analyte detected in associated blank
U - Analyte not detected
R - Analytical result rejected during validation

Table 8

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Water Analytical Summary - SVOCs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID / Sample Date / Units	SW-1	SW-2	SW-3	SW-4	SW-5
			Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
			Units	ug/l	ug/l	ug/l	ug/l	ug/l
Benzaldehyde	100-52-7	NC		10. U	10. U	10. U	11. U	11. U
Acetophenone	98-86-2	NC		1. J	10. U	10. U	11. U	11. U
bis(2-Chloroethyl)ether	111-44-4	NC		10. U	10. U	10. U	11. U	11. U
Caprolactam	105-60-2	NC		10. U	10. U	10. U	11. U	11. U
Phenol	108-95-2	5		**11. ***	10. U	10. U	11. U	11. U
1,1'-Biphenyl	92-52-4	NC		10. U	10. U	10. U	11. U	11. U
2-Chlorophenol	95-57-8	1		10. U	10. U	10. U	11. U	11. U
Atrazine	1912-24-9	NC		10. U	10. U	10. U	11. U	11. U
2,2'-oxybis(1-Chloropropane)	108-60-1	NC		10. U	10. U	10. U	11. U	11. U
2-Methylphenol	95-48-7	NC		11.	10. U	10. U	11. U	11. U
Hexachloroethane	67-72-1	0.6		10. U	10. U	10. U	11. U	11. U
N-Nitroso-di-n-propylamine	621-64-7	NC		10. U	10. U	10. U	11. U	11. U
4-Methylphenol	106-44-5	NC		4. J	10. U	10. U	11. U	11. U
Nitrobenzene	98-95-3	NC		10. U	10. U	10. U	11. U	11. U
Isophorone	78-59-1	NC		10. U	10. U	10. U	11. U	11. U
2-Nitrophenol	88-75-5	NC		10. U	10. U	10. U	11. U	11. U
2,4-Dimethylphenol	105-67-9	5		10. U	10. U	10. U	11. U	11. U
bis(2-chloroethoxy)methane	111-91-1	NC		10. U	10. U	10. U	11. U	11. U
2,4-Dichlorophenol	120-83-2	1		10. U	10. U	10. U	11. U	11. U
Naphthalene	91-20-3	13		10. U	10. U	10. U	11. U	11. U
4-Chloroaniline	106-47-8	NC		10. U	10. U	10. U	11. U	11. U
Hexachlorobutadiene	87-68-3	0.01		10. U	10. U	10. U	11. U	11. U
4-chloro-3-Methylphenol	59-50-7	NC		10. U	10. U	10. U	11. U	11. U
2-Methylnaphthalene	91-57-6	4.7		10. U	10. U	10. U	11. U	11. U
Hexachlorocyclopentadiene	77-47-4	0.45		10. U	10. U	10. U	11. U	11. U
2,4,6-Trichlorophenol	88-06-2	1		10. U	10. U	10. U	11. U	11. U
2,4,5-Trichlorophenol	95-95-4	1		25. U	25. U	25. U	28. U	27. U
2-Chloronaphthalene	91-58-7	NC		10. U	10. U	10. U	11. U	11. U
2-Nitroaniline	88-74-4	NC		25. U	25. U	25. U	28. U	27. U

Notes:
NC - No criteria
J - Estimated concentration
U - Analyte not detected

Table 8

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Water Analytical Summary - SVOCs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID	SW-1	SW-2	SW-3	SW-4	SW-5
			Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
			Units	ug/l	ug/l	ug/l	ug/l	ug/l
Acenaphthylene	208-96-8	NC		10. U	10. U	10. U	11. U	11. U
Dimethyl phthalate	131-11-3	NC		10. U	10. U	10. U	11. U	11. U
2,6-Dinitrotoluene	606-20-2	NC		10. U	10. U	10. U	11. U	11. U
Acenaphthene	83-32-9	5.3		10. U	10. U	10. U	11. U	11. U
3-Nitroaniline	99-09-2	NC		25. U	25. U	25. U	28. U	27. U
2,4-Dinitrophenol	51-28-5	400		25. U	25. U	25. U	28. U	27. U
Dibenzofuran	132-64-9	NC		10. U	10. U	10. U	11. U	11. U
2,4-Dinitrotoluene	121-14-2	NC		10. U	10. U	10. U	11. U	11. U
4-Nitrophenol	100-02-7	NC		25. U	25. U	25. U	28. U	27. U
Fluorene	86-73-7	0.54		10. U	10. U	10. U	11. U	11. U
4-Chlorophenyl phenyl ether	7005-72-3	NC		10. U	10. U	10. U	11. U	11. U
Diethyl phthalate	84-66-2	NC		10. U	10. U	10. U	11. U	11. U
4-Nitroaniline	100-01-6	NC		25. U	25. U	25. U	28. U	27. U
4,6-Dinitro-2-Methylphenol	534-52-1	NC		25. U	25. U	25. U	28. U	27. U
n-Nitrosodiphenylamine	86-30-6	NC		10. U	10. U	10. U	11. U	11. U
4-Bromophenyl phenyl ether	101-55-3	NC		10. U	10. U	10. U	11. U	11. U
Hexachlorobenzene	118-74-1	3		10. U	10. U	10. U	11. U	11. U
Pentachlorophenol	87-86-5	10		25. U	25. U	25. U	28. U	27. U
Phenanthrene	85-01-8	5		10. U	10. U	10. U	11. U	11. U
Anthracene	120-12-7	3.8		10. U	10. U	10. U	11. U	11. U
di-n-Butyl Phthalate	84-74-2	NC		10. U	10. U	10. U	11. U	11. U
Carbazole	86-74-8	NC		10. U	10. U	10. U	11. U	11. U
Fluoranthene	206-44-0	NC		10. U	10. U	10. U	11. U	11. U
Pyrene	129-00-0	4.6		10. U	10. U	10. U	11. U	11. U
Benzyl Butyl Phthalate	85-68-7	NC		10. U	10. U	10. U	11. U	11. U
3,3'-Dichlorobenzidine	91-94-1	NC		10. U	10. U	10. U	11. U	11. U
Benzo[a]anthracene	56-55-3	0.03		10. U	10. U	10. U	11. U	11. U
Chrysene	218-01-9	NC		10. U	10. U	10. U	11. U	11. U
bis(2-ethylhexyl)phthalate	117-81-7	0.6		10. U	10. U	10. U	11. U	11. U

Notes:
NC - No criteria
J - Estimated concentration
U - Analyte not detected

Table 8

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Water Analytical Summary - SVOCs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID	SW-1	SW-2	SW-3	SW-4	SW-5
			Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
			Units	ug/l	ug/l	ug/l	ug/l	ug/l
di-n-Octyl Phthalate	117-84-0	NC		10. U	10. U	10. U	11. U	11. U
Benzo[b]fluoranthene	205-99-2	NC		10. U	10. U	10. U	11. U	11. U
Benzo[k]fluoranthene	207-08-9	NC		10. U	10. U	10. U	11. U	11. U
Benzo[a]pyrene	50-32-8	0.0012		10. U	10. U	10. U	11. U	11. U
Indeno[1,2,3-cd]pyrene	193-39-5	NC		10. U	10. U	10. U	11. U	11. U
Dibenz[a,h]anthracene	53-70-3	NC		10. U	10. U	10. U	11. U	11. U
Benzo[g,h,i]perylene	191-24-2	NC		10. U	10. U	10. U	11. U	11. U

Notes:
NC - No criteria
J - Estimated concentration
U - Analyte not detected

Table 9

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Water Analytical Summary - Inorganics

		NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID	SW-1	SW-2	SW-3	SW-4	SW-5
			Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
Chemical Name	**CAS No**		Units	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	7429-90-5	100		**10200 ***	**253 ***	**2740 ***	**3820 ***	**5260 ***
Antimony	7440-36-0	NC		2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Arsenic	7440-38-2	150		4.2 B	2.7 U	6.2 B	3.2 B	3.7 B
Barium	7440-39-3	NC		77.2 B	133 B	390	170 B	264
Beryllium	7440-41-7	1100		.27 B	.04 U	.04 U	.07 B	.07 B
Cadmium	7440-43-9	4		.2 U	.2 U	.2 U	.85 B	2.2 B
Calcium	7440-70-2	NC		6740	98800	193000	72900	84000
Chromium	7440-47-3	141		9.4 B	.94 U	2.5 B	4.1 B	4.8 B
Cobalt	7440-48-4	5		**7.6 B ***	.99 U	**6.9 B ***	.99 U	**11.2 B ***
Copper	7440-50-8	18		5.5 B	1.2 U	7.3 B	9 B	18 B
Iron	7439-89-6	300		**14200 ***	**1350 ***	**47900 ***	**12800 ***	**38000 ***
Lead	7439-92-1	5		**11.1 ***	1.1 U	**8.4 ***	**10.9 ***	**22.5 ***
Magnesium	7439-95-4	NC		3020 B	13000	20700	10900	12300
Manganese	7439-96-5	NC		869	477	3230	416	876
Mercury	7439-97-6	0.77		.03 B	.02 U	.02 U	.02 U	.04 B
Nickel	7440-02-0	101		9.3 B	8.4 B	42.8	8.6 B	24 B
Potassium	7440-09-7	NC		3360 BJ	4770 BJ	4890 BJ	2880 BJ	4410 BJ
Selenium	7782-49-2	4.6		2.7 U	2.7 U	2.7 U	2.7 U	2.8 BJ
Silver	7440-22-4	16		1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Sodium	7440-23-5	NC		786 BJ	5800 J	3330 BJ	7240 J	6900 J
Thallium	7440-28-0	8		3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Vanadium	7440-62-2	14		**16.6 B ***	1.1 U	4.4 B	6.6 B	8.5 B
Zinc	7440-66-6	162		60.2	8.8 B	98.2	69.9	**210 ***
Cyanide	57-12-5	5.2		10	10	10	10	10

Notes:
NC - No criteria
U - Analyte not detected
B - Value is greater than IDL but less than CRDL
* - Concentration exceeds criteria
J - Estimated concentration

Table 10

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Surface Water Analytical Summary - Pesticides/PCBs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID Sample Date Units	SW-4 9/23/2004 ug/l
alpha-BHC	319-84-6	0.002		.056 U
Beta-BHC	319-95-7	NC		.056 U
delta-BHC	319-86-8	0.008		.056 U
gamma-BHC (Lindane)	58-89-9	0.008		.056 U
Heptachlor	76-44-8			.056 U
Heptachlor Epoxide	1024-57-3	0.0003		.056 U
Aldrin	309-00-2	0.001		.056 U
Endosulfan I	959-98-8	0.009		.056 U
Dieldrin	60-57-1	0.056		.11 U
4,4'-DDE	72-55-9	7		.11 U
Endrin	72-20-8	0.036		.11 U
Endosulfan II	33213-65-9	0.009		.11 U
4,4'-DDD	72-54-8	8		.11 U
Endosulfan Sulfate	1031-07-8	NC		.11 U
4,4'-DDT	50-29-3	1		.11 U
Methoxychlor	72-43-5	0.03		.56 U
Endrin Ketone	53494-70-5	NC		.11 U
Endrin Aldehyde	7421-93-4	NC		.11 U
alpha-Chlordane	5103-71-9	2		.056 U
gamma-Chlordane	5103-74-2	2		.056 U
Toxaphene	8001-35-2	6		5.6 U
Aroclor-1016	12674-11-2	.000001		1.1 U
Aroclor-1221	11104-28-2	.000001		2.2 U
Aroclor-1232	11141-16-5	.000001		1.1 U
Aroclor-1242	53469-21-9	.000001		1.1 U
Aroclor-1248	12672-29-6	.000001		1.1 U
Aroclor-1254	11097-69-1	.000001		1.1 U
Aroclor-1260	11096-82-5	.000001		1.1 U

Notes:

NC - No criteria
J - Estimated concentration
B - Analyte detected in associated blank
P - Greater than 25% difference for detected concentrations between the two GC columns

Table 11

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Sediment Analytical Summary - VOCs

			Location ID	SED-01		SED-02		SED-03		SED-04		SED-05	
			Sample Date	9/23/2004		9/23/2004		9/23/2004		9/23/2004		9/23/2004	
Chemical Name	**Human Health (ug/gOC)**	**Benthic Chronic (ug/gOC)**	**Units / CAS No**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**
Dichlorodifluoromethane	---	---	75-71-8	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Chloromethane	---	---	74-87-3	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Vinyl Chloride	0.07	---	75-01-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Bromomethane	---	---	74-83-9	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Chloroethane	---	---	75-00-3	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Trichlorofluoromethane	---	---	75-69-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Acetone	---	---	67-64-1	4. J	0.13	29.	1.3	2. J	0.1	33.	0.58	39.	2.6
1,1-Dichloroethene	0.02	---	75-35-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Methylene chloride	---	---	75-09-2	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Methyl Acetate	---	---	79-20-9	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,1,2-Trichloro-1,2,2-trifluoroethane	---	---	76-13-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Carbon Disulfide	---	---	75-15-0	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
trans-1,2-Dichloroethene	---	---	156-60-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Methyl tert-Butyl ether	---	---	1634-04-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,1-Dichloroethane	---	---	75-34-3	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
2-Butanone	---	---	78-93-3	15. U	---	14. U	---	13. U	---	19. U	---	5. J	0.33
cis-1,2-Dichloroethene	---	---	156-59-2	15. U	---	14. U	---	11. J	0.57	19. U	---	14. U	---
Chloroform	---	---	67-66-3	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2-Dichloroethane	0.7	---	107-06-2	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,1,1-Trichloroethane	---	---	71-55-6	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Cyclohexane	---	---	110-82-7	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Carbon Tetrachloride	0.6	---	56-23-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Benzene	0.6	28	71-43-2	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Trichloroethylene	2.0	---	79-01-6	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2-Dichloropropane	---	---	78-87-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Bromodichloromethane	---	---	75-27-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Methylcylohexane	---	---	108-87-2	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
cis-1,3-Dichloropropene	---	---	10061-01-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
trans-1,3-Dichloropropene	---	---	10061-02-6	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,1,2-Trichloroethane	0.6	---	79-00-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Dibromochloromethane	---	---	124-48-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Bromoform	---	---	75-25-2	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
4-Methyl-2-Pentanone	---	---	108-10-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Toluene	---	49	108-88-3	4. J	0.13	14. U	---	13. U	---	19. U	---	14. U	---
Tetrachloroethene	0.8	---	127-18-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
2-Hexanone	---	---	591-78-6	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2-Dibromoethane	---	---	106-93-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Chlorobenzene	---	3.5	108-90-7	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Ethylbenzene	---	24	100-41-4	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Xylene (Total)	---	92	1330-20-7	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Styrene	---	---	100-42-5	15. U	---	14. U	---	3. J	0.15	19. U	---	14. U	---
1,1,2,2-Tetrachloroethane	0.3	---	79-34-5	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Isopropylbenzene	---	12	98-82-8	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,3-Dichlorobenzene	---	12.0	541-73-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,4-Dichlorobenzene	---	12.0	106-46-7	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2-Dichlorobenzene	---	12.0	95-50-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2-Dibromo-3-Chloropropane	---	---	96-12-8	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
1,2,4-Trichlorobenzene	---	---	120-82-1	15. U	---	14. U	---	13. U	---	19. U	---	14. U	---
Total Organic Carbon (%)				3.1		2.28		1.94		5.67		1.51	

Notes:

ug/gOC - micrograms per grams organic carbon
J - Estimated concentration
U - Analyte not detected
B - Analyte detected in associated blank

Table 12

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Sediment Analytical Summary - SVOCs

Chemical Name	Human Health (ug/gOC)	Benthic Chronic (ug/gOC)	Location ID / Sample Date / Units / CAS No	SED-01 9/23/2004 ug/kg	SED-01 ug/g OC	SED-02 9/23/2004 ug/kg	SED-02 ug/g OC	SED-03 9/23/2004 ug/kg	SED-03 ug/g OC	SED-04 9/23/2004 ug/kg	SED-04 ug/g OC	SED-05 9/23/2004 ug/kg	SED-05 ug/g OC
Benzaldehyde	---	---	100-52-7	61 J	1.97	470. U	---	510. U	---	670. U	---	490. U	---
Acetophenone	---	---	98-86-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
bis(2-Chloroethyl)ether	0.03		111-44-4	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Caprolactam	---	---	105-60-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Phenol	---	---	108-95-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
1,1'-Biphenyl	---	---	92-52-4	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2-Chlorophenol	---	---	95-57-8	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Atrazine	---	---	1912-24-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,2'-oxybis(1-Chloropropane)	---	---	108-60-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2-Methylphenol	---	---	95-48-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Hexachloroethane	---	---	67-72-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
N-Nitroso-di-n-propylamine	---	---	621-64-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Methylphenol	---	---	106-44-5	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Nitrobenzene	---	---	98-95-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Isophorone	---	427	78-59-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2-Nitrophenol	---	---	88-75-5	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,4-Dimethylphenol	---	---	105-67-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
bis(2-chloroethoxy)methane	---	---	111-91-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,4-Dichlorophenol	---	---	120-83-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Naphthalene	---	30	91-20-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Chloroaniline	---	---	106-47-8	510. UJ	---	470. UJ	---	510. UJ	---	670. UJ	---	490. UJ	---
Hexachlorobutadiene	0.3	5.5	87-68-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-chloro-3-Methylphenol	---	---	59-50-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2-Methylnaphthalene	---	34	91-57-6	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Hexachlorocyclopentadiene	---	4.4	77-47-4	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,4,6-Trichlorophenol	---	---	88-06-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,4,5-Trichlorophenol	---	---	95-95-4	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
2-Chloronaphthalene	---	---	91-58-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2-Nitroaniline	---	---	88-74-4	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
Acenaphthylene	---	---	208-96-8	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Dimethyl phthalate	---	---	131-11-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
2,6-Dinitrotoluene	---	---	606-20-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Acenaphthene	---	140	83-32-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
3-Nitroaniline	---	---	99-09-2	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
2,4-Dinitrophenol	---	---	51-28-5	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
Dibenzofuran	---	---	132-64-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---

Notes:
ug/gOC - micrograms per gram organic carbon
U - Analyte not detected

Table 12

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Sediment Analytical Summary - SVOCs

			Location ID Sample Date	SED-01 9/23/2004		SED-02 9/23/2004		SED-03 9/23/2004		SED-04 9/23/2004		SED-05 9/23/2004	
Chemical Name	**Human Health (ug/gOC)**	**Benthic Chronic (ug/gOC)**	**Units** **CAS No**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**	**ug/kg**	**ug/g OC**
2,4-Dinitrotoluene	---	---	121-14-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Nitrophenol	---	---	100-02-7	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
Fluorene	---	8	86-73-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Chlorophenyl phenyl ether	---	---	7005-72-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Diethyl phthalate	---	---	84-66-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Nitroaniline	---	---	100-01-6	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
4,6-Dinitro-2-Methylphenol	---	---	534-52-1	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
n-Nitrosodiphenylamine	---	---	86-30-6	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
4-Bromophenyl phenyl ether	---	---	101-55-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Hexachlorobenzene	0.15	5570	118-74-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Pentachlorophenol	---	40	87-86-5	1300. U	---	1200. U	---	1300. U	---	1700. U	---	1200. U	---
Phenanthrene	---	120	85-01-8	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Anthracene	---	107	120-12-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
di-n-Butyl Phthalate	---	---	84-74-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Carbazole	---	---	86-74-8	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Fluoranthene	---	1020	206-44-0	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Pyrene	---	961	129-00-0	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzyl Butyl Phthalate	---	---	85-68-7	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
3,3'-Dichlorobenzidine	---	---	91-94-1	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzo[a]anthracene	---	12	56-55-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Chrysene	---	---	218-01-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
bis(2-ethylhexyl)phthalate	---	199.5	117-81-7	510. U	---	470. U	---	87. J	4.5	670. U	---	490. U	---
di-n-Octyl Phthalate	---	---	117-84-0	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzo[b]fluoranthene	---	---	205-99-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzo[k]fluoranthene	---	---	207-08-9	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzo[a]pyrene	1.3	---	50-32-8	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Indeno[1,2,3-cd]pyrene	---	---	193-39-5	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Dibenz[a,h]anthracene	---	---	53-70-3	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Benzo[g,h,i]perylene	---	---	191-24-2	510. U	---	470. U	---	510. U	---	670. U	---	490. U	---
Total Organic Carbon (%)				3.1		2.28		1.94		5.67		1.51	

Notes:
ug/gOC - micrograms per gram organic carbon
U - Analyte not detected

Table 13

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Sediment Analytical Summary - Inorganics

				Location ID	SED-01	SED-02	SED-03	SED-04	SED-05
				Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
				Sample ID	SED-1	SED-2	SED-3	SED-4	SED-5
Chemical Name	**CAS No**	**Lowest Effect Level (ug/g)**	**Severe Effect Level (ug/g)**	**Unit**	**ug/g**	**ug/g**	**ug/g**	**ug/g**	**ug/g**
Aluminum	7429-90-5		---		9550	12100	16200	15900	17100
Antimony	7440-36-0	2 (L)	25 (L)		.76 U	.7 U	1.1 B	1.4 B	.73 U
Arsenic	7440-38-2	6 (P)	33 (P)		5.4	4.1	**13.8 ***	**7.5 ***	**6 ***
Barium	7440-39-3		---		67	138	249	234	227
Beryllium	7440-41-7		---		.32 B	.55 B	.71 B	.71 B	.67 B
Cadmium	7440-43-9	0.6 (P)	9 (L)		.06 U	.23 B	.49 B	**.82 B ***	1 B
Calcium	7440-70-2		---		927 B	2520	7120	3340	2890
Chromium	7440-47-3	26 (P)	110 (P)		9.1	14.6	23.2	19.7	20.9
Cobalt	7440-48-4		---		3.6 B	10.8 B	16.8	12.6 B	15.7
Copper	7440-50-8	16 (P)	110 (P)		4.2 B	11.3	27.2	21.5	13.9
Iron	7439-89-6	20000 (P)	40000 (P)		13900	**25300 ***	**67300 ***	**45600 ***	**36200 ***
Lead	7439-92-1	31 (P)	110 (L)		17.4	15.4	28.6	39.9	20.8
Magnesium	7439-95-4		---		1490 B	3100	5060	3410	3900
Manganese	7439-96-5	460 (P)	1100 (L)		199	**611 ***	**1320 ***	**885 ***	**593 ***
Mercury	7439-97-6	0.15 (L)	1.3 (L)		.11 B	.06 B	.09 B	.13 B	.07 B
Nickel	7440-02-0	16 (P)	50 (L)		8.2 B	**23.2 ***	**40.4 ***	**26.8 ***	**28.2 ***
Potassium	7440-09-7		---		766 B	797 B	1390 B	1150 B	1200 B
Selenium	7782-49-2		---		1.1 B	.95 B	2.1	2.4	1.7
Silver	7440-22-4	1 (L)	2.2 (L)		.45 U	.42 U	.97 B	.6 U	.44 U
Sodium	7440-23-5		---		26.6 B	47.6 B	41.9 B	54.6 B	47.6 B
Thallium	7440-28-0		---		1.1 U	1.6 BJ	4.7 J	3.1 BJ	2.5 BJ
Vanadium	7440-62-2		---		16	15.8	23.8	24.8	24.3
Zinc	7440-66-6	120 (P)	270 (L)		44.4	105	**176 ***	**191 ***	**148 ***
Cyanide	57-12-5		---		.76 U	.7 U	.76 U	1 U	.73 U

Notes:

B - Value is greater than IDL but less than CRDL
U - Analyte not detected
* - Concentration exceeds criteria
J - Estimated concentration
(L) - Long and Morgan, 1990. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National States and Trends Program. National Oceanic Atmospheric Administration Technical Memorandum No. 5, OMA52, NOAA National Ocean Service, Seattle, Washington
(P) - Persaud, 1992. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment, Queen's Printer for Ontario.

Table 14

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Sediment Analytical Summary - Total Organic Carbon

	Location ID	SED-01	SED-02	SED-03	SED-04	SED-05
	Sample Date	9/23/2004	9/23/2004	9/23/2004	9/23/2004	9/23/2004
	Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Chemical Name	**CAS No**					
Total Organic Carbon		31000	22800	19400	56700	15100

Table 15

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Subsurface Soil Analytical Summary - VOCs

Chemical Name	**CAS No**	**TAGM 4046 Rec. Soil Cleanup Objective**	**Location ID**	SOIL-01	SOIL-02	SOIL-03	TP-04	TP-07	TP-10	TP-11	TP-8
			Sample Date	9/22/2004	9/22/2004	9/23/2004	8/17/2004	8/17/2004	8/19/2004	8/18/2004	8/19/2004
			Sample ID	SOIL-01	SOIL-02	SOIL-03	TP-04/SS-1	TP-07/SS-2	TP-10/SS-4	TP-11/SS-3	TP-8/SS-5
			Unit	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Dichlorodifluoromethane	75-71-8	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Chloromethane	74-87-3	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Vinyl Chloride	75-01-4	200 ug/kg		35. UJ	18. UJ	5. J	11. U	110. U	18. U	13. U	12. U
Bromomethane	74-83-9	NC		3. J	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Chloroethane	75-00-3	1900 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Trichlorofluoromethane	75-69-4	NC		35. UJ	18. UJ	33. UJ	11. U	6. J	18. U	13. U	12. U
Acetone	67-64-1	200 ug/kg		74.	7. J	19. J	11. U	110. U	18. U	13. U	12. U
1,1-Dichloroethene	75-35-4	400 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Methylene chloride	75-09-2	100 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Methyl Acetate	79-20-9	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6000 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Carbon Disulfide	75-15-0	2700 ug/kg		35. UJ	18. UJ	33. UJ	11. U	11. J	18. U	13. U	12. U
trans-1,2-Dichloroethene	156-60-5	300 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Methyl tert-Butyl ether	1634-04-4	120 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,1-Dichloroethane	75-34-3	200 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
2-Butanone	78-93-3	300 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
cis-1,2-Dichloroethene	156-59-2	NC		35. UJ	18. UJ	100.	11. U	110. U	18. U	13. U	12. U
Chloroform	67-66-3	300 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,2-Dichloroethane	107-06-2	100 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,1,1-Trichloroethane	71-55-6	800 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Cyclohexane	110-82-7	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Carbon Tetrachloride	56-23-5	600 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Benzene	71-43-2	60 ug/kg		2. J	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Trichloroethylene	79-01-6	700 ug/kg		35. UJ	18. UJ	130.	11. U	8. J	18. U	13. U	2. J
1,2-Dichloropropane	78-87-5	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Bromodichloromethane	75-27-4	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Methylcylohexane	108-87-2	NC		35. UJ	18. UJ	33. UJ	11. U	31. J	18. U	13. U	12. U
cis-1,3-Dichloropropene	10061-01-5	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
trans-1,3-Dichloropropene	10061-02-6	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,1,2-Trichloroethane	79-00-5	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Dibromochloromethane	124-48-1	N/A ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Bromoform	75-25-2	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
4-Methyl-2-Pentanone	108-10-1	1000 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Toluene	108-88-3	1500 ug/kg		35. UJ	18. UJ	33. UJ	11. U	13. J	18. U	13. U	12. U
Tetrachloroethene	127-18-4	1400 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
2-Hexanone	591-78-6	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,2-Dibromoethane	106-93-4	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Chlorobenzene	108-90-7	1700 ug/kg		60.	1. J	33. UJ	11. U	110. U	18. U	2. J	12. U
Ethylbenzene	100-41-4	5500 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Xylene (Total)	1330-20-7	1200 ug/kg		35. UJ	18. UJ	33. UJ	11. U	46. J	18. U	13. U	12. U
Styrene	100-42-5	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,1,2,2-Tetrachloroethane	79-34-5	600 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
Isopropylbenzene	98-82-8	5000 ug/kg		6. J	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,3-Dichlorobenzene	541-73-1	1600 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,4-Dichlorobenzene	106-46-7	8500 ug/kg		40.	4. J	33. UJ	11. U	150.	18. U	7. J	12. U
1,2-Dichlorobenzene	95-50-1	7900 ug/kg		8. J	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U
1,2,4-Trichlorobenzene	120-82-1	3400 ug/kg		35. UJ	18. UJ	33. UJ	11. U	110. U	18. U	13. U	12. U

Notes:

NC - No criteria
J - Estimated concentration
B - Analyte detected in associated blank
U - Analyte not detected

Table 16

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Subsurface Soil Analytical Summary - SVOCs

Chemical Name	**CAS No**	**TAGM 4046 Rec. Soil Cleanup Objective**	**Location ID**	SOIL-02	TP-04	TP-07	TP-10	TP-11	TP-8
			Sample Date	9/22/2004	8/17/2004	8/17/2004	8/19/2004	8/18/2004	8/19/2004
			Sample ID	SOIL-02	TP-04/SS-1	TP-07/SS-2	TP-10/SS-4	TP-11/SS-3	TP-8/SS-5
			Unit	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Benzaldehyde	100-52-7	NC		76. J	380. U	52000. U	6100. U	450. U	46. J
Acetophenone	98-86-2	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
bis(2-Chloroethyl)ether	111-44-4	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Caprolactam	105-60-2	NC		680. UJ	46. J	52000. U	6100. U	450. U	400. U
Phenol	108-95-2	30 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
1,1'-Biphenyl	92-52-4	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2-Chlorophenol	95-57-8	800		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Atrazine	1912-24-9	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,2'-oxybis(1-Chloropropane)	108-60-1	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2-Methylphenol	95-48-7	100 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Hexachloroethane	67-72-1	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
N-Nitroso-di-n-propylamine	621-64-7	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Methylphenol	106-44-5	900		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Nitrobenzene	98-95-3	200 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Isophorone	78-59-1	4400		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2-Nitrophenol	88-75-5	330 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,4-Dimethylphenol	105-67-9	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
bis(2-chloroethoxy)methane	111-91-1	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,4-Dichlorophenol	120-83-2	400		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Naphthalene	91-20-3	13000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Chloroaniline	106-47-8	220 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Hexachlorobutadiene	87-68-3	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-chloro-3-Methylphenol	59-50-7	240 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2-Methylnaphthalene	91-57-6	36400		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Hexachlorocyclopentadiene	77-47-4	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,4,6-Trichlorophenol	88-06-2	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,4,5-Trichlorophenol	95-95-4	100		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
2-Chloronaphthalene	91-58-7	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2-Nitroaniline	88-74-4	430 or MDL		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
Acenaphthylene	208-96-8	41000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Dimethyl phthalate	131-11-3	2000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,6-Dinitrotoluene	606-20-2	1000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Acenaphthene	83-32-9	50000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
3-Nitroaniline	99-09-2	500 or MDL		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
2,4-Dinitrophenol	51-28-5	200 or MDL		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
Dibenzofuran	132-64-9	6200		680. UJ	380. U	52000. U	6100. U	450. U	400. U
2,4-Dinitrotoluene	121-14-2	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Nitrophenol	100-02-7	100 or MDL		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
Fluorene	86-73-7	50000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Chlorophenyl phenyl ether	7005-72-3	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Diethyl phthalate	84-66-2	7100		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Nitroaniline	100-01-6	NC		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
4,6-Dinitro-2-Methylphenol	534-52-1	NC		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
n-Nitrosodiphenylamine	86-30-6	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
4-Bromophenyl phenyl ether	101-55-3	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Hexachlorobenzene	118-74-1	410		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Pentachlorophenol	87-86-5	1000 or MDL		1700. U	960. U	130000. U	15000. U	1100. U	1000. U
Phenanthrene	85-01-8	50000		680. UJ	380. U	52000. U	6100. U	63. J	400. U
Anthracene	120-12-7	50000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
di-n-Butyl Phthalate	84-74-2	8100		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Carbazole	86-74-8	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Fluoranthene	206-44-0	50000		680. UJ	380. U	52000. U	6100. U	140. J	400. U
Pyrene	129-00-0	50000		680. UJ	380. U	52000. U	6100. U	260. J	400. U
Benzyl Butyl Phthalate	85-68-7	50000		680. UJ	380. U	52000. U	6100. U	45. J	400. U
3,3'-Dichlorobenzidine	91-94-1	NC		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Benzo[a]anthracene	56-55-3	224 or MDL		680. UJ	380. U	52000. U	6100. U	62. J	400. U
Chrysene	218-01-9	400		680. UJ	380. U	52000. U	6100. U	98. J	400. U
bis(2-ethylhexyl)phthalate	117-81-7	50000		680. UJ	380. U	**62000. D ***	6100. U	1300.	73. J
di-n-Octyl Phthalate	117-84-0	50000		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Benzo[b]fluoranthene	205-99-2	1100		680. UJ	380. U	52000. U	6100. U	91. J	400. U
Benzo[k]fluoranthene	207-08-9	1100		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Benzo[a]pyrene	50-32-8	61 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Indeno[1,2,3-cd]pyrene	193-39-5	3200		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Dibenz[a,h]anthracene	53-70-3	14 or MDL		680. UJ	380. U	52000. U	6100. U	450. U	400. U
Benzo[g,h,i]perylene	191-24-2	50000		680. UJ	380. U	52000. U	6100. U	450. U	400. U

Notes:

NC - No criteria
J - Estimated concentration
U - Analyte not detected
MDL - Method detection limit
D - Diluted result
***** - Anaytical result exceeds criteria

Table 17

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Subsurface Soil Analytical Summary - Inorganics

Chemical Name	CAS No	TAGM 4046 Rec. Soil Cleanup Objective (mg/Kg)	Eastern USA Background (mg/Kg)	Location ID	SOIL-01	SOIL-02	SOIL-03	TP-04	TP-07	TP-10	TP-11	TP-8
				Sample Date	9/22/2004	9/22/2004	9/23/2004	8/17/2004	8/17/2004	8/19/2004	8/18/2004	8/19/2004
				Sample ID	SOIL-01	SOIL-02	SOIL-03	TP-04/SS-1	TP-07/SS-2	TP-10/SS-4	TP-11/SS-3	TP-8/SS-5
				Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7429-90-5	SB	33000		14200. J	14500.J	10200. J	10900.	9190.	6970.	10100.	7380.
Antimony	7440-36-0	SB	NC		1.9 BJ	1.5 BJ	2.7 BJ	.42 UJ	24.3 BJ	18.3 BJ	4.1 JB	.43 UJ
Arsenic	7440-38-2	7.5 or SB	3 - 12 **		**29.7 J ***	**10.2 J ***	**13.8 J ***	5.2	**26.8 ***	6.5	**17.1 ***	**12.1 ***
Barium	7440-39-3	300 or SB	15 - 600		271. J	212.J	216.J	127.	206.	93.7	106.	122.
Beryllium	7440-41-7	0.16 or SB	0 - 1.75		**.70 BJ ***	**.62 BJ ***	**.43 BJ ***	**.70 B ***	**.55 B ***	**.35 B ***	**.47 B ***	**.32 B ***
Cadmium	7440-43-9	1 or SB	0.1 - 1		**1.9 BJ ***	.87 BJ	**1.9 BJ ***	.16 B	**23.9 ***	**1.2 B ***	.38 B	.06 U
Calcium	7440-70-2	SB	130 - 35,000		5730. J	4860.J	32200.J	2100.	18200.	13300.	5160.	7410.
Chromium	7440-47-3	10 or SB	1.5 - 40 **		**20.7 J ***	**16.4 J ***	**14.1 J ***	**15. ***	**8870. ***	**5900. ***	**291. ***	**23.1 ***
Cobalt	7440-48-4	30 or SB	2.5 - 60 **		7.8 BJ	6.9 BJ	19.9 BJ	8.7 B	**731. ***	**179. ***	**291. ***	11.6 B
Copper	7440-50-8	25 or SB	1 - 50		**28.7 J ***	16.1J	**40.1 J ***	11.1	**1600. ***	**297. ***	**109. ***	**42.8 ***
Iron	7439-89-6	2 or SB	2,000 - 550,000		**87200. J ***	**59100. J ***	**65000. J ***	**20600. ***	**79900. ***	**75800. ***	**52100. ***	**113000. ***
Lead	7439-92-1	SB	4 - 61		70.3 J	32.9 J	33.4 J	R	R	R	R	R
Magnesium	7439-95-4	SB	100 - 5,000		3110. BJ	3030.J	2900. BJ	2760.	5150.	2490.	3720.	3060.
Manganese	7439-96-5	SB	50 - 5,000		513.J	556.J	329. J	241.	2380.	1160.	703.	1110.
Mercury	7439-97-6	0.1	0.001 - 0.2		**.15 BJ ***	.08 BJ	**.23 BJ ***	.04 B	**2.2 ***	**.16 B ***	.060 B	.02 B
Nickel	7440-02-0	13 or SB	0.5 - 25		**32.6 J ***	**22.5 J ***	**245. J ***	**23. ***	**30700. ***	**4300. ***	**588. ***	**27.1 ***
Potassium	7440-09-7	SB	8,500 - 43,000 **		1090. BJ	1040. BJ	1070. BJ	607. B	573. B	567. B	883. B	839. B
Selenium	7782-49-2	2 or SB	0.1 - 3.9		**4.1 J ***	**2.4 J ***	**2.7 BJ ***	.61 BJ	**3.2 J ***	**2.5 J ***	1.6 J	**3.6 J ***
Silver	7440-22-4	SB	NC		1.1 UJ	.62 UJ	1.4 BJ	.28 U	4.2	2.1 B	.87 B	1.5 B
Sodium	7440-23-5	SB	6,000 - 8,000		56.1 BJ	42.7 BJ	54. BJ	39.2 B	96.2 B	29. B	36.2 B	30.3 B
Thallium	7440-28-0	SB	NC		2.7 BJ	3.4 BJ	2.6 UJ	1.4 BJ	4.4 J	1.9 BJ	2.0 JB	2.7 J
Vanadium	7440-62-2	150 or SB	1 - 300		24.6 BJ	21.5 J	20.1 BJ	17.3	61.1	32.8	20.6	12.
Zinc	7440-66-6	20 or SB	9 - 50		**318. J ***	**238. J ***	**347. J ***	**56.4 ***	**1820. ***	**274. ***	**301. ***	**80.1 ***
Cyanide	57-12-5	NC	NC		1.8 UJ	1.0 UJ	1.8 UJ	.58 U	2.0	.91 U	.68 U	.60 U

Notes:

SB - Site background
NC - No criteria
B - Value is greater than IDL but less than CRDL
U - Analyte not detected
J - Estimated concentration
R - Analytical result rejected during validation
***** - Concentration exceeds criteria
** - New York State Background

Table 18

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Subsurface Soil Analytical Summary - Pesticides/PCBs

Chemical Name	**CAS No**	**TAGM 4046 Rec. Soil Cleanup Objective**	**Location ID**	TP-10	TP-11	TP-8
			Sample Date	8/19/2004	8/18/2004	8/19/2004
			Sample ID	TP-10/SS-4	TP-11/SS-3	TP-8/SS-5
			Unit	mg/kg	mg/kg	mg/kg
alpha-BHC	319-84-6	0.11 mg/kg		.003 U	.0023 U	.002 U
Beta-BHC	319-95-7	0.2 mg/kg		.003 U	.0023 U	.002 U
delta-BHC	319-86-8	0.3 mg/kg		.003 U	.0023 U	.002 U
gamma-BHC (Lindane)	58-89-9	0.06 mg/kg		.003 U	.0023 U	.002 U
Heptachlor	76-44-8	0.1 mg/Kg		.003 U	.0023 U	.002 U
Heptachlor Epoxide	1024-57-3	0.02 mg/kg		.003 U	.0023 U	.002 U
Aldrin	309-00-2	0.041 mg/kg		.003 U	.0023 U	.002 U
Endosulfan I	959-98-8	0.9 mg/kg		.003 U	.0034	.002 U
Dieldrin	60-57-1	0.044 mg/kg		.0061 U	.0045 U	.004 U
4,4'-DDE	72-55-9	2.1 mg/kg		R	.011 JP	.004 U
Endrin	72-20-8	0.1 mg/kg		.02 JP	.0048 JP	.004 U
Endosulfan II	33213-65-9	0.9 mg/kg		R	.0045 U	.004 U
4,4'-DDD	72-54-8	2.9 mg/kg		R	.013	.004 U
Endosulfan Sulfate	1031-07-8	1 mg/kg		R	.0045 U	.004 U
4,4'-DDT	50-29-3	2.1 mg/kg		.0061 U	.0045 U	.004 U
Methoxychlor	72-43-5	NC		R	.023 U	R
Endrin Ketone	53494-70-5	NC		.013 JP	.0048 U	.004 U
Endrin Aldehyde	7421-36-3	NC		R	.005 JP	.004 U
alpha-Chlordane	5103-71-9	NC		.0033 JP	.0014 JP	.002 U
gamma-Chlordane	5103-74-2	0.54 mg/kg		.003 U	R	.002 U
Toxaphene	8001-35-2	NC		.3 U	.23 U	.2 U
Aroclor-1016	12674-11-2	10 mg/kg		.061 U	.045 U	.04 U
Aroclor-1221	11104-28-2	10 mg/kg		.12 U	.091 U	.08 U
Aroclor-1232	11141-16-5	10 mg/kg		.061 U	.045 U	.04 U
Aroclor-1242	53469-21-9	10 mg/kg		.061 U	.045 U	.04 U
Aroclor-1248	12672-29-6	10 mg/kg		.061 U	.16 JP	.04 U
Aroclor-1254	11097-69-1	10 mg/kg		.061 U	.045 U	.04 U
Aroclor-1260	11096-82-5	10 mg/kg		.81 P	.12 JP	.04 U

Notes:

NC - No criteria
U - Analyte not detected
J - Estimated concentration
P - Greater than 25% difference for detected concentrations between the two GC columns
R - Analytical result was rejected during validation

Table 19

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Leachate Seep Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID	LT-01	LT-02	LT-03
			Sample Date	9/22/2004	9/22/2004	9/23/2004
			Units	ug/l	ug/l	ug/l
Dichlorodifluoromethane	75-71-8	NC		10. U	10. U	10. U
Chloromethane	74-87-3	NC		10. U	10. U	10. U
Vinyl Chloride	75-01-4	NC		10. U	10. U	10. U
Bromomethane	74-83-9	NC		10. U	10. U	10. U
Chloroethane	75-00-3	NC		10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	NC		10. U	10. U	10. U
Acetone	67-64-1	NC		3. J	10. U	4. J
1,1-Dichloroethene	75-35-4	NC		10. U	10. U	10. U
Methylene chloride	75-09-2	200		10. U	10. U	10. U
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	NC		10. U	10. U	10. U
2-Butanone	78-93-3	NC		10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	NC		10. U	10. U	24.
Chloroform	67-66-3	NC		10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	NC		10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	NC		10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	NC		10. U	10. U	10. U
Benzene	71-43-2	10		10. U	10. U	10. U
Trichloroethylene	79-01-6	40		10. U	10. U	21.
1,2-Dichloropropane	78-87-5	NC		10. U	10. U	10. U
Bromodichloromethane	75-27-4	NC		10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	NC		10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	NC		10. U	10. U	10. U
1,1,2-Trichloroethane	79-00-5	NC		10. U	10. U	10. U
Dibromochloromethane	124-48-1	NC		10. U	10. U	10. U
Bromoform	75-25-2	NC		10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U
Toluene	108-88-3	100		10. U	10. U	10. U
Tetrachloroethene	127-18-4	1		10. U	10. U	10. U
2-Hexanone	591-78-6	NC		10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	NC		10. U	10. U	10. U
Chlorobenzene	108-90-7	5		1. J	10. U	10. U
Ethylbenzene	100-41-4	17		10. U	10. U	10. U
Xylene (Total)	1330-20-7	65		10. U	10. U	10. U
Styrene	100-42-5	NC		10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	NC		10. U	10. U	10. U
Isopropylbenzene	98-82-8	2.6		10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	5		10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	5		10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	5		10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U

Notes:

NC - No criteria
J - Estimated concentration
B - Analyte detected in associated blank

Table 20

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Leachate Seep Analytical Summary - SVOCs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID Sample Date Units	LT-02 9/22/2004 ug/l
Benzaldehyde	100-52-7	NC		10. U
Acetophenone	98-86-2	NC		10. U
bis(2-Chloroethyl)ether	111-44-4	NC		10. U
Caprolactam	105-60-2	NC		10. U
Phenol	108-95-2	5		10. U
1,1'-Biphenyl	92-52-4	NC		10. U
2-Chlorophenol	95-57-8	1		10. U
Atrazine	1912-24-9	NC		10. U
2,2'-oxybis(1-Chloropropane)	108-60-1	NC		10. U
2-Methylphenol	95-48-7	NC		10. U
Hexachloroethane	67-72-1	0.6		10. U
N-Nitroso-di-n-propylamine	621-64-7	NC		10. U
4-Methylphenol	106-44-5	NC		10. U
Nitrobenzene	98-95-3	NC		10. U
Isophorone	78-59-1	NC		10. U
2-Nitrophenol	88-75-5	NC		10. U
2,4-Dimethylphenol	105-67-9	5		10. U
bis(2-chloroethoxy)methane	111-91-1	NC		10. U
2,4-Dichlorophenol	120-83-2	1		10. U
Naphthalene	91-20-3	13		10. U
4-Chloroaniline	106-47-8	NC		10. U
Hexachlorobutadiene	87-68-3	0.01		10. U
4-chloro-3-Methylphenol	59-50-7	NC		10. U
2-Methylnaphthalene	91-57-6	4.7		10. U
Hexachlorocyclopentadiene	77-47-4	0.45		10. U
2,4,6-Trichlorophenol	88-06-2	1		10. U
2,4,5-Trichlorophenol	95-95-4	1		25. U
2-Chloronaphthalene	91-58-7	NC		10. U
2-Nitroaniline	88-74-4	NC		25. U
Acenaphthylene	208-96-8	NC		10. U
Dimethyl phthalate	131-11-3	NC		10. U
2,6-Dinitrotoluene	606-20-2	NC		10. U
Acenaphthene	83-32-9	5.3		10. U
3-Nitroaniline	99-09-2	NC		25. U
2,4-Dinitrophenol	51-28-5	400		25. U
Dibenzofuran	132-64-9	NC		10. U
2,4-Dinitrotoluene	121-14-2	NC		10. U
4-Nitrophenol	100-02-7	NC		25. U
Fluorene	86-73-7	0.54		10. U
4-Chlorophenyl phenyl ether	7005-72-3	NC		10. U

Notes:

NC - No criteria
U - Analyte not detected

Table 20

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Leachate Seep Analytical Summary - SVOCs

		NYS Class C Water Quality Standards and Guidance	Sample ID	LT-02
			Sample Date	9/22/2004
Chemical Name	**CAS No**	**Values (ug/L)**	**Units**	ug/l
Diethyl phthalate	84-66-2	NC		10. U
4-Nitroaniline	100-01-6	NC		25. U
4,6-Dinitro-2-Methylphenol	534-52-1	NC		25. U
n-Nitrosodiphenylamine	86-30-6	NC		10. U
4-Bromophenyl phenyl ether	101-55-3	NC		10. U
Hexachlorobenzene	118-74-1	3		10. U
Pentachlorophenol	87-86-5	10		25. U
Phenanthrene	85-01-8	5		10. U
Anthracene	120-12-7	3.8		10. U
di-n-Butyl Phthalate	84-74-2	NC		10. U
Carbazole	86-74-8	NC		10. U
Fluoranthene	206-44-0	NC		10. U
Pyrene	129-00-0	4.6		10. U
Benzyl Butyl Phthalate	85-68-7	NC		10. U
3,3'-Dichlorobenzidine	91-94-1	NC		10. U
Benzo[a]anthracene	56-55-3	0.03		10. U
Chrysene	218-01-9	NC		10. U
bis(2-ethylhexyl)phthalate	117-81-7	0.6		10. U
di-n-Octyl Phthalate	117-84-0	NC		10. U
Benzo[b]fluoranthene	205-99-2	NC		10. U
Benzo[k]fluoranthene	207-08-9	NC		10. U
Benzo[a]pyrene	50-32-8	0.0012		10. U
Indeno[1,2,3-cd]pyrene	193-39-5	NC		10. U
Dibenz[a,h]anthracene	53-70-3	NC		10. U
Benzo[g,h,i]perylene	191-24-2	NC		10. U

Notes:

NC - No criteria
U - Analyte not detected

Table 21

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Leachate Seep Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID / Sample Date / Units	LT-01	LT-02	LT-03
			Sample ID	LT-01	LT-02	LT-03
			Sample Date	9/22/2004	9/22/2004	9/23/2004
			Units	ug/l	ug/l	ug/l
Aluminum	7429-90-5	100		**998 ***	**109 B ***	**110000 ***
Antimony	7440-36-0	NC		2.5 U	2.5 U	12.5 U
Arsenic	7440-38-2	150		9.3 B	2.7 U	**156 ***
Barium	7440-39-3	NC		327	329	2680
Beryllium	7440-41-7	1100		.04 U	.04 U	5.2
Cadmium	7440-43-9	4		.2 U	2.7 B	**24.3 ***
Calcium	7440-70-2	NC		73700	148000	606000
Chromium	7440-47-3	141		1.4 B	.94 U	**142 ***
Cobalt	7440-48-4	5		.99 U	.99 U	**291 ***
Copper	7440-50-8	18		4.9 B	16.6 B	**365 ***
Iron	7439-89-6	300		**102000 ***	**14600 ***	**721000 ***
Lead	7439-92-1	5		**9.9 ***	**17.4 ***	**302 ***
Magnesium	7439-95-4	NC		8890	15200	51200
Manganese	7439-96-5	NC		1380	1480	4420
Mercury	7439-97-6	0.77		.02 U	.08 B	**.78 ***
Nickel	7440-02-0	101		5.7 B	8.8 B	**2560 ***
Potassium	7440-09-7	NC		4770 BJ	3720 BJ	15000 J
Selenium	7782-49-2	4.6		2.7 U	2.7 U	**31.2 J ***
Silver	7440-22-4	16		1.5 U	1.5 U	8.6 B
Sodium	7440-23-5	NC		4140 BJ	3970 BJ	4210 BJ
Thallium	7440-28-0	8		3.7 U	3.7 U	**22.9 ***
Vanadium	7440-62-2	14		2.2 B	1.1 U	**195 ***
Zinc	7440-66-6	162		56.3	124	**4150 ***
Cyanide	57-12-5	5.2		10 U	10 U	10 U

Notes:
NC - No criteria
U - Analyte not detected
B - Value is greater than IDL but less than CRDL
* - Concentration exceeds criteria
J - Estimated concentration

Table 22

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Leachate Seep Analytical Summary - Pesticides/PCBs

Chemical Name	CAS No	NYS Class C Water Quality Standards and Guidance Values (ug/L)	Sample ID Sample Date Units	9/22/2004 LT-02 ug/l
alpha-BHC	319-84-6	0.002		.05 U
Beta-BHC	319-95-7	NC		.05 U
delta-BHC	319-86-8	0.008		.05 U
gamma-BHC (Lindane)	58-89-9	0.008		.05 U
Heptachlor	76-44-8	0.0002		.05 U
Heptachlor Epoxide	1024-57-3	0.0003		.05 U
Aldrin	309-00-2	0.001		.05 U
Endosulfan I	959-98-8	0.009		.05 U
Dieldrin	60-57-1	0.056		.1 U
4,4'-DDE	72-55-9	7		.1 U
Endrin	72-20-8	0.036		.1 U
Endosulfan II	33213-65-9	0.009		.1 U
4,4'-DDD	72-54-8	8		.1 U
Endosulfan Sulfate	1031-07-8	NC		.1 U
4,4'-DDT	50-29-3	1		.1 U
Methoxychlor	72-43-5	0.03		.5 U
Endrin Ketone	53494-70-5	NC		.1 U
Endrin Aldehyde	7421-93-4	NC		.1 U
alpha-Chlordane	5103-71-9	2		.05 U
gamma-Chlordane	5103-74-2	2		.05 U
Toxaphene	8001-35-2	6		5 U
Aroclor-1016	12674-11-2	.000001		1 U
Aroclor-1221	11104-28-2	.000001		2 U
Aroclor-1232	11141-16-5	.000001		1 U
Aroclor-1242	53469-21-9	.000001		1 U
Aroclor-1248	12672-29-6	.000001		1 U
Aroclor-1254	11097-69-1	.000001		1 U
Aroclor-1260	11096-82-5	.000001		1 U

Notes:

NC - No criteria
U - Analyte not detected

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-101 10/14/2004 MW-101 ug/l	MW-102 10/11/2004 MW-102 ug/l	MW-102 3/8/2005 MW-102 ug/l	MW-102I 10/11/2004 MW-102I ug/l	MW-102I 3/9/2005 MW-102I ug/l	MW-103 10/12/2004 MW-103 ug/l	MW-103 3/9/2005 MW-103 ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	2. J	1. J	1. J	.9 J	10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		10. U	2. J	1. J	**5. J ***	**3. J ***	10. U	10. U
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	1. J	1. J	**7. J ***	5. J	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		10. U	10. U	2. JB	10. U	2. JB	10. U	4. JB
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		10. U	10. U	.6 JB	10. U	.9 JB	10. U	.5 JB
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		10. U	2. J	1. J	**14.***	**6. J ***	10. U	10. U
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-101 10/14/2004 MW-101 ug/l	MW-102 10/11/2004 MW-102 ug/l	MW-102 3/8/2005 MW-102 ug/l	MW-102I 10/11/2004 MW-102I ug/l	MW-102I 3/9/2005 MW-102I ug/l	MW-103 10/12/2004 MW-103 ug/l	MW-103 3/9/2005 MW-103 ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID	MW-104	MW-104	MW-105S	MW-105S	MW-106S	MW-106S	MW-107S
			Sample Date	10/14/2004	3/9/2005	10/14/2004	3/9/2005	10/14/2004	3/10/2005	10/12/2004
			Sample ID	MW-104	MW-104	MW-105S	MW-105S	MW-106S	MW-106S	MW-107S
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	10. U	10. U	10. U	0.6 J	10. U	**9. J ***
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		2. J	.9 J	10. U	10. U	.6 J	10. U	**600. D ***
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		10. U	2. JB	10. U	2. JB	10. U	2. JB	10. U
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		10. U	.7 JB	10. U	10. U	10. U	.9 JB	10. U
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U	10. U	10. U	10. U	3. J
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U	10. U	10. U	10. U	10. U	2. J
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		5. J	3. J	10. U	10. U	10. U	10. U	**69.***
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U	10. U	10. U	10. U	10. U	**2. J ***
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	10. U	10. U	10. U	.6 J
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-104 10/14/2004 MW-104 ug/l	MW-104 3/9/2005 MW-104 ug/l	MW-105S 10/14/2004 MW-105S ug/l	MW-105S 3/9/2005 MW-105S ug/l	MW-106S 10/14/2004 MW-106S ug/l	MW-106S 3/10/2005 MW-106S ug/l	MW-107S 10/12/2004 MW-107S ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID	MW-107S	MW-107I	MW-107I	MW-108S	MW-108S	MW-108I	MW-108I
			Sample Date	3/9/2005	10/12/2004	3/9/2005	10/13/2004	3/7/2005	10/13/2004	3/7/2005
			Sample ID	MW-107S	MW-107I	MW-107I	MW-108S	MW-108S	MW-108I	MW-108I
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Dichlorodifluoromethane	75-71-8	5		3. J	10. U	10. U	10. U	10. U	10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		**250. ***	.6 J	10. U	10. U	10. U	10. U	10. U
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		2. JB	10. U	2. JB	10. U	2. JB	10. U	3. JB
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		.8 JB	10. U	.8 JB	10. U	.6 JB	10. U	.6 JB
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	.7 J	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		1. J	10. U	10. U	10. U	10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		.7 J	10. U	10. U	10. U	10. U	10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		**25.***	10. U	10. U	10. U	10. U	10. U	10. U
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		.6 J	10. U	10. U	10. U	10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	.6 J	.7 J	10. U	10. U
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID	MW-107S	MW-107I	MW-107I	MW-108S	MW-108S	MW-108I	MW-108I
			Sample Date	3/9/2005	10/12/2004	3/9/2005	10/13/2004	3/7/2005	10/13/2004	3/7/2005
			Sample ID	MW-107S	MW-107I	MW-107I	MW-108S	MW-108S	MW-108I	MW-108I
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	.6 J	10. U	.5 J	10. U	.6 J	10. U
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	.8 J	10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
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Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-109S 10/12/2004 MW-109S ug/l	MW-109S 3/8/2005 MW-109S ug/l	MW-109I 10/12/2004 MW-109I ug/l	MW-109I 3/8/2005 MW-109I ug/l	MW-109D 10/12/2004 MW-109D ug/l	MW-109D 3/8/2005 MW-109D ug/l	MW-110S 10/13/2004 MW-110S ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		10. U	10. U	10. U	10. U	1. J	10	10. U
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		10. U	2. JB	10. U	4. JB	10. U	2. J	10. U
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		10. U	.6 JB	10. U	.6 JB	10. U	.7 JB	10. U
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		10. U	10. U	10. U	10. U	10. U	1. J	10. U
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
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Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-109S 10/12/2004 MW-109S ug/l	MW-109S 3/8/2005 MW-109S ug/l	MW-109I 10/12/2004 MW-109I ug/l	MW-109I 3/8/2005 MW-109I ug/l	MW-109D 10/12/2004 MW-109D ug/l	MW-109D 3/8/2005 MW-109D ug/l	MW-110S 10/13/2004 MW-110S ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	10. U	10. U	10. U	.8 J	10. U	10. U
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
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Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-110S 3/9/2005 MW-110S ug/l	MW-110I 10/13/2004 MW-110I ug/l	MW-110I 3/9/2005 MW-110I ug/l	MW-111S 10/13/2004 MW-111S ug/l	MW-111S 3/9/2005 MW-111S ug/l	MW-111I 10/13/2004 MW-111I ug/l	MW-111I 3/9/2005 MW-111I ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		2. JB	10. U	2. JB	4. J	2. JB	10. U	3. JB
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		.9 JB	10. U	.9 JB	10. U	2. JB	10. U	.5 JB
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
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Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-110S 3/9/2005 MW-110S ug/l	MW-110I 10/13/2004 MW-110I ug/l	MW-110I 3/9/2005 MW-110I ug/l	MW-111S 10/13/2004 MW-111S ug/l	MW-111S 3/9/2005 MW-111S ug/l	MW-111I 10/13/2004 MW-111I ug/l	MW-111I 3/9/2005 MW-111I ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	.6 J	10. U	.6 J	10. U	10. U	10. U
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID	MW-13 (39'-41')	MW-13 (49'-51')	MW-13 (59'-61')	MW-13 (69'-71')	MW-13	TW-TP-02
			Sample Date	9/3/2004	9/3/2004	9/3/2004	9/3/2004	10/14/2004	9/2/2004
			Sample ID	MW-13 (39'-41')	MW-13 (49'-51')	MW-13 (59'-61')	MW-13 (69'-71')	MW-13	TW-TP-02
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	10. U	10. U	10. U	10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U	10. U	10. U	10. U	10. U
Vinyl Chloride	75-01-4	2		.8 J	1. J	1. J	1. J	.6 J	10. U
Bromomethane	74-83-9	5		10. U	10. U	10. U	10. U	10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U	10. U	10. U	10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U	10. U	10. U	10. U	10. U
Acetone	67-64-1	50		5. J	3. J	3. J	3. J	10. U	11.
1,1-Dichloroethene	75-35-4	5		10. U	10. U	10. U	10. U	10. U	10. U
Methylene chloride	75-09-2	5		10. U	10. U	10. U	10. U	10. U	10. U
Methyl Acetate	79-20-9	NC		10. U	10. U	10. U	10. U	10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U	10. U	10. U	10. U	10. U
Carbon Disulfide	75-15-0	NC		10. U	10. U	10. U	10. U	10. U	10. U
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U	10. U	10. U	10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U	10. U	10. U	10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U	10. U	10. U	10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		1. J	2. J	2. J	10. U	.8 J	1. J
Chloroform	67-66-3	7		10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U	10. U	10. U	10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U	10. U	10. U	10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U	10. U	10. U	10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U	10. U	10. U	10. U	10. U
Benzene	71-43-2	1		10. U	10. U	10. U	10. U	10. U	**2. J ***
Trichloroethylene	79-01-6	5		10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U	10. U	10. U	10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U	10. U	10. U	10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U	10. U	10. U	10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U	10. U	10. U	10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-13 (39'-41')	MW-13 (49'-51')	MW-13 (59'-61')	MW-13 (69'-71')	MW-13	TW-TP-02
			Sample Date	9/3/2004	9/3/2004	9/3/2004	9/3/2004	10/14/2004	9/2/2004
			Sample ID	MW-13 (39'-41')	MW-13 (49'-51')	MW-13 (59'-61')	MW-13 (69'-71')	MW-13	TW-TP-02
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U	10. U	10. U	10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U	10. U	10. U	10. U	10. U
Bromoform	75-25-2	50		10. U	10. U	10. U	10. U	10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U	10. U	10. U	10. U	10. U
Toluene	108-88-3	5		10. U	10. U	10. U	10. U	10. U	3. J
Tetrachloroethene	127-18-4	5		10. U	10. U	10. U	10. U	10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U	10. U	10. U	10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U	10. U	10. U	10. U	1. J
Ethylbenzene	100-41-4	5		10. U	10. U	10. U	10. U	10. U	4. J
Xylene (Total)	1330-20-7	5		10. U	10. U	10. U	10. U	10. U	**11. ***
Styrene	100-42-5	5		10. U	10. U	10. U	10. U	10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U	10. U	10. U	10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U	10. U	10. U	10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U	10. U	10. U	10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U	10. U	10. U	10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U	10. U	10. U	10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U	10. U	10. U	10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)			
			Location ID	TW-TP-06	TW-TP-22
			Sample Date	9/2/2004	9/2/2004
			Sample ID	TW-TP-06	TW-TP-22
			Unit	ug/l	ug/l
Dichlorodifluoromethane	75-71-8	5		10. U	10. U
Chloromethane	74-87-3	5		10. U	10. U
Vinyl Chloride	75-01-4	2		10. U	10. U
Bromomethane	74-83-9	5		10. U	10. U
Chloroethane	75-00-3	5		10. U	10. U
Trichlorofluoromethane	75-69-4	5		10. U	10. U
Acetone	67-64-1	50		43.	25.
1,1-Dichloroethene	75-35-4	5		10. U	10. U
Methylene chloride	75-09-2	5		10. U	10. U
Methyl Acetate	79-20-9	NC		10. U	10. U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC		10. U	10. U
Carbon Disulfide	75-15-0	NC		1. J	2. J
trans-1,2-Dichloroethene	156-60-5	NC		10. U	10. U
Methyl tert-Butyl ether	1634-04-4	NC		10. U	10. U
1,1-Dichloroethane	75-34-3	5		10. U	10. U
2-Butanone	78-93-3	50		10. U	10. U
cis-1,2-Dichloroethene	156-59-2	5		10. U	10. U
Chloroform	67-66-3	7		10. U	10. U
1,2-Dichloroethane	107-06-2	0.6		10. U	10. U
1,1,1-Trichloroethane	71-55-6	5		10. U	10. U
Cyclohexane	110-82-7	NC		10. U	10. U
Carbon Tetrachloride	56-23-5	5		10. U	10. U
Benzene	71-43-2	1		10. U	10. U
Trichloroethylene	79-01-6	5		10. U	10. U
1,2-Dichloropropane	78-87-5	1		10. U	10. U
Bromodichloromethane	75-27-4	50		10. U	10. U
Methylcylohexane	108-87-2	NC		10. U	10. U
cis-1,3-Dichloropropene	10061-01-5	0.4		10. U	10. U
trans-1,3-Dichloropropene	10061-02-6	0.4		10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
* - Concentration Exceeds Criteria

Table 23

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - VOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	TW-TP-06 9/2/2004 TW-TP-06 ug/l	TW-TP-22 9/2/2004 TW-TP-22 ug/l
1,1,2-Trichloroethane	79-00-5	1		10. U	10. U
Dibromochloromethane	124-48-1	50		10. U	10. U
Bromoform	75-25-2	50		10. U	10. U
4-Methyl-2-Pentanone	108-10-1	NC		10. U	10. U
Toluene	108-88-3	5		.8 J	2. J
Tetrachloroethene	127-18-4	5		10. U	10. U
2-Hexanone	591-78-6	50		10. U	10. U
1,2-Dibromoethane	106-93-4	5		10. U	10. U
Chlorobenzene	108-90-7	5		10. U	10. U
Ethylbenzene	100-41-4	5		10. U	10. U
Xylene (Total)	1330-20-7	5		10. U	10. U
Styrene	100-42-5	5		10. U	10. U
1,1,2,2-Tetrachloroethane	79-34-5	5		10. U	10. U
Isopropylbenzene	98-82-8	NC		10. U	10. U
1,3-Dichlorobenzene	541-73-1	3		10. U	10. U
1,4-Dichlorobenzene	106-46-7	3		10. U	.6 J
1,2-Dichlorobenzene	95-50-1	3		10. U	10. U
1,2-Dibromo-3-Chloropropane	96-12-8	NC		10. U	10. U
1,2,4-Trichlorobenzene	120-82-1	5		10. U	10. U

Notes: U - Not Detected
J - Estimated Concentration
B - Analyte Detected in Prep Blank
NC - No Criteria
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Table 24

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analyitcal Summary - SVOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-102 / 10/11/2004 / MW-102 / ug/l	MW-105S / 10/14/2004 / MW-105S / ug/l	MW-108I / 10/13/2004 / MW-108I / ug/l	MW-109D / 10/12/2004 / MW-109D / ug/l	TW-TP-02 / 9/2/2004 / TW-TP-02 / ug/l
Benzaldehyde	100-52-7	NC		110 U	12. U	10. U	10. U	10. U
Acetophenone	98-86-2	NC		110 U	12. U	10. U	10. U	10. U
bis(2-Chloroethyl)ether	111-44-4	1		110 U	12. U	10. U	10. U	10. U
Caprolactam	105-60-2	NC		110 U	12. U	10. U	10. U	10. U
Phenol	108-95-2	1		110 U	12. U	10. U	10. U	1. J
1,1'-Biphenyl	92-52-4	NC		110 U	12. U	10. U	10. U	10. U
2-Chlorophenol	95-57-8	1		110 U	12. U	10. U	10. U	10. U
Atrazine	1912-24-9	NC		110 U	12. U	10. U	10. U	10. U
2,2'-oxybis(1-Chloropropane)	108-60-1	NC		110 U	12. U	10. U	10. U	10. U
2-Methylphenol	95-48-7	1		110 U	12. U	10. U	10. U	1. J
Hexachloroethane	67-72-1	5		110 U	12. U	10. U	10. U	10. U
N-Nitroso-di-n-propylamine	621-64-7	NC		110 U	12. U	10. U	10. U	10. U
4-Methylphenol	106-44-5	1		110 U	12. U	10. U	10. U	**60. ***
Nitrobenzene	98-95-3	0.4		110 U	12. U	10. U	10. U	10. U
Isophorone	78-59-1	50		110 U	12. U	10. U	10. U	10. U
2-Nitrophenol	88-75-5	1		110 U	12. U	10. U	10. U	10. U
2,4-Dimethylphenol	105-67-9	50		110 U	12. U	10. U	10. U	10. U
bis(2-chloroethoxy)methane	111-91-1	5		110 U	12. U	10. U	10. U	10. U
2,4-Dichlorophenol	120-83-2	1		110 U	12. U	10. U	10. U	10. U
Naphthalene	91-20-3	10		110 U	12. U	10. U	10. U	4. J
4-Chloroaniline	106-47-8	5		110 U	12. U	10. U	10. U	10. U
Hexachlorobutadiene	87-68-3	0.5		110 U	12. U	10. U	10. U	10. U
4-chloro-3-Methylphenol	59-50-7	1		110 U	12. U	10. U	10. U	**5. J ***
2-Methylnaphthalene	91-57-6	NC		110 U	12. U	10. U	10. U	1. J
Hexachlorocyclopentadiene	77-47-4	5		110 UJ	12. UJ	10. UJ	10. UJ	10. UJ
2,4,6-Trichlorophenol	88-06-2	1		110 U	12. U	10. U	10. U	10. U
2,4,5-Trichlorophenol	95-95-4	1		260 U	31. U	25. U	25. U	25. U
2-Chloronaphthalene	91-58-7	10		110 U	12. U	10. U	10. U	10. U
2-Nitroaniline	88-74-4	5		260 U	31. U	25. U	25. U	25. U

Notes: NC - No Criteria
J - Estimated Concentration
U - Analyte Not Detected

Table 24

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analyitcal Summary - SVOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-102 10/11/2004 MW-102 ug/l	MW-105S 10/14/2004 MW-105S ug/l	MW-108I 10/13/2004 MW-108I ug/l	MW-109D 10/12/2004 MW-109D ug/l	TW-TP-02 9/2/2004 TW-TP-02 ug/l
Acenaphthylene	208-96-8	NC		110 U	12. U	10. U	10. U	10. U
Dimethyl phthalate	131-11-3	50		110 U	12. U	10. U	10. U	10. U
2,6-Dinitrotoluene	606-20-2	5		110 U	12. U	10. U	10. U	10. U
Acenaphthene	83-32-9	20		110 U	12. U	10. U	10. U	10. U
3-Nitroaniline	99-09-2	5		260 U	31. U	25. U	25. U	25. U
2,4-Dinitrophenol	51-28-5	10		260 U	31. U	25. U	25. U	25. U
Dibenzofuran	132-64-9	NC		110 U	12. U	10. U	10. U	10. U
2,4-Dinitrotoluene	121-14-2	5		110 U	12. U	10. U	10. U	10. U
4-Nitrophenol	100-02-7	1		260 U	31. U	25. U	25. U	**2. J ***
Fluorene	86-73-7	50		110 U	12. U	10. U	10. U	10. U
4-Chlorophenyl phenyl ether	7005-72-3	5		110 U	12. U	10. U	10. U	10. U
Diethyl phthalate	84-66-2	50		110 U	12. U	10. U	10. U	10. U
4-Nitroaniline	100-01-6	5		260 U	31. U	25. U	25. U	25. U
4,6-Dinitro-2-Methylphenol	534-52-1	1		260 U	31. U	25. U	25. U	25. U
n-Nitrosodiphenylamine	86-30-6	50		110 U	12. U	10. U	10. U	10. U
4-Bromophenyl phenyl ether	101-55-3	5		110 U	12. U	10. U	10. U	10. U
Hexachlorobenzene	118-74-1	0.04		110 U	12. U	10. U	10. U	10. U
Pentachlorophenol	87-86-5	1		260 U	31. U	25. U	25. U	25. U
Phenanthrene	85-01-8	50		110 U	12. U	10. U	10. U	10. U
Anthracene	120-12-7	50		110 U	12. U	10. U	10. U	10. U
di-n-Butyl Phthalate	84-74-2	50		110 U	12. U	10. U	10. U	10. U
Carbazole	86-74-8	NC		110 U	12. U	10. U	10. U	10. U
Fluoranthene	206-44-0	50		110 U	12. U	10. U	10. U	10. U
Pyrene	129-00-0	50		110 U	12. U	10. U	10. U	10. U
Benzyl Butyl Phthalate	85-68-7	50		110 U	12. U	10. U	10. U	10. U
3,3'-Dichlorobenzidine	91-94-1	NC		110 UJ	12. UJ	10. UJ	10. UJ	10. U
Benzo[a]anthracene	56-55-3	0.002		110 U	12. U	10. U	10. U	10. U

Notes: NC - No Criteria
J - Estimated Concentration
U - Analyte Not Detected

Table 24

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analyitcal Summary - SVOCs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-102 10/11/2004 MW-102 ug/l	MW-105S 10/14/2004 MW-105S ug/l	MW-108I 10/13/2004 MW-108I ug/l	MW-109D 10/12/2004 MW-109D ug/l	TW-TP-02 9/2/2004 TW-TP-02 ug/l
Chrysene	218-01-9	0.002		110 U	12. U	10. U	10. U	10. U
bis(2-ethylhexyl)phthalate	117-81-7	5		110 U	12. U	1. J	2. J	1. J
di-n-Octyl Phthalate	117-84-0	50		110 U	12. U	10. U	10. U	10. U
Benzo[b]fluoranthene	205-99-2	0.002		110 U	12. U	10. U	10. U	10. U
Benzo[k]fluoranthene	207-08-9	0.002		110 U	12. U	10. U	10. U	10. U
Benzo[a]pyrene	50-32-8	NC		110 U	12. U	10. U	10. U	10. U
Indeno[1,2,3-cd]pyrene	193-39-5	0.002		110 U	12. U	10. U	10. U	10. U
Dibenz[a,h]anthracene	53-70-3	NC		110 U	12. U	10. U	10. U	10. U
Benzo[g,h,i]perylene	191-24-2	NC		110 U	12. U	10. U	10. U	10. U

Notes: NC - No Criteria
J - Estimated Concentration
U - Analyte Not Detected

Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-101 10/14/2004 MW-101 ug/l	MW-102I 10/11/2004 MW-102I ug/l	MW-102I 3/9/2005 MW-102I ug/l	MW-102 10/11/2004 MW-102 ug/l	MW-102 3/8/2005 MW-102 ug/l
Aluminum	7429-90-5	NC		463	2130	6620	13 U	4420
Antimony	7440-36-0	3		2.5 U	2.5 U	1.8 U	2.5 U	1.8 U
Arsenic	7440-38-2	25		**46.1**	2.7 U	7.6 B	2.7 U	3.4 B
Barium	7440-39-3	1000		669	152 B	209	165 B	224
Beryllium	7440-41-7	3		.04 U	.08 B	.29 B	.04 U	0.12 B
Cadmium	7440-43-9	5		.2 U	.2 U	.29 U	.2 U	**8.4**
Calcium	7440-70-2	NC		R	R	108000	R	127000
Chromium	7440-47-3	50		.94 U	2.7 B	10.2	.94 U	7.8 B
Cobalt	7440-48-4	NC		.99 U	.99 U	2.7 B	.99 U	1.5 U
Copper	7440-50-8	200		1.7 B	9.4 B	19.4 B	1.2 U	44.4
Iron	7439-89-6	300		**4910**	**3800**	**12200**	32.7 B	**6220**
Lead	7439-92-1	25		2.1 B	6.8	13.7	1.1 B	6.1
Magnesium	7439-95-4	35000		R	R	25000	R	26900
Manganese	7439-96-5	3000		983	1570	1750	186	258
Mercury	7439-97-6	0.7		.01 U	.01 B	.01 U	.01 B	.01 U
Nickel	7440-02-0	NC		1.1 B	4.2 B	10.4 B	1 U	7.6 B
Potassium	7440-09-7	NC		752 B	2150 B	3080 B	1030 B	2570 B
Selenium	7782-49-2	10		2.7 U	2.7 U	1.6 U	2.7 U	1.6 U
Silver	7440-22-4	50		1.5 U	1.5 U	1.4 U	1.5 U	1.4 U
Sodium	7440-23-5	20000		R	R	5160	R	4740 B
Thallium	7440-28-0	0.5		3.7 U	3.7 U	4.5 U	3.7 U	4.5 U
Vanadium	7440-62-2	NC		1.4 B	3.4 B	11.2 B	1.1 U	9.2 B
Zinc	7440-66-6	2000		9.2 B	17.4 B	45.8	20.5	46.5
Cyanide	57-12-5	200		10 U	10 U	3.1 U	10 U	3.1 U

Notes:

NC - No criteria
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Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-103 10/12/2004 MW-103 ug/l	MW-104 10/14/2004 MW-104 ug/l	MW-104 3/10/2005 MW-104 ug/l	MW-105S 10/14/2004 MW-105S ug/l	MW-105S 3/10/2005 MW-105S ug/l
Aluminum	7429-90-5	NC		634	1150	16000	23800	25900
Antimony	7440-36-0	3		2.5 U	2.5 U	2 B	2.5 U	1.8 B
Arsenic	7440-38-2	25		2.7 U	**53.2**	24.1	**29.2**	22.1
Barium	7440-39-3	1000		240	530	566	393	380
Beryllium	7440-41-7	3		.04 U	.04 U	.6 B	1.1 B	1.3 B
Cadmium	7440-43-9	5		.2 U	.2 U	.48 B	.31 B	.29 U
Calcium	7440-70-2	NC		54500	R	126000	R	55800
Chromium	7440-47-3	50		.94 U	3.7 B	25.2	33.8	35.1
Cobalt	7440-48-4	NC		.99 U	.99 U	13.2 B	20 B	21.4 B
Copper	7440-50-8	200		1.2 U	5.5 B	22.3 B	33.3	30.1
Iron	7439-89-6	300		**1030**	**13200**	**37300**	**53400**	**50100**
Lead	7439-92-1	25		1.6 B	2.1 B	11	19.5	16.5
Magnesium	7439-95-4	35000		12000	R	**39500**	R	20800
Manganese	7439-96-5	3000		251	678	1080	1040	748
Mercury	7439-97-6	0.7		.01 U	.01 U	.01 U	.02 B	.01 B
Nickel	7440-02-0	NC		1 U	3.2 B	36.6 B	50.3	48.4
Potassium	7440-09-7	NC		938 B	2240 B	4580 B	6830	6670
Selenium	7782-49-2	10		2.7 U	2.7 U	1.6 U	2.7 U	1.9 B
Silver	7440-22-4	50		1.5 U	1.5 U	1.4 U	1.5 U	1.4 U
Sodium	7440-23-5	20000		R	R	**27100**	R	12400
Thallium	7440-28-0	0.5		3.7 U	3.7 U	4.5 U	3.7 U	4.5 U
Vanadium	7440-62-2	NC		1.1 U	2.6 B	23.9 B	34.6 B	37.8 B
Zinc	7440-66-6	2000		6.8 B	10.2 B	94.6	119	113
Cyanide	57-12-5	200		10 U	10 U	3.1 U	10 U	5 B

Notes:

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U - Analyte not detected
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***** - Concentration exceeds criteria
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Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-106S 10/14/2004 MW-106S ug/l	MW-107I 10/12/2004 MW-107I ug/l	MW-107S 10/12/2004 MW-107S ug/l	MW-107S 3/10/2005 MW-107S ug/l	MW-108I 10/13/2004 MW-108I ug/l
Aluminum	7429-90-5	NC		3690	5700	10900	410	7030
Antimony	7440-36-0	3		2.5 U	2.5 U	2.5 U	1.8 U	2.5 U
Arsenic	7440-38-2	25		13	16.1	16.5	2.9 B	4.2 B
Barium	7440-39-3	1000		543	193 B	745	585	384
Beryllium	7440-41-7	3		.11 B	.19 B	.33 B	.05 U	.21 B
Cadmium	7440-43-9	5		.2 U	.2 U	.2 U	.29 U	.2 U
Calcium	7440-70-2	NC		R	R	178000	128000	R
Chromium	7440-47-3	50		6.7 B	9 B	15.5	3.6 B	12.4
Cobalt	7440-48-4	NC		.99 U	1.4 B	3.8 B	1.5 U	.99 U
Copper	7440-50-8	200		8.6 B	12.4 B	17.1 B	1.5 U	14.5 B
Iron	7439-89-6	300		**8440**	**12100**	**24900**	**679**	**15300**
Lead	7439-92-1	25		5.2	6	8.8	.74 U	7.8
Magnesium	7439-95-4	35000		R	R	**57900**	**37600**	R
Manganese	7439-96-5	3000		533	365	818	571	385
Mercury	7439-97-6	0.7		.05 B	.01 B	.02 B	.01 U	.01 B
Nickel	7440-02-0	NC		9.9 B	11.9 B	24.1 B	2.8 B	11 B
Potassium	7440-09-7	NC		3650 B	9500	4030 B	1970 B	5310
Selenium	7782-49-2	10		2.7 U	2.7 U	2.7 U	1.6 U	2.7 U
Silver	7440-22-4	50		1.5 U	1.5 U	1.5 U	1.4 U	1.5 U
Sodium	7440-23-5	20000		R	R	R	16500	R
Thallium	7440-28-0	0.5		3.7 U	3.7 U	3.7 U	4.5 U	3.7 U
Vanadium	7440-62-2	NC		5.7 B	9.4 B	15.9 B	2.2 B	10.4 B
Zinc	7440-66-6	2000		23.6	30.7	55	6.9 B	34.2
Cyanide	57-12-5	200		10 U	11	10 U	3.1 U	10 U

Notes:

NC - No criteria
U - Analyte not detected
B - Value greater than IDL but less than CRDL
***** - Concentration exceeds criteria
R - Analytical result rejected during validation

Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID / Sample Date / Sample ID / Unit	MW-108I 3/7/2005 MW-108I ug/l	MW-108S 10/13/2004 MW-108S ug/l	MW-108S 3/7/2005 MW-108S ug/l	MW-109D 10/12/2004 MW-109D ug/l	MW-109D 3/8/2005 MW-109D ug/l
Aluminum	7429-90-5	NC		587	5840	3520	3950	13700
Antimony	7440-36-0	3		1.8 U	2.5 U	1.8 U	2.5 U	1.8 U
Arsenic	7440-38-2	25		3.9 B	12.1	**28.2**	2.9 B	14
Barium	7440-39-3	1000		612	**1230**	890	143 B	325
Beryllium	7440-41-7	3		.05 U	.13 B	.18 B	.13 B	.7 B
Cadmium	7440-43-9	5		.29 U	.2 U	.29 U	.2 U	.29 U
Calcium	7440-70-2	NC		91900	R	123000	R	86800
Chromium	7440-47-3	50		2.7 B	8.3 B	**68.4**	5.6 B	25.9
Cobalt	7440-48-4	NC		1.5 U	.99 U	2.8 B	.99 U	11.2 B
Copper	7440-50-8	200		2. B	8 B	7.9 B	10.2 B	40.9
Iron	7439-89-6	300		**1740**	**55100**	**82600**	**8440**	**29900**
Lead	7439-92-1	25		.74 U	9.3	5	7.9	24.6
Magnesium	7439-95-4	35000		18400	R	19200	R	18600
Manganese	7439-96-5	3000		329	**3150**	2890	873	1270
Mercury	7439-97-6	0.7		.01 U	.01 B	.01 U	.01 B	.02 B
Nickel	7440-02-0	NC		1.5 B	11.5 B	36.7 B	6.1 B	23.1 B
Potassium	7440-09-7	NC		1730 B	9310	5020	2420 B	4020 B
Selenium	7782-49-2	10		1.6 U	2.7 U	2.6 B	2.7 U	1.8 B
Silver	7440-22-4	50		1.4 U	1.5 U	1.4 U	1.5 U	1.4 U
Sodium	7440-23-5	20000		16100	R	9590	R	5400
Thallium	7440-28-0	0.5		4.5 U	3.7 U	4.5 U	3.7 U	4.5 U
Vanadium	7440-62-2	NC		1.3 B	9.2 B	6.8 B	6.2 B	22.7 B
Zinc	7440-66-6	2000		10.5 B	43.4	28.2	21.8	73.6
Cyanide	57-12-5	200		6.7 B	10 U	3.1 U	10 U	3.1 U

Notes:

NC - No criteria
U - Analyte not detected
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***** - Concentration exceeds criteria
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Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-109I 10/12/2004 MW-109I ug/l	MW-109I 3/8/2005 MW-109I ug/l	MW-109S 10/12/2004 MW-109S ug/l	MW-109S 3/8/2005 MW-109S ug/l	MW-110I 10/13/2004 MW-110I ug/l
Aluminum	7429-90-5	NC		17900	33900	1650	9950	82900
Antimony	7440-36-0	3		2.5 U	1.8 B	2.5 U	1.8 U	2.6 B
Arsenic	7440-38-2	25		17.8	**37**	2.7 U	11	**87.8**
Barium	7440-39-3	1000		329	562	215	273	725
Beryllium	7440-41-7	3		.93 B	1.9 B	.04 U	.39 B	**3.6 B**
Cadmium	7440-43-9	5		.2 U	.32 B	.2 U	.29 U	.2 U
Calcium	7440-70-2	NC		R	121000	R	72400	185000
Chromium	7440-47-3	50		24.5	42.8	.94 U	14.4	**112**
Cobalt	7440-48-4	NC		12.3 B	33 B	.99 U	6.5 B	72.2
Copper	7440-50-8	200		49	96.6	2.6 B	13.9 B	162
Iron	7439-89-6	300		**36000**	**68300**	**2520**	**18400**	**191000**
Lead	7439-92-1	25		**40.7**	**87.1**	2.6 B	8.6	**92.4**
Magnesium	7439-95-4	35000		R	29500	R	17100	**70900**
Manganese	7439-96-5	3000		1970	**3720**	239	400	**3720**
Mercury	7439-97-6	0.7		.05 B	.07 B	.02 B	.01 U	.07 B
Nickel	7440-02-0	NC		30.3 B	60.6	3 B	17.3 B	169
Potassium	7440-09-7	NC		8070	15500	1860 B	2980 B	13400
Selenium	7782-49-2	10		2.7 U	1.8 B	2.7 U	1.6 U	4.4 B
Silver	7440-22-4	50		1.5 U	1.9 B	1.5 U	1.4 U	1.7 B
Sodium	7440-23-5	20000		R	14900	R	8410	R
Thallium	7440-28-0	0.5		3.7 U	**7.2 B**	3.7 U	4.5 U	**14**
Vanadium	7440-62-2	NC		28.1 B	53.8	2.8 B	14.7 B	118
Zinc	7440-66-6	2000		109	203	8.8 B	55.7	447
Cyanide	57-12-5	200		10 U	3.1 U	10 U	3.7 B	10 U

Notes:

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Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID	MW-110I	MW-110S	MW-110S	MW-111I	MW-111S
			Sample Date	3/10/2005	10/13/2004	3/10/2005	10/13/2004	10/13/2004
			Sample ID	MW-110I	MW-110S	MW-110S	MW-111I	MW-111S
			Unit	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	7429-90-5	NC		17400	35300	4210	10300	20600
Antimony	7440-36-0	3		1.8 U	2.5 U	1.8 U	2.5 U	2.5 U
Arsenic	7440-38-2	25		23.9	**35.1**	10.9	12.7	**30.5**
Barium	7440-39-3	1000		339	540	312	310	508
Beryllium	7440-41-7	3		.72 B	1.6 B	.19 B	.38 B	.84 B
Cadmium	7440-43-9	5		.29 U	.45 B	.29 U	.2 U	.2 U
Calcium	7440-70-2	NC		81400	R	54400	R	R
Chromium	7440-47-3	50		24.5	46.8	6.6 B	13.8	31.1
Cobalt	7440-48-4	NC		13.1 B	28 B	2.5 B	3.7 B	16.9 B
Copper	7440-50-8	200		30.6	49.9	4.8 B	31.7	30.8
Iron	7439-89-6	300		**37000**	**74900**	**6310**	**20700**	**48800**
Lead	7439-92-1	25		15.7	**26.8**	2.1 B	13.1	16.3
Magnesium	7439-95-4	35000		26300	R	14400	R	R
Manganese	7439-96-5	3000		880	1550	325	530	898
Mercury	7439-97-6	0.7		.01 U	.02 B	.01 U	.01 B	.01 B
Nickel	7440-02-0	NC		34.5 B	69.9	7.1 B	16.9 B	46.6
Potassium	7440-09-7	NC		4770 B	7620	2670 B	5050	8770
Selenium	7782-49-2	10		1.6 U	3.8 B	1.6 U	3 B	2.7 U
Silver	7440-22-4	50		1.4 U	1.5 U	1.4 U	1.5 U	1.5 U
Sodium	7440-23-5	20000		13800	R	7140	R	R
Thallium	7440-28-0	0.5		4.5 U	3.7 U	4.5 U	3.7 U	3.7 U
Vanadium	7440-62-2	NC		26.5 B	52.2	7.6 B	15.2 B	30.6 B
Zinc	7440-66-6	2000		98.9	172	17.7 B	55.3	112
Cyanide	57-12-5	200		3.1 U	10 U	9 B	10 U	10 U

Notes:

NC - No criteria
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Table 25

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Inorganics

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-13 10/14/2004 MW-13 ug/l	TW-TP-02 9/2/2004 TW-TP-02 ug/l
Aluminum	7429-90-5	NC		854	57500
Antimony	7440-36-0	3		2.5 U	1.8 U
Arsenic	7440-38-2	25		2.7 U	**55.4**
Barium	7440-39-3	1000		97.2 B	**1760**
Beryllium	7440-41-7	3		.04 U	2.2 B
Cadmium	7440-43-9	5		.2 U	1.3 B
Calcium	7440-70-2	NC		R	204000
Chromium	7440-47-3	50		1.6 B	**85**
Cobalt	7440-48-4	NC		.99 U	74.9
Copper	7440-50-8	200		2.7 B	95.2
Iron	7439-89-6	300		**979**	**230000**
Lead	7439-92-1	25		1.6 B	**157**
Magnesium	7439-95-4	35000		R	**40300**
Manganese	7439-96-5	3000		41.1	**12300**
Mercury	7439-97-6	0.7		.01 U	.34
Nickel	7440-02-0	NC		1 U	152
Potassium	7440-09-7	NC		1470 B	19000
Selenium	7782-49-2	10		2.7 U	5 U
Silver	7440-22-4	50		1.5 U	2.5 B
Sodium	7440-23-5	20000		R	9050
Thallium	7440-28-0	0.5		3.7 U	**15.2**
Vanadium	7440-62-2	NC		1.8 B	86.7
Zinc	7440-66-6	2000		6.4 B	684
Cyanide	57-12-5	200		10 U	5 U

Notes:

NC - No criteria
U - Analyte not detected
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* - Concentration exceeds criteria
R - Analytical result rejected during validation

Table 26

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Pesticides/PCBs

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-102 10/11/2004 MW-102 ug/l	MW-105S 10/14/2004 MW-105S ug/l	MW-108I 10/13/2004 MW-108I ug/l	MW-109D 10/12/2004 MW-109D ug/l	TW-TP-02 9/2/2004 TW-TP-02 ug/l
alpha-BHC	319-84-6	0.01		.05 U	.053 UJ	.053 U	.05 U	.05 U
Beta-BHC	319-95-7	NC		.05 U	.053 UJ	.053 U	.05 U	.05 U
delta-BHC	319-86-8	0.04		.05 U	.053 UJ	.053 U	.05 U	.05 U
gamma-BHC (Lindane)	58-89-9	0.05		.05 U	.053 UJ	.053 U	.05 U	.05 U
Heptachlor	76-44-8	0.04		.05 U	.053 UJ	.053 U	.05 U	.05 U
Heptachlor Epoxide	1024-57-3	0.03		.05 U	.053 UJ	.053 U	.05 U	.05 U
Aldrin	309-00-2	NC		.05 UJ	.053 UJ	.053 UJ	.05 UJ	.05 U
Endosulfan I	959-98-8	NC		.05 U	.053 UJ	.053 U	.05 U	.05 U
Dieldrin	60-57-1	0.004		.1 U	.11 UJ	.11 U	.1 U	.05 U
4,4'-DDE	72-55-9	0.2		.1 U	.11 UJ	.11 U	.1 U	.1 U
Endrin	72-20-8	NC		.1 U	.11 UJ	.11 U	.1 U	.1 U
Endosulfan II	33213-65-9	NC		.1 U	.11 UJ	.11 U	.1 U	.1 U
4,4'-DDD	72-54-8	0.3		.1 U	.11 UJ	.11 U	.1 U	.1 U
Endosulfan Sulfate	1031-07-8	NC		.1 U	.11 UJ	.11 U	.1 U	.1 U
4,4'-DDT	50-29-3	0.2		.1 U	.11 UJ	.11 U	.1 U	.1 U
Methoxychlor	72-43-5	35		.5 U	.53 UJ	.53 U	.5 U	.5 U
Endrin Ketone	53494-70-5	NC		.1 U	.11 UJ	.11 U	.1 U	.1 U
Endrin Aldehyde	7421-93-4	0.5		.1 U	.11 UJ	.11 U	.1 U	.1 U
alpha-Chlordane	5103-71-9	NC		.05 U	.053 UJ	.053 U	.05 U	.05 U
gamma-Chlordane	5103-74-2	NC		.05 U	.053 UJ	.053 U	.05 U	.05 U
Toxaphene	8001-35-2	0.09		5 U	5.3 UJ	5.3 U	5 U	5 U
Aroclor-1016	12674-11-2	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U
Aroclor-1221	11104-28-2	0.09		2 U	2.1 UJ	2.1 U	2 U	2 U
Aroclor-1232	11141-16-5	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U
Aroclor-1242	53469-21-9	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U
Aroclor-1248	12672-29-6	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U
Aroclor-1254	11097-69-1	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U
Aroclor-1260	11096-82-5	0.09		1 U	1.1 UJ	1.1 U	1 U	1 U

Notes:

NC - No Criteria
U - Analyte not detected
J - Estimated concentration
P - Greater than 25% difference for detected concentrations between the two GC columns

Table 27

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Chautauqua County Department of Health
Sample Results Summary

Well ID	Supply Well #5				MW-13			
Class GA Ground Water Standard	5	2	5	5	5	2	5	5
Constituent	Freon-12	VC	CE	cis-1,2-DCE	Freon-12	VC	CE	cis-1,2-DCE
Sample Date								
4/17/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2/14/2002	---	<0.5	---	<0.5	---	<0.5	---	2.3
3/14/2002	---	<0.5	---	<0.5	---	---	---	---
3/28/2002	---	<0.5	---	<0.5	---	<0.5	---	0.8
4/1/2002	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	1.8
8/5/2002	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	0.8
10/7/2002	---	---	---	---	---	---	---	---
10/28/2002	---	---	---	---	0.5	2.1	<0.5	1.1
2/4/2003	---	0.5	---	---	---	2.5	---	---
2/24/2003	---	0.5	---	---	---	1.6	---	---
3/18/2003	<0.5	0.5	<0.5	1.2	<0.5	3.2	<0.5	0.9
4/14/2003	<0.5	<0.5	<0.5	0.9	<0.5	4	<0.5	0.7
5/26/2003	<0.5	0.7	<0.5	1.8	<0.5	5.9	<0.5	1.2
7/14/2003	<0.5	0.7	<0.5	2.5	3.1	2.3	2.3	2.4
10/8/2003	<0.5	0.6	<0.5	2.1	0.6	6.4	1.8	2.5
12/15/2003	<0.5	0.9	<0.5	2.4	0.9	7.7	1.8	2.7
1/21/2004	<0.5	0.9	<0.5	2.6	0.5	6.6	1.1	2.8
8/16/2004	<0.5	0.5	<0.5	2.5	0.6	5.7	0.7	5.3
10/13/2004	0.5	0.8	---	2.7	5.2	6	---	6.7
6/6/2005	---	0.8	---	2.4	2	10	---	15

Units: ug/L
--- Data not available
VC - vinyl chloride
CE - chloroethane
cis-1,2-DCE - cis-1,2-dichloroethene

Source: Chautauqua County Department of Health

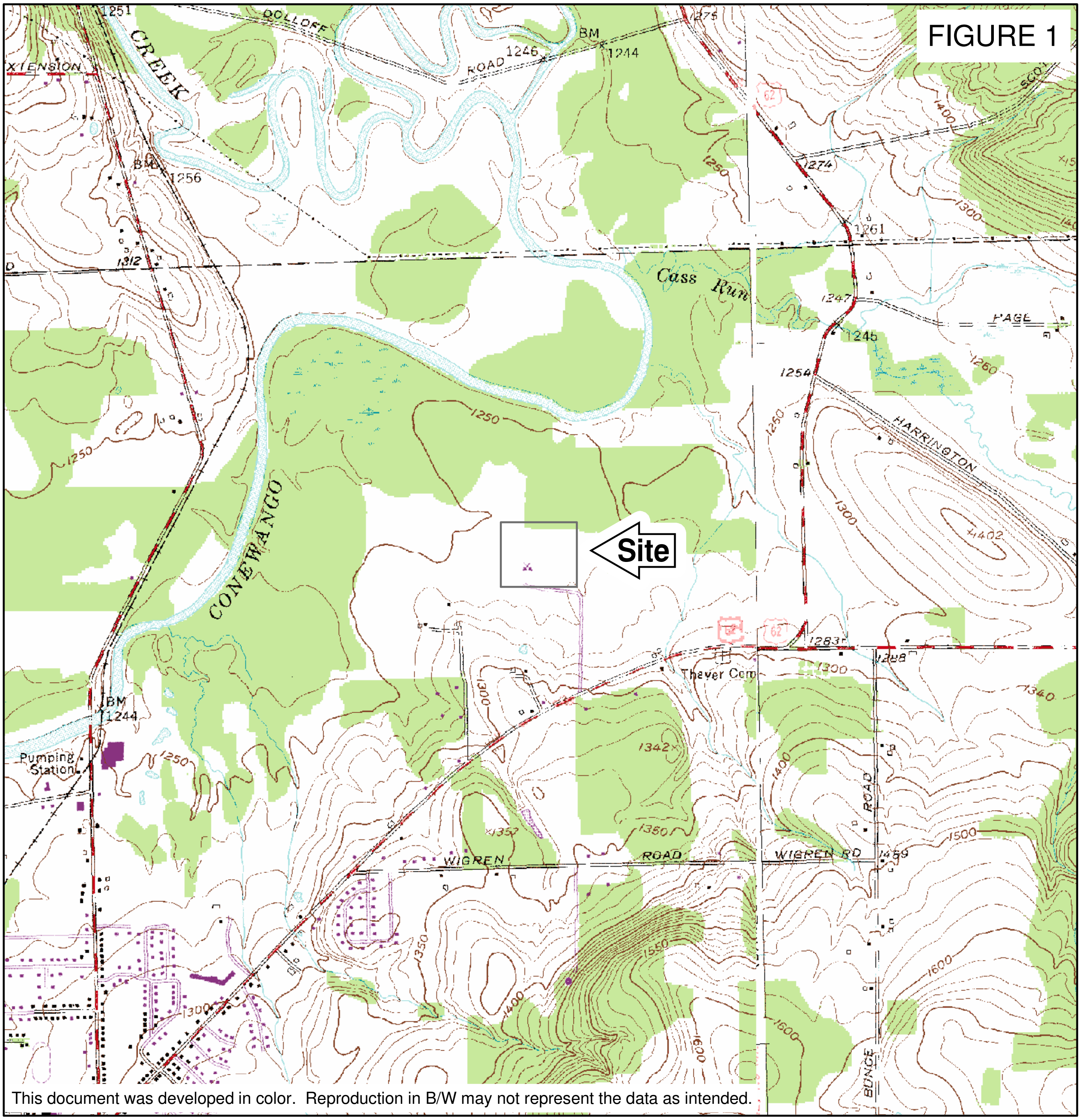
Table 28

Town of Carroll Landfill RI/FS
NYSDEC Site #9-07-017

Ground Water Analytical Summary - Methane/Ethane/Ethene

Chemical Name	CAS No	NYS Class GA Water Quality Standards and Guidance Values (ug/L)	Location ID Sample Date Sample ID Unit	MW-102 3/8/2005 MW-102 ug/l	MW-102I 3/9/2005 MW-102I ug/l	MW-103 3/9/2005 MW-103 ug/l	MW-107S 3/9/2005 MW-107S ug/l	MW-107I 3/9/2005 MW-107I ug/l	MW-110S 3/9/2005 MW-110S ug/l	MW-110I 3/9/2005 MW-110I ug/l
Methane				2800	2900	220	2400	18	42	31
Ethane				150	160. J	120. U	200. U	3.4 J	3. J	5.5
Ethene				80. U	140. J	4. U	190. J	4. U	4. U	4. U

Notes: U - Not Detected
J - Estimated Concentration
NC - No Criteria



T:\10653_NYSDEC\JAMESTOWN\MXD\34241\SITE_LOC.MXD

PLOT DATE: 03/03/05 DIV. 84 JPS

ADAPTED FROM: IVORY AND JAMESTOWN, NEW YORK USGS QUADRANGLES.

QUADRANGLE LOCATION

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

1:24,000

10653.34241
MARCH 2005

O'BRIEN & GERE ENGINEERS, INC.

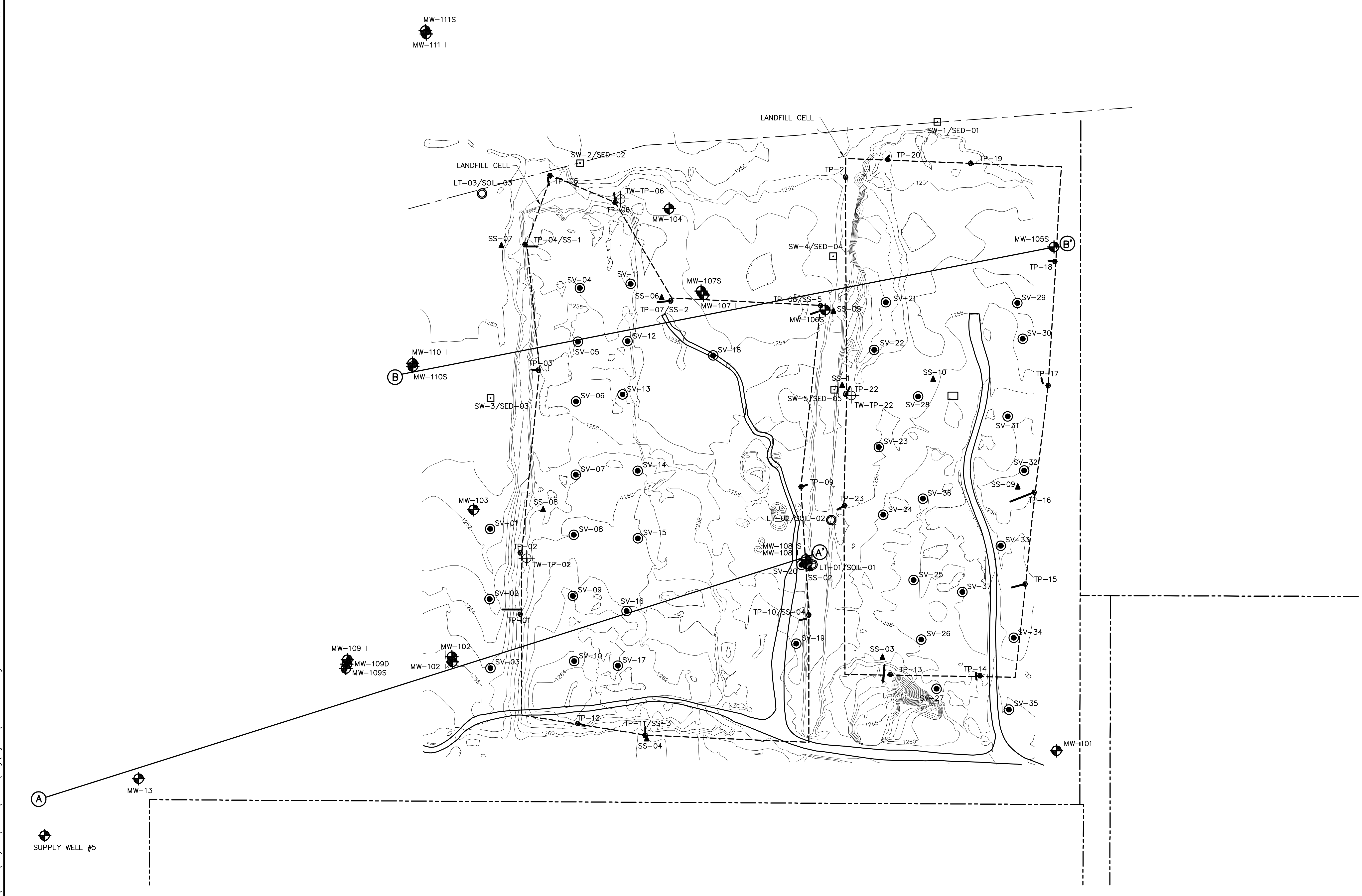


FIGURE 2

LEGEND

- PROPERTY LINE
- EDGE OF CREEK
- ACCESS ROAD
- SV-30 SOIL VAPOR LOCATIONS
- SW-1/SED-01 SURFACE WATER AND SEDIMENT LOCATIONS
- SS-07 SURFACE SOIL LOCATIONS
- LT-01 LEACHATE SEEP LOCATIONS
- TP-18 TEST PIT LOCATIONS
- MW-105S MONITORING WELL LOCATIONS
- A CROSS SECTION LINES
- TW-TP-02 TEMPORARY WELL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SAMPLE LOCATION PLAN

0 80 160
SCALE IN FEET

FILE NO.10653.34241.013
DECEMBER 2005

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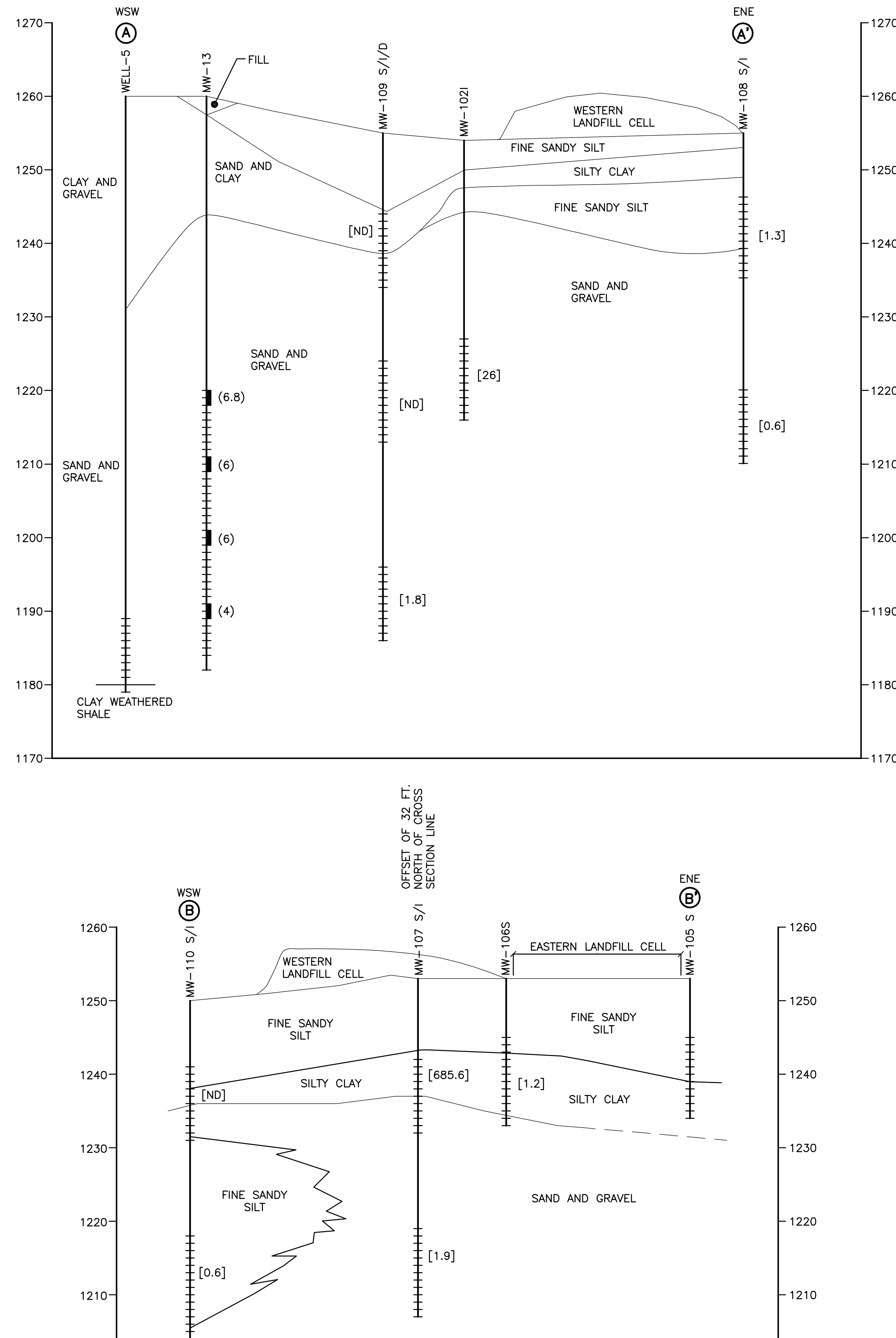

FIGURE 3

LEGEND

[1.9] TOTAL VOC CONCENTRATION (ug/L)

(ND) VOCs NOT DETECTED

WELL SCREEN INTERVAL

PDB SAMPLE INTERVAL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC #9-07-017

CROSS SECTIONS A-A' & B-B'

0 160 320
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET

FILE NO.10653.34241.022
DECEMBER 2005

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Dec 15, 2005 - 12:58pm

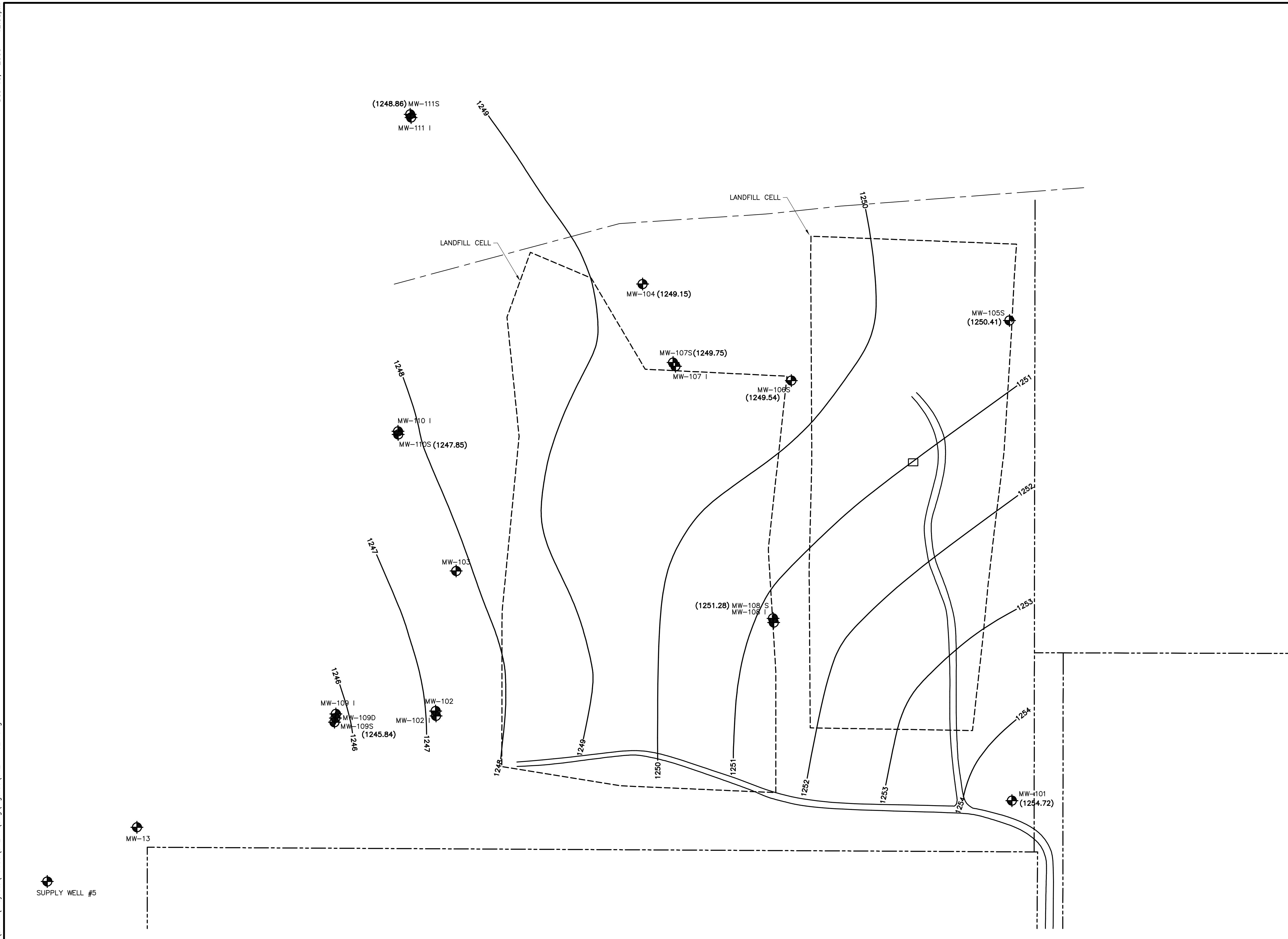

FIGURE 4

LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

MW-105S MONITORING WELL LOCATIONS

(1245.84) GROUND WATER ELEVATIONS (FT. MSL)

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SHALLOW GROUNDWATER CONTOUR MAP (10/14/04)

0 80 160
SCALE IN FEET

FILE NO.10653.34241.021
DECEMBER 2005

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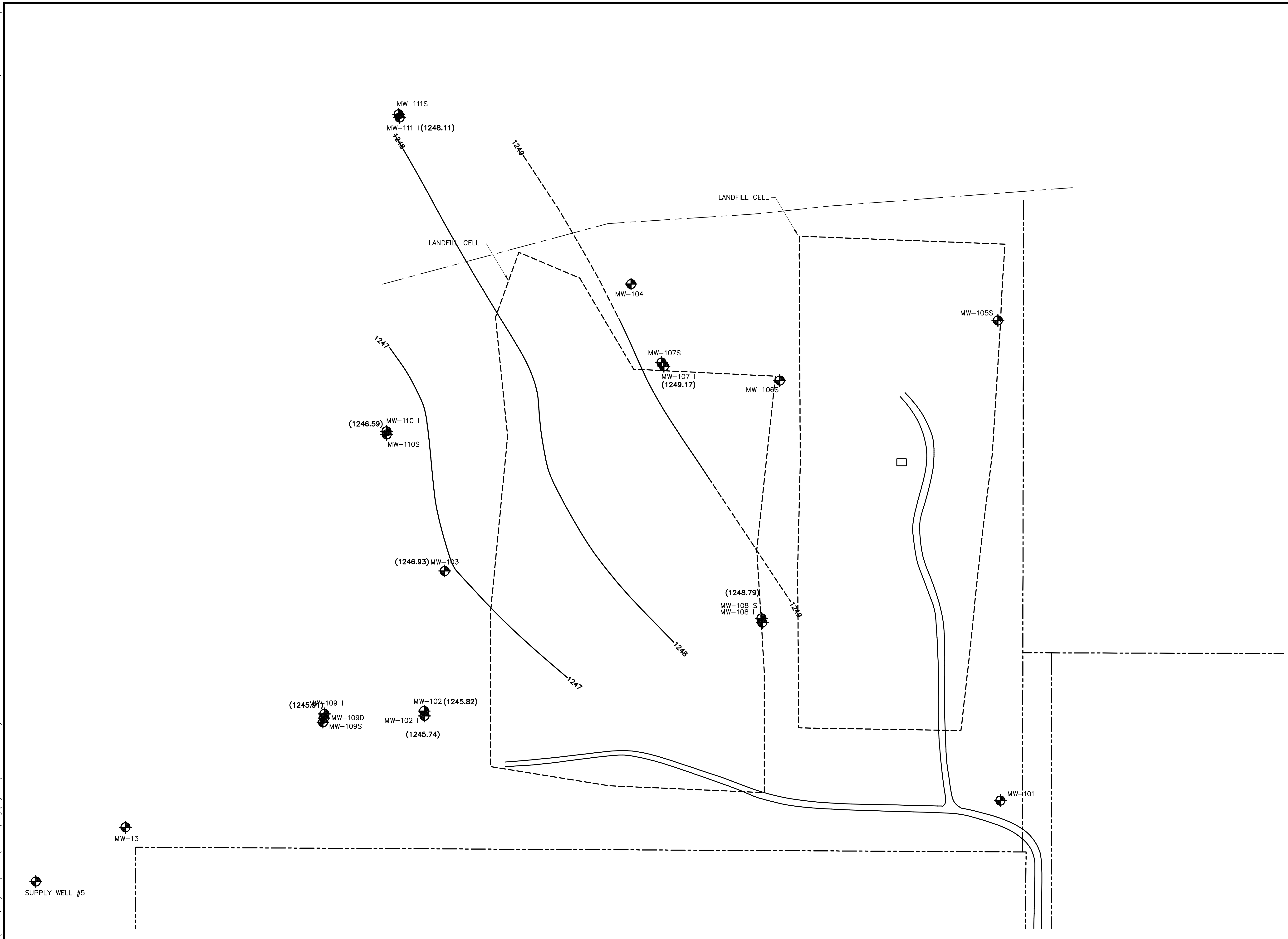

FIGURE 5

LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

MW-105S MONITORING WELL LOCATIONS

(1249.17) GROUND WATER ELEVATIONS (FT.)

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

INTERMEDIATE GROUNDWATER CONTOUR MAP (10/14/04)

0 80 160
SCALE IN FEET

FILE NO.10653.34241.020
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

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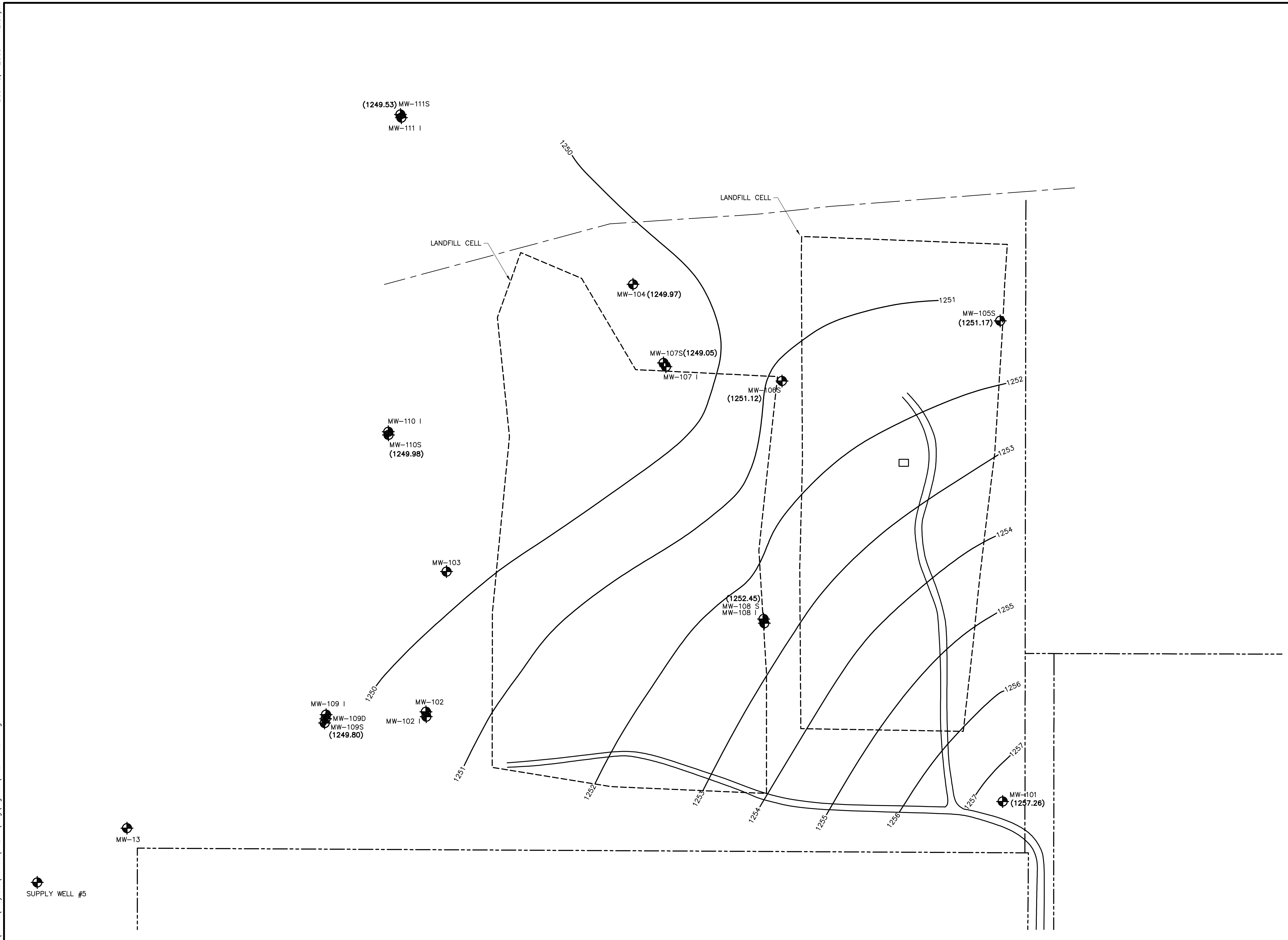

FIGURE 6

LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

MW-105S MONITORING WELL LOCATIONS

(1251.17) GROUND WATER ELEVATIONS (FT. MSL)

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SHALLOW GROUNDWATER CONTOUR MAP (3/7/05)

0 80 160
SCALE IN FEET

FILE NO.10653.34241.024
DECEMBER 2005

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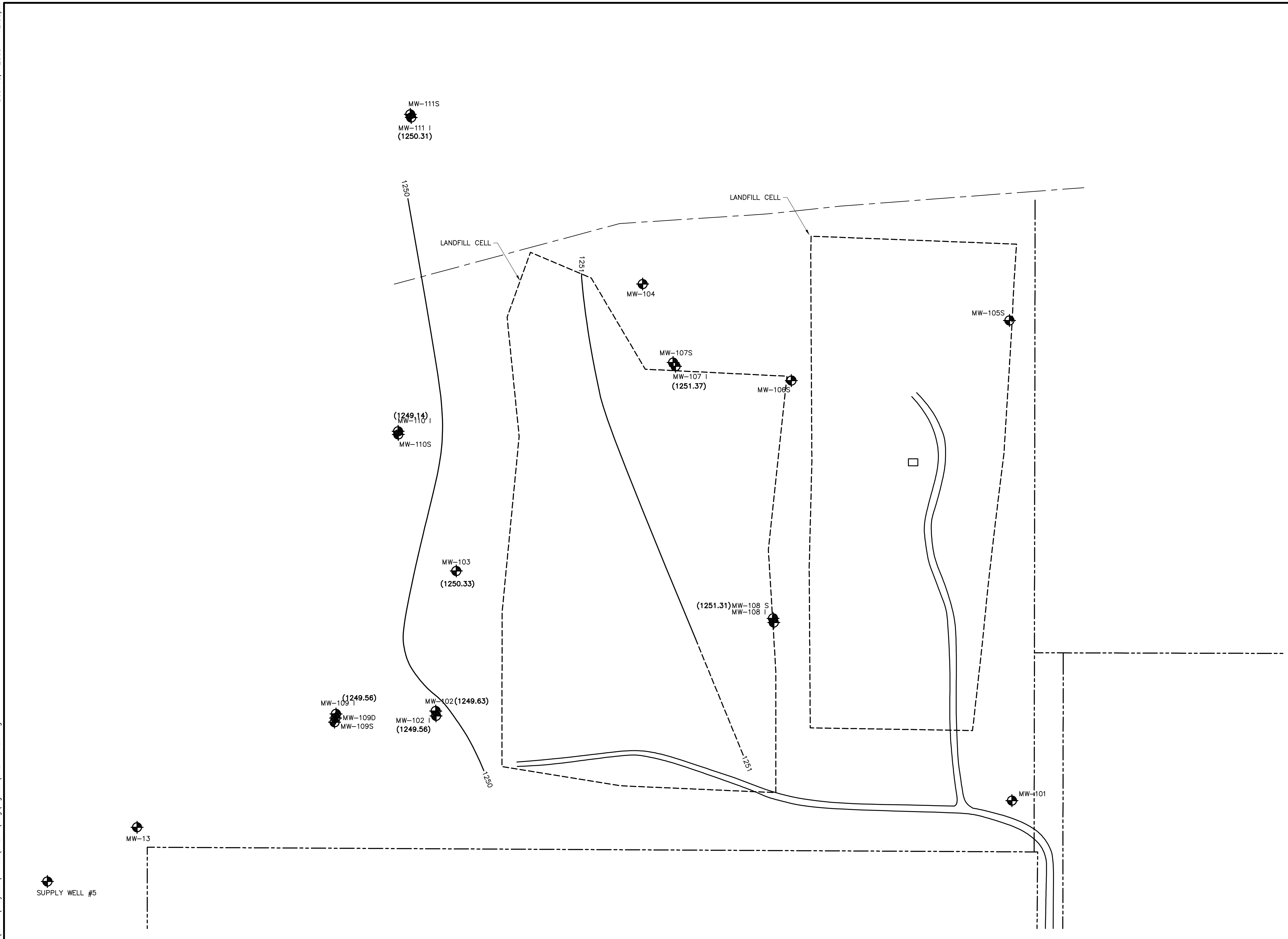

FIGURE 7

LEGEND

PROPERTY LINE
EDGE OF CREEK
ACCESS ROAD
MW-105S MONITORING WELL LOCATIONS
(1251.37) GROUND WATER ELEVATIONS (FT. MSL)

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

INTERMEDIATE GROUNDWATER CONTOUR MAP (3/7/05)

0 80 160
SCALE IN FEET

FILE NO.10653.34241.025
DECEMBER 2005

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Dec 15, 2005 - 12:56pm

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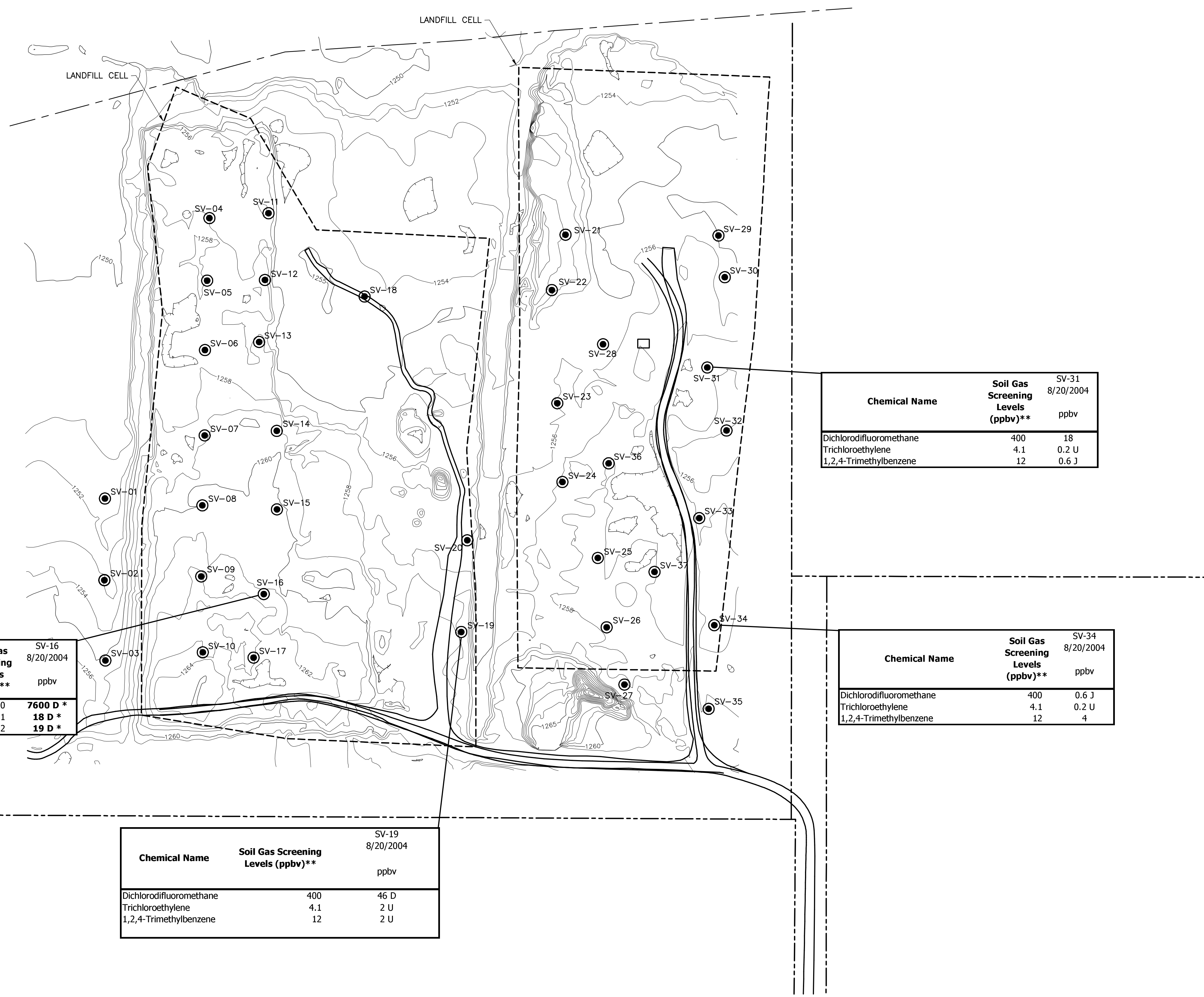
Dec 15, 2005 - 12:53pm

FIGURE 8

NOTES

1. **USEPA OSWER (2002): TABLE 2c: QUESTION 4 GENERIC SCREENING LEVELS AND SUMMARY SHEET RISK = 1x10−4
2. TARGET SHALLOW SOIL GAS CONCENTRATION CORRESPONDING TO TARGET INDOOR AIR CONCENTRATION WHERE THE SOIL GAS TO INDOOR AIR ATTENUATION FACTOR=0.1 Csoil−gas



Chemical Name	Soil Gas Screening Levels (ppbv)**	SV-16 8/20/2004 ppbv
Dichlorodifluoromethane	400	**7600 D ***
Trichloroethylene	4.1	**18 D ***
1,2,4-Trimethylbenzene	12	**19 D ***

Chemical Name	Soil Gas Screening Levels (ppbv)**	SV-19 8/20/2004 ppbv
Dichlorodifluoromethane	400	46 D
Trichloroethylene	4.1	2 U
1,2,4-Trimethylbenzene	12	2 U

Chemical Name	Soil Gas Screening Levels (ppbv)**	SV-31 8/20/2004 ppbv
Dichlorodifluoromethane	400	18
Trichloroethylene	4.1	0.2 U
1,2,4-Trimethylbenzene	12	0.6 J

Chemical Name	Soil Gas Screening Levels (ppbv)**	SV-34 8/20/2004 ppbv
Dichlorodifluoromethane	400	0.6 J
Trichloroethylene	4.1	0.2 U
1,2,4-Trimethylbenzene	12	4

LEGEND

- PROPERTY LINE
- EDGE OF CREEK
- ACCESS ROAD
- SV−30 SOIL VAPOR LOCATIONS

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC #9−07−017

SOIL VAPOR DETECTIONS GREATER THAN CRITERIA

0 80 160
SCALE IN FEET

FILE NO.10653.34241.014
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

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Dec 15, 2005 - 12:52pm

FIGURE 9

Chemical Name	Lowest Effect Level	SED-02 9/23/2004 ug/g
Arsenic	6	4.1
Cadmium	0.6	.23 B
Copper	16	11.3
Iron	20000	**25300 ***
Lead	31	15.4
Manganese	460	**611 ***
Nickel	16	**23.2 ***
Zinc	120	105

Chemical Name	NYS Class C Water Quality Standards and	SW-2 9/23/2004 ug/l
Inorganics		
Aluminum	100	**253 ***
Cobalt	5	.99 U
Iron	300	**1350 ***
Lead	5	1.1 U
Vanadium	14	1.1 U
Zinc	162	8.8 B
SVOCs		
Phenol	5	10. U

Chemical Name	Effect Level (ug/g)	SED-01 9/23/2004 ug/g
Arsenic	6	5.4
Cadmium	0.6	.06 U
Copper	16	4.2 B
Iron	20000	13900
Lead	31	17.4
Manganese	460	199
Nickel	16	8.2 B
Zinc	120	44.4

Chemical Name	NYS Class C Water Quality Standards and Guidance Values (ug/L)	SW-1 9/23/2004 ug/l
Inorganics		
Aluminum	100	**10200 ***
Cobalt	5	**7.6 B ***
Iron	300	**14200 ***
Lead	5	**11.1 ***
Vanadium	14	**16.6 B ***
Zinc	162	60.2
SVOCs		
Phenol	5	**11. ***

NOTES

NC – NO CRITERIA

U – ANALYTE NOT DETECTED

B – VALUE IS GREATER THAN IDL BUT LESS THAN CRDL

* – CONCENTRATION EXCEEDS CRITERIA

Chemical Name	NYS Class C Water Quality Standards and	SW-4 9/23/2004 ug/l
Inorganics		
Aluminum	100	**3820 ***
Cobalt	5	.99 U
Iron	300	**12800 ***
Lead	5	**10.9 ***
Vanadium	14	6.6 B
Zinc	162	69.9
SVOCs		
Phenol	5	11. U

Chemical Name	Lowest Effect Level	SED-04 9/23/2004 SED-4 ug/g
Arsenic	6	**7.5 ***
Cadmium	0.6	**.82 B ***
Copper	16	**21.5 ***
Iron	20000	**45600 ***
Lead	31	**39.9 ***
Manganese	460	**885 ***
Nickel	16	**26.8 ***
Zinc	120	**191 ***

Chemical Name	Lowest Effect Level	SED-03 9/23/2004 ug/g
Arsenic	6	**13.8 ***
Cadmium	0.6	.49 B
Copper	16	**27.2 ***
Iron	20000	**67300 ***
Lead	31	28.6
Manganese	460	**1320 ***
Nickel	16	**40.4 ***
Zinc	120	**176 ***

Chemical Name	NYS Class C Water Quality Standards and	SW-3 9/23/2004 ug/l
Inorganics		
Aluminum	100	**2740 ***
Cobalt	5	**6.9 B ***
Iron	300	**47900 ***
Lead	5	**8.4 ***
Vanadium	14	4.4 B
Zinc	162	98.2
SVOCs		
Phenol	5	10. U

Chemical Name	Lowest Effect Level	SED-05 9/23/2004 SED-5 ug/g
Arsenic	6	6
Cadmium	0.6	**1 B ***
Copper	16	13.9
Iron	20000	**36200 ***
Lead	31	20.8
Manganese	460	**593 ***
Nickel	16	**28.2 ***
Zinc	120	**148 ***

Chemical Name	NYS Class C Water Quality Standards and	SW-5 9/23/2004 ug/l
Inorganics		
Aluminum	100	**5260 ***
Cobalt	5	**11.2 B ***
Iron	300	**38000 ***
Lead	5	**22.5 ***
Vanadium	14	8.5 B
Zinc	162	**210 ***
SVOCs		
Phenol	5	11. U

LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

SW-1/SED-01 SURFACE WATER/ SEDIMENT LOCATIONS

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SURFACE WATER AND SEDIMENT DETECTIONS GREATER THAN CRITERIA

FILE NO.10653.34241.015
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

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FIGURE 10

NOTES

SB – SITE BACKGROUND

U – ANALYTE NOT DETECTED

B – VALUE IS GREATER THAN IDL BUT LESS THAN CRDL

* – CONCENTRATION EXCEEDS CRITERIA

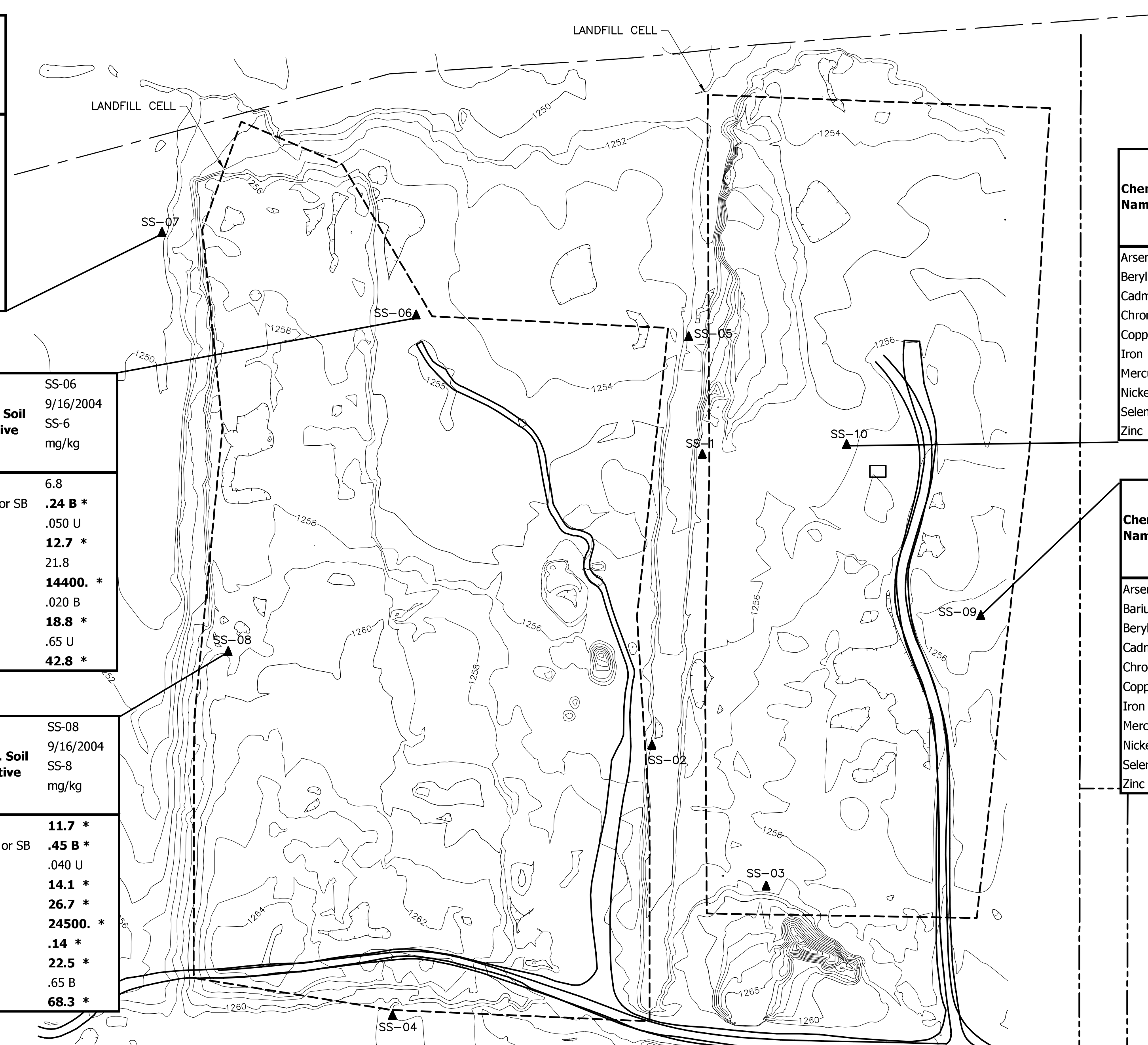
LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

SS–07 SURFACE SOIL LOCATIONS



Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SS-07 9/16/2004 SS-7 mg/kg
Arsenic	7.5 mg/kg or SB	**9.2 ***
Beryllium	0.16 mg/kg (HEAST) or SB	**.34 B ***
Cadmium	1 mg/kg or SB	.21 B
Chromium	10 mg/kg or SB	**24. ***
Copper	25 mg/kg or SB	**39.4 ***
Iron	2 mg/kg or SB	**24900. ***
Mercury	0.1 mg/kg	**.19 ***
Nickel	13 mg/kg or SB	**52.4 ***
Selenium	2 mg/kg or SB	1.0 B
Zinc	20 mg/kg or SB	**87.7 ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SS-06 9/16/2004 SS-6 mg/kg
Arsenic	7.5 mg/kg or SB	6.8
Beryllium	0.16 mg/kg (HEAST) or SB	**.24 B ***
Cadmium	1 mg/kg or SB	.050 U
Chromium	10 mg/kg or SB	**12.7 ***
Copper	25 mg/kg or SB	21.8
Iron	2 mg/kg or SB	**14400. ***
Mercury	0.1 mg/kg	.020 B
Nickel	13 mg/kg or SB	**18.8 ***
Selenium	2 mg/kg or SB	.65 U
Zinc	20 mg/kg or SB	**42.8 ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SS-08 9/16/2004 SS-8 mg/kg
Arsenic	7.5 mg/kg or SB	**11.7 ***
Beryllium	0.16 mg/kg (HEAST) or SB	**.45 B ***
Cadmium	1 mg/kg or SB	.040 U
Chromium	10 mg/kg or SB	**14.1 ***
Copper	25 mg/kg or SB	**26.7 ***
Iron	2 mg/kg or SB	**24500. ***
Mercury	0.1 mg/kg	**.14 ***
Nickel	13 mg/kg or SB	**22.5 ***
Selenium	2 mg/kg or SB	.65 B
Zinc	20 mg/kg or SB	**68.3 ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SS-10 9/16/2004 SS-10 mg/kg
Arsenic	7.5 mg/kg or SB	**9.2 ***
Beryllium	0.16 mg/kg (HEAST) or SB	**.38 B ***
Cadmium	1 mg/kg or SB	.66 B
Chromium	10 mg/kg or SB	**19.3 ***
Copper	25 mg/kg or SB	**46.7 ***
Iron	2 mg/kg or SB	**33900. ***
Mercury	0.1 mg/kg	.05 B
Nickel	13 mg/kg or SB	**30.6 ***
Selenium	2 mg/kg or SB	.85 U
Zinc	20 mg/kg or SB	**381. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SS-09 9/16/2004 SS-9 mg/kg
Arsenic	7.5 mg/kg or SB	**12.1 ***
Barium	300 mg/kg or SB	**448 ***
Beryllium	0.16 mg/kg (HEAST) or SB	**.65 B ***
Cadmium	1 mg/kg or SB	**2.9 ***
Chromium	10 mg/kg or SB	**24.2 ***
Copper	25 mg/kg or SB	**89.3 ***
Iron	2 mg/kg or SB	**71600. ***
Mercury	0.1 mg/kg	**.14 B ***
Nickel	13 mg/kg or SB	**40.3 ***
Selenium	2 mg/kg or SB	**2.7 ***
Zinc	20 mg/kg or SB	**229. ***

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9–07–017

SURFACE SOIL DETECTIONS GREATER THAN CRITERIA

0 80 160
SCALE IN FEET

FILE NO.10653.34241.016
DECEMBER 2005

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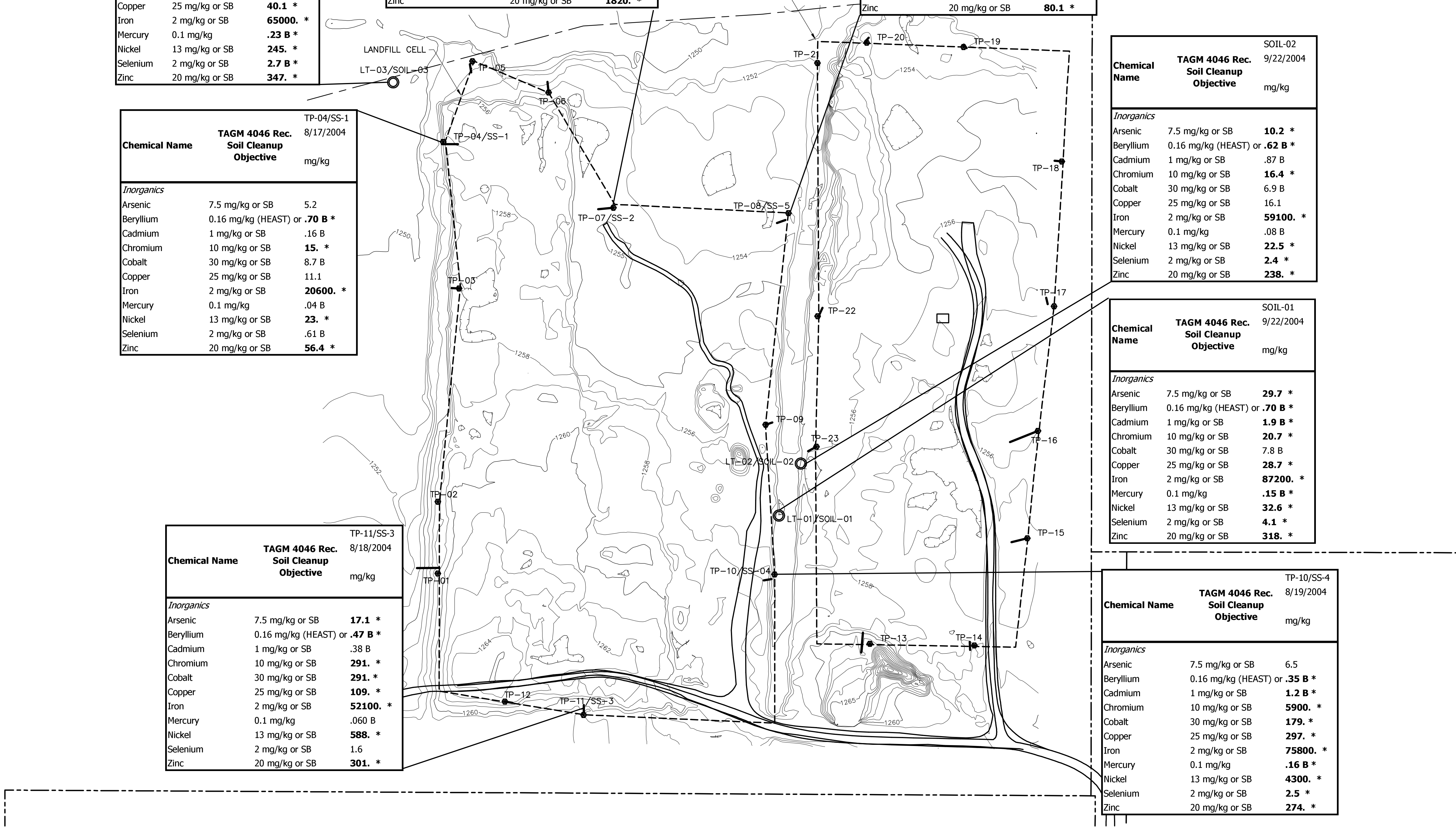
FIGURE 11

NOTES

SB – SITE BACKGROUND
U – ANALYTE NOT DETECTED
B – VALUE IS GREATER THAN IDL BUT LESS THAN CRDL
* – CONCENTRATION EXCEEDS CRITERIA

LEGEND

PROPERTY LINE
EDGE OF CREEK
ACCESS ROAD
TP–18 TEST PIT LOCATIONS



Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SOIL-03 9/23/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	**13.8 ***
Beryllium	0.16 mg/kg (HEAST) or	**.43 B ***
Cadmium	1 mg/kg or SB	**1.9 B ***
Chromium	10 mg/kg or SB	**14.1 ***
Cobalt	30 mg/kg or SB	19.9 B
Copper	25 mg/kg or SB	**40.1 ***
Iron	2 mg/kg or SB	**65000. ***
Mercury	0.1 mg/kg	**.23 B ***
Nickel	13 mg/kg or SB	**245. ***
Selenium	2 mg/kg or SB	**2.7 B ***
Zinc	20 mg/kg or SB	**347. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	TP-07/SS-02 8/17/2004 mg/kg
SVOCs		
bis(2-ethylhexl)phthalate	50000 mg/kg	62000
Inorganics		
Arsenic	7.5 mg/kg or SB	**26.8 ***
Beryllium	0.16 mg/kg (HEAST) or	**.55 B ***
Cadmium	1 mg/kg or SB	**23.9 ***
Chromium	10 mg/kg or SB	**8870. ***
Cobalt	30 mg/kg or SB	**731. ***
Copper	25 mg/kg or SB	**1600. ***
Iron	2 mg/kg or SB	**79900. ***
Mercury	0.1 mg/kg	**2.2 ***
Nickel	13 mg/kg or SB	**30700. ***
Selenium	2 mg/kg or SB	**3.2 ***
Zinc	20 mg/kg or SB	**1820. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	TP-8/SS-5 8/19/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	**12.1 ***
Beryllium	0.16 mg/kg (HEAST) or	**.32 B ***
Cadmium	1 mg/kg or SB	.06 U
Chromium	10 mg/kg or SB	**23.1 ***
Cobalt	30 mg/kg or SB	11.6 B
Copper	25 mg/kg or SB	**42.8 ***
Iron	2 mg/kg or SB	**113000. ***
Mercury	0.1 mg/kg	.02 B
Nickel	13 mg/kg or SB	**27.1 ***
Selenium	2 mg/kg or SB	**3.6 ***
Zinc	20 mg/kg or SB	**80.1 ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	TP-04/SS-1 8/17/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	5.2
Beryllium	0.16 mg/kg (HEAST) or	**.70 B ***
Cadmium	1 mg/kg or SB	.16 B
Chromium	10 mg/kg or SB	**15. ***
Cobalt	30 mg/kg or SB	8.7 B
Copper	25 mg/kg or SB	11.1
Iron	2 mg/kg or SB	**20600. ***
Mercury	0.1 mg/kg	.04 B
Nickel	13 mg/kg or SB	**23. ***
Selenium	2 mg/kg or SB	.61 B
Zinc	20 mg/kg or SB	**56.4 ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SOIL-02 9/22/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	**10.2 ***
Beryllium	0.16 mg/kg (HEAST) or	**.62 B ***
Cadmium	1 mg/kg or SB	.87 B
Chromium	10 mg/kg or SB	**16.4 ***
Cobalt	30 mg/kg or SB	6.9 B
Copper	25 mg/kg or SB	16.1
Iron	2 mg/kg or SB	**59100. ***
Mercury	0.1 mg/kg	.08 B
Nickel	13 mg/kg or SB	**22.5 ***
Selenium	2 mg/kg or SB	**2.4 ***
Zinc	20 mg/kg or SB	**238. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	SOIL-01 9/22/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	**29.7 ***
Beryllium	0.16 mg/kg (HEAST) or	**.70 B ***
Cadmium	1 mg/kg or SB	**1.9 B ***
Chromium	10 mg/kg or SB	**20.7 ***
Cobalt	30 mg/kg or SB	7.8 B
Copper	25 mg/kg or SB	**28.7 ***
Iron	2 mg/kg or SB	**87200. ***
Mercury	0.1 mg/kg	**.15 B ***
Nickel	13 mg/kg or SB	**32.6 ***
Selenium	2 mg/kg or SB	**4.1 ***
Zinc	20 mg/kg or SB	**318. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	TP-11/SS-3 8/18/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	**17.1 ***
Beryllium	0.16 mg/kg (HEAST) or	**.47 B ***
Cadmium	1 mg/kg or SB	.38 B
Chromium	10 mg/kg or SB	**291. ***
Cobalt	30 mg/kg or SB	**291. ***
Copper	25 mg/kg or SB	**109. ***
Iron	2 mg/kg or SB	**52100. ***
Mercury	0.1 mg/kg	.060 B
Nickel	13 mg/kg or SB	**588. ***
Selenium	2 mg/kg or SB	1.6
Zinc	20 mg/kg or SB	**301. ***

Chemical Name	TAGM 4046 Rec. Soil Cleanup Objective	TP-10/SS-4 8/19/2004 mg/kg
Inorganics		
Arsenic	7.5 mg/kg or SB	6.5
Beryllium	0.16 mg/kg (HEAST) or	**.35 B ***
Cadmium	1 mg/kg or SB	**1.2 B ***
Chromium	10 mg/kg or SB	**5900. ***
Cobalt	30 mg/kg or SB	**179. ***
Copper	25 mg/kg or SB	**297. ***
Iron	2 mg/kg or SB	**75800. ***
Mercury	0.1 mg/kg	**.16 B ***
Nickel	13 mg/kg or SB	**4300. ***
Selenium	2 mg/kg or SB	**2.5 ***
Zinc	20 mg/kg or SB	**274. ***

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SUBSURFACE SOIL DETECTIONS GREATER THAN CRITERIA

0 80 160
SCALE IN FEET

FILE NO.10653.34241.017
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

Dec 15, 2005 – 12:45pm

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FIGURE 12

NOTES

NC - NO CRITERIA

J - ESTIMATED CONCENTRATION

B - ANALYTE DETECTED IN ASSOCIATED BLANK

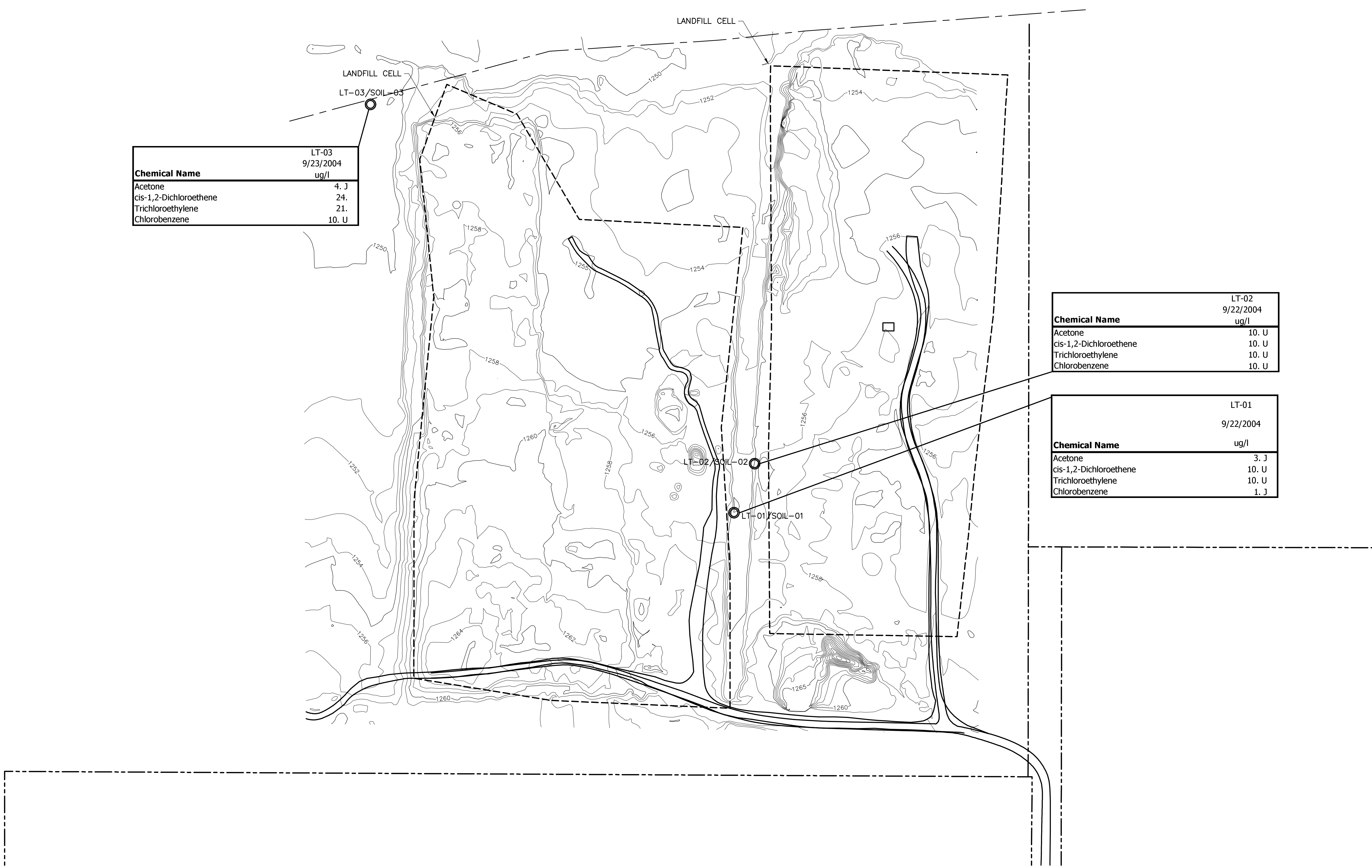
LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

LT-01 LEACHATE SEEP LOCATIONS



Chemical Name	LT-03 9/23/2004 ug/l
Acetone	4. J
cis-1,2-Dichloroethene	24.
Trichloroethylene	21.
Chlorobenzene	10. U

Chemical Name	LT-02 9/22/2004 ug/l
Acetone	10. U
cis-1,2-Dichloroethene	10. U
Trichloroethylene	10. U
Chlorobenzene	10. U

Chemical Name	LT-01 9/22/2004 ug/l
Acetone	3. J
cis-1,2-Dichloroethene	10. U
Trichloroethylene	10. U
Chlorobenzene	1. J

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

LEACHATE SEEP ORGANIC CONSTITUENT DETECTIONS

0 80 160
SCALE IN FEET

FILE NO.10653.34241.018
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

Dec 15, 2005 - 1:00pm

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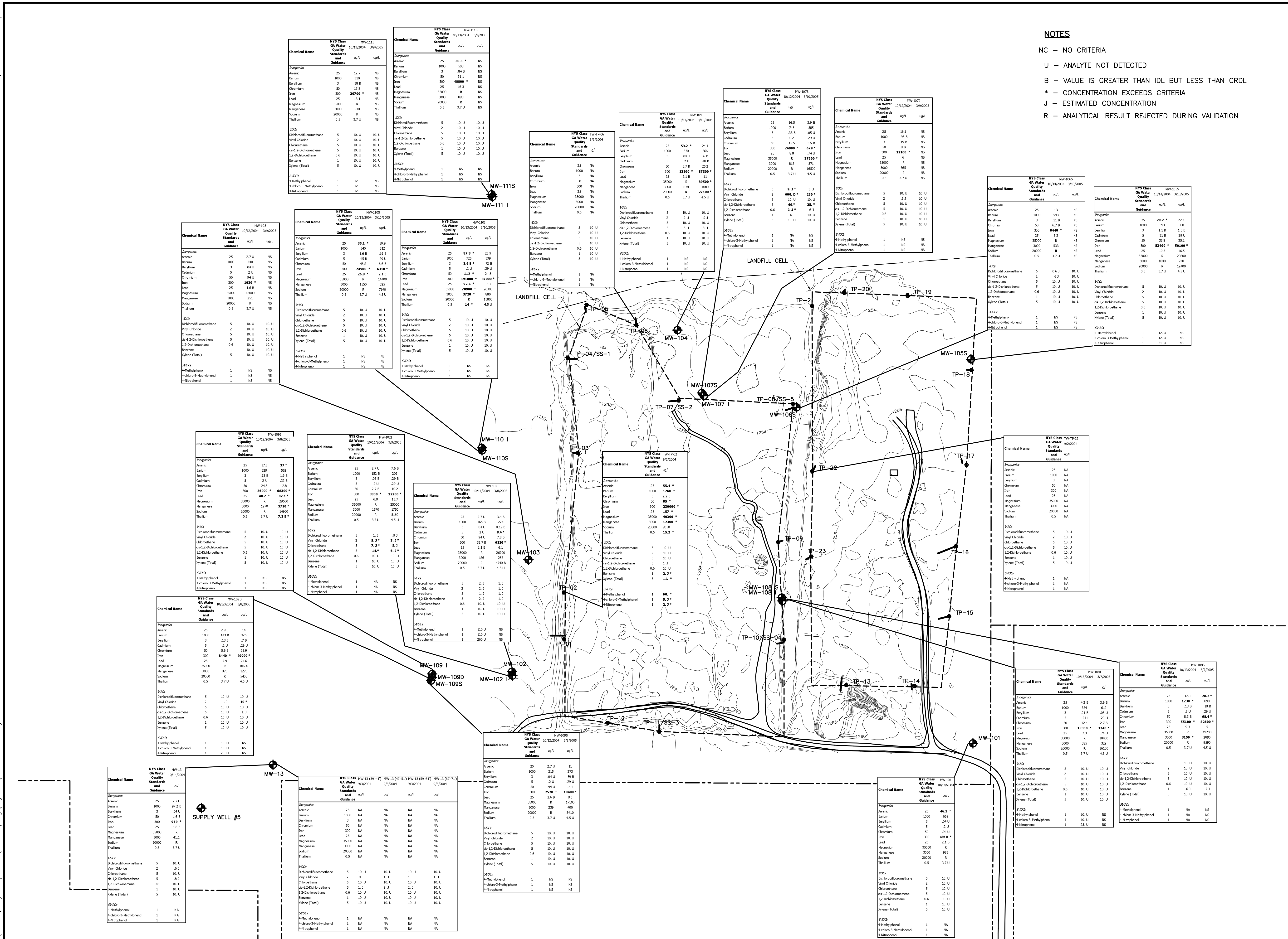
FIGURE 13



Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-111I 10/13/2004 ug/L	MW-111I 3/9/2005 ug/L
Inorganics			
Arsenic	25	12.7	NS
Barium	1000	310	NS
Beryllium	3	.38 B	NS
Chromium	50	13.8	NS
Iron	300	**20700 ***	NS
Lead	25	13.1	NS
Magnesium	35000	R	NS
Manganese	3000	530	NS
Sodium	20000	R	NS
Thallium	0.5	3.7 U	NS
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-111S 10/13/2004 ug/L	MW-111S 3/9/2005 ug/L
Inorganics			
Arsenic	25	**30.5 ***	NS
Barium	1000	508	NS
Beryllium	3	.84 B	NS
Chromium	50	31.1	NS
Iron	300	**48800 ***	NS
Lead	25	16.3	NS
Magnesium	35000	R	NS
Manganese	3000	898	NS
Sodium	20000	R	NS
Thallium	0.5	3.7 U	NS
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	TW-TP-06 9/2/2004 ug/l
Inorganics		
Arsenic	25	NA
Barium	1000	NA
Beryllium	3	NA
Chromium	50	NA
Iron	300	NA
Lead	25	NA
Magnesium	35000	NA
Manganese	3000	NA
Sodium	20000	NA
Thallium	0.5	NA
VOCs		
Dichlorodifluoromethane	5	10. U
Vinyl Chloride	2	10. U
Chloroethane	5	10. U
cis-1,2-Dichloroethene	5	10. U
1,2-Dichloroethane	0.6	10. U
Benzene	1	10. U
Xylene (Total)	5	10. U
SVOCs		
4-Methylphenol	1	NA
4-chloro-3-Methylphenol	1	NA
4-Nitrophenol	1	NA

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-104 10/14/2004 ug/L	MW-104 3/10/2005 ug/L
Inorganics			
Arsenic	25	**53.2 ***	24.1
Barium	1000	530	566
Beryllium	3	.04 U	.6 B
Cadmium	5	.2 U	.48 B
Chromium	50	3.7 B	25.2
Iron	300	**13200 ***	**37300 ***
Lead	25	2.1 B	11
Magnesium	35000	R	**39500 ***
Manganese	3000	678	1080
Sodium	20000	R	**27100 ***
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	2. J	.9 J
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	5. J	3. J
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-107S 10/12/2004 ug/L	MW-107S 3/10/2005 ug/L
Inorganics			
Arsenic	25	16.5	2.9 B
Barium	1000	745	585
Beryllium	3	.33 B	.05 U
Cadmium	5	0.2	.29 U
Chromium	50	15.5	3.6 B
Iron	300	**24900 ***	**679 ***
Lead	25	8.8	.74 U
Magnesium	35000	R	**37600 ***
Manganese	3000	818	571
Sodium	20000	R	16500
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	**9. J ***	3. J
Vinyl Chloride	2	**600. D ***	**250 ***
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	**69.***	**25. ***
1,2-Dichloroethane	0.6	**2. J ***	.6 J
Benzene	1	.6 J	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NA	NS
4-chloro-3-Methylphenol	1	NA	NS
4-Nitrophenol	1	NA	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-107I 10/12/2004 ug/L	MW-107I 3/9/2005 ug/L
Inorganics			
Arsenic	25	16.1	NS
Barium	1000	193 B	NS
Beryllium	3	.19 B	NS
Chromium	50	9 B	NS
Iron	300	**12100 ***	NS
Lead	25	6	NS
Magnesium	35000	R	NS
Manganese	3000	365	NS
Sodium	20000	R	NS
Thallium	0.5	3.7 U	NS
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	.6 J	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-106S 10/14/2004 ug/L	MW-106S 3/10/2005 ug/L
Inorganics			
Arsenic	25	13	NS
Barium	1000	543	NS
Beryllium	3	.11 B	NS
Chromium	50	6.7 B	NS
Iron	300	**8440 ***	NS
Lead	25	5.2	NS
Magnesium	35000	R	NS
Manganese	3000	533	NS
Sodium	20000	R	NS
Thallium	0.5	3.7 U	NS
VOCs			
Dichlorodifluoromethane	5	0.6 J	10. U
Vinyl Chloride	2	.6 J	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-105S 10/14/2004 ug/L	MW-105S 3/10/2005 ug/L
Inorganics			
Arsenic	25	**29.2 ***	22.1
Barium	1000	393	380
Beryllium	3	1.1 B	1.3 B
Cadmium	5	.31 B	.29 U
Chromium	50	33.8	35.1
Iron	300	**53400 ***	**50100 ***
Lead	25	19.5	16.5
Magnesium	35000	R	20800
Manganese	3000	1040	748
Sodium	20000	R	12400
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	12. U	NS
4-chloro-3-Methylphenol	1	12. U	NS
4-Nitrophenol	1	31. U	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-103 10/12/2004 ug/L	MW-103 3/9/2005 ug/L
Inorganics			
Arsenic	25	2.7 U	NS
Barium	1000	240	NS
Beryllium	3	.04 U	NS
Cadmium	5	.2 U	NS
Chromium	50	.94 U	NS
Iron	300	**1030 ***	NS
Lead	25	1.6 B	NS
Magnesium	35000	12000	NS
Manganese	3000	251	NS
Sodium	20000	R	NS
Thallium	0.5	3.7 U	NS
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-110S 10/13/2004 ug/L	MW-110S 3/10/2005 ug/L
Inorganics			
Arsenic	25	**35.1 ***	10.9
Barium	1000	540	312
Beryllium	3	1.6 B	.19 B
Cadmium	5	.45 B	.29 U
Chromium	50	46.8	6.6 B
Iron	300	**74900 ***	**6310 ***
Lead	25	**26.8 ***	2.1 B
Magnesium	35000	R	14400
Manganese	3000	1550	325
Sodium	20000	R	7140
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-110I 10/13/2004 ug/L	MW-110I 3/10/2005 ug/L
Inorganics			
Arsenic	25	**87.8 ***	23.9
Barium	1000	725	339
Beryllium	3	**3.6 B ***	.72 B
Cadmium	5	.2 U	.29 U
Chromium	50	**112 ***	24.5
Iron	300	**191000 ***	**37000 ***
Lead	25	**92.4 ***	15.7
Magnesium	35000	**70900 ***	26300
Manganese	3000	**3720 ***	880
Sodium	20000	R	13800
Thallium	0.5	**14 ***	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-109I 10/12/2004 ug/L	MW-109I 3/8/2005 ug/L
Inorganics			
Arsenic	25	17.8	**37 ***
Barium	1000	329	562
Beryllium	3	.93 B	1.9 B
Cadmium	5	.2 U	.32 B
Chromium	50	24.5	42.8
Iron	300	**36000 ***	**68300 ***
Lead	25	**40.7 ***	**87.1 ***
Magnesium	35000	R	29500
Manganese	3000	1970	**3720 ***
Sodium	20000	R	14900
Thallium	0.5	3.7 U	**7.2 B ***
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-102I 10/11/2004 ug/L	MW-102I 3/9/2005 ug/L
Inorganics			
Arsenic	25	2.7 U	7.6 B
Barium	1000	152 B	209
Beryllium	3	.08 B	.29 B
Cadmium	5	.2 U	.29 U
Chromium	50	2.7 B	10.2
Iron	300	**3800 ***	**12200 ***
Lead	25	6.8	13.7
Magnesium	35000	R	25000
Manganese	3000	1570	1750
Sodium	20000	R	5160
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	1. J	.9 J
Vinyl Chloride	2	**5. J ***	**3. J ***
Chloroethane	5	**7. J ***	5. J
cis-1,2-Dichloroethene	5	**14.***	**6. J ***
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NA	NS
4-chloro-3-Methylphenol	1	NA	NS
4-Nitrophenol	1	NA	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-102 10/11/2004 ug/L	MW-102 3/8/2005 ug/L
Inorganics			
Arsenic	25	2.7 U	3.4 B
Barium	1000	165 B	224
Beryllium	3	.04 U	0.12 B
Cadmium	5	.2 U	**8.4 ***
Chromium	50	.94 U	7.8 B
Iron	300	32.7 B	**6220 ***
Lead	25	1.1 B	6.1
Magnesium	35000	R	26900
Manganese	3000	186	258
Sodium	20000	R	4740 B
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	2. J	1. J
Vinyl Chloride	2	2. J	1. J
Chloroethane	5	1. J	1. J
cis-1,2-Dichloroethene	5	2. J	1. J
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	110 U	NS
4-chloro-3-Methylphenol	1	110 U	NS
4-Nitrophenol	1	260 U	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	TW-TP-02 9/2/2004 ug/l
Inorganics		
Arsenic	25	**55.4 ***
Barium	1000	**1760 ***
Beryllium	3	2.2 B
Chromium	50	**85 ***
Iron	300	**230000 ***
Lead	25	**157 ***
Magnesium	35000	**40300 ***
Manganese	3000	**12300 ***
Sodium	20000	9050
Thallium	0.5	**15.2 ***
VOCs		
Dichlorodifluoromethane	5	10. U
Vinyl Chloride	2	10. U
Chloroethane	5	10. U
cis-1,2-Dichloroethene	5	1. J
1,2-Dichloroethane	0.6	10. U
Benzene	1	**2. J ***
Xylene (Total)	5	**11. ***
SVOCs		
4-Methylphenol	1	**60. ***
4-chloro-3-Methylphenol	1	**5. J ***
4-Nitrophenol	1	**2. J ***

Chemical Name	NYS Class GA Water Quality Standards and Guidance	TW-TP-22 9/2/2004 ug/l
Inorganics		
Arsenic	25	NA
Barium	1000	NA
Beryllium	3	NA
Chromium	50	NA
Iron	300	NA
Lead	25	NA
Magnesium	35000	NA
Manganese	3000	NA
Sodium	20000	NA
Thallium	0.5	NA
VOCs		
Dichlorodifluoromethane	5	10. U
Vinyl Chloride	2	10. U
Chloroethane	5	10. U
cis-1,2-Dichloroethene	5	10. U
1,2-Dichloroethane	0.6	10. U
Benzene	1	10. U
Xylene (Total)	5	10. U
SVOCs		
4-Methylphenol	1	NA
4-chloro-3-Methylphenol	1	NA
4-Nitrophenol	1	NA

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-109D 10/12/2004 ug/L	MW-109D 3/8/2005 ug/L
Inorganics			
Arsenic	25	2.9 B	14
Barium	1000	143 B	325
Beryllium	3	.13 B	.7 B
Cadmium	5	.2 U	.29 U
Chromium	50	5.6 B	25.9
Iron	300	**8440 ***	**29900 ***
Lead	25	7.9	24.6
Magnesium	35000	R	18600
Manganese	3000	873	1270
Sodium	20000	R	5400
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	1. J	**10 ***
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	1. J
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	10. U	NS
4-chloro-3-Methylphenol	1	10. U	NS
4-Nitrophenol	1	25. U	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-13 10/14/2004 ug/l
Inorganics		
Arsenic	25	2.7 U
Barium	1000	97.2 B
Beryllium	3	.04 U
Chromium	50	1.6 B
Iron	300	**979 ***
Lead	25	1.6 B
Magnesium	35000	R
Manganese	3000	41.1
Sodium	20000	**R**
Thallium	0.5	3.7 U
VOCs		
Dichlorodifluoromethane	5	10. U
Vinyl Chloride	2	.6 J
Chloroethane	5	10. U
cis-1,2-Dichloroethene	5	.8 J
1,2-Dichloroethane	0.6	10. U
Benzene	1	10. U
Xylene (Total)	5	10. U
SVOCs		
4-Methylphenol	1	NA
4-chloro-3-Methylphenol	1	NA
4-Nitrophenol	1	NA

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-13 (39'-41') 9/3/2004 ug/l	MW-13 (49'-51') 9/3/2004 ug/l	MW-13 (59'-61') 9/3/2004 ug/l	MW-13 (69'-71') 9/3/2004 ug/l
Inorganics					
Arsenic	25	NA	NA	NA	NA
Barium	1000	NA	NA	NA	NA
Beryllium	3	NA	NA	NA	NA
Chromium	50	NA	NA	NA	NA
Iron	300	NA	NA	NA	NA
Lead	25	NA	NA	NA	NA
Magnesium	35000	NA	NA	NA	NA
Manganese	3000	NA	NA	NA	NA
Sodium	20000	NA	NA	NA	NA
Thallium	0.5	NA	NA	NA	NA
VOCs					
Dichlorodifluoromethane	5	10. U	10. U	10. U	10. U
Vinyl Chloride	2	.8 J	1. J	1. J	1. J
Chloroethane	5	10. U	10. U	10. U	10. U
cis-1,2-Dichloroethene	5	1. J	2. J	2. J	10. U
1,2-Dichloroethane	0.6	10. U	10. U	10. U	10. U
Benzene	1	10. U	10. U	10. U	10. U
Xylene (Total)	5	10. U	10. U	10. U	10. U
SVOCs					
4-Methylphenol	1	NA	NA	NA	NA
4-chloro-3-Methylphenol	1	NA	NA	NA	NA
4-Nitrophenol	1	NA	NA	NA	NA

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-109S 10/12/2004 ug/L	MW-109S 3/8/2005 ug/L
Inorganics			
Arsenic	25	2.7 U	11
Barium	1000	215	273
Beryllium	3	.04 U	.39 B
Cadmium	5	.2 U	.29 U
Chromium	50	.94 U	14.4
Iron	300	**2520 ***	**18400 ***
Lead	25	2.6 B	8.6
Magnesium	35000	R	17100
Manganese	3000	239	400
Sodium	20000	R	8410
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NS	NS
4-chloro-3-Methylphenol	1	NS	NS
4-Nitrophenol	1	NS	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-101 10/14/2004 ug/l
Inorganics		
Arsenic	25	**46.1 ***
Barium	1000	669
Beryllium	3	.04 U
Cadmium	5	.2 U
Chromium	50	.94 U
Iron	300	**4910 ***
Lead	25	2.1 B
Magnesium	35000	R
Manganese	3000	983
Sodium	20000	R
Thallium	0.5	3.7 U
VOCs		
Dichlorodifluoromethane	5	10. U
Vinyl Chloride	2	10. U
Chloroethane	5	10. U
cis-1,2-Dichloroethene	5	10. U
1,2-Dichloroethane	0.6	10. U
Benzene	1	10. U
Xylene (Total)	5	10. U
SVOCs		
4-Methylphenol	1	NA
4-chloro-3-Methylphenol	1	NA
4-Nitrophenol	1	NA

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-108I 10/13/2004 ug/L	MW-108I 3/7/2005 ug/L
Inorganics			
Arsenic	25	4.2 B	3.9 B
Barium	1000	384	612
Beryllium	3	.21 B	.05 U
Cadmium	5	.2 U	.29 U
Chromium	50	12.4	2.7 B
Iron	300	**15300 ***	**1740 ***
Lead	25	7.8	.74 U
Magnesium	35000	R	18400
Manganese	3000	385	329
Sodium	20000	**R**	16100
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	10. U	10. U
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	10. U	NS
4-chloro-3-Methylphenol	1	10. U	NS
4-Nitrophenol	1	25. U	NS

Chemical Name	NYS Class GA Water Quality Standards and Guidance	MW-108S 10/13/2004 ug/L	MW-108S 3/7/2005 ug/L
Inorganics			
Arsenic	25	12.1	**28.2 ***
Barium	1000	**1230 ***	890
Beryllium	3	.13 B	.18 B
Cadmium	5	.2 U	.29 U
Chromium	50	8.3 B	**68.4 ***
Iron	300	**55100 ***	**82600 ***
Lead	25	9.3	5
Magnesium	35000	R	19200
Manganese	3000	**3150 ***	2890
Sodium	20000	R	9590
Thallium	0.5	3.7 U	4.5 U
VOCs			
Dichlorodifluoromethane	5	10. U	10. U
Vinyl Chloride	2	10. U	10. U
Chloroethane	5	10. U	10. U
cis-1,2-Dichloroethene	5	10. U	10. U
1,2-Dichloroethane	0.6	10. U	10. U
Benzene	1	.6 J	.7 J
Xylene (Total)	5	10. U	10. U
SVOCs			
4-Methylphenol	1	NA	NS
4-chloro-3-Methylphenol	1	NA	NS
4-Nitrophenol	1	NA	NS

NOTES

NC – NO CRITERIA

U – ANALYTE NOT DETECTED

B – VALUE IS GREATER THAN IDL BUT LESS THAN CRDL

* – CONCENTRATION EXCEEDS CRITERIA

J – ESTIMATED CONCENTRATION

R – ANALYTICAL RESULT REJECTED DURING VALIDATION

LEGEND

PROPERTY LINE

EDGE OF CREEK

ACCESS ROAD

TP-18 TEST PIT LOCATIONS

MW-105S MONITORING WELL LOCATIONS

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

GROUND WATER DETECTIONS GREATER THAN CRITERIA

0 80 160
SCALE IN FEET

FILE NO.10653.34241.019
MARCH 2005

O'BRIEN & GERE ENGINEERS, INC.

Appendix A

Test pit logs

Test Pit Log Summary Table

Test Pit ID	Total Depth (ft. bg)	Fill Depth (ft bg.)		Cover/Fill Description
Western Cell		Top	Bottom	
TP-01	3	2.5	~3	Cover material consists of approximately 2.5-ft of silty clay. Fill materials consist of metal debris, metal turnings, plastic, and wood. Water was encountered at approximately 2-ft below grade. Water in test pit did not exhibit odor or sheen.
TP-02	7	1.5	4	Cover material consists of approximately 1.5-ft of silty clay. Fill materials consist of metal turnings, plastic, pieces of clothing, and tires. Water encountered at about 3.5-ft below grade within the fill. Water without odor/sheen. Native soil at about 4-ft below grade consisting of medium gray stiff clay some silt.
TP-03	8	4	7	Cover material consists of approximately 4-ft of gravel and silty clay. Fill material consist of scrap metal, plastic, tires, aluminum cans, broken bottles. Native soil encountered approximately 7-ft below grade consisting of grayish dark soft clay with some silt. Water was not encountered.
TP-04	7	2	4	Cover material consists of approximately 2-ft of silty clay with gravel. Fill materials consist of scrap metals, plastic, bottles, tires, and crushed drum. Native soil encountered approximately 4-ft below grade consisting of medium gray stiff clay some silt. Water was not encountered.
TP-05	5	2	4	Cover material consists of approximately 2-ft of silty clay and gravel. Fill materials consist of scrap metals, plastics, bottles, cans, pieces of cables. Native soil was encountered approximately 4-ft below grade consisting of medium gray stiff clay some silt. Water was not encountered. Note: Limit of fill is further north and closer to a drainage swale than previously expected based on previous mapping.
TP-06	5	2	~5	Cover consists of approximately 2-ft of silty clay and gravel. Fill materials consists of scrap metals, plastics, bottles. Water was encountered approximately 3-ft below grade within the fill. Water in test pit did not exhibit odor or sheen.
TP-07	6	2	~6	Cover material consists of approximately 2-ft of silty clay and gravel. Fill materials consist of pieces of wood, plastic, and a crushed drum with some metal turnings inside. Water was encountered approximately 1-ft below grade. Note: Limit of fill was encountered further east than initially expected based on previous mapping.
TP-08	3	1.5	2	Cover material consists of approximately 1.5-ft of silty sand and gravel. Fill materials consist of scrap metals, bottles, cans, pieces of wood, and crushed drums. Native soil was encountered approximately 2-ft below grade consisting of dark gray clay some silt and organic matter. Water was not encountered. Note: Limit of fill was encountered approximately 350-ft further east than initially expected based on previous mapping.

Test Pit Log Summary Table

Test Pit ID	Total Depth (ft. bg)	Fill Depth (ft bg.)		Cover/Fill Description
Western Cell		**Top**	**Bottom**	
TP-09	4	2	3.5	Cover consists of approximately 2-ft of silt and fine sand with some gravel. Fill materials consist of household refuse, plastic, bottles, and tires. Native soil was encountered approximately 3.5-ft below grade consisting of brownish clay. Water was not encountered. Note: Limit of fill was encountered approximately 350-ft further east than initially expected based on previous mapping.
TP-10	4	2	3.5	Cover material consists of approximately 2-ft of silt and fine sand. Fill materials consist of household refuse, plastics, and bottles. Crushed drum found close to surface. Native soil was encountered approximately 3.5-ft below grade consisting of brownish clay and silt. Water was not encountered. Note: Limit of fill was encountered approximately 350-ft further east than initially expected based on previous mapping.
TP-11	5	1	<5	Cover consists of approximately 1-ft of silty clay with some gravel and cobbles. Fill materials consist of crushed drums, scrap metals, plastic, batteries, and stumps. Water encountered approximately 1-ft below grade.
TP-12	10	1.5	9	Cover material consists of approximately 1.5-ft of gravel and silty clay. Fill materials consist of scrap metals, plastics, cans, tires, and crushed drums. Native soil encountered approximately 9-ft below grade consisting of dark gray stiff clay with some silt. Water encountered at approximately 8.5-ft below grade
Test Pit ID	**Total Depth (ft. bg)**	**Fill Depth (ft bg.)**		**Cover/Fill Description**
Eastern Cell		**Top**	**Bottom**	
TP-13	4	1	3	Cover material consists of approximately 1-ft of gravel, silt, and sand. Fill materials consists of metal turnings, plastics, papers, toys, bottles, wood, pieces of hose. Native soil encountered approximately 3-ft below grade consisting of clay and silt. Water was not encountered.
TP-14	4	1	3.5	Cover material consists of approximately 1-ft of silt, sand, and some gravel. Fill materials consist of construction waste such as wires, hose, pipes, metal debris, and some wood. Native soil encountered approximately 3.5-ft below grade consisting of clay and silt. Water was not encountered.
TP-15	3	1	2.5	Cover material consists of approximately 1-ft of silt and fine sand with some gravel. Fill materials consist of crushed drums, car parts, parts of wheel barrel, bottles, plastics. Native soil encountered approximately 2.5-ft below grade consisting of dark gray clay and silt. Water was not encountered.
TP-16	2	1	<2	Cover material consists of approximately 1-ft of silt and fine sand. Fill materials consist of parts of refrigerators, bottles, plastics. Water encountered at approximately 1-ft below grade.

Test Pit Log Summary Table

Test Pit ID	Total Depth (ft. bg)	Fill Depth (ft bg.)		Cover/Fill Description
Eastern Cell		**Top**	**Bottom**	
TP-17	5	2	3	Cover material consists of approximately 2-ft of silt and fine sand with some gravel. Fill materials consist of tires, bottles, and plastic. Native soil encountered approximately 3-ft below grade consisting of clay and silt. Water was not encountered.
TP-18	2	0.5	1	Cover materials consist of approximately 0.5-ft of silt. Fill materials consist of brush, logs, and stumps. Native soil encountered approximately 1-ft below grade consisting of gray clayey silt. Water was not encountered.
TP-19	3.5	1	~1.5	Cover material consists of approximately 1-ft of silt and fine sand. Fill materials consist of brush, logs, and stumps. Native soil encountered approximately 1.5-ft below grade consisting of gray clay silt. Water was not encountered.
TP-20	2	surface	1	Fill material consists of brush, logs, and stumps. Native soil encountered approximately 1-ft below grade consisting of gray clay silt. Water was not encountered.
TP-21	5	surface	4	Fill material consists of brush, logs, and stumps. Native soil encountered approximately 4-ft below grade consisting of gray clay silt. Water was not encountered.
TP-22	3.5	2	~3	Cover material consists of approximately 2-ft of silt and fine sand some clay and gravel. Fill material consists of bottles, plastics, papers, cans, and plastic lids. Water encountered at approximately 2-ft below grade.
TP-23	4	0.5	1	Cover material consists of approximately 0.5-ft of silt and fine sand with some clay and gravel. Fill material consists of plastics, bottles, and cans. Native soil encountered approximately 1-ft below grade consisting of brownish clay silt.

O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

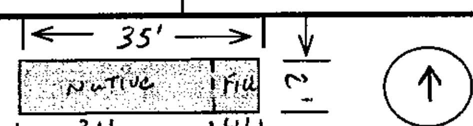
TEST PIT NO. TP-01

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1230 pm	DATE STARTED: 8/16/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1345 pm	DATE FINISHED: 8/16/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
0			Pale brown ( ), soft, moist, silty clay	
1	–	0.0	Some med. cs sand and gravel, roots.	Native
2	–	0.0	Dark brown ( ) soft, moist, silty clay at ~ 2.0' is grayish black fill material	Native 2.0' / 2.5'
3	–	0.0	Consisting of metal pipe, plastic, pieces of wood, roots. Water at ~ 2' bg. Water is turbid, but no odor, no sheen. End of pit at ~ 3' bg.	Fill

TEST PIT LOCATION AND NOTES:

- We found water at ~ 2' bg. Pit was ~ 3' deep. We stop there b/c water won't allow to find the bottom of fill.
- 200' from SW corner



TEST PIT PLAN

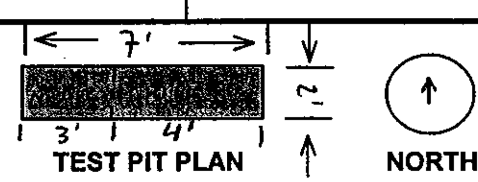
NORTH

O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-02
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 0800	DATE STARTED: 8/17/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 0835	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			Moderate brown ( ), moist, loose SILTY CLAY,	SILTY
1		0.0	Some med-cs gravel, fine sand.	CLAY
2			At ~1.5' is fill material 1.5	
			→ clothes, plastic, scrap metal, tires	
3		0.0		FILL
4			4'	
5		0.0	Medium gray (NT), saturated, stiff, clay,	CLAY
			some silt. water on top of clay	SILT
6		0.0		
7			End of pit ~7' bg 7'	
			well installed	

TEST PIT LOCATION AND NOTES:

- 100' from TP-01
- Temporary well installed from 7' bg. Screened from 7'-0' bg



TEST PIT PLAN

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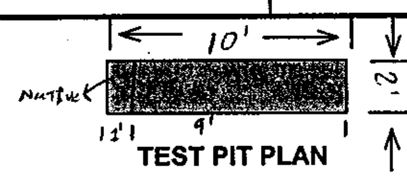
OBRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-3
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1430	DATE STARTED: 8/16/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1500	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			0	
1		0.0	Moderate brown ( ), dry, loose, med-cs gravel and silty clay.	Gravel + silt
2				
3				
4		0.0	4' Fill material-broken bottles, can, plastic, tires, scrap metal.	Fill
5				
6		0.0		
7		0.0	7' Grayish dark ( ), moist, soft, clay some silt.	clay - silt
8			End of pit at ~8'	

TEST PIT LOCATION AND NOTES:

~300' from TP-02



TEST PIT PLAN

NORTH

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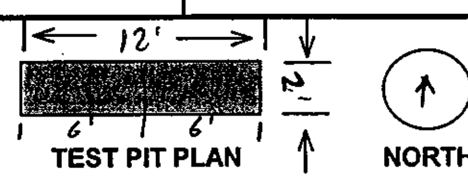
O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-04
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 0935	DATE STARTED: 8/17/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1025	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			Moderate brown ( ), dry, loose silty clay and med. cs gravel.	silty clay
1		0.0		
2			Fill material → scrap metal, drum, plastic bottles, tires 2'	
3	SS-1 Soil Sample			Fill
4		0.0	medium gray (N5) wet, stiff clay, some silt 4'	
5				clay
6		0.0		
7			End of pit at ~ 7' bg 7'	

TEST PIT LOCATION AND NOTES:

- 200' from TP-03 (near NW corner)
- Soil sample collected TP-04/SS-1

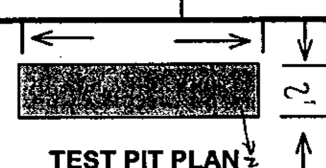


O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-05
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1130	DATE STARTED: 8/17/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1250	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
1		0.0	moderate brown (5YR 3/4), dry loose, silty clay and med-cs gravel, boulders	silty clay
			2'	
2			Fill material → clothes, scrap metal, plastic cans, bottles, pipes, cables	
3		0.0		Fill
			4'	
4				
		0.0	Medium gray (N5) ~~[illegible]~~, moist, stiff, clay some silt.	clay
5				
			5'	

TEST PIT LOCATION AND NOTES:

- From drainage swale
- hard to find the edge of fill, it is closer to the swale than it is shown on map.



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

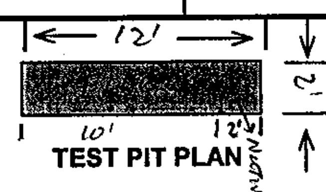
TEST PIT NO. TP-06

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1430	DATE STARTED: 8/17/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1515	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
1		0.0	Moderate brown (5YR 3/4) dry, loose, silty clay and med-cs Gravel, boulders. 2'	silty clay Gravel
2			Fill material → plastic, Scrap metals, bottles.	
3			3'	Fill
4		0.0	water comes out of the fill	
5			End of pit ~ 5' bg	Fill
		0.0	Well Installed from 5'-0' bg 5	

TEST PIT LOCATION AND NOTES:

- 100' east of TP-05
- well Installed from 5'-0' bg



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO. TP-07

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1520	DATE STARTED: 8/17/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1730	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
1		0.0	Moderate brown (5YR 3/4), dry, loose, silty clay and some Gravel, fine sand.	silty clay Fn sand
			2'	▽
2		0.0	Fill material → wood pieces, plastic, 55-gal drum crushed, some metals in it. → saturated	Fill
3	SS-2 drum			
4				
5				Fill
6		0.0	End of pit → 6' bgs water does not allow see bottom of fill. Soil sample → TP-07/SS-2 (drum)	

TEST PIT LOCATION AND NOTES:

TEST PIT PLAN

NORTH

O'BRIEN & GERE ENGINEERS, INC.

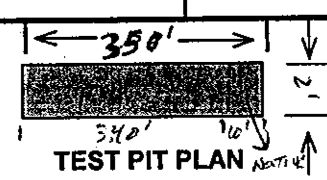
TEST PIT LOG

TEST PIT NO. TP-08

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT: ~~[illegible]~~ ~~[illegible]~~ 555C Backhoe Ford	GROUND WATER DEPTH:
OPERATOR: Ken Fuller — TIME STARTED: 0800	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz — TIME FINISHED: 0940	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			Moderate brown (5YR 3/4), moist, loose, fine Sand and SILT, some gravel.	Silty Sand Gravel
1		0.0	1.5'	
2			AT ~1.5' Fill material → Scrap metals, bottles, cans, wood, black 2'	Fill
3			Soil (org. matter),	clay
4		0.0	AT ~2' is dark gray clay, some SILT. This depth is consistent from the begining of pit (~100' from supossed contact) ~~[illegible]~~ to ~	
		[illegible]	100' so far. we keep going east trying find edge of fill.	
			We are at 280' east from edge of fill according to map. we still are finding fill.	
			8/19/04	
			we came back here to keep going further east.	
			we found edge of fill at ~ 350 east of supposed contact.	
			Soil sample collected from drum TP-08/SS-5	
			- photos - 11, 12, 13	

TEST PIT LOCATION AND NOTES:
- 150' South of TP-07
- Test pit not continuos. we we skipping terrain until find native soil
- Soil sample collected



TEST PIT PLAN

NORTH

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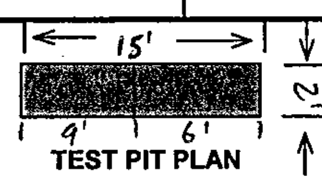
O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-9

PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1310	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1337	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W … E	
0				
1		0.0	Mod. brown, moist, silt and fn sand, some med - cs gravel.	
2				
3		0.0	Fill material - mixed w/soil domestic garbage, plastic, bottles, and 1 tire — silt + sand	▽
4		0.0	Brownish clay - unit saturated — clay	
			End of pit at 4'bg.	
			Photo → 171, 170, 169	

TEST PIT LOCATION AND NOTES:

~200' North from TP-10



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

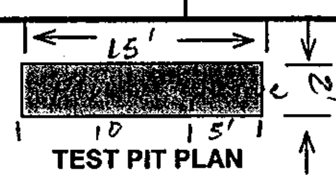
TEST PIT NO. TP-10

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1140	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1230	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W ... E	
0				
1		0.0	mod. brown, dry, loose Silt + Fn Sand ... drum ... Silt + Fn Sand	
2'				
3'		0.0	Fill material domestic garbage, bottles Plastic, ... clay-silt	
4'		0.0	Brown clay-silt unit	
			End of pit at 4' bg Soil sample collected.	

TEST PIT LOCATION AND NOTES:

- 100' W from concrete wall, then 200' North.
- Soil sample collected from surficial drum (TP-10/SS-4)



TEST PIT PLAN

NORTH

O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO. TP-11

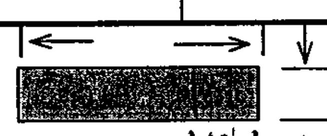
PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1015	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1115	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			N SILTY CLAY — S	SILTY CLAY
1		0.0	FIL MATERIAL — Mod. brown, moist, SILTY CLAY, some gravel + cobbles	1'
			Drums, stump, scrap metals, Battery — 1' grayish brown clay	
2	SS-3 drum		Drums (4) — some SILT	FILL
3		0.0	Saturated FILL	
4				5'
5		0.0		
			End of pit ~ 5'bg.	
6			Bottom of pit not found b/c water	
7				
8				

TEST PIT LOCATION AND NOTES:

- 100' east from TP-12
- soil sample collected from drum (1100)

TP-11/SS-3



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO. TP-12

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1540	DATE STARTED:
INSPECTOR: Yuri Veliz / TIME FINISHED: 1630	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
1		0.0	Moderate brown ( ), dry, loose, med-cs gravel and silty clay. 1.5'	Gravel silty clay
2			at ~ 1.5 begins fill material. → Scrap metal, bottles, cans, plastic,	
3			Tires, drums.	
4		0.0	Fill material	Fill
5				
6		0.0	Fill material	
7		0.0	Fill material	
8				
9		0.0	dark grayish ( ), wet, stiff, clay some silt. 9'	
10			Little water right at clay.	clay-silt
			End of pit at ~ 10' bg	

TEST PIT LOCATION AND NOTES:

~100' from SW corner

TEST PIT PLAN: 8' × 2'

NORTH

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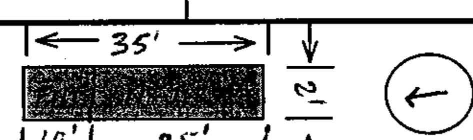
O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-13
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1230	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1311	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
		0.0	N. Gravel + silt / S Light brown, dry loose, Gravel and silt, some sand	Gravel - silt 1'
1			Fill material → plastic, paper, scrap metal, chain (toy), bottles wood, hose.	Fill material
2		0.0	3'	3'
3				clay 4'
4		0.0	clay - silt / End of pit ~ 4' bg	

TEST PIT LOCATION AND NOTES:

- 100' from concrete wall.



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO.	TP-14
PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1330	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1630	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
0		0.0	N — SILT and Sand — 1' / S — mod. brown, dry loose, SILT and Sand Some gravel. — 1'	SILT + Sand — 1'
1			Fill material → construction waste wires, wood, metal / Clay-SILT — 2'	FILL
2		0.0	?	3 FT
3			— 3.5' — Clay-SILT	Clay-SILT 4'
4		0.0	— 4' — ?	
			End of pit at ~4'	

TEST PIT LOCATION AND NOTES:

- ~100' from concrete wall
- Test pit was not continuos. we tried to find the edge trying not disturb whole area

TEST PIT PLAN: 60' (50' / 10') × 2'

NORTH ←

O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-15

PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1500	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1530	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W mod. brown, moist loose, SILT + Fn sand some gravel. — SILT + Fn sand — E	
0		0.0		
1			1'	
2		0.0	Fill material → drum, car parts wheel barrel, bottles, plastic 2.5' — 2' — clay-SILT	
3			clay-SILT Dark Gray 3' — 3'	
			End of pit ~3' bg	

TEST PIT LOCATION AND NOTES:

~160' North of TP-14

25'

10' 15'

2'

TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-16
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1540	DATE STARTED: 8/18/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1620	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W ... E	
0		0.0	Mod brown, dry, SILT + Fn Sand / SILT + Fn Sand	
1			FILL material / FILL material	
2		0.0	2'	
			End of pit at ~2' bg. We hit water right at fill material. We did not see the clay-silt unit.	
			We did not localized the edge of fill access is difficult.	
			A stake (TP-16) was put at the easternmost part of pit, but this is not the edge of fill	

TEST PIT LOCATION AND NOTES:
~13' of North from TP-15

TEST PIT PLAN: 30' × 2'

NORTH

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O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-17
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1630	DATE STARTED: 9/18/04
INSPECTOR: Yuri Veliz	TIME FINISHED:	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W ... E	
0			0'	
1		0.0	SILT + fn sand, some gravel	
2			2'	
		0.0	FILL MATERIAL Tires, bottles, plastic, SMW FILL	
3			3'	
			SILT + fn sand, some gravel	
4			4'	
		0.0	clay - SILT	
5				
			End of pit at ~5' bg.	

TEST PIT LOCATION AND NOTES:

~200' from TP-16

25'

2'

12' 13'

TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

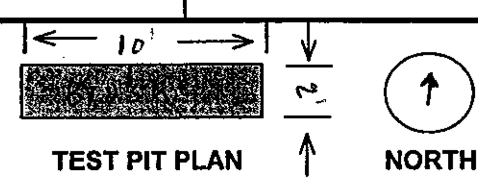
TEST PIT NO. TP-18

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of 1
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 0815	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 0830	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W ... E	
0			thin brown soil, moist	
			0.5'	
1		0.0	FILL MATERIAL → mainly brush (logs, stump) NO Garbage	
			2'	
2			Gray clay-silt unit, saturated.	
		0.0	2'	
			End of pit at 2' bgs	
			we found mainly brush, no garbage.	

TEST PIT LOCATION AND NOTES:

~200' North of TP-17



TEST PIT PLAN

NORTH

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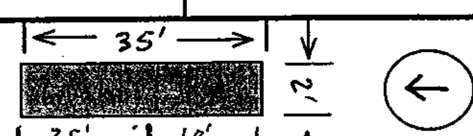
O'BRIEN & GERE ENGINEERS, INC.	**TEST PIT LOG**	**TEST PIT NO.** TP-19
PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 0845	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 0910	DATE FINISHED:

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			S ... N	
0		0.0	mod. brown, moist loose, SILT and fine sand ... SILT + Fn sand	
1			1'	
			Trace of Fill mat. MSW @1.25' > Brush material	
2		0.0	Brown silty sand saturated	
3			3' ... UNIT	
			3.5' ... clay-silt unit	
			End of pit at ~3.5' bg	
			access does not allow go further North.	

TEST PIT LOCATION AND NOTES:

- 270' North from shed.



TEST PIT PLAN

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O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-20

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 0910	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 0940	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
0		0.0	Topsoil mixed with brush material (logs, stumps) No garbage	
1			1'	
2		0.0	Clay - SILT unit 2'	
			End of pit at 2' bgs. Accessibility does not allow go further north.	

TEST PIT LOCATION AND NOTES:

- ~12' west from TP-19

TEST PIT PLAN

12'

2'

NORTH →

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO. TP-21

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1100	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1120	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
0 – 1		0.0	Dark brown Top Soil, some woods, gravel moist	
2 – 4		0.0	<u>Brush material</u> Logs, stumps, <u>no garbage</u> one piece of cement, plywood moist.	
5		0.0	clay-silt unit, moist.	
6			End of pit at ~6' bgs. further north and west access <u>is not possible</u>, Terrain drops sharply where swamp is present.	

TEST PIT LOCATION AND NOTES:

- 100' west from TP-20

TEST PIT PLAN

5'

2'

NORTH

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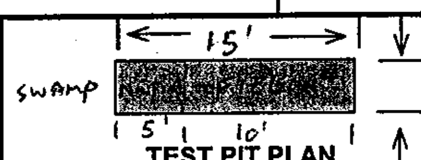
O'BRIEN & GERE ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-22

PROJECT: Town of Carroll Landfill		JOB NO.: 34241.001.002
CLIENT: NYSDEC		GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.		Page 1 of
EQUIPMENT:		GROUND WATER DEPTH:
OPERATOR:	TIME STARTED: 1030	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz	TIME FINISHED: 1045	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W — E	
0			moderate brown, wet, silt + fn sand, some clay, gravel.	
1				
2			Fill material - saturated domestic garbage, bottles, plastic paper, cans, lids	▽
3			clay - unit	
			End of pit at 3.5' bg.	
			We install a well from 3.5'-0' bg	

TEST PIT LOCATION AND NOTES:

- 200' west from shed
- Well installed here



TEST PIT PLAN

NORTH

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O'BRIEN & GERE ENGINEERS, INC.

TEST PIT LOG

TEST PIT NO. TP-23

PROJECT: Town of Carroll Landfill	JOB NO.: 34241.001.002
CLIENT: NYSDEC	GROUND ELEV.:
CONTRACTOR: SJB Drilling Co.	Page 1 of 1
EQUIPMENT:	GROUND WATER DEPTH:
OPERATOR: / TIME STARTED: 1120	DATE STARTED: 8/19/04
INSPECTOR: Yuri Veliz / TIME FINISHED: 1436	DATE FINISHED: 8/19/04

Depth Ft.	Sample #	PID (ppm)	GEOLOGIC DESCRIPTION	REMARKS
			W / E	
0				
		0.0	Mod. brown silt + fn sand med - cs gravel, some clay. / Fill material - plastic cans, glass, domestic	0.5'
1				1'
			clay-silt unit	
2				
		0.0		
3				
		0.0	Brownish clay-silt unit	
4				
			End of pit at 4'bg	
			Photos - 168, 167, 166, 165	

TEST PIT LOCATION AND NOTES:

-200' South of TP-22.

TEST PIT PLAN: 12' ; 8' ; 4'

NORTH

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Appendix B

Soil boring logs

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-102I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 3 Location: N 42°04'29.2" W79°08'45" Start Date: 9/3/04 End Date: 9/3/04
Boring Company: SJB Services Inc. Foreman: Dale Matthies OBG Geologist: Yuri Veliz		Screen / Riser; Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
0	1	2	3/5 6/7	2/1.5	11	olive gray (5Y 3/2), damp stiff, Fn sandy silt, some gravel, little clay Topsoil at top.	Topsoil Fn sandy silt		0.0	NA
2	2	4	7/4 7/7	2/1.0	11	same as above		4'	0.0	
4	3	6	3/4 5/5	2/1.8	9	olive gray (5Y 3/2), damp stiff, silty clay, some Fine sand. at 5.5' changes to med. gray (N5) silty clay to clay	silty clay	5.5'	0.0	
6	4	8	3/5 6/7	2/1.5	11	same as above up to 7' bg. Then is mod. brown (5Y 3/4), moist, dense, Fn sand and silt, some med-sand, little gravel	silty clay to clay	7'	0.0	
							Fn sandy silt	8'		
8	5	10	3/7 9/9	2/0.5	16	Poor recovery Cobbles	cobble area	10'	6.7	
10	6	12	9/8 10/11	2/1.0	18	mod. yellowish brown (10YR 5/4), wet, dense Fn-med sand, some silt and Gravel, little clay	Fn-med sand Gravel		0.0	
12	7	14	12/12 8/10	2/1.0	20	same as above			1.4	
14	8	16	13/11 14/25	2/1.5	25	same as above little cobbles.	Fn-med sand Gravel		0.0	
16	9	18	35/21 10/15	2/1.8	31	same as above. but sat. up to 17' bg. Then is moist, dense, cobbles and med sand and gravel little silt.	▽16' Cobbles + Gravel	Sat. 16'-17' 17'	0.0	↓

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-102I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 3 Location: Start Date: 9/3/04 End Date:
Boring Company: SJB Services Inc. Foreman: Dale Mathews OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
18	10	20	11/14 19/22	2/1.0	23	mod. brown (5YR 4/4), wet, dense, med-cs sand and cobble, some gravel little silt.	med-cs sand Gravel		0.0	NA
20	11	22	17/41 48/49	2/1.5	89	Same as above. wet to saturated some cobbles	▽ 22'	Sat. 22-26' 22'	0.6	
22	12	24	30 50/4	2/1.0	-	Light olive gray (5Y 3/2) saturated, very dense, cs sand and gravel some cobbles and silt, med sand. Auger to 24'	cs-sand Gravel		0.6	
24	13	26	28/38 50/.3	2/1.0	-	Same as above med-cs sand, Auger to 26'	med-cs sand Gravel	24'	1.7	
26	14	28	21/22 50/.4	2/1.0	82	same as above wet to sat. Auger to 28'			2.9	
28	15	30	24/34 40/10	2/1.0	74	Same as above. Trace cobbles. wet to sat	med-cs sand Gravel		2.5	
30	16	32	17/32 50/.4	2/1.0	82	Light olive gray (5Y 3/2), saturated, dense, med-cs sand, some gravel, trace silt. Auger to 32'	▽30' med-cs sand	30'	0.7	
32	17	34	21/30 26/30	2/1.0		Same as above. Some cs gravel and cobble	med-cs sand cobbles		0.4	
34	18	36	2/9 16/44	2/1.5	25	Light olive gray (5Y 3/2), saturated, dense, med. sand (well sorted), at ~35' is cs sand, trace cs gravel, cobble.	medium sand Coarse Sand	34' 35'	0.7	

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-102I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 3 of 3
Location:

Start Date: 9/3/04
End Date: 9/3/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathieo
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
36	19	38	50/-3	2/0.3	–	Poor recovery. Same as above. Auger to 38'	Coarse sand		2.9	NA
								38'		
38	20	40	14/14 30/36	2/1.0	44	Same as above. Increase gravel and cobbles to bottom	Coarse sand + gravel		2.9	
								40'		
40	21	42	11/4 17/44	2/1.5	21	Olive gray (5Y3/2), wet to saturated, dense, medium sand, little med. gravel.	medium sand		0.5	
42	22	44	12/14 50/-4	2/2	54	Same as above some gravel at bottom	medium sand + gravel		1.4	
						EOB → 45'bg		44'		

Well desing → screen 43'-33' ; sand - 43'-30' seal - 30'-27' ; grout - 27-0'bg

well located ~10' south of MW-102. (existing well)

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-103S
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 1 Location: Start Date: 9/13/04 End Date: 9/13/04
Boring Company: SJB Services Inc. Foreman: Dale Mathieo OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
0	1	2	1/1 1/1	2/0.5	2	Poor recovery. Topsoil - some wooden fragments	Topsoil	2'	0.0	NA
2	2	4	1/1 1/1	2/0	2	No Recovery	NR	4'	0.0	
4	3	6	5/6 6/8	2/1.8	12	Mod. yellowish brown (10YR 5/4), moist, stiff fn sandy SILT, some clay.	Fn Sandy SILT		0.0	
6	4	8	9/7 9/10	2/1.5	15	Light olive gray (5Y 5/2) wet to saturated, stiff fn sandy SILT, some clay	Fn Sandy SILT		0.0	
8	5	10	4/4 9/7	2/1.5	13	Same as above saturated	▽8' Fn Sandy SILT	Sat.	0.0	
10	6	12	4/6 7/7	2/1.5	13	Med. gray (N5), saturated, stiff, fn sandy SILT, some clay.		12'		
12	7	14	9/9 3/7	2/0	-	No Recovery	NR	14'	0.0	
14	8	16	1/2 2/3	2/1.5	4	Med. gray (N5), saturated, soft, silty clay little fn sand.	Silty clay	16'	0.0	
16	9	18	3/3 3/2	2/1.5	6	Med. gray (N5), saturated, soft, silty clay to clay. Little fn sand	Silty clay to clay	18'	0.0	
18	10	20	1/1 4/7	2/0	-	No Recovery	NR	20'		
						EOB - 20'bg. well set at 18'bg				

Well design - screen - 18'-8'; sand - 18'-6'; seal - 6'-4'; grout - 4'-0'

Well relocated. It is located ~ 100' South of original location, closer to TP-18.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-106S
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" split spoon Hammer: Automatic Fall: 30"	Page 1 of 1 Location: N 42° 04.[illegible]" / W 79° 08.[illegible]" Start Date: 9/1/04 End Date: 9/1/04
Boring Company: SJB Services Inc. Foreman: Dale Matthies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
0	1	2	2/1 2/3	2/0.5	3	Dusky brown (5YR 2/2), moist soft, fn sand and silt, little clay and gravel.	Fn sand + silt		0.0	NA
2	2	4	2/3 4/4	2/0.5	7	Same as above up to 3.5' then is pale yellowish brown (10YR 6/2), moist stiff, orange mottling silty clay.	Silty clay	3.5'	0.0	
4	3	6	3/4 4/5	2/1.0	8	Dark greenish gray (5GY 4/1), wet, stiff, fn sandy silt, some clay	Sandy silt	4'	0.0	
6	4	8	3/4 4/7	2/1.5	8	Same as above	Sandy silt		0.0	
8	5	10	5/4 4/6	2/1.8	8	Same as above but saturated	Sandy silt	8'	0.0	
10	6	12	5/5 6/4	2/1.0	11	Medium gray (N5), saturated, stiff, silty clay to clay, little fn sand.	Silty clay to clay	10'	0.0	
12	7	14	5/4 5/7	2/1.8	9	Medium gray (N5), saturated, stiff, silty clay, some fn sand.	Silty clay + fn sand	12'	0.0	
14	8	16	3/2 3/3	2/1.5	5	Same as above	Silty clay		0.0	
16	9	18	5/7 7/3	2/1.5	5	Same as above				
18	10	20	5/4 2/3	2/0.5	6	Medium gray (N5), saturated loose, fine sand, some silty clay, trace gravel	Fine sand	18'	0.0	
						EOB @ 20 bgs		20'		

Well design: screen - 20'-10'; sand - 20'-8' Seal - 8'-5'; grout - 5'-0'

Well located ~5' east from TP-08

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-107S
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 1 Location: N 42° 04.85"/W 79° 08' 10" Start Date: 9/1/04 End Date: 9/1/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
0	1	2	3/3 1/2	2/0.3	4	Poor recovery. Mod. brown (5YR 3/4), moist, loose, Fn-med sand, some SILT	Fn-med sand SILT	2'	0.0	NA
2	2	4	1/1 1/3	2/0.1	2	No recovery	No recovery	4'	-	
4	3	6	4/4 6/5	2/1.5	10	Dark greenish gray (5GY 4/1), moist, stiff, Fn sandy SILT, some clay	Sandy SILT		3.4	
6	4	8	8/6 7/10	2/1.8	13	Same as above up to 7' bg. then it is mod. yellowish brown (10YR 5/4) damp, stiff, Fn sandy SILT, some clay	Sandy SILT		0.0	
8	5	10	5/3 5/6	2/1.8	8	Dark greenish gray (5GY 4/1), wet, stiff, Fn sandy SILT, some clay	Sandy SILT		2.0	
10	6	12	4/4 5/6	2/1.8	9	Same as above but saturated up to 11' bg then is Med. gray (N5) saturated, stiff, silty clay to clay, some Fn sand	∇ 10'	11'	1.4	
12	7	14	5/4 3/4	2/1.9	7	Med. gray (N5), saturated stiff, silty clay to clay, little Fn sand	Silty clay to clay		1.4	
14	8	16	2/2 1/2	2/1.8	3	Same as above	Silty clay to clay		0.0	
16	9	18	6/7 9/12	2/1.6	16	Same as above. becomes sandy at bottom		18'	0.0	
18	10	20	5/3 4/6	2/1.0	7	medium gray (N5), sat. soft, fine to med. sand little silt and clay, trace gravel. EOB → 20' bg	Fn-med Sand	20'	0.0	

Well desing → screen - 20'-10' ; Sand - 20'-8'
seal → 8'-5' ; Grout - 5'-0'

{ well located ~ 50' east of TP-07

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-107I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 3 Location: N 42'04'35" W 79'08'10" Start Date: 9/2/04 End Date: 9/2/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
0	1	2	3/3 2/1	2/0.3	5	Poor recovery. Med. brown (5YR 3/4), moist, loose Fn-med sand, some silt Topsoil.	Fn-med sand silt		8.5	NA
2	2	4	3/2 1/1 3/2	2/0	4	No recovery	2' No recovery		-	
4	3	6	2/3 6/7	2/1.8	9	Dark greenish gray (5GY 4/1), damp, stiff, fn sandy SILT, some clay little gravel.	4' Sandy silt		6.1	
6	4	8	5/7 6/4	2/1.8	13	Same as above. damp to moist	Sandy silt		8.6	
8	5	10	4/5 5/6	2/1.8	10	Grayish olive (10Y 4/2), moist to wet, stiff, fn sandy SILT, some clay	Sandy silt		2.1	
10	6	12	3/5 5/5	2/1.8	10	Same as above up to 10.5 Then is med. gray (N5), wet to saturated, stiff silty clay to clay, some fn sand.	10.5' Silty clay		0.1	
12	7	14	3/4 4/5	2/1.8	9	med. gray (N5), saturated, stiff, silty clay to clay, some fn sand	▽ 12' Silty clay to clay		0.0	
14	8	16	1/2 5/7	2/1.0	7	Same as above up to 15.5' Then becomes sandier	15.5'		0.0	
16	9	18	3/7 5/7	2/1.0	12	moderate brown (N5), saturated, soft, fn-med sand and silt, some gravel, little clay	Fn-med sand Gravel		0.1	
18	10	20	1/2 2/3	2/0.8	4	Same as above. Trace cobbles.	Fn-med sand		0.7	

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-109I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 3 Location: Start Date: 9/2/04 End Date: 9/2/04
Boring Company: SJB Services Inc. Foreman: Dale Mathics OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
20	11	22	1/1 3/5	2/1.5	4	Same as above.	Fn-med Sand		0.0	NA
22	12	24	3/5 7/9	2/1.5	12	Light olive gray (5Y 3/2) saturated, dense, fn-med sand and gravel, some silt, little clay	Gravel	24'	0.0	
24	13	26	20 50/.3	2/1.0	-	Light olive gray (5Y 3/2) Damp, dense, fn sand and silt, some clay little gravel.	Fn Sand Silt		0.0	
26	14	28	50/.4	2/0.5	-	Poor recovery. Auger to 28' Light olive gray (5Y 3/2), moist, dense, med-sand and gravel (rock fragments) some fn sand and silt.	medium sand + Gravel	26'	0.9	
28	15	30	18 50/.4	2/0.5	-	Light olive gray (5Y 3/2), wet, dense, med-cs sand and gravel, little silt & clay auger to 30'	med-cs sand Gravel	28'	0.0	
30	16	32	47 50/.3	2/0.5	-	Same as above. Some cobbles. Auger to 32'	med-cs sand Gravel		0.4	
32	17	34	20 50/.4	2/1.0	-	Light olive gray (5Y 3/2), wet to saturated, dense, cs sand and Gravel, little silt, fn sand. Auger to 34'	cs sand + Gravel		0.0	
34	18	36	14 50/.3	2/0.5	-	Light olive gray (5Y 3/2), wet to sat., dense, cs sand and Gravel, some rock fragments (calcareous) cobble) auger to 36'	∇34' cs sand + Gravel	wet to sat.	0.0	
36	19	38	15 50/.3	2/0.5	-	Same as above. wet. auger to 38'	∇38'	38' saturated	2.0	

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-107I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 3 of 3 Location: Start Date: 9/2/04 End Date: 9/2/04
Boring Company: SJB Services Inc. Foreman: Dale Matthies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
38	20	40	24/29 50/.3	2/1.0	79	Light olive gray (5Y 3/2), saturated, dense, fn-med gravel and cs sand little silt, med. sand	Fn-med Gravel + cs sand		0.0	NA
40	21	42	32 50/.4	2/0.5	-	Same as above auger to 42'	Fn-med Gravel + cs sand		0.0	
42	22	44	20 50/.4	2/0.5	-	Same as above wet to saturated auger to 44'		44'	0.0	
44	23	46	50/.3	2/0	-	No recovery	No Recovery	46'	0.0	
						EOB → 46' bg				

Well design → screen 45'-35'; sand – 45'-33'; Seal – 33'-30'; Grout – 30'-0' bg.

Well located ~10' south of MW-107S

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG	REPORT OF BORING MW-108S

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Aut. hammer
Fall: 30"

Page 1 of 1
Location: N42°04'.32"/W79°08'.102"
Start Date: 8/31/04
End Date: 8/31/04

Boring Company: SJB Services Inc.
Foreman: Dale Matthies
OBG Geologist: Yuri Veliz

Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
						Boring through overburden to 20' bg utilizing hollow steam auger.				
						See soil description in MW-108I boring log.				

Well design - Screen - 20'-10' bg; Sand - 20'-18'
Seal - 18'-16'; Grout - 16'-0'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-108I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 3 Location: N42°04'.320/W79°08'.020" Start Date: 8/30/04 End Date: 8/31/04
Boring Company: SJB Services Inc. Foreman: Dale Matthies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
0	1	2	1/2 1/2	2/0.5	3	Grayish brown (5YR 5/2), damp, loose, silt and fn sand, trace gravel SILT	Fn sand + SILT	2'	0.0	NA
2	2	4	1/2 2/1	2/0.5	4	Grayish brown (5YR 3/2) damp, soft, silty clay trace sand	Silty clay	4'	0.0	
4	3	6	2/2 2/3	2/1.5	4	medium gray (N5), damp, soft, silty clay to clay, trace fn sand	Silty clay to clay	6'	0.0	
	4	8	4/3 3/5	2/2	6	medium gray (N5), saturated, stiff, fine sandy silt, some clay.	▽ 6' Sandy SILT		0.5	
8	5	10	3/4 4/7	2/1.5	8	Dark greenish gray (5GY 4/1), damp, stiff fn sandy SILT, some clay	Sandy SILT		0.9	
10	6	12	3/4 5/5	2/1.0	9	same as above up to 10.5 then medium light gray (N6), damp, stiff, fn sand and SILT	Sandy SILT		0.0	
12	7	14	4/6 6/7	2/1.5	12	same as above		14'		
14		16	6/8 7/11	2/1.0	13	Medium dark gray (N4) saturated, dense, fn-med sand and SILT some med fn gravel	▽ 14' Fn-med sand, SILT		0.0	

well located between test pits TP-10 and TP-9. About 10' east of SV-20 (soil gas sampling spot)

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-108I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 3 Location: Start Date: 8/30/04 End Date: 8/31/04
Boring Company: SJB Services Inc. Foreman: Dale Matthies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
16	9	18	4/9 9/5	2/1.5	18	Medium gray (N4), saturated, dense, fn. sand and SILT, some med-cs gravel.	Fn-med sand SILT		0.0	NA
18	10	20	14/10 9/14	2/1.0	19	Same as above. Increase gravel content.	Fn-med sand SILT		0.0	
8/31 20	11	22	21/21 33/14	2/1.0	54	Same as above. Moist Rock fragments (sandst.)	Fn-med sand SILT		0.0	
22	12	24	41- 50/.3	2/0.5	-	Poor recovery. Moist same as above, auger to 24'		24'	0.2	
24	13	26	31/37 50/.1	2/1.0	-	Medium gray (N4), moist dense, fine-med sand some SILT, med. gravel (increase sand content)	Fn-med sand		0.0	
26	14	28	50/22 22/38	2/1.5	52	Same as above up to ~27' bg then is med. gray (N6), moist, stiff, fine sand and SILT, trace clay	Fine sand SILT	27'	0.0	
28	15	30	9/14 17/24	2/1.0	31	Same as above		30'	0.0	
30	16	32	19/19 30/37	2/1.5	49	Med. gray (N6), moist, stiff, fine sand, some SILT, trace clay, med. sand.	Fine sand ~~Sand SILT~~		0.0	
32	17	34	38 50/.4	2/0.5	-	Poor recovery. Med. gray (N6), wet, stiff, fine sand some SILT. Trace clay. Thin fn sand and SILT layers ~~auger~~ auger to 34'	Fine ~~sand SILT~~ sand	34'	0.5	

NO?

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-108 I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY
File No.: 34241 002.001

Sampler: [illegible]
Hammer: [illegible]
Fall: [illegible]

Page 3 of 3
Location:
Start Date: 8/30/04
End Date: 8/31/04

Boring Company: SJB Services Inc.
Foreman: Dale Matthies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
34	18	36	17/27 31/41	2/1.0	58	Medium gray (N6), wet dense, medium sand some fn sand, silt, trace med. gravel. Thin fn sand + silt layers	med-sand	34'	0.0	NA
36	19	38	50/.4	2/1.0	-	Medium gray (N6), saturated, loose, medium sand, some cs sand, trace silt, gravel. Augered to 38'	▽36' med sand	36'	0.0	
38	20	40	11/17 19/24	2/1.5	36	Medium gray (N6), saturated, loose, med. to coarse sand some fine sand + silt layers, little fine-med gravel, trace silt.	med-cs sand med-cs sand		0.0	
40	21	42	20/14 32/50/.3	2/1.5	46	Same as above up to 40.5' then is med. gray (N6), saturated, dense, fn sand and silt, at ~41' bg is medium sand some fn sand and silt med-cs sand at bottom	Fn-sand silt medium sand med-cs sand	40.5' 41' 41.5'	0.0	
42	22	44	21- 50/.4	2/1.0	-	med. gray (N6), saturated, dense, med-cs sand, little silt, fn sand. at ~43.5' is rock fragments and sand, little gravel.	Sand + Rock Frag.	43.5' 44'	0.0	
44	23	46'	15/34 50/.4	2/2	84	Med gray (N6), sat, loose med-cs sand, some fine gravel trace silt.	med-cs sand + gravel	46'	0.0	

well design: Screen - 45'-35'; Sand - 45'-33' bg
Seal - 33'-30'; Grout - 30'-0' bg

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-109S
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2" Split Spoon Hammer: Automatic Fall: 30"	Page 1 of 1 Location: Start Date: 9/9/04 End Date: 9/9/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
						Boring through overburden utilizing 4 1/4" Hollow stem auger, to 20'bg				
						See soil description in MW-109D boring log.				

well desing: Screen - 20'-10'; Sand - 20'-8'
Seal - 8'-5'; Grout - 5'-0'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-109I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: 2' split spoon Hammer: Automatic Fall: 30"	Page 1 of 1 Location: Start Date: 9/9/04 End Date: 9/9/04
Boring Company: SJB Services Inc. Foreman: Dale Mathes OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
						Boring through overborden utilizing 4 1/4" HSA To 40' bg See soil description in MW-109D boring log				

well desing: screen-45-35'; Sand-45'-33'
Seal-33'-30'; Grout-30'-0'

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-109D

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" split spoon
Hammer: Automatic
Fall: 30"

Page 1 of 4
Location:
Start Date: 9/7/04
End Date: 9/8/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
0	1	2	2/2 4/7	2/1.5	6	Topsoil. Dusky brown (5YR 2/2), moist, soft Topsoil Then at ~1' bgs is mod. yellowish brown (10YR 5/4) damp, stiff, fn sandy SILT, little clay, trace gravel.	Topsoil / Fn Sandy SILT	1'	0.0 / 0.0	NA
			5/5 7/8		12					
2	2	4	5/6 7/8	2/1.5	13	Same as above	Fn sandy SILT			
4	3	6	5/5 6/6	2/1.5	11	Same as above up to 5.5' Then is light olive gray (5Y 5/2), moist, stiff, fn sand and silty clay		5.5'	0.0	
6	4	8	5/4 5/6	2/1.8	9	Same as above up to 7.25' Then is med. gray (N5), wet, stiff, silty clay and fn sand, trace gravel	Silty clay + Fn sand		0.0	
8	5	10	3/3 3/4	2/1.5	6	med. gray (N5), saturated stiff, silty clay and fn sand	▽8'	10'	0.0	
10	6	12	3/2 3/4	2/1.5	5	med. gray (N5), sat, stiff silty clay to clay, some fn sand.	Silty clay		0.0	
12	7	14	5/4 5/4	2/1.8	9	Same as above	Silty clay		0.0	
14	8	16	1/2 5/5	2/1.0	7	med. gray (N5), saturated stiff, silty clay to clay little fn sand	Silty clay to clay		0.0	
16		18	6/6 2/5	2/1.0	8	Same as above up to 17' Then is med. gray (N5), sat, dense, fn-med sand some silty clay, little gravel, trace cobble	Fn-med sand	17'		↓

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-109D
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 4 Location: Start Date: 9/7/04 End Date:
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
18	10	~~20~~	4/5 5/5	2/1.0	10	Same as above	Fn-med Sand		0.0	NA
20	11	22	7/7 9/7	2/0	16	No Recovery	No Recovery	20'	0.0	
22	12	24	4/6 10/11	2/0.8	16	Poor Recovery. Mod. yellowish brown (10YR 5/4), Saturated, Soft med-sand and gravel some fn sand.	med-Sand + Gravel	22'	0.0	
24	13	26	6/5 6/5	2/1.0	11	mod. yell-brown (10YR 5/4) Sat, dense, medium sand, little gravel	med. Sand	24'	0.0 0.0	
26	14	28	11/21 4/14	2/0.5		Poor Recovery Same as above	med. Sand		0.0	
28	15	30	18/14 18/29	2/1.5	32	mod. yellowish brown (10YR 5/4), Saturated, Medium dense, med-cs sand and gravel, little cobble	med-cs sand + Gravel	28'		
30	16	32	1/5 37/30	2/1.0	42	Same as above. Increase cobble content			0.0	
32	17	34	50/.4	2/0.4	–	Poor Recovery. Same as above. Spoon Refusal. Auger to 34'	med-cs Sand + Gravel		0.0	
34	18	36	4/7 11/15	2/1.8	18	Light olive gray (5Y 5/2) Sat. dense, med-cs sand and Gravel, little cobble	med-cs Sand + Gravel		0.0	
36	19	38	12/24 50/.4	2/1.5	74	Same as above Auger to 38'			0.0	

O'BRIEN & GERE ENGINEERS INC.

Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	**TEST BORING LOG** Sampler: Hammer: Fall:	**REPORT OF BORING** MW-109D Page 3 of 4 Location: Start Date: 9/7/04 End Date: 9/8/04
Boring Company: SJB Services Inc. Foreman: Dalo Mathics OBG Geologist: Yuri Veliz		Screen / Riser / Gr[illegible] / S[illegible]k / [illegible]

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change [illegible]	[illegible]lled	Testing PID (ppm)	UV
38	20	40	13/17 11/12	2/1.5	[illegible]	Same as above	[illegible] Sand + Gravel		0.0	NA
40	21	42	6/17 17/20	2/[illegible]		Same as above			0.0	
42	22	44	50/.4	2/1.5"		Same as above. Auger to 44'	Med-Cs Sand + Gravel		0.0	
44	23	46"	8/24 15/26	2/1.0		Same as above up to 45.5'. Then is medium sand, some Gravel.		45.5'	0.0	
46	24	48	12/25 10/11	2/	35	Same as above	Med. Sand		0.0	
48	25	50	5/9 6/14	2/1.5	15	Light olive gray (5Y5/2) Saturated, dense, med-Fn sand, some silt, little gravel	Fn-med sand	48'	0.0	
50	26	52	11/6 3/21	2/1.0	9	Same as above. Trace cobbles	Fn-med Sand		0.0	
52	27	54	8/10 14/19	2/1.0	24	Same as above Trace cobbles	Fn-med Sand		0.0	
54	29	56'	4/10 24/15	2/1.0	39	Same as above up to 55' bg. Then is light olive gray (5Y5/2), saturated, very dense, med Gravel and cs sand, little cobble, trace med sand.	Gravel + Cs Sand	55'	0.0	
[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	Gravel + Cs Sand			

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O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-109D
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 4 of 4 Location: Start Date: 9/7/04 End Date: 9/8/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
58	30	60	50/.4	2/0.4		Poor recovery Same as above Spoon refusal auger to 60'bg	Gravel + Cs Sand		0.0	NA
58	30	60	11/16 18/16	.4 2/1.0	32	Same as above auger to 61			0.0	
61	31	63	5/4 50/.4	2/1.0	59	Same as above auger to 62'		62'	0.0	
62	32	64	50/.4	2/0.4	—	light olive gray (5Y 4/2) Saturated, very dense Med-Cs sand, some gravel, little fn sand	Med-Cs Sand		0.0	
64	33	66	17/18 50/.4	2/1.0	68	auger to 64'			0.0	
66	34	68	50/.4	2/1.0	—	Same as above auger to 66' Same as above auger to 68'	Med-Cs Sand		0.0	
68	35	70	11/14 50/.4	2/1.0	64	Same as above				
						EOB - 75'bg Well set at 70'bg		70'		

well desing - screen - 70'-60'bg ; sand - 70'-55'
Seal - 55'-50' ; Grout - 50'-0'bg

{Well located ~300' NE of existing MW-13

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-110I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 3
Location:

Start Date: 9/10/04
End Date: 9/10/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
0	1	2	1/2 3/5	2/1.5	5	Mod. brown (5YR 5/4), moist, soft, sandy SILT some clay. Topsoil to 0.5' bg.	Topsoil / Fn Sandy SILT some clay		0.0	NA
2	2	4	5/4 5/6	2/1.0	9	Same as above		4'	0.0	
4	3	6	5/4 5/7	2/1.5	9	Light olive gray (5Y 5/2), moist, stiff, fn sandy SILT, little clay	Fn Sandy SILT		0.0	
6	4	8	4/6 7/7	2/1.8	13	Same as above up to ~7.75' then is mod. gray (N5), moist, stiff fn sandy SILT some clay	Fn Sandy SILT		0.0	
8	5	10	3/4 6/5	2/	10	Mod. gray (N5), wet, stiff fn sandy SILT, some clay at ~9.5' fn sandy silty and silty clay	Fn Sandy	9.5' / Sat. 10-23.5	0.0	
10	6	12	2/2 3/5	2/1.8	5	Mod. brown (N5), saturated, stiff, fn sandy SILT and silty clay	▽10' SILT + silty clay	12'	0.0	
12	7	14	9/9 11/17	2/1.0	22	Mod. brown (N5), saturated stiff, silty clay. At ~13' bg is fn sand and SILT some gravel, trace cobble	Silty clay	13'	0.0	
14	8	16	3/5 5/6	2/0.5	10	Mod. gray (N5), saturated loose, fn-med sand, some silt and gravel	Fn Sand SILT + Gravel	14'	0.0	
16	9	18	6/7 5/6	2/0.5	12	Same as above	Fn-med sand + gravel / Fn-med sand		0.0	

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-11DI
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 3 Location: Start Date: 9/10/04 End Date: 9/10/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	PID (ppm)	UV
18	10	20	5/4 4/5	2/1.5	8	med gray (NT), Saturated dense, medium sand, some SILT. at ~19' bgs is fn Sandy SILT, some clay	Medium Sand 19' Fn Sandy SILT		0.0 0.0	NA
20	11	22	1/2 6/7	2/1.0	9	Mod. gray (NT), Sat, STIFF fn Sandy SILT, some clay layers of med. sand.	SILT med sand Fn Sandy SILT		0.0	
22	12	24	7/5 9/12	2/1.0	14	Med. gray (NT), sat, STIFF fn Sandy SILT, some clay at ~23.9' becomes MOIST little clay	Fn Sandy SILT ▽ 24'	Sat. 24'-30'	0.0	
24	13	26	8/10 19/21	2/1.8	29	Med. gray (NT), wet to sat fn Sandy SILT, little clay	Fn Sandy SILT		0.0	
26	14	28	30/28 20/20	2/1.0	48	same as above. Saturated.	Fn Sandy SILT		0.0	
28	15	30	7/8 12/14	2/1.5	20	Same as above				
30	16	32	6/14 14/16	2/1.8	28	med. gray (NT), damp to MOIST, hard, fn sandy SILT, little to trace clay	Fn Sandy SILT ▽ 32'	Sat 32'-34'	0.0	
32	17	34	16/18 20/21	2/1.0	38	Same as above. Saturated	Fn Sandy SILT		0.0 0.0	
34	18	36	11/12 15/16	2/1.5	32	Same as above damp to MOIST	Fn Sandy SILT		0.0	
36	19	38	9/20 20/21	2/1.0	40	Same as above MOIST to WET	SILT			

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG	REPORT OF BORING
	MW-110I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 3 of 3
Location:

Start Date: 9/10/04
End Date: 9/10/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
38	20	40	9/14 17/19	2/1.0	31	Med. gray (NY), moist to wet, hard, fn sandy SILT, little clay. at ~38.25' there is a 1" layer of red clay	Fn Sandy SILT; red clay; 40'	Well to Sat 40'-46'	0.0	NA
40	21	42	15/21 21/23	2/1.8	42	Same as above. wet to sat.	Fn Sandy SILT		0.0	
42	22	44	19/29 50/.4	2/1.8	79	Same as above. wet to sat	Fn Sandy SILT	44'	0.0	
44	23	46	20/17 29/33	2/1.5	46	med. gray (NY), wet to sat dense fn-med sand, some silt, little gravel	Fn-med sand Gravel	46'		
						EOB → 46'				
						set well at 45' bg				

Well desing - Screen - 45'-35'; Sand - 45'-33'
Seal - 33'-30'; Grout 30'-0' bg

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-111I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 3
Location:

Start Date: 9/14/04
End Date: 9/14/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
0	1	2	1/1 3/5	2/1.0	4	Topsoil to ~0.5', the rest is med. brown (5YR 5/4) moist, stiff, silt, some fn sand, little clay	Topsoil / Silt	0.5'	0.0	NA
2	2	4	7/10 8/8	2/1.0	18	Same as above. Trace cs gravel.	Silt		0.0	
4	3	6	4/5 6/10	2/1.5	11	Same as above, at ~5.5' is fn sandy silt	Silt	5.5'	0.0	
6	4	8	8/7 8/10	2/1.5	15	Light olive gray (5Y 5/2) moist, stiff, fn sandy silt, some clay	Fn Sandy Silt		0.0	
8	5	10	3/3 3/4	2/1.5	6	med. gray (N5), saturated, stiff, fn sandy silt, some clay	▽ 8' Fn Sandy Silt	Sat.	0.0	
10	6	12	3/2 4/5	2/1.8	6	Same as above			0.0	
12	7	14	5/6 6/7	2/1.5	12	med. gray (N5), saturated, soft, silty clay to clay. then at ~13' is silty clay, some fn sand.	Silty clay to clay / Silty clay	12' / 13'		
14	8	16	2/3 3/4	2/1.5	6	med. gray (N5), saturated, stiff, silty clay, some fn sand			0.0	
16	9	18	4/11 6/7	2/1.5	10	Same as above. silty clay to clay some fn sand.	Silty Clay to Clay	16'	0.0	
18	10	20		2/1.0		Same as above silty clay	Silty clay	18' / 20'	0.0	NA

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-111I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 2 of 3 Location: Start Date: 9/14/04 End Date: 9/14/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser; Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV
20	11	22	1/2 2/4	2/1.8	4	Med. gray (NY), saturat. soft, silty clay, some fn sand.	Silty clay	22'	0.0	NA
22	12	24	-	2/1.5		Same as above silty clay to clay	Silty clay to clay	24'	0.0	
24	13	26	5/4 5/6	2/1.5	9	Same as above up to 25'. then is med. gray (NY), sat. dense, fn sand and silt, some med. sand and gravel	Silty clay / Fn sand Med. + Gravel	25'	0.0 0.0	
26	14	28	9/8 11/11	2/1.5	19	Med. gray (NY), saturat. dense, fn sand and silt some med. sand and gravel, little clay			0.0	
28	15	30	5/4 8/7	2/0.5	12	Light olive gray (5Y 5/2) saturated, dense, fn sand and silty, some gravel, med. sand, little clay, trace cs gravel	Fn sand Med. + Gravel / Fn-med sand gravel		0.0	
30	16	32	11/10 17/21	2/0.5	27	Same as above		32'	0.0	
32	17	34	19/21 50/.3	2/0.5	71	Light olive gray (5Y 5/2) sat. dense, cs gravel then fn-med sand little silt	Cs gravel / Fn-med sand	34'	0.0	
34	18	36	21/36 40/41	2/0.5	76	Light olive gray (5Y 5/2) sat, dense, cs sand and gravel, some med. sand, silt.	Cs sand + Gravel		0.0	
36	19	38	50/.2	2/0.5	–	Same as above auger to 38'				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING MW-111 I
Client: NYSDEC Remedial Investigation Feasibility Study Proj. Loc: Town of Carroll, Frewsburg, NY File No.: 34241 002.001	Sampler: Hammer: Fall:	Page 3 of 3 Location: Start Date: 9/14/04 End Date: 9/14/04
Boring Company: SJB Services Inc. Foreman: Dale Mathies OBG Geologist: Yuri Veliz		Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
38	20	40	5/6 14/17	2/1.5	20	olive gray ( ), sat. dense, medium sand. at ~39' is medium sand and gravel, little silt, some cs sand.	Medium sand	39'	0.0	ND
							med. sand + gravel	39'	0.0	
40	21	42	10/11 45/40	2/1.5	56	Same as above	med. sand + gravel		0.0	
42	22	44	50/.4	2/1.8	-	Same as above				
						EOB - 45'. well set at 45'bg		44'		

well desing - screen - 45'-35'; sand - 45'-33'
seal - 33'-30'; grout - 30'-0'

well located ~250' NW of TP-05

Appendix C

Ground water sampling logs

O'Brien & Gere Engineers, Inc.		Low Flow Ground Water Sampling Log			
Date	10/14/04	Personnel	YV/NT	Weather	Cloudy 50°F
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW-101
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 17.80 ft.

Depth to Water * 6.52 ft.

Length of Water Column 11.28 ft.

Time → 1445

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	±10 Oxidation Reduction Potential	Dissolved Oxygen ±10% (mg/l)	±10% Turbidity (NTU)	Flow Rate (ml/min).
0	6.72	13.18	7.41	0.593	-13.2	0.78	149	140
5	6.98	13.12	7.35	0.594	-13.1	0.61	103.80	100
10	6.98	13.12	7.30	0.592	-12.0	0.60	96.90	105
15	7.40	13.15	7.31	0.586	-12.3	0.67	81.30	105
20	7.10	13.15	7.31	0.583	-14.4	0.60	75.90	110
25	7.14	13.15	7.31	0.582	-16.3	0.53	51.30	105
30	7.16	13.17	7.32	0.583	-26.0	0.50	39.40	105
35	7.20	13.17	7.32	0.584	-29.5	0.53	42.10	105
40	7.24	13.17	7.33	0.588	-33.2	0.51	33.7	100

Water sample:

Time collected: 1530

Total volume of purged water removed: ~4 gall

Physical appearance at start

Color: clear

Odor: no

Sheen/Free Product: no

Physical appearance at sampling

Color: clear

Odor: no

Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date	10/11/04	Personnel	YV/RT	Weather	~~Cool~~ Sunny 70°F
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW-102S
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 18.40 ft.
Depth to Water * 10.76 ft.
Length of Water Column 7.64 ft.

* Measurements taken from
- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Time - 1630

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	±10% Turbidity (NTU)	Flow Rate (ml/min).
0	10.80	13.56	7.60	0.481	-97.00	1.73	35	250
5	10.84	13.41	7.59	0.481	-97.5	1.53	31.2	250
10	10.84	12.98	7.50	0.488	-88.7	1.40	10.22	220
15	10.84	12.89	7.46	0.498	-82.0	1.50	4.90	220
20	10.84	12.78	7.43	0.507	-71.3	1.73	2.92	220
25	10.84	12.42	7.43	0.511	-59.5	1.94	1.96	250
30	10.84	12.29	7.45	0.512	-54.4	2.08	1.47	250
35	10.84	12.22	7.45	0.512	-51.2	2.21	1.21	280
40	10.84	12.18	7.46	0.514	-47.8	2.29	0.97	280

Water sample:

Time collected: 1715

Total volume of purged water removed: ~4 gall

Physical appearance at start
- Color: Colorless
- Odor: Garbage
- Sheen/Free Product: ND

Physical appearance at sampling
- Color: Colorless
- Odor: Garbage
- Sheen/Free Product: ND

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL	vial	3	-	HCL	<2
1L	PE	2	-	HNO_3, NaOH	
1L	amber	3	-	-	

Notes: Blind dup. collected

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date	10/11/04	Personnel	YN/ST	Weather	Sunny 65°F
Site Name	Town of Carroll	Evacuation Method	Bladder pump	Well #	MW-102I
Site Location	Frewsburg	Sampling Method	Bladder pump	Project #	

Well Information:

Depth of Well * 40.06 ft. TOC

Depth to Water * 11.73 ft. TOC

Length of Water Column 29.33 ft.

Time - 245

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	Turbidity ±10% (NTU)	Flow Rate (ml/min).
0	11.82	14.34	7.61	0.442	-74.7	7.07	500	300
5	11.82	12.28	7.55	0.419	-127.2	3.48	420	300
10	11.78	11.94	7.60	0.414	-152.6	1.83	670	300
15	11.78	11.85	7.54	0.425	-144.4	1.08	>1,000	300
20	11.77	11.84	7.47	0.442	-115.8	0.70	>1,000	260
25	11.75	11.77	7.45	0.446	-99.9	0.58	>1,000	250
30	11.76	11.52	7.42	0.446	-83.6	0.45	581	320
35	11.76	11.42	7.43	0.445	-75.0	0.45	320	320
40	11.76	11.49	7.43	0.446	-74.1	0.44	310	310
45	11.76	11.65	7.45	0.446	-53.6	0.63	284	320
50	11.76	11.63	7.46	0.446	-39.5	0.84	191	320
55	11.76	11.63	7.50	0.448	-15.2	1.43	129	310
60	11.76	11.62	7.46	0.449	-11.5	1.48	100	310
65	11.76	11.63	7.46	0.449	-10.5	1.51	106.4	310

Water sample:

Time collected: 1550

Total volume of purged water removed: ~8 gall

Physical appearance at start

Color: brownish

Odor: Garbage

Sheen/Free Product: ND

Physical appearance at sampling

Color: Light gray

Odor: Garbage

Sheen/Free Product: ND

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	Vial	3	~~HCL~~	HCL	<2
1L	PE	2		HNO3, NAOH	

Notes:

O'Brien & Gere Engineers, Inc.		Low Flow Ground Water Sampling Log	
Date	10/12/04	Personnel	YV/RT
Weather	Sunny 60°F	Site Name	Town Carroll
Evacuation Method	Bladder	Well #	MW-103
Site Location	Frewsburg, NY	Sampling Method	Bladder
Project #			

Well Information:

Depth of Well * 34.24 ft.

Depth to Water * 6.23 ft.

Length of Water Column 28.01 ft.

Time 1740

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
1740 0	6.70	13.85	8.15	0.398	-66.2	3.13	68.7	280
5	6.94	12.83	8.00	0.298	-121.5	2.94	17.1	190
10	6.86	12.50	7.97	0.294	-129.8	2.60	9.80	150
15	6.86	12.23	7.97	0.294	-134.0	2.34	8.82	160
1600 20	6.88	12.03	7.98	0.292	-137.6	2.30	4.92	180
25	6.90	11.87	7.99	0.292	-136.7	2.10	12.4	200
30	6.80	11.76	8.00	0.291	-134.6	1.94	16.8	120
35	6.70	11.88	8.00	0.293	-135.9	1.78	16.3	140

Water sample:

Time collected: 1815

Total volume of purged water removed: 2.25 gal

Physical appearance at start

Color Clearish

Odor NO

Sheen/Free Product NO

Physical appearance at sampling

Color Clearish

Odor NO

Sheen/Free Product NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL VOA	VOA	3	NO	HCL	—
250mL	plastic	1	NO	NaOH	—
250mL	" "	1	NO	Sodium Hydroxide	—

Notes:

O'Brien & Gere Engineers, Inc. **Low Flow Ground Water Sampling Log**

Date	10/14/04	Personnel	YV/AT	Weather	cloudy 60°F
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW-104
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 21.56 ft.
Depth to Water * 5.46 ft.
Length of Water Column 16.10 ft.
Time → 11:00 AM

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% mS/cm² Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	±10% Turbidity (NTU)	Flow Rate (ml/min).
0	5.55	11.86	7.69	0.847	-94.6	1.50	473	125
5	6.20	11.77	7.60	0.874	-105.2	0.50	311	135
10	6.88	11.68	7.59	0.877	-110.7	0.25	259	100
15	7.40	11.69	7.59	0.877	-112.9	0.25	243	105
20	7.95	11.70	7.59	0.876	-114.3	0.20	189	100
25	8.47	11.71	7.59	0.873	-114.9	0.18	180	100
30	8.90	11.73	7.59	0.871	-115.7	0.17	146	105
35	9.34	11.71	7.60	0.869	-115.8	0.16	111	110
40	9.86	11.69	7.60	0.867	-114.8	0.19	93.8	110
45	9.96	11.70	7.60	0.867	-113.5	0.18	90.5	110

Water sample:

Time collected: 1140

Total volume of purged water removed: ~2 gall

Physical appearance at start
Color: Clear
Odor: NO
Sheen/Free Product: NO

Physical appearance at sampling
Color: Clear
Odor: NO
Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	vial	3	-	HCL	<2
1/2 L	PE	5	-	HNO₃, NaOH	

Notes: Water level dropping. Rate at 100ml: Iron Building up in bucket

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date	10/14/04	Personnel	YW/RT	Weather	cloudy 50°F
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW-105S
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 20.00 ft.

Depth to Water * 4.56 ft.

Length of Water Column 15.44 ft.

Time → 1235

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature 3%	pH 0.1	Conductivity 3%	Oxidation Reduction Potential 10	Dissolved Oxygen (mg/l) 10%	Turbidity (NTU) 10%	Flow Rate (ml/min).
0	~~?~~5.38	12.53	8.58	0.367	-18.9	1.48	>1,000	190
5	5.84	12.36	8.31	0.369	-47.6	0.42	>1,000	100
10	6.16	12.47	8.23	0.368	-58.3	0.36	>1,000	115
15	6.68	12.46	8.17	0.367	-63.1	0.31	>1,000	115
20	7.20	12.48	8.17	0.367	-64.1	0.34	>1,000	115
25	7.42	12.49	8.17	0.366	-64.3	0.34	>1,000	110
30	7.66	12.48	8.16	0.365	65.0	0.35	>1,000	110

Water sample:

Time collected: 1310

Total volume of purged water removed: ~2gall

Physical appearance at start		Physical appearance at sampling	
Color	Gray	Color	Gray
Odor	no	Odor	no
Sheen/Free Product	no	Sheen/Free Product	no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40-ml	vial	3	-	HCL	<2
1Lcc	PE	2	-	HNO3, NaOH	
1L	amber	3	-		

Notes: SVOCs, PCBs/Pest. collected / NOT able drop Turbidity

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date	10/14/04	Personnel	YV/RT	Weather	Overcast Lt. 20's 50's
Site Name	TOWN OF CATOL(I)	Evacuation Method	Bladder	Well #	106-S
Site Location	Flushing NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 5060 ft.
Depth to Water * 22.57 ft.
Length of Water Column 16.92 ft.
Time → 0855

* Measurements taken from
[X] Top of Well Casing
[ ] Top of Protective Casing
[ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	mS/cm Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.84	12.07	7.53	0.651	141.0	3.45	631	180
5	6.56	11.95	7.74	0.663	50.0	1.21	532	140
10	6.94	11.96	7.78	0.661	22.5	1.07	623	160
15	7.78	11.96	7.83	0.660	-15.9	0.64	594	105
20	8.18	12.01	7.86	0.658	-32.5	0.65	639	~~130~~ 115
25	8.52	12.02	7.87	0.656	-37.4	0.37	590	105
30	8.88	12.03	7.88	0.656	-41.0	0.39	503	105
35	9.28	11.99	7.89	0.654	-43.9	0.34	399	100
40	9.50	11.95	7.89	0.652	-45.0	0.32	399	110
45	9.51	11.98	7.88	0.651	-44.9	0.32	385	110

Water sample:

Time collected: 0945

Total volume of purged water removed: ~2 gall

Physical appearance at start		Physical appearance at sampling	
Color	gray	Color	gray
Odor	NO	Odor	NO
Sheen/Free Product	NO	Sheen/Free Product	NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	vial	3	–	HCL	<2
1/2L	PE	2	–	HNO_3 NaOH	

Notes:

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date	10/12/04	Personnel	YV / RT	Weather	Sunny 60°F
Site Name	Town Carroll	Evacuation Method	Bladder	Well #	107 S
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 22.39 ft.
Depth to Water * 4.81 ft.
Length of Water Column 17.58 ft.

* Measurements taken from

✓	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	mS/cm Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	4.48	14.94	7.24	1.187	53.0	3.66	579	200
5	5.76	ADJUSTING	PUMP	DTW	Falling	Quickly		
10	6.80	13.43	6.73	1.276	131.0	2.45	589	100
15	6.82	13.68	6.72	1.276	140.2	2.31	483	100
20	6.96	13.65	6.72	1.276	148.1	2.12	453	110
25	6.96	13.84	6.73	1.273	154.5	2.04	373	100
30	7.02	13.68	6.73	1.263	156.6	1.81	367	115
35	7.14	13.54	6.74	1.259	161.2	1.75	292	120
40	7.28	13.47	6.74	1.264	164.9	1.64	297	110

Water sample:

Time collected: 1655

Total volume of purged water removed: ~2 gall

Physical appearance at start
Color: Clearish
Odor: no
Sheen/Free Product: no

Physical appearance at sampling
Color: Clearish
Odor: no
Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: Water level Dropping Flow Rate @ 100 ML

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date	10/12/04	Personnel	RT / YV	Weather	60's partly sunny
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	1072
Site Location	Frewsburg	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 45.21 ft.

Depth to Water * 5.70 ft.

Length of Water Column 39.51 ft.

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

240

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.90	14.01	9.29	0.407	-214.5	4.26	215	370
5	6.00	11.84	8.98	0.392	-281.2	2.30	163	370
10	5.91	12.25	8.92	0.384	-395	1.17	138	160
15	5.91	12.66	8.94	0.384	-311.4	0.84	140	200
20	5.91	12.48	8.96	0.386	-312.3	0.61	150	210
25	5.92	12.26	8.71	0.370	-300.5	0.49	243	~~2~~ 230
30	5.91	12.24	8.27	0.360	-276.6	0.39	290	200
35	5.92	12.40	8.09	0.358	-251.0	0.32	287	200
40	5.92	12.40	8.00	0.357	-236.9	0.29	287	200
45	5.93	12.36	7.94	0.357	-224.4	0.24	273	200
50	5.92	12.27	7.88	0.355	-209.4	0.18	285	200
55	5.92	12.19	7.85	0.355	-209.4	0.18	278	200

Water sample:

Time collected: 1540

Total volume of purged water removed: 4 gal

Physical appearance at start — Color: clearish; Odor: no; Sheen/Free Product: no

Physical appearance at sampling — Color: clearish; Odor: no; Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.		Low Flow Ground Water Sampling Log	
Date	10/13/04	Personnel	RT/YV
Weather	Overcast	Site Name	Transport Caroll
Evacuation Method	Bladder	Well #	108S
Site Location	Frewsbury	Sampling Method	Bladder
Project #			

Well Information:

Depth of Well * 22.56 ft.

Depth to Water * 6.40 ft.

Length of Water Column 16.60 ft.

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	mS/cm Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	6.90	13.15	7.23	.987	-115.5	0.34	170	130
5	~~[illegible]~~ 7.90	13.11	7.22	.988	-117.5	0.21	120	100
10	8.40	13.09	7.22	.989	-117.7	0.13	124	100
15	8.73	13.05	7.22	.989	-117.4	0.11	118	105
20	9.36	12.97	7.21	.989	-117.1	0.10	141	100
25	9.90	12.87	7.21	.990	-117.0	0.08	186	100
30	10.32	12.76	7.20	.989	-117.0	0.07	228	100
35	10.70	12.71	7.20	.989	-116.9	0.06	257	100

Water sample:

Time collected: 1845

Total volume of purged water removed: ~3 gall

Physical appearance at start

Color: Clearish

Odor: garbage

Sheen/Free Product: N

Physical appearance at sampling

Color: Clearish

Odor: Garbage

Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: pump @ 100 ml/m water falling

O'Brien & Gere Engineers, Inc.			Low Flow Ground Water Sampling Log		
Date	10/13/04	Personnel	NW/RT	Weather	overcast 60's
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW/OBI
Site Location	Frewsburg NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 47.16 ft.

Depth to Water * 8.80 ft.

Length of Water Column 38.36 ft.

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

1615

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	9.28	13.25	8.14	0.583	-153.4	1.01	326	140
5	9.36	12.71	8.14	0.623	-183.9	0.72	367	105
10	9.28	12.98	8.17	0.637	-190.2	0.63	362	100
15	9.28	12.97	8.18	0.641	-191.7	0.62	362	100
20	9.28	13.15	8.19	0.645	-192.5	0.61	328	105
25	9.30	12.96	8.20	0.645	-192.5	0.56	344	110
30	9.40	12.22	8.24	0.650	-197.4	0.48	350	110
35	9.42	12.03	8.26	0.650	-199.7	0.46	315	120
40	9.42	11.99	8.28	0.650	-193.5	0.43	311	115
45	9.42	11.93	8.29	0.650	-194.9	0.42	291	115

Water sample:

Time collected: 5:15pm

Total volume of purged water removed: 3 gal w samples

Physical appearance at start

Color: Clear

Odor: garbage

Sheen/Free Product: no

Physical appearance at sampling

Color: Clear

Odor: garbage

Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: MS/MSD collected + SVOCs, PCBs/Pest

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date 10/13/04 Personnel YN/AT Weather Cloudy 55°F

Site Name Town of Lowell Evacuation Method Bladder Well # MW-110S

Site Location Frewsburg, NY Sampling Method Bladder Project #

Well Information:

Depth of Well * 22.53 ft.

Depth to Water * 5.31 ft.

Length of Water Column 17.22 ft.

Time → 1400

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.68	12.43	8.46	0.381	-63.7	1.43	>1,000	300
5	6.80	11.60	8.41	0.378	-78.8	0.31	>1,000	180
10	7.10	11.70	8.39	0.378	-79.1	0.22	>1,000	120
15	7.36	12.18	8.39	0.378	-75.9	0.27	>1,000	110
20	7.49	12.06	8.40	0.378	-74.6	0.28	>1,000	130
25	7.52	11.98	8.42	0.378	-73.3	0.28	>1,000	140
30	7.44	12.02	8.44	0.376	-65.7	0.26	>1,000	130

Water sample:

Time collected: 1440

Total volume of purged water removed: ~3 gall

Physical appearance at start

Color Gray

Odor NO

Sheen/Free Product NO

Physical appearance at sampling

Color Gray

Odor NO

Sheen/Free Product NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ML	VOA	3	NO	HCL	—
250 ML	Plastic	1	" "	NaOH	—
250 ML	" "	1	" "	Sa	—

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	10/13/04	Personnel	YU/RT	Weather	Cloudy 50°F
Site Name	Town of Carroll	Evacuation Method	Bladder	Well #	MW-111S
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 21.94 ft.

Depth to Water * 4.80 ft.

Length of Water Column ______ ft.

Time → 1025

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	±10 Oxidation Reduction Potential	±10% Dissolved Oxygen (mg/l)	±10% Turbidity (NTU)	Flow Rate (ml/min).	
0	5.80	11.94	7.94	0.587	-51.2	0.99	>1,000	150	
5	6.06	11.93	7.90	0.589	-53.4	0.63	>1,000	130	
10	6.16	11.69	7.88	0.588	-51.3	0.63	>1,000	100	
15	6.76	11.93	7.86	0.587	-42.9	0.66	>1,000	105	
20	7.20	12.03	7.86	0.595	-32.2	0.73	>1,000	50	pump is adjusted
25	7.40	12.25	7.85	0.583	-25.9	0.42	>1,000	100	
30	7.64	12.27	7.85	0.583	-20.0	0.88	>1,000	100	
35	8.08	12.31	7.85	0.583	-13.6	0.74	>1,000	140	Hard to keep 100
40	8.40	12.31	7.85	0.580	-10.00	0.98	1,042	130	
45	8.64	12.36	7.86	0.577	-5.5	1.00	1,029	120	

Water sample:

Time collected: 1115

Total volume of purged water removed: ~ 2 gall

Physical appearance at start

Color: Gray

Odor:

Sheen/Free Product:

Physical appearance at sampling

Color: Light Gray

Odor:

Sheen/Free Product:

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL	vial	3	-	HCL	<2
1/2 L	PE	2	-	HNO3, NaOH	

Notes: Water level dropping, Flow rate at 100 ML (minimum)

O'Brien & Gere Engineers, Inc. **Low Flow Ground Water Sampling Log**

Date	10/13/04	Personnel	YY/AT	Weather	Cloudy 55°F
Site Name	Town Carroll	Evacuation Method	Bladder	Well #	MW-110I
Site Location	Frewsburg NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 40.00 ft.
Depth to Water * 5.44 ft.
Length of Water Column 34.56 ft.
Time → 1240

* Measurements taken from
[X] Top of Well Casing
[ ] Top of Protective Casing
[ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.58	11.71	8.45	0.356	40.00	1.66	190	160
5	6.36	11.25	8.38	0.353	44.2	0.69	260	140
10	6.94	11.14	8.35	0.354	37.5	0.51	370	140
15	7.28	11.07	8.33	0.356	-23.8	0.29	>1,000	115
20	7.38	11.33	8.32	0.361	-80.3	0.35	>1,000	100
25	7.41	11.40	8.32	0.362	-100.3	0.25	>1,000	110
30	7.44	11.44	8.32	0.364	-113.1	0.30	>1,000	100
35	7.46	11.49	8.32	0.366	-118.3	0.24	>1,000	100
40	7.50	11.42	8.31	0.367	-121.6	0.22	>1,000	110
45	7.62	11.33	8.30	0.365	-127.6	0.24	>1,000	105
50	7.70	11.32	8.30	0.363	-134.1	0.20	>1,000	100

Water sample:

Time collected: 1335

Total volume of purged water removed: ~2.5 gall

Physical appearance at start
Color: Gray
Odor: ND
Sheen/Free Product: ND

Physical appearance at sampling
Color: Gray
Odor: ND
Sheen/Free Product: ND

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL	Vial	3	–	HCL	<2
1L	PE	2	–	HNO3, NaOH	

Notes: water level dropping. Flow rate at minimum → 100 mL

O'Brien & Gere Engineers, Inc. | **Low Flow Ground Water Sampling Log**

Date	10/13/04	Personnel	YV / RT	Weather	Cloudy 50s
Site Name	Town Carroll	Evacuation Method	Bladder	Well #	MW-111 I
Site Location	Frewsburg NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 48.05 ft.
Depth to Water * 5.60 ft.
Length of Water Column 42.45 ft.

* Measurements taken from
[X] Top of Well Casing
[ ] Top of Protective Casing
[ ] (Other, Specify)

Time → 0856

Water parameters:

Elapsed Time	Depth To Water	YSI Temperature	pH	YSI Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.69	9.87	9.71	0.368	-27.7	3.82	470	175
5	5.68	10.30	9.23	0.368	-87.9	1.52	>1,000	150
10	5.66	10.46	8.98	0.367	-132.9	0.87	>1,000	170
15	5.66	10.42	8.84	0.361	-176.6	0.50	>1,000	175
20	5.68	10.47	8.78	0.353	-201.5	0.41	>1,000	180
25	5.68	10.45	8.77	0.352	-209.2	0.38	>1,000	180
30	5.68	10.54	8.75	0.350	-220.1	0.30	>1,000	180
35	5.68	10.71	8.73	0.350	-225.6	0.29	>1,000	170
40	5.66	10.78	8.72	0.349	-228.8	0.25	980	180
45	5.66	10.79	8.70	0.350	-234.9	0.22	990	180
50	5.66	10.76	8.70	0.351	-244.0	0.22	930	180
55	5.66	10.79	8.69	0.350	-250.2	0.19	857	180

Water sample:

Time collected: 1000

Total volume of purged water removed: ~4 gall

Physical appearance at start
Color: Gray
Odor: NO
Sheen/Free Product: NO

Physical appearance at sampling
Color: Light Gray
Odor: NO
Sheen/Free Product: Sheen

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL	vial	3	HCL →		<2
1/2 L	PE	2	HNO3, NaOH →		

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date 10/12/04 | Personnel YV/RT | Weather cloudy 60°F

Site Name Town Carroll | Evacuation Method Bladder | Well # MW-109S

Site Location Frewsburg, NY | Sampling Method Blader | Project #

Well Information:

Depth of Well * 22.92 ft.

Depth to Water * 11.68 ft.

Length of Water Column 11.24 ft.

Time - 0850

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

	Elapsed Time	Depth To Water	°C Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
	0	12.14	8.22	7.57	0.402	122.0	4.71	21,000	120
	5	12.30	8.95	7.66	0.403	83.9	3.09	21,000	290
	10	12.34	9.75	7.72	0.401	67.1	2.34	21,000	390
	15	12.54	9.80	7.82	0.409	35.2	1.70	852	220
	20	12.54	9.84	7.87	0.404	7.5	1.29	852	220
10	25	12.70	9.58	7.90	0.407	-34.9	0.85	411	120
20	30	12.50	9.48	7.91	0.409	-49.4	0.70	286	140
25	35	12.42	9.45	7.92	0.410	-65.2	0.53	154	150
30	40	12.42	9.57	7.92	0.412	-74.0	0.44	94	140
	45	12.40	9.46	7.93	0.411	-77.4	0.45	83.7	140

Water sample:

Time collected: 0945

Total volume of purged water removed: ~3 gall

Physical appearance at start

Color Light Gray

Odor No

Sheen/Free Product No

Physical appearance at sampling

Color colorless

Odor No

Sheen/Free Product organic Sheen

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	vial	3		HCL	<2
1/2L	PE	2		HNO3, NaOH	

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	10/12/04	Personnel	YU/RT	Weather	Cloudy 55°F
Site Name	Town Landfill	Evacuation Method	Bladder	Well #	MW-107I
Site Location	Fulmsburg, NY	Sampling Method	Bladder	Project #	

Well Information:

Depth of Well * 43.77 ft.

Depth to Water * 11.34 ft.

Length of Water Column 32.43 ft.

Time 1015

* Measurements taken from

- X Top of Well Casing
- Top of Protective Casing
- (Other, Specify)

Water parameters:

	Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	Turbidity ±10% (NTU)	Flow Rate (ml/min).
1015	0	11.40	10.03	9.36	0.495	-34.9	2.64	66.2	180
20	5	11.40	10.25	8.62	0.553	-102.6	1.91	60.7	180
25	10	11.40	10.33	8.36	0.565	-130.3	1.46	71.4	180
30	15	11.40	10.38	8.30	0.567	-146.1	1.22	94.0	180
35	20	11.40	10.36	8.29	0.567	-153.6	1.09	133.0	180
40	25	11.40	10.67	8.29	0.569	-157.1	1.03	168.0	170
45	30	11.40	10.93	8.25	0.576	-153.4	0.98	304.0	170
50	35	11.40	11.03	8.18	0.586	-136.8	0.99	>1,000	180
55	40	11.38	10.62	8.11	0.596	-113.3	0.95	>1,000	180
1100	45	11.38	10.36	8.12	0.596	-94.2	0.93	>1,000	180
	50	11.38	10.96	8.11	0.598	-78.9	1.03	>1,000	160
	55	11.40	11.07	8.07	0.600	-57.0	1.00	>1,000	180
	60	11.40	11.10	8.05	0.601	-41.5	1.08	>1,000	180

Water sample:

Time collected: 1120

Total volume of purged water removed: ~4 gall

Physical appearance at start

- Color: Colorless
- Odor: Garbage
- Sheen/Free Product: NO

Physical appearance at sampling

- Color: Light brown
- Odor: Garbage
- Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40mL	Vial	3	—	HCL	<2
1/2 L	PE	2	—	HNO3, NaOH	

Notes: Turbidity did not go down after 1/2 hour of purging

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	10/12/04	Personnel	YU/RT	Weather	Cloudy 60°F
Site Name	Town Carroll	Evacuation Method	Bladder	Well #	MW-109D
Site Location	Frewsburg, NY	Sampling Method	Bladder	Project #	

Well information:

Depth of Well * 71.11 ft.
Depth to Water * 11.58 ft.
Length of Water Column 59.53 ft.
Time: 1150

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters:

	Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	±10% Turbidity (NTU)	Flow Rate (ml/min).
1150	0	12.38	12.68	8.46	0.413	-219.8	1.82	360	140
	5	11.35	12.33	8.41	0.417	-235.6	1.63	382	140
1200	10	11.34	12.27	8.39	0.420	-251.2	1.48	364	140
	15	11.38	12.26	8.38	0.419	-257.0	1.09	343	160
	20	11.36	12.12	8.36	.415	-270.8	0.90	313	150
	25	11.34	12.01	8.35	0.410	-276.9	0.54	280	160
	30	11.34	12.01	8.34	0.404	-277.2	0.51	250	160
	35	11.34	11.93	8.32	0.402	-279.8	0.52	246	150
1230	40	11.34	12.04	8.29	0.398	-274.0	0.47	222	160
	45	11.34	11.99	8.26	0.395	-274.5	0.52	215	140

Water sample:

Time collected: 1240

Total volume of purged water removed: ~4 gall

Physical appearance at start
Color: Gray
Odor: no
Sheen/Free Product: no

Physical appearance at sampling
Color: Gray
Odor: no
Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	Vial	3	-	HCL	<2
1/2 L	PE	2	-	HNO_3, NaOH	
1 L	Amber	3	-	-	

Notes: SVOCs, PCBs/PEST. Collected

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date: 10/14/04 | Personnel: YV/MT | Weather: cloudy 50°F

Site Name: Town Carroll | Evacuation Method: Bladder | Well #: MW-13

Site Location: Evansburg | Sampling Method: Bladder | Project #:

Well Information:

Depth of Well *: 70.00 ft.

Depth to Water *: 18.24 ft.

Length of Water Column: 51.76 ft.

Time → 1600

* Measurements taken from
- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters:

Elapsed Time	Depth To Water	±3% Temperature	0.1 pH	±3% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	Turbidity ±10% (NTU)	Flow Rate (ml/min).
0	18.26	12.53	7.74	0.586	33.4	0.51	77.4	90
5	18.28	12.40	7.69	0.636	39.5	0.51	73.0	110
10	18.28	12.09	7.67	0.729	44.2	0.40	91.6	110
15	18.30	11.80	7.67	0.779	48.1	0.21	91.6	110
20	18.30	11.72	7.66	0.791	52.2	0.22	73.6	110
25	18:30	11.66	7.67	0.797	56.9	0.23	47.3	110
30	18.30	11.59	7.67	0.796	59.4	0.15	33.9	110
35	18.30	11.60	7.67	0.798	61.9	0.18	29.4	100
40	18.30	11.62	7.67	0.799	63.1	0.14	27.4	110

Water sample:

Time collected: 1650

Total volume of purged water removed:

Physical appearance at start
- Color: clear
- Odor: NO
- Sheen/Free Product: NO

Physical appearance at sampling
- Color: clear
- Odor: NO
- Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. **Low Flow Ground Water Sampling Log**

Date	3/8/05	Personnel		Weather	Cold 20°F
Site Name	Town of Carroll	Evacuation Method		Well #	MW-102
Site Location	Frewsburg, NY	Sampling Method		Project #	

Well Information:

Depth of Well * 32.05 ft.
Depth to Water * 6.92 ft.
Length of Water Column 25.13 ft. × 0.16 = 4.07
3× = 12.21

* Measurements taken from
☐ Top of Well Casing
☐ Top of Protective Casing
☐ (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		5.70	8.12	0.896			3.8	
4		7.31	8.17	0.968			4.0	
8		7.31	8.17	0.988			4.90	
12		7.31	8.17	0.968			4.90	

Water sample:

Time collected: 1530

Total volume of purged water removed: ~13

Physical appearance at start
Color
Odor
Sheen/Free Product

Physical appear[redacted]nce at sampling
Color clear
Odor no
Sheen/Free Product no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date	3/9/25	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW-102 I
Site Location	Ruensburg	Sampling Method	Bladder Pump	Project #	

Well Information:

Depth of Well * 41.06 ft.
Depth to Water * 8.05 ft.
Length of Water Column 33.01 ft. x 0.16 = 5.28
x 3 = 15.84

* Measurements taken from

	Top of Well Casing
X	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Well Volume ~~Elapsed Time~~	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		6.02	8.19	0.657			30	
1		7.68	8.47	0.700			90	
2		7.42	8.47	0.814			113	
3		7.72	8.49	0.844			150	

Water sample:
Time collected: 1100
Total volume of purged water removed: 16 gall

Physical appearance at start
Color Colorless
Odor no
Sheen/Free Product no

Physical appearance at sampling
Color Turbid
Odor no
Sheen/Free Product no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/9/05	Personnel	CYV/RT	Weather	Snow 10°F
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW 103
Site Location	Evansburg	Sampling Method	Bladder Pump	Project #	

Well Information:

Depth of Well * 34.24 ft.

Depth to Water * 2.98 ft.

Length of Water Column 31.26 ft. × 0.16 = 5 gall × 3 = 15 gall

* Measurements taken from

- [ ] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		8.41	8.49	0.537			30	
1		8.04	8.52	0.516			42	
2		8.00	8.50	0.500			50	
3		8.97	8.69	0.522				

Water sample:

Time collected: 1150

Total volume of purged water removed: 15 gall

Physical appearance at start		Physical appearance at sampling	
Color	clear	Color	clear
Odor	no	Odor	no
Sheen/Free Product	no	Sheen/Free Product	no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/9/05	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW-104
Site Location	Pvrwsburg	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * 21.56 ft.

Depth to Water * 4.64 ft.

Length of Water Column 16.82 ft. x 0.16 = 2.69
x 3 = 9 Gall

* Measurements taken from

- [ ] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0		7.80	8.66	0.960			25	
1		7.04	8.6	0.938			34	
2		7.95	9.62	0.972			320	
3		DRY						

Water sample:

Time collected: 1600

Total volume of purged water removed: 6 gall (went dry)

Physical appearance at start
Color: Clear
Odor: NO
Sheen/Free Product: NO

Physical appearance at sampling
Color: Turbid
Odor: NO
Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.		**Low Flow Ground Water Sampling Log**			
Date	3/9/05	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW-105S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well Information:

Depth of Well * 20.00 ft.

Depth to Water * 3.80 ft.

Length of Water Column 16.20 ft. x 0.16 = 2.59

3x = 7.77

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column

Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute

Collect readings at every three minute intervals

Elapsed Time	Depth To Water	°C Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		4.54	8.51	0.382			250	
1		5.53	8.49	0.388			>1,000	
2		6.71	8.70	0.272			>1,000	
3		—	DRY	—				

Water sample:

Time collected: 1750

Total volume of purged water removed: 5 gall (went DRY)

Physical appearance at start

Color: clear

Odor: no

Sheen/Free Product: no

Physical appearance at sampling

Color: Turbid

Odor: no

Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date	3/10/05	Personnel	CYV/RT	Weather	
Site Name	Town of Carroll	Evacuation Method	Bladder Pump	Well #	MW-106S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well Information:

Depth of Well * 4.02 ft.

Depth to Water * 22.52 ft.

Length of Water Column 18.50 ft. x 0.16 = 2.96

3x = 8.88

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column

Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute

Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		4.51	8.30	0.605			25	
1		6.87	8.43	0.554			>1,000	
2		7.03	8.70	0.321			>1000	
3		—	DRY	—				

Water sample:

Time collected: 1000

Total volume of purged water removed: 5 gall (went DRY)

Physical appearance at start

Color: Clear

Odor: no

Sheen/Free Product: no

Physical appearance at sampling

Color: turbid

Odor: no

Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/9/05	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW-107S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well *	22.39	ft.
Depth to Water *	3.34	ft.
Length of Water Column	19.05	ft. x 0.16 = 3.05 x3 = 10 gall

* Measurements taken from

- [ ] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		4.10	8.89	1.223	[illegible]		28	
1		3.61	8.65	1.226			97	
2		3.61	4.65	1.226			240	
3		— DRY —						

Water sample:

Time collected: 1640

Total volume of purged water removed: 10 gall

Physical appearance at start

Color	clear
Odor	no
Sheen/Free Product	no

Physical appear[redacted]nce at sampling

Color	turbid
Odor	no
Sheen/Free Product	no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. **Low Flow Ground Water Sampling Log**

Date	3/9/05	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW-107I
Site Location	Frewsburg	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * 45.29 ft.

Depth to Water * 3.50 ft.

Length of Water Column 41.79 ft. x 0.16 = 6.67

3x = 20 Gall

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		3.60	9.50	1.212			30	
1		3.61	8.66	1.226			80	
2		3.61	8.65	1.226			297	
3								

Water sample:

Time collected: 1705

Total volume of purged water removed: 20 gall

Physical appearance at start

Color Clear

Odor no

Sheen/Free Product no

Physical appearance at sampling

Color Turbid

Odor no

Sheen/Free Product no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/7/05	Personnel	CYV/RT	Weather	P Sunny 40's–30's
Site Name	Town of Carrolle	Evacuation Method	Bladder Pump	Well #	MW-108S
Site Location	Jamestown NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * ________ ft.

Depth to Water * 5.25 ft.

Length of Water Column ________ ft.

* Measurements taken from

X	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	mS/cm Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	7.06	7.75	7.58	1.278	-41.4	7.81	140	100
5	7.15	7.75	7.58	1.284	-41.5	7.00	135	100
10	7.82	7.35	7.46	1.275	-40.9	7.62	145	100
15	8.09	7.24	7.38	1.275	-41.8	8.10	142	100
20	8.31	7.22	7.38	1.275	-42.7	8.34	145	100
25	8.53	7.21	7.33	1.272	-42.4	9.70	184	100
30	9.18	7.22	7.26	1.267	-44.3	4.27	242	100
35	9.61	7.30	7.24	1.266	-44.2	0.78	232	100
40	9.72	7.31	7.23	1.266	-44.0	0.56	247	100
45	9.85	7.18	7.19	1.266	-43.2	0.00	244	100

Water sample:

Time collected: 1300

Total volume of purged water removed: ~ 4.5 gall

Physical appearance at start
- Color: Clear
- Odor: No
- Sheen/Free Product: No

Physical appearance at sampling
- Color: Turbid
- Odor: No
- Sheen/Free Product: No

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date: 3/7/05
Site Name:
Site Location:

Personnel: CYV/RT
Evacuation Method: Bladder Pump
Sampling Method: Bladder Pump

Weather:
Well #: MW-106 I
Project #:

Well information:

Depth of Well * ______ ft.
Depth to Water * 6.28 ft.
Length of Water Column ______ ft.

* Measurements taken from

- [ ] Top of Well Casing
- [X] Top of Protective Casing
- [ ] (Other, Specify)

Time → 1710

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	°C ±10% Temperature	±0.1 pH	±10% Conductivity	Oxidation Reduction Potential ±10	Dissolved Oxygen ±10% (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	6.72	8.08	7.81	0.857	-29.0	3.00	54.2	-
5	6.85	8.25	7.72	0.924	-20.5	1.01	31.5	170
10	6.86	8.28	7.71	0.943	-32.6	0.57	24	170
15	6.86	8.30	7.73	0.945	-40.6	0.41	24.2	170
20	6.87	8.29	7.72	0.949	-47.5	0.30	18.5	170
25	6.85	8.29	7.74	0.950	-51.6	0.29	19.3	170
30	6.86	8.29	7.75	0.951	-54.2	0.27	18.0	170

Water sample:

Time collected: 1745

Total volume of purged water removed: ~2 gall

Physical appearance at start
Color: Clear
Odor: ND
Sheen/Free Product: ND

Physical appear[redacted]nce at sampling
Color: Turbid
Odor: ND
Sheen/Free Product: ND

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date	3/8/05	Personnel	CYV/RT	Weather	
Site Name	Town of Carroll	Evacuation Method	Bladder Pump	Well #	MW-109S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well Information:

Depth of Well * 20.00 ft.
Depth to Water * 7.72 ft.
Length of Water Column 12.28 ft. x0.16 = 1.96
3x = 5.86

* Measurements taken from

	Top of Well Casing
X	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		7.8	8.2	0.540			36	
1		8.1	8.5	0.570			45	
2		8.1	8.3	0.600			80	
3		8.0	8.0	0.550			120	

Water sample:
Time collected:
Physical appearance at start
Color: Clear
Odor: no
Sheen/Free Product: no

Total volume of purged water removed: 6 gall
Physical appearance at sampling
Color: Turbid
Odor: no
Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/8/05	Personnel	CYV/RT	Weather	Cold Snow Tdons
Site Name	Town of Carroll	Evacuation Method	Bladder Pump	Well #	MW-109D
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * ________ ft.

Depth to Water * 7.75 ft.

Length of Water Column ________ ft.

* Measurements taken from

	Top of Well Casing
X	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column

Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute

Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	7.89	7.71	8.97	0.682	182.4	0.96	E3	300
5	7.89	7.71	8.93	0.696	186.0	5.34	E3	300
10	7.90	7.67	8.86	0.716	191.6	5.39	E3	300
15	7.90	7.71	8.82	0.726	195.0	5.36	E3	300
20	7.90	7.71	8.79	0.733	192.1	5.39	E3	300
25	7.90	7.69	8.74	0.727	200.1	5.30	E3	325

Water sample:

Time collected: 1200

Total volume of purged water removed: 4 gall

Physical appearance at start

Color: Clear

Odor: NO

Sheen/Free Product: NO

12:00 PM

Physical appearance at sampling

Color: Turbid

Odor: NO

Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: Everything is freezing!!

MS/MSDS

O'Brien & Gere Engineers, Inc.		Low Flow Ground Water Sampling Log	
Date	3/8/05	Personnel	CYV/RT
Site Name	Town of Carroll	Evacuation Method	Bladder Pump
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump
Weather		Well #	MW-109I
Project #			

Well Information:

Depth of Well * ______ ft.

Depth to Water * 7.69 ft.

Length of Water Column ______ ft.

* Measurements taken from

	Top of Well Casing
X	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	7.80	2.19	5.89	0.002	122.5	1.16	-	475
5	7.80	2.21	6.94	0.002	122.0	1.21	79.9	475
10	7.80	2.02	6.00	0.002	120.0	1.32	>1,000	475
15	7.82	6.75	6.07	0.001	127.6	1.46	>1,000	300
20	7.82	9.40	6.07	0.001	98.7	1.48	>1,000	300
25	7.82	10.67	6.92	0.001	91.9	1.49	>1,000	300
30	7.85	2.70	8.16	0.558	76.6	3.20	>1,000	250
35	7.85	6.69	8.05	0.578	65.4	0.08	>1,000	350
40	7.85	7.58	8.25	0.576	50.8	0.06	>1,000	350
45	7.85	7.61	8.30	0.576	49.8	0.04	>1,000	350
50	7.85	7.60	8.32	0.576	49.0	0.03	>1,000	350

Water sample:

Time collected: 1130

Total volume of purged water removed: ~4 gall

Physical appearance at start
- Color: Turbid
- Odor: no
- Sheen/Free Product: no

Physical appearance at sampling
- Color: Turbid
- Odor: no
- Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: Blind dup. collected

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date: 3/01/05 Personnel: CYV/RT Weather: Slow 20's

Site Name: FBL Evacuation Method: ~~Bladder Pump~~ Bailer Well #: 110I

Site Location: Sampling Method: ~~Bladder Pump~~ Project #:

Well information:

Depth of Well *: 44.00 ft.

Depth to Water *: 2.89 ft.

Length of Water Column: 41.11 ft.

6.58X3 = 19.74

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column

Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute

Collect readings at every three minute intervals

well vol

~~Elapsed Time~~	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0		3.21	8.53	[illegible]			20	
1		7.58	8.62	0.445			50	
2		7.65	9.12	0.420			350	
3		[illegible]	9.23	[illegible]				

Water sample:

Time collected: 1502

Total volume of purged water removed: 20 gall

Physical appearance at start

Color: clear

Odor: no

Sheen/Free Product: NO

Physical appear[redacted]nce at sampling

Color: Turbid

Odor: no

Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

41.11
.16

6.58

O'Brien & Gere Engineers, Inc. — **Low Flow Ground Water Sampling Log**

Date	3/9/05	Personnel	CYV/RT	Weather	Snow 20°F
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	110S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * 20.50 ft.

Depth to Water * 3.18 ft.

Length of Water Column 17.32 ft. × 0.16 = 2.77
×3 = 8.31

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		2.48	9.01	0.492			11	
1		5.83	9.98	0.481			>1,000	
2		6.37	9.03	0.479			>1,000	
3		7.18	9.14	0.449			>1,000	

Water sample:

Time collected: 1528

Total volume of purged water removed: 9 gall

Physical appearance at start
Color: Clear
Odor: NO
Sheen/Free Product: NO

Physical appearance at sampling
Color: Turbid
Odor: NO
Sheen/Free Product: NO

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/9/05	Personnel	CYV/RT	Weather	
Site Name	Town Carroll	Evacuation Method	Bladder Pump	Well #	MW 111S
Site Location	Frewsburg, NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * 21.94 ft.

Depth to Water * 3.13 ft.

Length of Water Column 18.81 ft. × 0.16 = 3.01 × 3 = 9

* Measurements taken from

- [X] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column

Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute

Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		3.49	8.90	0.712			30	
1		7.25	8.51	0.690			26000	
2		7.6	8.41	0.673			26000	
3		8.34	8.36	0.312				

Water sample:

Time collected: 1350

Total volume of purged water removed: 10 gall

Physical appearance at start

Color: Colorless

Odor: no

Sheen/Free Product: no

Physical appearance at sampling

Color: Turbid

Odor: no

Sheen/Free Product: no

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: only VOCs

O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3/9/05	Personnel	CYV/RT	Weather	Cloudy 10°F
Site Name	Town Lance	Evacuation Method	Bladder Pump	Well #	MW-111
Site Location	Frewsburg NY	Sampling Method	Bladder Pump	Project #	

Well information:

Depth of Well * 44.00 ft.

Depth to Water * 3.40 ft.

Length of Water Column 40.60 ft. x 0.16 = 6.5

3x = 19.5

* Measurements taken from

	Top of Well Casing
X	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
Initial		3.31	9.64	0.454			35	
1		7.16	9.72	0.234			2500	
2		8.12	9.63	0.460			2500	
3		7.23	9.46	0.470			337	

Water sample:

Time collected: 1330

Total volume of purged water removed: 20 gall

Physical appearance at start

Color: colorless

Odor: no

Sheen/Free Product: no

Physical appearance at sampling

Color: turbid

Odor: no

Sheen/Free Product: no

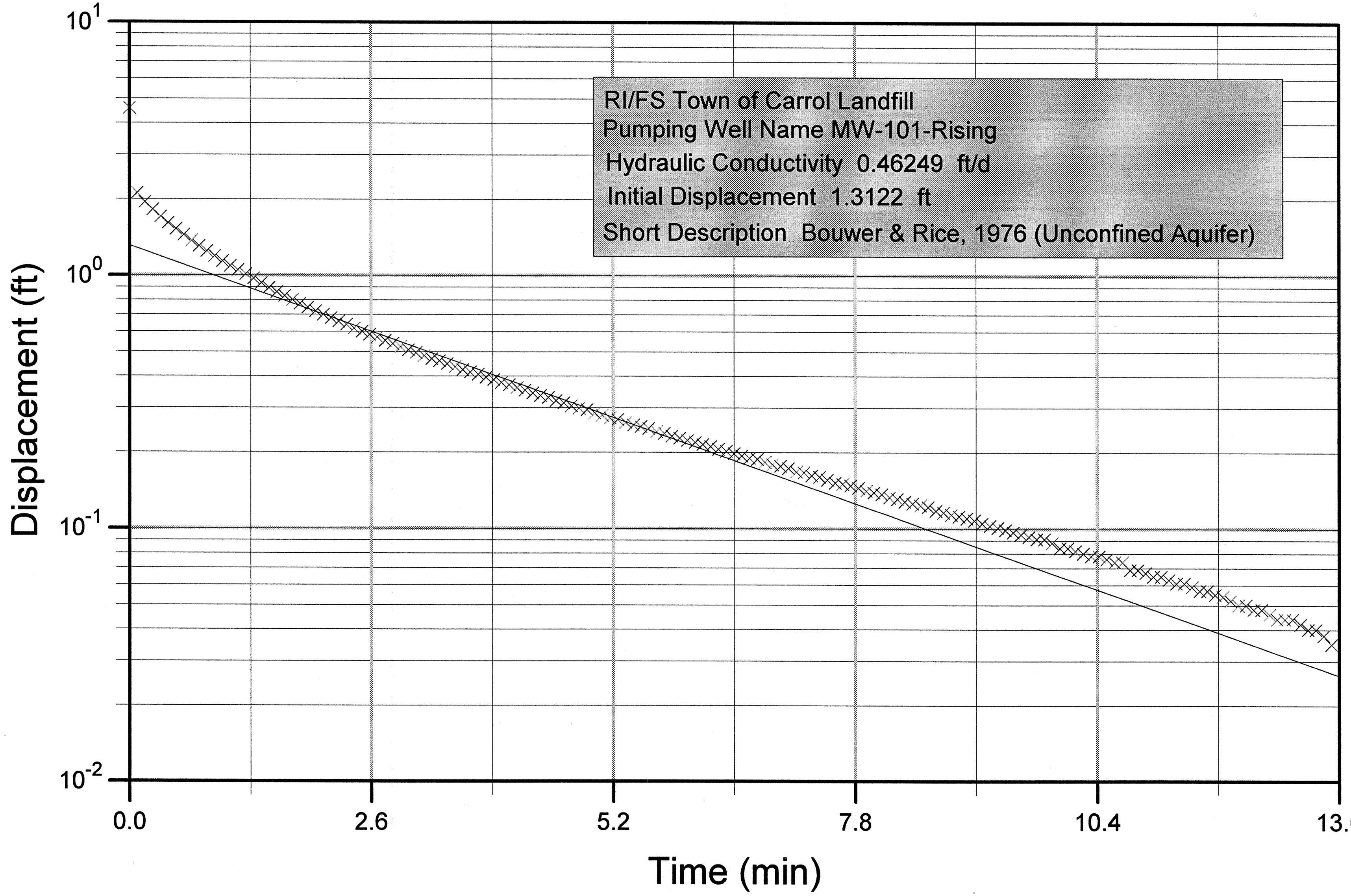
Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes: only Vols

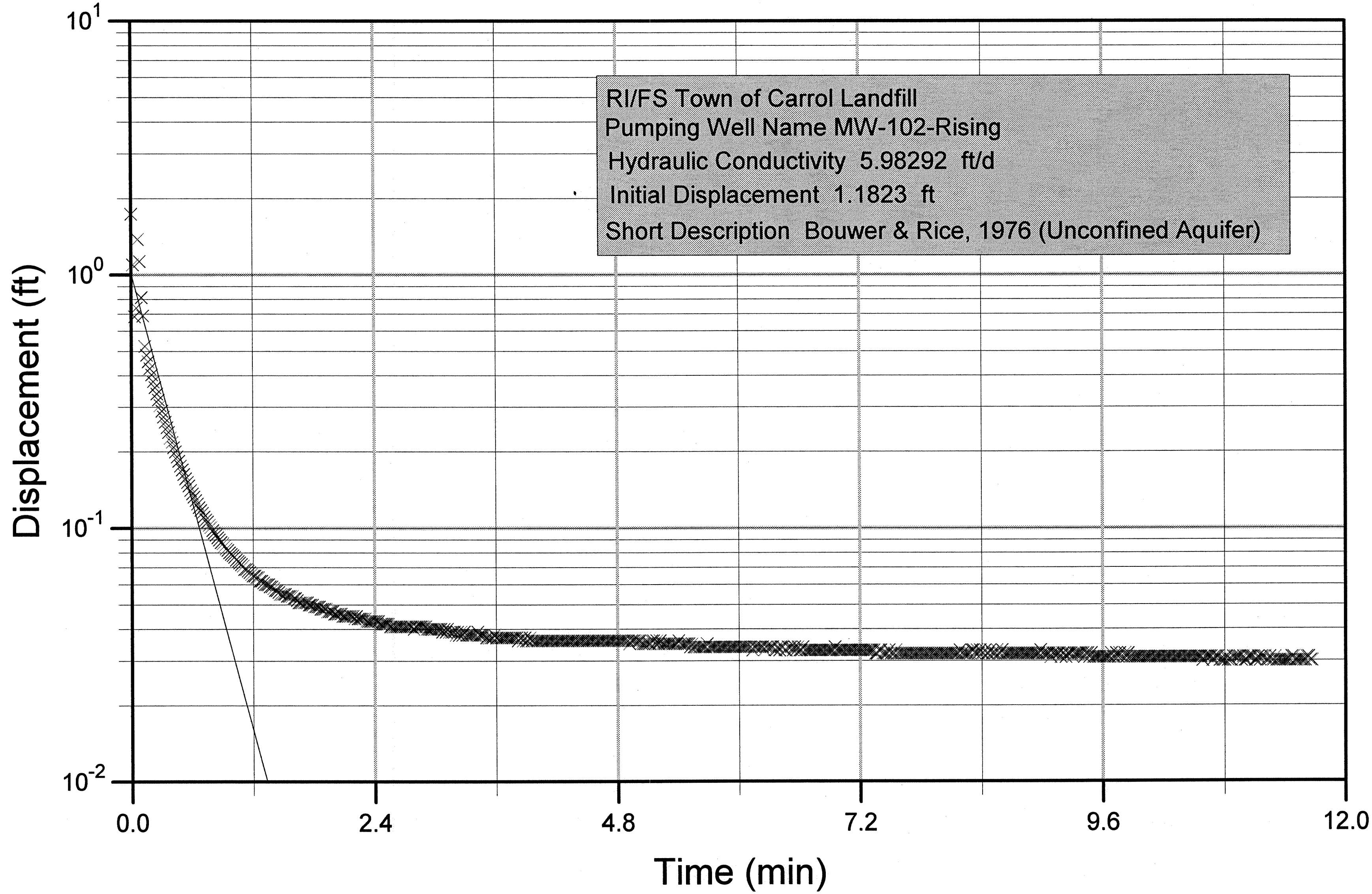
Hydraulic conductivity test data

Bouwer & Rice



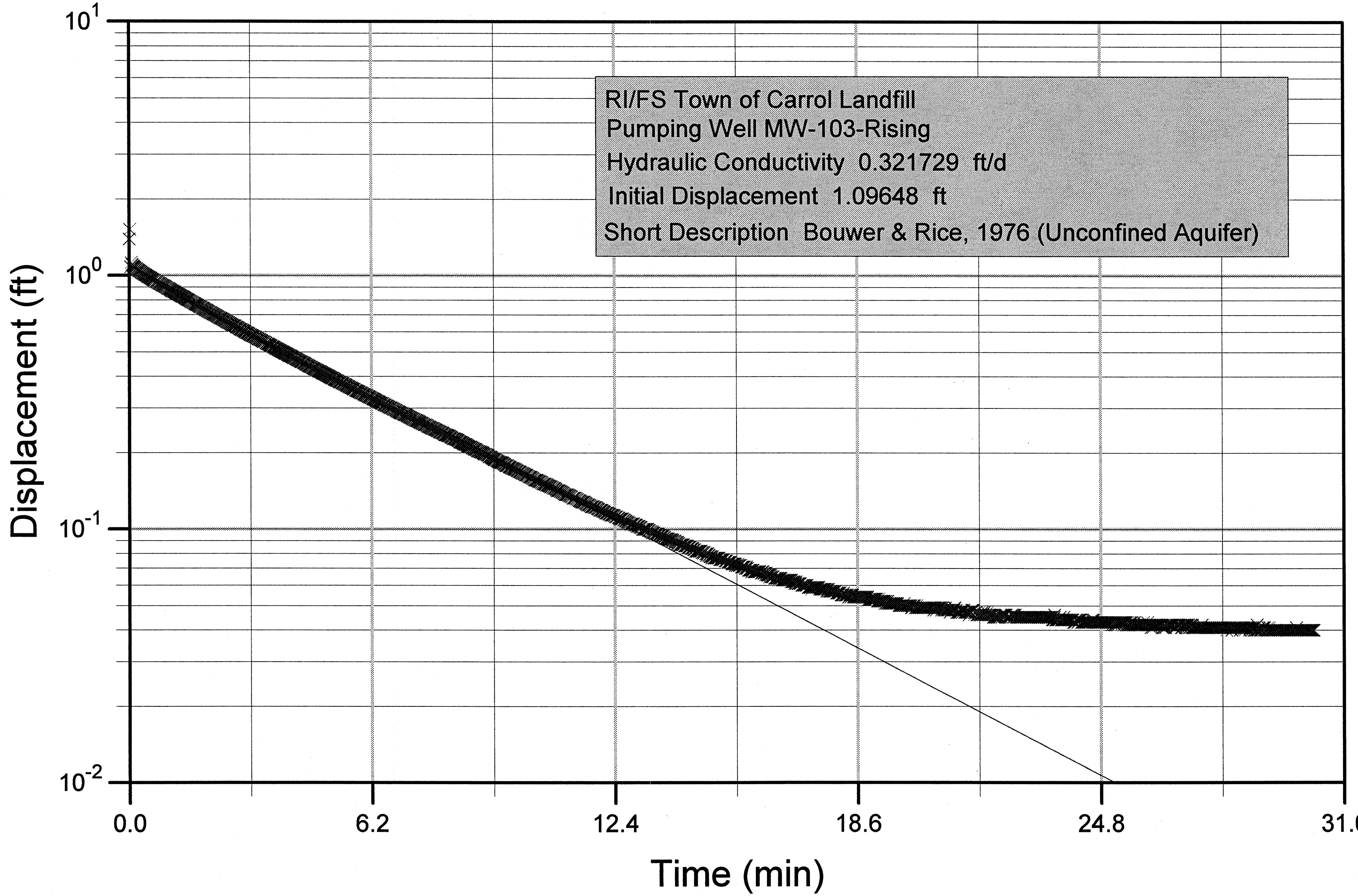
RI/FS Town of Carrol Landfill
Pumping Well Name MW-101-Rising
Hydraulic Conductivity 0.46249 ft/d
Initial Displacement 1.3122 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^{1}
10^{0}
10^{-1}
10^{-2}
0.0
2.6
5.2
7.8
10.4
13.0
Time (min)

Bouwer & Rice

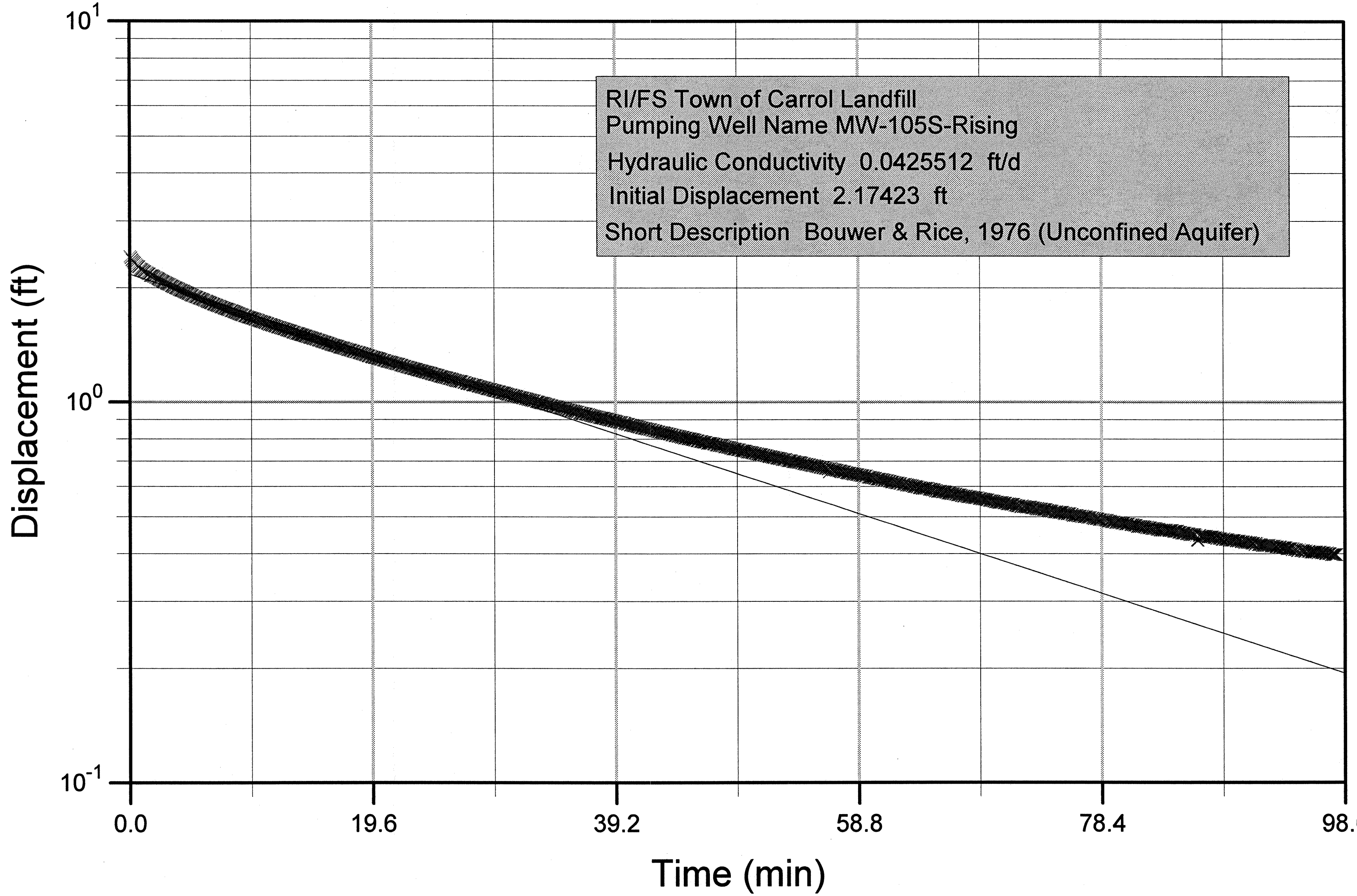


RI/FS Town of Carrol Landfill
Pumping Well Name MW-102-Rising
Hydraulic Conductivity 5.98292 ft/d
Initial Displacement 1.1823 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
10^{-2}
0.0
2.4
4.8
7.2
9.6
12.0
Time (min)

Bouwer & Rice

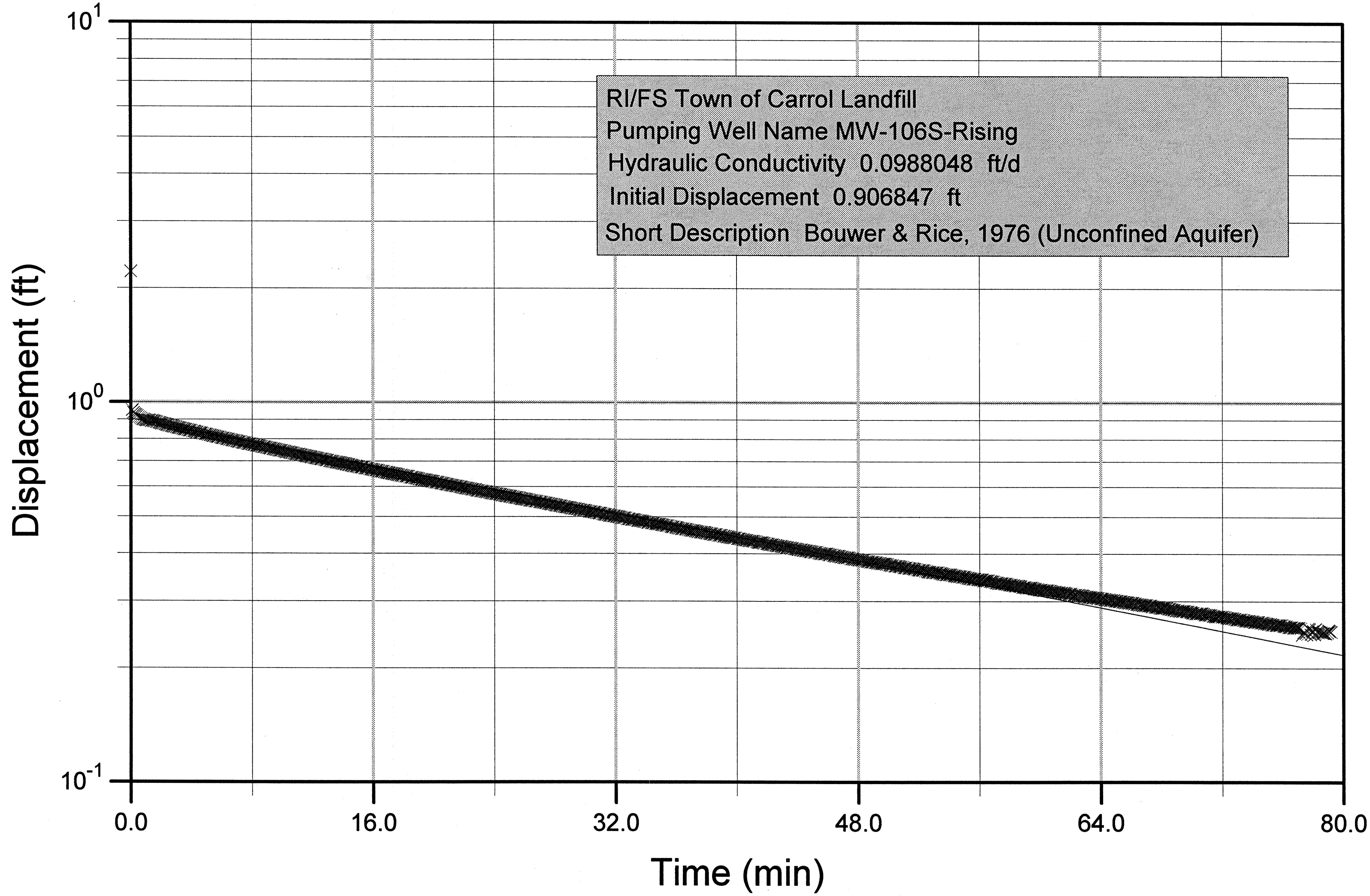

RI/FS Town of Carrol Landfill
Pumping Well MW-103-Rising
Hydraulic Conductivity 0.321729 ft/d
Initial Displacement 1.09648 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
Time (min)
0.0
6.2
12.4
18.6
24.8
31.0

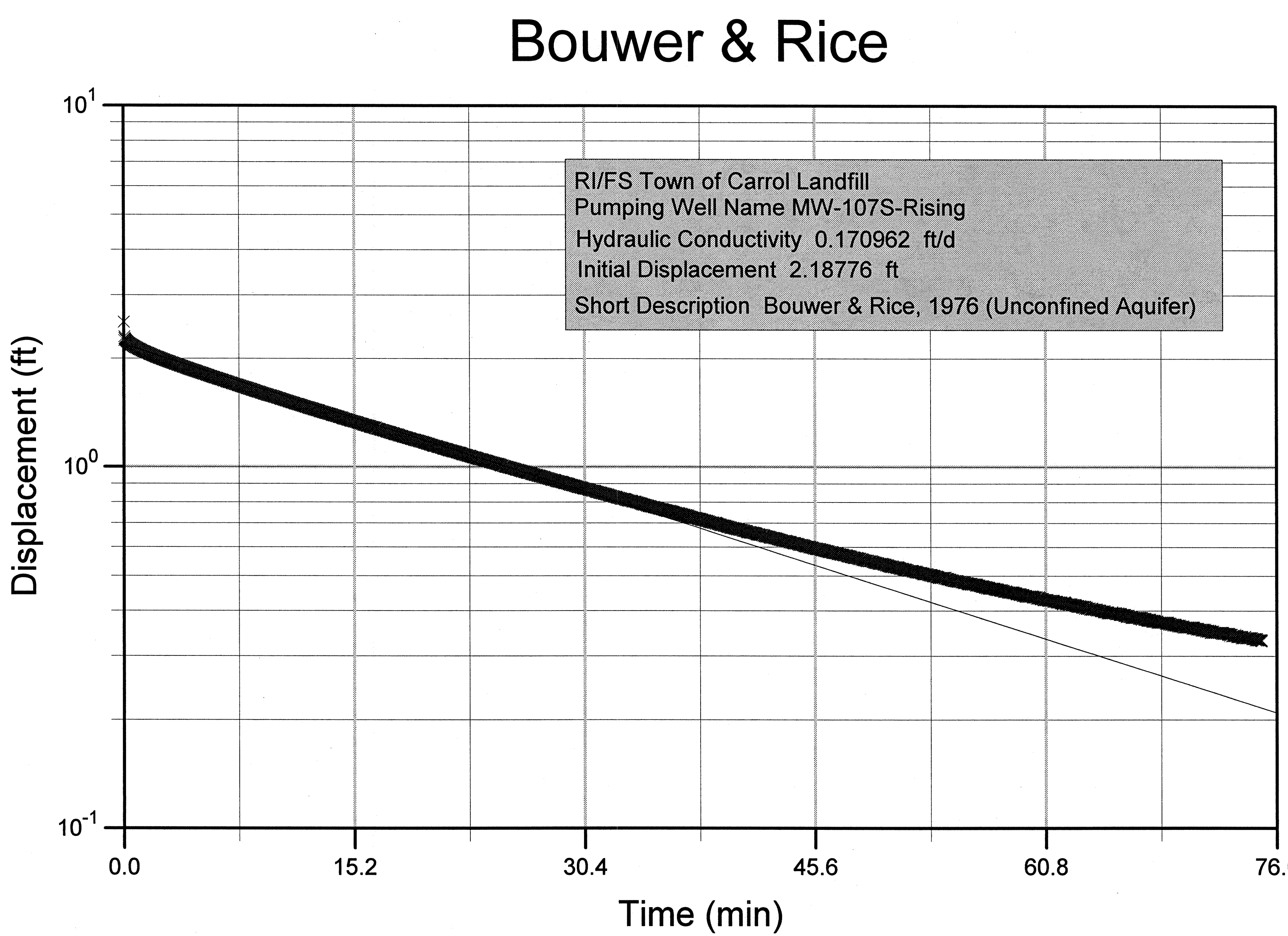
Bouwer & Rice



RI/FS Town of Carrol Landfill
Pumping Well Name MW-105S-Rising
Hydraulic Conductivity 0.0425512 ft/d
Initial Displacement 2.17423 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
19.6
39.2
58.8
78.4
98.0
Time (min)

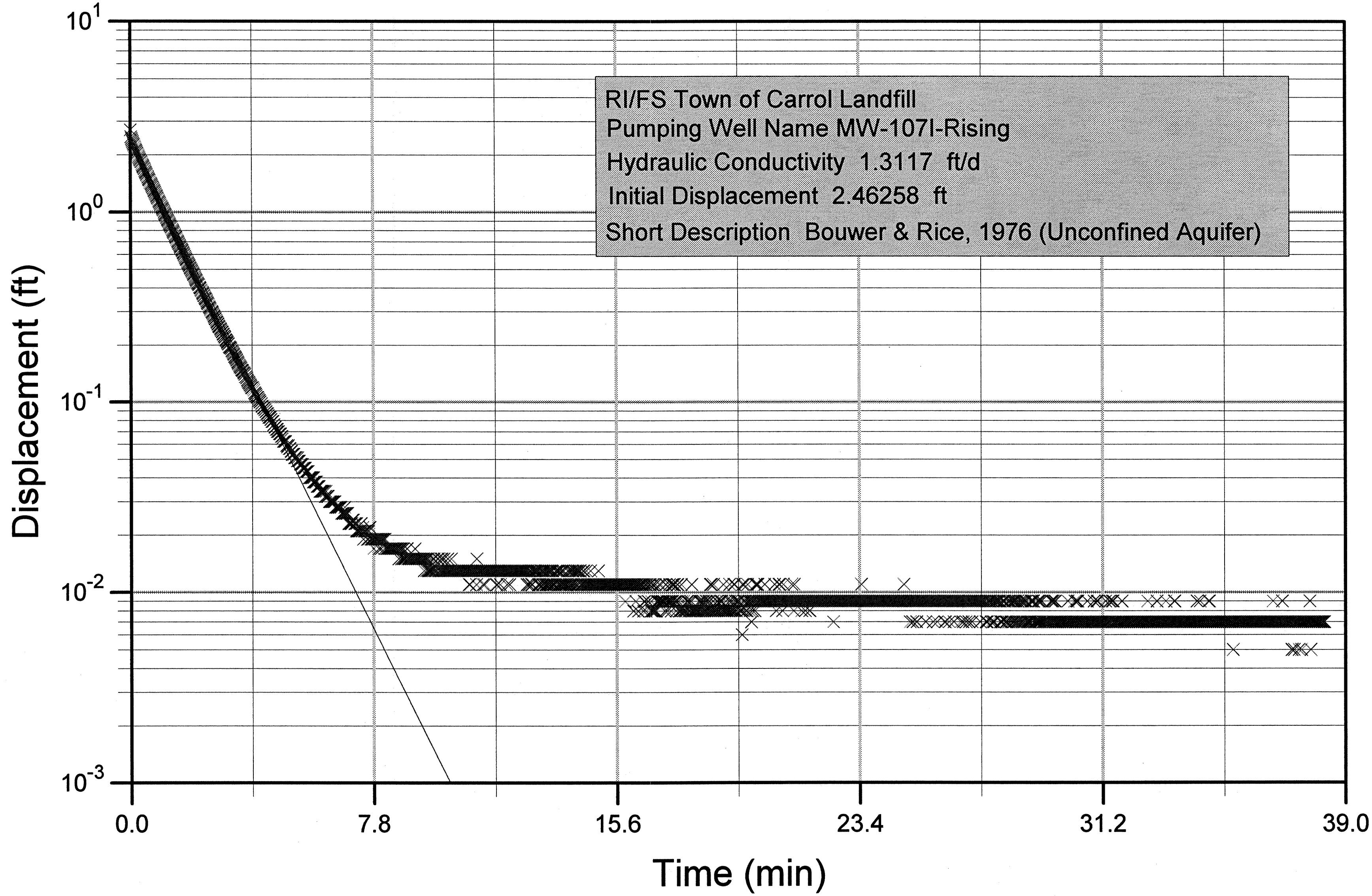
Bouwer & Rice


RI/FS Town of Carrol Landfill
Pumping Well Name MW-106S-Rising
Hydraulic Conductivity 0.0988048 ft/d
Initial Displacement 0.906847 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
16.0
32.0
48.0
64.0
80.0
Time (min)

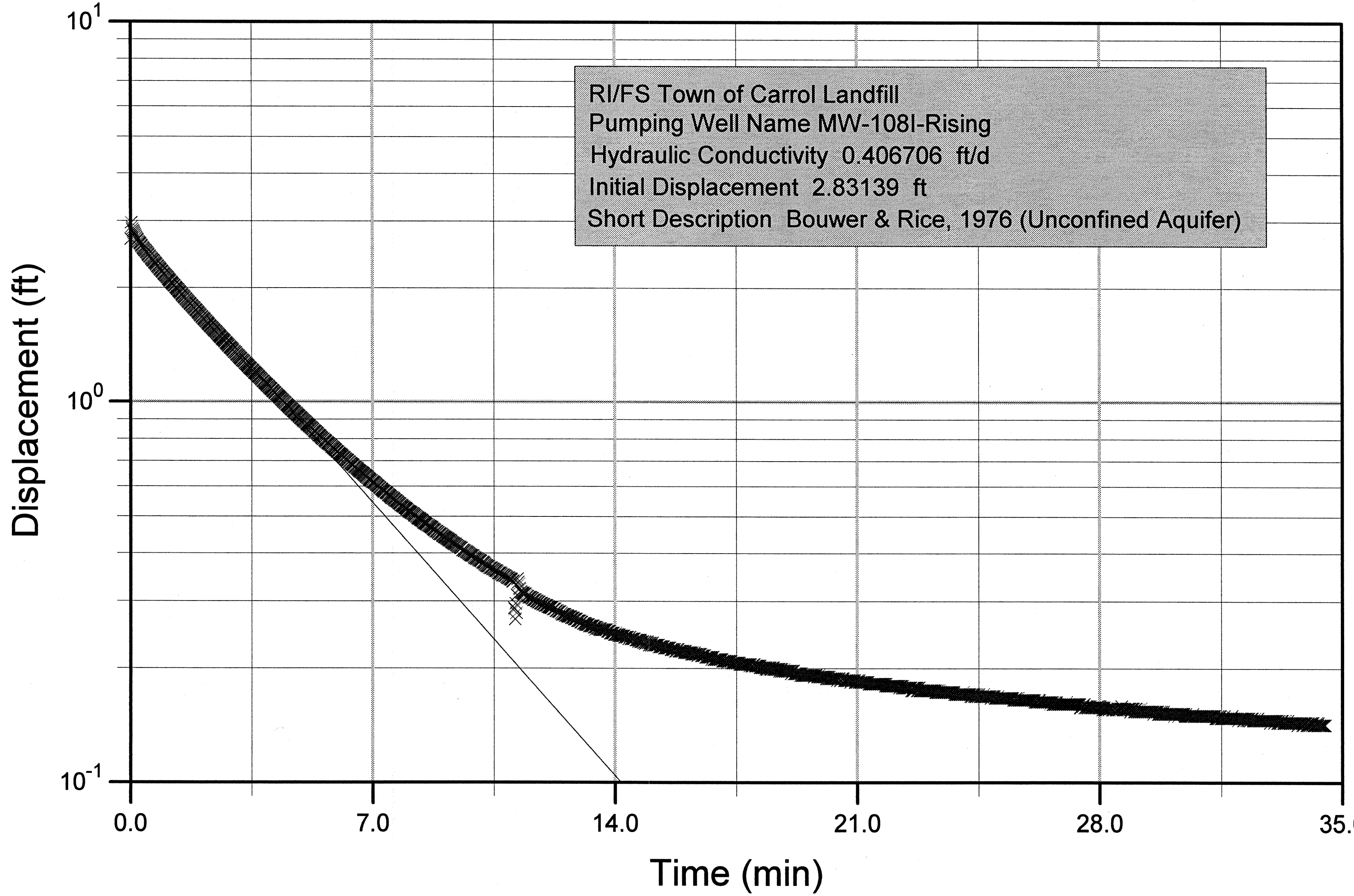


Bouwer & Rice
RI/FS Town of Carrol Landfill
Pumping Well Name MW-107S-Rising
Hydraulic Conductivity 0.170962 ft/d
Initial Displacement 2.18776 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
15.2
30.4
45.6
60.8
76.0
Time (min)

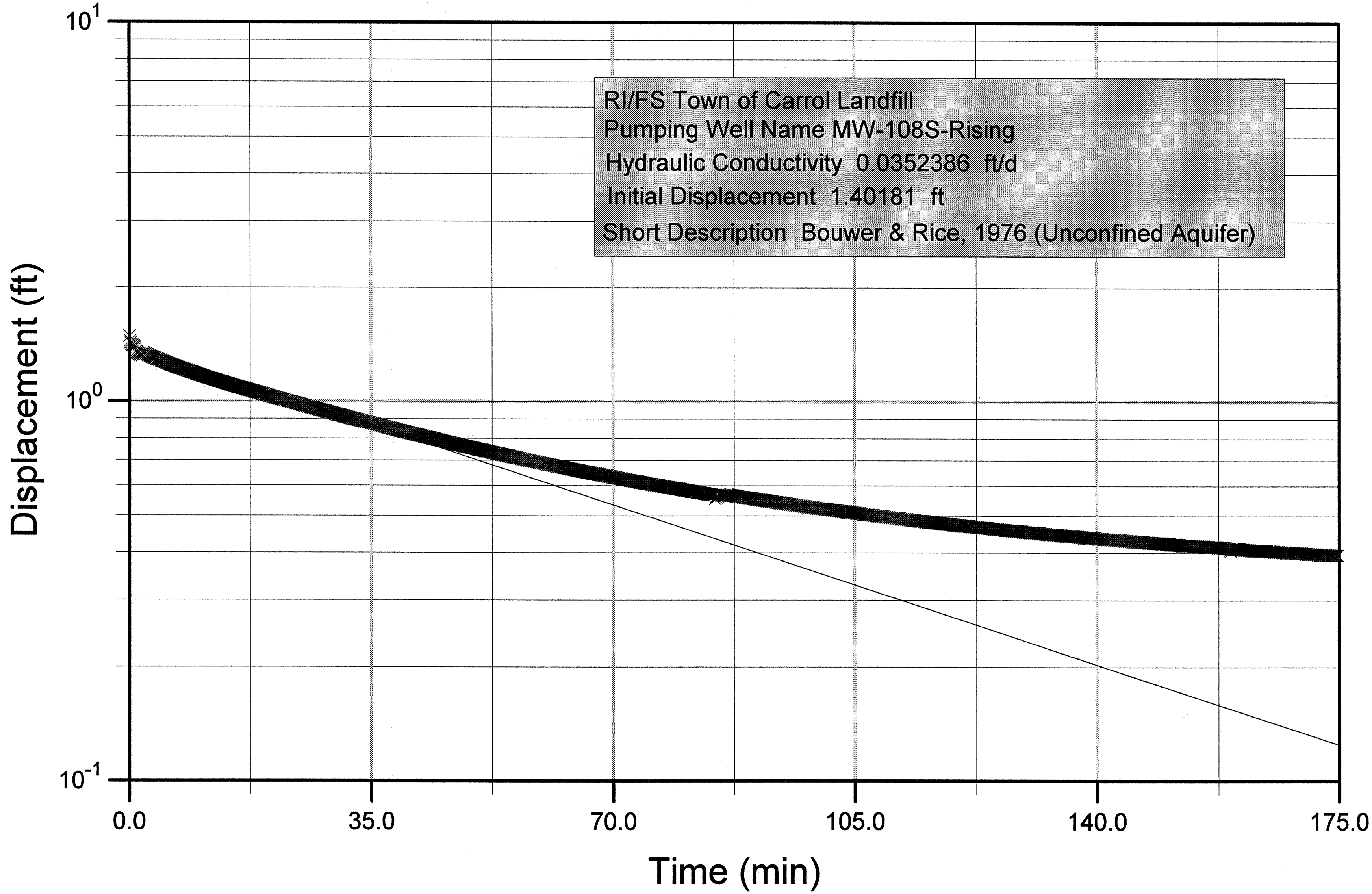
Bouwer & Rice


RI/FS Town of Carrol Landfill
Pumping Well Name MW-107I-Rising
Hydraulic Conductivity 1.3117 ft/d
Initial Displacement 2.46258 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
10^-3
0.0
7.8
15.6
23.4
31.2
39.0
Time (min)

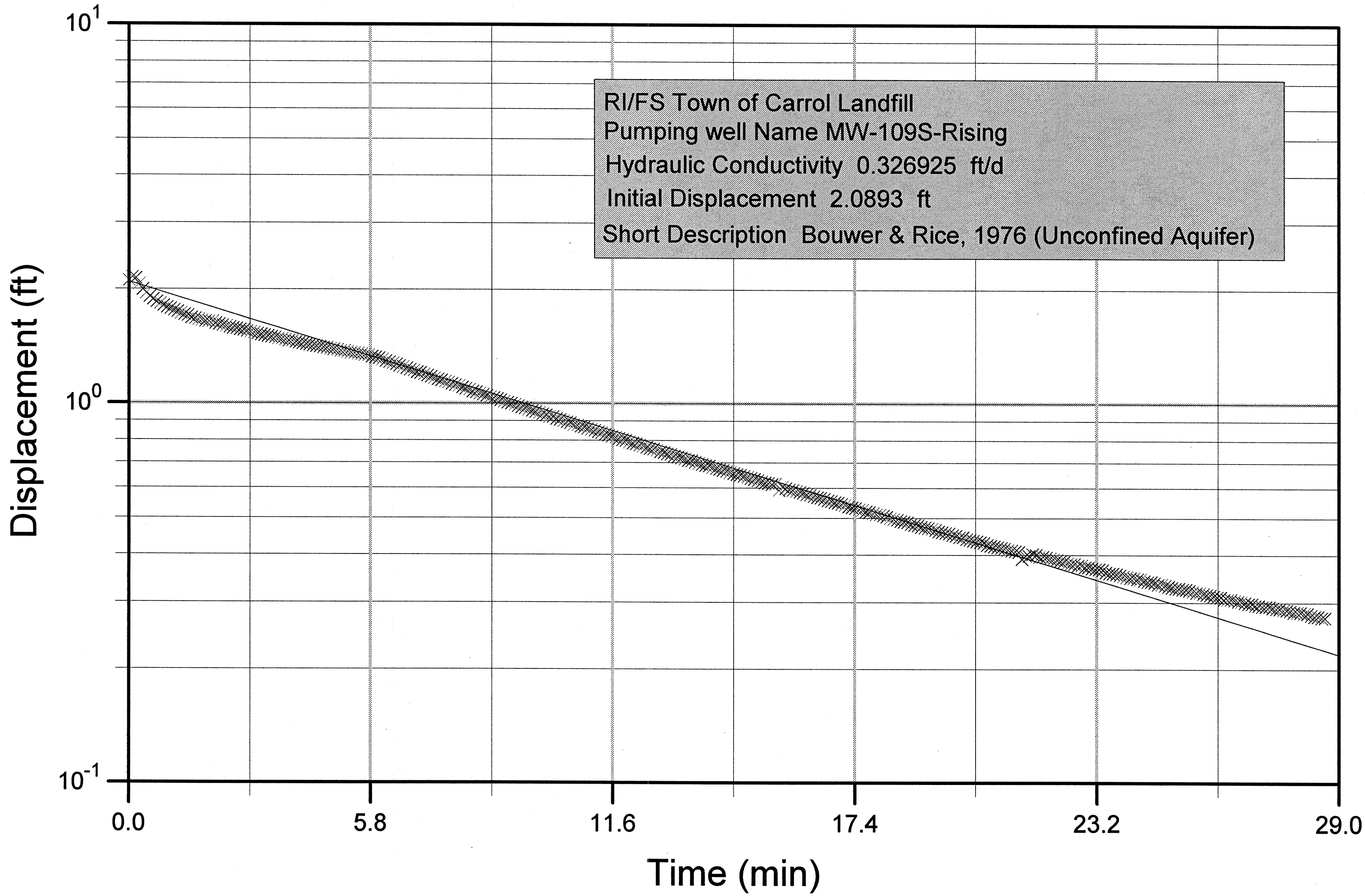
Bouwer & Rice


RI/FS Town of Carrol Landfill
Pumping Well Name MW-108I-Rising
Hydraulic Conductivity 0.406706 ft/d
Initial Displacement 2.83139 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
0.0
7.0
14.0
21.0
28.0
35.0
Time (min)

Bouwer & Rice

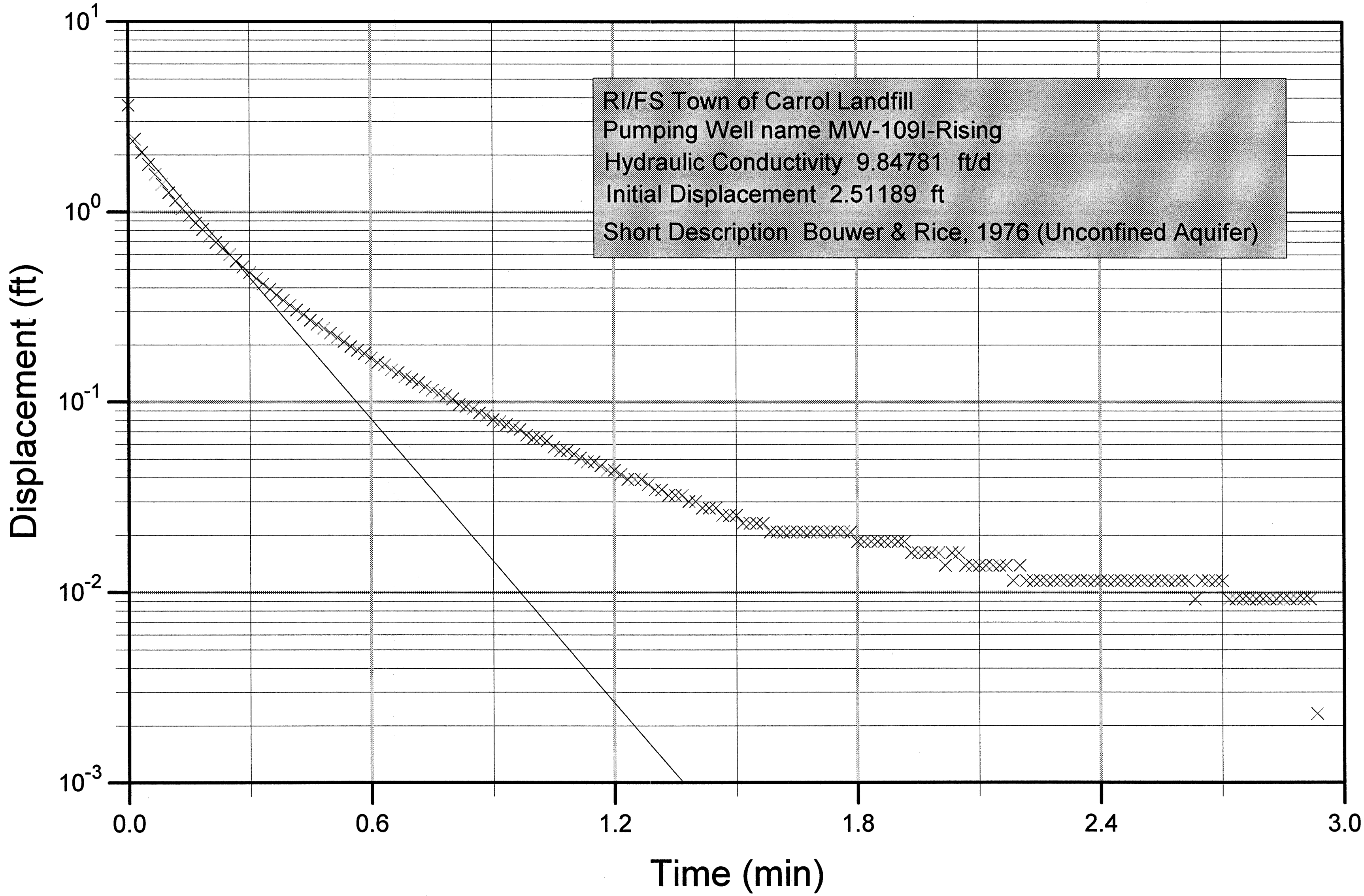

RI/FS Town of Carrol Landfill
Pumping Well Name MW-108S-Rising
Hydraulic Conductivity 0.0352386 ft/d
Initial Displacement 1.40181 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
0.0
35.0
70.0
105.0
140.0
175.0
Time (min)

Bouwer & Rice



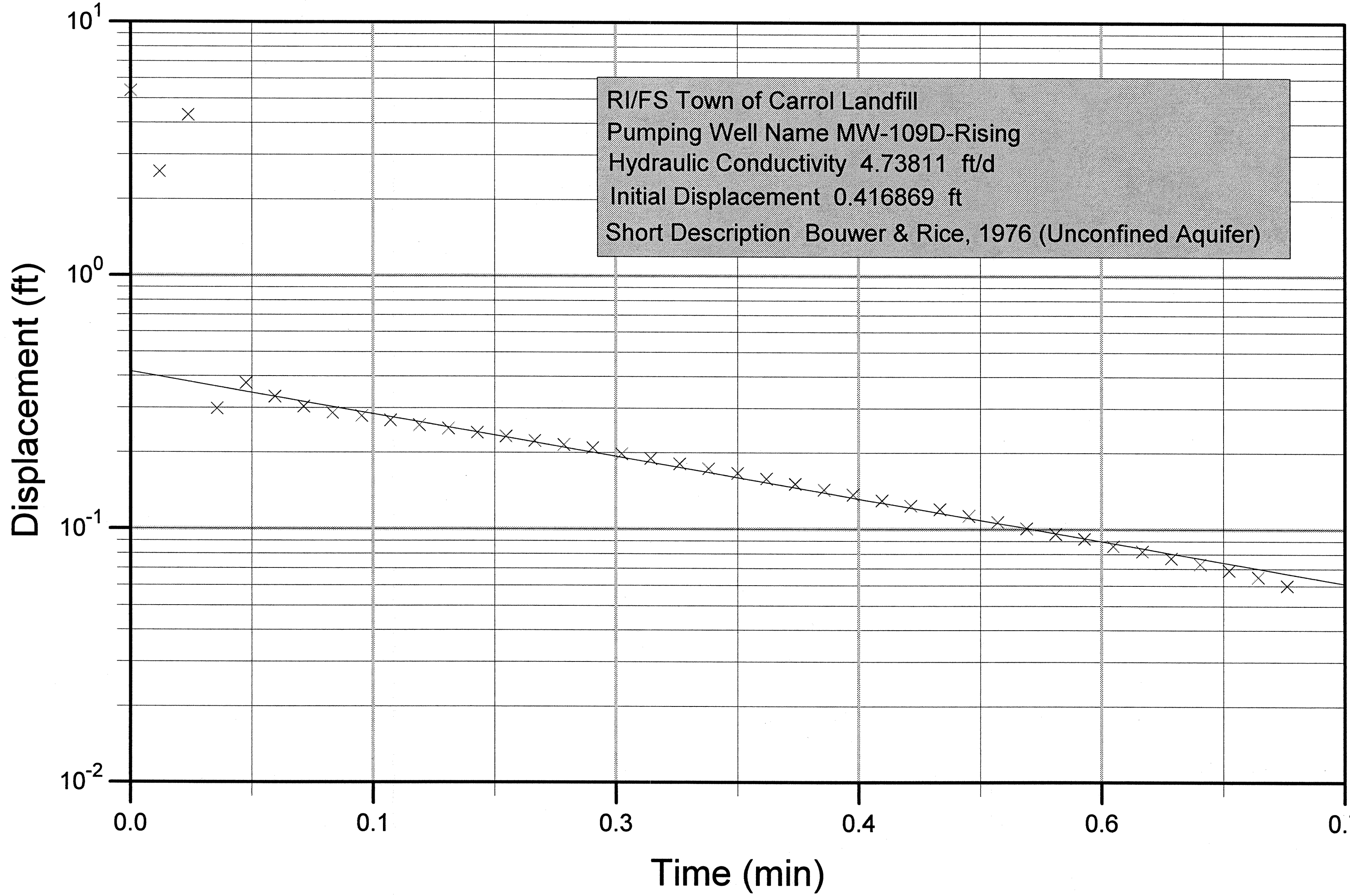
RI/FS Town of Carrol Landfill
Pumping well Name MW-109S-Rising
Hydraulic Conductivity 0.326925 ft/d
Initial Displacement 2.0893 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
5.8
11.6
17.4
23.2
29.0
Time (min)

Bouwer & Rice

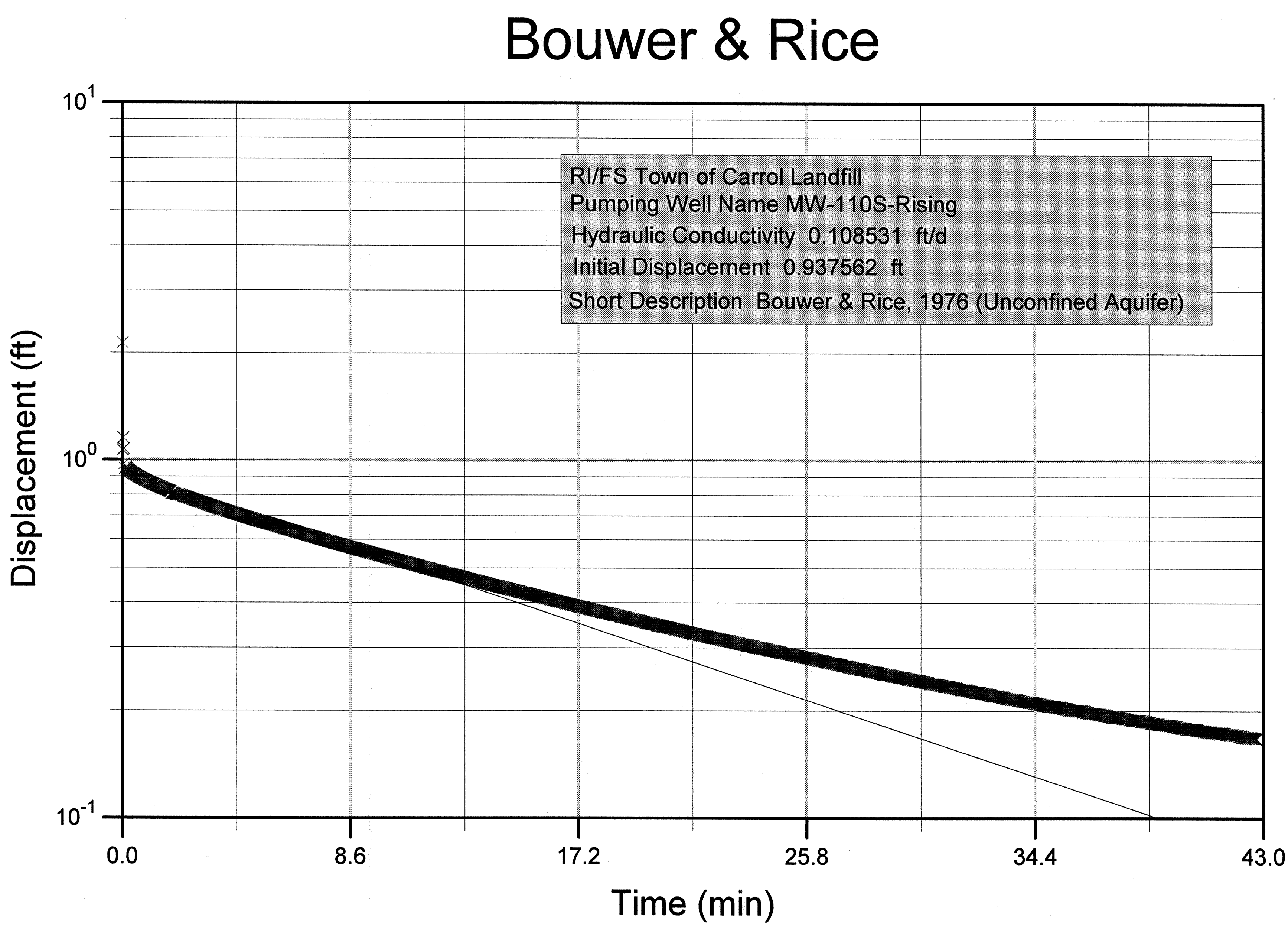


RI/FS Town of Carrol Landfill
Pumping Well name MW-109I-Rising
Hydraulic Conductivity 9.84781 ft/d
Initial Displacement 2.51189 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
10^-3
0.0
0.6
1.2
1.8
2.4
3.0
Time (min)

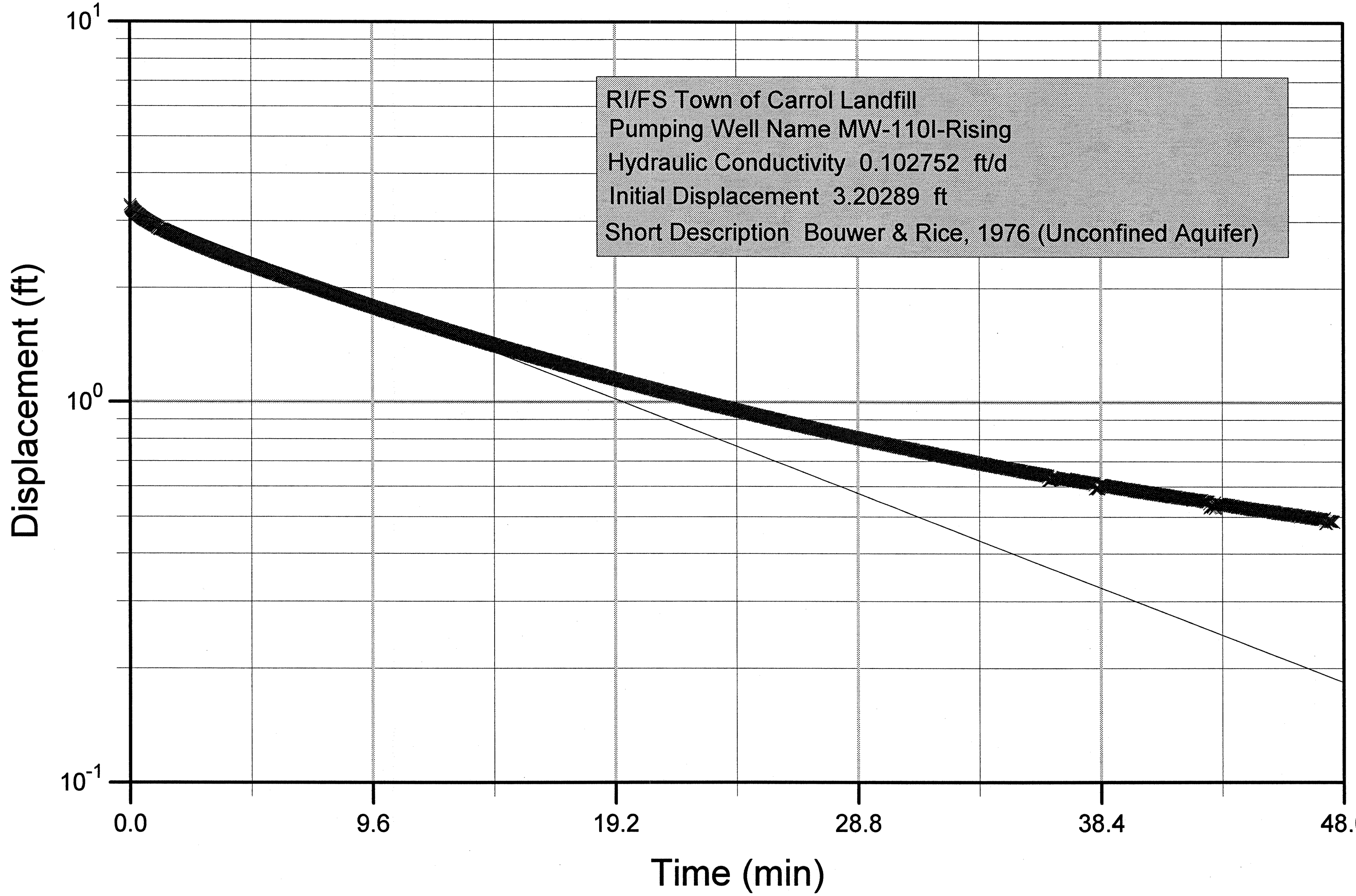
Bouwer & Rice



RI/FS Town of Carrol Landfill
Pumping Well Name MW-109D-Rising
Hydraulic Conductivity 4.73811 ft/d
Initial Displacement 0.416869 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
0.1
0.3
0.4
0.6
0.7
Time (min)

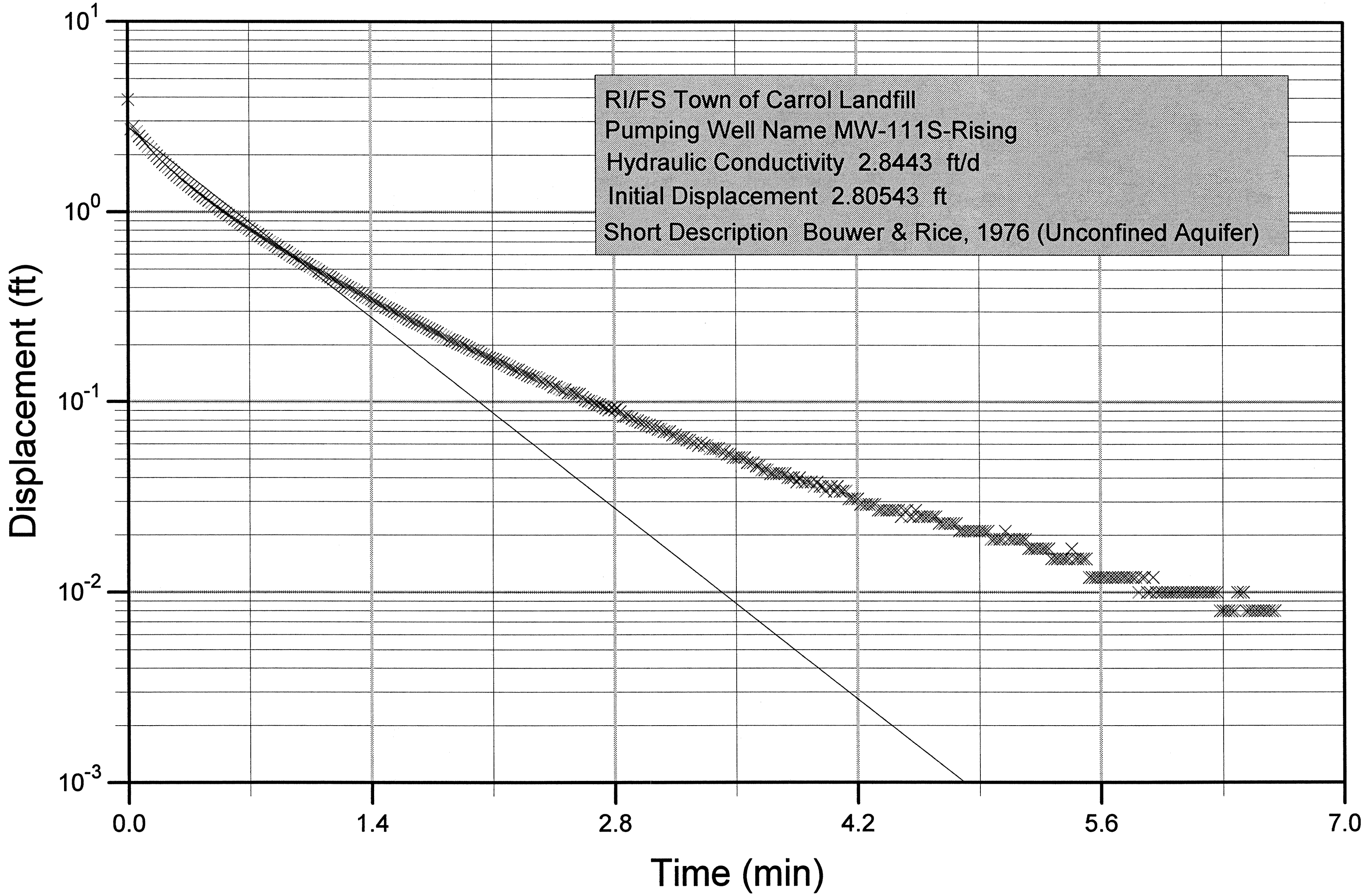

Bouwer & Rice
RI/FS Town of Carrol Landfill
Pumping Well Name MW-110S-Rising
Hydraulic Conductivity 0.108531 ft/d
Initial Displacement 0.937562 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
0.0
8.6
17.2
25.8
34.4
43.0
Time (min)

Bouwer & Rice



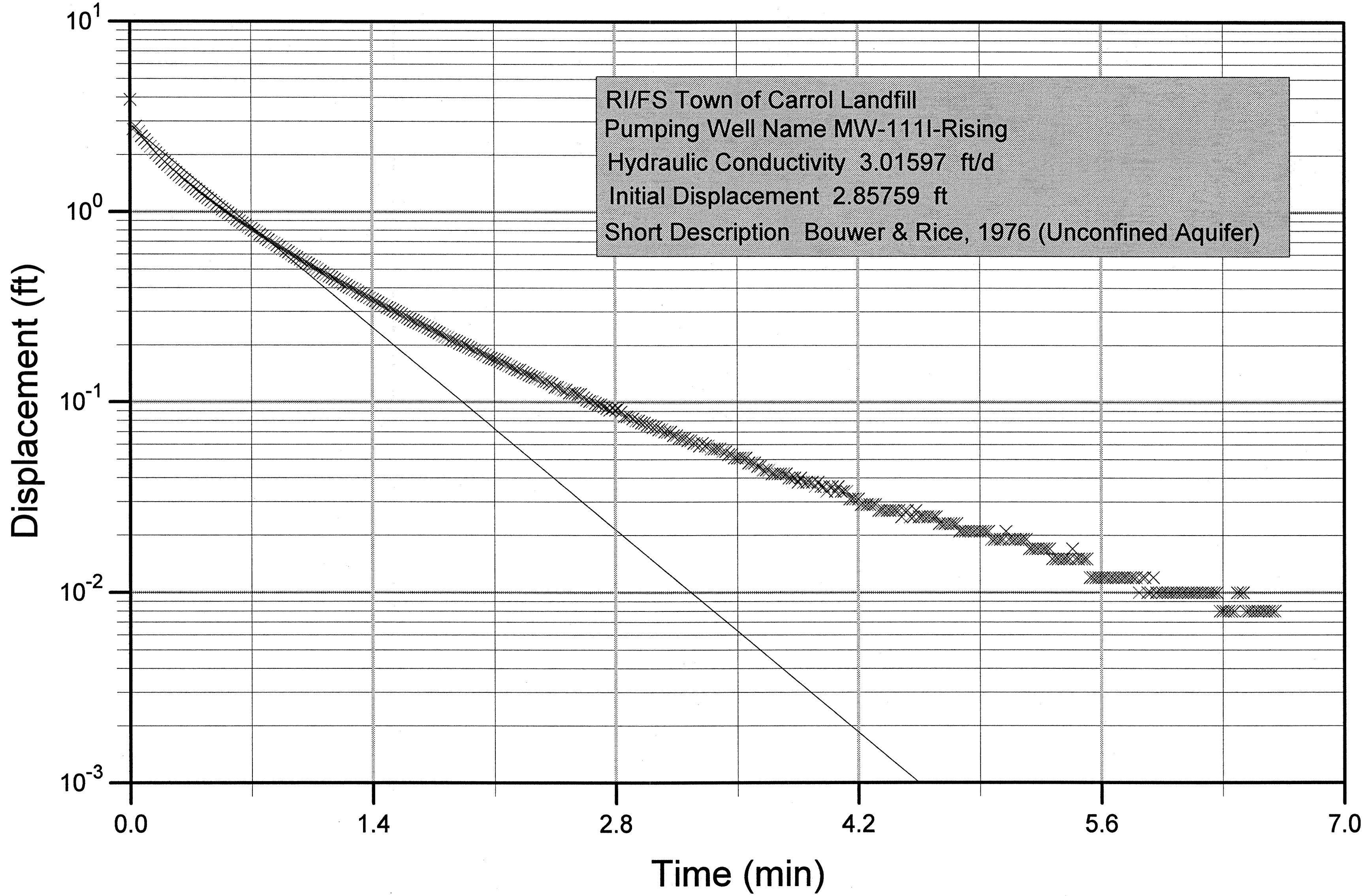
RI/FS Town of Carrol Landfill
Pumping Well Name MW-110I-Rising
Hydraulic Conductivity 0.102752 ft/d
Initial Displacement 3.20289 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
9.6
19.2
28.8
38.4
48.0
Time (min)

Bouwer & Rice

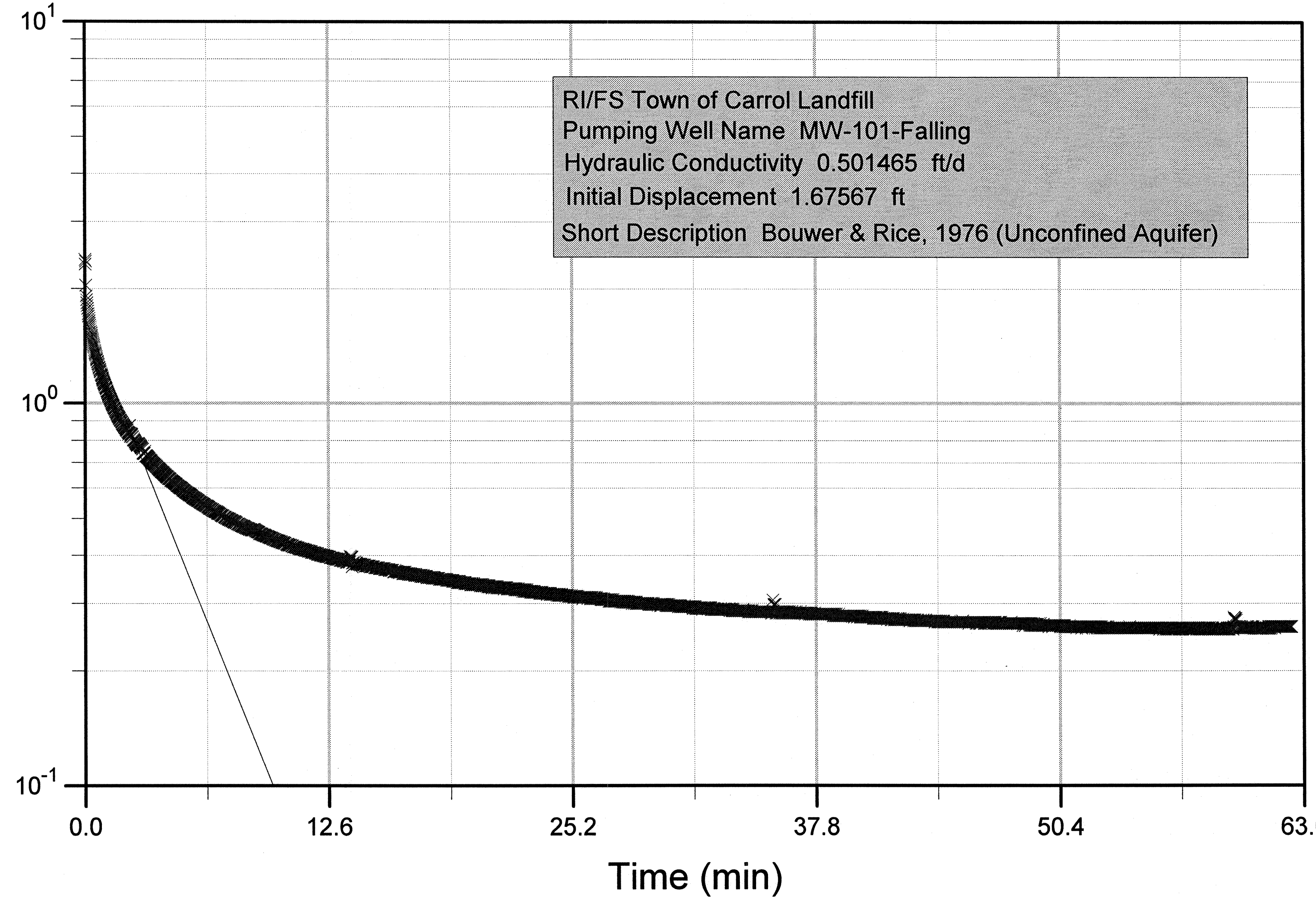


RI/FS Town of Carrol Landfill
Pumping Well Name MW-111S-Rising
Hydraulic Conductivity 2.8443 ft/d
Initial Displacement 2.80543 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
10^-3
0.0
1.4
2.8
4.2
5.6
7.0
Time (min)

Bouwer & Rice

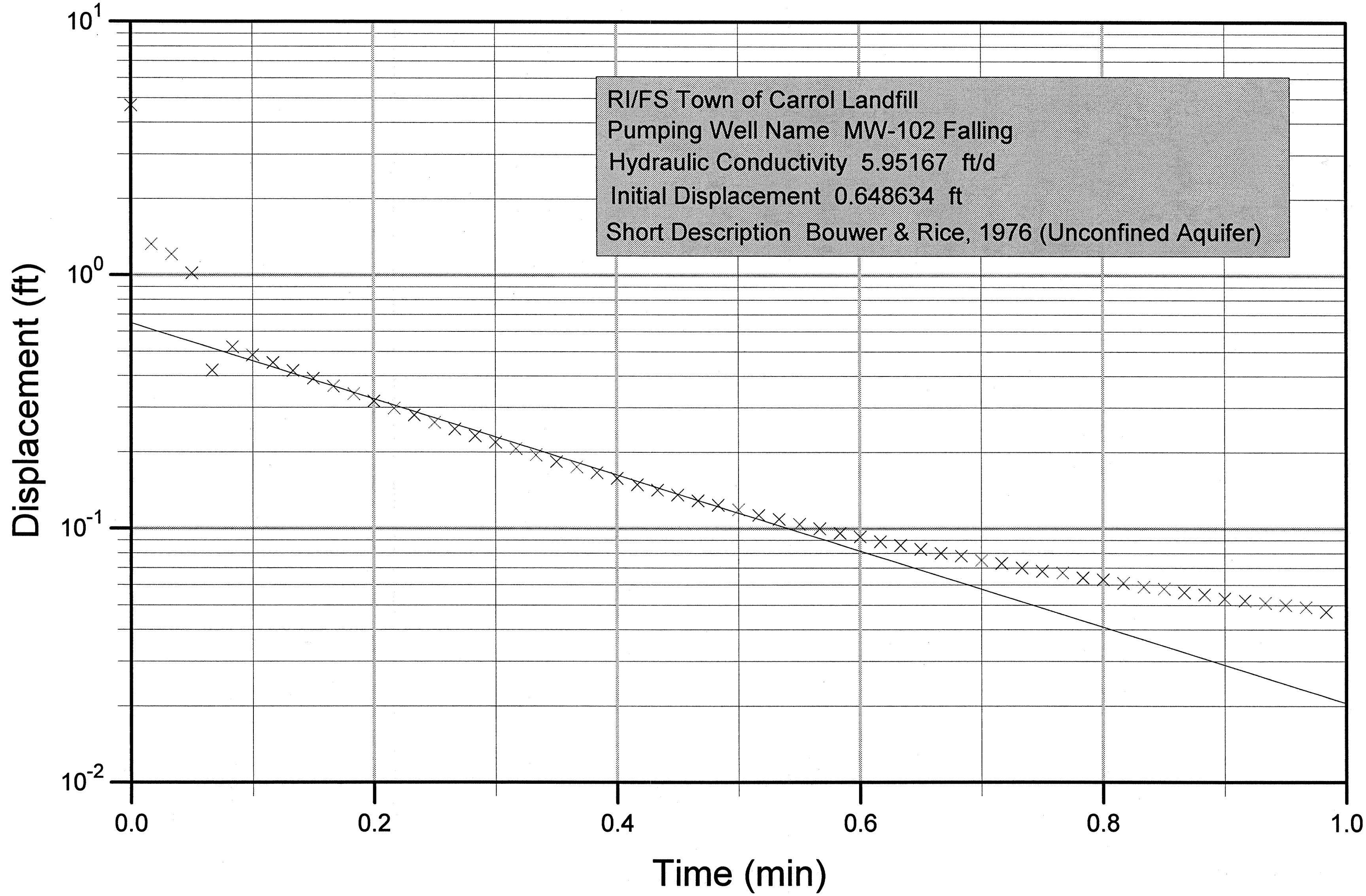

RI/FS Town of Carrol Landfill
Pumping Well Name MW-111I-Rising
Hydraulic Conductivity 3.01597 ft/d
Initial Displacement 2.85759 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
0.0
1.4
2.8
4.2
5.6
7.0
Time (min)

Bouwer & Rice



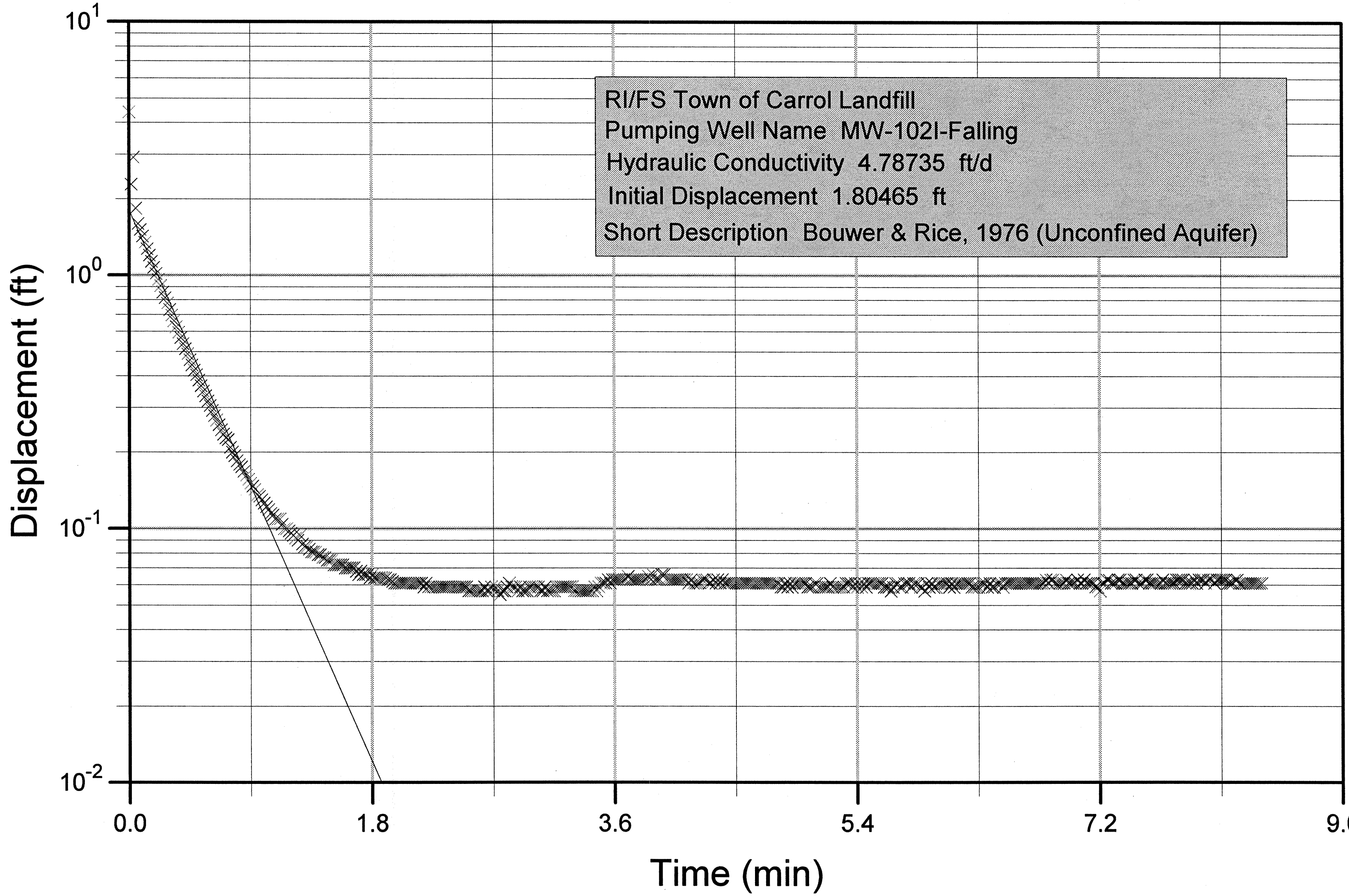
RI/FS Town of Carrol Landfill
Pumping Well Name MW-101-Falling
Hydraulic Conductivity 0.501465 ft/d
Initial Displacement 1.67567 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
12.6
25.2
37.8
50.4
63.0
Time (min)

Bouwer & Rice

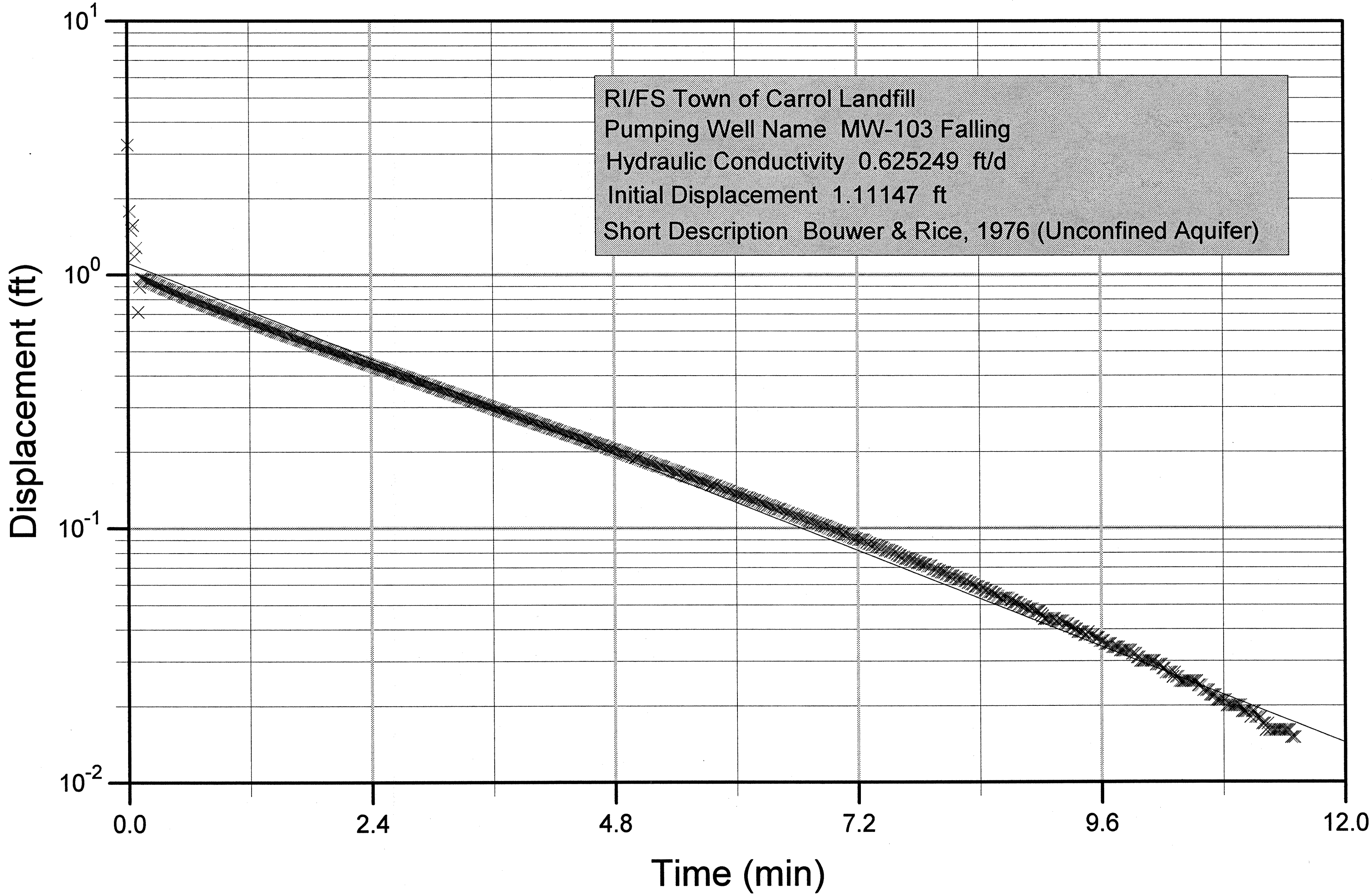


RI/FS Town of Carrol Landfill
Pumping Well Name MW-102 Falling
Hydraulic Conductivity 5.95167 ft/d
Initial Displacement 0.648634 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
10^{-2}
0.0
0.2
0.4
0.6
0.8
1.0
Time (min)

Bouwer & Rice

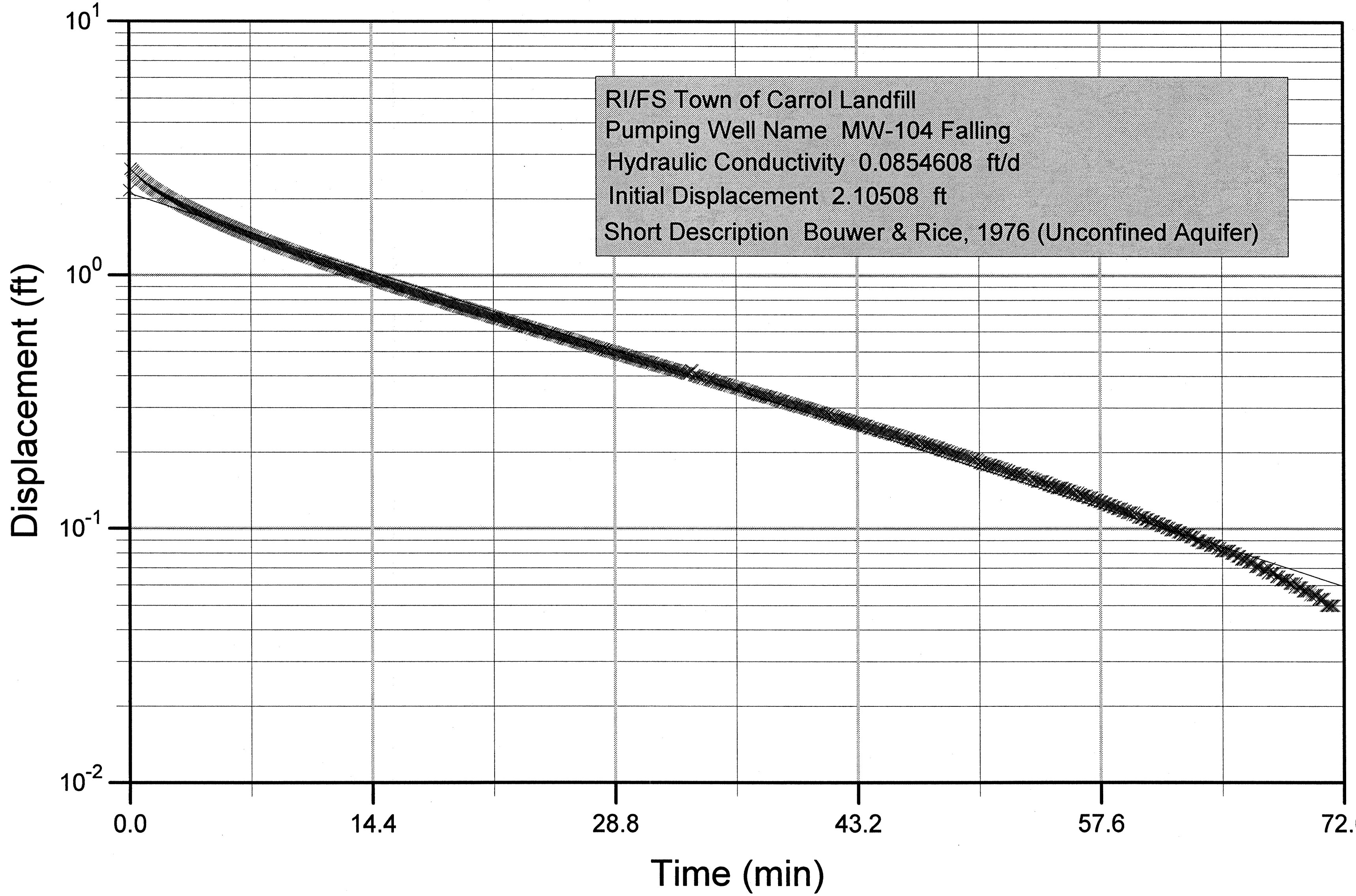

RI/FS Town of Carrol Landfill
Pumping Well Name MW-102I-Falling
Hydraulic Conductivity 4.78735 ft/d
Initial Displacement 1.80465 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
1.8
3.6
5.4
7.2
9.0
Time (min)

Bouwer & Rice

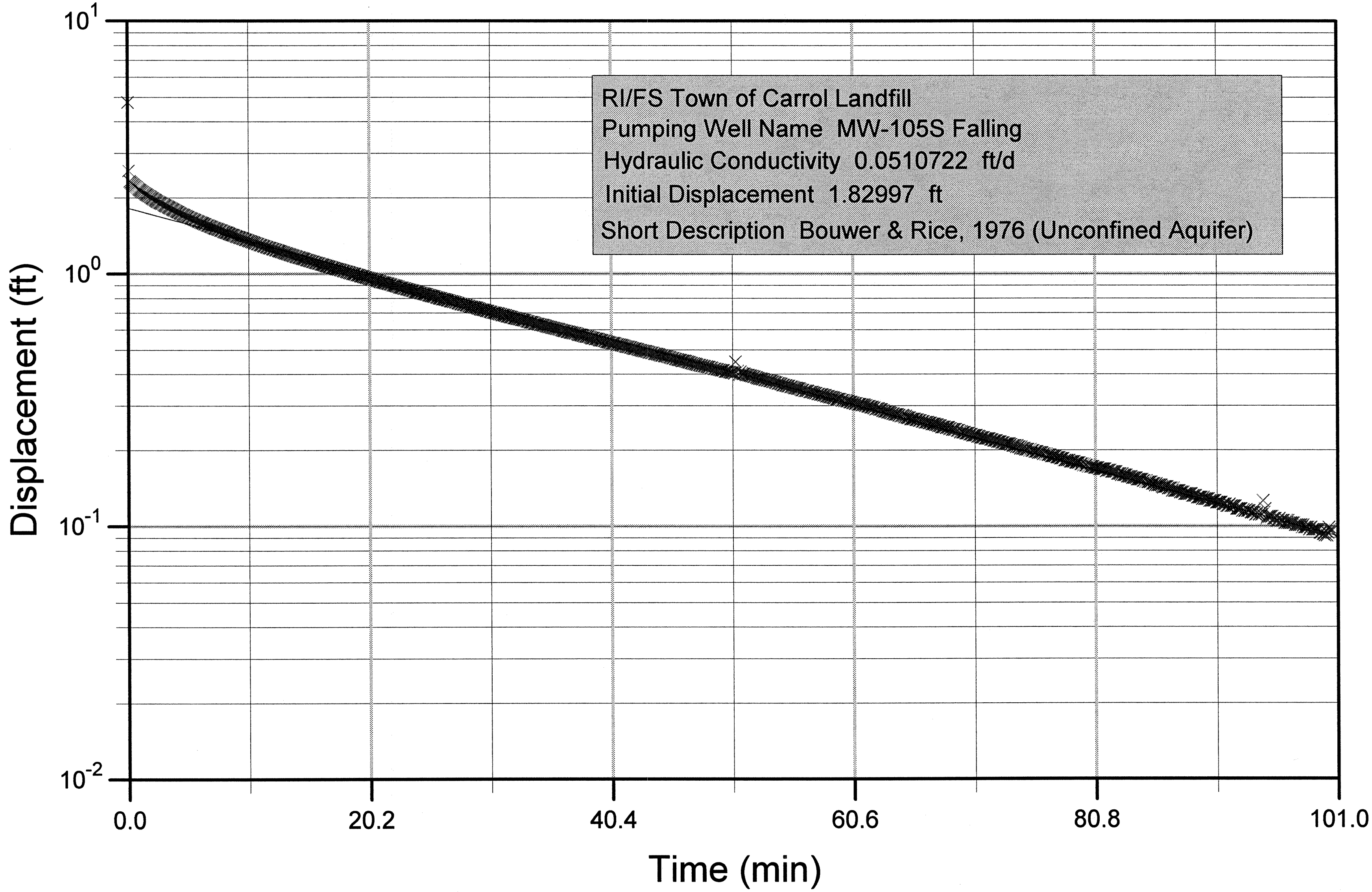


RI/FS Town of Carrol Landfill
Pumping Well Name MW-103 Falling
Hydraulic Conductivity 0.625249 ft/d
Initial Displacement 1.11147 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^{1}
10^{0}
10^{-1}
10^{-2}
0.0
2.4
4.8
7.2
9.6
12.0
Time (min)

Bouwer & Rice

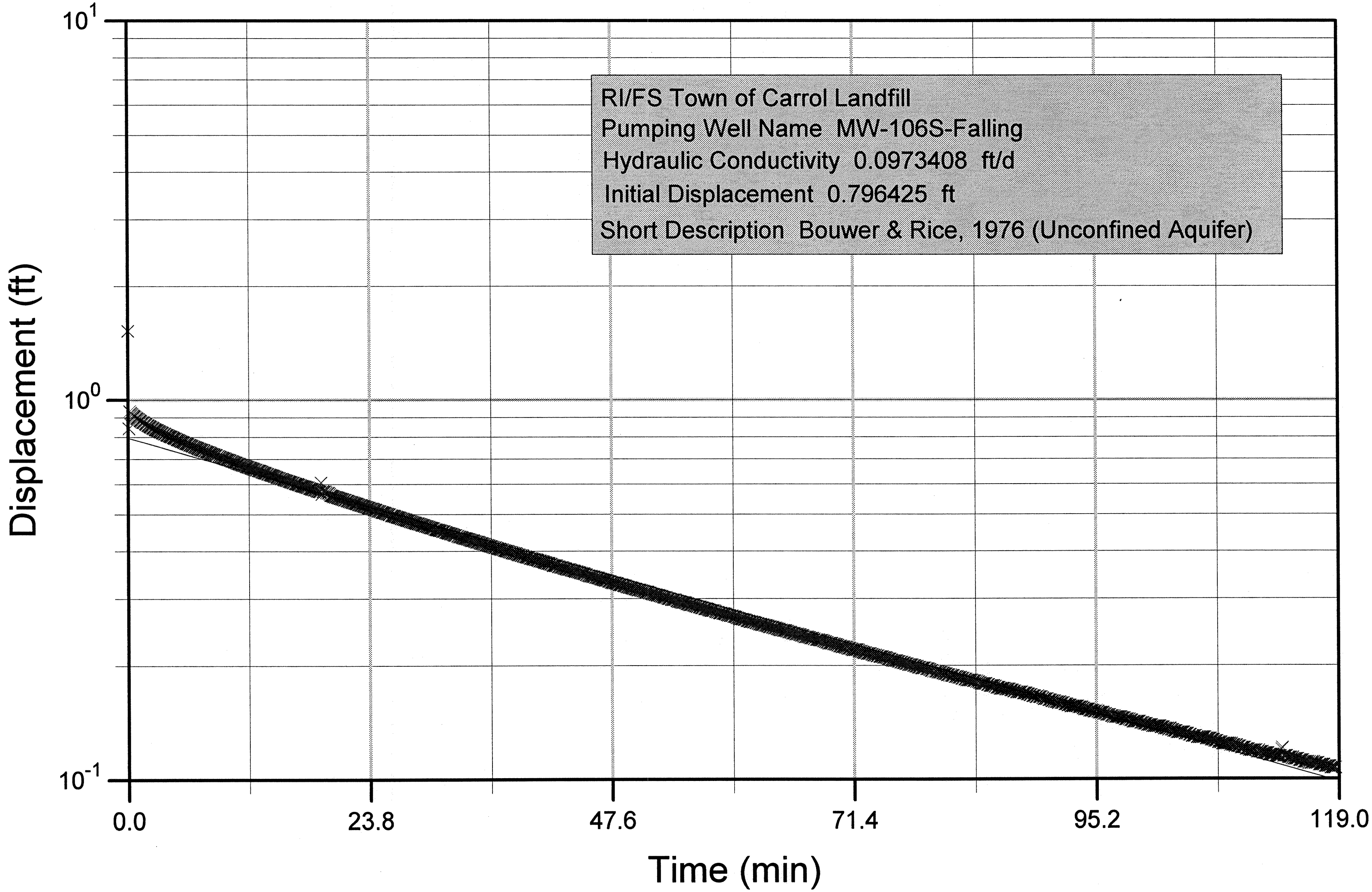

RI/FS Town of Carrol Landfill
Pumping Well Name MW-104 Falling
Hydraulic Conductivity 0.0854608 ft/d
Initial Displacement 2.10508 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^{1}
10^{0}
10^{-1}
10^{-2}
0.0
14.4
28.8
43.2
57.6
72.0
Time (min)

Bouwer & Rice



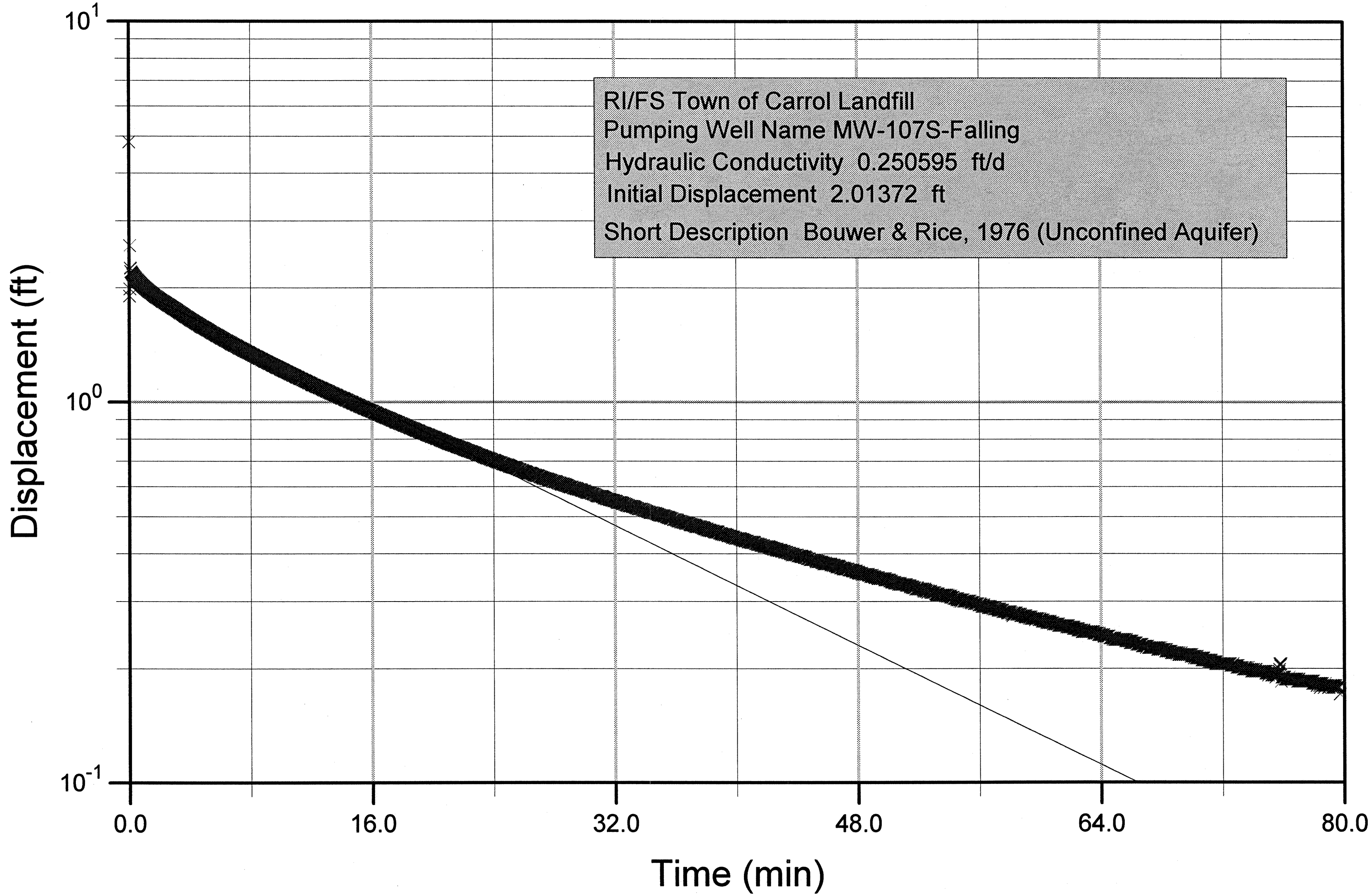
RI/FS Town of Carrol Landfill
Pumping Well Name MW-105S Falling
Hydraulic Conductivity 0.0510722 ft/d
Initial Displacement 1.82997 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
20.2
40.4
60.6
80.8
101.0
Time (min)

Bouwer & Rice



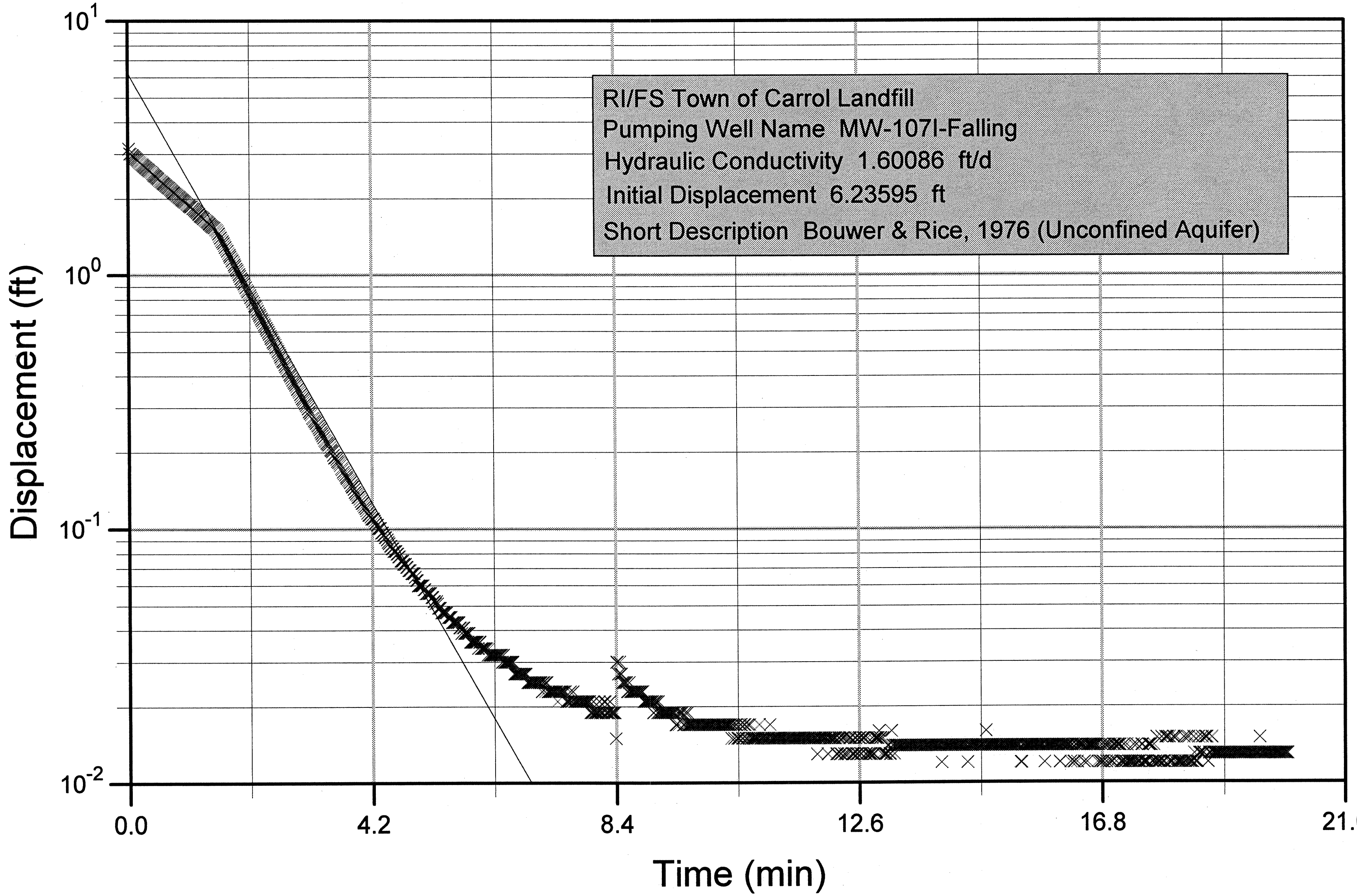
RI/FS Town of Carrol Landfill
Pumping Well Name MW-106S-Falling
Hydraulic Conductivity 0.0973408 ft/d
Initial Displacement 0.796425 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
23.8
47.6
71.4
95.2
119.0
Time (min)

Bouwer & Rice



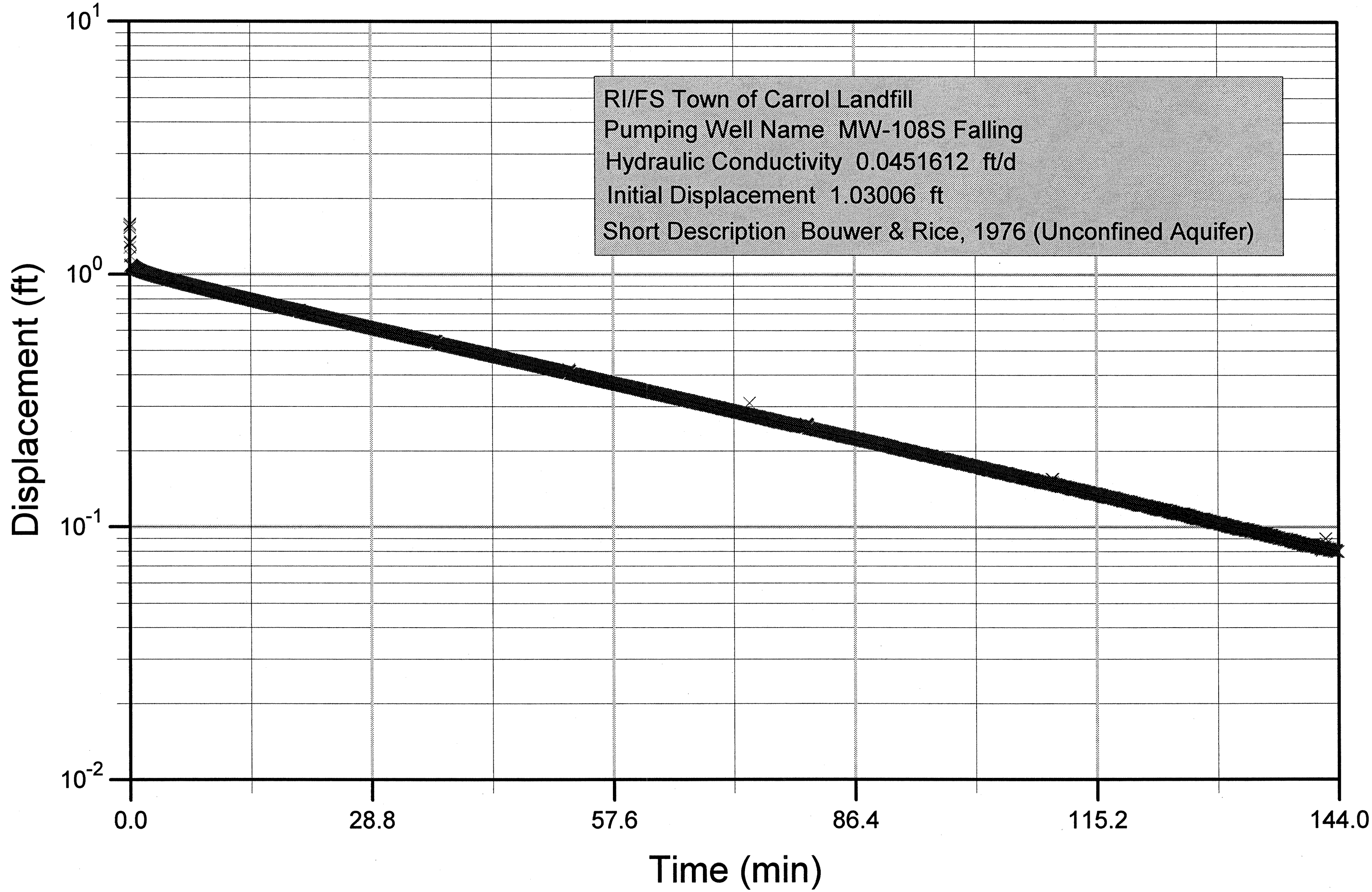
RI/FS Town of Carrol Landfill
Pumping Well Name MW-107S-Falling
Hydraulic Conductivity 0.250595 ft/d
Initial Displacement 2.01372 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
0.0
16.0
32.0
48.0
64.0
80.0
Time (min)

Bouwer & Rice

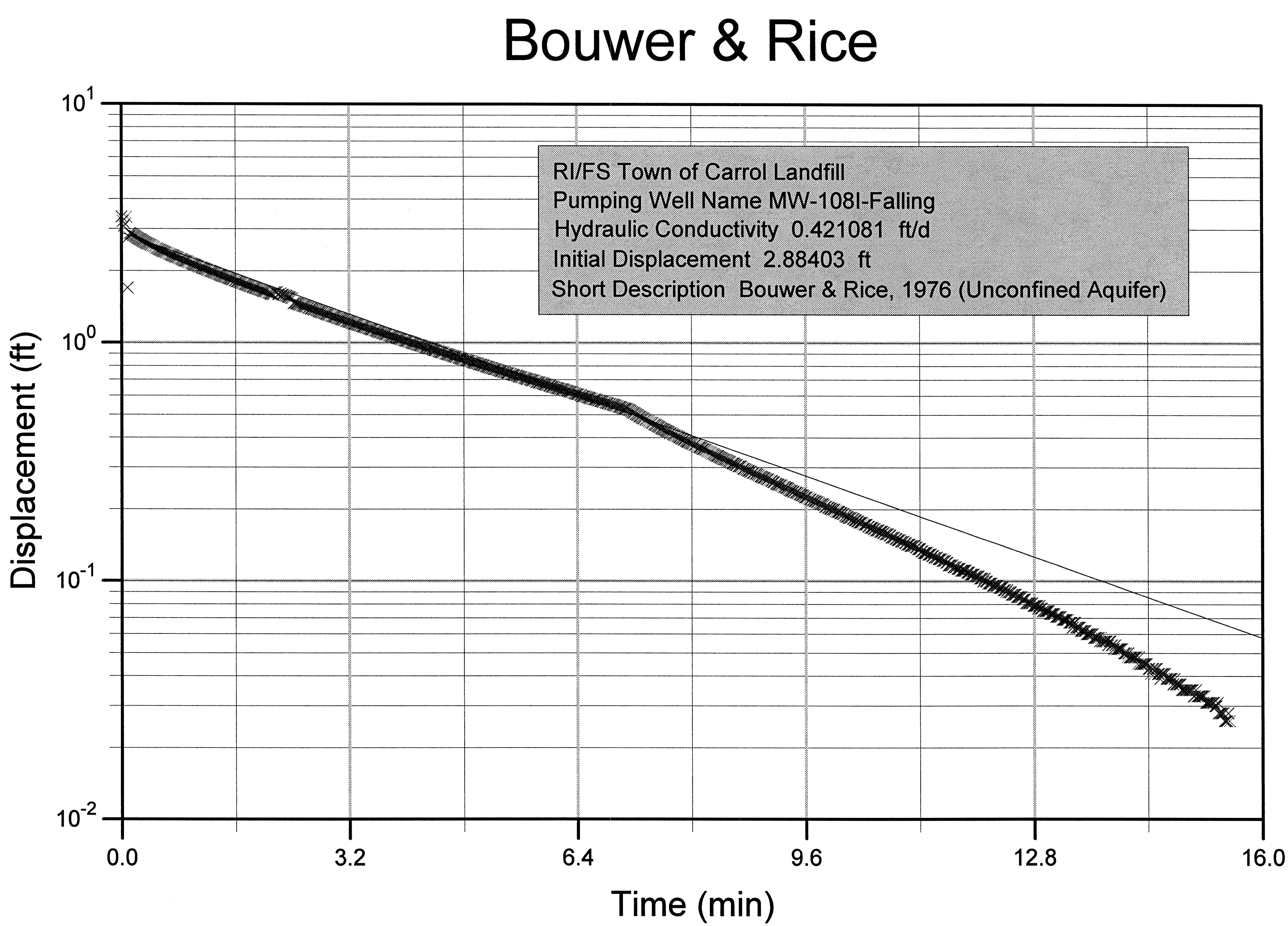


RI/FS Town of Carrol Landfill
Pumping Well Name MW-107I-Falling
Hydraulic Conductivity 1.60086 ft/d
Initial Displacement 6.23595 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
10^{-2}
0.0
4.2
8.4
12.6
16.8
21.0
Time (min)

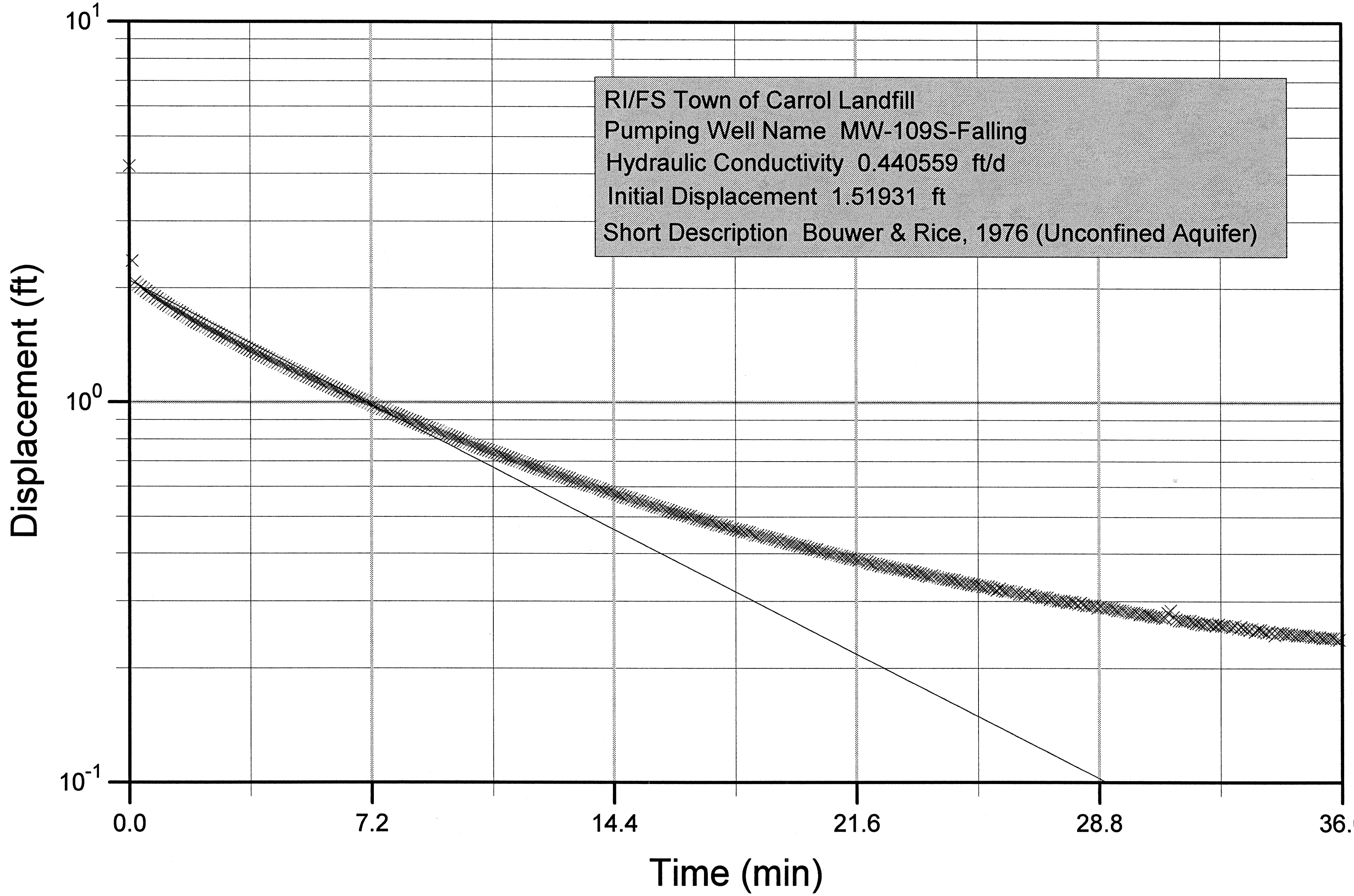
Bouwer & Rice



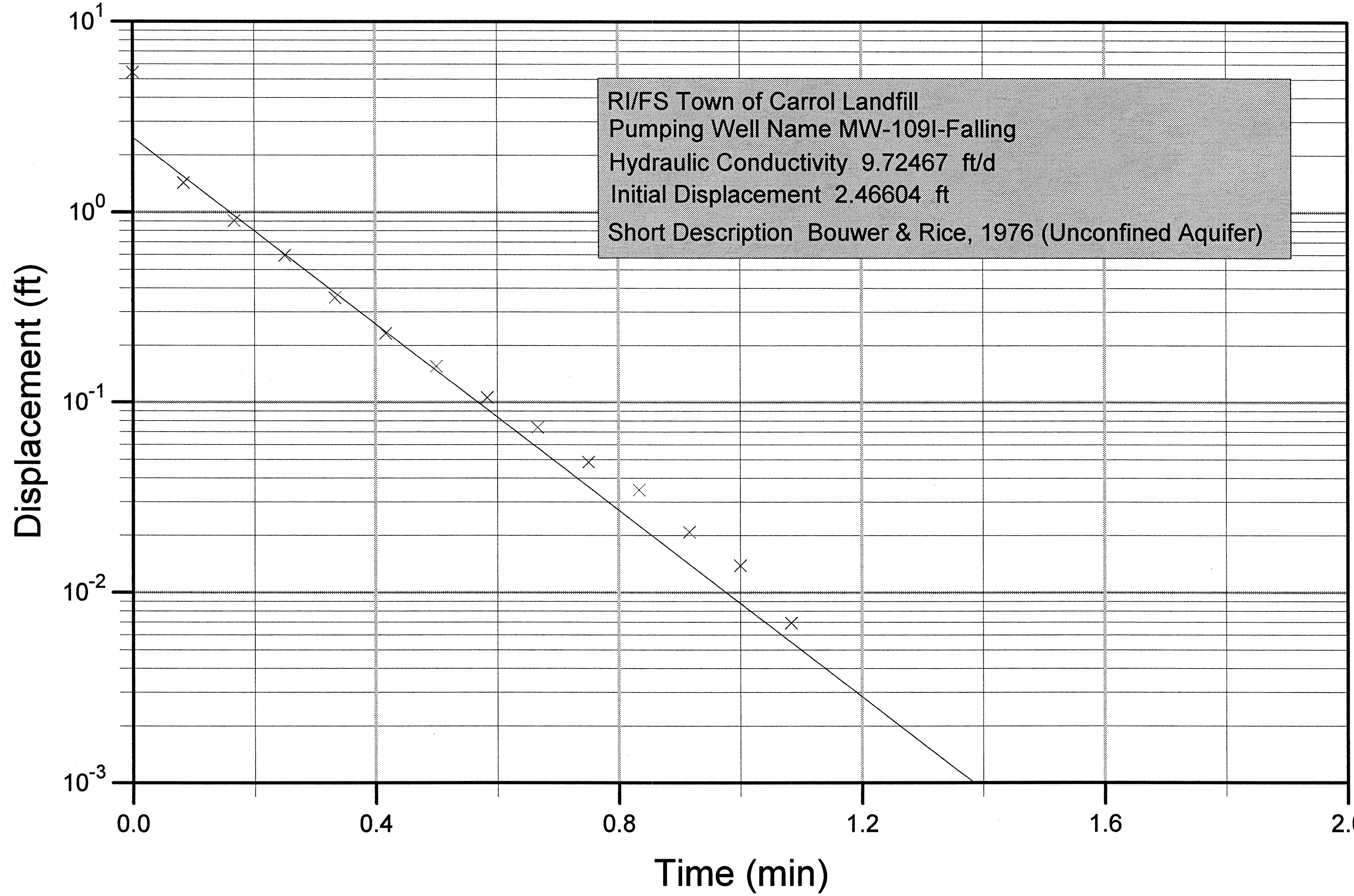
RI/FS Town of Carrol Landfill
Pumping Well Name MW-108S Falling
Hydraulic Conductivity 0.0451612 ft/d
Initial Displacement 1.03006 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
28.8
57.6
86.4
115.2
144.0
Time (min)


Bouwer & Rice
RI/FS Town of Carrol Landfill
Pumping Well Name MW-108I-Falling
Hydraulic Conductivity 0.421081 ft/d
Initial Displacement 2.88403 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
3.2
6.4
9.6
12.8
16.0
Time (min)

Bouwer & Rice

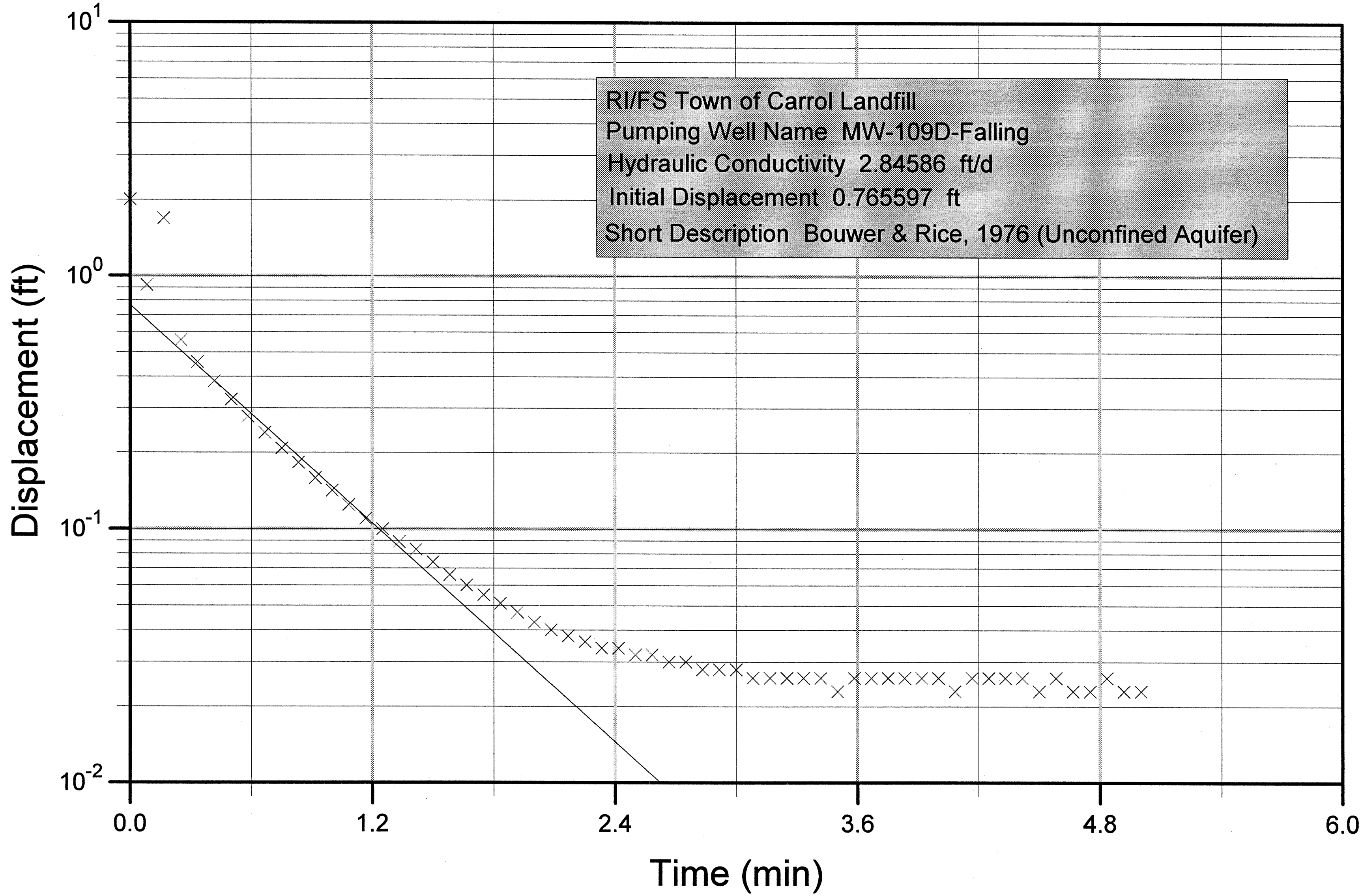

RI/FS Town of Carrol Landfill
Pumping Well Name MW-109S-Falling
Hydraulic Conductivity 0.440559 ft/d
Initial Displacement 1.51931 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
0.0
7.2
14.4
21.6
28.8
36.0
Time (min)

Bouwer & Rice



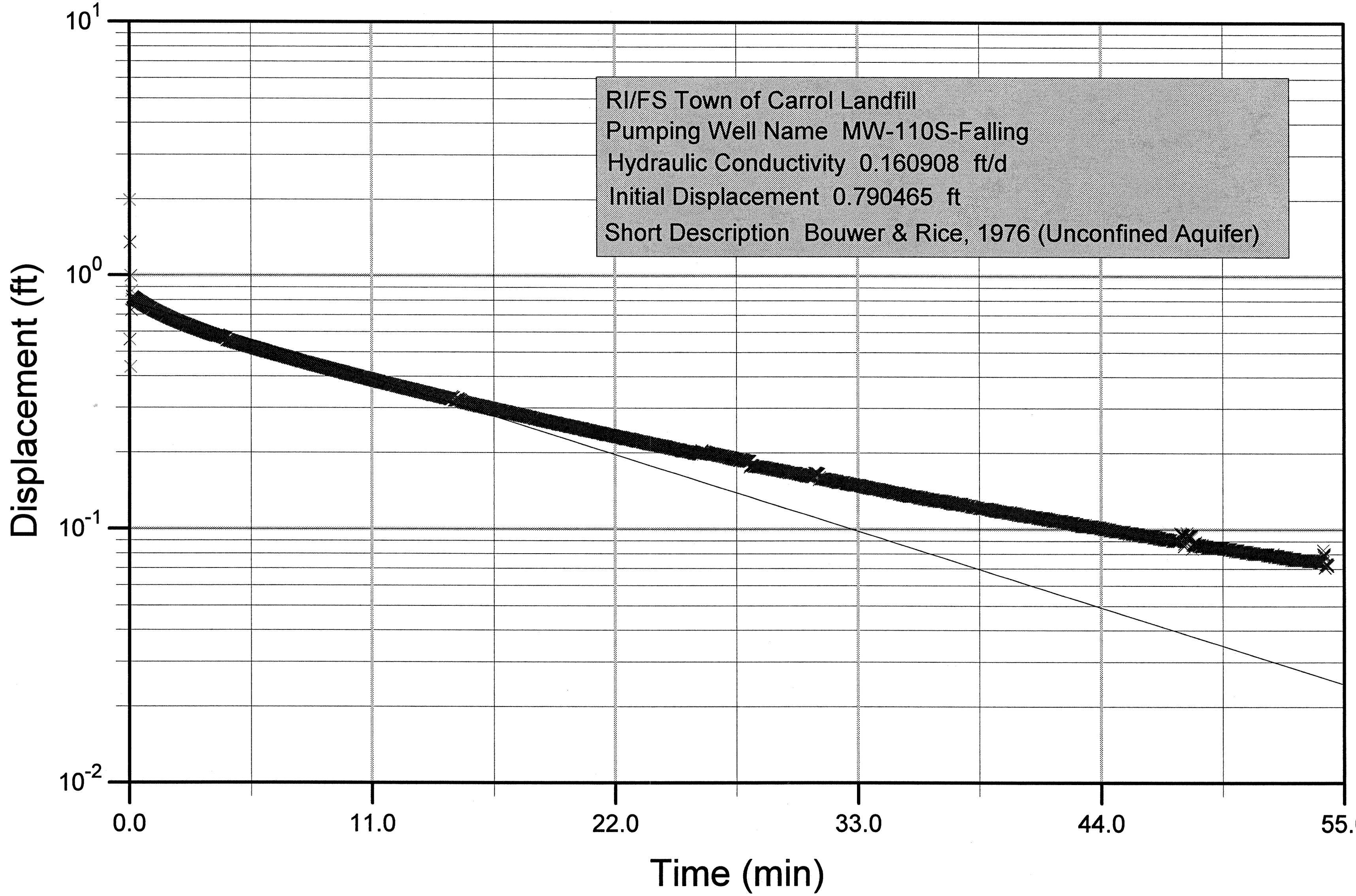
RI/FS Town of Carrol Landfill
Pumping Well Name MW-109I-Falling
Hydraulic Conductivity 9.72467 ft/d
Initial Displacement 2.46604 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
Time (min)
10^1
10^0
10^-1
10^-2
10^-3
0.0
0.4
0.8
1.2
1.6
2.0

Bouwer & Rice



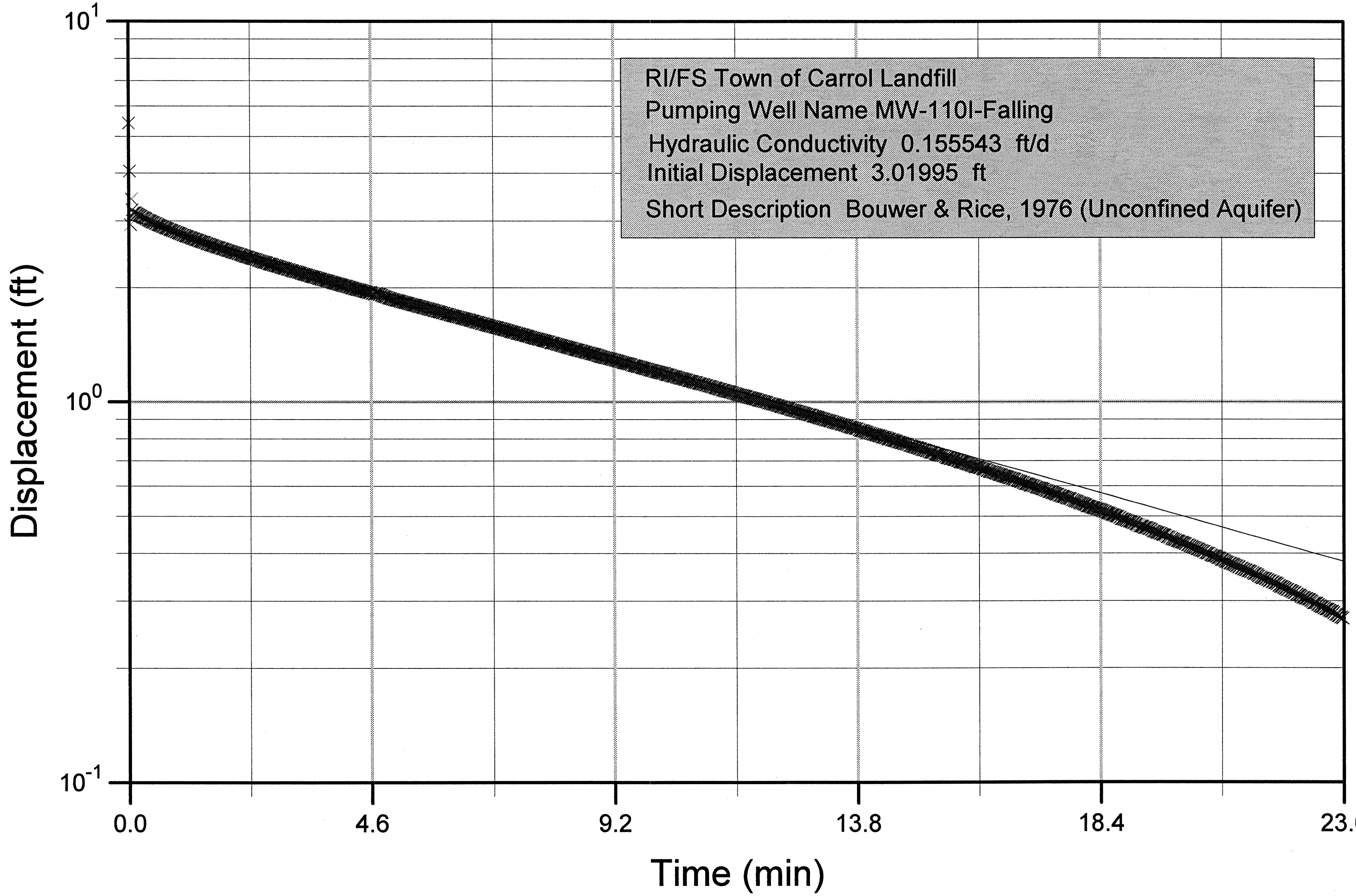
RI/FS Town of Carrol Landfill
Pumping Well Name MW-109D-Falling
Hydraulic Conductivity 2.84586 ft/d
Initial Displacement 0.765597 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
1.2
2.4
3.6
4.8
6.0
Time (min)

Bouwer & Rice



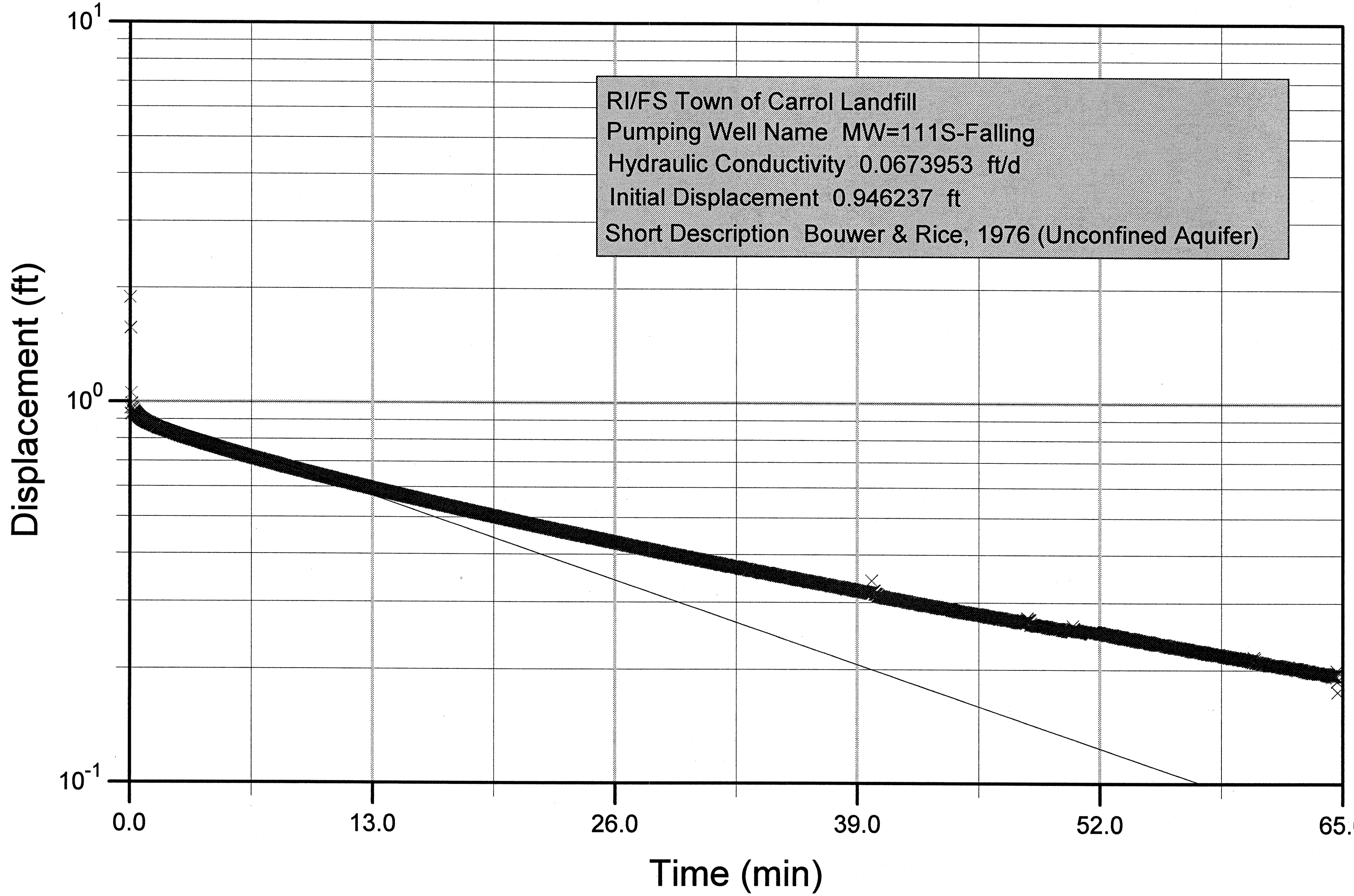
RI/FS Town of Carrol Landfill
Pumping Well Name MW-110S-Falling
Hydraulic Conductivity 0.160908 ft/d
Initial Displacement 0.790465 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
Time (min)
0.0
11.0
22.0
33.0
44.0
55.0

Bouwer & Rice

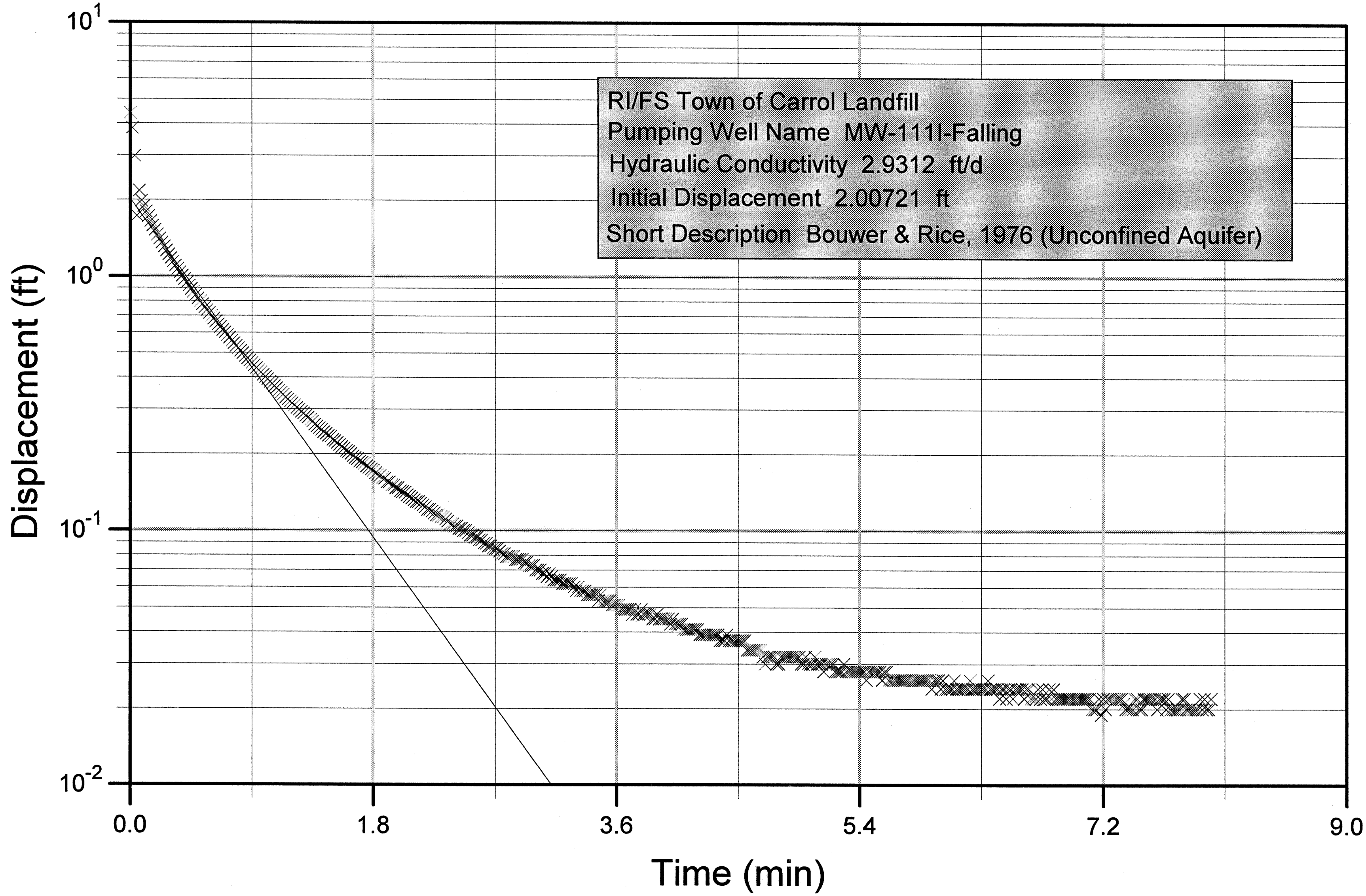


RI/FS Town of Carrol Landfill
Pumping Well Name MW-110I-Falling
Hydraulic Conductivity 0.155543 ft/d
Initial Displacement 3.01995 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
10^1
10^0
10^-1
Displacement (ft)
0.0
4.6
9.2
13.8
18.4
23.0
Time (min)

Bouwer & Rice


RI/FS Town of Carrol Landfill
Pumping Well Name MW=111S-Falling
Hydraulic Conductivity 0.0673953 ft/d
Initial Displacement 0.946237 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^{-1}
0.0
13.0
26.0
39.0
52.0
65.0
Time (min)

Bouwer & Rice


RI/FS Town of Carrol Landfill
Pumping Well Name MW-111I-Falling
Hydraulic Conductivity 2.9312 ft/d
Initial Displacement 2.00721 ft
Short Description Bouwer & Rice, 1976 (Unconfined Aquifer)
Displacement (ft)
10^1
10^0
10^-1
10^-2
0.0
1.8
3.6
5.4
7.2
9.0
Time (min)

APPENDIX E

Appendix E (Summary of Lab data) has been removed from the report and saved as a separate document.

Summary of Frequency of SCG Exceedances and Detections

LEACHATE

Constituent	CAS Number	Concentration Range (ug/L)	SCGs (ug/L)	Frequency of SCG Exceedance	Frequency of Detections
Inorganics					
Aluminum	7429-90-5	109 - 110000	100	3/3	3/3
Arsenic	7440-38-2	<2.7 - 156	150	1/3	2/3
Barium	7440-39-3	327-2680	NC	0/3	3/3
Beryllium	7440-41-7	<0.04 - 5.2	1100	0/3	1/3
Cadmium	7440-43-9	<0.2 - 24.3	4	1/3	2/3
Calcium	7440-70-2	73700 - 606000	NC	0/3	3/3
Chromium	7440-47-3	<0.94 - 142	141	1/3	2/3
Cobalt	7440-48-4	<0.99 - 291	5	1/3	1/3
Copper	7440-50-8	4.9 - 365	18	1/3	3/3
Iron	7439-89-6	14600 - 721000	300	3/3	3/3
Lead	7439-92-1	9.9 - 302	5	3/3	3/3
Magnesium	7439-95-4	8890 - 51200	NC	0/3	3/3
Manganese	7439-96-5	1380 - 4420	NC	0/3	3/3
Mercury	7439-97-6	<0.02 - 0.78	0.77	1/3	2/3
Nickel	7440-02-0	5.7 - 2560	101	1/3	3/3
Potassium	7440-09-7	3720 - 15000	NC	0/3	3/3
Selenium	7782-49-2	<2.7 - 31.2	4.6	1/3	1/3
Silver	7440-22-4	<1.5 - 8.6	16	0/3	1/3
Sodium	7440-23-5	3970 - 4210	NC	0/3	3/3
Thallium	7440-28-0	<3.7 - 22.9	8	1/3	1/3
Vanadium	7440-62-2	<1.1 - 195	14	1/3	2/3
Zinc	7440-66-6	56.3 - 4150	162	1/3	3/3
VOCs					
Acetone	67-64-1	<10 - 4	NC	0/3	2/3
cis-1,2-Dichloroethene	156-59-2	<10 - 24	NC	0/3	1/3
Trichloroethylene	79-01-6	<10 - 21	40	0/3	1/3
Chlorobenzene	108-90-7	<10 - 1	5	0/3	1/3

Notes:

NC - No Criteria
SCG - NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria
ug/L - microgram per liter

SEDIMENT

Constituent	CAS Number	Concentration Range (ug/gOC)	SCGs (ug/gOC)	Frequency of SCG Exceedance	Frequency of Detections
Inorganics					
Aluminum	7429-90-5	9550 - 17100	NA	0/5	5/5
Antimony	7440-36-0	<0.7 - 1.4	2	0/5	2/5
Arsenic	7440-38-2	4.1 - 13.8	6	3/5	5/5
Barium	7440-39-3	67 - 249	NA	0/5	5/5
Beryllium	7440-41-7	0.32 - 0.71	NA	0/5	5/5
Cadmium	7440-43-9	0.23 - 1	0.6	1/5	4/5
Calcium	7440-70-2	927 - 7120	NA	0/5	5/5
Chromium	7440-47-3	9.1 - 23.2	26	0/5	5/5
Cobalt	7440-48-4	3.6 - 16.8	NA	0/5	5/5
Copper	7440-50-8	4.2 - 27.2	16	2/5	5/5
Iron	7439-89-6	13900 - 67300	20000	4/5	5/5
Lead	7439-92-1	15.4 - 39.9	31	1/5	5/5
Magnesium	7439-95-4	1490 - 5060	NA	0/5	5/5
Manganese	7439-96-5	199 - 1320	460	4/5	5/5
Mercury	7439-97-6	0.06 - 0.13	0.15	0/5	5/5
Nickel	7440-02-0	8.2 - 40.4	16	4/5	5/5
Potassium	7440-09-7	766 - 1390	NA	0/5	5/5
Selenium	7782-49-2	0.95 - 2.4	NA	0/5	5/5
Silver	7440-22-4	<0.42 - 0.97	1	0/5	1/5
Sodium	7440-23-5	26.6 - 54.6	NA	0/5	5/5
Thallium	7440-28-0	1.6 - 4.7	NA	0/5	4/5
Vanadium	7440-62-2	15.8 - 24.8	NA	0/5	5/5
Zinc	7440-66-6	44.4 - 191	120	3/5	5/5
SVOCs					
Benzaldehyde	100-52-7	<20.6 - 1.97	NA	0/5	1/5
bis(2-ethylhexyl)phthalate	117-81-7	<20.6 - 4.5	199.5	0/5	1/5
VOCs					
Acetone	67-64-1	0.1 - 0.58	NA	0/5	5/5
2-Butanone	78-93-3	<0.67 - 0.33	NA	0/5	1/5
cis-1,2-Dichloroethene	156-59-2	<0.61 - 0.57	NA	0/5	1/5
Toluene	108-88-3	<0.67 - 0.13	49	0/5	1/5
Styrene	100-42-5	<0.61 - 0.15	NA	0/5	1/5

Notes:
NC - No Criteria
SCG - NYSDEC Technical Guidance for Screening Contaminated Sediments
ug/gOC - microgram per gram organic carbon

SOIL VAPOR

Constituent	CAS Number	Concentration Range (ppbv)	SCGs (ppbv)	Frequency of SCG Exceedance	Frequency of Detections
VOCs					
Ethylbenzene	100-41-4	0.6 - 6	510	0/4	4/4
Styrene	100-42-5	<0.2 - 6	2300	0/4	1/4
1,3,5-Trimethylbenzene	108-67-8	<0.2 - 4	12	0/4	2/4
Toluene	108-88-3	5 - 35	1100	0/4	4/4
Pentane	109-66-0	1 - 20	NC	0/4	4/4
Hexane	110-54-3	0.8 - 8	570	0/4	4/4
Octane	111-65-9	27 - 400	NC	0/4	4/4
Propene	115-07-1	1 - 71	NC	0/4	4/4
Tetrachloroethene	127-18-4	<0.2 - 4	120	0/4	2/4
Xylene (Total)	1330-20-7	2 - 21	NC	0/4	4/4
Heptane	142-82-5	1 - 20	NC	0/4	4/4
Methyl tert-Butyl ether	1634-04-4	4 - 43	8300	0/4	4/4
Isooctane	540-84-1	<2 - 1	NC	0/4	2/4
2-Hexanone	591-78-6	<0.5 - 4	NC	0/4	1/4
4-Ethyltoluene	622-96-8	<0.2 - 8	NC	0/4	2/4
Acetone	67-64-1	7 - 67	1500	0/4	4/4
Chloroform	67-66-3	<0.2 - 9	22	0/4	1/4
Benzene	71-43-2	2 - 8	98	0/4	4/4
Methylene chloride	75-09-2	<0.5 - 0.6	1500	0/4	1/4
Carbon Disulfide	75-15-0	<5 - 4	2200	0/4	2/4
Chlorodifluoromethane	75-45-6	<1 - 53	140000	0/4	1/4
tert-Butyl Alcohol	75-65-0	<0.2 - 3	NC	0/4	2/4
Trichlorofluoromethane	75-69-4	0.5 - 56	1200	0/4	4/4
Dichlorodifluoromethane	75-71-8	0.6 - 7600	400	1/4	4/4
Freon 114	76-14-2	<0.2 - 21	NC	0/4	1/4
2-Butanone	78-93-3	<0.5 - 9	3400	0/4	1/4
Trichloroethylene	79-01-6	<0.2 - 18	4.1	1/4	1/4
o-Xylene	95-47-6	0.7 - 7	16000	0/4	4/4
1,2,4-Trimethylbenzene	95-63-6	<2 - 19	12	1/4	3/4
Isopropylbenzene	98-82-8	<0.2 - 180	810	0/4	1/4

Notes:
NC - No Criteria
SCG - USEPA, 2002 - OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)
ppbv - parts per billion volume

SUBSURFACE SOIL

Constituent	CAS Number	Concentration Range	SCGs	Frequency of SCG Exceedance	Frequency of Detections
Inorganics (mg/Kg)					
Aluminum	7429-90-5	10200 - 14500	NC	0/8	8/8
Antimony	7440-36-0	1.5 - 2.7	NC	0/8	6/8
Arsenic	7440-38-2	10.2 - 29.7	7.5	6/8	8/8
Barium	7440-39-3	212 - 271	300	0/8	8/8
Beryllium	7440-41-7	0.43 - 0.7	0.16	8/8	8/8
Cadmium	7440-43-9	0.87 - 1.9	1	4/8	7/8
Calcium	7440-70-2	4860 - 32200	NC	0/8	8/8
Chromium	7440-47-3	14.1 - 20.7	10	8/8	8/8
Cobalt	7440-48-4	6.9 - 19.9	30	3/8	8/8
Copper	7440-50-8	16.1 - 40.1	25	6/8	8/8
Iron	7439-89-6	59100 - 87200	2	8/8	8/8
Lead	7439-92-1	32.9 - 70.3	NC	0/8	3/8
Magnesium	7439-95-4	2900 - 3110	NC	0/8	8/8
Manganese	7439-96-5	329 - 556	NC	0/8	8/8
Mercury	7439-97-6	0.08 - 0.23	0.1	4/8	8/8
Nickel	7440-02-0	22.5 - 245	13	8/8	8/8
Potassium	7440-09-7	1040 - 1090	NC	0/8	8/8
Selenium	7782-49-2	2.4 - 4.1	2	6/8	8/8
Silver	7440-22-4	<0.62 - 1.4	NC	0/8	5/8
Sodium	7440-23-5	42.7 - 56.1	NC	0/8	8/8
Thallium	7440-28-0	2.7 - 3.4	NC	0/8	7/8
Vanadium	7440-62-2	20.1 - 24.6	150	0/8	8/8
Zinc	7440-66-6	238 - 347	20	8/8	8/8
Pesticides/PCBs (mg/Kg)					
4,4'-DDE	72-55-9	<0.004 - 0.011	2.1	0/2	1/2
Endrin	72-20-8	<0.0048 - 0.02	0.1	0/3	2/3
4,4'-DDD	72-54-8	<0.004 - 0.013	2.9	0/2	1/2
Endrin Ketone	53494-70-5	<0.0048 - 0.013	NC	0/3	1/3
Endrin Aldehyde	7421-36-3	<0.004 - 0.005	NC	0/2	1/2
alpha-Chlordane	5103-71-9	<0.002 - 0.0033	NC	0/3	2/3
Aroclor-1248	12672-29-6	<0.61 - 0.16	10	0/3	1/3
Aroclor-1260	11096-82-5	<0.04 - 0.81	10	0/3	2/3
SVOCs (ug/Kg)					
Benzaldehyde	100-52-7	<380 - 76	NC	0/6	2/6
Caprolactum	105-60-2	<450 - 46	NC	0/6	1/6
Phenanthrene	85-01-8	<380 - 63	50000	0/6	1/6
Fluoranthene	206-44-0	<380 - 140	50000	0/6	1/6
Pyrene	129-00-0	<380 - 260	50000	0/6	1/6
Benzyl Butyl Phthalate	85-68-7	<380 - 45	50000	0/6	1/6
Benzo[a]anthracene	56-55-3	<380 - 62	50000	0/6	1/6
Chrysene	218-01-9	<380 - 98	400	0/6	1/6
bis(2-ethylhexyl)phthalate	117-81-7	<380 - 62000	50000	1/6	3/6
Benzo[b]fluoranthene	205-99-2	<380 - 91	1100	0/6	1/6
VOCs (ug/Kg)					
Vinyl Chloride	75-01-4	<11 - 5	200	0/8	1/8
Bromomethane	74-83-9	<11 - 3	NC	0/8	1/8
Trichlorofluoromethane	75-69-4	<11 - 6	NC	0/8	1/8
Acetone	67-64-1	<11 - 74	200	0/8	3/8
Carbon Disulfide	75-15-0	<11 - 11	2700	0/8	1/8
cis-1,2-Dichloroethene	156-59-2	<11 - 100	NC	0/8	1/8
Benzene	71-43-2	<11 - 2	60	0/8	1/8
Trichloroethylene	79-01-6	<11 - 130	700	0/8	3/8
Methylcylohexane	108-87-2	<11 - 31	NC	0/8	1/8
Toluene	108-88-3	<11 - 13	1500	0/8	1/8
Chlorobenzene	108-90-7	<11 - 60	1700	0/8	3/8
Xylene (Total)	1330-20-7	<11 - 46	1200	0/8	1/8
Isopropylbenzene	98-82-8	<11 - 6	5000	0/8	1/8
1,4-Dichlorobenzene	106-46-7	<11 - 150	8500	0/8	4/8
1,2-Dichlorobenzene	95-50-1	<11 - 8	7900	0/8	1/8

Notes:

NC - No Criteria
SCG - NYSDEC Technical Administrative Guidance Memorandum Number 4046 (TAGM #4046) – Recommended Soil Cleanup Objectives
mg/Kg - milligram per kilogram
ug/Kg - microgram per kilogram

SURFACE SOIL

Constituent	CAS Number	Concentration Range (mg/Kg)	SCGs (mg/Kg)	Frequency of SCG Exceedance	Frequency of Detections
Inorganics					
Aluminum	7429-90-5	5920 - 14400	NC	0/10	10/10
Antimony	7440-36-0	0.81 - 20.7	NC	0/10	8/10
Arsenic	7440-38-2	5.2 - 26.8	7.5	7/10	10/10
Barium	7440-39-3	81.3 - 448	300	1/10	10/10
Beryllium	7440-41-7	0.24 - 0.7	0.16	10/10	10/10
Cadmium	7440-43-9	0.16 - 23.1	1	3/10	7/10
Calcium	7440-70-2	2100 - 25600	NC	0/10	10/10
Chromium	7440-47-3	12.7 - 8870	10	10/10	10/10
Cobalt	7440-48-4	5.7 - 691	30	3/10	10/10
Copper	7440-50-8	11.1 - 1600	25	8/10	10/10
Cyanide	57-12-5	<0.53 - 2	NC	0/10	1/10
Iron	7439-89-6	14400 - 113000	2	10/10	10/10
Lead	7439-92-1	12.7 - 837	NC	0/10	10/10
Magnesium	7439-95-4	2490 - 5790	NC	0/10	10/10
Manganese	7439-96-5	241 - 2380	NC	0/10	10/10
Mercury	7439-97-6	0.02 - 2.2	0.1	5/10	10/10
Nickel	7440-02-0	18.8 - 27700	13	10/10	10/10
Potassium	7440-09-7	567 - 1330	NC	0/10	10/10
Selenium	7782-49-2	0.61 - 3.6	2	4/10	8/10
Silver	7440-22-4	0.68 - 4.2	NC	0/10	6/10
Sodium	7440-23-5	29 - 96.2	NC	0/10	10/10
Thallium	7440-28-0	1.4 - 4.8	NC	0/10	8/10
Vanadium	7440-62-2	10.6 - 61.1	150	0/10	10/10
Zinc	7440-66-6	42.8 - 1700	20	10/10	10/10
Pesticides/PCBs					
4,4'-DDD	72-54-8	0.2 - 13	2900	0/8	4/8
4,4'-DDE	72-55-9	0.05 - 11	2100	0/8	8/8
4,4'-DDT	50-29-3	0.55 - 3.9	2100	0/8	3/8
Aldrin	309-00-2	0.15 - 0.3	41	0/8	2/8
alpha-BHC	319-84-6	<1.8 - 1.1	110	0/8	1/8
alpha-Chlordane	5103-71-9	0.94 - 11	NC	0/8	5/8
Aroclor-1248	12672-29-6	<35 - 160	NC	0/8	1/8
Aroclor-1260	11096-82-5	7.8 - 810	NC	0/8	6/8
Beta-BHC	319-95-7	0.26 - 0.59	NC	0/8	3/8
delta-BHC	319-86-8	<1.8 - 0.18	300	0/8	1/8
Dieldrin	60-57-1	0.16 - 1.3	44	0/8	2/8
Endosulfan I	959-98-8	<1.8 - 3.4	900	0/8	1/8
Endosulfan II	33213-65-9	1.2 - 3.2	900	0/8	2/8
Endosulfan Sulfate	1031-07-8	0.28 - 17	1000	0/8	5/8
Endrin	72-20-8	0.67 - 20	100	0/8	6/8
Endrin Aldehyde	7421-93-4	0.52 - 5.5	NC	0/8	7/8
Endrin Ketone	53494-70-5	0.52 - 13	NC	0/8	4/8
gamma-BHC (Lindane)	58-89-9	<1.8 - 0.35	60	0/8	1/8
gamma-Chlordane	5103-74-2	0.25 - 9.8	540	0/8	6/8
Heptachlor	76-44-8	0.23 - 1.8	100	0/8	2/8
Heptachlor Epoxide	1024-57-3	0.093 - 0.85	20	0/8	4/8
Methoxychlor	72-43-5	1.6 - 30	NC	0/8	4/8

SURFACE SOIL

Constituent	CAS Number	Concentration Range (mg/Kg)	SCGs (mg/Kg)	Frequency of SCG Exceedance	Frequency of Detections
SVOCs					
Benzaldehyde	100-52-7	<380 - 46	NC	0/5	1/5
Benzo[a]anthracene	56-55-3	<380 - 62	224	0/5	1/5
Benzo[b]fluoranthene	205-99-2	<380 - 91	1100	0/5	1/5
Benzyl Butyl Phthalate	85-68-7	<380 - 45	50000	0/5	1/5
bis(2-ethylhexyl)phthalate	117-81-7	73 - 62000	50000	1/5	3/5
Caprolactam	105-60-2	<380 - 46	NC	0/5	1/5
Chrysene	218-01-9	<380 - 98	400	0/5	1/5
Fluoranthene	206-44-0	<380 - 140	50000	0/5	1/5
Phenanthrene	85-01-8	<380 - 63	50000	0/5	1/5
Pyrene	129-00-0	<380 - 260	50000	0/5	1/5
1,4-Dichlorobenzene	106-46-7	7 - 150	8500	0/5	2/5
VOCs					
Acetone	67-64-1	12 - 39	200	0/5	2/5
Carbon Disulfide	75-15-0	<11 - 11	2700	0/5	1/5
Chlorobenzene	108-90-7	<11 - 2	1700	0/5	1/5
Methylcylohexane	108-87-2	<11 - 31	NC	0/5	1/5
Methylene chloride	75-09-2	4 - 10	100	0/5	5/5
Toluene	108-88-3	<11 - 13	1500	0/5	1/5
Trichloroethylene	79-01-6	2 - 8	700	0/5	2/5
Trichlorofluoromethane	75-69-4	<11 - 6	NC	0/5	1/5
Xylene (Total)	1330-20-7	<11 - 46	1200	0/5	1/5

Notes:
NC - No Criteria
SCG - NYSDEC Technical Administrative Guidance Memorandum Number 4046 (TAGM #4046) – Recommended Soil Cleanup Objectives
mg/Kg - milligram per kilogram

SURFACE WATER

Constituent	CAS Number	Concentration Range (ug/L)	SCGs (ug/L)	Frequency of SCG Exceedance	Frequency of Detections
Inorganics					
Aluminum	7429-90-5	0.253 - 10.2	0.1	5/5	5/5
Arsenic	7440-38-2	0.0032 - 0.0062	0.15	0/5	4/5
Barium	7440-39-3	0.0772 - 0.39	NC	0/5	5/5
Beryllium	7440-41-7	0.00007 - 0.00027	1.1	0/5	3/5
Cadmium	7440-43-9	0.00085 - 0.0022	0.004	0/5	2/5
Calcium	7440-70-2	6.74 - 193	NC	0/5	5/5
Chromium	7440-47-3	0.0025 - 0.0094	0.141	0/5	4/5
Cobalt	7440-48-4	0.0069 - 0.0112	0.005	3/5	3/5
Copper	7440-50-8	0.0055 - 0.018	0.018	0/5	4/5
Iron	7439-89-6	1.35 - 47.9	0.3	5/5	5/5
Lead	7439-92-1	0.0084 - 0.0225	0.005	4/5	4/5
Magnesium	7439-95-4	3.02 - 20.7	NC	0/5	5/5
Manganese	7439-96-5	0.416 - 3.23	NC	0/5	5/5
Mercury	7439-97-6	0.00003 - 0.00004	0.00077	0/5	2/5
Nickel	7440-02-0	0.0084 - 0.0428	0.101	0/5	5/5
Potassium	7440-09-7	2.88 - 4.89	NC	0/5	5/5
Selenium	7782-49-2	<0.0027 - 0.0028	0.0046	0/5	1/5
Sodium	7440-23-5	0.786 - 7.24	NC	0/5	5/5
Vanadium	7440-62-2	0.0044 - 0.0166	0.014	1/5	4/5
Zinc	7440-66-6	0.0088 - 0.21	0.162	1/5	5/5
Pesticides					
Endrin	72-20-8	<0.11 - 0.029	0.036	0/1	1/1
SVOCs					
2-Methylphenol	95-48-7	<10 - 11	NC	0/5	1/5
4-Methylphenol	106-44-5	<10 - 4	NC	0/5	1/5
Acetophenone	98-86-2	<10 - 1	NC	0/5	1/5
Phenanthrene	85-01-8	ND	5	0/5	0/5
Phenol	108-95-2	<10 - 11	5	1/5	1/5

Notes:
NC - No Criteria
SCG - NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria
ug/L - microgram per liter

GROUND WATER

Constituent	CAS Number	Concentration Range (ug/L)	SCGs (ug/L)	Frequency of SCG Exceedance	Frequency of Detections
Inorganics					
Aluminum	7429-90-5	<13 - 82900	NC	0/32	31/32
Antimony	7440-36-0	<1.8 - 2.6	3	0/32	4/32
Arsenic	7440-38-2	<2.7 - 87.8	25	9/32	27/32
Barium	7440-39-3	97.2 - 1760	1000	2/32	32/32
Beryllium	7440-41-7	<0.04 - 3.6	3	1/32	24/32
Cadmium	7440-43-9	<0.29 - 8.4	5	1/32	6/32
Calcium	7440-70-2	54400 - 204000	NC	0/16	16/16
Chromium	7440-47-3	<0.94 - 112	50	3/32	28/32
Cobalt	7440-48-4	<1.5 - 74.9	NC	0/32	18/32
Copper	7440-50-8	<1.5 - 162	200	0/32	29/32
Cyanide	57-12-5	<10 - 11	200	0/32	5/32
Iron	7439-89-6	32.7 - 230000	300	31/32	32/32
Lead	7439-92-1	<0.74 - 157	25	5/32	30/32
Magnesium	7439-95-4	12000 - 70900	35000	5/16	16/16
Manganese	7439-96-5	41.1 - 12300	3000	4/32	32/32
Mercury	7439-97-6	<0.01 - 0.34	0.7	0/32	19/32
Nickel	7440-02-0	<1 - 169	NC	0/32	29/32
Potassium	7440-09-7	752 - 19000	NC	0/32	32/32
Selenium	7782-49-2	<2.7 - 4.4	10	0/32	7/32
Silver	7440-22-4	<1.5 - 2.5	50	0/32	3/32
Sodium	7440-23-5	4740 - 27100	20000	1/13	13/13
Thallium	7440-28-0	<3.7 - 15.2	0.5	3/32	3/32
Vanadium	7440-62-2	<1.1 - 118	NC	0/32	30/32
Zinc	7440-66-6	6.4 - 684	2000	0/32	32/32
SVOCs					
Phenol	108-95-2	<10 - 1	1	0/5	1/5
2-Methylphenol	95-48-7	<10 - 1	1	0/5	1/5
4-Methylphenol	106-44-5	<10 - 60	1	1/5	1/5
Naphthalene	91-20-3	<10 - 4	10	0/5	1/5
4-chloro-3-Methylphenol	59-50-7	<10 - 5	1	1/5	1/5
2-Methylnaphthalene	91-57-6	<10 - 1	NC	0/5	1/5
4-Nitrophenol	100-02-7	<25 - 2	1	1/5	1/5
bis(2-ethylhexyl)phthalate	117-81-7	<12 - 1	5	0/5	3/5
VOCs					
Dichlorodifluoromethane	75-71-8	<10 - 9	5	1/43	7/43
Vinyl Chloride	75-01-4	<10 - 600	2	4/43	16/43
Chloroethane	75-00-3	<10 - 7	5	1/43	4/43
Acetone	67-64-1	<10 - 43	50	0/43	25/43
Methylene chloride	75-09-2	<10 - 2	5	0/43	16/43
Carbon Disulfide	75-15-0	<10 - 2	NC	0/43	3/43
trans-1,2-Dichloroethene	156-60-5	<10 - 3	NC	0/43	2/43
1,1-Dichloroethane	75-34-3	<10 - 2	5	0/43	2/43
cis-1,2-Dichloroethene	156-59-2	<10 - 69	5	4/43	14/43
1,2-Dichloroethane	107-06-2	<10 - 2	0.6	1/43	2/43
Benzene	71-43-2	<10 - 2	1	1/43	4/43
Toluene	108-88-3	<10 - 3	5	0/43	9/43
Chlorobenzene	108-90-7	<10 - 1	5	0/43	2/43
Ethylbenzene	100-41-4	<10 - 4	5	0/43	1/43
Xylene (Total)	1330-20-7	<10 - 11	5	1/43	1/43
1,4-Dichlorobenzene	106-46-7	<10 - 0.6	3	0/43	1/43

Notes:
NC - No Criteria
SCG - NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class GA Ground Water Criteria
ug/L - microgram per liter

Data usability summary reports

SUMMARY OF THE ANALYTICAL DATA USABILITY
Town of Carroll Landfill

Soil Volatile Organic Analyses
Samples Collected August 18th & 19th, 2004
Samples Received August 19th & 20th, 2004
Sample Delivery Group: 8685, 8696
Laboratory Reference Numbers:

TP-11/SS-3	E5141
TP-11/SS-3MS	E5141MS
TP-11/SS-3MSD	E5141MSD
TP-04/SS-1	E5142
TP-07/SS-2	E5143
Storage Blank	E5144
TP-10/SS-4	E5246
TP-8/SS-5	E5247

Data were reviewed for usability according to the following criteria:

* - Data Completeness
* - GC/MS Tuning
* - Holding Times
- Calibrations
- Laboratory Blanks
- Field Blank
- Trip Blanks
- Storage Blank
- Equipment Blank
* - System Monitoring Compound Recoveries
* - Internal Standard Recoveries
* - Matrix Spike / Matrix Spike Duplicate
* - Blank Spike
* - Laboratory Control Sample
- Instrument Detection Limits
* - Compound Identification
* - Compound Quantitation

* - Indicates that all criteria were met for this parameter.

DATA USABILITY SUMMARY

The instrument detection limits were analyzed almost one year prior to sample analysis.

Section J of Exhibit B of the NYSDEC ASP protocols states: The Laboratory shall perform and report semiannually verification of instrument detection limits and linear range by methods specified in Exhibit E for each instrument used under this Protocol.

Field, trip and equipment blanks were not analyzed with this sample delivery group.

The minor methylene chloride contamination in the method and trip blanks should be noted.

No other significant problems were found with this sample delivery group, which would affect the usability of the data.

Holding Times

All samples were preserved and analyzed within the 10 day EPA contractual holding time.

Tunes

No problems were detected with the one tune associated with the samples of this delivery group.

System Monitoring Compound Recoveries

All system monitoring compound recoveries were within the required quality assurance limits.

Calibrations

The %RSD of 2-hexanone, 30.2%, was above the 30% quality assurance limit. This compound was not detected in any of the samples and the data were not qualified for the high %RSD.

All of the samples were analyzed on the same day as the initial calibration. A continuing calibration summary was not provided.

Matrix Spike / Matrix Spike Duplicate

Sample TP-11/SS-3 (Lab. #: E5141) was used as the matrix spike and matrix spike duplicate. All recoveries and RPDs were within the NYS DEC ASP quality control limits.

Blank Spike

All blank spike recoveries were within the required quality assurance limits.

Laboratory Control Sample

One laboratory control sample was analyzed with this sample delivery group. The recoveries of all compounds were within the quality assurance limits.

Method Blanks

A low concentration of methylene chloride (1J ug/l) was detected in VBLK01

Methylene chloride was detected in all of the sample of this delivery group at low concentrations.. All of the methylene chloride data was reported as "10 U ug/l" and flagged with the "MB" qualifier.

Trip Blanks

A trip blank was not analyzed with this sample delivery group.

Field Blank

A field blank was not analyzed with this sample delivery group.

Storage Blank

Low concentrations of methylene chloride (2JB ug/l) and acetone (2J ug/l) were detected in the storage blank.

Methylene chloride was detected in all of the samples of this delivery group at low concentrations. All of the methylene chloride data was reported as "10 U ug/l" and flagged with the "MB" qualifier.

Acetone was detected in samples TP-11/SS-3 (Lab. #: E5141) and TP-07/SS-2 (Lab. #: E5143) at low concentrations. The acetone data was reported as "10 U ug/l" and flagged with the "SB" qualifier

Equipment Blanks

An equipment blank was not analyzed with this sample delivery group.

Internal Standard Areas and Retention Times

The recoveries and retention times of all internal standards were within the required quality control limits.

Instrument Detection Limits

The instrument detection limits were analyzed almost one year prior to sample analysis.

Section J of Exhibit B of the NYSDEC ASP protocols states: The Laboratory shall perform and report semiannually verification of instrument detection limits and linear range by methods specified in Exhibit E for each instrument used under this Protocol.

Sample Results

No problems were found with the reported results of any of the samples of this delivery group.

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-11/SS-3

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5141

Level (low/med): LOW__ Date Received: 08/19/04

% Solids: _73.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	10100			P_	
7440-36-0	Antimony_	4.1	B	N J	P_	
7440-38-2	Arsenic__	17.1			P_	
7440-39-3	Barium___	106			P_	
7440-41-7	Beryllium	0.47	B		P_	
7440-43-9	Cadmium__	0.38	B		P_	
7440-70-2	Calcium__	5160			P_	
7440-47-3	Chromium_	291			P_	
7440-48-4	Cobalt___	291			P_	
7440-50-8	Copper___	109			P_	
7439-89-6	Iron_____	52100			P_	
7439-92-1	Lead_____	273		N R	P_	MS= 8101,
7439-95-4	Magnesium	3720			P_	
7439-96-5	Manganese	703			P_	
7439-97-6	Mercury__	0.06	B		CV	
7440-02-0	Nickel___	588			P_	
7440-09-7	Potassium	883	B		P_	
7782-49-2	Selenium_	1.6		N J	P_	
7440-22-4	Silver___	0.87	B		P_	
7440-23-5	Sodium___	36.2	B		P_	
7440-28-0	Thallium_	2.0	B	J	P_	Low CRDL
7440-62-2	Vanadium_	20.6			P_	
7440-66-6	Zinc_____	301			P_	
	Cyanide__	0.68	U		C_	

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-04/SS-1

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5142

Level (low/med): LOW__ Date Received: 08/19/04

% Solids: _86.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	10900	_		P_
7440-36-0	Antimony_	0.42	U	NJ	P_
7440-38-2	Arsenic__	5.2	_		P_
7440-39-3	Barium__	127	_		P_
7440-41-7	Beryllium	0.70	B		P_
7440-43-9	Cadmium__	0.16	B		P_
7440-70-2	Calcium__	2100	_		P_
7440-47-3	Chromium_	15.0	_		P_
7440-48-4	Cobalt___	8.7	B		P_
7440-50-8	Copper___	11.1	_		P_
7439-89-6	Iron___	20600	_		P_
7439-92-1	Lead___	12.7	_	N R	P_
7439-95-4	Magnesium	2760	_		P_
7439-96-5	Manganese	241	_		P_
7439-97-6	Mercury__	0.04	B		CV
7440-02-0	Nickel___	23.0	_		P_
7440-09-7	Potassium	607	B		P_
7782-49-2	Selenium_	0.61	B	NJ	P_
7440-22-4	Silver___	0.28	U		P_
7440-23-5	Sodium___	39.2	B		P_
7440-28-0	Thallium_	1.4	B	J	P_
7440-62-2	Vanadium_	17.3	_		P_
7440-66-6	Zinc___	56.4	_		P_
	Cyanide__	0.58	U		C_

MS= 210%

Low CRDL

Color Before: ________ Clarity Before: ______ Texture: ______

Color After: ________ Clarity After: ______ Artifacts: ______

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-07/SS-2

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5143

Level (low/med): LOW__ Date Received: 08/19/04

% Solids: _63.5 * use 8 x dilution

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9190			P	
7440-36-0	Antimony	* ~~20.7~~		NJ	P	
7440-38-2	Arsenic	26.8			P	
7440-39-3	Barium	206			P	
7440-41-7	Beryllium	0.55	B		P	
7440-43-9	Cadmium	* ~~23.1~~			P	
7440-70-2	Calcium	18200			P	
7440-47-3	Chromium	8870			P	
7440-48-4	Cobalt	691			P	
7440-50-8	Copper	* ~~1600~~			P	
7439-89-6	Iron	79900			P	
7439-92-1	Lead	* ~~837~~		NR	P	MS=210%
7439-95-4	Magnesium	5150			P	
7439-96-5	Manganese	2380			P	
7439-97-6	Mercury	2.2			CV	
7440-02-0	Nickel	* ~~27700~~			P	
7440-09-7	Potassium	573	B		P	
7782-49-2	Selenium	3.2		NJ	P	
7440-22-4	Silver	4.2			P	
7440-23-5	Sodium	96.2	B		P	
7440-28-0	Thallium	4.4		J	P	Low CRDL
7440-62-2	Vanadium	61.1			P	
7440-66-6	Zinc	* ~~1700~~			P	
	Cyanide	2.0			C	

Color Before: ________ Clarity Before: ______ Texture: ______

Color After: ________ Clarity After: ______ Artifacts: ______

Comments:

Ni, Zn above Linear range; Dilute and rerun for Ni and Zn and the ICC elements: Sb, Cd, Co, Pb

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-07/SS-2

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5143DL

Level (low/med): LOW__ Date Received: 08/19/04

% Solids: _63.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_	24.3	B	NJ	P_
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__	23.9			P_
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___	731			P_
7440-50-8	Copper___				NR
7439-89-6	Iron_____				NR
7439-92-1	Lead_____	888		N R	P_
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___	30700			P_
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____	1820			P_
	Cyanide__				NR

MS = 210%

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-10/SS-4

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5216

Level (low/med): LOW__ Date Received: 08/21/04

% Solids: _55.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	6970			P_	
7440-36-0	Antimony_	18.3	B	NJ	P_	
7440-38-2	Arsenic__	6.5			P_	
7440-39-3	Barium___	93.7			P_	
7440-41-7	Beryllium	0.35	B		P_	
7440-43-9	Cadmium__	1.2	B		P_	
7440-70-2	Calcium__	13300			P_	
7440-47-3	Chromium_	5900			P_	
7440-48-4	Cobalt___	179			P_	
7440-50-8	Copper___	297			P_	
7439-89-6	Iron_____	75800			P_	
7439-92-1	Lead_____	134		NR	P_	R
7439-95-4	Magnesium	2490			P_	
7439-96-5	Manganese	1160			P_	
7439-97-6	Mercury__	0.16	B		CV	
7440-02-0	Nickel___	4300			P_	
7440-09-7	Potassium	567	B		P_	
7782-49-2	Selenium_	2.5		NJ	P_	
7440-22-4	Silver___	2.1	B		P_	
7440-23-5	Sodium___	29.0	B		P_	
7440-28-0	Thallium_	1.9	B	J	P_	Low CRDL
7440-62-2	Vanadium_	32.8			P_	
7440-66-6	Zinc_____	274			P_	
	Cyanide__	0.91	U		C_	

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

FORM I - IN ILM04.0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

TP-8/SS-5

Lab Name: OBRIEN_AND_GERE_LABORATOR Contract: 3435229748

Lab Code: 10155_ Case No.: OBGE__ SAS No.: ______ SDG No.: 8685__

Matrix (soil/water): SOIL_ Lab Sample ID: E5217

Level (low/med): LOW__ Date Received: 08/21/04

% Solids: _83.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	7380			P_	
7440-36-0	Antimony_	0.43	U	NJ	P_	
7440-38-2	Arsenic__	12.1			P_	
7440-39-3	Barium___	122			P_	
7440-41-7	Beryllium	0.32	B		P_	
7440-43-9	Cadmium__	0.06	U		P_	
7440-70-2	Calcium__	7410			P_	
7440-47-3	Chromium_	23.1			P_	
7440-48-4	Cobalt___	11.6	B		P_	
7440-50-8	Copper___	42.8			P_	
7439-89-6	Iron_____	113000			P_	
7439-92-1	Lead_____	16.6		N R	P_	MS=210%
7439-95-4	Magnesium	3060			P_	
7439-96-5	Manganese	1110			P_	
7439-97-6	Mercury__	0.02	B		CV	
7440-02-0	Nickel___	27.1			P_	
7440-09-7	Potassium	839	B		P_	
7782-49-2	Selenium_	3.6		NJ	P_	
7440-22-4	Silver___	1.5	B		P_	
7440-23-5	Sodium___	30.3	B		P_	
7440-28-0	Thallium_	2.7		J	P_	Low < RDL
7440-62-2	Vanadium_	12.0			P_	
7440-66-6	Zinc_____	80.1			P_	
	Cyanide__	0.60	U		C_	

Color Before: ________ Clarity Before: ______ Texture: ______

Color After: ________ Clarity After: ______ Artifacts: ______

Comments:

FORM I - IN ILM04.0

GC/MS Volatile Organics Case Narrative

Client: O'Brien & Gere Engineers, Inc.
Job Number: 3435.229.74894
Package #: 8685, 8696
Methodology: OLM04.2

Analyzed/Reviewed by (Initials/Date): SG 10-4-04

Supervisor/Reviewed by (Initials/Date): AW 10-4-04

QA/QC Review (Initials/Date): 10-4-04

File Name: C:\Documents MS3\Narratives\8685vnar.doc

GC/MS Volatile Organics
The GC/MS Volatile instruments used a Restek Rtx-502.2, 105 m x 0.53 mm ID capillary column and a Vocarb 3000 trap.

Holding Times and Sample Preservation
All samples were prepared and analyzed within the method and/or QAPP specified holding time requirements. Aqueous soil QA/QC samples had a pH of < 2.

Laboratory Control Sample
All spike recoveries met method and/or project specific QC criteria.

MS/MSD/MSB
All spike recovery and RPD data met method and/or project specific QC criteria.

Surrogate Standards
All surrogate standard recoveries met method and/or project specific QC criteria.

Internal Standards
All internal standard areas met method and/or project specific QC criteria.

Calibrations
All initial calibrations and calibration verifications met method and/or project specific QC criteria.

Preparation Blanks
All preparation blanks met method and/or project specific QC criteria.

Miscellaneous
The sample TP-07/SS-2 [E5143] was diluted due to matrix interference and reporting limits are elevated.

GC/MS Semi-Volatile Organics Case Narrative

Client:	O'Brien & Gere Engineers, Inc.
Job Number:	3435.229.74894
Package #:	8685,8686
Methodology:	OLM04.2

Analyzed/Reviewed by (Initials/Date): MM 10-6-04

Supervisor/Reviewed by (Initials/Date): AW 10-6-04

QA/QC Review (Initials/Date): A 10-6-04

File Name: C:\Documents MS5\Narratives\8685svnar.doc

GC/MS Semi-Volatile Organics
The GC/MS Semi-volatile instruments used a Zebron ZB-5, 30 m x 0.25 mm ID capillary column.

Holding Times and Sample Preservation
All samples were prepared and analyzed within the method and/or QAPP specified holding time requirements.

Laboratory Control Sample
The following compound(s) did not meet laboratory control sample recovery criteria:

LCS No.	Compound	Corrective Action
L082404S1	4-Chloroaniline	1
D082404S1	4-Chloroaniline	1

1 The recovery exceeded the lower control limit. The chromatogram was inspected for concentrations down to the MDL and the analyte was not detected. The control limits used are in-house limits and may not accurately reflect the method. No corrective action was taken.

Surrogate Standards
All surrogate standard recoveries met method and/or project specific QC criteria.

Internal Standards
All internal standard areas met method and/or project specific QC criteria.

Calibrations
All initial calibrations and calibration verifications met method and/or project specific QC criteria.

Preparation Blanks
All preparation blanks met method and/or project specific QC criteria.

Miscellaneous
Samples TP-07/SS-2[E5143] and TP-10/SS-4[E5216] had elevated detection limits due to matrix interference.

GC Semivolatile Organics Case Narrative

Client:	O'Brien & Gere Engineers, Inc.
Job Number:	3435.229.74894
Package #:	8685,8696
Methodology	OLM4.2

Analyzed/Reviewed by (Initials/Date): 10-27-04

Supervisor/Reviewed by (Initials/Date): 10/27/04

QA/QC Review (Initials/Date): 10-27-04

File Name : A:\8685PST.NAR

Pesticide/PCBs

Holding Times
All samples were prepared and analyzed within the method and/or QAPP specified holding time requirements.

Laboratory Control Samples
The following compound(s) did not meet laboratory control sample recovery criteria:

LCS No.	Compound	Column	Corrective Action
L082404S2	d-BHC	RTXCLP	1

1. This compound failed marginally and met criteria on the RTXCLP2 column. No corrective action was taken.

MSB
All spike recovery data met method and/or project specific QC criteria.

Surrogates
The following samples did not meet criteria for surrogate recoveries for Decachlorobiphenyl (DCBP):

Sample Description	Sample #	Column	Corrective Action
TP-10/SS-4	E5216	RTXCLP2	1
TP-8/SS-5	E5217	RTXCLP2	1

1. The recoveries failed high due to matrix interference. The control limits are advisory only. No corrective action is required.

Calibrations
All calibrations and calibration verifications met method and/or project specific QC criteria.

Preparation Blanks
All preparation blanks met method and/or project specific QC criteria.

Client:	O'Brien & Gere Engineers, Inc.
Job Number:	3435.229.74894
Package:	8685,8696
Methodology:	OLM4.2

Miscellaneous

The resolution check analyzed on the RTXCLP column did not meet the >60% method criteria for Endosulfan I (57%). All other resolution criteria were met and the excursion did not impact peak identification.

A GPC check was not analyzed for this QC batch of samples.

Project Management Case Narrative

INTRODUCTION/ANALYTICAL RESULTS

This report summarizes the laboratory results for O'Brien & Gere Engineers, Inc. samples from the Town of Carroll Landfill. New York State Department of Environmental Conservation forms are included in the Laboratory Report Package.

CONDITION UPON RECEIPT/CHAIN OF CUSTODY

The cooler(s) were received intact. When the cooler(s) were received by the laboratory, the sample custodian(s) opened and inspected the shipment(s) for damage and custody inconsistencies. Chain of custodies documenting receipt are presented in the chain of custody section. Each sample was assigned a unique laboratory number and a custody file created. The samples were placed in a secured walk-in cooler and signed in and out by the chemists performing the tests. The sign out record, or lab chronicle, is presented in the chain of custody section.

No discrepancies were noted upon receipt. Temperatures of the well-iced coolers were 2°C and 2.4°C.

METHODOLOGY

The following methods were used to perform the analyses:

PARAMETER	METHOD	REFERENCE
Volatile Organics	OLM04.2	1
Semivolatile Organics	OLM04.2	1
Pesticides/PCBs	OLM04.2	1
ICP Metals	200.7 CLP-M*	1
Mercury	245.5 CLP-M*	1
Cyanide	335.2 CLP-M*	1
Percent Total Solids	2540-G	2

1) New York State Department of Environmental Conservation Analytical Services Protocol, October 1995.

2) Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.

QUALITY CONTROL

QA/QC results are summarized in the Laboratory Report Package and are also included in the raw data.

RAW DATA

The raw data is organized in the New York State Department of Environmental Conservation Analytical Services Protocol Superfund order of data requirements.

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5895.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 26.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q	
75-71-8	Dichlorodifluoromethane	13	U	
74-87-3	Chloromethane	13	U	
75-01-4	Vinyl chloride	13	U	
74-83-9	Bromomethane	13	U	
75-00-3	Chloroethane	13	U	
75-69-4	Trichlorofluoromethane	13	U	
67-64-1	Acetone	13 ~~12~~	~~J~~U	S.B.
75-35-4	1,1-Dichloroethene	13	U	
75-09-2	Methylene chloride	13 ~~5~~	~~JB~~U	M.B./S.B.
79-20-9	Methyl acetate	13	U	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	13	U	
75-15-0	Carbon disulfide	13	U	
156-60-5	trans-1,2-Dichloroethene	13	U	
1634-04-4	Methyl tert-Butyl ether	13	U	
75-34-3	1,1-Dichloroethane	13	U	
78-93-3	2-Butanone	13	U	
156-59-4	cis-1,2-Dichloroethene	13	U	
67-66-3	Chloroform	13	U	
107-06-2	1,2-Dichloroethane	13	U	
71-55-6	1,1,1-Trichloroethane	13	U	
110-82-7	Cyclohexane	13	U	
56-23-5	Carbon tetrachloride	13	U	
71-43-2	Benzene	13	U	
79-01-6	Trichloroethene	13	U	
78-87-5	1,2-Dichloropropane	13	U	
75-27-4	Bromodichloromethane	13	U	
108-87-2	Methylcyclohexane	13	U	
10061-01-5	cis-1,3-Dichloropropene	13	U	
10061-02-6	trans-1,3-Dichloropropene	13	U	
79-00-5	1,1,2-Trichloroethane	13	U	
124-48-1	Dibromochloromethane	13	U	
75-25-2	Bromoform	13	U	
108-10-01	4-Methyl-2-pentanone	13	U	
108-88-3	Toluene	13	U	
127-18-4	Tetrachloroethene	13	U	
591-78-6	2-Hexanone	13	U	
106-93-4	1,2-Dibromoethane	13	U	
108-90-7	Chlorobenzene	2	J	
100-41-4	Ethylbenzene	13	U	

1A

NYSDEC SAMPLE

VOLATILE ORGANICS ANALYSIS DATA SHEET

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5895.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 26.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND	UG/KG	Q
95-47-6	Xylene (total)	13	U
100-42-5	Styrene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
98-82-8	Isopropylbenzene	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	7	J
95-50-1	1,2-Dichlorobenzene	13	U
96-12-8	1,2-Dibromo-3-chloropropane	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5895.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 26.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 1

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q
1.	unknown C10H18	26.59	11	J

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04/SS-1

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5896.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 13.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q
75-71-8	Dichlorodifluoromethane	11	U
74-87-3	Chloromethane	11	U
75-01-4	Vinyl chloride	11	U
74-83-9	Bromomethane	11	U
75-00-3	Chloroethane	11	U
75-69-4	Trichlorofluoromethane	11	U
67-64-1	Acetone	11	U
75-35-4	1,1-Dichloroethene	11	U
75-09-2	Methylene chloride	11 ~~4~~	~~JB~~ U M.B./S.B
79-20-9	Methyl acetate	11	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	11	U
75-15-0	Carbon disulfide	11	U
156-60-5	trans-1,2-Dichloroethene	11	U
1634-04-4	Methyl tert-Butyl ether	11	U
75-34-3	1,1-Dichloroethane	11	U
78-93-3	2-Butanone	11	U
156-59-4	cis-1,2-Dichloroethene	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	U
71-55-6	1,1,1-Trichloroethane	11	U
110-82-7	Cyclohexane	11	U
56-23-5	Carbon tetrachloride	11	U
71-43-2	Benzene	11	U
79-01-6	Trichloroethene	11	U
78-87-5	1,2-Dichloropropane	11	U
75-27-4	Bromodichloromethane	11	U
108-87-2	Methylcyclohexane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
79-00-5	1,1,2-Trichloroethane	11	U
124-48-1	Dibromochloromethane	11	U
75-25-2	Bromoform	11	U
108-10-01	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	11	U
127-18-4	Tetrachloroethene	11	U
591-78-6	2-Hexanone	11	U
106-93-4	1,2-Dibromoethane	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04/SS-1

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5896.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 13.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
95-47-6	Xylene (total)	11	U
100-42-5	Styrene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
98-82-8	Isopropylbenzene	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
96-12-8	1,2-Dibromo-3-chloropropane	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04/SS-1

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5896.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 13.4 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 0.7 (g/ml) G Lab File ID: M5899.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 36.5 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q	
75-71-8	Dichlorodifluoromethane	110	U	
74-87-3	Chloromethane	110	U	
75-01-4	Vinyl chloride	110	U	
74-83-9	Bromomethane	110	U	
75-00-3	Chloroethane	110	U	
75-69-4	Trichlorofluoromethane	6	J	
67-64-1	Acetone	110 ~~30~~	~~J~~ U	S.B.
75-35-4	1,1-Dichloroethene	110	U	
75-09-2	Methylene chloride	110 ~~10~~	~~JB~~ U	M.B./S.B
79-20-9	Methyl acetate	110	U	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	110	U	
75-15-0	Carbon disulfide	11	J	
156-60-5	trans-1,2-Dichloroethene	110	U	
1634-04-4	Methyl tert-Butyl ether	110	U	
75-34-3	1,1-Dichloroethane	110	U	
78-93-3	2-Butanone	110	U	
156-59-4	cis-1,2-Dichloroethene	110	U	
67-66-3	Chloroform	110	U	
107-06-2	1,2-Dichloroethane	110	U	
71-55-6	1,1,1-Trichloroethane	110	U	
110-82-7	Cyclohexane	110	U	
56-23-5	Carbon tetrachloride	110	U	
71-43-2	Benzene	110	U	
79-01-6	Trichloroethene	8	J	
78-87-5	1,2-Dichloropropane	110	U	
75-27-4	Bromodichloromethane	110	U	
108-87-2	Methylcyclohexane	31	J	
10061-01-5	cis-1,3-Dichloropropene	110	U	
10061-02-6	trans-1,3-Dichloropropene	110	U	
79-00-5	1,1,2-Trichloroethane	110	U	
124-48-1	Dibromochloromethane	110	U	
75-25-2	Bromoform	110	U	
108-10-01	4-Methyl-2-pentanone	110	U	
108-88-3	Toluene	13	J	
127-18-4	Tetrachloroethene	110	U	
591-78-6	2-Hexanone	110	U	
106-93-4	1,2-Dibromoethane	110	U	
108-90-7	Chlorobenzene	110	U	
100-41-4	Ethylbenzene	110	U	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 0.7 (g/ml) G Lab File ID: M5899.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 36.5 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
95-47-6	Xylene (total)	47	J
100-42-5	Styrene	110	U
79-34-5	1,1,2,2-Tetrachloroethane	110	U
98-82-8	Isopropylbenzene	110	U
541-73-1	1,3-Dichlorobenzene	110	U
106-46-7	1,4-Dichlorobenzene	150	
95-50-1	1,2-Dichlorobenzene	110	U
96-12-8	1,2-Dibromo-3-chloropropane	110	U
120-82-1	1,2,4-Trichlorobenzene	110	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 0.7 (g/ml) G Lab File ID: M5899.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 36.5 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 10

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q
1.	unknown C8H16	19.22	54	J
2.	unknown C9H18	21.01	58	J
3.	unknown	21.35	380	J
4.	unknown C9H18	21.84	140	J
5.	unknown	22.81	240	J
6.	unknown C9H18	23.94	270	J
7.	unknown hydrocarbon	24.14	330	J
8.	unknown C10H20	25.63	950	J
9. 002958-76-1	Naphthalene, decahydro-2-methy	30.12	510	JN
10. 002958-76-1	Naphthalene, decahydro-2-methy	30.58	610	JN

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5144

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: Storage Blank

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5894.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 0 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
67-64-1	Acetone	2	J
75-35-4	1,1-Dichloroethene	10	U
75-09-2	Methylene chloride	2	JB (M.B.)
79-20-9	Methyl acetate	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	10	U
75-15-0	Carbon disulfide	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl tert-Butyl ether	10	U
75-34-3	1,1-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
156-59-4	cis-1,2-Dichloroethene	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon tetrachloride	10	U
71-43-2	Benzene	10	U
79-01-6	Trichloroethene	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
108-87-2	Methylcyclohexane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
124-48-1	Dibromochloromethane	10	U
75-25-2	Bromoform	10	U
108-10-01	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5144

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: Storage Blank

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5894.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 0 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

95-47-6	Xylene (total)	10	U
100-42-5	Styrene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
98-82-8	Isopropylbenzene	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5144

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: Storage Blank

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5894.D

Level: (low/med) LOW Date Received: 8/19/04

% Moisture: not dec. 0 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS4

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5897.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 45 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	18	U
74-87-3	Chloromethane	18	U
75-01-4	Vinyl chloride	18	U
74-83-9	Bromomethane	18	U
75-00-3	Chloroethane	18	U
75-69-4	Trichlorofluoromethane	18	U
67-64-1	Acetone	18	U
75-35-4	1,1-Dichloroethene	18	U
75-09-2	Methylene chloride	185	~~JB~~ U (M.B)/S.B.
79-20-9	Methyl acetate	18	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	18	U
75-15-0	Carbon disulfide	18	U
156-60-5	trans-1,2-Dichloroethene	18	U
1634-04-4	Methyl tert-Butyl ether	18	U
75-34-3	1,1-Dichloroethane	18	U
78-93-3	2-Butanone	18	U
156-59-4	cis-1,2-Dichloroethene	18	U
67-66-3	Chloroform	18	U
107-06-2	1,2-Dichloroethane	18	U
71-55-6	1,1,1-Trichloroethane	18	U
110-82-7	Cyclohexane	18	U
56-23-5	Carbon tetrachloride	18	U
71-43-2	Benzene	18	U
79-01-6	Trichloroethene	18	U
78-87-5	1,2-Dichloropropane	18	U
75-27-4	Bromodichloromethane	18	U
108-87-2	Methylcyclohexane	18	U
10061-01-5	cis-1,3-Dichloropropene	18	U
10061-02-6	trans-1,3-Dichloropropene	18	U
79-00-5	1,1,2-Trichloroethane	18	U
124-48-1	Dibromochloromethane	18	U
75-25-2	Bromoform	18	U
108-10-01	4-Methyl-2-pentanone	18	U
108-88-3	Toluene	18	U
127-18-4	Tetrachloroethene	18	U
591-78-6	2-Hexanone	18	U
106-93-4	1,2-Dibromoethane	18	U
108-90-7	Chlorobenzene	18	U
100-41-4	Ethylbenzene	18	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS4

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5897.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 45 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

95-47-6	Xylene (total)	18	U
100-42-5	Styrene	18	U
79-34-5	1,1,2,2-Tetrachloroethane	18	U
98-82-8	Isopropylbenzene	18	U
541-73-1	1,3-Dichlorobenzene	18	U
106-46-7	1,4-Dichlorobenzene	18	U
95-50-1	1,2-Dichlorobenzene	18	U
96-12-8	1,2-Dibromo-3-chloropropane	18	U
120-82-1	1,2,4-Trichlorobenzene	18	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS4

Sample wt/vol: 5.1 (g/ml) G Lab File ID: M5897.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 45 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5898.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 16.7 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q	
75-71-8	Dichlorodifluoromethane	12	U	
74-87-3	Chloromethane	12	U	
75-01-4	Vinyl chloride	12	U	
74-83-9	Bromomethane	12	U	
75-00-3	Chloroethane	12	U	
75-69-4	Trichlorofluoromethane	12	U	
67-64-1	Acetone	12	U	
75-35-4	1,1-Dichloroethene	12	U	
75-09-2	Methylene chloride	12 ~~5~~	~~JB~~ U	M.B/S.B
79-20-9	Methyl acetate	12	U	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroetha	12	U	
75-15-0	Carbon disulfide	12	U	
156-60-5	trans-1,2-Dichloroethene	12	U	
1634-04-4	Methyl tert-Butyl ether	12	U	
75-34-3	1,1-Dichloroethane	12	U	
78-93-3	2-Butanone	12	U	
156-59-4	cis-1,2-Dichloroethene	12	U	
67-66-3	Chloroform	12	U	
107-06-2	1,2-Dichloroethane	12	U	
71-55-6	1,1,1-Trichloroethane	12	U	
110-82-7	Cyclohexane	12	U	
56-23-5	Carbon tetrachloride	12	U	
71-43-2	Benzene	12	U	
79-01-6	Trichloroethene	2	J	
78-87-5	1,2-Dichloropropane	12	U	
75-27-4	Bromodichloromethane	12	U	
108-87-2	Methylcyclohexane	12	U	
10061-01-5	cis-1,3-Dichloropropene	12	U	
10061-02-6	trans-1,3-Dichloropropene	12	U	
79-00-5	1,1,2-Trichloroethane	12	U	
124-48-1	Dibromochloromethane	12	U	
75-25-2	Bromoform	12	U	
108-10-01	4-Methyl-2-pentanone	12	U	
108-88-3	Toluene	12	U	
127-18-4	Tetrachloroethene	12	U	
591-78-6	2-Hexanone	12	U	
106-93-4	1,2-Dibromoethane	12	U	
108-90-7	Chlorobenzene	12	U	
100-41-4	Ethylbenzene	12	U	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5898.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 16.7 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

95-47-6	Xylene (total)	12	U
100-42-5	Styrene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
98-82-8	Isopropylbenzene	12	U
541-73-1	1,3-Dichlorobenzene	12	U
106-46-7	1,4-Dichlorobenzene	12	U
95-50-1	1,2-Dichlorobenzene	12	U
96-12-8	1,2-Dibromo-3-chloropropane	12	U
120-82-1	1,2,4-Trichlorobenzene	12	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

NYSDEC SAMPLE

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 5.0 (g/ml) G Lab File ID: M5898.D

Level: (low/med) LOW Date Received: 8/21/04

% Moisture: not dec. 16.7 Date Analyzed: 8/26/04

GC Column: Rtx-502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5 (uL) Soil Aliquot Volume: 5 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 10/95

SUMMARY OF THE ANALYTICAL DATA USABILITY
Town of Carroll Landfill

Soil Semivolatile Organic Analyses – Method 95-1
With Benzaldehye, Acetophenone and Caprolactam
Samples Collected August 18th & 19th, 2004
Samples Received August 19th & 20th, 2004
Sample Delivery Group: 8685, 8696
Laboratory Reference Numbers:

TP-11/SS-3	E5141
TP-04/SS-1	E5142
TP-07/SS-2	E5143
TP-10/SS-4	E5246
TP-8/SS-5	E5247

Data were reviewed for usability according to the following criteria:

* - Data Completeness
* - GC/MS Tuning
* - Holding Times
* - Calibrations
- Laboratory Blanks
- Field Blank
- Storage Blank
- Equipment Blank
* - System Monitoring Compound Recoveries
* - Internal Standard Recoveries
- Matrix Spike / Matrix Spike Duplicate
- Blank Spike
- Laboratory Control Sample
* - Instrument Detection Limits
- Compound Identification
* - Compound Quantitation

* - Indicates that all criteria were met for this parameter.

DATA USABILITY SUMMARY

The volatile compound 1,1,2,2-tetrachloroethane was reported as a non-target in Sample TP-04/SS-1 (Lab. #: E5142) fraction. This was rejected during the data validation. It should be noted that this compound was not detected in the volatile fraction.

Field blank, storage and equipment blanks were not analyzed with this sample delivery group.

Matrix spikes and blank spikes were not analyzed with this sample.

No other problems were found with this sample delivery group, which would affect the usability of the data.

The minor problems with the laboratory control samples should be noted.

Holding Times

All samples were extracted and analyzed within the EPA contractual holding times.

Tunes

No problems were detected with any of the tunes associated with the samples of this delivery group.

Surrogate Compound Recoveries

All surrogate compound recoveries were within the required quality assurance limits.

The recoveries of sample TP-07/SS-2 (Lab. #: E5143) were diluted out since the sample was analyzed at a 100X dilution due to a high concentration of bis(2-ethylhexyl)phthalate (62,000 mg/kg).

Calibrations

No problems were found with any of the calibrations.

Matrix Spike / Matrix Spike Duplicate

A matrix spike was not analyzed with this sample delivery group.

Blank Spike

A blank spike was not analyzed with this sample delivery group.

Laboratory Control Sample

Two laboratory control samples were analyzed with this sample delivery group. The recoveries of all compounds were within the 40% - 120% quality assurance limits with the exception of 4-chloroaniline (35% & 20%) in both of the LCS standards.

The 4- chloroaniline data was flagged with the "J – LCS" qualifier. It was not detected in any of the samples of this delivery group.

Method Blanks

Low concentrations of nine non-target compounds were detected in the method blank.

When one of these compounds was detected in a sample it was flagged with the "R-MB" qualifier.

Field Blank

A field blank was not analyzed with this sample delivery group.

Storage Blank

A storage blank was not analyzed with this sample delivery group.

Equipment Blank

An equipment blank was not analyzed with this sample delivery group.

Internal Standard Areas and Retention Times

The recoveries and retention times of all internal standards were within the required quality control limits.

Instrument Detection Limits

No problems were detected with the instrument detection limits.

Sample Results

Sample TP-04/SS-1 (Lab. #: E5142)

The volatile compound 1,1,2,2-tetrachloroethane was reported as a non-target in the semivolatile fraction. This was rejected during the data validation. It should be noted that this compound was not detected in the volatile fraction.

No other problems were found with the reported results of any of the samples of this delivery group.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 30 (g/ml) G Lab File ID: N0133.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 26 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	450	U
98-86-2	Acetophenone	450	U
111-44-4	bis(2-Chloroethyl)ether	450	U
105-60-2	Caprolactam	450	U
108-95-2	Phenol	450	U
92-52-4	1,1'-Biphenyl	450	U
95-57-8	2-Chlorophenol	450	U
191-22-49	Atrazine	450	U
108-60-1	2,2'-oxybis(1-chloropropane)	450	U
95-48-7	2-Methylphenol	450	U
67-72-1	Hexachloroethane	450	U
621-64-7	N-Nitroso-di-n-propylamine	450	U
106-44-5	4-Methylphenol	450	U
98-95-3	Nitrobenzene	450	U
78-59-1	Isophorone	450	U
88-75-5	2-Nitrophenol	450	U
105-67-9	2,4-Dimethylphenol	450	U
111-91-1	bis(2-Chloroethoxy)methane	450	U
120-83-2	2,4-Dichlorophenol	450	U
91-20-3	Naphthalene	450	U
106-47-8	4-Chloroaniline	450	U
87-68-3	Hexachlorobutadiene	450	U
59-50-7	4-Chloro-3-methylphenol	450	U
91-57-6	2-Methylnaphthalene	450	U
77-47-4	Hexachlorocyclopentadiene	450	U
88-06-2	2,4,6-Trichlorophenol	450	U
95-95-4	2,4,5-Trichlorophenol	1100	U
91-58-7	2-Chloronaphthalene	450	U
88-74-4	2-Nitroaniline	1100	U
208-96-8	Acenaphthylene	450	U
131-11-3	Dimethyl phthalate	450	U
606-20-2	2,6-Dinitrotoluene	450	U
83-32-9	Acenaphthene	450	U
99-09-2	3-Nitroaniline	1100	U
51-28-5	2,4-Dinitrophenol	1100	U
132-64-9	Dibenzofuran	450	U
121-14-2	2,4-Dinitrotoluene	450	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 30 (g/ml) G Lab File ID: N0133.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 26 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
100-02-7	4-Nitrophenol	1100	U
86-73-7	Fluorene	450	U
7005-72-3	4-Chlorophenyl phenyl ether	450	U
84-66-2	Diethyl phthalate	450	U
100-01-6	4-Nitroaniline	1100	U
534-52-1	4,6-Dinitro-2-methylphenol	1100	U
86-30-6	n-Nitrosodiphenylamine	450	U
101-55-3	4-Bromophenyl phenyl ether	450	U
118-74-1	Hexachlorobenzene	450	U
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	63	J
120-12-7	Anthracene	450	U
84-74-2	Di-n-butyl phthalate	450	U
86-74-8	Carbazole	450	U
206-44-0	Fluoranthene	140	J
129-00-0	Pyrene	260	J
85-68-7	Butyl benzyl phthalate	45	J
91-94-1	3,3'-Dichlorobenzidine	450	U
56-55-3	Benzo[a]anthracene	62	J
218-01-9	Chrysene	98	J
117-81-7	bis(2-Ethylhexyl)phthalate	1300	
117-84-0	Di-n-octyl phthalate	450	U
205-99-2	Benzo[b]fluoranthene	91	J
207-08-9	Benzo[k]fluoranthene	450	U
50-32-8	Benzo[a]pyrene	450	U
193-39-5	Indeno[1,2,3-cd]pyrene	450	U
53-70-3	Dibenz[a,h]anthracene	450	U
191-24-2	Benzo[g,h,i]perylene	450	U

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

E5141

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-11/SS-3

Sample wt/vol: 30 (g/ml) G Lab File ID: N0133.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 26 decanted: (Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

Number TICs found: 9 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.	unknown	4.84	~~670~~	~~J~~ R	M.B,
2.	unknown	5.20	~~1000~~	J R	M.B,
3.	unknown	7.12	680	J	
4.	unknown	7.39	~~1200~~	J R	M.B
5.	unknown hydrocarbon	15.29	830	J	
6.	unknown hydrocarbon	15.79	1200	J	
7.	unknown hydrocarbon	16.66	1100	J	
8.	unknown	19.20	1200	J	
9.	unknown	20.09	950	J	

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04-/SS-1

Sample wt/vol: 30 (g/ml) G Lab File ID: N0134.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 13 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q
100-52-7	Benzaldehyde	380	U
98-86-2	Acetophenone	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
105-60-2	Caprolactam	46	J
108-95-2	Phenol	380	U
92-52-4	1,1'-Biphenyl	380	U
95-57-8	2-Chlorophenol	380	U
191-22-49	Atrazine	380	U
108-60-1	2,2'-oxybis(1-chloropropane)	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
106-44-5	4-Methylphenol	380	U
98-95-3	Nitrobenzene	380	U
78-59-1	Isophorone	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
91-20-3	Naphthalene	380	U
106-47-8	4-Chloroaniline	380	U
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
208-96-8	Acenaphthylene	380	U
131-11-3	Dimethyl phthalate	380	U
606-20-2	2,6-Dinitrotoluene	380	U
83-32-9	Acenaphthene	380	U
99-09-2	3-Nitroaniline	960	U
51-28-5	2,4-Dinitrophenol	960	U
132-64-9	Dibenzofuran	380	U
121-14-2	2,4-Dinitrotoluene	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04-/SS-1

Sample wt/vol: 30 (g/ml) G Lab File ID: N0134.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 13 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
100-02-7	4-Nitrophenol	960	U
86-73-7	Fluorene	380	U
7005-72-3	4-Chlorophenyl phenyl ether	380	U
84-66-2	Diethyl phthalate	380	U
100-01-6	4-Nitroaniline	960	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
86-30-6	n-Nitrosodiphenylamine	380	U
101-55-3	4-Bromophenyl phenyl ether	380	U
118-74-1	Hexachlorobenzene	380	U
87-86-5	Pentachlorophenol	960	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
84-74-2	Di-n-butyl phthalate	380	U
86-74-8	Carbazole	380	U
206-44-0	Fluoranthene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butyl benzyl phthalate	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
56-55-3	Benzo[a]anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
117-84-0	Di-n-octyl phthalate	380	U
205-99-2	Benzo[b]fluoranthene	380	U
207-08-9	Benzo[k]fluoranthene	380	U
50-32-8	Benzo[a]pyrene	380	U
193-39-5	Indeno[1,2,3-cd]pyrene	380	U
53-70-3	Dibenz[a,h]anthracene	380	U
191-24-2	Benzo[g,h,i]perylene	380	U

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

E5142

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-04-/SS-1

Sample wt/vol: 30 (g/ml) G Lab File ID: N0134.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 13 decanted: (Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

Number TICs found: 9 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.	unknown	4.84	~~570~~	~~J~~ R	M.B
2.	unknown	5.19	~~860~~	~~J~~ R	M.B.
3. 000079-34-5	Ethane, 1,1,2,2-tetrachloro-	6.87	~~280~~	~~JN~~ R	VOA
4.	unknown hydrocarbon	7.13	1000	J	
5.	unknown	7.38	~~250~~	~~J~~ R	M.B.
6.	unknown	13.67	~~430~~	~~J~~ R	M.B.
7. 000057-10-3	Hexadecanoic acid	17.84	280	JN	
8.	unknown	19.15	270	J	
9.	unknown	29.64	740	J	

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 30 (g/ml) G Lab File ID: N0135.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 36 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 100.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	52000	U
98-86-2	Acetophenone	52000	U
111-44-4	bis(2-Chloroethyl)ether	52000	U
105-60-2	Caprolactam	52000	U
108-95-2	Phenol	52000	U
92-52-4	1,1'-Biphenyl	52000	U
95-57-8	2-Chlorophenol	52000	U
191-22-49	Atrazine	52000	U
108-60-1	2,2'-oxybis(1-chloropropane)	52000	U
95-48-7	2-Methylphenol	52000	U
67-72-1	Hexachloroethane	52000	U
621-64-7	N-Nitroso-di-n-propylamine	52000	U
106-44-5	4-Methylphenol	52000	U
98-95-3	Nitrobenzene	52000	U
78-59-1	Isophorone	52000	U
88-75-5	2-Nitrophenol	52000	U
105-67-9	2,4-Dimethylphenol	52000	U
111-91-1	bis(2-Chloroethoxy)methane	52000	U
120-83-2	2,4-Dichlorophenol	52000	U
91-20-3	Naphthalene	52000	U
106-47-8	4-Chloroaniline	52000	U
87-68-3	Hexachlorobutadiene	52000	U
59-50-7	4-Chloro-3-methylphenol	52000	U
91-57-6	2-Methylnaphthalene	52000	U
77-47-4	Hexachlorocyclopentadiene	52000	U
88-06-2	2,4,6-Trichlorophenol	52000	U
95-95-4	2,4,5-Trichlorophenol	130000	U
91-58-7	2-Chloronaphthalene	52000	U
88-74-4	2-Nitroaniline	130000	U
208-96-8	Acenaphthylene	52000	U
131-11-3	Dimethyl phthalate	52000	U
606-20-2	2,6-Dinitrotoluene	52000	U
83-32-9	Acenaphthene	52000	U
99-09-2	3-Nitroaniline	130000	U
51-28-5	2,4-Dinitrophenol	130000	U
132-64-9	Dibenzofuran	52000	U
121-14-2	2,4-Dinitrotoluene	52000	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 30 (g/ml) G Lab File ID: N0135.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 36 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 100.0

GPC Cleanup: (Y/N) Y pH: 7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-02-7	4-Nitrophenol	130000	U
86-73-7	Fluorene	52000	U
7005-72-3	4-Chlorophenyl phenyl ether	52000	U
84-66-2	Diethyl phthalate	52000	U
100-01-6	4-Nitroaniline	130000	U
534-52-1	4,6-Dinitro-2-methylphenol	130000	U
86-30-6	n-Nitrosodiphenylamine	52000	U
101-55-3	4-Bromophenyl phenyl ether	52000	U
118-74-1	Hexachlorobenzene	52000	U
87-86-5	Pentachlorophenol	130000	U
85-01-8	Phenanthrene	52000	U
120-12-7	Anthracene	52000	U
84-74-2	Di-n-butyl phthalate	52000	U
86-74-8	Carbazole	52000	U
206-44-0	Fluoranthene	52000	U
129-00-0	Pyrene	52000	U
85-68-7	Butyl benzyl phthalate	52000	U
91-94-1	3,3'-Dichlorobenzidine	52000	U
56-55-3	Benzo[a]anthracene	52000	U
218-01-9	Chrysene	52000	U
117-81-7	bis(2-Ethylhexyl)phthalate	62000	D
117-84-0	Di-n-octyl phthalate	52000	U
205-99-2	Benzo[b]fluoranthene	52000	U
207-08-9	Benzo[k]fluoranthene	52000	U
50-32-8	Benzo[a]pyrene	52000	U
193-39-5	Indeno[1,2,3-cd]pyrene	52000	U
53-70-3	Dibenz[a,h]anthracene	52000	U
191-24-2	Benzo[g,h,i]perylene	52000	U

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

E5143

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-07/SS-2

Sample wt/vol: 30 (g/ml) G Lab File ID: N0135.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 36 decanted: (Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 100.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

Number TICs found: 10 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	unknown	13.43	13000	JD
2.	unknown	13.72	11000	JD
3.	unknown	13.80	25000	JD
4.	unknown	14.75	24000	JD
5.	unknown hydrocarbon	15.29	12000	JD
6.	unknown hydrocarbon	15.79	36000	JD
7.	unknown hydrocarbon	16.66	40000	JD
8.	unknown	19.18	37000	JD
9.	unknown	25.21	23000	JD
10.	unknown	25.80	35000	JD

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS-4

Sample wt/vol: 30 (g/ml) G Lab File ID: N0136.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 45 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	6100	U
98-86-2	Acetophenone	6100	U
111-44-4	bis(2-Chloroethyl)ether	6100	U
105-60-2	Caprolactam	6100	U
108-95-2	Phenol	6100	U
92-52-4	1,1'-Biphenyl	6100	U
95-57-8	2-Chlorophenol	6100	U
191-22-49	Atrazine	6100	U
108-60-1	2,2'-oxybis(1-chloropropane)	6100	U
95-48-7	2-Methylphenol	6100	U
67-72-1	Hexachloroethane	6100	U
621-64-7	N-Nitroso-di-n-propylamine	6100	U
106-44-5	4-Methylphenol	6100	U
98-95-3	Nitrobenzene	6100	U
78-59-1	Isophorone	6100	U
88-75-5	2-Nitrophenol	6100	U
105-67-9	2,4-Dimethylphenol	6100	U
111-91-1	bis(2-Chloroethoxy)methane	6100	U
120-83-2	2,4-Dichlorophenol	6100	U
91-20-3	Naphthalene	6100	U
106-47-8	4-Chloroaniline	6100	U
87-68-3	Hexachlorobutadiene	6100	U
59-50-7	4-Chloro-3-methylphenol	6100	U
91-57-6	2-Methylnaphthalene	6100	U
77-47-4	Hexachlorocyclopentadiene	6100	U
88-06-2	2,4,6-Trichlorophenol	6100	U
95-95-4	2,4,5-Trichlorophenol	15000	U
91-58-7	2-Chloronaphthalene	6100	U
88-74-4	2-Nitroaniline	15000	U
208-96-8	Acenaphthylene	6100	U
131-11-3	Dimethyl phthalate	6100	U
606-20-2	2,6-Dinitrotoluene	6100	U
83-32-9	Acenaphthene	6100	U
99-09-2	3-Nitroaniline	15000	U
51-28-5	2,4-Dinitrophenol	15000	U
132-64-9	Dibenzofuran	6100	U
121-14-2	2,4-Dinitrotoluene	6100	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS-4

Sample wt/vol: 30 (g/ml) G Lab File ID: N0136.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 45 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
100-02-7	4-Nitrophenol	15000	U
86-73-7	Fluorene	6100	U
7005-72-3	4-Chlorophenyl phenyl ether	6100	U
84-66-2	Diethyl phthalate	6100	U
100-01-6	4-Nitroaniline	15000	U
534-52-1	4,6-Dinitro-2-methylphenol	15000	U
86-30-6	n-Nitrosodiphenylamine	6100	U
101-55-3	4-Bromophenyl phenyl ether	6100	U
118-74-1	Hexachlorobenzene	6100	U
87-86-5	Pentachlorophenol	15000	U
85-01-8	Phenanthrene	6100	U
120-12-7	Anthracene	6100	U
84-74-2	Di-n-butyl phthalate	6100	U
86-74-8	Carbazole	6100	U
206-44-0	Fluoranthene	6100	U
129-00-0	Pyrene	6100	U
85-68-7	Butyl benzyl phthalate	6100	U
91-94-1	3,3'-Dichlorobenzidine	6100	U
56-55-3	Benzo[a]anthracene	6100	U
218-01-9	Chrysene	6100	U
117-81-7	bis(2-Ethylhexyl)phthalate	6100	U
117-84-0	Di-n-octyl phthalate	6100	U
205-99-2	Benzo[b]fluoranthene	6100	U
207-08-9	Benzo[k]fluoranthene	6100	U
50-32-8	Benzo[a]pyrene	6100	U
193-39-5	Indeno[1,2,3-cd]pyrene	6100	U
53-70-3	Dibenz[a,h]anthracene	6100	U
191-24-2	Benzo[g,h,i]perylene	6100	U

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

E5216

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-10/SS-4

Sample wt/vol: 30 (g/ml) G Lab File ID: N0136.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 45 decanted: (Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/20/04

Injection Volume: 2.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

Number TICs found: 9 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	unknown	7.37	~~1500~~	~~JD~~ R
2.	unknown	13.81	1500	JD
3.	unknown	14.61	2600	JD
4.	unknown	14.75	1900	JD
5.	unknown	14.84	2200	JD
6.	unknown	15.39	1700	JD
7.	unknown	22.78	5600	JD
8.	unknown	25.22	8900	JD
9.	unknown	25.81	17000	JD

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 30 (g/ml) G Lab File ID: N0140.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 17 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/21/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	UG/KG	Q
100-52-7	Benzaldehyde	46	J
98-86-2	Acetophenone	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
105-60-2	Caprolactam	400	U
108-95-2	Phenol	400	U
92-52-4	1,1'-Biphenyl	400	U
95-57-8	2-Chlorophenol	400	U
191-22-49	Atrazine	400	U
108-60-1	2,2'-oxybis(1-chloropropane)	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
106-44-5	4-Methylphenol	400	U
98-95-3	Nitrobenzene	400	U
78-59-1	Isophorone	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
91-20-3	Naphthalene	400	U
106-47-8	4-Chloroaniline	400	U
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
208-96-8	Acenaphthylene	400	U
131-11-3	Dimethyl phthalate	400	U
606-20-2	2,6-Dinitrotoluene	400	U
83-32-9	Acenaphthene	400	U
99-09-2	3-Nitroaniline	1000	U
51-28-5	2,4-Dinitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
121-14-2	2,4-Dinitrotoluene	400	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 30 (g/ml) G Lab File ID: N0140.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 17 decanted:(Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/21/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-02-7	4-Nitrophenol	1000	U
86-73-7	Fluorene	400	U
7005-72-3	4-Chlorophenyl phenyl ether	400	U
84-66-2	Diethyl phthalate	400	U
100-01-6	4-Nitroaniline	1000	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
86-30-6	n-Nitrosodiphenylamine	400	U
101-55-3	4-Bromophenyl phenyl ether	400	U
118-74-1	Hexachlorobenzene	400	U
87-86-5	Pentachlorophenol	1000	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
84-74-2	Di-n-butyl phthalate	400	U
86-74-8	Carbazole	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
85-68-7	Butyl benzyl phthalate	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
56-55-3	Benzo[a]anthracene	400	U
218-01-9	Chrysene	400	U
117-81-7	bis(2-Ethylhexyl)phthalate	73	J
117-84-0	Di-n-octyl phthalate	400	U
205-99-2	Benzo[b]fluoranthene	400	U
207-08-9	Benzo[k]fluoranthene	400	U
50-32-8	Benzo[a]pyrene	400	U
193-39-5	Indeno[1,2,3-cd]pyrene	400	U
53-70-3	Dibenz[a,h]anthracene	400	U
191-24-2	Benzo[g,h,i]perylene	400	U

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

E5217

Lab Name: O'Brien & Gere Laboratories, Inc. Contract: O'Brien & G

Lab Code: OBG Case No.: 3435.229. SAS No.: ______ SDG No.: 8685,8696

Matrix: (soil/water) SOIL Lab Sample ID: TP-8/SS-5

Sample wt/vol: 30 (g/ml) G Lab File ID: N0140.D

Level: (low/med) LOW Date Received: 08/19/04

% Moisture: 17 decanted: (Y/N) N Date Extracted: 08/24/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 09/21/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7

CONCENTRATION UNITS:

Number TICs found: 9 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.	unknown	4.81	~~760~~	J R	M.B.
2.	unknown	5.16	~~1100~~	J R	M.B.
3.	unknown hydrocarbon	7.10	1200	J	
4.	unknown	7.35	520	J	
5.	unknown	23.41	530	J	
6.	unknown hydrocarbon	23.71	840	J	
7.	unknown	24.50	820	J	
8.	unknown hydrocarbon	24.79	1200	J	
9.	unknown	29.52	~~560~~	~~J~~ R	M.B.

SUMMARY OF THE ANALYTICAL DATA VALIDATION
Town of Carroll Landfill

Water Pesticide and PCB Analyses
Samples Collected August 18th & 19th, 2004
Samples Received August 19th & 20th, 2004
Sample Delivery Group: 8685, 8696
Laboratory Reference Numbers:

TP-11/SS-3
TP-10/SS-4
TP-8/SS-5

Soil samples were received for analyses of the pesticide and PCB TCL analyte list by US EPA Region II protocols. A complete analytical validation was performed based upon the following parameters:

- Data Completeness
* - Holding Times
* - Laboratory Blanks
- Field Blanks
- Surrogate Recoveries
* - Surrogate Retention Times
- Matrix Spike / Matrix Spike Duplicate
* - Blank Spike
* - Laboratory Control Sample Recovery
- Initial Calibration
* - Method Blanks
- Analyte Resolutions
* - Performance Evaluation Mixtures
* - IND A and IND B Standards
* - Florisil Cartridge Check
- GPC Calibration
- Compound Identification

* - Indicates that all criteria were met for this parameter.

DATA VALIDATION SUMMARY

The laboratory used retention time windows for target compounds and surrogates that were wider than the ones required according to Method OLM04.2

The laboratory only included the positive hits in the sample raw data. All of the peaks should be included. Without all of the data, it is not possible to verify that compounds were not overlooked.

There were problems with the overlap of retention times on each column:

The retention times for endosulfan I (9.07 – 9.21) and 4,4'-DDE (9.00 – 9.14) overlapped in the range of 9.07 to 9.14 minutes on the CLP column.

The retention times for endosulfan I (10.69 – 10.83) and alpha chlordane (10.57 – 10.71) overlapped in the range of 10.69 to 10.71 minutes on the CLP column.

There should not be a problem with overlapping peaks.

The laboratory's case narrative states:

The resolution check analyzed on the RTXCLP column did not meet the >60% method criteria for Endosulfan I (57%). All other resolution criteria were met and the excursion did not impact peak identification.

During the usability, positives are reported to the practical detection limit of ½ of the reporting limit.

Holding Times

All extractions and analyses were performed within the required holding times.

Surrogate Recoveries

All surrogate recoveries were within the required limits with the following exceptions:

Sample	TCX 1	TCX 2	DCB 1	DCB 2
TP-10 / SS-3				632%
TP-8 / SS-5				191%

QC limits: 30% - 150%

The high recoveries were due to inference. The data were not qualified for the high recoveries since only one surrogate was affected.

Matrix Spike

A matrix spike and matrix spike duplicate were not analyzed.

Blank Spike

All blank spike recoveries were within the required limits.

Laboratory Control Sample

All LCS recoveries were within the required limits.

Initial Calibrations

The laboratory used retention time windows for target compounds and surrogates that were wider than the ones required according to Method OLM04.2

	OLM04.2	Lab
alpha-BHC	± 0.05	0.10

beta-BHC	± 0.05	0.10
gamma-BHC (Lindane)	± 0.05	0.10
delta-BHC	± 0.05	0.10
Heptachlor	± 0.05	0.10
Aldrin	± 0.05	0.10
alpha-Chlordane	± 0.07	0.10
gamma-Chlordane	± 0.07	0.10
Heptachlor epoxide	± 0.07	0.14
Dieldrin	± 0.07	0.14
Endrin	± 0.07	0.14
Endrin aldehyde	± 0.07	0.14
Endrin ketone	± 0.07	0.14
4,4'-DDD	± 0.07	0.14
4,4'-DDE	± 0.07	0.14
4,4'-DDT	± 0.07	0.14
Endosulfan I	± 0.07	0.14
Endosulfan II	± 0.07	0.14
Endosulfan sulfate	± 0.07	0.14
Methoxychlor	± 0.07	0.14
Aroclors	± 0.07	0.14
Toxaphene	± 0.07	0.14
Tetrachloro-m-xylene	± 0.05	0.10
Decachlorobiphenyl	±0.10	0.20

No problems were detected with the initial calibration.

Analyte Resolution

The laboratory's case narrative states:

> *The resolution check analyzed on the RTXCLP column did not meet the >60% method criteria for Endosulfan I (57%). All other resolution criteria were met and the excursion did not impact peak identification.*

This did not affect the usability of the data.

All other RESC standard percent resolutions were greater than 60% on both the RTX-CLP and RTX-35 columns for both calibrations.

Continuing Calibrations

All PEM and INDA & INDB continuing calibrations were within the required quality assurance limits.

Surrogate Retention Times

All surrogate retention times were within the required limits for both surrogates and on both columns.

Florisil Cartridge Check

All recoveries were within the 80% - 120% quality assurance limits.

GPC Calibration

A GPC cleanup was not performed on this sample.

Method Blanks

No problems were detected with any of the method blanks.

Calibration Blanks

No problems were detected with the calibration blanks associated with this sample delivery group.

Field Blank

A field blank was not collected with this sample delivery group.

Sample Results

Many of the %Ds of the pesticide and PCB concentrations are very high. The data were qualified on the following bases:

% Difference	Qualifier
0 - 25%	None
25 - 70%	"J"
70 - 100%	"JN"
> 100%	"R"
100 - 200% (Interference detected)*	"JN"
> 50% (Pesticide value is < CRQL)**	"U"

Sample TP-11/SS-3

The low concentrations of beta-BHC, gamma-BHC, endosulfan sulfate, methoxychlor and endrin ketone were reported at the quantitation limit since the concentrations were less than ½ of the quantitation limits. The peaks are likely to be noise and false positives.

The data for gamma-chlordane were rejected since the %D was 138%.

The %D of DDE was 36%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of endrin was 38%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of endrin aldehyde was 56%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of Aroclor 1248 was 50%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of Aroclor 1260 was 33%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

Sample TP-10/SS-4

The low concentrations of beta-BHC and heptachlor epoxide were reported at the quantitation limit since the concentrations were less than ½ of the quantitation limits. The peaks are likely to be noise and false positives.

The data for DDE was rejected since the %D was 153%.

The data for endosulfan II was rejected since the %D was 2,619%.

The data for DDD was rejected since the %D was 215%.

The data for methoxychlor was rejected since the %D was 150%.

The data for endrin aldehyde was rejected since the %D was 1,400%.

The %D of endrin ketone was 100%. The data were flagged with the "JN" qualifier and the concentration should be considered to be highly estimated. It may be a false positive.

The %D of endrin was 60%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of alpha chlordane was 55%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

The %D of Aroclor 1260 was 60%. The data were flagged with the "J" qualifier and the concentration should be considered to be estimated.

Sample TP-8/SS-5

The low concentrations of delta-BHC and DDE were reported at the quantitation limit since the concentrations were less than ½ of the quantitation limits. The peaks are likely to be noise and false positives.

The data for methoxychlor was rejected since the %D was 422%.

No other problems were detected with the sample data.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TP-11/SS-3

Lab Name: O'Brien & Gere Laboratories Contract: OBG

Lab Code: 10155 Case No.: ________ SAS No.: ________ SDG No.: 8685 8696

Matrix: (soil/water) SOIL Lab Sample ID: E5141

Sample wt/vol: 30 (g/mL) G Lab File ID: ________________

% Moisture: 26.4 decanted: (Y/N) N Date Received: 08/19/2004

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/24/2004

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 09/29/2004

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
319-84-6	alpha-BHC	2.3	U
319-95-7	beta-BHC	2.3 ~~.26~~	U ~~J P~~
319-86-8	delta-BHC	2.3	U
58-89-9	gamma-BHC (Lindane)	2.3 ~~.35~~	U ~~J P~~
76-44-8	Heptachlor	2.3	U
309-00-2	Aldrin	2.3	U
1024-57-3	Heptachlor epoxide	2.3	U
959-98-8	Endosulfan I See Text	3.4	
60-57-1	Dieldrin	4.5	U
72-55-9	4,4'-DDE See text	11	J P
72-20-8	Endrin	4.8	J P
33213-65-9	Endosulfan II	4.5	U
72-54-8	4,4'-DDD	13	
1031-07-8	Endosulfan sulfate	4.5 ~~1.8~~	U ~~J P~~
50-29-3	4,4'-DDT	4.5	U
72-43-5	Methoxychlor	23 ~~19~~	~~U~~
53494-70-5	Endrin ketone	4.8 ~~.52~~	U ~~J P~~
7421-36-3	Endrin aldehyde	5.0	J P
5103-71-9	alpha-Chlordane See Text	1.4	J P
5103-74-2	gamma-Chlordane	~~6.2~~	P - R %D > 100%
8001-35-2	Toxaphene	230	U
12674-11-2	Aroclor-1016	45	U
11104-28-2	Aroclor-1221	91	U
11141-16-5	Aroclor-1232	45	U
53469-21-9	Aroclor-1242	45	U
12672-29-6	Aroclor-1248	160	J P
11097-69-1	Aroclor-1254	45	U
11096-82-5	Aroclor-1260	120	J P

EPA SAMPLE NO.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

TP-8/SS-5

Lab Name: O'Brien & Gere Laboratories Contract: OBG

Lab Code: 10155 Case No.: ________ SAS No.: ________ SDG No.: 8685 8696

Matrix: (soil/water) SOIL Lab Sample ID: E5217

Sample wt/vol: 30 (g/mL) G Lab File ID: ________________

% Moisture: 16.7 decanted: (Y/N) N Date Received: 08/21/2004

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/24/2004

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 09/29/2004

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) UG/KG	Q	
319-84-6	alpha-BHC	2.0	U	
319-95-7	beta-BHC	2.0	U	
319-86-8	delta-BHC	2.0 ~~.18~~	U ~~P~~	
58-89-9	gamma-BHC (Lindane)	2.0	U	
76-44-8	Heptachlor	2.0	U	
309-00-2	Aldrin	2.0	U	
1024-57-3	Heptachlor epoxide	2.0	U	
959-98-8	Endosulfan I	2.0	U	
60-57-1	Dieldrin	4.0	U	
72-55-9	4,4'-DDE	4.0 ~~1.4~~	U ~~P~~	
72-20-8	Endrin	4.0	U	
33213-65-9	Endosulfan II	4.0	U	
72-54-8	4,4'-DDD	4.0	U	
1031-07-8	Endosulfan sulfate	4.0	U	
50-29-3	4,4'-DDT	4.0	U	
72-43-5	Methoxychlor	~~4.6~~	R ~~P~~	%D= 422%
53494-70-5	Endrin ketone	4.0	U	
7421-36-3	Endrin aldehyde	4.0	U	
5103-71-9	alpha-Chlordane	2.0	U	
5103-74-2	gamma-Chlordane	2.0	U	
8001-35-2	Toxaphene	200	U	
12674-11-2	Aroclor-1016	40	U	
11104-28-2	Aroclor-1221	80	U	
11141-16-5	Aroclor-1232	40	U	
53469-21-9	Aroclor-1242	40	U	
12672-29-6	Aroclor-1248	40	U	
11097-69-1	Aroclor-1254	40	U	
11096-82-5	Aroclor-1260	40	U	

FORM I PEST

EPA SAMPLE NO.

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

TP-10/SS-4

Lab Name: O'Brien & Gere Laboratories Contract: OBG

Lab Code: 10155 Case No.: ______ SAS No.: ______ SDG No.: 8685 8696

Matrix: (soil/water) SOIL Lab Sample ID: E5216

Sample wt/vol: 30 (g/mL) G Lab File ID: ______

% Moisture: 45 decanted: (Y/N) N Date Received: 08/21/2004

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/24/2004

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 09/29/2004

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) UG/KG	Q	
319-84-6	alpha-BHC	3.0	U	
319-95-7	beta-BHC	3.0 ~~.42~~	UJ P	
319-86-8	delta-BHC	3.0	U	
58-89-9	gamma-BHC (Lindane)	3.0	U	
76-44-8	Heptachlor	3.0	U	
309-00-2	Aldrin	3.0	U	
1024-57-3	Heptachlor epoxide	3.0 ~~.24~~	UJ P	
959-98-8	Endosulfan I	3.0	U	
60-57-1	Dieldrin	6.1	U	
72-55-9	4,4'-DDE	~~3.8~~	RJ P	% D=1537
72-20-8	Endrin	20	J P	
33213-65-9	Endosulfan II	3.2	RJ P	% D= 2,600
72-54-8	4,4'-DDD	5.4	RJ P	% D= 2001
1031-07-8	Endosulfan sulfate	17	R P	% D= 5471
50-29-3	4,4'-DDT	6.1	U	
72-43-5	Methoxychlor	30	R P	% D= 150
53494-70-5	Endrin ketone	13	RJN P	
7421-36-3	Endrin aldehyde	~~5.5~~	RJ P	% D= 1460
5103-71-9	alpha-Chlordane	3.3 J	P	
5103-74-2	gamma-Chlordane	3.0	U	
8001-35-2	Toxaphene	300	U	
12674-11-2	Aroclor-1016	61	U	
11104-28-2	Aroclor-1221	120	U	
11141-16-5	Aroclor-1232	61	U	
53469-21-9	Aroclor-1242	61	U	
12672-29-6	Aroclor-1248	61	U	
11097-69-1	Aroclor-1254	61	U	
11096-82-5	Aroclor-1260	810	J P	

FORM I PEST

SUMMARY OF THE ANALYTICAL DATA VALIDATION
Town of Carroll Landfill

Metals and Cyanide Analyses
Samples Collected August 18th & 19th, 2004
Samples Received August 19th & 20th 2004
Sample Delivery Group: 8685, 8696
Laboratory Reference Numbers:

TP-11 / SS-3
TP-04 / SS-1
TP-07 / SS-2
TP-10 / SS-4
TP-8 / SS-5
TP-8 / SS-5MS
TP-8 / SS-5MD

Soil samples were received for total metals and cyanide analyses by NYS DEC ASP protocols. A complete analytical validation was performed based upon the following parameters;

* - Data Completeness
* - Holding Times
* - Calibration Verification
*- CRDL Standard
* - Laboratory Control Sample
* - Serial Dilutions
* - Calibration Blanks
- Field Blanks
* - Preparation Blanks
- Matrix Spike
* - Duplicate Analyses
* - ICP Interference Check Sample
* - Detection Limit Results
* - Linear Range
* - Sample Results

* - Indicates that all criteria were met for this parameter.

Data Validation Summary

The lead data were technically rejected because the matrix spike recovery was above 200%. The concentration of spike added (4.8 mg/kg) was more than 4X the sample concentration (16.5 mg/l).

The low recovery of the thallium CRDL standard should be noted.

No other problems were detected with the analyses.

Holding Times

All samples were analyzed within the required holding times.

CRDL Standards

The recoveries of all CRDL standards were within the 80% to 120% quality assurance limits with the one exception of the initial thallium CRDL (74%). Low concentrations of thallium (less than 40 ug/l) were flagged with the "J" qualifier.

Initial and Continuing Calibrations

No problems were detected with any of the calibrations associated with this sample delivery group.

Preparation Blank

No compounds were detected in the one preparation blank associated with the digestions of these samples at concentrations above the CRDL. Several analytes were found in the preparation blank at concentrations between the CRDL and instrument detection limit. These very low concentrations are not required to be noted in the data validation summary table.

Calibration Blanks

Several analytes were found in the continuing calibration blanks at concentrations between the CRDL and instrument detection limit. These very low concentrations are not required to be noted in the data validation summary table and do not affect the end use of the data.

Field Blank

A field blank was not analyzed with this sample delivery group.

ICP Interference Check Sample

No problems were detected with the ICP Interference Check Sample recoveries.

Matrix Spike Recovery

Sample TP-8/SS-5 was used as the matrix spike. All recoveries were within the 75% - 125% quality assurance limits with the exceptions of antimony (36%), lead (210%) and selenium (57%)

The lead data were technically rejected because the matrix spike recovery was above 200%. The concentration of spike added (4.8 mg/kg) was more than 4X the sample concentration (16.5 mg/l).

The antimony and selenium data were flagged with the "J" qualifier and estimated values.

All post digestions spike recoveries were within the required limits.

Duplicate Analysis

Sample TP-8/SS-5 was used as the matrix duplicate. All RPDs that could be accurately calculated were less then 20%.

Laboratory Control Sample

No problems were detected with the recoveries of the LCS standards

Serial Dilutions

Sample TP-8/SS-5 was used for the serial dilution. All percent differences that could be accurately calculated were less than 10%.

Instrument Detection Limit

No problems were found with the instrument detection limits.

ICP Linear Ranges

Sample TP-07 / SS-2 was reanalyzed at a 5X dilution due to high concentrations of nickel and zinc.

The data for nickel and zinc and elements with similar wavelengths – antimony, cadmium, cobalt and lead, should be reported from the 5X dilution.

The data from the original analysis and dilution were not significantly different.

No other problems were detected with the linear ranges.

Sample Results

No problems were detected with the sample data.

Appendix H

Fish and wildlife impact analysis

Report

Fish and Wildlife Impact Analysis Remedial Investigation/Feasibility Study - Town of Carroll Landfill Site #9-07-017 Frewsburg, New York

New York State Department of Environmental Conservation

December 2005

10653/34241

Fish and Wildlife Impacts Analysis

Remedial Investigation/Feasibility Study
Town of Carroll Landfill
Site #9-07-017
Frewsburg, New York

New York State Department of Environmental Conservation

December 2005

O'BRIEN & GERE
ENGINEERS, INC.

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B. USFWS and NYNHP information request letter responses

1. Introduction

This report presents the results of a Fish and Wildlife Impact Analysis (FWIA) for the Town of Carroll Landfill Site (site) located near Frewsburg, New York. The FWIA was conducted according to the New York State Department of Environmental Conservation (NYSDEC) document entitled *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (NYSDEC 1994; Guidance). Step I - *Site Description* and Step IIA - *Contaminant-Specific Impact Assessment – Pathway Analysis* of the NYSDEC Guidance is addressed in this report.

The specific objectives of this FWIA are to:

- describe the ecology of the site and surrounding environs within a 0.5 mile radius of the site including fish and wildlife resources and associated fauna for each natural community within the study area
- identify other natural resources in the vicinity of the site including significant habitats and endangered, threatened, or species of special concern (ETSC)
- identify applicable criteria and guidance values
- identify potential pathways of site stressors to ecological receptors.

This FWIA report is organized into five sections, described below:

1. *Introduction.* This section presents general information about the performance of the FWIA, the objectives of the study and the format of the report.

2. *Site and study area characterization.* This section characterizes the communities of the Site and study area based on vegetation and associates wildlife species with the communities.

3. *Description of fish and wildlife resources.* This section presents a qualitative evaluation of the ability of the study area to provide habitat for wildlife and discusses the value to humans of the natural resources within the study area. This section also discusses resources other than wildlife, such as significant habitats; protected species; surface waters; and freshwater wetlands that exist within a two-mile radius of the site.

4. *Identification of fish and wildlife criteria.* This section identifies applicable fish and wildlife regulatory criteria that may be referenced within the FWIA process.

5. *Summary and conclusions*. This section presents a summary and a discussion of the FWIA conclusions regarding ecological resources within the study area.

Associated tables, figures and attachments are included at end of the document.

2. Study area characterization

This section describes the physical and biological components of the site and study area under current conditions. In accordance with Step I of the Guidance, this information is used to identify the ecological communities of the study area, associate wildlife species with the communities, evaluate the value of the communities to wildlife and humans, and to provide information necessary for the design of future activities associated with the overall site investigation, if required.

2.1. Site description

According to information provided in the Work Assignment, the Town of Carroll Landfill is a former municipal and C&D debris landfill, and solid waste transfer station located at the end of an unnamed gravel road, approximately 1,700 feet north of NYS Route 62 (also known as Ivory Road) in the Village of Frewsburg, Town of Carroll, Chautauqua County, New York (Figure 1). The landfill area is located on a 305-acre lot, although the landfill occupies only approximately 25 acres of the property. The surrounding area includes active and inactive farmland, wooded areas, wetlands, and private homes. Northwest of the site is Conewango Creek and it's broad floodplain.

The site is located on a northwest-facing, gently sloping hillside and is composed of two roughly rectangular disposal areas, each surrounded by drainage ditches and swales. The dimensions of each disposal area are approximately 750 feet from north to south and 300 feet from east to west. The ground surface of the eastern cell is estimated to range from 1 to 4 feet above surrounding ditches on the east, north and west. The topography of the western cell is more uneven, ranging from approximately 1 to 10 feet above the surrounding ditches with several flat areas. A drainage area separates the two disposal areas and eventually flows to the northwest into a wetland area before discharging to Conewango Creek. An area to the west of the site is reported to have been used as a borrow area for cover soil.

Approximately 700 feet west of the site is the Town of Carroll Public Works Garage area and the Frewsburg Water District property that includes a water supply well and pump station. The Public Works Garage and Water District are located on the same lot, but are accessed from Wahlgren Road off NYS Route 62. The nearest homes are approximately 1200 feet to the west and south and topographically upgradient of the site.

Descriptions of the vegetative communities on-site and in the site's vicinity are presented in the following subsections. Site photographs taken during a site reconnaissance are included as Attachment A.

2.2. Covertype delineations

Evaluation of ecological communities (covertypes) in the study area assists in the identification of fish and wildlife resources and ecological receptors that may enter the site from surrounding areas. This subsection describes the ecological covertypes of the site and study area.

Consistent with the Guidance, the study area for the FWIA is defined as the site property and the area within a 0.5 mile radius of the site. The 0.5 mile radius includes the landfill cells, adjacent agricultural and nearby residential properties, the town garage, and terrestrial and aquatic communities. In the context of this report, a "covertype" is defined as an area characterized by a distinct pattern of natural (*e.g.*, forest) or cultural (*e.g.*, residential) land use. Covertypes of the study area were identified based on the physical and vegetative features observed by an O'Brien & Gere biologist during a study area visit performed in November 2004 and from interpretations of local mapping and aerial photographs that included the study area. A map indicating the covertypes of the study area is presented as Figure 2. Each covertype designation was selected based on a comparison of observed characteristics with the ecological community descriptions presented in the New York Natural Heritage Program document *Ecological Communities of New York State* (Edinger *et al.* 2002).

Thirteen covertypes have been identified within the study area. Their locations and approximate boundaries are depicted on Figure 2. The description of each identified covertype, below, includes a list of dominant woody and herbaceous plant species observed during the study area reconnaissance. A mixture of natural and cultural land uses exists within the study area. Agricultural (cropland, non-cropland and pasture) roadways, landfill, and residential properties comprise the majority of the cultural areas. Forested areas, scrub areas, palustrine (wetland) habitats and aquatic (open water) communities comprise the natural areas.

Representative photographs of some of the study area covertypes are presented in Attachment A.

2.3. Terrestrial covertypes

The terrestrial (upland) communities within the study area predominantly consist of "cultural" covertypes with some natural communities. The cultural designation reflects the extent of human disturbance to the study area for land uses such as agricultural fields, roadways, disturbed land (landfill) and residences.

Physical characteristics of the agricultural areas consist of crop and non-crop fields generally larger than 25 acres with interspersed agricultural and residential structures, access roads, and fencing. Residential properties are also present and consist of smaller lots, typically 1-acre to 3 acres in area. In general, these areas do not support large or diverse wildlife communities but do provide some forage and cover areas for wildlife inhabiting the surrounding natural covertypes.

The natural terrestrial covertypes within the study area are representative of forested and scrub-shrub communities. The identified terrestrial covertypes of the study area are further described below.

Landfill/dump. Edinger *et al.* (2002) characterizes this covertype as a site that has been cleared or excavated, where garbage has been disposed. As shown on Figure 2, the landfill cells of the site are designated as this covertype.

Rural structure exterior. This covertype is characterized by the exterior surfaces of structures such as agricultural and residential buildings and bridges in a rural or sparsely populated suburban area (Edinger *et al.* 2002). The areas near the site included in this designation consist of buildings associated with the Town of Carroll Town Garage to the west of the site and agricultural/residential structures to the south associated with a horse farm. Also observed in this covertype are sub-communities typical of the *Paved and unpaved road/path, mowed lawn* and *mowed roadside,* and *interior of agricultural* and *non-agricultural building* covertypes.

Cropland/Pastureland. Edinger *et al.* provides separate descriptions for each of these covertypes including separate descriptions for *row* and *field* croplands; however, for this report they have been combined as one covertype. This is justified in that agricultural fields are routinely planted in different crops from year to year in a process known as rotating; therefore, what may be observed as hay field (*field cropland*) one year, could be planted with corn (*row cropland*) the following. This covertype is present to the southwest, south and southeast of the site and also occurs in the eastern and northern portions of the study area.

Hemlock-northern hardwood forest. According to Edinger *et al.* (2002), this covertype occurs on middle to lower slopes of ravines; on cool, mid-elevation slopes; and on moist, well-drained sites at the margins of wetlands. Portions of the forested communities of the study area are representative of this covertype. The largest areas within the study area representative of this covertype are located to the east and northeast of the site and in the southeastern and southern portions of the study area. These areas, commonly associated with forested wetland areas, included white pine (*Pinus strobus*) intermixed with hemlocks (*Tsuga canadensis*) and other hardwoods such as beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*).

Rich mesophytic forest. According to Edinger *et al.* (2002), this covertype occurs on rich, fine-textured, well-drained soils that are favorable for the dominance of a wide variety of tree species. Portions of the forested communities within the study area and within the New York State Freshwater Wetland (NYSFW) JA-6 (described below) are indicated as this covertype on Figure 2. This covertype was observed in the northwestern portion of the study area. The dominant tree species observed in these forested communities consists of oaks (*Quercus* spp.), beech, sugar maple and hickories (*Carya* spp.).

Successional covertypes. A successional *hardwood* area is located just north of the site and also logged areas within the NYSFW JA-6 exhibit characteristics of *successional hardwood.* Species observed in this covertype included small diameter maples (*Acer* spp.), poplars (*Populus* spp.), and hawthorne (*Crataegus* sp.).

Areas of *successional shrubland* and *successional old field* are present within the study area, mostly associated with fallow agricultural fields.

2.4. Palustrine covertypes

The presence of freshwater wetlands in the study area was evaluated through a review of the Jamestown and Ivory New York State Freshwater Wetlands (NYSFW) maps and the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps. The NYSFW maps present the boundaries of wetlands regulated by NYSDEC. The NWI maps present wetlands inventoried by USFWS to monitor waterfowl habitat. The NWI maps have no regulatory significance but provide an indication of areas potentially meeting the federal criteria for wetlands regulated by the U.S. Army Corps of Engineers.

As noted on Figures 2 and 3, several large freshwater wetland (palustrine) habitats exist in the study area. These wetlands are associated with Conewango Creek and it's floodplain and are predominantly forested wetlands with some areas of scrub-shrub and emergent habitats. The observed wetland habitats are representative of *Open* and *Forested mineral soil wetland* covertypes as classified in Edinger *et al.* (2002). Generally, the wetland areas consist of areas densely vegetated with trees (deciduous and coniferous), shrubs and herbs with little or no open water. Additional discussion concerning wetlands is presented in Section 3.4.

The primary wetland habitats located within the study area include state-regulated freshwater wetlands designated on the NYSFW map as: JA-6, a 279-acre wetland located adjacent to and west and northwest of the site; JA-8, a 50-acre wetland located in the northern portion of the study area; and JA-1, a 246-acre wetland located in the northeastern portion of the study area. Each of these wetlands consists primarily of forested habitat with moderately to extremely dense shrub and herbaceous vegetative layers. Dominant trees observed in JA-6 consist predominantly of 4 inch to 20 inch dbh specimens of oak, poplar, red maple (*Acer rubrum*), hickory, hemlock, pine, and black willow (*Salix nigra*). Vegetative species diversity of the shrub and herbaceous layers was high. Dominant trees reported of JA-1 include ash (*Fraxinus* spp.), maple, oak, and elm (*Ulmus* sp.). Based on a review of the aerial photograph of the study area, NYSFW JA-8 appears to be a deciduous forest wetland that occurs along the northern banks of the Conewango Creek. This wetland was inaccessible at the time of the site reconnaissance.

In many instances, the forested wetlands were surrounded by emergent and scrub-shrub wetlands dominated by dogwoods, sedges (*Carex* spp.), reed canary grass (*Phalaris arundinacea*), cattails (*Typha* sp.), and other aquatic vegetative species. Accordingly, the NWI habitats in the vicinity of the site are designated as "palustrine forested" and "palustrine scrub-shrub/emergent" on the NWI maps.

Although a jurisdictional wetland delineation was not part of the scope of the FWIA, it appears that significant portions of the site and Town property contain state and federally-regulated wetlands, as shown on Figures 2 and 3.

At the time of the site reconnaissance, wetland characteristics were observed by the O'Brien & Gere biologist in disturbed areas of the site, particularly the drainage that bisects the two landfill cells and the drainage along the northern and eastern perimeter of the landfill. Therefore, there is a potential for these areas to be classified as jurisdictional (federally-regulated) wetland habitats. A formal wetland delineation, including a review of the applicable information related to the formation of the ponded areas, would confirm the appropriate classification of these areas.

2.5. Aquatic covertypes

Confined River. This covertype is an aquatic community of relatively large, fast flowing sections of streams with a moderate to gentle gradient. Conewango Creek, which is located to the north and northwest of the site within the study area, would likely be considered a *confined river* per the riverine community description in Edinger *et al.* (2002); however, portions of the creek may also exhibit *Unconfined river* characteristics as well. *Unconfined rivers* have very low gradients and clearly distinguished meanders, which are present in the Conewango system further downstream of the site. Conewango Creek flows in a southeasterly direction in the study area. The creek appears to be a moderate to deepwater run in the study area. The channel of the creek is approximately 125 to 150 feet wide and appeared to be at half bank-full at the time of the site reconnaissance (late fall). The water clarity was murky and the substrate was not visible. No vegetation was observed within the creek banks although trees and some shrubs occurred along the top of the creek banks.

Marsh headwater stream. Several drainage ways converge just west of the landfill and form a small stream that meanders westward through scrub-shrub and forested wetlands on the Town property and eventually discharge to Conewango Creek approximately 0.75 mile west of the site. This unnamed tributary to the Conewango Creek represents a *Marsh headwater stream* as defined in Edinger *et al.* (2002). The unnamed tributary has a well-defined meandering pattern and contains low flow (unmeasured). The channel of the creek is approximately 6 to 10 feet wide and contained approximately 6 to 12 inches of water at the time of the site reconnaissance (late fall). The substrate consisted primarily of silt and detritus. Little or no emergent vegetation was observed in the tributary. The banks of the tributary as it exists on the site property are approximately 2 to 3 feet high and predominantly vegetated with shrubs and trees. The drainage ways that form this tributary are characteristic of *ditch/artificial intermittent stream* habitat since these drainage ways appear to have been channelized through the site and through agricultural fields upstream of the site.

Cass Run and two additional unnamed streams exist within the study area. All three of these waterbodies are located to the east and northeast of the site and are not likely influenced by the on-site drainage patterns. Each of these additional streams has similar physical characteristics of *marsh headwater streams* and some of them appear to be channelized through agricultural fields as well.

Farm/artificial pond. Three *farm/artificial ponds* are located within the study area upgradient of the site. Edinger *et al.* (2002) describes these aquatic communities as typically eutrophic habitats that may be stocked with panfish. These ponds were inaccessible at the time of the site reconnaissance.

3. Description of fish and wildlife resources

The objective of this section is to identify potential ecological receptors of the study area based on observations conducted during the study area reconnaissance or by reasonable association of these resources with the identified covertypes. The results of the tasks performed to meet the objective are discussed in the following subsections.

3.1. Fish and wildlife of the study area

The presence of fish and wildlife in the study area was assessed through contact with regulatory agencies, a literature review, and the study area reconnaissance performed by an O'Brien & Gere biologist in November 2004. During the study area reconnaissance, wildlife were identified based on actual sightings; audible indicators such as bird songs; or other indicators such as nests, tracks, burrows, or scat. A listing of the fish and wildlife species that were either directly observed or concluded to be present based on observed indicators is presented below.

Observed fish and wildlife. Avian species were observed frequenting the site and/or the study area at the time of the site reconnaissance, including, but not limited to: black-capped chickadee (*Parus atricapillus*), American crow (*Corvus brachyrhynchos*) gray catbird (*Dumetella carolinensis*), blue jay (*Cyanocitta cristata*), white-breasted nuthatch (*Sitta carolinensis*), fox sparrows (*Passerella iliaca*), downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), tree sparrow (*Spizella arborea*), and red-tailed hawk (*Buteo jamaicensis*). A potential Coopers or sharp-shinned hawk with a recent kill (likely a blue jay or mourning dove based on feather remains) was also observed near the drainage way between the two landfill cells.

Additional species observed in the study area include: white-tailed deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*) and muskrat (*Ondatra zibethicus*) or beaver (*Castor canadensis*) burrows in the banks of the unnamed tributary near the Conewango Creek. Tracks of other unidentified small mammals were also observed throughout the study area.

3.2. Fauna expected within each covertype

In addition to those observed, a variety of other wildlife species are likely to inhabit the natural communities of the study area. The upland forest and wetland forest covertypes *(Rich mesophytic forest, Hemlock/northern hardwood, Open* and *Forested mineral soil wetland)* are likely to contain the most diverse wildlife populations due to the ability of these areas to provide food, cover and resting areas for wildlife.

Characteristic wildlife of the forested communities include, but are not limited to, various avian species, (songbirds, woodpeckers, turkey, grouse, hawks and owls); small mammals (raccoon, fox) and large mammals such as white-tailed deer. The aquatic and palustrine habitats within the study area are likely to support benthic invertebrates, reptiles (snakes and turtles), amphibians (frogs, toads, salamanders), fish, waterfowl (ducks and geese), herons, shorebirds, gulls, kingfishers, and songbirds. Additionally, Conewango Creek likely supports warm water sport fish populations such as various species of bass and pan fish (sunfish). Potential wildlife inhabitants of the study area's natural covertypes are presented in Table 1. Additionally, a list of the breeding birds of the site vicinity, as recorded by the New York State Breeding Bird Atlas project, is presented in Table 2.

3.3. Observation of stress

During the study area reconnaissance, evidence of physical or chemical stressors to flora or fauna related to the site such as stained soils, leachate seeps, or wildlife mortality, was not observed in the study area. However, it appears that the placement of garbage and other fill in the cells has altered the vegetative community along the landfill edges by allowing invasive species such as common reed (*Phragmites australis*), box-elder (*Acer negundo*) and burdock (*Arctium* sp.) to become well established. Additionally, evidence of logging, including downed tress, stumps and tire ruts, was apparent in the forested areas to the north of the subject property and dead trees (snags) were present in wet areas just north of the site. The cause of the trees' (snags) poor condition is unknown but likely due to the wet conditions in this portion of the study area.

3.4. Other resources

Consistent with the FWIA Guidance, Step I includes the identification of other fish and wildlife resources, such as significant wildlife habitats, rare species, regulated wetlands, or special surface waters that are present within two miles of the site. Special resources were identified through contact with regulatory agencies and review of the associated state and federal wetland maps. The results of these efforts are described below. The approximate location of the identified special resources, as available, is presented on Figure 3.

Significant habitats and endangered, threatened, or species of special concern. The presence of significant habitats and ETSC species in the study area was evaluated through contact with the New York Natural Heritage Program (NYNHP) and the USFWS. Letter responses received by O'Brien & Gere from these agencies are included with this report as Attachment B, and discussed below.

The USFWS indicated that a mollusc species, the clubshell (*Pleurobema clava*) is listed as an endangered species that is known to occur in the Allegheny River drainage basin, including Cassadaga Creek, and may occur within Conewango Creek. Another mollusc species, the rayed bean (*Villosa fabalis*) is a candidate for the Federal Endangered and Threatened Wildlife and Plants list that has been found in Cassadaga Creek and may occur within Conewango Creek. Also, occasional transient federally-listed or proposed endangered or threatened species individuals occur in the vicinity of the site.

The NYNHP indicated that their database has no records of known occurrences of rare or state-listed animals or plants or other significant habitats on or in the vicinity of the site.

Wetlands. As previously discussed, the potential presence of freshwater wetlands in the study area was evaluated through a review of applicable state and federal wetland mapping. The NYSFW maps present the boundaries of wetlands identified and regulated by NYSDEC. Nine state-regulated wetlands were identified within two miles of the site perimeter (Figure 3). The three wetlands closest to the site are designated on the NYSFW map as JA-6, JA-8 and JA-1.

New York State classifies the wetlands identified on the NYSFW maps into one of four separate classes that rank wetlands according to their ability to perform wetland functions and provide wetland benefits (6 NYCRR Part 664). Class I wetlands have the highest rank, and the ranking descends through Classes II, III and IV. Wetlands JA-1 and JA-6 are designated as Class I wetlands and JA-8 is designated as a Class II wetland.

Numerous NWI wetland habitats were identified within two miles of the site perimeter including many in similar locations as the state-regulated wetlands (see Figure 3). The NWI maps have no regulatory significance but provide an indication of areas potentially meeting the federal criteria for wetlands regulated by the U.S. Army Corps of Engineers. Most of the NWI habitats in the vicinity of the site are designated as "palustrine scrub/shrub" (PSS) on the NWI map.

Although a jurisdictional wetland delineation was not part of the scope of the FWIA, it appears that portions of the Town of Carroll property contain state and federally-regulated wetlands, as shown on Figures 2 and 3.

Surface waters. As identified on Figures 2 and 3, surface waters within a two-mile radius of the site include: Conewango Creek, Cass Run, the unnamed tributary and two other relatively small streams, and several small (less than 2 acres) ponds. Conewango Creek is designated as a Class C, Standard C water body, (6 NYCRR Part 800). The unnamed tributary, which traverses the site property, is not specified on the maps in 6 NYCRR part 800 and, therefore, is not listed with a class or standard. However, according to these regulations, streams that are physically present in the field but are not indicated on the map are designated with the class and standard of the water body to which it is tributary. In this case, the unnamed tributary is tributary to Conewango Creek and is therefore designated as a Class C, Standard C. Classification C is applied to waters supporting fisheries and suitable for non-contact activities (6NYCRR Parts 701 and 897). Cass Run is a Class C, Standard C(T) water. Standard C(T) indicates that the water body may support a trout population.

Critical Environmental Areas. Based on information obtained from NYSDEC's Division of Environmental Permits (www.dec.state.ny.us/website/dcs), Critical Environmental Areas do not exist in the vicinity of the site.

3.5. Description of fish and wildlife resource value

The value of the identified covertypes to wildlife and society was evaluated based on the habitat requirements of associated wildlife species and potential resource utilization by humans. In accordance with Step I of the Guidance, habitat requirements such as feeding preferences, home range, and cover for species identified in the study area were considered. Field observations used to evaluate habitat quality included: 1) the diversity of observed wildlife, 2) the availability of suitable habitat in the study area, 3) the size of the habitat, and 4) adjacent land use patterns.

3.5.1. Value of habitat to associated fauna

Site. Although some cover and foraging area is afforded to birds and small mammals on the site, the fill area, mowed areas and active disposal areas of the site do not provide sufficient cover, food sources or nesting and resting areas to make the site attractive to a diverse wildlife population. Therefore, the value of the site's upland habitat to wildlife is concluded to be low.

The portions of the unnamed tributary, drainage ways, and potential wetlands on and in vicinity of the site provide foraging areas for piscivorous animals frequenting the area and habitat for aquatic species including, but not limited to, benthic invertebrates, amphibians and reptiles. However, the relatively small size of these areas limits the utilization of this habitat by wildlife and the overall population size of the groups of animals inhabiting these areas.

Study area. Wildlife species identified in the study area were consistent with those expected to inhabit terrestrial and aquatic communities existing in rural and forested environments. A significant portion of the study area contains diverse and high quality forested and wetland habitat. The *rich mesophytic forest, hemlock northern hardwoods*, aquatic and various wetland covertypes of the study area offer the most valuable habitat within the study area. Avian and small mammal species find suitable food and cover in these areas. Indicators of use of these covertypes by other mammals such as muskrat, beaver, and deer were observed during the study area reconnaissance.

The culturally influenced habitats (residential and agricultural communities) of the study area also provide vegetation and food sources and "edge" communities that provide habitat diversity to the study area.

Aquatic communities comprise a significant portion of the natural habitat located within the study area due to the presence of Conewango Creek, Cass Run and their tributaries. These areas provide valuable habitat to aquatic and semi-aquatic wildlife. Additionally, the undeveloped areas (primarily forested communities) surrounding these water bodies serve as a riparian corridor providing forage, nesting and roosting areas for local and migratory wildlife.

3.5.2. Value of resources to humans

Site. The current physical character of the site provides little value to humans, although portions of the site are still used for the disposal of yard wastes including tree stumps and limbs. Much of the landfill areas consist of a homogenous vegetative community (*i.e.*, mowed lawn) maintained for cosmetic purposes or areas containing exposed soil with little or no vegetation. The undeveloped areas of the study area, especially the forested and wetland areas adjacent to the north, east and west of the site boundaries, harbor various wildlife species and, therefore, provide aesthetic and recreational values such as hiking and wildlife viewing.

Due to the small size of the unnamed tributary located on-site, sport fish do not likely inhabit the tributary. Therefore, little or no fishing opportunities exist for humans on-site.

Study Area. The undeveloped areas of the study area likely provide opportunity for hiking and similar forms of outdoor recreation, including small and large mammal hunting. Public access to some of these areas may be limited due to private land ownership, dense vegetative growth and/or the lack of established parking areas and walking trails.

The palustrine (wetland) areas located repeatedly within the study area provide a number of wetland-related functions and values to the public. These values include flood storage capacity, sediment/toxicant retention, biological productivity, wildlife habitat, and, to a lesser extent, recreational value (*i.e.*, hiking and nature viewing). These characteristics assist in maintaining water quality in areas downstream of these habitats, such as the Conewango Creek.

3.6. Applicable fish and wildlife regulatory criteria

Step I-D of the Guidance identifies criteria that are potentially applicable to the evaluation of fish and wildlife resources. Table 3 presents a listing of the criteria potentially applicable to the site. The following sections describe these criteria.

3.6.1. Site-specific criteria

New York State's Freshwater Wetlands Act (1975) is designed to prevent the destruction of freshwater wetlands by requiring permits for defined activities in state-regulated wetlands. Similarly, Section 404 of the federal Clean Water Act allows no discharge of fill material into "waters of the United States" including wetlands if there is a practicable alternative that is less damaging to the aquatic environment. Individual or general permits may be received for unavoidable wetland impacts as long as steps have been taken by the permit applicant for avoidance, minimization and mitigation of wetland impacts.

The Use and Protection of Waters is regulated by a permit system under 6 NYCRR Part 608. The basis for permit issuance is a determination that the proposal is in the public interest by being reasonable and necessary; will not endanger the health, safety, or welfare of the people; and will not cause unreasonable, uncontrolled, or unnecessary damage to the natural resources of the state.

Through the Endangered Species Act of 1973, Congress authorized the USFWS to protect our nation's threatened and endangered flora and fauna. Those species protected are identified on a list that is periodically updated by USFWS. At the state level, the NYSDEC has responsibility to protect those species identified on their respective list. State and federal permits must be obtained for activities potentially effecting a listed species and/or its habitat.

3.6.2. Contaminant-specific criteria

The Guidance identifies *New York State Water Quality Standards and Guidance Values*, NYSDEC Division of Water Technical and Operational Guidance Series, and *NYSDEC Technical Guidance for Screening Contaminated Sediments* as examples of contaminant-specific criteria potentially applicable to the FWIA. These criteria, and other potentially applicable guidance, are listed in Table 3.

These sources will be referenced as part of the data evaluation performed during additional FWIA Steps, if warranted.

4. Pathway analysis

In accordance with Step IIA of the FWIA guidance, this subsection describes potential routes of exposure for ecological receptors to site related stressors. Exposure is the contact of a receptor with a stressor (*e.g.*, chemical constituent). An exposure pathway is a mechanism by which a receptor may be exposed to a constituent at, or originating from, a source. The two primary routes of exposure for ecological receptors are ingestion and dermal contact. Exposure pathways are classified as being complete or incomplete. An exposure pathway is complete when a receptor could contact and uptake a constituent. The pathway is incomplete if there are no receptors or no exposures could occur. The status of potential exposure pathways for ecological receptors of the study area is discussed in this section.

4.1. Surface soil

Exposures to stressors in surface soil can occur by direct contact to plants, macroinvertebrates, and wildlife or through the terrestrial food chain. Ground gleaning birds, small mammals, and soil macroinvertebrates could be exposed to constituents in soils through direct contact with affected soils. In the terrestrial food chain, soil constituents can enter plants and invertebrates, which are consumed by small mammals, which are subsequently consumed by higher trophic level mammalian and avian predators. Upper food chain receptors consuming these organisms can bioaccumulate constituents.

Small mammal tracks were present at the site, and vegetation is present over a majority of the site. Previous investigations have identified chemical constituents in site surface soils; therefore, the soil exposure pathways through direct contact and through the terrestrial food chain are considered to be complete.

4.2. Surface water and sediment

Surface waters of the study area include: the NYSFW JA-6, JA-1, and JA-8 and other unmapped wetlands; Conewango Creek; an unnamed tributary to Conewango Creek; and several drainage ways. Site-related constituents can enter these water bodies through storm water runoff or seep from the site ground water, or upstream sources. Previous investigations have identified chemical constituents in site surface waters and sediments. Potential receptors, including benthic invertebrates and fish, are likely present in study area surface waters and sediments. Further, higher trophic level wildlife that may consume these organisms (*e.g.*, kingfisher, raccoon) may also inhabit the study area. Therefore, the surface water and sediment direct contact and food chain exposure pathways are complete for study area receptors.

4.3. Ground water

Wildlife inhabiting or utilizing the site are not likely to contact ground water since dens or burrows are not excavated or inhabited below the water table and wildlife food sources occur above ground or in shallow soil. Therefore, the ground water exposure pathway is considered incomplete for the site. However, constituents in ground water can influence overlying soil quality through water table elevation fluctuation or through volatilization, and can discharge to the study area surface waters. Therefore, the potential contribution of ground water constituents to soil, sediment and surface water exposures are evaluated as part of the assessment of those exposure pathways.

5. Summary and conclusions

This FWIA evaluated the physical and biological characteristics and potential ecological receptors at the Town of Carroll Landfill site in Frewsburg, New York. Step I and Step IIA of the FWIA Guidance was performed for this assessment. The results and conclusions of this assessment are summarized below:

- The terrestrial portion of the site consists of the landfill cells, dirt access roads, maintained fields/mowed areas, an old concrete loading bay area, and a small block structure. These features limit the use by resident and transient wildlife species.

- Aquatic areas existing on-site include a portion of the unnamed tributary of Conewango Creek, emergent and scrub-shrub wetlands and several drainage ways. The wetlands provide habitat for a variety of terrestrial and aquatic receptors. The unnamed tributary likely provides some habitat for a variety of fish and other wildlife species that frequent aquatic habitats. However, the relatively small size of the tributary limits the value of this habitat to some wildlife, particularly fish.

- The terrestrial areas surrounding the site and within the study area consist of a mixture of natural communities and areas exhibiting rural (predominantly agricultural and residential) land use. Approximately 45 percent of the areal extent of the study area consists of agricultural and residential land uses that may somewhat limit use by transient or residential wildlife species.

- Approximately 55 percent of the areal extent of the study area consists of natural covertypes such as coniferous and hardwood forest; freshwater wooded, scrub-shrub and emergent wetlands; and streams that provide appropriate habitat for a variety of fish and wildlife species.

- The USFWS has records of an endangered species, the clubshell, and a candidate species, the rayed bean within a two-mile radius of the site. The NYNHP had no records of rare, threatened or endangered flora and fauna or significant natural communities within a two-mile radius of the site.

- Based on a review of the applicable state and federal mapping, several freshwater wetlands were identified in within two miles of the site. Although a wetland boundary delineation was not performed as part of this assessment, it appears that regulated wetland habitats exist on and adjacent to site.

- Due to the presence of chemical constituents in surface soil, surface water and sediment associated with the site, complete exposure pathways to terrestrial and aquatic receptors likely exist at and down gradient of the site. These pathways should be evaluated further within the FWIA process.

References

Chambers, R.E. 1983. *Integrating Timber and Wildlife Management Handbook.* State University of New York, College of Environmental Science and Forestry and the New York State Department of Environmental Conservation. Syracuse, New York.

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Tables

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

AMPHIBIANS

American Toad	Northern Two-lined Salamander
Bullfrog	Pickerel Frog
Eastern Newt	Red back Salamander
Eastern Tiger Salamander	Red-spotted Newt
Four-toed Salamander	Slimy Salamander
Fowler's Toad	Southern Leopard Frog
Gray Treefrog	Spotted Salamander
Green Frog	Tiger Salamander
Jefferson Salamander	Western Chorus Frog
Marbled Salamander	Wood Frog
Mink Frog	
Mountain Dusky Salamander	
Northern Dusky Salamander	
Northern Red Salamander	
Northern Spring Peeper	
Northern Spring Salamander	

SOURCES:
Integrating Timber and Wildlife Management. Robert E. Chambers. New York State Department of Environmental Conservation and State University of New York. College of Environmental Science and Forestry. 1983.

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

REPTILES	
Black Rat Snake	Eastern Worm Snake
Broadhead Skink	Five-lined Skink
Coal Skink	Ground Skink
Common Garter Snake	Milk Snake
Common Kingsnake	Northern Black Racer
Common Snapping Turtle	Northern Brown Snake
Copperhead	Northern Copperhead
Corn Snake	Northern Redbelly Snake
Eastern Box Turtle	Northern Ringneck Snake
Eastern Garter Snake	Northern Water Snake
Eastern Hognose Snake	Painted Turtle
Eastern Milk Snake	Queen Snake
Eastern Painted Turtle	Shorthead Garter Snake
Eastern Ribbon Snake	Wood Turtle
Eastern Smooth Green Snake	

SOURCES:
Integrating Timber and Wildlife Management. Robert E. Chambers. New York State Department of Environmental Conservation and State University of New York. College of Environmental Science and Forestry. 1983.

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

BIRDS	
Acadian Flycatcher	Common Screech Owl
Alder Flycatcher	Common Yellowthroat
American Robin	European Starling
American Black Duck	Field Sparrow
American Crow	Grasshopper Sparrow
American Goldfinch	Northern Rough-winged Swallow
American Redstart	Northern Shrike
American Kestrel	Northern Three-toed Woodpecker
Bald Eagle	Pine Siskin
Bank Swallow	Prairie Warbler
Barn Owl	Red-eyed Vireo
Barn Swallow	Ring-billed Gull
Barred Owl	Yellow-billed Cuckoo
Bay-breasted Warbler	Yellow-rumped Warbler
Belted Kingfisher	Cape May Warbler
Black Duck	Cardinal
Black and White Warbler	Chipping Sparrow
Black-billed Cuckoo	Cedar Waxwing
Black-capped Chickadee	Chestnut-sided Warbler
Black-crowned Night Heron	Cerulean Warbler
Black-throated Green Warbler	Clay-colored Sparrow
Blackburnian Warbler	Cliff Swallow
Blackpoll Warbler	Common Crow
Blue Jay	Common Flicker
Blue-gray Gnatcatcher	Common Grackle
Blue-winged Warbler	Common Nighthawk
Boreal Chickadee	Common Merganser
Broad-winged Hawk	Cooper's Hawk
Brown Thrasher	Downy Woodpecker
Brown Creeper	Eastern Bluebird
Brown-headed Cowbird	Eastern Kingbird
Canada Warbler	Eastern Pewee
Great Crested Flycatcher	Eastern Phoebe

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

BIRDS	
Great Blue Heron	Eastern Screech Owl
Great Horned Owl	Eastern Wood-Pewee
Green Heron	Evening Grosbeak
Hairy Woodpecker	Golden-crowned Kinglet
Hermit Thrush	Gray Catbird
Herring Gull	Golden-winged Warbler
Hooded Merganser	Gray Jay
Hooded Warbler	Northern Saw-whet
House sparrow	Northern Raven
House Wren	Northern Waterthrush
House Finch	Orchard Oriole
Indigo Bunting	Osprey
Killdeer	Ovenbird
Least Flycatcher	Philadelphia Vireo
Loggerhead Shrike	Pileated Woodpecker
Long-eared Owl	Peregrine Falcon
Louisiana Waterthrush	Pine Warbler
Mallard	Prothonotary Warbler
Mourning Dove	Purple Finch
Mourning Warbler	Red-bellied Woodpecker
Nashville Warbler	Red-breasted Nuthatch
Northern Parula Warbler	Red-headed Woodpecker
Northern Parula	Red-shouldered Hawk
Northern Oriole	Red-tailed Hawk
Northern Mockingbird	Red-winged Blackbird
Northern Cardinal	Ring-necked Pheasant
Northern Junco	Warbling Vireo
Northern Goshawk	Whip-poor-will
Northern Flicker	White-breasted Nuthatch
Rusty Blackbird	White-eyed Vireo
Rufous-sided Towhee	White-throated Sparrow
Ruffed Grouse	Willow Flycatcher
Ruby-throated Hummingbird	Winter Wren

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

BIRDS	
Rock dove	Wood Pewee
Ruby-crowned Kinglet	Wood Thrush
Rose-breasted Grosbeak	Wood Duck
Swainsons Thrush	Worm-eating Warbler
Swamp Sparrow	Yellow-breasted Chat
Tennessee Warbler	Yellow Warbler
Tree Swallow	Yellow-bellied Flycatcher
Tufted Titmouse	Yellow-bellied Sapsucker
Turkey Vulture	Yellow-throated Vireo
Upland sandpiper	
Veery	

SOURCES:
Field Guide to the Birds of North America 2nd Edition. National Geographic Society. 1993.
Integrating Timber and Wildlife Management. Robert E. Chambers. New York State Department of Environmental Conservation and State University of New York. College of Environmental Science and Forestry. 1983.

Table 1
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potential Wildlife Inhabitants of the Study Area Natural Covertypes

MAMMALS	
Beaver	New England Cottontail
Big Brown Bat	Northern Flying Squirrel
Boreal Red-backed Vole	Opossum
Cotton Mouse	Pine Vole
Deer Mouse	Porcupine
Eastern Chipmunk	Raccoon
Eastern Cottontail	Red Bat
Eastern Mole	Red Fox
Eastern Pipistrelle	Red Squirrel
Eastern Spotted Skunk	River Otter
Eastern Woodrat	Shorttail Shrew
Fox Squirrel	Shorttail Weasel
Gray Fox	Silver-haired Bat
Gray Squirrel	Smoky Shrew
Hairytail Mole	Southern Bog Lemming
Hoary Bat	Southern Flying Squirrel
Indiana Myotis	Starnose Mole
Keen Myotis	Striped Skunk
Least Shrew	Virginia Opossum
Little Brown Myotis	White-footed Mouse
Long-tailed Weasel	White-tailed Deer
Masked Shrew	Woodchuck
Meadow Jumping Mouse	Woodland Jumping Mouse
Meadow Vole	Woodland Vole
Mink	

SOURCES:
Field Guide to the Birds of North America 2nd Edition. National Geographic Society. 1993.
Integrating Timber and Wildlife Management. Robert E. Chambers. New York State Department of Environmental Conservation and State University of New York. College of Environmental Science and Forestry. 1983.

Table 2
Town of Carroll Landfill Site
Fish and Wildlife Impact Analysis
New York State Breeding Bird Atlas Information
2000-2004[1]

Common Name	Scientific Name	NY Legal Status
American Bittern	*Botaurus lentiginosus*	Protected-Special Concern
Great Blue Heron	*Ardea herodias*	Protected
Green Heron	*Butorides virescens*	Protected
Turkey Vulture	*Cathartes aura*	Protected
Canada Goose	*Branta canadensis*	Game Species
Wood Duck	*Aix sponsa*	Game Species
Mallard	*Anas platyrhynchos*	Game Species
Common Merganser	*Mergus merganser*	Game Species
Cooper's Hawk	*Accipiter cooperii*	Protected-Special Concern
Northern Goshawk	*Accipiter gentilis*	Protected-Special Concern
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Red-tailed Hawk	*Buteo jamaicensis*	Protected
American Kestrel	*Falco sparverius*	Protected
Ruffed Grouse	*Bonasa umbellus*	Game Species
Wild Turkey	*Meleagris gallopavo*	Game Species
Ring-necked Pheasant	*Phasianus colchicus*	Game Species
Virginia Rail	*Rallus limicola*	Game Species
Sora	*Porzana carolina*	Game Species
Common Moorhen	*Gallinula chloropus*	Game Species
Killdeer	*Charadrius vociferus*	Protected
Spotted Sandpiper	*Actitis macularia*	Protected
American Woodcock	*Scolopax minor*	Game Species
Rock Pigeon	*Columba livia*	Unprotected
Mourning Dove	*Zenaida macroura*	Protected
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Protected
Yellow-billed Cuckoo	*Coccyzus americanus*	Protected
Great Horned Owl	*Bubo virginianus*	Protected
Barred Owl	*Strix varia*	Protected
Chimney Swift	*Chaetura pelagica*	Protected

Table 2
Town of Carroll Landfill Site
Fish and Wildlife Impact Analysis
New York State Breeding Bird Atlas Information
2000-2004[1]

Common Name	Scientific Name	NY Legal Status
Ruby-throated Hummingbird	*Archilochus colubris*	Protected
Belted Kingfisher	*Ceryle alcyon*	Protected
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Protected
Red-bellied Woodpecker	*Melanerpes carolinus*	Protected
Downy Woodpecker	*Picoides pubescens*	Protected
Hairy Woodpecker	*Picoides villosus*	Protected
Northern Flicker	*Colaptes auratus*	Protected
Pileated Woodpecker	*Dryocopus pileatus*	Protected
Eastern Wood-Pewee	*Contopus virens*	Protected
Acadian Flycatcher	*Empidonax virescens*	Protected
Alder Flycatcher	*Empidonax alnorum*	Protected
Willow Flycatcher	*Empidonax traillii*	Protected
Least Flycatcher	*Empidonax minimus*	Protected
Eastern Phoebe	*Sayornis phoebe*	Protected
Great Crested Flycatcher	*Myiarchus crinitus*	Protected
Eastern Kingbird	*Tyrannus tyrannus*	Protected
Yellow-throated Vireo	*Vireo flavifrons*	Protected
Blue-headed Vireo	*Vireo solitarius*	Protected
Warbling Vireo	*Vireo gilvus*	Protected
Red-eyed Vireo	*Vireo olivaceus*	Protected
Blue Jay	*Cyanocitta cristata*	Protected
American Crow	*Corvus brachyrhynchos*	Game Species
Tree Swallow	*Tachycineta bicolor*	Protected
Cliff Swallow	*Petrochelidon pyrrhonota*	Protected
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Protected
Bank Swallow	*Riparia riparia*	Protected
Cliff Swallow	*Petrochelidon pyrrhonota*	Protected
Barn Swallow	*Hirundo rustica*	Protected
Black-capped Chickadee	*Poecile atricapillus*	Protected

Table 2
Town of Carroll Landfill Site
Fish and Wildlife Impact Analysis
New York State Breeding Bird Atlas Information
2000-2004[1]

Common Name	Scientific Name	NY Legal Status
Tufted Titmouse	*Baeolophus bicolor*	Protected
Red-breasted Nuthatch	*Sitta canadensis*	Protected
White-breasted Nuthatch	*Sitta carolinensis*	Protected
Brown Creeper	*Certhia americana*	Protected
Carolina Wren	*Thryothorus ludovicianus*	Protected
House Wren	*Troglodytes aedon*	Protected
Winter Wren	*Troglodytes troglodytes*	Protected
Marsh Wren	*Cistothorus palustris*	Protected
Blue-gray Gnatcatcher	*Polioptila caerulea*	Protected
Eastern Bluebird	*Sialia sialis*	Protected
Veery	*Catharus fuscescens*	Protected
Wood Thrush	*Hylocichla mustelina*	Protected
American Robin	*Turdus migratorius*	Protected
Gray Catbird	*Dumetella carolinensis*	Protected
Brown Thrasher	*Toxostoma rufum*	Protected
European Starling	*Sturnus vulgaris*	Unprotected
Cedar Waxwing	*Bombycilla cedrorum*	Protected
Blue-winged Warbler	*Vermivora pinus*	Protected
Yellow Warbler	*Dendroica petechia*	Protected
Chestnut-sided Warbler	*Dendroica pensylvanica*	Protected
Magnolia Warbler	*Dendroica magnolia*	Protected
Yellow-rumped Warbler	*Dendroica coronata*	Protected
Black-throated Green Warbler	*Dendroica virens*	Protected
Blackburnian Warbler	*Dendroica fusca*	Protected
Black-and-white Warbler	*Mniotilta varia*	Protected
American Redstart	*Setophaga ruticilla*	Protected
Ovenbird	*Seiurus aurocapilla*	Protected
Louisiana Waterthrush	*Seiurus motacilla*	Protected
Northern Waterthrush	*Seiurus noveboracensis*	Protected

Table 2
Town of Carroll Landfill Site
Fish and Wildlife Impact Analysis
New York State Breeding Bird Atlas Information
2000-2004[1]

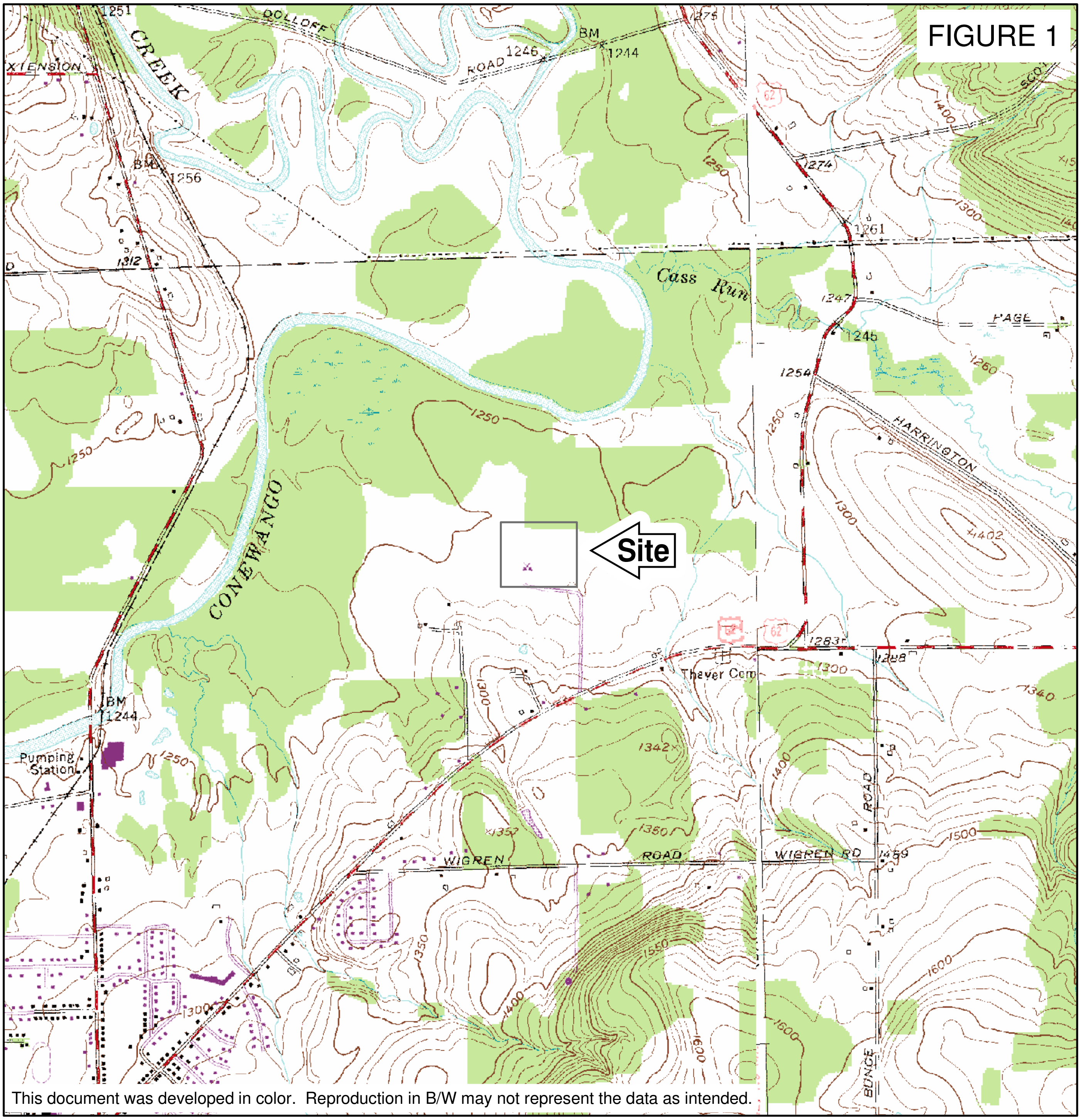
Common Name	Scientific Name	NY Legal Status
Mourning Warbler	*Oporornis philadelphia*	Protected
Common Yellowthroat	*Geothlypis trichas*	Protected
Hooded Warbler	*Wilsonia citrina*	Protected
Canada Warbler	*Wilsonia canadensis*	Protected
Scarlet Tanager	*Piranga olivacea*	Protected
Eastern Towhee	*Pipilo erythrophthalmus*	Protected
Chipping Sparrow	*Spizella passerina*	Protected
Field Sparrow	*Spizella pusilla*	Protected
Savannah Sparrow	*Passerculus sandwichensis*	Protected
Song Sparrow	*Melospiza melodia*	Protected
Swamp Sparrow	*Melospiza georgiana*	Protected
Dark-eyed Junco	*Junco hyemalis*	Protected
Northern Cardinal	*Cardinalis cardinalis*	Protected
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Protected
Indigo Bunting	*Passerina cyanea*	Protected
Bobolink	*Dolichonyx oryzivorus*	Protected
Red-winged Blackbird	*Agelaius phoeniceus*	Protected
Eastern Meadowlark	*Sturnella magna*	Protected
Common Grackle	*Quiscalus quiscula*	Protected
Brown-headed Cowbird	*Molothrus ater*	Protected
Baltimore Oriole	*Icterus galbula*	Protected
Purple Finch	*Carpodacus purpureus*	Protected
House Finch	*Carpodacus mexicanus*	Protected
American Goldfinch	*Carduelis tristis*	Protected
House Sparrow	*Passer domesticus*	Unprotected

[1] Based on the New York State Department of Environmental Conservation Breeding Bird Atlas (Blocks 1566A, B, C & D and 1466B & D) www.dec.state.ny.us/apps/bba/results/index

Table 3
Town of Carroll Landfill Site
Frewsburg, New York
Fish and Wildlife Impact Analysis
Potentially Applicable Criteria, Standards, or Guidance

Media	**Potentially Applicable Criteria, Standards, or Guidance**
Soil	The NYSDEC has not established ecologically-based criteria for contaminated soils *Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*. (Efroymson *et al*. 1997a) *Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision*. (Efroymson *et al*. 1997b) *Ecological Soil Screening Level Guidance* (USEPA 2000)
Surface Water	*TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*. (NYSDEC1998). Use and Protection of Waters – New York Environmental Conservation Law Articles 15 and 17; 6 NYCRR Part 608 *National Recommended Water Quality Criteria*-Correction (USEPA 2002) *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota* (Suter and Tsao 1996)
Sediments	*Technical Guidance for Screening Contaminated Sediments* (NYSDEC 1999) *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revision* (Jones *et al*., 1997)
Wetlands	NY Freshwater Wetlands Act (NYS 1985; NYS 1980; 6 NYCRR Parts 663, 664) USEPA Clean Water Act - Section 404 Executive Order 11990 – Protection of Wetlands Executive Order 11988 – Floodplain Management
Waterways	Use and Protection of Waters (6 NYCRR Part 608)
Flora and Fauna	Endangered Species Act of 1973 (50 CFR Parts 17 and 402) Endangered and Threatened Species of Fish and Wildlife - Species of Special Concern (NY ECL Article 11, Title 5; 6 NYCRR Part 182

Figures



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PLOT DATE: 03/03/05 DIV. 84 JPS

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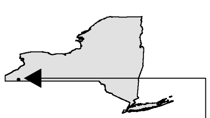

QUADRANGLE LOCATION

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

10653.34241
MARCH 2005

1:24,000

O'BRIEN & GERE ENGINEERS, INC.

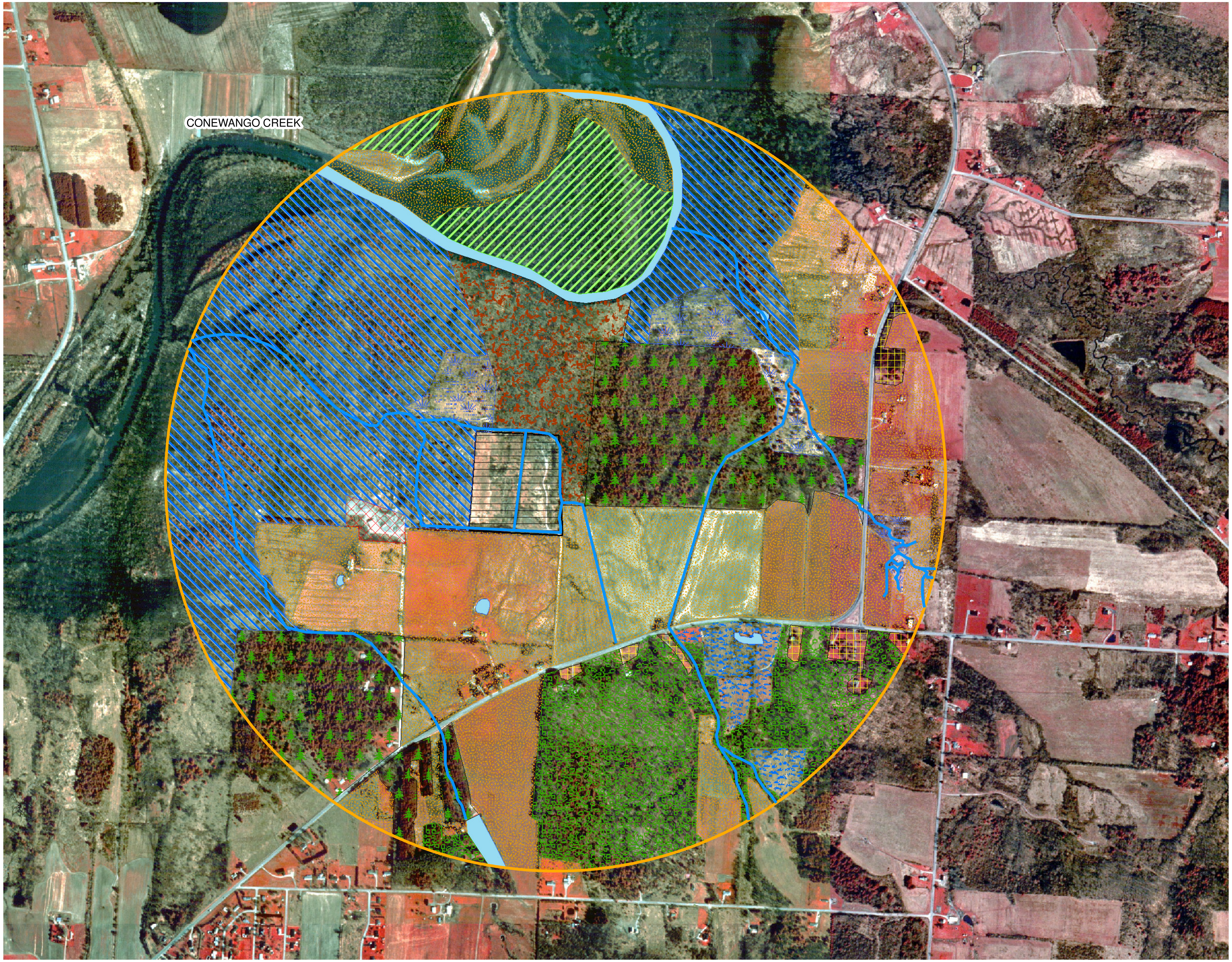

FIGURE 2

LEGEND

- CROPLAND/PASTURELAND
- HEMLOCK/NORTHERN HARDWOOD FOREST
- DECIDUOUS FOREST
- DECIDUOUS FORESTED WETLAND
- INDUSTRIAL
- LANDFILL CELLS
- MIXED FORESTED UPLAND
- MIXED WETLAND
- SUCCESSIONAL OLD FIELD
- OPEN WATER
- RESIDENTIAL
- SCRUB-SHRUB WETLAND
- 1/2 MILE SITE RADIUS
- STREAM/DRAINAGE WAY

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

STUDY AREA COVERTYPES

0 500 1,000 2,000
Feet

MARCH 2005
10653.34241

O'BRIEN & GERE ENGINEERS, INC.

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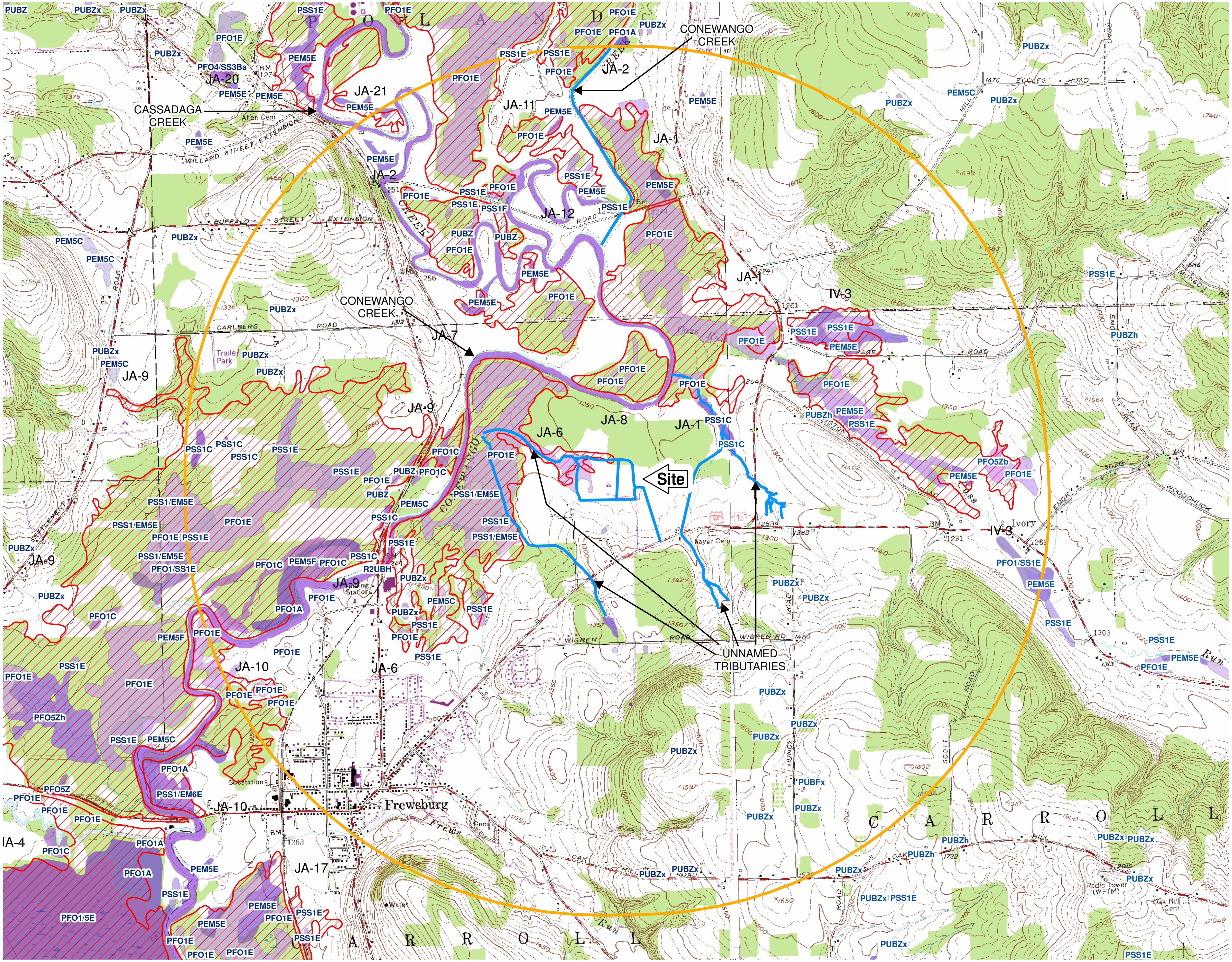
PLOT DATE: 02/23/05 DIV. 84 JPS

This document was developed in color. Reproduction in B/W may not represent the data as intended.

Source: Aerial photography from http://www.nysgis.state.ny.us/.

FIGURE 3



LEGEND

- STREAM/DRAINAGE WAY
- 2 MILE SITE RADIUS
- PSS1E NATIONAL WETLANDS INVENTORY HABITAT AREA
- JA-1 NYSDEC FRESH WATER WETLANDS

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

DOCUMENTED NATURAL RESOURCES

0 1,250 2,500 5,000
Feet

MARCH 2005
10653.34241

O'BRIEN & GERE ENGINEERS, INC.

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Source: NWI data from http://wetlands.fws.gov/downloads.htm. NYSDEC Fresh Water Wetlands from http://cugir.mannlib.cornell.edu/.

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PLOT DATE: 02/23/05 DIV. 84 JPS

Attachment A

Site photographs


Photo 1: Looking northwest at southern portion of eastern landfill cell.


Photo 2: Looking southeast at western landfill cell.

Photo 3: Looking north at drainage way located between landfill cells.

Photo 4: Looking west at drainage and scrub-shrub emergent wetland just north of western landfill cell.


Photo 5: Looking south at scrub-shrub wetland and drainage located south of landfill cells.


Photo 6: Looking northwest at northern portion of eastern landfill cell.

Photo 7: Looking northwest at tree stump disposal area at northern portion of eastern landfill cell and forested and scrub-shrub wetland in background of photo.

Photo 8: Looking northwest at unnamed tributary to Conewango Creek and forested wetland (NYSFW JA-6) northwest of site.

Photo 9: Looking south at mouth of unnamed tributary and Conewango Creek.

Photo 10: Looking north at mixed forested wetland north of site within study area.

Attachment B

USFWS and NYNHP information request letter responses

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

January 24, 2005

Mr. Ronald P. Chiarello
Project Scientist
O'Brien & Gere Engineers, Inc.
P.O. Box 4873
Syracuse, NY 13221-4873

Dear Mr. Chiarello:

This responds to your November 9, 2004, letter requesting information on the presence of endangered or threatened species in the vicinity of the proposed Carroll Town Landfill in the Village of Frewsburg, Chautauqua County, New York.

The clubshell (*Pleurobema clava*), listed as an endangered species by the U.S. Fish and Wildlife Service (Service), is known to occur in the Allegheny River drainage, including the Cassadaga Creek, and may occur within the Conewango Creek. The proposed project is less than one mile from the Conewango Creek. In addition to the clubshell, the rayed bean (*Villosa fabalis*), has been found in the Cassadaga Creek and may occur within the Conewango Creek. The rayed bean is a candidate species which is being considered by the Service for addition to the Federal List of Endangered and Threatened Wildlife and Plants. Candidate species are species for which the Service has on file sufficient information on the biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. Candidate species do not receive substantive or procedural protection under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.); however, the Service does encourage Federal agencies and other appropriate parties to consider these species in the project planning process.

Should the rayed bean be proposed for listing as endangered or threatened prior to completion of this project, conference procedures pursuant to Section 7(a)(4) of the ESA may be necessary if your project involves Federal authorizations. Should this species be listed prior to completion of the project, further coordination or consultation pursuant to the ESA will be required to evaluate potential adverse effects of project implementation on the rayed bean or its habitat, and to determine if formal consultation is necessary.

The project's environmental documents should identify project activities that might result in adverse impacts, directly or indirectly, to the clubshell, rayed bean, or their habitat. The following links may assist you as they provide additional information about the rayed bean and clubshell:

http://midwest.fws.gov/Endangered/clams/rayed-bean-sa.pdf, and
http://nyfo.fws.gov/es/clubshell.pdf

The project's environmental documents or other information regarding the project's potential impacts on these species should be provided to this office and as they will be used to evaluate potential impacts to the clubshell or its habitat, and to determine the need for further coordination or consultation pursuant to the ESA.

Except for the potential for the clubshell, rayed bean, and occasional transient individuals, no other Federally-listed or proposed endangered or threatened species under our jurisdiction are known to exist in the project impact area. In addition, no habitat in the project impact area is currently designated or proposed "critical habitat" in accordance with provisions of the ESA. Should project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered. The most recent compilation of Federally-listed and proposed endangered and threatened species in New York* is available for your information. If the proposed project is not completed one year from the date of this determination, we recommend that you contact us to ensure that the listed species presence/absence information for the proposed project is current.

The above comments pertaining to endangered species under our jurisdiction are provided pursuant to the ESA. This response does not preclude additional Service comments under other legislation.

The clubshell and rayed bean are listed as endangered by the State of New York. Project plans and the results of the above information should be coordinated with both this office and with the New York State Department of Environmental Conservation (State). The State contacts for the clubshell and rayed bean are:

Ms. Jean Pietrusiak
New York State Department of
Environmental Conservation
New York Natural Heritage Program
Information Services
625 Broadway
Albany, NY 12233-4757
(518) 402-8935

Mr. Peter Nye
New York State Department of
Environmental Conservation
Endangered Species Unit
625 Broadway
Albany, NY 12233
(518) 402-8859

For additional information on fish and wildlife resources or State-listed species, we suggest you contact the appropriate State regional office(s),* and:

New York State Department of Environmental Conservation
New York Natural Heritage Program Information Services
625 Broadway
Albany, NY 12233-4757

Since wetlands may be present, you are advised that National Wetlands Inventory (NWI) maps may or may not be available for the project area. However, while the NWI maps are reasonably accurate, they should not be used in lieu of field surveys for determining the presence of wetlands or delineating wetland boundaries for Federal regulatory purposes. Copies of specific NWI maps can be obtained from:

Cornell Institute for Resource Information Systems
302 Rice Hall
Cornell University
Ithaca, NY 14853-5601
(607) 255-6520
web: http://iris.css.cornell.edu
email: cornell-iris@cornell.edu

Work in certain waters of the United States, including wetlands, may require a permit from the U.S. Army Corps of Engineers (Corps). If a permit is required, in reviewing the application pursuant to the Fish and Wildlife Coordination Act, the Service may concur, with or without recommending additional permit conditions, or recommend denial of the permit depending upon potential adverse impacts on fish and wildlife resources associated with project construction or implementation. The need for a Corps permit may be determined by contacting the appropriate Corps office(s).*

Thank you for your time. If you require additional information please contact Robyn Niver at (607) 753-9334.

Sincerely,

David A. Stilwell
Field Supervisor

*Additional information referred to above may be found on our website at: http://nyfo.fws.gov/es/section7.htm

cc: NYSDEC, Allegany, NY (Attn: Environmental Permits)
NYSDEC, Albany, NY (Natural Heritage Program)
NYSDEC, Albany, NY (Endangered Species; Attn: P. Nye)
COE, Buffalo, NY

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

November 30, 2004

Ronald P. Chiarello
O'Brien & Gere
5000 Brittonfield Pkwy
Syracuse, NY 13221-4873

Dear Mr. Chiarello:

In response to your recent request, we have reviewed the New York Natural Heritage Program databases with respect to an Environmental Assessment for the Carroll Town Landfill, File 10653/34241.003.001, area as indicated on the map you provided, including a 2-mile radius, located in the Village of Frewsburg, Chautauqua County.

We have no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats, on or in the immediate vicinity of your site.

The absence of data does not necessarily mean that rare or state-listed species, natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain any information which indicates their presence. For most sites, comprehensive field surveys have not been conducted. For these reasons, we cannot provide a definitive statement on the presence or absence of rare or state-listed species, or of significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

This response applies only to known occurrences of rare or state-listed animals and Pplants, significant natural communities and other significant habitats maintained in the Natural Heritage Data bases. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

Sincerely,
Betty Ketcham
Betty A. Ketcham, Information Services
New York Natural Heritage Program

Enc.
cc: Reg. 9, Wildlife Mgr.
Reg. 9, Fisheries Mgr.

Appendix I

Exposure pathway analysis

Exposure Pathway Analysis Report

As part of the RI for the Town of Carroll Landfill Site (Site), an Exposure Pathway Analysis Report (EPAR) was prepared. The tables within the EPAR were developed consistent with the *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments* (USEPA 2001), referred to as RAGS Part D. The EPAR contains Table 1 consistent with the RAGS D format.

Attached is Table 1 that was prepared according to RAGS Part D for the Site, and constitutes the EPAR. Table 1 provides a summary of the exposure pathways that were assessed for the qualitative assessment of risk to humans from potential contact with site media. Consistent with the July 15, 2004 RI/FS Final Project Management Work Plan, a comparison to USEPA risk based criteria was not conducted for this Site and chemicals of potential concern (COPC) were not identified as part of this EPAR. Analytical results were compared to NYSDEC TAGM 4046 recommended soil cleanup objectives and NYSDEC Class GA ground water standards as part of the RI. Consistent with the July 15, 2004 Final Project Management Work Plan, this comparison is documented in the analytical data summary tables included in the RI Report.

TABLE 1.1a
SELECTION OF ON-SITE EXPOSURE PATHWAYS - CURRENT/FUTURE USES
Town of Carroll Landfill

Scenario	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Site surface soil	Surface soil	Site-wide surface soils (0-2ft bgs.)	Construction Worker	Adult	Ingestion	Qual.	A construction worker could have occasional incindental ingestion while performing duties.
						Dermal	Qual.	A construction worker could have occasional dermal exposure while performing duties.
				Maintenance worker	Adult	Ingestion	Qual.	A maintenance worker could have occasional incidental ingestion while performing duties.
						Dermal	Qual.	A maintenance worker could have occasional dermal exposure while performing duties.
				Trespasser	Adult, Adolescent, Child	Ingestion	Qual.	It is possible that trespassing could occur on site; incidental ingestion of soil could occur while trespassing. For example, hunting reportedly has occurred on the site.
						Dermal	Qual.	It is possible that trespassing could occur on site; dermal exposure to soil could occur while trespassing. For example, hunting reportedly has occurred on the site.
		Air	Site-wide ambient air	Construction worker	Adult	Air inhalation	Qual.	It is possible that construction workers could inhale fugitive dust and vapors while performing duties.
				Maintenance worker	Adult	Air inhalation	Qual.	It is possible that site workers (e.g. utility worker, fencing company employees, maintenance workers) could occasionally inhale fugitive dusts and vapors.
				Trespasser	Adult, Adolescent, Child	Air inhalation	None	This potential pathway is insignificant.
	Site subsurface soil	Subsurface soil	Subsurface soil (2-10ft bgs.)	Construction worker	Adult	Ingestion	Qual.	Construction or workers could incidentally ingest soil to a depth of approximately 10ft bgs as part of building projects or construction activities.
						Dermal	Qual.	Construction workers could have dermal exposure to soils at a depth of approximately 10ft bgs as part of building projects or construction activities.

TABLE 1.1a
SELECTION OF ON-SITE EXPOSURE PATHWAYS - CURRENT/FUTURE USES
Town of Carroll Landfill

Scenario	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future (continued)	Site subsurface soil	Air	Outdoor air-trenches/excavations	Construction worker	Adult	Air inhalation	Qual.	Construction workers could occasionally inhale vapors originating from excavations made while working.
	Groundwater	Groundwater	Groundwater	Construction worker	Adult	Ingestion	Qual.	Construction workers could ingest groundwater incidentally during construction activities at or below the water table.
						Dermal	Qual.	Construction workers could have dermal exposure incidentally during construction activities at or below the water table.
		Air	Ambient Air	Construction worker	Adult	inhalation	Qual.	Construction workers could inhale vapors originating from groundwater while working.

TABLE 1.1b

SELECTION OF ON-SITE EXPOSURE PATHWAYS - FUTURE USES

Town of Carroll Landfill

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Site surface soil	Surface soil	Site-wide surface soils (0-2ft) bgs	Residents	Adult, Adolescent, Child	Ingestion	Qual.	The site is zoned AR-1 intended for agricultural/residential use with a 1 acre minimum lot size. Over 275 acres of the site is undeveloped; the closed landfill comprises the other approximately 25 acres of it. Future residential development of the site could result in incidental ingestion of surface soils by a resident.
						Dermal	Qual.	The site is zoned AR-1 intended for agricultural/residential use with a 1 acre minimum lot size. Over 275 acres of the site is undeveloped; the closed landfill comprises the other approximately 25 acres of it. Future residential development of the site could result in dermal contact with surface soils by a resident
				Construction worker	Adult	Ingestion	Qual.	Future construction workers could ingest surface soil incidentally as a part of building projects or repair.
						Dermal	Qual.	Future construction workers could have dermal contact with surface soil as a part of building projects or construction activity.
			Site-wide ambient air	Construction worker	Adult	Air inhalation	Qual.	It is possible that future construction workers could inhale fugitive dust and vapors while performing duties.
	Site subsurface soil	Subsurface soil	Site -wide subsurface soil (2-10ft bgs)	Construction worker	Adult	Ingestion	Qual.	Future construction workers could incidentally ingest soil to a depth of approximately 10ft bgs as part of building projects or construction activity.
						Dermal	Qual.	Future construction workers could have dermal exposure to a depth of approximately 10ft bgs as part of building projects or construction activity.
		Air	Outdoor air - trenches/excavations	Construction worker	Adult	Inhalation	Qual.	Future construction workers could inhale dust or vapors originating from excavations made to perform work.

TABLE 1.1b
SELECTION OF ON-SITE EXPOSURE PATHWAYS - FUTURE USES
Town of Carroll Landfill

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (continued)	Subsurface soil (continued)	Air (continued)	Indoor air - vapor intrusion	Office worker	Adult	Inhalation	None	Potential exposure to vapor intrusion into indoor air is considered via the ground water pathway. EPA does not recommend indoor air vapor intrusion evaluation from soil data.
				Commercial worker	Adult	Inhalation	None	Potential future exposure to vapor intrusion into indoor air is considered via the ground water pathway. EPA does not recommend indoor air vapor intrusion evaluation from soil data.
				Residents	Adult, Adolescent, Child	Inhalation	None	Potential future exposure to vapor intrusion into indoor air is considered via the ground water pathway. EPA does not recommend indoor air vapor intrusion evaluation from soil data.
	Groundwater	Groundwater	Potable water	Office worker	Adult	Ingestion, dermal contact	Qual.	There are presently no known wells on the Site that provide potable water. However, the village currently operates a production well that is located approximately 700 ft from the site. Use of that well could expose a future office worker to ground water via the potable water supply.
				Commercial worker	Adult	Ingestion, dermal contact	Qual.	There are presently no known wells on the Site that provide potable water. However, the village currently operates a production well that is located approximately 700 ft from the site. Use of that well could expose a future commercial worker to ground water via the potable water supply.
				Residents	Adult, Adolescent, Child	Ingestion, dermal contact	Qual.	There are presently no known wells on the Site that provide potable water. However, the village currently operates a production well that is located approximately 700 ft from the site. Use of that well could expose a future resident to ground water via the potable water supply.
		Air	Indoor air - vapor intrusion	Office worker	Adult	Inhalation	Qual.	Future development of site could result in office worker that has the potential to inhale indoor air affected by vapor intrusion from groundwater sources.
				Commercial worker	Adult	Inhalation	Qual.	Future development of site could result in commercial worker that has the potential to inhale indoor air affected by vapor intrusion from groundwater sources.

TABLE 1.1b

SELECTION OF ON-SITE EXPOSURE PATHWAYS - FUTURE USES

Town of Carroll Landfill

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
				Residents	Adult, Adolescent, Child	Inhalation	Qual.	Future residential development of the site could result in residents have the potential to inhale indoor air affected by vapor intrusion from groundwater sources.

TABLE 1.2
SELECTION OF OFF-SITE EXPOSURE PATHWAYS - CURRENT/FUTURE
Town of Carroll Landfill

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Groundwater	Groundwater	Potable water	Resident	Adult, Adolescent, Child	Ingestion	Qual.	Village operates potable water supply well located approximately 700 ft from the site. Residents can be exposed to and ingest constituents in potable water during daily activities such as showering/bathing, washing, cooking and cleaning.
						Dermal	Qual.	Village operates potable water supply well located approximately 700 ft from the site. Residents can be exposed to dermal contact with constituents in potable water during daily activities such as showering/bathing, washing, cooking and cleaning.
			Groundwater	Construction worker	Adult	Ingestion	Qual.	Construction workers could ingest groundwater incidentally during construction activities at or below the water table.
						Dermal	Qual.	Construction workers could have dermal exposure incidentally during construction activities at or below the water table.
		Air	Indoor Air Vapor Intrusion	Resident	Adult, Adolescent, child	Inhalation	Qual.	It is possible that buildings offsite could experience vapor intrusion into buildings from groundwater, leading to inhalation of vapors.
	Sediment	Wetland Sediment	Wetland Sediment	Recreational visitor/ Trespasser	Adult, Adolescent, Child	Ingestion	Qual.	It is possible for constituents to be transported from the Site to wetland sediment providing a pathway and potential exposure via incidental ingestion with sediment during recreational activities or trespassing.
						Dermal	Qual.	It is possible for constituents to be transported from the Site to wetland sediment providing a pathway and potential exposure via dermal contact with sediment during recreational activities or trespassing.

FINAL REPORT

Town of Carroll Landfill Site
Hamlet of Frewsburg, New York
Feasibility Study

New York State Department of Environmental Conservation
Albany, New York

April 2006

10653/34241

FINAL REPORT

Town of Carroll Landfill Site
Feasibility Study Report
Hamlet of Frewsburg, New York

New York State
Department of Environmental Conservation
Albany, New York

Douglas M. Crawford
Douglas M. Crawford, P.E
Vice President

April 2006

O'BRIEN & GERE
ENGINEERS, INC.

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1. Introduction

1.1. Purpose

The purpose of this report is to present the Feasibility Study (FS) for the Town of Carroll Landfill Site (Site), New York State Superfund Site No. 9-07-017, located in Frewsburg, New York. A site location map is provided as Figure 1.

This FS was conducted on behalf of the New York State Department of Environmental Conservation (NYSDEC) in accordance with:

- the provisions of CERCLA as amended by SARA
- the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; Federal Register 1990)
- the NYSDEC Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10; NYSDEC 2002)
- the USEPA *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA 1988)
- the NYSDEC revised *Technical Administrative Guidance Memorandum (TAGM) on Selection of Remedial Actions at Inactive Hazardous Waste Sites* (NYSDEC 1990)
- the USEPA *Presumptive Remedy for CERCLA Municipal Landfill Sites* (USEPA 1993)
- the Remedial Investigation/Feasibility Study – Final Project Management Work Plan (PMWP; O'Brien & Gere 2004).

1.2. Site Background

The Town of Carroll Landfill is a former municipal and construction and demolition (C&D) debris landfill and solid waste transfer station. The landfill is located at the end of an unnamed gravel road, approximately 1,700 feet north of NYS Route 62 (also known as Ivory Road) in the Village of Frewsburg, Town of Carroll, Chautauqua County, New York (Figure 1). The landfill is located on a 305-acre lot, although the landfill Site occupies only approximately 25 acres of the property. The surrounding area includes active and inactive farmland, wooded areas, wetlands, and private homes. Conewango Creek lies to the north, northwest, and west of the Site within a broad floodplain (NYSDEC, 2003).

The Site is located on a northwest-facing, gently sloping hillside and is composed of two roughly rectangular landfill cells, each surrounded by drainage ditches and swales. Based on the field activities conducted at the Site, the western landfill cell is approximately 900 ft from north to south and 450 ft from east to west. The eastern landfill cell is approximately 750 ft from north to south and 300 ft from east to west. The ground surface of the eastern cell is estimated to range from 1 to 4 feet above surrounding ditches on the east, north and west. The topography of the western cell is more uneven, ranging from approximately 1 to 10 feet above the surrounding ditches with several flat areas. A narrow drainage area, approximately 70 ft wide, separates the two landfill cells and eventually drains to the northwest into a wetland area before reaching Conewango Creek (NYSDEC, 2003).

Approximately 700 feet west of the Site is the Town of Carroll Public Works Garage area and the Frewsburg Water District including a water supply well and pump station. The Public Works Garage and Water District are located on the same lot, but are accessed from Wahlgren Road off NYS Route 62. The nearest homes are approximately 1200 feet to the west and south and uphill from the Site (NYSDEC, 2003).

1.3. Geology and Hydrogeology

1.3.1. Geology

The Site is located in the Allegany Plateau physiographic province of New York State near the Village of Frewsburg. The following hydrogeologic units can be differentiated at the Site: fill, lacustrine sandy silt and silty clay, glacial outwash sand and gravel, till, and bedrock.

Fill. The uppermost unit within the boundaries of the landfill cells is fill. Fill materials around the edges of the western cell were observed to be mainly composed of wood pieces, metal debris, metal turnings, plastic and glass bottles, plastic sheeting, paper, tires, and drum carcasses. Fill materials around the edges of the southern portion of the eastern cell were observed to be mainly composed of municipal waste such as plastics, miscellaneous metallic debris, paper and plastic toys. Fill materials around the edges of the northern portion of the eastern cell were observed to be mainly composed of brush and log materials. Test pits completed around the edges of the landfill cells indicate that the total depth of fill ranged from approximately 2-ft at TP-01, TP-11, and TP-18 to approximately 10-ft at TP-12. The top of the fill materials was encountered between approximately 1 and 5-ft within each test pit.

A soil cover exists over the fill material, however, this cover was noted to be eroded in places with partially buried drums observed. The cover, did not appear to be suitable for preventing infiltration of precipitation through the underlying fill materials. No consistent cover thickness was noted during field investigations, with several drums observed partially exposed at the surface.

Lacustrine sandy silt and silty clay. The uppermost naturally occurring material outside of the boundaries of the landfill cells, and underlying the fill consists of a yellowish brown, stiff, fine sandy silt with some clay. This sandy silt unit varies in thickness from 5 ft (southwest) to 10 ft (northeast). Underlying this unit is a medium gray, stiff, silty clay unit. This silty clay unit varies in thickness from about 3 ft to 10 ft. The total depth of these units ranges from 7 ft to 20 ft below ground surface.

Glacial outwash sand and gravel. An outwash sand and gravel was encountered underlying the lacustrine sandy silt and silty clay units. The sand and gravel unit consists of yellowish brown, medium dense, fine to coarse sand and gravel with some silt. The total depth of this unit is approximately 45 ft below ground surface.

Till. Till was encountered at the MW-109D location underlying the outwash sand and gravel unit. The glacial till consists of olive gray, very dense gravel and medium to coarse sand with few cobbles. This unit has a thickness of about 15 ft.

Bedrock. Bedrock was not encountered at the Site during the Remedial Investigation (RI; O'Brien & Gere 2005). The uppermost bedrock formations consist of upper Devonian age shale and siltstone of the Conneaut Group. The formations may also include limited beds of sandstone and conglomerate. Previous activities completed for the investigation for the Frewsburg Water District encountered weathered shale bedrock at 76 to 81 ft below ground surface (O'Brien & Gere 2005)

1.3.2. Hydrogeology

Ground water was observed between 3 ft and 9 ft below grade. Shallow ground water is defined as the ground water present to approximately 20 ft below grade. Intermediate ground water is defined as the ground water present between 20 and 45 ft below grade. Deep ground water is defined as ground water present between 45 and 70 ft below grade. Nine wells are installed such that the screen is situated within the shallow ground water zone, eight wells are installed such that the screen is situated within the intermediate zone, and one ground water well is installed within the deep ground water zone.

Flow components of ground water observed during the RI, in combination with historical information, suggest that the natural flow of ground water is generally northerly toward Conewango Creek. The Frewsburg Water District Supply Well #5 is located about 700-ft southwest of the landfill Site. Shallow ground water was observed during various monitoring events to have a flow component to the west-northwest or to the west-southwest. Ground water in the intermediate zone flows to the southwest. It is likely that ground water flow direction is being influenced and redirected by initiation of pumping activities of the Frewsburg Water District Supply Well #5 in January 1995.

Shallow ground water hydraulic gradients ranged from 0.002 to 0.009 ft/ft and were noted to generally be higher in the southern portions of the landfill than in the northern portion. Intermediate ground water had a uniform hydraulic gradient of about 0.004 ft/ft. Vertical hydraulic gradients were observed to be both upward and downward depending on the sampling date.

Results indicate that hydraulic conductivity of the shallow hydrogeologic unit ranges from 0.05 ft/day to 0.5 ft/day. Hydraulic conductivity values from the intermediate wells range from 0.16 ft/day to 9.72 ft/day. The hydraulic conductivity of the deep sand and gravel is approximately 2.85 ft/day.

The geometric mean hydraulic conductivity of the intermediate sand and gravel is approximately one order of magnitude higher than the hydraulic conductivity of the silts and clay of the shallow hydrogeologic unit. The low hydraulic conductivity values from the shallow wells are representative of the finer grained surficial sandy silt and silty clay units at the Site. Conductivity values from the intermediate wells are representative of the coarser grained sand and gravel unit.

1.4. Summary of Remedial Investigation

A RI was conducted at the Site by O'Brien & Gere Engineers, Inc. on behalf of NYSDEC from August 16, 2004 through November 10, 2004. The RI is summarized in the Remedial Investigation Report (O'Brien & Gere 2005).

Environmental samples were collected from the following media: soil vapor, surface soil, surface water, sediment, landfill material, leachate seep liquid, and ground water. Ground water wells were installed to three general depths: "shallow" screened within the 10 to 20 ft interval, "intermediate" screened within the 35 to 45 ft interval, and "deep" screened within the 60 to 70 ft interval. Surface soils were sampled, generally, from within 2 inches of the surface. Landfill material was sampled from test pits dug by an excavator at locations along the edges of the western cell. Surface water and sediment samples were co-located. Two surface water/sediment samples were collected from a drainage swale (intermittent stream) north of the landfill cells, one surface water/sediment sample was collected from the wetland area west of the western landfill cell, and two surface water/sediment samples were collected in the drainage swale between the eastern and western landfill cells. Test wells (those with the designation "TW") were installed in test pit locations that contained visibly impacted water. Sampling locations are shown on Figure 2.

Solid and liquid samples were analyzed by O'Brien and Gere Laboratories in Syracuse New York, while soil vapor samples were screened in the field by a photoionization detector (PID) and subsequently analyzed by Lancaster Laboratories.

The following media were analyzed for volatile organic compounds (VOCs) by USEPA Method OLM04.2 (soil vapor by USEPA Method TO-15):

- Soil Vapor (4 samples)
- Sediment (5 samples)
- Landfill material (8 samples)
- Leachate seeps (3 samples)
- Ground water (25 samples).

VOC compounds were detected in each of the media sampled; however, concentrations within the sediment, landfill material, and leachate seeps were below associated screening criteria.

VOCs were detected in soil vapor within the boundaries of the landfill cells at concentrations that exceeded the generic screening levels for target shallow soil gas concentrations (O'Brien & Gere 2005). Since occupied structures are not currently present in the immediate vicinity of the landfill, potential for vapor impacts are considered minimal. VOCs detected in soil vapor consist mainly of aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, and refrigerant compounds. Detected concentrations in the soil vapor are relatively low and do not indicate the presence of a significant VOC source.

VOCs were detected in shallow and intermediate ground water at concentrations above New York State (NYS) Class GA drinking water standards; however, based on ground water data collected from upgradient, cross gradient, and downgradient monitoring wells, concentrations above NYS Class GA standards in shallow and intermediate ground water appear to be localized at or near monitoring wells MW-107S and MW-102I, respectively. VOCs in deep ground water samples did not exceed the NYS Class GA drinking water standards.

The detection of VOCs in the shallow, intermediate, and deep monitoring wells suggest that VOCs have migrated from the landfill; however, overall VOC concentrations decrease with depth. This may suggest that the limited detection and low concentration of VOCs in the intermediate and deep sand and gravel unit are the result of attenuation of VOCs along the migration pathways.

The following media were analyzed for semivolatile organic compounds (SVOCs) by USEPA Method OLM04.2:

- Surface water (5 samples)
- Sediment (5 samples)
- Landfill material (6 samples)
- Leachate seeps (1 sample)
- Ground water (5 samples).

SVOCs were detected in each medium sampled except for the leachate seeps. SVOCs were detected at concentrations above associated screening levels in surface water, landfill material, and perched ground water. SVOCs detected in sediment were below the associated sediment criteria. While SVOCs were detected in the perched ground water collected from TW-TP-02, they were not detected in ground water samples collected from the monitoring wells, which suggests that the migration of SVOCs from landfill materials is limited.

The following media were analyzed for pesticides and polychlorinated biphenyls (PCBs) by USEPA Method OLM04.2:

- Surface soil (5 samples)
- Surface water (1 sample)
- Landfill material (3 samples)
- Leachate seeps (1 sample)
- Ground water (5 samples).

Neither pesticides nor PCBs were detected above associated screening criteria in any of the environmental media sampled.

The following media were analyzed for inorganic constituents including cyanide by USEPA Method ILM04.0:

- Surface soil (5 samples)
- Surface water (5 samples)
- Sediments (5 samples)
- Landfill material (8 samples)
- Leachate seeps (3 samples)
- Ground water (5 samples).

Within surface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other surface soil sample concentrations are barium, cadmium, lead, and zinc at the SS-09 location, and lead and zinc at the SS-10 location. As shown on Figure 10, these surface soil samples were collected within the eastern landfill cell. Although barium and lead concentrations at SS-09 appear as though they could be related to landfill operations, their respective concentrations are within the range for Eastern United States background soils (NYSDEC 1990). Review of the analytical results for cadmium, lead, and zinc indicates that concentrations are within an order of magnitude of either the TAGM 4046 criteria and/or Eastern United States background concentrations ranges, indicating the overall inorganic impacts to surface soil are low.

Within surface water, inorganic constituents that were detected at concentrations exceeding NYS Class C water quality criteria included aluminum, cobalt, iron, lead, vanadium, and zinc. The inorganic constituents detected in the surface water samples are likely attributable to the migration of leachate from the landfill to drainage swales between the two landfill cells, which ultimately drain to the drainage swale to the north of the cells. Similar inorganic constituents were detected in the surface water samples as in the leachate samples. Whether the elevated concentrations of inorganics are adversely impacting Conewango Creek which is located approximately 4,000 feet to the west of the Site is not known. However, given the relatively large distance to Conewango Creek, potential for impacts is considered to be low.

Sediment samples were co-located with the surface water samples. In general, similar inorganic constituents were detected in the sediment samples as in the surface water samples. However, in almost all cases, constituent concentrations in the sediment were higher than those detected in surface water. Inorganic sediment concentrations were compared to the Lowest Effect Level and the Severe Effect Level. This comparison indicated that arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc exceeded the Lowest Effect Level, whereas iron in the SED-03 and SED-04 samples, and manganese in the SED-03 sample exceeded the Severe Effect Level. The highest concentrations of arsenic, copper, iron, manganese, and nickel were detected in the SED-03 sample. SED-03 is located within a drainage swale located west of the western landfill cell.

Within leachate, concentrations of aluminum, cadmium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc were detected at concentrations that exceeded NYS Class C water quality criteria. The highest concentrations of these constituents were detected at the LT-03 location to the northwest of the western landfill cell. Concentrations of inorganics were generally one order of magnitude greater at the LT-03 location than the other leachate sampling locations. The LT-03 location was observed to have a sheen during sampling.

Within subsurface soil, the concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations compared to other subsurface soil sample concentrations were cadmium, chromium, cobalt, copper, mercury, nickel, and zinc. As shown on Figure 11, these subsurface soil samples were from test pits installed at the northern, eastern and southern limits of the western landfill cell. The highest concentrations of these inorganic constituents were detected in the subsurface soil sample collected from the TP-07/SS-2 location.

Within ground water, arsenic, barium, beryllium, cadmium, chromium, iron, lead, magnesium, manganese, sodium, and thallium were detected at concentrations exceeding ground water standards. Of these constituents, iron was the only constituent that was detected consistently (30 of 31 samples) above ground water standards in the ground water samples. The frequency of detections of the other inorganic constituents that exceeded ground water standards are as follows:

- barium (MW-108S – one of two sampling rounds)
- beryllium (MW-110I – one of two sampling rounds)
- cadmium (MW-102 – one of two sampling rounds)
- sodium (MW-104 – one of two sampling rounds)
- chromium (MW-108S and MW-110I – one of two sampling rounds)
- thallium (MW-109I and MW-110I – one of two sampling rounds)
- manganese (MW-108S, MW-109I, and MW-110I – one of two sampling rounds)
- lead (MW-109I – both sampling rounds; MW-110S and MW-110I – one of two sampling rounds)
- magnesium (MW-107S – both sampling rounds, MW-104 and MW-110I – one of two sampling rounds)
- arsenic (MW-101, MW-104, MW-105S, MW-108S, MW-109I, MW-110S MW-110I, MW-111S – one of two sampling rounds)

As shown above, inorganic concentrations above the ground water standards were detected sporadically, both spatially and temporally, with the exception of iron. Review of the iron concentrations, combined with the frequency of detection suggests that the detected concentrations are likely representative of background ground water quality conditions.

1.5. Chautauqua County Department of Health Ground Water Sampling

As described in the RI Report (O'Brien & Gere 2005), The Chautauqua County Department of Health (CCDOH) has been conducting ground water sampling of the Frewsburg Water District Supply Well # 5 and sentinel well MW-13 on a periodic basis. Based on available data from the CCDOH, vinyl chloride and cis-1,2-DCE have been detected in the Frewsburg Water District Supply Well # 5 since 2003. These detections range from 0.5 ug/L to 0.9 ug/L for vinyl chloride and 0.9 ug/L to 2.7 ug/L for cis-1,2- DCE. These detected concentrations were below drinking water standards. The analytical results for the Frewsburg Water District Supply Well # 5 are summarized in a table included in the RI Report (O'Brien & Gere 2005).

Concentrations of Freon-12, vinyl chloride, chloroethane, and cis-1,2 DCE have been consistently detected in sentinel well MW-13 since July 2003. Vinyl chloride has been consistently detected above the NYS Class GA ground water standard of 2 ug/L since October 2002. Review of data indicate that concentrations of vinyl chloride have been slowly increasing between 2002 and 2005. Concentrations of cis-1,2-DCE have also been detected above the NYS Class GA ground water standard of 5 ug/L in samples collected during August and October 2004, and June 2005. Review of data indicate that concentrations of cis-1,2-DCE have been slowly increasing between 2003 and 2005. The analytical results for the sentinel well are summarized in a table included in the RI Report (O'Brien & Gere 2005).

1.6. Summary of Risk Assessment

1.6.1. Human Health Risk Assessment

A qualitative exposure pathway analysis was performed to evaluate the potential for human contact with site constituents and is documented in the exposure pathway analysis report (EPAR) (O'Brien and Gere, 2005a) The qualitative exposure pathway analysis consisted of identification of potentially complete exposure pathways.

Potentially complete exposure pathways identified in the EPAR for the Site were:

Current on-site exposure pathways

- Ingestion and dermal contact of surface soil by adult, adolescent, and child trespasser; and adult site worker
- Inhalation of ambient air by adult site worker
- Ingestion and dermal contact of subsurface soil by adult site worker
- Inhalation of outdoor air (trenches/excavations) by adult site worker.
- Ingestion and dermal contact with site ground water by adult site worker
- Ingestion of potable ground water by adult, adolescent, and child town residents

Future on-site exposure pathways

- Ingestion and dermal contact of surface soil by adult, adolescent, and child residents; adult site worker; adult commercial worker; adult, adolescent, and child trespasser
- Inhalation of ambient air by adult site worker
- Ingestion and dermal contact of subsurface soil by adult site worker
- Inhalation of outdoor air (trenches/excavations) by adult site worker
- Inhalation of indoor air (vapor intrusion) by adult commercial worker; adult office worker; and adult, adolescent, and child residents
- Ingestion and dermal contact with potable ground water by adult commercial worker; adult office worker; and adult, adolescent, and child residents.

Current/future off-site exposure pathways

- Inhalation of indoor air (vapor intrusion) by adult, adolescent, and child residents
- Ingestion and dermal contact with potable ground water by adult, adolescent, and child residents

- Ingestion and dermal contact with ground water by adult construction worker
- Ingestion and dermal contact with sediment by adult, adolescent, and child trespasser.

1.6.2. Fish and Wildlife Impact Analysis

A Fish and Wildlife Impact Analysis (FWIA) through Step IIA was completed for the Site (O'Brien & Gere 2005b). The FWIA was conducted according to the NYSDEC document entitled *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (NYSDEC 1994; Guidance). Step I - *Site Description* and Step IIA - *Contaminant-Specific Impact Assessment – Pathway Analysis* of the NYSDEC Guidance were addressed.

The FWIA evaluated the physical and biological characteristics and potential ecological receptors. The results and conclusions of the assessment are summarized below:

- The terrestrial portion of the Site consists of the landfill cells, dirt access roads, maintained fields/mowed areas, an old concrete loading bay area, and a small block structure. These features limit the use by resident and transient wildlife species.

- Aquatic areas existing on-site include a portion of the unnamed tributary of Conewango Creek, emergent and scrub-shrub wetlands and several drainage ways. The wetlands provide habitat for a variety of terrestrial and aquatic receptors. The unnamed tributary likely provides some habitat for a variety of fish and other wildlife species that frequent aquatic habitats. However, the relatively small size of the tributary limits the value of this habitat to some wildlife, particularly fish.

- The terrestrial areas surrounding the Site and within the study area consist of a mixture of natural communities and areas exhibiting rural (predominantly agricultural and residential) land use. Approximately 45 percent of the areal extent of the study area consists of agricultural and residential land uses that may somewhat limit use by transient or residential wildlife species.

- Approximately 55 percent of the areal extent of the study area consists of natural covertypes such as coniferous and hardwood forest; freshwater wooded, scrub-shrub and emergent wetlands; and streams that provide appropriate habitat for a variety of fish and wildlife species.

- The United States Fish & Wildlife Service (USFWS) has records of an endangered species, the clubshell, and a candidate species, the rayed bean, within a 2-mile radius of the Site. The New York Natural

Heritage Program (NYNHP) had no records of rare, threatened or endangered flora and fauna or significant natural communities within a two-mile radius of the Site.

- Based on a review of the applicable state and federal mapping, several freshwater wetlands were identified in within 2 miles of the Site. Although a wetland boundary delineation was not performed as part of this assessment, it appears that regulated wetland habitats exist on and adjacent to the Site.

- Due to the presence of chemical constituents in surface soil, surface water and sediment associated with the Site, complete exposure pathways to terrestrial and aquatic receptors likely exist at and down gradient of the Site.

1.7. Conceptual Site Model

Based on a review of the results of the RI, the following represent the conceptual site model:

- The landfill consists of two distinct and irregularly shaped landfill cells. The fill material of these cells is generally municipal in nature (brush and wood pieces, plastics and glass, miscellaneous metallic debris, paper, plastic toys, tires, etc.) with industrial materials (metal turnings, drum carcasses, metal debris) observed primarily in the northern portions of the western cell.
- The fill material was observed to range from 2 ft to 10 ft in thickness and overlays silty clay and clay layers to a total depth below grade of 7 ft to 10 ft. The fill material is overlain by soil that varies in thickness from 1 to 5 ft from top of fill with several drums partially buried at the surface.
- The soil cover did not appear to prevent or minimize infiltration to fill materials below, and some drums were observed to be only partially buried.
- Observations from test pits around the western landfill cell suggest that shallow ground water within the limits of the landfill cell is "perched". Comparison of the approximate bottom elevations of the test pits to shallow ground water elevations further suggests that this is perched water within the fill with no direct hydraulic connection to the water table during water elevation monitoring events conducted as part of the RI.
- A municipal drinking water well (Frewsburg Water District Supply Well # 5) serving the Frewsburg Water District is located approximately 700 feet southwest of the landfill Site.
- The nearest discharge for shallow and intermediate ground water is likely Conewango Creek to the north; however, ground water flow was observed to be to the southwest toward the municipal drinking water well.

- VOCs were detected in each of the media sampled (sediment, landfill material, leachate seeps, soil vapor, and ground water). VOC concentrations within the sediment, landfill material, and leachate seep samples were below associated screening levels, which may indicate that VOC concentrations in the fill material are low, or are naturally attenuating. Soil vapor and ground water were the only environmental media sampled that contained VOCs at concentrations above associated screening levels. Given the historical placement of fill at the site, the landfill material is likely the source of ground water and soil vapor VOC contamination.
- Regarding soil vapor, the magnitudes of detected concentrations in the soil vapor samples are relatively low and do not appear indicative of the presence of a significant source of VOCs at the sample locations. Exposure to indoor or ambient air is considered to be minimal as occupied structures are not currently present in the immediate vicinity of the landfill.
- Vinyl chloride and cis-1,2-dichloroethene were the predominant VOCs exhibiting concentrations above NYS Class GA ground water standards that are contaminants of concern. These constituents are common degradation products of trichloroethene (TCE).
- Methane, ethane, and ethene were monitored to evaluate degradation. Ethene was detected indicating that geochemical conditions are serving to allow degradation of vinyl chloride. Ethane was also detected in shallow and intermediate wells, indicating that ethene is degrading to ethane.
- Based on data collected by NYSDOH, it is apparent that VOCs have migrated from the landfill to the municipal drinking water well. A review of NYSDOH sample data also indicate that concentrations of vinyl chloride and cis-1,2-dichloroethene have increased over time but constituent concentrations remain below NYS Class GA ground water standards. The detection of these constituents in the municipal drinking well approximately eight years after the initiation of pumping suggests that these constituents were drawn to the municipal drinking water well and were not present in the area prior to installation of the well.
- The highest concentration of an organic constituent was vinyl chloride detected in the shallow ground water sample collected at MW-107S; however, organic concentrations at this location appear to be limited in horizontal and vertical extent.
- Inorganics were detected in each of the environmental media sampled (surface soil, surface water, sediment, landfill material, leachate seeps, ground water). Several inorganics were detected at concentrations exceeding associated screening criteria.
- Review of the ground water data suggests that the inorganic detections may be indicative of background conditions for certain constituents. Concentrations of inorganic constituents were generally within one order of magnitude upstream and downstream of the Site.
- Ground water inorganic data indicates that there is a general decrease in concentrations with depth.

- Within leachate, inorganics were detected at concentrations that exceeded NYS Class GA ground water standards. The highest concentrations of inorganics in leachate were detected to the northwest of the western landfill cell. Leachate from this area ultimately drains to Conewango Creek.
- The inorganic constituents detected in surface water are likely attributable to the migration of leachate from the landfill to the drainage swale between the two landfill cells, which ultimately drain to the drainage swale/intermittent creek north of the landfill. Similar inorganic constituents were detected in the surface water samples as in the leachate samples. Impacts to the Conewango Creek, which is located approximately 4,000 ft to the west of the Site, are not known. However, given the distance to Conewango Creek, and the common low flow conditions in the drainage swales, potential for impacts is considered to be minimal.
- Exposure to impacted surface water and sediments is considered to be minimal based on the limited extent of impacted sediment. The presence of elevated concentrations of inorganic constituents in sediment may be due to direct run-off and deposition of sediment material from the landfill to the drainage swales, or due to potentially more dense landfill leachate flowing to surface water areas that may subsequently settle into the sediment. The drainage swales from which sediment samples were collected are believed to be low flow systems for much of the time. It is also possible that during certain times of the year the surface water in the drainage swales evaporates potentially concentrating inorganic constituents in the underlying sediment.

2. Development of Remedial Alternatives

The objective of this phase of the FS was to develop a range of remedial alternatives for the Site. The development of alternatives process included the development of remedial action objectives; development of general response actions; identification of volumes or areas of media; identification and screening of remedial technologies and process options; evaluation of remedial technologies and process options; and the assembly of remedial alternatives.

2.1. Development of Remedial Action Objectives

Remedial action objectives are goals set for environmental media such as soil, ground water, sediment and surface water (medium-specific objectives) that are intended to provide protection for human health and the environment. These remedial action objectives form the basis for the FS by providing overall goals for site remediation. The remedial action objectives are considered during the identification of appropriate remedial technologies and formulation of alternatives for the Site, and later during the evaluation of remedial alternatives.

Remedial action objectives (RAOs) are based on engineering judgement, risk-based information established in the risk assessment, and potentially applicable or relevant and appropriate standards, criteria and guidance (SCGs). Based on the consideration of potentially complete exposure pathways identified in Sections 1.5.1. and 1.5.2., the conceptual site model described in Section 1.6 and potentially applicable or relevant and appropriate SCGs, the following remedial action objectives (RAOs) have been established:

- Minimize or eliminate unacceptable human health and ecological risks associated with dermal contact or ingestion of landfill materials.
- Minimize or eliminate unacceptable human health risks associated with ingestion of ground water via the Frewsburg Water District drinking water well located adjacent to the Site.
- Minimize, to the extent practicable, discharge and/or migration of leachate from the landfill material to surface water or ground water.

- Meet ground water standards or guidance values to the extent practicable.

2.2. Identification of General Response Actions

General response actions are remedial actions for environmental media such as soil, ground water, sediment and surface water ("medium-specific actions") that may be combined into alternatives to satisfy the RAOs. Based on RAOs identified in Section 2.1, ground water, landfill material and leachate are the media of concern. General response actions that address the RAOs related to the landfill material include institutional controls, containment, removal, disposal, and treatment. General response actions that address the RAOs related to ground water and leachate are institutional controls, containment, collection, treatment, and discharge actions.

2.3. Identification of Areas and Volumes of Media

Site conditions, the nature and extent of contamination, and RAOs were taken into consideration to estimate the volumes and areas of media to be addressed by the general response actions.

This Site is composed of two "cells" of landfilled materials running generally north-south. These cells are adjacent to one another and generally rectangular in shape, although the width of the western cell varies. A swale separates the two cells. The eastern cell measures approximately 9.3 acres, while the western cell measures approximately 5.2 acres. The areal extent of both landfill cells and contiguous swale measures approximately 20 acres. Fill material was observed to range from approximately 2 ft to 10 ft in thickness based on test pits completed along the perimeter of the cells during the RI. Assuming the depth of fill averages 4 ft over this area, the estimated volume of landfill material is approximately 90,000 cubic yards, with approximately 60,000 cubic yards contained in the western cell, and approximately 30,000 cubic yards contained in the eastern cell.

Contaminated ground water was not observed within the limits of the eastern cell. The areal extent of contaminated ground water, therefore, generally occurs between MW-104 and MW-106S to the northeast and MW-13 to the southwest. This area is approximately 12 acres in area.

2.4. Estimates of Ground Water Remedial Timeframes

In an effort to estimate timeframes for different ground water remedial approaches, a two-dimensional ground water flow model was used. The modeling effort is described in Appendix A.

The estimated remedial timeframe for vinyl chloride in Site ground water using a ground water extraction well system is within approximately 40 years. The remedial timeframe for vinyl chloride currently present in off-site ground water if a site ground water extraction system is implemented is estimated to be within approximately 32 years.

The estimated remedial timeframe for vinyl chloride in Site and off-site ground water using an *in situ* ground water treatment wall is approximately 40 years. If the source of VOCs is removed and no active ground water remediation is implemented, ground water remediation of site ground water is estimated to be within approximately 72 years.

Each of these estimates assumes that the source of VOC concentrations in ground water is removed and the municipal drinking water well continues to be pumped. A range of retardation factors for vinyl chloride was considered and applied to advective ground water flow rates for these estimates; however, natural attenuation was not considered, since there is currently insufficient information to evaluate the rate of natural attenuation.

2.5. Identification and Screening of Remedial Technologies and Process Options

Potentially applicable remedial technology types and process options for each general response action were identified during this step. Process options were screened on the basis of technical implementability. The technical implementability of each identified process option was evaluated with respect to site contaminant information, site physical characteristics, and areas and volumes of affected media.

Descriptions and screening comments for technologies and process options identified for the Site are presented in Table 1. Process options that were viewed as not implementable for the Site were not considered further in the FS. Following are descriptions of technologies that were considered potentially implementable for the Site.

2.5.1. No Action

The no action general response action must be considered in the FS, as specified in the NCP (40 CFR Part 300.430) and DER-10.

2.5.2 Institutional Actions

The institutional actions identified for the landfill material were deed restrictions and access restrictions. Deed restrictions would involve limiting the future uses of the Site, while access restrictions would limit access to the Site.

The institutional actions identified for ground water were monitoring and deed restrictions. Deed restrictions identified consist of ground water use restrictions that would preclude the use of contaminated ground water at the Site as a potable source of water without prior treatment. In addition, deed restrictions would preclude the use of untreated contaminated ground water at the Site for sources other than potable use without prior review and approval by NYSDEC.

Ground water monitoring would involve periodic sampling and analysis of ground water at the Site. Ground water monitoring would provide a means to detect changes in VOC, SVOC and inorganics concentrations in the ground water. Data gathered by ongoing monitoring would provide the opportunity to gauge the effectiveness of the implemented alternative. While VOCs are the primary contaminants of concern, monitoring of SVOCs and inorganic constituents would continue allowing for future assessment of these constituents in ground water.

2.5.3. Containment Actions

Presumptive remedy. USEPA has developed presumptive remedies for certain categories of sites that have similar characteristics, such as types of contamination present, types of disposal practices, or how environmental media are affected. The objective of presumptive remedies is to make use of past experience to streamline the FS process. If a presumptive remedy is applicable for the Site, a focused FS can be prepared. The study can then be limited to the “no action” alternative and the presumptive remedy technologies. This is possible because USEPA has conducted an analysis of potentially available technologies for the presumptive remedy site categories and has determined that certain technologies are routinely and appropriately screened out. This detailed analysis serves to substitute for the development and screening of alternatives phases of the FS (and will allow the remaining alternatives to be limited to variations of the presumptive remedy)(USEPA 1993).

The presumptive remedy guidance that is relevant and appropriate for the Site is the *Presumptive Remedy for CERCLA Municipal Landfill Sites* (USEPA 1993). As stated in the Presumptive Remedy guidance, USEPA expects that “engineering controls such as containment will be used for waste that poses a relatively low long-term threat or where treatment is impracticable.” For sites such as municipal landfills where wastes are present as large volumes of heterogeneous materials, USEPA generally considers treatment impracticable. Thus, USEPA regards containment as the presumptive remedy for municipal landfill sites (USEPA 1993). The landfill material is considered to be heterogeneous and constitute a considerable volume to warrant the application of the presumptive remedy for municipal landfills.

USEPA presumptive remedy guidance specifies that a soil cover be built to Federal Subtitle D requirements except where State closure requirements are more stringent. The prevailing closure requirement for this Site, therefore, is 6 NYCRR Part 360 requiring the installation of a low permeability landfill cap which must be "constructed to minimize precipitation migration into an inactive area of the landfill" (NYSDEC, 1999). However, minimizing infiltration of precipitation at this Site may not prevent the production of leachate at the Site, given that fill material may be in contact with ground water, based on the RI. The possible incidence of ground water to landfill material was considered in the development of RAOs resulting in the objective to minimize discharge and/or migration of leachate from the landfill to the surface water or ground water to the extent practicable. A soil cover, as defined by presumptive remedy guidance, would be substantively equivalent to the Part 360 cover by meeting this RAO and the containment requirement of the presumptive remedy.

The following containment actions have been identified in accordance with the presumptive remedy:

- **Vegetated soil cover.** A soil cover for containment of landfill material would incorporate layers of backfill soil material and topsoil to encapsulate the landfill material preventing direct contact when properly maintained. The soil cover would be vegetated to provide stability and resistance to erosion. These layers would be such that surface run off and evapotranspiration are favored over infiltration. The cover would incorporate toe drains at the edges for the management of leachate present or produced as is required by the presumptive remedy. To reduce the overall footprint of the cover, consolidation of the fill could be performed. This would consist of excavation of the western cell and consolidation over the eastern cell prior to installation of the cover.

- **Low-permeability cover.** A low permeability cover for containment of landfill materials would have the components of a soil cover, however additional layers of low permeability material (*i.e.*, low permeable soils or geocomposites) would be incorporated minimizing infiltration with proper maintenance. The cover would incorporate toe drains at the edges for the management of leachate present or produced as is required by the presumptive remedy. To reduce the overall footprint of the cover, consolidation of the fill could be performed. This would consist of excavation of the western cell and consolidation over the eastern cell prior to installation of the cover.

2.5.4 Removal Actions

The following removal action has been identified for landfill material:

- **Excavation.** Physical removal of the landfill material was considered for this Site to evaluate returning the Site to "pre-disposal conditions" in accordance with NYSDEC DER-10 guidance.

- **Partial excavation.** Physical removal of only a portion of the landfill material, such as the western cell, for options including fill consolidation. Partial excavation is not fundamentally different than Excavation described previously and will not be considered as a distinct removal action. Partial excavation will not return the site to a "pre-disposal" condition, but is applicable as part of other containment and disposal actions for the landfill material.

The following removal action has been identified for ground water:

- **Recovery wells.** Recovery wells are placed such that they intercept and remove contaminated ground water. A pumping test performed on the Site would be required to identify the number and locations to place the recovery wells and evaluate appropriate pumping rates. Recovery wells would require a discharge action, and possibly a treatment action, be implemented.

2.5.5 Treatment Actions

In accordance with the presumptive remedy, treatment actions were not evaluated for landfill material.

The following *in situ* treatment actions have been identified for ground water:

- **Natural Attenuation.** Natural attenuation relies on the biotic and abiotic processes naturally occurring *in situ* to degrade organic constituents in the saturated zone.

- **Air sparging.** Air sparging is an *in situ* technology used primarily to remove VOCs from the subsurface. Air sparging, when used in conjunction with an *in situ* air stripping system, enables ground water to be stripped of VOCs. Contaminant-free air is introduced into the affected aquifer system in the form of minute bubbles utilizing microporous bubblers (or sparge points). VOCs below the water table are removed by volatilization, and often biodegradation, as the air percolates through the water column and into the unsaturated zone. The movement of the air bubbles tends to facilitate the transfer of VOCs into soil pore spaces in the unsaturated zone where they can be removed by an *in situ* air stripping system.

- **In-well stripping.** In-well stripping is similar in function to the *ex situ* treatment action of air stripping and involves the contact of ground water with air. However, ground water is not drawn up to an above ground treatment system; instead a blower and diffuser release air bubbles into the well itself. Ground water is taken in through either a top or bottom screen and released through the opposite screen contacting the air as it moves through the well. These wells may be driven by the convection induced solely by the air, or they may be a pumped system. Depending on the resulting characteristics of the discharging air stream, air treatment may be required. In-well stripping would be effective to treat site-related VOCs.

- **Bioremediation/Biobarrier.** A biobarrier is a zone of enhanced natural attenuation established to degrade contaminants by exploiting desired metabolic processes of the natural microorganisms. Electron donors and/or nutrients are added to facilitate the desired process. This process may also include bioaugmentation of the existing microbial fauna. Electron donors and/or nutrients are injected by wells to the required depth. Wells are spaced such that a continuous zone is established perpendicular to flow of ground water to provide treatment as the affected water flows through the zone. Typically, proprietary systems are used that are proven to provide treatment of the desired contaminant.

- **Treatment wall (iron wall).** An iron wall is a subsurface treatment wall constructed of iron granules or other iron bearing material for treatment of chlorinated VOCs within ground water. Chlorinated VOCs are dechlorinated by oxidizing the iron material as ground water flows through the wall area. Physical treatment walls are typically suitable for long term treatment and control of contaminated ground waters, but are limited to depths achievable by conventional trenching equipment unless injection techniques are utilized.

The following *ex situ* treatment actions have been identified for ground water:

- **Air stripping**. Air stripping involves the contact of ground water with air in a countercurrent packed or tray column or bulk reactor to transfer volatile contaminants from the ground water to the air. Air stripping would be effective to treat site-related VOCs. Depending on the resulting characteristics of the discharging air stream, air treatment may be required.

- **Carbon adsorption.** Activated carbon can adsorb organic contaminants from ground water onto its surfaces during contact. Carbon adsorption would likely be an effective treatment for site-related VOCs, although only minimally effective for vinyl chloride. The carbon must be periodically replaced, regenerated, treated and/or disposed. Regeneration may be accomplished at the Site or off-site at a permitted facility. Carbon disposal would be off-site at a permitted facility.

- **Adsorptive resins.** Commercial resins are available which can adsorb organic contaminants from the ground water during contact. Adsorptive resins would likely be an effective treatment for site-related organic compounds. Such resins are typically regenerated on the Site on a periodic basis.

- **Chemical oxidation.** Chemical oxidation involves the addition of oxidation agents such as hydrogen peroxide or ozone to the ground water in the presence of ultraviolet light to oxidize organic contaminants to non-toxic byproducts. Chemical oxidation would likely be an effective treatment for site-related VOCs. Chemical oxidation is typically performed in a closed reactor system.

- **Biological reactor.** A biological reactor could be used to enhance conditions for co-metabolic degradation of chlorinated organics. Nutrients, co-metabolites, and aeration would be provided as necessary to optimize degradation. Sludge management would be required.

2.5.6 Disposal/Discharge Actions

The following disposal action has been identified for landfill material:

- **Off-site commercial landfill disposal.** Excavated material would be transported off-site for disposal at a permitted facility. Non-hazardous material would be appropriately landfilled. If hazardous material is encountered, it will be appropriately managed to meet land disposal restrictions (LDRs) prior to disposal.

- **On-site relocation (fill consolidation).** Material excavated for the purpose of fill consolidation. Material removed from the western cell would be consolidated to the eastern cell to reduce the footprint of waste on-site.

The following discharge action has been identified for ground water:

- **Surface water discharge.** Ground water removed and treated *ex situ* would be discharged to the unnamed tributary of Conewango Creek adjacent to the Site. Discharge to surface water would be contingent upon the *ex situ* treatment technology producing effluent meeting Class C surface water limits.

2.6. Evaluation of Remedial Technologies

The process options remaining after the initial screening were evaluated further according to the criteria of effectiveness, implementability, and cost. The effectiveness criterion included the evaluation of: potential effectiveness of the process options in meeting remedial objectives and handling the estimated volumes or areas of media; potential effects on human health and the environment during construction and implementation; and experience and reliability of the process options for site contaminants and conditions. Technical and institutional aspects of implementing the process options were assessed for the implementability criterion. The capital and operation and maintenance (O&M) costs of each process option were evaluated as to whether they were high, medium, or low relative to the other process options of the same technology type. The evaluation of the process options is shown in Table 2.

Based on the evaluation, the more favorable process options of each technology type were chosen as representative process options. The selection of representative process options simplifies the assembly and evaluation of alternatives, but does not eliminate other process options. The process option actually used to implement remediation may not be selected until the remedial design phase.

2.7. Assembly of Remedial Alternatives

Remedial alternatives were developed by assembling general response actions and the process options chosen to represent the various technology types into combinations that address the Site.

Five alternatives were developed for the Site. These alternatives are described in the following subsections, and are summarized in Table 3. Descriptions of each alternative have been developed according to the parameters set forth in DER-10 Section 4.2.5. as follows:

1. Size and configuration of process options
2. Time for remediation
3. Spatial requirements
4. Options for disposal
5. Substantive technical permit requirements
6. Limitations or other factors necessary to evaluate the alternatives, and
7. Beneficial and/or adverse impacts on fish and wildlife resources.

2.7.1. Alternative 1

Alternative 1 is the no further action alternative. The no further action alternative is required by the NCP and serves as a benchmark for the evaluation of action alternatives. This alternative involves the following process options:

Ground water monitoring. Ground water monitoring would be implemented to track VOC and SVOC compounds and inorganic constituent concentrations in ground water. For estimating purposes, it is assumed that the 18 existing monitoring wells will be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for a period of 30 years.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when contaminated material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections.

This alternative is further defined, consistent with Section 2.6, as follows:

1. No process options requiring sizing are included under this alternative.

2. Some natural attenuation is evident by the presence of TCE breakdown products observed during the RI. The results of the RI do not provide enough information to determine the rate at which natural attenuation is occurring. Because source material (western cell landfill material) likely remains at the Site in this alternative, natural attenuation is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. For cost estimation purposes, a period of 30 years was assumed for O&M activities.

3. This alternative maintains the existing conditions (surface, subsurface and ground water conditions) of the Site.

4. No options for disposal are associated with this alternative.

5. This option would not allow for the re-permitting of this Site as a landfill or transfer station, as is currently in place.

6. The analysis of this alternative is limited by the lack of information regarding natural attenuation mechanisms. In particular, it is not known if natural attenuation of ground water will continue to be protective for the nearby municipal drinking water well. Ongoing monitoring of the sentinel well (MW-13) shows increasing concentrations of vinyl chloride and cis-1,2-dichloroethene in the sentinel well with recent detections in June 2005 of both compounds at concentrations greater than the respective NYS Class GA standards. Neither of these compounds were detected at concentrations greater than the respective NYS Class GA standards in the municipal drinking water well, and the increasing trend observed in the sentinel well is not clearly evident in this well.

7. The Site currently has a minimal and variable depth of soil covering landfill material that provides some encapsulation of waste. Contamination of surface and ground waters and sediments appear, by the RI, to be relatively limited in extent. Notwithstanding, this alternative does not remove identified potential exposure pathways, nor does it eliminate additional or increased migration of contaminant off-site by means of ground water or surface water. The "no further action" alternative, however, does consist of ground water monitoring, and five year reviews as described in Section 2.6.1, to provide continued assessment of affects to off-site areas.

2.7.2. Alternative 2

The "Pre-Disposal" alternative is required by the NYSDEC DER-10 to establish the cost and feasibility of returning the Site to "pre-disposal condition". This alternative involves the following process options:

Excavation and off site disposal of landfill material. Landfill material would be removed by excavators and appropriately managed. Clean backfill and topsoil would be deposited on-site, graded and seeded for restoration.

Ground water recovery and treatment. Ground water would be pumped from the aquifer by means of approximately one recovery well located downgradient of the western landfill cell to minimize potential future impacts to the Frewsburg Water District Supply Well # 5. As described in Section 2.4, if the source of ground water VOC impacts is removed, it is estimated that remediation of Site ground water to NYS Class GA standards could be accomplished within approximately 40 years. It is estimated that off-site ground water could be remediated to NYS Class GA standards within approximately 32 years. Leachate present would also be recovered and treated incidental to ground water recovery and treatment. Recovered ground water would be treated by an on-site air stripper system for the mass removal of VOCs. Treated water would be discharged to the unnamed tributary of Conewango Creek adjacent to the landfill site. The system would operate until NYS Class GA ground water standards are achieved in the monitoring wells. It has been assumed that air controls would not be required for the treatment system, however, a pretreatment system to handle naturally occurring inorganics and solids may be required.

Institutional controls. Institutional controls would include "use restrictions" as follows:

- *Ground water use restrictions* would preclude the use of untreated ground water with concentrations in excess of NYS Class GA ground water standards as a potable water source, or as a non-potable water source without prior notification and approval from NYSDEC. The property deed would be revised to reflect this restriction. This restriction could be lifted upon attainment of NYS Class GA ground water standards by the recovery and treatment system.

Ground water monitoring. The 18 existing monitoring wells would be employed for continued sampling. It is assumed that the monitoring wells would be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for the duration of recovery and treatment activities.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted soil remains at a site; however, this program would be applicable to this alternative for the ground water medium. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five-year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. Both landfill cells, 14.5 acres, would be excavated to an average depth of approximately 4-ft yielding an estimated total excavated volume of 90,000 cubic yards. The recovery well would be installed to capture ground water. Treated ground water would ultimately discharge to surface water.

2. It is estimated that excavation and management of landfill material and restoration of the Site will require 1 to 2 years. It is estimated that ground water remediation to attain NYS Class GA ground water standards at the Site would occur within approximately 40 years. For cost estimation purposes, a period of 30 years was assumed for O&M activities.

3. Implementation of Alternative 2 would disturb approximately 20 acres of site area with a nominal amount of additional space required for the installation of treatment equipment.

4. No options exist for the disposal of landfill material off-site other than handling or treatment and disposal by a permitted facility. Other technologies for the treatment of extracted ground water are available, as is an option to utilize ground water injection as a means of treated water discharge. These options not withstanding, the aspects incorporated into this alternative have been chosen to be representative of the time and costs expected of applicable options.

5. Compliance with substantive requirements for wetland permitting would likely be required for construction of the remedy. Compliance with the substantive requirements of a NYSDEC SPDES discharge permit would be required for surface water disposal of treated ground water. This would likely require flow monitoring as well as periodic sampling to verify that discharge criteria established by the NYSDEC permit are met. The air stripping system may require compliance with substantive requirements of an air permit.

6. The analysis of this alternative is limited by the data available to accurately determine the fill depth, and by extension, the volume of waste material to be removed. The actual volume of waste removed would directly affect remediation time and disposal and remediation costs.

7. This alternative would remove the potential exposure sources, thereby removing the associated potential risks.

2.7.3. Alternative 3

Alternative 3 is the landfill cover and natural attenuation alternative. This alternative incorporates the presumptive remedy of containment as identified by the Superfund Accelerated Cleanup Model (SACM) for landfills composed primarily of municipal waste. Because ground water is a potential exposure pathway at this Site, process options are included for this medium. This alternative would involve the following process options:

Landfill cover. A soil cover would consist of the following minimum components (listed from the finished grade down): 6 inches topsoil and 18 inches soil material as a vegetative support layer. The cover would function to encapsulate the waste, would be vegetated to maximize evapotranspiration, and would be graded to promote surface water runoff. Vegetation and grading would reduce infiltration to the wastes below. A low permeability layer may be installed to further decrease infiltration and consolidation of fill material from the western cell to the eastern cell may be performed to reduce the footprint of the waste and decrease the volume of waste potentially in contact with ground water. To achieve a low permeability cover per 6 NYCRR Part 360, the soil material layer would be expanded to 24 inches to serve as a barrier protection layer and the following additional layers would be installed (listed in order from the barrier protection material down): tri-planar geonet, 40 mil linear low density polyethylene, 6 inches soil bedding layer. Consolidation of fill material would consist of partial excavation and subsequent placement on-site. Results of the RI do not suggest that landfill gas (methane) management is required at this Site. Leachate would be conveyed to a holding tank by toe drains incorporated at the cover edges and hauled off-site for treatment and disposal.

Monitored natural attenuation. This alternative would utilize the natural attenuation mechanisms currently observed at this site. RI results identified the breakdown products of TCE, vinyl chloride and cis-1,2-DCE, as the primary VOCs present suggesting that natural attenuation is active at this Site.

Institutional controls. Institutional controls would generally include “use restrictions” and “access restrictions”. The various components are more specifically described as follows:

- *Access/Use restrictions* would preclude the conduct of activities that would potentially disturb or expose contaminated materials or impair the integrity of a cover over contaminated materials without prior notification and approval from NYSDEC.

  A program would be established to educate and authorize users about the past uses, remedial technologies in place, potential hazards, and proper conduct while on-site. Persons wishing to engage in an approved use upon the property must receive this education and authorization. This program would be developed by the NYSDEC in conjunction with the Town and implemented by the Town.

- *Ground water use restrictions* would preclude the use of untreated ground water with concentrations in excess of NYS Class GA ground water standards as a potable water source, or as a non-potable water source without prior notification and approval from NYSDEC. The property deed would be revised to reflect this restriction. This restriction could be lifted upon attainment of NYS Class GA ground water standards.

Ground water monitoring. The 18 existing monitoring wells would be employed for continued sampling. It is assumed that the monitoring wells would be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for a period of 30 years.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. It is assumed that a single cover would be installed over fill material.. Based on the area of both cells and contiguous swale area presented in Section 2.3, the largest cover area required would be approximately 20 acres if no consolidation of fill material is incorporated into the designed alternative. If consolidation of the western cell to the eastern cell is performed, the cover area would be approximately 10 acres.

2. It is estimated that either landfill cover option would require approximately 1 to 2 years to install. The rate of attenuation of VOCs in ground water is not known. For cover options other than consolidation, where source material (western cell landfill material) would likely remain in place, natural attenuation is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. Under the consolidation cover option, where source material would be removed, it is estimated that Site ground water would exhibit VOC concentrations at or below NYS Class GA standards within 72 years. For cost estimation purposes, a period of 30 years was assumed for O&M activities.

3. Implementation of this alternative would disturb approximately 10 to 20 acres of site area for the installation of the landfill cover plus a nominal surrounding work area during construction activities.

4. If partial excavation of the landfill material is performed, placement on site would be used for disposal of material.

*5.*Compliance with substantive requirements for wetland permitting would likely be required for construction of the remedy.

6. The analysis of this alternative is limited by the lack of information regarding natural attenuation mechanisms. In particular, it is not known if natural attenuation of ground water will continue to be protective for the nearby municipal drinking water well. Ongoing monitoring of the sentinel well (MW-13) shows increasing concentrations of vinyl chloride and cis-1,2-dichloroethene in the sentinel well with recent detections in June 2005 of both compounds at concentrations greater than the respective NYS Class GA standards. Neither of these compounds were detected at concentrations greater than the respective NYS Class GA standards in the municipal drinking water well, and the increasing trend observed in the sentinel well is not clearly evident in this well. In addition, the analysis of this alternative is limited by the data available to accurately determine the fill depth, and by extension, the volume of waste material to be removed and consolidated.

7. Impacted soil remains on this site, but is encapsulated by the landfill cover minimizing direct contact. The ground water pathway to nearby surface waters is monitored but not removed.

2.7.4. Alternative 4

Alternative 4 is the landfill cover and ground water extraction alternative. This alternative also incorporates the presumptive remedy process option to address the landfill media. However, an engineered process option for the treatment of ground water is utilized. This alternative would involve the following process options:

Landfill cover. As described in Section 2.6.3.

Ground water recovery and treatment. This alternative incorporates ground water recovery wells to pump and treat ground water in place of monitored natural attenuation. As described in Section 2.4, if the source of ground water VOC impacts is removed (*i.e.*, the consolidation cover is implemented), it is estimated that remediation of Site ground water to NYS Class GA standards could be accomplished within approximately 40 years. It is estimated that off-site ground water could be remediated to NYS Class GA standards within approximately 32 years. For cover options other than consolidation where source material (western cell landfill material) would likely remain in place, ground water extraction is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. Approximately two, 70-foot deep ground water recovery wells would be installed downgradient of the landfill between the landfill and the municipal drinking water well. Ground water pumped from this system would be treated by an on-site air stripper system for the mass removal of VOC compounds. Treated water would be discharged to the unnamed tributary of Conewango Creek adjacent to the landfill site. It has been assumed that air controls would not be required for the treatment system, however, a pretreatment system to handle naturally occurring inorganics and solids may be required.

Institutional controls. Institutional controls would include "use restrictions" and "access restrictions". The various components are more specifically described as follows:

- *Access/Use restrictions* would preclude the conduct of activities that would potentially disturb or expose contaminated materials or impair the integrity of a cover over contaminated materials without prior notification and approval from NYSDEC.

  A program would be established to educate and authorize users about the past uses, remedial technologies in place, potential hazards, and proper conduct while on-site. Persons wishing to engage in an approved use upon the property must receive this education and authorization. This program would be developed by the NYSDEC in conjunction with the Town and implemented by the Town.

- *Ground water use restrictions* would preclude the use of untreated ground water with concentrations in excess of NYS Class GA ground water standards as a potable water source, or as a non-potable water source without prior notification and approval from NYSDEC. The property deed would be revised to reflect this restriction. This restriction could be lifted upon attainment of NYS Class GA ground water standards.

Ground water monitoring. The 18 existing monitoring wells would be employed for continued sampling. It is assumed that the monitoring wells would be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for a period of 30 years.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five-year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. It is assumed that a single cover would be installed over the fill material. Based on the area of both cells and contiguous swale area presented in Section 2.3, the largest cover area required would be approximately 20 acres if no consolidation of fill material is incorporated into the designed alternative. If consolidation of the western cell to the eastern cell is performed, the cover area would be approximately 10 acres. Nominal additional space may be required along the extents of the cover for the installation of ground water handling piping.

2. It is estimated that either landfill cover option would require approximately 1 to 2 years to install. For cover options other than consolidation where source material (western cell landfill material) remains in place, ground water treatment is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. If the source material is removed (e.g. through consolidation of the western cell to the eastern cell), it is estimated that ground water remediation to attain NYS Class GA ground water standards at the Site would be achieved within approximately 40 years. For cost estimation purposes, a period of 30 years was assumed for O&M activities.

3. Spatial requirements would be similar to those for Alternative 3.

4. Other technologies for the treatment of recovered ground water are available, as is an option to utilize ground water injection as a means of treated water discharge. These options not withstanding, the aspects incorporated into this alternative have been chosen to be representative of the time and costs expected from applicable options. If partial excavation of the landfill material is performed, placement on site would be used for disposal of material.

5. Compliance with substantive requirements for wetland permitting would likely be required for construction of the remedy. Compliance with the substantive requirements of a NYSDEC SPDES discharge permit would be required for surface water disposal of treated ground water. This permit would likely require flow monitoring as well as periodic sampling to verify that discharge criteria established by the NYSDEC permit are met. The air stripping system may require compliance with substantive requirements of an air permit.

6. The analysis of this alternative is limited by the data available to accurately determine the fill depth, and by extension, the volume of waste material to be removed and consolidated.

7. Impacted soil remains on this site, but is encapsulated by the landfill cover minimizing direct contact. The movement of impacted ground water to nearby surface waters and associated ecological receptors is greatly reduced by recovery and treatment activities.

2.7.5. Alternative 5

Alternative 5 is the landfill cover and enhanced natural attenuation (biobarrier) of ground water treatment alternative. This alternative also incorporates the presumptive remedy process option to address the landfill media. However, an engineered biological process option for the treatment of ground water is utilized. This alternative would involve the following process options:

Landfill cover. As described in Section 2.6.3.

In situ enhanced natural attenuation (biobarrier). A biobarrier would be constructed between the existing landfill site and the municipal drinking water well (MW-5). Wells would be installed to inject materials that would favor the establishment of a zone within the ground water aquifer where microbial activity is enhanced. The zone would be established such that affected ground water would pass through the "treatment zone" of engineered microbial activity. Based on data collected to date, an approximate treatment zone comprising a 500-foot width and a 75-foot depth has been assumed. As described in Section 2.4, if the source of ground water VOC impacts is removed (*i.e.*, the consolidation cover option is chosen), it is estimated that remediation of impacted ground water to NYS Class GA standards would be achieved within approximately 40 years. For cover options other than consolidation, where source material (western cell landfill material) would likely remain in place, treatment of the ground water is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future.

Institutional controls. Institutional controls would include "use restrictions" and "access restrictions". The various components are more specifically described as follows:

- *Access/Use restrictions* would preclude the conduct of activities that would potentially disturb or expose contaminated materials or impair the integrity of a cover over contaminated materials without prior notification and approval from NYSDEC.

  A program would be established to educate and authorize users about the past uses, remedial technologies in place, potential hazards, and proper conduct while on-site. Persons wishing to engage in an approved use upon the property must receive this education and authorization. This program would be developed by the NYSDEC in conjunction with the Town and implemented by the Town.

- *Ground water use restrictions* would preclude the use of untreated, ground water with concentrations in excess of NYS Class GA ground water standards as a potable water source, or as a non-potable water source without prior notification and approval from NYSDEC. The property deed would be revised to reflect this restriction. This restriction could be lifted upon attainment of NYS Class GA ground water standards.

Ground water monitoring. The 18 existing monitoring wells would be employed for continued sampling. It is assumed that the monitoring wells would be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for a period of 30 years.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five-year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. It is assumed that a single cover would be installed over the fill material. Based on the area of both cells and contiguous swale area presented in Section 2.3, the largest cover area required would be approximately 20 acres if no consolidation of fill material is incorporated into the designed alternative. If consolidation of the western cell to the eastern cell is performed, the cover area would be approximately 10 acres. Nominal additional area may be disturbed downgradient of the fill for the installation of ground water treatment injection wells.

2. It is estimated that either landfill cover option would require approximately 1 to 2 years to install. For cover options other than consolidation where source material (western cell landfill material) remains in place, ground water treatment is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. If the source material is removed (eg. through consolidation of the western cell to the eastern cell), it is estimated that ground water remediation to attain NYS Class GA ground water standards would be achieved within approximately 40 years. For cost estimation purposes, a period of 30 years was assumed for O&M activities.

3. Spatial requirements would be similar to those for Alternative 3.

4. If partial excavation of the landfill material is performed, placement on site would be used for disposal of material. This option requires no options for ground water disposal to be developed.

5. Compliance with substantive requirements for wetland permitting would likely be required for construction of the remedy.

6. Site investigations to date do not provide adequate detail to determine the dimensions of the *in situ* zone. Pre-design investigations related to ground water treatment would be necessary to identify the biological treatment option, to estimate the number of injection wells necessary, and to estimate the frequency of reagent injection required. In addition, the analysis of this alternative is limited by the data available to accurately determine the fill depth, and by extension, the volume of waste material to be removed and consolidated.

7. Impacted soil remains on this site, but is encapsulated by the landfill cover thereby minimizing direct contact. The movement of impacted ground water to nearby surface waters and associated ecological receptors would be reduced by recovery drains.

2.7.6. Alternative 6

Alternative 6 is the landfill cover and *in situ* ground water treatment (iron wall) alternative. This alternative would involve the following process options:

Landfill cover. As described in Section 2.6.3.

In situ ground water treatment (iron wall). This alternative incorporates a reactive barrier wall designed to intercept contaminated ground water. Treatment would be provided as ground water flows through the wall material. A wall would be installed to a depth of approximately 75 feet below grade, extending approximately 500 feet in length perpendicular to the predominant direction of ground water flow (assumed will be installed between the existing landfill site and the municipal drinking water well, MW-5). Conventional excavation techniques are not expected to achieve sufficient depth of treatment due to the depth of the affected aquifer. Installation of an iron wall to the depths required would require employing a trenched slurry wall or hydrofracturing/injection well techniques. As described in Section 2.4, if the source of ground water VOC impacts is removed (*i.e.*, the consolidation cover option is chosen), it is estimated that ground water remediation to NYS Class GA standards could be achieved within 40 years. For cover options other than consolidation where source material (western cell landfill material) would likely remain in place, treatment of the ground water is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future.

Institutional controls. Institutional controls would include "use restrictions" and "access restrictions". The various components are more specifically described as follows:

- *Access/Use restrictions* would preclude the conduct of activities that would potentially disturb or expose contaminated materials or impair the integrity of a cover over contaminated materials without prior notification and approval from NYSDEC.

  A program would be established to educate and authorize users about the past uses, remedial technologies in place, potential hazards, and proper conduct while on-site. Persons wishing to engage in an approved use upon the property must receive this education and authorization. This program would be developed by the NYSDEC in conjunction with the Town and implemented by the Town.

- *Ground water use restrictions* would preclude the use of untreated, ground water with concentrations in excess of NYS Class GA ground water standards as a potable water source, or as a non-potable water source without prior notification and approval from NYSDEC. The property deed would be revised to reflect this restriction. This restriction could be lifted upon attainment of NYS Class GA ground water standards.

Ground water monitoring. The 18 existing monitoring wells would be employed for continued sampling. It is assumed that the monitoring wells would be sampled quarterly for VOCs, SVOCs and inorganics (including cyanide) for a period of 30 years.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five-year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. It is assumed that a single cover would be installed over fill material. Based on the area of both cells and contiguous swale area presented in Section 2.3, the largest cover area required would be approximately 20 acres if no consolidation of fill material is incorporated into the designed alternative. If consolidation of the western cell to the eastern cell is performed, the cover area would be approximately 10 acres. Nominal additional area may be disturbed downgradient of the fill for the installation of an iron wall.

2. It is estimated that either landfill cover option would require approximately 1 to 2 years to install. For cover options other than consolidation where source material (western cell landfill material) remains in place, ground water treatment is not anticipated to achieve the NYS Class GA standards for Site ground water for the foreseeable future. If the source material is removed (eg. through consolidation of the western cell to the eastern cell), it is estimated that ground water remediation to attain NYS Class GA ground water standards could be achieved within approximately 40 years. For cost estimation purposes, a period of 30 years was assumed for O&M activities. Because the life of the iron reactive wall is anticipated to be approximately 15 years, a one-time replacement at year 15 has been included in the O&M costs.

3. Spatial requirements would be similar to those for Alternative 3 with the additional space for the installation of the iron wall.

4. If partial excavation of the landfill material is performed, placement on site would be used for disposal of material. This option requires no options for ground water disposal to be developed.

5. Compliance with substantive requirements for wetland permitting would likely be required for construction of the remedy.

6. Site investigations to date do not provide adequate detail to determine the dimension or location of the iron wall. Pre-design investigations related to ground water treatment would be necessary to estimate the

service life of the wall. In addition, the analysis of this alternative is limited by the data available to accurately determine the fill depth, and by extension, the volume of waste material to be removed and consolidated.

7. Impacted soil remains on this site, but is encapsulated by the landfill cover minimizing direct contact. The movement of impacted ground water to nearby surface waters and associated ecological receptors would be reduced by recovery drains.

2.7.7. Alternative 7

Alternate 7 is the wellhead protection alternative. The adjacent municipal drinking water well is specifically addressed. This alternative would involve the following process options:

Air stripping. An air stripper system would be installed on the existing municipal drinking water well system to treat volatile compounds in the well water. The air stripper system would be constructed adjacent to the well and treat pumped ground water prior to release into the potable water distribution system. The system would begin operation only if the concentration of VOCs in the well exceed NYS Class GA ground water standards. It would operate until such time as NYS Class GA ground water standards are attained within the municipal drinking water well or the well is abandoned. For purposes of cost estimation it is assumed that the system would operate for a period of 30 years. It has been assumed that air controls would not be required for the treatment system, however, a pretreatment system to handle naturally occurring inorganics and solids may be required.

Five-year reviews. Five-year reviews are required by the NCP (Federal Register 1990) when impacted material remains at a site. The five-year review would focus on evaluating the Site with regard to the continuing protection of human health and the environment as evidenced by information such as ground water monitoring and documentation of field inspections conducted for the five-year review.

This alternative is further defined, consistent with Section 2.6, as follows:

1. Air stripping equipment would be located adjacent to the existing production water well and would treat water following extraction, but prior to discharge to the distribution system.

2. Installation of the well head air stripper system would require approximately 6 months. It was assumed that the wellhead stripping system would be necessary for the useful life of the production drinking water well. For cost estimation purposes, a period of 30 years was assumed for O&M activities. Because source material (western cell landfill material) remains at the Site in this alternative, natural attenuation is not anticipated to achieve the NYS Class GA standards for ground water for the foreseeable future.

3. This alternative would require nominal space for air stripping equipment.

4. This alternative requires no options for disposal to be developed.

5. This option may require the modification of the permit in place governing the drinking water well. The wellhead air stripper system may be required to meet the substantive requirements of an air permit.

6. The concentration of VOCs observed at the production well and the pumping rate and volume over the useful life of the production well are not known. These gaps in data may limit precision when estimating flow rates and contaminant concentrations for design purposes.

7. This alternative would not address potential impacts to fish or wildlife resources posed by landfill material.

3. Detailed Analysis of Alternatives

The following section documents the detailed evaluation of the alternatives developed for the site. The objective of the detailed analysis of alternatives was to analyze and present sufficient information to allow the alternatives to be compared and a remedy selected. The analysis consisted of an individual assessment of each alternative with respect to nine evaluation criteria that encompass statutory requirements and overall feasibility and acceptability. The detailed evaluation of alternatives also included a comparative evaluation designed to consider the relative performance of the alternatives and identify major trade-offs among them. The nine evaluation criteria are:

- Overall protectiveness of human health and the environment
- Compliance with SCGs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

The preamble to the NCP (Federal Register 1990) indicates that, during remedy selection, these nine criteria should be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The two threshold criteria, overall protection of human health and the environment, and compliance with SCGs, must be satisfied in order for an alternative to be eligible for selection. Long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost are primary balancing criteria that are used to balance the trade-offs between alternatives. The modifying criteria are state and community acceptance, which are formally considered after public comment is received on the Proposed Remedial Action Plan. The New York State TAGM entitled *Selection of Remedial Actions at Inactive Hazardous Waste Sites*, (NYSDEC 1990) and NYSDEC's Department of Environmental Restoration (DER)-10 draft guidance entitled *Technical Guidance or Site Investigation and Remediation* were also considered during this evaluation (NYSDEC 2002).

3.1. Individual Analysis of Alternatives

In the individual analysis of alternatives, each of the remedial alternatives was evaluated with respect to the evaluation criteria. A summary of the individual analysis of alternatives is presented in Table 4.

3.1.1. Overall Protection of Human Health and the Environment

The analysis of each alternative with respect to this criterion provides an evaluation of whether the alternative achieves and maintains adequate protection and a description of how site risks are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 4.

3.1.2. Compliance with SCGs

Identification of potential standards, criteria and guidance (SCGs). Section 121(d) of CERCLA, as amended by the Superfund Amendment and Reauthorization Act (SARA), requires that remedial actions comply with ARARs under federal and state environmental law. USEPA also requires consideration of TBCs (USEPA 1988). NYSDEC evaluates compliance with SCGs, as such, SCGs will be evaluated for this Site.

There are three types of SCGs: chemical-, location-, and action-specific SCGs. Chemical-specific SCGs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the ambient environment. Location-specific SCGs set restrictions on activities based on the characteristics of the site or immediate environs. Action-specific SCGs set controls or restrictions on particular types of remedial actions once the remedial actions have been identified as part of a remedial alternative

Compliance. Potential SCGs for the Site are presented in Table 5. The alternatives meeting the individual SCGs are noted in Table 5.

3.1.3. Long-Term Effectiveness and Permanence

This criterion assesses the magnitude of residual risk remaining from untreated material or treatment residuals at the site. The adequacy and reliability of controls used to manage untreated material or treatment residuals are also evaluated. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 4.

3.1.4. Reduction of Toxicity, Mobility, or Volume through Treatment

The evaluation of this criterion addressed the expected performance of treatment technologies in each alternative. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 4.

3.1.5. Short-Term Effectiveness

The evaluation of short-term effectiveness addressed the protection of workers and the community during construction and implementation of each alternative, and the potential environmental effects resulting from implementation of each alternative. The time required to achieve remedial objectives was also evaluated under this criterion. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 4.

3.1.6. Implementability

The analysis of implementability involved an assessment of the ability to construct and operate the technologies, the reliability of the technologies, the ease of undertaking additional remedial action, the ability to monitor the effectiveness of each remedy, and the ability to obtain necessary approvals from other agencies. Additionally, the availability of services, capacities, equipment, materials, and specialists necessary for implementation of the alternative was also assessed. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 4.

3.1.7. Cost

For the cost analysis, cost estimates were prepared for each alternative based on vendor information and quotations, cost estimating guides, and experience. Cost estimates were prepared for the purpose of alternative comparison and were based on information currently known about the study area. The cost estimates include capital costs, annual operation and maintenance costs, and present worth cost. The present worth cost for these alternatives was calculated for the expected duration of the remedy at a 7% discount rate.

The individual cost estimates for the remedial alternatives are included in Tables 6 through 12.

3.1.8. Support Agency Acceptance

Support agency acceptance will be addressed during development of the preferred alternative.

3.1.9. Community Acceptance

Community acceptance will be addressed during the preferred alternative public comment period prior to the ROD.

3.2. Comparative Analysis of Alternatives

In the comparative analysis of alternatives, the performance of each alternative relative to the others was evaluated for each criterion.

As discussed in the following subsections, with the exception of Alternative 1, each alternative satisfies the threshold criteria by providing protection to human health and the environment and by complying with the identified SCGs; therefore, each active alternative is eligible for selection as the final remedy. The primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) were used for balance in the comparative evaluation of alternatives.

3.2.1. Overall Protection of Human Health and the Environment

Concentrations of site-related constituents in the municipal drinking water well are currently below NYS Class GA standards, thus each alternative is protective of human health exposure to VOCs in ground water through the municipal drinking water well. In the event that the municipal drinking water well were to become impacted, Alternative 7 would provide the greatest level of protection for human health exposure to VOCs in the ground water from the municipal drinking water well through the active treatment at the well head. The remaining alternatives would rely on natural attenuation of currently impacted ground water that has reached the vicinity of the municipal drinking water well, as is evidenced by the sentinel well concentrations detected in June 2005. Alternative 2, through source removal and treatment of site ground water, provides the next greatest level of protection, followed by Alternatives 4, 5 and 6 that would provide treatment of on-site ground water. Alternatives 1 and 3 would provide the least level of protection to the municipal drinking water well as these would rely on natural attenuation to address VOCs in on-site ground water that may reach the municipal drinking water well.

Exclusive of wellhead concerns, each alternative, with the exception of Alternatives 1 and 7, would be protective of human health and the environment through institutional controls, removal of fill material, and/or containment of fill material. Alternative 2, by removal of the fill material and the treatment of ground water would provide the greatest overall level of protection to human health and the environment. Alternatives 4, 5, and 6 would provide adequate protection to human health and the environment. Alternative 3, because it relies on natural attenuation, would provide a lesser degree of protection to human health and the environment from a protection of ground water impacts standpoint, however, it would be just as protective as Alternatives 4, 5 and 6 from fill material/soil impacts.

Although Alternative 7 would be most protective of impacts, should they occur at the municipal drinking water well, it would provide no protection of impacts to human health through exposure to site ground water nor would it be protective of the environment. Alternative 7 would need to be implemented in conjunction with another alternative to be protective of human health through pathways not directly related to the municipal drinking water well and be protective of the environment.

Alternatives 1 and 7 would provide no protection of human health or the environment from the soil medium.

3.2.2. Compliance with SCGs

Attainment of ground water SCGs for inorganics is technically impracticable due to background concentrations. With the exception of inorganics, Alternative 2 would achieve the soil and ground water SCGs through fill material removal and ground water treatment. Alternative 4, 5 and 6 are anticipated to meet ground water SCGs through active ground water treatment. Alternatives 1 and 3 rely on natural attenuation to meet ground water SCGs. Though soil SCGs are not met for Alternatives 3, 4, 5 and 6, soil SCGs are addressed through containment. Action and location specific SCGs can be met for each alternative.

3.2.3. Long-term Effectiveness and Permanence

With the exception of Alternative 1, each active alternative would provide for long-term effectiveness and permanence. With the exception of Alternative 1, each alternative would effectively discourage contact with fill material and provide for management of risks at the site, through deed restrictions, landfill material removal or containment.

Deed restrictions, included in Alternatives 3 through 6, would provide adequate long-term effectiveness for the control of ground water use. Treatment at the well head included in Alternative 7 provides the greatest reduction in the magnitude of potential residual risk to human health relative to the municipal drinking water well, if the municipal drinking water well were to become impacted by site-related constituents.

3.2.4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 2, 4, 5, 6 and 7 include active treatment of ground water. The treatment processes included in Alternatives 2 4, 5, and 6 would provide a reduction of toxicity of Site ground water to both human and environmental receptors. Treatment of ground water included in Alternative 7 would result in a reduction of toxicity to human receptors. Reduction of ground water toxicity by these alternatives would be an irreversible process.

Containment of the fill material by a cover in Alternatives 3, 4, 5, and 6 would also reduce the volume of impacted ground water potentially produced by increasing runoff and evapotranspiration of surface waters. The option to consolidate fill, as part of Alternative 3, 4, 5, and 6, would provide a reduction of the footprint of the fill material possibly decreasing the amount of fill in contact with ground water, further reducing mobility of contaminant from the soil to the ground water media.

Alternative 2 would reduce the toxicity, mobility and volume of the fill material itself by excavation and removal. Alternatives 3, 4, 5 and 6 provide a reduction in mobility of the fill material. Containment of fill material in this manner is considered an acceptable and relevant action for municipal landfills (USEPA, 1993).

3.2.5. Short-Term Effectiveness

Implementation of Alternatives 1, 3, 4, 5, 6 and 7 would not be anticipated to result in the need for protection of the community during implementation aside from standard construction protections (*e.g.* air and surface water quality). During implementation of Alternative 2, protection of workers and the community would be required with respect to dust, volatile emissions, landfill gas and surface runoff. Engineering controls would be implemented during construction of the alternatives that would be adequately protective of the community and the environment.

Alternative 1 could be implemented immediately. It is assumed that the cover component (either cover configuration) included in Alternatives 3, 4, 5 and 6 would require approximately 1 to 2 years to construct. It is assumed that the landfill material removal component included in Alternative 2 would require approximately 1 to 2 years to construct. It is estimated that in the absence of ground water treatment, ground water would achieve NYS Class GA standards within approximately 72 years of landfill material removal (*i.e.*, Alternative 2 or the consolidation cover in Alternatives 3).

Installation of the ground water treatment system components of Alternatives 2 and 4 though 7 was assumed to require approximately 1 year to construct. When combined with the source removal (*i.e.*, Alternative 2 or the consolidation cover in Alternatives 4 through 6), it was assumed that operation of the ground water extraction and treatment system or installation of an *in situ* treatment wall would result in NYS Class GA standards being achieved in Site ground water within approximately 40 years. In the absence of source removal, active treatment or natural attenuation of Site ground water is not anticipated to meet NYS Class GA standards in the foreseeable future.

3.2.6. Implementability

Each alternative is implementable. The technologies being used are reliable technologies. Each alternative allows for additional remedial actions to be implemented if necessary, and is readily monitored for effectiveness of the remedy.

3.2.7. Cost

Detailed cost estimates for Alternatives 1 through 7 are included as Tables 6 through 12. Assumptions employed for the development of the costs for each alternative are included as Table 13.

Alternative 7, if implemented as a stand alone alternative, represents the least cost with a present worth value of $467,000. The cost of Alternate 7 can also be applied as an "adder" to other alternatives to represent the present worth value of incorporating well head treatment. Alternative 1, the no further action alternative, is the second least cost alternative at an estimated present worth value of $983,000 (due primarily to the ongoing ground water monitoring).

Alternative 3, with soil cover and monitored natural attenuation, is the least cost of the active cover alternatives at estimated present worth values of $4,620,000 (soil), $6,842,000 (low permeability with consolidation), and $9,163,000 (low permeability).

Alternatives 4 and 5, which incorporate active ground water treatment and a cover, are the next least cost alternatives. Alternative 4 with ground water extraction and *ex situ* treatment is the next least cost at an estimated present worth value of $5,246,000 (soil), $7,465,000 (low permeability with consolidation), and $9,788,000 (low permeability). Alternative 5 with *in situ* ground water treatment by biobarrier has an estimated present worth of $13,768,000 (soil), $15,988,000 (low permeability with consolidation), and $18, 309,000 (low permeability).

Alternatives 2 and 6 are the most expensive alternatives. Alternative 6 with *in situ* ground water treatment by iron reactive wall has an estimated present worth value of $28,224,000 (soil), $30,765,000 (low permeability with consolidation), and $32,765,000 (low permeability), and $24,674,000. Alternative 2, the excavation and disposal and ground water treatment alternative has an estimated total present worth of approximately $28,492,000.

3.2.8. Support Agency Acceptance

Support agency acceptance will be addressed during development of the preferred alternative.

3.2.9. Community Acceptance

Community acceptance will be addressed during the preferred alternative public comment period prior to the ROD.

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Table 1. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
Landfill material				
NO ACTION	None	None	No remedial action.	Required for consideration by NCP.
INSTITUTIONAL ACTIONS	Access restrictions	Deed restrictions	Land use restrictions for site.	Potentially applicable.
		Fencing	Installation of fencing surrounding area(s) of contamination.	Potentially applicable.
CONTAINMENT ACTIONS (Presumptive Remedy)	Capping	Vegetated soil cover	Vegetated soil layer covering landfill	Potentially applicable
		Low-permeability cover	Vegetated soil layer used in conjunction with low permeability and protective layers.	Potentially applicable.
REMOVAL ACTIONS	Excavation	Excavation	Use of construction equipment, such as backhoes, bulldozers, clamshells, draglines, or conveyors to remove site soils.	Required for consideration by DER-10 (in conjunction with disposal) to restore site to “Pre-Disposal Conditions”.
DISPOSAL ACTIONS	Land disposal	Off-site commercial landfill	Off-site disposal of soil.	Required for consideration by DER-10 (in conjunction with removal) to restore site to “Pre-Disposal Conditions”.
		On-site relocation (fill consolidation)	On-site placement of excavated soils to reduce the footprint of impacted material.	Potentially applicable.
Ground water				
NO ACTION	None	Natural attenuation	In-place reduction of VOCs, SVOCs in ground water over the long-term by biotic and abiotic attenuation processes.	Required for consideration by NCP. Potentially applicable.

Table 1. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
INSTITUTIONAL ACTIONS	Monitoring	Ground water monitoring	Periodic sampling and analysis of ground water to observe and document the effectiveness of natural attenuation or other treatment technology.	Potentially applicable.
INSTITUTIONAL ACTIONS	Use restrictions	Ground water use restriction	Restriction of ground water use at the site.	Potentially applicable.
CONTAINMENT ACTIONS	Vertical barrier	Slurry wall	Soil- or cement-bentonite slurry wall placed around the area of contamination to contain ground water.	Potentially applicable for shallow ground water only.
		Sheet piles	Sheet piles installed around the area of contamination to contain ground water.	Potentially applicable for shallow ground water only.
	Ground water control	Groundwater extraction wells	Removal of ground water by pumping for hydraulic containment to site.	Potentially applicable.
		Recovery trench	Removal of ground water by pumping from recovery trenches for hydraulic containment or mass removal.	Potentially applicable for shallow ground water only.
COLLECTION ACTIONS	Ground water control	Recovery wells	Removal of ground water by pumping from recovery wells for mass removal.	Potentially applicable.
IN SITU TREATMENT ACTIONS	Physical	Air sparging	Injection of air into the saturated soil zone to volatilize constituents from the liquid medium.	Potentially applicable.
		In-well stripping	Injection of air into the water column within a well to volatilize constituents. Ground water circulation is performed i*n situ*; entering the well at one screen and discharged through a second screen. Air is collected and treated if necessary.	Potentially applicable.

Table 1. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
	Biological	Bioremediation/ Biobarrier	Injection of oxygen and/or nutrient (as required) to the aquifer to enhance biological degradation of organics by indigenous microbes. Either in a large spatial area, or as a targeted "treatment zone".	Potentially applicable.
IN SITU TREATMENT ACTIONS	Chemical	Treatment wall	Construction of an iron wall or carbon wall to treat ground water as it flows through the treatment zone.	Potentially applicable.
EX SITU TREATMENT ACTIONS	Physical	Air stripping	Contact of air with water in countercurrent column or bulk reactor to transfer VOCs from water to air.	Potentially applicable.
		Carbon adsorption	Adsorption of organic constituents from water to activated carbon.	Potentially applicable.
		Adsorptive resin	Adsorption of organic constituents from water to commercial adsorptive resin.	Potentially applicable.
		Settling	Retention of aqueous stream in tank to settle/separate light or heavy components.	Not applicable for dissolved constituents.
		Filtration	Separation of solids from water phase using semipermeable filter medium.	Not applicable for dissolved constituents.
	Chemical	Chemical oxidation	Addition of oxidation agents such as hydrogen peroxide and ultraviolet light to water to oxidize/destroy organic contaminants.	Potentially applicable.
		Precipitation	pH adjustment of ground water to separate out dissolved metal contaminants.	Not applicable for dissolved organic constituents.

Table 1. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
		Ion exchange	Chemical alternation of a hazardous constituent to a non-hazardous constituent.	Not applicable for dissolved organic constituents.
EX SITU TREATMENT ACTIONS	Biological	Biological reactor	Addition of oxygen, nutrients, and cometabolites to ground water in reactor to enhance co-metabolic degradation of organic constituents.	Potentially applicable.
DISCHARGE ACTIONS	Treated water discharge	Discharge to Surface water	Discharge of extracted and treated ground water to surface water features such as streams, ponds, culverts, *etc*.	Potentially applicable.
		Discharge to ground water	Re-injection of extracted and treated ground water back to the sub-surface.	Potentially applicable.
		Discharge to engineered system	Discharge of extracted and treated ground water to sanitary or storm sewers.	Not applicable because these facilities are not available.

Table 2. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
Landfill material					
NO ACTION	None	Natural attenuation *	Relies on long-term biotic and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M
INSTITUTIONAL ACTIONS	Access restrictions	Deed restrictions *	Effectively minimizes access to the Site.	Readily implementable.	Low capital No O&M
		Fencing	Effectively minimizes access to the Site.	Readily implementable.	Low capital Low O&M
CONTAINMENT ACTIONS	Capping	Vegetated soil cover *	Effectively minimizes human and ecological contact with impacted soil.	Readily implementable.	Low capital Low O&M
		Low-permeability cover*	Effectively minimizes human and ecological contact with impacted soil.	Readily implementable.	High capital Low O&M
REMOVAL ACTIONS	Excavation	Excavation *	Effectively removes impacted soil and fill material.	Readily implementable for unsaturated soil. Difficult to implement for soil below ground water table due to dewatering needs in highly permeable soil.	High capital No O&M
DISPOSAL ACTIONS	Land disposal	Off-site commercial landfill or handling facility*	Effective method of disposal. Minimizes constituent migration.	Readily implementable.	High capital No O&M
		On-site relocation (fill consolidation)*	Effectively reduces area of cover required for containment and reduces the volume of impacted soil in contact with ground water.	Readily implementable.	Medium capital No O&M

Table 2. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
Ground water					
NO ACTION	None	Natural attenuation *	Relies on long-term biological and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M
INSTITUTIONAL ACTIONS	Monitoring	Ground water monitoring*	Effective for monitoring changes in organics and metals over time. Useful for evaluating remedy effectiveness.	Readily implementable.	Low capital Low O&M
	Deed restrictions	Ground water use restriction*	Effectively minimizes potable water use of ground water.	Readily implementable.	Low capital No O&M
CONTAINMENT ACTIONS	Vertical barrier	Slurry wall	Effectively minimizes movement of ground water into or out of a containment area.	Readily implementable to limited depths.	Medium capital No O&M
		Sheet Piles	Effectively minimizes movement of ground water into or out of a containment area.	Readily implementable to limited depths.	Medium capital No O&M
	Groundwater Control	Groundwater extraction wells	Effectively controls migration of contaminated groundwater from site.	Readily implementable.	Low capital Medium O&M
		Recovery trench	Effectively removes contaminated ground water.	Readily implementable to limited depths.	Medium capital Medium O&M
COLLECTION ACTIONS	Groundwater removal	Recovery wells*	Effectively removes contaminated ground water.	Readily implementable.	Low capital Medium O&M
IN SITU TREATMENT ACTIONS	Physical	Air sparging	Effective for removal of chlorinated VOCs.	Readily implementable.	High capital Medium O&M

Table 2. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
		In well air stripping	Effective for removal of chlorinated VOCs.	Readily implementable.	High capital Medium O&M
	Biological	Bioremediation/ Biobarrier*	Effective for removal of chlorinated VOCs	Readily implementable.	Low capital Medium O&M
IN SITU TREATMENT ACTIONS	Chemical	Treatment wall (iron wall)*	Effective for removal of chlorinated VOCs	Readily implementable.	High capital High O&M
EX SITU TREATMENT ACTIONS	Physical	Air stripping*	Effective for removal of chlorinated VOCs.	Readily implementable.	Low capital Medium O&M
		Carbon adsorption	Effective for removal of some chlorinated VOCs.	Readily implementable.	Low capital High O&M
		Adsorptive resin	Effective for removal of some chlorinated VOCs.	Readily implementable.	Medium capital Medium O&M
	Chemical	Chemical oxidation	Effective for destruction of chlorinated VOCs.	Difficult to implement due excessive quantities of extracted water as a result of the underlying sand and gravel.	Medium capital Medium O&M
EX SITU TREATMENT ACTIONS	Biological	Biological reactor	Likely effective for destruction of chlorinated VOCs.	Difficult to implement due excessive quantities of extracted water as a result of the underlying sand and gravel.	Medium capital Medium O&M

Table 3. *Components of remedial alternatives*

General Response Actions	Remedial technology - process option	1	2	3	4	5	6	7
Institutional actions	Access/Use restrictions		x	x	x	x	x	
	Ground water monitoring	x	x	x	x	x	x	
	Five-year reviews	x	x	x	x	x	x	x
Containment actions	Landfill cover - vegetated soil cover			x	x	x	x	
	Landfill cover - low permeability cover			x	x	x	x	
Removal actions	Fill excavation (complete)		x					
	Fill excavation (partial relocation)			x	x	x	x	
	Ground water recovery well		x		X			
Disposal actions	Off-site land disposal of fill (permitted facility)		x					
	On-site land disposal of fill (consolidation of fill)			x	x	x	x	
	Discharge of treated ground water to site surface water				x			
Treatment actions	*Ex situ* air stripping		x		x			x
	In situ enhanced attenuation (biobarrier)					x		
	In situ groundwater treatment (iron wall)						x	
	Monitored natural attenuation (MNA)			x				

Alternative 1 No Action
Alternative 2 Excavation and disposal with ground water recovery and treatment and institutional controls
Alternative 3 Landfill cover with monitored natural attenuation and institutional controls
Alternative 4 Landfill cover with ground water extraction and treatment and institutional controls
Alternative 5 Landfill cover with *in situ* ground water enhanced natural attentuation (biobarrior) and institutional controls
Alternative 6 Landfill cover with *in situ* ground water treatment (iron wall) and institutional controls
Alternative 7 Wellhead protection by *ex situ* air stripping of municipal drinking water well and five-year reviews.

Table 4. Detailed analysis of alternatives

Criterion	**Alternative 1:** **No further action**	**Alternative 2:** **Excavation and off-site disposal with GW recovery and treatment**	**Alternative 3:** **Landfill cover with MNA of GW**	**Alternative 4:** **Landfill cover with GW extraction and *ex situ* treatment**	**Alternative 5:** **Landfill cover with *in situ* GW treatment by biobarrier**	**Alternative 6:** **Landfill cover with *in situ* GW treatment by iron wall**	**Alternative 7** **Wellhead Protection by *ex situ* water treatment**
	• **Ground water monitoring** • **Five year reviews**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Excavation of fill material** • **Offsite fill material disposal** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Natural attenuation of ground water (with monitoring)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (biobarrier)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (iron wall)**	• **Five year reviews** • ***Ex situ* air stripping (of drinking water well)** • **Discharge to distribution system**
Overall protection of human health and the environment							
Overall protection of human health	Ground water monitoring provides minimal protection of adjacent municipal water supply well. Does not eliminate any identified exposure pathway. Existing soil cover provides minimal protection of potential exposure pathways to landfill material. Relies on natural attenuation for protection of potental and existing pathways to ground water.	Protection of human health is provided through the removal of fill material from the site. Ground water treatment and onsite disposal would address existing impacts to ground water and protect the adjacent municipal water supply well.	Protection of human health is provided through the isolation of the fill and surface water exposure pathways. Relies on natural attenuation for continued protection of potential and existing pathways for ground water offsite. Future use of onsite ground water would be further restricted through deed restrictions. Impacted ground water already at the vicinity of the drinking water well would be addressed by natural attenuation.	Protection of human health is provided through the isolation of the fill and surface water exposure pathways. Ground water treatment and onsite disposal would provide protection of the exposure pathway of the adjacent municipal drinking water well. Future use of onsite ground water would be further restricted through deed restrictions. Impacted ground water already at the vicinity of the drinking water well would be addressed by natural attenuation.	Protection of human health is provided through the isolation of the fill and surface water exposure pathways. Ground water treatment and onsite disposal would provide protection of the exposure pathway of the adjacent municipal drinking water well. Future use of onsite ground water would be further restricted through deed restrictions. Impacted ground water already at the vicinity of the drinking water well would be addressed by natural attenuation.	Protection of human health is provided through the isolation of the fill and surface water exposure pathways. Ground water treatment and onsite disposal would provide protection of the exposure pathway of the adjacent municipal drinking water well. Future use of onsite ground water would be further restricted through deed restrictions. Impacted ground water already at the vicinity of the drinking water well would be addressed by natural attenuation.	Direct treatment of municipal water flow would provide protection for ground water pathway of the adjacent municipal drinking water well. No protection from exposure to fill material or affected surface water is provided by this alternative.
Overall protection of the environment	Relies on natural attenuation for protection of the environment.	Protection of the environment is provided through treatment or removal of contaminated media of concern.	Protection of the environment is provided through isolation of the fill and surface water exposure pathways. Consolidation of fill is more protective of ground water media than capping material in place. Relies on natural attenuation of ground water for to provide protection from impacted ground water.	Protection of the environment is provided through isolation of the fill and surface water exposure pathways. Consolidation of fill is more protective of ground water media than capping material in place. Protection of environment is provided through ground water treatment.	Protection of the environment is provided through isolation of the fill and surface water exposure pathways. Consolidation of fill is more protective of ground water media than capping material in place. Protection of environment is provided through ground water treatment.	Protection of the environment is provided through isolation of the fill and surface water exposure pathways. Consolidation of fill is more protective of ground water media than capping material in place. Protection of environment is provided through ground water treatment.	No protection to the environment is provided by this alternative. Relies on natural attenuation for protection of the environment.
Compliance with standards, criteria, and guidance (SCGs)							
Compliance with chemical-specific SCGs	Does not attain surface water or soil chemical specific SCGs. Relies on natural attenuation to achieve ground water SCGs. Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Attainment of NYS Class GA ground water (for VOCs only) and TAGM soil guidance values is provided through source removal and removal of landfill material and ground water. Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Relies on natural attenuation to achieve ground water SCGs for VOCs. Soil SCGs would be addressed through risk management (containment). Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Attainment of NYS Class GA ground water standards (for VOCs only) is provided through isolation of source material and removal/treatment of ground water. Soil SCGs would be addressed through risk management (containment). Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Attainment of NYS Class GA ground water standard (for VOCs only) is provided through isolation of source media and treatment of ground water. Soil SCGs would be addressed through risk management (containment). Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Attainment of NYS Class GA ground water standard (for VOCs only) is provided through isolation of source media and treatment of ground water. Soil SCGs would be addressed through risk management (containment). Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.	Does not attain surface water or soil chemical specific SCGs. Relies on natural attenuation to achieve ground water SCGs. Attainment of NYS Class GA ground water standards for inorganics is technically impracticable due to background concentrations.
Compliance with location-specific SCGs	No potential location specific SCGs were identified.	Landfill excavation and treated water discharge would need to be conducted in a manner consistent with NYS and Federal requirements for the protection of wetlands. Cultural resource assessments should be conducted prior to sitework, and depending on outcome, construction activities may need to be conducted such that archeological and historical resources are not damaged.	Landfill cover installation would need to be conducted in a manner consistent with NYS and Federal requirements for the protection of wetlands. Cultural resource assessments should be conducted prior to sitework, and depending on outcome, construction activities may need to be conducted such that archeological and historical resources are not damaged. Landfill cover design would need to consider NYS and Federal requirements concerning construction within a 100-year flood plain.	Landfill cover installation and treated water discharge would need to be conducted in a manner consistent with NYS and Federal requirements for the protection of wetlands. Cultural resource assessments should be conducted prior to sitework, and depending on outcome, construction activities may need to be conducted such that archeological and historical resources are not damaged. Landfill cover design would need to consider NYS and Federal requirements concerning construction within a 100-year flood plain.	Landfill cover and *in situ* technologies would need to be conducted in a manner consistent with NYS and Federal requirements for the protection of wetlands. Cultural resource assessments should be conducted prior to sitework, and depending on outcome, construction activities may need to be conducted such that archeological and historical resources are not damaged. Landfill cover design would need to consider NYS and Federal requirements concerning construction within a 100-year flood plain.	Landfill cover and *in situ* technologies would need to be conducted in a manner consistent with NYS and Federal requirements for the protection of wetlands. Cultural resource assessments should be conducted prior to sitework, and depending on outcome, construction activities may need to be conducted such that archeological and historical resources are not damaged. Landfill cover design would need to consider NYS and Federal requirements concerning construction within a 100-year flood plain.	No potential location specific SCGs were identified.

Table 4. Detailed analysis of alternatives

Criterion	**Alternative 1:** **No further action**	**Alternative 2:** **Excavation and off-site disposal with GW recovery and treatment**	**Alternative 3:** **Landfill cover with MNA of GW**	**Alternative 4:** **Landfill cover with GW extraction and *ex situ* treatment**	**Alternative 5:** **Landfill cover with *in situ* GW treatment by biobarrier**	**Alternative 6:** **Landfill cover with *in situ* GW treatment by iron wall**	**Alternative 7** **Wellhead Protection by *ex situ* water treatment**
	• **Ground water monitoring** • **Five year reviews**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Excavation of fill material** • **Offsite fill material disposal** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Natural attenuation of ground water (with monitoring)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (biobarrier)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (iron wall)**	• **Five year reviews** • ***Ex situ* air stripping (of drinking water well)** • **Discharge to distribution system**
Compliance with action-specific SCGs	No actions are part of this alternative.	Excavation activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Offsite disposal of landfill material would be conducted in accordance with transportation and disposal requirements. Construction activities would be conducted in accordance with OSHA safety requirements. The air stripper would be operated according to applicable air discharge regulations.	Construction activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Site construction activities would be conducted in accordance with OSHA safety requirements.	Construction activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Site construction activities would be conducted in accordance with OSHA safety requirements. The air stripper would be operated according to applicable air discharge regulations.	Construction activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Site construction activities would be conducted in accordance with OSHA safety requirements.	Construction activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Site construction activities would be conducted in accordance with OSHA safety requirements.	Site construction activities would be conducted in accordance with OSHA safety requirements. The air stripper would be operated according to applicable air discharge requirements.
Long-term effectiveness and permanence							
Magnitude of residual risk	Impacted media would remain onsite. No reduction of risk associated with landfill material. Minimal potential residual risk to end users of municipal drinking water source from adjacent well due to ground water monitoring.	Removal of fill material removes risk of exposure to fill material. Minimal potential residual risk of exposure to ground water by treatment and use controls.	Minimal residual risk to end users of municipal drinking water source from adjacent well due to ground water monitoring. Minimal risk of exposure to on-site ground water through use controls. Minimal potential residual risk of exposure to fill material despite being left onsite.	Minimal residual risk of exposure to covered fill material. Minimal potential residual risk of exposure to ground water by treatment and use controls.	Minimal residual risk of exposure to covered fill material. Minimal potential residual risk of exposure to ground water by treatment and use controls.	Minimal residual risk of exposure to covered fill material. Minimal potential residual risk of exposure to ground water by treatment and use controls.	Negligible potential residual risk of exposure via the municipal drinking water well. No reduction of risk for other identified pathways.
Adequacy and reliability of controls	Natural attenuation is adequte protection to control direct exposure via the municipal drinking well, however long-term reliability is not known. Ground water monitoring is an adequate and reliable method for detecting increasing concentrations approaching the municipal water supply well.	Removal of landfill material and ground water treatment and use restrictions provide adequate and reliable control of exposures.	Covering landfill material provides adequate and reliable control over exposures to contaminated soil and fill media. Ground water use restrictions provides adequate control of onsite ground water exposure. Natural attenuation is adequate protection to control direct exposure via the municipal drinking water well, however long-term reliability is not known. Ground water monitoring is an adequate and reliable method of detecting increasing concentrations approaching the municipal water supply well.	Covering landfill material and ground water treatment and use restrictions provide adequate and reliable control of exposures.	Covering landfill material and ground water treatment and use restrictions provide adequate and reliable control of exposures.	Covering landfill material and ground water treatment and use restrictions provide adequate and reliable control of exposures.	Treatment of ground water would provide reliable removal of potential risk of exposure to affected ground waters via the municipal drinking water well.
Reduction of toxicity, mobility, or volume through treatment							
Treatment process used and materials treated	No active treatment processes are used in this alternative. Natural attenuation will be used for ground water.	Excavation and offsite disposal will address contaminats in fill material. Ex situ air stripping will be used to treat VOCs in ground water.	No active treatment processes are used in this alternative. Natural attenuation will be used for ground water.	*Ex situ* air stripping will be used to treat VOCs in ground water.	*In situ* treatment zone of increased metabolic activity of site microorganisms established by introduction of nutrients will be used to address VOCs in ground water.	*In situ* treatment zone established to oxidize VOCs in groundwater by interaction with iron.	*Ex situ* air stripping and natural attentuation will be used to treat VOCs in ground water.
Amount of hazardous material destroyed or treated	No active treatment processes or removal are used in this alternative. Natural attenuation will be used for ground water.	Approximately 90,000 cubic yards of fill material will be removed. Approximately 2,000,000 gallons per year of ground water will be treated.	Approximately 90,000 cubic yards of fill material will be isolated by installation of a landfill cover.	Approximately 90,000 cubic yards of fill material will be isolated by installation of a landfill cover. Approximately 2,000,000 gallons per year of ground water will be treated.	Approximately 90,000 cubic yards of fill material will be isolated by installation of a landfill cover. Approximately 2,000,000 gallons per year of ground water will be treated.	Approximately 90,000 cubic yards of fill material will be isolated by installation of a landfill cover. Approximately 2,000,000 gallons per year of ground water will be treated.	The volume of ground water treated will vary based on water system demands.
Degree of expected reduction in toxicity, mobility, or volume	No active treatment processes or removal are used in this alternative. Natural attenuation provide a sufficient reduction in concentration of organic compounds in ground water. Long term reduction of compounds is not known.	Approximately 90,000 cubic yards of fill material will be removed. Approximately 2,000,000 gallons per year of ground water will be treated. Air strippers can be up to 99% efficient in VOC removal from water.	Consolidation of fill material would reduce potential for mobility of contaminants in fill to ground water (degree based on amount of fill excavated from contact with ground water).	Extraction and treatment of ground water would capture ground water migration toward the municipal well. Consolidation of fill would yield reductions similar to Alt. 3. Air strippers can be up to 99% efficient in VOC removal from water.	Treatment zone would provide reduction of VOC concentration to below Class GA ground water standards.	Treatment zone would provide reduction of VOC concentration to below Class GA ground water standards.	Attainment of drinking water standards for VOC compounds of interest is expected.

Criterion	Alternative 1: No further action	Alternative 2: Excavation and off-site disposal with GW recovery and treatment	Alternative 3: Landfill cover with MNA of GW	Alternative 4: Landfill cover with GW extraction and *ex situ* treatment	Alternative 5: Landfill cover with *in situ* GW treatment by biobarrier	Alternative 6: Landfill cover with *in situ* GW treatment by iron wall	Alternative 7 Wellhead Protection by *ex situ* water treatment
	• **Ground water monitoring** • **Five year reviews**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Excavation of fill material** • **Offsite fill material disposal** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Natural attenuation of ground water (with monitoring)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (biobarrier)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (iron wall)**	• **Five year reviews** • ***Ex situ* air stripping (of drinking water well)** • **Discharge to distribution system**
Degree to which treatment is irreversible	Natural attenuation of ground water is irreversible.	Removal of landfill material is irreversible. Treatment of ground water is irreversible.	Natural attenuation of ground water is irreversible.	Treatment of ground water is irreversible.	Treatment of ground water is irreversible.	Treatment of ground water is irreversible.	Treatment of ground water is irreversible.
Type and quantity of residuals remaining after treatment	No active treatment processes or removal are used in this alternative.	No residuals would remain after treatment.	90,000 cubic yards of fill material will remain onsite. VOCs will remain in ground water.	90,000 cubic yards of fill material will remain onsite.VOCs will remain in ground water downgradient of treatment zone.	90,000 cubic yards of fill material will remain onsite. VOCs will remain in ground water downgradient of treatment zone.	90,000 cubic yards of fill material will remain onsite. VOCs will remain in ground water downgradient of treatment zone.	90,000 cubic yards of fill material will remain onsite. VOCs will remain in ground water.
Short-term effectiveness							
Protection of community during remedial actions	No remedial actions are considered under this alternative.	Dust and volatile emissions, if any, will be controlled during excavation and removal of fill material. Air stripper would be designed such that emissions will be protective of the community.	Dust and volatile emissions, if any, will be controlled during installation of landfill cover.	Dust and volatile emissions, if any, will be controlled during installation of landfill cover. Air stripper would be designed such that emissions will be protective of the community.	Dust and volatile emissions, if any, will be controlled during installation of landfill cover.	Dust and volatile emissions, if any, will be controlled during installation of landfill cover.	Air stripper would be designed such that emissions will be protective of the community.
Protection of workers during remedial actions	No remedial actions are considered under this alternative.	Proper health and safety measures will be established and implemented during remedial activities.	Proper health and safety measures will be established and implemented during remedial activities.	Proper health and safety measures will be established and implemented during remedial activities.	Proper health and safety measures will be established and implemented during remedial activities.	Proper health and safety measures will be established and implemented during remedial activities.	Proper health and safety measures will be established and implemented during remedial activities.
Environmental impacts	There are no environmental impacts expected as a result of implementation of this alternative.	Dust, volatile emissions, and surface runoff controls will be instituted to minimize impacts to the environment during implementation of this alternative. This action will require the discharge of approximately 6,000 gallons per day of treated ground water to surface waters.	Dust, volatile emissions, and surface runoff controls will be instituted to minimize impacts to the environment during implementation of this alternative.	Dust, volatile emissions, and surface runoff controls will be instituted to minimize impacts to the environment during implementation of this alternative. This action will require the discharge of approximately 6,000 gallons per day of treated ground water to surface waters.	Dust, volatile emissions, and surface runoff controls will be instituted to minimize impacts to the environment during implementation of this alternative.	Dust, volatile emissions, and surface runoff controls will be instituted to minimize impacts to the environment during implementation of this alternative.	Air stripper would be designed such that emissions will be protective of the environment.
Time until remedial action objectives (RAOs) are achieved	RAOs related to human health and to ecological receptors will not be met upon completion of the remedy. Natural attenuation under this alternative is not anticipated to achieve NYS Class GA standards in ground water in the foreseeable future, due to the presence of a continuing source of VOCs.	RAOs associated with direct contant of fill and leachate generation would be met upon completion of excavation. RAOs associated with Site ground water contact and criteria are estimated to be met within approximately 40 years. RAOs associated with off-site ground water contact and criteria are estimted to be met within approximately 32 years.	RAOs associated with direct contant of fill and leachate generation would be met upon completion of a cover. Under the consolidation cover alternative, RAOs associated with Site ground water contact and criteria are estimated to be met within approximately 72 years. For cover options other than consolidation, it is not anticipated that natural attenuation will achieve Site ground water RAOs in the foreseeable future, due to the presence of a continuing source of VOCs.	RAOs associated with direct contant of fill and leachate generation would be met upon completion of a cover. Under the consolidation cover alternative, RAOs associated with Site ground water contact and criteria are estimated to be met within approximately 40 years. RAOs associated with off-site ground water contact and criteria are estimted to be met within approximately 32 years. For cover options other than consolidation, it is not anticipated that natural attenuation will achieve Site ground water RAOs in the foreseeable future, due to the presence of a continuing source of VOCs.	RAOs associated with direct contant of fill and leachate generation would be met upon completion of a cover. Under the consolidation cover alternative, RAOs associated with Site ground water contact and criteria are estimated to be met within approximately 40 years. For cover options other than consolidation, it is not anticipated that natural attenuation will achieve Site ground water RAOs in the foreseeable future, due to the presence of a continuing source of VOCs.	RAOs associated with direct contant of fill and leachate generation would be met upon completion of a cover. RAOs associated with ground water contact and criteria are estimated to be met within approximately 40 years. For cover options other than consolidation, it is not anticipated that natural attenuation will achieve Site ground water RAOs in the foreseeable future, due to the presence of a continuing source of VOCs.	This alternative would achieve the RAO addressing exposure to affected ground water via the municipal drinking water well upon installation. Natural attenuation is not anticipated to achieve NYS Class GA standards in Site ground water in the foreseeable future, due to the presence of a continuing source of VOCs.

Criterion	Alternative 1: No further action	Alternative 2: Excavation and off-site disposal with GW recovery and treatment	Alternative 3: Landfill cover with MNA of GW	Alternative 4: Landfill cover with GW extraction and *ex situ* treatment	Alternative 5: Landfill cover with *in situ* GW treatment by biobarrier	Alternative 6: Landfill cover with *in situ* GW treatment by iron wall	Alternative 7 Wellhead Protection by *ex situ* water treatment
	• **Ground water monitoring** • **Five year reviews**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Excavation of fill material** • **Offsite fill material disposal** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Natural attenuation of ground water (with monitoring)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • **Ground water recovery** • ***Ex situ* air stripping** • **Surface water disposal**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (biobarrier)**	• **Ground water monitoring** • **Five year reviews** • **Access/Use restrictions** • **Soil or low-permeability landfill cover** • ***In situ* ground water treatment (iron wall)**	• **Five year reviews** • ***Ex situ* air stripping (of drinking water well)** • **Discharge to distribution system**
Implementability							
Ability to construct and operate the technology	There are no technologies to be constructed in this alternative.	Removal of fill material is readily constructable. Installation and operation of ground water recovery wells and air stripping equipment is readily constructable and operable.	Installation of any landfill cover option is readily constructable.	Installation of any landfill cover option is readily constructable. Installation and operation of ground water extraction wells and air stripping equipment is readily constructable and operable.	Installation of any landfill cover option is readily constructable. Installation of material or equipment of develop treatment zones are readily constructable.	Installation of any landfill cover option is readily constructable. Installation of material or equipment of develop treatment zones are readily constructable.	Addition of air stripping equipment to municipal well system is readily constructable and operable.
Reliability of technology	Ground water sampling and analysis is a reliable means to continue to monitor on- and off-site ground water concentrations.	Removal of soil and fill materials is a reliable technology. Air stripping is a reliable technology to remove VOCs in ground water.	A landfill cover is a reliable technology for isolation of impacted soils and for reduction of surface water infiltration. A low-permeability cover provides reliablility for minimizing infiltration and subsequent potential for contaminant migration.	A landfill cover is a reliable technology for isolation of impacted soils and for reduction of surface water infiltration. A low-permeability cover provides the reliablility for minimizing infiltration and subsequent potential for contaminant migration. Air stripping is a reliable technology to remove VOC concentrations in ground water.	A landfill cover is a reliable technology for isolation of impacted soils and for reduction of surface water infiltration. A low-permeability cover provides the reliablility for minimizing infiltration and subsequent potential for contaminant migration. Biobarriers are a reliable technology to reduce VOC concentrations in ground water.	A landfill cover is a reliable technology for isolation of impacted soils and for reduction of surface water infiltration. A low-permeability cover provides the reliablility for minimizing infiltration and subsequent potential for contaminant migration. Iron walls are a reliable technology to reduce VOC concentrations in ground water.	Air stripping is a reliable technology to remove VOC concentrations in ground water.
Ease of undertaking additional remedial actions, if necessary	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.
Ability to monitor effectiveness of remedy	Ground water monitoring allows the ability to monitor the effectiveness of natural attenuation.	Effectiveness of remedy could be monitored through confirmation sampling and ground water monitoring.	Effectiveness of remedy could be monitored by ground water monitoring and cover inspection.	Effectiveness of remedy could be monitored by ground water monitoring and cover inspection.	Effectiveness of remedy could be monitored by ground water monitoring and cover inspection.	Effectiveness of remedy could be monitored by ground water monitoring and cover inspection.	Effectiveness of remedy components would be monitored through analysis of stripper emissions and treated water discharge.
Coordination with other agencies and property owners	None required.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with authorities, including the local water department and state and local departments of health, would be necessary to implement modifications to the municipal ground water well.
Availability of off-site treatment storage and disposal services and capacities	None required.	Offsite disposal facilities for material generated by removal of landfill material are available.	None required.	None required.	None required.	None required.	None required.
Availability of necessary equipment, specialists, and materials	Readily available.	Readily available.	Readily available.	Readily available.	Readily available.	Readily available.	Readily available.
Costs							
Capital cost [(1)]	$0	$21,800,000	$2,720,000 $6,360,000 $4,500,000	$3,032,000 $6,671,000 $4,810,000	$3,845,000 $7,483,000 $5,623,000	$6,024,000 $9,662,000 $7,801,000	$290,000
Present worth of operation and maintenance cost [(1)(2)]	$983,000	$6,692,000	$1,900,000 $2,803,000 $2,342,000	$2,214,000 $3,117,000 $2,655,000	$9,923,000 $10,826,000 $10,365,000	$22,200,000 $23,103,000 $22,641,000	$177,000
Approximate total net present worth cost [(1)]	$983,000	$28,492,000	$4,620,000 $9,163,000 $6,842,000	$5,246,000 $9,788,000 $7,465,000	$13,768,000 $18,309,000 $15,988,000	$28,224,000 $32,765,000 $30,442,000	$467,000

[(1)] Where applicable, top figure represents cost for soil cover; middle figure represents cost of low-permeability cover, bottom figure represents of cost of fill consolidation with low-permeability cover.

[(2)] Operation and Maintenance costs for Alternative 6 include a one time cost to reinstall the iron wall after an anticipated 15-year service life. The present worth value of $19,464,000 has been added to O&M. See Table 11.

Table 5. *Evaluation of potential SCGs*

Medium/Location/ Action	Citation	Requirements	Comments	PotentialSCG	Alternative
Potential chemical-specific SCGs					
Ground water	6 NYCRR 703 - Class GA ground water quality standards	Fresh ground waters of the state must attain Class GA standards if intended for potable use. There are no specific standards for other ground water classifications.	Potentially applicable to site ground water given proximity to existing municipal water production well.	Yes	1, 2, 3, 4, 5, 6 & 7
Surface water	6 NYCRR 703 - Class C surface water standards	Outlines surface water quality standards and guidance values for Class C surface waters.	Potentially applicable to site surface wa ter.	Yes	1, 2, 3, 4, 5, 6 & 7
Soil	NYSDEC TAGM HWR-94-4046 - Recommended soil cleanup objectives	Guidance that provides recommended soil cleanup objectives.	Potentially applicable to site soil.	Yes	1, 2, 3, 4, 5, 6 & 7
Potential location-specific SCGs					
Wetlands	6 NYCRR 663 - Freshwater wetland permit requirements	Actions occurring in a designated freshwater wetland (within 100 ft) must be approved by NYSDEC or its designee. Activities occurring adjacent to freshwater wetlands must: be compatible with preservation, protection, and conservation of wetlands and benefits; result in no more than insubstantial degradation to or loss of any part of the wetland; and be compatible with public health and welfare.	Potentially applicable since the Site is within 100 ft of one or more NYS designated freshwater wetlands, as shown on available mapping provided in the FWIA for the Site (O'Brien & Gere 2005).	Yes	2, 3, 4, 5, & 6
	Executive Order 11990 - Protection of Wetlands	Activities occurring in wetlands must avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. The procedures also require USEPA to avoid direct or indirect support of new construction in wetlands wherever there are practicable alternatives or minimize potential harm to wetlands when there are no practicable alternatives.	Potentially applicable based on available mapping which shows NWI habitat within 100 ft of the Site (O'Brien & Gere 2005). However, delineation of Federal Wetlands has not been conducted at this site.	Yes	2, 3, 4, 5, & 6
100-year flood plain	6 NYCRR 373-2.2 - Location standards for hazardous waste treatment, storage, and disposal facilities -100-yr floodplain	Hazardous waste treatment, storage, or disposal facilities located in a 100-yr floodplain must be designed, constructed, operated and maintained to prevent washout of hazardous waste during a 100-yr flood.	Potentially applicable if hazardous waste is capped on-site and if the Site is in the 100-year floodplain.	Yes	3, 4, 5, & 6
	Executive Order 11988 - Floodplain Management	EPA is required to conduct activities to avoid, to the extent possible, the long- and short- term adverse impacts associated with the occupation or modification of floodplains. The procedures also require EPA to avoid direct or indirect support of floodplain development wherever there are practicable alternatives and minimize potential harm to floodplains when there are no practicable alternatives.	Potentally applicable for alternatives that involve excavation/grading activities if the Site is located in the 100-year floodplain.	Yes	2, 3, 4, 5, & 6
Within 61 meters (200 ft) of a fault displaced in Holocene time	40 CFR Part 264.18	New treatment, storage, or disposal of hazardous waste is not allowed.	Not applicable or relevant and appropriate. Site is not located within 200 ft of a fault displaced in Holocene time, as listed in 40 CFR 264 Appendix VI.	No	None
River or stream	16 USC 661 - Fish and Wildlife Coordination Act	Requires protection of fish and wildlife in a stream when performing activities that modify a stream or river.	Potentially applicable for actions that may impact the unnamed tributary located adjacent to the site to the north by discharge of treated ground water.	Yes	2, 3, 4, 5, & 6
Habitat of an endangered or threatened species	6 NYCRR 182	Provides requirements to minimize damage to habitat of an endangered species.	Potentially applicable for actions that may impact the habitat of identified endangered species.	Yes	2, 3, 4, 5, & 6
	Endangered Species Act	Provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction.	Potentially applicable because of the existance of one listed and one recommended endangered species w/in 2 mi. radius of site.	Yes	2, 3, 4, 5, & 6

Table 5. *Evaluation of potential SCGs*

Medium/Location/ Action	Citation	Requirements	Comments	PotentialSCG	Alternative
Potential location-specific SCGs (cont.)					
Historical property or district	National Historic Preservation Act	Remedial actions are required to account for the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places.	Potentially applicable or relevant and appropriate, if Site found to be a historical property.	Yes	2, 3, 4, 5, & 6
Potential action-specific SCGs					
Construction in a floodplain	6 NYCRR 500 - Floodplain management regulations development permits	Development in a 100-year floodplain must be approved by NYSDEC. Construction must not result in increased flood elevations in the community.	Potentially applicable for alternatives that involve excavation, grading, and/or capping if the Site is located in a 100-year floodplain.	Yes	2, 3, 4, 5, & 6
General excavation	6 NYCRR 257-3 - Air Quality Standards	Provide limitations for generation of constituents including particulate matter.	Not applicable or relevant and appropriate because dust emissions would not be from a point source. May be useful for consideration during dust generating activities such as earth moving, grading and excavation of soil.	Yes	2, 3, 4, 5, & 6
	40 CFR 50.1 through 50.12 - National Ambient Air Quality Standards.	Provides air quality standards for pollutants considered harmful to public health and the environment. The six principle pollutants include carbon monoxide, lead, nitrogen dioxide, particulates, ozone, and sulfur oxides.	Potentially applicable during dust generating activities such as earth moving, grading, and excavation of soil.	Yes	2, 3, 4, 5, & 6
Removal & treatment actions	6 NYCRR 373 - Hazardous waste management facilities	Provides requirements for managing hazardous wastes.	Potentially applicable if hazardous waste is present in/removed from the landfill. May also be applicable for treatment of ground water.	Yes	2 & 4
Landfill cover	6 NYCRR 360 - Solid Waste Management Facilities	Provides requirements for construction of the final cover of a solid waste landfill.	Potentially applicable for alternatives that include capping material on-site.	Yes	3, 4, 5, & 6
Land disposal	6 NYCRR 376 - Land disposal restrictions	Provides treatment standards to be met prior to land disposal of hazardous wastes.	Potentially applicable for alternatives that include capping material on-site.	Yes	3, 4, 5, & 6
Discharge to surface water	6 NYCRR Parts 750 - 758 - SPDES	Provides concentration limits and monitoring requirements for discharges to waters of the State.	Potentially applicable for surface discharge of treated ground water	Yes	2 & 4
Construction	29 CFR Part 1910 - Occupational Safety and Health Standards - Hazardous Waste Operations and Emergency Response	Remedial activities must be in accordance with applicable OSHA requirements.	Applicable for construction and monitoring phase of remediation.	Yes	1, 2, 3, 4, 5, 6 & 7
	29 CFR Part 1926 - Safety and Health Regulations for Construction	Remedial construction activities must be in accordance with applicable OSHA requirements.	Applicable for construction phase of remediation.	Yes	2, 3, 4, 5, 6 & 7
Transportation	6 NYCRR 364 - Waste Transporter Permits	Hazardous waste transport must be conducted by a hauler permitted under 6 NYCRR 364.	Potentially applicable.	Yes	2
	6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	Substantive hazardous waste generator and transportation requirements must be met when hazardous waste is generated for disposal. Generator requirements include obtaining an EPA Identification Number and manifesting hazardous waste for disposal.	Potentially applicable.	Yes	2
	49 CFR 172-174 and 177-179 - Department of Transportation Regulations	Hazardous waste transport to offsite disposal facilities must be conducted in accordance with applicable DOT requirements	Potentially applicable.	Yes	2
Generation of air emissions	NYS Air Guide 1	Provides annual guideline concentrations (AGLs) and short-term guideline concentrations (SGCs) for specific chemicals. These are property boundary limitations that would result in no adverse health effects.	Potentially applicable.	Yes	2, 3, 4, 5 & 6
	NYS TAGM 4031 - Dust Suppressing and Particle Monitoring at Inactive Hazardous Waste Disposal Sites	Provides limitations on dust emissions.	Potentially applicable.	Yes	2, 3, 4, 5 & 6

Table 5. *Evaluation of potential SCGs*

Medium/Location/ Action	Citation	Requirements	Comments	PotentialSCG	Alternative
Construction storm water management	NYSDEC General permit for storm water discharges associated with construction activities. Pursuant to Article 17 Titles 7 and 8 and Article 70 of the Environmental Conservation Law.	The regulation prohibits discharge of materials other than storm water and all discharges that contain a hazardous substance in excess of reportable quantities established by 40 CFR 117.3 or 40 CFR 302.4, unless a separate NPDES permit has been issued to regulate those discharges. A permit must be acquired if activities involve the disturbance of 5 acres or more. If the project is covered under the general permit, the following are required: development and implementation of a storm water pollution prevention plan; development and implementation of a monitoring program; all records must be retained for a period of at least 3 years after construction is complete.	Potentially applicable for construction activities.	Yes	2, 3, 4, 5, & 6

Town of Carroll Landfill
Carroll, NY

Table 6: Alternative #1
No Action
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs; *No Direct Capital Costs are associated with Alternative No. 1*					
				SUBTOTAL:	None
			TOTAL DIRECT CAPITAL COST:		
Indirect Capital Costs; *No Indirect Capital Costs are associated with Alternative No. 1*					
Contingency (25% Direct Capital Costs)	LS	1	$0	$0	
Engineering (15% of Direct Capital Costs)	LS	1	$0	$0	
Legal Fees (5% Direct Capital Costs)	LS	1	$0	$0	
			TOTAL INDIRECT CAPITOL COSTS:		None
			TOTAL CAPITAL COSTS ROUNDED:		
Annual Operation & Maintenance Costs					
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$2,000	$2,000	
Ground Water Monitoring	LS	1	$70,000	$70,000	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Insurance (1% Direct Capital Cost; $1,500 minimum)	LS	1	$0	$1,500	
Reserve Fund (1% Direct Capital Cost; $1,500 minimum)	LS	1	$0	$1,500	
			SUBTOTAL:	$79,200	
			PRESENT WORTH OF ANNUAL O&M: *30 yr, I=7%		$983,000
			APPROXIMATE TOTAL PRESENT WORTH COST:		**$983,000**

Town of Carroll Landfill
Carroll, NY

Table 7: Alternative #2
Excavation and Offsite Disposal
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%)	LS	1	$155,567	$155,567	
Equipment and Site Facilities	LS	1	$259,000	$259,000	
				SUBTOTAL:	**$414,567**
2) Site Preparation					
Site Survey and Topography	ACRE	16	$1,000	$16,000	
Clearing and Grubbing	ACRE	6.4	$15,300	$97,920	
Erosion and Sediment Control					
Silt Fence	LF	3,800	$1	$3,800	
				SUBTOTAL:	**$117,720**
3) Soil Excavation, Offsite Disposal and Surface Restoration					
Dewatering Pad	LS	1	$85,000	$85,000	
Excavation of Landfill Material	CY	90,000	$15	$1,350,000	
Soil Management and Staging	LS	1	$50,000	$50,000	
Confirmatory Sampling	LS	1	$150,000	$150,000	
Offsite Disposal - Hazardous	TON	33,750	$150	$5,062,500	
Offsite Disposal - Nonhazardous	TON	101,250	$75	$7,593,750	
Backfill Material	CY	15,000	$12	$180,000	
Topsoil	CY	12,000	$22	$264,000	
Seeding/Mulch	SF	864,000	$0.50	$432,000	
				SUBTOTAL:	**$15,167,250**
4) Groundwater Recovery and Treatment					
Install 8-inch wells	VLF	140	$75	$10,500	
Submersible Well Pump	EA	2	$2,500	$5,000	
Level Transducer	EA	2	$1,000	$2,000	
Air Stripper Equipment	LS	1	$12,000	$12,000	
Air Stripper Enclosure	LS	1	$85,000	$85,000	
Controls and Integration	LS	1	$15,000	$15,000	
Electrical Conduit and Service	LS	1	$25,000	$25,000	
Treatment system discharge piping (8-inch PVC)	LF	250	$45	$11,250	
				SUBTOTAL:	**$165,750**
5) Other Costs					
Winter Shutdown	LS	1	$30,000	$30,000	
Deed Restrictions	LS	1	$20,000	$20,000	
Air monitoring	LS	1	$20,000	$20,000	
Dust Control Plan	LS	1	$5,000	$5,000	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
SPDES Discharge Permit	LS	1	$10,000	$10,000	
Final Site Survey	LS	1	$16,000	$16,000	
				SUBTOTAL:	**$106,000**
			TOTAL DIRECT CAPITAL COST:		**$15,971,287**
Indirect Capital Costs					
Contingency (30% Direct Capital Costs)		1	$4,791,386	$4,791,386	$4,791,386
Engineering (15% of Direct Capitol Costs)		1	$239,569	$239,569	$239,569
Legal Fees (5% Direct Capital Costs)		1	$798,564	$798,564	$798,564
			TOTAL INDIRECT CAPITOL COSTS:		**$5,829,520**
			TOTAL CAPITAL COSTS ROUNDED:		**$21,800,000**
Annual Operation & Maintenance Costs					
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$10,000	$10,000	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Ground Water Monitoring	LS	1	$70,000	$70,000	
SDPES Discharge Monitoring	LS	1	$18,000	$18,000	
Electrical Usage	LS	1	$1,050	$1,050	
Insurance (1% Direct Capital Cost)	LS	1	$218,000	$218,000	
Reserve Fund (1% Direct Capital Cost)	LS	1	$218,000	$218,000	
			SUBTOTAL:	**$539,250**	
			PRESENT WORTH* OF ANNUAL O&M:		**$6,692,000**
			*30 yr, I=7%		
			APPROXIMATE TOTAL PRESENT WORTH COST:		**$28,492,000**

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Town of Carroll Landfill
Carroll, NY

Table 8: Alternative #3
Landfill Cover
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%) (Soil cover)	LS	1	$17,986	$17,986	
Contractor Bond (1%) (Low perm cover)	LS	1	$42,002	$42,002	
Contractor Bond (1%) (Fill consolidation with low perm cover)	LS	1	$29,720	$29,720	
Equipment and Site Facilities	LS	1	$66,000	$66,000	
				SUBTOTAL (soil cover):	**$83,986**
				SUBTOTAL (low-perm cover):	**$108,002**
				SUBTOTAL (Fill consolidation and low-perm cover):	**$95,720**
2) Site Preparation					
Site Survey and Topography	ACRE	16	$1,000	$16,000	
Clearing and Grubbing	ACRE	6.4	$15,300	$97,920	
Swale/Site Fill Material	CY	10,000	$12	$120,000	
Erosion and Sediment Control					
Silt Fence	LF	3,800	$1	$3,800	
				SUBTOTAL:	**$237,720**
3A) Soil Cover					
Topsoil	CY	16,000	$22	$352,000	
Seeding/Mulch	SF	864,000	$0.50	$432,000	
Backfill Soil Material (18-inch depth)	CY	48,000	$12	$576,000	
Perimeter Drainage Stone	CY	320	$6	$1,920	
Toe Drain	LF	1,800	$15	$27,000	
Holding Tank	EA	1	$10,000	$10,000	
3B) Low Permeability Cover (additional components)					
Backfill Soil Material (additional 6-inch depth)	CY	16,000	$12	$192,000	
Tri-Planar Geonet	SF	864,000	$1.40	$1,209,600	
40 mil LLDPE (Impermeable layer)	SF	864,000	$0.75	$648,000	
Soil Bedding Material (6-inch depth)	SF	16,000	$22	$352,000	
3C) Fill Consolidation and Low-Permeability Cover					
Dewatering Pad	LS	1	$85,000	$85,000	
Excavation of Landfill Material (western cell)	CY	60,000	$15	$900,000	
Topsoil	CY	16,000	$22	$352,000	
Seeding/Mulch	SF	864,000	$0.50	$432,000	
Backfill Soil Material (24-inch depth)	CY	17,000	$12	$204,000	
Tri-Planar Geonet	SF	225,000	$1.40	$315,000	
40 mil LLDPE (Impermeable layer)	SF	225,000	$0.75	$168,750	
Soil Bedding Material (6-inch depth)	SF	4,000	$22	$88,000	
Perimeter Drainage Stone	CY	170	$6	$1,020	
Toe Drain	LF	1,100	$15	$16,500	
Holding Tank	EA	1	$10,000	$10,000	
				SUBTOTAL (soil cover):	**$1,398,920**
				SUBTOTAL (low-perm cover):	**$3,800,520**
				SUBTOTAL (Fill consolidation and low-perm cover):	**$2,572,270**
4) Other Costs					
Winter Shutdown	LS	1	$30,000	$30,000	
Deed Restrictions	LS	1	$20,000	$20,000	
Air monitoring	LS	1	$20,000	$20,000	
Dust Control Plan	LS	1	$5,000	$5,000	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
Final Site Survey	LS	1	$16,000	$16,000	
				SUBTOTAL:	**$96,000**
				TOTAL DIRECT CAPITAL COST (SOIL COVER):	**$1,816,626**
				TOTAL DIRECT CAPITAL COST (LOW PERM COVER):	**$4,242,242**
				TOTAL DIRECT CAPITAL COST (FILL CONSOLIDATION WITH LOW PERM COVER):	**$3,001,710**
Indirect Capital Costs					
Soil Cover					
Contingency (30% Direct Capital Costs)		1	$544,988	$544,988	$544,988
Engineering (15% of Direct Capitol Costs)		1	$272,494	$272,494	$272,494
Legal Fees (5% Direct Capital Costs)		1	$90,831	$90,831	$90,831
Low perm cover					
Contingency (30% Direct Capital Costs)		1	$1,272,673	$1,272,673	$1,272,673
Engineering (15% of Direct Capitol Costs)		1	$636,336	$636,336	$636,336
Legal Fees (5% Direct Capital Costs)		1	$212,112	$212,112	$212,112
Soil Cover with Fill consolidation and low perm cover					
Contingency (30% Direct Capital Costs)		1	$900,513	$900,513	$900,513
Engineering (15% of Direct Capitol Costs)		1	$450,256	$450,256	$450,256
Legal Fees (5% Direct Capital Costs)		1	$150,085	$150,085	$150,085
				TOTAL INDIRECT CAPITAL COST (SOIL COVER):	**$908,313**
				TOTAL INDIRECT CAPITAL COST (LOW PERM COVER):	**$2,121,121**
				TOTAL INDIRECT CAPITAL COST (FILL CONSOLIDATION WITH LOW PERM COVER):	**$1,500,855**
				TOTAL CAPITAL COST (SOIL COVER):	**$2,720,000**
				TOTAL CAPITAL COST (LOW PERM COVER):	**$6,360,000**

Town of Carroll Landfill
Carroll, NY

Table 8: Alternative #3
Landfill Cover
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
	TOTAL CAPITAL COST (FILL CONSOLIDATION WITH LOW PERM COVER):				**$4,500,000**

Town of Carroll Landfill
Carroll, NY

Table 8: Alternative #3
Landfill Cover
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST
Annual Operation & Maintenance Costs				
Insurance (1% Direct Capital Cost of Soil cover)	LS	1	$27,200	$27,200
Reserve Fund (1% Direct Capital Cost of Soil cover)	LS	1	$27,200	$27,200
Insurance (1% Direct Capital Cost of Low perm cover)	LS	1	$63,600	$63,600
Reserve Fund (1% Direct Capital Cost of Low perm cover)	LS	1	$63,600	$63,600
Insurance (1% Direct Capital Cost of fill consolidation with low perm cover)	LS	1	$45,000	$45,000
Reserve Fund (1% Direct Capital Cost of fill consolidation with low perm cover)	LS	1	$45,000	$45,000
Site Inspection	DAYS	4	$800	$3,200
Site Maintenance	LS	1	$12,000	$12,000
Off-site Leachate removal and disposal	Gal.	10000	$1.25	$12,500
5 year Review (Annual Cost)	LS	1	$1,000	$1,000
Ground Water Monitoring	LS	1	$70,000	$70,000
			SUBTOTAL (soil cover):	**$153,100**
			SUBTOTAL (low-perm cover):	**$225,900**
			SUBTOTAL (Fill consolidation and low-perm cover):	**$188,700**

APPROX. PRESENT WORTH* OF ANNUAL O&M (SOIL COVER):	**$1,900,000**
APPROX. PRESENT WORTH* OF ANNUAL O&M (LOW PERM COVER):	**$2,803,000**
APPROX. PRESENT WORTH* OF ANNUAL O&M (FILL CONSOLIDATION WITH LOW PERM COVER):	**$2,342,000**
*30 yr, I=7%	

APPROXIMATE TOTAL PRESENT WORTH COST (SOIL COVER):	**$4,620,000**
APPROXIMATE TOTAL PRESENT WORTH COST (LOW PERM COVER):	**$9,163,000**
APPROXIMATE TOTAL PRESENT WORTH COST (FILL CONSOLIDATION WITH LOW PERM COVER):	**$6,842,000**

Town of Carroll Landfill
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Table 9: Alternative #4
Cover with Ground water Extraction/Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%) - Soil cover	LS	1	$20,014	$20,014	
Contractor Bond (1%) - Low-permeability cover	LS	1	$44,030	$44,030	
Contractor Bond (1%) - Fill consolidation with low-perm cover	LS	1	$31,747	$31,747	
Equipment and Site Facilities	LS	1	$58,000	$58,000	
SUBTOTAL (soil cover):					**$78,014**
SUBTOTAL: (low-perm cover):					**$102,030**
SUBTOTAL: (fill consolidation and low-perm cover):					**$89,747**
2) Site Preparation					
Site Survey and Topography	ACRE	16	$1,000	$16,000	
Clearing and Grubbing	ACRE	6.4	$15,300	$97,920	
Swale/Site Fill Material	CY	10,000	$12	$120,000	
Erosion and Sediment Control					
Silt Fence	LF	3,800	$1	$3,800	
SUBTOTAL:					**$237,720**
3) Landfill Cover*					
**See Table 8 (Alternative 3) for detailed estimate of each option*					
SUBTOTAL (soil cover):					**$1,398,920**
SUBTOTAL: (low-perm cover):					**$3,800,520**
SUBTOTAL: (fill consolidation and low-perm cover):					**$2,572,270**
4) Groundwater Recovery and Treatment					
Pre-design study	EA	1	$40,000	$40,000	
Install 8-inch wells	VLF	140	$75	$10,500	
Submersible Well Pump	EA	2	$2,500	$5,000	
Level Transducer	EA	2	$1,000	$2,000	
Air Stripper Equipment	LS	1	$12,000	$12,000	
Air Stripper Enclosure	LS	1	$85,000	$85,000	
Controls and Integration	LS	1	$15,000	$15,000	
Electrical Conduit and Service	LS	1	$25,000	$25,000	
Treatment system discharge piping (8-inch PVC)	LF	250	$45	$11,250	
SUBTOTAL:					**$205,750**
5) Other Costs					
Winter Shutdown	LS	1	$30,000	$30,000	
Deed Restrictions	LS	1	$20,000	$20,000	
Air monitoring	LS	1	$20,000	$20,000	
Dust Control Plan	LS	1	$5,000	$5,000	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
Modification of Drinking Water Permit	LS	1	$5,000	$5,000	
Final Site Survey	LS	1	$16,000	$16,000	
SUBTOTAL:					**$101,000**
TOTAL DIRECT CAPITOL COSTS (soil cover):					**$2,021,404**
TOTAL DIRECT CAPITOL COSTS (low-perm cover):					**$4,447,020**
TOTAL DIRECT CAPITOL COSTS (fill consolidation and low-perm cover):					**$3,206,487**
Indirect Capital Costs					
Soil Cover					
Contingency (30% Direct Capital Costs)		1	$606,421	$606,421	$606,421
Engineering (15% of Direct Capitol Costs)		1	$303,211	$303,211	$303,211
Legal Fees (5% Direct Capital Costs)		1	$101,070	$101,070	$101,070
Low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$1,334,106	$1,334,106	$1,334,106
Engineering (15% of Direct Capitol Costs)		1	$667,053	$667,053	$667,053
Legal Fees (5% Direct Capital Costs)		1	$222,351	$222,351	$222,351
Fill consolidation and low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$961,946	$961,946	$961,946
Engineering (15% of Direct Capitol Costs)		1	$480,973	$480,973	$480,973
Legal Fees (5% Direct Capital Costs)		1	$160,324	$160,324	$160,324
TOTAL INDIRECT CAPITOL COSTS (soil cover):					**$1,010,702**
TOTAL INDIRECT CAPITOL COSTS low-perm cover):					**$2,223,510**
TOTAL INDIRECT CAPITOL COSTS (fill consolidation and low-perm cover):					**$1,603,244**
TOTAL CAPITOL COSTS (soil cover):					**$3,032,000**
TOTAL CAPITOL COSTS (low-perm cover):					**$6,671,000**
TOTAL CAPITOL COSTS (fill consolidation and low-perm cover):					**$4,810,000**

Town of Carroll Landfill
Carroll, NY

Table 9: Alternative #4
Cover with Ground water Extraction/Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Annual Operation & Maintenance Costs					
Insurance (1% Direct Capital Cost of Soil Cover)	LS	1	$30,320	$30,320	
Reserve Fund (1% Direct Capital Cost of Soil Cover)	LS	1	$30,320	$30,320	
Insurance (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$66,710	$66,710	
Reserve Fund (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$66,710	$66,710	
Insurance (1% Direct Capital Cost of Fill Consolidation and Low-Perm Cover)	LS	1	$48,100	$48,100	
Reserve Fund (1% Direct Capital Cost of Fill Consol. and Low-Perm Cover)	LS	1	$48,100	$48,100	
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$12,000	$12,000	
Off-site Leachate removal and disposal	Gal.	10000	$1.25	$12,500	
SPDES Discharge Monitoring	LS	1	$18,000	$18,000	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Electrical Usage	LS	1	$1,050	$1,050	
Ground Water Monitoring	LS	1	$70,000	$70,000	
			SUBTOTAL ANNUAL O&M (soil cover):	**$178,390**	
			SUBTOTAL ANNUAL O&M (low-perm cover):	**$251,170**	
			SUBTOTAL ANNUAL O&M (fill consolidation and low-perm cover):	**$213,950**	
			APPROX. PRESENT WORTH* OF ANNUAL O&M (soil cover):		**$2,214,000**
			APPROX. PRESENT WORTH* OF ANNUAL O&M (low-perm cover):		**$3,117,000**
			APPROX. PRESENT WORTH* OF ANNUAL O&M (fill consolidation and low-perm cover):		**$2,655,000**
				*30 yr, I=7%	
			APPROXIMATE TOTAL PRESENT WORTH COST (soil cover):		**$5,246,000**
			APPROXIMATE TOTAL PRESENT WORTH COST (low-perm cover):		**$9,788,000**
			APPROXIMATE TOTAL PRESENT WORTH COST (fill consolidation and low perm cover):		**$7,465,000**

Town of Carroll Landfill
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Table 10: Alternative #5
Cover with *In Situ* Enhanced Attenuation
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%) - Soil cover	LS	1	$25,379	$25,379	
Contractor Bond (1%) - Low-permeability cover	LS	1	$49,395	$49,395	
Contractor Bond (1%) - Fill consolidation with low-perm cover	LS	1	$37,113	$37,113	
Equipment and Site Facilities	LS	1	$58,000	$58,000	
				SUBTOTAL (soil cover):	**$83,379**
				SUBTOTAL: (low-perm cover):	**$107,395**
				SUBTOTAL: (fill consolidation and low-perm cover):	**$95,113**
2) Site Preparation					
Site Survey and Topography	ACRE	16	$1,000	$16,000	
Clearing and Grubbing	ACRE	6.4	$15,300	$97,920	
Swale/Site Fill Material	CY	10,000	$12	$120,000	
Erosion and Sediment Control					
Silt Fence	LF	3,800	$1	$3,800	
				SUBTOTAL:	**$237,720**
3) Landfill Cover*					
**See Table 8 (Alternative 3) for detailed estimate of each option*					
				SUBTOTAL (soil cover):	**$1,398,920**
				SUBTOTAL: (low-perm cover):	**$3,800,520**
				SUBTOTAL: (fill consolidation and low-perm cover):	**$2,572,270**
4) In Situ groundwater treatment - Biobarrier					
Predesign Investigation	LS	1	$32,400	$32,400	
Injection Wells (7 wells)	VLF	525	$75	$39,400	
Initial injection	LS	1	$99,600	$99,600	
Regular injection round (1 per mo.)	LS	11	$49,800	$547,800	
Ground water sampling (for injection confirmation)	LS	11	$2,100	$23,100	
				SUBTOTAL:	**$742,300**
5) Other Costs					
Winter Shutdown	LS	1	$30,000	$30,000	
Deed Restrictions	LS	1	$20,000	$20,000	
Air monitoring	LS	1	$20,000	$20,000	
Dust Control Plan	LS	1	$5,000	$5,000	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
Modification of Drinking Water Permit	LS	1	$5,000	$5,000	
Final Site Survey	LS	1	$16,000	$16,000	
				SUBTOTAL:	**$101,000**
				TOTAL DIRECT CAPITOL COSTS (soil cover):	**$2,563,319**
				TOTAL DIRECT CAPITOL COSTS (low-perm cover):	**$4,988,935**
				TOTAL DIRECT CAPITOL COSTS (fill consolidation and low-perm cover):	**$3,748,403**
Indirect Capital Costs					
Soil Cover					
Contingency (30% Direct Capital Costs)		1	$768,996	$768,996	$768,996
Engineering (15% of Direct Capitol Costs)		1	$384,498	$384,498	$384,498
Legal Fees (5% Direct Capital Costs)		1	$128,166	$128,166	$128,166
Low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$1,496,681	$1,496,681	$1,496,681
Engineering (15% of Direct Capitol Costs)		1	$748,340	$748,340	$748,340
Legal Fees (5% Direct Capital Costs)		1	$249,447	$249,447	$249,447
Fill consolidation and low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$1,124,521	$1,124,521	$1,124,521
Engineering (15% of Direct Capitol Costs)		1	$562,260	$562,260	$562,260
Legal Fees (5% Direct Capital Costs)		1	$187,420	$187,420	$187,420
				TOTAL INDIRECT CAPITOL COSTS (soil cover):	**$1,281,660**
				TOTAL INDIRECT CAPITOL COSTS low-perm cover):	**$2,494,468**
				TOTAL INDIRECT CAPITOL COSTS (fill consolidation and low-perm cover):	**$1,874,201**
				TOTAL CAPITOL COSTS (soil cover):	**$3,845,000**
				TOTAL CAPITOL COSTS low-perm cover):	**$7,483,000**
				TOTAL CAPITOL COSTS (fill consolidation and low-perm cover):	**$5,623,000**

Town of Carroll Landfill
Carroll, NY

Table 10: Alternative #5
Cover with *In Situ* Enhanced Attenuation
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Annual Operation & Maintenance Costs					
Insurance (1% Direct Capital Cost of Soil Cover)	LS	1	$38,450	$38,450	
Reserve Fund (1% Direct Capital Cost of Soil Cover)	LS	1	$38,450	$38,450	
Insurance (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$74,830	$74,830	
Reserve Fund (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$74,830	$74,830	
Insurance (1% Direct Capital Cost of Fill Consolidation and Low-Perm Cover)	LS	1	$56,230	$56,230	
Reserve Fund (1% Direct Capital Cost of Fill Consol. and Low-Perm Cover)	LS	1	$56,230	$56,230	
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$12,000	$12,000	
Off-site Leachate removal and disposal	Gal.	10000	$1.25	$12,500	
Regular injection round (1 per mo.)	LS	12	$49,800	$597,600	
Ground water sampling (for injection confirmation)	LS	12	$2,100	$25,200	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Electrical Usage	LS	1	$1,280	$1,280	
Ground Water Monitoring	LS	1	$70,000	$70,000	
SUBTOTAL ANNUAL O&M (soil cover):				**$799,680**	
SUBTOTAL ANNUAL O&M (low-perm cover):				**$872,440**	
SUBTOTAL ANNUAL O&M (fill consolidation and low-perm cover):				**$835,240**	
APPROX. PRESENT WORTH* OF ANNUAL O&M (soil cover):					**$9,923,000**
APPROX. PRESENT WORTH* OF ANNUAL O&M (low-perm cover):					**$10,826,000**
APPROX. PRESENT WORTH* OF ANNUAL O&M (fill consolidation and low-perm cover):					**$10,365,000**
*30 yr, I=7%					
APPROXIMATE TOTAL PRESENT WORTH COST (soil cover):					**$13,768,000**
APPROXIMATE TOTAL PRESENT WORTH COST (low-perm cover):					**$18,309,000**
APPROXIMATE TOTAL PRESENT WORTH COST (fill consolidation and low perm cover):					**$15,988,000**

Town of Carroll Landfill
Carroll, NY

Table 11: Alternative #6
Cover with *In Situ* Ground water Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%) - Soil cover	LS	1	$39,760	$39,760	
Contractor Bond (1%) - Low-permeability cover	LS	1	$63,776	$63,776	
Contractor Bond (1%) - Fill consolidation with low-perm cover	LS	1	$51,494	$51,494	
Equipment and Site Facilities	LS	1	$58,000	$58,000	
				SUBTOTAL (soil cover):	**$97,760**
				SUBTOTAL: (low-perm cover):	**$121,776**
				SUBTOTAL: (fill consolidation and low-perm cover):	**$109,494**
2) Site Preparation					
Site Survey and Topography	ACRE	16	$1,000	$16,000	
Clearing and Grubbing	ACRE	6.4	$15,300	$97,920	
Swale/Site Fill Material	CY	10,000	$12	$120,000	
Erosion and Sediment Control					
Silt Fence	LF	3,800	$1	$3,800	
				SUBTOTAL:	**$237,720**
3) Landfill Cover*					
**See Table 8 (Alternative 3) for detailed estimate of each option*					
				SUBTOTAL (soil cover):	**$1,398,920**
				SUBTOTAL: (low-perm cover):	**$3,800,520**
				SUBTOTAL: (fill consolidation and low-perm cover):	**$2,572,270**
4) In Situ groundwater treatment - iron wall					
Pre-design Study	LS	1	$28,400	$28,400	
Bench Scale Testing	LS	1	$15,000	$15,000	
Zero Valent Iron (including delivery)	LS	1	$683,000	$683,000	
Installation (by slurry wall construction technique)	LS	1	$1,454,000	$1,454,000	
				SUBTOTAL:	**$2,180,400**
5) Other Costs					
Predesign Investigation	LS	1	$28,390	$28,390	
Winter Shutdown	LS	1	$30,000	$30,000	
Deed Restrictions	LS	1	$20,000	$20,000	
Air monitoring	LS	1	$20,000	$20,000	
Dust Control Plan	LS	1	$5,000	$5,000	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
Modification of Drinking Water Permit	LS	1	$5,000	$5,000	
Final Site Survey	LS	1	$16,000	$16,000	
				SUBTOTAL:	**$101,000**
				TOTAL DIRECT CAPITOL COSTS (soil cover):	**$4,015,800**
				TOTAL DIRECT CAPITOL COSTS (low-perm cover):	**$6,441,416**
				TOTAL DIRECT CAPITOL COSTS (fill consolidation and low-perm cover):	**$5,200,884**
Indirect Capital Costs					
Soil Cover					
Contingency (30% Direct Capital Costs)		1	$1,204,740	$1,204,740	$1,204,740
Engineering (15% of Direct Capitol Costs)		1	$602,370	$602,370	$602,370
Legal Fees (5% Direct Capital Costs)		1	$200,790	$200,790	$200,790
Low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$1,932,425	$1,932,425	$1,932,425
Engineering (15% of Direct Capitol Costs)		1	$966,212	$966,212	$966,212
Legal Fees (5% Direct Capital Costs)		1	$322,071	$322,071	$322,071
Fill consolidation and low-permeability cover					
Contingency (30% Direct Capital Costs)		1	$1,560,265	$1,560,265	$1,560,265
Engineering (15% of Direct Capitol Costs)		1	$780,133	$780,133	$780,133
Legal Fees (5% Direct Capital Costs)		1	$260,044	$260,044	$260,044
				TOTAL INDIRECT CAPITOL COSTS (soil cover):	**$2,007,900**
				TOTAL INDIRECT CAPITOL COSTS low-perm cover):	**$3,220,708**
				TOTAL INDIRECT CAPITOL COSTS (fill consolidation and low-perm cover):	**$2,600,442**
				TOTAL CAPITOL COSTS (soil cover):	**$6,024,000**
				TOTAL CAPITOL COSTS low-perm cover):	**$9,662,000**
				TOTAL CAPITOL COSTS (fill consolidation and low-perm cover):	**$7,801,000**

Town of Carroll Landfill
Carroll, NY

Table 11: Alternative #6
Cover with *In Situ* Ground water Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Annual Operation & Maintenance Costs					
Insurance (1% Direct Capital Cost of Soil Cover)	LS	1	$60,240	$60,240	
Reserve Fund (1% Direct Capital Cost of Soil Cover)	LS	1	$60,240	$60,240	
Insurance (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$96,620	$96,620	
Reserve Fund (1% Direct Capital Cost of Low-Perm Cover)	LS	1	$96,620	$96,620	
Insurance (1% Direct Capital Cost of Fill Consolidation and Low-Perm Cover)	LS	1	$78,010	$78,010	
Reserve Fund (1% Direct Capital Cost of Fill Consol. and Low-Perm Cover)	LS	1	$78,010	$78,010	
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$12,000	$12,000	
Off-site Leachate removal and disposal	Gal.	10000	$1.25	$12,500	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Electrical Usage	LS	1	$1,280	$1,280	
Ground Water Monitoring	LS	1	$70,000	$70,000	
			SUBTOTAL ANNUAL O&M (soil cover):	**$220,460**	
			SUBTOTAL ANNUAL O&M (low-perm cover):	**$293,220**	
			SUBTOTAL ANNUAL O&M (fill consolidation and low-perm cover):	**$256,000**	
				APPROX. PRESENT WORTH* OF ANNUAL O&M (soil cover):	**$2,736,000**
				APPROX. PRESENT WORTH* OF ANNUAL O&M (low-perm cover):	**$3,639,000**
				APPROX. PRESENT WORTH* OF ANNUAL O&M (fill consolidation and low-perm cover):	**$3,177,000**
				*30 yr, I=7%	
Reinstallation of Iron Wall Costs					
Zero Valent Iron (including delivery)	LS	1	$683,000	$683,000	
Installation (by slurry wall construction technique)	LS	1	$1,454,000	$1,454,000	
			SUBTOTAL (iron wall reinstallation):	**$2,137,000**	
				APPROX. PRESENT WORTH* OF REINSTALLATION:	**$19,464,000**
				15 yr, I=7%	
				APPROXIMATE TOTAL PRESENT WORTH COST (soil cover):	**$28,224,000**
				APPROXIMATE TOTAL PRESENT WORTH COST (low-perm cover):	**$32,765,000**
				APPROXIMATE TOTAL PRESENT WORTH COST (fill consolidation and low perm cover):	**$30,442,000**

Town of Carroll Landfill
Carroll, NY

Table 12: Alternative #7
Wellhead Ground water Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond (1%)	LS	1	$1,890	$1,890	
Equipment and Site Facilities	LS	1	$5,000	$5,000	
				SUBTOTAL:	**$6,890**
2) Wellhead Air Stripping					
Air Stripper with carbon polishing	LS	1	$49,000	$49,000	
Air Stripper Enclosure	LS	1	$85,000	$85,000	
Miscellaneous Piping Modifications	LS	1	$5,000	$5,000	
Controls, Integration and Electrical Modifications	LS	1	$20,000	$20,000	
				SUBTOTAL:	**$159,000**
3) Other Costs					
Air monitoring	LS	1	$20,000	$20,000	
Modification of Drinking Water Permit	LS	1	$5,000	$5,000	
				SUBTOTAL:	**$25,000**
				TOTAL DIRECT CAPITAL COST:	**$190,890**
Indirect Capital Costs					
Air Stripper					
Contingency (30% Direct Capital Costs)		1	$57,267	$57,267	$57,267
Engineering (15% of Direct Capitol Costs)		1	$28,634	$28,634	$28,634
Legal Fees (5% Direct Capital Costs)		1	$9,545	$9,545	$9,545
				TOTAL INDIRECT CAPITOL COSTS:	**$95,445**
				TOTAL CAPITAL COST:	**$290,000**
Annual Operation & Maintenance Costs					
Insurance (1% Direct Capital Cost of Soil Cover)	LS	1	$2,900	$2,900	
Reserve Fund (1% Direct Capital Cost of Soil Cover)	LS	1	$2,900	$2,900	
Site Inspection	DAYS	4	$800	$3,200	
Site Maintenance	LS	1	$3,000	$3,000	
5 year Review (Annual Cost)	LS	1	$1,000	$1,000	
Electrical Usage	LS	1	$1,280	$1,280	
			SUBTOTAL ANNUAL O&M:	**$14,280**	
				APPROX. PRESENT WORTH* OF ANNUAL O&M (SOIL COVER): *30 yr, I=7%	**$177,000**
				APPROXIMATE TOTAL PRESENT WORTH COST:	**$467,000**

Town of Carroll Landfill
Carroll, NY

Table 13: Assumptions and Calculations

DIMENSIONS

Area (* As scaled from Site Plan Feb. 2005)	Dimensions (approx)	Area (sf) (approx)	Area (ac.) (approx)	Average Depth (approx)	Volume (cf) (approx)	Volume (cy) (approx)
Western Cell	900 x 450	405,000	9.3	4	1,620,000	60,000
Eastern Cell	750 x 300	225,000	5.2	4	900,000	33,333
Total of Both Cells:		630,000	14		2,500,000	90,000
Saturated Waste if GW at 3-feet:				*2*	1,300,000	50,000
Assume 25% Hazardous Waste:	**22500 cy**		**33750 TON**			
Assume 75% Non-Haz Waste:	**67500 cy**		**101250 TON**			
Combined Cells	960' x 900'	864,000	19.8			
Swale Only (estimate)	70' x 900'	63,000	1.4	4	252,000	10,000

GLOBAL COST ESTIMATES

Item	Cost	Unit
Site Survey and Topography	$1,000	acre
Clearing and Grubbing	$5,000	acre
Excavation	$15	CY
Offsite Disposal - Hazardous	$150	TON
Offsite Disposal - Nonhazardous	$75	TON
Backfill Material	$12	CY
Topsoil	$22	CY
Seeding/Mulch	$0.50	SF
Mirafi 140N Indicator Layer	$0.08	SF
Silt Fence	$1.00	LF
Soil Management and Staging	$50,000	LS
40 mil LLDPE (Impermeable layer)	$0.75	SF
Tri-Planar Geonet	$1.40	SF
Barrier Protection Material	$12	CY
Soil Bedding Layer	$22	CY
Crushed Stone	$6.00	CY
Leachate Disposal and Treatment	$1.25	Gal.

ASSUMPTIONS

1. Site is approximately 40% heavily vegetated requiring clearing and grubbing.
2. Waste material to be removed averages 4-foot deep over both cells.
3. Wastes are generally covered by 1-foot of clean material.
4. A weight to volume ratio of 1.5 has been applied to all excavated material disposed of off-site.
5. Excavated waste will be predominantly municipal in nature and non-hazardous; assume only 25% of all waste excavated disposed of as haz. material.
6. Assume installed topsoil depth to be 6-inches
7. Assume depth to GW at uniformly worst case: 3-feet.
8. No GW monitoring wells will be installed; existing wells assumed to provide adequate monitoring points.
9. Assume 250 LF of discharge piping will be required between Air Stripping equipment and the point of discharge.
10. Final Grade for Alt. 2 is assumed to generally be that of the surrounding swale elevations. An allowance of 15,000 cy of clean fill is assumed to reach final grade.
11. A site inspection will be performed during quarterly groundwater monitoring site visits.
12. "Site Maintenance" for Alt. 3A and 4 includes an allowance for pumping and disposal of holding tank of leachate collected from shallow soils.
13. Leachate collected in holding tank (Alt. 3A and 4) will be minimal following installation of cover. An allowance of 10,000 gal/ yr has been assumed.

CALCULATED ESTIMATES

Confirmatory Sampling

Alternative	Volume Removed (cf)	No. of Samples	Cost of Sampling
Alt 2	2,500,000	500	$150,000

Assume
1 sample / 5000 cf of excavated material
Analysis to be VOC and SVOC by OLM04.2 on Soil
$300 per sample.

Town of Carroll Landfill
Carroll, NY

Table 13: Assumptions and Calculations

CALCULATED ESTIMATES (continued)

Dewatering Pad

F&I Components	Cost	Unit	Area of pad (sf)	Extended Total
40 mil LLDPE	$0.75	sf		
Tri-Planar Geonet	$1.40	sf		
12" Crushed Stone	$0.65	cf		
Mirafi Layer	$0.15	sf		
Subtotal:	$2.95	sf	22500	$66,375.00
6-Inch Pump	$1,500.00	ea		$1,500.00
Maintenance Contingency (25%):				$16,968.75
Pad Total:				**$85,000**

Groundwater Monitoring / **SPDES Discharge Monitoring**

Assume one sample analyzed for VOC/SVOC/Inorg.

	Groundwater Monitoring		SPDES Discharge Monitoring	
No. Sampling Events per year:	4		12	
No. Wells Sampled per event:	18		1	Assume outfall only sampled
No. Samples per well	1		1	
Annual No. Samples Taken:	72	annually	12	per event
Labor Hours per sampling event:	16	per event	8	per event
Total Sampling hours per year:	64	annually	96	annually
No. Analite types per sample	3		3	
Cost per Analysis	$300		$300	
Labor Rate:	$80	per hour	$80	per hour
Annual Analysis Cost:	$64,800	annually	$10,800	annually
Annual Labor Cost:	$5,120	annually	$7,680	annually
Total Annual GW Monitoring Cost: / Tot. Annual SPDES cost:	**$70,000**	(rounded)	**$18,000**	(rounded)

Site Fill, Restoration and Low Perm Layers

Alternative	Backfill (cy)	Topsoil (cy)	Seeding/mulch (sf)	Backfill Soil Mat.(cy)	Backfill Soil Mat.(cy)	Soil Bedding (cy)
	D = Varies	D = 0.5 ft		D = 18in	D = 6in	D = 0.5 ft
Alt. 2	15,000	12,000	0			
Low permeability cover (both cells)	10,000	16,000	864,000	48,000	16,000	16,000
	Tri-Planar Geonet=	864,000	40 mil LLDPE (Impermeable layer)=		864,000	
Low permeability cover (consolidation)	17,000	16,000	864,000			4,000
	Tri-Planar Geonet=	225,000	40 mil LLDPE (Impermeable layer)=		225,000	

Perimeter Drainage Stone

Assume stone "wedge" at edge of cover. 18-inches deep at edge of cover, 3-foot wide to end of stone.
- (1.5' x 3' x 1') / 2 = CF stone per LF of perimeter length = 2.25 CF

(960LF + 900LF)*2 = 3,800LF (approx) x 2.25 CF/LF =	8600 CF (approx)	320 CY (approx)	Alt 3A/B
(750LF + 300LF)*2 = 2100 LF (approx) x 2.25 CF/LF=	4700 CF (approx)	170 CY (approx)	Alt 3C

Toe Drain

Assume toe drain to be 5' deep by 3' wide with 6-inch CPP integral.

- (5' x 3' x 1') = 15 CF stone per LF of perimeter length	$6 / CY x (15 CF / 27)=	$3
- 6-inch CPP	$12 / LF	$12
		$15 / LF

Power Usage (Assume 80% efficiency to pumps/blowers; Assume cost / kWh = $0.065)

	Effective HP	kW equivalent	Operating Hours / YR	Annual KWH	Annual Cost	(rounded)
Alt 2/4 (2 HP) GW Extraction Pump	1.6	1.1936	8760	10456	$680	$700
Alt 2/4 (1 HP) Blower	0.8	0.5968	8760	5228	$340	$350
Alt 7 (7.5 HP) Blower	6	4.476	4380	19605	$1,274	$1,280

Air Stripper

	Pump Rate	Cost	Discharge	Carbon polishing	Total
Alt 2/4	4 gpm	$12,000	by gravity		
Alt 7	200 gpm	$37,000	to water system	$12,000	$49,000

Notes

Costs per quote from North East Environmental Products, Inc.; 5-05

Vendor quote does not indicate a need for pretreatment based on an initial screening of groundwater constituents.

Each alternative includes cost of the basic system with controls, alarms and enclosure. Alt. 7 includes the cost of a discharge pump to match water system pressures.

Town of Carroll Landfill
Carroll, NY

Table 13: Assumptions and Calculations

General In Situ treatment assumptions

In Situ treatment "zone" has been assumed to extend the full depth of the aquifer (to approx. 75-ft below grade); Assumed 500-ft wide.
A predesign study will be required for any in situ treatment technology to further assess plume extents and chemistry.

Predesign Ground Water Study

	No. wells	Depth	Cost / VLF	Cost per well	Total cost
Installation of monitoring wells (2-in OD)	10	75	$25	$1,875	$18,750
	Samples per well	Analysis Cost/samp	Labor hours	Labor Rate	
Sampling/Analysis for VOCs	3	$300	8	$80	$9,640
Bench-scale microbiological assay	$4,000	(addnl cost for biobarrier technology only)			

Total Predesign Cost

Alt 6 (Iron Wall).	$28,390
Alt 5 (biobarrier).	$32,390

In Situ Bio Barrier Assumptions

7 injection wells (on 25-foot centers) D=75 foot Assume $75 / LF installation costs
Assume one round of injections per month for a period of 15 years
Sampling: assume 7 GW samples for VOCs collected monthly. (7 * $300 per analysis = $2,100)
Assumed that bench scale treatability results indicate that the proposed technology is applicable for the site conditions/constituents.

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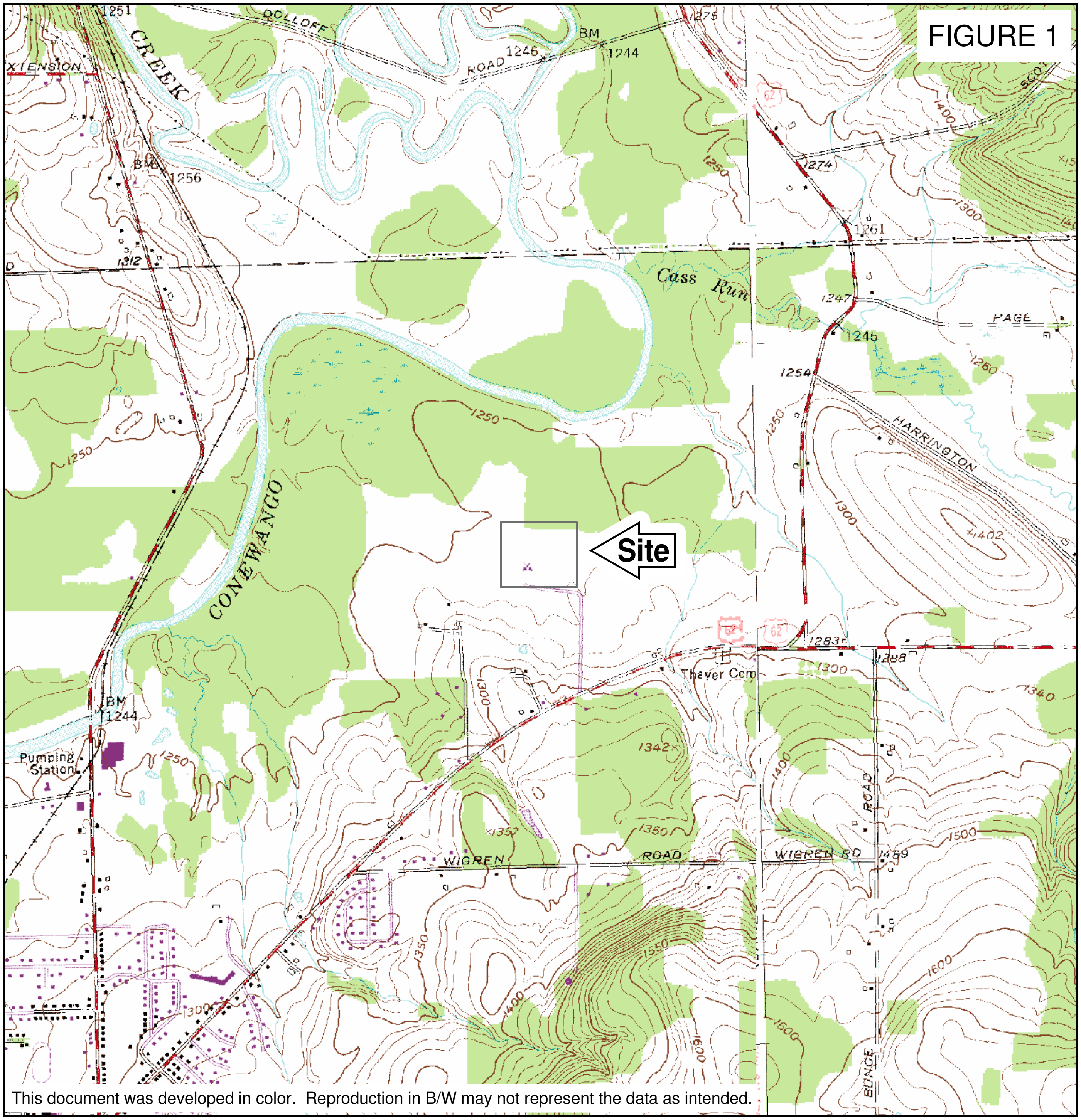

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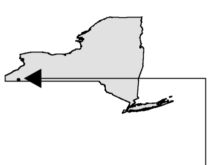
PLOT DATE: 03/03/05 DIV. 84 JPS

ADAPTED FROM: IVORY AND JAMESTOWN, NEW YORK USGS QUADRANGLES.



QUADRANGLE LOCATION

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

10653.34241
MARCH 2005

1:24,000

O'BRIEN & GERE ENGINEERS, INC.

Dec 14, 2005 - 2:56pm

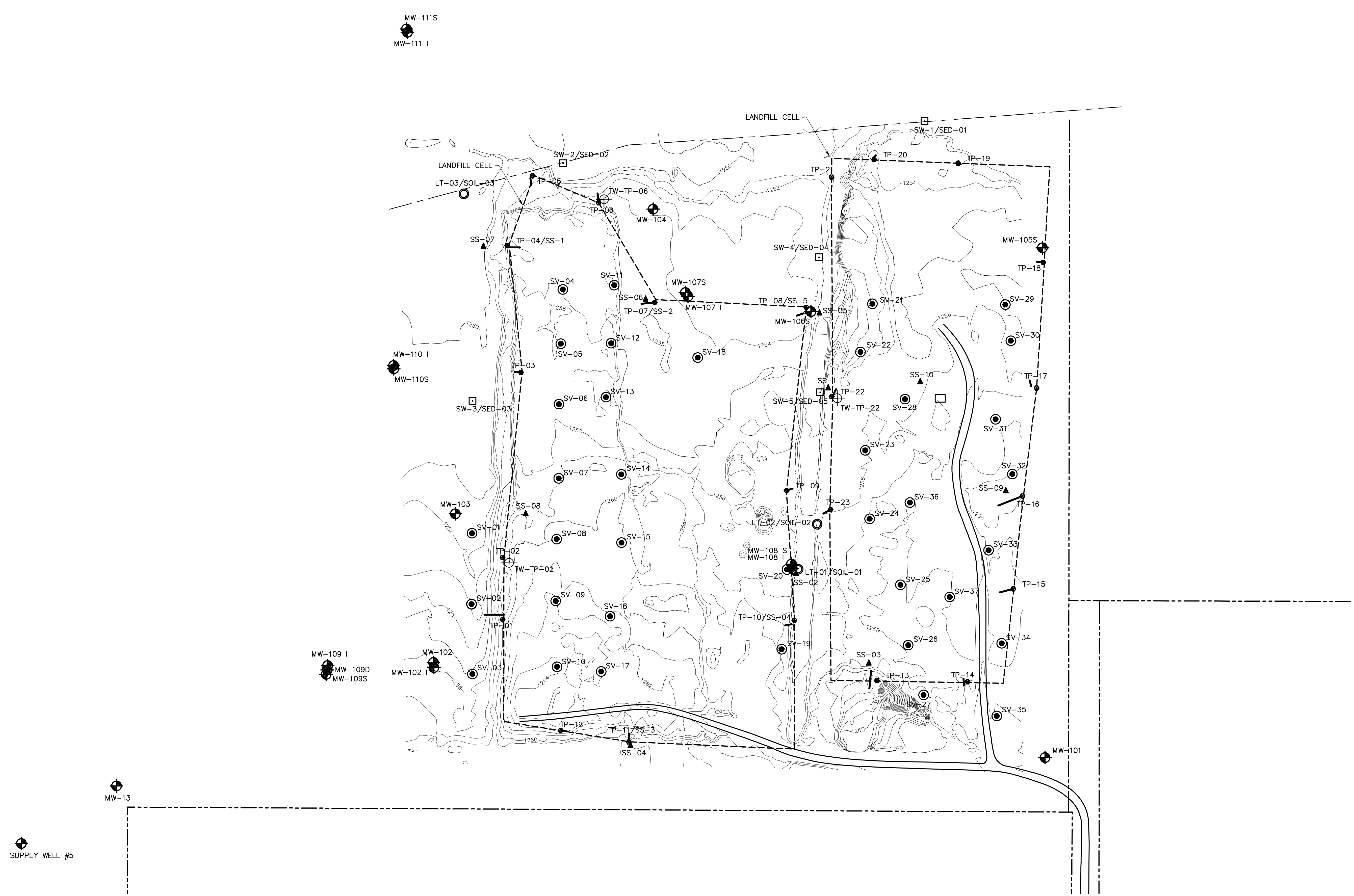


FIGURE 2

LEGEND

PROPERTY LINE
EDGE OF CREEK
ACCESS ROAD
SV-30 SOIL VAPOR LOCATIONS
SW-1/SED-01 SURFACE WATER AND SEDIMENT LOCATIONS
SS-07 SURFACE SOIL LOCATIONS
LT-01 LEACHATE SEEP LOCATIONS
TP-18 TEST PIT LOCATIONS
MW-105S MONITORING WELL LOCATIONS
TW-TP-02 TEMPORARY WELL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SITE MAP

0 80 160
SCALE IN FEET

FILE NO.10653.34241.027
MAY 2005

O'BRIEN & GERE ENGINEERS, INC.

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Appendix A
Estimated Remedial Timeframes for Ground Water
Town of Carroll Landfill Site
Feasibility Study

A two-dimensional ground water flow model (WinTran by Environmental Simulations, Inc.) was used to evaluate ground water travel times based on estimated aquifer parameters obtained during the Remedial Investigation. The flow modeling was restricted to the intermediate/deep aquifer. The shallow water-bearing formation was not modeled due to the low hydraulic conductivity and resulting slow ground water velocity within this formation (~2.5 ft/year) and limited impacts at the landfill.

The travel times for an *in-situ* treatment wall remedial scenario (Alternatives 5 and 6), a ground water extraction remedial scenario (Alternatives 2 and 4), and a waste consolidation and capping remedial scenario were evaluated using the ground water flow model. The locations of the different treatment components for these remedies are shown on Figure A1. A key assumption in this evaluation is that the source of ground water contaminants has been effectively controlled such that continued contaminant loading to ground water does not occur. Also, this evaluation estimates remedial timeframes based on March 2005 ground water flow conditions and pumping from the Frewsburg Water District Supply Well # 5. If the supply well is shutdown or pumping rates significantly altered, ground water flow directions and velocities may change the remedial timeframes presented herein.

Aquifer parameter inputs to the ground water flow model for the intermediate/deep aquifer were as follows:

- hydraulic conductivity — 9.7 feet per day (based on site-specific hydraulic conductivity testing and testing within the flow model)
- aquifer thickness — 60 feet (based on site-specific monitoring well installations)
- hydraulic gradient — 0.002 feet per foot (based on ground water elevations across the southern portion of the western landfill cell during March 2005)
- aquifer porosity — 0.25 (estimate based on mixed sand and gravel (Fetter, 1980))

The travel time results from the model are representative of advective ground water flow. The ground water modeling provided the following travel times for the two remedial scenarios:

	Estimated Travel Time of Ground Water (Years)	
Remedial Scenario	**Upgradient of Remedy**	**Downgradient of Remedy**
In-situ treatment wall (Alt. 5 & 6)	25	25
Ground water extraction (Alt. 2 & 4)	25	20
Consolidation/Capping	---	45

Note: The ground water extraction scenario included one extraction well pumping at a rate of 10 gallons per minute

To better represent contaminant travel time, a retardation factor should be applied. For the purposes of this evaluation, sorption was assumed to be the primary process influencing retardation of contaminant transport. The retardation factor is dependent on the amount of organic carbon present in an aquifer. In addition to the amount of organic carbon present in an aquifer, contaminant retardation is also dependent on the specific contaminant. Some organic contaminants sorb more readily than others depending on their chemical structure.

For the purposes of estimating contaminant travel time, vinyl chloride was selected as the contaminant of concern as it was detected at the highest concentration within site ground water, and also detected in the sentinel well (MW-13) near the Town of Carroll Supply Well #5. Retardation factors for vinyl chloride have been calculated to range from 1 to 1.6 depending on the fraction of organic carbon present in an aquifer (0.0001 to 0.1) and assuming a porosity and bulk soil density of 0.35 and 1.72, respectively

(Wiedemeier, 1999). If the retardation factor for vinyl chloride is estimated to be 1, then the travel time for vinyl chloride is equal to advective ground water flow and would equal the travel times provided in the table above. If the retardation factor of vinyl chloride is estimated to be 1.6, then the travel time of vinyl chloride is 1.6 times slower than the advective ground water flow and the values presented in the table above would be multiplied by 1.6. Using the retardation factor for vinyl chloride of 1.6, the following travel times are estimated:

	Estimated Travel Time of Vinyl Chloride (Years)	
Remedial Scenario	**Upgradient of Remedy**	**Downgradient of Remedy**
In-situ treatment wall (Alt. 5 & 6)	40	40
Ground water extraction (Alt. 2 & 4)	40	32
Consolidation/Capping	---	72

REFERENCES

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Wiedemeier, T.H., 1999. Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface. John Wiley & Sons, Inc. ISBN 0-471-19749-1.

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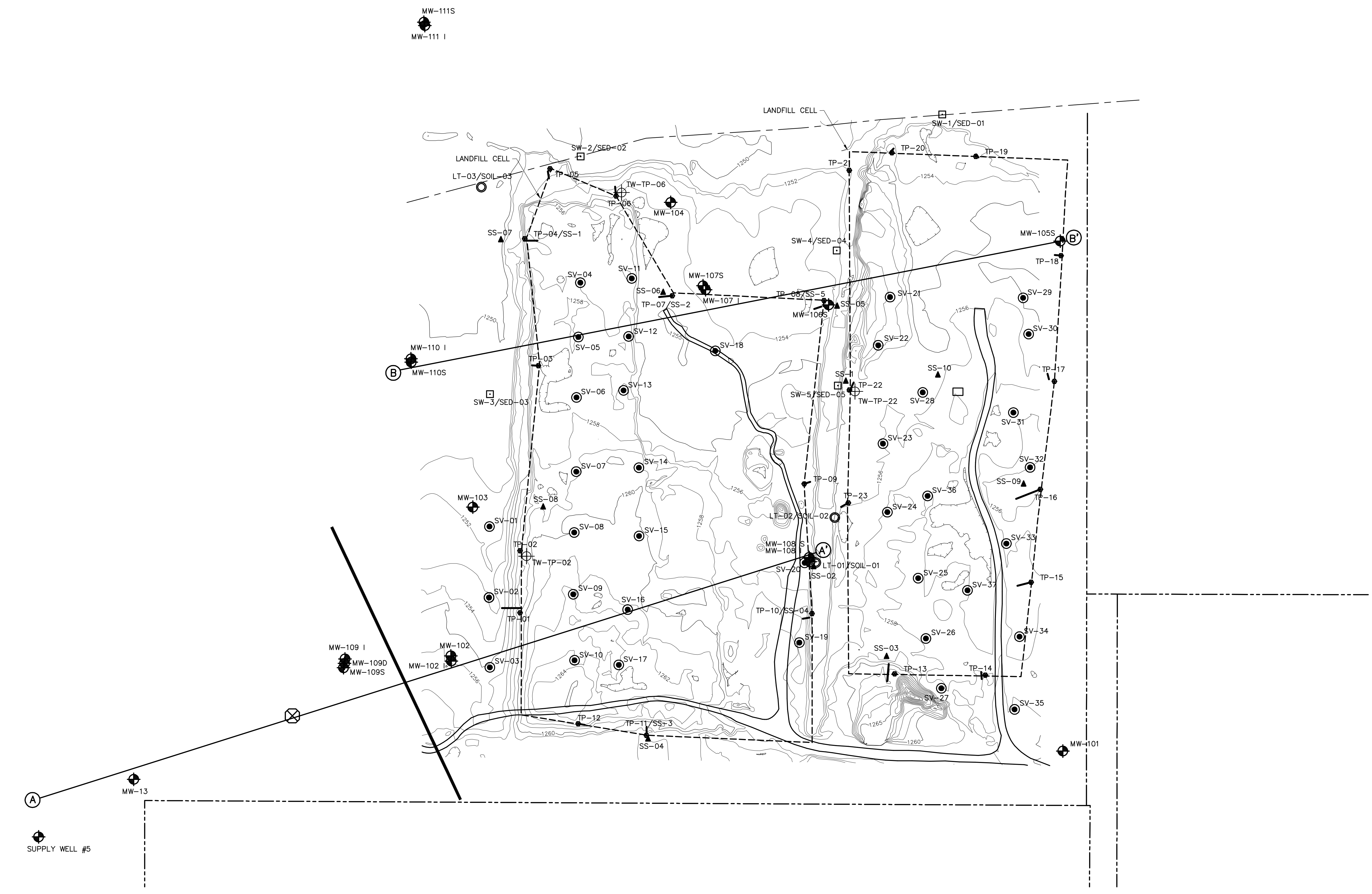

FIGURE A1

LEGEND

- PROPERTY LINE
- EDGE OF CREEK
- ACCESS ROAD
- SV-30 SOIL VAPOR LOCATIONS
- SW-1/SED-01 SURFACE WATER AND SEDIMENT LOCATIONS
- SS-07 SURFACE SOIL LOCATIONS
- LT-01 LEACHATE SEEP LOCATIONS
- TP-18 TEST PIT LOCATIONS
- MW-105S MONITORING WELL LOCATIONS
- A CROSS SECTION LINES
- TW-TP-02 TEMPORARY WELL
- SIMULATED EXTRACTION WELL
- IN-SITU TREATMENT WALL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

0 80 160
SCALE IN FEET

LOCATION OF POTENTIAL REMEDIES

FILE NO.10653.34241.029
DECEMBER 2005

O'BRIEN & GERE ENGINEERS, INC.

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