DRA

OB-3030 D3715

PHASE I REMEDIAL INVESTIGATION REPORT
WELLSVILLE-ANDOVER LANDFILL SITE
TOWNS OF WELLSVILLE AND ANDOVER
ALLEGANY COUNTY, NEW YORK
SITE NUMBER 9-02-004

March 1992

Prepared for:

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12233

ecology and environment
engineering, p.c.
BUFFALO CORPORATE CENTER
368 PLEASANTVIEW DRIVE, LANCASTER, NEW YORK 14086, TEL. 716/684-8060

recycled paper

DRA

ERRATA SHEET

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

Thomas C. Jorling
Commissioner

May 11, 1992

Mr. George Zelt, Ph.D.
Ecology and Environment, Inc.
368 Pleasantview Drive
Lancaster, New York 14086

Dear Dr. Zelt:

Re: Wellsville - Andover Landfill Site,
Allegany County, Site No. 9-02-004

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the Phase I Remedial Investigation (RI) Report for the above-referenced site. The following comments are offered:

General Comments:

1. Since the NYSDOH regulates public but not private water supplies, all references which are made to the NYSDOH Maximum Contaminant Levels (MCSs) should include the phrase "for public water supplies".

2. Section 4.5 Data Assessment Survey

   It is noted in the report that samples from several locations exceeded the holding time prior to analysis. In the future, Ecology and Environment will be liable for resampling and reanalysis of the samples with missed holding times.

Specific Comments:

1. Section 4.4.4 - Residential Well and Spring Samples. When discussing the NYSDOH sodium guideline for people on severely or moderately restricted sodium diets, the guideline concentration should be given as follows: "Water containing more than 20 mg/L of sodium should not be used for drinking by people on severely

restricted sodium diets; water containing more than 270 mg/L of sodium should not be used for drinking by people on moderately restricted sodium diets."

2. Page 7-3. The statement indicating that the lack of contamination at wells along the west site boundary is due to the effects of the leachate collection system or vertical migration of groundwater may in fact be valid. Other possible explanations exist and the slight assumed westward gradient in combination with the lack of sufficient data points for defining the gradient in this area make the above statement unsupported, at best.

Please attach this letter to the Draft RI Report as an errata. Comments pertaining to Section 7.2 entitled, "Conclusions and Recommendations", have not been included. This section will be addressed in the Phase II RI Work Assignment.

If you have any questions and/or comments, please contact me at (518) 457-0315.

Sincerely,

Marcia E. Ladiana

Marcia Ladiana
Environmental Engineer
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation

ML/kk
cc: L. Rafferty - NYSDOH

DRAI

TABLE OF CONTENTS

Table of Contents (Cont.)

Table of Contents (Cont.)

Table of Contents (Cont.)

LIST OF ILLUSTRATIONS

LIST OF TABLES

List of Tables (Cont.)

List of Tables (Cont.)

1. INTRODUCTION

1.1 PURPOSE OF REMEDIAL INVESTIGATION

Ecology and Environment Engineering, P.C. (E & E), under contract to the New York State Department of Environmental Conservation (NYSDEC), Division of Hazardous Waste Remediation (DHWR), was requested to perform a Remedial Investigation and Feasibility Study (RI/FS) at the Wellsville-Andover Landfill, site number 9-02-004, an inactive municipal landfill in the towns of Wellsville and Andover, Allegany County, New York. The objectives of the RI/FS, as outlined in this summary report, are to:

- Assess the cause, extent, and effects of the presence of hazardous materials in the project area;
- Identify and evaluate remedial alternatives selected to mitigate contamination problems that pose threats to the environment or to public health, as determined by the fieldwork and data evaluation conducted during the RI; and
- Recommend remedial alternatives.

The RI/FS specifications were formulated in accordance with criteria presented in the State Superfund Standby Contract (Work Assignment No. D002625-8).

1.2 SITE DESCRIPTION

The Wellsville-Andover Landfill site is located along the east side of Snyder Road (formerly Gorman Road) in a sparsely populated rural area of eastern Allegany County, New York (see Figure 1-1). The site straddles the border between the towns of Wellsville and Andover, with approximately the southern third in Wellsville and the northern two-thirds in Andover. The property owned by the Village of Wellsville is roughly rectangular in shape, measuring approximately 4,000 feet north-to-south by 1,500 feet east-to-west, for a total area of approximately 120 acres. The northernmost portion of the property, consisting of approximately 35 acres, has not been used for waste deposition and was not included in the site investigation.

The landfill is located on a hillside on the west side of Duffy Hollow with nearly 200 feet of relief from north to south. The north end of the property is on top of the hill at an approximate elevation of 2,230 feet above mean sea level (AMSL). This area is currently used by a local community group, the Wellsville Area Small Plane Society, for recreational purposes. Access to the undisturbed portion of the site is gained only by a central dirt road that runs north-south through the filled areas. The east side of the site is bounded by open fields and patches of mature beech/sugar maple forests and slopes downward to Duffy Creek at grades of 14% to 20%. Numerous permanent and seasonal residences exist along Duffy Creek approximately 1,400 to 1,500 feet east of the eastern border of the site. The southern border of the site is fenced with barbed wire and lies adjacent to fields often grazed by horses. The nearest residence south of the site is seasonal and located 600 feet to the southeast. Snyder Road borders the southern third of the site to the west. One permanent and one seasonal residence exist along the west side of Snyder Road within 300 feet of the landfill. The remainder of the west side is bounded by mature beech/sugar maple forests, with one seasonal residence located approximately 500 feet west of the site.

Approximately 1,500 feet east of the site is Duffy Creek, a Class C stream (6 NYCRR 821.6). An unnamed intermittent tributary to Duffy Creek begins along the west side of the site and flows south-southeast until it converges with Duffy Creek approximately 3,000 feet southeast of the site. Duffy Creek flows south, eventually joining Dyke Creek 1.8 miles south-southeast of the site. Dyke Creek, also a Class C stream, is a direct tributary of the Genesee River.

Numerous man-made containment ditches exist at the site for the purpose of diverting surface runoff from the filled areas. Surface water from the northeast area of the site is collected in a drainage collection pond in the center of the site. This pond, which contains water perennially, is designed with an overflow to allow excess water to drain via ditches toward Snyder Road. Surface water from other areas of the site generally flows to the south and west, eventually draining into a ditch along the east side of Snyder Road. A series of culverts then divert this water directly into the unnamed tributary west of the site.

1.3 SITE HISTORY

The following site history contains information and data from numerous sources, including the Phase I and Phase II reports, that have not been combined in a single document before.

The Wellsville-Andover Landfill was operated by the Village of Wellsville from 1964 until 1983. The site consists of four fill areas, as shown on Figure 1-2. The south, south-central, and northwest fill areas accepted municipal, industrial, and hazardous waste between 1964 and 1978. According to NYSDEC's 1983 Phase I Report, the Rochester Button Company of Wellsville, New York disposed of unknown quantities of methylene chloride (MC) and possible trichloroethene (TCE) at the site between 1960 and 1973. However, correspondence between the Rochester Button Company and the Village of Wellsville Department of Public Works (DPW) indicates that the waste stream reaching the landfill consisted of two phases, solid and sludge (Massey 1978). The solid portion reportedly consisted of polymerized polyester scraps, while typical sludge, composed of 65% solids, consisted of approximately 44% pumice, 22% polyester fines, 35% water, trace amounts of talc and detergent, and 0.04 ppm lead carbonate. The total amount of solid waste produced by the Rochester Button Company (including paper and office waste) was reportedly 481,500 tons per year (Massey 1978).

The northeast fill area, open from 1978 to 1983, accepted municipal and industrial solid waste similar to the solid wastes described above. As described in the Phase I report, other wastes disposed of at the landfill included plastics, sodium cyanide salt, cutting oils, chromium and zinc chromate paints, solvents, coolants, and lubricating oils (NYSDEC 1983).

In addition to the above wastes, the landfill also accepted water-soluble cutting oils from two Wellsville area heavy metal manufacturing plants, C.E. Air Preheater Company, Inc. and Turbodyne Division of McGraw-Edison (MacFarquhar 1973).

Of the four fill areas, only the northeast area had a leachate collection system installed prior to waste deposition. However, as was the case with the other three fill areas, no liner was installed beneath the waste. The three older areas were in operation prior to modern regulatory requirements for design and operation of landfills. Apparently, no accurate documentation of the location or construction of cells in these areas was recorded. The available information suggests that the trench method of landfill operation was used and that the depth of waste varies but probably is less than 14 feet below ground surface.

In 1986, the Village of Wellsville prepared a Phase II Superfund investigation report under an Order on Consent filed by NYSDEC in August 1985. As described in this Phase II report prepared by Malcolm Pirnie, the Village of Wellsville installed a leachate collection system along the west side and central portion of the site in 1984 and 1985 to curtail the off-site migration of leachate. The system consists of a series of perforated 6-inch polyvinyl chloride (PVC) pipes in trenches backfilled with number 2 round stone. The trenches were excavated to depths of approximately 9 to 14 feet, which was stated to be below the estimated depth of the fill material. The layout of the system was based on the assumed direction of local groundwater flow--that is, from north to southwest in the central and western portion of the landfill. As shown in Figure 1-2, one main collection line runs along the west side of the site, adjacent to the northwest fill area. This line is joined at the northern access gate by another main line, which runs along the east side of the northwest fill area and joins with the system installed in the northeast fill area. A separate main line was installed along the south side of the south fill area. Lateral lines with vertical risers at the terminal ends were extended from the main lines into areas displaying visible leachate seeps. Leachate collected in the northwest, northeast, and south-central fill areas flows by gravity to a sump adjacent to Pump Station 1 (see Figure 1-2). Leachate from the south fill area flows by gravity to Pump Station 2, consisting of a cistern with a submersible pump, where it is then pumped to the sump at Pump Station 1. Leachate from the sump is then stored in two 10,000-gallon holding tanks adjacent to Pump Station 1. An 80,000-gallon pond located on site near the southern access gate stores leachate that overflows from the two holding tanks. This unlined pond is rarely dry and shows evidence of having overflowed.

During E & E's site visit in February 1991, Pump Station 2 was full, and excess leachate was flowing off site to the south onto the property of Mr. D. LaDue.

Between July and December 1991, during the Phase I RI field work, E & E observed the conditions of the pump stations and pond. The excess-leachate holding pond was found to be full on numerous occasions, but no evidence of overflow from this pond was observed. During the dry mid- to late-summer months, the pond was often drained by the DPW, and no overflow from the sumps at either pump station was observed. During E & E's investigation, it was noted that the DPW drained the holding tanks at Pump Station 1 up to four times per day. The frequency of drainings was dependent upon the amount of leachate in the tanks and holding pond. Precipitation increased in September and October 1991, and during this time, leachate was observed overflowing from Pump Station 2 and migrating south onto Mr. LaDue's property.

In addition, during a site visit in February 1992, leachate was observed overflowing from Pump Station 2 as well as from the holding pond. Leachate overflow from the pond was followed and seen entering the unnamed stream west of the site.

The results of previous sampling programs at the site prior to 1986 were discussed in the Phase II investigation report prepared by Malcolm Pirnie for the Village of Wellsville in 1986. The sampling performed prior to the Phase II investigation concentrated on leachate, Duffy Hollow Creek, and residential wells in the vicinity of the landfill. The residential wells showed low-level cyanide and zinc contamination but at concentrations below NYSDEC Class GA standards. Duffy Hollow Creek samples showed low-level zinc contamination but at a concentration below NYSDEC Class C standards. Analyses of the leachate indicated the presence of phenol, cadmium, chromium, and lead. No analyses for toxic organic substances were performed. The accuracy of this reported data is questionable because appropriate NYSDEC Contract Laboratory Program (CLP) methods were not utilized.

NYSDEC sampled a number of private wells and springs in the vicinity of the Wellsville-Andover Landfill in 1984. The samples were tested for oil and grease, phenols, volatile organic contaminants (VOCs), and metals. Analytical results indicated that:

- Phenols were not detected in any of the samples;
- No metals were detected above NYSDEC Class GA groundwater quality standards;
- All samples were free from VOCs, with the exception of those collected from the LaDue spring, which contained 150 ppb of trans-1,2-dichloroethene (tDCE) and 9 ppb of TCE; and
- All of the samples, with the exception of those collected from the LaDue spring, showed low levels of oil and grease contamination.

VOC results of this sampling effort are presented in Table 1-1, along with Allegany County Department of Health (ACDOH) sampling results for residential water supplies in the area. Figure 1-3 depicts the approximate residential well and spring locations sampled between 1984 and 1989.

NYSDEC again sampled a number of residential water supplies in August 1987. The results of this sampling effort, which are included in Table 1-1, indicate the following:

- The Miller spring contained 20 μg/L tDCE and 15 μg/L TCE; and
- The LaDue spring contained 40 μg/L tDCE and 23 μg/L TCE.

As summarized in Table 1-1, ACDOH has sampled numerous residential water supplies in the vicinity of the site. The only locations found to contain VOCs were the LaDue and Miller springs, as follows:

- In April 1985, the LaDue spring contained 67 μg/L tDCE, 16 μg/L TCE, and 20 μg/L benzene;
- In May 1989, the LaDue spring contained 17 μg/L of cis-1,2-dichloroethene (cDCE) and 14 μg/L TCE;
- In December 1989, the LaDue spring contained 18 μg/L tDCE, 10 μg/L TCE, and 1 μg/L bromodichloromethane (a trihalomethane); and
- In December 1989, the Miller spring contained 2 μg/L cDCE and 1 μg/L of TCE.

Sampling performed by Malcolm Pirnie in 1986 during the Phase II investigation included analyses of leachate, groundwater, residential well and spring water, surface water, and sediment. The leachate, groundwater, and residential water supplies were analyzed for priority pollutant metals (unfiltered), organic substances, cyanide, pH, and conductivity. The surface waters were analyzed for the same five constituents as well as temperature and dissolved oxygen. Sediment samples were analyzed for priority pollutant metals, organic substances, and cyanide. Tables 1-2 and 1-3 summarize the residential water, groundwater, and leachate sampling results. A summary of the results is as follows:

- The presence of cyanide or chromium at the significantly elevated levels indicated by the Phase I investigation was not confirmed in the various media sampled.

- Seven VOCs were detected in the leachate, including MC, acetone, vinyl chloride (VC), tDCE, 2-butanone, toluene, and ethyl benzene. Cadmium and manganese were also detected at elevated levels in the leachate.

- Two of the three downgradient groundwater monitoring well samples exhibited elevated levels of acetone and/or MC. In addition, one groundwater sample exhibited an elevated pH value. One potable residential water source (the LaDue spring) contained tDCE and TCE at levels exceeding NYSDEC Class GA standards. The Miller spring, which is not a source of potable water, contained MC, tDCE, and TCE at concentrations above regulatory levels.

- Iron was detected above the NYSDEC Class GA standard in the upgradient seep and downgradient groundwater, residential well, and spring water samples. Manganese was detected above the Class GA standard in downgradient groundwater, residential well water, and leachate samples. Sodium was detected above the NYSDEC Class GA standard in the groundwater and leachate samples but not in the residential water supply samples. No other metals were detected in excess of Class GA standards.

- Iron was detected at levels above the Class C surface water standard in the on-site drainage pond and Duffy Hollow Creek downstream samples.

Table 1-1

ACDOH AND NYSDEC
RESIDENTIAL WATER SUPPLY VOC SAMPLING RESULTS

Name	Date	Organic Compounds Detected (μg/L)				
		cDCE	tDCE	TCE	THM	Benzene
Baker[a]	05-01-89[c] 08-05-87[b]	--	--	--	--	--
Bauer	11-14-84[b]	--	--	--	--	--
Fanton	11-14-84[b]	--	--	--	--	--
Gephart	12-03-89[c]	--	--	--	1	--
Green	11-14-84[b]	--	--	--	--	--
Kelly, Jr.	11-14-84[b]	--	--	--	--	--
LaDue	12-03-89[c] 05-01-89[c] 08-05-87[b] 04-30-85[c] 11-14-84[b]	-- 17 -- -- --	18 -- 40 67 150	10 14 23 16 9	1 -- -- -- --	-- -- -- 20 --
Miller	12-04-89[c] 08-05-87[b]	2 --	-- 20	1 15	-- --	-- --
Ormsby	05-01-89[c]	--	--	--	--	--
Rosini	05-01-89[c] 11-14-84[b]	-- --	-- --	-- --	-- --	-- --
Teller	05-01-89[c] 11-14-84[b]	-- --	-- --	-- --	-- --	-- --

[a] Former Fitzgibbon residence.
[b] Sampled by NYSDEC.
[c] Sampled by ACDOH.

Key:

cDCE = cis-1,2-Dichloroethene.
tDCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
THM = Total trihalomathanes.
NA = Not analyzed.

Sources: Vossler 1989a, 1989b, 1989c, 1989d, 1989e, 1990a, 1990b, and 1990c; Clare 1987; and Bates 1986.

DRAFT

Table 1-2

PHASE II INVESTIGATION[a]
GROUNDWATER AND LEACHATE SAMPLING RESULTS
(JUNE 1986)

Sample	Organic Compounds Detected ($\mu g/L$)								Inorganics Above Standards[b] ($\mu g/L$)			
	VC	MC	Acet	tDCE	2-But	Tol	EB	TCE	Cd	Fe	Mn	Na
Groundwater												
3B	--	19	470	--	--	--	--	--	--	17,400	707	25,600
4A	--	--	5,100	--	--	--	--	--	--	10,200	4,240	20,900
4B	--	--	--	--	--	--	--	--	--	18,500	4,110	45,500
Leachate												
Trench	670	–	--	1,400	--	--	--	--	--	914	689	--
Sump	--	J	2,100	8,300	3,200	540	950	--	47	529	22,900	135,000

[a] Malcolm Pirnie 1986.
[b] Indicates only those inorganic analytes detected above NYSDEC Class GA standards per 6 NYCRR Part 701.

Key:

VC = Vinyl chloride.
MC = Methylene chloride.
Acet = Acetone.
tDCE = trans-1,2-Dichloroethene.
2-But = 2-Butanone.
Tol = Toluene.
EB = Ethylbenzene.
TCE = Trichloroethene.
J = Detected below sample quantitation limit.

Source: Village of Wellsville 1986.

02:D3715-03/03/92-D1

Table 1-3

PHASE II INVESTIGATION[a]
RESIDENTIAL WATER SUPPLY SAMPLING RESULTS
(JUNE 1986)

Name	Organic Compounds Detected (μg/L)						Inorganics above MCLs[b] (μg/L)	
	MC	tDCE	TCE	DEP	Phenol	4MP	Iron	Manganese
Fitzgibbon	--	--	--	--	--	--	--	--
Kelly	--	--	--	--	--	--	--	--
LaDue	--	72	34	--	--	--	--	--
Miller	24	32	21	J	J	1,900	1,130	--
Rosini	--	--	--	--	--	--	650	508
Teller	22	--	--	--	--	--	--	--

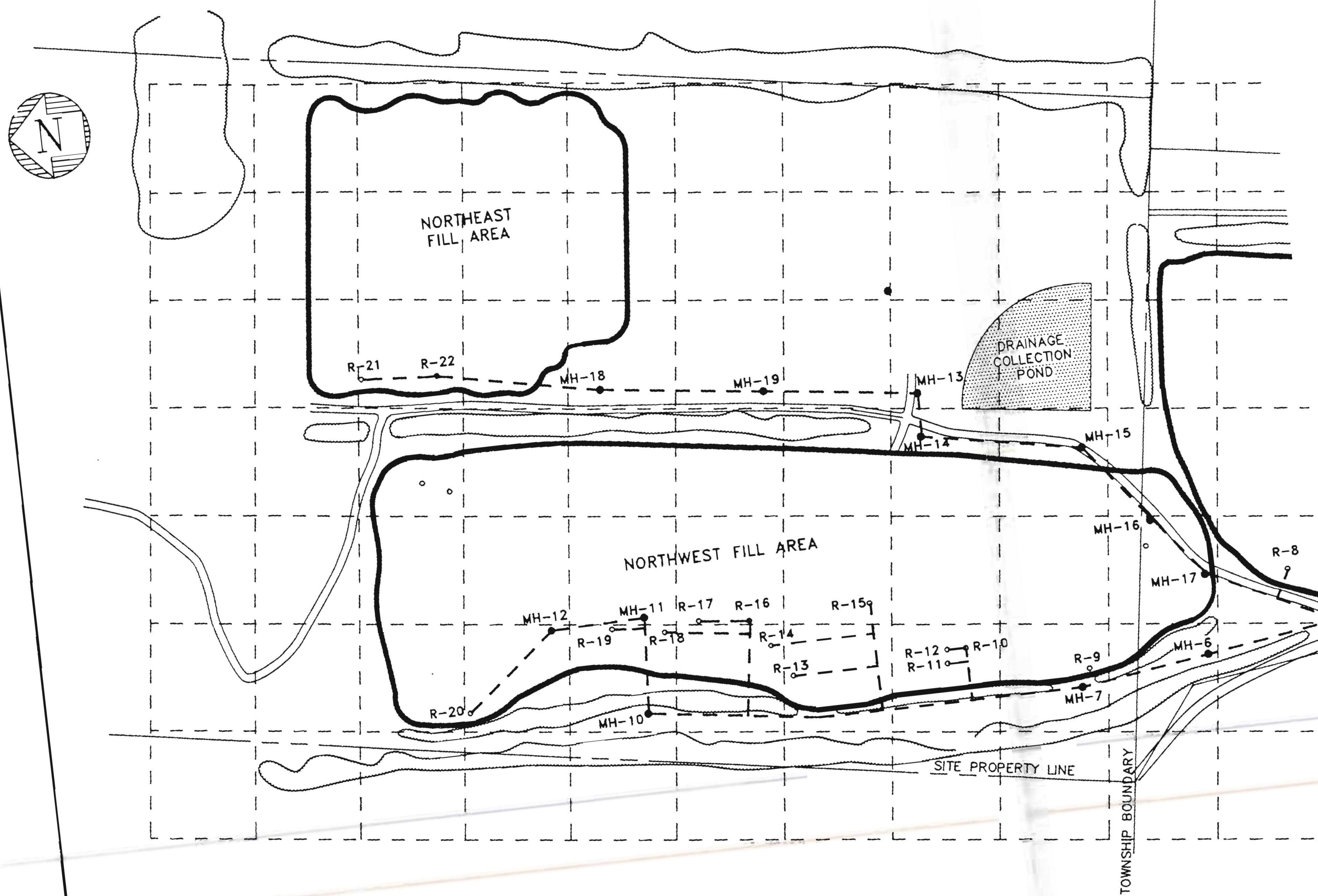
[a] Performed by Malcom Pirnie in 1986.
[b] Indicates only those inorganic analytes detected above Maximum Contaminant Levels (MCLs) per 10 NYCRR Subpart 5-1.

Key:

MC = Methylene chloride.
tDCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
DEP = Diethylphthalate.
4MP = 4-Methylphenol.
J = Detected below sample quantitation limit.

Source: Village of Wellsville 1986.

DRAFT



NOTE:
BOUNDARIES OF FILL AREAS DELINIATED BY GROUND CONDUCTIVITY SURVEY PERFORMED IN AUGUST 1991.

LEGEND

● MANHOLE (MH-1 TO MH-19)

○ RISER (R-1 TO R-22)

—x—x— FENCE

— — — LEACHA

TREE L

SCALE IN FEET

750

OB3WELLS-SAMPLOCS

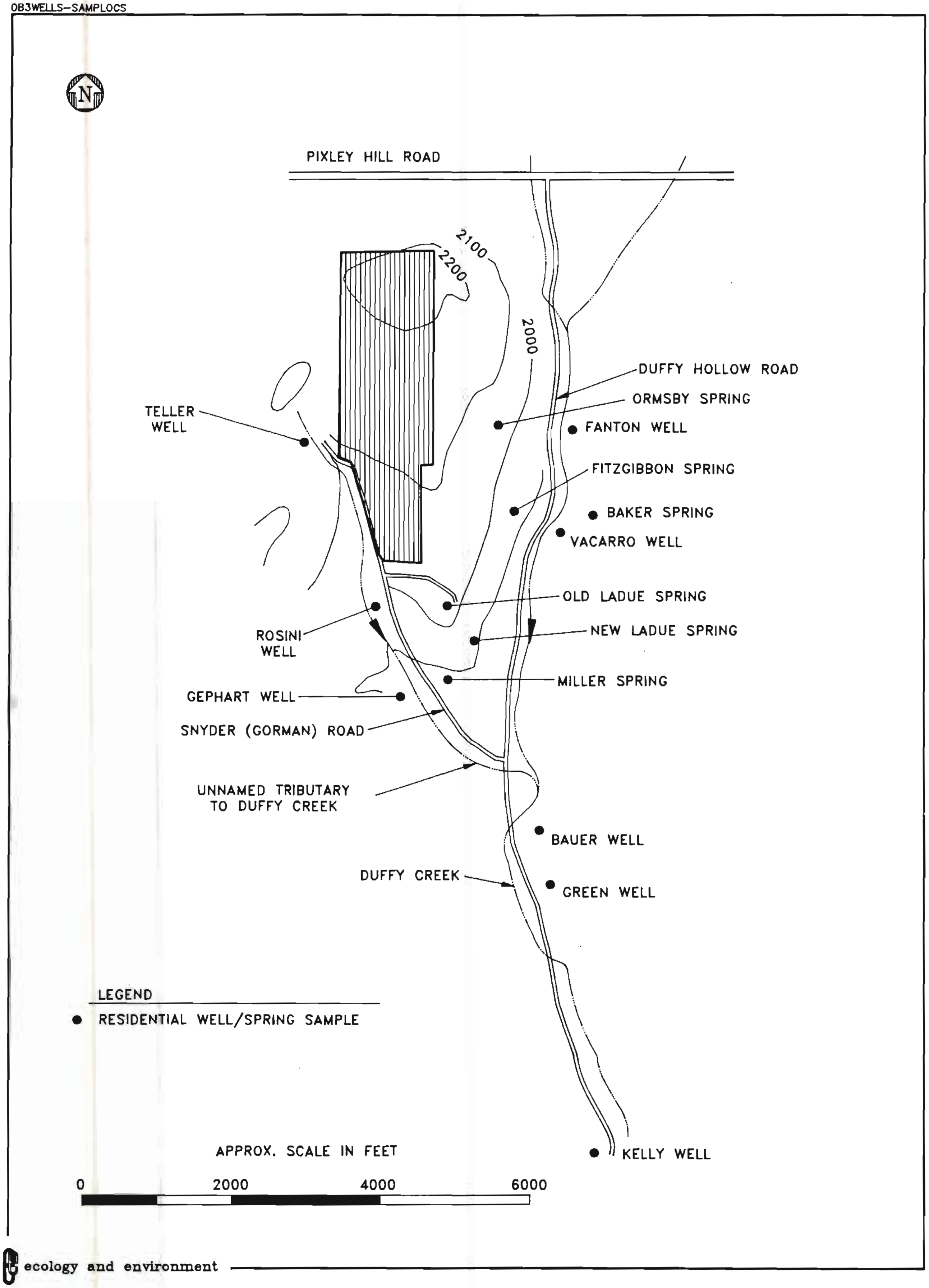


Figure 1-3 RESIDENTIAL WELL AND SPRING SAMPLE LOCATIONS, 1984-1989

2. ENVIRONMENTAL SETTING

2.1 INTRODUCTION

This section discusses the physical setting of the Wellsville-Andover area to provide a framework for a detailed discussion of the Wellsville-Andover Landfill site. Specific discussions regarding site characteristics (i.e., geology, topography, hydrology, and hydrogeology) are presented in Section 4.

2.2 PHYSIOGRAPHY AND TOPOGRAPHY

Wellsville is located in southeast Allegany County in the southern tier of New York State. The area is part of the Allegheny Plateau region of the Appalachian physiographic province (Woodruff 1942) and is characterized by a mature, medium-textured upland of moderate relief developed on sedimentary rocks with a gentle southward regional dip (Muller 1957). All of Allegany County was affected by moderate glaciation during two or more episodes of the Pleistocene Epoch and therefore contains the characteristic open valleys, glacially scoured summits, and drift deposits of the southern New York section of the Appalachian province (Muller 1957).

Allegany County includes some of the most rugged topography in Western New York, with a maximum relief of 1,400 feet. Average local relief is approximately 600 to 800 feet. The highest elevation in the area is Alma Hill near Belmont, New York, with a summit elevation of 2,548 feet AMSL. The lowest elevation in Allegany County is where the Genesee River crosses into Wyoming County at an elevation of less than 1,120 feet AMSL (Muller 1957 and Woodruff 1942).

While glacial history has played an important role in the topographic development of the area, the underlying Paleozoic strata also influence topography. Interbedded shales, sandstones, and conglomerates produce scarplets and benches in many areas with relatively erosion-resistant caprock of sandstone and conglomerate.

2.3 REGIONAL GEOLOGY

2.3.1 Soils

The following discussion of the regional soil types is based primarily on the soil survey for Allegany County prepared by the United States Department of Agriculture (USDA) in 1956.

The soils in Allegany County are derived from a variety of glacial materials, creating the large variation of soil types throughout the county. The soils identified by USDA on or adjacent to the site include members of the Bath, Freemont, Lordstown, Mardin, and Volusia series. These soils range from level or gently sloping to hilly and moderately steep, are found in upland areas, and range from well-drained to poorly and imperfectly drained.

A large portion of the landfill site is composed of Volusia channery silt loam. Volusia soils are the most extensive in the county. In general, they are characterized by high acidity and poor drainage, occur on gentle slopes, and may receive seepage water from higher lying areas. Volusia soils have a gray-brown surface horizon underlain by a light-colored horizon that is periodically saturated. Below this lies a mottled zone underlain by a very firm hardpan. This hardpan restricts permeability, causing increased runoff and, consequently, increased erosion.

Freemont soils are found in relatively level to gently sloping areas near the high plateau. The soil is described as a yellow-brown silt loam with a mottled layer below 7 to 10 inches, indicating the presence of water at this depth periodically. Hardpan occurs at a depth of 18 inches. Freemont soils are imperfectly drained and grade into the poorly drained Volusia. In some locations, the two soils cannot be distinguished.

Lordstown soils are shallow to moderately deep, strongly acidic, well-drained, and have a bright yellow-brown subsoil. The soil contains flat stone fragments throughout, derived locally from weathered sandstone and shale. These soils are commonly found in areas with strongly sloping terrains. Bedrock generally occurs at depths between 18 and 30 inches.

Mardin soils are strongly acidic and moderately well drained. These soils occur on uniform slopes ranging from gently sloping to steep and formed from glacial till consisting mainly of sandstone and shale. The surface soil is almost black with an underlying bright yellow-brown subsoil. A mottled horizon exists at about 14 inches, and the underlying hardpan is compact enough to restrict the downward movement of groundwater.

Prior to filling, the northwest and northeast portions of the site were composed mainly of Volusia channery silt loam. These portions also included small areas of Lordstown flaggy silt loam and Freemont and Mardin channery silt loams. These soil types are described above.

The south-central fill area was composed chiefly of Volusia channery silt loam with small areas of Lordstown flaggy silt loam, Mardin channery silt loam, and Bath channery loam. The Bath soils are yellow-brown, strongly acidic, deep, and well drained. These soils generally occur on the highest hills of the county at elevations of 2,000 to 2,500 feet. They were derived from glacial till and contain a high percentage of thinly bedded sandstone and shale fragments.

The soils in the vicinity of the south fill area included Mardin channery silt loam, Lordstown flaggy silt loam, and Bath Channery silt loam, all of which have been described previously.

2.3.2 Bedrock

The Late Devonian strata of the Wellsville area are some of the least understood in the New York Devonian sequence. Different group and formation names as well as different time relationships have been used by different authors. The majority of the following discussion is based on the works of Woodruff 1942, Rickard 1957, and Rickard 1975, using the names and temporal relationships described by Rickard 1975.

The stratigraphic section exposed in Allegany County consists primarily of interbedded shale and sandstone, with numerous locally conspicuous conglomerate layers in the upper portion of the column. While the majority of the county consists of Upper Devonian formations, the strata became progressively younger to the south, and outcrops of Mississippian units and Pennsylvanian conglomerate can be found near the New York-Pennsylvania state line. Regional dip is to the south at a fraction of a degree; however, the strata have been warped into open fields with anti- and synclinal axes trending northeast-southwest. This gentle folding causes local variation and reversal of dip (Woodruff 1942).

The Upper Devonian strata of Allegany County represent lateral facies changes that occurred during deposition of the Catskill Delta. As the Catskill mountains shed debris westward into a shallow sea, a progression of depositional environments developed from east to west across New York State. Deep depositional environments occur to the west and near the bottom of the stratigraphic section. Shallow depositional environments occur to the east and near the top of the section. As the basin filled and the sea regressed, progressively shallower type sediments were deposited in the Wellsville area.

In the Wellsville area, the base of the Upper Devonian section is formed by the Genesee and Sonyea groups (see Figure 2-1). These groups consist primarily of shales including the Geneseo, Penn Yan, West River, Middlesex, and Cashagua formations. These groups represent deposition in a relatively deep, anaerobic, distal basin. Above the Sonyea Group is the West Falls Group. At the base of the West Falls is the Rhinestreet Shale, which was deposited in an environment similar to that of the Genesee and Sonyea groups. Above the Rhinestreet, but within the West Falls Group, are numerous formations consisting of shale, siltstone, and sandstone representing deposition in a proximal basin and on an open shelf well below the wave base (Rickard 1975).

Atop the West Falls Group is the Canadaway Group. At the base of this group is the Hume shale, a dark gray to black shale. The Hume is considered the base of the Dunkirk Shale, which is prominent west of Wellsville. Above the Hume is the Caneadea Shale, which extends upward to the base of the Rushford Sandstone. The Caneadea consists of gray, silty shales and gray siltstones. The Hume and Caneadea were deposited under conditions similar to that of the upper West Falls Group. The upper part of the Canadaway Group is dominated by the interbedded shales, siltstones, and sandstones of the Wellsville and Whitesville formations. Originally thought to be two distinct units separated by a sandstone unit (Woodruff 1942), both formations are now considered the same and are thought to represent lateral facies changes (Rickard 1975). The Wellsville-Andover Landfill site is underlain by these units. Originally thought to be above the Cuba Sandstone (Woodruff 1942), the Wellsville and Whitesville formations are now believed to lie beneath the Cuba Sandstone (Rickard 1975). The Cuba, which marks the top of the Canadaway Group, consists of gray siltstones and fine-grained sandstones. The Wellsville and Cuba formations include material deposited in a diverse subtidal shelf (includes prodelta, delta front sands, and delta platform) and in the nearshore zone (e.g., distributary mouth bars, channels, estuaries, tidal flats, swamps, and marshes). The Whitesville represents peritidal deposits--i.e., cyclic interbeds of marine and non-marine deposits (Rickard 1975).

Above the Cuba is the Conneaut Group. This group consists of reddish shales interbedded with greenish-gray sandstones and may be part of the Germania Formation of Woodruff (1942) or part of the Cattaraugus Formation of Rickard (1975). Like the Whitesville, the Conneaut Group represents peritidal deposits (Rickard 1975).

Above the Conneaut Group, the Wolf Creek conglomerate forms the base of the Conewango Group. The lower part of the Conewango, especially to the west, consists of the interbedded red and green shales and greenish-gray sandstones of the Cattaraugus Formation. Above the Cattaraugus are the upper Sunfish shales and sandstones. The Cattaraugus, like the Whitesville, represents peritidal deposits, while the Sunfish consists of piedmont and alluvial floodplain deposits (Rickard 1975).

The site is underlain by the Wellsville and/or Whitesville formations of the upper Canadaway Group. Older formations from the lower Canadaway Group are exposed west and northwest of the site in the Genesee River and Vandermark Creek. Small areas of the younger Conewango Group are still exposed on hilltops south of Dyke Creek (Rickard and Fisher 1970).

The nearest known fault to the site exists approximately 7 miles to the southeast and is of an undetermined nature. Additionally, three topographic linear features have been observed on high altitude photographs. One is more than 25 miles long and trends northwest-southeast through the center of the Village of Wellsville. Another is approximately 3.5 miles long and trends northeast-southwest along Dyke Creek. The third is approximately 2 miles long and trends northwest-southeast joining the second feature where Dyke Creek enters the village (Isachsen and McKendree 1977).

Two pervasive joint sets have been mapped in the Wellsville area. One set of unspecified prominence with vertical and subvertical planes trends N20°W/S20°E. The second set, also of unspecified prominence, trends N29°W/S29°E (dip not given) (Isachsen and McKendree 1977).

2.4 REGIONAL HYDROLOGY

The Wellsville-Andover Landfill is located within the Genesee River Basin. The basin extends from the mouth of the Genesee River at Lake Ontario to northern Pennsylvania and has a total drainage area of 2,480 square miles (NYSWRC 1966). This section summarizes the hydrologic features of this basin in order to provide a framework for the discussion of the site hydrology presented in Section 4.

2.4.1 Surface Water

The Genesee River drains three-fourths of Allegany County. The river enters the county in the southeast, generally flows north, and exits the county to the north. A small southeastern portion of the county is drained by the Allegheny River, which flows south. Surface waters of the northeastern part of the county drain through tributaries of the Canisteo River into the Susquehanna River system, and surface waters from the northwestern corner of Allegany County drain into Lake Erie (USDA 1956). The Wellsville area is part of the Genesee River drainage basin. The major tributary streams to the Genesee River are Cryder, Dyke, and Angelica creeks east of the river and VanCampen, Black, and Caneadea creeks to the west. The principal lakes in the Genesee basin are the Little Finger Lakes: Conesus, Honeoye, Canadice, and Hemlock (NYSWRC 1966).

Springs, both intermittent and continuous, are common throughout the county. In upland areas, the underlying bedrock is close to the surface and is generally covered by glacial till with very low permeability. Water seeps downslope above the till layer and often comes to the surface as springs in wet seasons. If the impermeable layer is deep, permanent springs may be present (USDA 1956).

The Village of Wellsville relies on the Genesee River as its potable water source, while most residents outside the village rely on groundwater wells and/or springs.

2.4.2 Groundwater

Within Allegany County, water is found in both the overburden and the bedrock. Most of the unconsolidated sediments were deposited during glaciation. Low-lying areas were flooded and filled with sediments ranging from clays to coarse gravel. In the upland areas, till is the most common overburden material.

The greatest potential for groundwater exists in unconsolidated glacial outwash deposits in partially buried valleys in the central portions of the Genesee River drainage basin. In the northern portion of the basin, groundwater occurs at shallow depths but is highly mineralized (NYSWRC 1966).

The thick deposits of sand and gravel outwash contain little silt and clay and, therefore, are the most permeable water-bearing units. Recharge to these areas tends to be high due to their location in valley bottoms. Outwash deposits can supply sufficient quantities of groundwater for municipal and industrial use (Frimpter 1974).

Deposits in the upland areas are generally composed of till. Due to large variations in composition ranging from clays to gravels, tills tend to have low permeability and do not yield large quantities of groundwater. However, wells completed in till are sometimes adequate for domestic water supplies (Frimpter 1974).

Glacial deposits of clay and silt have low permeabilities and may confine underlying or perch overlying water-bearing deposits. Moraine deposits, where present, often lie above the water table. Where these moraine deposits are saturated, sand and gravel lenses within the deposits are capable of yielding sufficient water supplies for domestic use (Frimpter 1974).

Wells completed in the shale, siltstone, and sandstone bedrock of the area yield dependable supplies of groundwater for domestic or farm use. The quantity of groundwater is dependent on the occurrence of joints, fractures, and other secondary porosity characteristics of the bedrock. Wells are more likely to intercept and receive water from horizontal joints and fractures than vertical joints and fractures. However, vertical joints and fractures may act as conduits to recharge deeper portions of the aquifer (Frimpter 1974).

2.5 CLIMATOLOGY

Allegany County has a continental climate characterized by fairly high summer daytime temperatures and cool summer nights. Winters are usually long and severe. The hill and valley topography of the county causes many local variations in precipitation, temperature, and wind patterns.

The average yearly temperature is about 45° F, with a mean summer temperature of 66° F and a mean winter temperature of 24° F. Summer daytime temperatures have been as high as 98° F, and it has been as cold as -38° F in winter. Relative humidity in summer is relatively low, with only occasional intrusion of humid air. Thus, few sultry days occur.

The annual average rainfall is 35 inches; annual snowfall averages 64 inches. Precipitation is rather evenly distributed throughout the year. When precipitation occurs, it falls in a long, steady manner, rather than in torrential downpours. Flash floods are rare for the area. The driest year recorded only 22 inches of rain, while the wettest year had 54 inches.

Prevailing winds are from the west; however, local variations in wind speed and direction can occur due to topography, especially during fair-weather, light-wind conditions. Destructive wind velocities are rare, but the area does experience severe thunderstorms during the late spring and early summer months.

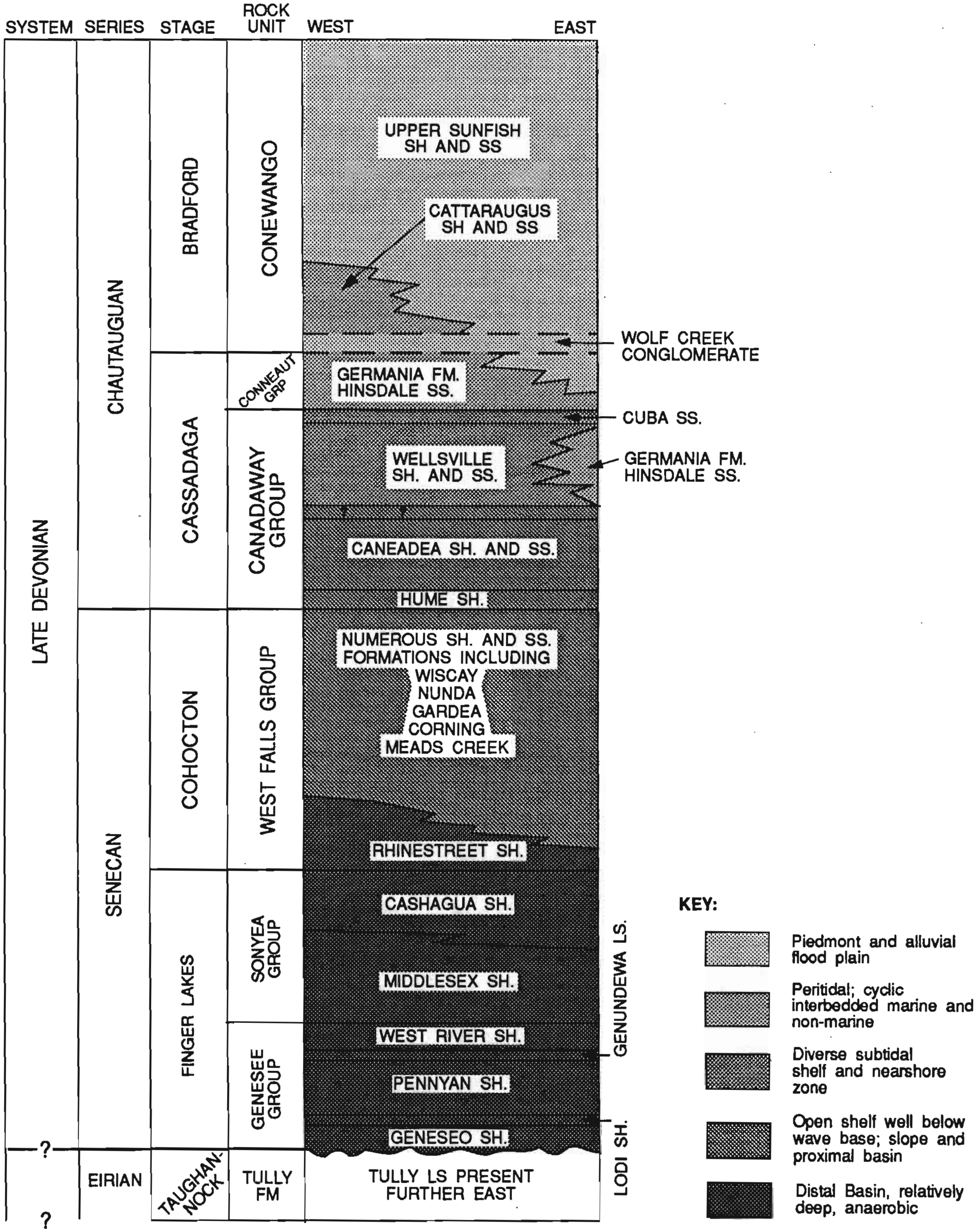
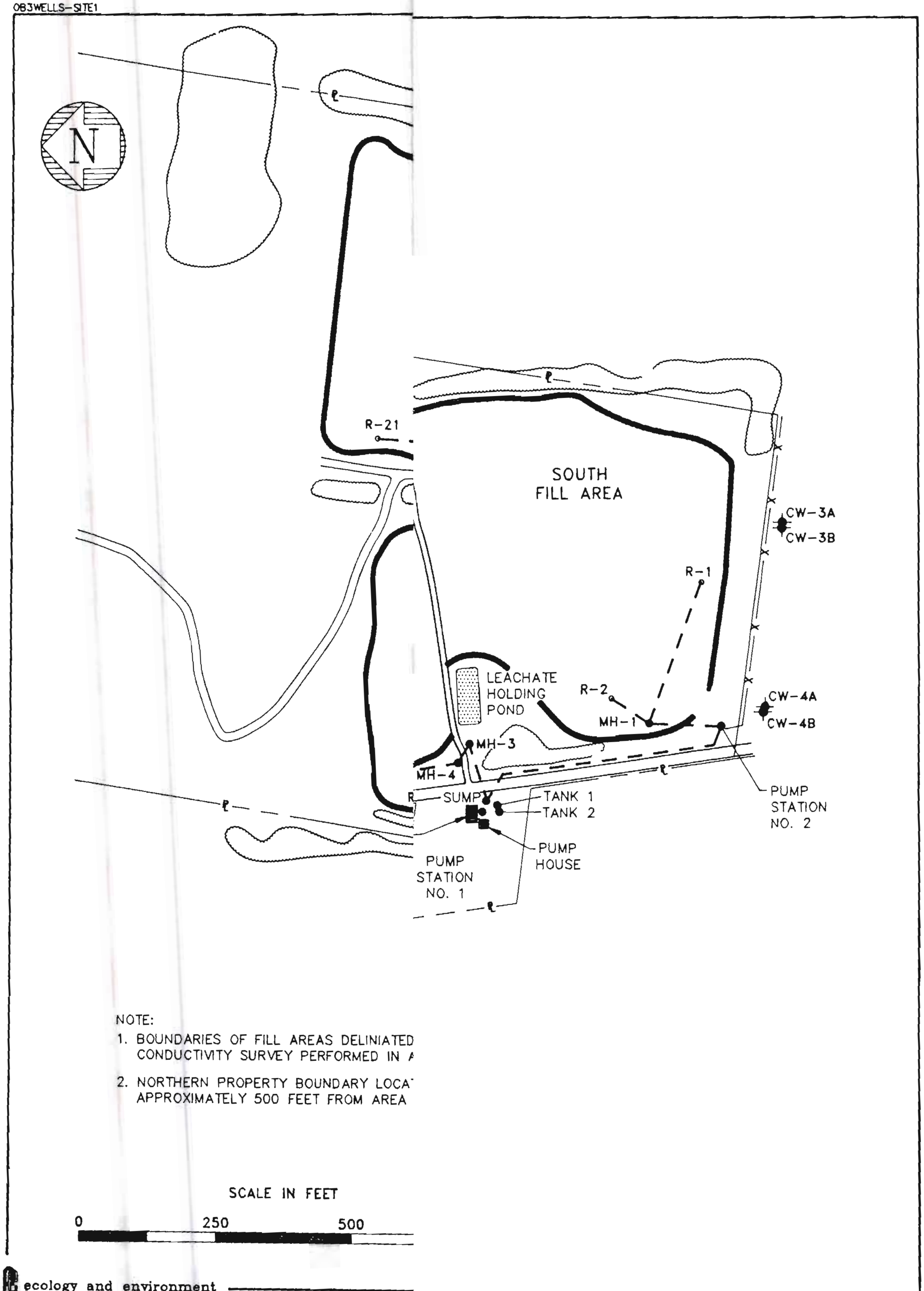


Figure 2-1
STRATIGRAPHIC CORRELATION CHART FOR THE WELLSVILLE AREA

OB3WELLS-SITE1



ecology and environment

Figure 2-2 WELLSVILE - ANDOVER LANDFILL
SITE PLAN

3. SITE INVESTIGATION METHODOLOGY

3.1 INTRODUCTION

Field investigation activities were performed on and adjacent to the Wellsville-Andover Landfill site between July 15, 1991 and February 27, 1992. The primary objectives of the field investigation were to:

- Determine the nature of on-site contamination;
- Determine the geologic and hydrogeologic characteristics of the site that may affect contaminant migration; and
- Assess possible contaminant migration off site.

The field tasks that were performed in order to complete these objectives were as follows:

- Base map development;
- Geophysical surveys (total earth field magnetics, ground conductivity, and seismic refraction);
- Trench excavation;
- Monitoring well installation (including description of the overburden and upper bedrock geology);
- Subsurface soil sampling;
- Groundwater sampling;
- Residential well and spring sampling;
- Surface water and sediment sampling;
- Surface soil sampling;
- Leachate sampling;
- Air sampling;

- Leachate collection system evaluation; and
- Habitat-based ecological assessment.

All samples collected during the Wellsville-Andover Landfill RI/FS were subject to the analytical protocols of the NYSDEC Contract Laboratory Program (CLP) as defined in the Analytical Services Protocol (ASP) of September 1989. All analyses were performed by E & E's Analytical Services Center (ASC), with the exception of the air and geotechnical analyses. Air samples were analyzed by Method TO-14 by Air Toxics, Ltd., and geotechnical analyses were performed by GZA GeoEnvironmental of New York, in Cheektowaga, New York. A summary of the analytical methods employed appears in Table 3-1. Field and laboratory quality assurance (QA) and quality control (QC) procedures are discussed in the Quality Assurance Project Plan (QAPjP) prepared by E & E for the site (provided under separate cover).

3.2 BASE MAP DEVELOPMENT

A base map of the site was developed to delineate the locations of man-made on-site structures, site topographic features, and sampling points within the site. Initial surveying was completed in July 1991. Surveying of on-site buildings, roads, manholes, etc. and the establishment of a 200-foot by 200-foot grid system were accomplished during the initial site survey. The final site survey, which was completed in November 1991, consisted of surveying the locations of all on-site sampling points, surveying the elevation and location of all monitoring wells, and surveying the elevation of the leachate collection system. All elevations were vertically surveyed to within 0.05 foot, and all locations were horizontally surveyed to within 1 foot.

In order to supplement ground-based data collected at the site, an aerial photograph was taken on March 4, 1992. Data derived from this photograph were used in conjunction with the ground survey during the development of the base maps used in this report.

As recommended and approved by NYSDEC, the use of infrared sensing techniques during aerial photography was deemed unnecessary at this time and not performed during the Phase I RI.

3.3 GEOPHYSICAL INVESTIGATION

The geophysical investigation program was designed to accomplish several objectives:

- To locate and delineate the boundaries of subsurface, ferrous objects of concern (e.g., 55-gallon drums);
- To define waste disposal areas and, if possible, delineate the cells within the disposal areas;

- To detect and define the boundary of potential groundwater contaminant plumes containing conductive heavy metals;
- To determine the depth to, and morphology of, the bedrock surface and delineate subsurface stratigraphy; and
- To assist in the selection of monitoring well locations.

Three surface geophysical surveying techniques were selected to accomplish the preceding goals: total earth field magnetics, electromagnetic ground conductivity, and seismic refraction.

A grid system was established over the site during the initial survey in July 1991. Transect lines trending north-south and east-west were surveyed with a node spacing of 200 feet. Within this surveyed grid, geophysical survey data points were located on a 40-foot north-south by 20-foot east-west grid system.

Data collected in the unfilled area north of the containment ditch are considered representative of background conditions and have been used for comparison with data collected in filled and disturbed areas.

3.3.1 Total Earth Field Magnetics

Total earth field magnetic data were collected with an EG&G model G856 magnetometer. The magnetometer was used to delineate subsurface ferrous objects and screen monitoring well locations prior to drilling. Data were collected every 20 feet along east-west transects spaced 40 feet north to south as described above.

In order to correct for diurnal variations in the earth's magnetic field, periodic readings were made at a single background location. Due to the vast extent of the survey area, it was impractical to periodically return to the same background location. Therefore, a second G856 magnetometer was employed at the background location. This magnetometer was used to collect data at 15-minute intervals from the beginning until the end of the magnetometer survey, thus allowing for correction of diurnal drift. The background location, or base station, was located in the tree line between the northwest fill area and the central access road. The exact location and magnitude of the readings are relatively unimportant, but the fluctuations in the earth's magnetic field recorded are of primary importance.

All magnetic data were stored directly in the memory of the G856 magnometer. At each location, the G856 stores the magnetic field strength, time, station number (incremented by one for each reading), and assigned survey line number. These data, along with the data collected at the base station, were downloaded into an IBM-compatible computer using the software package MAGPAC, version 4.1.5, by EG&G Geometrics. MAGPAC allows the field data to be corrected for diurnal drift (using the base station data) and then converted to a form with x and y coordinates suitable for contouring. The corrected data were then plotted and contoured using the software package Surfer, version 4.10, by Golden Software, Inc. The final total earth field magnetics contour map and a discussion of the results are presented in Section 4.2.2.

3.3.2 Electromagnetic Ground Conductivity

Ground conductivity data were collected with a Geonics model EM31 conductivity meter equipped with a digital data logger (polycorder). This instrument was selected because its maximum depth of influence is 18 feet, and the depth of fill is estimated to be less than 14 feet. The EM31 was used to define waste disposal areas and individual cells, delineate conductive groundwater contaminant plumes, and screen monitoring well locations prior to drilling. Data were collected every 20 feet along east-west transects spaced 40 feet north to south as described previously. At each data collection node, a measurement was recorded in both the horizontal and vertical dipole modes. The depth of penetration in the vertical dipole mode is approximately 18 feet. The depth of penetration in the horizontal dipole mode is approximately 8 to 10 feet, and the instrument is more sensitive to shallow subsurface features than in the vertical dipole mode.

All conductivity data were stored directly in the memory of the polycorder. At each location, the polycorder stores the magnitude of the ground conductivity along with the x and y coordinates of that location for both the vertical and horizontal dipole modes. These data were then downloaded into an IBM-compatible computer using the software package DAT31, version 2.03, by Geonics, Limited. DAT31 allows the field data to be converted into a form suitable for contouring. The adjusted data were then plotted and contoured using Surfer version 4.10 by Golden Software, Inc. The final electromagnetic ground conductivity contour map and a discussion of the results are presented in Section 4.2.2.

3.3.3 Seismic Refraction Survey

Seismic refraction data were collected with a Geometrics Ltd., model 2401, 24-channel, signal enhancement seismograph. Data were collected along six lines, labeled A through F (see Figure 1, Appendix A), in separate 24-channel spreads consisting of 24 geophones laid out at 10-foot intervals along the 230-foot spread cable. Energy for the seismic survey was provided by a sledgehammer impacting a steel plate. Multiple hammer blows were recorded at each shot-point and digitally stacked in order to obtain sufficient energy and reduce the signal-to-noise ratio. In two instances, the signal-to-noise ratio was high and these two spreads were redone. Shot-points were located in the middle, at each end, and offset 115 feet from each end of the spread cable.

All recorded data were downloaded to a computer for interpretation. Interpretation included picking the first arrivals from each record, plotting time-distance graphs, and analyzing these graphs to assign arrival times. The site was found to best fit a three-layer model representing overburden, weathered bedrock, and competent bedrock. Data were analyzed using the RF software package developed by the U.S. Bureau of Reclamation, which uses algorithms from the widely-accepted Society of Exploration Geophysicists' General Reciprocal Method (GRM).

Appendix A contains the seismic refraction survey report prepared by Davenport/Hadley for this site, which contains detailed information on the collection, interpretation, and analysis of the seismic refraction data.

3.4 TRENCH EXCAVATION

The results of the total earth field magnetics and electromagnetic ground conductivity surveys indicated that numerous anomalies with varying intensity and areal extent exist at the site. Based on these results, which are discussed in Section 4.2.2, five areas were selected for trench excavation. These locations are shown in Figure 3-1. Trench 1 was excavated in the northwest corner of the northwest fill area in an area of very strong magnetic and ground conductivity (in both the horizontal and vertical dipoles) anomalies. Trench 2 was excavated in the central portion of the northeast fill area in an area exhibiting strong ground conductivity anomalies (in both the horizontal and vertical dipoles) and adjacent to a strong magnetic anomaly. Trench 3 was excavated in the southeast portion of the northwest fill area in an area exhibiting a very strong ground conductivity anomaly (in both the horizonal and vertical dipoles) and a moderately strong magnetic anomaly. Trench 4 was excavated in the northeast corner of the south-central fill area in an area exhibiting a very strong ground conductivity anomaly (in both the horizontal and vertical dipoles) and a moderately strong magnetic anomaly. Trench 5 was excavated in the central portion of the south fill area in an area exhibiting a very strong ground conductivity anomaly (in both the horizontal and vertical dipoles) and a moderately strong magnetic anomaly.

In terms of temporal distribution, landfilling reportedly proceeded in a north-to-south direction, beginning with the northwest fill area followed by the south-central, south, and northeast fill areas, respectively (Village of Wellsville 1986). Therefore, Trench 1 represents the oldest fill followed by Trench 3, Trench 4, Trench 5, and Trench 2, respectively. During excavation of Trench 1, a newspaper dated 1967 was found. Newspapers found in Trench 3 and Trench 2 date these areas to 1974 and 1980, respectively.

All trenches were excavated by E & E's subcontractor, Entech Management Services Corporation, using a Caterpillar Model 426 backhoe equipped with non-sparking teeth. All trenches were excavated approximately 3 feet wide by 12 to 15 feet long. The trench depths were dependent upon the material encountered and are discussed in Section 4.4.1. All trenches were excavated until the probable source of the anomaly was determined. The cover material was removed and placed alongside the trench. The waste was then removed and placed on the opposite side of the trench on plastic sheeting. After excavation and sampling were complete, the waste was placed back in the trench and the cover soil replaced on top. In all cases, additional clean fill (bank run gravel) was spread on top of the excavated area followed by hay. A description of the trenching and materials encountered is presented in Section 4.4.1.

During excavation, downwind air quality conditions were monitored with a photoionization detector (HNu), flame ionization detector (OVA), and MIE aerosol monitor (miniram). In addition, conditions near the backhoe were monitored with a combustible gas and oxygen (CG/O) meter.

One composite soil sample was collected from each trench for laboratory analysis. All samples were collected from the bucket of the backhoe or from the pile of excavated material using dedicated stainless-steel spoons, precleaned according to the procedures described in Section 3.14. All samples were analyzed by E & E's ASC for full Target Compound List (TCL) parameters according to NYSDEC CLP protocols. Table 3-2 describes the samples collected. For QA/QC purposes, additional volume was collected with sample TP-5 for matrix spike and matrix spike duplicate (MS/MSD) analyses. All sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP.

3.5 GROUNDWATER MONITORING WELLS

3.5.1 Monitoring Well Installation

A total of 18 wells were installed between August 26 and October 4, 1991. All monitoring wells were installed by American Auger and Ditching Company, Inc., a subcontractor of E & E, under the guidance of an E & E geologist and site safety officer. Eight pairs of shallow and deep wells and two separate deep wells were installed. The shallow wells were screened across the water table, while the deep wells were screened either across the water table or within the first water-bearing zone below the first relatively competent bedrock layer encountered. The primary purposes of these wells were to establish groundwater flow direction, determine horizontal and vertical hydraulic gradients, describe the subsurface geology, and provide groundwater sampling points.

Monitoring well locations are shown on Figure 3-1. MW-1D was installed north and upgradient of the filled areas to assess background groundwater conditions in the bedrock aquifer. A shallow background well could not be installed because of the lack of water encountered in the overburden at this location. Additionally, due to the comparatively greater depth at which water was encountered in the bedrock, it was expected that very little water would exist in the overburden, even during periods of high precipitation. Three pairs of shallow and deep wells and a single deep well were installed along the eastern perimeter of the site. Monitoring well pair 2S and 2D was installed southeast of the northeast fill area in order to intercept possible groundwater contamination migrating from that area. MW-2S was installed 66 feet south of MW-2D near a small pond that is assumed to be spring fed based on its continual presence during the dry summer. MW-4D was installed as a single bedrock well at the northern end of the southern borrow pit. Competent bedrock was encountered at 9 feet, thereby precluding the installation of an overburden well. Monitoring well pair 5S and 5D was installed northeast of the southern fill area to intercept possible contamination from the south-central and/or south fill areas. Monitoring well pair 6S and 6D was installed just east of the south fill area to assess the fill area's impact on the groundwater.

Three well pairs were installed along the western perimeter of the site. Monitoring well pair 10S and 10D was installed just west of the northwest fill area and the leachate collection system. MW-9S and MW-9D were installed near the north access gate to assess the potential for contamination migrating south from the northwest area. MW-8S and MW-8D were installed immediately west of the south fill area in a bedrock "trough" identified during the seismic survey. However, after completion, MW-8D was deemed incompetent due to the presence of grout in the well casing. While subsurface information collected during the drilling of MW-8D has been used in this report, MW-8D was not used as a groundwater sampling point because the PVC casing had apparently collapsed and rendered the well inoperable. This well was subsequently abandoned and a new one drilled (as directed by NYSDEC on February 4, 1992) in its place on February 26 and 27, 1992. As agreed upon with NYSDEC, this new well will be sampled during the Phase II RI.

In addition to the perimeter wells, MW-3S and MW-3D were installed near the center of the site in a wide drainage swale adjacent to the drainage collection pond. Two additional wells were installed south of the site. MW-7D was installed to penetrate a bedrock trough trending north-south. At this location, no water was encountered in the overburden. Therefore, rather than install MW-7S, a new location was chosen approximately 190 feet west and downhill of MW-7D. This well was designated MW-11S.

Deep (Bedrock) Wells

All deep wells were screened entirely within the bedrock underlying the site. The screened intervals were determined in the field based on such factors as the presence of fractures, drilling water loss or gain, and well recharge determined by a bailer test. The bailer test consisted of bailing out the standing water in the open core hole and measuring the subsequent recharge. Additionally, an attempt was made to set all bedrock well screens in the same horizon near the top of bedrock across the site. However, due to the relief at the site, different types of bedrock were encountered at different locations.

During drilling, 2-foot split-spoon samples were collected continuously in the overburden. Split-spoon sampling was performed in conjunction with a standard penetration test as described in the American Society for Testing and Materials (ASTM) Designation D 1586-84, "Standard Method for Penetration Test and Split-Barrel Sampling of Soils." A 2-foot by 1.5-inch inside diameter (ID) hardened steel split-barrel sampler with shoe was driven in 2-foot depth intervals by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 6 inches was recorded as the blow count on the subsurface boring log. These blow counts were used to assess the relative density of the overburden at each well location.

All split-spoon recoveries were logged in the field by an E & E geologist. Special note was made of all soil types encountered, changes in lithology, and the depth at which groundwater was encountered. Soil descriptions were based upon the Unified Soil Classification System (USCS). In addition, all recovered soil was screened for VOCs with an HNu and OVA. Soil samples were retained from each deep well boring for chemical and geotechnical analyses as outlined in Section 3.5.3. In addition to monitoring with an HNu and OVA, the borehole was continuously monitored with a CG/O meter, and the surrounding area downwind of the drilling location was monitored with a miniram.

The boreholes were advanced with 4.25-inch ID, continuous-flight, hollow-stem augers until bedrock refusal. Bedrock was then cored to the total depth of the well using HQ-size water coring techniques, yielding a nominal 4-inch diameter corehole. Water drilling techniques were chosen instead of air drilling techniques in order to suppress the escape of any VOCs encountered during drilling. The augers remained in place until the well was nearly completed to serve as temporary surface casing. All drill water was held for discharge to the leachate holding pond near the southern access gate. All soil cuttings were left at the borehole location because no recovered soils exhibited HNu readings in excess of 5 ppm above background.

Auger refusal was encountered twice in MW-1D. First, at a depth of 15 feet, refusal occurred on a competent siltstone layer approximately 1.5 feet thick. Below this layer was clay, derived from weathered shale, that was too soft to core. Therefore, augering resumed until refusal at a depth of 44 feet. Below this depth, the well was cored.

Once a bedrock well was drilled to its total depth and sufficient water was encountered, 10 feet of 2-inch ID, 0.010-inch machine-slotted, schedule 40, PVC screen was set in the bottom of the corehole. Flush-joint, threaded, schedule 40, PVC riser of the same diameter was positioned above the screen to an approximate height of 2.5 feet above the ground surface. A quartz sand filter-pack was then poured around the screen. The height of sand above the screen varied from 1.5 feet to 6 feet and was dependent upon the depth of the well and the depth at which water was encountered. Number 2 Q-Rok® quartz/silica sand was used in all wells except MW-7D and MW-10D, where Number 3 Q-Rok® was used. A bentonite seal was then placed above the sand pack. All deep wells were sealed within bedrock or across the interface to prevent direct overburden/bedrock communication within the well. All deep wells except MW-4D were sealed by mixing a slurry of 4 to 5 gallons of Benseal® (Wyoming bentonite chips) and pumping it downhole with tremie lines. This resulted in a 3.9- to 8.5-foot seal, depending on the amount of void space surrounding the riser. Since MW-4D was relatively shallow, a 2.5-foot bentonite pellet seal was emplaced by hand. Table 3-3 summarizes the monitoring well construction data for each well.

The remainder of the annulus around the well was filled to the surface with grout consisting of Portland cement and 5% bentonite. Bentonite was not used in the upper 3 feet of the grout to ensure stability for the locking steel protective casing that was furnished for each well. Each well was completed with a concrete drainage pad constructed on the ground surface around the protective casing to divert surface runoff away from the well. All wells were secured with a No. 3252 Master lock. Figure 3-2 depicts the deep (bedrock) well design.

Shallow (Overburden) Wells

One shallow well was installed at each monitoring well location depicted on Figure 3-1 with the exception of the locations adjacent to wells MW-1D, MW-4D, and MW-7D. As discussed previously, these locations were not suitable for overburden wells. All shallow wells were screened entirely within the overburden at and around the site. The depth of each shallow well was predetermined during split-spoon sampling of the adjacent deep well. The screens in the overburden wells were set at such a depth as to intercept the water table and to allow for seasonal variations in the elevation of the water table.

The boreholes were advanced to the appropriate depth below the water table with 4.25-inch ID, hollow-stem, continuous-flight augers. Two-inch ID, 0.010-inch machine-slotted, schedule 40, PVC well screen was then placed into the borehole. Ten feet of screen was used in all wells except MW-2S and MW-6S. Due to the shallow depths of these wells, 4 feet of screen was used in MW-2S and 7 feet was used in MW-6S. Number 2 Q-Rok® quartz/silica sand was then placed around the screen to serve as a filter pack. The height of sand above the screen varied from 1 foot to 5 feet and was dependent upon the depth of the well and the depth to water. In all shallow wells except MW-2S, a 2-foot thick bentonite seal was placed above the sand using hydrated Wyoming bentonite pellets. Since MW-2S was only 9 feet deep, there was only sufficient room for a 1-foot seal. The remainder of each well was constructed identically to the deep wells, as described previously. Figure 3-3 depicts the shallow (overburden) well design, and Table 3-3 contains monitoring well construction data.

As with the deep wells, an HNu, OVA, CG/O meter, and miniram were used to monitor the borehole. All soil cuttings were left uncontained at the well location because no recovered soils exhibited HNu readings in excess of 5 ppm above background.

On September 20, 1991 a sample of the water used for drilling and decontamination was collected from the driller's holding tank. This sample, identified as DW-1, was analyzed for full TCL parameters according to NYSDEC CLP protocols. The water used for decontamination and drilling was obtained with the permission of the Village of Wellsville from a hydrant located at the Wellsville water treatment plant. This water is obtained from the Genesee River, treated, and used as potable water within the village. Analysis indicated that this water was free of contaminants.

Subsurface boring logs for all of the wells installed during the Phase I RI are included in Appendix B.

3.5.2 Well Development

Following the completion of drilling activities, all 17 competent wells installed at the site were developed to repair formation damage caused by the drilling operation, thereby restoring the natural hydraulic properties of the aquifer, as well as to enhance water flow into the wells. Data collected during the development of each well are included in tabular form in Appendix C.

All wells were developed by water evacuation and surging. Well MW-5D was initially developed on September 26, 1991 by surging with a PVC bailer and then pumping at a low flow rate with a centrifugal pump. Wells MW-1D, MW-2D, MW-3D, MW-3S, MW-4D, MW-5S, MW-10D, and MW-11S were initially developed between October 8 and 11, 1991. These wells were all purged with a PVC bailer and then pumped at a low flow rate with a submersible pump. In addition to pumping, wells MW-10D and MW-11S were purged of 10 and 16 gallons, respectively, with a PVC bailer. Wells MW-6D, MW-6S, MW-7D, MW-8S, MW-9D, MW-9S, and MW-10S were initially developed between October 8 and 11, 1991 by surging and subsequent evacuation with a PVC bailer.

Following initial development, all wells were developed additionally between October 15 and 18, 1991. At this time, all wells, with the exception of MW-1D and MW-2D, were surged with a rubber surge block and then bailed with a stainless-steel bailer. MW-1D and MW-2D were bailed with a stainless-steel bailer only. MW-2S was not developed prior to October 15, 1991 due to a lack of water in the well.

During development, periodic measurements of the pH, conductivity, temperature, and turbidity of the groundwater were recorded. These data are presented in Appendix C, along with the volume of water removed from each well. The number of well volumes purged from each well varied from 5.8 to 143.4 and was a function of the well recharge and amount of standing water in the well. All readings stabilized prior to completion of development; however, the turbidity of the disturbed groundwater remained well above the NYSDEC goal of 50 nephelometric turbidity units (NTU) in all cases.

Due to the high percentage of silt and clay in the formation, the turbidity goal of 50 NTU could not be achieved without sacrificing the integrity of the wells. However, when the wells were allowed to recharge and stabilize prior to sampling, much of the suspended material settled out, yielding relatively clear samples (see Section 4.4.2).

3.5.3 Subsurface Soil Sampling

During subsurface drilling activities, the deep boring from each monitoring well pair was continuously sampled with a split spoon as described in Section 3.5.1. The samples were logged by a field geologist and monitored for the presence of VOCs using an HNu and OVA. Two subsurface soil samples were obtained from each of the 10 deep wells, with the exception of MW-2D. Due to the shallow depth to bedrock and the coarseness of the overburden, only one sample was collected from MW-2D. Including the duplicate sample, a total of 20 samples were collected for laboratory analysis. Eight samples consisting of two samples from the upgradient well MW-1D and two each from MW-6D, MW-7D, and MW-8D were collected and analyzed for full TCL parameters according to NYSDEC CLP methods. Samples from each of the remaining six deep borings were collected and analyzed for TCL VOCs and inorganic substances only. Table 3-4 lists the samples collected, and Figure 3-1 depicts the monitoring well/boring locations.

In addition to the samples retained for chemical analyses, subsurface soil samples were also collected from each deep boring for geotechnical analyses (see Table 3-4). Samples were collected from each major lithologic unit encountered at each well pair location. Geotechnical samples were retained until all drilling was complete. At that time, 19 samples were chosen for moisture content, grain-size distribution, hydrometer, and Atterberg limits testing.

All split-spoon samples were screened with an HNu and OVA immediately upon opening the spoon. Any sample in which VOCs were detected with the HNu were screened with vinyl chloride Draeger tubes. No readings were observed with the Draeger tubes.

No HNu readings were observed on any split-spoon sample except in MW-1D and MW-5D. HNu readings up to 5 ppm were observed in the upper 4 feet of MW-1D; however, these readings were interpreted as interference from water vapor in the topsoil. Fluctuating HNu readings of 0 to 2 ppm and 0 to 1 ppm were observed in the 6- to 8-foot and 8- to 10-foot interval split spoons, respectively, in MW-5D. Various OVA readings up to 10 ppm were observed in numerous wells. However, based on associated HNu readings, these readings were interpreted as methane and other light hydrocarbons.

Samples for chemical analysis were collected in areas exhibiting the greatest VOC concentration whenever possible. However, due to coarse soils and poor split-spoon recoveries, this was not always possible. Therefore, sample collection was also based on field observation of physical characteristics. Each split-spoon sampler was decontaminated prior to use, as described in Section 3.14. Preservation, shipping, and handling procedures were performed in accordance with the QAPjP.

Field QA/QC samples collected during subsurface soil sampling include one field duplicate, one rinsate blank, and one MS/MSD sample set for full TCL analysis, as well as one MS/MSD sample set for TCL VOC and inorganic substance analyses. The field duplicate for full TCL analysis was collected from MW-8D, and the MS/MSD sample set for full TCL analysis was collected from MW-6D. The MS/MSD sample set for TCL VOC and inorganic substance analyses was collected from MW-10D. The rinsate blank consisted of deionized water passed through a previously decontaminated split spoon. All sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP.

3.5.4 Groundwater Sampling

Monitoring wells sampled during this phase of the RI included 17 of the 18 newly installed wells (excluding MW-8D) and the four wells installed during Malcolm Pirnie's Phase II study. Not including field QA/QC samples, a total of 21 groundwater samples were collected between October 22 and 24, 1991 and analyzed for full TCL parameters according to NYSDEC CLP methods.

Prior to groundwater sampling, static water levels were measured to within 0.01 foot in each well. All wells were then purged of three times the volume of water standing in the casing, with the exception of MW-2S and CW-3B. Due to very slow recharge rates, these wells were purged dry and only 2 and 1.4 well volumes, respectively, could be purged prior to sampling. Temperature, conductivity, and turbidity measurements were recorded at the time of sampling and are presented in Section 4.4.2.

Due to the presence of silt and clay in the surrounding formation, the turbidity in all wells remained above 50 NTU following development. Therefore, after purging, only the organic portion of the sample was collected. The well was then allowed to recharge, and the suspended sediment was allowed to settle overnight. Within 24 hours of purging, the inorganic portion of the sample was carefully collected in order to minimize sample turbidity. The turbidity of both the organic and inorganic sample portions was recorded and is presented in Section 4.4.2.

Dedicated, disposable, polyethylene bailers with dedicated polyethylene rope were used to purge and sample all the monitoring wells. Vials for VOC analysis were filled first, and care was taken not to agitate the sample. When the inorganic sample portion was collected, the bailer was used to carefully remove water from the top of the standing water column without agitating the settled sediment. The bottle for metals analysis was filled prior to the bottle for cyanide analysis, and both turbidities were recorded. Ten of the metals sampled had turbidities less than 50 NTU, while only two (GW-2S and GW-9S) had very high turbidities (>4,000 NTU).

Due to very slow recharge, sufficient sample volume could not be collected from MW-2S, MW-9S, and CW-3B for full TCL analysis. Therefore, samples GW-2S, GW-9S, and GW-12S were analyzed only for VOCs and metals.

All analyses were performed on unfiltered samples. Field QA/QC samples included a trip blank analyzed for TCL VOCs, as well as one field duplicate and one MS/MSD sample set analyzed for full TCL parameters. The field duplicate, designated GW-11SDD, was collected from MW-11S, and the MS/MSD sample set was collected from MW-10D. Sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP for all groundwater samples.

3.6 RESIDENTIAL WELL AND SPRING SAMPLING

Five residential wells (Rosini, Teller, Kelly, Bauer, and Vacarro) and two groundwater springs (LaDue and Miller) were sampled on October 24 and 25, 1991 (see Figure 3-4). All samples were analyzed for full TCL parameters according to NYSDEC CLP methods, with the exception of VOCs, which were analyzed according to United States Environmental Protection Agency (EPA) Drinking Water Method 524.2.

Following sample collection, measurements of conductivity, temperature, and turbidity were recorded. These data are presented in Section 4.4.3. Due to an instrument malfunction, no pH data were collected.

Samples DW-2, DW-3, DW-4, and DW-7 (from the Teller, Kelly, Bauer, and Vacarro residences, respectively) were collected from the cold water tap of the kitchen sink. The Tellers and Vacarros use their wells for drinking and washing, whereas the Kellys and Bauers use their wells only for washing. All wells are used on a regular basis, and none is equipped with any type of filtration system. In each case, the cold water tap was allowed to run for 3 to 5 minutes. Vials of water for VOC analysis were collected first and in a manner that minimized disturbance.

The Vacarro residence is the site of the Fitzgibbon spring, sampled during previous investigations. The now-dry Fitzgibbon spring was located on the hillside west of Duffy Creek and Duffy Hollow Road. Following the sale of the Fitzgibbon property to the Bakers, the new owners utilized a spring on the hillside east of Duffy Creek. This spring still exists. The property was then purchased by Vacarro, and a bedrock well was drilled adjacent to the east side of Duffy Creek. Sample DW-7 was collected from this well to determine if contamination from the site has passed east of Duffy Creek.

Sample DW-1 (Rosini) was collected from an outside spigot. The Rosini well is used only for washing; however, since this is not a permanent residence, the well had not been used in several weeks. Therefore, three well volumes (approximately 425 gallons) were purged from the well prior to sample collection. Water was pumped, using the existing pump, through the spigot used for sample collection and allowed to discharge on the ground downgradient of the well. The sample was collected in a manner similar to that described previously for other residential water samples.

Sample DW-5 (LaDue) was collected from the spring currently used for drinking and washing at LaDue's seasonal residence. The spring that was sampled is approximately 500 feet east and downhill of the spring sampled during previous investigations. During the summer of 1991, Mr. LaDue deepened his old spring in an attempt to increase the flow rate. However, he broke through a confining clay layer, causing all water in the spring to flow out. Therefore, he dug a new spring further downhill. This spring, which is approximately 6 to 8 feet deep, is the one that was sampled. Because the spring is enclosed, water was collected from a PVC overflow pipe that allows excess water to exit at the base of the enclosure. Because water flows continuously from this pipe, the sample was collected immediately after arrival and in a manner similar to that described previously. Water from this spring is not filtered prior to use.

Sample DW-6 (Miller) was not collected from the spring sampled during previous investigations. That spring, which was located in the hillside northeast of the Miller's seasonal residence, was found to be dry at the time of sampling. Therefore, an 18-inch-deep sump was dug in a marshy area downhill from the former Miller spring and other active springs noted during the investigation. The bottom of the sump was an impervious clay and silt layer on which perched groundwater flows. When this location was sampled, the sump was noted to be overflowing with a continuous supply of clear water. Sample DW-6 was collected by carefully submerging the sample bottles in the sump. The sample portions for VOC and metals analyses were collected first in a manner that minimized disturbance of the settled sediment at the bottom of the sump.

In addition to the above samples, QA/QC samples collected included a duplicate (DW-5D) from the LaDue spring and additional volume from the Teller well (DW-2) for MS/MSD analyses.

Sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP for all domestic water samples.

3.7 SURFACE WATER AND SEDIMENT SAMPLING

A total of six surface water samples were collected from the two streams bordering the site. At each surface water sampling location, a sediment sample was also obtained. The approximate locations of the surface water and sediment samples are shown in Figure 3-4 and are described as follows:

- Two samples were collected as far upgradient in each stream as possible, in order to determine background conditions. One sample (SW-1/SED-1) was obtained from the unnamed tributary north of Pump Station 1. The furthest upstream that SW-1/SED-1 could be collected was where surface runoff from the site first enters the tributary. Upstream of this location, the tributary was nearly dry and did not facilitate sample collection. Therefore, SW-1/SED-1 is not considered representative of background conditions in the unnamed tributary. Sample SW-2/SED-2 was taken from Duffy Creek west of Duffy Hollow Road, approximately 1,000 feet south of Pixley Hill Road. This sample is expected to represent background conditions in Duffy Creek.

- Sample SW-3/SED-3 was collected from a pool in the unnamed tributary west and slightly downstream of Pump Station 1.

- Sample SW-4/SED-4 was obtained from a pool downstream of the site in Duffy Creek, approximately 500 feet upstream of its confluence with the unnamed western tributary.

- Sample SW-5/SED-5 was collected approximately 350 feet downstream of the confluence of Duffy Creek and its unnamed western tributary.

- Sample SW-6/SED-6 was obtained approximately 800 feet downstream of the confluence of Duffy Creek and its unnamed western tributary to determine if there is any downstream risk associated with the site.

Samples were collected from downstream to upstream so that any disturbances (turbulence) caused by sampling activities would not affect downstream sampling locations. Additionally, the surface water samples were collected prior to the sediment samples at each location. Samples were collected by carefully submerging precleaned bottles directly into the creek in such a way as to minimize agitation of the water.

The six surface water samples were analyzed for full TCL parameters, as well as hardness, by the methods described in Section 3.1. All samples were analyzed unfiltered. Field QA/QC samples included one field duplicate (SW-4D) for full TCL and hardness analyses and one MS/MSD sample set for full TCL analysis, both of which were collected from the same location as SW-4.

The six corresponding sediment samples were analyzed for full TCL parameters according to the NYSDEC CLP methods, as well as percent organic matter by ASTM methods (see Section 3.1). Field QA/QC samples include one field duplicate for full TCL and percent organic matter analyses (SED-4D) and one MS/MSD sample set for full TCL analysis, both of which were collected from the same area as SED-4.

Sample locations were chosen from places where sediment accumulates. Sediment samples were collected from near shore with minimal disturbance, using dedicated stainless-steel spoons, and transferred directly into appropriate prelabeled sample containers.

Sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP for all surface water and sediment samples.

3.8 SURFACE SOIL SAMPLING

Biased surface soil samples (0 to 4 inches deep) were collected from 12 locations where physical evidence of contamination existed (SS-3 through SS-14). These locations were selected in the field based on visual observations (i.e., leachate outbreaks, stained soil, etc.) and HNu readings. These samples consisted of leachate-stained sediment and soil as well as other surficial materials including the cover material. Two additional samples (SS-1 and SS-2) were collected from undisturbed areas in the vicinity of the upgradient monitoring well MW-1D (upgradient of the fill areas) to serve as background soil samples. Table 3-5 describes the location of each surface soil sample. Figure 3-1 depicts the soil sampling locations.

Surface soil samples were collected with precleaned, dedicated, stainless-steel spoons. An appropriate amount of soil, excluding gravel, roots, and organic matter, was placed directly into precleaned, prelabeled sample jars. VOC sample bottles were filled first with material that was as undisturbed as possible.

All 14 surface soil samples were analyzed for full TCL parameters according to NYSDEC CLP methods. Field QA/QC samples included one field duplicate (SS-10D) collected from the same location as SS-10 and an MS/MSD sample set collected from the same location as SS-11 for full TCL analysis. Analytical methods are summarized in Section 3.1. All preservation, shipping, and handling procedures were performed in accordance with the QAPjP.

3.9 LEACHATE SAMPLING

Leachate samples were to be collected from six locations within the on-site leachate collection system. Four of the samples were to be collected from manholes on the mainline and two from 6-inch-diameter PVC risers on the lateral lines. The manholes and risers to be sampled were to be those containing the highest concentrations of VOCs as determined during the air monitoring described in Section 3.10. However, when the selected manholes and risers were opened, no liquid leachate was found. The remaining manholes were then checked, and most were found to contain no liquid leachate or an amount insufficient to sample. The drain pipes at the bottom of the manholes were found to contain sediment, with the leachate most likely flowing through the sediment and/or the stone surrounding the drain pipe.

Due to the lack of liquid leachate, only two locations were sampled. Sample L-1 was collected from Manhole 4 across Snyder Road from Pump Station 1. Through this manhole, leachate from the northeast, northwest, and south-central fill areas passes prior to entering the sump at Pump Station 1. Sample L-2 was collected from the sump at Pump Station 2, which collects leachate from the south fill area only. These locations are shown on Figure 3-1.

The following procedures were used to collect the leachate samples:

- Upon opening the manhole, the head space and breathing zone were monitored with an HNu.
- A dedicated polyethylene bailer was lowered slowly into the manhole as often as necessary to fill the required sample jars. VOC sample bottles were filled from the initial bail of leachate at each location.
- Leachate samples were poured carefully from the bailer into precleaned and prelabeled sample bottles.
- Preserving, shipping, and handling procedures were performed in accordance with the QAPjP.

Field parameters, including pH and conductivity, were measured. These results are discussed in Section 4.4.7.

The two samples collected from the leachate collection system were analyzed for full TCL parameters according to NYSDEC CLP methods. Field QA/QC samples included one MS/MSD sample set for full TCL analysis collected from the same location as L-2. Analytical methods are outlined in Section 3.1.

In accordance with the work plan, no leachate samples were collected from the pump stations for Toxicity Characteristic Leaching Procedure (TCLP) analysis because the analytical results from L-1 and L-2 did not warrant this analysis.

3.10 AIR SAMPLING

The sampling strategy involved a graduated approach. First, all of the manholes and risers in the leachate collection system were screened using an HNu, OVA, and vinyl chloride Draeger tubes. The screening was accomplished by inserting the probe directly into the manhole or riser, either through an existing hole or by lifting the cover just enough to admit the probe. This procedure was used to avoid venting the manholes and risers and dispersing any gas collected in them. The readings obtained reflect the total concentration of the VOCs (aromatics such as benzene, toluene, and xylene and chlorinated alkenes such as tetrachlorethene [PCE], TCE, DCE, and vinyl chloride) of interest from a risk standpoint. Originally, leachate samples were to be collected from various areas of the leachate collection system in order to assess the relative contributions of contaminants from each fill area.

However, due to insufficient liquid sample volume, the air sampling strategy was altered to achieve that goal and support the risk assessment. Rather than selecting the six locations with the highest PID readings, the "hottest" manholes and/or risers near each fill area were sampled. Four manholes and two risers were selected for formal gas sampling. Table 3-6 summarizes the air samples collected. Figure 3-1 depicts the locations of the manholes and risers sampled. Results of the air monitoring and sampling activities are presented in Section 4.4.8.

The formal sampling was done using EPA method TO-14 (USEPA 600/4-84-041, April 1984; Second Supplement, June 1988), which involves drawing a whole air sample into a 6-liter SUMMA® passivated canister. SUMMA® passivation involves coating the interior of the stainless-steel canister with a nickel-chromium oxide that deters VOCs from adhering to the interior walls. Evacuated canisters were obtained from Air Toxics, Ltd., the analytical laboratory subcontracted to perform the analyses.

A sample of 4 to 6 liters was drawn from the manhole or riser through a 2-foot Teflon tube attached to the canister inlet with a 1-foot stainless-steel tube. Sampling was performed over a short time period (i.e., 2 to 3 minutes) because conditions in the collection system should have remained relatively stable.

Once the samples were collected, they were shipped to the laboratory for Method TO-14 analysis. Method TO-14 involves cryogenically trapping the VOCs in the sample and analyzing them using a high-resolution gas chromatograph coupled with the appropriate detectors.

In addition to the samples collected from the manholes and risers, a duplicate sample and field blank were also analyzed for QA purposes. The duplicate sample, designated A-6, was collected from Riser R-2. The field blank consisted of a previously evacuated canister into which 4 to 6 liters of purified nitrogen was run. The purpose of the blank was to act as a trip blank and to assess the VOC contribution made by the attached tubing.

3.11 LEACHATE COLLECTION SYSTEM EVALUATION

In conjunction with the ground-based survey and leachate sampling, E & E collected data in order to determine the effectiveness of the leachate collection system as well as means to increase its effectiveness, if necessary. In order to evaluate the system, the following information regarding its construction and operation was collected:

- Verification of vertical and horizontal layout of the collection system by means of a ground survey;

- Review of selected records from the Village of Wellsville wastewater treatment facility regarding delivery of leachate from the landfill in an attempt to determine seasonal and climatic trends; and

- Estimation of flow rates at various points in the collection system to determine the relative contribution of leachate from the individual fill areas.

Data will be used in the determination of which areas, if any, are suited for phased or interim remedial actions in addition to the development of final remedial solutions. Results pertaining to the leachate collection system are not included in this draft of the RI report but will be included in the first draft of the FS report.

3.12 HABITAT-BASED ECOLOGICAL ASSESSMENT

In order to characterize the ecological resources associated with the Wellsville-Andover Landfill site, E & E conducted initial background research. In addition, E & E biologists conducted a field reconnaissance of the terrestrial and aquatic communities existing at and in the general vicinity of the site on October 24, 1991.

E & E's scope of work addresses items identified in Step I of the NYSDEC document Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites.

The following is a discussion of the approach E & E utilized to characterize ecological communities associated with the Wellsville-Andover Landfill site.

Terrestrial Ecosystems

Prior to field work, E & E analyzed current USGS topographic maps, United States Department of Agriculture (USDA) Soil Conservation Service (SCS) soils maps, and NYSDEC Wetland Maps to distinguish vegetative cover types. Cover type designations correlate to cover types described by the New York State Natural Heritage Program (NYSNHP) in its Ecological Communities of New York State. Both the NYSNHP and NYSDEC regional offices, as well as any other pertinent agencies, were contacted to identify any significant habitats known to occur on or near the site.

Field reconnaissance was used to verify the initial cover type mapping. Each cover type was surveyed in the field by traversing random but representative transects. Within each cover type, dominant species in the overstory, understory, and herbaceous layers were identified.

Potential wetlands were characterized and map-delineated following procedures detailed in the Corps of Engineers Wetland Delineation Manual (Department of the Army 1987) that use hydric soils, wetland hydrology, and hydrophytic vegetation for making wetland determinations.

Evidence of disturbed or stressed vegetation was noted, and each cover type was evaluated with regard to its relative value for wildlife habitat. Potential wildlife utilization was determined primarily through literature review supported by in-field observations. Because of the mobile and often nocturnal habits of mammals and the transitory nature of avifauna, verification relied on evidences of wildlife utilization in the form of browse, tracks, burrows, or scat. Bird species were identified by sight and call.

Aquatic Ecosystems

Collection of information characterizing the aquatic ecosystem relied primarily on project field surveys. As for the terrestrial ecosystems, NYSNHP and NYSDEC were contacted to identify any significant communities or species in the vicinity of the Wellsville-Andover Landfill site, as well as typical species that might be expected.

Duffy Creek and its unnamed tributary were surveyed to characterize their various ecological features and infer their relative quality based primarily on the type, number, and diversity of benthic organisms present. In addition, basic water chemistry data were collected.

To characterize the physical nature of the streams, depth, width, bottom composition, stream flow, bank height, and fish habitat characteristics were observed and recorded at sampling locations. Riparian vegetation adjacent to the stream was characterized as to successional stage, species composition, and canopy closure. The presence or absence of in-stream submergent and emergent vegetation was used to assess the relative health of the aquatic community.

3.13 QUALITY CONTROL (QC) SAMPLES AND PROCEDURES

All field work and sampling activities at the site were performed in accordance with E & E's June 1991 Quality Assurance Project Plan (QAPjP), Phase I Remedial Investigation/Feasibility Study (RI/FS) for the Wellsville-Andover Landfill Site in Wellsville, New York as well as the June 1991 Remedial Investigation/Feasibility Study, Health and Safety Plan (HASP) for the Wellsville-Andover Site.

As described in the June 1991 QAPjP and work plan, several field QC samples were required for the various media sampled. Duplicate samples were collected for subsurface soils (SB-8AD), groundwater (GW-11SDD), domestic water (DW-5D), surface water (SW-4D), sediment (SED-4D), surface soil (SS-10D), and air (A-6). MS/MSD sample sets were collected for test pit samples (TP-5), subsurface soil (SB-6A and SB-10A), groundwater (GW-10D), domestic water (DW-2), surface water (SW-4), sediment (SED-4), leachate (L-2), and surface soil (SS-11). All of the above samples were analyzed for full TCL parameters, with the exception of the MS/MSD set collected from SB-10A, which was analyzed for VOCs and inorganic substances only, and the air sample duplicate, which was analyzed for VOCs only by Method TO-14.

Other field QC samples collected include one rinsate (R-1), one air sample blank (A-8), and three trip blanks. The rinsate sample, collected at the time of subsurface soil sampling, was collected by pouring laboratory deionized water through a split spoon previously decontaminated according to the procedures in Section 3.14. This sample, analyzed for full TCL parameters, was used to check the decontamination procedure. The air sample blank consisted of an unopened SUMMA® canister transported to and from the field with the other canisters in order to assess potential leakage and ambient conditions. This sample was analyzed for VOCs by Method TO-14. Three trip blanks, analyzed for VOCs only, were incorporated with sample shipments containing water samples on October 2, 4, and 25, 1991.

In addition to the above, a sample of the water used for drilling and decontamination (DW-1) was collected from the driller's holding tank. This water, analyzed for full TCL parameters, consisted of potable water collected from a hydrant at the Village of Wellsville's water treatment plant.

3.14 DECONTAMINATION PROCEDURES

All decontamination was performed in accordance with NYSDEC-approved procedures. Sampling methods and equipment were chosen to minimize decontamination requirements and prevent the possibility of cross-contamination. All drilling equipment was decontaminated prior to drilling, after drilling each monitoring well, and after the completion of all monitoring wells. Specific attention was given to the drilling assembly, augers, split spoons, and PVC casing and screens. Split spoons were decontaminated prior to and following each use. Decontamination of drilling equipment consisted of:

- Removal of foreign matter, followed by
- High-pressure steam-cleaning.

Sampling equipment, including stainless-steel spoons, was decontaminated using the following procedure:

- Washing in a trisodium phosphate (TSP) solution;
- Rinsing with potable water;
- Rinsing with 10% nitric acid;
- Rinsing with deionized water;
- Rinsing with pesticide-quality methanol;
- Rinsing with deionized water; and
- Air drying.

A temporary decontamination pad was constructed west of the leachate holding pond using plywood and heavy plastic sheeting. The primary purpose of the pad was to support decontamination of heavy equipment, such as the drill rig and augers. Fluids generated during decontamination were pumped from the pad directly into the leachate holding pond. Split spoons were often steam-cleaned at the drill site in a tub, and the generated water was transported to the leachate holding pond for disposal.

No soil cuttings generated during monitoring well installation exhibited HNu readings greater than 5 ppm above background. Therefore, all soil was left on the ground near the monitoring well, except at MW-7D and MW-11S. Since these wells were off site, the soil was transported to the site and disposed.

All waters generated by decontamination or by developing, purging, or pumping monitoring wells were transported to the leachate holding pond. All expendable materials generated during the investigation (i.e., Tyvek clothing, gloves, spoons, plastic sheeting from the decontamination pad, etc.) were placed in U.S. Department of Transportation (DOT)-approved 17H drums and stored at a central location on site. All drums containing investigation-derived waste were labeled with type of generated material, the site name, the location where the material was generated, and the date when the material was generated.

Personal decontamination was performed in accordance with the HASP.

Table 3-1

ANALYTICAL METHODS SUMMARY

Method Reference	Method Number	Brief Description of Method	Matrix
Atterberg Limits ASTM	D4318-84	Liquid and plastic limit, plasticity index	Soil
Cyanide-Total ASP	335.2	Spectrophotometric	Water
ASP	9010	Colorimetric	Soil
Grain Size ASTM	D422-63	Sieve and hydrometer analysis	Soil
Hardness ASP	130.2	Titrimetric, EDTA	Water
Moisture Content ASTM	D2216-90	Heat to 110°C	Soil
Percent Organic Matter ASTM	D2974-87	Ash content, heat to 440°C in muffle furnace	Sediment
Aluminum ASP CLP	200.7-M	ICP	Soil, Water
Arsenic ASP CLP	206.2-M	Furnace AA	Soil, Water
ASP	6010	ICP	Soil, Water
Barium ASP CLP	200.7-M	ICP	Soil, Water
ASP	6010	ICP	Soil, Water
Beryllium ASP CLP	200.7-M	ICP	Soil, Water
Cadmium ASP CLP	200.7-M	ICP	Soil, Water
ASP	6010	ICP	Soil, Water
Calcium ASP CLP	200.7-M	ICP	Soil, Water
Chromium ASP CLP	200.7-M	ICP	Soil, Water
ASP	6010	ICP	Soil, Water
Cobalt ASP CLP	200.7-M	ICP	Soil, Water

Table 3-1

ANALYTICAL METHODS SUMMARY

Method Reference	Method Number	Brief Description of Method	Matrix
Copper ASP CLP	200.7-M	ICP	Soil, Water
Iron ASP CLP	200.7-M	ICP	Soil, Water
Lead ASP CLP	239.2-M	Furnace AA	Soil, Water
ASP CLP	200.7-M	ICP	Soil, Water
ASP	6010	ICP	Soil, Water
Magnesium ASP CLP	200.7-M	ICP	Soil, Water
Manganese ASP CLP	200.7-M	ICP	Soil, Water
Mercury ASP CLP	245.1-M	Manual cold vapor	Soil, Water
ASP	7470	Cold vapor-liquid	Water
Nickel ASP CLP	200.7-M	ICP	Soil, Water
Potassium ASP CLP	200.7-M	ICP	Soil, Water
Selenium ASP CLP	270.2-M	Furnace AA	Soil, Water
ASP	6010	ICP	Soil, Water
Silver ASP CLP	200.7-M	ICP	Soil, Water
ASP	6010	ICP	Soil, Water
Sodium ASP CLP	200.7-M	ICP	Water
Thallium ASP CLP	279.2-M	Furnace AA	Soil, Water
Vanadium ASP CLP	200.7-M	ICP	Soil, Water
Zinc ASP CLP	200.7-M	ICP	Soil, Water

Table 3-1

ANALYTICAL METHODS SUMMARY

Method Reference	Method Number	Brief Description of Method	Matrix
Base/Neutral/Acid Extractables			
ASP CLP	89-2	Extraction, GC/MS	Soil, Water
Volatile Organic Compounds			
ASP CLP	89-1	Purge & Trap, GC/MS	Soil, Water
ASP	524.2	Purge & Trap, GC/MS	Drinking water
Pesticides/PCBs			
ASP CLP	89-3	Extraction, GC/ECD	Soil, Water

Key:

AA = Atomic absorption spectroscopy.
ASP = NYSDEC Analytical Services Protocol, September 1989.
ASTM = American Society of Testing and Materials, 1991.
GC/MS = Gas chromatograph/mass spectrometer.
GC/ECD = Gas chromotograph/electron capture detector.
CLP = Contract Laboratory Program SOW, July 1988, modified.
ICP = Inductively coupled argon plasma.

Source: Ecology and Environment Engineering, P.C. 1992.

Table 3-2

SOIL SAMPLES COLLECTED DURING TRENCH EXCAVATION

Sample Number	Trench Number	Date	Approximate Depth (feet)	Analysis	Description
TP-1	1	12-19-92	6	Full TCL	Saturated dark gray clay loam with minor trash fragments on which black liquid contents of drum leaked.
TP-2	2	12-19-92	5 to 6	Full TCL	Moist, dark gray to black clay loam with minor trash fragments. Collected from bucket that scraped along full 12-foot length of trench.
TP-3	3	12-19-92	6	Full TCL	Saturated dark gray and brown clay loam with minor trash fragments collected from northeast end of trench near unknown scrap metal.
TP-4	4	12-18-92	3	Full TCL	Moist brown clay loam containing pieces of plastic buttons from trench as well as fragments of pink and white plastic material from drums. Includes material directly from partially removed drum.
TP-5	5	12-18-92	4	Full TCL	Saturated medium gray clay loam with rock and municipal trash fragments collected at the level of the water table below a crushed oil drum.

Source: Ecology and Environment Engineering, P.C. 1992.

Table 3-3

MONITORING WELL CONSTRUCTION DATA[a]

Well	Depth to Auger Refusal	Total Depth	Depth of Screened Interval	Depth of Sand Pack	Depth of Bentonite Seal
1D	44.0	74.5	64.5 - 74.5	61.9 - 74.5	58.0 - 61.9
2D	24.0	61.0	49.0 - 59.0	43.0 - 61.0	36.5 - 43.0
2S	9.0[b]	9.0	5.0 - 9.0	4.0 - 9.0	3.0 - 4.0
3D	25.0	41.6	30.0 - 40.0	28.0 - 41.6	22.5 - 28.0
3S	19.0[b]	19.0	9.0 - 19.0	7.0 - 19.0	5.0 - 7.0
4D	9.0	23.3	12.0 - 22.0	10.0 - 23.3	7.5 - 10.0
5D	23.5	36.8	26.5 - 36.5	25.0 - 36.8	19.0 - 25.0
5S	--	22.0	10.0 - 20.0	8.0 - 22.0	6.0 - 8.0
6D	14.6	28.3	18.0 - 28.0	16.0 - 28.3	11.0 - 16.0
6S	14.8	13.5	6.5 - 13.5	5.0 - 13.5	3.0 - 5.0
7D	26.0	45.4	35.1 - 45.1	31.0 - 45.4	24.0 - 31.0
8D[c]	64.0	77.0	67.0 - 77.0	65.5 - 77.0	57.0 - 65.5
8S	--	20.7	7.0 - 17.0	5.5 - 20.7	3.5 - 5.5
9D	29.0	45.4	35.1 - 45.1	32.0 - 45.4	26.0 - 32.0
9S	--	19.3	9.0 - 19.0	7.0 - 19.3	5.0 - 7.0
10D	29.0	43.4	33.1 - 43.1	31.0 - 43.4	26.0 - 31.0
10S	--	24.3	14.0 - 24.0	9.0 - 24.3	7.0 - 9.0
11S	>24	23.6	8.0 - 18.0	6.0 - 23.6	4.0 - 6.0

[a] All depths are in feet below ground surface (BGS).
[b] Different depths to auger refusal in shallow well achieved due to change in bit type.
[c] Well found to be incompetent after completion.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 3-4

SUBSURFACE SOIL SAMPLES COLLECTED DURING WELL DRILLING

Well Number	Sample ID	Depth (feet)	Date	Analysis
MW-1D	SB-1A	12 - 14	08-27-91	Full TCL
	SB-1B	1 - 2	08-29-91	Full TCL
	1D[a]	0 - 2	08-30-91	Geotechnical
MW-2D	SB-2A	6.5 - 7.5	09-03-91[a]	TCL volatiles and inorganics
	2D[a]	4 - 6	09-03-91	Geotechnical
MW-3D	SB-3A	1 - 2	09-05-91[a]	TCL volatiles and inorganics
	SB-3B	10 - 12	09-05-91[a]	TCL volatiles and inorganics
	3D[a]	5 - 6	09-05-91	Geotechnical
	3D[b]	22 - 24	09-05-91	Geotechnical
MW-4D	SB-4A	2 - 4	09-09-91	TCL volatiles and inorganics
	5B-4B	7 - 9	09-09-91	TCL volatiles and inorganics
	4D[a]	1 - 2	09-09-91	Geotechnical
MW-5D	SB-5B	8 - 9	09-10-91	TCL volatiles and inorganics
	SB-5C	18 - 19	09-10-91	TCL volatiles and inorganics
	5D[a]	8 - 10	09-10-91	Geotechnical
MW-6D	SB-6A[b]	6 - 10	09-11-91	Full TCL
	SB-6B	12 - 14	09-12-91	Full TCL
	6D[a]	2 - 4	09-11-91	Geotechnical
	6D[b]	12 - 14	09-12-91	Geotechnical
MW-7D	SB-7A	8 - 10	10-01-91	Full TCL
	SB-7B	20 - 21 and 22 - 23	10-01-91	Full TCL
	7D[a]	10.5 - 11	10-01-91	Geotechnical
	7D[b]	20 - 22	10-01-91	Geotechnical
MW-8D	SB-8A	7 - 9	09-20-91	Full TCL
	SB-8AD[c]	7 - 9	09-20-91	Full TCL
	SB-8B	21 - 23	09-20-91	Full TCL
	8D[a]	1 - 3	09-20-91	Geotechnical
	8D[b]	11 - 12	09-20-91	Geotechnical
	8D[c]	43 - 44	09-25-91	Geotechnical
MW-9D	SB-9A	4 - 6	09-18-91	TCL volatiles and inorganics
	SB-9B	26 - 27.5	09-18-91	TCL volatiles and inorganics
	9D[a]	1 - 3	09-18-91	Geotechnical
	9D[b]	14 - 16	09-18-91	Geotechnical
MW-10D	SB-10A[b]	5 - 7	09-13-91	TCL volatiles and inorganics
	SB-10B	18 - 19	09-16-91	TCL volatiles and inorganics

Table 3-4

SUBSURFACE SOIL SAMPLES COLLECTED DURING WELL DRILLING

Well Number	Sample ID	Depth (feet)	Date	Analysis
MW-11S	11S[a]	17 - 18	10-03-91	Geotechnical
--	CL-1[d]	1.5 - 2	10-25-91	Geotechnical

Note: Geotechnical analysis refers to moisture content, grain size, and hydrometer analysis and Atterburg limits testing.

[a] Portion for TCL volatile analysis re-collected 10-03-91.
[b] MS/MSD sample set also collected for QA/QC.
[c] Duplicate sample for QA/QC.
[d] Sample of confining layer material collected from area of Miller spring.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 3-5

SURFACE SOIL SAMPLE LOCATIONS

Sample Number	Description
SS-1	Background soil sample from undisturbed ground approximately 50 feet northwest of MW-1D.
SS-2	Background soil sample from shallow ditch along west side of dirt road, due west of MW-1D.
SS-3	Head of active leachate seep at southwest corner of northeast fill area. Seep is not stained orange and red like other seeps on site.
SS-4	East bank of the small standing surface water body adjacent to and west of MW-2S.
SS-5	Bottom of the southeast corner of the drainage collection pond at a point where runoff from the northeast portion of the site enters the pond.
SS-6	Head of an active leachate seep in the east-central portion of the northwest fill area. Soil was stained dark red.
SS-7	Head of an active leachate seep in the southwest portion of the northwest fill area. Soil, which was stained red, was collected near point of bubbling gas escape.
SS-8	Base of an active leachate seep (immediately west of bubbling seep) in the southwest portion of the northwest fill area. Soil was stained red.
SS-9	In the confluence of two ditches adjacent to the gate at the northern access road in order to assess the potential for off-site contaminant migration. One ditch runs along the west side of the northwest fill area and the other along the east and south sides of that fill area.
SS-10	South of the sump at Pump Station 2 where leachate often overflows. Soil was stained red.
SS-10D	Duplicate of SS-10.
SS-11	Head of an inactive leachate seep in the center of the south fill area. Soil was stained reddish-orange.
SS-12	In a shallow runoff ditch cut into the cover along the south side of the south-central fill area.
SS-13	In a ditch along the south side of the dirt access road to LaDue's home. Collected near a culvert where leachate from Pump Station 2 can pass onto LaDue's property, in order to assess the potential for off-site contaminant migration.
SS-14	In a shallow ditch on the property of E. Ormsby east and downhill of the northeast fill area, in order to assess the potential for off-site contaminant migration.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 3-6

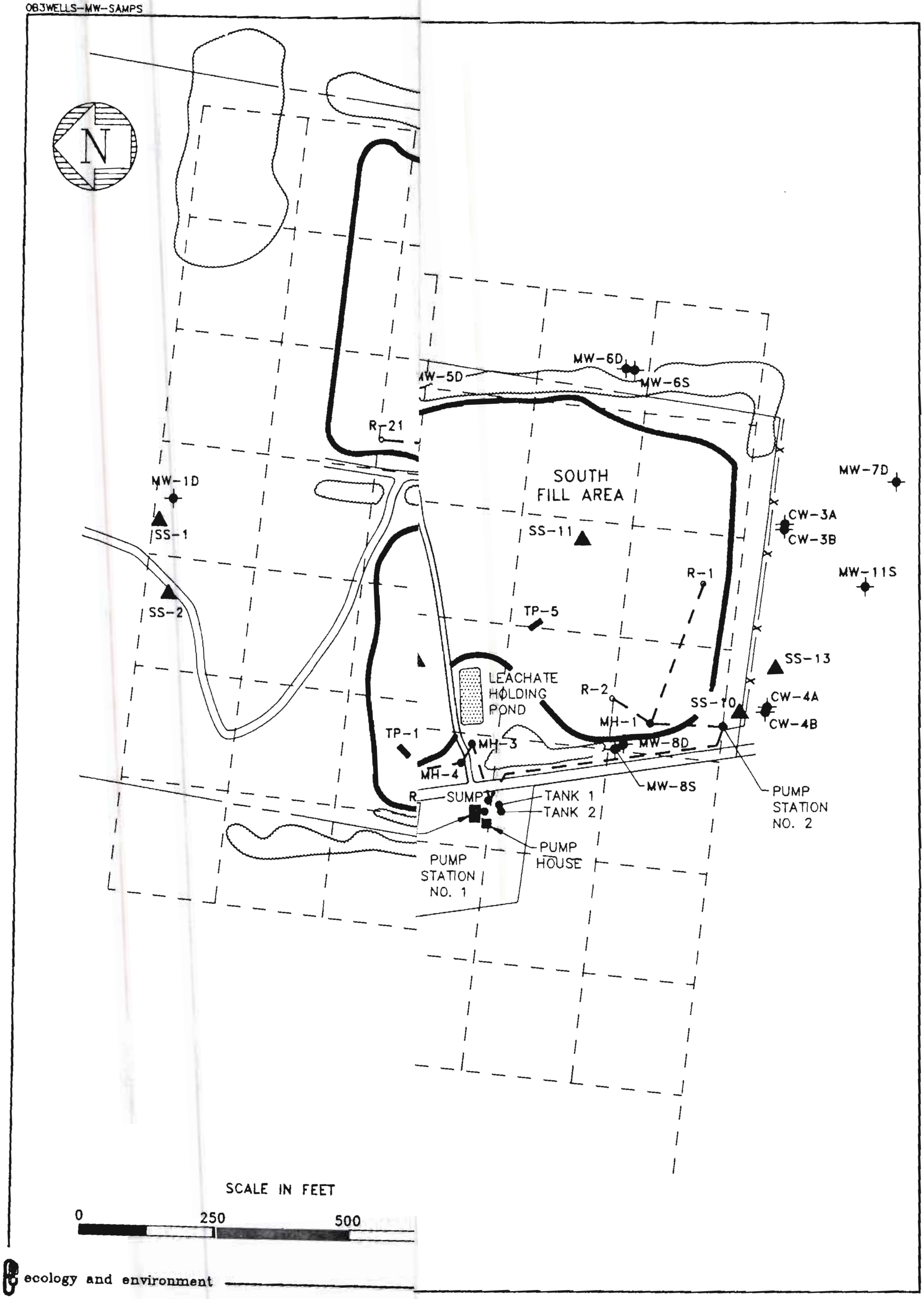
AIR SAMPLES COLLECTED FROM THE LEACHATE COLLECTION SYSTEM
DECEMBER 19, 1991

Sample Number	Canister Number	Manhole/Riser	Description
A-1	11302	MH-10	Collected to evaluate the relative VOC contribution from the northern portion of the northwest fill area.
A-2	11303	R-10	Collected to evaluate a "hot spot" in the northwest fill area.
A-3	11306	MH-6	Collected to evaluate the relative VOC contribution from the southern portion of the northwest fill area.
A-4	11305	MH-15	Collected to evaluate the relative VOC contribution from the northeast fill area.
A-5	11300	R-2	Collected to evaluate a "hot spot" as well as the relative VOC contribution from the south fill area.
A-6	11301	R-2	Duplicate of A-5 for QA/QC.
A-7	11299	MH-3	Collected to assess the relative VOC contribution from the south-central fill area.
A-8[a]	11298	NA	Field blank for QA/QC.

[a]Purified nitrogen from E & E's ASC collected on 12-20-91.

Source: Ecology and Environment Engineering, P.C. 1991.

OB3WELLS-MW-SAMPS



ecology and environment

Figure 3-1 MONITORING WELL AND SAMPLING LOCATIONS WELLSVILLE-ANDOVER LANDFILL

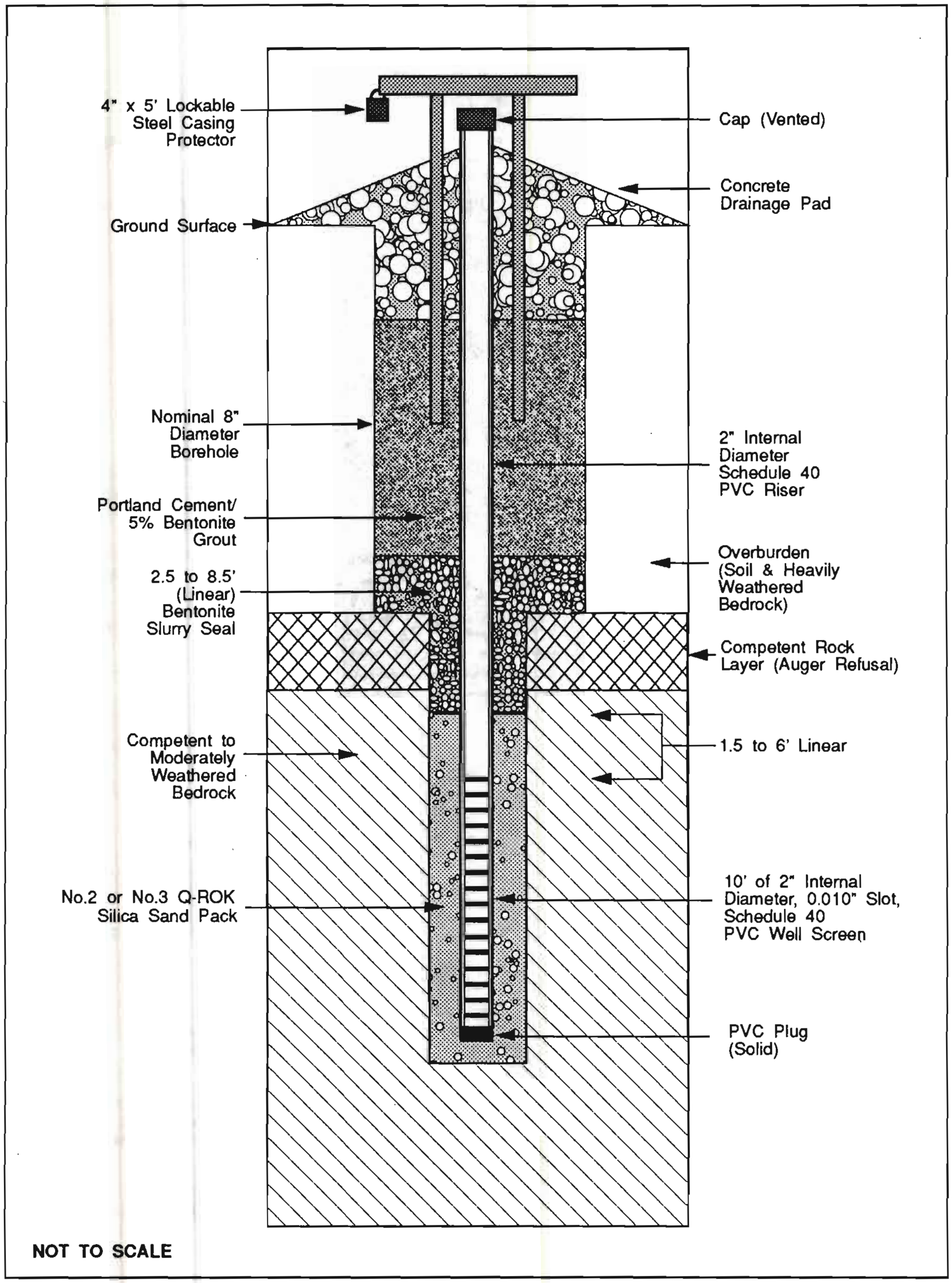


Figure 3-2
DEEP MONITORING WELL CONSTRUCTION

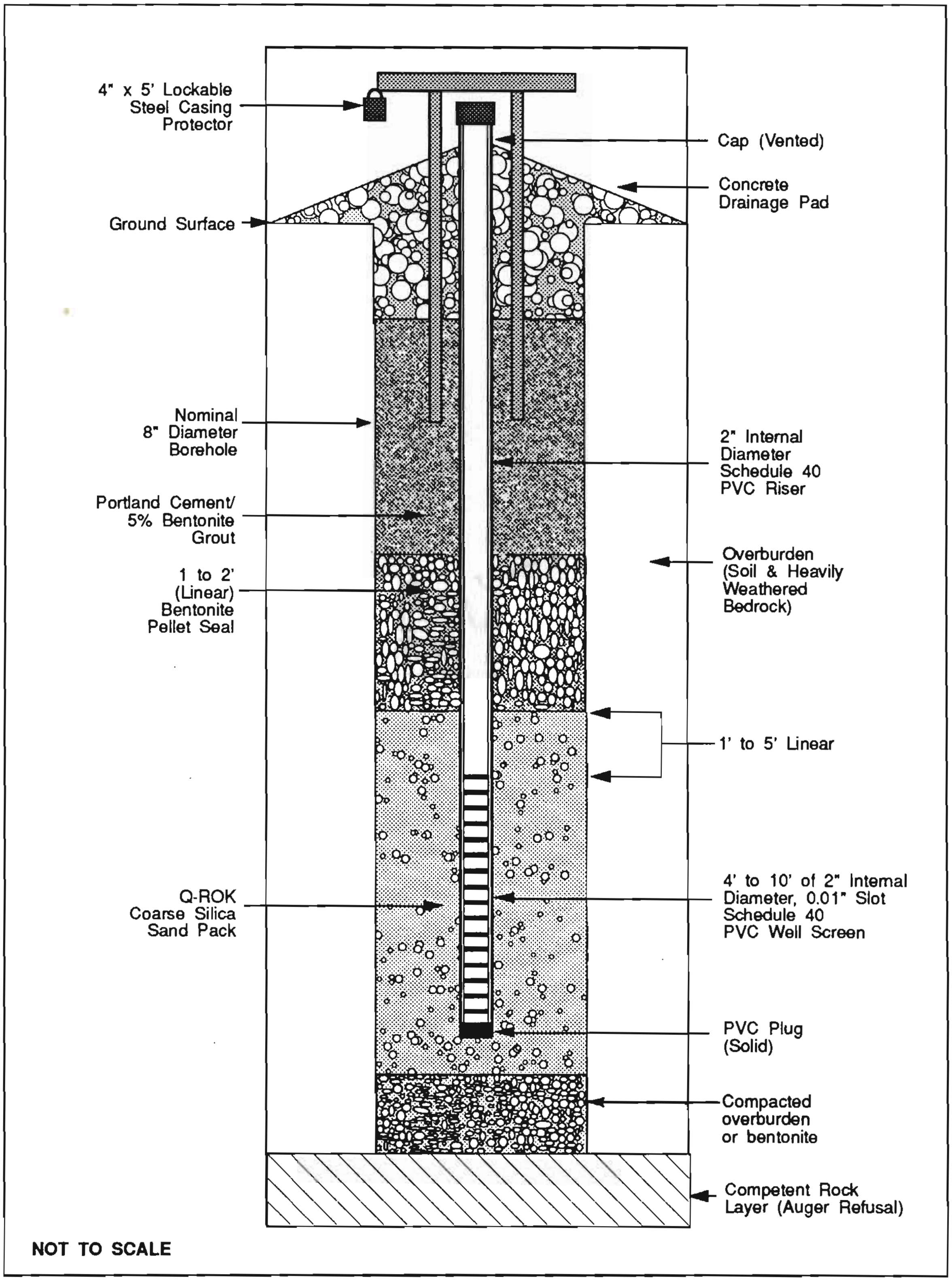


Figure 3-3
SHALLOW MONITORING WELL CONSTRUCTION

OB3571-2

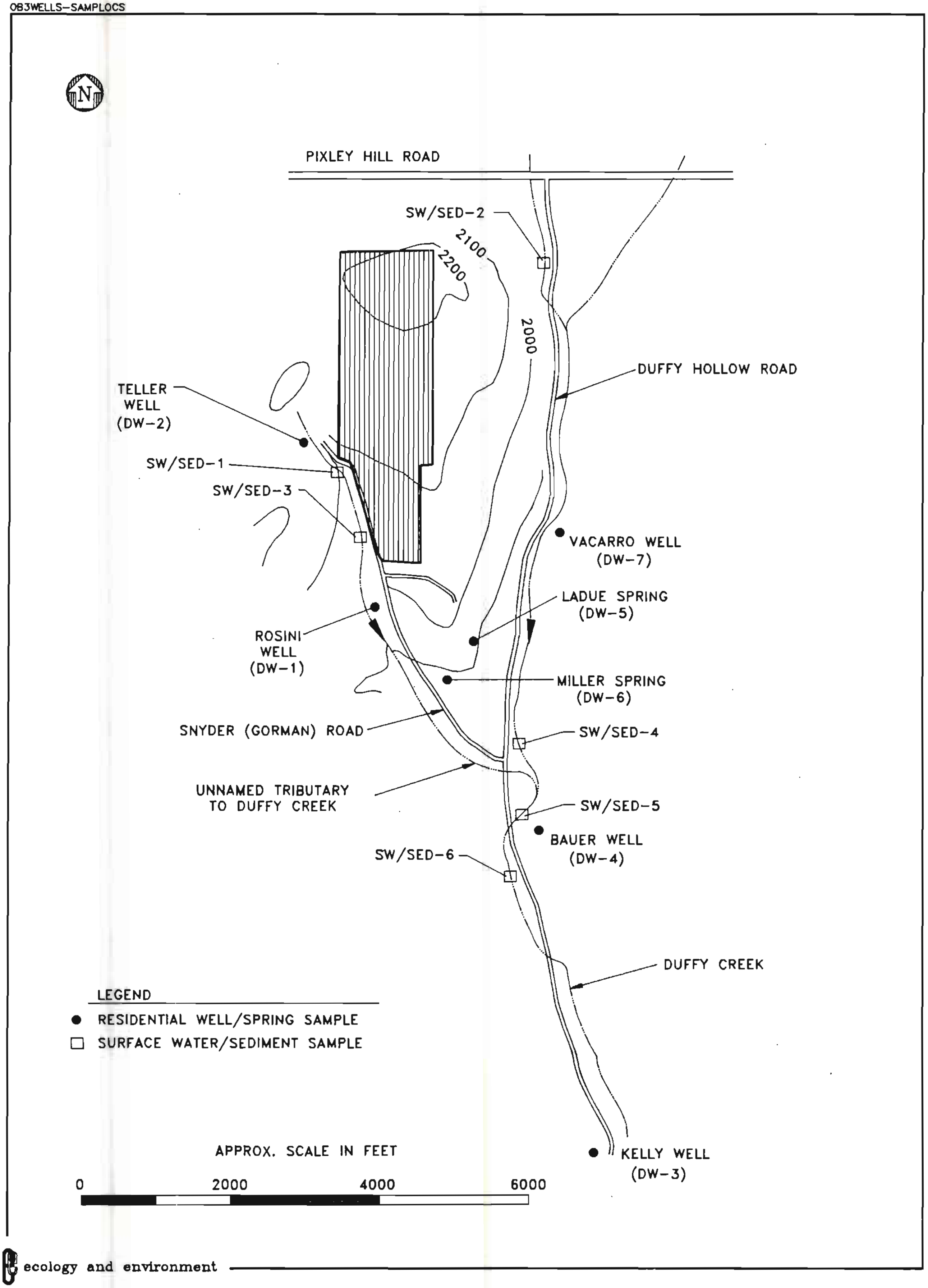


Figure 3-4 RESIDENTIAL WELL AND SPRING, SURFACE WATER, AND SEDIMENT SAMPLE LOCATIONS 1991

DRAFT

4. NATURE AND EXTENT OF CONTAMINATION

4.1 INTRODUCTION

To develop an understanding of the nature and extent of contamination at the Wellsville-Andover Landfill site, this section discusses the primary environmental media that influence contaminant migration, such as geology, surface hydrology, and hydrogeology. This is followed by a discussion of the concentrations and areal extent of contamination that exist in these media.

All analytical data (including field and laboratory samples) are presented on data summary sheets in Appendix D. Tables summarizing the organic and inorganic analytes detected in each sample type are provided in this section.

4.2 SITE GEOLOGY

4.2.1 Introduction

The geology at the Wellsville-Andover Landfill and throughout Allegany County can be subdivided into two primary units. One unit is the Paleozoic sedimentary rocks that underlie all of western New York and northern Pennsylvania. The second unit is a thin overburden of unconsolidated Pleistocene glacial deposits and recent alluvium. Section 2.3 provides a discussion of the regional geology. Site-specific interpretations of the geology at the Wellsville-Andover Landfill site were developed using primarily the following techniques:

- Field observations of soils as well as local bedrock outcrops;
- Interpretation of geophysical surveys;
- Examination of split-spoon samples and rock cores collected during the drilling of the 10 deep monitoring wells;
- Geotechnical analyses performed on selected samples; and
- Review of drilling log records and photos.

Subsurface boring logs were developed for each of the monitoring wells installed during the Phase I RI and are presented in Appendix B. Geologic cross-sections and a groundwater potentiometric surface contour map were generated from data collected from the monitoring wells and are discussed below.

4.2.2 Geophysical Survey Interpretation

Geophysical investigations performed at the site included total earth field magnetics, electromagnetic ground conductivity, and seismic refraction surveys. Data collection methods are described in Section 3.3 of this report.

As discussed in Section 3.3.1, magnetometer data were corrected for diurnal variations and then contoured using Surfer, version 4.10 (see Figure 4-1). Magnetic field strength in undisturbed areas was approximately 55,500 to 56,000 gammas. Anomalous areas of unusually high or low magnetic field strength were then noted for possible trench excavation. Several unusual features were noted on the generated contour map. Among them is the east-west linear feature with high magnetic field strength, located at the north end of the site. This feature correlates with the cut-off ditch at the north end of the filled areas. Since it is unlikely that metallic objects exist below the ditch, it is assumed that the sidewalls of the ditch interfered with the magnetic field. Another linear feature noted on Figure 4-1 occurs along the north side of the northeast fill area. This feature may represent a buried linear object or may again be due to magnetic field interference caused by the sloped embankment of the northeast fill area.

As discussed in Section 3.3.2, Surfer was used to generate contour maps of ground conductivity in both the horizontal and vertical dipole modes of the EM31 (see Figures 4-2 and 4-3). The ground conductivity in undisturbed areas was approximately 5 to 15 micromhos per meter (μMhos/M) in the horizontal dipole mode and approximately 10 to 20 μMhos/M in the vertical mode. The horizontal dipole was especially effective in defining the fill areas. In addition, Figure 4-2 appears to indicate that linear east-west cells were filled in the northeast area, while irregularly shaped cells exist in the other fill areas. Anomalous areas were noted on the contour maps, and those that correlated with magnetic anomalies were selected for trenching. The locations of the trenches are shown on Figure 3-1. The strong anomaly near coordinate 815,1285 on both Figures 4-2 and 4-3 was due to a concrete pad adjacent to the central access road.

As discussed in Section 3.3.3, seismic refraction data were collected around the perimeter of the fill area as well as along two transects across the center of the site (see Figure 1, Appendix A). Data interpretation involved selecting the first-break arrival times from the seismic traces. These measurements represent the arrival times of the primary wave (P-wave) of the seismic energy refracted along layers exhibiting significant velocity contrast. A P-wave is the fastest-propagating type of seismic wave. The number of layers and their associated velocities are determined from the first-break data.

Algorithms from the GRM were used to convert the data from measurements of time to measurements of layer thickness. The approximate accuracy of this method is ±15%. Due to lack of borehole control at the time the survey was performed and analyzed, absolute depth estimates varied. However, the relative changes in bedrock topography interpreted along seismic profiles can be used to evaluate changes in overburden stratigraphy and bedrock topography.

A complete seismic report prepared by Davenport/Hadley, including seismic profiles, is presented in Appendix A. Based upon these results, overburden thickness appears to be consistent with topography with localized variations caused by erosional alteration of the bedrock surface. In general, the seismic data indicate three layers are present. The upper layer ranges in P-wave velocity from 1,090 to 2,220 feet per second (fps), typical of unconsolidated, unsaturated surficial soil. Generally, this layer is less than 10 feet thick. The middle layer ranges in velocity from about 2,090 to 5,400 fps, which is representative of dense soils or weathered rock. Velocities in excess of 5,000 fps represent saturated conditions. Based on subsurface boring information, the middle layer is thought to represent dense soil with many rock fragments derived from the local bedrock. The third layer generally has P-wave velocities in excess of 10,000 fps and was interpreted as competent rock. However, the subsurface boring logs indicate that the third layer may represent an increase in density from dense soil to either very dense soil with structurally intact rock lenses or to relatively competent, yet still highly fractured, bedrock.

4.2.3 Characteristics of the Overburden

As previously described, the Wellsville-Andover Landfill occupies a hill between Duffy Creek and its unnamed tributary. The site slopes generally to the south at approximately 5% to 6%. A description of the soils encountered in the area is provided in Section 2.3.1. In general, the soils consist of glacial till of local derivation underlain by hardpan and soils formed *in situ*.

The nature of the overburden was characterized using the results from the subsurface investigation. Split-spoon sampling was performed in MW-11S and each of the 10 deep wells installed at the site. Split-spoon sampling was performed in accordance with ASTM Designation D1586-84. In general, blow counts recorded during split-spoon sampling indicate mixed soils of varying density; however, the general pattern appears to be medium-density soils (10 to 29 blows/ft) underlain by dense (30 to 49 blows/ft) to very dense (≥50 blows/ft) soils, as expected.

The thickness of overburden at the site does not appear to change with topography; rather, localized bedrock erosional patterns and anthropogenic alterations control overburden thickness. This is seen in the seismic cross sections in Appendix A. In borrow areas, the overburden is artificially thin (9 feet at MW-4D). Overburden thickness in undisturbed areas ranged from about 10 feet in MW-2D to 64 feet in MW-8D.

Nineteen subsurface soil samples were collected at and around the site for geotechnical analyses. All samples were subject to Atterberg limits testing (ASTM D4318), grain size analysis including hydrometer (ASTM D422), and water content analysis (ASTM D2216). The results of these analyses, including classification by the Unified Soil Classifications System (ASTM D2487-85), are presented in Appendix E. In general, the soil samples collected were well graded, with a fairly uniform distribution of gravels, sands, silts, and clays. Ten samples, including those from the north end (MW-1D) and south end (MW-8D) of the site, were classified as sandy lean clay with gravel (CL) or gravelly lean clay with sand (CL). Seven samples from various depths across the site were classified as clayey gravel with sand (GC) or clayey sand with gravel (SC). The general trend is for finer-grained soils (CL) to overlie coarser-grained soils (GC and SC).

One soil sample (CL-1) was collected from the Millers' property south of the site at the same location as the Millers' domestic water sample. At this location, perched water flowed on top of an unsaturated clay and silt layer. This sample contained more clay than any sample collected on site (24%) but contained enough silt (47%) and sand (16%) and was of sufficiently low plasticity to be classified as a silt with sand (ML). The clay portion of this sample has a low enough activity to be considered a mixture of illite and kaolinite (Holtz and Kovacs 1981). The low activity of the clay in the remainder of the samples suggests that most clay found at the site is illite. The presence of the clay- and silt-rich layer, as well as the existence of springs south of the site, suggests that as glacial ice receded from Duffy Hollow, outwash deposits of fine-grained soils were deposited in the area. These low-permeability units create perched water zones that emerge from hillsides as springs.

Trench excavation indicated that local materials were used for cover and that this material also contained a uniform grain-size distribution. Visual classification during trenching indicated the presence of various grain sizes from clay to boulder. Boulders consisted of locally derived sandstone ranging up to an 8-inch thick flagstone 6 feet in diameter.

4.2.4 Bedrock Geology

The characterization of the bedrock was determined from literature published regarding local geology as well as site investigation activities, including the seismic refraction survey and well drilling.

The site lies within the glaciated Allegheny Plateau section of the Appalachian Plateau physiographic province. This area is known locally as the Southwestern Plateau (USDA 1956). The entire region is underlain by Paleozoic sedimentary strata. The bedrock beneath the site is part of the Late Devonian Canadaway Group (Rickard 1975). As described in Section 2.3.2, this group consists of approximately 700 to 1,200 feet of subtidal and peritidal deposits of shale, siltstone, and sandstone. Specifically, the bedrock beneath the site consists of the Wellsville Formation (called the Whitesville Formation to the east and the Forty Bridge to the west) (Rickard 1975). The Wellsville Formation consists of thin sandstones and siltstones, 0.5 to 3 inches thick, interbedded with primarily argillaceous but sometimes arenaceous shales. The formation is generally olive green to gray, weathering to greenish brown or brownish gray. In addition, some brown to dull red beds have been noted in the upper Wellsville. Calcareous shale and siltstone beds are present throughout the section. Many beds exhibit cross-bedding, ripple marks, and mud flows, and many are highly fossiliferous, containing mostly brochiopods (Woodruff 1942).

Definition of the upper bedrock surface at the site is very difficult due to the high degree of weathering of the bedrock as well as erosional irregularities in the surface. Bedrock was encountered in each of the 10 deep wells installed across the site. In general, auger refusal was achieved on a relatively competent, light gray, laminated, calcareous siltstone or fine-grained sandstone ranging in thickness from 1 to 5 feet. However, as indicated by the seismic refraction survey, the former bedrock surface may also be defined by changes in soil density or type; i.e., from glacial till to clays weathered in place from native shale. In many instances, the first competent calcareous siltstone layer encountered was underlain by rock so severely weathered it may be considered soil. Geologic cross-sections of lines AA' and BB' (see Figure 4-4) are provided as Figures 4-5 and 4-6. Cross-section AA' runs N4°E/S4°W along the east side of the site. Cross-section BB' runs N54°W/S54°E across the center of the site. Both cross-sections indicate a complex, interbedded formation, with various layers appearing, disappearing, or lying unconformably on others. This complex interbedding indicates deposition in a very active subtidal and nearshore environment.

The seismic survey indicates that the bottom refractor dips south at approximately 3° to 5°. However, correlation of coal stringers encountered in wells MW-3D, MW-5D, and MW-6D and subsequent correction to an east-west strike (Woodruff 1942) indicates that the bedrock beneath the site dips approximately 1.4° south.

With the exception of the occasional competent sandstone bed, the majority of the bedrock encountered was extremely weathered and very highly fractured. In general, shale beds were more highly fractured and weathered than the silt and sandstone beds, and contained subhorizontal to subvertical fractures. Numerous fractures in a variety of beds were open, with visible oxidation residues present on the fracture surfaces. Horizontal and vertical clay-filled fractures were also encountered across the site. No significant zones of competent bedrock were encountered beneath the fractured zone. Therefore, the potential maximum depth of contaminant migration cannot be determined at this time.

4.3 SITE HYDROLOGY

4.3.1 Surface Water and Runoff

The Wellsville-Andover Landfill occupies a hillside that slopes to the south at approximately 5% to 6%. In addition, the majority of the site dips gently to the southwest toward the unnamed tributary to Duffy Creek. The hillside adjacent to the east side of the site slopes more steeply to Duffy Creek at approximately 14% to 20%. However, due to the presence of a low ridge along the east side of the site, the vast majority of surface water drains toward the unnamed tributary.

Numerous ditches were excavated at the site to divert surface runoff away from the filled areas. The northernmost trench, located approximately 160 feet north of the northeast fill area, runs east-west, diverting flow around the northeast and northwest fill areas. Flow diverted to the east runs via shallow ditches into the drainage collection pond. This pond is meant for temporary storage, as water can drain out to the west via a culvert. Pond overflow drains in a ditch toward the northern access gate. In addition, runoff on the west side of the site flows to the northern access gate, as does runoff from the north central portion of the site. All runoff that reaches the northern access gate flows through a culvert under Snyder Road directly into Duffy Creek's unnamed tributary. Ditches also exist around the perimeters of the south and south-central fill areas. Runoff in these areas is also diverted to the west, eventually ending up in the unnamed tributary via culverts under Snyder Road.

Throughout the field investigation, ponded surface water was present in the drainage collection pond as well as in a small depression adjacent to MW-2S, even when all ditches were dry. This suggests that springs may be present in these areas.

The unnamed tributary that flows along the west side of the site is registered as a Class C water body (6 NYCRR 821.6). This stream is shown to be intermittent by the USGS (1965b), and this was confirmed during surface water sampling. At the time of sampling, the stream consisted only of isolated pools. Duffy Creek, also classified as Class C (6 NYCRR 821.6), consisted primarily of pools connected by very low flow streams at the time of surface water sampling. Detailed characterization of these two streams is provided in Section 6 of this report.

4.3.2 Groundwater Hydrogeology

Groundwater data were collected from the nine bedrock and eight overburden wells installed during the Phase I RI as well as the four pre-existing wells. Water levels were measured in each of the wells after development but prior to sampling in October 1991 and then again in November 1991. These data are presented in Table 4-1.

During drilling and split-spoon sampling, saturated soils were not encountered, except in MW-11S. In this well, the soil became moist to wet at 15 to 16 feet below ground surface

(BGS). Prior to sampling, the water level in MW-11S rose to 5.7 feet BGS. In the remaining wells, alternating zones of wet and dry soils were encountered. In general, the coarser-grained zones (sands and gravels) were drier than the fine-grained zones (clays and silts). The presence of moisture in the slow-draining clays and silts is interpreted as residual moisture from a fluctuating water table. In general, however, moisture was first noticed at 6 to 8 feet BGS in most wells.

After well development but prior to sampling in October 1991, water levels in the overburden wells ranged from 1.1 feet BGS in MW-5S to 17.9 feet BGS in MW-9S. At this same time, water levels in the bedrock wells ranged from 1.3 feet BGS in MW-5D to 64.2 feet BGS in MW-1D. In general, water levels in November 1991 were similar to those in October 1991. Most water levels rose slightly by November, except in MW-1D, MW-2D, and MW-3D, where they dropped slightly, and in MW-9D, MW-10D, MW-10S, CW-3A, and MW-3B, where they dropped from 0.5 to 8.8 feet. In addition, the water level rose significantly (8.2 feet) in MW-3S between October and November 1991.

The water level data indicate that perched water exists in the overburden at and around the site, supporting data collected during well drilling and geotechnical analyses regarding the soils. The presence of springs near the site also supports this theory.

Using the data collected in November 1991, various hydraulic gradients were calculated. Vertical gradients are difficult to interpret at this site and may be misleading due to the presence of perched water. Nonetheless, the vertical gradient was found to be moderately uniform across the site, ranging from 0.3 to 0.6 ft/ft (downward) based on well pairs MW-3D/3S, MW-6D/6S, MW-9D/9S, and MW-10D/10S. The vertical gradient at well pair MW-5D/5S was found to be significantly less than that above (0.01 ft/ft). This pair is relatively close to MW-6D/6S, and the order of magnitude difference in vertical gradients between these two well pairs supports the theory that perched water zones are present in the overburden.

Horizontal hydraulic gradients were calculated based on the November 1991 bedrock well water levels. The average horizontal gradient across the entire site is to the south and was calculated to be 0.04 ft/ft between MW-1D and MW-7D. This is similar to but slightly less than the topographic gradient between these wells (0.05 ft/ft south), suggesting that the potentiometric surface is strongly influenced by topography. At the north end of the site, the horizontal hydraulic gradient is approximately 0.03 ft/ft south as calculated between MW-1D and MW-10D, MW-3D, and MW-2D. This is less than the topographic gradient of 0.06 ft/ft in this area. At the south end of the site, the horizontal gradient increases to a maximum of 0.10 ft/ft between MW-6D and MW-7D, which is greater than the topographic gradient between these wells (0.07 ft/ft). In some areas, the horizontal hydraulic gradient is reversed. For example, between MW-2D and MW-4D, the gradient is 0.01 ft/ft to the north, indicating the presence of a groundwater divide.

Contouring of water surface elevations for the bedrock wells indicates that groundwater flow mimics topography with a general flow direction in the northern and central portions of the site to the south-southwest (see Figure 4-6). An exception to this is seen on the west side of the site, where groundwater flows southwest toward the unnamed tributary to Duffy Creek. Additionally, flow at the south end of the site is directed more to the south. The contours also indicate that a groundwater divide exists on the east side of the site trending approximately north to N7°W. The presence of this divide is also supported by the reversal in horizontal hydraulic gradient between wells MW-2D and MW-4D, and MW-2D and MW-3D. Groundwater flow on the east side of the site is to the east, following the steep topographic gradient down to Duffy Creek. Some of this flow likely emerges as the springs present on the lower hillside between the site and Duffy Creek.

Due to the presence of complicating perched zones, a contour map of groundwater flow in the overburden is not included. However, comparison of water levels suggests that groundwater flow in the overburden is similar to the flow depicted in the bedrock.

Based on the water level data as well as subsurface boring logs, the overburden and bedrock beneath the site are interpreted as being one continuous aquifer. That is, no confining layer was found to be consistently present between the overburden and bedrock, and groundwater appears to be able to pass freely from one medium to the next. Low permeability zones of clayey silt are present throughout the overburden in the area as discussed; however, they appear to be discontinuous, creating perched but unconfined water-bearing zones. The springs in the area are interpreted as resulting from the convergence of these perched zones just beneath the ground surface.

Generally, groundwater flow in the overburden is restricted vertically by clay and silt lenses but is facilitated in sandy and gravelly zones. In the bedrock, the major component of flow appears to be the result of secondary porosity features of the bedrock--i.e., fractures and joints. Open and clay-filled fractures of all orientations were observed in both arenaceous and argillaceous beds, indicating that water can flow both horizontally and vertically and is generally unrestricted by usually confining shale beds. Interstitial flow due to the primary porosity of the bedrock is expected to be a relatively minor component. Interstitial pore flow is most likely restricted both horizontally and vertically by the presence of shale beds.

4.4 EXTENT OF CONTAMINATION OF ENVIRONMENTAL MEDIA

The following sections include a summary of the chemical contamination discovered at the Wellsville-Andover Landfill site during the Phase I RI between August and December 1991. The following media were sampled in order to assess the extent of contamination on and off the site:

- Subsurface soil and waste from trenches;
- Subsurface soil from borings;
- Groundwater;
- Residential wells and springs;
- Surface water;
- Sediment;
- Surface soil;
- Leachate; and
- Air.

Tables 4-2 through 4-21 contain a summary of the analytical data for the various media sampled. Appendix D contains a tabulation of all analytical results including tentatively identified compounds (TICs).

All of the analytical data were independently qualified and then reviewed by E & E prior to reporting. A discussion of the data qualification is presented in Section 4.5 of this report. In general, common laboratory contaminants including methylene chloride, acetone, and phthalate compounds are not discussed in this section when these compounds were detected in the field samples at concentrations similar to those in the method blanks.

4.4.1 Subsurface Soil/Waste Samples From Trenches

As discussed in Section 3.4, five trenches were excavated at the site, the locations of which were based upon the geophysical surveys performed. One soil/waste sample was collected from each trench shown in Figure 3-1. A description of the samples (TP-1 to TP-5) is provided in Table 3-2.

Trench 1 was excavated on December 19, 1991 in the northwest corner of the northwest fill area. The top 1.5 feet consisted of brown channery loam of local derivation consisting of clay- to boulder-sized material. This was underlain by approximately 1.5 feet of gray clay and silt containing large sandstone fragments. Municipal trash was encountered at 3 to 4 feet and continued down to at least 15 feet. No cause for the geophysical anomaly was observed, so a second trench was excavated 10 feet north of the first. In both, water was found to flow into the excavation at approximately 5 feet below grade. In the second excavation, two 55-gallon drums were encountered at approximately 6 feet. These drums were heavily rusted and contained a black liquid that may or may not have been groundwater that entered the breached drums. Sample TP-1 was collected from soil adjacent to the drums on which the liquid had spilled. No markings were noted on the drums.

Trench 2 was excavated on December 19, 1991 in the central portion of the northeast fill area. The cover material consisted of only about 1.5 feet of brown channery loam of local derivation containing clay- to boulder-sized material. This trench was excavated to 7 or 8 feet, and only municipal trash was encountered. The source of the geophysical anomaly was determined to be numerous metal objects, including a steel trash can, an aluminum storm door, a roll of steel chicken wire, and copper tubing. Sample TP-2 was collected from this trench and consisted of soil composited from the full length of the trench at about 5 to 6 feet below grade.

Trench 3 was excavated on December 18 and 19, 1991 near the southeast corner of the northwest fill area. At this location, approximately 3 feet of cover material was encountered, consisting of medium brown and dark gray channery loam (clay- to boulder-sized material). Municipal trash in an ash-like matrix was encountered at 3 to 4 feet. Water was found to enter the trench at 4 and 6 feet. Excavation of the trench was completed the morning of December 19, 1991, and water had filled the trench to about 1.5 feet below grade by the next morning. The source of the geophysical anomaly was determined to be a large piece of scrap metal at 6 feet as well as numerous truck tire rims. Sample TP-3 consisted of a mixture of the soil and ash-like substance collected at about 6 feet.

Trench 4 was excavated on December 18, 1991 in the northeast corner of the south-central fill area. The cover material at this location consisted of about 2 to 2.5 feet of medium brown channery loam (clay- to boulder-sized material). Immediately below the cover, five heavily rusted and dented 55-gallon drums were encountered along the 15- to 20-foot length of the trench. These drums, which were all lying on their sides in the same orientation, contained a pink, white, gray, and brown mottled solid material. This material seemed to be a low-density plastic with many air bubbles. No markings were observed on the drums; however, the soil around the drums contained more than 50% plastic buttons and plastic scraps from which these buttons were apparently punched. Sample TP-4, composited from all five drums, consisted of soil, plastic scraps, and small fragments of the plastic-like material from the drums.

Trench 5 was excavated on December 17 and 18, 1991 in the central portion of the south fill area. The cover consisted of about 2 feet of brown channery loam (clay- to boulder-sized material). This trench contained municipal trash as well as construction and demolition debris. The source of the geophysical anomaly was found to be a car fender, a roll of steel barbed wire, and one empty, crushed 55-gallon drum marked "oil," all of which were found at less than 6 feet below grade. Water was found to enter the trench at approximately 4 feet and had a very slight oil sheen. Sample TP-5 was collected from the soil and waste below the crushed drum where water entered the trench.

Samples TP-1 through TP-5 were analyzed by E & E's ASC for full TCL parameters according to NYSDEC CLP methods. Sample preservation, shipping, and handling procedures were performed in accordance with the QAPjP. For QC purposes, additional sample volume was collected with TP-5 for MS/MSD analyses.

The organic compounds detected in the samples collected are included in Table 4-2. Numerous VOCs were detected in the samples including ketones, aromatic hydrocarbons, and chlorinated alkenes and alkanes. Acetone, a common laboratory contaminant, is included in Table 4-2 because it was detected in four of the samples but not in the laboratory method blank. However, even the relatively high acetone concentration in TP-1 may be due to laboratory contamination because this sample was analyzed as a medium-concentration sample, which amplifies the amount of laboratory contaminants, such as acetone, detected. Other ketones detected include 2-butanone and 2-hexanone in TP-1 and TP-5, and 4-methyl-2-pentanone in TP-1 only.

Several aromatic hydrocarbons were detected in the samples. Benzene was detected in TP-5 only, at an estimated concentration of 78 μg/kg. Ethylbenzene was detected in all five samples at estimated concentrations ranging from 31 μg/kg in TP-2 to 33,000 μg/kg in TP-1. Toluene was also detected in all five samples, ranging from an estimated 11 μg/kg in TP-2 to 3,200 μg/kg in TP-4. Styrene was detected in two samples only: 45 μg/kg in TP-1 and 4,200 μg/kg in TP-4. Xylenes were detected in all samples except TP-3, ranging from an estimated 51 μg/kg in TP-2 to 1,700 μg/kg in TP-1.

Several chlorinated aliphatic compounds were also detected in the trench samples. 1,1-Dichloroethane (1,1-DCA) was detected in TP-1 at 710 μg/kg. Total 1,2-dichloroethene (total 1,2-DCE) was detected in all samples except TP-2, ranging from an estimated 21 μg/kg in TP-5 to 3,900 μg/kg in TP-1. Tetrachloroethene (PCE) was detected in TP-4 only, at an estimated concentration of 520 μg/kg. TCE was detected in TP-1 at 73 μg/kg and TP-4 at 5,300 μg/kg. Vinyl chloride (VC) was detected in TP-1 only, at an estimated concentration of 980 μg/kg. MC, a common laboratory contaminant, is included in Table 4-2 because it was detected in TP-5 at concentrations significantly higher than in the associated method blank.

Several semivolatile organic compounds were detected in the trench samples, including phthalates, polynuclear aromatic hydrocarbons (PAHs), and phenols. Five phthalates were detected in the samples. While these compounds are common laboratory and field contaminants, most of the concentrations detected are higher than would be expected for background contamination. Bis(2-ethylhexyl)phthalate was detected in all samples except TP-3, ranging from an estimated 1,100 μg/kg in TP-1 and TP-2 to 8,300 μg/kg in TP-4 and TP-5. Butylbenzylphthalate was detected at 16,000 μg/kg in TP-2 and estimated concentrations of 1,000 and 2,700 μg/kg in TP-4 and TP-5, respectively. Di-n-butylphthalate was detected in all samples except TP-1 and TP-3, ranging from an estimated 270 μg/kg in TP-2 to 14,000 μg/kg in TP-4. Diethylphthalate was detected only in TP-1 and TP-3 at estimated concentrations of 110 and 25 μg/kg, respectively. Dimethylphthalate was detected only in TP-4 and TP-5, at estimated concentrations of 910 and 530 μg/kg, respectively.

Numerous PAHs were detected in samples TP-1, TP-2, and TP-5, but none was detected in TP-3 or TP-4. Benzo(b)fluoranthene, benzo(a)pyrene, and chrysene were detected in sample TP-2. 2-Methylnaphthalene and napthalene were detected in TP-2 and TP-5. Fluoranthene, phenanthrene, and pyrene were detected in samples TP-1, TP-2, and TP-5. Concentrations of individual PAHs ranged from an estimated 130 μg/kg (phenanthrene in TP-1) to approximately 720 μg/kg (fluoranthene in TP-2).

Several phenolic compounds were also detected in the trench samples. 4-Chloro-3-methylphenol was found only in TP-2, at approximately 300 μg/kg. 4-Methylphenol was detected in all of the samples except TP-4, ranging from an estimated 370 to 1,600 μg/kg. Pentachlorophenol was detected only in TP-5, at approximately 6,600 μg/kg.

In addition to the above compounds, benzyl alcohol was detected in TP-4 at approximately 1,200 μg/kg, and 1,2-dichlorobenzene was detected in TP-4 and TP-5 at estimated concentrations of 1,200 and 670 μg/kg, respectively.

No PCBs were detected in any of the five samples; however, several pesticides were detected at low concentrations in TP-1, TP-2, and TP-5. Sample TP-1 was found to contain beta-BHC at approximately 12 μg/kg, and TP-5 contained 4,4'-DDD at 120 μg/kg. TP-2 was found to contain dieldrin; 4,4-'DDE; 4,4'-DDD; and 4,4'-DDT at estimated concentrations ranging from 13 to 130 μg/kg.

Table 4-3 summarizes the inorganic analytes detected in the trench samples. Of the 24 inorganics analyzed for, 17 were detected. Concentrations of metals in the trench samples were compared to the common range detected in eastern United States soils as well as to the upper limit of the 90th percentile in order to preliminarily screen the metals of interest (Shacklette and Boerngen 1984). The upper limit of the 90th percentile, indicating the value below which 90% of background samples should fall, was calculated using the following formula:

$$\text{90th percentile} = M*D^{1.282}$$

where:

M is the geometric mean, D is the geometric standard deviation, and 1.282 is the alpha value pertaining to the 90th percentile, provided in Shacklette and Boerngen (1984).

Aluminum, barium, beryllium, calcium, chromium, iron, manganese, potassium, sodium, and vanadium were detected in all five samples but at concentrations within the 90th percentile for eastern U.S. soils. Arsenic exceeded the 90th percentile only in TP-1 at an estimated 20.9

mg/kg. Cobalt exceeded the 90th percentile in all samples, ranging from 20.8 to 28.1 mg/kg. Copper exceeded the 90th percentile in TP-3 at 194 mg/kg. Elevated concentrations of lead were detected in all samples except TP-3 and ranged from approximately 15.3 mg/kg in TP-3 to about 86.9 mg/kg in TP-4. Nickel exceeded the 90th percentile in TP-1 only, at a concentration of 43.2 mg/kg. Zinc exceeded the 90th percentile in all samples except TP-4 and ranged from approximately 87.4 mg/kg in TP-4 to an estimated 269 mg/kg in TP-3. While many of the above metals exceeded the upper limit of the 90% percentile, none exceeded the observed range. In addition, no cyanide was detected in any of the samples.

In summary, TP-1 contained five metals above the 90th percentile for common eastern U.S. soils, while the remaining samples contained three such metals. Cobalt was detected at elevated concentrations in all samples but with a small difference between concentrations. This suggests that cobalt may be naturally abundant in the area. Chlorinated aliphatics were detected in four of the five samples, ranging from 21 µg/kg in TP-5 to 8,720 µg/kg in TP-4. Aromatic hydrocarbons were detected in all five samples and ranged from 93 µg/kg in TP-2 to 35,900 µg/kg in TP-1. PAHs were detected in three of the five samples, with the highest total concentration (3,170 µg/kg) detected in TP-2. Phthalates, detected in all of the samples, ranged from 204 µg/kg in TP-3 to 24,200 µg/kg in TP-4. Phenols ranged up to 6,870 µg/kg in TP-5. Pesticides, detected in three samples, ranged up to 201 µg/kg in TP-2.

4.4.2 Subsurface Soil Samples From Borings

As discussed in Section 3.5.3, 20 subsurface soil samples were collected during boring of the 10 deep monitoring wells. Samples from wells MW-1D, MW-6D, MW-7D, and MW-8D were analyzed for full TCL organic substances and inorganic substances, while samples from MW-2D, MW-3D, MW-4D, MW-5D, MW-9D, and MW-10D were analyzed for TCL VOCs and inorganic substances only. All analyses were performed according to NYSDEC CLP methods. Tables 4-4 and 4-5 summarize the organic and inorganic analytes detected in the subsurface soil samples, respectively.

VOCs were detected only in the soil samples collected from monitoring well MW-5D. Three chlorinated aliphatic compounds were detected in samples SB-5B and SB-5C. Sample SB-5B, collected from 8 to 9 feet below grade, contained total 1,2-DCE at 87 µg/kg, TCE at 22 µg/kg, and VC at 21 µg/kg. Sample SB-5C, collected from 18 to 19 feet below grade, contained 61 µg/kg of total 1,2-DCE, 13 µg/kg of TCE, and an estimated 7 µg/kg of VC. No semivolatile substances, PCBs, or pesticides were detected in any of the samples analyzed for those compounds.

Of the 24 inorganic analytes tested, 19 were detected in at least one subsurface soil sample. Concentrations of the metals detected were compared to the common range detected in eastern U.S. soils as well as to the upper limit of the 90th percentile (Shacklette and

Boerngen 1984). Aluminum, barium, beryllium, chromium, copper, iron, potassium, sodium, vanadium, and zinc were detected in all or most of the samples, but all at concentrations within the 90th percentile. Cadmium was detected above the contract required detection limit (CRDL) only in SB-2A and SB-10A, and mercury was detected only in SB-8B; however, all three concentrations were within the 90th percentile.

Arsenic, which was detected in all subsurface soil samples, exceeded the 90th percentile in samples SB-3A, SB-9A, and SB-9B at concentrations of 16.4 (estimated), 17.4, and 17.9 mg/kg, respectively. Calcium and magnesium, both detected in all samples, exceeded the 90th percentile in sample SB-10B only, at concentrations of 77,500 and 17,100 mg/kg, respectively. Cobalt, detected in all samples, exceeded the 90th percentile in all samples except SB-10B (including both background samples). Cobalt concentrations ranged from 14.5 to only 33.2 mg/kg, indicating a possible natural abundance of this metal in the area. Lead was detected in all samples except SB-4A, exceeding the 90th percentile in SB-6B and SB-10A at estimated values of 35.6 and 45.3 mg/kg, respectively. Manganese, detected in all samples, exceeded the 90th percentile in SB-4A only, at 1,670 mg/kg. Nickel, also detected in all samples, exceeded the 90th percentile in SB-1A, SB-4A, SB-4B, SB-6A, SB-7A, and SB-7B, with the highest concentration, 53.4 mg/kg, detected in background sample SB-1A. No cyanide was detected in any of the subsurface soil samples.

In summary, organic compounds were detected only in the subsurface soil samples from MW-5D and consisted of the three chlorinated aliphatics of primary concern at this site. In terms of inorganic substances, no sample contained more than three metals above the 90th percentile for typical eastern U.S. soils, including cobalt, which appears to be naturally abundant. Of those metals above the 90th percentile, none exceeded the common range detected in eastern U.S. soils (Shacklette and Boerngen 1984).

4.4.3 Groundwater Samples

As discussed in Section 3.5.4, groundwater samples were collected from the 17 newly installed monitoring wells and the four pre-existing wells. All samples were unfiltered and were analyzed for full TCL organic substances and inorganic substances according to NYSDEC CLP methods, with the exception of GW-2S, GW-9S, and GW-12S, which, due to insufficient sample volume, were analyzed for TCL VOCs and inorganic substances only. Tables 4-6 and 4-7 summarize the organic substances and inorganic substances detected in the groundwater samples, respectively. Table 4-8 summarizes the sampling parameters pertaining to the groundwater samples. All samples remained unfiltered; therefore, the suspended sediment in each well was allowed to settle out prior to sampling, as discussed in Section 3.5.4. By doing so, the metals portion of 10 samples had a turbidity below 50 NTU, and all but three samples had turbidities below 250 NTU. The high turbidities of samples GW-2S and GW-9S were due to the small amount of water in these wells.

Several organic substances, including aromatic hydrocarbons and chlorinated aliphatic compounds, were detected in various groundwater samples. Acetone was detected in GW-3S at 33 µg/L. While acetone is a common laboratory contaminant, it is included in Table 4-6 because it was not detected in the method blank related to GW-3S. However, based on the low concentration and its presence in GW-3S alone, the acetone is assumed to result from laboratory contamination. One trihalomethane was detected in the groundwater samples--chloroform in GW-9S--but at a concentration below the NYSDEC Class GA standard.

Several chlorinated aliphatic compounds were detected across the site. Chloroethane was detected above the Class GA standard in GW-11S at an estimated concentration of 8 µg/L. 1,1-DCA was detected above the Class GA standard in samples GW-5D and GW-5S at estimated concentrations of 6 and 11 µg/L, respectively. 1,1-DCE was detected above the standard in samples GW-5D, GW-5S, GW-11S, and GW-11SDD at estimated concentrations ranging from 9 to 12 µg/L. 1,1-DCE was also detected below the standard in GW-2D. Total 1,2-DCE was detected at or above the standard in samples GW-2D, GW-5D, GW-5S, GW-6D, GW-6S, GW-11S, GW-11SDD, and GW-12D at estimated concentrations of 5 to 5,600 µg/L. In addition, total 1,2-DCE was detected below the standard in GW-10D, GW-12S, and GW-13D. MC was detected only in GW-12D, below the Class GA standard. This compound is a common laboratory contaminant but is included in Table 4-6 because it was not detected in the method blank associated with GW-12D. 1,1,1-Trichloroethane (1,1,1-TCA) was detected only in GW-2D and GW-5S, both at levels below the Class GA standard. TCE was detected above the standard in GW-2D, GW-5D, GW-5S, GW-6D, GW-11S, GW-11SDD, and GW-12S at concentrations ranging from 38 to 1,200 µg/L. TCE was also detected below the standard in GW-3D, GW-4D, and GW-10D. VC was detected above the Class GA standard in samples GW-2D, GW-5D, GW-5S, GW-6D, GW-11S, GW-11SDD, and GW-12D at concentrations ranging from an estimated 45 to 2,100 µg/L.

Two aromatic hydrocarbons were also detected at the site. Ethylbenzene was detected below the standard in GW-5D, and toluene was detected at or above the standard in GW-5D, GW-5S, and GW-12S at concentrations ranging from 5 to an estimated 9 µg/L.

No semivolatile substances, PCBs, or pesticides were detected in any of the groundwater samples analyzed.

Of the 24 inorganic substances analyzed for, 17 were detected in the groundwater samples. Aluminum, arsenic, barium, beryllium, calcium, cobalt, copper, nickel, potassium, vanadium, and zinc were detected in various samples across the site, as detailed in Table 4-7, but all at concentrations below Class GA standards. Chromium, detected only in seven samples including the background, exceeded the standard only in GW-2S at 110 µg/L. Iron was detected and exceeded the standard in all samples, including the background, at concentrations ranging from 316 to an estimated 110,000 µg/L. Lead was detected in all but eight samples and exceeded the standard in GW-2S and GW-12S at an estimated 38.1 and 125 µg/L, respectively. Magnesium was detected in all samples but exceeded the Class GA guidance value only in GW-2S and GW-8S at 50,500 and 56,000 µg/L, respectively. Manganese was detected in all samples, exceeding the standard in 15 samples at concentrations ranging from 387 to 8,530 µg/L. Sodium was also detected in all the samples and exceeded the standard in 12 samples at concentrations ranging from 20,400 to 516,000 µg/L. No cyanide was detected in any sample.

The high inorganic content in many of the wells, especially GW-2S, is most likely a result of the high turbidity of those samples. In terms of organic substances, the two most contaminated wells are MW-5D and MW-5S, with total VOC concentrations of approximately 6,300 and 8,100 µg/L, respectively.

4.4.4 Residential Well and Spring Samples

As discussed in Section 3.6, water samples were collected from five residential wells and two springs. All samples were analyzed for TCL semivolatile substances, PCBs, pesticides, metals, and cyanide according to NYSDEC CLP methods, as well as volatiles by EPA Method 524.2. Tables 4-9 and 4-10 summarize the organic and inorganic analytes detected, respectively. At the time of sampling, conductivity, temperature, and turbidity data were collected for each of the samples. These data are presented in Table 4-11.

The only volatile substance detected in the samples collected, other than those attributable to laboratory contamination, was TCE. This chlorinated aliphatic compound was detected only in water from the LaDue spring (DW-5) at 2.6 µg/L. TCE was also detected in the field duplicate collected at the LaDue spring (DW-5D) at 2.9 µg/L. No semivolatile substances, PCBs, or pesticides were detected in any of the samples.

Of the 24 inorganic analytes tested for, 14 were detected in the residential water samples. Aluminum, barium, calcium, magnesium, and potassium were detected in all the samples at concentrations below NYSDEC Class GA standards and guidance values and New York State Department of Health (NYSDOH) Maximum Contaminant Levels (MCLs). Chromium, copper, lead, mercury, and cyanide were detected in some of the samples, but none was detected at concentrations exceeding NYSDEC Class GA standards or NYSDOH MCLs.

Iron, present in all but DW-2, exceeded the Class GA standard and MCL in DW-1, DW-3, DW-4, DW-5, and DW-6 at concentrations ranging from 534 to 1,300 µg/L. Manganese, present in all samples, exceeded the Class GA standard and MCL in DW-1 only, at 510 µg/L. Iron and manganese are both considered secondary contaminants by NYSDOH, with MCLs based on aesthetic quality. Both are also commonly high in unfiltered groundwater samples.

Sodium, present in all samples, exceeded the NYSDEC Class GA standard in samples DW-1, DW-3, DW-4, and DW-7 at concentrations ranging from 31,600 to 58,000 μg/L. No MCL for this secondary contaminant exists; however, the sodium content in the above four samples exceeds the guideline for people on severely restricted sodium diets. No sodium concentrations exceeded guidelines for people on moderately restricted sodium diets (10 NYCRR 5-1.52).

Zinc, detected in all samples, exceeded the NYSDEC Class GA standard in DW-4 only, at a concentration of 338 μg/L. However, this concentration is below the MCL for this secondary contaminant.

4.4.5 Surface Water Samples

As discussed in Section 3.7, six surface water samples plus one field duplicate were collected from Duffy Creek and its unnamed tributary. Two samples were collected from Duffy Creek (SW-2 and SW-4), two were collected from its tributary (SW-1 and SW-3) upstream of their confluence, and two were collected downstream of the confluence (SW-5 and SW-6). All samples were analyzed for full TCL organic substances and inorganic substances. Tables 4-12 and 4-13 summarize the organic substances and inorganic substances detected in the surface water samples, respectively.

No VOCs other than common laboratory contaminants were detected in the surface water samples. Two semivolatile compounds were detected in the samples. Di-n-butylphthalate was detected at low concentrations in SW-1, SW-2, SW-4, and SW-6. In addition, di-n-octylphthalate was detected at a low concentration in SW-2. Phthalates are common laboratory contaminants but are included here because neither was detected in the method blank associated with these samples. Phthalates are also common field contaminants resulting from rubber-based protective clothing. The phthalates detected in the downstream samples are assumed not to be site-related because they were also detected upstream (SW-2).

No PCBs or pesticides were detected in any of the surface water samples.

Of the 24 inorganics analyzed for, 13 were detected in the samples. Barium, calcium, magnesium, manganese, potassium, sodium, vanadium, and zinc were present in most or all of the samples analyzed but at concentrations below NYSDEC Class C standards. Aluminum was present in all samples and exceeded the Class C standard in all samples except SW-6, collected the furthest downstream of the site. Aluminum concentrations ranged from 119 to 578 μg/L in the samples, exceeding the Class C standard, and was present at 307 μg/L in the background sample from Duffy Creek (SW-2). Copper and nickel were both detected only in the background sample (SW-2), and both were detected at concentrations below Class C standards. Iron was detected in all seven samples, exceeding the standard in all except SW-4 and SW-6. The highest concentration of iron was detected in SW-2, the background sample (estimated to be 3,840 µg/L). Lead was detected in all seven samples, ranging from estimated concentrations of 1.1 to 4.9 µg/L. The Class C standard for lead was exceeded in samples SW-3, SW-4, SW-4D, and SW-5 but not in the sample closest to the site (SW-1) nor furthest downstream (SW-6).

The surface water samples were also analyzed for hardness, as indicated on Table 4-13. All seven samples fall near the border between soft and moderately hard water.

4.4.6 Sediment Samples

As discussed in Section 3.7, sediment samples were collected from six locations in Duffy Creek and its unnamed tributary. These samples were collected from the same locations as the surface water samples discussed in Section 4.4.5. Tables 4-14 and 4-15 summarize the organic and inorganic analytes detected in the sediment samples, respectively.

The only VOC detected in any of the sediment samples was acetone which was present in all samples except SED-6 at concentrations ranging from approximately 10 to 38 µg/kg. Acetone is a common laboratory contaminant but is discussed here because it was not detected in the associated method blank. However, due to the low concentrations detected, as well as its presence in the upstream sample (SED-2), the presence of acetone in these samples is assumed to be due to laboratory contamination.

The only semivolatile substances detected was butylbenzylphthalate in sample SED-3 at an estimated concentration of 24 µg/kg. Phthalates are common field and lab contaminants resulting from rubber-based protective clothing. No sediment criteria exist for either acetone or butylbenzyl phthalate (NYSDEC 1989).

No PCBs or pesticides were detected in any of the sediment samples.

In addition to the above analyses, the sediment samples were also analyzed for organic matter according to ASTM Designation D2974-87. The results, which are presented in Table 4-14, ranged from 3.2 to 7.3%.

Of the 24 inorganics analyzed for, 17 were detected in the sediment samples. Aluminum, barium, beryllium, calcium, chromium, cobalt, lead, magnesium, potassium, and vanadium were detected in all seven samples at concentrations below the sediment criteria. Sodium, detected only in SED-2, has no applicable criterion. Arsenic, detected in all samples at concentrations ranging from 8.1 to 14.3 µg/kg, exceeded the sediment criterion but not the limit of tolerance in all samples, including the background sample (SED-2). Copper was detected in all of the sediment samples at concentrations ranging from 15.7 to 23.0 µg/kg and exceeded the criteria, but not the limit of tolerance, in SED-1, SED-4, and SED-4D. Iron exceeded the sediment criterion in all samples, with concentrations ranging from 31,600 to 43,200 µg/kg. Iron also exceeded the limit of tolerance in SED-2, the background sample, and in SED-6. Manganese exceeded the sediment criterion in all samples, with concentrations ranging from 705 to 2,440 µg/kg, and it exceeded the limit of tolerance in samples SED-1, SED-2, SED-3, and SED-5. The highest concentrations of iron and manganese were detected in the background sample SED-2, suggesting that the presence of these metals at high concentrations is not site-related.

Nickel exceeded the sediment criterion but not the tolerance limit in all of the samples, with concentrations ranging from 33.4 to 42.2 µg/kg. Zinc, detected in all samples, exceeded the criterion in SED-2, SED-3, and SED-4D, but not the tolerance limit. The background sample, SED-2, contained one of the highest concentrations of zinc.

4.4.7 Surface Soil Samples

As discussed in Section 3.8, two background (SS-1 and SS-2) and twelve biased (SS-3 through SS-14) surface soil samples were collected at and around the site. All 14 samples were analyzed for full TCL organic substances and inorganic substances according to NYSDEC CLP methods. Tables 4-16 and 4-17 summarize the organic and inorganic analytes detected in the surface soil samples, respectively.

Three VOCs were detected in the surface soil samples. Acetone was detected in one sample (SS-11) at a concentration that was not directly attributable to laboratory contamination. Chloromethane was detected in SS-7 at an estimated concentration of 40 µg/kg, and ethylbenzene was detected in SS-6 and SS-7 at estimated concentrations of 1 and 18 µg/kg, respectively. No other chlorinated aliphatic compounds were detected in any of the surface soil samples.

Several semivolatile compounds, including phthalates and PAHs, were detected in several soil samples. Two phthalate compounds were detected at concentrations not directly attributable to laboratory contamination, including bis(2-ethylhexyl)phthalate at 2,100 µg/kg in SS-3 and butylbenzylphthalate at estimated concentrations of 50 and 260 µg/kg in SS-10D and SS-13, respectively. Phthalates are common laboratory and field contaminants due to their presence in rubber gloves and other protective equipment.

As summarized in Table 4-15, several PAHs were detected in numerous samples. The total estimated PAH concentrations in these samples are 53 µg/kg in SS-3; 160 µg/kg in SS-7; 40 µg/kg in SS-9; 980 µg/kg in SS-10; 140 µg/kg in SS-12; and 410 µg/kg in SS-14. Individual PAHs found to exceed typical ranges detected in rural soils (ASTDR 1989) include benzo(b)fluoranthene in SS-10 and SS-14; chrysene in SS-10 and SS-14; fluoranthene in SS-7 and SS-10; indeno(1,2,3-cd)pyrene in SS-12; phenanthrene in SS-7, SS-10, and SS-14; and pyrene in SS-3, SS-7, SS-10, and SS-14.

No PCBs or pesticides were detected in any of the surface soil samples.

Of the 24 inorganic analytes tested for, 18 were detected in the surface soil samples. Concentrations of metals in the surface soil samples were compared to the common range detected in eastern United States soils as well as to the upper limit of the 90th percentile (Shacklette and Boerngen 1984).

Aluminum, arsenic, barium, beryllium, chromium, copper, magnesium, potassium, sodium, and vanadium were detected in all or most samples but at concentrations within the observed range and 90th percentile.

The concentrations of calcium in SS-3 and SS-9 were found to exceed the 90th percentile but fell within the observed range. Cobalt was detected at concentrations exceeding the 90th percentile in all samples except background sample SS-2 (including background sample SS-1). However, all cobalt concentrations fell within the observed range except in SS-11, where it was detected at 87.3 mg/kg. Iron was found to exceed the upper limit of the 90th percentile in SS-3, SS-10, SS-10D, and SS-11 at concentrations ranging from 54,300 to 283,000 mg/kg. Lead was found to exceed the 90th percentile in SS-3 and SS-11 at 35.5 and 56.1 mg/kg, respectively, while manganese exceeded this limit in SS-3 and SS-13 at estimated concentrations of 4,540 and 1,940 mg/kg, respectively. Nickel exceeded the 90th percentile in SS-3, SS-6, SS-7, and SS-11 at concentrations ranging from 39.4 to 88.0 mg/kg. Zinc was detected above the 90th percentile in SS-3, SS-11, and SS-13 at concentrations ranging from 131 to 356 mg/kg. All of these metals, with the exception of iron in SS-3 and SS-11, fell within the observed range.

In addition to these metals, cyanide was detected in one sample, SS-11, at an estimated concentration of 3.5 mg/kg.

In summary, SS-3 contained seven metals at concentrations above the 90th percentile, and SS-11 contained five as well as cyanide. The remainder of the samples contained zero to three metals above the 90th percentile. The presence of cobalt in all of the surface samples at relatively similar concentrations suggests a natural local abundance of this metal. In terms of organic compounds, low concentrations of VOCs were detected in three samples. Additionally, phthalates and PAHs were detected at relatively low concentrations in numerous samples.

4.4.8 Leachate Samples

As discussed in Section 3.9, two leachate samples of liquid matrix were collected from the on-site leachate collection system. Sample L-1 was collected from Manhole 4 (MH-4), which is the next-to-last manhole before leachate from the northwest, northeast, and south-central fill areas enters the sump at Pump Station 1. Sample L-2 was collected from the sump at Pump Station 2, which contains leachate from the south fill area only. Both samples were analyzed for full TCL organic substances and inorganic substances according to NYSDEC CLP methods. Tables 4-18 and 4-19 summarize the organic and inorganic analytes detected in the leachate samples.

Leachate sample L-1, which consisted of a reddish-orange liquid of pH 7.02 and conductivity of 860 ppm, contained two VOCs: total 1,2-DCE at 8 μg/L and TCE at an estimated concentration of 2 μg/L. Sample L-2, a reddish-orange liquid of pH 6.63 and conductivity of 1,170 ppm, contained three VOCs: TCE at 14 μg/L, chlorobenzene at an estimated 3 μg/L, and total 1,2-DCE at an estimated concentration of 2 μg/L.

Sample L-1 contained no semivolatile substances, PCBs, or pesticides, while L-2 did not include any PCBs or pesticides. However, several semivolatile substances were detected in L-2 at estimated concentrations as follows: 4-chloro-3-methylphenol at 4 μg/L; 1,4-dichlorobenzene at 1 μg/L; di-n-butylphthalate at 2 μg/L; naphthalene at 1 μg/L; and n-nitrosodiphenylamine at 1 μg/L. Di-n-butylphthalate, a common laboratory and field contaminant, is included in this discussion because it was not detected in the laboratory method blank.

Since leachate on site has in the past flowed directly into the unnamed tributary to Duffy Creek and the potential still exists for this to occur, the leachate results were compared to NYSDEC Class C surface water standards in order to preliminarily assess the leachate's potential impact on the creek. The only organic substances found to exceed these standards and guidance values were TCE and 4-chloro-3-methylphenol in L-2.

Of the 24 inorganic analytes tested for, 17 were detected in the leachate samples, as detailed in Table 4-19. Arsenic, barium, beryllium, cadmium, chromium, copper, magnesium, manganese, nickel, potassium, and sodium were all detected in one or both leachate samples at concentrations below NYSDEC Class C standards. Aluminum, cobalt, iron, lead, and zinc were detected in concentrations above Class C standards in both samples. Vanadium exceeded the imposed standard in L-1 only.

In summary, the leachate from the south fill area contained more organic compounds than the leachate collected at MH-4. However, the concentration of VOCs in the leachate is much less than in the air above the leachate as discussed in Section 4.4.9. In terms of inorganic substances, several metals exceeded Class C standards; however, most appear ubiquitous at the site, with the exception of lead and vanadium.

4.4.9 Air Samples

As discussed in Section 3.10, the manholes and risers of the leachate collection system were surveyed with air monitoring equipment in order to locate "hot spots" and identify leachate and air sampling locations. Data were collected on September 30, 1991 prior to the leachate sampling. These data, along with data from the additional survey performed on December 17 and 18, 1991 prior to air sampling, are presented in Table 4-20. Since only two leachate samples could be collected (see Section 3.9), air samples were collected from the "hottest" manholes and risers from each fill area, as detailed on Table 3-6. Eight air samples were collected, including one field duplicate and one field blank. All samples were analyzed for VOCs by EPA method TO-14, which utilizes SUMMA® canisters. The analytical results provided by Air Toxics, Ltd. are provided in Appendix F.

As detailed in Table 4-21, several VOCs were detected in the air samples, including aromatic hydrocarbons (including benzene, ethylbenzene, 1,2,4-trimethylbenzene, toluene, and o-, m-, and p-xylene), chlorinated aliphatic hydrocarbons (including chloroethane; 1,1-DCA; cDCE; MC; 1,1,1-TCA; TCE; and VC), and chlorofluorocarbons (CFCs) (including Freon® 11 [fluorotrichloromethane], Freon® 12 [dichlorodifluoromethane], Freon® 113 [1,1,2-trichloro-1,2,2-trifluoroethane], and Freon® 114 [dichlorotetrafluorethane]).

Sample A-1 (MH-10) contained 22,100 parts per billion by volume (ppbv) of aromatic hydrocarbons and 71,000 ppbv of chlorinated aliphatic compounds, totaling 93,100 ppbv VOCs. Sample A-2 (R-10) contained 12,500 ppbv aromatics, more than 100,000 ppbv chlorinated aliphatics, and 2,910 ppb CFCs, totaling 116,000 ppbv VOCs. Sample A-3 (MH-6) contained 29,600 ppbv aromatics and approximately 102,000 ppbv chlorinated aliphatic compounds, totaling 131,000 ppbv VOCs. Sample A-4 (MH-15) contained approximately 10,300 ppbv aromatics; 2,370 ppbv chlorinated aliphatics; and 2,660 ppbv CFCs, totaling 15,400 ppbv VOCs. Sample A-5 (R-2) contained 234 ppbv aromatics, 106 ppbv chlorinated aliphatics, 19.8 ppbv CFCs, and 3.8 ppbv chlorinated aromatics, totaling 360 ppbv VOCs. Duplicate sample A-6 contained similar compounds to A-5 but at about half the concentration, totaling 170 ppbv VOCs. Sample A-7 contained 8,090 ppbv aromatics and 18,600 ppbv chlorinated aliphatics, totaling 26,700 ppbv VOCs. Sample A-8, the field blank through which purified nitrogen was run, contained 3.6 ppbv 1,2-dichlorobenzene and 2.8 ppbv Freon® 113, neither of which was detected in any other sample. In addition, A-8 was found to contain 1.6 ppbv of MC, which was also detected in A-2, but at a significantly high enough concentration that it is not considered background contamination.

In summary, the samples containing the highest concentrations of VOCs were those collected nearest the northwest fill area. Manhole 6, located at the southern end of the northwest fill area before the junction with the line from the northeast fill area, contained the highest concentration of VOCs. The air samples contained much higher concentrations of VOCs than the liquid leachate samples. This indicates that the collection system is efficiently removing VOCs from the leachate or it is serving as a direct migratory pathway for VOCs from the fill areas, or both.

4.4.10 Leachate Collection System Evaluation

As discussed in Section 3.11, information regarding the leachate collection system was collected during the RI by means of visual inspection, surveying, and file review. Since these data pertain to the FS, results are not discussed in the RI report.

4.5 DATA ASSESSMENT SUMMARY

All analytical data generated for this remedial investigation have been reviewed by a third-party data validator for compliance, completeness, and data usability. QA/QC concerns that may have an effect on data usability are summarized below with the appropriate data qualifiers.

- Low levels of MC, acetone, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate were attributable to laboratory background contamination because they were present in the method blanks at comparable levels. In some instances, the method blanks did not exhibit contamination by one or more of these common contaminants. However, because MC and acetone are widely used laboratory solvents and phthalate esters are present in the gloves used in handling samples, their presence is most likely due to laboratory/field contamination. Di-n-butylphthalate in TP-4 and TP-5 and bis(2-ethylhexyl)phthalate in TP-1, TP-2, TP-4, and TP-5 are at levels higher than those usually found for laboratory or field contamination.

- Volatile analysis holding time of seven days was exceeded by one day for the following samples: SB-2A, SB-3A, SB-3B, SS-10D-RE, and SS-13-RE. The holding time was exceeded by three to four days for samples TP-1 to TP-5, TP-1DL, and TP-2 MS/MSD. Sample TP-1DL was analyzed according to medium level protocol, so no qualification was necessary. Positive results and quantitation limits for aromatic volatiles in these samples were qualified "J" and "UJ" as estimated. However, samples SB-2A, SB-3A, and SB-3B were re-collected and analyzed within the holding time.

- Surrogate recovery for bromofluorobenzene was below QC limits for volatile analysis of the following samples: GW-5D, TB-1, SS-1, SS-2-RE, SS-13, and SS-13-RE. Matrix interference was substantiated for SS-13 because reanalysis gave similar results. Surrogate recoveries for toluene-d8 and bromofluorobenzene were below QC limits for sample TP-1DL. Positive results and limits for all volatile substances in these samples were qualified "J" and "UJ" as estimated.

- Several samples indicated one or more high surrogate recoveries for volatile analysis, including TB-1-RE, SS-1-RE, SS-2, SS-7, SS-7-RE, SB-7A, SB-7B, SB-10B, GW-5S, GW-6S, GW-11S, GW-12D, GW-12D-RE, GW-13D, and GW-13S. Matrix interferences were substantiated for SS-7 and GW-12D because reanalysis gave similar results. Positive results only in these samples were qualified "J" as estimated.

- Positive results for 2-butanone in TP-1 and TP-5 were qualified "J" as estimated due to a relative standard deviation result of greater than 35% for the initial calibration of 2-butanone.

- Low internal standard (IS) areas for volatile analysis of several samples were noted. Samples SS-1, SS-2-RE, SS-7, SS-7-RE, SS-10D, and SS-13 gave low IS areas for chlorobenzene-d5, and sample SS-7 also gave a low IS area for bromochloromethane. Positive results and limits for the compounds quantitated using these ISs were qualified "J" and "UJ" as estimated in these samples.

- Base/neutral/acid extractable (BNA) extraction holding time of five days was exceeded by one day for samples SB-6A and SB-6B; by 23 days for samples GW-2D-RE, GW-8S, and GW-10S-RE; and by 28 days for sample GW-11-SDD-RE. Positive results and limits for BNAs in these samples were qualified "J" and "UJ" as estimated.

- Two or more acid phenol (AP) surrogates gave recoveries of less than 10% for BNA analysis in the following samples: GW-2D, GW-2D-RE, GW-10S, GW-10S-RE, GW-11-SDD, GW-13D, and GW-13D-RE. Reanalysis of GW-11-SDD gave one recovery below 10%. AP quantitation limits for GW-11SDD-RE were qualified "UJ" as estimated, while AP limits for the other samples were qualified "R" as rejected. Matrix interferences were substantiated by poor AP recoveries for the reanalysis of these samples.

- Low IS areas for BNA analysis of several samples were noted. The following samples had low IS areas for chrysene-d12 and perylene-d12: SS-12, SS-13, SS-14, and their reanalyses. In addition, samples SS-9 and SS-14 had low IS areas for perylene-d12 only. Four IS areas were low for sample TP-5: acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12. In most instances, matrix interferences were substantiated by similar results for reanalyses or MS/MSD analyses. Positive results and limits for the compounds quantitated using these ISs were qualified "J" and "UJ" as estimated in the associated samples.

- Pesticide/PCB extraction holding time of five days was exceeded by one day for samples SB-6A and SB-6B. Positive results and limits for pesticide/PCBs in these samples were qualified "J" and "UJ" as estimated.

- Several pesticides gave percent difference (%D) values greater than 20% for continuing calibration, including beta-BHC; dieldrin; 4,4'-DDE; 4,4'-DDD; and 4,4'-DDT. Positive results for these compounds in samples TP-1 and TP-2 were qualified "J" as estimated.

- Volatile analysis of residential well samples by Method 524.2 indicated zero percent recovery for 1,2-dibromo-3-chloropropane in both laboratory-fortified blank spikes. The quantitation limit for this compound was qualified "R" as rejected in all residential well samples.

- Cobalt results for SW-1 to SW-6 were qualified "U" as undetected because cobalt was detected at 6.1 μg/L in the associated preparation blank. Manganese results for SW-4, SW-4D, and SW-6 were qualified "U" because manganese was detected at 3.2 μg/L in the preparation blank. Manganese and zinc results for DW-1 were qualified "U" because of manganese detected at 2.6 μg/L and zinc at 4.9 μg/L in the preparation blank. The iron result for GW-7D was qualified "U" because of iron detected at 15.9 μg/L in the preparation blank.

- Field blank results for rinsate sample R-1 were used to qualify the associated soil samples. Cadmium results for SB-8AD, SB-8B, and SB-9B were qualified "U" as undetected because of cadmium detected at 6.5

µg/L in R-1. All other contaminants found in R-1 were either present at greater than five times the blank level or not detected in the associated samples.

- The cyanide holding time of 12 days was exceeded by six days for samples TP-1, TP-2, and TP-3. Quantitation limits for cyanide in these samples were qualified "UJ" as estimated.

- For samples TP-1 to TP-5, inorganic spike recoveries were zero percent for antimony and selenium; between 30% and 75% for arsenic, silver, thallium, and zinc; and greater than 125% for lead. Quantitation limits for antimony and selenium were qualified "R" as rejected; arsenic, lead, and zinc positive results were qualified "J" as estimated; and silver and thallium limits were qualified "UJ" as estimated.

- Inorganic spike recovery was less than 30% for antimony in four spike analyses. Quantitation limits for antimony were qualified "R" as rejected in the associated samples SB-1A to SB-6A, SB-1B to SB-6B, SB-5C, and SB-10A. Arsenic, selenium, and silver results and limits for these samples were qualified "J" and "UJ" as estimated, due to spike recoveries between 30% and 75%.

- For water samples L-1 (MH-4) and L-2 (PS#2), antimony and silver gave spike recoveries between 30% and 75%, while arsenic and selenium gave recoveries less than 30%. For soil samples SS-1 to SS-14, antimony and silver gave zero percent recoveries, while mercury and selenium gave recoveries between 30% and 75%. Antimony and silver quantitation limits were qualified "UJ" as estimated for the waters and "R" as rejected for the soils. Arsenic results were qualified "J" as estimated, while arsenic and selenium limits were qualified "R" as rejected for the waters. Mercury and selenium limits were qualified "UJ" as estimated for the soils.

- For soil samples SB-7A, SB-7B, and SED-1 to SED-6, antimony and silver gave spike recoveries less than 30%, and selenium gave a recovery between 30% and 75%. For water samples SW-1 to SW-6, selenium gave a recovery between 30% and 75%. Antimony and silver limits were qualified "R" as rejected for the soils, and selenium limits were qualified "UJ" as estimated for both soils and waters.

- Duplicate results gave relative percent difference (RPD) values greater than QC limits for the following: manganese for soil samples SB-1A to SB-6A, SB-1B to SB-6B, SB-5C, and SB-10A; lead for water samples L-1 (MH-4) and L-2 (PS#2); barium, manganese, and cyanide for soil samples SS-1 to SS-14; lead and iron for water samples SW-1 to SW-6; lead for water samples GW-1D to GW-4D, GW-2S, GW-3S, GW-8S to GW-10S, GW-9D, and GW-10D, and barium and zinc for soil samples TP-1 to TP-5. Positive results for these analytes in the associated samples were qualified "J" as estimated.

- Serial dilution results for water samples L-1 (MH-4) and L-2 (PS#2) gave %D values greater than 10% for aluminum and zinc. For soil samples SS-1 to SS-14, the %D for iron exceeded 10%. For water samples DW-1 to DW-7, GW-5D to GW-7D, GW-5S to GW-7S, GW-11S to GW-13S, GW-11-SDD, GW-12D, and GW-13D, the %D for aluminum exceeded

10%. Positive results for these analytes that exceeded 50 times the instrument detection limit (IDL) were qualified "J" as estimated in the associated samples.

Table 4-1

MONITORING WELL AND WATER LEVEL ELEVATION DATA[a]

Well ID	Elevation (feet)		Water Surface Elevation	
	Ground	Top of Inner Casing	10/22/91 through 10/24/91	11/20/91
MW-1D	277.63	280.27	213.40	213.19
MW-2D	208.30	211.01	158.41	158.31
MW-2S	204.59	207.29	197.54	198.60
MW-3D	174.80	178.05	164.10	163.91
MW-3S	175.10	177.56	162.16	170.39
MW-4D	176.49	178.95	166.69	167.38
MW-5D	151.52	153.55	150.25	150.27
MW-5S	151.55	154.12	150.48	150.49
MW-6D	132.81	134.83	116.69	116.79
MW-6S	132.15	134.79	122.44	123.10
MW-7D	96.48	98.99	65.13	65.40
MW-8S	109.78	112.23	102.96	103.11
MW-9D	156.26	158.93	130.76	129.15
MW-9S	156.71	159.12	138.83	141.77
MW-10D	184.40	186.65	163.18	161.24
MW-10S	184.65	187.20	172.90	172.39
MW-11S	88.32	90.32	82.61	83.71
CW-3A	98.26	100.43	94.77	85.95
CW-3B	99.43	100.59	90.29	87.81
CW-4A	91.66	92.81	88.37	89.18
CW-4B	91.65	92.53	88.39	88.50

[a] Elevation reference: Site benchmark, BM-1 = 296.150 feet.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-2

ORGANIC COMPOUNDS DETECTED IN TRENCH SAMPLES
(all values reported in $\mu g/kg$)

Compound	TP-1	TP-2	TP-3	TP-4	TP-5
Volatiles					
Acetone	4,500 DJ	230 J	1,800 J	ND	370 J
Benzene	ND	ND	ND	ND	78 J
2-Butanone	490 J	ND	ND	ND	75 J
1,1-Dichloroethane	710	ND	ND	ND	ND
total 1,2-Dichloroethene	3,900 DJ	ND	2,200	2,900	21 J
Ethylbenzene	33,000 J	31 J	12,000 J	830 J	1,200 J
2-Hexanone	120	ND	ND	ND	44 J
Methylene chloride	U	U	U	U	110
4-Methyl-2-pentanone	260 J	ND	ND	ND	ND
Styrene	45	ND	ND	4,200	ND
Tetrachloroethene	ND	ND	ND	520 J	ND
Toluene	970 J	11 J	760 J	3,200 J	33 J
Trichloroethene	73	ND	ND	5,300	ND
Vinyl chloride	980 DJ	ND	ND	ND	ND
Total xylenes	1,700 J	51 J	ND	690 J	350 J
Semivolatiles					
Benzo(b)fluoranthene	ND	370 J	ND	ND	ND
Benzo(a)pyrene	ND	280 J	ND	ND	ND
Benzyl alcohol	ND	ND	ND	1,200 J	ND
Bis(2-ethylhexyl)phthalate	1,100 J	1,100 J	U	8,300	8,300 J
Butylbenzylphthalate	ND	16,000	ND	1,000 J	2,700 J
4-Chloro-3-methylphenol	ND	300 J	ND	ND	ND
Chrysene	ND	410 J	ND	ND	ND
Di-n-butylphthalate	ND	270 J	U	14,000	4,100 J
1,2-dichlorobenzene	ND	ND	ND	1,200 J	670 J
Diethylphthalate	110 J	ND	25 J	ND	ND
Dimethylphthalate	ND	ND	ND	910 J	530 J

Key at end of table.

Table 4-2

ORGANIC COMPOUNDS DETECTED IN TRENCH SAMPLES
(all values reported in μg/kg)

Compound	TP-1	TP-2	TP-3	TP-4	TP-5
Fluoranthene	280 J	720 J	ND	ND	300 J
2-Methylnaphthalene	ND	180 J	ND	ND	190 J
4-Methylphenol	1,600 J	820 J	870	ND	370 J
Naphthalene	ND	140 J	ND	ND	150 J
Pentachlorophenol	ND	ND	ND	ND	6,600 J
Phenanthrene	130 J	540 J	ND	ND	610 J
Pyrene	190 J	530 J	ND	ND	340 J
Pesticides					
beta-BHC	12 J	ND	ND	ND	ND
Dieldrin	ND	13 J	ND	ND	ND
4,4'-DDE	ND	15 J	ND	ND	ND
4,4'-DDD	ND	43 J	ND	ND	120
4,4'-DDT	ND	130 J	ND	ND	ND

Key:

D = Reported result is taken from diluted sample analysis.
J = Associated numerical value is considered estimated.
ND = Compound was not detected above the CRQL.
U = The compound was detected in the method blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

DRAFT

Table 4-3

INORGANIC ANALYTES DETECTED IN TRENCH SAMPLES
(all values reported in mg/kg)

						Common Range in Eastern U.S. Soils[a]	
Analyte	TP-1	TP-2	TP-3	TP-4	TP-5	Observed Range	Upper Limit of 90th Percentile
Aluminum	13,200	9,450	13,900	12,000	14,600	7,000 - 100,000	128,000
Arsenic	20.9 J	14.3 J	12.2 J	11.5 J	12.7 J	<0.1 - 73	16.0
Barium	132 J	121 J	121 J	85.7 J	215 J	10 - 1,500	867
Beryllium	0.74 B	0.47 B	0.71 B	0.60 B	0.64 B	<1 - 7	1.81
Calcium	4,350	9,890	1,610	1,850	2,710	100 - 280,000	14,400
Chromium	28.8	18.2	23.2	24.3	26.9	1 - 1,000	112
Cobalt	28.1	20.8	24.9	26.0	24.5	<0.3 - 70	19.8
Copper	29.0	28.4	194	25.4	34.6	<1 - 700	48.7
Iron	36,400	23,900	31,700	35,100	38,300	100 - >100,000	54,100
Lead	33.4 J	53.5 J	15.3 J	86.9 J	62.5 J	<10 - 300	33.0
Magnesium	5,070	4,470	4,240	4,130	3,330	50 - 50,000	10,700
Manganese	760	422	661	784	709	<2 - 7,000	1,450
Nickel	43.2	25.8	33.5	35.0	31.9	<5 - 700	38.2
Potassium	2,160	1,970	2,230	1,570	1,670	50 - 37,000	23,500
Sodium	509 B	289 B	323 B	71.2 B	276 B	<500 - 50,000	17,400

[illegible] at end of table.

Table 4-3

INORGANIC ANALYTES DETECTED IN TRENCH SAMPLES
(all values reported in mg/kg)

Analyte	TP-1	TP-2	TP-3	TP-4	TP-5	Common Range in Eastern U.S. Soils[a] Observed Range	Common Range in Eastern U.S. Soils[a] Upper Limit of 90th Percentile
Vanadium	17.8	15.1	22.0	18.6	26.2	<7 - 300	140
Zinc	173 J	258 J	269 J	87.4 J	263 J	<5 - 2,900	104

[a]Shacklette and Boerngen 1984.

Key:

B = Result is greater than IDL but less than CRDL.
J = Reported value is estimated due to variance from QC limits.

Source: Ecology and Environment Engineering, P.C. 1991.

DRAFT

Table 4-4

ORGANIC COMPOUNDS DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported in μg/kg)

Compound	SB-1A[a] (12-14')	SB-1B[a] (1-2')	SB-2A (6.5-7.5')	SB-3A (1-2')	SB-3B (10-12')	SB-4A (2-4')	SB-4B (7-9')	SB-5B (8-9')	SB-5C (18-19')
Volatiles									
total 1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	87	61
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	22	13
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	21	7 J
Semivolatiles									
None Detected			NA	NA	NA	NA	NA	NA	NA

Key at end of table.

3715-03/12/92-D1

DRAFT

Table 4-4

ORGANIC COMPOUNDS DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported in μg/kg)

Compound	SB-6A (6-10')	SB-6B (12-14')	SB-7A (8-10')	SB-7B (20-21' and 22-23')	SB-8A (7-9')	SB-8AD[b] (7-9')	SB-8B (21-23')	SB-9A (4-6')	SB-9B (26-27.5')	SB-10A (5-7')	SB-10b (18-19')
Volatiles											
total 1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semivolatiles											
None Detected								NA	NA	NA	NA

[a]Background samples from well MW-1D.
[b]Field duplicate of sample SB-8A.

Key:

J = The reported value is estimated.
NA = Not analyzed for.
ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1991.

02:D3715-03/12/92-D1

DRAFT

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-1A[a] (12-14')	SB-1B[a] (1-2')	SB-2A (6.5-7.5')	Common Range in Eastern U.S. Soils[c] Observed Range	Common Range in Eastern U.S. Soils[c] Upper Limit of 90th Percentile
Aluminum	18,100	16,200	15,600	7,000 - 100,000	128,000
Arsenic	2.9 J	6.8 J	12.7 J	<0.1 - 73	16.0
Barium	31.2 B	72.3	109	10 - 1,500	867
Beryllium	0.64 B	0.50 B	1.1 B	<1 - 7	1.81
Cadmium	ND	ND	1.3	NA	NA
Calcium	1,180	1,050 B	850 B	100 - 280,000	14,400
Chromium	27.6	21.1	20.8	1 - 1,000	112
Cobalt	33.2	25.8	30.2	<0.3 - 70	19.8
Copper	37.0	7.7	29.3	<1 - 700	48.7
Iron	43,700	32,900	45,200	100 - >100,000	54,100
Lead	6.6 J	18.4 J	11.6 J	<10 - 300	33.0
Magnesium	6,680	3,650	6,710	50 - 50,000	10,700
Manganese	431 J	1,750 J	686 J	<2 - 7,000	1,450
Mercury	ND	ND	ND	0.01 - 3.4	0.265
Nickel	53.4	25.8	42.1	<5 - 700	38.2
Potassium	1,870	1,520	2,430	50 - 37,000	23,500
Sodium	54.6 B	34.2 B	99.5 B	<500 - 50,000	17,400
Vanadium	21.9	24.8	19.0	<7 - 300	140
Zinc	96.5 J	75.2 J	87.3 J	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-3A (1-2')		SB-3B (10-12')		SB-4A (2-4')		Common Range in Eastern U.S. Soils[c]	
							Observed Range	Upper Limit of 90th Percentile
Aluminum	15,500		12,800		13,600		7,000 - 100,000	128,000
Arsenic	16.4	J	7.1	J	1.3	J	<0.1 - 73	16.0
Barium	71.3		137		281		10 - 1,500	867
Beryllium	0.69	B	0.59	B	0.63	B	<1 - 7	1.81
Cadmium	ND		ND		ND		NA	NA
Calcium	360	B	1,150		1,640		100 - 280,000	14,400
Chromium	18.6		18.2		22.2		1 - 1,000	112
Cobalt	29.2		22.5		30.1		<0.3 - 70	19.8
Copper	9.8		12.8		21.1		<1 - 700	48.7
Iron	35,100		30,600		32,500		100 - >100,000	54,100
Lead	32.8	J	20.1	J	ND		<10 - 300	33.0
Magnesium	3,590		4,570		5,820		50 - 50,000	10,700
Manganese	1,140	J	668	J	1,670	J	<2 - 7,000	1,450
Mercury	ND		ND		ND		0.01 - 3.4	0.265
Nickel	25.7		30.4		41.9		<5 - 700	38.2
Potassium	1,510		1,840		1,780		50 - 37,000	23,500
Sodium	35.5	B	71.7	B	ND		<500 - 50,000	17,400
Vanadium	21.4		16.9		18.9		<7 - 300	140
Zinc	56.9	J	65.7	J	74.6	J	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-4B (7-9')		SB-5B (8-9')		SB-5C (18-19')		Common Range in Eastern U.S. Soils[c] Observed Range	Upper Limit of 90th Percentile
Aluminum	14,500		13,800		11,100		7,000 - 100,000	128,000
Arsenic	12.7	J	9.0	J	5.0	J	<0.1 - 73	16.0
Barium	42.8	B	132		80.7		10 - 1,500	867
Beryllium	0.86	B	0.77	B	0.49	B	<1 - 7	1.81
Cadmium	ND		ND		ND		NA	NA
Calcium	1,440		1,230		1,370		100 - 280,000	14,400
Chromium	21.1		20.1		15.4		1 - 1,000	112
Cobalt	32.7		25.6		21.3		<0.3 - 70	19.8
Copper	18.3		15.7		26.3		<1 - 700	48.7
Iron	41,400		33,700		26,000		100 - >100,000	54,100
Lead	8.0	J	13.0	J	12.7	J	<10 - 300	33.0
Magnesium	6,020		5,030		4,260		50 - 50,000	10,700
Manganese	1,010	J	694	J	551	J	<2 - 7,000	1,450
Mercury	ND		ND		ND		0.01 - 3.4	0.265
Nickel	48.0		36.4		30.1		<5 - 700	38.2
Potassium	1,990		1,710		1,110	B	50 - 37,000	23,500
Sodium	ND		ND		ND		<500 - 50,000	17,400
Vanadium	20.6		18.7		15.8		<7 - 300	140
Zinc	78.0	J	72.1	J	64.6	J	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-6A (6-10')	SB-6B (12-14')	SB-7A (8-10')	Common Range in Eastern U.S. Soils[c]: Observed Range	Common Range in Eastern U.S. Soils[c]: Upper Limit of 90th Percentile
Aluminum	13,500	13,100	13,000	7,000 - 100,000	128,000
Arsenic	10.6 J	15.7 J	11.7	<0.1 - 73	16.0
Barium	64.9	67.2	129	10 - 1,500	867
Beryllium	0.58 B	0.65 B	0.80 B	<1 - 7	1.81
Cadmium	ND	ND	ND	NA	NA
Calcium	742 B	777 B	1,600	100 - 280,000	14,400
Chromium	18.7	17.5	22.0	1 - 1,000	112
Cobalt	26.5	21.7	27.7	<0.3 - 70	19.8
Copper	15.5	12.5	23.6	<1 - 700	48.7
Iron	36,700	32,800	33,500	100 - >100,000	54,100
Lead	27.7 J	35.6 J	20.3 J	<10 - 300	33.0
Magnesium	4,660	4,720	5,130	50 - 50,000	10,700
Manganese	1,040 J	461 J	849	<2 - 7,000	1,450
Mercury	ND	ND	ND	0.01 - 3.4	0.265
Nickel	38.5	31.5	39.0	<5 - 700	38.2
Potassium	1,520	1,720	1,680	50 - 37,000	23,500
Sodium	54.3 B	67.0 B	44.4 B	<500 - 50,000	17,400
Vanadium	15.9	14.8	19.0	<7 - 300	140
Zinc	71.6 J	66.7 J	72.0	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-7B (20-21' and 22-23')	SB-8A (7-9')	SB-8AD[b] (7-9')	Common Range in Eastern U.S. Soils[c]	
				Observed Range	Upper Limit of 90th Percentile
Aluminum	12,500	12,100	13,200	7,000 - 100,000	128,000
Arsenic	14.5	14.1	10.4	<0.1 - 73	16.0
Barium	43.0	111	111	10 - 1,500	867
Beryllium	0.94 B	0.51 B	0.61 B	<1 - 7	1.81
Cadmium	ND	ND	U	NA	NA
Calcium	1,420	1,180	1,320	100 - 280,000	14,400
Chromium	21.7	15.1	18.8	1 - 1,000	112
Cobalt	27.0	21.8	24.9	<0.3 - 70	19.8
Copper	16.7	17.3	16.9	<1 - 700	48.7
Iron	35,800	29,400	32,700	100 - >100,000	54,100
Lead	13.3 J	13.9	12.3	<10 - 300	33.0
Magnesium	4,600	4,130	4,890	50 - 50,000	10,700
Manganese	909	996	828	<2 - 7,000	1,450
Mercury	ND	ND	ND	0.01 - 3.4	0.265
Nickel	40.1	32.2	34.7	<5 - 700	38.2
Potassium	2,710	1,470	1,790	50 - 37,000	23,500
Sodium	54.1 B	52.4 B	56.6 B	<500 - 50,000	17,400
Vanadium	21.0	14.0	16.2	<7 - 300	140
Zinc	71.3	60.1	66.2	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-8B (21-23')	SB-9A (4-6')	SB-9B (26-27.5')	Common Range in Eastern U.S. Soils[c]: Observed Range	Common Range in Eastern U.S. Soils[c]: Upper Limit of 90th Percentile
Aluminum	11,500	13,800	13,900	7,000 - 100,000	128,000
Arsenic	10.6	17.4	17.9	<0.1 - 73	16.0
Barium	90.2	122	87.7	10 - 1,500	867
Beryllium	0.59 B	0.65 B	0.92 B	<1 - 7	1.81
Cadmium	U	ND	U	NA	NA
Calcium	1,540	1,700	1,800	100 - 280,000	14,400
Chromium	14.8	18.9	15.1	1 - 1,000	112
Cobalt	23.2	25.4	30.1	<0.3 - 70	19.8
Copper	12.6	17.9	22.9	<1 - 700	48.7
Iron	33,900	33,300	35,100	100 - >100,000	54,100
Lead	11.8	22.4	8.0	<10 - 300	33.0
Magnesium	4,900	5,450	5,200	50 - 50,000	10,700
Manganese	1,420	771	894	<2 - 7,000	1,450
Mercury	0.12	ND	ND	0.01 - 3.4	0.265
Nickel	31.1	35.6	37.9	<5 - 700	38.2
Potassium	1,560	1,840	2,100	50 - 37,000	23,500
Sodium	61.6 B	64.2 B	80.1 B	<500 - 50,000	17,400
Vanadium	14.2	16.1	16.6	<7 - 300	140
Zinc	62.1	69.3	75.2	<5 - 2,900	104

Key at end of table.

Table 4-5

INORGANIC ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES FROM BORINGS
(all values reported mg/kg)

Analyte	SB-10A (5-7')	SB-10B (18-19')	Common Range in Eastern U.S. Soils[c] Observed Range	Common Range in Eastern U.S. Soils[c] Upper Limit of 90th Percentile
Aluminum	13,400	5,550	7,000 - 100,000	128,000
Arsenic	14.1 J	3.1	<0.1 - 73	16.0
Barium	182	40.5 B	10 - 1,500	867
Beryllium	0.67 B	ND	<1 - 7	1.81
Cadmium	1.8	ND	NA	NA
Calcium	1,150	77,500	100 - 280,000	14,400
Chromium	18.6	9.3	1 - 1,000	112
Cobalt	27.0	14.5	<0.3 - 70	19.8
Copper	15.1	9.5	<1 - 700	48.7
Iron	32,100	14,700	100 - >100,000	54,100
Lead	45.3 J	7.3	<10 - 300	33.0
Magnesium	4,250	17,100	50 - 50,000	10,700
Manganese	1,430 J	290	<2 - 7,000	1,450
Mercury	ND	ND	0.01 - 3.4	0.265
Nickel	31.7	16.9	<5 - 700	38.2
Potassium	1,340	630 B	50 - 37,000	23,500
Sodium	38.3 B	103	<500 - 50,000	17,400
Vanadium	19.1	11.0	<7 - 300	140
Zinc	64.8 J	56.3	<5 - 2,900	104

[a] Background samples from well MW-1D.
[b] Field duplicate of sample SB-8A.
[c] Shacklette and Boerngen 1984.

Key:

B = Result is greater than IDL, but less than CRDL.
J = Reported value is estimated due to variance from quality control limits.
NA = Not applicable.
ND = Not detected.
U = Analyte was detected in preparation blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

DRAFT

Table 4-6

ORGANIC COMPOUNDS DETECTED IN GROUNDWATER SAMPLES
(all values reported in µg/L)

Compound	GW-1D	GW-2D	GW-2S	GW-3D	GW-3S	GW-4D	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D	GW-8S	GW-9D
Volatiles													
Acetone	ND	ND	ND	ND	33	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	6 J	11 J	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	3 J	ND	ND	ND	ND	11 J	12 J	ND	ND	ND	ND	ND
total 1,2-Dichloroethene	ND	520 D	ND	ND	ND	ND	4,600 DE	5,600 DE	200 D	5 J	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	3 J	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	9 J	8 J	ND	ND	ND	ND	ND
1,1,1-Trichlorethane	ND	1 J	ND	ND	ND	ND	ND	4 J	ND	ND	ND	ND	ND
Trichloroethene	ND	230 D	ND	2 J	ND	1 J	310 D	370 D	7	ND	ND	ND	ND
Vinyl chloride	ND	160 D	ND	ND	ND	ND	1,400 D	2,100 D	63	ND	ND	ND	ND
Semivolatiles													
None detected			NA										

Key at end of table.

02:D3716-03/12/92-D1

Table 4-6

ORGANIC COMPOUNDS DETECTED IN GROUNDWATER SAMPLES
(all values reported in μg/L)

Compound	GW-9S	GW-10D	GW-10S	GW-11S	GW-11SDD[a]	GW-12D[b]	GW-12S	GW-13D	GW-13S	NYSDEC Class GA Groundwater Standard
Volatiles										
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	50 G
Chloroethane	ND	ND	ND	8 J	ND	ND	ND	ND	ND	5
Chloroform	2 J	ND	ND	ND	ND	ND	ND	ND	ND	7
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
1,1-Dichloroethene	ND	ND	ND	9 J	9	ND	ND	ND	ND	5
total 1,2-Dichloroethene	ND	3 J	ND	390 D	390 D	9 J	3 J	4 J	ND	5
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Methylene chloride	ND	ND	ND	ND	ND	4 J	ND	ND	ND	5
Toluene	ND	ND	ND	ND	ND	ND	5	ND	2 J	5
1,1,1-Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Trichloroethene	ND	3 J	ND	1,200 D	1,200 D	ND	38	ND	ND	5
Vinyl chloride	ND	ND	ND	110 J	110	45 J	ND	ND	ND	2

Key at end of table.

02:D3716-03/12/92-D1

Table 4-6

ORGANIC COMPOUNDS DETECTED IN GROUNDWATER SAMPLES
(all values reported in μg/L)

Compound	GW-9S	GW-10D	GW-10S	GW-11S	GW-11SDD[a]	GW-12D[b]	GW-12S	GW-13D	GW-13S	NYSDEC Class GA Groundwater Standard
Semivolatiles										
None detected	NA						NA			

[a] Field duplicate of sample G11S.
[b] Reported results from reanalysis of sample GW-12D.

Key:

ND = Not detected.
G = General organic guidance value (NYSDEC 1990).
J = The reported value is estimated.
D = Reported result is taken from diluted sample analysis.
E = Reported value is estimated because it exceeds the calibration limit.
NA = Sample not analyzed for semi-volatiles due to insufficient volume.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-7

INORGANIC ANALYTES DETECTED IN GROUNDWATER SAMPLES
(all values reported in $\mu g/L$)

Analyte	GW-1D	GW-2D	GW-2S	GW-3D	GW-3S	GW-4D	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D	GW-8S	GW-9D
Aluminum	364	742	42,700	252	3,040	393	3,140 J	531	131 B	6,990 J	29.5 B	217	3,650
Arsenic	2.9 B	9.1 B	17.8	ND	2.4 B	ND	3.5 B	2.5 B	ND	6.4 B	ND	ND	4.3 B
Barium	273	49.0 B	342	101 B	53.4 B	13.9 B	110 B	12.8 B	20.0 B	40.2 B	10.2 B	61.4 B	43.4 B
Beryllium	ND	ND	2.2 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	21,600	30,600	53,600	49,700	31,900	13,100	9,160	16,300	16,000	12,800	30,200	85,200	26,400
Chromium	11.6	ND	110	ND	ND	ND	49.6	ND	ND	14.2	ND	ND	ND
Cobalt	ND	8.1 B	102	ND	14.7 B	ND	ND	ND	ND	11.3 B	ND	11.5 B	13.4 B
Copper	ND	3.3 B	115	ND	7.7 B	ND	46.2	3.2 B	ND	15.3 B	ND	ND	9.7 B
Iron	972 J	1,910 J	110,000 J	524 J	8,270 J	834 J	2,480	650	316	15,700	U	542 J	8,290 J
Lead	ND	4.1 J	38.1 J	ND	6.0 J	ND	2.4 B	ND	ND	10.8	ND	11.0 J	5.7 J
Magnesium	8,600	15,600	50,500	21,400	19,100	12,100	5,400	12,300	11,000	12,200	21,700	56,000	13,100
Manganese	227	1,820	8,530	41.2	1,300	72.3	1,060	563	828	514	16.4	2,200	179
Nickel	ND	ND	155	ND	ND	ND	ND	ND	ND	22.3 B	ND	ND	ND
Potassium	2,090 B	14,900	17,500	18,800	5,960	1,990 B	8,800	1,750 B	1,230 B	5,020	2,520 B	4,940 B	18,300
Sodium	4,690 B	19,700	20,900	29,800	20,400	9,730	516,000	9,920	6,080	7,450	19,000	35,500	32,600
Vanadium	ND	7.3 B	67.1	6.4 B	10.2 B	7.0 B	ND	ND	ND	10.1 B	ND	8.7 B	12.7 B
Zinc	ND	16.0 B	230	ND	24.1	ND	154	63.5	6.7 B	64.3	12.4 B	7.1 B	62.4

Key at end of table.

02:D3715-03/12/92-D1

DRAF

DRAFT

Table 4-7

INORGANIC ANALYTES DETECTED IN GROUNDWATER SAMPLES
(all values reported in $\mu g/L$)

Analyte	GW-9S	GW-10D	GW-10S	GW-11S	GW-11SDD[a]	GW-12D	GW-12S	GW-13D	GW-13S	NYSDEC Class GA Groundwater Standard
Aluminum	342	1,250	1,760	2,230 J	2,480 J	910 J	2,760 J	2,640 J	286	NA
Arsenic	ND	5.6 B	4.1 B	ND	ND	ND	3.1 B	3.5 B	ND	25
Barium	38.8 B	262	208	69.5 B	71.3 B	36.4 B	91.9 B	211	85.7 B	1,000
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	3 G
Calcium	67,900	25,300	15,700	43,600	44,000	71,300	31,000	47,500	54,600	NA
Chromium	ND	ND	ND	ND	10.0	11.0	22.2	ND	ND	50
Cobalt	9.0 B	9.5 B	10.5 B	ND	ND	ND	ND	ND	ND	NA
Copper	ND	8.0 B	ND	3.7 B	9.1 B	11.6 B	9.0 B	4.7 B	ND	200
Iron	1,630 J	3,270 J	4,620 J	4,280	4,440	736	5,780	5,130	414	300[b]
Lead	1.2 J	7.6 J	3.3 J	3.5	4.6	ND	125	3.6	ND	25
Magnesium	30,600	6,090	6,300	22,100	22,200	37,300	3,100 B	21,500	24,600	35,000 G
Manganese	1,490	387	4,110	2,030	2,040	24.6	123	2,370	2,770	300[b]
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
Potassium	11,300	27,100	4,380 B	2,140 B	1,970 B	2,540 B	38,000	4,340 B	2,320 B	NA
Sodium	33,200	20,200	5,720	14,600	18,700	33,300	41,700	21,200	24,600	20,000
Vanadium	7.2 B	8.4 B	7.8 B	ND	ND	ND	27.9 B	ND	ND	NA
Zinc	5.7 B	27.2	11.0 B	26.4	39.8	41.0	83.4	54.6	5.6 B	300

Key at end of table.

02:D3715-03/12/92-D1

a Field duplicate of sample G11S.
b Total concentration of iron and manganese shall not exceed 500 µg/L.

Key:

J = Reported value is estimated due to variance for quality control limits.
B = Result is greater than IDL, but less than CRDL.
NA = No applicable NYS SCG.
ND = Not detected.
G = Guidance value (NYSDEC 1990).
D = Reported result is taken from diluted sample analysis.
U = Analyte was detected in preparation blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-8

GROUNDWATER SAMPLE PARAMETERS

Sample Number	Well Number	Organic Sample Portion[a]				Inorganic Portion[b]	
		Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date/Time	Turbidity[c] (NTU)	Date/Time
GW-1D	MW-1D	123	11.0	146	10-22-91/1740	14	10-23-91/0910
GW-2D	MW-2D	218	11.5	210	10-22-91/1525	38	10-23-91/0925
GW-2S[d]	MW-2S	416	11.0	>4,000	10-22-91/1728	>4,000	10-23-91/0929
GW-3D	MW-3D	315	13.0	600	10-22-91/1555	20	10-23-91/0855
GW-3S	MW-3S	248	13.5	2,800	10-22-91/1618	160/>1,000	10-23-91/0858
GW-4D	MW-4D	124	13.0	141	10-22-91/1613	18	10-23-91/0835
GW-5D	MW-5D	182	14.0	660	10-24-91/1100	18	10-25-91/0845
GW-5S	MW-5S	166	14.5	585	10-24-91/1110	19	10-25-91/0850
GW-6D	MW-6D	138	12.5	770	10-24-91/1120	7	10-25-91/0900
GW-6S	MW-6S	121	14.0	2,000	10-24-91/1125	440	10-25-91/0903
GW-7D	MW-7D	265	11.0	361	10-23-91/1625	17	10-24-91/1035
GW-8S	MW-8S	586	14.0	>4,000	10-22-91/1654	15/960	10-23-91/1010
GW-9D	MW-9D	222	11.5	190	10-22-91/1634	240	10-23-91/1000
GW-9S[d]	MW-9S	NA	NA	>4,000	10-22-91/1634	>4,000	10-23-91/1002
GW-10D	MW-10D	145	11.0	1,600	10-22-91/1715	110/200	10-23-91/0940
GW-10S	MW-10S	116	13.0	2,700	10-22-91/1710	140/540	10-23-91/0937
GW-11S	MW-11S	322	12.0	309	10-23-91/1625	125	10-24-91/1025
GW-12D	CW-3A	449	14.0	182	10-23-91/1640	31	10-24-91/1043
GW-12S[d]	CW-3B	NA	14.0	270	10-23-91/1640	173	10-24-91/1042

02:D3716-03/12/92-D1

Table 4-8

GROUNDWATER SAMPLE PARAMETERS

Sample Number	Well Number	Organic Sample Portion[a]				Inorganic Portion[b]	
		Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date/Time	Turbidity[c] (NTU)	Date/Time
GW-13D	CW-4A	391	15.0	>4,000	10-23-91/1655	114	10-24-91/1055
GW-13S	CW-4B	386	14.0	1,600	10-23-91/1655	75	10-24-91/1053

[a] Organic portion refers to VOC, BNA, PCB, and pesticides analyses except where noted.
[b] Inorganic portion refers to metals and total cyanide except where noted.
[c] Where two turbidities are listed, the first is for the metals portion and the second is for the cyanide portion.
[d] Due to low well volume, water was collected for VOC and metals analyses only.

Key:

NA = Data not acquired.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-9

ORGANIC COMPOUNDS DETECTED IN RESIDENTIAL WELL AND SPRING SAMPLES
(all values reported in μg/L)

Compound	DW-1 Rosini	DW-2 Teller	DW-3 Kelly	DW-4 Bauer	DW-5 LaDue	DW-5D LaDue	DW-6 Miller	DW-7 Vacarro	NYSDOH MCL[a]	NYSDEC Class GA Groundwater Standard
Volatiles										
Trichloroethene	ND	ND	ND	ND	2.6	2.9	ND	ND	5	5
Semivolatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

[a] Maximum contaminant level per 10 NYCRR 5-1.5.2.

Key:

ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-10 INORGANIC ANALYTES DETECTED IN RESIDENTIAL WELL AND SPRING SAMPLES (all values reported in μg/L)					
Analyte	DW-1 Rosini	DW-2 Teller	DW-3 Kelly	DW-4 Bauer	DW-5 LaDue
Aluminum	107 B	25.6 B	741	200 B	645
Barium	32.8 B	72.8 B	67.0 B	54.7 B	26.4 B
Calcium	40,100	37,400	21,300	33,300	44,900
Chromium	ND	ND	11.1	ND	ND
Copper	4.5 B	ND	29.8	3.6 B	7.3 B
Iron	534	U	693	730	535
Lead	ND	1.8 B	ND	ND	ND
Magnesium	13,300	13,400	6,070	12,100	19,600
Manganese	510	148	17.7	150	54.6
Mercury	ND	ND	ND	0.46	ND
Potassium	1,450 B	1,240 B	1,150 B	1,400 B	1,810 B
Sodium	50,400	8,200	31,600	58,000	17,000
Zinc	8.8 B	134	39.4	338	26.7
Cyanide	ND	ND	ND	ND	ND

Key at end of table.

Table 4-10

INORGANIC ANALYTES DETECTED IN RESIDENTIAL WELL AND SPRING SAMPLES
(all values reported in μg/L)

Analyte	DW-5D[a] LaDue	DW-6 Miller	DW-7 Vacarro	NYSDOH MCL[b]	NYSDEC Class GA Groundwater Standard
Aluminum	134 B	400	16.9 B	NA	NA
Barium	24.3 B	31.5 B	34.7 B	1,000 P	1,000
Calcium	44,800	13,400	21,800	NA	NA
Chromium	ND	ND	ND	50 P	50
Copper	ND	ND	33.8	1,000 S	200
Iron	193	1,300	107	300[c] S	300[c]
Lead	ND	ND	ND	50 P	25
Magnesium	19,600	8,160	8,230	NA	35,000 G
Manganese	41.1	166	76.9	300[c] S	300[c]
Mercury	ND	ND	ND	2 P	2
Potassium	1,680 B	1,100 B	1,450 B	NA	NA
Sodium	8,540	4,110 B	55,100	NA[d]	20,000
Zinc	7.9 B	9.7 B	5.3 B	5,000 S	300
Cyanide	ND	19.0	ND	NA	100

a Field duplicate of sample DW-5.
b Maximum contaminant level per 10 NYCRR 5-1.5.2.
c Total concentration of iron and manganese shall not exceed 500 μg/L.
d Water containing 20,000 μg/L should not be used for drinking by people on severely restricted sodium diets.
Water containing >270,000 μg/L should not be used for drinking by people on moderately restricted sodium diets.

Key:

- B = Result is greater than IDL, but less than CRDL.
- G = Guidance value (NYSDEC 1990).
- NA = No applicable NYS SCG.
- ND = Not detected.
- P = NYSDOH Primary Contaminant.
- S = NYSDOH Secondary Contaminant.
- U = Analyte was detected on preparation blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-11

RESIDENTIAL WELL AND SPRING SAMPLE PARAMETERS

Sample	Owner	Type	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)
DW-1	Rosini	150-foot well	329	14.0	4.2
DW-2	Teller	120-foot well	218	14.0	5.0
DW-3	Kelly	56-foot well	162	13.5	1.2
DW-4	Bauer	130-foot well	319	15.0	9.0
DW-5	LaDue	Spring	269	15.0	18
DW-6	Miller	Spring	126	15.5	8.0/51[a]
DW-7	Vacarro	Well	260	19.0	1.5

[a] First value pertains to VOA, metals, and cyanide portions, which were filled first. Second value pertains to BNA and PCB/Pesticide portions that caused disturbance in spring when sampled.

Source: Ecology and Environment Engineering, P.C., 1991.

DRAFT

Table 4-12

ORGANIC COMPOUNDS DETECTED IN SURFACE WATER SAMPLES
(all values reported in µg/L)

Compound	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	NYSDEC Class C Surface Water Standard
Volatiles								
None detected.								
Semivolatiles								
Di-n-butylphthalate	2 J	1 J	ND	2 J	ND	ND	1 J	NA
Di-n-octylphthalate	ND	2 J	ND	ND	ND	ND	ND	NA

Key:

J = The reported value is estimated.
NA = No applicable NYS SCG.
ND = Not detected.

Source: Ecology and Environment Engineering, P.C., 1991.

02:OB3030_D3716-03/12/92-D1

Table 4-13

INORGANIC ANALYTES DETECTED IN SURFACE WATER SAMPLES
(all values reported in μg/L)

Analyte	SW-1	SW-2	SW-3	SW-4	SW-4D[a]	SW-5	SW-6	NYSDEC Class C Surface Water Standard
Aluminum	578	307	496	119 B	274	874	96.0 B	100
Barium	35.4 B	43.6 B	99.3 B	49.5 B	50.8 B	57.7 B	49.2 B	NA
Calcium	15,400	15,900	19,800	18,000	17,900	18,300	17,200	NA
Copper	ND	5.8 B	ND	ND	ND	ND	ND	7.75[b]
Iron	1,110 J	3,840 J	778 J	150 J	387 J	1,610 J	130 J	300
Lead	2.2 J	1.7 J	4.8 J	4.9 J	2.5 J	2.7 J	1.1 J	1.48 - 1.90[c]
Magnesium	4,490 B	7,200	7,010	6,600	6,600	6,800	6,360	NA
Manganese	533	3,090	143	U	U	68.5	U	NA
Nickel	ND	30.6 B	ND	ND	ND	ND	ND	65.6[d]
Potassium	2,980 B	1,770 B	1,480 B	1,430 B	1,490 B	1,790 B	1,250 B	NA
Sodium	4,170 B	22,100	8,980	14,800	14,700	15,000	13,800	NA
Vanadium	6.5 B	6.3 B	6.1 B	ND	5.5 B	5.8 B	7.3 B	14
Zinc	8.5 B	19.4 B	10.7 B	4.1 B	7.3 B	6.8 B	ND	30

Key at end of table.

DRAF

Table 4-13

INORGANIC ANALYTES DETECTED IN SURFACE WATER SAMPLES (all values reported in μg/L)

Analyte	SW-1	SW-2	SW-3	SW-4	SW-4D[a]	SW-5	SW-6	NYSDEC Class C Surface Water Standard
Hardness (mg/L)	54	61	62	62	61	66	65	NA

[a] Duplicate sample of SW-4.
[b] Standard is a function of hardness. For SW-2 only, standard is 7.75 μg/L.
[c] Standard is a function of hardness as follows: SW-1 (1.48 μg/L); SW-2 (1.72); SW-3 (1.75); SW-4 (1.75); SW-4D (1.72); SW-5 (1.90); and SW-6 (1.87 μg/L).
[d] Standard is a function of harndess. For SW-2 only, standard is 65.6 μg/L.

Key:

B = Result is greater than IDL, but less than CRDL.
J = Reported value is estimated due to variance from quality control limits.
NA = No applicable NYS SCG.
ND = Not detected.
U = Analyte was detected in preparation blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-14

ORGANIC COMPOUNDS DETECTED IN SEDIMENT SAMPLES
(all values reported in µg/kg except as noted)

Compound	SED-1	SED-2	SED-3	SED-4	SED-4D[a]	SED-5	SED-6	Sediment Criteria[b]	Limit of Tolerance[c]
Volatiles									
Acetone	20	30	10 J	31	38	11 J	ND	NA	NA
Semivolatiles									
Butylbenzylphthalate	ND	ND	24 J	ND	ND	ND	ND	NA	NA
Organic matter (%)	7.3	6.6	3.4	5.3	5.2	3.2	3.2		

[a] Field duplicate of sample SED-4.
[b] Geometric mean of "no-effect" and "lowest-effect" levels based on toxicity studies in benthic organisms (NYSDEC 1989).
[c] Concentration which would be detrimental to the majority of species (NYSDEC 1989).

Key:

J = The reported value is estimated.
NA = No applicable NYS SCG.
ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1991.

DRAFT

Table 4-15

INORGANIC ANALYTES DETECTED IN SEDIMENT SAMPLES (all values reported in mg/kg)

Analyte	SED-1	SED-2	SED-3	SED-4	SED-4D[a]	SED-5	SED-6	Sediment Criteria[b]	Limit of Tolerance[c]
Aluminum	12,800	13,000	12,400	14,500	16,900	11,200	11,000	NA	NA
Arsenic	12.7	10.9	11.0	9.6	14.3	8.1	13.5	5	33
Barium	123	97.4	175	169	202	192	129	NA	NA
Beryllium	0.81 B	0.96 B	0.89 B	0.91 B	1.1 B	0.85 B	0.85 B	NA	NA
Calcium	2,010	1,320 B	1,290	1,470 B	1,760 B	1,150 B	999 B	NA	NA
Chromium	22.5	21.3	18.5	20.9	24.4	18.5	18.3	26	111
Cobalt	26.9	27.8	26.1	24.8	29.7	27.9	25.4	NA	NA
Copper	20.5	16.0	16.0	19.8	23.0	16.7	15.7	19	114
Iron	32,400	43,200	36,000	31,600	38,400	39,000	40,200	24,000	40,000
Lead	26.1 J	20.8 J	20.7 J	20.2 J	26.7 J	3.2 J	18.9 J	27	250
Magnesium	3,900	3,630	3,720	4,270	5,010	3,660	3,510	NA	NA
Manganese	1,180	2,440	1,200	705	891	1,480	808	428	1,110
Nickel	40.1	33.4	37.7	36.2	42.2	38.1	36.0	22	90
Potassium	1,200 B	1,310 B	1,230 B	1,790 B	2,140 B	1,110 B	1,060 B	NA	NA
Sodium	ND	108 B	ND	ND	ND	ND	ND	NA	NA

Key at end of table.

02:OB3030_D3715-03/12/92-D1

Table 4-15

INORGANIC ANALYTES DETECTED IN SEDIMENT SAMPLES
(all values reported in mg/kg)

Analyte	SED-1	SED-2	SED-3	SED-4	SED-4D[a]	SED-5	SED-6	Sediment Criteria[b]	Limit of Tolerance[c]
Vanadium	22.8	22.1	19.7	21.4	25.3	17.5	18.2	NA	NA
Zinc	84.7	96.3	107	81.0	96.9	78.7	76.1	85	800

[a] Field duplicate of sample SED-4.
[b] Geometric mean of "no-effect" and "lowest-effect" levels based on toxicity studies in benthic organisms (NYSDEC 1989).
[c] Concentration which would be detrimental to the majority of species (NYSDEC 1989).

Key:

B = Result is greater than IDL, but less than CRDL.
J = Reported value is estimated due to variance from quality control limits
NA = No applicable NYS SCG.
ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1991.

Key at end of table.

DRAF

DRAFT

Table 4-16

ORGANIC COMPOUNDS DETECTED IN SURFACE SOIL SAMPLES
(all values reported in μg/kg)

Compound	Background		SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	Background PAH Concentrations in Rural soils[b]
	SS-1	SS-2							
Volatiles									
Acetone	U	U	U	U	ND	U	U	U	
Chloromethane	ND	ND	ND	ND	ND	ND	40 J	ND	
Ethylbenzene	ND	ND	ND	ND	ND	1 J	18 J	ND	
Semivolatiles									
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	NA
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	20 - 30
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	10 - 110
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	10 -70
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	2 - 1,300
Bis(2-ethylhexyl)phthalate	U	U	2,100	U	U	U	U	U	NA
Butylbenzylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	NA
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	38
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	NA
Fluoranthene	ND	ND	ND	ND	ND	ND	55 J	ND	0.3 - 40
Ideno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	10 - 15
Phenanthrene	ND	ND	ND	ND	ND	ND	46 J	ND	30
Pyrene	ND	ND	53 J	ND	ND	ND	59 J	ND	1 - 19.7

Key at end of table.

02:OB3030_D3715-03/12/92-D1

Table 4-16

ORGANIC COMPOUNDS DETECTED IN SURFACE SOIL SAMPLES
(all values reported in μg/kg)

Compound	SS-9	SS-10	SS-10D	SS-11	SS-12[a]	SS-13[a]	SS-14	Background PAH Concentrations in Rural soils[b]
Volatiles								
Acetone	ND	U	ND	240	ND	ND	U	
Chloromethane	ND	ND	ND	ND	ND	ND	ND	
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	
Semivolatiles								
Anthracene	ND	27 J	ND	ND	ND	ND	ND	NA
Benzo(b)fluoranthene	ND	67 J	ND	ND	ND	ND	140 J	20 - 30
Benzo(k)fluoranthene	ND	44 J	ND	ND	ND	ND	ND	10 - 110
Benzo(g,h,i)perylene	ND	ND	ND	ND	47 J	ND	ND	10 -70
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	88 J	2 - 1,300
Bis(2-ethylhexyl)phthalate	U	U	U	U	U	U	U	NA
Butylbenzylphthalate	ND	ND	50 J	ND	ND	260 J	ND	NA
Chrysene	40 J	100 J	ND	ND	ND	ND	48 J	38
Dibenz(a,h)anthracene	ND	ND	ND	ND	44 J	ND	ND	NA
Fluoranthene	ND	370 J	ND	ND	ND	ND	42 J	0.3 - 40
Ideno(1,2,3-cd)pyrene	ND	ND	ND	ND	45 J	ND	ND	10 - 15
Phenanthrene	ND	94 J	ND	ND	ND	ND	41 J	30
Pyrene	ND	280 J	ND	ND	ND	ND	49 J	1 - 19.7

DRAF

Table 4-16 (Cont.)

[a] Indicates results from reanalyzed sample.
[b] ATSDR 1989

Key:

J = The reported value is estimated.
NA = No applicable data provided.
ND = Not detected.
U = Compound was detected in method blank at comparable level and is considered undetected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-17

INORGANIC ANALYTES DETECTED IN SURFACE SOIL SAMPLES
(all values reported in mg/kg)

Analyte	Background		SS-3	SS-4	SS-5	SS-6	Common Range in Eastern U.S. Soils[b]	
	SS-1	SS-2					Observed Range	Upper Limit of 90th Percentile
Aluminum	13,100	10,400	1,030	12,300	10,300	14,300	7,000 - 100,000	128,000
Arsenic	10.3	13.5	7.3	10.0	11.9	12.6	<0.1 - 73	16.0
Barium	97.3 J	90.8 J	741 J	43.9 J	99.8 J	96.5 J	10 - 1,500	867
Beryllium	0.61 B	0.47 B	ND	0.49 B	0.52 B	0.70 B	<1 - 7	1.81
Calcium	3,390	915 B	173,000	176 B	1,070 B	925 B	100 - 280,000	14,400
Chromium	17.3	12.9	23.3	19.6	16.3	23.6	1 - 1,000	112
Cobalt	22.4	17.7	53.0	20.9	23.4	29.1	<0.3 - 70	19.8
Copper	11.3	6.6	1.5 B	18.4	17.8	28.2	<1 - 700	48.7
Iron	27,400 J	24,900 J	182,000 J	30,300 J	26,700 J	42,500 J	100 - >100,000	54,100
Lead	17.5	17.3	35.5	15.1	15.1	13.2	<10 - 300	33.0
Magnesium	2,440	1,710	2,950	3,840	3,860	5,290	50 - 50,000	10,700
Manganese	1,260 J	1,170 J	4,540 J	418 J	987 J	446 J	<2 - 7,000	1,450
Nickel	21.0	15.8	40.0	28.8	33.6	43.3	<5 - 700	38.2
Potassium	1,130 B	853 B	1,230 B	1,300	1,240 B	1,950	50 - 37,000	23,500
Sodium	90.9 B	74.8 B	1,610 B	49.1 B	40.1 B	78.8 B	<500 - 50,000	17,400
Vanadium	22.3	21.7	12.6 B	19.0	14.4	19.4	<7 - 300	140
Zinc	58.2	43.0	356	51.4	92.0	74.5	<5 - 2,900	104
Cyanide	ND	ND	ND	ND	ND	ND	NA	NA

DRAF

DRAFT

Table 4-17

INORGANIC ANALYTES DETECTED IN SURFACE SOIL SAMPLES
(all values reported in mg/kg)

Analyte	SS-7	SS-8	SS-9	SS-10	SS-10D[a]	SS-11	Common Range in Eastern U.S. Soils[b] Observed Range	Common Range in Eastern U.S. Soils[b] Upper Limit of 90th Percentile
Aluminum	14,300	11,100	9,740	10,600	11,000	7,340	7,000 - 100,000	128,000
Arsenic	10.5	11.8	11.8	9.6	9.7	6.4	<0.1 - 73	16.0
Barium	135 J	105 J	84.8 J	151 J	147 J	309 J	10 - 1,500	867
Beryllium	0.71 B	0.57 B	0.49 B	0.60 B	0.56 B	ND	<1 - 7	1.81
Calcium	1,200 B	2,360	31,300	4,550	3,120	5,460	100 - 280,000	14,400
Chromium	24.0	19.3	15.9	19.8	20.0	40.4	1 - 1,000	112
Cobalt	27.5	27.1	21.1	31.6	30.1	87.3	<0.3 - 70	19.8
Copper	26.5	19.6	19.1	18.0	18.0	14.7	<1 - 700	48.7
Iron	40,200 J	45,600 J	26,300 J	60,300 J	54,300 J	283,000 J	100 - >100,000	54,100
Lead	23.8	14.5	15.6	15.8	22.4	56.1	<10 - 300	33.0
Magnesium	5,040	3,510	9,060	4,320	3,720	2,790	50 - 50,000	10,700
Manganese	374 J	548 J	1,000 J	922 J	880 J	798 J	<2 - 7,000	1,450
Nickel	39.4	32.2	26.9	34.3	33.0	88.0	<5 - 700	38.2
Potassium	1,930	1,870	1,400	1,570	1,750	2,250	50 - 37,000	23,500
Sodium	85.9 B	134 B	95.3 B	76.3 B	71.0 B	ND	<500 - 50,000	17,400
Vanadium	21.7	19.4	17.7	18.9	19.9	21.0 B	<7 - 300	140
Zinc	77.4	61.6	102	98.1	95.2	193	<5 - 2,900	104
Cyanide	ND	ND	ND	ND	ND	3.5 J	NA	NA

Key at end of table.

02:OB3030_D3716-03/12/92-D1

Table 4-17

INORGANIC ANALYTES DETECTED IN SURFACE SOIL SAMPLES
(all values reported in mg/kg)

Analyte	SS-12	SS-13	SS-14	Common Range in Eastern U.S. Soils[b]	
				Observed Range	Upper Limit of 90th Percentile
Aluminum	13,100	11,500	10,500	7,000 - 100,000	128,000
Arsenic	12.3	13.4	4.0	<0.1 - 73	16.0
Barium	87.4 J	107 J	90.8 J	10 - 1,500	867
Beryllium	0.70 B	0.71 B	0.56 B	<1 - 7	1.81
Calcium	1,680	3,110	650 B	100 - 280,000	14,400
Chromium	18.8	20.3	17.0	1 - 1,000	112
Cobalt	26.3	31.6	22.8	<0.3 - 70	19.8
Copper	12.8	17.3	11.7	<1 - 700	48.7
Iron	29,800 J	46,400 J	23,800 J	100 - >100,000	54,100
Lead	17.9	23.0	16.4	<10 - 300	33.0
Magnesium	3,120	3,700	2,920	50 - 50,000	10,700
Manganese	1,190 J	1,940 J	235 J	<2 - 7,000	1,450
Nickel	25.3	32.6	24.2	<5 - 700	38.2
Potassium	1,670	1,670	1,510	50 - 37,000	23,500
Sodium	ND	94.8 B	ND	<500 - 50,000	17,400
Vanadium	25.6	22.7	20.7	<7 - 300	140
Zinc	59.3	131	72.3	<5 - 2,900	104
Cyanide	ND	ND	ND	NA	NA

DRAF

Table 4-17 (Cont.)

[a] Field duplicate of sample SS-10.
[b] Shacklette and Boerngen 1984.

Key:

B = Result is greater than IDL, but less than CRDL.
J = Reported value is estimated due to variance from quality control limits.
NA = No applicable values given.
ND = Not detected.

Table 4-18 ORGANIC COMPOUNDS DETECTED IN LEACHATE SAMPLES (all values reported in μg/L)			
Compound	**L-1 (MH-4)**	**L-2 (PS#2)**	**NYSDEC Class C Surface Water Standard**
Volatiles			
Chlorobenzene	ND	3 J	5
total 1,2-dichloroethene	8	2 J	NA
Trichloroethene	2 J	14	11 G
Semivolatiles			
4-chloro-3-methylphenol	ND	4 J	1[a]
1,4-Dichlorobenzene	ND	1 J	5[b]
Di-n-butylphthalate	ND	2 J	NA
Naphthalene	ND	1 J	NA
N-Nitrosodiphenylanine	ND	1 J	NA

[a] Applies to total of chlorinated phenols.
[b] Applies to sum of meta, ortho, and para isomers.

Key:

G = Guidance value (NYSDEC 1990).
J = Reported value is estimated.
NA = No applicable NYS SCG.
ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-19

INORGANIC ANALYTES DETECTED IN LEACHATE SAMPLES
(all values reported in μg/L)

Analyte	L-1 (MH-4)		L-2 (PS#2)		NYSDEC Class C Surface Water Standard
Aluminum	27,600	J	774	J	100
Arsenic	12.5	J		R	190
Barium	406		577		NA
Beryllium	0.96	B	ND		1,100
Calcium	191,000		123,000		NA
Chromium	39.9		15.2		962 / 791[a]
Cobalt	58.4		55.4		5
Copper	35.2		8.0	B	58.8 / 47.9[a]
Iron	71,900		165,000		300
Lead	47.9	J	27.2	J	34.6 / 25.6[a]
Magnesium	42,800		50,300		NA
Manganese	3,670		1,880		NA
Nickel	54.5		38.8	B	398 / 332[a]
Potassium	50,700		33,400		NA
Sodium	33,600		71,500		NA
Vanadium	52.2		11.6	B	14
Zinc	151	J	227	J	30
Hardness (mg/L $CaCO_3$)[b]	653		514		NA

[a] Standard is a function of hardness. First value is for L-1, second is for L-2.
[b] Hardness is calculated from reported concentrations of Ca^{2+} and Mg^{2+} (Freeze and Cherry 1979).

Key:

J = Reported value is estimated due to variance from quality control limits.
R = Reported value is unusable due to variance from quality control limits.
B = Result is greater than IDL, but less than CRDL.
ND = Not detected.
NA = No applicable NYS SCG.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-20

RESULTS OF LEACHATE COLLECTION SYSTEM AIR MONITORING SURVEY

Manhole/Riser	9-30-91			12-17/18-91
	HNu (ppm)	OVA (ppm)	Draeger Tube[a] (ppm)	HNu (ppm)
MH-1	0	>1,000	0	0
MH-2	NA	NA	NA	NA
MH-3	3	>1,000	3	6 - 8
MH-4	1.2	120	0	0
MH-5	0	>1,000	0	25
MH-6	<1	>1,000	0	92
MH-7	<1	>1,000	0	73
MH-8	NA	NA	NA	NA
MH-9	NA	NA	NA	NA
MH-10	<1	>1,000	0	40
MH-11	<1	>1,000	0	1.5
MH-12	0	250	0	0
MH-13	0	>1,000	0	0
MH-14	0	>1,000	0	0
MH-15	<1	>1,000	0	0
MH-16	<1	>1,000	0	0
MH-17	<1	>1,000	0	0
MH-18	NA	NA	NA	0
MH-19	NA	NA	NA	0
R-1	3	0[b]	0	6
R-2	7	>1,000	0	18 - 22
R-3	0	100	0	NA
R-4	0	30	0	15
R-5	0	250	0	0
R-6	0	>1,000	0	0
R-7	0	350	0	20
R-8	0	>1,000	0	0
R-9	0	20	0	2

Table 4-20

RESULTS OF LEACHATE COLLECTION SYSTEM AIR MONITORING SURVEY

Manhole/Riser	9-30-91			12-17/18-91
	HNu (ppm)	OVA (ppm)	Draeger Tube[a] (ppm)	HNu (ppm)
R-10	<1	400	0	125
R-11	<1	>1,000	0	100
R-12	<1	150	0	5
R-13	<1	10	0	6
R-14	<1	35	0	0
R-15	0	>1,000	0	0
R-16	11	>1,000	11	0
R-17	0	>1,000	0	0
R-18	0	>1,000	0	0
R-19	0	3	0	4 - 5
R-20	0	0	0	NA
R-21	0	>1,000	0	0
R-22	0	>1,000	0	0
R-23	0	>1,000	0	NA
Pump Station 2	34	>1,000	0	0
Pump Station 1				
Sump	0	300	0	NA
Tank No. 1	<1	180	0	NA
Tank No. 2	<1	100	0	NA

[a] Draeger tube for vinyl chloride (numerous chlorinated alkenes interfere and are also detected).
[b] Questionable data due to instrument malfunction.

Key:

NA = Data not acquired due to equipment malfunction or manhole not located.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 4-21

VOLATILE ORGANIC COMPOUNDS DETECTED IN AIR SAMPLES COLLECTED 12-19-91

Compound	Amount Detected (ppbv)							
	A-1	A-2	A-3	A-4	A-5	A-6[a]	A-7	A-8[b]
Benzene	ND	240	ND	ND	150	76	ND	ND
Chloroethane	ND	ND	ND	820	74	46	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	3.6
1,1-Dichloroethane	1,700	1,400	ND	55	6.9	ND	ND	ND
cis-1,2-Dichloroethene	55,000	87,000 E	100,000	190	4.6	ND	16,000	ND
Ethylbenzene	15,000	7,700	21,000	7,900 E	26	11	5,600	ND
Freon®11	ND	210	ND	180	ND	ND	ND	ND
Freon®12	ND	2,700	ND	1,500	16	7.2	ND	ND
Freon®113	ND	ND	ND	ND	ND	ND	ND	2.8
Freon®114	ND	ND	ND	980	3.8	ND	ND	ND
Methylene chloride	ND	860	ND	ND	ND	ND	ND	1.6
1,2,4-Trichlorobenzene	ND	ND	ND	ND	3.8	ND	ND	ND
1,1,1-Trichloroethane	2,300	800	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	390	ND	ND	4.4	ND	ND	ND
1,2-4-Trimethylbenzene	ND	ND	ND	34	ND	ND	ND	ND
Toluene	5,300	4,200	8,600	520	5.7	ND	1,500	ND
Vinyl chloride	12,000	9,700	1,700	1,300	16	6.6	2,600	ND
m,p-Xylene	1,800	370	ND	1,600	46	21	990	ND
[illegible]	ND	ND	ND	290	6.4	3.2	ND	ND

DRAF

Table 4-21

VOLATILE ORGANIC COMPOUNDS DETECTED IN AIR SAMPLES COLLECTED 12-19-91

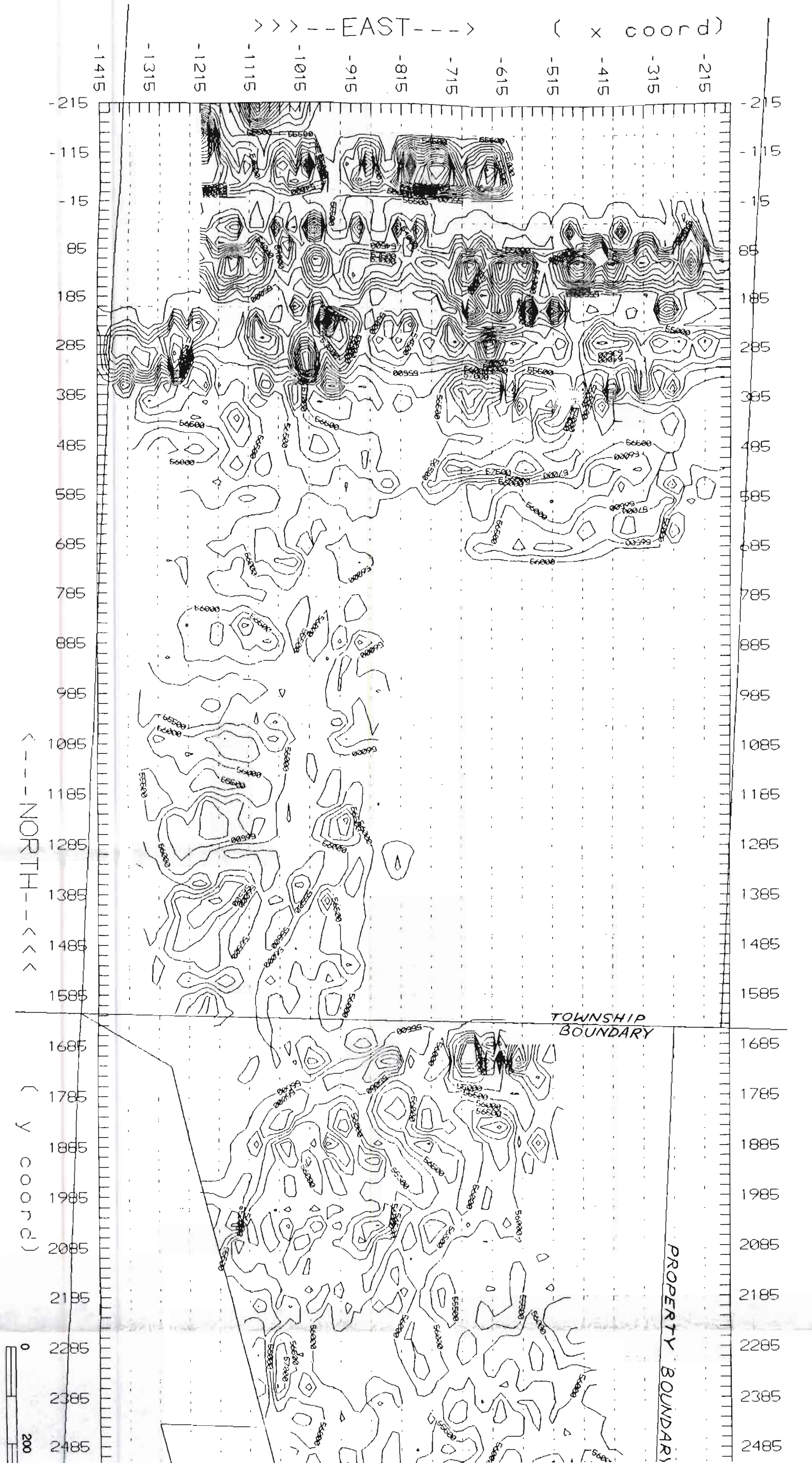
Compound	Amount Detected (ppbv)							
	A-1	A-2	A-3	A-4	A-5	A-6[a]	A-7	A-8[b]
MDL (ppbv)[c]	1,400	210	3,700	28	3.7	3.0	310	1.0
Manhole or riser no.	MH-10	R-10	MH-6	MH-15	R-2	R-2	MH-3	Blank

a Field duplicate of sample A-5.
b Blank consisting of purified nitrogen.
c Minimal detection limit (parts per billion by volume).

Key:

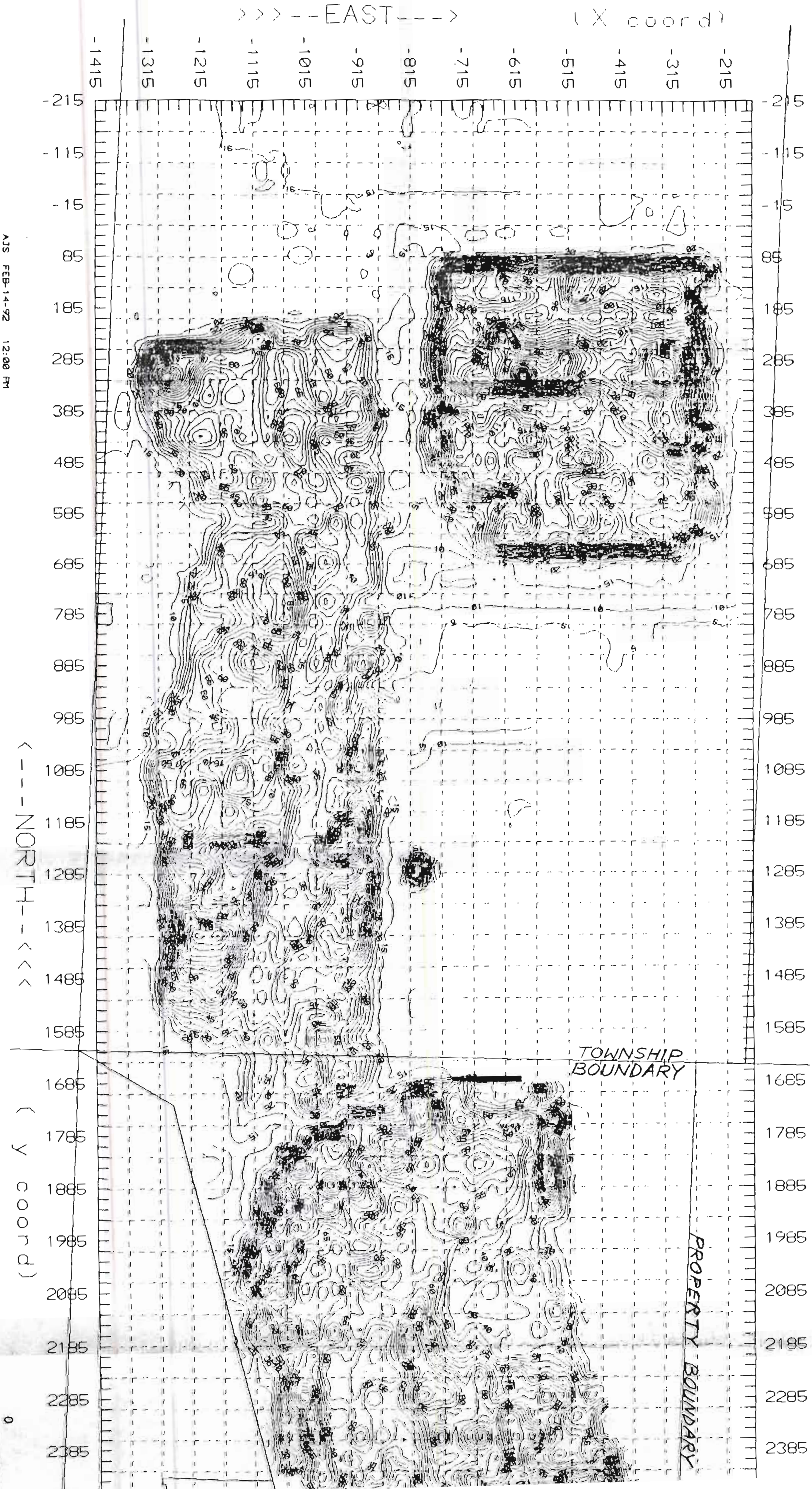
E = Exceeds instrument calibration range, but within linear range.
ND = Not detected.

Source: Air Toxics Ltd. 1992.



>>>--EAST---> (x coord)
-1415 -1315 -1215 -1115 -1015 -915 -815 -715 -615 -515 -415 -315 -215
<---NORTH--<<< (y coord)
-215 -115 -15 85 185 285 385 485 585 685 785 885 985 1085 1185 1285 1385 1485 1585 1685 1785 1885 1985 2085 2185 2285 2385 2485
TOWNSHIP BOUNDARY
PROPERTY BOUNDARY
0 200

AJS FEB-14-92 12:00 PM



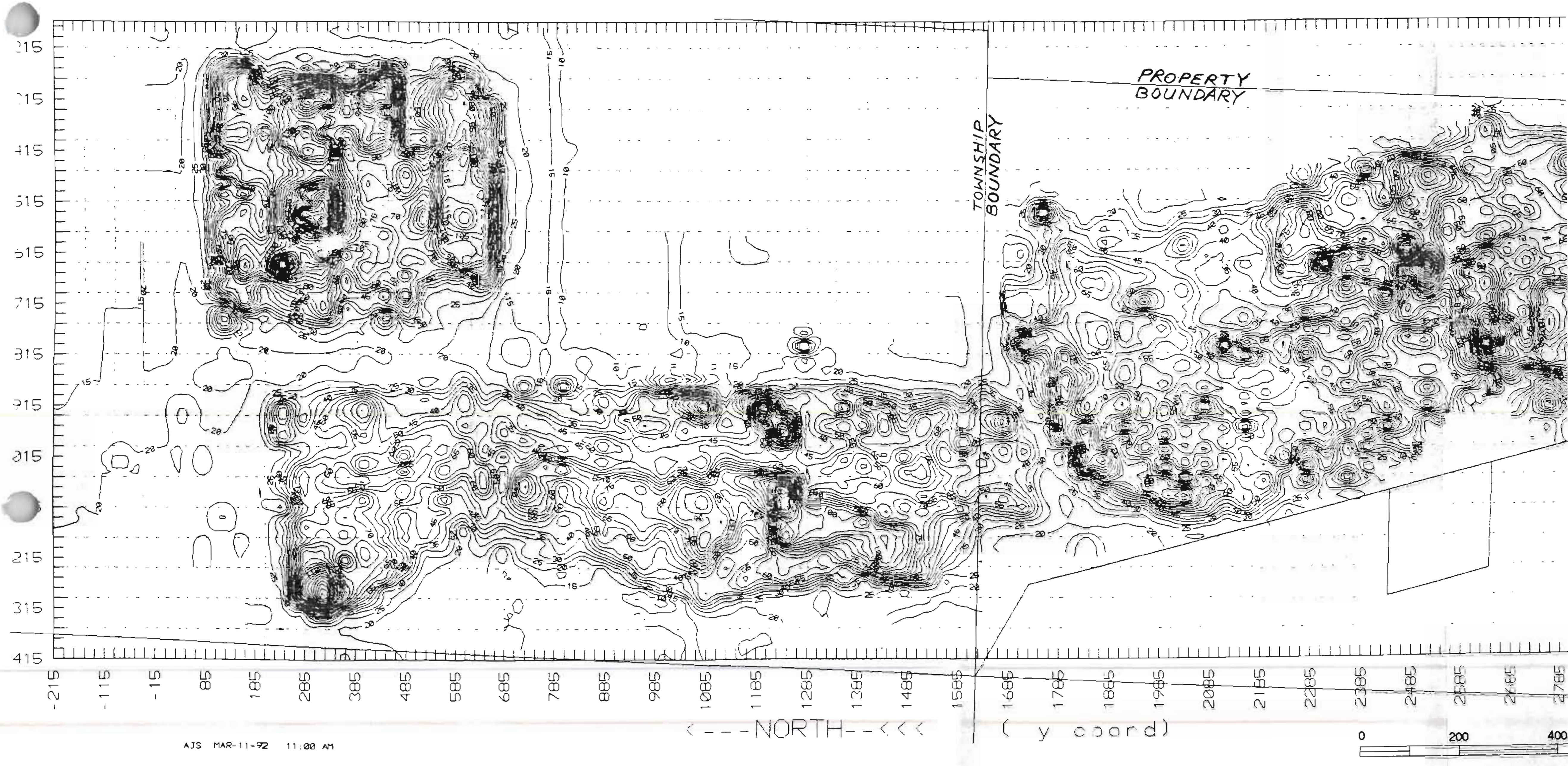
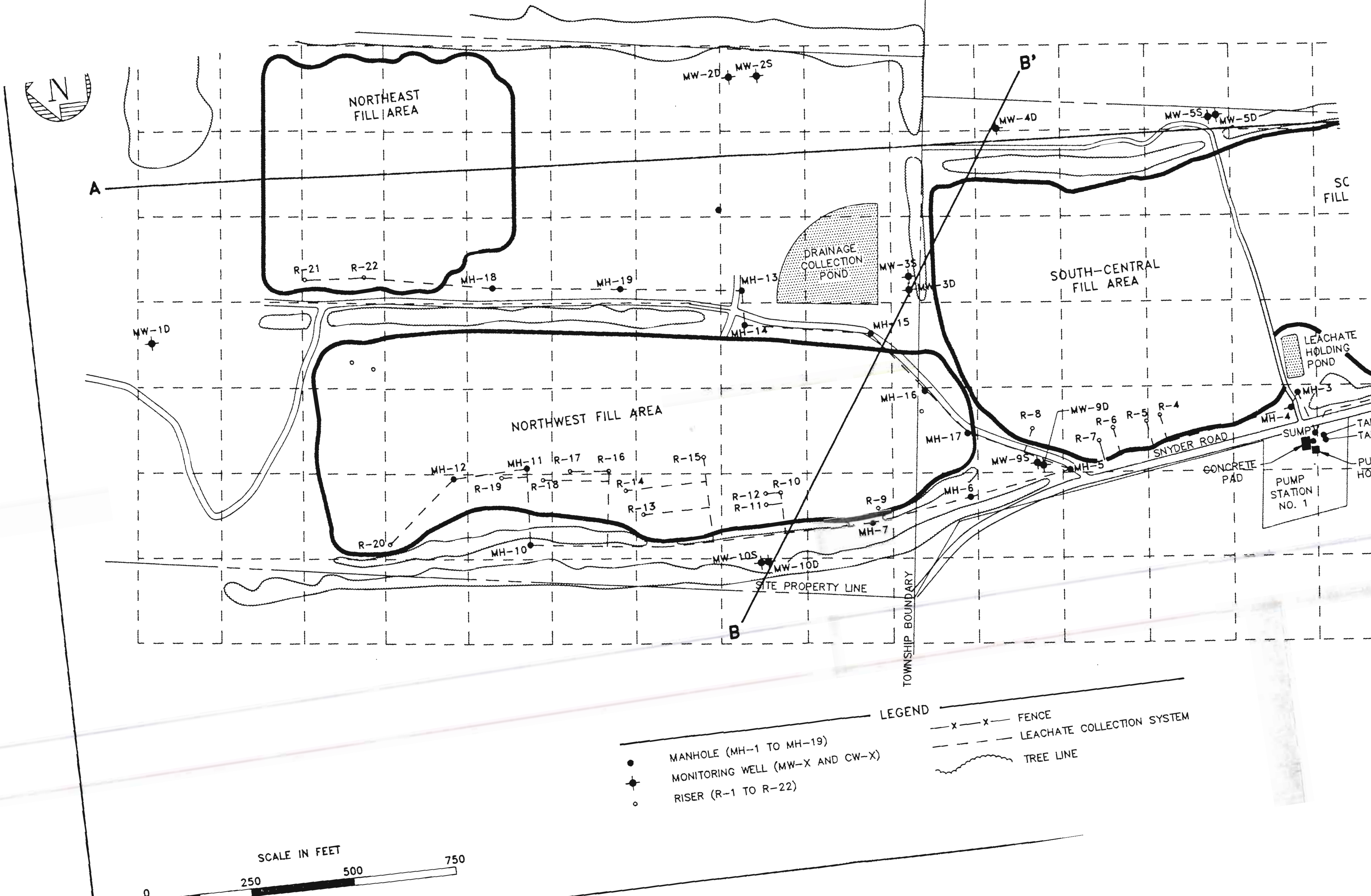
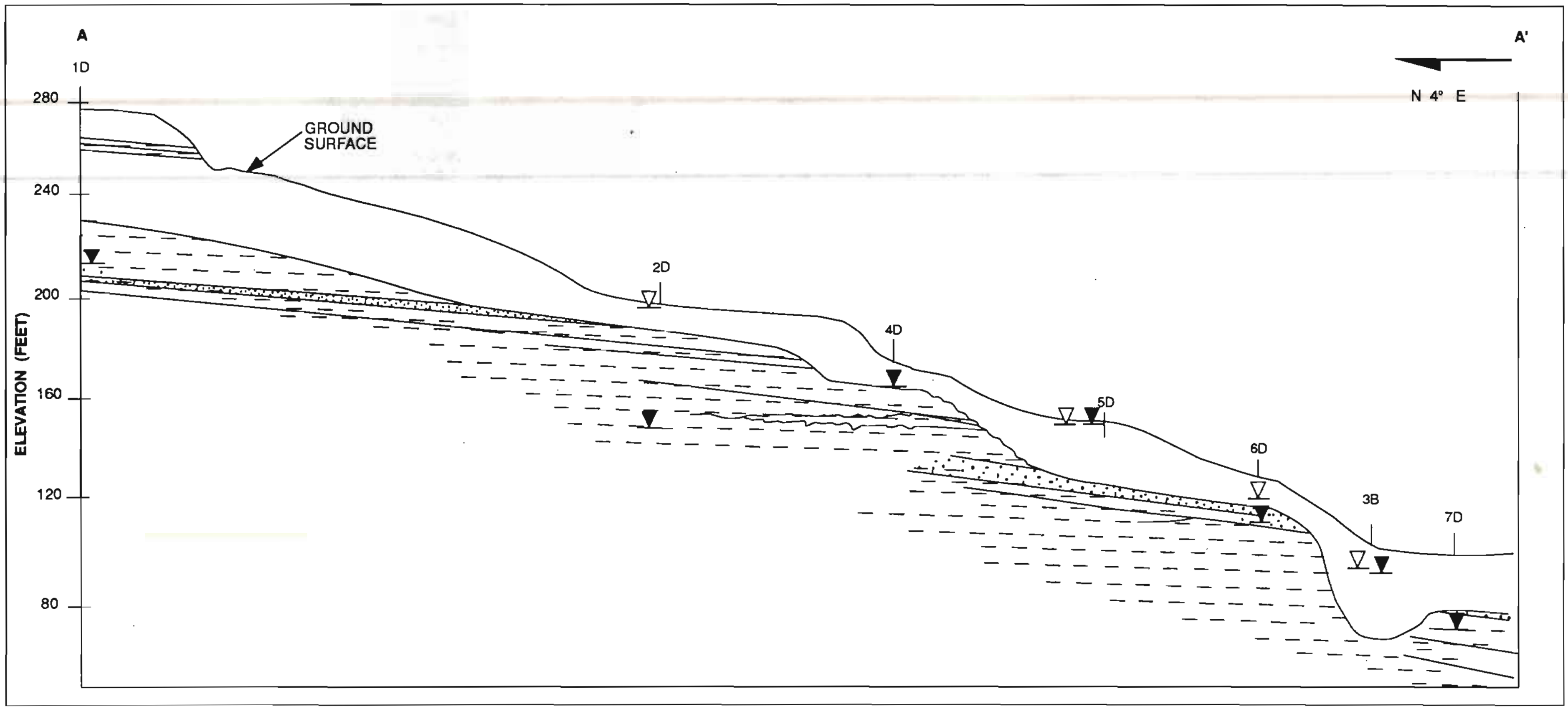


Figure 4-3
GROUND CONDUCT
VERTICAL DIPO
WELLSVILLE-ANDOVER
uMhos/M


N
A
B
B'
NORTHEAST FILL AREA
NORTHWEST FILL AREA
SOUTH-CENTRAL FILL AREA
SC FILL
DRAINAGE COLLECTION POND
LEACHATE HOLDING POND
MW-1D
MW-2D
MW-2S
MW-3S
MW-3D
MW-4D
MW-5S
MW-5D
MW-9S
MW-9D
MW-10S
MW-10D
MH-3
MH-4
MH-5
MH-6
MH-7
MH-10
MH-11
MH-12
MH-13
MH-14
MH-15
MH-16
MH-17
MH-18
MH-19
R-4
R-5
R-6
R-7
R-8
R-9
R-10
R-11
R-12
R-13
R-14
R-15
R-16
R-17
R-18
R-19
R-20
R-21
R-22
SITE PROPERTY LINE
TOWNSHIP BOUNDARY
SNYDER ROAD
CONCRETE PAD
PUMP STATION NO. 1
SUMP
TANK
PUMP HOUS
LEGEND
MANHOLE (MH-1 TO MH-19)
MONITORING WELL (MW-X AND CW-X)
RISER (R-1 TO R-22)
FENCE
LEACHATE COLLECTION SYSTEM
TREE LINE
SCALE IN FEET
0
250
500
750

DRAFT



KEY:

Overburden - mixed soils (glacial till and alluvium); e.g., clayey gravel with sand, gravelly lean clay with sand, etc. Also includes soils maintaining the original structure of the bedrock consisting of clay, silt, and/or sand with fragments of local rock.

Siltstone - relatively competent to mildly fractured, light- to medium-gray siltstone to fine-grained sandstone. Generally calcareous and may contain thin beds of medium- to coarse- grained sandstone.

Interbedded shale, siltstone, and sandstone - light gray to black, laminated to thinly interbedded, arenaceous, and argillaceous unit. Moderately to very heavily fractured and weathered.

Bedrock well water surface elevation.

Overburden well water surface elevation.

NOTES:

Elevation Reference: BM-1, 296.150 ft

Verticle Exaggeration = 6.25

SCALE

16 feet
8
0
200 feet

Figure 4-5
GEOLOGIC CROSS SECTION A A'
WELLSVILLE-ANDOVER LANDFILL

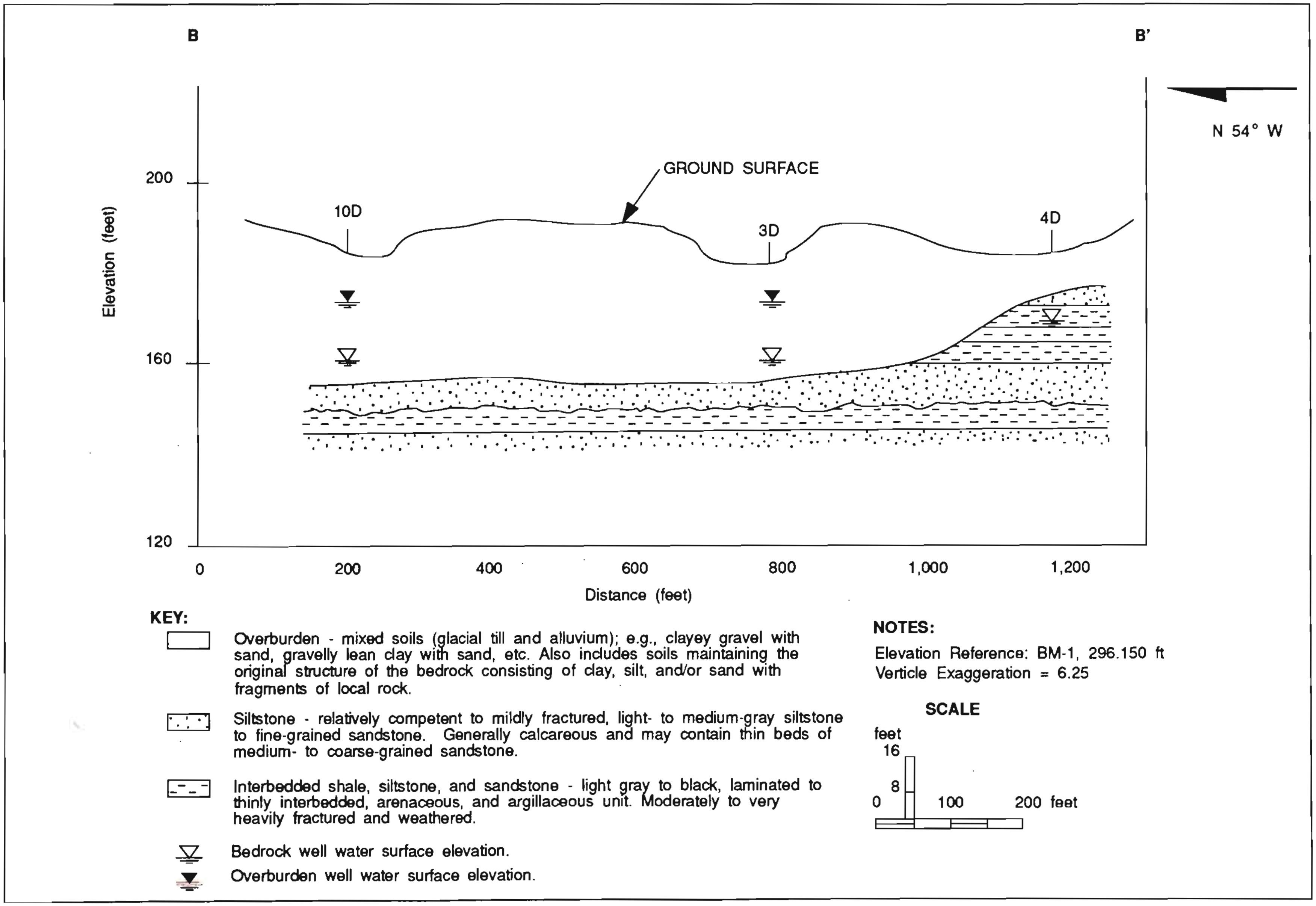
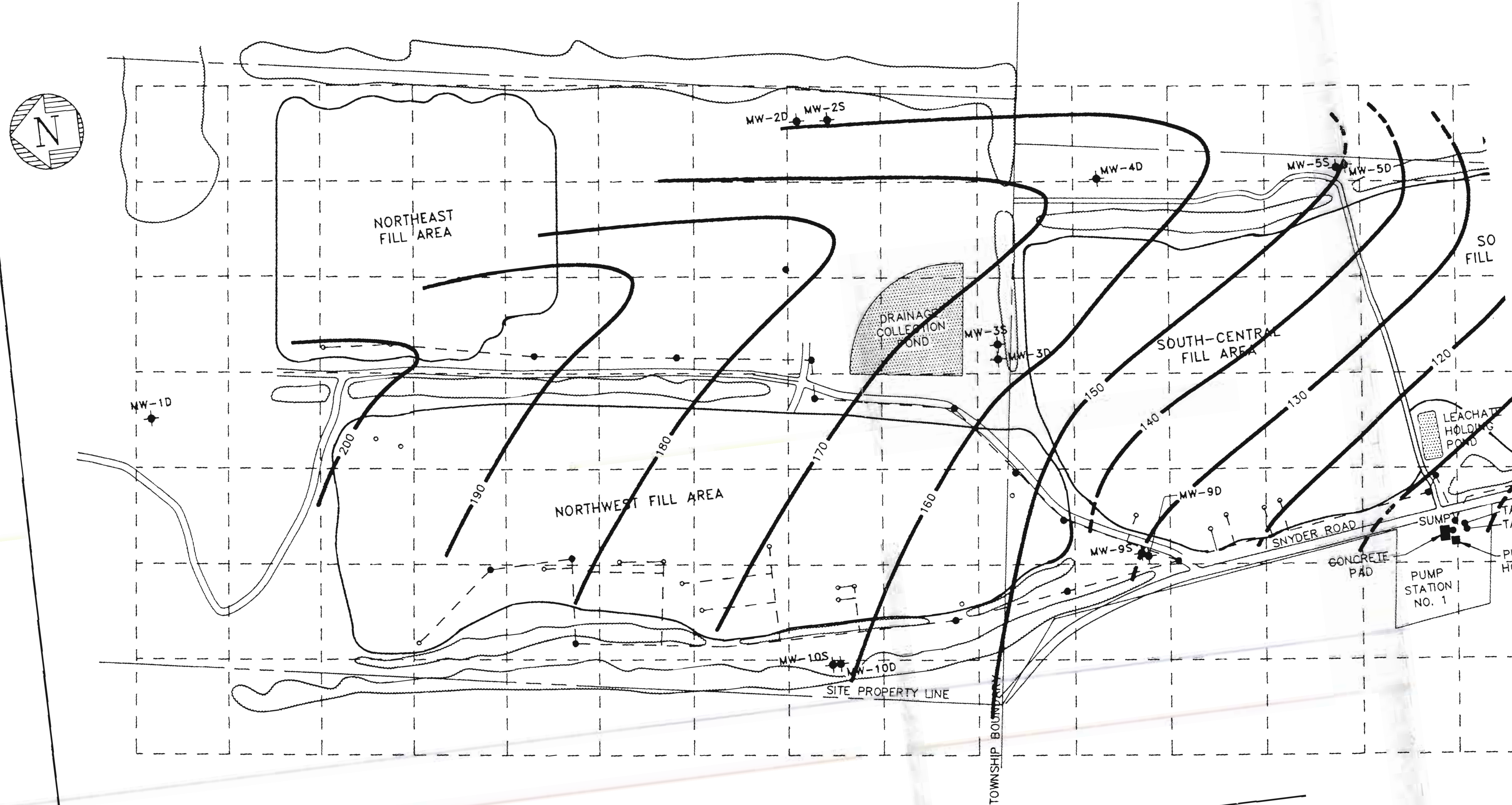


Figure 4-6
GEOLOGIC CROSS SECTION B B'
WELLSVILLE-ANDOVER LANDFILL



NOTE:
CONTOURS BASED ON DATA COLLECTED
NOVEMBER 20, 1991.

LEGEND

- ● MANHOLE
- ⯌ MONITORING WELL (MW-X AND CW-X)
- ○ RISER
- —x—x— FENCE
- — — — LEACHATE COLLECTION SYSTEM
- TREE LINE
- 190 BEDROCK WATER SURFACE ELEVATION CONTOUR (FEET)

SCALE IN FEET

750

5. PHASE I HUMAN HEALTH RISK EVALUATION

5.1 INTRODUCTION

5.1.1 Overview

The Wellsville-Andover Landfill site is an inactive municipal landfill. It is situated on approximately 120 acres and was shared by the towns of Wellsville and Andover in Allegany County, New York.

Between 1960 and 1983, municipal, industrial, and hazardous wastes were disposed of at the Wellsville-Andover Landfill. Some waste that may have been disposed of includes scraps of polymerized polyester, MC, TCE, plastics, sodium cyanide salt, cutting oils, chromium and zinc chromate paints, unspecified solvents, coolants, and lubricating oils (NYSDEC 1983; Village of Wellsville 1986). Each of these products contains, or could contain, a number of chemicals that could potentially pose a threat to human health. The objective of this phase of the risk evaluation is to determine whether chemicals associated with the site could potentially pose such a threat. This determination will be accomplished by the following:

- Comparison of site analytical data to appropriate background levels, and standards and guidelines set forth by NYSDEC, NYSDOH, and the United States Environmental Protection Agency (EPA);
- Selection of chemicals of potential concern (COPCs);
- Discussion of potential exposure pathways and receptors; and
- Discussion of toxicological properties of the COPCs.

5.1.2 Site Description and Setting

The Wellsville-Andover Landfill is located in a sparsely populated, rural area of Allegany County, New York. A number of permanent and seasonal residences are located along Duffy Creek, approximately 1,400 to 1,500 feet east of the site. In addition, one seasonal residence is located 600 feet southeast of the site, one is situated about 500 feet west of the site, and one permanent and one seasonal residence are located within 300 feet of the landfill to the west. The western side of the site is otherwise bounded by a mature beech and sugar maple forest. No schools, parks, or other public facilities are located in the immediate vicinity of the site, and the demographics of the area suggest the nearby population would not be expected to include exceptionally high percentages of potentially sensitive subpopulations such as young children or the elderly.

The site is unpaved, with most of the area covered by grasses. Dirt access roads pass through the site, and the site is easily approachable from all sides. A barbed wire fence exists at the southern border of the site, and some patches of mature beech and sugar maple forests remain on the eastern side of the site. No natural barriers exist that would hinder the approach and entrance of wildlife or humans. In fact, the northernmost area of the site, on top of a hill at an approximate elevation of 2,230 feet, is used for recreational purposes by the Wellsville Area Small Plane Society, a local community group. Access to this portion of the site is gained by one of the dirt roads that crosses the site.

Although no streams cross the site, an unnamed tributary begins along the west side of the site and flows south-southeast until it converges with Duffy Creek approximately 3,000 feet southeast of the site. Duffy Creek is a Class C stream, indicating that its best potential use is to support fish propagation. A number of man-made ditches are also present at the site and divert surface runoff away from the filled areas. All surface runoff is eventually diverted to the unnamed tributary west of the site.

Groundwater in the area flows from north to southwest in the central and western portion of the landfill. A groundwater divide exists along the east side of the site, and groundwater on the east side flows toward Duffy Creek. A portion of the groundwater at the site emerges in springs south and east of the site. Both permanent and seasonal residences in the area utilize private wells and springs for drinking water supply purposes.

5.2 SUMMARY OF SITE INVESTIGATION

The site investigation focused on characterizing the nature and extent of contamination associated with the site and identifying potential migration pathways that could result in exposure of human receptors to site contaminants. Samples were collected from a variety of media and locations at the site, including:

- Landfill gas;
- Landfill leachate;
- Surface soils from drainage ditches and seep areas on and around the landfill;
- Subsurface soils and waste materials from the landfill;
- Subsurface soils from borings around the landfill;

- Surface water from streams draining the site;
- Stream sediments;
- Groundwater from monitoring wells on and around the site; and
- Groundwater samples from residential wells and springs near the site that are used for drinking water supply purposes.

A summary of contaminants detected at the site can be found in Tables 5-1 through 5-9. The chemicals of potential concern (COPCs) were selected based on the analytical results for all media sampled. The COPCs selected are indicated by an asterisk in Tables 5-1 through 5-9 and are summarized in Table 5-10.

Samples from all media except air show cobalt, iron, manganese, and zinc at elevated levels. These elevated concentrations seem to occur throughout the area and are not necessarily site-derived. Lead was found in some leachate, surface water, and groundwater samples at levels above relevant criteria. However, when present at such levels, it was usually accompanied by elevated aluminum concentrations, which are indicative of suspended soil minerals (sediment) in the samples. Lead and other metals are natural constituents of soil minerals; therefore, these elevated lead levels are probably not related to waste materials. Lead associated with soil minerals in such samples is unlikely to pose a threat to human health or the environment; therefore, lead was not selected as a COPC.

The leachate sample taken from Pump Station 2 in the southwest corner of the site exhibited an elevated concentration of TCE. Groundwater in that area contained levels of TCE that were above both the NYSDOH MCL and the NYSDEC Class GA groundwater standard. This groundwater also contained elevated concentrations of 1,1-DCE; total 1,2-DCE; and VC. One residential spring sample collected further south of the site, on the LaDue property, also contained detectable levels of TCE. Other site groundwater samples, most notably one taken from the south-southeast portion of the site, contained elevated concentrations of toluene as well as all of the organic contaminants previously discussed. No organic chemicals were detected in surface water samples. Lead was detected at levels above its NYSDEC Class C surface water standard, but these occurrences appear to be due to suspended sediment, as discussed above.

Some PAHs were found in the surface soil sample taken from the southwest corner of the site and in subsurface soil/waste material samples. The levels found were comparable to concentrations for PAHs in rural soils reported in the ASTDR toxicological profile for PAHs. Therefore, PAHs were not selected as COPCs at this site. 1,2-DCE, TCE, and VC were detected in the subsurface soil taken from the south-southeast portion of the site and were selected as COPCs. No other soil samples contained elevated levels of organic contaminants.

5.3 CONTAMINANT MIGRATION AND EXPOSURE PATHWAYS

Contaminants in the environmental media at the Wellsville-Andover Landfill site seem to be located primarily at the southwest corner of the site, at the southern border of the site where a leachate sump overflowed, and in the south-southeast portion of the site. Although historical data have shown the presence of organic contamination in downgradient residential wells and springs, the only potable water contamination found in this study was the presence of TCE in the LaDue spring. This may be due to the overflow of the leachate sump at the southern border of the site or to groundwater contamination originating elsewhere on site. This was the only evidence of off-site contaminant migration found by the Phase I study.

Potential exposure pathways are shown schematically in Figure 5-1, the conceptual site model. Substantial concentrations of several VOCs were found in landfill gas samples. Investigations at other landfills have shown VOC concentrations in ambient air are usually at least 1,000 times lower than in the landfill gas or soil gas. Therefore, the NYSDEC annual guidance concentrations (AGC), which apply to ambient air, were multiplied by 1,000 in order to obtain suitable benchmarks for evaluating the significance of the landfill gas concentrations.

Chemicals were selected as COPCs if they were detected at concentrations exceeding NYSDEC and NYSDOH criteria, and if their presence at those concentrations in more than one medium suggests they are site-related chemicals. COPCs selected as a result of this evaluation are marked with an asterisk in Tables 5-1 through 5-9, and are listed separately in Table 5-10.

Waste materials placed in the landfill were covered with clean fill. Therefore, direct contact with waste materials is not a potential exposure pathway. The sampling results did not reveal the presence of contaminants in surface soils, surface water, or stream sediments. Therefore, direct contact with contaminants on most of the site and adjacent areas also does not appear to be a complete exposure pathway.

One leachate sample contained TCE at a level above its NYSDOH MCL and its NYSDEC Class C surface water standard. However, this sample was from a manhole well upstream in the leachate collection system from the leachate collection pond, and samples taken from manholes closer to the pond did not reveal contamination above criteria values. Thus, direct contact with contaminants in the leachate collection pond or overflow areas also does not appear to be a viable exposure pathway.

COPCs were detected in landfill gas samples from the leachate collection system at levels above benchmark concentrations. These volatile organic chemicals could migrate to the landfill surface and into the ambient air, where site visitors and nearby residents might inhale them. This is a potentially complete exposure pathway.

COPCs were found in site groundwater and also in one off-site residential spring. Some of the same contaminants also have been found historically in other domestic wells downgradient of the site. Water from these wells is used for general domestic supply purposes. Thus, residents could potentially be exposed to contaminants in the water by drinking the water or by showering or bathing in it. Since the COPCs in the groundwater are VOCs, they might also migrate from the groundwater via soil gas into ambient air or even indoor air in areas downgradient from the landfill. If this were to occur, nearby residents might also be exposed to site contaminants through inhalation of the air.

5.4 HEALTH EFFECTS SUMMARIES

The health effects summaries describe the potential toxic properties of the COPCs at the Wellsville-Andover Landfill site. In most cases, the majority of the information is drawn from the public health statement in the Agency for Toxic Substances and Disease Registry's (ATSDR) toxicological profile for the given chemical (ATSDR 1988-1991).

In cases where the EPA has evaluated the carcinogenicity of a chemical, its classification has been listed. These classifications are:

Group A: Human carcinogen; sufficient evidence from epidemiological studies

Group B: Probable human carcinogen

- B1: At least limited evidence of carcinogenicity to humans
- B2: Usually a combination of sufficient evidence for animals and inadequate data for humans

Group C: Possible human carcinogen; limited evidence of carcinogenicity in animals and an absence of human data

Group D: Not classified; inadequate animal evidence of carcinogenicity

Group E: Non-carcinogen; no evidence of carcinogenicity in animals or man.

1,1-Dichloroethane (1,1-DCA)

1,1-DCA is a man-made liquid chemical that is used industrially as a solvent and in the manufacture of other chemicals. When 1,1-DCA is released to surface water or surface soil, the chemical will evaporate into air. Though solubility is low, 1,1-DCA can migrate from soil into groundwater. Some 1,1-DCA found in the environment is a breakdown product of 1,1,1-trichloroethane. Human exposure to 1,1-DCA can result from breathing contaminated air or eating or drinking contaminated food or water.

Relatively little information is available on the health effects of 1,1-DCA in humans or animals. 1,1-DCA was once used as a surgical anesthetic gas, although this use was discontinued when it was discovered that irregular heartbeats were induced at anesthetic doses. Exposure to high levels of 1,1-DCA in air has caused death in animals. Long-term exposure to high levels of 1,1-DCA has caused kidney damage in laboratory animals. In addition, exposure of pregnant rats to 1,1-DCA in air resulted in delayed development in the offspring. There is no evidence of similar harmful health effects in humans. In light of the results of animal studies, EPA has classified 1,1-DCA as a Group C possible human carcinogen.

1,1-Dichloroethene (1,1-DCE)

1,1-DCE is a man-made chemical. It is a clear, colorless liquid that has a mild, sweet, chloroform-like odor. 1,1-DCE is used to make plastic products such as plastic films for wrapping foods, and flame-retardant fabrics.

Although 1,1-DCE does not occur naturally, it has been detected in the air near factories that make or use it and at some chemical waste sites. Surveys of U.S. drinking water supplies have shown that a small percentage of those supplies also contain detectable amounts of 1,1-DCE.

High levels of exposure to 1,1-DCE can occur among plant workers while making or using it. 1,1-DCE usually enters the body via inhalation and/or ingestion. It may also enter the body through the skin. The health effects resulting from human exposure to 1,1-DCE are unknown.

In animal studies, brief exposures to high concentrations of 1,1-DCE have caused liver, kidney, heart, and lung damage; nervous system disorders; and death. Prolonged exposure to lower concentrations has also resulted in liver damage. In one study, an increased incidence of cancer was observed in animals exposed to 1,1-DCE. Based upon this study, 1,1-DCE is classified as a Group C, or possible human carcinogen, by the EPA.

1,2-Dichloroethene (1,2-DCE)

1,2-DCE is a man-made flammable liquid that has a sharp, harsh odor. It is used primarily in the production of solvents and as an additive to dyes, lacquer solutions, perfumes, and thermoplastics. There are two forms of 1,2-DCE: cis-1,2-DCE and trans-1,2-DCE. These may occur separately or as a mixture.

If 1,2-DCE is released to surface soil or surface water, almost all of the chemical rapidly evaporates. If it is placed underground, such as in a landfill or chemical waste site, 1,2-DCE can migrate to groundwater. In groundwater, 1,2-DCE breaks down slowly, mainly to VC, a chemical more toxic than 1,2-DCE.

Because it evaporates so readily, inhalation is the most likely route of human exposure to 1,2-DCE. Inhalation of high levels of 1,2-DCE can cause nausea, dizziness, and drowsiness and may result in death. Liver, heart, and lung damage were observed in laboratory animals after short- and long-term exposure to 1,2-DCE in air.

1,2-DCE can also enter the body by drinking water or eating food contaminated with 1,2-DCE. Animals fed 1,2-DCE were reported to incur liver and lung damage. 1,2-DCE is classified as a Group D chemical and is not considered a carcinogen.

Vinyl Chloride (VC)

VC is a gas or pressurized liquid used by the chemical manufacturing industry in the production of polymeric chemicals that are in turn used to manufacture a variety of vinyl and plastic products. VC is present in tobacco smoke. Additionally, it is a known environmental degradation product of many chlorinated chemicals.

When released to surface water or soil, VC readily evaporates. Once in the air, it rapidly breaks down to nonhazardous chemicals. In groundwater, VC can eventually break down to non-toxic substances (carbon dioxide, water, and chloride ions); however, VC can persist for many years before this process is complete.

Adverse health effects may occur as a result of inhalation or ingestion of VC, or by dermal or eye contact with it. Inhalation of high levels of VC can cause dizziness or sleepiness. Unconsciousness, and in some cases death, may result from breathing very high levels of VC. Skin contact with VC can result in redness and blistering of the skin. Noncarcinogenic effects associated with long-term occupational exposure to VC include hepatitis-like changes in the liver, immune system reactions, and nerve damage.

Occupational exposure to VC concentrations in air of about 25 ppm or greater has been shown to cause liver cancer. Liver and lung cancers have also been seen in rats exposed to VC.

Based upon this evidence, VC is classified by the EPA as a Group A, or known human, carcinogen.

Toluene

Toluene is a clear, colorless liquid with a sweet smell; it occurs naturally in crude oil and the tolu tree. Toluene is produced in petroleum refining and as a byproduct of styrene production and coke oven operations. It is primarily used by industry in gasoline refining and chemical manufacturing. Toluene is used in solvents, paints, inks, adhesives, cleaning agents, and chemical extractions. Toluene is also used in the manufacture of benzene, urethane foams, pharmaceuticals, dyes, and cosmetic nail products.

Toluene is volatile, and when released to surface water and soil, tends to evaporate quickly. Non-volatilized toluene undergoes microbial degradation and, therefore, does not tend to build up over time.

Inhalation and ingestion of, and dermal contact with, toluene liquid or vapor can result in short-term, intermediate, and long-term health effects. The toxicity of toluene, primarily by inhalation exposure, has been investigated in both humans and animals. The central nervous system (CNS) seems to be the system primarily affected by toluene.

In humans, acute inhalation exposure can cause depression of the CNS. Acute exposure to higher concentrations of toluene can produce unconsciousness and impaired neuromuscular function. At still higher levels, long-term effects may include permanent damage, such as cerebral and cerebellar effects including ataxia and tremors, and speech, hearing, and vision impairment.

Inhalation exposure of animals to moderate levels of toluene may be associated with CNS depression, while lower exposure levels can cause subtle behavioral and neurological effects. Animal studies indicate that toluene is a developmental toxicant.

Toluene is classified as a Group D chemical and has not been associated with cancer in humans or animals.

Trichloroethene (TCE)

TCE is a man-made liquid. It is used as a cleaning agent and solvent for degreasing operations. TCE may be found in metal cleaners, spot removers, rug-cleaning fluids, paints, and paint removers.

TCE is a volatile chemical that readily evaporates to the air from surface water and soil. Although it is relatively persistent in subsurface soil, it breaks down in air and water. Some of the products of TCE breakdown are hazardous chemicals such as VC.

Adverse health effects may result from exposure to TCE via inhalation, ingestion, or skin or eye contact. Chronic exposure to TCE could cause liver damage, skin reactions, and CNS effects. CNS effects include drowsiness, dizziness, headache, blurred vision, lack of coordination, mental confusion, flushed skin, tremors, nausea, vomiting, fatigue, heart arrhythmia, and in some cases, death.

Exposure of laboratory animals to TCE has been associated with an increased incidence of a variety of tumors, including kidney, liver, and lung tumors. TCE is thus considered a Group B2, or probable human, carcinogen by the EPA.

5.5 CONCLUSION

In this first phase of the risk evaluation for the Wellsville-Andover Landfill site, the analytical results of site samples were compared to background contaminant levels and applicable NYSDEC, NYSDOH, and EPA criteria. COPCs were chosen based on this comparison process and are listed in Table 5-10. These contaminants include 1,1-DCA; 1,1-DCE; 1,2-DCE; toluene; TCE; and VC.

The only pathway by which site visitors might experience significant exposure to site contaminants is through inhalation of vapors that could migrate from the landfill gas to the ambient air. The Phase I sampling results indicate that COPCs are not present in other environmental media (soil, surface water, or sediment) on or adjacent to the site with which site visitors are likely to come into contact.

Pathways by which nearby residents could be exposed to site contaminants are ingestion of, and dermal contact with, contaminated water used for domestic supply purposes; inhalation of chemicals volatilized from the water while showering or bathing; and inhalation of COPCs in indoor or outdoor air that might have migrated to these locations from the groundwater by way of soil gas.

Adverse effects that might occur as a result of these possible exposures have also been discussed in this phase of the evaluation and can be found in Section 5.4, Health Effects Summaries.

Table 5-1

SUMMARY OF CONTAMINANTS DETECTED IN LANDFILL GAS SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (ppb)		1000x NYSDEC AGC (ppb)[a]	Exceedance Frequency
		Minimum	Maximum		
Volatile Organic Compounds					
Benzene	2/6	113	240	38	2/6
Chloroethane	2/6	60	820	NA	NA
1,1-Dichloroethane*	4/6	4	1,700	124,000	0/6
cis-1,2-Dichloroethene*	6/6	2	87,000	479,000	0/6
Ethylbenzene	6/6	19	21,000	230,000	0/6
Freon®11	2/6	180	210	125,000	0/6
Freon®12	3/6	12	27	NA	NA
Freon®114	2/6	2	980	NA	NA
Methylene chloride	1/6	--	860	7,770	0/6
1,2,4-Trichlorobenzene	1/6	--	2	1,210	0/6
1,1,1-Trichloroethane	2/6	800	2,300	183,000	0/6
Trichloroethene*	2/6	2	390	80	1/6
1,2,4-Trimethylbenzene	1/6	--	34	59,000	0/6
Toluene*	6/6	3	8,600	531,000	0/6
Vinyl chloride*	6/6	11	12,000	8	6/6
m,p-Xylene	5/6	34	1,800	69,000	0/6
o-Xylene	2/6	5	290	161,000	0/6

* Chemical of potential concern.

[a] Annual Guidance Concentration (NYSDEC 1991c) converted from $\mu g/m^3$ to ppb and multiplied by 1,000 (see text for explanation).

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-2

SUMMARY OF CONTAMINANTS DETECTED IN LEACHATE SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		NYSDEC Class C Surface Water Standard (µg/L)[a]	Exceedance Frequency
		Minimum	Maximum		
INORGANIC SUBSTANCES					
Aluminum	2/2	774	27,600	100	2/2
Arsenic	1/2	--	12.5	190	0/2
Barium	2/2	406	577	NA	NA
Calcium	2/2	123,000	191,000	NA	NA
Chromium	2/2	15.2	39.9	962 / 791[b]	0/2
Cobalt	2/2	55.4	58.4	5	2/2
Copper	1/2	--	35.2	58.8 / 47.9[b]	0/2
Iron	2/2	71,900	165,000	300	2/2
Lead	2/2	27.2	47.9	34.6 / 25.6[b]	2/2
Magnesium	2/2	42,800	50,300	NA	NA
Manganese	2/2	1,880	3,670	NA	NA
Nickel	1/2	--	54.5	398 / 332[b]	0/2
Potassium	2/2	33,400	50,700	NA	NA
Sodium	2/2	33,600	71,500	NA	NA
Vanadium	1/2	--	52.2	14	1/2
Zinc	2/2	151	227	30	2/2
ORGANIC SUBSTANCES					
Volatiles					
Chlorobenzene	1/2	--	3	5	0/2
total 1,2-Dichloroethene*	2/2	2	8	NA	NA
Trichloroethene*	2/2	2	14	11	1/2

Key at end of table.

Table 5-2

SUMMARY OF CONTAMINANTS DETECTED IN LEACHATE SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		NYSDEC Class C Surface Water Standard (µg/L)[a]	Exceedance Frequency
		Minimum	Maximum		
ORGANIC SUBSTANCES (CONT.)					
Semi-Volatiles					
4-Chloro-3-methyl phenol	1/2	--	4	1[c]	1/2
1,4-Dichlorobenzene	1/2	--	1	5[d]	0/2
Di-n-butyl phthalate	1/2	--	2	NA	NA
Naphthalene	1/2	--	1	NA	NA
n-Nitrosodiphenylamine	1/2	--	1	NA	NA

* Contaminant of potential concern.

a NYSDEC 1991.
b Standard is a function of hardness; first value is for sample L-1, and second value is for sample L-2.
c Standard applies to total chlorinated phenols.
d Standard applies to the sum of ortho, meta, and para isomers.

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-3

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL/WASTE MATERIALS FROM TRENCHES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentration (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	5/5	9,450	14,600	128,000	0/5	NA	NA
Arsenic	5/5	11.5	20.9	16	1/5	80	0/5
Barium	5/5	85.7	215	867	0/5	4,000	0/5
Calcium	5/5	1,610	9,890	14,400	0/5	NA	NA
Chromium	5/5	18.2	28.8	112	0/5	80,000	0/5
Cobalt	5/5	20.8	28.1	19.8	5/5	NA	NA
Copper	5/5	25.4	194	48.7	1/5	3,000[c]	0/5
Iron	5/5	23,900	38,300	54,100	0/5	NA	NA
Lead	5/5	15.3	86.9	33	4/5	250	0/5
Magnesium	5/5	3,330	5,070	10,700	0/5	NA	NA
Manganese	5/5	422	784	1,450	0/5	20,000	0/5
Nickel	5/5	31.9	43.2	38.2	1/5	2,000	0/5
Potassium	5/5	1,570	2,160	23,500	0/5	NA[d]	NA
Vanadium	5/5	15.1	26.2	140	0/5	600	0/5
Zinc	5/5	87.4	269	104	4/5	20,000	0/5

Key at end of table.

02:D3715-03/13/92-D1

Table 5-3

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL/WASTE MATERIALS FROM TRENCHES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum		
ORGANIC SUBSTANCES					
Volatiles					
Acetone	4/5	0.23	4.5	6,000	0/5
Benzene	1/5	--	0.078	24	0/5
2-Butanone	2/5	0.075	0.49	NA	NA
1,1-Dichloroethane*	1/5	--	0.71	8,000	0/5
total 1,2-Dichloroethene*	4/5	0.021	3.9	800[e] (as cis-)	0/5
Ethylbenzene	5/5	0.031	33	8,000	0/5
2-Hexanone	2/5	0.044	0.12	NA	NA
Methylene chloride	1/5	--	0.11	93	0/5
4-Methyl-2-pentanone	1/5	--	0.26	NA	NA
Styrene	2/5	0.045	4.2	23	0/5
Tetrachloroethene	1/5	--	0.52	14	0/5
Toluene*	5/5	0.011	3.2	20,000	0/5
Trichloroethene*	2/5	0.073	5.3	64	0/5
Vinyl chloride*	1/5	--	0.98	0.36	1/5
Total xylenes	4/5	0.051	1.7	200,000	0/5

Key at end of table.

Table 5-3

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL/WASTE MATERIALS FROM TRENCHES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum		
ORGANIC SUBSTANCES (CONT.)					
Semivolatiles					
Benzo(a)fluoranthene	1/5	--	0.37	0.22	1/5
Benzo(a)pyrene	1/5	--	0.28	0.061	1/5
Benzyl alcohol	1/5	--	1.2	20,000	0/5
Bis(2-ethylhexyl)phthalate	5/5	0.13	8.3	50	0/5
Butylbenzylphthalate	3/5	1.0	16	20,000	0/5
4-Chloro-3-methylphenol	1/5	--	0.30	NA	NA
Chrysene	1/5	--	0.41	NA	NA
Di-n-butylphthalate	4/5	0.049	14	8,000	0/5
1,2-Dichlorobenzene	2/5	0.67	1.2	7,000	0/5
Diethylphthalate	2/5	0.025	0.11	60,000	0/5
Dimethylphthalate	2/5	0.53	0.91	80,000	0/5
Fluoranthene	3/5	0.28	0.72	3,000	0/5
2-Methylnaphthalene	2/5	0.18	0.19	NA	NA
4-Methylphenol	4/5	0.37	1.6	NA	NA

Key at end of table.

02:D3715-03/13/92-D1

Table 5-3

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL/WASTE MATERIALS FROM TRENCHES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum		
ORGANIC SUBSTANCES (CONT.)					
Semivolatiles (Cont.)					
Naphthalene	2/5	0.14	0.15	300	0/5
Pentachlorophenol	1/5	--	6.6	2,000	0/5
Phenanthrene	3/5	0.13	0.61	NA	NA
Pyrene	3/5	0.19	0.53	2,000	0/5
Pesticides					
beta-BHC	1/5	--	0.012	3.9	0/5
Dieldrin	1/5	--	0.013	0.044	0/5
4,4'-DDD	2/5	0.043	0.12	2.9	0/5
4,4'-DDE	1/5	--	0.015	2.1	0/5
4,4'-DDT	1/5	--	0.13	2.1	0/5

Key at end of table.

Table 5-3 (Cont.)

*Contaminant of potential concern.

[a]Guidance derived from direct ingestion pathway (NYSDEC 1991c).
[b]Upper 90th percentile of concentrations in eastern U.S. soils (Shacklette and Boerngen 1984);
[c]RCRA CMS action level for soil (USEPA 1990).
[d]NYSDEC value was derived from potassium cyanide and is inappropriate for this use.
[e]Derived from cis-1,2-Dichloroethene.

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-4

SUMMARY OF CONTAMINANTS DETECTED IN SURFACE WATER

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		Class C Surface Water Standard (µg/L)[a]	Exceedance Frequency
		Minimum	Maximum		
INORGANIC SUBSTANCES					
Aluminum	5/6	137	874	100	5/6
Calcium	6/6	15,400	19,800	NA	NA
Iron	6/6	130	3,840	300	4/6
Lead	6/6	1.1	4.8	1.48 - 1.90[b]	3/6
Magnesium	5/6	6,360	7,200	NA	NA
Manganese	4/6	68.5	3,090	NA	NA
Sodium	5/6	8.980	22,100	NA	NA
ORGANIC SUBSTANCES					
Semi-Volatiles					
Di-n-butyl phthalate	4/6	1	2	NA	NA
Di-n-octyl phthalate	1/6	--	2	NA	NA

[a] NYSDEC 1991.
[b] Standard is a function of hardness.

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-5

SUMMARY OF CONTAMINANTS DETECTED IN SEDIMENT SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentrations (mg/kg)[b]	Exceedance Frequency	NYSDEC Aquatic Sediment Criteria (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	6/6	1,000	15,700	128,000	0/6	NA	NA
Arsenic	6/6	8.1	13.5	16	0/6	5	6/6
Barium	6/6	97.4	192	867	0/6	NA	NA
Calcium	2/6	1,290	2,010	14,400	0/6	NA	NA
Chromium	6/6	18.3	22.7	112	0/6	26	0/6
Cobalt	6/6	25.4	27.9	19.8	6/6	NA	NA
Copper	6/6	15.7	21.4	48.7	0/6	19	2/6
Iron	6/6	32,400	43,200	54,100	0/6	24,000	6/6
Lead	6/6	3.2	26.1	33	0/6	27	0/6
Magnesium	6/6	3,510	4,640	10,700	0/6	NA	NA
Manganese	6/6	798	2,440	1,450	2/6	428	6/6
Nickel	6/6	33.4	40.1	38.2	2/6	22	6/6
Potassium	1/6	--	1,070	23,500	1/6	NA	NA
Vanadium	6/6	17.5	23.4	140	0/6	NA	NA
Zinc	6/6	76.1	107	104	1/6	85	3/6

Key at end of table.

02:D3715-03/12/92-D1

Table 5-5

SUMMARY OF CONTAMINANTS DETECTED IN SEDIMENT SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentrations (mg/kg)[b]	Exceedance Frequency	NYSDEC Aquatic Sediment Criteria (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
ORGANIC SUBSTANCES							
Volatiles							
Acetone	5/6	0.01	0.035	NA	NA	NA	NA
Semi-Volatiles							
Butylbenzylphthalate	1/6	--	0.024	NA	NA	NA	NA

a Geometric mean of "no-effect" and "lowest effect" levels based on studies in benthic organisms (NYSDEC 1991c).
b Upper 90th percentile of concentrations in eastern U.S. soils (Schacklette and Boerngen 1984).

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-6

SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentrations (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	14/14	1,030	14,300	128,000	0/14	NA	NA
Arsenic	14/14	4.0	13.5	16	0/14	80	0/14
Barium	14/14	43.9	741	867	0/14	4,000	0/14
Calcium	8/14	1,680	173,000	14,400	2/14	NA	NA
Chromium	14/14	12.9	40.4	112	0/14	80,000	0/14
Cobalt	14/14	17.7	87.3	19.8	13/14	NA	NA
Copper	13/14	6.6	28.2	48.7	0/14	3,000[c]	0/14
Iron	14/14	23,800	283,000	54,100	3/14	NA	NA
Lead	14/14	13.2	56.1	33	2/14	250	0/14
Magnesium	14/14	1,710	9,060	10,700	0/14	NA	NA
Manganese	14/14	235	4,540	1,450	2/14	20,000	0.14
Nickel	14/14	15.8	88	38.2	4/14	2,000	0/14
Potassium	10/14	1,300	2,250	23,500	0/14	NA[d]	0/14
Vanadium	13/14	14.4	25.6	140	0/14	600	0/14
Zinc	14/14	43	356	104	3/14	20,000	0/14
Cyanide	1/14	--	3.5	NA	NA	2,000	0/14

Key at end of table.

02:D3716-03/12/92-D1

Table 5-6

SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentrations (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
ORGANIC SUBSTANCES							
Volatiles							
Acetone	1/14	--	0.240	NA	NA	6,000	0/14
Chloromethane	1/14	--	0.040	NA	NA	NA	NA
Ethylbenzene	2/14	0.001	0.018	NA	NA	8,000	0/14
Semi-Volatiles							
Anthracene	1/14	--	0.014	NA	NA	20,000	0/14
Benzo(b)fluoranthene	2/14	0.034	0.140	0.020 - 0.030	2/14	0.22	0/14
Benzo(k)fluoranthene	1/14	--	0.022	0.010 - 0.110	0/14	0.22	0/14
Benzo(g,h,i)perylene	1/14	--	0.047	0.010 - 0.070	0/14	NA	NA
Benzo(a)pyrene	1/14	--	0.088	0.002 - 1.3	0/14	0.061	1/14
Bis(2-ethylhexyl)phthalate	1/14	--	2.1	NA	NA	50	0/14
Butylbenzylphthalate	2/14	0.025	0.260	NA	NA	20,000	0/14
Chrysene	3/14	0.040	0.050	0.038	3/14	NA	NA
Dibenz(a,h)anthracene	1/14	--	0.044	NA	NA	0.014	1/14
Fluoranthene	3/14	0.042	0.185	0.003 - 0.040	3/14	3,000	0/14
Indeno(1,2,3-cd)pyrene	1/14	--	0.045	0.010 - 0.015	1/14	NA	NA

Key at end of table.

Table 5-6

SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Background Concentrations (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
Phenanthrene	3/14	0.041	0.047	0.030	3/14	NA	NA
Pyrene	4/14	0.049	0.140	0.001 - 0.197	0/14	2,000	

a Guidance derived from human direct ingestion pathway (NYSDEC 1991c).
b For inorganics, benchmark value is the upper 90th percentile of concentrations in eastern U.S. soils (Shacklette and Boerngen 1984); for PAHs, benchmark value is the background value found in rural soils (ATSDR 1989).
c RCRA CMS action level for copper in soil (USEPA 1990).
d NYSDEC value was derived from potassium cyanide and is inappropriate for this use.

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

DRAFT

Table 5-7

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL FROM BORINGS

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Value (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	19/19	5,550	18,100	128,000	0/19	NA	NA
Arsenic	19/19	1.3	17.9	16	3/19	80	0/19
Barium	16/19	43	281	867	0/19	4,000	0/19
Cadmium	2/19	1.3	1.8	NA	NA	80	0/19
Calcium	14/19	1,150	77,550	14,400	1/19	NA	NA
Chromium	19/19	9.3	27.6	112	0/19	80,000	0/19
Cobalt	19/19	14.5	33.2	19.8	18/19	NA	NA
Copper	19/19	7.7	37	48.7	0/19	3,000[c]	0/19
Iron	19/19	14,700	45,200	54,100	0/19	NA	NA
Lead	18/19	6.6	45.3	33	2/19	250	0/19
Magnesium	19/19	3,590	17,100	10,700	1/19	NA	NA
Manganese	19/19	431	1,750	1,450	2/19	20,000	0/19
Mercury	1/19	--	0.12	0.265	0/19	20	0/19
Nickel	19/19	16.9	53.4	38.2	7/19	2,000	0/19
Potassium	17/19	1,340	1,990	23,500	0/19	NA[d]	0/19
Vanadium	18/19	14.2	24.8	140	0/19	600	0/19
Zinc	19/19	56.3	96.5	104	0/19	20,000	0/19

Key at end of table.

Table 5-7

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL FROM BORINGS

Chemical	Detection Frequency	Range of Detected Concentrations (mg/kg)		Benchmark Value (mg/kg)[b]	Exceedance Frequency	Benchmark Health Risk Value (mg/kg)[a]	Exceedance Frequency
		Minimum	Maximum				
ORGANIC SUBSTANCES							
Volatiles							
total 1,2-Dichloroethene*	2/19	0.061	0.087	NA	NA	800[e]	0/19
Trichloroethene*	2/19	0.013	0.022	NA	NA	64	0/19
Vinyl chloride*	2/19	0.007	0.021	NA	NA	0.36	0/19

* Contaminant of potential concern.

a Guidance derived from human direct ingestion pathway (NYSDEC 1991c).
b Upper 90th percentile of concentrations in eastern U.S. soils (Shacklette and Boerngen 1984).
c RCRA CMS action level for soils (USEPA 1990).
d NYSDEC value was derived from potassium cyanide and is inappropriate for this use.
e Derived from cis-1,2-dichloroethene.

Key:

NA = Not available.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-8

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER SAMPLES FROM MONITORING WELLS

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		NYSDOH MCL (µg/L)[a]	Exceedance Frequency	NYSDEC Class GA Groundwater Standard (µg/L)[b]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	19/21	217	42,700	NA	NA	NA	NA
Arsenic	1/21	--	17.8	50 P	0/21	25	0/21
Barium	5/21	208	342	1,000 P	0/21	1,000	0/21
Calcium	21/21	9,160	85,200	NA	NA	NA	NA
Chromium	7/21	5	110	50 P	1/21	50	1/21
Cobalt	1/21	--	102	NA	NA	NA	NA
Copper	2/21	46.2	115	1,000 S	0/21	200	0/21
Iron	20/21	316	110,000	300 S[c]	20/21	300[c]	20/21
Lead	12/21	1.2	125	50 P	1/21	25	2/21
Magnesium	20/21	5,400	56,000	NA	NA	35,000 G	3/21
Manganese	21/21	16.4	8,530	300 S[c]	14/21	300[c]	14/21
Potassium	10/21	5,020	38,000	NA	NA	NA	NA
Sodium	20/21	7,450	51,600	NA	NA	2,000	12/21
Vanadium	1/21	--	67.1	NA	NA	NA	NA
Zinc	11/21	24.1	230	5,000 S	0/21	300	0/21

Key at end of table.

Table 5-8

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER SAMPLES FROM MONITORING WELLS

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		NYSDOH MCL (µg/L)[a]	Exceedance Frequency	NYSDEC Class GA Groundwater Standard (µg/L)[b]	Exceedance Frequency
		Minimum	Maximum				
ORGANIC SUBSTANCES							
Volatiles							
Acetone	1/21	--	33	50 G	0/21	5	1/21
Chloroethane	1/21	--	4	5	0/21	5	0/21
Chloroform	1/21	--	2	7	0/21	7	0/21
1,1-Dichloroethane*	2/21	6	11	5	2/21	5	2/21
1,1-Dichloroethene*	4/21	3	12	5	3/21	5	3/21
total 1,2-Dichloroethene*	10/21	3	5,600	5	7/21	5	7/21
Ethylbenzene	1/21	--	3	5	0/21	5	0/21
Methylene chloride	1/21	--	4	5	0/21	5	0/21
Toluene*	4/21	2	9	5	3/21	5	3/21
1,1,1-Trichloroethane	2/21	1	4	5	0/21	5	0/21
Trichloroethene*	9/21	1	1,200	5	6/21	5	6/21

Key at end of table.

02:D3716-03/12/92-D1

Table 5-8

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER SAMPLES FROM MONITORING WELLS

Chemical	Detection Frequency	Range of Detected Concentrations (μg/L)		NYSDOH MCL (μg/L)[a]	Exceedance Frequency	NYSDEC Class GA Groundwater Standard (μg/L)[b]	Exceedance Frequency
		Minimum	Maximum				
Vinyl chloride*	6/21	45	2,100	2	6/21	2	6/21

* Contaminant of potential concern.

a Maximum Contaminant Level (10 NYCRR 5-1.52).
b NYSDEC 1991.
c Total concentration of iron and manganese is not to exceed 500 μg/L.

Key:

G = Guidance value (NYSDEC 1991).
NA = Not available.
P = NYSDOH primary contaminant.
S = NYSDOH secondary contaminant.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-9

SUMMARY OF CONTAMINANTS DETECTED IN RESIDENTIAL WELL AND SPRING SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		NYSDOH MCL (µg/L)[a]	Exceedance Frequency	NYSDEC Class GA Groundwater Standard (µg/L)[b]	Exceedance Frequency
		Minimum	Maximum				
INORGANIC SUBSTANCES							
Aluminum	3/7	323	741	NA	NA	NA	NA
Barium	0/7	NA	NA	1,000 P	0/7	1,000	0/7
Calcium	7/7	13,400	44,850	NA	NA	NA	NA
Chromium	1/7	--	11.1	50 P	0/7	50	0/7
Copper	1/7	--	33.8	1,000 S	0/7	200	0/7
Iron	6/7	107	1,300	300 S[c]	5/7	300[c]	5/7
Lead	0/7	NA	NA	50 P	0/7	25	0/7
Magnesium	7/7	6,070	19,600	NA	NA	35,000 G	0/7
Manganese	7/7	17.7	510	300 S[c]	1/7	300[c]	1/7
Mercury	1/8	--	0.46	2 P	0/7	2	0/7
Potassium	0/7	NA	NA	NA	NA	NA	NA
Sodium	6/7	8,200	58,000	NA	NA	20,000	4/7
Zinc	4/7	13.4	338	5,000 S	0/7	300	1/7
Cyanide	1/7	--	19	NA	0/7	100	0/7

Key at end of table.

02:D3715-03/12/92-D1

Table 5-9

SUMMARY OF CONTAMINANTS DETECTED IN RESIDENTIAL WELL AND SPRING SAMPLES

Chemical	Detection Frequency	Range of Detected Concentrations (μg/L)		NYSDOH MCL (μg/L)[a]	Exceedance Frequency	NYSDEC Class GA Groundwater Standard (μg/L)[b]	Exceedance Frequency
		Minimum	Maximum				
ORGANIC SUBSTANCES							
Volatiles							
Trichloroethene*	1/7	--	2.9	5	0/7	5	0/7

* Contaminant of potential concern.

a Maximum Contaminant Level (10 NYCRR 5-1.52).
b NYSDEC 1991.
c Total concentration of iron and manganese is not to exceed 500 μg/L.

Key:

G = Guidance value (NYSDEC 1991).
NA = Not available.
P = NYSDOH primary contaminant.
S = NYSDOH secondary contaminant.

Source: Compiled by Ecology and Environment Engineering, P.C. 1992.

Table 5-10 CHEMICALS OF POTENTIAL CONCERN
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethene
Toluene
Trichloroethene
Vinyl chloride

DRAFT

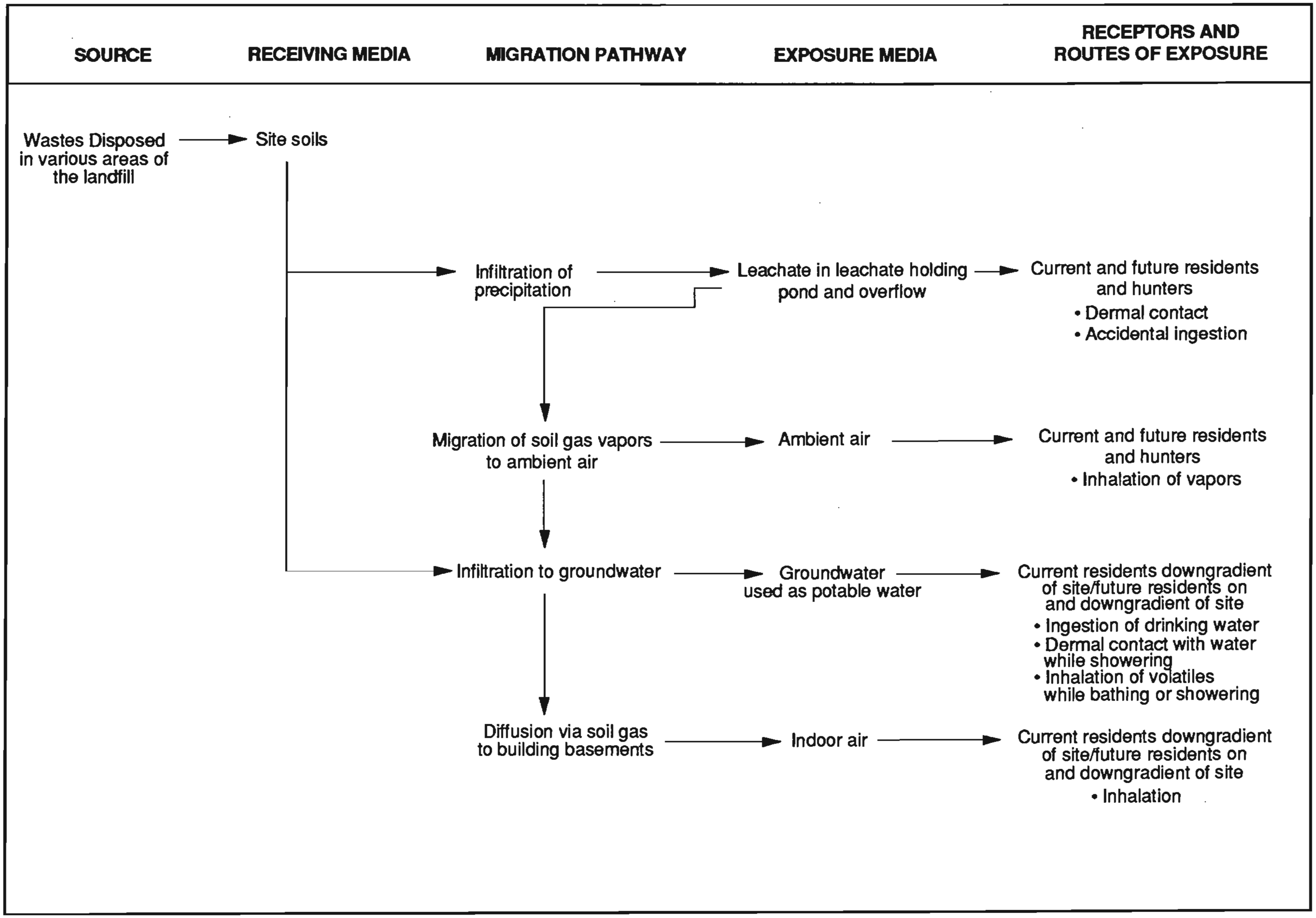


Figure 5-1
CONCEPTUAL SITE MODEL FOR WELLSVILLE-ANDOVER LANDFILL

OB30CSM
MP

6. HABITAT-BASED ECOLOGICAL ASSESSMENT

The purpose of this habitat-based ecological assessment (HBA) was to identify, map, and describe the upland, wetland, and aquatic ecosystems that occur within the vicinity of the Wellsville-Andover Landfill site. A major objective of the ecological characterization was to determine whether or not significant resources that could be impacted by site contaminants are present within the vicinity of this landfill. These significant resources include jurisdictional wetlands and other sensitive environments; federal or state endangered, threatened, or rare species; and economically or recreationally important fisheries or wildlife. Observations of physically stressed plants and animals that may indicate the effects of landfill site contaminants are also discussed in this section. The scope of work performed during the first phase of the RI addressed items in Step I of Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC 1991).

6.1 REGIONAL ECOLOGY

6.1.1 Aquatic Ecosystems

The Wellsville-Andover Landfill site is located in the Genesee River drainage basin, which is in the south Lake Ontario subbasin of the Great Lakes basin of New York State (United States Geological Survey [USGS] 1985). The Genesee basin is a long and narrow valley that extends southward into Pennsylvania and is characterized by fairly short tributaries flowing into the main stem. Water bodies of interest for this investigation include Duffy Creek, which is approximately 1,500 feet east of the site, and an unnamed tributary to Duffy Creek which is approximately 3,000 feet southeast of the site (see Figure 6-1). Duffy Creek converges with Dyke Creek approximately 1.8 miles south-southeast of the site, then flows southwest for approximately 4 miles, where it converges with the Genesee River.

NYSDEC has designated many water bodies in the Genesee River drainage basin as Class B. Class B waters are to be maintained as suitable habitat for fish and other aquatic life as well as for primary and secondary contact recreation. Class B streams cannot be used as a source of drinking water. Some water bodies within this watershed are designated Class A, which indicates that the water may be used as a public water supply, while some are designated Class C, indicating that the waters are suitable for fishing and fish propagation as well as secondary contact recreation but not primary contact recreation.

Duffy Creek and its tributaries are designated Class C (6 NYCRR 821.6). Dyke Creek is designated Class C between the Village of Andover and the Genesee River. In addition to Class C standards, trout water standards apply to Dyke Creek from 1 mile above its mouth to Andover. Trout standards indicate a cold-water stream. According to a 1990 report by NYSDEC's Division of Water, Dyke Creek downstream of Andover is considered Class C partially due to impairment from failing septic systems. The Genesee River is designated Class C from the mouth of Dyke Creek downstream to the dam at Belmont, New York, which is more than 10 miles from the site. Immediately upstream of Dyke Creek, the Genesee is designated Class A due to the presence of Village of Wellsville water intakes.

6.1.2 Terrestrial Ecosystems

The Wellsville-Andover Landfill is located within beech-maple forest cover types (Eyre 1980). A variety of plant communities occur in the vicinity of the site. The chief determinants of the existing plant communities are topography, soils, moisture, and land use. Since the terrain and land use history at the site are diverse, the associated plant communities are also quite diverse. Hence, the vegetative cover is a mosaic of early successional fields, hedge rows, early successional forests, and mature beech-maple forests. The area surrounding the landfill is a relatively high-quality area due to the terrain, lack of development, and large tracts of unbroken forest on relatively steep hills.

The landfill and surrounding area appears to support an abundance and diversity of animal life. Food sources including seeds, fruits, and browse are available in abundance. Year-round cover is available from the mature forests. Mature forests also provide den trees and raptor nest trees. Water is available in ample supply from streams and ponds.

6.2 ECOLOGICAL CHARACTERIZATION

The HBA of the Wellsville-Andover landfill was conducted using methodologies established in Fish and Wildlife Impact Analyses for Inactive Hazardous Waste Sites (NYSDEC 1991). This involved using information obtained from a site survey, government agency contacts, and literature and map resources to characterize the site. HBAs are a three-step process; however, only step 1 was required by NYSDEC at this time. Step 1, "Site Description," consists of (a) Site Maps, (b) Description of Fish and Wildlife Resources, (c) Value of Fish and Wildlife Resources, and (d) Applicable Fish and Wildlife Regulatory Criteria.

Prior to the initiation of field work, federal and state natural resource agencies were contacted regarding species-of-concern, significant habitats, and fishery resources that are within a 1.5-mile radius of the landfill site.

Literature and map resources were reviewed prior to the initiation of field work. These resources included the USGS Wellsville North topographic quadrangle map, the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Wellsville North quadrangle map, and the Soil Survey of Allegany County (USDA 1956).

E & E conducted a field survey of the site and surrounding areas on October 24, 1991. The findings of this survey are described below in Section 6.3.

6.2.1 Aquatic Ecosystems

A two-member field team surveyed the two streams adjacent to the site on October 24, 1991. Duffy Creek and its unnamed tributary were surveyed in order to characterize their ecological features and to infer their relative quality based on type, number, and diversity of benthic organisms. In addition, some basic water chemistry data were collected. The results of this survey are presented in Section 6.3.

The objective of the survey was to determine if aquatic resources such as biota may be impacted by site-related contaminants. This involved the identification of available habitat in the streams as well as identification of the actual aquatic and benthic species present.

At selected points along the two streams, physical parameters were observed and recorded (see Figure 6-1). These observations included stream location, bank height and composition, stream substratum composition, and flow estimates. In addition, field measurements of temperature, pH, alkalinity, and conductivity were recorded. Temperature, conductivity, and pH were measured using a Cambridge Instruments meter. Alkalinity was measured using a Hach kit. Samples for water hardness were collected and delivered to E & E's ASC for analysis. Stream flow was measured by timing a floating object for a known (measured) distance.

Systematic sampling was conducted to determine type, number, and subsequent diversity of benthic organisms at two locations in Duffy Creek (a perennial tributary to Dyke Creek) and at one location in the intermittent tributary to Duffy Creek. Sampling methods were to include disturbing a known area of the bottom substrate in flowing water and collecting invertebrates swept downstream with a net positioned immediately downstream of the disturbed area. However, conditions in the streams were such that a less quantitative approach was necessitated. Due to the low discharge of the streams, stones were overturned and examined, and leaf debris and woody debris were picked through and examined to determine whether invertebrates were present, and if so, what taxon they belonged to. Because no samples were collected and preserved, identification of benthic macroinvertebrates extend no further than "order."

6.2.2 Terrestrial Ecosystems

The objectives of the terrestrial survey were to map and describe plant communities present on and adjacent to the site, observe wildlife species present in the vicinity of the landfill, identify and evaluate significant ecological resources that could be impacted by site contamination, and note evidence of plant or animal stress that may be a result of site contamination. The results of this survey are presented in Section 6.3.

Vegetative cover-type boundaries were identified and mapped. Each cover type was traversed and described in terms of plant species composition, vegetative structure, edaphic conditions, and land use. Dominant plant species were identified within each strata (i.e., tree sapling, shrubs, liana, and herb). Each vegetative cover type identified was classified according to the New York State Natural Heritage Program's Ecological Communities of New York State (Reschke 1990).

Wetlands were delineated using procedures described in the Corps of Engineers Wetland Delineation Manual (Department of the Army 1987). Soil, vegetation, and hydrology were sampled at suspected wetland areas. Wetland function and value was assessed for each wetland.

Wildlife use was evaluated using literature sources as well as field observations. Species lists were generated by reviewing literature for relatively common species that occur within Allegany County, New York. These species lists were augmented by wildlife sightings made during the field survey. Wildlife sightings included direct observations as well as identification based on vocalizations, tracks, burrows, browse, and scat. General wildlife values (i.e., food and cover availability) of each cover type were also noted.

Evidence of physical stress to flora and fauna observed during the field survey was noted. Areas that exhibited evidence of stress were studied closely for indications of whether or not the stress may have been caused by site contaminants.

6.3 HABITAT-BASED ASSESSMENT

6.3.1 Aquatic Ecosystems

As shown on Figure 6-1, one stream sampling station in Duffy Creek was located upgradient of the landfill (according to USGS topographic maps). This sampling location is still adjacent to the site but near an area that was not used for landfilling purposes. Therefore, this area is assumed to be upstream of any impact from the site. The other two sampling stations were located downgradient of the landfill drainage. Stream widths and depths at all locations were all indicative of first-order streams.

Results of water chemistry analyses are found in Table 6-1. Results of the benthic macroinvertebrate survey are given in Table 6-2. The locations of the sampling points on the streams are shown on Figure 6-1.

Site 1 (Duffy Creek - Upstream)

The upstream sampling site (labeled Site 1) in Duffy Creek has a substratum composed of 60% cobble, 30% boulder, and 10% silt/pebble. Pooled areas contained primarily silt and leaf debris.

At Site 1, the east bank is 10 feet high, 3 feet from shore. Bank has exposed roots covered with moss. Riparian vegetation consisted of a mature American beech *(Fagus grandifolia)* and hemlock *(Tsuga canadensis)* forest. Many sawtimber-sized trees are present, and the understory has a sparse herbaceous cover. The reproductive layer consists of beech, sugar maple *(Acer saccharum)*, and hemlock interspersed with white ash *(Fraxinus americana)*. The west bank was 15 feet high, 10 feet from shore. Some herbaceous cover was present on the bank, and pole size ironwood *(Carpinus caroliniana)*, white ash, and beech were present. Sapling-sized maples were also present.

Stream depth at Site 1 was less than 1 inch in the deepest areas. Flow was negligible, which correlates with the USGS topographic map showing the stream as intermittent at this point. Stream width was 2 to 3 feet, with the majority of this area outside of the main channel.

Water chemistry parameters at the upstream site in Duffy Creek are within the expected range of results for a first-order stream for this geographic area at the time of day the parameters were measured. The upstream portion of Duffy Creek is reasonably well buffered, with alkalinity at 80 mg/L as $CaCO_3$. The water here is moderately hard (120 mg/L as $CaCO_3$) (see Table 6-1). The normal range for alkalinity is 20 to 200 mg $CaCO3_3$ per liter (Lind 1979). According to the classification of Brown, Skougstad, and Fishman (1970), hardness is classified as follows: 0 to 60 mg/L $CaCO_3$ is soft, 61 to 120 mg/L $CaCO_3$ is moderately hard, 121 to 180 mg/L $CaCO_3$ is hard, and 181 mg/L $CaCO_3$ and above is very hard. At 1130 hours, pH was 6.87; the normal diel range for pH in this geographic location is 6.0 to 9.0 (Cole 1979). Both streams in question are Class C (6 NYCRR 821.6). No standards are given for any of the parameters measured, except pH. According to 6 NYCRR 701.19, pH shall be between 6.5 and 8.5, and this water body meets the standard.

Invertebrates collected at the upstream site consisted of a single order of insect larvae, caddisflies *(Trichoptera)*. All individuals were found on the bottom of cobble and boulders; no individuals of any taxon were observed in leaf litter, sand, or woody debris. A monotypic assemblage such as this is often indicative of a stressed system. The probable major stress on this stream system is its intermittent nature.

Site 2 (Duffy Creek - Downstream)

The downstream sampling site in Duffy Creek, labeled Site 2, has a stream substratum composed of 70% cobble, 5% boulder, 15% pebble, and 10% silt. At Site 2, the east bank is

2 feet high, 25 feet from shore. Bank vegetation was mostly herbaceous until the first bank shelf. There, pole-sized quaking aspen *(Populus tremuloides)*, black cherry *(Prunus serotina)*, and ironwood are present. The understory is sparsely populated with raspberry *(Rubus ssp.)*. The second bank shelf has an upland pole-sized forest dominated by beech with occasional ironwood and black cherry. The understory is open, with sensitive ferns *(Onoclea sensibilis)* and sapling beech trees present. The west bank was 10 feet high, 5 feet from shore. This bank is eroded, with sparse herbaceous vegetation and exposed roots. The top of the west bank adjacent to the roadway is a late successional field containing willow *(Salix spp.)*, shrubs, raspberry, sapling- to pole-sized black cherry, sapling-sized ironwood trees, and apple trees *(Malus spp)*.

Stream depth at the downstream site was 1 inch in riffle areas and 8 to 12 inches in pooled areas. Flow was measured as 0.66 feet per second. Stream width ranged from 6 to 8 feet.

Water chemistry results are given in Table 6-1; results fall within the expected range of results for a first-order stream for this geographic area. The downstream portion of this stream had hardness of 76 mg/L as $CaCO_3$, a moderately hard stream. The system is reasonably well buffered, with alkalinity of 60 mg/L as $CaCO_3$. This tributary is Class C according to 6 NYCRR 821.6. No standards for which data was collected were exceeded.

Invertebrates collected at the downstream site area are listed in Table 6-2. Six orders of insects were represented by nine individuals. The taxa present are generally indicative of average-to-good water quality. Mayflies *(Ephemeroptera)* and stoneflies *(Plecoptera)* generally require well-oxygenated water, and dobsonflies *(Megaloptera)* are rarely found in areas lacking a healthy riparian vegetation zone. Cranefly larvae *(Tipulidae)* are generally found in areas high in organic material because these invertebrates are generally detrital feeders (shredders). Numbers of individuals are low, but this may be related to a lack of available habitat.

In the pooled area, several fish were observed, including two sculpins and three minnows.

Site 3 (Tributary to Duffy Creek)

This stream (Site 3) had a substratum of cobbles, boulders, and leaf litter. The stream meanders, and very little water was present.

Bank morphology was variable at Site 3; some banks were high and steep, and others were low. Banks had exposed roots. Riparian vegetation included large red oak *(Quercus rubra)* and large sugar maple, pole-sized white ash, beech, hop hornbeam *(Ostrya virginiana)*, and ironwood. A sparse understory consisted of raspberry and sapling beech trees.

Stream depth at Site 3 was approximately 1 inch, and water was found only in small pools. Flow was negligible. This correlates with the USGS topographic map, which indicates that the stream is intermittent. Stream width was 2 feet.

Water chemistry parameters are within the expected range of results for a first order stream in this geographical area, with alkalinity at 60 mg/L as $CaCO_3$, and pH 6.96 at 1315 hours. No NYSDEC water quality standards were exceeded for any parameter measured in this stream (see Table 6-1).

The benthic macroinvertebrate population in this stream at the locus sampled was not heavily colonized by invertebrates: only two taxa were present, represented by only three individuals. The species found here are species commonly found in small first-order streams as well as ephemeral ponds. Lack of high diversity here is likely a reflection on the transient, intermittent nature of the water body.

Other Aquatic Resources On Site

The drainage collection pond (Pond 1) is a variable-sized pond with a total area of approximately 0.01 acre (see Figure 6-1). This pond is bounded by an early successional stage field and has an emergent wetland containing broadleaf cattails *(Typha latifolia)*, sedges *(Carex spp.)*, and rushes *(Juncus spp.)*. Pond 1 collects surface runoff from the north end of the site. Green frogs were observed in the littoral zone of the pond.

Pond 2, the leachate holding pond, also contains variable amounts of water and encompasses 0.006 acre. This pond is bounded by an early successional field. The pond has no visible submerged or emergent macrophytes. Water in this pond is a rust-orange color and a rust-colored film covered the southern 25% of the pond during the survey. The presence and size of this film was noted to vary. Grass bordering the pond was coated with this red material. This pond collects excess leachate from all areas of the site. Frogs were observed in this water.

6.3.2 Terrestrial Ecosystems

A total of 11 distinct vegetation plant communities were identified within the vicinity of the landfill. The boundaries between these cover types are depicted in Figure 6-2. Dominant plant species identified within the landfill site are listed in Table 6-3. Mammals, birds, and herptiles that were observed during the field surveys or which are likely to occur in the area are listed in Tables 6-4, 6-5, and 6-6, respectively.

Each plant cover type present within the landfill site is described below in terms of plant species composition, vegetation structure, edaphic conditions, and land use. Whenever possible, these areas were classified according to the New York State Natural Heritage Program's <u>Ecological Communities of New York State</u> (Reschke 1990).

Cover Type 1A: Beech-Maple Mesic Forest

This area is located along the western boundary of the landfill. American beech and sugar maple are codominants in this 60- to 70-foot tall overstory. The understory is fairly sparse and open with sapling beech trees and various raspberry shrubs *(Rubus spp.)*. The ground is predominantly covered with leaf litter, with little herbaceous growth except for a few Christmas ferns *(Polytichum acrostichoides)*.

This cover type is rather large and appears to extend well west of the area surveyed. This forest occurs on a hillside with a slope ranging between 20% and 40%. This cover type provides benefits to a variety of animals because many wildlife species include the seeds, bark, and leaves in their diet. In addition, the trees provide nesting and roosting areas for songbirds and gamebirds, as well as valuable cover for whitetail deer *(Odocoileus virginianus)*, eastern gray squirrel *(Sciurus cardinensis)*, and eastern chipmunk *(Tamias striatus)* (Martin et al. 1961).

Cover Type 1B: Beech-Maple Mesic Forest

This pole-sized forest, dominated by beech and sugar maple, is an island surrounded by grassy field. A minor component of the canopy is quaking aspen. The understory consisted of beech saplings. There was no ground cover at the time of survey.

This forest is basically similar in structure and species composition to Cover Type 1A. Therefore, the value of this community to wildlife is expected to be basically similar to that of Cover Type 1A. The size of the island is a factor limiting the size population that it may support.

Cover Type 1C: Beech-Maple Early Successional Forest

This cover type is dominated by beech trees and saplings, and sugar maple and quaking aspen saplings. It has a thick shrub layer consisting of staghorn sumac *(Rhus typhina)* and raspberries. A dense herbaceous layer is present at the edge of this area and is dominated by grasses and goldenrod. The leachate collection system runs through this area.

Sumacs do not provide choice or preferred food for wildlife; however, they are an important winter food for upland gamebirds such as ruffed grouse and wild turkey. Songbirds such as the cardinal *(Cardinalis cardinalis)* and robin also utilize Sumac fruit, and whitetail deer feed on the twigs and fruit (Martin et al. 1961). This area also provides cover for those wildlife species using the grassy fields.

Cover Type 2: Red Oak-Maple Forest

Cover Type 2 consists of a pole- to sawtimber-sized forest dominated by sugar maple and red oak. Minor components of the canopy include ironwood, white ash, and pin cherry

(Prunus pensylvanica). There was a dense reproductive/shrub area dominated by beech and maple sapling and wild raisin. The ground was covered with ferns.

This cover type is rather large and appears to extend well north and east of the area surveyed for this ecological characterization. Numerous snag trees are present.

The abundance of red oak results in a high-quality wildlife area. Oak acorns are valuable fall and winter wildlife foods. Upland game birds such as ruffed grouse *(Bonasa umbellus)* and wild turkey *(Meleagris gallopavo)* feed heavily upon acorns in season. A few songbirds, including the blue jay *(Cyanocitta cristata)* and northern flicker *(Colaptes avratus)*, feed on acorns. Acorns are also important food items in the diets of several rodents, including the northern flying squirrel *(Glaucomys sabrinus)*, eastern gray squirrel, and chipmunks. Whitetail deer and black bear *(Ursus americanus)* also feed heavily upon acorns during fall and winter months (Martin et al. 1961).

The snag trees provide nesting cavities for wildlife species such as the barred owl *(Strix varia)* and downy woodpecker *(Picoides pubescens)*. These snags, as well as the saplings and shrubs for deer browse and late summer fruit, contribute to habitat quality.

Cover Type 3: Quaking Aspen Early Successional Forest

This cover type is an approximately 25-foot woodland area bordering a drainage ditch. At the time of survey, no water was present in the ditch. This area consists of a few large red oak and hemlock trees interspersed with pole-sized quaking aspen. The reproductive layer was dense and consisted of sugar maple, white ash, ironwood, and hop hornbeam. The herbaceous layer was sparse and dominated by goldenrods.

The relatively dense sapling growth adjacent to the grassy landfill is a valuable source of cover for animals that use the grassy field.

Cover Type 4: Grassy Field

Cover Type 4 is the most prevalent cover type found within the boundaries of the landfill. The dominant species included goldenrod *(Solidago spp.)* and panic grass *(Panicum sp.)*. Other herbs that occur in lesser abundance include Queen Anne's Lace *(Daucus carota)*, yarrow *(Achillea millefolium)*, teasel *(Dipsacus sylvestris)*, and red clover *(Trifolium pratense)*. Saplings and shrubs such as quaking aspen and wild raisin *(Viburnum cassinoides)* are sparse and beginning to invade this field.

This grassy field area serves as a small opening that provides edge and food. Panic grass produces seed that is eaten by songbirds such as the song sparrow *(Melospiza melodia)*, field sparrow *(Spizella pusilla)*, and rufous-sided towhee *(Pipilio erythrophthalmus)*. The wild raisin produces fruit that is important in the diets of a variety of songbirds, such as the American robin *(Turdus migratorius)*. These shrubs also provide browse for whitetail deer and eastern cottontail *(Sylvilagus floridanus)* (Martin et al. 1961). The sparse nature of these shrubs will not support a large population of fruit-eating species.

Cover Type 5: Wetland 1

This cover type is a herbaceous wet area dominated by cattail and reed grass *(Phragmites communis)*. A soil test pit revealed an impervious clay layer approximately 6 inches below ground surface that had water flowing on it.

This area meets the hydrophytic vegetation and wetland criteria of the U.S. Army Corps of Engineers wetland delineation process (Department of the Army 1987). Soils were not sampled; however, the hydric soil criterion is assumed to be met based on the presence of hydrophytic vegetation and wetland hydrology. This area therefore is classified as a jurisdictional palustrine emergent wetland.

Due to the small size of this wetland area, its value for wildlife is limited. Wildlife species from the surrounding area may forage at this area.

Cover Type 6: Hedgerow

This cover type is composed of a single row of trees and shrubs that border the eastern edge of the landfill. These trees are pole-sized white ash, quaking aspen, sugar maple, red oak, and hemlock.

The quality and size of this area make it markedly poor habitat for wildlife species.

Cover Type 7: Mowed Lawn

This cover type is dominated by clipped grasses. It is located around the Wellsville Area Small Plane Society Airfield located north of the site. Characteristic birds of these areas include robin, killdeer *(Charadrius vociferus)*, and starling *(Sturnus vulgaris)*. Otherwise, this area is a low-quality wildlife habitat.

Cover Type 8: Borrow Field

The soil from this area was removed and used for cover in the fill areas. This area is barren, with a sparse herbaceous covering.

Due to the barren nature of this area, it is a low-quality wildlife habitat.

Cover Type 9: Drainage Collection Pond

This area contains a pond that collects surface runoff from the north end of the site. Surrounding this pond is emergent wetland vegetation. This includes broad-leaf cattail, sedges, and rushes.

This area meets the hydrophytic vegetation and wetland hydrology criteria of the U.S. Army Corps of Engineers wetland designation process (Department of the Army 1987). Soils were not sampled; however, the hydric soil criterion is assumed to be met based on the presence of hydrophytic vegetation and wetland hydrology. This pond area is therefore classified as a jurisdictional wetland.

Due to the small size of this wetland area, its value for wildlife is limited. Amphibians such as the green frog *(Rana clamitans)* and bull frog *(Rana catesbeiana)* may use the pond for breeding. Wildlife species from the surrounding area may forage and drink water from this pond.

Cover Type 10: Leachate Overflow Collection Pond

This area collects excess red leachate from the on-site pump house. The grasses surrounding the pond are coated with the leachate. The pond itself is void of any vegetation.

This pond is a low-quality wildlife habitat. A few amphibians such as green and bull frogs may use this area for breeding in the spring.

Cover Type 11: Hemlock-Northern Hardwood Forest

Cover Type 11 consists of pole- to sawtimber-sized forest dominated by hemlock, with beech and sugar maple present. This forest type is found on the middle to lower slopes of ravines. The understory is fairly sparse, with hemlock, beech, and sugar maple saplings. The understory was sparse with a few ferns scattered. This cover type appears to extend for some distance east of the site.

This cover type provides benefits to a variety of animals, such as those described for Cover Type 1A. Also, the dense covering of hemlock provides excellent deer wintering areas. Hemlock provides food and shelter through the winter months.

Table 6-1

STREAM WATER CHEMISTRY
OCTOBER 24, 1991

Sampling Station	Temperature (°F)	pH (s.u.)	Alkalinity (mg/L as $CaCO_3$)	Specific Conductance (µS/cm)	Hardness (mg/L as $CaCO_3$)	Time of Readings
Site 1	57	6.87	80	335	120	
Site 2	59	6.99	60	259	76	
Site 3	61.5	6.96	60	171	NA	

NA = Water not present in sufficient quantity to sample without disturbing sediment.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 6-2

AQUATIC BIOTA (INVERTEBRATES) ENCOUNTERED DURING STREAM SURVEY OCTOBER 24, 1991

Sampling Station	Taxon (order)	Common Name	Number of Individuals
Site 1	*Trichoptera*	Caddisfly	15
Site 2	*Diptera*[a]	Cranefly	3
	Trichoptera	Caddisfly	1
	Megaloptera[b]	Dobsonfly	1
	Ephemeroptera	Mayfly	1
	Plecoptera	Stonefly	2
	Hemiptera[c]	Water strider	1
Site 3	*Gastropoda*[d]	Snail	4
	Oligochaeta[d]	Aquatic earthworm	1

[a] *Tipulidae*.
[b] *Corydalus cornutus*.
[c] *Gerridae*.
[d] Class.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 6-3

PLANT SPECIES IDENTIFIED AT THE WELLSVILLE-ANDOVER LANDFILL

Common Name	Scientific Name
Black Cherry	*Prunus serotina*
Blackberry	*Rubus allegheniensis*
Willow	*Salix spp.*
Ironwood	*Carpinus caroliniana*
Quaking aspen	*Populus tremuloides*
Beech	*Fagus grandifolia*
White ash	*Fraxinus americana*
Sugar maple	*Acer saccharum*
Hemlock	*Tsuga canadensis*
Grasses	*Poa spp.*
Small white aster	*Aster vimineus*
Goldenrod	*Solidago spp.*
Queen Anne's lace	*Daucus carota*
Yarrow	*Achillea millefolium*
Teasel	*Dipsacus sylvestris*
Daisy fleabone	*Erigeron annuus*
Alsike clover	*Trifolium hybridum*
Red oak	*Quercus rubra*
Broadleaf cattail	*Typha latifolia*
Sedges	*Carex spp.*
Rushes	*Juncus spp.*
Hop hornbeam	*Ostrya virginiana*
Staghorn sumac	*Rhus typhina*
Pin cherry	*Prunus pensylvanica*
Wild raisin	*Viburnum cassinoides*
Arrowwood	*Viburnum recognitum*
Wild strawberry	*Fragaria virginiana*
Sensitive fern	*Onoclea sensibilis*

Table 6-3

PLANT SPECIES IDENTIFIED AT THE WELLSVILLE-ANDOVER LANDFILL

Common Name	Scientific Name
Black raspberry	*Rubus phoenicolasius*
Christmas fern	*Polytichum aerostichoides*

Note: During the survey, it was difficult to identify herbaceous vegetation because of a killing frost that caused it to die off.

Source: Ecology and Environment Engineering, P.C. 1991.

Table 6-4

REPTILES AND AMPHIBIANS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Snapping turtle (common)	*Chelydra serpentina*
Wood turtle	*Clemmys insculpta*
Spotted turtle	*Clemmys guttata*
Stinkpot	*Sternotherus odoratus*
Midland painted turtle	*Chrysemys picta*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Northern red-bellied snake	*Storeria occipitomaculata*
Northern brown snake	*Storeria dekayi dekayi*
Northern ringneck snake	*Diadophis punctatus*
Eastern green snake	*Opheodrys vernalis*
Northern black racer	*Coluber constrictor*
Black rat snake	*Elaphe obsoleta*
Eastern milk snake	*Lampropeltis triangulum*
Red-spotted newt	*Notophthalmus viridescens*
Jefferson salamander	*Ambystoma jeffersonianum*
Spotted salamander	*Ambystoma maculatam*
Mountain dusky salamander	*Desmognathus ochrophaeus*
Northern dusky salamander	*Desmognathus fuscus*
Northern spring salamander	*Gyrinophilus porphyriticus*
Slimy salamander	*Plethodon glutinosus*
Red-backed salamander	*Plethodon cinereus*
Four-toed salamander	*Hemidactylium scutatum*
Northern two-lined salamander	*Eurycea bislineata*
Long-tailed salamander	*Eurycea longicauda*
American toad	*Bufo Americanus*
Northern spring peepers	*Hyla crucifer*
Gray treefrogs	*Hyla versicolor and Hyla chrysoscelis*
Green frogs	*Rana clamitans*
Bull frog	*Rana catesbeiana*

Table 6-4 REPTILES AND AMPHIBIANS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE	
Common Name	**Scientific Name**
Pickerel frog	*Rana palustris*
Wood frog	*Rana sylvatica*

Compiled by Ecology and Environment Engineering, P.C. 1991.

Source: Conot 1975.

Table 6-5

BIRDS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Common barn-owl	*Tyto alba*
Eastern screech-owl	*Otus asio*
Great horned owl	*Bubo virginianus*
Chimney swift	*Chaetura pelagica*
Ruby-throated hummingbird	*Archilochus colubris*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Red-bellied woodpecker	*Melanerpes carolinus*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Downy woodpecker	*Picoides pubescens*
Hairy woodpecker	*Picoides villosus*
Northern flicker	*Colaptes auratus*
Eastern wood-pewee	*Contopus virens*
Willow fly catcher	*Dmpidonax traillii*
Least fly catcher	*Empidonax minimus*
Eastern phoebe	*Sayornis phoebe*
Great crested flycatcher	*Myiarchus crinitus*
Eastern kingbird	*Tyrannus tyrannus*
Horned lark	*Eremophila alpestris*
Purple martin	*Progne subis*
Tree swallow	*Tachycineta bicolor*
Barn swallow	*Hirundo rustica*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Black-capped chickadee	*Parus atricapillus*
Tufted titmouse	*Parus bicolor*
White-breasted nuthatch	*Sitta carolinensis*
Brown creeper	*Certhia americana*
House wren	*Troglodytes aedon*
Sharp-shinned hawk	*Accipiter striatus*

Table 6-5

BIRDS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Cooper's hawk	*Accipiter cooperii*
Northern goshawk	*Accipiter gentilis*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Butes platypterus*
Red-tailed hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*
Ring-necked pheasant	*Phasianus colchicus*
Ruffed grouse	*Bonasa umbellus*
Wild turkey	*Meleagris gallopavo*
Killdeer	*Charadrius vociferus*
Rock dove (domestic pigeon)	*Columba livia*
Mourning dove	*Zenaida macroura*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Yellow-billed cuckoo	*Coccyzus americanus*
Barred owl	*Strix varia*
Pileated woodpecker	*Dryocopus pileatus*
Northern rough-winged swallow	*Stelgidopterix serripennis*
Bank swallow	*Riparia riparia*
Veery	*Cathaus fuscescerrs*
Northern mockingbird	*Mimus polygottos*
Yellow-throated vireo	*Vireo flavifrons*
Warbling vireo	*Vireo gilvus*
Red-eyed vireo	*Vireo olivaceus*
Blue-winged warbler	*Vermifurma pinus*
Yellow warbler	*Dendroica petechia*
Chestnut-sided warbler	*Dendroica pensylvanica*
Black-throated green warbler	*Dendroica virens*
American red start	*Setophaga raticilla*
Mourning warbler	*Oporornis philadelphia*

Table 6-5

BIRDS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Common yellow throat	*Geothlypis trichas*
Scarlet tanager	*Piraga olivacea*
Northern cardinal	*Cardinalis cardinalis*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Indigo bunting	*Passerina cyanea*
Rufous-sided towhee	*Pipilo erythrophathalmus*
Chipping sparrow	*Spizella passerina*
Field sparrow	*Spizella*
Pusilla	*Savannah sparrow*
Passerculus	*sandwichensis*
Song sparrow	*Melogpiza melodia*
Bobolink	*Dolichonyx oryzivorus*
Red-winged blackbird	*Agelqius phoeniceus*
Eastern meadowlark	*Sturnella magna*
Common grackle	*Quiscalus quiscula*
Brownheaded cowbird	*Molothrus ater*
Northern oriole	*Icterus galbula*
Purple finch	*Carpodacus purpureus*
American goldfinch	*Carduelis tristis*
House sparrow	*Passer domesticus*
Starling	*Sturnus vaqaris*

Compiled by Ecology and Environment Engineering, P.C., 1991.

Source: Andrle and Carrol 1988.

Table 6-6

MAMMALS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Opossum	*Didelphis marsupialis*
Masked shrew	*Sorex cinereus*
Smoky shrew	*Sorex fumeus*
Longtail shrew	*Sorex dispar*
Pygmy shrew	*Microsorex hoyi*
Least shrew	*Cryptosis parva*
Shorttail shrew	*Blarina brevicauda*
Hairytail mole	*Parascalops breweri*
Keen myotis	*Myotis keeni*
Little brown myotis	*Myotis lucifugus*
Small-footed myotis	*Myotis subulatus*
Silver-haired bat	*Lasionycteris noctivagans*
Eastern pipistrel	*Pipistrellus subflavus*
Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Hoary bat	*Lasiurus cinereus*
Raccoon	*Procyon lotor*
Shorttail weasel	*Mustela erminea*
Longtail weasel	*Mustela frenata*
Striped skunk	*Mephitis mephitis*
Red fox	*Vulpes fulva*
Gray fox	*Urocyon cinereoargenteus*
Woodchuck	*Marmota monax*
Black bear	*Ursus americanus*
Eastern chipmunk	*Tamias striatus*
Eastern gray squirrel	*Sciurus carolinensis*
Red squirrel	*Tamiasciurus hudsonicus*
White-footed mouse	*Peromyscus leucopus*
Deer mouse	*Peromyscus maniculatus*

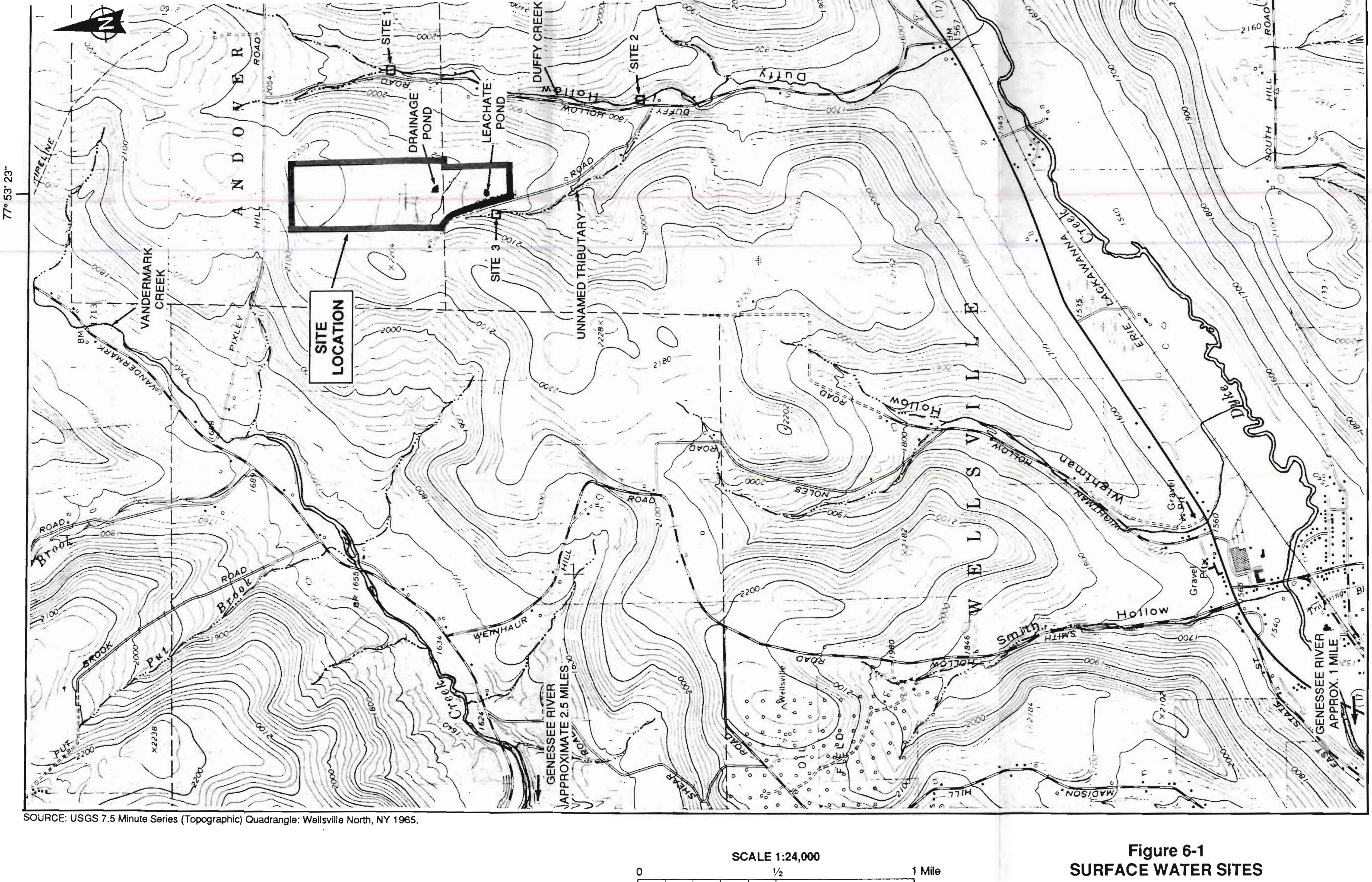
Table 6-6

MAMMALS THAT MAY OCCUR AT THE WELLSVILLE-ANDOVER LANDFILL SITE

Common Name	Scientific Name
Coyote	*Canis latrans*
Boreal redback vole	*Clethrionomys gapperi*
Meadow vole	*Microtus pennsylvanicus*
Pine vole	*Pitymys pinetorum*
Meadow jumping mouse	*Zapus hudsonius*
Southern flying squirrel	*Glaucomys volans*
Northern flying squirrel	*Glaucomys sabrinus*
Eastern cottontail	*Sylvilagus floridanus*
Whitetail deer	*Odocoileus virginianus*

Compiled by Ecology and Environment Engineering, P.C., 1991.

Source: Burt and Grossenheider 1976.



SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle: Wellsville North, NY 1965.

Figure 6-1
SURFACE WATER SITES


N
NORTHEAST FILL AREA
NORTHWEST FILL AREA
SOUTH-CENTRAL FILL AREA
SITE PROPERTY LINE
TOWNSHIP BOUNDARY
SNYDER ROAD
SUMP
CONCRETE PAD
PUMP STATION NO. 1
LEGEND
1A BEECH/MAPLE MESIC FOREST – I
1B BEECH/MAPLE MESIC FOREST – II
1C BEECH/MAPLE EARLY SUCCESSIONAL FOREST
2 RED OAK/MAPLE FOREST
3 QUAKING ASPEN EARLY SUCCESSIONAL FOREST
4 GRASSY FIELD
5 WETLAND I
6 HEDGEROW
7 MOWED LAWN
8 BORROW FIELD
9 DRAINAGE COLLECTION POND
10 LEACHATE HOLDING POND
11 HEMLOCK–NORTHERN HARDWOOD FOREST
—x—x— FENCE
— — — — LEACHATE COLLECTION SYSTEM
TREE LINE
0
30

7. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.1 SUMMARY

The Phase I RI for the Wellsville-Andover Landfill, Site No. 9-02-004, in the towns of Wellsville and Andover, Allegany County, New York, was performed by E & E under contract to NYSDEC. Site work for the Phase I field activities was performed from August of 1991 through February of 1992. The objectives of the RI/FS are to:

- Assess the cause, extent, and effects of the hazardous materials present in the project area;
- Identify and evaluate remedial alternatives selected to mitigate contamination problems threatening the environment or public health; and
- Recommend remedial alternatives.

Prior to the Phase I RI, a Phase I study was performed for NYSDEC in 1983 by Engineering-Science, Inc. in association with Dames and Moore, and a Phase II study was performed in 1986 by Malcolm Pirnie for the Village of Wellsville. Factors of concern indicated by these studies were contaminated groundwater potentially impacting local residents and the generation of leachate contaminated with VOCs.

During the Phase I RI site characterization, preliminary field activities performed prior to sampling of environmental media included a ground-based survey, the development of a base map, and the performance of three geophysical surveys.

The geophysical investigation included a total earth field magnetics survey, a ground conductivity survey, and a seismic refraction survey. The purposes of the geophysical investigation were to:

- Locate subsurface ferrous objects;
- Define waste-disposal areas;
- Detect potential groundwater contaminant plumes;

- Determine the morphology and stratigraphy of the subsurface; and
- Assist in the selection of monitoring well locations.

The results of this investigation allowed E & E to detect five highly anomalous locations within the fill areas. Each area was excavated and the cause of the anomaly determined. In addition, the boundaries of the four fill areas were identified by the geophysical investigation and depicted on the base map. Waste disposal appears to have been performed in a cellular fashion in the northeast fill area, while in the other areas, filling appears to have occurred in a more haphazard manner. No groundwater contaminant plume was noted outside the fill areas, suggesting that heavy metals have not had a major impact on groundwater. Seismic profiles for the site were generated, depicting subsurface stratigraphy, and these profiles were used to aid in the selection of monitoring well locations.

Steel 55-gallon drums were located in three of the five locations excavated. Of these, an empty, crushed oil drum was located in the south fill area, and five rusted drums were located in the northeast corner of the south-central fill area. These drums contained a solid, plastic-like material and were surrounded by plastic buttons and scraps, presumably from Rochester Button Co. In addition, two rusted, liquid-filled drums with no identifiable markings were discovered in the northwest corner of the northwest fill area. Soil and waste samples collected from these trenches indicate the presence of numerous contaminants, including chlorinated aliphatic compounds (1,2-DCE, TCE, VC, etc.), aromatic hydrocarbons (benzene, ethylbenzene, toluene, xylene, and styrene), PAHs, phthalates, phenols, and pesticides. Sample TP-2 contained relatively low amounts of the above contaminants, except for PAHs, phthalates, and pesticides, which were found at comparatively higher concentrations. The PAHs detected may have resulted from incomplete combustion of waste prior to disposal, while the phthalates most likely resulted from the relatively large amount of plastic in this disposal area compared to other areas. Sample TP-1 from the northwest fill area contained relatively high concentrations of most of the above contaminants, while TP-4 from the south-central fill area contained the highest concentration of total chlorinated aliphatics and phthalates.

When compared to observed ranges in eastern U.S. soils, concentrations of cobalt, lead, and zinc were found to be slightly elevated across the site, while arsenic, copper, and nickel were slightly elevated only in the northwest fill area. Based on available data, the concentrations of these metals suggest that all are fairly ubiquitous in the area.

Subsurface soil samples were collected from each of the deep well borings for chemical analysis. The only organic substances detected were chlorinated aliphatic compounds in the two samples from MW-5D. A total of 130 μg/kg were detected at 8 to 9 feet, and approximately 81 μg/kg were detected at 18 to 19 feet. Several inorganic substances exceeded the 90th percentile of the observed range in eastern U.S. soils, but only lead appears not to be attributable to background conditions.

During the Phase I RI, E & E installed 17 monitoring wells were installed and sampled along with four pre-existing wells. Organic compounds detected in the groundwater samples included several chlorinated aliphatic compounds and the aromatic hydrocarbons ethylbenzene and toluene. The monitoring wells containing these compounds above NYSDEC Class GA standards included MW-2D, MW-5D, MW-5S, MW-6D, MW-11S, CW-3A, and CW-3B. All of these wells are on the east or south side of the site. Concentrations of total chlorinated aliphatic compounds ranged up to a maximum of approximately 8,100 μg/L in GW-5S. Since a component of groundwater flow does exist toward the wells on the west side of the site, the relative lack of contaminants in these wells suggests that the leachate collection system on the west side of the site may be intercepting contaminated groundwater and/or the fractured bedrock has permitted the groundwater to migrate vertically.

Inorganic substances detected above Class GA standards in the groundwater--with the exception of iron, manganese, magnesium, and sodium, which are commonly high in unfiltered samples--were chromium in GW-2D and lead in GW-12S and GW-2D.

Seven residential wells and springs in the area were sampled. The only organic compound detected was TCE, which was found below the Class GA standard in the LaDue spring south-southeast of the site. Inorganic substances above Class GA standards include iron and sodium in more than half the samples, manganese in the Rosini well, and zinc in the Bauer well. All four of these metals are considered secondary contaminants by NYSDOH and appear to be naturally ubiquitous.

Six surface water and sediment samples were collected from Duffy Creek and its unnamed tributary. No organic or inorganic analytes in either medium were found to significantly exceed the concentrations in the background sample.

Twelve biased and two background surface soil samples were collected at the site. Analysis indicated the presence of chloromethane and/or ethylbenzene in samples collected from seeps in the northwest fill area. In addition, several PAHs were detected at various concentrations in leachate seeps and ditches on and off the site. Inorganic substance analyses of these surface soil samples indicated elevated concentrations of calcium, cobalt, iron, lead, manganese, nickel, and zinc; however, all these substances appear to be naturally ubiquitous.

Liquid leachate samples were collected from two locations along the leachate collection system. Inorganic substances exceeding Class C standards in the leachate are aluminum, lead, and zinc in both samples and vanadium only in L-1. Volatile and semivolatile compounds were also detected in these samples; however, the concentrations were significantly less than expected based on air sampling results.

Six air samples were collected at various points along the leachate collection system. Analysis indicated the presence of relatively high concentrations of chlorinated aliphatic compounds and aromatic hydrocarbons. The relatively high concentrations of VOCs in the air samples suggests that the leachate may not be the only source of the VOCs. However, if the leachate collection system were receiving vapors directly from the landfill, then VOCs should have been detected in subsurface soil samples collected near fill areas.

Air sampling results indicated that the majority of the VOCs in the collection system are emanating from the northwest fill area. Samples collected from manholes MH-6 and MH-10 and Riser R-10 contained one to two orders of magnitude more VOCs than the other samples analyzed. Air monitoring results support this.

In addition to the above site characterization, a habitat-based ecological assessment was performed at the site to characterize the ecological resources associated with this site. The scope of work performed addressed items only in Step 1 of Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC 1991). A background search and a field reconnaissance were performed to characterize both the terrestrial and aquatic ecosystems at the site. Site-related flora and fauna were identified, with emphasis on sensitive receptors. In addition, a cover-type map of the site was generated.

7.2 CONCLUSIONS AND RECOMMENDATIONS

The Phase I RI has identified several contaminants of concern that occur in significant concentrations at the Wellsville-Andover Landfill site. As identified by the preliminary risk evaluation, the most significant contaminants of potential concern are 1,1-DCA; 1,1-DCE; 1,2-DCE; toluene; TCE; and VC. These contaminants were detected at elevated concentrations in a variety of media, including subsurface soil and waste, surface soil, groundwater, leachate, and air.

These contaminants are migrating off site to an unknown extent in the groundwater. The extent of migration of contaminants in both the leachate and surface water has also not been fully characterized. In addition, no ambient air samples were collected over a prolonged period. Ambient air quality is of concern due to the known presence of VOCs in all media sampled and their potential to migrate off site.

The data suggest that perched water occurs sporadically in the area of the site. Below the perched water, fractured bedrock may provide a pathway for groundwater to migrate vertically and eventually travel off site. Due to a lack of subsurface information, the significance of vertical migration and the interplay between the perched water and the lower aquifer cannot be assessed.

In order to fully assess the impact of the site-related contaminants on human health and the environment and provide further information for the selection of remedial alternatives, a Phase II RI is recommended.

E & E proposes the following as a general course of action for the additional investigation. It is noted that the Phase I FS is in progress at the time of this report, and, therefore, the site activities recommended as follows may be altered to accommodate the findings of the FS. Comments supplied by NYSDEC may also affect these recommendations.

- In order to further define the horizontal extent of groundwater contamination and further characterize the local hydrogeology, the installation of a minimum of five off-site groundwater monitoring well pairs is recommended. This includes wells south of MW-11S and east of MW-2D/2S, MW-5D/5S, and MW-6D/6S, as well as the installation of a monitoring well pair east of the northeast fill area.

- The depth to competent (confining) bedrock and the degree of vertical contamination should be investigated. E & E suggests that at least one deep monitoring well be drilled in an area of contamination (e.g., near MW-5D/5S). A field gas chromatograph or other means may be utilized during drilling to investigate contamination.

- Installation of additional on-site wells should be considered in areas conducive to drilling in order to supplement data collected for each fill area.

- The installation of approximately 12 shallow well points (piezometers) in the fill areas is recommended to investigate the interaction of groundwater and the fill and provide more detailed information pertaining to on-site hydrogeology.

- In order to characterize site groundwater hydrogeology and aid in the determination of the quantity of groundwater permeating the site, slug tests should be performed in 10 to 12 of the existing and proposed monitoring wells.

- A limited soil gas survey performed on the west side of the site adjacent to a fill area may provide information about the effectiveness of the leachate collection system. Further limited soil gas surveys in selected areas on and off site on the east and south sides of the site, especially near MW-2D/2S, MW-5D/5S, MW-6D/6S, and MW-11S, would aid in the selection of the monitoring well locations discussed above. These data will also provide information pertaining to the potential migratory pathway of VOCs in soil and may provide a rough estimate of the quantities of VOCs that could permeate surrounding areas if the site were provided with an impermeable cap.

- To further investigate the migratory pathways of VOCs and to further assess their impact on human health and the environment, E & E proposes to collect leachate samples for full TCL analysis from approximately four locations. Leachate samples should be collected from both the north and south ends of the collection system to evaluate volatilization along the system. In addition, at least one seep in the northwest area should be sampled to assess direct-contact hazards and determine the need for seep remediation. Since leachate was not available for sampling from the north end of the collection system in October 1991, it is recommended that sampling be performed during a wet season.

- Resample existing and proposed monitoring wells for TCL VOCs and inorganic substances. Sampling should be performed during a wet season for comparison with existing data. Data derived from aerial photographs, to include surface contours, have been used, in part, to tentatively identify some sampling locations.

- Resample surface water for TCL VOCs and inorganic substances, and sediment for full TCL parameters, during a wet season for comparison with existing data.

- In order to further assess air pathway exposures and provide data for a human health risk assessment, E & E proposes the collection of approximately six air samples at and around the site. Time-integrated air samples may be collected at Pump Station 1, at the leachate holding pond, and downhill of the site. Downhill samples should be collected during calm evening hours when temperature and moisture conditions may allow contaminants to settle downhill, impacting local residents.

- The current preliminary human health risk evaluation should be expanded to a full human health risk assessment or to the extent necessary to fulfill the objectives defined by NYSDEC.

- The current habitat-based risk assessment should be expanded to the extent necessary to fulfill the objectives defined by NYSDEC. At a minimum, this should include expansion of Step I to cover off-site downgradient receptors (i.e., springs) as well as completion of Step II, a Contaminant-Specific Impact Analysis (NYSDEC 1991b).

In addition to the above site-investigation activities, E & E would perform further literature review as well as geological and hydrologic field reconnaissances in the area in order to identify additional wells and springs further downgradient from the site. A preliminary interpretation of aerial photographs has provided some information in this report. This investigation is necessary because contamination may have migrated to significant depths and then traveled horizontally further than was initially expected.

8. REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 1989, Toxicological Profile for Polycyclic Aromatic Hydrocarbons, Draft Report, U.S. Public Health Service.

Andrle, R.F. and J.R. Carroll, 1988, The Atlas of Breeding Birds in New York State, Cornell University Press, Ithaca, New York.

Bates, Steven M., P.E., February 26, 1986, Letter to Mr. and Mrs. LaDue from New York State Department of Health, Albany, New York.

Brown, E.M., M.W. Skougstad, and M.J. Fishman, 1970. Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases. U.S. Geological Survey, U.S. Department of the Interior, Washington, D.C., 166 pp.

Burt, W.H. and R.P. Grossenheider, 1976, A Field Guide to the Mammals of America North of Mexico, Houghton Mifflin Company, Boston, Massachusetts.

Cadwell, Donald H., 1988, Surficial Geologic Map of New York, Niagara Sheet, New York State Museum - Geological Survey, Map and Chart Series No. 40.

Clare, Lawrence G., P.E., November 10, 1987, Letter to Ms. Rosalie S. Rosini from New York State Department of Environmental Conservation, Buffalo, New York.

Cole, Gerald A., 1979. Textbook of Limnology, Second Edition, The C.V. Mosby Company, 426 pp.

Conot, Roger, 1975, A Fieldguide to Reptiles and Amphibians of Eastern and Central North America, Houghton-Mifflin Co., Boston, Massachusetts.

Eyre, F.H., 1980, Forest Cover Types of the United States and Canada, Society of American Foresters, Washington, D.C.

Fickies, R.H. and E.E. Brabb, 1989, Landslide Inventory Map of New York, New York State Museum - Geological Survey, Circular 52.

Fisher, Donald W., Yngvar W. Isachsen, and Lawrence V. Richard, 1971, Generalized Tectonic - Metamorphic Map of New York, New York State Museum and Science Service, Map and Chart Series No. 15.

Freeze, R. Allan and John A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 603 pp.

Frimpter, Michael H., 1974, Groundwater Resources, Allegheny River Basin and Part of the Lake Erie Basin, New York, Prepared for the Allegheny River Basin Regional Water Resources Planning Board by U.S. Department of the Interior, Geological Survey, in cooperation with NYSDEC, Basin Planning Report ARB-2.

Holtz, Robert D. and William D. Kovacs, 1981, An Introduction to Geotechnical Engineering, Prentice-Hall, Inc. Englewood Cliffs, New Jersey, 733 pp.

Isachsen, Yngvar W. and William G. McKendree, 1977a, Preliminary Brittle Structures Map of New York, Niagara-Finger Lakes Sheet, New York State Museum, Map and Chart Series No. 31D.

______________, 1977b, Generalized Map of Recorded Joint Systems in New York, New York State Museum Map and Chart Series No. 31F.

Lind, Owen T., 1979. Handbook of Common Methods in Limnology, Second Edition, The C.V. Mosby Company, 199 pp.

MacFarquhar, D.A., March 9, 1978, Letter from Village of Wellsville Department of Public Works to Mr. Frank Shattuck, P.E., NYSDEC.

Martin, A.C., H.S. Zim, and A.L. Nelson, 1961, American Wildlife and Plants: A Guide to Wildlife Food Habits, Dover Publications, New York, New York.

Massey, W.D., April 4, 1978, Letter from Rochester Button Company to D. MacFarquhar, Department of Public Works, Village of Wellsville.

Muller, Ernest H. in Young, W.H. and W.L. Kreidler (Eds.), May 1957, Guidebook, New York State Geological Association, Twenty-ninth Annual Meeting, Wellsville, New York.

New York State Department of Environmental Conservation (NYSDEC), June 1983, Phase I Report, Engineering Investigations and Evaluations at Inactive Hazardous Waste Disposal Sites, Wellsville-Andover, Allegany County, New York, Submitted by Engineering-Science, Inc. in association with Dames and Moore.

______________, June 1989, Official Compilation of the Codes, Rules, and Regulations of the State of New York, Division of Water Resources, Classes and Standards of Quality and Purity Assigned to Fresh Surface and Tidal Salt Waters, Title 6, Part 821.6, Albany, New York.

______________, December 1989, Sediment Criteria, Bureau of Environmental Protection, Division of Fish and Wildlife, Albany, New York.

______________, September 25, 1990, Ambient Water Quality Standards and Guidance Values, Division of Water Technical and Operational Guidance Series (1.1.1), Albany, New York.

______________, 1990b, New York State Water Quality 1990, 305(b) Plan, Division of Water, Albany, New York.

______________, September, 1991, Official Compilation of the Codes, Rules, and Regulations of the State of New York, Division of Water Resources, Water Quality Regulations, Title 6, Parts 700-703, Albany, New York.

_____________, 1991b, Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites, Division of Fish and Wildlife, Albany, New York.

_____________, October 1991c, Draft Cleanup Policy and Guidelines, Volumes 1 and 2, Cleanup Standards Task Force, Albany, New York.

New York State Department of Health (NYSDOH), June 1991, Official Compilation of the Codes, Rules, and Regulations of the State of New York, Public Water Supplies, Title 10, Subpart 5-1, Albany, New York.

New York State Water Resources Commission (NYSWRC), 1966, Reconnaissance Study of Water Resources, Hanza Engineers - Greeley and Hansen, Chicago, Illinois.

Reschke, C., 1990, Ecological Communities of New York State, New York State Natural Heritage Program, New York State Department of Environmental Conservation, Latham, New York.

Rickard, Lawrence V., 1975, Correlation of the Silurian and Devonian Rocks in New York State, New York State Museum and Science Service, Map and Chart Series No. 24.

_____________ in Young, W.H. and W.L. Kreidler (Eds.), May 1957, Guidebook, New York State Geological Association, Twenty-ninth Annual Meeting, Wellsville, New York.

Rickard, Lawrence V. and Donald W. Fisher (Eds.), March 1970, Geologic Map of New York, Niagara Sheet, New York State Museum and Science Service, Map and Chart Series No. 15.

Shacklette, Hansford T. and Josephine A. Boerngen, 1984, "Element Concentrations in Soils and Other Surficial Materials of the Coterminous United States," U.S. Department of the Interior, U.S. Geological Survey, Professional Paper 1270, Washington, D.C.

United States Department of Agriculture (USDA), February 1956, Soil Survey, Allegany County, New York, Soil Conservation Service, in Cooperation with Cornell University Agricultural Experiment Station, Series 1942, No. 12, 141 pp.

United States Department of the Army, Army Corps of Engineers, 1987, Corps of Engineers Wetlands Delineation Manual, Washington, D.C.

United States Environmental Protection Agency (USEPA), July 1990, Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule, 40 CFR Parts 264, 265, 270, and 271.

United States Geological Survey (USGS), 1965 Wellsville North Quadrangle Map, New York, Allegany County, 7.5-Minute Series (Topographic).

_____________, 1985. National Water Summary - Hydrologic Events and Surface Water Resources. Water Supply Paper 2300.

Village of Wellsville, 1986, Phase II State Superfund Investigation Report, Towns of Wellsville/Andover Landfill Site, Allegany County, New York, Prepared for Department of Public Works by Malcolm Pirnie.

Vossler, Albert M., March 13, 1990a, Letter to Mr. Daniel LaDue, from Allegany County Department of Health, Belmont, New York.

______________, March 13, 1990b, Letter to Ms. Mary Gephart, from Allegany County Department of Health, Belmont, New York.

______________, March 13, 1990c, Letter to Mr. Carlton Miller, from Allegany County Department of Health, Belmont, New York.

______________, August, 25, 1989a, Letter to Mr. Daniel LaDue, from Allegany County Department of Health, Belmont, New York.

______________, August 25, 1989b - Letter to Mr. Eugene Ormsby, from Allegany County Department of Health, Belmont, New York.

______________, August 25, 1989c, Letter to Mr. Russell Teller, from Allegany County Department of Health, Belmont, New York.

______________, August 25, 1989d, Letter to Mr. William Baker, from Allegany County Department of Health, Belmont, New York.

______________, August 25, 1989e, Letter to Ms. Rosalie Rosini, from Allegany County Department of Health, Belmont, New York.

Woodruff, J.G., 1942, Geology of the Wellsville Quadrangle, New York, New York State Museum Bulletin No. 326.

APPENDIX A

SEISMIC REFRACTION SURVEY REPORT

The appendix referenced in this report is not included due to its large size. The referenced appendix provides a listing of the data used to generate the profiles provided herein.

DRAFT

davenport/hadley
applied earth sciences

SEISMIC REFRACTION SURVEYS

WELLSVILLE - ANDOVER LANDFILL

WELLSVILLE, NEW YORK

Prepared for

Ecology & Environment, Inc.
368 Pleasantview Drive
Lancaster, NY 14068

November 13, 1991

821 16th street • golden, co 80401 • (303) 278-8158

INTRODUCTION

Davenport/Hadley, Ltd. was contracted by Ecology & Environment Engineering, P.C. to conduct approximately 10,000 feet of seismic refraction profiling at a closed landfill site near Wellsville, New York. The purpose of the seismic refraction investigation was to map the top of rock to assist in the location of monitoring wells and to provide additional information for input into other site characterization studies. Seismic line locations were selected by Ecology & Environment and are shown on Figure 1. The field work was conducted from August 19 through August 25, 1991.

FIELD PROCEDURE

The seismic data were collected using industry standard techniques. A Geometrics 2401 24-channel, signal enhancement seismograph was used to record the information. The equipment utilizes a floating-point digital recording system which allows true amplitude recovery of all data. The data is recorded on 3.5-inch diskettes for later analysis. A professional geophysicist inspected each record to insure that data quality objectives were being met.

The data for each seismic line were collected in separate 24-channel "spreads" consisting of 24 geophones laid out at 10-foot intervals. Surface elevations for each geophone were obtained by hand level surveys using the stake at the northwest corner of the site (Intersection of Lines A and E) as a control point with an assigned elevation of 1000 feet. For Lines A and D, a 10-foot gap was left between spreads. The remaining lines were laid out end to end by overlapping one geophone.

A sledgehammer impacted on a metal plate was used as an energy source. Multiple blows were recorded and stacked digitally to obtain sufficient energy for quality records. In most cases, record quality was very good. In a few instances, signal to noise was reduced due to ground coupling from rain. The worst two spreads, Line D - Spreads 3 and 5, were reoccupied in dry weather in order to obtain better data. Examples of field records are shown on Figures 2 and 3.

Hammer points (referred to as "shotpoints") were located at each end, in the middle and offset from each end in order to obtain coverage on the target refractor. The offsets were generally 115 feet (half a spread length) to obtain arrivals from the refractor. This shotpoint arrangement is necessary in order to utilize the newer interpretation methods, specifically the Generalized Reciprocal Method, as outlined below.

INTERPRETATION

The data were downloaded from the diskettes to a computer in order to pick first arrivals from the records. Some data were picked directly from the seismograph screen. Initial records were picked, plotted and interpreted in a preliminary manner the first day in order to determine that the project objectives were being met and to make sure that the field data acquisition procedures were appropriate. Daily field record inspection indicated no major changes in site conditions.

The first arrivals are plotted versus distance to obtain time-distance (T-D) graphs for analysis. Inspection of the T-D graphs provides a basis for assigning arrival times to individual layers. The data were analyzed using a program known as "RF" which was written by Richard Markiewicz of the U.S. Bureau of Reclamation and has been used extensively by the Bureau and their subcontractors for refraction data analysis. The program uses algorithms developed by Derecke Palmer for his "GRM" interpretation published by the Society of Exploration Geophysicists (The Generalized Reciprocal Method of Seismic Refraction Interpretation, Tulsa, 1980).

When the data is acquired in the proper format in the field, this interpretation method allows the computation of a depth to the refractor (top of rock) beneath each geophone. However, due to the way in the which seismic refraction data is acquired, good definition of the contact between the upper two layers is not always possible. At the Wellsville site most of the data could be analyzed using a three-layer system. One area along Line D (Spread 6) where the upper layer was removed for borrow yielded a two-layer case.

RESULTS

A seismic cross-section was computed for each spread. The individual spreads were then put together to present an entire line. Seismic cross-sections for each seismic line are shown on Figures 4 through 9. In general, the seismic data indicate three layers. The upper layer ranges in compressional wave velocity from 1,090 to 2,220 feet per second (fps). This range of velocity is typical of loose to dense, unsaturated surficial soil materials. The thickness of this layer varies from about 0 to about 30 feet, but is generally less than 10 feet thick.

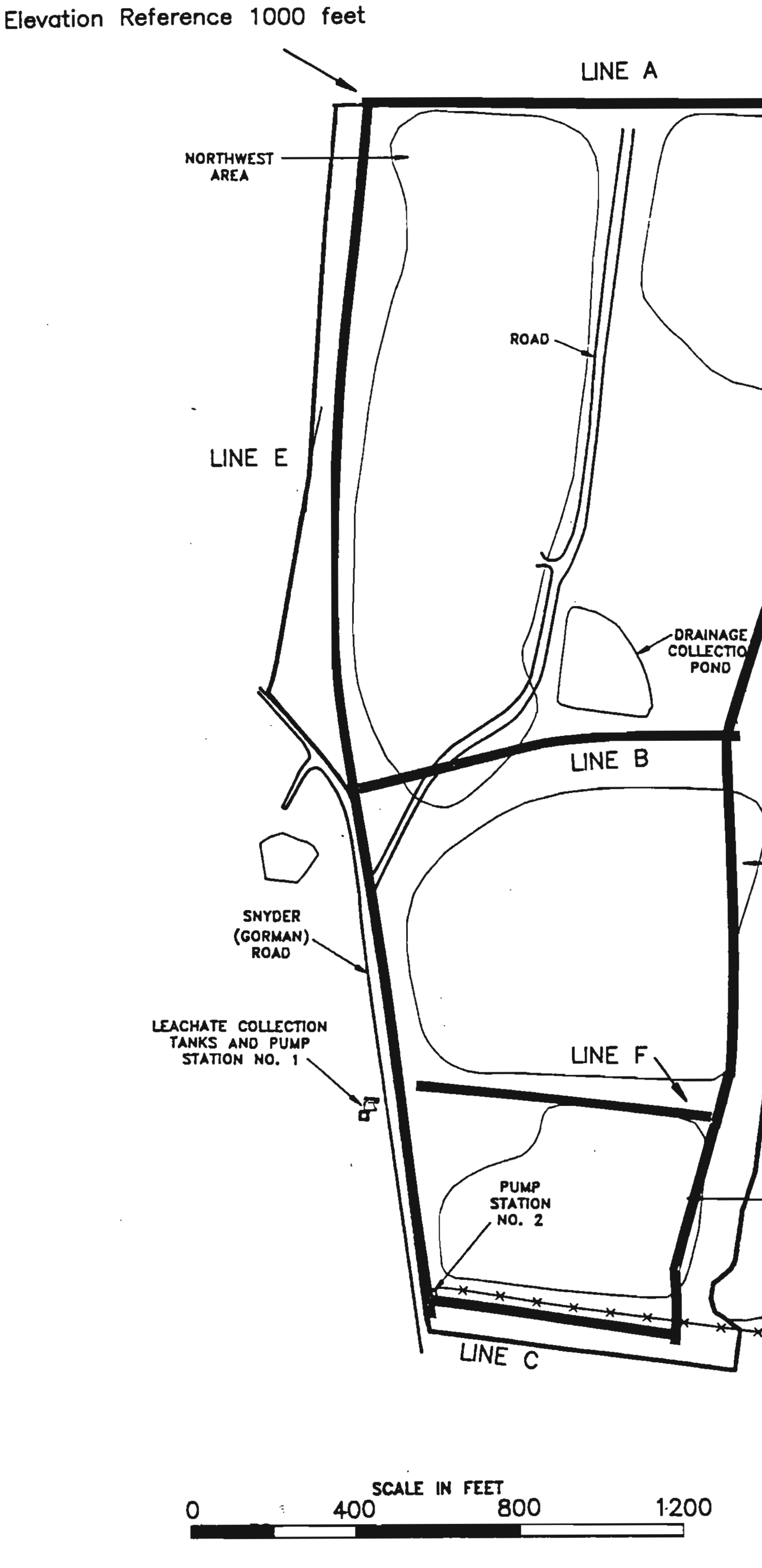
The middle layer ranges in velocity from about 2,090 to about 5,400 fps. This range of velocity can represent either denser soil materials or weathered rock. Velocities less than 5,000 fps indicate unsaturated conditions. At saturation, the compressional wave velocity of the water (5,000 to 5,500 fps) dominates in soil or loose rock materials. The contact between the upper two layers is defined in most areas, but there are places where the depth to this interface is extrapolated.

A two layer case was encountered on Spread 6 of Line D where surficial material was removed for borrow. In this area, the upper layer exhibits a velocity on the order of 2,100 fps which probably corresponds to the intermediate layer (V_2) of the adjoining spreads and represents weathered bedrock. The lower V_2 velocity in this area, as compared to other spreads, is most likely due to unloading (causing more open fractures) and desiccation.

The refractor at the Wellsville-Andover landfill site generally has a compressional wave velocity in excess of 10,000 fps. Velocities in this range are generally indicative of sound, unweathered bedrock. In some areas, particularly around the southern portion of the site (Lines C and E), the time-distance graphs exhibit curved rather than straight line segments for the third layer. This indicates that the refractor is increasing in velocity with depth. When a gradual contact (such as between slightly weathered and unweathered material) exists, it makes interpretation difficult since the curved section on the T-D graphs must be forced into discrete line segments in order to conform to refraction theory. For this interpretation, the curved portions were ignored except where curvature was significant. In these instances, the curved portion was divided into two sections. This may or may not be a valid assumption. This process yields a four layer interpretation with the third layer (V_3) representing a minimum bedrock velocity and the fourth layer (V_4) representing a maximum velocity. Both velocities are shown on the seismic cross sections where this occurs. Correlation with drilling data may assist in defining how these layers should be assigned in order to provide a more meaningful interpretation. The total data printout for each seismic line is included in Appendix A.

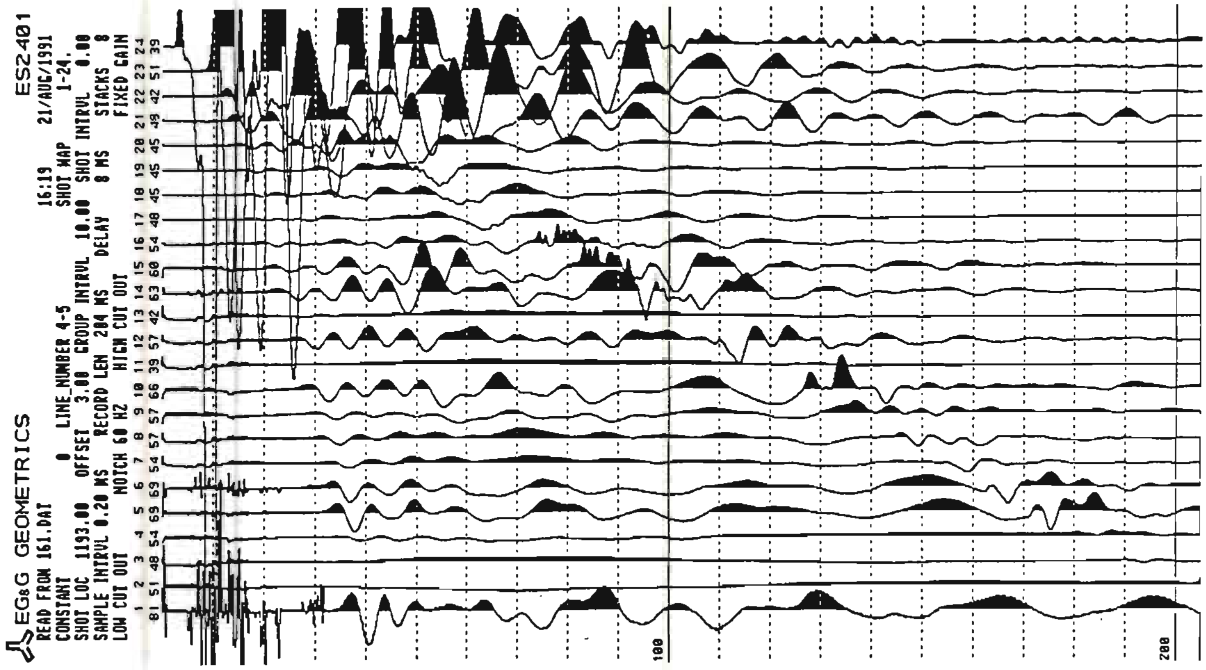
LIST OF ILLUSTRATIONS

DRAFT

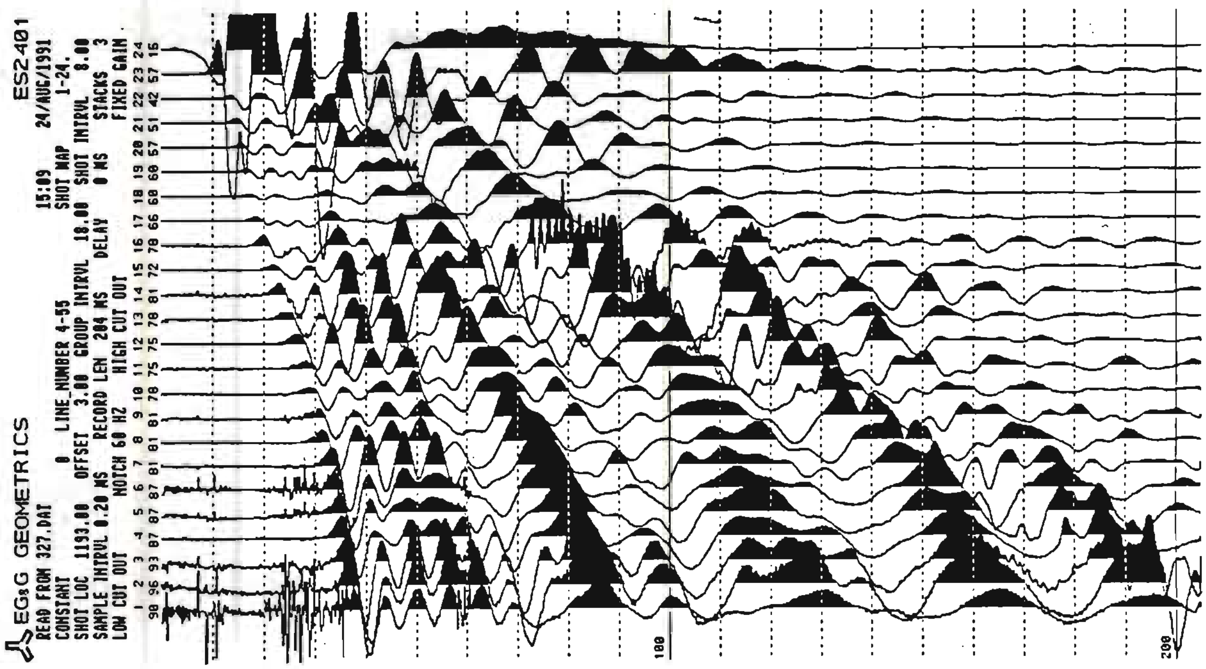


Wellsville–Andover Landfill		
LOCATIONS OF SEISMIC PROFILES		
Davenport/Hadley, Ltd.		Figure 1
Oct. 1991	Job No 91–23	

DRAFT



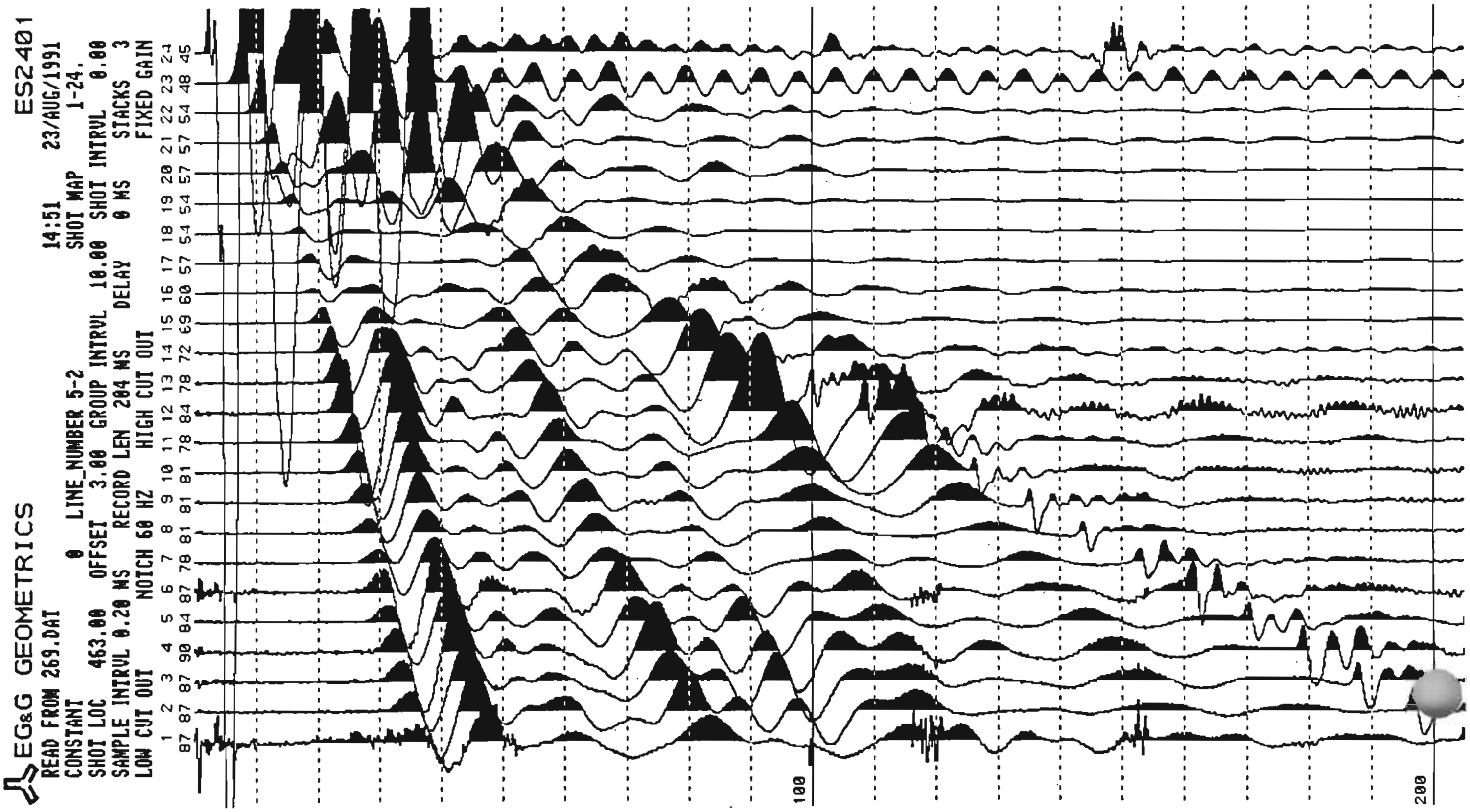
a. Line D Spread 5 – recorded during rainstorm.



b. Line D Spread 5 – reoccupied and recorded in dry conditions.

Wellsville–Andover Landfill		
EXAMPLES OF FIELD RECORDS – LINE D		
Davenport/Hadley, Ltd.		Figure 2
Oct. 1991	Job No 91–23	

DRAFT



Line 5, Spread 2

Wellsville–Andover Landfill		
EXAMPLE OF TYPICAL FIELD RECORD – LINE E		
Davenport/Hadley, Ltd.		Figure 3
Oct. 1991	Job No 91-23	

APPENDIX B

SUBSURFACE BORING LOGS FOR DEEP AND SHALLOW WELLS

Acronymns Used in Well Logs

ang	- angular
blk	- black
brach(s)	- brachiopod fossils
brn	- brown
conglom	- conglomerate
cs	- coarse
dk	- dark
esp	- especially
Fe	- iron
fn	- fine
frac(s)	- fracture(s)
frag(s)	- fragment(s)
grnd	- grained
horiz	- horizontal
incr	- increased
lamin	- laminated
lt	- light
med	- medium
orng	- orange
oxid	- oxidized
qtz	- quartz
rec or recov	- recovery
rnd	- round
sh	- shale
ss	- sandstone or split spoon
sts	- siltstone
subang	- subangular
subrnd	- subround
v	- very
vert	- vertical
wthrd	- weathered

DRAFT

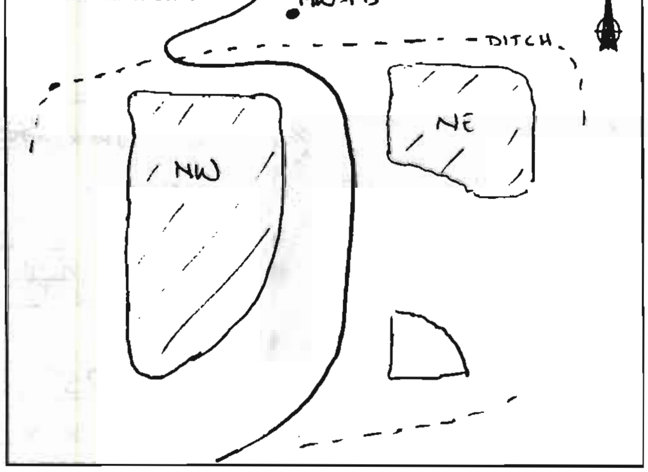
DRILLING LOG FOR MW-1D

Project Name	Wellsville-Andover Landfill
Site Location	Upgradient Well, N of ditch, In area of bedrock "low"
Date Started/Finished	8-27-91 / 8-30-91
Drilling Company	American Auger
Driller's Name	Lee Penrod
Geologist's Name	Rick Watt
Geologist's Signature	Richard Watt
Rig Type (s)	Mobile B-57
Drilling Method (s)	Auger / core (water)
Bit Size (s)	
Auger Size (s)	4¼" ID
(Auger)/Split Spoon Refusal	15.5' + 44' auger
Total Depth of Borehole Is	s.s. 44'
Total Depth of Corehole Is	75'

Water Level (TOIC)

Date	Time	Level(Feet)
9-4-91	0750	62.38
10-22-91	1325	66.87
11-20-91	1335	67.08
2-26-92	1000	68.80

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	(HNu)/OVA (ppm)	Comments
1	1	2	8								0-2	HNu jumpy - probably H_2O vapors
2	SB-1A	13	25									
3	2	34	33								0-5	?-able HNu H_2O in area of plant roots
4		50 5"	x									
5	3	6	11								0	
6		18	50 6"									
7	4	6	13								0	
8		22	50 5"									
9	5	~~18~~ 35	14			1 ft/min @ 400psi					0	
10		17	22									
11	6	10	12								0	
12		24	24									
13	7	9	13								0	
14	~~MW-1A~~ SB-1B	24	24									
	8	18	22								0	

Stick-up 2.8 ft (2.7 ws 8/30/91)

SCREENED WELL

Inner Casing Material PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 3' ft

Borehole Diameter 8-10 inches ft

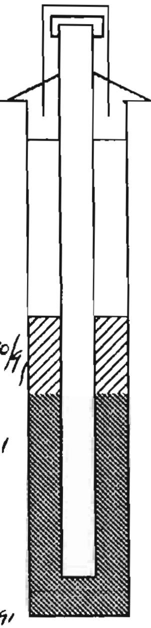
Top of Seal at ~~60~~ 58' ft (ws 8/30/91)

Bottom of Seal at ~~63~~ 61.9' (ws 8/30/91)

Top of Screen at ~~65~~ 64' ft (ws 8/30/91)

Pack Type/Size:
- ☒ Sand #02
- ☐ Gravel
- ☐ Natural

Bottom of Screen at ~~75~~ 74' ft (ws 8/30/91)



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets ______

Cement ______

Cement/ Bentonite ______

Grout ______ (ws 8/30/91)

Top of Sand Pack ~~63~~ 61.9'

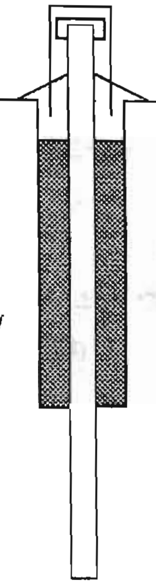
Screen Slot Size 0.010"

Screen Type 2" ID
- ☒ PVC sch 40
- ☐ Stainless Steel

Bottom of Hole at 75 ft

Bottom of Sandpack at 75'

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ Inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.3' Mottled grey + lt brown clay w/ silt + fine sand + ang. SS frags up to 1"	☒	○	○
2	0.3-0.9' Dk brn organic-rich silt. 0.9-1.6' same as 0-0.3'	○	☒	○
3	2-3'5" (0.6' Rec) Same as above. Cuttings to 4' show angular SS	☒	○	○
4	frags in silt matrix	☒	○	○
5	4-6' (1.8' Rec) Lt brn silt w/ gravel (SS frags), clay, + fn sand	☒	○	○
6	Minor clay (5-10%) + sand (5-10%). Friable + noncohesive.	☒	○	○
7	Approx 40% of cuttings is SS frags up to 2" diameter	☒	○	○
8	6-7'8" Same As Above - grades down to buff fine sand w/ ang.	☒	○	○
9	wthrd SS frags. Sand contains what looks like mica (probably $CaCO_3$ crystals)	☒	○	○
10	8-10' Same As Above but slightly higher clay content. Apparent	☒	○	○
11	Fe in SS causes reddish-purple stains - esp. where soil contacts SS	☒	○	○
12	10-12' Same as above but now tan to lt brown (1.7' Rec.)	☒	○	○
13	12-14' (1.6' Rec) Same as above but w/ shale frags too.			
14	14-16' (1' Rec) Mottled grey + brn silt w/ clay, fn sand, + shale	☒	○	○
	frags. Auger refusal @ 15.5' - begin coring	☒	○	○

DRAFT

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
	8	50 4"	x									
16							1	1'	90%		0	Core to 16.5' Hit Soil again
	9	50	x								0	Ref. @ 17'
17												
18						8 min/ft	2	1'	0		0	
19	10	50 1"	x								0	SS Ref @ 19'1" Auger to 21'
20		x	x									
21	11	50 5"	x								0	SS Ref @ 21'5" Auger to 23'
22		x	x									
23	12	50 4"	x								0	SS Ref @ 23'4" Auger to 25'
24		x	x									
25	13	50 3"	x								0	SS Ref @ 25'3" Auger to 27'
26		x	x									
27	14	40	50 3"								0	SS Ref @ 27'9" Auger to 29'
28		x	x									
29	15	50 5"	x								0	SS Ref @ 29'5" Auger to 31'
30		x	x									
31	16	47	50 2"								0	SS Ref @ 31'8" Auger to 33'
32		x	x									
33	17	50 6"	x								0	SS Ref @ 33.5' Auger to 35'
34		x	x									
35	18	50 6"	x								0	SS Ref @ 35.5' Auger to 37'
36		x	x									
37	19	50 4"	x								0	SS Ref @ 37'4" Auger to 39'
38		x	x									
39	20	50 3'	x								0	SS. Ref. @ 39'3" Auger to 1'
40		x	x									
41	21	50 3"	x								0	SS Ref. @ 41'3" Auger to 43'
42		x	x									
43	22	50 4"	x								0	SS Ref @ 43'4" Core @ 44'
44		x	x				3	2.5'	40%		0	

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Dry	Moist	Wet
16	15.5-16.5' Grey laminated argillaceous shale or siltstone - mostly			
17	Fn grained like shale but contains NS-10% visible qtz grains			
18	16.5-17' Highly wthrd rock - clay w/ shaly fragments	X		
19	17-19' interlayered blk/dk grey shale + clay			
20	19-19'1" Blk/dk grey highly wthrd shale (1" SS Rec.)	X		
21	auger indicates same to 21'	X		
22	21-21'5" Same as above (5" Rec.). Auger indcates same to 23'	X		
23	23-23.4' Same as above (4" Rec.) Auger indicates	X		
24	same to 25'	X		
25	25-25'3" Same as above w/ shale "platlets" to 1.5"	X		
26	diameter + 1-2 mm thick. Drill 25-27' w/ 900 psi	X		
27	(9" Rec) 27-27'9" same as above. Largest shale frag 1/2"	X		
28	Auger indicates same to 29". Drill 27-29 @ 600 PSi	X		
29	29-29'5" Same wthrd shale as above. Auger	X		
30	indicates same to 31'. Drills fine @ 700 PSi (5" Rec)	X		
31	(8" Rec.) 31-31'8" First 2" is same as above. Remainder is purplish-	X		
32	grey highly wthrd shale (higher Fe content than above)	X		
33	Still bone dry. Drill 31-33' @ 500 psi okay, Hard spot 32-32'3"	X		
34	33-33'6" Same as above - after 4" returns to	X		
35	dk grey. (6" Recov)	X		
36	35-35'6" Same as above - both dk grey + purple-	X		
37	grey wthrd shale. Fresh surface of shale frags is blk	X		
38	37-37'4" (4" Rec) Same as above - all w/ purple tinge	X		
39	Hit hard rock w/ auger @ 38.5' 39-39'3" (3" Rec). Dk grey wthrd shale w/ minor qtz grains (5%)	X		
40	More competent than above - looks like 15.5-16.5'	X		
41	41-41'3" (3" Rec). Pulverized shale (dk grey) - Rock is competent but still augerable	X		
42	43'-43'4" (4" Rec.) Same as above	X		
43	44-46.5' Blk/Dk grey shale (laminated) 5" vertical	X		
44	fracture @ 45' Bottom 4" is highly fractured			
	+ shows Fe-staining - sign of water.			

DRAFT

MW-1D

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
46						3 cont.					
47						4	4.6' (94%)	61%		0	highly fractured & rust stains frequent especially 49-50'
48										0	
49										0	
50										0	
51											
52						5	4.7' 94%	69%		0	no signs of water
53										0	
54										0	
55										0	
56										0	
57						6	5.2' (100%)	91		0	no sign of H_2O
58										0	
59										0	
60										0	
61										0	
62						7	4.7' 94%	77		0	Clay at 65.7 due to coring. full of small rock fragments
63										0	
64										0	
65										0	
67						8	5.0' 100%	75%		0	clay layer yellow-gray water sign rust in vertical fracture
68										0	
69										0	
70										0	
71											
72						9	5.0' 100%	65		0	vertical fracture 72.6-72.8, 73.35-73.7 water at 72.6
73										0	
74										0	
75											

missing 66

Depth(feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
46.5-51.5'	Non-fissile shale to shaly	X		
	siltstone, dark grey to black (cws 8/29/91), laminated, open	X		
	vertical fracture at 48.8-49.1, 49.5-49.8	X		
	rust staining on horizontal fractures		X	
	@ 46.6, 48.5, 48.6, 49.5, 49.8, VF 49.5-49.8		X	
	fossiliferous layer ~ 47.35 graptolites?		X	
	~~micaceous~~ calcareous			
51.5-54.0'	Interbedded shale (black) and sandstone	X		
	medium grained sandstone, dk and lt grey	X		
	poorly sorted, shale fragments	X		
54.0-56.2'	Black shale, laminated	X		
	non-fissile to low	X		
	rust staining at 55.0'		X	
56.5-61.7'	Non fissile black shale to	X		
	shaly siltstone, calcareous ~~micaceous~~ cws 8/29/91, laminated, competent	X		
	SS layer at 58.0-58.35, bioturbation	X		
	rust stains in horizontal fractures 57.55	X		
	softer fissile shale at 57.55, 57.85, 59.9			
61.7-66.7'	Non fissile black shale to minor	X		
	shaly siltstone. fissile black shale	X		
	at 63.8', poorly laminated in	X		
	general, calcareous ~~micaceous~~	X		
66.7-68.6'	Black shale, nonfissile	X		
	poorly laminated generally with intermittent	X		
	fissile layers. 68.6 clay layer yellow-grey			X
	slick at boundary with siltstone			
68.6-71.3'	Grey siltstone, competent, vertical		X	
	fracture, 68.6-69.1 - rust staining		X	
	shale pocket at 69.5, poorly to nonlaminated			
71.3-71.7'	Black shale, nonfissile same as above		X	
71.7-75.35'	Black shale - fissile, laminated		X	
	clay zone at 72.6 with very friable		X	
	shale and rust stain in vertical fracture		X	
	.01' siltstone layer 75.1 and 75.3		X	

MW-1D

MW-1D

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
77											
78											
79											
80											
81											
82											
83											
84											
85											
86											
87											
88											
89											
90											
91											
92											
93											
94											
95											
96											
97											
98											
99											
100											
101											
102											
103											
104											
105											

DRAFT

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	75.35-76.7' interbedded sandstone and shale fine grained red/grey sandstone at	○	○	○
77	75.35 - 75.7', grey at 75.95 and 76.4-76.6	○	○	○
78	Note TD actually 75 feet	○	○	○
79	so log off by 1.7'	○	○	○
80		○	○	○
81		○	○	○
82		○	○	○
83		○	○	○
84		○	○	○
85		○	○	○
86		○	○	○
87		○	○	○
88		○	○	○
89		○	○	○
90		○	○	○
91		○	○	○
92		○	○	○
93		○	○	○
94		○	○	○
95		○	○	○
96		○	○	○
97		○	○	○
98		○	○	○
99		○	○	○
100		○	○	○
101		○	○	○
102		○	○	○
103		○	○	○
104		○	○	○
105		○	○	○

MW-1D

DRAFT

DRILLING LOG FOR MW-2D

Project Name: Wellsville-Andover LF.

Site Location: E side of N borrow pit; SSE of NE fill area

Date Started/Finished: 9-3-91 / 9-4-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger / core (water)

Bit Size (s): HQ Auger Size (s): 4 1/4" ID

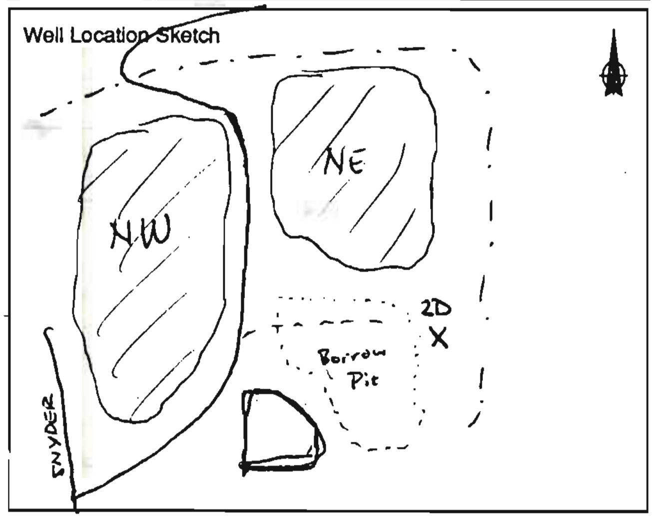
Auger/Split Spoon Refusal: 24'

Total Depth of Borehole Is: 24'

Total Depth of Corehole Is: 61'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	0955	52.60
11-20-91	1338	52.70
2-26-92	1036	51.74

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
	1	6	14								0	0.6' Rec.
1		29	32									
2	2	25	32								0	0 Rec. 1st Time will try again
3		36	34									1.9' Rec 2nd try
4	3	15	17								0	1.0' Rec.
5		15	38								1 in auger	
6	4	10	28								<1 & fluctuating	1.2' Rec.
7		20	50 3"									
8	5	50	50 4.5"								5 in auger	0.7' Rec.
9		x	x								0 in SS	
10	6	18	50 3"								Auger: OVA=8 HNu=0 SS=0	Rock @ 10 1/2' based on augers
11		x	x									
12	7	50 4"	x								0 (SS)	0.2' Rec.
13		x	x									
14	8	10	50 5"								0	1st 10 is probably soil from pit.

MW-2D **DRAFT**

Stick-up 2.5' ft

SCREENED WELL

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 3 ft

Borehole Diameter 8-10 Inches ft

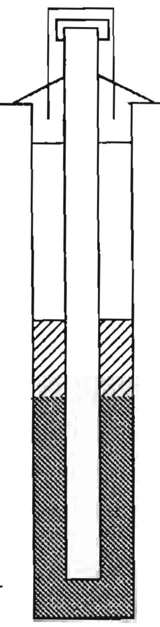
Top of Seal at 36.5 ft

Bottom of Seal at 43'

Top of Screen at 49' ft

Pack Type/Size:
- ☒ Sand #2QROK
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 59' ft



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:
Bentonite Pellets 0

Cement

Cement/ Bentonite

Grout

Top of Sand Pack 43'

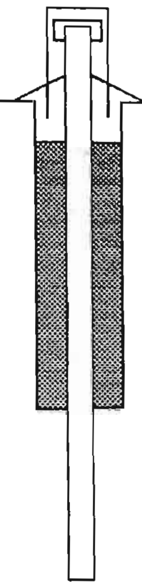
Screen Slot Size 0.010"

Screen Type Sch. 40
- ☒ PVC 10 SLOT
- ☐ Stainless Steel

Bottom of Hole at 61 ft

Bottom of Sandpack at 61

OPEN-HOLE WELL



Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter Inches

Top of Grout ft

Bottom of Outer Casing ft

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Grout/ Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0.2' Grass + Organics followed by med. brn silt w/ clay, sand	⊗	○	○
2	+ gravel. Sand (fn - cs) + gravel (fn) in SS particles	⊗	○	○
3	2-4' Same as above mottled w/ grey clay in bottom 6" Minor	⊗	○	○
4	$CaCO_3$ content.	⊗	○	○
5	4-6' Same as above. Clay content increasing downward,	⊗	○	○
6	$CaCO_3$ content increasing (~5-10% @ 6') (contains ~20%	⊗	○	○
7	subang. sandstone frags.	○	⊗	○
8	6-8' (Ref. @ 7'9") Greenish brown clay w/ silt, slightly	○	⊗	○
9	Moist.	⊗	○	○
10	8-8'10.5" Fragments of calcareous, dk grey, laminated	⊗	○	○
11	siltstone to 1.5" diameter- angular.	⊗	○	○
12	10-10'9" Same as 8-8'10" but w/ dry grey clay (dust)	⊗	○	○
13	12-12'4" Same as immed. above. Auger cuttings fr 10-12'	⊗	○	○
14	indicate purplish grey clay	⊗	○	○
		⊗	○	○

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
15–16		x x								0	0.5' Rec.
16–18	9	46 50/3" x x								0	0.4' Rec.
18–20	10	20 50/4" x x								0	0.4' Rec.
20–22	11	25 50/4" x x								0	0.3' Rec.
22–24	12	25 50/2" x x								0	0.5' Rec.
24–26	13	20 50/3" x x			6-7 min per ft.	1	2.2' 100%	86%		0 0	0.5' Rec. SS 2.2' Core Rec.
26–31					4½ min /Ft	2	4.8' 96%	11%		0	Definite water-bearing zone, but may be seasonal. Will core 8' more + then bailer test.
31–36						3	5' 100%	46%		0	
36–41						4	4.9' 98%	47%		0	TD=41' - bailer test - makes no water ∴ core 10' more.
41–44						5	4.8' 100%	27%		0	

MW-2D

DRAFT

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Dry	Moist	Wet
16	14-14.5' Wthrd maroon med-grained SS followed by wthrd	⊗	○	○
17	maroon fissile shale.	⊗	○	○
18	16-16'9" Interbedded wthrd maroon SS + shale.	⊗	○	○
19	18-18'9" wthrd dk grey fissile shale. Auger cuttings	⊗	○	○
20	indicate highly wthrd shale from ~12' ⇒	⊗	○	○
21	20-20'10" Same as immed. above	⊗	○	○
22	22-22'8" Same as above. Competent rock layer @	⊗	○	○
23	~22.5' based on auger response (~½' thick)	⊗	○	○
24	24-24'9" wthrd grey shaly siltstone, fissile.	⊗	○	○
25	Change in auger response - hard competent rock @ ~24'	○	○	○
26	Auger refusal just > 24'.	○	○	○
27	24-26.2' Grey laminated shaly siltstone, competent. Only 1 horizontal	○	○	○
28	wthrd (Fe-stain) fracture @ 26.2'	○	○	○
29	26.2-26.75' Grey lamin. shaly siltstone - stained brown from 26.4' down	○	○	○
30	(water table?)	○	○	○
31	26.75-31.2' Heavily wthrd + fractured dk grey/blk fissile shale	○	○	○
32	vertical + horiz. frac's Fe-stained. Vert. frac's @ 27.4-31'. Heavily	○	○	○
33	fract'd 27.9-28.1' + 29-30.2' (horiz + vert).	○	○	○
34	31.2-35.4' Heavily wthrd + fractured fissile dk grey/blk shale	○	○	○
35	w/ silty interbeds (maroon) esp. @ 31.2-31.7' + 32.8-33.3'	○	○	○
36	35.4-36.2' Shaly siltstone (grey) w/ blk shale interbeds - irregular	○	○	○
37	flow features more than interbeds. Vert. frac's @ 32.6-33' +	○	○	○
38	33.4-33.8'. Heavily fract'd from 33.4-33.8' (horiz. + vert.). Most	○	○	○
39	frac's are Fe-stained.	○	○	○
40	36.2'-41.2' Dk grey/blk silty shale w/ minor siltstone	○	○	○
41	interbeds. Shale is laminated + moderately competent.	○	○	○
42	Few horiz. fracs., some Fe-stained; no vert. fracs.	○	○	○
43	39.7-41.2' is heavily fract'd + wthrd.	○	○	○
44	41.2-41.4 Fract'd blk shale	○	○	○
	41.4-42.2' Grey shaley siltstone w/ 1 horiz. Fe-stained frac.	○	○	○

42.2'-44.1' Lamin. fissile blk shale w/ minor siltstone interbeds.
Numerous horiz. Fe-stained fractures.

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
46											
47							5'			0	
48						6	100%	42%			
49											
50											
51							4.9'				No water gain/loss until this run - lost 30-40 gals.
52						7	98%	78%		0	
53											
54											
55											
56							4.4'				cored 4.5' lost little water
57						8	98%	59%		0	
58											
59											
60											
61											
62											
63											
64											
65											
67											
68											
69											
70											
71											
72											
73											
74											
75											

DRAFT

Depth(feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry / Moist / Wet
	44.1-44.3 Grey shaly siltstone	
	44.3-46' Dk grey/black fissile shale. Heavily fract'd + wthrd from 44.5-46'. Vert. frac's from 44.3-44.8' + 45.4-46'	
	46-46.4' Shaly siltstone w/ minor sandstone interbeds. Horiz. + vert. Fe-stained fracs.	
	46.4-48' Siltstone to fn grnd sandstone, wthrd (Fe-stain) w/ vert. fract. containing 1/4" clay seam.	
	48-48.8' Poorly sorted SS containing rnd to subrnd qtz grains w/ vert. frac.	
	48.8-49.5' Interbedded shale + fn grnd SS w/ vert. Fe-stained frac.	
	49.5-51' Fn grnd SS w/ interbedded shale + cs grnd SS. Competent	
	51-56' Competent greenish-grey ~~micaceous~~ calcareous sandstone, laminated w/ v. thin interbeds of shale or siltstone.	
	56-56.8' same as 51-56'	
	56.8-58.9' Grey ~~micaceous~~ calcareous sandstone containing numerous "clasts" of black shale ranging from ~~1mm~~ to 3" long	
	58.9-59' Fe-stained cs grnd SS to conglomerate underlain by thin shale layer	
	59-59.4' Grey SS w/ coal stringers between 59.1 + 59.3'	
	59.4-60.5 Same greenish-greyish brn SS as above but w/ vert. + numerous horiz. Fe-stained fracs. Some clay in vert. frac.	

MW-2D

DRAFT

DRILLING LOG FOR MW-2S

Project Name: Wellsville-Andover L.F.

Site Location: E side of N borrow pit, SSE of NE Fill area

Date Started/Finished: 10-3-91 / 10-3-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger

Bit Size (s): ______ Auger Size (s): 4 1/4" ID

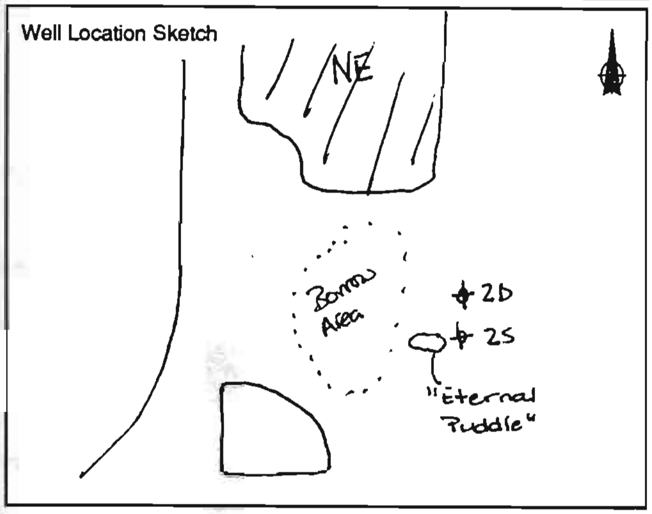
Auger/Split Spoon Refusal: 10'

Total Depth of Borehole Is: 9'

Total Depth of Corehole Is: NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	0950	9.75
11-20-91	1341	8.69
2-26-92	1034	6.06

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1												
2												
3												
4												
5												
6												
7	SB-2A (6.5-7.5')	11 / 20	11 / 25								HNu 0 OVA 1 ppm	Collect 1 split spoon for resample of SB-2A
8												
9												
10												
11												
12												
13												
14												

MW-2S

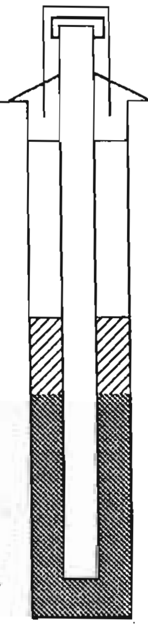
DRAFT

Stick-up ~2.5 ft

SCREENED WELL

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 inches



Lock Number 3252

GROUND SURFACE

Top of Grout 0 ft

Borehole Diameter 8-10 inches ___ ft

Top of Seal at 3 ft

Bottom of Seal at 4'

Top of Screen at 5 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 9 ft

Quantity of Material Used:
- Bentonite Pellets ______
- Cement ______
- Cement/ Bentonite ______
- Grout ______

Top of Sand Pack 4'

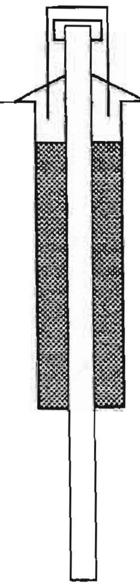
Screen Slot Size 0.010"

Screen Type Sch. 40
- ☒ PVC
- ☐ Stainless Steel

Bottom of Hole at 9 ft

Bottom of Sandpack at 9'

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	See Log for MW-2D for lithology	○	○	○
1		○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5	Medium brown gravelly sandy silt w/ clay (collected 1 spoon	⊗	○	○
6	for resampling).	○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○

DRAFT

DRILLING LOG FOR MW-3D

Project Name: Wellsville-Andover Landfill

Site Location: SW corner of drainage collection pond

Date Started/Finished: 9-5-91 / 9-6-91

Drilling Company: American Auger + Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger / core

Bit Size (s): HQ   Auger Size (s): 4 1/4" ID

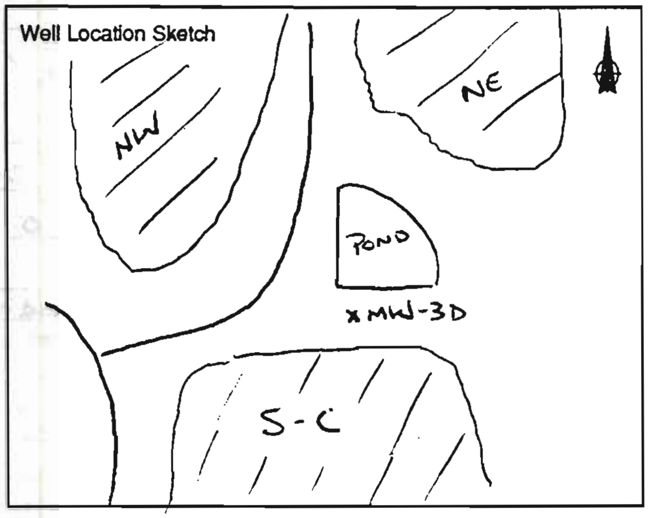
Auger/Split Spoon Refusal: 25'

Total Depth of Borehole Is: 25'

Total Depth of Corehole Is: 41.6'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1042	13.95
11-20-91	1223	14.14
2-26-92	1022	12.01

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	7	8								0	1.9' Rec.
		7	10									
2, 3	2	21	16								0	1.2' Rec.
		14	18									
4, 5	3	5	10								0	2.0' Rec.
		8	19									
6, 7	4	5	10								0	1.1' Rec.
		15	21									
8, 9	5	2	8								0	1.4' Rec.
		10	16									
10, 11	6	3	50								0	1.3' Rec.
		50 5"	x									
12, 13	7	9	11								0	2.0' Rec.
		10	30									
14	8	22	16								0	1.2' Rec

MW-3D **DRAFT**

Stick-up 2.5' ft

SCREENED WELL

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 inches

Top of Grout 3 ft

Borehole Diameter 8-10 inches ft

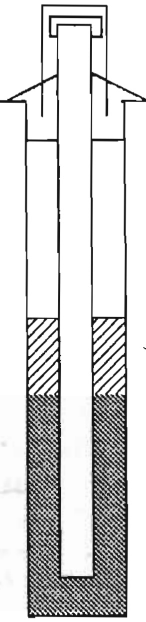
Top of Seal at 22.5 ft

Bottom of Seal at 28

Top of Screen at 30 ft

Pack Type/Size:
- ☒ Sand #2 Q-ROK
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 40 ft



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets –

Cement 3'

Cement/ Bentonite 19.5'

Grout

Top of Sand Pack 28'

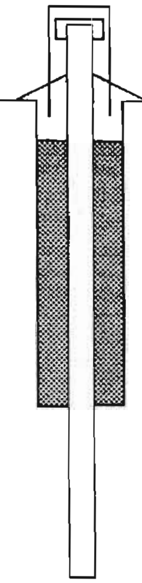
Screen Slot Size 0.010"

Screen Type
- ☒ PVC Sched. 40
- ☐ Stainless Steel

Bottom of Hole at 41.6' ft

Bottom of Sandpack at 41.6'

OPEN-HOLE WELL



Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Top of Grout ft

Bottom of Outer Casing ft

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Grout/ Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.9' Brn silt w/ clay (10%) + sand (5%) + organics (roots)	○	⊗	○
2	0.9-1.9' Mottled lt brn/grey silt w/ clay (15-20%) + sand (5%) + gravel (5%). Also	⊗	○	○
3	contains minor black organics (coal?)	⊗	○	○
4	2-3.2' Buff sandstone cobble followed by buff to brn silt w/ clay (5%)	⊗	○	○
5	sand (20%) + gravel (10%). Contains areas of Fe-stain	⊗	○	○
6	4-6' Light to med. brn silt w/ clay, sand + gravel. Gravel	⊗	○	○
7	is subrnd SS frags. Contains areas of Fe-stain	⊗	○	○
8	6-8' Same as above but incr. gravel content (gravel to 1")	⊗	○	○
9	8-10' Same as above, but gravel/cs sand up to 20-25%. SS frags	⊗	○	○
10	(subang) to "	⊗	○	○
11	10-12' 4" of material same as 8-10' followed by wthrd, ~~[illegible]~~ calcareous	⊗	○	○
12	SS bedrock (sand + SS frags to 1" x 1/4")	⊗	○	○
13	12-14' Same as 6-8'.			
14	14-16' Same as immed. above but increased content of ang.	⊗	○	○
	sandstone frags.	⊗	○	○

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16–18	9	17 19 / 24 24 / 19 25								0	1.0' Rec.
18–20	10	16 18 / 20 20								0	1.4' Rec. Steam generated by augers.
20–22	11	15 25 / 30 30								0	1.6' Rec. Must be minor water - steam generated.
22–24	12	15 20 / 20 15								0	1.8' Rec. steam - a lot
24–26	13	10 20 / 50 1" x								0	0.9' Rec. steam generated
26–27						1	1.3' 100%	67%		0	
27–31						2	4.9' 100%	69%		0	
31–36					4 min/ft	3	4.4' 89%	27%		0	Heavily wthd - good water bearing zone - will core 5' more + then check recharge
36–41					2 min/ft @ bottom	4	5' 100%	0			
42											
43											
44											

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
16	16-18' Same as above but more grey now. Gravel (to 1/2")	⊗	○	○
17	is subround SS of varying colors (brn, grey, maroon, etc.)	⊗	○	○
18	18-20' Same as above but sand content incr. to ~ 30-35%.	⊗	○	○
19	20-22' Same as above.	⊗	○	○
20	22-24' Same as above, sand content down slightly, +	⊗	○	○
21	gravel content incr. Gravel is subrnd to ang. SS.	⊗	○	○
22	24-25' Same as above Auger refusal @ 25'	⊗	○	○
23	~~25-25.5' Same as above.~~ [this was in auger bit. RW]	○	○	○
24	25-25.8' ~~25-27.5~~ RW Greenish grey [Calcareous] ~~Micaceous~~ fn to [Med] ~~fn~~ RW grnd sandstone	○	○	○
25	w/ thin conglomerate interbeds. Conglom. at end of run	○	○	○
26	is Fe-stained + contains subrnd qtz + subang SS +	○	○	○
27	Shale frags.	○	○	○
28	26.8-31.7' Conglomeratic in top 4" otherwise same sandstone	○	○	○
29	w/ vert fracs @ [30.3'] ~~29~~ RW + 31.7' + horiz. clay filled seam @	○	○	○
30	29.1'.	○	○	○
31	31.7'-36.6' Same sandstone w/ high [$CaCO_3$] ~~mica~~ RW content stained	○	○	○
32	orange brown to 31.9' + greenish-grey to 32.0'. High blk	○	○	○
33	organic content (coal? stingers?) from 32-32.2'.	○	○	○
34	Same SS as 26-32' from 32.2-33.3'. Heavily fract'd	○	○	○
35	SS w/ lower [$CaCO_3$] ~~mica~~ content from 33.3-36.6'. Vert. frac's @	○	○	○
36	33.4', 34.2', 34.4', 34.9-36.6'. Clay filled frac's from 33.3-	○	○	○
37	36.6'. Fe-stains throughout.	○	○	○
38	36.6- ~~41.6~~ RW 38.6' Heavily fract'd + wthrd shaly sandstone	○	○	○
39	w/ numerous horiz + vert. fractures, many clay-filled.	○	○	○
40	38.6-41.1' Heavily fract'd + wthrd, black, fissile shale w/	○	○	○
41	numerous horiz. + vert. fractures many clay filled	○	○	○
42	41.1-41.3' Cs sandstone to fine conglomerate, wthrd.	○	○	○
43	41.3-41.6' Fn to med grnd SS as above.	○	○	○
44		○	○	○

DRAFT

DRILLING LOG FOR MW-3S

Project Name: Wellsville-Andover Landfill

Site Location: In swale near SW corner of drainage collection pond

Date Started/Finished: 10-3-91 / 10-3-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger

Bit Size (s): ______ Auger Size (s): 4 1/4" ID

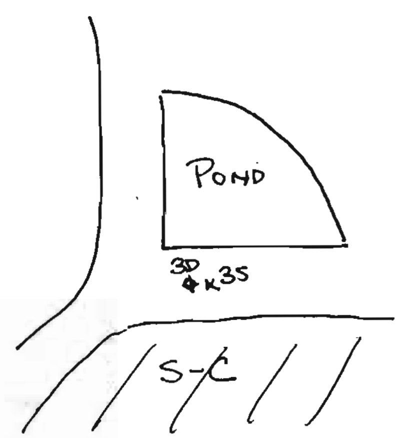
Auger/Split Spoon Refusal: 19'

Total Depth of Borehole Is: 19'

Total Depth of Corehole Is: NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1041	15.40
11-20-91	1224	7.17
2-26-92	1025	6.18

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	SB-3A	8 7 / 10 12								0	Take split spoon to resample 3A
2											
3											
4											
5											
6											
7											
8											
9											
10											
11	SB-3B	6 38 / 14 36									Take spoon to resample 3B
12											
13											
14											

MW-3S

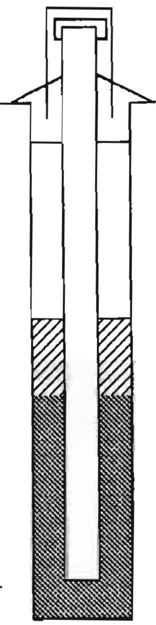
DRAFT

Stick-up ~2.5 ft

Inner Casing Material PVC

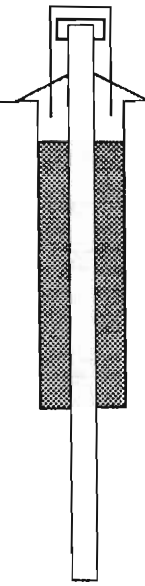
Inner Casing Inside Diameter 2 inches

SCREENED WELL



Lock Number 3252

OPEN-HOLE WELL



GROUND SURFACE

Top of Grout 3 ft

Borehole Diameter 8-10 inches ft

Top of Seal at 5 ft

Bottom of Seal at 7'

Top of Screen at 9 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 19 ft

Quantity of Material Used:

Bentonite Pellets ______

Cement ______

Cement/ Bentonite ______

Grout ______

Top of Sand Pack 7'

Screen Slot Size 0.010"

Screen Type ______
- ☒ PVC Sch. 40
- ☐ Stainless Steel ______

Bottom of Hole at 19 ft

Bottom of Sandpack at 19'

Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ Inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	See log for MW-3D for lithology	○	○	○
1		○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○

DRAFT

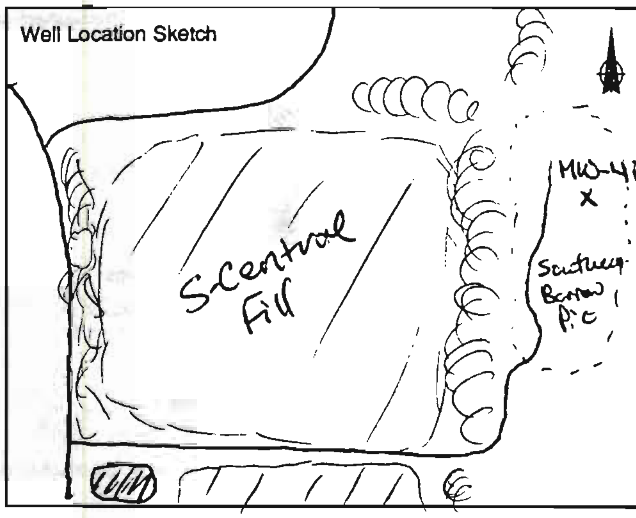
DRILLING LOG FOR MW-4D

Project Name Wellsville-Andover LF.
Site Location N end of S borrow pit.

Date Started/Finished 9-9-91
Drilling Company American Auger + Ditching
Driller's Name Lee Penrod
Geologist's Name Rick Watt
Geologist's Signature R Watt
Rig Type (s) Mobile B-57
Drilling Method (s) Auger / core
Bit Size (s) HQ Auger Size (s) 4 1/4" ID
Auger/Split Spoon Refusal 9'
Total Depth of Borehole Is 9'
Total Depth of Corehole Is 23.3'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1100	12.26
11-20-91	1346	11.57
2-26-92	1044	5.73

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0–2	1	6	10								0 HNu	2.0' Rec. MW-4D 1-2' Geotech
		16	26									
2–4	2	12	15								0 HNu	1.7' Rec. SB-4A VOA+metals.
		28	32									
4–6	3	44	24								0 HNu	1.6' Rec.
		2 98	20									
6–8	4	19	11								0 HNu	1.6' Rec. Auger grinds at more competent rock @ 8'
		14	18									
8–9	5	10	10									1' Rec
		50 1"	X									
9–11.3							1	2.8' 86%	29%		0	8-11.3' Hard Rock-core 900 psi downpressure
11.3–14						2'50"/ft	2					11.3-16.3' 900 psi

recycled paper ecology and environment

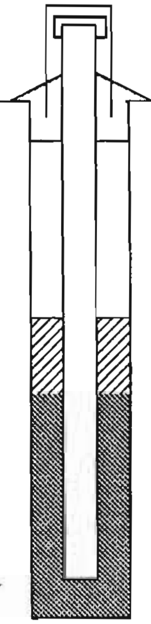
MW- **DRAFT**

Stick-up 2.5' ft

Inner Casing Material PVC

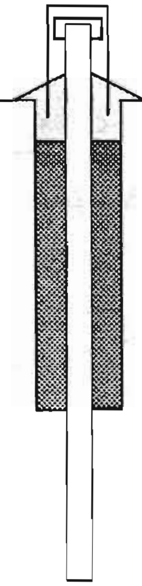
Inner Casing Inside Diameter 2 inches

SCREENED WELL



Lock Number 3252

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ inches

GROUND SURFACE

Top of Grout 0 ft

Borehole Diameter 8-10 inches ______ ft

Top of Seal at 7.5' ft

Bottom of Seal at 10'

Top of Screen at 12 ft

Pack Type/Size:
- [x] Sand #2 Q-Rok
- [ ] Gravel ______
- [ ] Natural ______

Bottom of Screen at 22 ft

Quantity of Material Used:
Bentonite Pellets 2.5'

Cement Portland Type I

Cement/ Bentonite ______

Grout ______

Top of Sand Pack 10'

Screen Slot Size 0.010"

Screen Type ______
- [x] PVC Sch. 40
- [ ] Stainless Steel ______

Bottom of Hole at 23.3' ft

Bottom of Sandpack at 23.3'

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.5' Brown silt w/ sand + organics (grass rootlets).	⊗	○	○
2	0.5-2.0' Brown (mottled w/ minor grey + orng) silt w/ sand + gravel -	⊗	○	○
3	wthrd shaley sandstone bedrock. Gravel is wthrd subang to ang. shaley SS frags	⊗	○	○
4	2-4' Same as above - heavy wthring (oxidation) Thin bedded	⊗	○	○
5	structure of shaley SS is still intact	⊗	○	○
6	4-6' Same as above - sandy shale, v. fissile.	⊗	○	○
7	6-8' Same as above - v. slightly moist zone @ 7'	⊗	○	○
8	8-9' Same as above - refusal on competent wthrd	⊗	○	○
9	fissile ~~shaley~~ brn sandy shale.	⊗	○	○
10	8.3-9.5' slightly wthrd brnish-grey fn-grnd, well-cemented	○	○	○
11	sandstone; fossiliferous (brachiopod)	○	○	○
12	9.5-11.3' Blk fissile shale; highly fract'd w/ oxid. on bedding	○	○	○
13	planes - Clay w/ sand filled frac. btwn SS + sh.	○	○	○
14	11.3-16.3' V. Heavily fract'd + wthrd (oxid. on most/all frac's)	○	○	○
	sandy/silty shale. Numer. vert. frac's. Clay throughout	○	○	○

bottom 2' of run

MW-4D

DRAFT

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	(HNu)/OVA (ppm)	Comments
16											
17						3	5'			0	16.3 - 21.3' Drills @ 600 psi
18							100%	0%			
19											
20											
21											
22					3 min/ft	4	1.7' 85%	0%		0	21.3-23.3' Drill @ 600 psi
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											

DRAFT 4D

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION
16	16.3-21.3' Very heavily fract'd & wthrd fissile
17	sandy shale to 18' followed by v. heavily
18	fract'd + wthrd shaly sandstone. SS is
19	gradually more calcareous ~~micaceous~~ Horiz + vert.
20	fractures as well as clay w/sand soil throughout
21	cal run.
22	21.3-21.9' Heavily fract'd wthrd shaly sandstone
23	21.9-22.3' Heavily fract'd wthrd sandy shale.
24	22.3-22.5' Same as 21.3-21.9'. All frac's throughout are
25	22.5-23.3' Same as 21.9-22.3'. oxidized.
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	

DRAFT

DRILLING LOG FOR MW-5D

Project Name: Wellsville - Andover Landfill

Site Location: S end of S borrow pit on E side of trees

Date Started/Finished: 9-10-91 / 9-10-91

Drilling Company: American Auger + Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger / watercore

Bit Size (s): HQ Auger Size (s): 4¼" ID

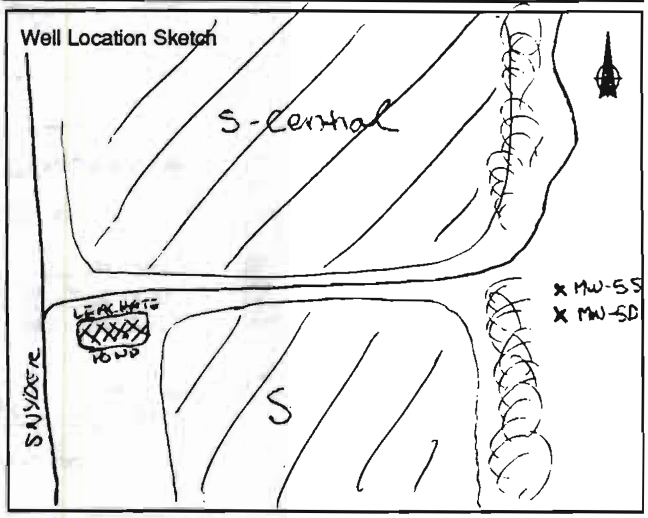
Auger/Split Spoon Refusal: 23.5'

Total Depth of Borehole Is: ~~36'9"~~ 23.5'

Total Depth of Corehole Is: 36'9"

Water Level (TOIC)		
Date	Time	Level(Feet)
10-24-91	0820	3.30
11-20-91	13:52	3.28
2-26-92	0932	2.85

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0–1	1	8	16								0	2.0' Rec.
1–2		24	18									
2–3	2	18	16								0	1.2' Rec. Pushed stone then retrieved bottom
3–4		12	12									
4–5	3	4	14								0	No Rec.
5–6		8	10									
6–7	4	2	5								0-2 soil	0.8' Rec.
7–8		16	13								0 in auger	Not enough to get sample
8–9	5	7	30								0-1 soil	2.0' Rec.
9–10		30	38								0 auger	
10–11	6	10	20								Slight deflection on stop	1.1' Rec.
11–12		50 5"	X								0 in rest	
12–13	7	10	50 4"								0	0.7' Rec.
13–14		X	X								0	1.2' Rec.
14–	8	23	33									

MW-5? **DRAFT**

Stick-up 2.5 ft

Inner Casing Material PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 3 ft

Borehole Diameter 8-10 Inches ft

Top of Seal at 19 ft

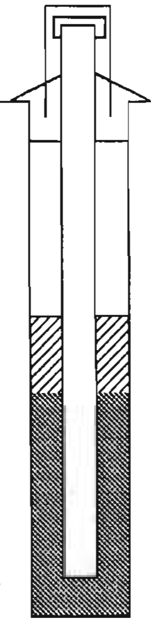
Bottom of Seal at 25

Top of Screen at 26 1/2 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 36.5 ft

SCREENED WELL



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:
- Bentonite Pellets N/A
- Cement 5 bags
- Cement/ Bentonite
- Grout

Top of Sand Pack 25

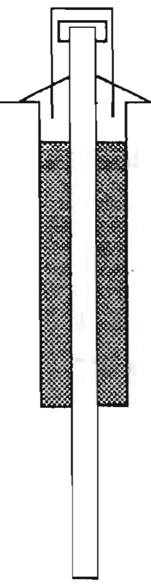
Screen Slot Size 0.010"

Screen Type
- ☒ PVC Sch. 40
- ☐ Stainless Steel

Bottom of Hole at 36.75 ft

Bottom of Sandpack at 36.75'

OPEN-HOLE WELL



Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter Inches

Top of Grout ft

Bottom of Outer Casing ft

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Grout/ Casing ft

Corehole Diameter

Bottom of Corehole ft

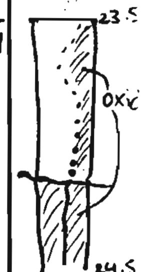
NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-1.25' Mottled grey/orng-brn clay w/ silt, sand, + gravel. Gravel	⊗	○	○
2	is subang. SS to 1/2" diam. Organics (grass + roots) to 0.5'	⊗	○	○
3	1.25-2' Orng-brn to brn gravel w/ sand, silt, + clay. Some gravel	○	⊗	○
4	to 1"	○	⊗	○
5	2-3.5' SS gravel + cobbles.	⊗	○	○
6	3.5-4' Moist mottled grey/brn clay w/ silt + sand. Clay	⊗	○	○
7	is tight + non-plastic	○	⊗	○
8	4-6' ? No recovery - pushed a cobble	○	⊗	○
9	6-6.3' SS gravel + cobbles (subang) to 1" w/ clay + sand	○	⊗	○
10	6.3-6.5' wthrd blk shale	⊗	○	○
11	6.5-6.8' Oxidized SS gravel w/ clay, silt + sand, slightly moist	⊗	○	○
12	8-8.7' Brn clay w/ silt, sand + gravel. Gravel is subrnd SS	⊗	○	○
13	to 1/2". Slightly moist.	○	⊗	○
14	8.7-10' Same but dry + structure of wthrd bedrock is intact.	⊗	○	○
	Shows wthrd calcareous ~~micaceous~~ shale, sandstone w/ minor coal frags.	⊗	○	○

MW-3D

DRAFT

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
		50 3"	X									
16	9	50	50 5"								0	0.9' Rec.
17		x	x									
18	10	25	50								0	1.1' Rec. Making 1/4 gpm
19		50 4"	x									
20	11	25	50 4"								0	0.5' Rec.
21		x	x									
22	12	40	50 3"								0	0.8' Rec. Auger @ 900 psi - hard soil
23		x	x									
24						4 min/ft @ 400 psi	1	3' 100%	30%		0	23.5-26.5'
25												
26												
27							2	4.6' 92%	28%		0	
28												
29												
30												
31												
32						~4 min/ft @ 400 psi	3	5' 100%	0%		0	
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												



Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Dry	Moist	Wet
	10 - 11.1' Saprolitic soil of wthrd blk shale - clay w/ sand + gravel		X	
16	sized frags of wthrd blk fissile shale. Slightly moist @ bottom		X	
17	12 - 12.7' Same as above, but shaly sandstone gravel			X
18	14 - 15.2' Same as 10 - 11' Moist soil is oxidized	X		
19	16 - 17' Moist highly oxidiz. SS - clay to sand. Grey where		X	
20	wet, orng-brn where dry	X (erased)		X
21	18 - 18.8' Wet heavily wthrd shale saprolite.	X		X (erased)
22	18.8 - 19.1' Dry " " "			
23	20 - 21' Moist heavily wthrd (oxid.) sandy shale saprolite			
24	22 - 22.5' Wet heavily wthrd sandy shale saprolite.			
25	22.5 - 22.7' Dry grey wthrd shale (clay "dust" w/ shale)			
26	22.7 - 22.9' Dry orng-brn wthrd SS			
27	23.5 - 23.9' Grey laminated fn to med.-grnd SS containing ~5% angular			
28	black grains ~~[illegible]?~~			
29	23.9 - 24.2' Poorly sorted med to cs-grnd SS, white to lt grey			
30	contains angular shale frags as well as rnd qtz grains			
31	24.2 - 26.5' Oxidized fn to med - grnd SS w/ interbedded			
32	shaly sand + cs-grnd SS layers. Vert. frac. 24.1 - 25.2' +			
33	25.9 - 26.3'. Clay + sand fill some fracs. Heavily fract'd / wthrd			
34	from 24.9 - 25.3'.			
35	26.5 - 27.5 @ Grey calcareous, very shaly / silty SS			
36	(oxidized in top 0.3'). Frac'd w/ minor clay in fracs.			
37	27.5 - 28.3' Brnish-grey (oxidized) lamin. fn-grnd SS w/ vert.			
38	fract. (clay filled).			
39	28.3 - 31.5' Interbedded fn-grnd SS + shale. Shale is irregular			
40	in shape (stringers) + SS is calcareous. Patchy			
41	oxidation throughout. Heavily fract'd 28.2 - 28.7'.			
42	31.5 - 32.2' Same as 28.3 - 31.5'			
43	32.2 - 36' Heavily fract'd + wthrd shaly SS.			
44	36 - 36.5' Unwthrd dk grey fissile shale.			

DRAFT MW-5D

DRAFT

DRILLING LOG FOR MW-5S

Project Name Wellsville-Andover L.F.

Site Location S end of southern borrow pit.

Date Started/Finished 9-11-91 / 9-11-91

Drilling Company American Auger & Ditching

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R. Watt

Rig Type (s) Mobile B-57

Drilling Method (s) Auger

Bit Size (s) ______ Auger Size (s) 4 1/4" ID

Auger/Split Spoon Refusal NA

Total Depth of Borehole Is 23'

Total Depth of Corehole Is NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-24-91	0820	3.64
11-20-91	1351	3.63
2-26-92	0935	3.04

Well Location Sketch

See MW-5D

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

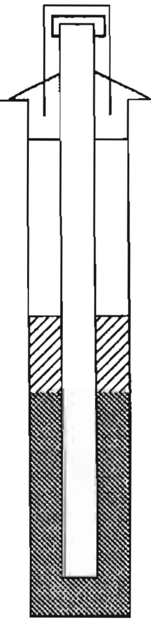
MW-5S **DRAFT**

Stick-up ~2.5 ft

Inner Casing Material Sch.40 PVC

Inner Casing Inside Diameter 2 inches

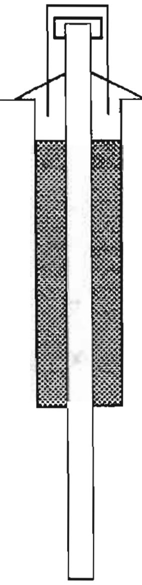
SCREENED WELL



Lock Number 3252

GROUND SURFACE

OPEN-HOLE WELL



Top of Grout 0 ft

Borehole Diameter 8-10 inches ___ ft ___

Top of Seal at 6' ft

Bottom of Seal at 8'

Top of Screen at 10 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel ___
- ☐ Natural ___

Bottom of Screen at 20 ft

Quantity of Material Used:
Bentonite Pellets ___

Cement ___

Cement/ Bentonite ___

Grout ___

Top of Sand Pack 8'

Screen Slot Size 0.010"

Screen Type ___
- ☒ PVC Sch.40
- ☐ Stainless Steel ___

Bottom of Hole at 23 ft

Bottom of Sandpack at 22

Stick-up ___ ft

Inner Casing Material ___

Inner Casing Inside Diameter ___ inches

Top of Grout ___ ft

Bottom of Outer Casing ___ ft

Borehole Diameter ___ ft

Bedrock ___ ft

Bottom of Rock Socket/ Grout/ Casing ___ ft

Corehole Diameter ___

Bottom of Corehole ___ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	See log for MW-5D for lithology	○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
		○	○	○

DRAFT

DRILLING LOG FOR MW-6D

Project Name: Wellsville-Andover LF.

Site Location: W side of tree line along W side of S Fill area

Date Started/Finished: 9-~~10~~ 11-91/9-12-91

Drilling Company: American Auger + Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: Richard K. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger /core

Bit Size (s): HQ Auger Size (s): 4 1/4" ID

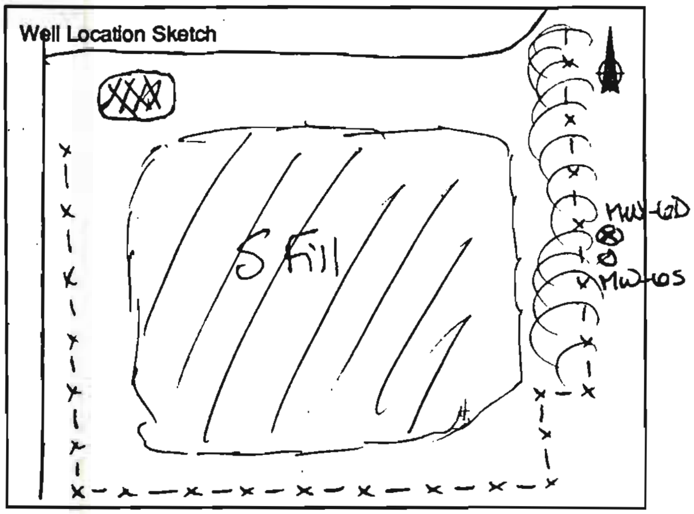
Auger/Split Spoon Refusal: ~~14.26~~ 14.6'

Total Depth of Borehole Is: 14.6'

Total Depth of Corehole Is: 28.3'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-24-91	0905	18.14
11-20-91	1357	18.04
2-26-92	0923	16.97

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0-2	1	8	7								0	1.8' Rec.
		15	50/5"									
2-4	2	8	30								0	1.6' Rec.
		28	17									
4-6	3	36	20								0	0.1' Rec.
		20	19									
6-8	4	10	10								0	1.4' Rec. Augered thru rock @ 7.5'
		15	21									
8-10	5	40	26								0	1.8' Rec.
		18	18									
10-12	6	15	15								0	1.6' Rec.
		15	19									
12-14	7	5	7								0	1.8' Rec.
		10	28									
14-	8	10	50/4"								0	0.4' Rec.

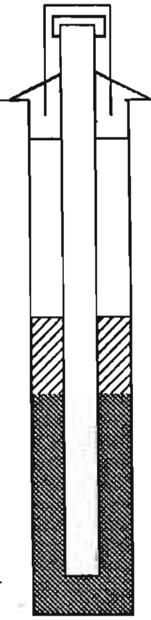
MW-6D **DRAFT**

SCREENED WELL

Stick-up 1.7 ft

Inner Casing Material PVC

Inner Casing Inside Diameter 2 inches



GROUND SURFACE

Top of Grout 3 ft

Borehole Diameter 8-10 inches ft

Top of Seal at 11 ft

Bottom of Seal at 16

Top of Screen at 18 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 28 ft

Lock Number 3252

Quantity of Material Used:

Bentonite Pellets N/A

Cement 3'

Cement/ Bentonite 8'

Grout

Top of Sand Pack 16

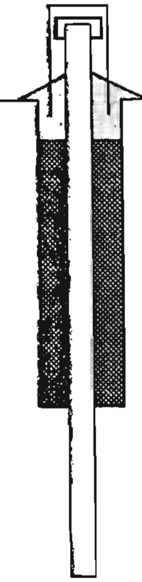
Screen Slot Size 0.010"

Screen Type
- ☒ PVC Sch. 40
- ☐ Stainless Steel

Bottom of Hole at 28.3 ft

Bottom of Sandpack at 28.3

OPEN-HOLE WELL



Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Top of Grout ft

Bottom of Outer Casing ft

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Grout/ Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-2' Light brn (minor grey mottling) sand w/ clay, silt + gravel.	⊗	○	○
2	Gravel is subrnd to subang. SS frags (oxidized).	⊗	○	○
3	2-4' Lt brn (minor grey + red mottling) clay w/ sand, gravel + silt	⊗	○	○
4	Gravel is oxidized (maroon) ang to subang SS	⊗	○	○
5	4-6' ? Pushed a cobble. Prob. SS blocked spoon,	⊗	○	○
6	Prob. same as above.	⊗	○	○
7	6-8' Same as 2-4' but more tight clay. Gravel (oxid. SS)	⊗	○	○
8	to 1". SS is more shale-rich now. Hit rock @ 7.5' w/ auger	○	⊗	○
9	8-10' Same as above. Mostly dry w/ small areas of	○	⊗	○
10	wet clay	○	⊗	○
11	10-12' Same as above. SS is shaley.	○	⊗	○
12	12-14' Same as above but more clay/shale-rich &	○	⊗	○
13	all moist	○	⊗	○
14	14-15' Lt brn / maroon oxidized subang. SS gravel (to 1") w/ clay,	○	⊗	○
	silt, + sand. Moist patches, remainder dry. Refusal @ 14.6'	○	⊗	○

DRAFT

MW-6D

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16						1	1.7' 100%	0%		0	14.6-16.3'
17											16.3-21.3'
18					2.5 min per ft @700 psi (2500 RPM)	2	5' 100%	34%		0	
19											
20											
21											
22					3.3 min per ft @ 900 psi (2200 RPM)						21.3-26.3'
23						3	5' 100%	24%		0	
24											
25											
26											
27					3.2 min per ft @ 900 psi	4	2' 100%	20%		0	26.3-28.3'
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											

DRAFT

MW 6D

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
16	~~[illegible]~~ 14.6'-16.3' Brnish grey, oxidized fn-grnd SS w/ interbedded			
17	CS SS layers. Vert. frac's throughout. soil zone (3") @ ~15'			
18	+ heavily fract'd/wthrd @ ~16' (4" thick)			
19	16.3-17.3' V. Heavily fract'd/wthrd SS			
20	17.3-18.2' Brnish grey, oxidized fn-grnd SS w/ interbdd CS SS layers.			
21	18.2-18.7' V. Heavily fract'd/wthrd shaley SS w/ coal "stringers"			
22	clay + sand seam 18.5-18.7'			
23	18.7'-21.3' Interbedded grey fn-grnd SS/siltstone + blk shale			
24	21.3-24.4' Interbedded grey fn-grnd SS/siltstone + blk shale			
25	become shalier to bottom. Heavily fract'd/wthrd 23.3-24.3'			
26	24.4-25.7' Dk grey shale w/ thin interbeds.			
27	25.7-26.3' "~~[illegible]~~ Laminated" dk grey silty shale. (Non fissile)			
28	26.3-28.3' Same as above. Minor blk sand grns (mafic min'l?)			
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				

DRAFT

DRILLING LOG FOR MW-6S

Project Name Wellsville-Andover L.F.

Site Location W side of S Fill area

Date Started/Finished 9-12-91 / 9-12-91

Drilling Company American Auger & Ditching

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R. Watt

Rig Type (s) Mobile B-57

Drilling Method (s) Auger

Bit Size (s) ______ Auger Size (s) 4 1/4" ID

Auger/Split Spoon Refusal 14.8'

Total Depth of Borehole Is 14.8'

Total Depth of Corehole Is NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-24-91	0905	12.35
11-20-91	1358	11.69
2-26-92	0920	9.87

Well Location Sketch

See MW-6D

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

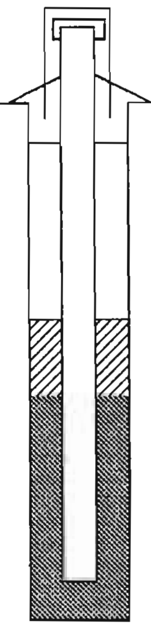
MW-6S **DRAFT**

Stick-up ~2.5 ft

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 Inches

SCREENED WELL



Top of Grout 0 ft

Borehole Diameter 8-10 Inches ______ ft ______

Top of Seal at 3 ft

Bottom of Seal at 5

Top of Screen at 6.5 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel ______
- ☐ Natural ______

Bottom of Screen at 13.5 ft

Lock Number ______

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets ______

Cement ______

Cement/ Bentonite ______

Grout ______

Top of Sand Pack 5

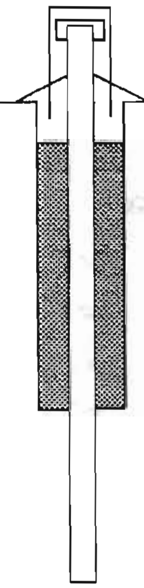
Screen Slot Size 0.010"

Screen Type ______
- ☒ PVC Sch. 40
- ☐ Stainless Steel -

Bottom of Hole at 14.8 ft

Bottom of Sandpack at 13.5

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	See log for MW-6D for lithology	○	○	○
1		○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○

DRAFT

DRILLING LOG FOR MW-7D

Project Name: Wellsville Andover Landfill

Site Location: On LaDue Property S of site

Date Started/Finished: 10-1-91 / 10-2-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger / core

Bit Size (s): HQ   Auger Size (s): 4 1/4" ID

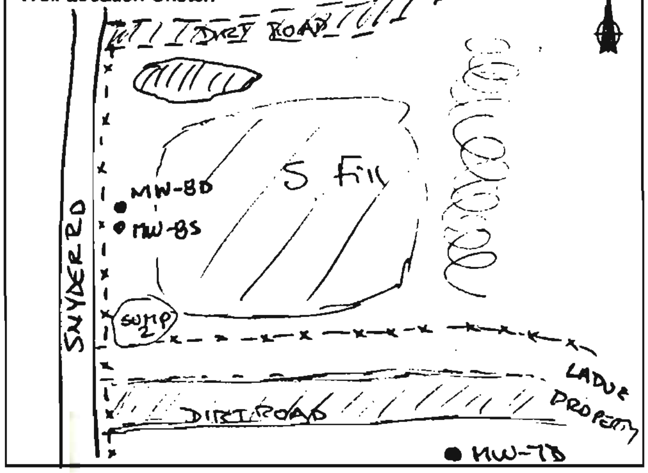
Auger/Split Spoon Refusal: 26'

Total Depth of Borehole Is: 26'

Total Depth of Corehole Is: 45.4

Water Level (TOIC)		
Date	Time	Level (Feet)
10-23-91	1433	33.86
11-20-91	~~1433~~ 1419	33.59
2-26-92	1155	33.33

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0–2	1	8	21								0	1.9' Rec.
		25	33									
2–4	2	14	25								0	1.2' Rec.
		49	35									
4–6	3	3	9								0	1.8' Rec.
		13	12									
6–8	4	8	22								0	1.2' Rec.
		23	20									
8–10	5	17	18								0	1.6' Rec.
		13	18									
10–12	6	13	40								0	1.8' Rec.
		32	13									
12–14	7	16	50 5.5"								0	1.0' Rec.
		x	x									
14–	8	36	30								0	1.9' Rec.

DRAFT

MW-7D

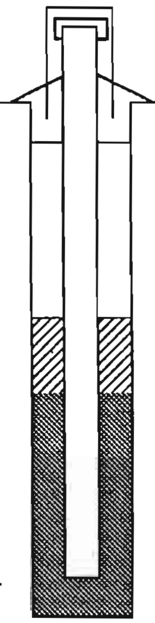
SCREENED WELL | **OPEN-HOLE WELL**

Stick-up 2.5 ft

Inner Casing Material Sch. 40 PVC

Lock Number 3252

Inner Casing Inside Diameter 2 Inches



GROUND SURFACE

Top of Grout 3 ft

Borehole Diameter 8-10 inches ___ ft

Top of Seal at 24 ft

Bottom of Seal at 31

Top of Screen at 35 ft

Pack Type/Size:
- ☒ Sand #3 Q-Rok
- ☐ Gravel ___
- ☐ Natural ___

Bottom of Screen at 45.1 ft

Quantity of Material Used:
- Bentonite Pellets N/A
- Cement 3'
- Cement/ Bentonite 21'
- Grout –

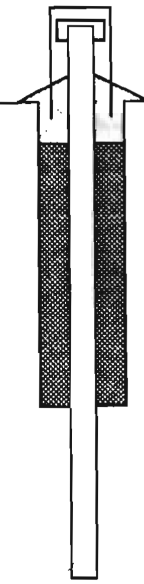
Top of Sand Pack 31

Screen Slot Size 0.010"

Screen Type ___
- ☒ PVC Sch. 40
- ☐ Stainless Steel ___

Bottom of Hole at 45.4 ft

Bottom of Sandpack at 45.4



Stick-up ___ ft

Inner Casing Material ___

Inner Casing Inside Diameter ___ Inches

Top of Grout ___ ft

Bottom of Outer Casing ___ ft

Borehole Diameter ___ ft

Bedrock ___ ft

Bottom of Rock Socket/ Grout/ Casing ___ ft

Corehole Diameter ___

Bottom of Corehole ___ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.4' Dk brown organic rich silt w/ clay + sand (topsoil)	⊗	○	○
2	0.4-2' Grey, wthrd SS gravel in a matrix of brown sand w/ minor clay	⊗	○	○
3	2-4' Brown clayey sand w/ silt + SS gravel to 1/2". SS	⊗	○	○
4	cobble in end of spoon.	⊗	○	○
5	4-4.5' Light brown sandy silt	⊗	○	○
6	4.5-6' Med. brn sandy clay w/ gravel + silt. Sand is fn to cs-	○	⊗	○
7	grained. Cs sand/gravel is angular ~~[illegible]~~ calcareous SS. Very slight moist	⊗	○	○
8	6-8' Same as above	⊗	○	○
9	8-10' Same as above	⊗	○	○
10	10-10.5' SS gravel w/ sand + clay (wthrd in place) - dry	⊗	○	○
11	10.5-11.2' Med. brn sandy clay w/ silt + gravel. Sand is ~~[illegible]~~ calcareous	⊗	○	○
12	(very slight moisture)	⊗	○	○
13	11.2-11.5' Same as 10-10.5'	⊗	○	○
14	11.5-12' Same as 10.5-11.2'	⊗	○	○
	12-13' Same as above 13-14' ?	⊗	○	○

DRAFT

MW-7D

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
		36	50 5"									
16	9	12	20								0	1.8' Rec.
17		20	30									
18	10	16	26								0	2.0' Rec.
19		35	36									
20	11	30	50 5½"								0	0.9' Rec.
21		x	x									
22	12	25	50 5"								0	0.6' Rec.
23		x	x									
24	13	49	50 5"								0	0.9' Rec.
25		x	x									
26	14	50 4"	x				1	4.3' 100%	15%		0	26-30.3'
27		x	x									
28												
29												
30												
31							2	5' 100%	24%		0	30.3-35.3'
32												
33												
34												
35												
36						3 min/ft @400 psi	3	4.7' 96%	32%		0	35.3-40.3'
37												
38												
39												
40												
41						3 min / Ft @ 400 psi	4	5' 100%	15%		0	40.3-45.3'
42												
43												
44												

DRAFT

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
16	14-14.5' Same as above	⊗	○	○
17	14.5-14.8' Grey SS cobbles (wthrd in place) dry	⊗	○	○
18	14.8-16' Same as 14-14.5' (very slight moisture)	⊗	○	○
19	16-18' Same as above	⊗	○	○
20	18-20' Same as above w/ shale gravel in addition to SS in	⊗	○	○
21	last 4"	⊗	○	○
22	20-21' Light brn sandy clay w/ silt (dry)	⊗	○	○
23	21-22' ?	⊗	○	○
24	22-23' Light brn sandy clay w/ silt + gravel (dry)	⊗	○	○
25	23-24' ?	⊗	○	○
26	24-24.6' Same as 22-23'	⊗	○	○
27	24.6-24.9' Red, wthrd/oxidiz. med-grnd SS	○	○	○
28	25-26' ?	○	○	○
29	26-26.3' wthrd/oxid. grey + red SS	○	○	○
30	26-30.3' wthrd brown (grey where fresh surface) fine-grnd,	○	○	○
31	laminated, fossiliferous (brachs) SS. Becomes shaley	○	○	○
32	SS/siltstone from 28-30'. Numerous horiz + vert.	○	○	○
33	frac's from 27.4' down.	○	○	○
34	30.3-35.3' Interbedded fn-grnd laminated SS and	○	○	○
35	laminated shaley SS/siltstone. Mostly oxidized orng-	○	○	○
36	brn, with some fresh grey areas. Numerous horiz. +	○	○	○
37	vert. frac's. Heavily fract'd from 35.9-37.9'	○	○	○
38	35.3-36.1' Laminated shaley fn-grnd SS, red-brn where	○	○	○
39	oxid. w/ minor grey fresh-surface. Numerous horiz. + vert fracs.	○	○	○
40	36.1-36.5' Laminated fine-grnd SS - otherwise same as above.	○	○	○
41	36.5-39.5' Dk grey sandy/silty shale w/ oxidized horiz.	○	○	○
42	fracs.	○	○	○
43	39.5-40.3' Red-maroon fn to cs-grnd-SS. Grades down from	○	○	○
44	grey shale to red. SS. one horiz. oxid. frac. cs grains	○	○	○
	are rounded qtz.	○	○	○

Depth(feet)	NARRATIVE LITHOLOGIC DESCRIPTION MW-7D	Moist. Content: Dry	Moist	Wet
46	40.3 - 40.8 Red, poorly sorted, fn to cs grnd SS, w/ subround			
47	qtz cs grains			
48	40.8-40.9 Black shale.			
49	40.9 - 41.1' Same as 40.3-40.8'			
50	41.1-45.3' Interbedded grey fn grnd SS, shaly SS, + dk grey			
51	shale. Oxidiz. frac 42.6 - 44.3' + heavily fract'd.			
52	from 42.6 - 43.3'. Vert. frac. @ 41.1 - 41.5'. Bottom 0.6'			
53	is dk grey shale w/ irregular interbeds of grey SS.			
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
67				
68				
69				
70				
71				
72				
73				
74				
75				

DRAFT

DRILLING LOG FOR MW-8D

Project Name Wellsville-Andover Landfill

Site Location W side of S fill area, adjacent to Snyder Rd.

Date Started/Finished 9-20-91 / 9-30-91

Drilling Company American Auger

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R Watts

Rig Type (s) Mobile B-57

Drilling Method (s) Auger / core

Bit Size (s) HQ Auger Size (s) 4 1/4" ID

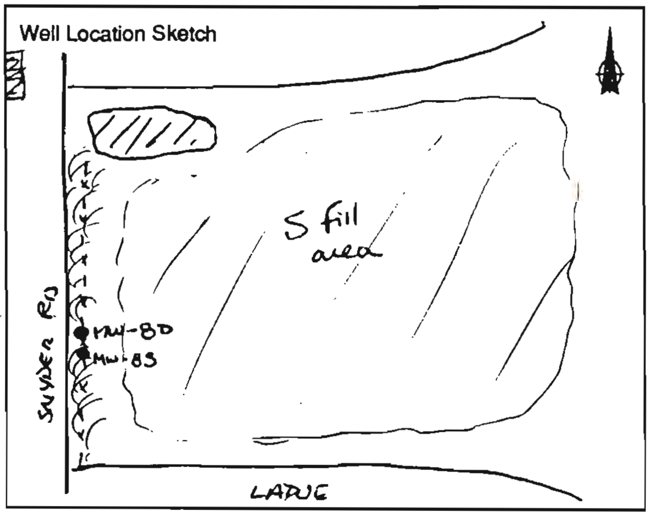
Auger/Split Spoon Refusal ~~[illegible]~~ ~~[illegible]~~ 64'

Total Depth of Borehole Is ~~[illegible]~~ 64'

Total Depth of Corehole Is 78'

Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0–2	1	11	17								0	1.9' Rec.
		12	20									
2–4	2	22	23								0	1.1' Rec.
		50 6"	x									
4–6	3	19	19								0 in hole + on cuttings	0 Rec. Prob. pushed a stone
		20	23									
6–8	4	16	17								0	1.1' Rec extra S. spoon for sample recov.
		16	24									
8–10	5	12	12								0	2' Rec.
		12	13									
10–12	6	6	7								0	2' Rec.
		9	12									
12–14	7	8	8								0	1.4' Rec.
		8	16									
14–	8	3	5								0	1.2' Rec.

10/9/91 DRAFT 14' open 10/9/91

ABANDONED 2-27-92

Stick-up 2.5 ft

Inner Casing Material PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 3 ft

Borehole 10 Inches Diameter ft

Top of Seal at 57 ft

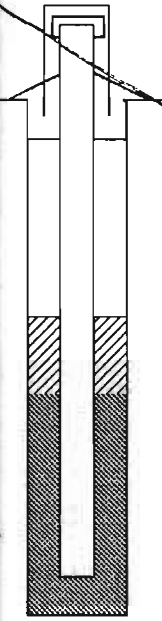
Bottom of Seal at 65.5'

Top of Screen at 67 ft

Pack Type/Size:
- ☒ Sand #2Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 77.0' ft

SCREENED WELL



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets NA

Cement #3'

Cement/ Bentonite 54'

Grout

Top of Sand Pack 65.5'

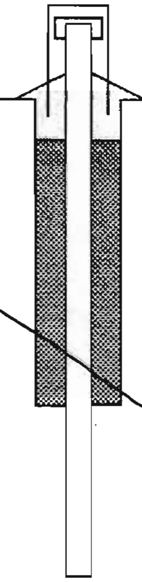
Screen Slot Size 0.010"

Screen Type
- ☒ PVC SCH. 40
- ☐ Stainless Steel

Bottom of Hole at 77.0' ft

Bottom of Sandpack at 77.0'

OPEN-HOLE WELL



Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Top of Grout ft

Bottom of Outer Casing ft

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Grout/ Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.2' Dk brn, organic rich silty sand topsoil	⊗	○	○
2	0.2-2' Mottled lt grey/orng-brn sandy silt w/ gravel + minor clay.	⊗	○	○
3	2-3.1' Mottled grey/brn sandy silt w/ gravel + clay. Tight but	⊗	○	○
4	noncohesive Gravel is angular SS w/ some ang. Shale.	⊗	○	○
5	4-6' ? Auger cuttings indicate same as above w/ increased	⊗	○	○
6	gravel content. %-ages now indicate gravelly sand w/ clay + silt Rock layer @ 5'	⊗	○	○
7	6-7.1' Slightly moist brn gravelly sand w/ clay + silt. Shaley SS	○	⊗	○
8	layer @ ~6', Cuttings indicate cobbles of shaley SS @ ~7.58'	○	⊗	○
9	8-10' Brn gravelly clay w/ sand + silt; slightly moist;	○	⊗	○
10	Tight.	○	⊗	○
11	10-12' Same as above.	○	⊗	○
12	12-14' Same as above w/ SS cobbles @ 12' + 13.5'. Slightly	○	⊗	○
13	Moist			
14	14-16' Same as above	○	⊗	○
		○	○	○

DRAFT MW-8

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
		7	12									
16–18	9	8	14								0	0.6' Rec. Cobble in end of spoon; OUTSIDE OF SPOON IS WET
		10	21									
18–20	10	6	17								0	0.4' Rec. pushed cobble; outside of spoon is wet.
		15	15									
20–22	11	6	9								0	No Rec. pushed cobble; Took 2nd spoon to see
		9	13									
22–24	12	5	5								0–0.2	1.5' Rec.
		5	14									
24–26	13	8	10								0	2' Rec.
		14	21									
26–28	14	12	12								0	1.8' Rec.
		16	20									
28–30	15	16	50 4"								0	0.4' Rec.
		x	x									
30–32	16	10	15								0	1.8' Rec
		25	23									
32–34	17	16	20								0	1.7' Rec.
		23	29									
34–36	18	12	30								0	1.2' Rec.
		23	28									
36–38	19	15	20								0 - [illegible]	1.7' Rec.
		49	41									
38–40	20	25	25			0.1'/min @ 1200 psi.					0-0.2	2' Rec Augers very
		25	30									
40–42	21	18	30								10 OVA 0 HNu dissipates quickly	0.2' Rec. Not enough to sample 0 OVA on cuttings
		39	38									
42–44	22	20	23								0	2' Rec.
		21	37									
44–	23	10	20								0	0.3' Rec.

DRAFT

NARRATIVE LITHOLOGIC DESCRIPTION

MW-8D

Depth(feet).	Narrative Lithologic Description	Moisture Content: Dry	Moist	Wet
16	16 - 16.6' Same as above.		X	
17	18 - 18.4' Same as above		X	
18	20-22' Same as above but very moist - clay content		X	
19	increased. - Gravelly clayey sand w/ silt		X	
20	22-24' Greyish-brn sandy clay w/ silt + gravel. Gravel is		X	
21	occaiss. SS frag. Moist. Less gravel than above + more			X
22	rnd (subrnd to subang).			X
23	24-26' Same as above, but gravel also consists of		X	
24	shale frags 1" x 1/2" x 1/16". Top 6" is saturated		X	
25	from sitting in auger bit, rest is wet.			X
26	26-28' Similar to above but more silt + clay +			X
27	less gravel + sand - greyish brn silty clay		X	
28	w/ sand + gravel		X	
29	28 - 28'10" Same as above		X	
30	Auger cuttings since 24' have been saturated.			
31	30 - 32' Similar to above, but high gravel content -			X
32	gravelly clay w/ silt + sand. Wet @ top - only		X	
33	slightly moist @ bottom.		X	
34	32-34' Same as above w/ inc. sand content - gravelly sandy		X	
35	clay w/ silt		X	
36	34-36' Same as above, only slightly moist.		X	
37	36-38' Same as above w/ SS cobble + rnd med-grnd sand		X	
38	@ ~~bottom~~ - Sand is oxidized maroon qtz.		X	
39	38-40' Same as above w/ wthrd maroon (sand +) sandstone		X	
40	@ 38.5-38.8' - ~~[illegible]~~		X	
41	40-42' ? Pushed a maroon SS cobble (heavily wthrd)		X	
42	42-44' Same as above w/ gravel also consisting of shaly		X	
43	SS + calcareous ~~micaceous~~ SS. SS layer 42.3-42.6' (brn to		X	
44	grey, wthrd, not oxidized).		X	
	44 - 44.3' SS cobbles. - pushed one - poor recovery.		X	

MW-3D

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
		31	30									
46	24	25	40								0	2' Rec
47		40	50 4"									
48	25	12	13								0	1.2' Rec.
49		40	49									
50	26	13	40								0	1.3' Rec.
51		38	38									
52	27	11	15								0	1.3' Rec.
53		22	31									
54	28	7	8								0	1.1' Rec.
55		15	49									
56	29	8	12								0	0.9' Rec
57		50 4"	x									
58	30	12	22								0	0.5' Rec.
59		40	50 4"									
60	31	6	23								0	0.7' Rec.
61		50 3"	x									
62	32	7	18								0	0.9' Rec.
63		50 5"	x									
64	33	6	40								0	0.8' Rec.
65		50 1"	x				1	100%	40%		0	64.5 - 66'
67						2.7 min per ft @ 600 psi	2	5' 100%	83%		0	66 - 71'
68												
69												
70												
71						3 min per ft @ 700 psi	3	5' 100%	19%		0	71 - 76'
72												
73												
74												
75												

DRAFT

NARRATIVE LITHOLOGIC DESCRIPTION MW-80

Depth(feet)	Narrative Lithologic Description	Moisture Content (Dry / Moist / Wet)
	~~Topsoil~~ 46-48' Greyish brown sandy clay w/ silt + occasional	Wet
46	gravel & wthrd SS. Top 4" is coarse sand, prob.	Moist
47	from auger bit. Top 1.5' is saturated from overlying	Moist
48	water, rest is MOIST.	Moist
49	48-49' Same as above.	Moist
50	49-50' Sandy clay w/ gravel mottled greenish-grey	Moist
51	+ pinkish grey. Contains shaly calcareous ~~micaceous~~	Moist
52	SS gravel (greenish grey) w/ 1mm coal @ bottom	Moist
53	50-52' Same as above not mottled grey / Lt brn (no coal)	Moist
54	52-54' Same as 49-50' w/ top 4" consisting of wthrd	Moist
55	SS cobbles + 1 conglomerate cobble.	Moist
56	54-56' Same as above w/ wthrd fossiliferous (brachs)	Moist
57	SS cobbles @ bottom.	Moist
58	56-57.3' Same as above but w/ bottom 3"-4" brn	Moist
59	heavily wthrd calcareous ~~micaceous~~ SS, structures intact.	Moist
60	58-60' Same as last 3" of above.	Moist
61	60-61.3' ~~70~~ Same as above	Moist
62	62-63.4' Same as above w/ slightly more clay rich	Moist
63	Matrix	Moist
64	64-65' Same as above. Auger refusal @ 64.5'	Moist
65	64.5-65' Wthrd (oxid) brn laminated fn-grnd SS	Moist
67	65-65.1' Irregular interbeds of blk shale w/ grey SS	
68	65.1-66' Same as 64.5-65'. Soil layer @ 65.1'	
69	66-71' Lt grey fn-grnd laminated sandstone w/	
70	occasional interbeds of blk $CaCO_3$ ~~mica~~-rich shale.	
71	Oxidized brn from 66-66.?', 68-68.3', 69', 69.4-69.8',	
72	+ @ 71'.	
73	71-74.4' Lt grey fn-grnd SS w/ irreg blk shale interbeds	
74	Blk shale clasts @ 71.7-71.9'. Brn Oxidation @ 71.6', 72.5',	
75	+ 74.4'.	

DRAFT

MW-8D

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
77						4	2' 100%	27.5'		0	76-78'
78											
79											
80											
81											
82											
83											
84											
85											
86											
87											
88											
89											
90											
91											
92											
93											
94											
95											
96											
97											
98											
99											
100											
101											
102											
103											
104											
105											

DRAFT

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION MW-8D	Moisture Content: Dry	Moist	Wet
77	74.4-76' Blk shale w/ irreg. interbeds of lt grey SS.			
78	Heavily wthrd/oxidized from 75.6-76' w/ vert. fract.			
79	76-78' Same as above w/ heavily wthrd/fract'd zones			
80	@ 76-76.3' + 77.5-77.9'			
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				
98				
99				
100				
101				
102				
103				
104				
105				

DRAFT

DRILLING LOG FOR MW-8D (redrill)

Project Name Wellsville-Andover L.F.

Site Location W side of S fill area, adjacent to Snyder Rd.

Date Started/Finished 2-26-92/2-27-92

Drilling Company American Auger & Ditching

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R. Watt

Rig Type (s) Mobile B-57

Drilling Method (s) Auger / water coring

Bit Size (s) HQ Auger Size (s) 4 1/4" ID

Auger/Split Spoon Refusal 55'

Total Depth of Borehole Is 55'

Total Depth of Corehole Is 71'

Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch

See original MW-8D

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

MW-8D (redrill)

DRAFT

Stick-up ~2.5 ft

Inner Casing Material Sch.40 PVC

Inner Casing Inside Diameter 2 inches

Top of Grout 0 ft

Borehole Diameter 8-10 inches

Top of Seal at 35 ft

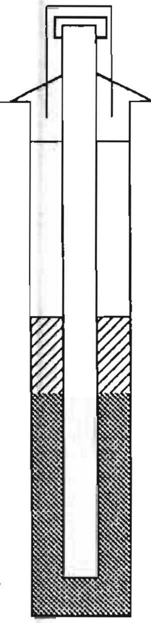
Bottom of Seal at 58'

Top of Screen at 61 ft

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

Bottom of Screen at 71 ft

SCREENED WELL



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets ______

Cement ______

Cement/ Bentonite ______

Grout ______

Top of Sand Pack 58'

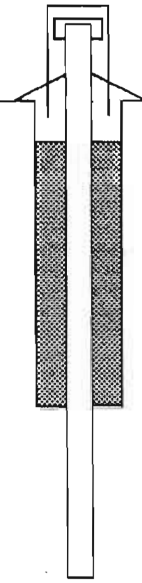
Screen Slot Size 0.010"

Screen Type ______
- ☐ PVC ______
- ☒ Stainless Steel 304

Bottom of Hole at 71.3' ft

Bottom of Sandpack at 71.3'

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	see log for original MW-8D (now abandoned)	○	○	○
1	for lithologic description.	○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
		○	○	○

DRAFT

DRILLING LOG FOR MW-8S

Project Name: Wellsville-Andover L.F.

Site Location: W side of S Fill area, adjacent to Snyder Rd.

Date Started/Finished: 9-30-91 / 10-1-92

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger

Bit Size (s): ______ Auger Size (s): 4¼" ID

Auger/Split Spoon Refusal: NA

Total Depth of Borehole Is: 20.7'

Total Depth of Corehole Is: NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1140	9.27
11-20-91	1411	9.12
2-26-92	1245	8.22

Well Location Sketch

See MW-8D

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

DRAFT

SCREENED WELL

Stick-up ~2.5 ft

Inner Casing Material sch 40 PVC

Inner Casing Inside Diameter 2 inches

Top of Grout 0 ft

Borehole Diameter 8-10 inches ______ ft ______

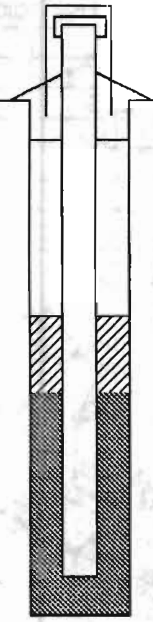
Top of Seal at 3.5 ft

Bottom of Seal at 5.5'

Top of Screen at 7 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel ______
- ☐ Natural ______

Bottom of Screen at 17 ft



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:
- Bentonite Pellets ______
- Cement ______
- Cement/Bentonite ______
- Grout ______

Top of Sand Pack 5.5'

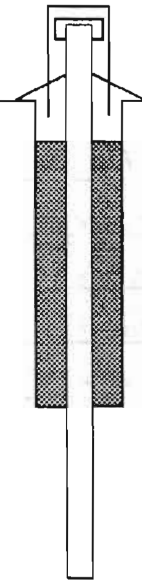
Screen Slot Size 0.010"

Screen Type ______
- ☒ PVC sch. 40
- ☐ Stainless Steel ______

Bottom of Hole at 20.7 ft

Bottom of Sandpack at 20.7'

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	See log for MW-8D for lithology.	○	○	○
1		○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○

DRAFT

DRILLING LOG FOR MW-9D

Project Name: Wellsville-Andover Landfill

Site Location: N of site access road near N access ~~road~~ gate

Date Started/Finished: 9-18-91 / 9-19-91

Drilling Company: American Auger + Ditching Co.

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger / core (water)

Bit Size (s): HQ Auger Size (s): 4 1/4" ID

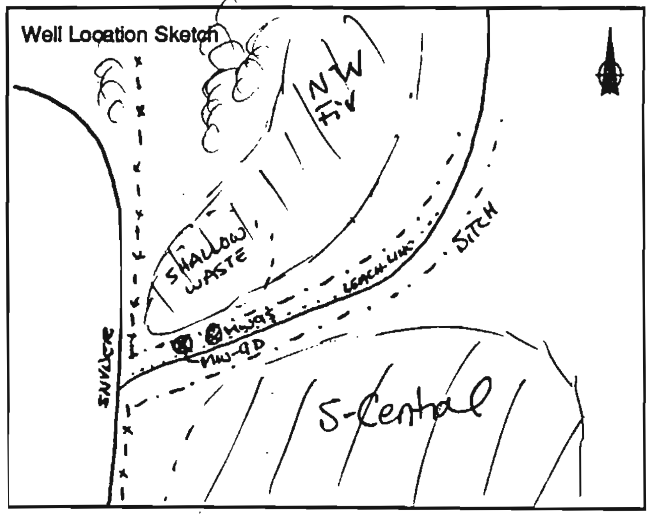
Auger/Split Spoon Refusal: 29'

Total Depth of Borehole Is: 29'

Total Depth of Corehole Is: 45.4'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1121	~~29.78~~ 28.17
11-20-91	1255	29.78
2-26-92	1100	29.76

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
	1	16	18								0/0	1.7' Rec.
1		18	23									
2	2	24	32								0/0	1.2' Rec.
3		29	26									
4	3	18	17								0/0	1.8' Rec.
5		22	15									
6	4	10	12								0/0	1.4' Rec.
7		13	12									
8	5	~~6~~ 10	7								0/0	0.9' Rec.
9		11	30									
10	6	16	24								0/0	1.5' Rec.
11		16	25									
12	7	26	21								0.4 OVA	1.4' Rec.
13		20	21								0 HNu	Not enough to sample tho'
14	8	10	10								0/0	1.6' Rec.

Stick-up 2.5 ft

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 0 ft

Borehole Diameter 8-10 Inches ft

Top of Seal at 26 ft

Bottom of Seal at 32

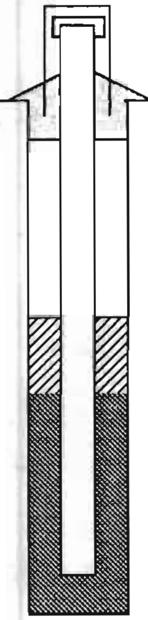
Top of Screen at 35.1 ft

Pack Type/Size:

- ☒ Sand #2 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 45.1 ft

SCREENED WELL



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets N/A

Cement 3'

Cement/ Bentonite 23'

Grout

Top of Sand Pack 32

Screen Slot Size 0.010"

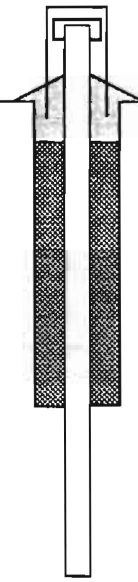
Screen Type Sch. 40

- ☒ PVC 10'
- ☐ Stainless Steel

Bottom of Hole at 45.4 ft

Bottom of Sandpack at 45.4

OPEN-HOLE WELL



Stick-up ______ ft

Inner Casing Material ______

Inner Casing Inside Diameter ______ Inches

Top of Grout ______ ft

Bottom of Outer Casing ______ ft

Borehole Diameter ______ ft

Bedrock ______ ft

Bottom of Rock Socket/ Grout/ Casing ______ ft

Corehole Diameter ______

Bottom of Corehole ______ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.3' Dark brown organic rich silt w/ sand + clay	⊗	○	○
2	0.3-0.4' Gravel (from road)	⊗	○	○
3	0.4-4' Brown sandy clay w/ silt + gravel - tight, dry. Occasional	⊗	○	○
4	gravel to 1.5" of ang. SS + subrnd qtz + SS to 1/4"	⊗	○	○
5	4-6 Same as above.	⊗	○	○
6	6-8' Same as above but contains orng + maroon sands from	⊗	○	○
7	oxidized SS. Very slightly moist.	○	⊗	○
8	8-9' Same as above + very slightly moist.	○	⊗	○
9	10-10.8' Angular wthrd SS frags to 1.5"	○	⊗	○
10	10.8-12' Same as 8-9'	○	⊗	○
11	12-12.9' Angular wthrd SS frags to 1.5"	⊗	○	○
12	12.9-14' Same as 8-9' but increased gravel %-age + size.	○	⊗	○
13	14-16' Same as immed. above but gravel also now consists of	⊗	○	○
14	wthrd shale frags.	○	⊗	○
		○	⊗	○

DRAFT

MW-9D

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
15–16		15 19									
16–18	9	6 10 15 29								0/0	1.6' Rec.
18–20	10	8 15 10 20								0/0	0.8' Rec.
20–22	11	9 10 12 15								0/0	1.3' Rec.
22–24	12	6 15 18 20								0/0	1.0' Rec
24–26	13	10 12 20 20								0/0	1.2' Rec
26–28	14	11 26 40 50/3"								0/0	1.4' Rec.
28–29	15	25 41								0/0	1.0' Rec. Ref. @ 29'
29–30.9		50/0" x				1	1.9' 100%	0%		0/0	29-30.9'
30.9–35.5					4 min for bottom ft @ 800 psi (caved?) got wh circul.	2	4' 86%	25%		0/0	30.9-35.5'
35.5–40.5					4 min/ft @ 750 psi	3	5' 100%	0%		1 OVA 0 HNu	35.5-40.5'
41–44											

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION MW-9D	Moisture Content: Dry	Moist	Wet
16	16-18' Same as immed. above but no shale		⊗	
17	18-18.5' wthrd angular SS frags in sand matrix, wthrd		⊗	
18	Maroon @ 18.5'		⊗	
19	18.5-18.8' Same as 16-18'	⊗		
20	20-22' Same as above w/ one large shaly SS frag 2" long x 1"		⊗	
21	22-23' Same as above		⊗	
22	24-26' Same as above		⊗	
23	26-27.5' Lt brown gravelly sand w/ clay + silt - wthrd sandy		⊗	
24	shale bedrock - gravel is shale frags + matrix		⊗	
25	still has bedrock structure intact. Dry	⊗		
26	28-29' Dk brn gravelly sandy clay w/ silt. Gravel is large (1.5")	⊗		
27	SS frags			
28	29-30.9' Heavily wthrd (oxidized) + fractured SS (calcareous)			
29	Except @ bottom is oxid. conglomerate w/ fine gravel of			
30	rnd qtz. Numerous vert. + horiz. clay - filled frac's.			
31	30.9-35.5' Heavily fract'd + wthrd shaly fn-grnd SS.			
32	Numerous horiz. + vert. fract's, many clay filled.			
33	35.5-40.5' Very heavily wthrd / fract'd SS - really			
34	almost soil + not rock - many soil zones, many			
35	rock zones which can be crushed w/ fingers.			
36	Horiz. + vert. frac's.			
37	40.5-45.5' Same as above but what rock exists is			
38	very shaley siltstone / fn grd SS or sandy / silty shale			
39				
40				
41				
42				
43				
44				

DRAFT

DRAFT

DRILLING LOG FOR MW-9S

Project Name Wellsville-Andover L.F.

Site Location Near N access gate

Date Started/Finished 9-19-91 / 9-19-91

Drilling Company American Auger & Ditching

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R. Watt

Rig Type (s) Mobile B-57

Drilling Method (s) Auger

Bit Size (s) ______ Auger Size (s) 4 1/4" ID

Auger/Split Spoon Refusal NA

Total Depth of Borehole Is 19.3'

Total Depth of Corehole Is NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1121	20.29
11-20-91	1256	17.35
2-26-92	1056	10.99

Well Location Sketch

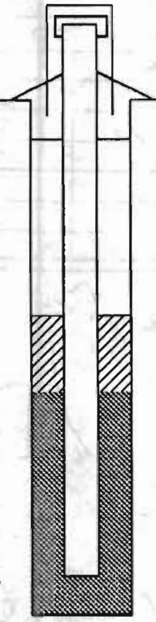
See MW-9D

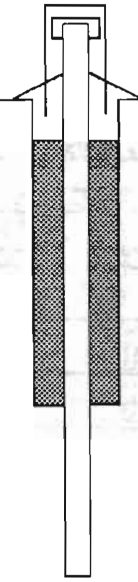
Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

MW-9S

DRAFT

SCREENED WELL		OPEN-HOLE WELL
Stick-up ~2.5 ft	Lock Number ______	Stick-up ______ ft
Inner Casing Material sch. 40 PVC		Inner Casing Material ______
Inner Casing Inside Diameter 2 inches	GROUND SURFACE	Inner Casing Inside Diameter ______ inches
Top of Grout 0 ft	Quantity of Material Used: Bentonite Pellets ______	Top of Grout ______ ft
Borehole 8-10 inches Diameter ______ ft ______	Cement ______	Bottom of Outer Casing ______ ft
Top of Seal at 5 ft	Cement/ Bentonite ______	Borehole Diameter ______ ft
Bottom of Seal at 7'	Grout ______	
	Top of Sand Pack 7'	Bedrock ______ ft
Top of Screen at 9 ft	Screen Slot Size 0.010"	
Pack Type/Size: ☒ Sand #2 Q-Rok ☐ Gravel ______ ☐ Natural ______	Screen Type ______ ☒ PVC sch. 40 ☐ Stainless Steel -	Bottom of Rock Socket/ Grout/ Casing ______ ft
		Corehole Diameter ______
Bottom of Screen at 19' ft	Bottom of Hole at 19.3 ft	Bottom of Corehole ______ ft
	Bottom of Sandpack at 19.3	





NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	See log for MW-9D for lithology	○	○	○
1		○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13				
14		○	○	○
		○	○	○

DRAFT

DRILLING LOG FOR MW-~~??~~10D

Project Name Wellsville-Andover Landfill

Site Location W side of ~~??~~ NW fill area on W side of ditch & "alleyway"

Date Started/Finished 9-13-91 / 9-17-91

Drilling Company American Auger & Ditching

Driller's Name Lee Penrod

Geologist's Name Rick Watt

Geologist's Signature R. Watt

Rig Type (s) Mobile B-57

Drilling Method (s) Auger / Core (water)

Bit Size (s) HQ   Auger Size (s) 4¼" ID

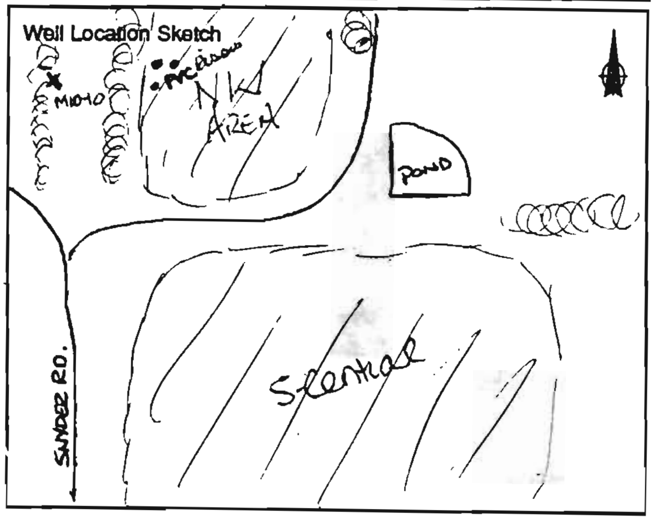
Auger/Split Spoon Refusal 29'

Total Depth of Borehole Is 29'

Total Depth of Corehole Is 43.4'

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1357	23.47
11-20-91	1306	25.41
2-26-92	1111	23.66

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	2 6 / 10 18								0/0	1.6' Rec.
2											
3	2	17 14 / 17 20								0/0	1.6' Rec.
4											
5	3	6 8 / 12 19								0/0	1.2' Rec.
6											
7	4	20 26 / 32 28								0-2 OVA 0 HNu	1.2' Rec.
8											
9	5	6 9 / 10 16								0/0	1.3' Rec
10											
11	6	7 12 / 16 25								0/0	1.7' Rec.
12											
13	7	4 5 / 9 13								0/0	1.4' Rec.
14											
	8	6 7									

MW-10D **DRAFT**

Stick-up 2.3 ft

Inner Casing Material Sch. 40 PVC

Inner Casing Inside Diameter 2 Inches

Top of Grout 0 ft

Borehole 8-10 Inches Diameter ___ ft

Top of Seal at 26 ft

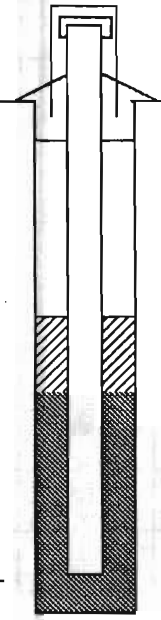
Bottom of Seal at 31

Top of Screen at 33.1 ft

Pack Type/Size:
- ☒ Sand #3 Q-Rok
- ☐ Gravel
- ☐ Natural

Bottom of Screen at 43.1 ft

SCREENED WELL



Lock Number 3252

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets N/A

Cement (Benseal/cement)

Cement/ Bentonite 23'

Grout

Top of Sand Pack 31

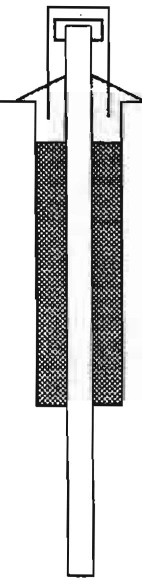
Screen Slot Size 0.010"

Screen Type
- ☒ PVC sch. 40
- ☐ Stainless Steel

Bottom of Hole at 43.4 ft

Bottom of Sandpack at 43.~~3~~ 4' (initialed)

OPEN-HOLE WELL



Stick-up ___ ft

Inner Casing Material ___

Inner Casing Inside Diameter ___ Inches

Top of Grout ___ ft

Bottom of Outer Casing ___ ft

Borehole Diameter ___ ft

Bedrock ___ ft

Bottom of Rock Socket/ Grout/ Casing ___ ft

Corehole Diameter ___

Bottom of Corehole ___ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	0-0.5' Dk brn silt w/ sand + organics (grass/roots)	X		
2	0.5-1.6' Mottled lt grey/orng-brn silty sand w/ clay + one 1"	X		
3	SS frag (subang)	X		
4	2-3.2' Same as immed. above but %age cs sand + gravel incr.	X		
5	down. Also orng-brn grades down to med. brn.	X		
6	3.2-3.6' Brown sand w/ clay, silt + gravel. CS sand + gravel is	X		
7	oxidized SS frags to 1/4"		X	
8	4-4.5' Same as immed. above.		X	
9	4.5-4.7' Competent SS layer. Greyish brown, wthrd		X	
10	4.7-5.2' Med. brown clayey sand w/ silt mottled w/ grey clay		X	
11	6-6.5' Brown gravelly sand w/ silt + clay, slightly moist		X	
12	6.5-7.3' Competent grey SS layer w/ SS gravel + minor silt + sand		X	
13	8-10' Moist, primarily olive-brn ~~Micaceous~~ calcareous sand w/ silt + clay			
14	+ minor gravel. Mottled w/ some grey clayey sand		X	
	10-12' Moist olive-brn micaceous clayey gravelly sand w/ silt			

Mottled w/ blk, grey, red, + maroon next to SS frags of same color.

DRAFT

MW-10D

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
15–16		7	10								0/0	1.8' Rec.
16–18	9	5	10								0/0	1.0' Rec.
		10	17									
18–20	10	8	14								3 OVA 0 HNu	1.8' Rec.
		16	20									
20–22	11	25	25								1 OVA 0 HNu	0.8' Rec.
		20	40									
22–24	12	13	50 3"								0/0	0.3' Rec. outside of spoon is wet.
		x	x									
24–26	13	10	26								0/0	1.6' Rec. outside of spoon is wet
		26	30									
26–28	14	15	15								<1/2 OVA 0 HNu	1.2' Rec.
		13	18									
28–30	15	10	50 6"								0/0	0.8' Rec. ~1.0' of hammer is wet
		x	x									
30–31.2						2 min/ft @500psi	1	2.2' 100%	0%		0/0	29-31.2'
31.2–36.2							2	5' 100%	56%		0/0	31.2-36.2'
36.2–41.2						3 to min/ft @800 psi	3	5' 100%	27%		0/0	36.2-41.2'
41.2–43.2							4	2' 100%	50%		0/0	41.2-43.2'

DRAFT

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION , MW-10D	Moisture Content: Dry	Moist	Wet
16	12-14' Moist olive-brn gravelly clay w/ sand & silt. Gravel is subrnd	○	⊗	○
17	shale + ss frags to 1/4"	○	⊗	○
18	14-16' Same as above w/ one ss frag to 1" + one oxidiz. conglom.	○	⊗	○
19	frag to 1". Bottom 5-6" is same color but no gravel -	○	⊗	○
20	~~Mica~~ $CaCO_3$-rich sandy clay w/ silt	○	⊗	○
21	16-18(?) Limited recovery due to pushing + subsequent	○	⊗	○
22	rec. of 1.5" SS cobble. Recov. is same as above w/ gravel	○	⊗	○
23	18-18.5' Same as above	○	⊗	○
24	18.5-20' Bluish grey wthrd calcareous ~~micaceous~~ shale / clay	○	⊗	○
25	20-21' Same as above. Fissile sandy calcareous ~~micaceous~~ shale frags in	○	○	⊗
26	clay matrix. Slightly moist	○	○	⊗
27	22-22.7' wthrd shale, slightly moist	⊗	○	○
28	24-26' Same as above but wet. Soil would be classif. as gravelly clay	⊗	○	○
29	26-28' Same as above but dry.	○	○	⊗
30	28-29' Wet clayey gravel w/ sand - gravel is shaly SS	○	○	⊗
31	29-31.2 Grey calcareous ~~micaceous~~ laminated fine-grnd SS. Appears lamin'd	○	○	○
32	w/ shale. Minor oxidation on fracture surfaces	○	○	○
33	31.2 - 33.7' Competent laminated grey/blk fn-grd, calcareous ~~micaceous~~ SS	○	○	○
34	33.7 - 33.9' Heavily wthrd, oxidiz. zone of same	○	○	○
35	33.9 - 34.1' Dk grey SS w/ coal "stringers")	○	○	○
36	34.1 - 34.3' Lamin'd shaly SS/shale.	○	○	○
37	34.3 - 34.5' Dk grey, soft shale	○	○	○
38	34.5 - 34.9' Same as 31.2-33.7' but half is oxidized.	○	○	○
39	34.9 - 35.1' Dk grey, soft shale w/ oxidized fracture zone @ top.	○	○	○
40	35.1 - 35.9' Same as 31.2-33.7'	○	○	○
41	35.9 - 36.2' Interbedded shale / SS (grey).	○	○	○
42	36.2 - 36.9' Laminated shaly SS (grey) w/ oxid. fract @ 36.5'	○	○	○
43	36.9 - 37.1' Heavily oxid. + fract'd shale	○	○	○
44	37.1 - 37.4' Lam'd shaly SS (grey)	○	○	○
	37.4 - 41.2' Black fissile shale w/ vert. oxid. frac @ 39'	○	○	○

+ clay filled horiz. frac @ 39.8' Interbedded w/ maroon shale @ bottom.

Depth(feet)	NARRATIVE LITHOLOGIC DESCRIPTION MW-10D	Moisture Content: Dry	Moist	Wet
46	41.2-42.2' Black shale w/ thin sandy/silty laminations	○	○	○
47	heavily fract'd @ 42-42.2'	○	○	○
48	42.2-43.2' Grey competent SS w/ conglomerate in	○	○	○
49	last 4"	○	○	○
50		○	○	○
51		○	○	○
52		○	○	○
53		○	○	○
54		○	○	○
55		○	○	○
56		○	○	○
57		○	○	○
58		○	○	○
59		○	○	○
60		○	○	○
61		○	○	○
62		○	○	○
63		○	○	○
64		○	○	○
65		○	○	○
67		○	○	○
68		○	○	○
69		○	○	○
70		○	○	○
71		○	○	○
72		○	○	○
73		○	○	○
74		○	○	○
75		○	○	○

DRAFT

DRAFT

DRILLING LOG FOR MW-10 S

Project Name: Wellsville - Andover L.F.

Site Location: W of NW fill area, W side of leachate collection sys.

Date Started/Finished: 9-17-91 / 9-17-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger

Bit Size (s): ______ Auger Size (s): 4 1/4" ID

Auger/Split Spoon Refusal: NA

Total Depth of Borehole Is: 24.3'

Total Depth of Corehole Is: NA

Water Level (TOIC)		
Date	Time	Level(Feet)
10-22-91	1356	14.30
11-20-91	1307	14.81
2-26-92	1109	9.61

Well Location Sketch

See MW-10D

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

MW-10S

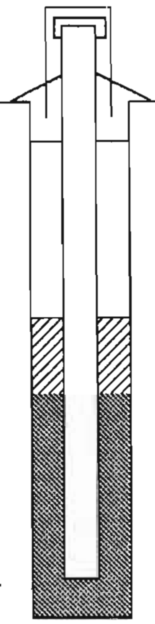
DRAFT

Stick-up 22.5 ft

Inner Casing Material sch.40 PVC

Inner Casing Inside Diameter 2 inches

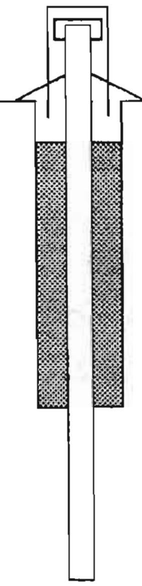
SCREENED WELL



Lock Number 3252

GROUND SURFACE

OPEN-HOLE WELL



Stick-up ____ ft

Inner Casing Material ____

Inner Casing Inside Diameter ____ inches

Top of Grout 0 ft

Borehole Diameter 8-10 inches ____ ft ____

Top of Seal at 7 ft

Bottom of Seal at 9'

Top of Screen at 14 ft

Pack Type/Size:
- ☒ Sand #2 Q-Rok
- ☐ Gravel ____
- ☐ Natural ____

Bottom of Screen at 24 ft

Quantity of Material Used:

Bentonite Pellets ____

Cement ____

Cement/ Bentonite ____

Grout ____

Top of Sand Pack 9'

Screen Slot Size 0.010"

Screen Type ____
- ☒ PVC sch.40
- ☐ Stainless Steel ____

Bottom of Hole at 24.3 ft

Bottom of Sandpack at 24.3'

Top of Grout ____ ft

Bottom of Outer Casing ____ ft

Borehole Diameter ____ ft

Bedrock ____ ft

Bottom of Rock Socket/ Grout/ Casing ____ ft

Corehole Diameter ____

Bottom of Corehole ____ ft

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	See log for MW-10D for lithology.	○	○	○
2		○	○	○
3		○	○	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
		○	○	○

DRAFT

DRILLING LOG FOR MW-11S

Project Name: Wellsville-Andover L.F.

Site Location: South of site on LaDue's property

Date Started/Finished: 10-3-91 / 10-4-91

Drilling Company: American Auger & Ditching

Driller's Name: Lee Penrod

Geologist's Name: Rick Watt

Geologist's Signature: R. Watt

Rig Type (s): Mobile B-57

Drilling Method (s): Auger

Bit Size (s):

Auger Size (s): 4 1/4" ID

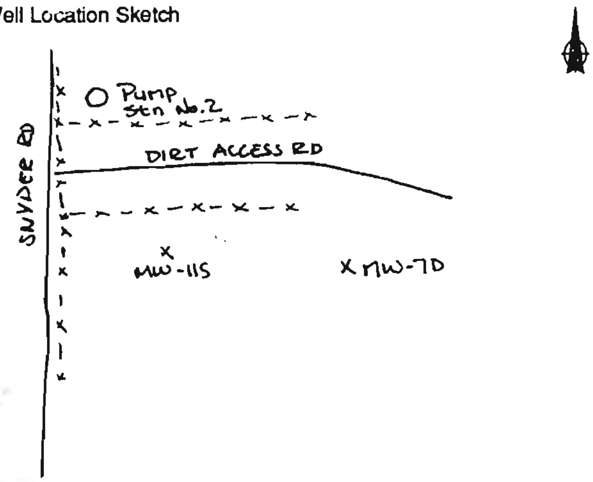
Auger/Split Spoon Refusal: NA

Total Depth of Borehole Is: 23.6'

Total Depth of Corehole Is:

Water Level (TOIC)		
Date	Time	Level(Feet)
10-23-91	1435	7.71
11-20-91	1424	6.61
2-26-92	1200	4.46

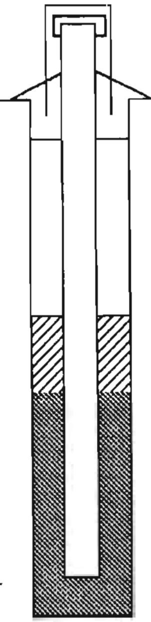
Well Location Sketch



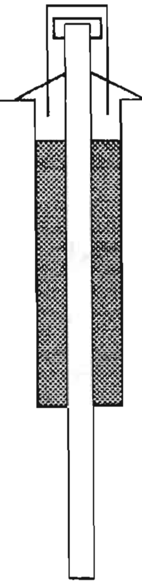
Depth(Feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

DRAFT

SCREENED WELL		OPEN-HOLE WELL
Stick-up ~2.5 ft	Lock Number 3252	Stick-up ____ ft
Inner Casing Material Sch. 40 PVC		Inner Casing Material ____
Inner Casing Inside Diameter 2 inches		Inner Casing Inside Diameter ____ inches



GROUND SURFACE



Screened well	Quantity of Material Used	Open-hole well
Top of Grout 0 ft	Bentonite Pellets ____	Top of Grout ____ ft
Borehole Diameter 8-10 inches ____ ft ____	Cement ____	Bottom of Outer Casing ____ ft
Top of Seal at 4 ft	Cement/ Bentonite ____	Borehole Diameter ____ ft
Bottom of Seal at 6	Grout ____	Bedrock ____ ft
Top of Screen at 8 ft	Top of Sand Pack 6	Bottom of Rock Socket/ Grout/ Casing ____ ft
Pack Type/Size: ☒ Sand #2 Q-Rok ☐ Gravel ____ ☐ Natural ____	Screen Slot Size 0.010"	Corehole Diameter ____
	Screen Type ____ ☒ PVC Sch. 40 ☐ Stainless Steel -	
Bottom of Screen at 18 ft	Bottom of Hole at 23.6 ft	Bottom of Corehole ____ ft
	Bottom of Sandpack at 23.6	

NOTE: See pages 109 and 110 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	See log for MW-7D for detailed lithology - Split spoon samples	○	○	○
2	described below collected for geotechnical sampling.	○	○	○
3		○	○	○
4	Auger cuttings to 10' indicate gravelly sandy silt w/ clay, Lt brn to	○	○	○
5	4', reddish brn to 7', then Lt brn again.	○	○	○
6	14-15' Moist clayey gravel w/ silt & sand. Gravel is ang. grey	○	○	○
7	SS frags.	○	○	○
8	15-16' Wet dark brown sandy clay w/ silt and gravel	○	○	○
9	16-17' Same but moist and reddish-brn.	○	○	○
10	17-21' Same as 15-16'	○	○	○
11	21-24' Saturated sandy clay	○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
		○	○	○

APPENDIX C

MONITORING WELL DEVELOPMENT DATA

DRAFT

Table C-1

WELL DEVELOPMENT RECORD FOR MW-1D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	8.34	128	8	150	10-08-91	0850
3	1.6	8.82	126	10	>200	10-08-91	0857
5	2.6	8.26	130	10	>200	10-08-91	0958
6	3.2	9.10	228	10	>200	10-08-91	1236
6	3.2	--	125	11	2,000	10-17-91	1746
11	6.5	--	127	11	3,600	10-17-91	1810
16	9.8	--	128	10.5	1,280	10-18-91	0839
18	11.1	--	131	10.5	700	10-18-91	0924
21	13.1	--	128	10.5	915	10-18-91	0942
23	14.4	--	126	10.5	700	10-18-91	1003
26	16.4	--	126	10.5	900	10-18-91	1021

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-2

WELL DEVELOPMENT RECORD FOR MW-2D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	10.24	323	14	>200	10-08-91	1322
5	3.2	6.97	231	13	>200	10-08-91	1332
10	6.5	7.14	238	13	>200	10-08-91	1342
15	9.7	7.07	203	13	>200	10-08-91	1353
20	12.9	7.06	201	13	184.8	10-08-91	1403
25	16.1	7.05	202	13	125.4	10-08-91	1416
30	19.4	7.05	199	13	92.9	10-08-91	1430
35	22.6	7.04	205	13	68.3	10-08-91	1442
40	25.8	7.10	210	13	>200	10-08-91	1455
45	29.0	6.96	232	13	>200	10-08-91	1632
55	35.5	7.04	201	13	>200	10-08-91	1640
65	41.9	7.07	204	13	>200	10-08-91	1654
75	48.4	7.10	206	13	>200	10-08-91	1702
85	54.8	7.08	204	13	>200	10-08-91	1710
95	61.3	7.08	206	13	>200	10-08-91	1718
105	67.7	7.10	206	13	>200	10-08-91	1726
115	74.2	7.11	203	13	>200	10-08-91	1734
135	87.1	7.09	211	13	>200	10-08-91	1750
155	100.0	7.07	205	13	>200	10-08-91	1806

Table C-2

WELL DEVELOPMENT RECORD FOR MW-2D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
175	112.9	7.09	205	13	>200	10-08-91	1822
200	129.0	7.08	205	13	>200	10-08-91	1840
200	129.0	--	284	13	>1,000	10-16-91	0940
205	132.6	--	240	11	>1,000	10-16-91	0958
210	136.2	--	216	11	>1,000	10-16-91	1004
215	139.8	--	219	11	>1,000	10-16-91	1018
220	143.4	--	213	11	>1,000	10-16-91	1030

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-3

WELL DEVELOPMENT RECORD FOR MW-2S

Volume Purged						
Gallons	Well Volume	pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
0	0	--	484	14.5	>1,000	10-16-91 0930
1	4.5	--	472	10.5	>1,000	10-16-91 1013
1.5	6.8	--	472	15.0	>4,000	10-19-91 1112

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-4

WELL DEVELOPMENT RECORD FOR MW-3D

Volume Purged						
Gallons	Well Volume	pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
0	0	10	319	12	>1,000	10-09-91 0834
5	1.1	10.2	360	13	>200	10-09-91 0951
8	1.8	9.28	287	18	>200	10-09-91 1236
8	1.8	--	325	12	>4,000	10-17-91 1650
13	2.9	--	319	12	>4,000	10-17-91 1659
15	3.3	--	312	12	>4,000	10-17-91 1728
15	3.3	--	318	11	>4,000	10-18-91 0850
20	4.4	--	329	11	>4,000	10-18-91 0905
25	5.5	--	316	11	>4,000	10-18-91 1100
26.5	5.8	--	310	11.5	>4,000	10-18-91 1225

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-5

WELL DEVELOPMENT RECORD FOR MW-3S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	7.17	297	14	18.6	10-09-91	1105
1	1.8	7.46	294	14	>200	10-09-91	1109
1.5	2.6	7.10	365	14	>200	10-09-91	1117
1.8	3.2	7.08	369	14	>400	10-09-91	1240
1.8	3.2	--	255	14	>4,000	10-17-91	1630
6.8	6.3	--	263	14	>4,000	10-17-91	1650
9	7.7	--	265	13.5	>4,000	10-17-91	1725
9	7.7	--	268	11	>4,000	10-18-91	0850
10	8.3	--	272	11	>4,000	10-18-91	0905
11	8.9	--	300	11	>4,000	10-18-91	1050

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-6

WELL DEVELOPMENT RECORD
FOR MW-4D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
Gallons	Well Volume					
0	0	6.85	165	11	>200	10-07-91 1705
5	2.5	6.88	145	11	>200	10-07-91 1712
10	4.9	6.91	142	11	>200	10-07-91 1725
15	7.4	6.82	121	11	109	10-07-91 1734
20	9.8	6.91	151	11	100	10-07-91 1745
25	12.3	6.84	149	11	75	10-07-91 1755
30	14.7	6.99	123	11	69	10-07-91 1807
40	19.6	6.96	119	11	57	10-07-91 1824
50	24.5	6.86	115	11	59	10-07-91 1842
60	29.4	6.85	112	11	54	10-07-91 1856
60	29.4	--	107	13.5	>4,000	10-16-91 1556
70	33.9	--	93	12.5	1,740	10-16-91 1604
75	36.2	--	91	12.5	~2,000	10-16-91 1618
80	38.5	--	91	12.5	~2,000	10-16-91 1629

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-7

WELL DEVELOPMENT RECORD FOR MW-5D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	9.12	320	--	>1,000	09-26-91	0910
5	0.9	8.64	191	--	>1,000	09-26-91	0920
10	1.8	9.41	209	--	>1,000	09-26-91	0938
15	2.6	8.50	186	--	>1,000	09-26-91	0953
20	3.5	7.62	163	--	>1,000	09-26-91	1002
25	4.4	7.29	165	--	200	09-26-91	1015
30	5.3	7.26	166	--	300	09-26-91	1028
35	6.2	7.28	168	--	350	09-26-91	1043
40	7.0	7.21	168	--	430	09-26-91	1056
45	7.9	7.25	161	--	430	09-26-91	1111
50	8.8	7.06	158	--	400	09-26-91	1124
55	9.7	7.12	156	--	360	09-26-91	1139
60	10.6	7.16	155	--	260	09-26-91	1156
65	11.4	7.10	156	--	400	09-26-91	1210
65	11.4	--	220	13	32	10-15-91	1120
70	12.3	--	180	11	>1,000	10-15-91	1130
75	13.3	--	176	11	>1,000	10-15-91	1140
80	14.2	--	185	11	>1,000	10-15-91	1150
85	15.2	--	164	11	415	10-15-91	1158

Table C-7

WELL DEVELOPMENT RECORD FOR MW-5D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
90	16.1	--	173	11	>1,000	10-15-91	1210
95	17.0	--	153	11	>1,000	10-15-91	1220
100	18.0	--	164	11	>1,000	10-15-91	1228
105	18.9	--	168	11	>1,000	10-15-91	1230

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-8

WELL DEVELOPMENT RECORD FOR MW-5S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	7.17	200	11	>200	10-08-91	1334
5	1.6	7.02	184	12	>200	10-08-91	1350
10	3.2	6.95	184	12	>200	10-08-91	1412
15	4.8	7.02	170	12	>200	10-08-91	1448
20	6.5	6.78	149	12	30	10-08-91	1520
22	7.1	6.84	168	12	148	10-08-91	1529
25	8.1	6.96	172	13	>200	10-08-91	1605
30	9.7	6.92	161	13	>200	10-08-91	1624
35	11.3	7.06	163	13	>200	10-08-91	1650
35	11.3	--	146	13	27	10-15-91	1120
40	13.2	--	150	12	>1,000	10-15-91	1130
45	15.0	--	143	12	>1,000	10-15-91	1215
50	16.9	--	139	12	>1,000	10-15-91	1220
55	18.7	--	143	12	>1,000	10-15-91	1230

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

02:D3716-03/05/92-D1

Table C-9

WELL DEVELOPMENT RECORD FOR MW-6D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
Gallons	Well Volume					
0	0	6.55	158	12	>200	10-10-91 1356
2.5	0.9	6.54	157	12	>200	10-10-91 1403
3	1.1	6.92	167	12	>200	10-10-91 1410
5	1.9	6.69	159	12	>200	10-10-91 1438
6	2.2	6.89	150	12	>200	10-10-91 1532
6	2.2	5.96	142	12	>200	10-11-91 1135
8.5	3.2	6.52	147	12	>200	10-11-91 1141
9.5	3.5	6.59	152	12	>200	10-11-91 1149
10	3.7	6.71	142	11	>200	10-11-91 1214
10	3.7	--	140	11	>4,000	10-16-91 1712
15	6.2	--	140	11	>4,000	10-16-91 1720
15	6.2	--	135	11	~2,000	10-17-91 0853
20	8.7	--	139	11	~2,000	10-17-91 0934

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-10

WELL DEVELOPMENT RECORD FOR MW-6S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	6.81	161	12	>200	10-10-91	1416
2.5	3.1	6.72	149	12	>200	10-10-91	1423
4	4.9	6.34	152	12	>200	10-10-91	1441
4.5	5.6	6.63	154	12	>200	10-10-91	1516
5	6.2	6.75	149	12	>200	10-10-91	1529
5	6.2	6.68	115	12	>200	10-11-91	1139
7	8.6	6.52	132	12	>200	10-11-91	1144
7.5	9.3	6.50	125	12	>200	10-11-91	1151
8	10.1	--	130	12	>4,000	10-16-91	1707
9.5	12.5	--	138	12	>4,000	10-16-91	1725
9.5	12.5	--	127	12.5	>4,000	10-17-91	0853
12	16.5	--	127	12.5	>4,000	10-17-91	0939

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

02:D3715-03/05/92-D1

Table C-11

WELL DEVELOPMENT RECORD FOR MW-7D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	7.15	252	13	>200	10-09-91	1551
4	1.8	6.92	259	11	>200	10-09-91	1609
5	2.2	7.22	256	11	>200	10-09-91	1616
6	2.6	7.22	259	11	>200	10-09-91	1705
7.5	3.3	6.95	260	11	>200	10-09-91	1711
7.5	3.3	--	261	12	~2,000	10-17-91	1420
12.5	5.5	--	265	11.5	~2,000	10-17-91	1438
14	6.2	--	269	11	1,700	10-17-91	1524
16	7.0	--	265	12	850	10-17-91	1604
20	8.8	--	258	11	782	10-18-91	1133
23	10.1	--	262	11	820	10-18-91	1150

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-12

WELL DEVELOPMENT RECORD FOR MW-8S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
Gallons	Well Volume					
0	0	5.12	607	14	>200	10-10-91 1605
2.5	1.7	5.87	641	14	>200	10-10-91 1616
5	3.4	5.79	656	14	>200	10-10-91 1622
7	4.7	6.49	565	14	>200	10-10-91 1629
8	5.4	6.56	583	14	>200	10-10-91 1656
9	6.1	6.63	571	14	>200	10-10-91 1704
10	6.8	6.68	584	14	>200	10-10-91 1708
11	7.5	6.52	588	14	>200	10-10-91 1733
12	8.1	6.57	586	14	>200	10-10-91 1740
12	8.1	6.79	585	13	>200	10-11-91 1027
14.5	9.8	6.80	583	13	>200	10-11-91 1036
17	11.5	6.77	578	13	>200	10-11-91 1041
19.5	13.2	6.77	582	13	>200	10-11-91 1058
20	13.6	6.63	586	13	>200	10-11-91 1107
20	13.6	--	--	13.5	840	10-15-91 1000
25	16.9	--	--	13	>1,000	10-15-91 1010
30	20.3	--	--	12	>1,000	10-15-91 1050

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-13

WELL DEVELOPMENT RECORD FOR MW-9D

Volume Purged						
Gallons	Well Volume	pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
0	0	8.71	302	12	70	10-09-91 1349
3	0.9	9.50	266	12	>200	10-09-91 1407
5	1.6	7.32	244	12	>200	10-09-91 1420
5	1.6	10.15	389	10	>200	10-11-91 0849
7.5	2.3	10.12	390	11	>200	10-11-91 0858
9	2.8	9.61	302	11	>200	10-11-91 0911
10	3.1	9.54	289	11	>200	10-11-91 0917
10.5	3.3	9.24	277	11	>200	10-11-91 0942
11	3.4	9.74	271	11	>200	10-11-91 0951
11	3.4	--	281	11	>1,000	10-15-91 1510
15	4.7	--	267	11	>1,000	10-15-91 1540
20	6.3	--	245	11	>1,000	10-15-91 1628
25	7.8	--	235	11	>1,000	10-15-91 1715
25	7.8	--	217	10.8	>1,000	10-16-91 1052
30	9.4	--	229	10.5	>1,000	10-16-91 1110
35	10.9	--	313	11	>1,000	10-16-91 1310

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

02:D3715-03/05/92-D1

Table C-14

WELL DEVELOPMENT RECORD FOR MW-9S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	6.19	429	15	62	10-09-91	1433
1	3.1	7.08	444	14	>200	10-09-91	1439
1	3.1	6.75	429	12	>200	10-11-91	0845
1.5	4.7	6.96	437	12	>200	10-11-91	0947
1.5	4.7	--	437	13	>1,000	10-15-91	1545
2.5	9.7	--	415	13	>1,000	10-15-91	1730
2.5	9.7	--	468	12	875	10-16-91	1055
2.7	10.7	--	440	12	>1,000	10-16-91	1120

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

Table C-15

WELL DEVELOPMENT RECORD FOR MW-10D

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	9.25	197	12	>200	10-10-91	0842
2.5	0.5	10.93	404	12	>200	10-10-91	0853
5	1	10.07	260	12	>200	10-10-91	0903
7.5	1.4	10.09	259	12	>200	10-10-91	0913
10	1.9	9.02	189	12	>200	10-10-91	0920
15	2.9	6.95	169	12	>200	10-10-91	0939
20	3.8	7.75	167	12	>200	10-10-91	0946
25	4.8	8.77	174	12	>200	10-10-91	1000
30	5.8	7.77	162	12	>200	10-10-91	1015
35	6.7	6.76	160	13	>200	10-10-91	1031
45	8.7	7.04	160	13	>200	10-10-91	1109
53	10.2	6.57	158	13	>200	10-10-91	1143
53	10.2	--	360	12	>1,000	10-16-91	1355
58	11.7	--	313	11	>1,000	10-16-91	1405
63	13.1	--	164	11	>1,000	10-16-91	1412
68	14.6	--	162	11	>1,470	10-16-91	1427
73	16.1	--	156	11	~2,000	10-16-91	1436
78	17.6	--	151	11	~2,000	10-16-91	1447
83	19.0	--	151	10.8	~2,000	10-16-91	1518

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

Table C-16

WELL DEVELOPMENT RECORD FOR MW-10S

Volume Purged						
Gallons	Well Volume	pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading
0	0	7.03	183	12	>200	10-10-91 0930
2.5	1.2	6.37	162	12	>200	10-10-91 0936
5	2.4	6.66	180	12	>200	10-10-91 0943
7	3.3	6.31	175	12	>200	10-10-91 0551
9	4.3	6.65	158	12	>200	10-10-91 1037
10	4.8	6.54	153	12	>200	10-10-91 1042
14	6.7	6.38	131	12	>200	10-10-91 1145
14	6.7	--	145	12.2	>1,000	10-16-91 1345
19	9.2	--	146	12	>1,000	10-16-91 1410
24	11.7	--	130	12	>4,000	10-16-91 1436
26	12.7	--	129	12	>4,000	10-16-91 1514

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

DRAFT

02:D3716-03/05/92-D1

DRAFT

Table C-17

WELL DEVELOPMENT RECORD FOR MW-11S

Volume Purged		pH	Conductivity (ppm)	Temperature (°C)	Turbidity (NTU)	Date and Time of Reading	
Gallons	Well Volume						
0	0	7.10	306	16	>200	10-09-91	1536
2.5	1.3	7.24	292	15	>200	10-09-91	1545
5	2.6	7.07	295	15	>200	10-09-91	1557
7.5	4.0	6.97	293	14	>200	10-09-91	1605
10	5.3	6.99	292	14	>200	10-09-91	1614
12.5	6.6	6.89	298	14	>200	10-09-91	1620
15	7.9	6.82	295	14	>200	10-09-91	1628
20	10.6	6.80	301	16	>200	10-09-91	1654
22	11.7	6.86	295	16	>200	10-09-91	1704
22	11.7	--	302	14	>4,000	10-17-91	1032
25	13.3	--	293	14	>4,000	10-17-91	1036
30	16.0	--	304	13.5	>4,000	10-17-91	1044
35	18.6	--	299	13.5	>4,000	10-17-91	1055
40	21.3	--	292	13.5	>4,000	10-17-91	1105
45	24.0	--	308	13.5	1,680	10-17-91	1149
50	26.7	--	305	13.5	>4,000	10-17-91	1200
55	29.3	--	302	14	>4,000	10-17-91	1358
60	32.0	--	301	13.5	>4,000	10-17-91	1406

Note: Data gaps exist where instrument failure occurred. Where the turbidity is preceded by ">", the value indicates the upper limit of the instrument.

APPENDIX D

ANALYTICAL DATA SUMMARY FORMS

The following data summary forms are from the data validation reports prepared by E & E's subcontractor ChemWorld Environmental, Inc. These tables were then corrected based on E & E's data validation review. All ChemWorld data validation reports and E & E data validation review memorandums pertaining to environmental sampling at the Wellsville-Andover Landfill have been provided to NYSDEC under separate cover.

DATA SUMMARY TABLES

VOLATILE ORGANICS

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.123

All results reported in ug/kg

Reanalyzed - see case no. 9102.414

Parameters - Volatiles	~~MW-2~~(SB-2A)	~~MW-3~~(SB-3A)	~~MW-3~~(SB-3B)	SB-10A	SB-1A	SB-1B	SB-4A	SB-4B	SB-5B	SB-5C	SB-6A	SB-6ARE
Chloromethane	UJ	UJ	UJ								UJ	
Bromomethane	UJ	UJ	UJ								UJ	
Vinyl Chloride	UJ	UJ	UJ						21	7 J	UJ	
Chloroethane	UJ	UJ	UJ								UJ	
Methylene Chloride	18 UJ	21 UJ	18 UJ	11 U	11 U	7 U	8 U	7 U	10 U	8 U	9 UJ	7 U
Acetone	63 UJ	31 UJ	24 UJ	15 U	10 U	22 U	10 U	11 U	11 U	12 U	25 UJ	10 U
Carbon Disulfide	UJ	UJ	UJ								UJ	
1,1-Dichloroethylene	UJ	UJ	UJ								UJ	
1,1-Dichloroethane	UJ	UJ	UJ								UJ	
Total 1,2-Dichloroethylene	UJ	UJ	UJ						87	61	UJ	
Chloroform	UJ	UJ	UJ								UJ	
1,2-Dichloroethane	UJ	UJ	UJ								UJ	
2-Butanone	4 J	UJ	UJ								UJ	
1,1,1-Trichloroethane	UJ	UJ	UJ								UJ	
Carbon Tetrachloride	UJ	UJ	UJ								UJ	
Vinyl Acetate	UJ	UJ	UJ								UJ	
Bromodichloromethane	UJ	UJ	UJ								UJ	
1,2-Dichloropropane	UJ	UJ	UJ								UJ	
Cis-1,3-Dichloropropene	UJ	UJ	UJ								UJ	
Trichloroethene	UJ	UJ	UJ						22	13	UJ	
Dibromochloromethane	UJ	UJ	UJ								UJ	
1,1,2-Trichlorethane	UJ	UJ	UJ								UJ	
Benzene	UJ	UJ	UJ								UJ	
Trans-1,3-Dichloropropene	UJ	UJ	UJ								UJ	
Bromoform	UJ	UJ	UJ								UJ	
4-Methyl-2-pentanone	UJ	UJ	UJ								UJ	
2-Hexanone	UJ	UJ	UJ								UJ	
Tetrachloroethene	UJ	UJ	UJ								UJ	
1,1,2,2-Tetrachloroethane	UJ	UJ	UJ								UJ	
Toluene	UJ	UJ	UJ								UJ	
Chlorobenzene	UJ	UJ	UJ								UJ	
Ethylbenzene	UJ	UJ	UJ								UJ	
Styrene	UJ	UJ	UJ								UJ	
Total Xylenes	UJ	UJ	UJ								UJ	

DRAFT

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.123 **All results reported in ug/kg**

Parameters - Volatiles	SB-6B	VBLKS1	VBLKS2	VBLKS3	VBLKS4	VBLKS5	VBLKS6	SB-5CMS	SB-5CMSD	MSB
Chloromethane					UJ					
Bromomethane					UJ					
Vinyl Chloride					UJ			2 J	4 J	
Chloroethane					UJ					
Methylene Chloride	8 U	9	6	17	9 J	7	3 J	9 U	11 U	8 U
Acetone	15 U	19	7 J	23	3 J	6 J		15 U	18 U	10 U
Carbon Disulfide					UJ					
1,1-Dichloroethylene					UJ			39	41	31
1,1-Dichloroethane					UJ					
Total 1,2-Dichloroethylene					UJ			48	65	
Chloroform					UJ					
1,2-Dichloroethane					UJ					
2-Butanone					UJ					
1,1,1-Trichloroethane					UJ					
Carbon Tetrachloride					UJ					
Vinyl Acetate					UJ					
Bromodichloromethane					UJ					
1,2-Dichloropropane					UJ					
Cis-1,3-Dichloropropene					UJ					
Trichloroethene					UJ			62	65	45
Dibromochloromethane					UJ					
1,1,2-Trichlorethane					UJ					
Benzene					UJ			49	52	48
Trans-1,3-Dichloropropene					UJ					
Bromoform					UJ					
4-Methyl-2-pentanone					UJ					
2-Hexanone					UJ					
Tetrachloroethene					UJ					
1,1,2,2-Tetrachloroethane					UJ					
Toluene					UJ			51	52	49
Chlorobenzene					UJ			49	49	47
Ethylbenzene					UJ					
Styrene					UJ					
Total Xylenes			1 J		UJ					

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.282 — **All results reported in ug/kg**

Parameters - Volatiles	SB-10B	SB-8A	SB-8AD	SB-8B	SB-9A	SB-9B	VBLKS1	VBLKS2	SB-9B-MS	SB-10B-MS	SB-9B-MSD	SB-10B-MSD
Chloromethane												
Bromomethane												
Vinyl Chloride												
Chloroethane												
Methylene Chloride	12 U	6 U	8 U	7 U	8 U	6 U	7	5	6 U	11 U	7 U	13 U
Acetone	12 U		17 U		19 U	17 U	6 J	5 J	10 U	15 U	10 U	14 U
Carbon Disulfide												
1,1-Dichloroethylene									61	40 J	50 J	50
1,1-Dichloroethane												
Total 1,2-Dichloroethylene												
Chloroform												
1,2-Dichloroethane												
2-Butanone												
1,1,1-Trichloroethane												
Carbon Tetrachloride												
Vinyl Acetate												
Bromodichloromethane												
1,2-Dichloropropane												
Cis-1,3-Dichloropropene												
Trichloroethene									49	38 J	49 J	55
Dibromochloromethane												
1,1,2-Trichlorethane												
Benzene									50	42 J	51 J	61
Trans-1,3-Dichloropropene												
Bromoform												
4-Methyl-2-pentanone												
2-Hexanone												
Tetrachloroethene												
1,1,2,2-Tetrachloroethane												
Toluene									50	46 J	53 J	64
Chlorobenzene									49	41 J	53 J	59
Ethylbenzene												
Styrene												
Total Xylenes												

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Parameters - Volatiles	DW-1	R-1	VBLKW1	MSB
Chloromethane				
Bromomethane				
Vinyl Chloride				
Chloroethane				
Methylene Chloride	8 U	12 U	3 J	16 U
Acetone				
Carbon Disulfide				
1,1-Dichloroethylene				46
1,1-Dichloroethane				
Total 1,2-Dichloroethylene				
Chloroform		36		
1,2-Dichloroethane				
2-Butanone				
1,1,1-Trichloroethane				
Carbon Tetrachloride				
Vinyl Acetate				
Bromodichloromethane		17		
1,2-Dichloropropane				
Cis-1,3-Dichloropropene				
Trichloroethene				49
Dibromochloromethane		5		
1,1,2-Trichlorethane				
Benzene				51
Trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-pentanone				
2-Hexanone				
Tetrachloroethene				
1,1,2,2-Tetrachloroethane				
Toluene				52
Chlorobenzene				52
Ethylbenzene				
Styrene				
Total Xylenes				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/L**

Parameters - Volatiles	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	TB-1	TB-1RE	VBLKW1	VBLKW2	MSB	SW-4MS	SW-4MSD
Chloromethane								UJ						
Bromomethane								UJ						
Vinyl Chloride								UJ						
Chloroethane								UJ						
Methylene Chloride	6 U	6 U	7 U	6 U	6 U	6 U	6 U	UJ	7 U	5	7	7 U	7 U	7 U
Acetone								UJ						
Carbon Disulfide								UJ						
1,1-Dichloroethylene								UJ				42	40	40
1,1-Dichloroethane								UJ						
Total 1,2-Dichloroethylene								UJ						
Chloroform								UJ						
1,2-Dichloroethane								UJ						
2-Butanone								UJ						
1,1,1-Trichloroethane								UJ						
Carbon Tetrachloride								UJ						
Vinyl Acetate								UJ						
Bromodichloromethane								UJ						
1,2-Dichloropropane								UJ						
Cis-1,3-Dichloropropene								UJ						
Trichloroethene								UJ				48	46	44
Dibromochloromethane								UJ						
1,1,2-Trichlorethane								UJ						
Benzene								UJ				49	50	49
Trans-1,3-Dichloropropene								UJ						
Bromoform								UJ						
4-Methyl-2-pentanone								UJ						
2-Hexanone								UJ						
Tetrachloroethene								UJ						
1,1,2,2-Tetrachloroethane								UJ						
Toluene								UJ				50	48	47
Chlorobenzene								UJ				46	45	44
Ethylbenzene								UJ						
Styrene								UJ						
Total Xylenes								UJ						

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/kg**

Parameters - Volatiles	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-6	VBLKS1	SED-4MSD	SED-4-MS
Chloromethane												
Bromomethane												
Vinyl Chloride												
Chloroethane												
Methylene Chloride	11 U	12 U	19 U	18 U	14 U	20 U	21 U	10 U	12 U	10	20 U	21 U
Acetone			20	30	10 J	31	38	11 J			66	27
Carbon Disulfide												
1,1-Dichloroethylene											99	89
1,1-Dichloroethane												
Total 1,2-Dichloroethylene												
Chloroform												
1,2-Dichloroethane												
2-Butanone												
1,1,1-Trichloroethane												
Carbon Tetrachloride												
Vinyl Acetate												
Bromodichloromethane												
1,2-Dichloropropane												
Cis-1,3-Dichloropropene												
Trichloroethene											84	80
Dibromochloromethane												
1,1,2-Trichlorethane												
Benzene											92	87
Trans-1,3-Dichloropropene												
Bromoform												
4-Methyl-2-pentanone												
2-Hexanone												
Tetrachloroethene												
1,1,2,2-Tetrachloroethane												
Toluene											100	92
Chlorobenzene											88	83
Ethylbenzene												
[illegible]rene												
[illegible]tal Xylenes												

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/L

Parameters - Volatiles	(MH-4) L-1	(PS-2) L-2	TB-2	VBLKW1	VBLKW2	MSB
Chloromethane						
Bromomethane						
Vinyl Chloride						
Chloroethane						
Methylene Chloride	7 U	13 U	7 U	7	9	7 U
Acetone						
Carbon Disulfide						
1,1-Dichloroethylene						42
1,1-Dichloroethane						
Total 1,2-Dichloroethylene	8	2 J				
Chloroform						
1,2-Dichloroethane						
2-Butanone						
1,1,1-Trichloroethane						
Carbon Tetrachloride						
Vinyl Acetate						
Bromodichloromethane						
1,2-Dichloropropane						
Cis-1,3-Dichloropropene						
Trichloroethene	2 J	14				48
Dibromochloromethane						
1,1,2-Trichlorethane						
Benzene						49
Trans-1,3-Dichloropropene						
Bromoform						
4-Methyl-2-pentanone						
2-Hexanone						
Tetrachloroethene						
1,1,2,2-Tetrachloroethane						
Toluene						50
Chlorobenzene		3 J				46
Ethylbenzene						
Styrene						
Total Xylenes						

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/kg

Parameters - Volatiles	~~MW-2~~ SB-2A	~~MW-3~~ SB-3A	~~MW-3~~ SB-3B	SS-1	SS-1-RE	SS-2	SS-2-RE	SS-3	SS-4	SS-5	SS-6	SS-7
Chloromethane				UJ			UJ					40 J
Bromomethane				UJ			UJ					UJ
Vinyl Chloride				UJ			UJ					UJ
Chloroethane				UJ			UJ					UJ
Methylene Chloride	11 U	11 U	11 U	14 UJ	12 U	16 U	16 UJ	20 U	11 U	17 U	12 U	35 UJ
Acetone	12 U	12 U	27 U	16 UJ	27 U		19 UJ	19 U	12 U		26 U	42 UJ
Carbon Disulfide				UJ			UJ					UJ
1,1-Dichloroethylene				UJ			UJ					UJ
1,1-Dichloroethane				UJ			UJ					UJ
Total 1,2-Dichloroethylene				UJ			UJ					UJ
Chloroform				UJ			UJ					UJ
1,2-Dichloroethane				UJ			UJ					UJ
2-Butanone				UJ			UJ					UJ
1,1,1-Trichloroethane				UJ			UJ					
Carbon Tetrachloride				UJ			UJ					
Vinyl Acetate				UJ			UJ					
Bromodichloromethane				UJ			UJ					
1,2-Dichloropropane				UJ			UJ					
Cis-1,3-Dichloropropene				UJ			UJ					
Trichloroethene				UJ			UJ					
Dibromochloromethane				UJ			UJ					
1,1,2-Trichlorethane				UJ			UJ					
Benzene				UJ			UJ					
Trans-1,3-Dichloropropene				UJ			UJ					
Bromoform				UJ			UJ					
4-Methyl-2-pentanone				UJ			UJ					UJ
2-Hexanone				UJ			UJ					UJ
Tetrachloroethene				UJ			UJ					UJ
1,1,2,2-Tetrachloroethane				UJ			UJ					UJ
Toluene				UJ			UJ					UJ
Chlorobenzene				UJ			UJ					UJ
Ethylbenzene				UJ			UJ				1 J	18 J
Styrene				UJ			UJ					UJ
Total Xylenes				UJ			UJ					UJ

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL – DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/kg

Parameters – Volatiles	SS-7-RE	SS-8	SS-9	SS-10	SS-10D	SS-10D-RE	SS-11	SS-12	SS-13	SS-13-RE	SS-14	VBLKS1	VBLKS2
Chloromethane	14 J								UJ	UJ			
Bromomethane									UJ	UJ			
Vinyl Chloride									UJ	UJ			
Chloroethane									UJ	UJ			
Methylene Chloride	14 U	15 U	15 U	10 U	16 U	11 U	23 U	18 U	12 UJ	11 UJ	14 U	13	12
Acetone	53 U	10 U		13 U			240		UJ	UJ	20 U	10	5 J
Carbon Disulfide									UJ	UJ			
1,1-Dichloroethylene									UJ	UJ			
1,1-Dichloroethane									UJ	UJ			
Total 1,2-Dichloroethylene									UJ	UJ			
Chloroform									UJ	UJ			
1,2-Dichloroethane									UJ	UJ			
2-Butanone									UJ	UJ			
1,1,1-Trichloroethene									UJ	UJ			
Carbon Tetrachloride									UJ	UJ			
Vinyl Acetate									UJ	UJ			
Bromodichloromethane									UJ	UJ			
1,2-Dichloropropane									UJ	UJ			
Cis-1,3-Dichloropropene									UJ	UJ			
Trichloroethene									UJ	UJ			
Dibromochloromethane									UJ	UJ			
1,1,2-Trichlorethane									UJ	UJ			
Benzene						UJ			UJ	UJ			
Trans-1,3-Dichloropropene									UJ	UJ			
Bromoform									UJ	UJ			
4-Methyl-2-pentanone	UJ				UJ				UJ	UJ			
2-Hexanone	UJ				UJ				UJ	UJ			
Tetrachloroethene	UJ				UJ				UJ	UJ			
1,1,2,2-Tetrachloroethane	UJ				UJ				UJ	UJ			
Toluene	UJ				UJ	UJ			UJ	UJ			
Chlorobenzene	UJ				UJ	UJ			UJ	UJ			
Ethylbenzene	11 J				UJ	UJ			UJ	UJ			
Styrene	UJ				UJ	UJ			UJ	UJ			
Total Xylenes	UJ				UJ	UJ			UJ	UJ			2 J

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in ug/kg**

Parameters - Volatiles	VBLKS3	VBLKS4	VBLKS5	MSB1	SS-4MS	SS-4MSD
Chloromethane						
Bromomethane						
Vinyl Chloride						
Chloroethane						
Methylene Chloride	9	8	8	9 U	11 U	11 U
Acetone	6 J				10 U	10 U
Carbon Disulfide						
1,1-Dichloroethylene				36	40	41
1,1-Dichloroethane						
Total 1,2-Dichloroethylene						
Chloroform						
1,2-Dichloroethane						
2-Butanone						
1,1,1-Trichloroethane						
Carbon Tetrachloride						
Vinyl Acetate						
Bromodichloromethane						
1,2-Dichloropropane						
Cis-1,3-Dichloropropene						
Trichloroethene				42	46	45
Dibromochloromethane						
1,1,2-Trichlorethane						
Benzene				46	51	50
Trans-1,3-Dichloropropene						
Bromoform						
4-Methyl-2-pentanone						
2-Hexanone						
Tetrachloroethene						
1,1,2,2-Tetrachloroethane						
Toluene				46	51	52
Chlorobenzene				43	48	49
Ethylbenzene						
Styrene						
Total Xylenes						

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.556

All results reported in ug/L

Parameters - Volatiles	GW-1D	GW-2D	GW-2DDL	GW-2S	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-9S	GW-10D	GW-10S
Chloromethane												
Bromomethane												
Vinyl Chloride		290 E	160 D									
Chloroethane												
Methylene Chloride			26 DJ									
Acetone						33						
Carbon Disulfide												
1,1-Dichloroethylene		3 J										
1,1-Dichloroethane												
Total 1,2-Dichloroethylene		770 E	520 D								3 J	
Chloroform										2 J		
1,2-Dichloroethane												
2-Butanone												
1,1,1-Trichloroethane		1 J										
Carbon Tetrachloride												
Vinyl Acetate												
Bromodichloromethane												
1,2-Dichloropropane												
Cis-1,3-Dichloropropene												
Trichloroethene		320 E	230 D		2 J		1 J				3 J	
Dibromochloromethane												
1,1,2-Trichlorethane												
Benzene												
Trans-1,3-Dichloropropene												
Bromoform												
4-Methyl-2-pentanone												
2-Hexanone												
Tetrachloroethene												
1,1,2,2-Tetrachloroethane												
Toluene												
Chlorobenzene												
Ethylbenzene												
Styrene												
Total Xylenes												

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.556

All results reported in ug/L

Parameters - Volatiles	VBLKW1	VBLKW2	MSB	GW-10DMS	GW-10DMSD
Chloromethane					
Bromomethane					
Vinyl Chloride					
Chloroethane					
Methylene Chloride				2 J	
Acetone					
Carbon Disulfide					
1,1-Dichloroethylene			45	30	25
1,1-Dichloroethane					
Total 1,2-Dichloroethylene				3 J	4J
Chloroform					
1,2-Dichloroethane					
2-Butanone					
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Vinyl Acetate					
Bromodichloromethane					
1,2-Dichloropropane					
Cis-1,3-Dichloropropene					
Trichloroethene			44	46	43
Dibromochloromethane					
1,1,2-Trichlorethane					
Benzene			44	47	46
Trans-1,3-Dichloropropene					
Bromoform					
4-Methyl-2-pentanone					
2-Hexanone					
Tetrachloroethene					
1,1,2,2-Tetrachloroethane					
Toluene			47	46	44
Chlorobenzene			48	49	48
Ethylbenzene					
St[illegible]ene					
T[illegible] Xylenes					

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER – DATA SUMMARY

CASE NO. 9102.587

All results reported in ug/L

Parameters – Volatiles	GW-5D	GW-5DDL	GW-5S	GW-5SDL	GW-6D	GW-6DDL	GW-6S	GW-7D	GW-11S	GW-11SDL	GW-11SDD
Chloromethane	UJ										
Bromomethane	UJ										
Vinyl Chloride	1700 E	1400 D	3300 E	2100 D	63	34 D			110 J	100 D	110
Chloroethane	UJ								8 J		
Methylene Chloride	UJ										
Acetone	UJ										
Carbon Disulfide	UJ										
1,1-Dichloroethylene	11 J		12 J						9 J		9
1,1-Dichloroethane	6 J		11 J								
Total 1,2-Dichloroethylene	3900 E	4600 DE	5400 E	5600 DE	290 E	200 D	5 J		440 E	390 D	430 E
Chloroform	UJ										
1,2-Dichloroethane	UJ										
2-Butanone	UJ										
1,1,1-Trichloroethane	UJ		4 J								
Carbon Tetrachloride	UJ										
Vinyl Acetate	UJ										
Bromodichloromethane	UJ										
1,2-Dichloropropane	UJ										
Cis-1,3-Dichloropropene	UJ										
Trichloroethene	290 E	310 D	450 E	370 D	7	4 DJ			1200 E	1200 D	1200 E
Dibromochloromethane	UJ										
1,1,2-Trichlorethane	UJ										
Benzene	UJ										
Trans-1,3-Dichloropropene	UJ										
Bromoform	UJ										
4-Methyl-2-pentanone	UJ										
2-Hexanone	UJ										
Tetrachloroethene	UJ										
1,1,2,2-Tetrachloroethane	UJ										
Toluene	9 J		8 J								
Chlorobenzene	UJ										
Ethylbenzene	3 J										
Styrene	UJ										
Total Xylenes	UJ										

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587

All results reported in ug/L

Parameters - Volatiles	GW-11SDDDL	GW-12D	GW-12DRE	GW-12S	GW-13D	GW-13S	TB-10	VBLKW1	VBLKW2	VBLKW3	MSB
Chloromethane											
Bromomethane											
Vinyl Chloride		36 J	45 J								
Chloroethane											
Methylene Chloride		6 J	4 J								
Acetone											
Carbon Disulfide											
1,1-Dichloroethylene											58 J
1,1-Dichloroethane											
Total 1,2-Dichloroethylene	390 D	4 J	9 J	3 J	4 J						
Chloroform											
1,2-Dichloroethane											
2-Butanone											
1,1,1-Trichloroethane											
Carbon Tetrachloride											
Vinyl Acetate											
Bromodichloromethane											
1,2-Dichloropropane											
Cis-1,3-Dichloropropene											
Trichloroethene	1200 D			38							59 J
Dibromochloromethane											
1,1,2-Trichlorethane											
Benzene											58 J
Trans-1,3-Dichloropropene											
Bromoform											
4-Methyl-2-pentanone											
2-Hexanone											
Tetrachloroethene											
1,1,2,2-Tetrachloroethane											
Toluene				5		2 J					59 J
Chlorobenzene											58 J
Ethylbenzene											
Styrene											
Total Xylenes											

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587

All results reported in ug/L

Parameters - Volatiles	GW-13SMS	GW-13SMSD
Chloromethane		UJ
Bromomethane		UJ
Vinyl Chloride		UJ
Chloroethane		UJ
Methylene Chloride		UJ
Acetone		UJ
Carbon Disulfide		UJ
1,1-Dichloroethylene	40	26 J
1,1-Dichloroethane		UJ
Total 1,2-Dichloroethylene		UJ
Chloroform		UJ
1,2-Dichloroethane		UJ
2-Butanone		UJ
1,1,1-Trichloroethane		UJ
Carbon Tetrachloride		UJ
Vinyl Acetate		UJ
Bromodichloromethane		UJ
1,2-Dichloropropane		UJ
Cis-1,3-Dichloropropene		UJ
Trichloroethene	62	39 J
Dibromochloromethane		UJ
1,1,2-Trichlorethane		UJ
Benzene	68	42 J
Trans-1,3-Dichloropropene		UJ
Bromoform		UJ
4-Methyl-2-pentanone		UJ
2-Hexanone		UJ
Tetrachloroethene		UJ
1,1,2,2-Tetrachloroethane		UJ
Toluene	63	40 J
Chlorobenzene	66	42 J
Ethylbenzene		UJ
Styrene		UJ
Total Xylenes		UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES 524.2/WATER - DATA SUMMARY

CASE NO. 9102.587

All results reported in ug/L

Parameters - Volatiles	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	VBLKW1	VBLKW2	VBLKW3	VBLKW4	LFB1	LFB2
Dichlorodifluoromethane														2.1
Chloromethane														1.5
Vinyl Chloride														2.0
Bromomethane														2.0
Chloroethane														2.5
Trichlorofluoromethane														2.0
1,1-Dichloroethene													1.4	1.9
Methylene Chloride	0.6 U	0.6 U	1.4 U	1.0 U	1.2 U			0.6 U	0.6	0.7	1.1		2.1 U	2.8 U
Trans-1,2-dichloroethene													1.4	1.8
1,1-Dichloroethane													1.6	2.1
cis-1,2-dichloroethene													1.5	2.1
2,2-dichloropropane													1.3	1.8
Chloroform													1.8	2.3
Bromochloromethane													1.6	2.2
1,1,1-Trichloroethane													1.6	2.1
1,2-Dichloroethane													1.7	2.3
1,1-Dichloropropene													1.6	1.9
Carbon Tetrachloride													1.6	1.9
Benzene													1.7	2.1
1,2-Dichloropropane													1.8	2.4
Trichloroethene					2.6	2.9							1.8	2.1
Dibromomethane													1.6	2.3
Bromodichloromethane													1.5	2.1
Toluene													1.8	2.3
1,1,2-Trichloroethane													1.7	2.4
1,3-Dichloropropane													1.6	2.4
Dibromochloromethane													1.2	1.7
Tetrachloroethene													1.7	2.2
1,2-Dibromoethane													1.6	2.3
Chlorobenzene													1.7	2.1
1,1,2,2-Tetrachloroethane													1.6	2.2
Cis-1,2-Dichloropropene													1.8	2.6
Trans-1,2-dichloropropene													0.8	1.2

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES 524.2/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587

All results reported in ug/L

Parameters - Volatiles	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	VBLKW1	VBLKW2	VBLKW3	VBLKW4	LFB1	LFB2
Ethylbenzene													1.6	2.0
p-Xylene/m-Xylene													3.4	4.2
Bromoform													0.9	1.4
o-Xylene													1.7	2.0
Styrene													1.5	2.0
1,1,2,2-Tetrachloroethane													1.3	2.2
1,2,3-Trichloropropane													1.7	2.2
Isopropylbenzene													1.6	2.0
Bromobenzene													1.7	2.2
2-Chlorotoluene													1.9	1.9
n-Propylbenzene													1.7	2.1
4-Chlorotoluene													1.9	2.1
1,3,5-Trimethylbenzene													1.7	2.2
tert-Butylbenzene													1.6	2.1
1,2,4-Trimethylbenzene													1.8	2.2
sec-Butylbenzene													1.8	2.0
1,3-Dichlorobenzene													1.8	2.3
p-Isopropyltoluene													1.7	2.2
1,4-Dichlorobenzene													1.8	2.4
1,2-Dichlorobenzene													1.8	2.4
n-Butylbenzene													1.8	2.1
1,2-Dibromo-3-Chloropropane	R	R	R	R	R	R	R	R	R	R	R	R	R	R
1,2,4-Trichlorobenzene													1.7	2.2
Naphthalene													1.8	2.3
Hexachlorobutadiene													1.9	2.3
1,2,3-Trichlorobenzene													1.3	2.3

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES 524.2/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587 — **All results reported in ug/L**

Parameters - Volatiles	DW-2MS	DW-2MSD	DW-7MS	DW-7MSD
Dichlorodifluoromethane			UJ	UJ
Chloromethane			UJ	UJ
Vinyl Chloride			UJ	UJ
Bromomethane			UJ	UJ
Chloroethane			UJ	UJ
Trichlorofluoromethane			UJ	UJ
1,1-Dichloroethene	10	9.5	10 J	10 J
Methylene Chloride	1.7 U	1.4 U	1.0 UJ	1.4 UJ
Trans-1,2-dichloroethene			UJ	UJ
1,1-Dichloroethane			UJ	UJ
cis-1,2-dichloroethene			UJ	UJ
2,2-dichloropropane			UJ	UJ
Chloroform			UJ	UJ
Bromochloromethane			UJ	UJ
1,1,1-Trichloroethane			UJ	UJ
1,2-Dichloroethane			UJ	UJ
1,1-Dichloropropene			UJ	UJ
Carbon Tetrachloride			UJ	UJ
Benzene	11	9.8	12 J	12 J
1,2-Dichloropropane			UJ	UJ
Trichloroethene	10	9.5	11 J	11 J
Dibromomethane			UJ	UJ
Bromodichloromethane			UJ	UJ
Toluene	11	10	13 J	13 J
1,1,2-Trichloroethane			UJ	UJ
1,3-Dichloropropane			UJ	UJ
Dibromochloromethane			UJ	UJ
Tetrachloroethene			UJ	UJ
1,2-Dibromoethane			UJ	UJ
Chlorobenzene	11	9.9	12.6 J	13 J
1,1,2,2-Tetrachloroethane			UJ	UJ
Cis-1,2-Dichloropropene			UJ	UJ
Trans-1,2-dichloropropene			UJ	UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

VOLATILES 524.2/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587

All results reported in ug/L

Parameters - Volatiles	DW-2MS	DW-2MSD	DW-7MS	DW-7MSD
Ethylbenzene			UJ	UJ
p-Xylene/m-Xylene			UJ	UJ
Bromoform			UJ	UJ
o-Xylene			UJ	UJ
Styrene			UJ	UJ
1,1,2,2-Tetrachloroethane			UJ	UJ
1,2,3-Trichloropropane			UJ	UJ
Isopropylbenzene			UJ	UJ
Bromobenzene			UJ	UJ
2-Chlorotoluene			UJ	UJ
n-Propylbenzene			UJ	UJ
4-Chlorotoluene			UJ	UJ
1,3,5-Trimethylbenzene			UJ	UJ
tert-Butylbenzene			UJ	UJ
1,2,4-Trimethylbenzene			UJ	UJ
sec-Butylbenzene			UJ	UJ
1,3-Dichlorobenzene			UJ	UJ
p-Isopropyltoluene			UJ	UJ
1,4-Dichlorobenzene			UJ	UJ
1,2-Dichlorobenzene			UJ	UJ
n-Butylbenzene			UJ	UJ
1,2-Dibromo-3-Chloropropane	R	R	R	R
1,2,4-Trichlorobenzene			UJ	UJ
Naphthalene			UJ	UJ
Hexachlorobutadiene			UJ	UJ
1,2,3-Trichlorobenzene			UJ	UJ

WELLSVILLE/ANDOVER LANDFILL SITE
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9103.051 — **All results reported in ug/kg**

Parameters - Volatiles	TP-1	TP-1DL	TP-2	TP-3	TP-4	TP-5	VBLKM1	VBLKS1	TP-2MS	TP-2MSD	MSB
Chloromethane		UJ									
Bromomethane		UJ									
Vinyl Chloride	2900 E	980 DJ									
Chloroethane		UJ									
Methylene Chloride	1900 U	2000 U	7 U	1400 U	850 U	110	550 J	4 J	10 U	10 U	6 U
Acetone	3100 E	4500 DJ	230 J	1800 J		370 J			360 J	250 E	4 J
Carbon Disulfide		UJ									
1,1-Dichloroethylene		UJ								54	22
1,1-Dichloroethane	710	UJ									
Total 1,2-Dichloroethylene	5400 E	3900 DJ		2200	2900	21 J					
Chloroform		UJ									
1,2-Dichloroethane		UJ							4 J		
2-Butanone	490 J	UJ				75 J			21 J	20 J	
1,1,1-Trichloroethane		UJ									
Carbon Tetrachloride		UJ									
Vinyl Acetate		UJ									
Bromodichloromethane		UJ									
1,2-Dichloropropane		UJ									
Cis-1,3-Dichloropropene		UJ									
Trichloroethene	73	UJ			5300				62	59	52
Dibromochloromethane		UJ									
1,1,2-Trichlorethane		UJ									
Benzene	UJ	UJ	UJ	UJ	UJ	78 J			66 J	63 J	53
Trans-1,3-Dichloropropene		UJ									
Bromoform		UJ									
4-Methyl-2-pentanone	260 J	UJ							UJ		
2-Hexanone	120	UJ				44 J			UJ		
Tetrachloroethene		UJ			520 J				UJ		
1,1,2,2-Tetrachloroethane		UJ							UJ		
Toluene	970 J	1200 D	11 J	760 J	3200 J	33 J			90 J	64 J	51
Chlorobenzene	UJ	UJ	UJ	UJ	UJ	UJ			64 J	64 J	54
Ethylbenzene	1800 J	33000 D	31 J	12000 J	830 J	1200 J			80 J	16 J	
[illegible]rene	45	UJ			4200				UJ		
Total Xylenes	1700 J	UJ	51 J	[illegible] J	690 J	350 J			130 J	28 J	

DATA SUMMARY TABLES

SEMI-VOLATILE ORGANICS

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.123 **All results reported in ug/kg**

Parameters - SemiVolatiles	SB-1A	SB-1B	SB-6A	SB-6B	SBLKS1	SBLKS2	SBLKS3	MSB	SB-6A-MS	SB-6A-MSD
Phenol			UJ	UJ				6400 E	5500 J	4900 J
bis (2-chloroethyl) ether			UJ	UJ					UJ	UJ
2-Chlorophenol			UJ	UJ				5100	4500 J	4100 J
1,3-Dichlorobenzene			UJ	UJ					UJ	UJ
1,4-Dichlorobenzene			UJ	UJ				3000	2700 J	2200 J
Benzyl Alcohol			UJ	UJ					UJ	UJ
1,2-Dichlorobenzene			UJ	UJ					UJ	UJ
2-Methylphenol			UJ	UJ					UJ	UJ
2,2-oxybis(1-chloropriopane)			UJ	UJ					UJ	UJ
4-methylphenol			UJ	UJ					UJ	UJ
N-Nitroso-di-n-propylamine			UJ	UJ				3100	2700 J	2300 J
Hexachloroethane			UJ	UJ					UJ	UJ
Nitrobenzene			UJ	UJ					UJ	UJ
Isophorone			UJ	UJ					UJ	UJ
2-Nitrophenol			UJ	UJ					UJ	UJ
2,4-Dimethylphenol			UJ	UJ					UJ	UJ
Benzoic Acid			UJ	UJ					UJ	UJ
bis(2-chloroethoxy)methane			UJ	UJ					UJ	UJ
2,4-Dichlorophenol			UJ	UJ					UJ	UJ
1,2,4-Trichlorobenzene			UJ	UJ				3000	2400 J	2300 J
Naphthalene			UJ	UJ					UJ	UJ
4-chloroaniline			UJ	UJ					UJ	UJ
Hexachlorobutadiene			UJ	UJ					UJ	UJ
4-chloro-3-methylphenol			UJ	UJ				5600 E	4700 J	4600 J
2-methylnaphthalene			UJ	UJ					UJ	UJ
Hexachlorocyclopentadiene			UJ	UJ					UJ	UJ
2,4,6-Trichlorophenol			UJ	UJ					UJ	UJ
2,4,5-Trichlorophenol			UJ	UJ					UJ	UJ
2-Chloronaphthalene			UJ	UJ					UJ	UJ
2-Nitroaniline			UJ	UJ					UJ	UJ
Dimethylphthalate			UJ	UJ					UJ	UJ
Acenaphthylene			UJ	UJ					UJ	UJ

DRAFT

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.123

All results reported in ug/kg

Parameters - SemiVolatiles	SB-1A	SB-1B	SB-6A	SB-6B	SBLKS1	SBLKS2	SBLKS3	MSB	SB-6A-MS	SB-6A-MSD
2,6-Dinitrotoluene			UJ	UJ					UJ	UJ
3-Nitroaniline			UJ	UJ					UJ	UJ
Acenaphthene			UJ	UJ				3100	2400 J	2400 J
2,4-Dinitrophenol			UJ	UJ					UJ	UJ
4-Nitrophenol			UJ	UJ				8300 E	5500 J	6000 E
Dibenzofuran			UJ	UJ					UJ	UJ
2,4-Dinitrotoluene			UJ	UJ				3900	2700 J	2700 J
Diethylphthalate			UJ	UJ					UJ	UJ
4-chlorophenyl-phenylether			UJ	UJ					UJ	UJ
Fluorene			UJ	UJ					UJ	UJ
4-Nitroaniline			UJ	UJ					UJ	UJ
4,6-Dinitro-2-methylphenol			UJ	UJ					UJ	UJ
N-Nitrosodiphenylamine			UJ	UJ					UJ	UJ
4-Bromophenyl-phenylether			UJ	UJ					UJ	UJ
Hexachlorobenzene			UJ	UJ					UJ	UJ
Pentachlorophenol			UJ	UJ				5300	4300 UJ	4500 J
Phenanthrene			UJ	UJ					UJ	UJ
Anthracene			UJ	UJ					UJ	UJ
Di-n-butylphthalate			UJ	UJ					UJ	UJ
Fluoranthene			UJ	UJ					UJ	UJ
Pyrene			UJ	UJ				2900	2400 J	2300 J
Butylbenzylphthalate			UJ	UJ					UJ	UJ
3,3'-Dichlorobenzidine			UJ	UJ					UJ	UJ
Benz(a)anthracene			UJ	UJ					UJ	UJ
Chrysene			UJ	UJ					UJ	UJ
bis(2-ethylhexyl)phthalate	360 U		360 UJ	400 UJ	46 J				360 UJ	UJ
Di-n-octyl phthalate			UJ	UJ					UJ	UJ
Benzo(b)flouranthene			UJ	UJ					UJ	UJ
Benzo(k)flouranthene			UJ	UJ					UJ	UJ
Benzo(a)pyrene			UJ	UJ					UJ	UJ
Indeno(1,2,3-cd)pyrene			UJ	UJ					UJ	UJ
Dibenz(a,h)anthracene			UJ	UJ					UJ	UJ
Benzo(g,h,i)perylene			UJ	UJ					UJ	UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Parameters - Semi-Volatiles	DW-1	R-1	SBLKW1	DW-1-MS
Phenol				39
bis (2-chloroethyl) ether				
2-Chlorophenol				70
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				67
Benzyl Alcohol				
1,2-Dichlorobenzene				
2-Methylphenol				
2,2-oxybis(1-chloropriopane)				
4-methylphenol				
N-Nitroso-di-n-propylamine				78
Hexachloroethane				
Nitrobenzene				
Isophorone				
2-Nitrophenol				
2,4-Dimethylphenol				
Benzoic Acid				
bis(2-chloroethoxy)methane				
2,4-Dichlorophenol				
1,2,4-Trichlorobenzene				67
Naphthalene				
4-chloroaniline				
Hexachlorobutadiene				
4-chloro-3-methylphenol				110
2-methylnaphthalene				
Hexachlorocyclopentadiene				UJ
2,4,6-Trichlorophenol				UJ
2,4,5-Trichlorophenol				UJ
2-Chloronaphthalene				UJ
2-Nitroaniline				UJ
Dimethylphthalate				UJ
Acenaphthylene				UJ

WELLSVILLE/ANDOVER LANDFILL SITE
SEMI-VOLATILES/WATER - DATA SUMMARY
(continued)

CASE NO. 9102.282 **All results reported in ug/L**

Parameters - Semi-Volatiles	DW-1	R-1	SBLKW1	DW-1-MS
2,6-Dinitrotoluene				UJ
3-Nitroaniline				UJ
Acenaphthene				73 J
2,4-Dinitrophenol				UJ
4-Nitrophenol				UJ
Dibenzofuran				UJ
2,4-Dinitrotoluene				86 J
Diethylphthalate				UJ
4-chlorophenyl-phenylether				UJ
Fluorene				UJ
4-Nitroaniline				UJ
4,6-Dinitro-2-methylphenol				UJ
N-Nitrosodiphenylamine				UJ
4-Bromophenyl-phenylether				UJ
Hexachlorobenzene				UJ
Pentachlorophenol				4 J
Phenanthrene				UJ
Anthracene				UJ
Di-n-butylphthalate				UJ
Fluoranthene				UJ
Pyrene	UJ			82 J
Butylbenzylphthalate	UJ			UJ
3,3'-Dichlorobenzidine	UJ			UJ
Benz(a)anthracene	UJ			UJ
Chrysene	UJ			UJ
bis(2-ethylhexyl)phthalate	UJ			UJ
Di-n-octyl phthalate	UJ			UJ
Benzo(b)flouranthene	UJ			UJ
Benzo(k)flouranthene	UJ			UJ
Benzo(a)pyrene	UJ			UJ
Indeno(1,2,3-cd)pyrene	UJ			UJ
Dibenz(a,h)anthracene	UJ			UJ
Benzo(g,h,i)perylene	UJ			UJ

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/kg**

Parameters - Semi-Volatiles	SB-8A	SB-8AD	SB-8B	SBLKS1	MSB
Phenol					5400 E
bis (2-chloroethyl) ether					
2-Chlorophenol					5000
1,3-Dichlorobenzene					
1,4-Dichlorobenzene					2700
Benzyl Alcohol					
1,2-Dichlorobenzene					
2-Methylphenol					
2,2-oxybis(1-chloropriopane)					
4-methylphenol					
N-Nitroso-di-n-propylamine					2900
Hexachloroethane					
Nitrobenzene					
Isophorone					
2-Nitrophenol					
2,4-Dimethylphenol					
Benzoic Acid					
bis(2-chloroethoxy)methane					
2,4-Dichlorophenol					
1,2,4-Trichlorobenzene					2500
Naphthalene					
4-chloroaniline					
Hexachlorobutadiene					
4-chloro-3-methylphenol					4800
2-methylnaphthalene					
Hexachlorocyclopentadiene					
2,4,6-Trichlorophenol					
2,4,5-Trichlorophenol					
2-Chloronaphthalene					
2-Nitroaniline					
Dimethylphthalate					
Acenaphthylene					

WELLSVILLE/ANDOVER LANDFILL SITE
SEMI-VOLATILES/SOIL - DATA SUMMARY
(continued)

CASE NO. 9102.282 **All results reported in ug/kg**

Parameters - Semi-Volatiles	SB-8A	SB-8AD	SB-8B	SBLKS1	MSB
2,6-Dinitrotoluene					
3-Nitroaniline					
Acenaphthene					2400
2,4-Dinitrophenol					
4-Nitrophenol					5500
Dibenzofuran					
2,4-Dinitrotoluene					3000
Diethylphthalate					
4-chlorophenyl-phenylether					
Fluorene					
4-Nitroaniline					
4,6-Dinitro-2-methylphenol					
N-Nitrosodiphenylamine					
4-Bromophenyl-phenylether					
Hexachlorobenzene					
Pentachlorophenol					3900
Phenanthrene					
Anthracene					
Di-n-butylphthalate					
Fluoranthene					
Pyrene					2300
Butylbenzylphthalate					
3,3'-Dichlorobenzidine					
Benz(a)anthracene					
Chrysene					
bis(2-ethylhexyl)phthalate	360 U	370 U	380 U	24 J	
Di-n-octyl phthalate					
Benzo(b)flouranthene					
Benzo(k)flouranthene					
Benzo(a)pyrene					
Indeno(1,2,3-cd)pyrene					
Dibenz(a,h)anthracene					
Benzo(g,h,i)perylene					

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/kg**

Parameters - SemiVolatiles	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-5RE	SED-6
Phenol										
bis (2-chloroethyl) ether										
2-Chlorophenol										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
Benzyl Alcohol										
1,2-Dichlorobenzene										
2-Methylphenol										
2,2-oxybis(1-chloropriopane)										
4-methylphenol										
N-Nitroso-di-n-propylamine										
Hexachloroethane										
Nitrobenzene										
Isophorone										
2-Nitrophenol										
2,4-Dimethylphenol										
Benzoic Acid										
bis(2-chloroethoxy)methane										
2,4-Dichlorophenol										
1,2,4-Trichlorobenzene										
Naphthalene										
4-chloroaniline										
Hexachlorobutadiene										
4-chloro-3-methylphenol										
2-methylnaphthalene										
Hexachlorocyclopentadiene										
2,4,6-Trichlorophenol										
2,4,5-Trichlorophenol										
2-Chloronaphthalene										
2-Nitroaniline										
Dimethylphthalate										
A[illegible]aphthylene										

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.387

All results reported in ug/kg

Parameters - SemiVolatiles	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-5RE	SED-6
2,6-Dinitrotoluene										
3-Nitroaniline										
Acenaphthene										
2,4-Dinitrophenol										
4-Nitrophenol										
Dibenzofuran										
2,4-Dinitrotoluene										
Diethylphthalate										
4-chlorophenyl-phenylether										
Fluorene										
4-Nitroaniline										
4,6-Dinitro-2-methylphenol										
N-Nitrosodiphenylamine										
4-Bromophenyl-phenylether										
Hexachlorobenzene										
Pentachlorophenol										
Phenanthrene										
Anthracene										
Di-n-butylphthalate	370 U	350 U	510 U	520 U	420 U	620 U	670 U	400 U	400 U	430 U
Fluoranthene										
Pyrene										
Butylbenzylphthalate					24 J					
3,3'-Dichlorobenzidine										
Benz(a)anthracene										
Chrysene										
bis(2-ethylhexyl)phthalate	370 U	350 U	510 U	520 U	420 U	620 U	670 U	400 U	400 U	430 U
Di-n-octyl phthalate								UJ	UJ	
Benzo(b)flouranthene								UJ	UJ	
Benzo(k)flouranthene								UJ	UJ	
Benzo(a)pyrene								UJ	UJ	
Indeno(1,2,3-cd)pyrene								UJ	UJ	
Dibenz(a,h)anthracene								UJ	UJ	
Benzo(g,h,i)perylene								UJ	UJ	

WELLSVILLE/ANDOVER LANDFILL SITE
SEMI-VOLATILES/SOIL - DATA SUMMARY
(continued)

CASE NO. 9102.387 **All results reported in ug/kg**

Parameters - SemiVolatiles	SBLKS1	SED-4MS	SED-4MSD
Phenol		8600 E	13000 E
bis (2-chloroethyl) ether			
2-Chlorophenol		7700 E	12000 E
1,3-Dichlorobenzene			
1,4-Dichlorobenzene		3500	5400 E
Benzyl Alcohol			
1,2-Dichlorobenzene			
2-Methylphenol			
2,2-oxybis(1-chloropriopane)			
4-methylphenol			
N-Nitroso-di-n-propylamine		4400	7200 E
Hexachloroethane			
Nitrobenzene			
Isophorone			
2-Nitrophenol			
2,4-Dimethylphenol			
Benzoic Acid			
bis(2-chloroethoxy)methane			
2,4-Dichlorophenol			
1,2,4-Trichlorobenzene		3800	5000
Naphthalene			
4-chloroaniline			
Hexachlorobutadiene			
4-chloro-3-methylphenol		6900 E	11000 E
2-methylnaphthalene			
Hexachlorocyclopentadiene			
2,4,6-Trichlorophenol			
2,4,5-Trichlorophenol			
2-Chloronaphthalene			
2-Nitroaniline			
Dimethylphthalate			
Acenaphthylene			

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
SEMI-VOLATILES/SOIL - DATA SUMMARY
(continued)

CASE NO. 9102.387 **All results reported in ug/kg**

Parameters - SemiVolatiles	SBLKS1	SED-4MS	SED-4MSD
2,6-Dinitrotoluene			
3-Nitroaniline			
Acenaphthene		3600	4900
2,4-Dinitrophenol			
4-Nitrophenol		7600 E	21000 E
Dibenzofuran			
2,4-Dinitrotoluene		4400	6500 E
Diethylphthalate			
4-chlorophenyl-phenylether			
Fluorene			
4-Nitroaniline			
4,6-Dinitro-2-methylphenol			
N-Nitrosodiphenylamine			
4-Bromophenyl-phenylether			
Hexachlorobenzene			
Pentachlorophenol		6700 E	15000 E
Phenanthrene			
Anthracene			
Di-n-butylphthalate	31 J	620 U	620 U
Fluoranthene			
Pyrene		5500 E	5400 E
Butylbenzylphthalate			
3,3'-Dichlorobenzidine			
Benz(a)anthracene			
Chrysene			
bis(2-ethylhexyl)phthalate	88 J	620 U	620 U
Di-n-octyl phthalate			
Benzo(b)flouranthene			
Benzo(k)flouranthene			
Benzo(a)pyrene			
Indeno(1,2,3-cd)pyrene			
Dibenz(a,h)anthracene			
Benzo(g,h,i)perylene			

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/L**

Parameters - Semi-Volatiles	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	SBLKW1	SBLKW2	SBLKW3	MSB	SW-4MS	SW-4MSD
Phenol											61	34	32
bis (2-chloroethyl) ether													
2-Chlorophenol											110	66	70
1,3-Dichlorobenzene													
1,4-Dichlorobenzene											48	40	35
Benzyl Alcohol													
1,2-Dichlorobenzene													
2-Methylphenol													
2,2-oxybis(1-chloropriopane)													
4-methylphenol													
N-Nitroso-di-n-propylamine											54	50	49
Hexachloroethane													
Nitrobenzene													
Isophorone													
2-Nitrophenol													
2,4-Dimethylphenol													
Benzoic Acid													
bis(2-chloroethoxy)methane													
2,4-Dichlorophenol													
1,2,4-Trichlorobenzene											54	44	41
Naphthalene													
4-chloroaniline													
Hexachlorobutadiene													
4-chloro-3-methylphenol											130	120	120
2-methylnaphthalene													
Hexachlorocyclopentadiene													
2,4,6-Trichlorophenol													
2,4,5-Trichlorophenol													
2-Chloronaphthalene													
2-Nitroaniline													
Dim[illegible]ylphthalate													
Acen[illegible]nthylene													

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.387

All results reported in ug/L

Parameters - Semi-Volatiles	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	SBLKW1	SBLKW2	SBLKW3	MSB	SW-4MS	SW-4MSD
2,6-Dinitrotoluene													
3-Nitroaniline													
Acenaphthene											62	57	56
2,4-Dinitrophenol													
4-Nitrophenol											53		15 J
Dibenzofuran													
2,4-Dinitrotoluene											78	77	78
Diethylphthalate													
4-chlorophenyl-phenylether													
Fluorene													
4-Nitroaniline													
4,6-Dinitro-2-methylphenol													
N-Nitrosodiphenylamine													
4-Bromophenyl-phenylether													
Hexachlorobenzene													
Pentachlorophenol											84	11 J	26 J
Phenanthrene													
Anthracene													
Di-n-butylphthalate	2 J	1 J		2 J			1 J					1 J	2 J
Fluoranthene													
Pyrene											87	81	72
Butylbenzylphthalate													
3,3'-Dichlorobenzidine													
Benz(a)anthracene													
Chrysene													
bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U		10 U	2 J	2 J		10 U	10 U	10 U
Di-n-octyl phthalate		2 J											
Benzo(b)flouranthene													
Benzo(k)flouranthene													
Benzo(a)pyrene													
Indeno(1,2,3-cd)pyrene													
Dibenz(a,h)anthracene													
Benzo(g,h,i)perylene													

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.414 | **All results reported in ug/kg**

Parameters - SemiVolatiles	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-9RE	SS-10
Phenol											
bis(2-chloroethyl) ether											
2-Chlorophenol											
1,3-Dichlorobenzene											
1,4-Dichlorobenzene											
Benzyl Alcohol											
1,2-Dichlorobenzene											
2-Methylphenol											
2,2-oxybis(1-chloropriopane)											
4-methylphenol											
N-Nitroso-di-n-propylamine											
Hexachloroethane											
Nitrobenzene											
Isophorone											
2-Nitrophenol											
2,4-Dimethylphenol											
Benzoic Acid											
bis(2-chloroethoxy)methane											
2,4-Dichlorophenol											
1,2,4-Trichlorobenzene											
Naphthalene											
4-chloroaniline											
Hexachlorobutadiene											
4-chloro-3-methylphenol											
2-methylnaphthalene											
Hexachlorocyclopentadiene											
2,4,6-Trichlorophenol											
2,4,5-Trichlorophenol											
2-Chloronaphthalene											
2-Nitroaniline											
Dimethylphthalate											
Acenaphthylene											

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/kg

Parameters - SemiVolatiles	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-9RE	SS-10
2,6-Dinitrotoluene											
3-Nitroaniline											
Acenaphthene											
2,4-Dinitrophenol											
4-Nitrophenol											
Dibenzofuran											
2,4-Dinitrotoluene											
Diethylphthalate											
4-chlorophenyl-phenylether											
Fluorene											
4-Nitroaniline											
4,6-Dinitro-2-methylphenol									UJ		
N-Nitrosodiphenylamine									UJ		
4-Bromophenyl-phenylether									UJ		
Hexachlorobenzene									UJ		
Pentachlorophenol									UJ		
Phenanthrene							46 J		UJ		94 J
Anthracene									UJ		27 J
Di-n-butylphthalate	420 U	410 U	570 U	370 U	420 U	420 U	450 U	420 U	850 UJ	420 U	820 U
Fluoranthene							55 J				370 J
Pyrene			53 J				59 J		UJ		280 J
Butylbenzylphthalate									UJ		
3,3'-Dichlorobenzidine									UJ		
Benz(a)anthracene									UJ		
Chrysene									40 J		100 J
bis(2-ethylhexyl)phthalate	420 U	410 U	2100	370 U	420 U	420 U	450 U	420 U	850 UJ	420 U	820 U
Di-n-octyl phthalate									UJ	UJ	
Benzo(b)flouranthene									UJ	UJ	67 J
Benzo(k)flouranthene									UJ	UJ	44 J
Benzo(a)pyrene									UJ	UJ	
Indeno(1,2,3-cd)pyrene									UJ	UJ	
Dibenz(a,h)anthracene									UJ	UJ	
Benzo(g,h,i)perylene									UJ	UJ	

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/kg

Parameters - SemiVolatiles	SS-10D	SS-11	SS-12	SS-12RE	SS-13	SS-13RE	SS-14	SS-14RE	SBLKS1	SS-11MS	SS-11MSD	MSB
Phenol										11000 E	12000 E	5200 E
bis (2-chloroethyl) ether												
2-Chlorophenol										11000 E	11000 E	4800 E
1,3-Dichlorobenzene												
1,4-Dichlorobenzene										4400	4500	2300
Benzyl Alcohol												
1,2-Dichlorobenzene												
2-Methylphenol												
2,2-oxybis(1-chloropriopane)												
4-methylphenol												
N-Nitroso-di-n-propylamine										4700	5100	2900 E
Hexachloroethane												
Nitrobenzene								UJ				
Isophorone								UJ				
2-Nitrophenol								UJ				
2,4-Dimethylphenol								UJ				
Benzoic Acid								UJ				
bis(2-chloroethoxy)methane								UJ				
2,4-Dichlorophenol								UJ				
1,2,4-Trichlorobenzene								UJ		5600	5600	2300
Naphthalene								UJ				
4-chloroaniline								UJ				
Hexachlorobutadiene								UJ				
4-chloro-3-methylphenol								UJ		10000 E	10000 E	4300 E
2-methylnaphthalene								UJ				
Hexachlorocyclopentadiene												
2,4,6-Trichlorophenol												
2,4,5-Trichlorophenol												
2-Chloronaphthalene												
2-Nitroaniline												
Dimethylphthalate												
Acenaphthylene												

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/kg

Parameters - SemiVolatiles	SS-10D	SS-11	SS-12	SS-12RE	SS-13	SS-13RE	SS-14	SS-14RE	SBLKS1	SS-11MS	SS-11MSD	MSB
2,6-Dinitrotoluene												
3-Nitroaniline												
Acenaphthene										5500	5200	2200
2,4-Dinitrophenol												
4-Nitrophenol										10000 E	9400 E	5900 E
Dibenzofuran												
2,4-Dinitrotoluene										5900 E	5400	3000 E
Diethylphthalate												
4-chlorophenyl-phenylether												
Fluorene												
4-Nitroaniline												
4,6-Dinitro-2-methylphenol							UJ			UJ	UJ	
N-Nitrosodiphenylamine							UJ			UJ	UJ	
4-Bromophenyl-phenylether							UJ			UJ	UJ	
Hexachlorobenzene							UJ			UJ	UJ	
Pentachlorophenol							UJ			5100 J	3500 J	6500 E
Phenanthrene							41 J	26 J		UJ	UJ	
Anthracene							UJ			UJ	UJ	
Di-n-butylphthalate	440 U	720 U	450 U	450 U		880 U	490 UJ	490 UJ	29 J	UJ	720 UJ	330 U
Fluoranthene							42 J	25 J		UJ	UJ	
Pyrene			UJ	UJ	UJ	UJ	49 J	49 J		6800 E	8200 E	2900 E
Butylbenzylphthalate	50 J		UJ	UJ	UJ	260 J	UJ	UJ		UJ	UJ	
3,3'-Dichlorobenzidine			UJ	UJ	UJ	UJ	UJ	UJ		UJ	UJ	
Benz(a)anthracene			UJ	UJ	UJ	UJ	UJ	UJ		UJ	UJ	
Chrysene			UJ	UJ	UJ	UJ	48 J	32 J		UJ	UJ	
bis(2-ethylhexyl)phthalate	440 U	720 U	450 UJ	450 UJ	440 UJ	880 UJ	490 UJ	490 UJ	99 J	720 UJ	720 UJ	330 U
Di-n-octyl phthalate			UJ	UJ	UJ	UJ	UJ	UJ		UJ	UJ	
Benzo(b)flouranthene			UJ	UJ	UJ	UJ	140 J	77 J		UJ	UJ	
Benzo(k)flouranthene			UJ	UJ	UJ	UJ	UJ	UJ		UJ	UJ	
Benzo(a)pyrene			UJ	UJ	UJ	UJ	88 J	67 J		UJ	UJ	
Indeno(1,2,3-cd)pyrene			UJ	45 J	UJ	UJ	UJ	UJ		UJ	UJ	
Dibenz(a,h)anthracene			UJ	44 J	UJ	UJ	UJ	UJ		UJ	UJ	
Benzo(g,h,i)perylene			UJ	47 J	UJ	UJ	UJ	UJ		UJ	UJ	

DRAFT

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.414 **All results reported in ug/L**

Parameters - Semi-Volatiles	(MH-4) L-1	(PS2) L-2	SBLKW1	PS2(L2) MS	PS2(L2) MSD	MSB1
Phenol				71	70	72
bis (2-chloroethyl) ether						
2-Chlorophenol				140	130	140
1,3-Dichlorobenzene						
1,4-Dichlorobenzene		1 J		62	62	66
Benzyl Alcohol						
1,2-Dichlorobenzene						
2-Methylphenol						
2,2-oxybis(1-chloropriopane)						
4-methylphenol						
N-Nitroso-di-n-propylamine				62	62 J	68
Hexachloroethane						
Nitrobenzene						
Isophorone						
2-Nitrophenol						
2,4-Dimethylphenol						
Benzoic Acid						
bis(2-chloroethoxy)methane						
2,4-Dichlorophenol						
1,2,4-Trichlorobenzene				63	70	66
Naphthalene		1 J				
4-chloroaniline						
Hexachlorobutadiene						
4-chloro-3-methylphenol		4 J		150	150	140
2-methylnaphthalene						
Hexachlorocyclopentadiene						
2,4,6-Trichlorophenol						
2,4,5-Trichlorophenol						
2-Chloronaphthalene						
2-Nitroaniline						
Dimethylphthalate						
Acenaphthylene						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/L

Parameters - Semi-Volatiles	(MH-4) L-1	(PS2) L-2	SBLKW1	PS2(L2) MS	PS2(L2) MSD	MSB1
2,6-Dinitrotoluene						
3-Nitroaniline						
Acenaphthene				66	65	68
2,4-Dinitrophenol						
4-Nitrophenol				88	92	78
Dibenzofuran						
2,4-Dinitrotoluene				71	73	90
Diethylphthalate						
4-chlorophenyl-phenylether						
Fluorene						
4-Nitroaniline						
4,6-Dinitro-2-methylphenol						
N-Nitrosodiphenylamine		1 J				
4-Bromophenyl-phenylether						
Hexachlorobenzene						
Pentachlorophenol				30 J	20 J	140
Phenanthrene						
Anthracene						
Di-n-butylphthalate		2 J				
Fluoranthene						
Pyrene				84	87	87
Butylbenzylphthalate						
3,3'-Dichlorobenzidine						
Benz(a)anthracene						
Chrysene						
bis(2-ethylhexyl)phthalate	10 U	10 U	2 J			
Di-n-octyl phthalate						
Benzo(b)flouranthene						
Benzo(k)flouranthene						
Benzo(a)pyrene						
Indeno(1,2,3-cd)pyrene						
Dibenz(a,h)anthracene						
Benzo(g,h,i)perylene						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.556 **All results reported in ug/L**

Parameters - Semi-Volatiles	GW-1D	GW-2D	GW-2DRE	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-10D	GW-10S	GW-10SRE
Phenol		R	R				UJ			R	R
bis (2-chloroethyl) ether			UJ				UJ				UJ
2-Chlorophenol		R	R				UJ			R	R
1,3-Dichlorobenzene			UJ				UJ				UJ
1,4-Dichlorobenzene			UJ				UJ				UJ
Benzyl Alcohol			UJ				UJ				UJ
1,2-Dichlorobenzene			UJ				UJ				UJ
2-Methylphenol		R	R				UJ			R	R
2,2-oxybis(1-chloropriopane)			UJ				UJ				UJ
4-methylphenol		R	R				UJ			R	R
N-Nitroso-di-n-propylamine			UJ				UJ				UJ
Hexachloroethane			UJ				UJ				UJ
Nitrobenzene			UJ				UJ				UJ
Isophorone			UJ				UJ				UJ
2-Nitrophenol		R	R				UJ			R	R
2,4-Dimethylphenol		R	R				UJ			R	R
Benzoic Acid			UJ				UJ				UJ
bis(2-chloroethoxy)methane			UJ				UJ				UJ
2,4-Dichlorophenol		R	R				UJ			R	R
1,2,4-Trichlorobenzene			UJ				UJ				UJ
Naphthalene			UJ				UJ				UJ
4-chloroaniline			UJ				UJ				UJ
Hexachlorobutadiene			UJ				UJ				UJ
4-chloro-3-methylphenol		R	R				UJ			R	R
2-methylnaphthalene			UJ				UJ				UJ
Hexachlorocyclopentadiene			UJ				UJ				UJ
2,4,6-Trichlorophenol		R	R				UJ			R	R
2,4,5-Trichlorophenol		R	R				UJ			R	R
2-Chloronaphthalene			UJ				UJ				UJ
2-Nitroaniline			UJ				UJ				UJ
Dimethylphthalate			UJ				UJ				UJ
Acenaphthylene			UJ				UJ				UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.556 **All results reported in ug/L**

Parameters - Semi-Volatiles	GW-1D	GW-2D	GW-2DRE	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-10D	GW-10S	GW-10SRE
2,6-Dinitrotoluene			UJ				UJ				UJ
3-Nitroaniline			UJ				UJ				UJ
Acenaphthene			UJ				UJ				UJ
2,4-Dinitrophenol		R	R				UJ			R	R
4-Nitrophenol		R	R				UJ			R	R
Dibenzofuran			UJ				UJ				UJ
2,4-Dinitrotoluene			UJ				UJ				UJ
Diethylphthalate			UJ				UJ				UJ
4-chlorophenyl-phenylether			UJ				UJ				UJ
Fluorene			UJ				UJ				UJ
4-Nitroaniline			UJ				UJ				UJ
4,6-Dinitro-2-methylphenol		R	R				UJ			R	R
N-Nitrosodiphenylamine			UJ				UJ				UJ
4-Bromophenyl-phenylether			UJ				UJ				UJ
Hexachlorobenzene			UJ				UJ				UJ
Pentachlorophenol		R	R				UJ			R	R
Phenanthrene			UJ				UJ				UJ
Anthracene			UJ				UJ				UJ
Di-n-butylphthalate			UJ				UJ				UJ
Fluoranthene			UJ				UJ				UJ
Pyrene			UJ				UJ				UJ
Butylbenzylphthalate			UJ				UJ				UJ
3,3'-Dichlorobenzidine			UJ				UJ				UJ
Benz(a)anthracene			UJ				UJ				UJ
Chrysene			UJ				UJ				UJ
bis(2-ethylhexyl)phthalate			UJ				UJ				UJ
Di-n-octyl phthalate			UJ				UJ				UJ
Benzo(b)flouranthene			UJ				UJ				UJ
Benzo(k)flouranthene			UJ				UJ				UJ
Benzo(a)pyrene			UJ				UJ				UJ
Indeno(1,2,3-cd)pyrene			UJ				UJ				UJ
Dibenz(a,h)anthracene			UJ				UJ				UJ
Benzo(g,h,i)perylene			UJ				UJ				UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.556 **All results reported in ug/L**

Parameters - Semi-Volatiles	SBLKW1	SBLKW2	GW-10DMS	GW-10DMSD
Phenol			56	52
bis (2-chloroethyl) ether				
2-Chlorophenol			110	97
1,3-Dichlorobenzene				
1,4-Dichlorobenzene			45	48
Benzyl Alcohol				
1,2-Dichlorobenzene				
2-Methylphenol				
2,2-oxybis(1-chloropriopane)				
4-methylphenol				
N-Nitroso-di-n-propylamine			49	49
Hexachloroethane				
Nitrobenzene				
Isophorone				
2-Nitrophenol				
2,4-Dimethylphenol				
Benzoic Acid				
bis(2-chloroethoxy)methane				
2,4-Dichlorophenol				
1,2,4-Trichlorobenzene			47	51
Naphthalene				
4-chloroaniline				
Hexachlorobutadiene				
4-chloro-3-methylphenol			110	110
2-methylnaphthalene				
Hexachlorocyclopentadiene				
2,4,6-Trichlorophenol				
2,4,5-Trichlorophenol				
2-Chloronaphthalene				
2-Nitroaniline				
Dimethylphthalate				
A[illegible]aphthylene				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.556

All results reported in ug/L

Parameters - Semi-Volatiles	SBLKW1	SBLKW2	GW-10DMS	GW-10DMSD
2,6-Dinitrotoluene				
3-Nitroaniline				
Acenaphthene			58	58
2,4-Dinitrophenol				
4-Nitrophenol			31 J	20 J
Dibenzofuran				
2,4-Dinitrotoluene			65	65
Diethylphthalate				
4-chlorophenyl-phenylether				
Fluorene				
4-Nitroaniline				
4,6-Dinitro-2-methylphenol				
N-Nitrosodiphenylamine				
4-Bromophenyl-phenylether				
Hexachlorobenzene				
Pentachlorophenol			66	52
Phenanthrene				
Anthracene				
Di-n-butylphthalate				
Fluoranthene				
Pyrene			72	66
Butylbenzylphthalate				
3,3'-Dichlorobenzidine				
Benz(a)anthracene				
Chrysene				
bis(2-ethylhexyl)phthalate				
Di-n-octyl phthalate				
Benzo(b)flouranthene				
Benzo(k)flouranthene				
Benzo(a)pyrene				
Indeno(1,2,3-cd)pyrene				
Dibenz(a,h)anthracene				
Benzo(g,h,i)perylene				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Parameters - Semi-Volatiles	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D	GW-11S	GW-11SDD
Phenol															R
bis (2-chloroethyl) ether															
2-Chlorophenol															R
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
Benzyl Alcohol															
1,2-Dichlorobenzene															
2-Methylphenol															R
2,2-oxybis(1-chloropriopane)															
4-methylphenol															R
N-Nitroso-di-n-propylamine															
Hexachloroethane															
Nitrobenzene															
Isophorone															
2-Nitrophenol															R
2,4-Dimethylphenol															R
Benzoic Acid															
bis(2-chloroethoxy)methane															
2,4-Dichlorophenol															R
1,2,4-Trichlorobenzene															
Naphthalene															
4-chloroaniline															
Hexachlorobutadiene															
4-chloro-3-methylphenol															R
2-methylnaphthalene															
Hexachlorocyclopentadiene															
2,4,6-Trichlorophenol															R
2,4,5-Trichlorophenol															R
2-Chloronaphthalene															
2-Nitroaniline															
Dimethylphthalate															
Acenaphthylene															

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (cont.)

CASE NO. 9102.587 **All results reported in ug/L**

Parameters - Semi-Volatiles	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D	GW-11S	GW-11SDD
2,6-Dinitrotoluene															
3-Nitroaniline															
Acenaphthene															
2,4-Dinitrophenol															R
4-Nitrophenol															R
Dibenzofuran															
2,4-Dinitrotoluene															
Diethylphthalate															
4-chlorophenyl-phenylether															
Fluorene															
4-Nitroaniline															
4,6-Dinitro-2-methylphenol															R
N-Nitrosodiphenylamine															
4-Bromophenyl-phenylether															
Hexachlorobenzene															
Pentachlorophenol															R
Phenanthrene															
Anthracene															
Di-n-butylphthalate															
Fluoranthene															
Pyrene															
Butylbenzylphthalate															
3,3'-Dichlorobenzidine															
Benz(a)anthracene															
Chrysene															
bis(2-ethylhexyl)phthalate					15										
Di-n-octyl phthalate															
Benzo(b)flouranthene															
Benzo(k)flouranthene															
Benzo(a)pyrene															
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene															
Benzo(g,h,i)perylene															

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Parameters - Semi-Volatiles	GW-11SDDRE	GW-12D	GW-13D	GW-13DRE	GW-13S	SBLKW1	SBLKW2	SBLKW3	SBLKW4	SBLKW5	DW-2MS	DW-2MSD
Phenol	R		R	R							58	48
bis (2-chloroethyl) ether	UJ											
2-Chlorophenol	R		R	R							110	96
1,3-Dichlorobenzene	UJ											
1,4-Dichlorobenzene	UJ										41	52
Benzyl Alcohol	UJ											
1,2-Dichlorobenzene	UJ											
2-Methylphenol	R		R	R								
2,2-oxybis(1-chloropriopane)	UJ											
4-methylphenol	R		R	R								
N-Nitroso-di-n-propylamine	UJ										44	60
Hexachloroethane	UJ											
Nitrobenzene	UJ											
Isophorone	UJ											
2-Nitrophenol	R		R	R								
2,4-Dimethylphenol	R		R	R								
Benzoic Acid	UJ											
bis(2-chloroethoxy)methane	UJ											
2,4-Dichlorophenol	R		R	R								
1,2,4-Trichlorobenzene	UJ										39	50
Naphthalene	UJ											
4-chloroaniline	UJ											
Hexachlorobutadiene	UJ											
4-chloro-3-methylphenol	R		R	R							110	100
2-methylnaphthalene	UJ											
Hexachlorocyclopentadiene	UJ											
2,4,6-Trichlorophenol	R		R	R								
2,4,5-Trichlorophenol	R		R	R								
2-Chloronaphthalene	UJ											
2-Nitroaniline	UJ											
Dimethylphthalate	UJ											
Acenaphthy[illegible]	UJ											

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/WATER - DATA SUMMARY (cont.)

CASE NO. 9102.587

All results reported in ug/L

Parameters - Semi-Volatiles	GW-11SDDRE	GW-12D	GW-13D	GW-13DRE	GW-13S	SBLKW1	SBLKW2	SBLKW3	SBLKW4	SBLKW5	DW-2MS	DW-2MSD
2,6-Dinitrotoluene	UJ											
3-Nitroaniline	UJ											
Acenaphthene	UJ										49	56
2,4-Dinitrophenol	R		R	R								
4-Nitrophenol	R		R	R							44 J	32 J
Dibenzofuran	UJ											
2,4-Dinitrotoluene	UJ										59	66
Diethylphthalate	UJ											
4-chlorophenyl-phenylether	UJ											
Fluorene	UJ											
4-Nitroaniline	UJ											
4,6-Dinitro-2-methylphenol	R		R	R								
N-Nitrosodiphenylamine	UJ											
4-Bromophenyl-phenylether	UJ											
Hexachlorobenzene	UJ											
Pentachlorophenol	R		R	R							38 J	40 J
Phenanthrene	UJ											
Anthracene	UJ											
Di-n-butylphthalate	UJ											
Fluoranthene	UJ											
Pyrene	UJ										53	60
Butylbenzylphthalate	UJ											
3,3'-Dichlorobenzidine	UJ											
Benz(a)anthracene	UJ											
Chrysene	UJ											
bis(2-ethylhexyl)phthalate	UJ											
Di-n-octyl phthalate	UJ											UJ
Benzo(b)flouranthene	UJ											UJ
Benzo(k)flouranthene	UJ											UJ
Benzo(a)pyrene	UJ											UJ
Indeno(1,2,3-cd)pyrene	UJ											UJ
Dibenz(a,h)anthracene	UJ											UJ
Benzo(g,h,i)perylene	UJ											UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9103.051 **All results reported in ug/kg**

Parameters - SemiVolatiles	TP-1	TP-2	TP-3	TP-4	TP-5	SBLKS1	MSB	TP-5MS	TP-5MSD
Phenol							3700	8600	8200 J
bis (2-chloroethyl) ether									UJ
2-Chlorophenol							3300	7900	7500 J
1,3-Dichlorobenzene									UJ
1,4-Dichlorobenzene							1800	3300	3400 J
Benzyl Alcohol				1200 J					UJ
1,2-Dichlorobenzene				1200 J	670 J				UJ
2-Methylphenol									UJ
2,2-oxybis(1-chloropriopane)									UJ
4-methylphenol	1600 J	820 J	870		370 J			200 J	UJ
N-Nitroso-di-n-propylamine							2000	3600	3500 J
Hexachloroethane									UJ
Nitrobenzene									
Isophorone									
2-Nitrophenol									
2,4-Dimethylphenol									
Benzoic Acid									
bis(2-chloroethoxy)methane									
2,4-Dichlorophenol									
1,2,4-Trichlorobenzene							1900	2500	2300
Naphthalene		140 J			150 J			73 J	
4-chloroaniline									
Hexachlorobutadiene									
4-chloro-3-methylphenol		300 J					4100	5700	6500
2-methylnaphthalene		180 J			190 J			58 J	2100 J
Hexachlorocyclopentadiene					UJ				UJ
2,4,6-Trichlorophenol					UJ				UJ
2,4,5-Trichlorophenol					UJ				UJ
2-Chloronaphthalene					UJ				UJ
2-Nitroaniline					UJ				UJ
Dimethylphthalate				910 J	530 J				200 J
Acenaphthylene					UJ				UJ

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9103.051

All results reported in ug/kg

Parameters - SemiVolatiles	TP-1	TP-2	TP-3	TP-4	TP-5	SBLKS1	MSB	TP-5MS	TP-5MSD
2,6-Dinitrotoluene					UJ				UJ
3-Nitroaniline					UJ				UJ
Acenaphthene					UJ		2400	3600	3500 J
2,4-Dinitrophenol					UJ				UJ
4-Nitrophenol					UJ		6400	8100 J	12000 J
Dibenzofuran					UJ				UJ
2,4-Dinitrotoluene					UJ		2900	2600	3100 J
Diethylphthalate	110 J		25 J		UJ				UJ
4-chlorophenyl-phenylether					UJ				UJ
Fluorene					UJ				UJ
4-Nitroaniline					UJ				UJ
4,6-Dinitro-2-methylphenol					UJ			UJ	UJ
N-Nitrosodiphenylamine					UJ			UJ	UJ
4-Bromophenyl-phenylether					UJ			UJ	UJ
Hexachlorobenzene					UJ			UJ	UJ
Pentachlorophenol					6600 J		4100	5500 J	7900 J
Phenanthrene	130 J	540 J			610 J			190 J	140 J
Anthracene					UJ			UJ	UJ
Di-n-butylphthalate		270 J	49 U	14000	4100 J		21 J	690 J	4500 J
Fluoranthene	280 J	720 J			300 J			UJ	160 J
Pyrene	190 J	530 J			340 J		3200	3800 J	3300 J
Butylbenzylphthalate		16000		1000 J	2700 J			UJ	UJ
3,3'-Dichlorobenzidine					UJ			UJ	UJ
Benz(a)anthracene					UJ			UJ	UJ
Chrysene		410 J			UJ			UJ	UJ
bis(2-ethylhexyl)phthalate	1100 J	1100 J	130 U	8300	8300 J		83 J	1500 J	2200 J
Di-n-octyl phthalate					UJ			UJ	UJ
Benzo(b)flouranthene		370 J			UJ			UJ	UJ
Benzo(k)flouranthene					UJ			UJ	UJ
Benzo(a)pyrene		280 J			UJ			UJ	UJ
Indeno(1,2,3-cd)pyrene					UJ			UJ	UJ
Dibenz(a,h)anthracene					UJ			UJ	UJ
Benzo(g,h,i)perylene					UJ			UJ	UJ

DATA SUMMARY TABLES

PESTICIDES AND PCB'S

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL - DATA SUMMARY

CASE NO. 9102.123 **All results reported in ug/kg**

Parameters-Pesticides/PCB's	SB-1A	SB-1B	SB-6A	SB-6B	PBLKS3	PBLKS1	SB-6AMS	SB-6AMSD	MSB2	MSB1
alpha-BHC			UJ	UJ			UJ	UJ		
beta-BHC			UJ	UJ			UJ	UJ		
delta-BHC			UJ	UJ			UJ	UJ		
gamma-BHC(Lindane)			UJ	UJ			21 J	27 J	29	28
Heptachlor			UJ	UJ			27 J	31 J	29	30
Aldrin			UJ	UJ			21 J	27 J	31	38
Heptachlor Epoxide			UJ	UJ			UJ	UJ		
Endosulfan I			UJ	UJ			UJ	UJ		
Dieldrin			UJ	UJ			57 J	74 J	63	75
4,4'-DDE			UJ	UJ			UJ	UJ		
Endrin			UJ	UJ			58 J	79 J	75	79
Endosulfan II			UJ	UJ			UJ	UJ		
4,4'-DDD			UJ	UJ			UJ	UJ		
Endosulfan Sulfate			UJ	UJ			UJ	UJ		
4,4'-DDT			UJ	UJ			69 J	87 J	69	98
Methoxychlor			UJ	UJ			UJ	UJ		
Endrin Ketone			UJ	UJ			UJ	UJ		
alpha-chlordane			UJ	UJ			UJ	UJ		
gamma-chlordane			UJ	UJ			UJ	UJ		
Toxaphene			UJ	UJ			UJ	UJ		
Aroclor-1016			UJ	UJ			UJ	UJ		
Aroclor-1221			UJ	UJ			UJ	UJ		
Aroclor-1232			UJ	UJ			UJ	UJ		
Aroclor-1242			UJ	UJ			UJ	UJ		
Aroclor-1248			UJ	UJ			UJ	UJ		
Aroclor-1254			UJ	UJ			UJ	UJ		
Aroclor-1260			UJ	UJ			UJ	UJ		

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Parameters-Pesticides/PCB's	DW-1	R-1	PBLKW1
alpha-BHC			
beta-BHC			
delta-BHC			
gamma-BHC(Lindane)			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
Dieldrin			
4,4'-DDE			
Endrin			
Endosulfan II			
4,4'-DDD			
Endosulfan Sulfate			
4,4'-DDT			
Methoxychlor			
Endrin Ketone			
alpha-chlordane			
gamma-chlordane			
Toxaphene			
Aroclor-1016			
Aroclor-1221			
Aroclor-1232			
Aroclor-1242			
Aroclor-1248			
Aroclor-1254			
Aroclor-1260			

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL - DATA SUMMARY

CASE NO. 9102.282 **results reported in ug/kg**

Parameters-Pesticides/PCB's	SB-8A	SB-8AD	SB-8B	PBLKS2	SB-8BMS	MSB3
alpha-BHC						
beta-BHC						
delta-BHC						
gamma-BHC(Lindane)					30	24
Heptachlor					42	26
Aldrin					29	25
Heptachlor Epoxide						
Endosulfan I						
Dieldrin					74	65
4,4'-DDE						
Endrin					80	71
Endosulfan II						
4,4'-DDD						
Endosulfan Sulfate						
4,4'-DDT					81	74
Methoxychlor						
Endrin Ketone						
alpha-chlordane						
gamma-chlordane						
Toxaphene						
Aroclor-1016						
Aroclor-1221						
Aroclor-1232						
Aroclor-1242						
Aroclor-1248						
Aroclor-1254						
Aroclor-1260						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL - DATA SUMMARY

CASE NO. 9102.387

All results reported in ug/kg

Parameters-Pesticides/PCB's	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-6	PBLKS1	PBLKS2	SED-4MS	SED-4MSD	MSB2
alpha-BHC														
beta-BHC														
delta-BHC														
gamma-BHC(Lindane)												45	49	22 J
Heptachlor												77	67	24 J
Aldrin												44	49	22 J
Heptachlor Epoxide														
Endosulfan I														
Dieldrin												110	120	56 J
4,4'-DDE														
Endrin												120	130	60 J
Endosulfan II														
4,4'-DDD														
Endosulfan Sulfate														
4,4'-DDT												110	130	62 J
Methoxychlor														
Endrin Ketone														
alpha-chlordane														
gamma-chlordane														
Toxaphene														
Aroclor-1016														
Aroclor-1221														
Aroclor-1232														
Aroclor-1242														
Aroclor-1248														
Aroclor-1254														
Aroclor-1260														

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/L**

Parameters-Pesticides/PCB's	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	PBLKW1	SW-4MS	SW-4MSD	MSB1
alpha-BHC											
beta-BHC											
delta-BHC											
gamma-BHC(Lindane)									0.18	0.18	0.18
Heptachlor									0.15	0.15	0.14
Aldrin									0.15	0.14	0.14
Heptachlor Epoxide											
Endosulfan I											
Dieldrin									0.50	0.49	0.50
4,4'-DDE											
Endrin									0.53	0.53	0.53
Endosulfan II											
4,4'-DDD											
Endosulfan Sulfate											
4,4'-DDT									0.52	0.53	0.52
Methoxychlor											
Endrin Ketone											
alpha-chlordane											
gamma-chlordane											
Toxaphene											
Aroclor-1016											
Aroclor-1221											
Aroclor-1232											
Aroclor-1242											
Aroclor-1248											
Aroclor-1254											
Aroclor-1260											

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/kg

Parameters-Pesticides/PCB's	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-10	SS-10D	SS-11	SS-12	SS-13	SS-14	SS-1
alpha-BHC															
beta-BHC															
delta-BHC															
gamma-BHC(Lindane)															
Heptachlor															
Aldrin															
Heptachlor Epoxide															
Endosulfan I															
Dieldrin															
4,4'-DDE															
Endrin															
Endosulfan II															
4,4'-DDD															
Endosulfan Sulfate															
4,4'-DDT															
Methoxychlor															
Endrin Ketone															
alpha-chlordane															
gamma-chlordane															
Toxaphene															
Aroclor-1016															
Aroclor-1221															
Aroclor-1232															
Aroclor-1242															
Aroclor-1248															
Aroclor-1254															
Aroclor-1260															

DRAF

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL – DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/kg

Parameters-Pesticides/PCB's	PBLKS1	PBLKS2	SS-11MS	SS-11MSD	MSB2
alpha-BHC					
beta-BHC					
delta-BHC					
gamma-BHC(Lindane)			52	59	28
Heptachlor			74	82	29
Aldrin			55	55	27
Heptachlor Epoxide					
Endosulfan I					
Dieldrin			130	160	71
4,4'-DDE					
Endrin			87	170	79
Endosulfan II					
4,4'-DDD					
Endosulfan Sulfate					
4,4'-DDT			87	170	82
Methoxychlor					
Endrin Ketone					
alpha-chlordane					
gamma-chlordane					
Toxaphene					
Aroclor-1016					
Aroclor-1221					
Aroclor-1232					
Aroclor-1242					
Aroclor-1248					
Aroclor-1254					
Aroclor-1260					

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER - DATA SUMMARY

CASE NO. 9102.414 **All results reported in ug/L**

	L-1	L-2				
Parameters-Pesticides/PCB's	MH-4	PS-2	PBLKW1	PS-2MS	PS-2MSD	MSB1
alpha-BHC						
beta-BHC						
delta-BHC						
gamma-BHC(Lindane)				1.4	1.4	1.5
Heptachlor				1.8	1.8	1.6
Aldrin				1.7	1.7	1.4
Heptachlor Epoxide						
Endosulfan I						
Dieldrin				4.5	4.5	4.6
4,4'-DDE						
Endrin				5.3	5.2	5.3
Endosulfan II						
4,4'-DDD						
Endosulfan Sulfate						
4,4'-DDT				6.2	6.1	6.3
Methoxychlor						
Endrin Ketone						
alpha-chlordane						
gamma-chlordane						
Toxaphene						
Aroclor-1016						
Aroclor-1221						
Aroclor-1232						
Aroclor-1242						
Aroclor-1248						
Aroclor-1254						
Aroclor-1260						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER - DATA SUMMARY

CASE NO. 9102.556

All results reported in ug/L

Parameters-Pesticides/PCB's	GW-1D	GW-2D	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-10D	GW-10S	PBLKW1	MSB1	GW-10DMS	GW-10DMSD
alpha-BHC													
beta-BHC													
delta-BHC													
gamma-BHC(Lindane)											0.16	0.15	0.17
Heptachlor											0.098	0.098	0.13
Aldrin											0.078	0.084	0.12
Heptachlor Epoxide													
Endosulfan I													
Dieldrin											0.47	0.40	0.49
4,4'-DDE													
Endrin											0.50	0.43	0.52
Endosulfan II													
4,4'-DDD													
Endosulfan Sulfate													
4,4'-DDT											0.57	0.51	0.57
Methoxychlor													
Endrin Ketone													
alpha-chlordane													
gamma-chlordane													
Toxaphene													
Aroclor-1016													
Aroclor-1221													
Aroclor-1232													
Aroclor-1242													
Aroclor-1248													
Aroclor-1254													
Aroclor-1260													

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Parameters-Pesticides/PCB's	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D	GW-11S	GW-11SDD	GW-12D	GW-13D	GW-13S	DW-1	DW-2	DW-3
alpha-BHC													
beta-BHC													
delta-BHC													
gamma-BHC(Lindane)													
Heptachlor													
Aldrin													
Heptachlor Epoxide													
Endosulfan I													
Dieldrin													
4,4'-DDE													
Endrin													
Endosulfan II													
4,4'-DDD													
Endosulfan Sulfate													
4,4'-DDT													
Methoxychlor													
Endrin Ketone													
alpha-chlordane													
gamma-chlordane													
Toxaphene													
Aroclor-1016													
Aroclor-1221													
Aroclor-1232													
Aroclor-1242													
Aroclor-1248													
Aroclor-1254													
Aroclor-1260													

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Parameters-Pesticides/PCB's	DW-4	DW-5	DW-5D	DW-6	DW-7	PBLKW2	DW-2MS	DW-2MSD	MSB2
alpha-BHC									
beta-BHC									
delta-BHC									
gamma-BHC(Lindane)							0.20	0.18	0.19
Heptachlor							0.15	0.16	0.13
Aldrin							0.12	0.15	0.12
Heptachlor Epoxide									
Endosulfan I									
Dieldrin							0.54	0.50	0.49
4,4'-DDE									
Endrin							0.58	0.54	0.52
Endosulfan II									
4,4'-DDD									
Endosulfan Sulfate									
4,4'-DDT							0.65	0.63	0.57
Methoxychlor									
Endrin Ketone									
alpha-chlordane									
gamma-chlordane									
Toxaphene									
Aroclor-1016									
Aroclor-1221									
Aroclor-1232									
Aroclor-1242									
Aroclor-1248									
Aroclor-1254									
Aroclor-1260									

WELLSVILLE/ANDOVER LANDFILL SITE

PESTICIDES and PCB'S/SOIL - DATA SUMMARY

CASE NO. 9103.051

All results reported in ug/kg

Parameters-Pesticides/PCB's	TP-1	TP-2	TP-3	TP-4	TP-5	PBLKS1	PBLKS2	TP-4MS	TP-4MSD	MSB1
alpha-BHC										
beta-BHC	12 J									
delta-BHC										
gamma-BHC(Lindane)										21
Heptachlor										28
Aldrin										30
Heptachlor Epoxide										
Endosulfan I										
Dieldrin		13 J								64
4,4'-DDE		15 J								
Endrin										65
Endosulfan II										
4,4'-DDD		43 J			120					
Endosulfan Sulfate										
4,4'-DDT		130 J								67
Methoxychlor										
Endrin Ketone										
alpha-chlordane										
gamma-chlordane										
Toxaphene										
Aroclor-1016										
Aroclor-1221										
Aroclor-1232										
Aroclor-1242										
Aroclor-1248										
Aroclor-1254										
Aroclor-1260										

DATA SUMMARY TABLES

INORGANICS

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY

CASE NO. 9102.123 **All results reported in mg/kg**

Parameters - Inorganics	SB-1A	SB-1B	SB-10A	SB-2A	SB-3A	SB-3B	SB-4A	SB-4B	SB-5B	SB-5C	SB-6A	SB-6B
Aluminum	18100	16200	13400	15600	15500	12800	13600	14500	13800	11100	13500	13100
Antimony	R	R	R	R	R	R	R	R	R	R	R	R
Arsenic	2.9 J	6.84 J	14.1 J	12.7 J	16.4 J	7.1 J	1.3 J	12.7 J	8.97 J	5.0 J	10.6 J	15.7 J
Barium	31.2 B	72.3	182	109	71.3	137	281	42.8 B	132	80.7	64.9	67.2
Beryllium	0.64 B	0.50 B	0.67 B	1.1 B	0.69 B	0.59 B	0.63 B	0.86 B	0.77 B	0.49 B	0.58 B	0.65 B
Cadmium			1.8	1.3								
Calcium	1180	1050 B	1150	850 B	360 B	1150	1640	1440	1230	1370	742 B	777 B
Chromium	27.6	21.1	18.6	20.8	18.6	18.2	22.2	21.1	20.1	15.4	18.7	17.5
Cobalt	33.2	25.8	27.0	30.2	29.2	22.5	30.1	32.7	25.6	21.3	26.5	21.7
Copper	37.0	7.7	15.1	29.3	9.8	12.8	21.1	18.3	15.7	26.3	15.5	12.5
Iron	43700	32900	32100	45200	35100	30600	32500	41400	33700	26000	36700	32800
Lead	6.6	18.4	45.3	11.6	32.8	20.1		8.01 J	13.0	12.7	27.7	35.6
Magnesium	6680	3650	4250	6710	3590	4570	5820	6020	5030	4260	4660	4720
Manganese	431 J	1750	1430	686	1140	668	1670	1010	694	551	1040	461
Mercury												
Nickel	53.4	25.8	31.7	42.1	25.7	30.4	41.9	48.0	36.4	30.1	38.5	31.5
Potassium	1870	1520	1340	2430	1510	1840	1780	1990	1710	1110 B	1520	1720
Selenium	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Silver	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Sodium	54.6 B	34.2 B	38.3 B	99.5 B	35.5 B	71.7 B					54.3 B	67.0 B
Thallium												
Vanadium	21.9	24.8	19.1	19.0	21.4	16.9	18.9	20.6	18.7	15.8	15.9	14.8
Zinc	96.5 J	75.2 J	64.8 J	87.3 J	56.9 J	65.7 J	74.6 J	78.0 J	72.1 J	64.6 J	71.6 J	66.7 J
Cyanide												

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY

CASE NO. 9102.282 **All results reported in mg/kg**

Parameters - Inorganics	SB-10B	SB-8A	SB-8AD	SB-8B	SB-9A	SB-9B
Aluminum	5550	12100	13200	11500	13800	13900
Antimony						
Arsenic	3.1	14.1	10.4	10.6	17.4	17.9
Barium	40.5 B	111	111	90.2	122	87.7
Beryllium		0.51 B	0.61 B	0.59 B	0.65 B	0.92 B
Cadmium			1.4 U	1.6 U		0.80 U
Calcium	77500	1180	1320	1540	1700	1800
Chromium	9.3	15.1	18.8	14.8	18.9	15.1
Cobalt	14.5	21.8	24.9	23.2	25.4	30.1
Copper	9.5	17.3	16.9	12.6	17.9	22.9
Iron	14700	29400	32700	33900	33300	35100
Lead	7.3	13.9	12.3	11.8	22.4	8.0
Magnesium	17100	4130	4890	4900	5450	5200
Manganese	290	996	828	1420	771	894
Mercury				0.12		
Nickel	16.9	32.2	34.7	31.1	35.6	37.9
Potassium	630 B	1470	1790	1560	1840	2100
Selenium						
Silver						
Sodium	103 B	52.4 B	56.6 B	61.6 B	64.2 B	80.1 B
Thallium						
Vanadium	11.0 B	14.0	16.2	14.2	16.1	16.6
Zinc	56.3	60.1	66.2	62.1	69.3	75.2
Cyanide						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Parameters - Inorganics	DW-1	R-1
Aluminum	142 B	13.6 B
Antimony		
Arsenic		
Barium	67.5 B	
Beryllium		
Cadmium		6.5
Calcium	19500	
Chromium		
Cobalt		
Copper		
Iron	245	23.6 B
Lead		1.5 B
Magnesium	5330	
Manganese	9.5 U	
Mercury		
Nickel		
Potassium	2200 B	
Selenium		
Silver	8.0 B	12.7
Sodium	9920	
Thallium		
Vanadium		
Zinc	7.7 U	
Cyanide		

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY

CASE NO. 9102.387 **All results reported in mg/kg**

Parameters - Inorganics	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-6
Aluminum	13000	12500	12800	13000	12400	14500	16900	11200	11000
Antimony	R	R	R	R	R	R	R	R	R
Arsenic	11.7	14.5	12.7	10.9	11.0	9.6	14.3	8.1	13.5
Barium	129	43.0	123	97.4	175	169	202	192	129
Beryllium	0.80 B	0.94 B	0.81 B	0.96 B	0.89 B	0.91 B	1.1 B	0.85 B	0.85 B
Cadmium									
Calcium	1600	1420	2010	1320 B	1290	1470 B	1760 B	1150 B	999 B
Chromium	22.0	21.7	22.5	21.3	18.5	20.9	24.4	18.5	18.3
Cobalt	27.7	27.0	26.9	27.8	26.1	24.8	29.7	27.9	25.4
Copper	23.6	16.7	20.5	16.0	16.0	19.8	23.0	16.7	15.7
Iron	33500	35800	32400	43200	36000	31600	38400	39000	40200
Lead	20.3 J	13.3 J	26.1 J	20.8 J	20.7 J	20.2 J	26.7 J	3.2 J	18.9 J
Magnesium	5130	4600	3900	3630	3720	4270	5010	3660	3510
Manganese	849	909	1180	2440	1200	705	891	1480	808
Mercury									
Nickel	39.0	40.1	40.1	33.4	37.7	36.2	42.2	38.1	36.0
Potassium	1680	2710	1200 B	1310 B	1230 B	1790 B	2140	1110 B	1060 B
Selenium	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Silver	R	R	R	R	R	R	R	R	R
Sodium	44.4 B	54.1 B		108 B					
Thallium									
Vanadium	19.0	21.0	22.8	22.1	19.7	21.4	25.3	17.5	18.2
Zinc	72.0	71.3	84.7	96.3	107	81.0	96.9	78.7	76.1
Cyanide									

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY

CASE NO. 9102.387

All results reported in ug/L

Parameters - Inorganics	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6
Aluminum	578	307	496	119 B	274	874	96.0 B
Antimony							
Arsenic							
Barium	35.4 B	43.6 B	99.3 B	49.5 B	50.8 B	57.7 B	49.2 B
Beryllium							
Cadmium							
Calcium	15400	15900	19800	18000	17900	18300	17200
Chromium							
Cobalt	6.1 U	8.9 U	5.6 U	5.2 U	6.0 U	6.5 U	7.0 U
Copper		5.8 B					
Iron	1110 J	3840 J	778 J	150 J	387 J	1610 J	130 J
Lead	2.2 J	1.7 J	4.8 J	4.9 J	2.5 J	2.7 J	1.1 J
Magnesium	4490 B	7200	7010	6600	6600	6800	6360
Manganese	533	3090	143	6.2 U	9.2 U	68.5	9.9 U
Mercury							
Nickel		30.6 B					
Potassium	2980 B	1770 B	1480 B	1430 B	1490 B	1790 B	1250 B
Selenium	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Silver							
Sodium	4170 B	22100	8980	14800	14700	15000	13800
Thallium							
Vanadium	6.5 B	6.3 B	6.1 B		5.5 B	5.8 B	7.3 B
Zinc	8.5 B	19.4 B	10.7 B	4.1 B	7.3 B	6.8 B	
Cyanide							

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY

CASE NO. 9102.414 **All results reported in mg/kg**

Parameters - Inorganics	SS-1	SS-10	SS-10D	SS-11	SS-12	SS-13	SS-14	SS-2	SS-3	SS-4
Aluminum	13100	10600	11000	7340	13100	11500	10500	10400	1030	12300
Antimony	R	R	R	R	R	R	R	R	R	R
Arsenic	10.3	9.6	9.7	6.4	12.3	13.4	4.0	13.5	7.3	10.0
Barium	97.3 J	151 J	147 J	309 J	87.4 J	107 J	90.8 J	90.8 J	741 J	43.9 J
Beryllium	0.61 B	0.60 B	0.56 B		0.70 B	0.71 B	0.56 B	0.47 B		0.49 B
Cadmium										
Calcium	3390	4550	3120	5460	1680	3110	650 B	915 B	173000	176 B
Chromium	17.3	19.8	20.0	40.4	18.8	20.3	17.0	12.9	23.3	19.6
Cobalt	22.4	31.6	30.1	87.3	26.3	31.6	22.8	17.7	53.0	20.9
Copper	11.3	18.0	18.0	14.7	12.8	17.3	11.7	6.6	1.5 B	18.4
Iron	27400 J	60300 J	54300 J	283000 J	29800 J	46400 J	23800 J	24900 J	182000 J	30300 J
Lead	17.5	15.8	22.4	56.1	17.9	23.0	16.4	17.3	35.5	15.1
Magnesium	2440	4320	3720	2790	3120	3700	2920	1710	2950	3840
Manganese	1260 J	922 J	880 J	798 J	1190 J	1940 J	235 J	1170 J	4540 J	418 J
Mercury	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Nickel	21.0	34.3	33.0	88.0	25.3	32.6	24.2	15.8	40.0	28.8
Potassium	1130 B	1570	1750	2250	1670	1670	1510	853 B	1230 B	1300
Selenium	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Silver	R	R	R	R	R	R	R	R	R	R
Sodium	90.9 B	76.3 B	71.0 B			94.8 B		74.8 B	1610 B	49.1 B
Thallium										
Vanadium	22.3	18.9	19.9	21.0 B	25.6	22.7	20.7	21.7	12.6 B	19.0
Zinc	58.2	98.1	95.2	193	59.3	131	72.3	43.0	356	51.4
Cyanide				3.5 J						

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in mg/kg**

Parameters - Inorganics	SS-5	SS-6	SS-7	SS-8	SS-9
Aluminum	10300	14300	14300	11100	9740
Antimony	R	R	R	R	R
Arsenic	11.9	12.6	10.5	11.8	11.8
Barium	99.8 J	96.5 J	135 J	105 J	84.8 J
Beryllium	0.52 B	0.70 B	0.71 B	0.57 B	0.49 B
Cadmium					
Calcium	1070 B	925 B	1200 B	2360	31300
Chromium	16.3	23.6	24.0	19.3	15.9
Cobalt	23.4	29.1	27.5	27.1	21.1
Copper	17.8	28.2	26.5	19.6	19.1
Iron	26700 J	42500 J	40200 J	45600 J	26300 J
Lead	15.1	13.2	23.8	14.5	15.6
Magnesium	3860	5290	5040	3510	9060
Manganese	987 J	446 J	374 J	548 J	1000 J
Mercury	UJ	UJ	UJ	UJ	UJ
Nickel	33.6	43.3	39.4	32.2	26.9
Potassium	1240 B	1950	1930	1870	1400
Selenium	UJ	UJ	UJ	UJ	UJ
Silver	R	R	R	R	R
Sodium	40.1 B	78.8 B	85.9 B	134 B	95.3 B
Thallium					
Vanadium	14.4	19.4	21.7	19.4	17.7
Zinc	92.0	74.5	77.4	61.6	102
Cyanide					

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY

CASE NO. 9102.414 **All results reported in ug/L**

Parameters - Inorganics	L-1 MH-4	L-2 PS*2
Aluminum	27600 J	774 J
Antimony	UJ	UJ
Arsenic	12.5 J	R
Barium	406	577
Beryllium	0.96 B	
Cadmium		
Calcium	191000	123000
Chromium	39.9	15.2
Cobalt	58.4	55.4
Copper	35.2	8.0 B
Iron	71900	165000
Lead	47.9 J	27.2 J
Magnesium	42800	50300
Manganese	3670	1880
Mercury		
Nickel	54.5	38.8 B
Potassium	50700	33400
Selenium	R	R
Silver	UJ	UJ
Sodium	33600	71500
Thallium		
Vanadium	52.2	11.6 B
Zinc	151 E	227 J
Cyanide		

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY

CASE NO. 9102.556

All results reported in ug/L

Parameters - Inorganics	GW-1D	GW-2D	GW-2S	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-9S	GW-10D	GW-10S
Aluminum	364	742	42700	252	3040	393	217	3650	342	1250	1760
Antimony											
Arsenic	2.9 B	9.1 B	17.8		2.4 B			4.3 B		5.6B	4.1B
Barium	273	49.0 B	342	101 B	53.4 B	13.9 B	61.4 B	43.4 B	36.8 B	262	208
Beryllium			2.2 B								
Cadmium											
Calcium	21800	30600	53600	49700	31900	13100	85200	26400	67900	25300	15700
Chromium	11.6		110								
Cobalt		8.1 B	102		14.7 B		11.5 B	13.4 B	9.0 B	9.5B	10.5B
Copper		3.3 B	115		7.7 B			9.7 B		8.0B	
Iron	972 J	1910 J	110000 J	524 J	6270 J	634 J	542 J	8290 J	1630 J	3270J	4620J
Lead		4.1 J	38.1 J		6.0 J		11.0 J	5.7 J	1.2 J	7.6J	3.3J
Magnesium	8600	15600	50500	21400	19100	12100	56000	13100	30600	8090	6300
Manganese	227	1820	8530	41.2	1300	72.3	2200	179	1490	387	4110
Mercury											
Nickel			155								
Potassium	2090 B	14900	17500	18800	5960	1990 B	4940 B	18300	11300	27100	4380B
Selenium											
Silver											
Sodium	4690 B	19700	20900	29800	20400	9730	35500	32600	33200	20200	5720
Thallium											
Vanadium		7.3 B	67.1	6.4 B	10.2 B	7.0 B	8.7 B	12.7 B	7.2 B	8.4B	7.8B
Zinc		16.0 B	230		24.1		7.1 B	62.4	5.7 B	27.2	11.0B
Cyanide											

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Parameters - Inorganics	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	GW-12S	GW-11S
Aluminum	107 B	25.6 B	741	200 B	645	134 B	400	16.9 B	2760 J	2230 J
Antimony										
Arsenic									3.1 B	
Barium	32.8 B	72.8 B	67.0 B	54.7 B	26.4 B	24.3 B	31.5 B	34.7 B	91.9 B	69.5 B
Beryllium										
Cadmium										
Calcium	40100	37400	21300	33300	44900	44800	13400	21800	31000	43800
Chromium			11.1						22.2	
Cobalt										
Copper	4.5 B		29.8	3.6 B	7.3 B			33.8	9.0 B	3.7 B
Iron	534	48.3 U	693	730	535	193	1300	107	5780	4260
Lead		1.8 B							125	3.5
Magnesium	13300	13400	6070	12100	19600	19600	8160	8230	3100 B	22100
Manganese	510	148	17.7	150	54.6	41.1	166	76.9	123	2030
Mercury				0.46						
Nickel										
Potassium	1450 B	1240 B	1150 B	1400 B	1810 B	1680 B	1100 B	1450 B	38000	2140 B
Selenium										
Silver										
Sodium	50400	8200	31600	58000	17000	8540	4110 B	55100	41700	14600
Thallium										
Vanadium									27.9 B	
Zinc	8.8 B	134	39.4	338	26.7	7.9 B	9.7 B	5.3 B	83.4	26.4
Cyanide							19.0			

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587 **All results reported in ug/L**

Parameters - Inorganics	GW-11SDD	GW-12D	GW-13D	GW-13S	GW-5D	GW-5S	GW-6D	GW-6S	GW-7D
Aluminum	2480 J	910 J	2640 J	286	3140 J	531	131 B	8990 J	29.5 B
Antimony									
Arsenic			3.5 B		3.5 B	2.5 B		6.4 B	
Barium	71.3 B	36.4 B	211	85.7 B	110 B	12.8 B	20.0 B	40.2 B	10.2 B
Beryllium									
Cadmium									
Calcium	44000	71300	47500	54600	9160	16300	16000	12800	30200
Chromium	10.0	11.0			49.6			14.2	
Cobalt								11.3 B	
Copper	9.1 B	11.6 B	4.7 B		46.2	3.2 B		15.3 B	
Iron	4440	736	5130	414	2480	650	316	15700	49.9 U
Lead	4.6		3.6		2.4 B			10.8	
Magnesium	22200	37300	21500	24800	5400	12300	11000	12200	21700
Manganese	2040	24.6	2370	2770	1060	563	828	514	16.4
Mercury									
Nickel								22.3 B	
Potassium	1970 B	2540 B	4340 B	2320 B	8880	1750 B	1230 B	5020	2520 B
Selenium									
Silver									
Sodium	18700	33300	21200	24800	516000	9920	6080	7450	19000
Thallium									
Vanadium								10.1 B	
Zinc	39.8	41.0	54.6	5.6 B	154	63.5	6.7 B	64.3	12.4 B
Cyanide									

WELLSVILLE/ANDOVER LANDFILL SITE

INORGANICS/SOIL - DATA SUMMARY

CASE NO. 9103.051 **\ll results reported in mg/kg**

Parameters - Inorganics	TP-1	TP-2	TP-3	TP-4	TP-5
Aluminum	13200	9450	13900	12000	14600
Antimony	R	R	R	R	R
Arsenic	20.9 J	14.3 J	12.2 J	11.5 J	12.7 J
Barium	132 J	121 J	121 J	85.7 J	215 J
Beryllium	0.74 B	0.47 B	0.71 B	0.60 B	0.64 B
Cadmium					
Calcium	4350	9890	1610	1850	2710
Chromium	28.8	18.2	23.2	24.3	26.9
Cobalt	28.1	20.8	24.9	26.0	24.5
Copper	29.0	28.4	194	25.4	34.6
Iron	36400	23900	31700	35100	38300
Lead	33.4 J	53.5 J	15.3 J	86.9 J	62.5 J
Magnesium	5070	4470	4240	4130	3330
Manganese	760	422	661	784	709
Mercury					
Nickel	43.2	25.8	33.5	35.0	31.9
Potassium	2160	1970	2230	1570	1670
Selenium	R	R	R	R	R
Silver	UJ	UJ	UJ	UJ	UJ
Sodium	509 B	289 B	323 B	71.2 B	276 B
Thallium	UJ	UJ	UJ	UJ	UJ
Vanadium	17.8	15.1	22.0	18.6	26.2
Zinc	173 J	258 J	269 J	87.4 J	263 J
Cyanide	UJ	UJ	UJ		

TENTATIVELY IDENTIFIED COMPOUNDS

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.123

All results reported in ug/kg

Reanalyzed - see case no. 9102.414

Tentatively Identified Compounds	MW-2(SB-2A)	MW-3(SB-3A)	MW-3(SB-3B)	SB-10A	SB-1A	SB-1B	SB-4A	SB-4B	SB-5B	SB-5C	SB-6A
Freon-113				78 J							170 J
Terpene Isomer				15 J							
Terpene Isomer				8.4 J							
Hexane						6.2 J					
Unknown				36 J							

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.123 **All results reported in ug/kg**

Tentatively Identified Compounds	SB-6ARE	SB-6B	VBLKS1	VBLKS2	VBLKS3	VBLKS4	VBLKS5	VBLKS6	SB-5CMS	SB-5CMSD	MSB
Freon-113	57 J										
Terpene Isomer											
Terpene Isomer											
Hexane											
Unknown					6.8 J						

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/kg**

Tentatively Identified Compounds	SB-10B	SB-8A	SB-8AD	SB-8B	SB-9A	SB-9B	VBLKS1	VBLKS2	SB-9B-MS	SB-10B-MS	SB-9B-MSD	SB-10B-MSD

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Tentatively Identified Compounds	DW-1	R-1	VBLKW1	MSB
Unknown Siloxane	14 BJ	15 BJ	13 J	

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.387 **All results reported in ug/kg**

Tentatively Identified Compounds	SB-7A	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-6	VBLKS1	SED-4MSD
Freon 113	63 J	39 J	230 J	88 J	37 J	120 J	150 J	80 J	55 J		
Unknown		5.4 J									

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.387

All results reported in ug/L

Tentatively Identified Compounds	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	TB-1	TB-1RE	VBLKW1	VBLKW2
Hexane	15 J	14 J									

Tentatively Identified Compounds	MSB	SW-4MS	SED-4MS	SW-4MSD
Hexane				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/L

Tentatively Identified Compounds	(MH-4) L-1	(PS-2) L-2	TB-2	VBLKW1	VBLKW2	MSB
Unknown		12 J				
Unknown		6.0 J				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.414

All results reported in ug/kg

Tentatively Identified Compounds	~~MW-2~~ SB-2A	~~MW-3~~ SB-3A	~~MW-3~~ SB-3B	SS-1-RE	SS-2	SS-2-RE	SS-3	SS-4	SS-5	SS-6	SS-7
Freon 113				110 J	95 J					27 J	
Methyl Propyl Benzene Isomer											15 J
Unknown Aliphatic Hydrocarbon											14 J
Unknown Aliphatic Hydrocarbon											37 J
Unknown Terpene											14 J
Unknown Terpene											
Unknown Terpene											
Unknown Hydrocarbon											
Unknown Hydrocarbon											
Unknown Hydrocarbon											
Unknown Hydrocarbon											
Unknown											11 J
Unknown											14 J
Unknown											15 J
Unknown											13 J
Unknown											11 J
Unknown											17 J

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414

All results reported in ug/kg

Tentatively Identified Compounds	SS-7-RE	SS-8	SS-9	SS-10	SS-10D	SS-10D-RE	SS-11	SS-12	SS-13	SS-13-RE	SS-14	VBLKS1	VBLKS2
Freon 113	52 J												
Methyl Propyl Benzene Isomer	11 J												
Unknown Aliphatic Hydrocarbon	8.7 J												
Unknown Aliphatic Hydrocarbon	24 J												
Unknown Terpene							37 J			16 J			
Unknown Terpene							14 J						
Unknown Terpene							260 J						
Unknown Hydrocarbon	10 J						44 J						
Unknown Hydrocarbon	7.7 J						20 J						
Unknown Hydrocarbon	11 J												
Unknown Hydrocarbon	37 J												
Unknown	12 J												5.8 J
Unknown	7.1 J												
Unknown													
Unknown													
Unknown													
Unknown													

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	VBLKS3	VBLKS4	VBLKS5	MSB1	SS-4MS	SS-4MSD
Freon 113						
Methyl Propyl Benzene Isomer						
Unknown Aliphatic Hydrocarbon						
Unknown Aliphatic Hydrocarbon						
Unknown Terpene						
Unknown Terpene						
Unknown Terpene						
Unknown Hydrocarbon						
Unknown Hydrocarbon						
Unknown Hydrocarbon						
Unknown Hydrocarbon						
Unknown						
Unknown						
Unknown						
Unknown						
Unknown						
Unknown						

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.556

All results reported in ug/L

Tentatively Identified Compounds	GW-1D	GW-2D	GW-2DDL	GW-2S	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-9S	GW-10D
Unknown				10 J							

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.556 **All results reported in ug/L**

Tentatively Identified Compounds	GW-10S	VBLKW1	VBLKW2	MSB	GW-10DMS	GW-10DMSD
Unknown						

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587 **All results reported in ug/L**

Tentatively Identified Compounds	GW-5D	GW-5DDL	GW-5S	GW-5SDL	GW-6D	GW-6DDL	GW-6S	GW-7D	GW-11S	GW-11SDL	GW-11SDD
Propyl Benzene Isomer	54 J		10 J								
Unknown						10 J					

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587 **All results reported in ug/L**

Tentatively Identified Compounds	GW-11SDDDL	GW-12D	GW-12DRE	GW-12S	GW-13D	GW-13S	TB-10	VBLKW1	VBLKW2	VBLKW3	MSB
Propyl Benzene Isomer											
Unknown											

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS

VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587

All results reported in ug/L

Tentatively Identified Compounds	GW-13SMS	GW-13SMSD
Propyl Benzene Isomer		
Unknown		

DRAF

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9103.051 **All results reported in ug/kg**

Tentatively Identified Compounds	TP-1	TP-1DL	TP-2	TP-3	TP-4	MSB	VBLKM1	VBLKS1
Alkylated Benzene Isomer	33 J		20 J	1100 J				
Alkylated Benzene Isomer	76 J		27 J					
Alkylated Benzene Isomer	44 J							
Terpene Isomer	59 J	820 J	39 J	1600 J				
1,2,3,4-tetrahydro-naphthale	100 J							
Hexane		990 U					750 J	
Unknown Oxy. Hydrocarbon	49 J							
Unknown Hydrocarbon				950 J	1400 J			
Unknown Hydrocarbon				1400 J	2400 J			
Unknown Hydrocarbon				4300 J				
Unknown Hydrocarbon				1700 J				
Unknown	66 U	11000 U	37 J	9200 U	18000 U		12000 J	
Unknown		8900 U	8.5 J	1400 U	3200 U		7400 J	
Unknown			51 J	6500 U			12000 J	
Unknown			7.8 J					
Unknown			15 J					
Unknown			71 J					

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.123

All results reported in ug/kg

Tentatively Identified Compounds	SB-1A	SB-1B	SB-6B	SBLKS1	SBLKS2	SBLKS3	MSB	SB-6A-MS	SB-6A-MSD
Unknown Oxy. Hydrocarbon		120 J							
Unknown Oxy. Hydrocarbon		78 J							
Unknown Oxy. Hydrocarbon		1200 J							
Unknown Oxy. Hydrocarbon		310 J							
Unknown Oxy. Hydrocarbon		210 J							
Unknown Carboxylic Acid		250 J	140 J						
Unknown Hydrocarbon		98 J	120 J						
Unknown Hydrocarbon		880 J							
Unknown Hydrocarbon		680 J							
Unknown Hydrocarbon		210 J							
Unknown	73 J	98 J	140 J	130 J	120 J	130 J			
Unknown	110 BJ	140 BJ	180 J	66 J	120 J	100 J			
Unknown		78 J	200 J	83 J	120 J				
Unknown		250 J	240 BJ	66 J					
Unknown		120 J	220 J	66 J					
Unknown		98 J	80 J						
Unknown		330 J	320 BJ						
Unknown			160 J						
Unknown			240 J						
Unknown			220 J						
Unknown			2200 J						
Unknown			620 J						
Unknown			2000 J						
Unknown			580 J						
Unknown			1300 J						
Unknown			680 J						
Unknown			1400 J						
Unknown			840 J						

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/kg**

Tentatively Identified Compounds	SB-8A	SB-8AD	SB-8B	SBLKS1	MSB
Unknown Carboxylic Acid	110 J		120 J		
Unknown Carboxylic Acid	570 J				
Unknown Carboxylic Acid	180 J				
Unknown Aliphatic Hydrocarbon	91 J				
Unknown Aliphatic Hydrocarbon	73 J				
Unknown Oxy. Hydrocarbon				170 J	
Unknown	110 J	92 J	97 J	83 J	
Unknown	290 J	110 BJ	77 J	66 J	
Unknown	330 J		150 BJ	100 J	
Unknown	150 BJ			100 J	
Unknown	73 J			83 J	

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.282 **All results reported in ug/L**

Tentatively Identified Compounds	DW-1	R-1	SBLKW1	DW-1-MS
Unknown			4.0 J	

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.387

All results reported in ug/kg

Tentatively Identified Compounds	SB-7B	SED-1	SED-2	SED-3	SED-4	SED-4D	SED-5	SED-5RE
Aldol Condensation Product	4100 U	9700 U	3100 U	3600 U	7200 U	6100 U	480 U	340 U
Bis Butyl Phenol Isomer	110 J	280 J	180 J	280 J	380 J	340 J	100 J	100 J
Molecular Sulfur		130 J	180 J		220 J	510 J		
Unknown Carboxylic Acid		230 BJ	210 BJ	260 BJ	250 BJ	170 BJ	80 BJ	
Unknown Carboxylic Acid		230 J	290 J					
Unknown Aliphatic Hydrocarbon		150 J	180 J	260 J	250 J	370 J		
Unknown Aliphatic Hydrocarbon		180 J	390 J		340 J	410 J		
Unknown Aliphatic Hydrocarbon		310 J	360 J		380 J			
Unknown Aliphatic Hydrocarbon		660 J	160 J					
Unknown Aliphatic Hydrocarbon		720 J						
Unknown Aliphatic Hydrocarbon		360 J						
Unknown Oxy. Hydrocarbon		260 J	160 J		250 J	300 J		
Unknown Oxy. Hydrocarbon					250 J			
Unknown Hydrocarbon		740 J	470 J	210 J	280 J	300 J		
Unknown Hydrocarbon			210 J					
Unknown Siloxane							200 J	200 J
Unknown	110 BJ	100 BJ	130 BJ	130 BJ	160 BJ	170 BJ	100 BJ	100 BJ
Unknown	420 J	410 J	100 J	150 J	250 J	580 J	140 J	120 J
Unknown	140 J	260 J	180 J	130 J	130 J	470 J	80 J	140 J
Unknown	530 J	1600 J	1600 J	360 J	130 J	910 J	120 J	
Unknown	320 J	260 J	160 J	190 J	280 J	240 J	140 J	
Unknown	260 J	640 J	540 J	1000 J	310 J	370 J		
Unknown		200 J		130 J	310 J	1900 J		
Unknown				1600 J	470 J	370 J		
Unknown				280 J	470 J	540 J		
Unknown				230 J	470 J	1600 J		
Unknown				2100 J		1200 J		
Unknown				260 J		340 J		
Unknown				2100 J				
Unknown				1900 J				
Unknown				980 J				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.387

All results reported in ug/kg

Tentatively Identified Compounds	SED-6	SBLKS1	SED-4MS	SED-4MSD
Aldol Condensation Product	8200 U	5300 AJ		
Bis Butyl Phenol Isomer	130 J			
Molecular Sulfur	730 J			
Unknown Carboxylic Acid	280 BJ	86 J		
Unknown Carboxylic Acid	340 J			
Unknown Aliphatic Hydrocarbon	110 J			
Unknown Aliphatic Hydrocarbon	150 J			
Unknown Aliphatic Hydrocarbon	110 J			
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Oxy. Hydrocarbon				
Unknown Oxy. Hydrocarbon				
Unknown Hydrocarbon				
Unknown Hydrocarbon				
Unknown Siloxane				
Unknown	150 BJ	120 J		
Unknown	86 J			
Unknown	130 J			
Unknown	170 J			
Unknown	110 J			
Unknown	390 J			
Unknown	190 J			
Unknown	130 J			
Unknown	430 J			
Unknown	130 J			
Unknown	280 J			
Unknown				
Unknown				
Unknown				
Unknown				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.387 — **All results reported in ug/L**

Tentatively Identified Compounds	SW-1	SW-2	SW-3	SW-4	SW-4D	SW-5	SW-6	SBLKW1	SBLKW2	SBLKW3	MSB	SW-4MS	SW-4MSD
Bis Butyl Phenol Isomer	7.0 J	6.0 J	6.0 J	9.0 J			9.0 J						
Aldol Condensation Product						22 U				23 AJ			
Unknown Aliphatic Hydrocarbon	5.9 J		14 J				12 J						
Unknown Aliphatic Hydrocarbon	5.9 J												
Unknown Aliphatic Hydrocarbon	9.7 J												
Unknown Aliphatic Hydrocarbon	34 J												
Unknown Aliphatic Hydrocarbon	17 J												
Unknown Aliphatic Hydrocarbon	14 J												
Unknown Carboxylic Acid		7.0 J			5.0 J								
Unknown Carboxylic Acid		8.0 J											
Unknown Hydrocarbon						36 BJ				67 J			
Unknown	34 BJ	31 BJ	5.0 J	17 J	20 BJ	7.0 BJ	9.0 J	11 J	16 J	7.0 J			
Unknown	8.0 J	10 J	5.0 J	13 J	29 BJ	4.0 BJ	18 BJ	12 J	11 J	5.0 J			
Unknown	13 J	15 J	18 BJ	16 J	4.0 J	47 BJ	13 J	9.0 J	23 J	38 J			
Unknown	40 BJ	56 BJ	7.0 J	64 BJ	33 BJ	17 BJ	21 BJ	5.0 J	26 J	14 J			
Unknown	28 BJ	23 BJ	16 BJ	18 J	12 BJ	6.0 J	11 J	18 J	13 J	4.0 J			
Unknown	90 BJ	7.0 J	10 J	53 BJ	41 BJ	5.0 BJ	38 BJ	8.0 J	40 J	4.0 J			
Unknown	22 J	11 J	30 BJ	14 J		5.0 BJ	25 BJ	39 J	26 J	4.0 J			
Unknown	120 BJ	150 BJ	8.0 BJ	11 J		5.0 BJ	70 BJ	9.0 J		4.0 J			
Unknown	10 BJ	80 BJ	49 BJ	55 BJ			56 BJ	34 J		4.0 J			
Unknown	9.0 J	25 J	36 BJ	5.0 BJ				9.0 J					
Unknown	110 BJ	20 J		76 BJ									
Unknown	100 BJ	150 BJ		51 J									
Unknown	57 BJ	6.0 J											
Unknown		16 BJ											
Unknown		160 BJ											
Unknown		120 BJ											
Unknown		20 J											

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9
Aldol Condensation Product	1700 U	4200 U	740 U	2200 U	6500 U	5700 U	7000 U	4700 U	
Bis Butyl Phenol Isomer		230 U			170 U	130 U			
Molecular Sulfur							400 J		
Pharmaceutical Sulfur									
Unknown Carboxylic Acid	570 BJ	870 BJ	1400 BJ	110 BJ	250 BJ	210 BJ	250 J	770 BJ	230 BJ
Unknown Carboxylic Acid	980 J	810 J			380 J	230 J	450 BJ	700 J	
Unknown Carboxylic Acid	2800 J	2300 J						940 J	
Unknown Carboxylic Acid		370 J							
Unknown Aliphatic Hydrocarbon	740 J	540 J	1900 J		210 J	110 J	430 J	1900 J	300 J
Unknown Aliphatic Hydrocarbon	1900 J	390 J	2800 J		570 J		520 J	2100 J	980 J
Unknown Aliphatic Hydrocarbon	2000 J		2500 J		670 J		380 J	1200 J	660 J
Unknown Aliphatic Hydrocarbon	1300 J				1900 J				
Unknown Aliphatic Hydrocarbon					480 J				
Unknown Aliphatic Hydrocarbon									
Unknown Aliphatic Hydrocarbon									
Unknown Aliphatic Hydrocarbon									
Unknown Aliphatic Hydrocarbon									
Unknown Aliphatic Hydrocarbon									
Unknown Aliphatic Hydrocarbon									
Unknown Hydrocarbon	1900 J	310 J	1900 J		170 J	130 J	160 J		
Unknown Hydrocarbon		460 J					580 J		
Unknown Hydrocarbon							580 J		
Unknown Hydrocarbon							490 J		
Unknown Oxy. Hydrocarbon		1400 J	690 J		210 J			7000 J	
Unknown Oxy. Hydrocarbon			8600 J		230 J				
Unknown Oxy. Hydrocarbon									
Unknown Sesquiterpene					530 J				
Unknown Sesquiterpene					84 J				
Unknown Siloxane									660 J
Unknown	1000 J	120 J	200 J	75 J	130 J	110 J	160 J	2300 J	190 J
Unknown	890 J	500 J	1700 J	130 J	270 J	130 J	180 J	830 J	170 J
Unknown	3800 J	640 J	3700 J	57 J	500 J	590 J	180 J	3000 J	260 J

recycled paper

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9
Unknown	940 J	2300 J	2400 J	150 J	170 J	250 J	250 J	1300 J	570 J
Unknown	2300 J	3700 J	2200 J	94 J	530 J	190 J	580 J	10000 J	450 J
Unknown	5500 J	930 J	2500 J	94 J	290 J	1200 J	900 J	960 J	830 J
Unknown	1300 J	890 J	1500 J	450 J		84 J	720 J	1800 J	920 J
Unknown	1100 J	640 J	2500 J	510 J		110 J	1000 J	1400 J	920 J
Unknown	1200 J	500 J	3100 J	1100 J		1300 J	400 J	960 J	490 J
Unknown	1300 J		1700 J	250 J		150 J		2600 J	890 J
Unknown	110 J		4600 J	210 J		150 J		2800 J	550 J
Unknown			3400 J	1700 J		420 J		790 J	640 J
Unknown				170 J		170 J			570 J
Unknown				110 J		170 J			1100 J
Unknown				190 J					620 J
Unknown				470 J					
Unknown				1800 J					
Unknown				1200 J					

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-9-RE	SS-10	SS-10D	SS-11	SS-12	SS-12RE	SS-13	SS-13RE	SS-14
Aldol Condensation Product			5800 U	2900 U					
Bis Butyl Phenol Isomer	85 U			180 U		110 U			
Molecular Sulfur									1200 J
Pharmaceutical Sulfur									
Unknown Carboxylic Acid	150 BJ		440 BJ	470 BJ	310 BJ	130 BJ			610 BJ
Unknown Carboxylic Acid					470 J	470 J			1600 J
Unknown Carboxylic Acid					1500 J				2400 J
Unknown Carboxylic Acid									
Unknown Aliphatic Hydrocarbon	230 J	420 J	930 J	320 J	310 J	290 J		710 J	1900 J
Unknown Aliphatic Hydrocarbon		770 J	890 J	650 J	790 J	540 J		1100 J	1400 J
Unknown Aliphatic Hydrocarbon		930 J		720 J	650 J	490 J			1100 J
Unknown Aliphatic Hydrocarbon		950 J		360 J	360 J	200 J			
Unknown Aliphatic Hydrocarbon		1200 J							
Unknown Aliphatic Hydrocarbon		810 J							
Unknown Aliphatic Hydrocarbon		930 J							
Unknown Aliphatic Hydrocarbon		460 J							
Unknown Aliphatic Hydrocarbon		750 J							
Unknown Aliphatic Hydrocarbon		230 J							
Unknown Aliphatic Hydrocarbon		310 J							
Unknown Hydrocarbon			750 J						
Unknown Hydrocarbon									
Unknown Hydrocarbon									
Unknown Hydrocarbon									
Unknown Oxy. Hydrocarbon	190 J		860 J	360 J	1900 J	790 J			3200 J
Unknown Oxy. Hydrocarbon			3500 J	1000 J	2700 J	1400 J			4900 J
Unknown Oxy. Hydrocarbon				250 J	380 J	1200 J			4600 J
Unknown Sesquiterpene					2700 J				
Unknown Sesquiterpene									
Unknown Siloxane									
Unknown	110 J	210 J	110 J	220 J	110 J	160 J	2200 J	200 J	320 J
Unknown	110 J	290 J	150 J	290 J	110 J	290 J	1500 J	200 J	810 J
Unknown	510 J	250 J	240 J	870 J	360 J	720 J		820 J	1300 J

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-9-RE	SS-10	SS-10D	SS-11	SS-12	SS-12RE	SS-13	SS-13RE	SS-14
Unknown	190 J	930 J	380 J	290 J	580 J	430 J		910 J	980 J
Unknown	570 J	290 J	240 J	430 J	540 J	200 J		1400 J	1700 J
Unknown	340 J	560 J	220 J	830 J	1900 J	310 J		750 J	7600 J
Unknown	920 J	710 J	440 J	360 J	340 J	250 J		750 J	3200 J
Unknown	530 J	580 J	1200 J	400 J	540 J	270 J		970 J	3400 J
Unknown	300 J	600 J	490 J	320 J	580 J	220 J		1100 J	1400 J
Unknown	570 J		2200 J	540 J		360 J		580 J	2200 J
Unknown	510 J		2000 J					530 J	
Unknown	300 J		860 J					2000 J	
Unknown	260 J		730 J					970 J	
Unknown	190 J							2100 J	
Unknown	300 J							350 J	
Unknown	230 J							530 J	
Unknown								840 J	
Unknown								1200 J	

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (cont.)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-14RE	SBLKS1	SS-11MS	SS-11MSD	MSB
Aldol Condensation Product		6600 AJ			
Bis Butyl Phenol Isomer	150 BJ	66 J			
Molecular Sulfur	780 J				
Pharmaceutical Sulfur	120 J				
Unknown Carboxylic Acid	270 BJ	66 J			
Unknown Carboxylic Acid	410 J				
Unknown Carboxylic Acid	1000 J				
Unknown Carboxylic Acid					
Unknown Aliphatic Hydrocarbon	1300 J				
Unknown Aliphatic Hydrocarbon	1300 J				
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Aliphatic Hydrocarbon					
Unknown Hydrocarbon					
Unknown Hydrocarbon					
Unknown Hydrocarbon					
Unknown Hydrocarbon					
Unknown Oxy. Hydrocarbon	730 J				
Unknown Oxy. Hydrocarbon	2200 J				
Unknown Oxy. Hydrocarbon	1500 J				
Unknown Sesquiterpene					
Unknown Sesquiterpene					
Unknown Siloxane					
Unknown	200 J				
Unknown	220 J				
Unknown	440 J				

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY (cont.)

CASE NO. 9102.414 **All results reported in ug/kg**

Tentatively Identified Compounds	SS-14RE	SBLKS1	SS-11MS	SS-11MSD	MSB
Unknown	460 J				
Unknown	1800 J				
Unknown	1900 J				
Unknown	1900 J				
Unknown	950 J				
Unknown	1400 J				
Unknown					
Unknown					
Unknown					
Unknown					
Unknown					
Unknown					
Unknown					
Unknown					
Unknown					

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.414 **All results reported in ug/L**

Tentatively Identified Compounds	(MH-4) L-1	(PS2)L-2	SBLKW1	PS2(L2) MS	PS2(L2) MSD	MSB1
Unknown Aliphatic Hydrocarbons	45 J					
Unknown Organic Acid		19 J				
Unknown Carboxylic Acid		8.0 J				
Unknown Hydrocarbon		9.0 J				
Unknown	8.0 J	4.0 J				
Unknown	4.0 J	10 J				
Unknown	5.0 J	5.0 J				
Unknown	5.0 J	7.0 J				
Unknown	11 J	6.0 J				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.556 **All results reported in ug/L**

Tentatively Identified Compounds	GW-1D	GW-2D	GW-2DRE	GW-3D	GW-3S	GW-4D	GW-8S	GW-9D	GW-10D	GW-10S	GW-10SRE
Nonyl Phenol Isomer							9.0 J				
Unknown Aliphatic Hydrocarbon	6.0 J										
Unknown Aliphatic Hydrocarbon	9.0 J										
Unknown Aliphatic Hydrocarbon	11 J										
Unknown Aliphatic Hydrocarbon	10 J										
Unknown Aliphatic Hydrocarbon	8.0 J										
Unknown Aliphatic Hydrocarbon	6.0 J										
Unknown Hydrocarbon			7.0 BJ				9.0 BJ		12 J		39 BJ
Unknown Hydrocarbon							5.0 BJ				
Unknown Carboxylic Acid							4.0 J				
Unknown	33 BJ	8.0 BJ	31 BJ	7.0 BJ	8.0 BJ	6.0 BJ	8.0 J	8.0 BJ	8.0 BJ	10 BJ	30 BJ
Unknown	8.0 BJ	11 J	6.0 BJ	36 BJ	37 BJ	32 BJ	7.0 J	36 BJ	39 BJ	4.0 J	6.0 BJ
Unknown	4.0 J	7.0 J		8.0 BJ	7.0 BJ	6.0 BJ	29 BJ	6.0 BJ	7.0 BJ	11 J	4.0 BJ
Unknown	4.0 BJ	37 BJ		4.0 BJ	5.0 BJ		5.0 BJ	4.0 BJ	5.0 BJ	8.0 J	
Unknown		7.0 BJ								38 BJ	
Unknown		5.0 BJ								8.0 BJ	
Unknown										5.0 J	
Unknown										5.0 BJ	

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER – DATA SUMMARY (continued)

CASE NO. 9102.556

All results reported in ug/L

Tentatively Identified Compounds	SBLKW1	SBLKW2	GW-10DMS	GW-10DMSD
Nonyl Phenol Isomer				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Aliphatic Hydrocarbon				
Unknown Hydrocarbon		8.0 J		
Unknown Hydrocarbon				
Unknown Carboxylic Acid				
Unknown	8.0 J	32 J		
Unknown	40 J	6.0 J		
Unknown	9.0 J	4.0 J		
Unknown	5.0 J			
Unknown				
Unknown				
Unknown				
Unknown				

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587 | **All results reported in ug/L**

Tentatively Identified Compounds	GW-6S	GW-7D	GW-11S	GW-11SDD	GW-11SDDRE	GW-12D	GW-13D	GW-13DRE	GW-13S	SBLKW1	SBLKW2
Aldol Condensation Product											
Nonyl Phenol Isomer								7.0 J			
Unknown Hydrocarbon	7.0 J	6.0 J	5.0 J	5.0 J	6.0 BJ	16 J			10 J		8.0 J
Unknown	8.0 BJ	7.0 BJ	7.0 BJ	8.0 BJ	6.0 J	49 BJ	11 J	21 J	51 BJ	50 J	32 J
Unknown	40 BJ	38 BJ	7.0 J	7.0 J	7.0 J	9.0 BJ	10 J	29 BJ	9.0 BJ	9.0 J	6.0 J
Unknown	6.0 BJ	6.0 BJ	7.0 J	5.0 J	9.0 J	5.0 BJ	50 BJ	6.0 BJ	5.0 BJ	5.0 J	4.0 J
Unknown	5.0 BJ	4.0 BJ	37 BJ	42 BJ	33 BJ		9.0 BJ				
Unknown			6.0 BJ	9.0 BJ	5.0 BJ		5.0 BJ				
Unknown			4.0 BJ	5.0 BJ	5.0 BJ						
Unknown					4.0 BJ						
Unknown					94 BJ						

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY (continued)

CASE NO. 9102.587

All results reported in ug/L

Tentatively Identified Compounds	SBLKW3	SBLKW4	SBLKW5	DW-2MS	DW-2MSD
Aldol Condensation Product		24 J			
Nonyl Phenol Isomer					
Unknown Hydrocarbon		6.0 J	24 J		
Unknown	9.0 J	36 J	39 J		
Unknown	39 J	9.0 J	8.0 J		
Unknown	5.0 J	4.0 J	5.0 J		
Unknown	5.0 J		5.0 J		
Unknown					
Unknown					
Unknown					
Unknown					

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/WATER - DATA SUMMARY

CASE NO. 9102.587

All results reported in ug/L

Tentatively Identified Compounds	DW-1	DW-2	DW-3	DW-4	DW-5	DW-5D	DW-6	DW-7	GW-5D	GW-5S	GW-6D
Aldol Condensation Product					50 U	390 AJ	63 U				
Nonyl Phenol Isomer											
Unknown Hydrocarbon	5.0 J										6.0 J
Unknown	59 BJ	52 BJ	44 BJ	55 BJ	9.0 J	40 BJ	8.0 J	7.0 J	6.0 BJ	4.0 J	8.0 BJ
Unknown	10 BJ	9.0 BJ	7.0 BJ	9.0 BJ	46 BJ	9.0 BJ	40 BJ	37 BJ	5.0 J	39 BJ	7.0 J
Unknown	4.0 J	5.0 BJ	4.0 BJ	6.0 BJ	11 BJ	5.0 BJ	10 BJ	7.0 BJ	4.0 J	7.0 BJ	6.0 J
Unknown	7.0 BJ				5.0 BJ		4.0 BJ	4.0 BJ	34 BJ	5.0 BJ	41 BJ
Unknown	6.0 J				4.0 BJ		5.0 BJ		6.0 BJ		7.0 BJ
Unknown							4.0 J				5.0 BJ
Unknown											
Unknown											

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE
TENTATIVELY IDENTIFIED COMPOUNDS
SEMI-VOLATILES/SOIL - DATA SUMMARY

CASE NO. 9103.051 **All results reported in ug/kg**

Tentatively Identified Compounds	TP-1	TP-2	TP-3	TP-4	TP-5	SBLKS1
Aldol Condensation Product	35000 U	17000 U	12000 U	14000 U	20000 U	7500 AJ
Phenyl Acetic Acid	2200 J		610 J			
Phenyl Propanoic Acid	3900 J		590 J			
Molecular Sulfur	17000 J	8700 J	1500 J		3600 J	
Terpene Isomer		2200 J				
Octyl Phenol Isomer			360 J			
Benzaldehyde				45000 J	1500 J	
Acetophenone				7700 J		
Benzoic Acid				22000 J		
Methyl Phenylacetate				3600 J		
Chalcone				19000 J		
Phthalic Anhydride					800 J	
Tetrachlorophenol Isomer					1100 J	
Unknown Carboxylic Acid	2400 J	4300 J	820 J	5500 J	1200 J	
Unknown Carboxylic Acid	120000 J	20000 J	4600 J	18000 J	13000 J	
Unknown Carboxylic Acid	50000 J	1200 J	800 J	13000 J	6400 J	
Unknown Carboxylic Acid	6300 J	1800 J	2500 J	11000 J		
Unknown Carboxylic Acid	98000 J	2400 J	1400 J			
Unknown Carboxylic Acid	18000 J	16000 J	400 J			
Unknown Carboxylic Acid	2100 J		1500 J			
Unknown Carboxylic Acid	44000 J		1200 J			
Unknown Carboxylic Acid	12000 J		6500 J			
Unknown Carboxylic Acid	16000 J		1500 J			
Unknown Carboxylic Acid	8300 J		2900 J			
Unknown Carboxylic Acid			380 J			
Unknown Carboxylic Acid			1600 J			
Unknown Hydrocarbon	6100 J	3600 J			910 J	
Unknown Hydrocarbon	7200 J	3200 J			2700 J	
Unknown Hydrocarbon	8500 J	4000 J			3000 J	
Unknown Hydrocarbon	8700 J				3400 J	
Unknown Hydrocarbon	8500 J					
Unknown Oxy. Hydrocarbon		24000 J	460 J			

DRAFT

WELLSVILLE/ANDOVER LANDFILL SITE

TENTATIVELY IDENTIFIED COMPOUNDS

SEMI-VOLATILES/SOIL - DATA SUMMARY (continued)

CASE NO. 9103.051 **All results reported in ug/kg**

Tentatively Identified Compounds	TP-1	TP-2	TP-3	TP-4	TP-5	SBLKS1
Unknown Oxy. Hydrocarbon		17000 J				
Unknown Alkyl Benzyl Alcohol				45000 J		
Unknown		1200 J	440 J	11000 J	770 J	
Unknown		1700 J		9100 J	2100 J	
Unknown		3800 J		14000 J	4100 J	
Unknown		22000 J		10000 J	3900 J	
Unknown		19000 J		24000 J		
Unknown		8100 J		12000 J		
Unknown				14000 J		
Unknown				14000 J		
Unknown				20000 J		

DATA QUALIFIERS

NYSDEC SSP DATA QUALIFIERS

ORGANIC DATA QUALIFIERS

U - Indicates that the compound was analyzed for but not detected at or above the Contract Required Quantitation Limit (CRQL).

J - The associated numerical value is an estimated quantity.

UJ- The compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance in quality control limits.

B - The analyte is found in the blanks as well as the sample. It indicates possible sample contamination and warns the data user to use caution when applying the results of this analyte.

C - Indicates that the compound was detected beyond the calibration range and was subsequently analyzed at a dilution.

M - Matrix spike compound.

E - Reported value is estimated because it exceeds the calibration limit.

D - Reported result taken from diluted sample analysis.

A - Aldol condensation product.

R - Reported value is unusable and rejected due to variance from quality control limits.

NYSDEC SSP DATA QUALIFIERS

INORGANIC DATA QUALIFIERS

U - Indicates analyte result less than Contract Required Detection Limit (CRDL).

B - Indicates analyte result between Instrument Detection Limit (IDL) and CRDL.

J - Reported value is estimated due to variance from quality control limits identified during data validation procedures.

UJ- The element was analyzed for, but not detected. The sample quantitation limit is an estimate due to variance in quality control limits.

E - Reported value is estimated because of the presence of interference.

APPENDIX E

RESULTS OF GEOTECHNICAL ANALYSES

DRAFT

GEOTECHNICAL LABORATORY TESTING DATA SUMMARY

PROJECT NAME: WELLSVILLE-ANDOVER LANDFILL
PROJECT NO. R5977.10
PROJECT ENGINEER: R. WATT
MATERIAL SOURCE: WELLSVILLE-ANDOVER LANDFILL SITE
DATE ASSIGNED: 12/16/91
WORK ORDER NO. 1552

IDENTIFICATION			WATER CONTENT	ATTERBERG LIMITS			GRAIN SIZE ANALYSIS		MOISTURE-DENSITY RELATIONSHIP (Modified)		PERMEABILITY TEST					LABORATORY LOG AND SOIL DESCRIPTION
SAMPLE LOCATION	SAMPLE NUMBER	DEPTH ft.	%	LL %	PL %	PI	SIEVE -200 %	HYD. -2μ %	MAX. DRY DENSITY pcf	OPT. WATER CONTENT %	PERME-ABILITY cm/sec.	TYPE OF TEST	$\bar{\sigma}_c$ psf	DRY UNIT WT pcf	WATER CONTENT %	
MW-1D	1Da	0.0-2.0	16.4	39	24	15	55	18								Light Yellowish Brown to Olive Brown Gravelly Lean Clay with Sand (CL)
MW-2D	2Da	4.0-6.0	13.3	37	22	15	54	16								Light Olive Brown Gravelly Lean Clay with Sand (CL)
MW-3D	3Da	5.0-6.0	13.3	33	20	13	56	19								Light Olive Brown Sandy Lean Clay with Gravel (CL)
MW-3D	3Db	22.0-24.0	10.2	36	19	17	42	16								Light Yellowish Brown Clayey Gravel with Sand (GC)
MW-4D	4Da	1.0-2.0	6.1	32	21	11	31	10								Light Yellowish Brown Clayey Sand with Gravel and Organic Matter (SC)
MW-5D	5Da	8.0-10.0	6.7	33	19	14	28	10								Light Olive Brown Clayey Sand with Gravel (SC)
MW-6D	6Da	2.0-4.0	9.4	36	20	16	53	19								Light Olive Brown Sandy Lean Clay with Gravel (CL)
MW-6D	6Db	12.0-14.0	19.2	35	21	14	44	16								Light Olive Brown Clayey Gravel with Sand (GC)
MW-7D	7Da	10.5-11.0	9.2	31	19	12	53	17								Light Olive Brown Sandy Lean Clay with Gravel (CL)
MW-7D	7Db	20.0-22.0	5.5	33	19	14	47	17								Light Olive Brown Clayey Sand with Gravel (SC)
MW-8D	8Da	1.0-3.0	12.6	36	23	13	62	19								Light Olive Brown Sandy Lean Clay with Gravel (CL)
MW-8D	8Db	11.0-12.0	13.2	33	19	14	54	20								Olive Brown Sandy Lean Clay with Gravel (CL)
MW-8D	8Dc	43.0-44.0	12.1	29	18	11	52	15								Olive Sandy Lean Clay with Gravel (CL)
MW-9D	9Da	1.0-3.0	8.9	32	19	13	47	17								Light Olive Brown Clayey Gravel with Sand (GC)
MW-9D	9Db	14.0-16.0	10.3	28	17	11	46	14								Olive Brown Clayey Gravel with Sand (GC)

GZA Geo[illegible]ronmental of New York
Engineer[illegible]nd Scientists

DRAFT

GEOTECHNICAL LABORATORY TESTING DATA SUMMARY

PROJECT NAME: WELLSVILLE-ANDOVER LANDFILL
PROJECT NO. R5977.10
PROJECT ENGINEER: R. WATT
MATERIAL SOURCE: WELLSVILLE-ANDOVER LANDFILL SITE
DATE ASSIGNED: 12/16/91
WORK ORDER NO. 1552

IDENTIFICATION			WATER CONTENT	ATTERBERG LIMITS			GRAIN SIZE ANALYSIS		MOISTURE-DENSITY RELATIONSHIP (Modified)		PERMEABILITY TEST					LABORATORY LOG AND SOIL DESCRIPTION
SAMPLE LOCATION	SAMPLE NUMBER	DEPTH ft.	%	LL %	PL %	PI	SIEVE -200 %	HYD. -2μ %	MAX. DRY DENSITY pcf	OPT. WATER CONTENT %	PERME-ABILITY cm/sec.	TYPE OF TEST	$\bar{\sigma}_c$ psf	DRY UNIT WT pcf	WATER CONTENT %	
MW-10D	10Da	1.0-3.0	14.4	39	21	18	73	23								Light Olive Brown Lean Clay with Gravel (CL)
MW-10D	10Db	8.0-10.0	16.3	24	19	5	60	9								Olive Brown Sandy Silty Clay with Gravel (CL-ML)
MW-11S	11Sa	17.0-18.0	18.1	28	17	11	61	19								Light Olive Brown Sandy Lean Clay (CL)
MILLER SPRING	CL-1	1.5-2.0	20.5	37	25	12	71	24								Light Olive Brown Silt with Sand (ML)

GZA GeoEnvironmental of New York
Engineers and Scientists

LEGEND FOR GEOTECHNICAL LABORATORY DATA SUMMARY SHEET

WATER CONTENT (ASTM D 2216)

%	=	WATER CONTENT IN PERCENT

ATTERBERG LIMITS (ASTM D 4318)

LL %	=	LIQUID LIMIT IN PERCENT
PL %	=	PLASTIC LIMIT IN PERCENT
PI	=	PLASTICITY INDEX

GRAIN SIZE ANALYSIS (ASTM D 422)

SIEVE -200 %	=	PERCENT FINES, MATERIAL FINER THAN NO. 200 SIEVE (0.074 MM)
HYD. -2μ %	=	PERCENT FINER THAN 2 MICRONS

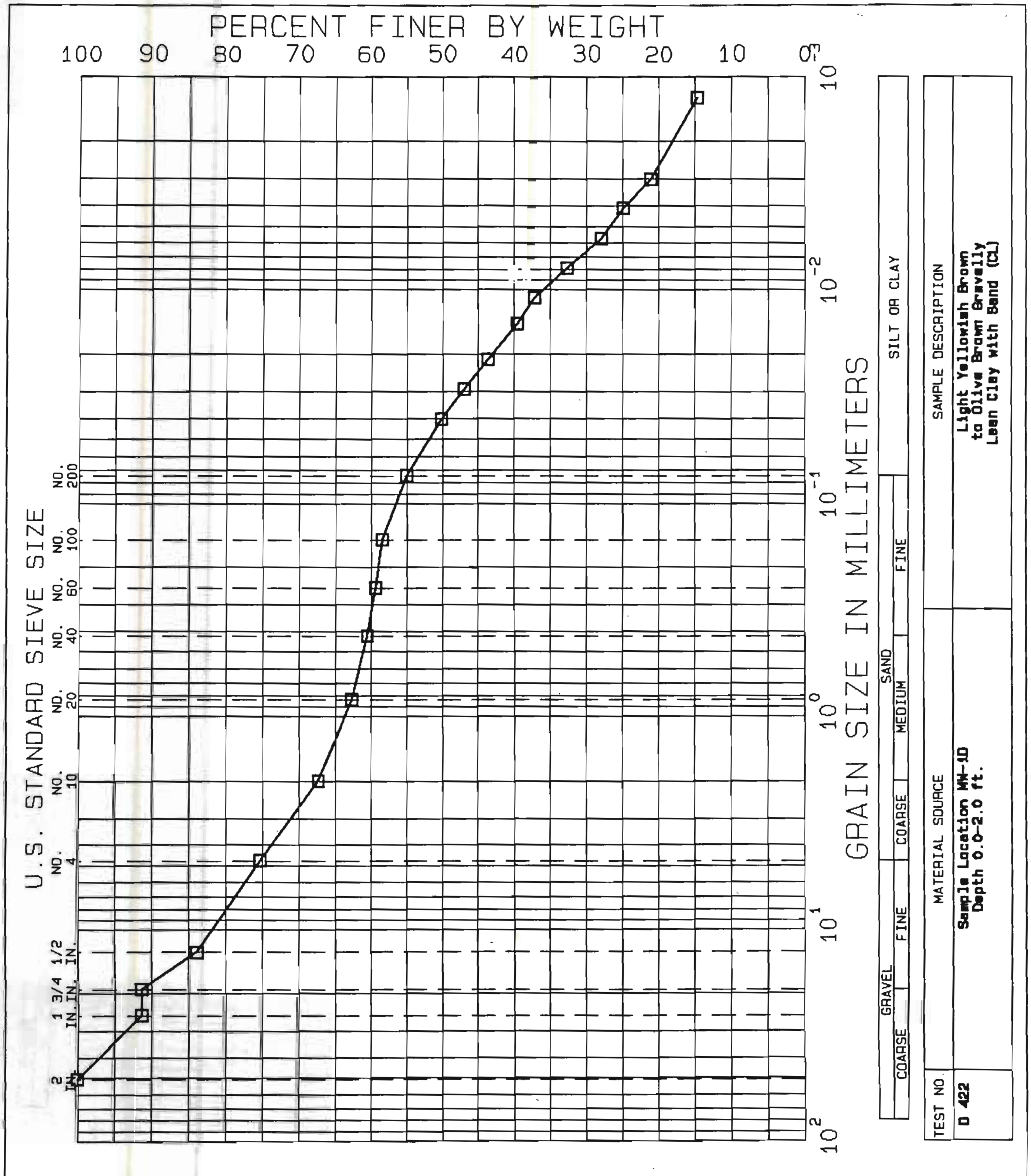
MOISTURE-DENSITY RELATIONSHIP (Modified) (ASTM D 1557)

MAX. DRY DENSITY pcf	=	MAXIMUM DRY DENSITY IN POUNDS PER CUBIC FOOT
OPT. WATER CONTENT %	=	OPTIMUM WATER CONTENT IN PERCENT

PERMEABILITY TEST (U.S. ARMY CORPS. OF ENGINEERS EM-1110-2-1906)

PERMEABILITY cm/sec.	=	PERMEABILITY MEASURED IN CENTIMETERS PER SECOND
TYPE OF TEST Kr	=	RECONSTITUTED (REMOLDED) SAMPLE
K	=	UNDISTURBED SAMPLE
$\bar{\sigma}_c$ psf	=	EFFECTIVE CONFINING PRESSURE DURING PERMEABILITY TEST IN POUNDS PER SQUARE FOOT
DRY UNIT WT. pcf	=	DRY DENSITY OF TEST SAMPLE IN POUNDS PER CUBIC FOOT
WATER CONTENT %	=	WATER CONTENT OF TEST SAMPLE IN PERCENT

DRAFT



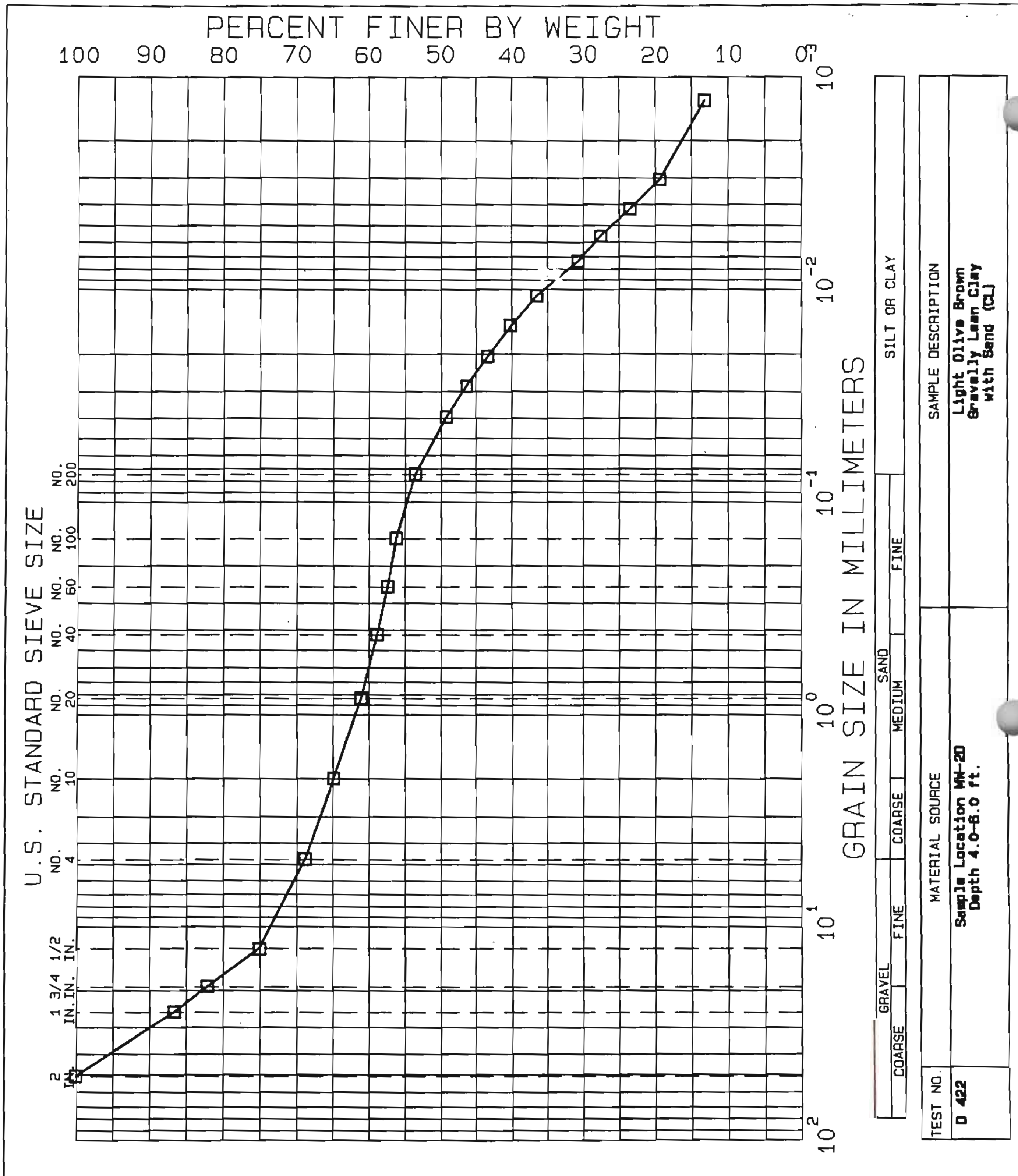
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-1D	WORK ORDER NO.	1552
SAMPLE NO.	1Dm	DATE	1/6/92
DEPTH	0.0-2.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

GZA GeoEnvironmental of New York
Engineers and Scientists

DRAFT



WELLSVILLE-ANDOVER LANDFILL

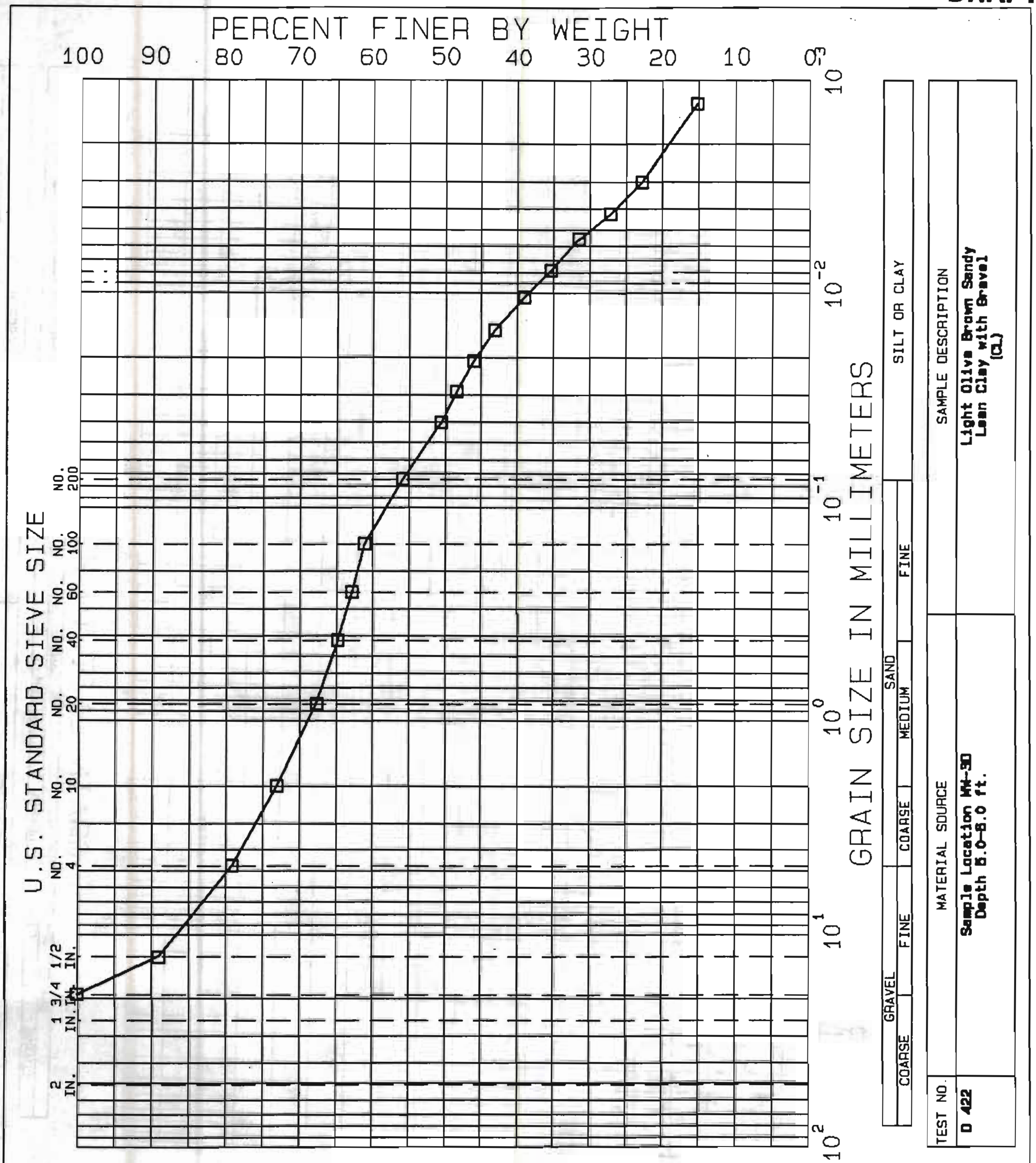
GRADATION TESTS

EXPLOR. NO. **MW-2D**
SAMPLE NO. **2Da**
DEPTH **4.0-6.0 ft.**
TECH. **WGL**
REVIEWER **RAR**

WORK ORDER NO. **1552**
DATE **1/2/92**

FILE **R5977.10**

DRAFT

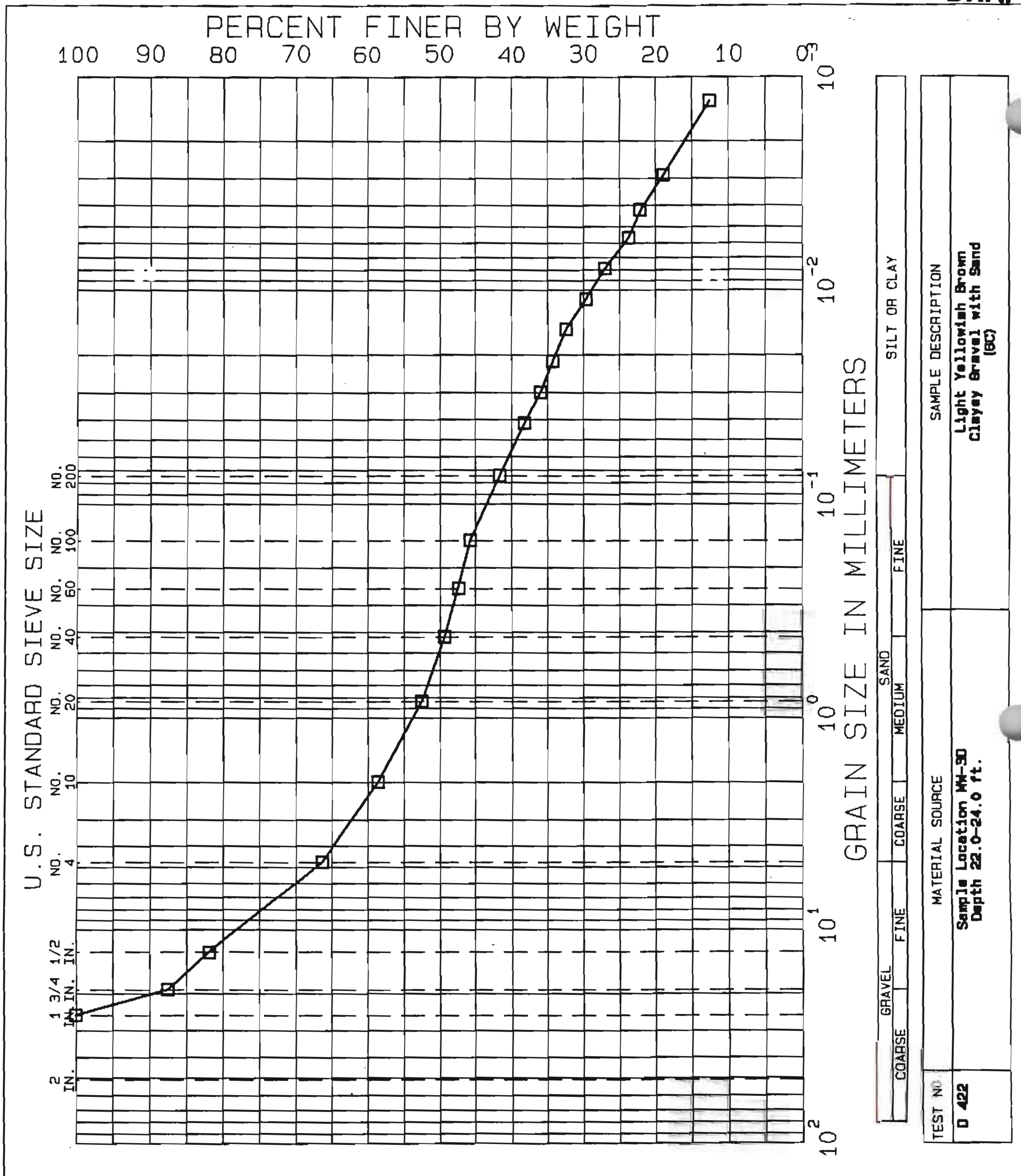


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-3D	WORK ORDER NO.	1552
SAMPLE NO.	3Da	DATE	1/2/92
DEPTH	5.0-6.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT

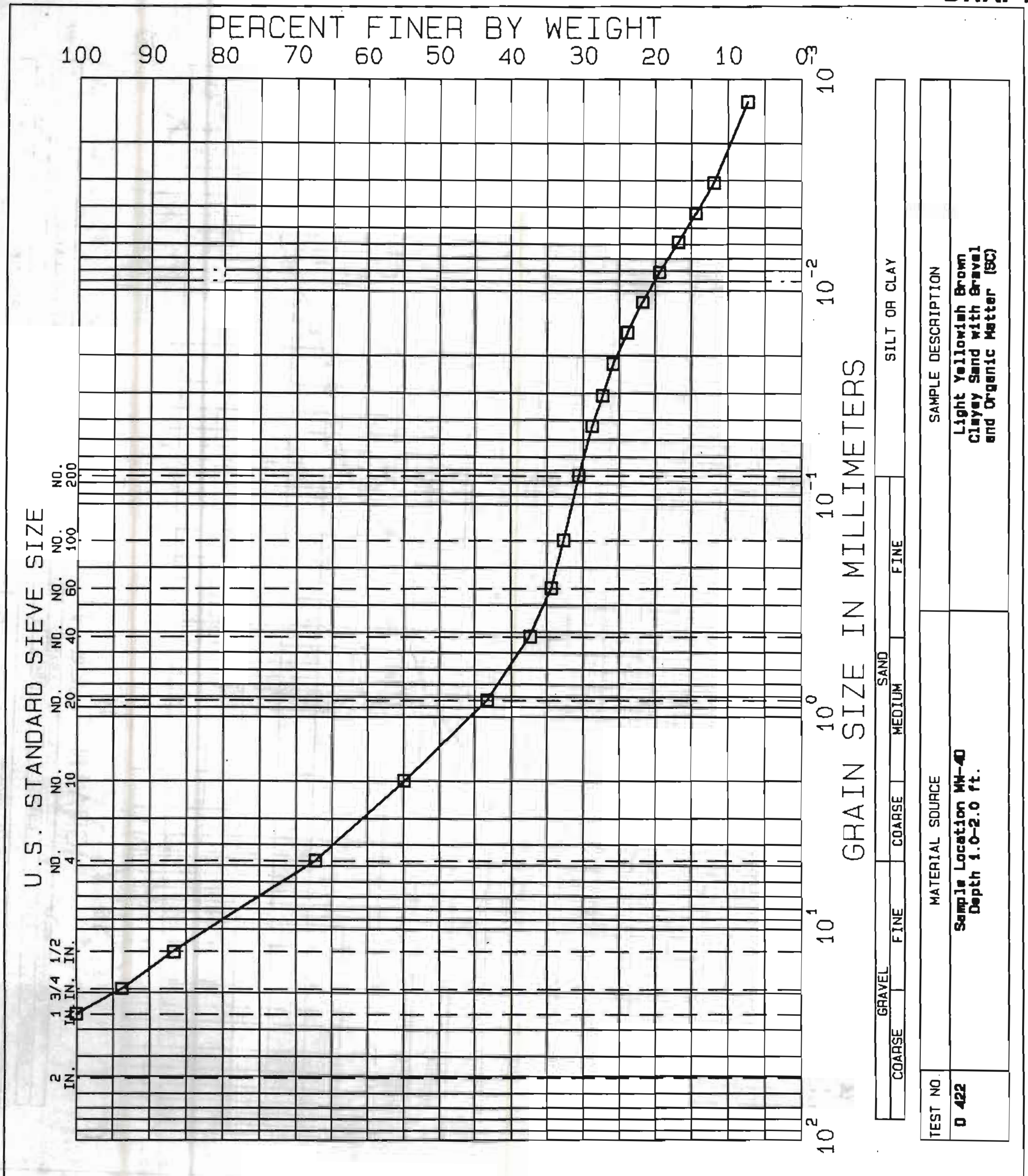


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-3D	WORK ORDER NO.	1552
SAMPLE NO.	30b	DATE	1/2/92
DEPTH	22.0-24.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT



WELLSVILLE-ANDOVER LANDFILL

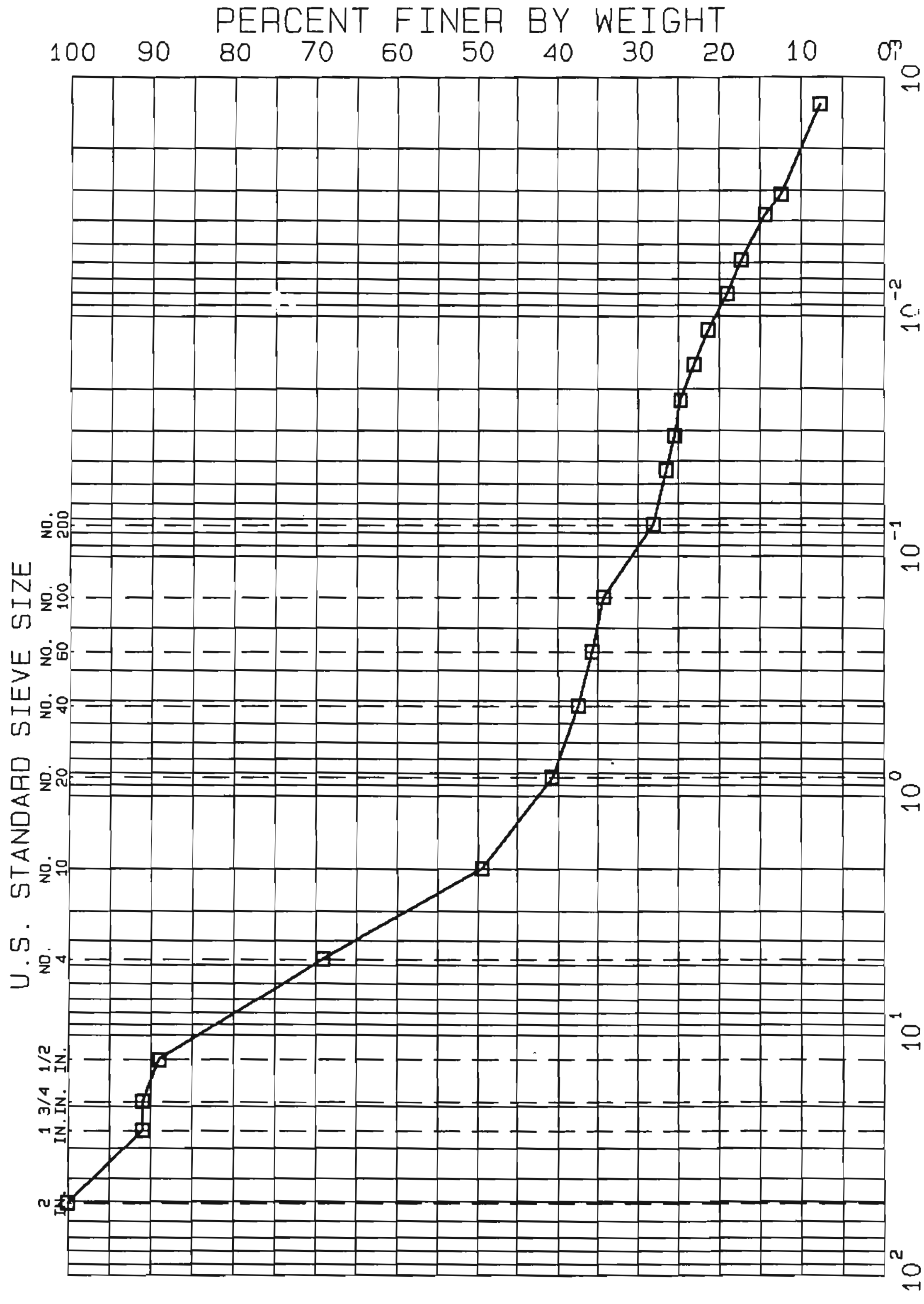
GRADATION TESTS

EXPLOR. NO. MW-4D
SAMPLE NO. 4Dm
DEPTH 1.0-2.0 ft.
TECH. WGL
REVIEWER RAR

WORK ORDER NO. 1552
DATE 1/6/92

FILE R5977.10

DRAFT



TEST NO.	MATERIAL SOURCE	SAMPLE DESCRIPTION
D 422	Sample Location MW-5D Depth 8.0-10.0 ft.	Light Olive Brown Clayey Sand with Gravel (SC)

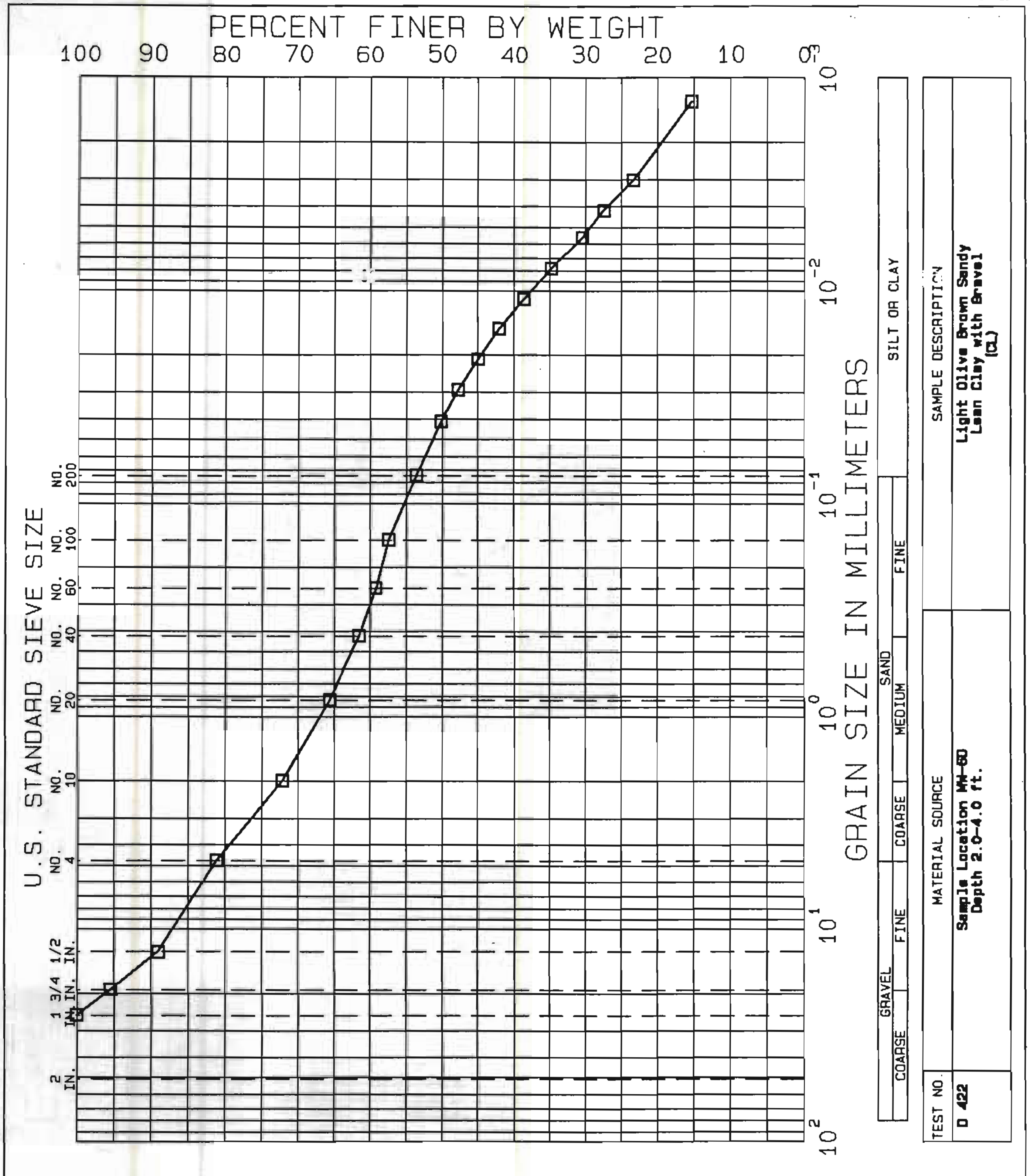
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO. **MW-5D**
SAMPLE NO. **5Da**
DEPTH **8.0-10.0 ft.**
TECH. **WGL**
REVIEWER **RAR**

WORK ORDER NO. **1552**
DATE **1/2/92**
FILE **R5977.10**

DRAFT

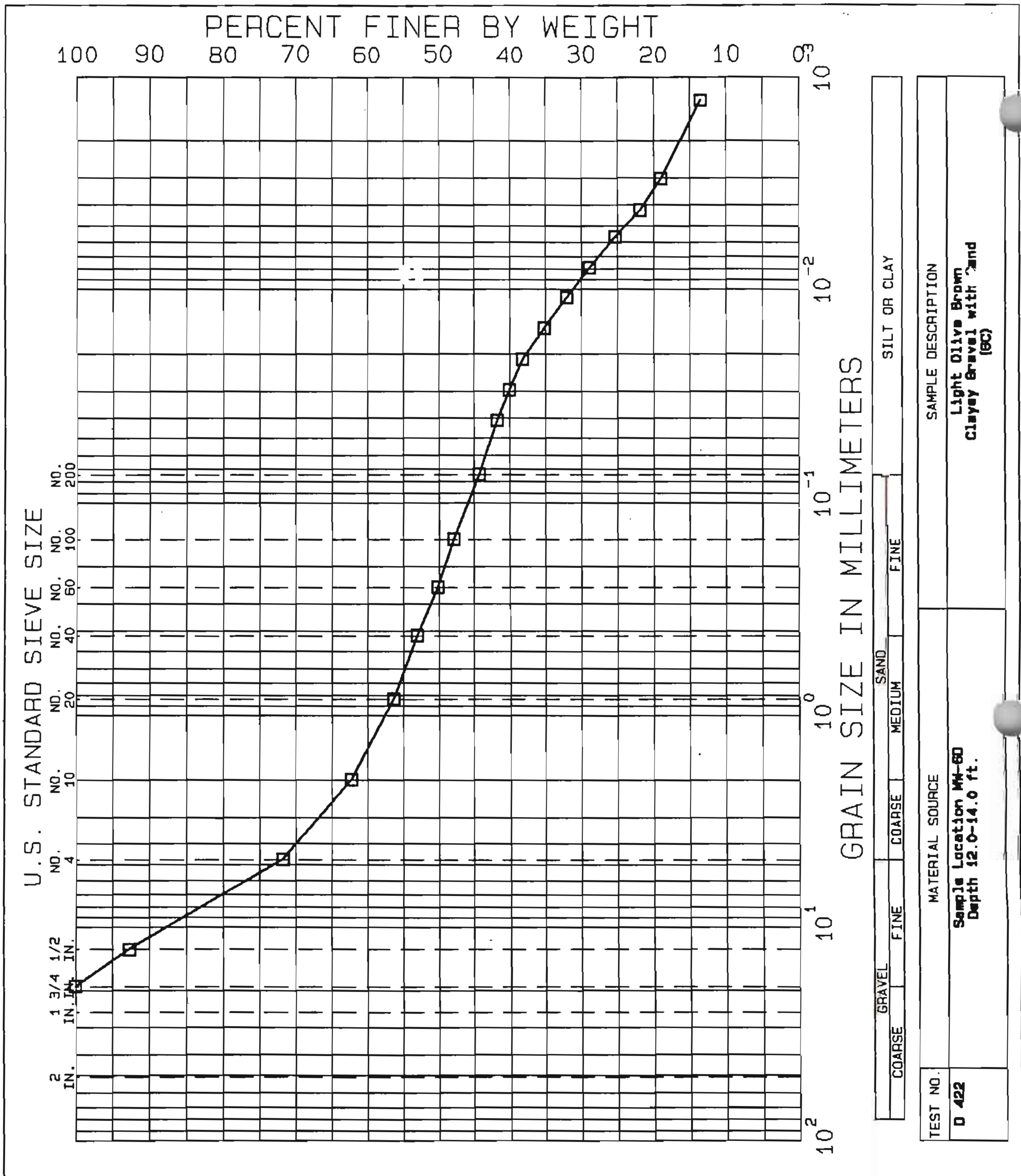


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-6D	WORK ORDER NO.	1552
SAMPLE NO.	6Da	DATE	1/2/92
DEPTH	2.0-4.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT

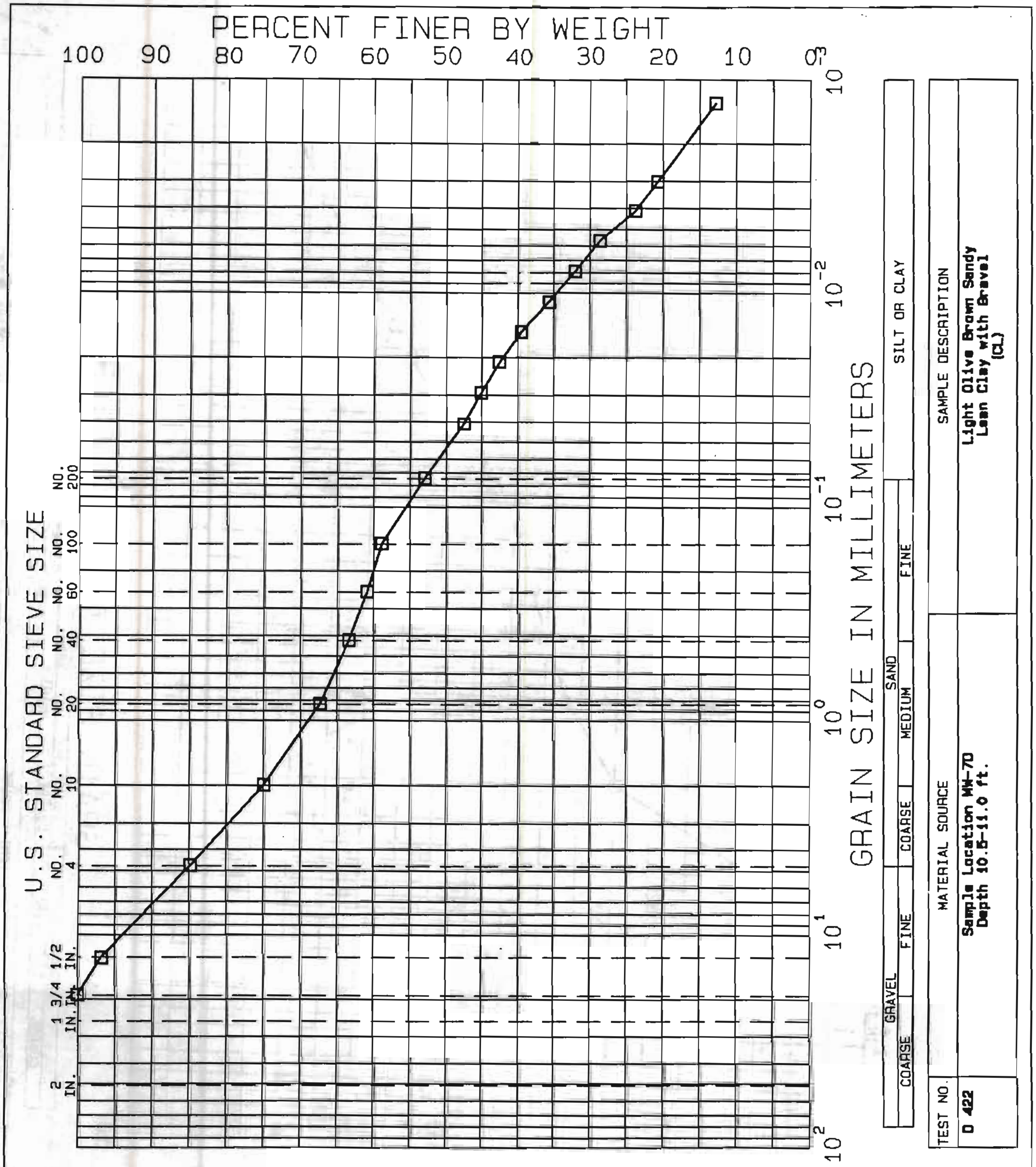


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-6D	WORK ORDER NO.	1552
SAMPLE NO.	6Db	DATE	1/2/92
DEPTH	12.0-14.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT



WELLSVILLE-ANDOVER LANDFILL

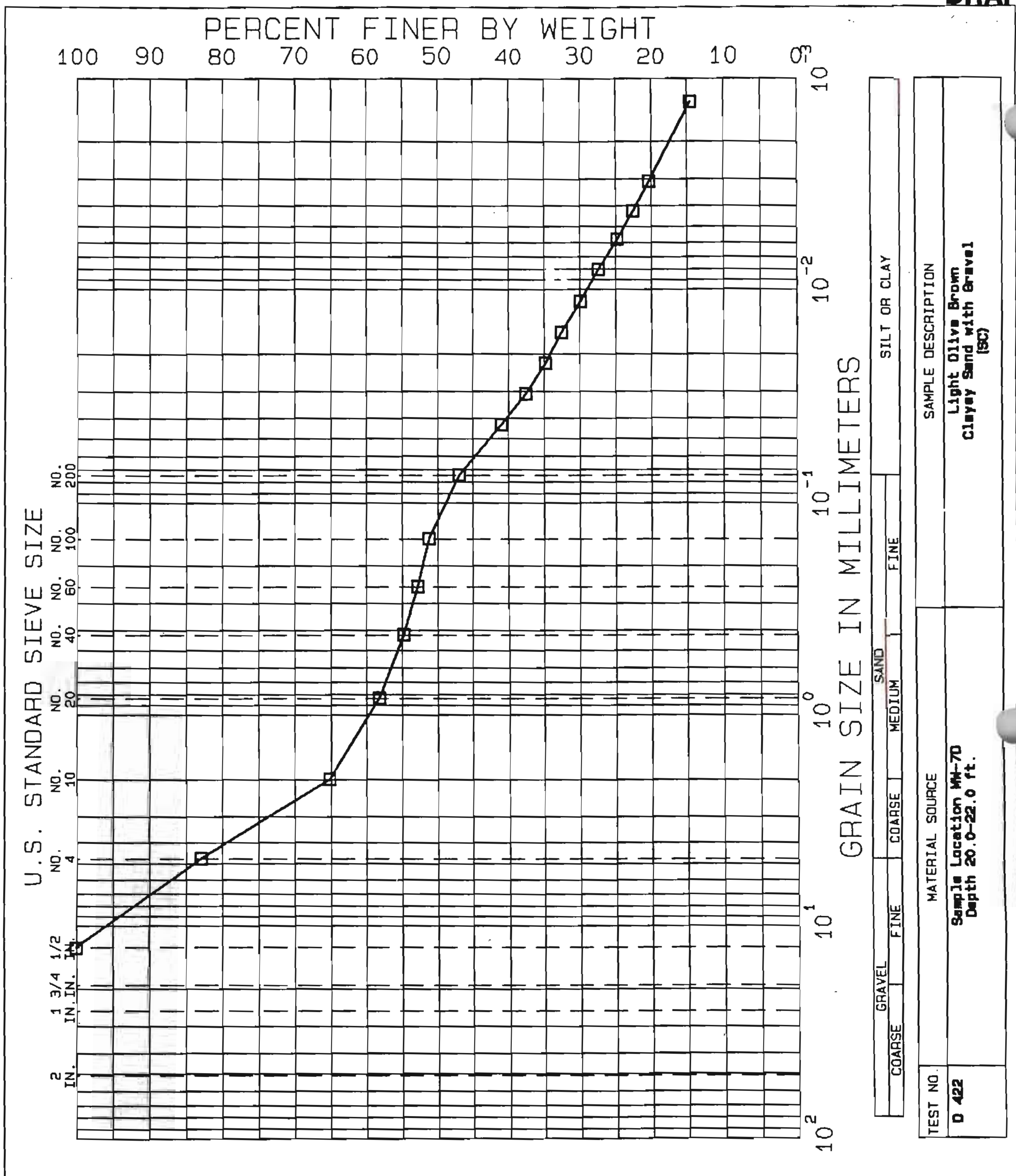
GRADATION TESTS

EXPLOR. NO. **MW-7D**
SAMPLE NO. **7Da**
DEPTH **10.5-11.0 ft.**
TECH. **WGL**
REVIEWER **RAR**

WORK ORDER NO. **1552**
DATE **1/2/92**
FILE **R5977.10**

GZA GeoEnvironmental of New York
Engineers and Scientists

DRAFT



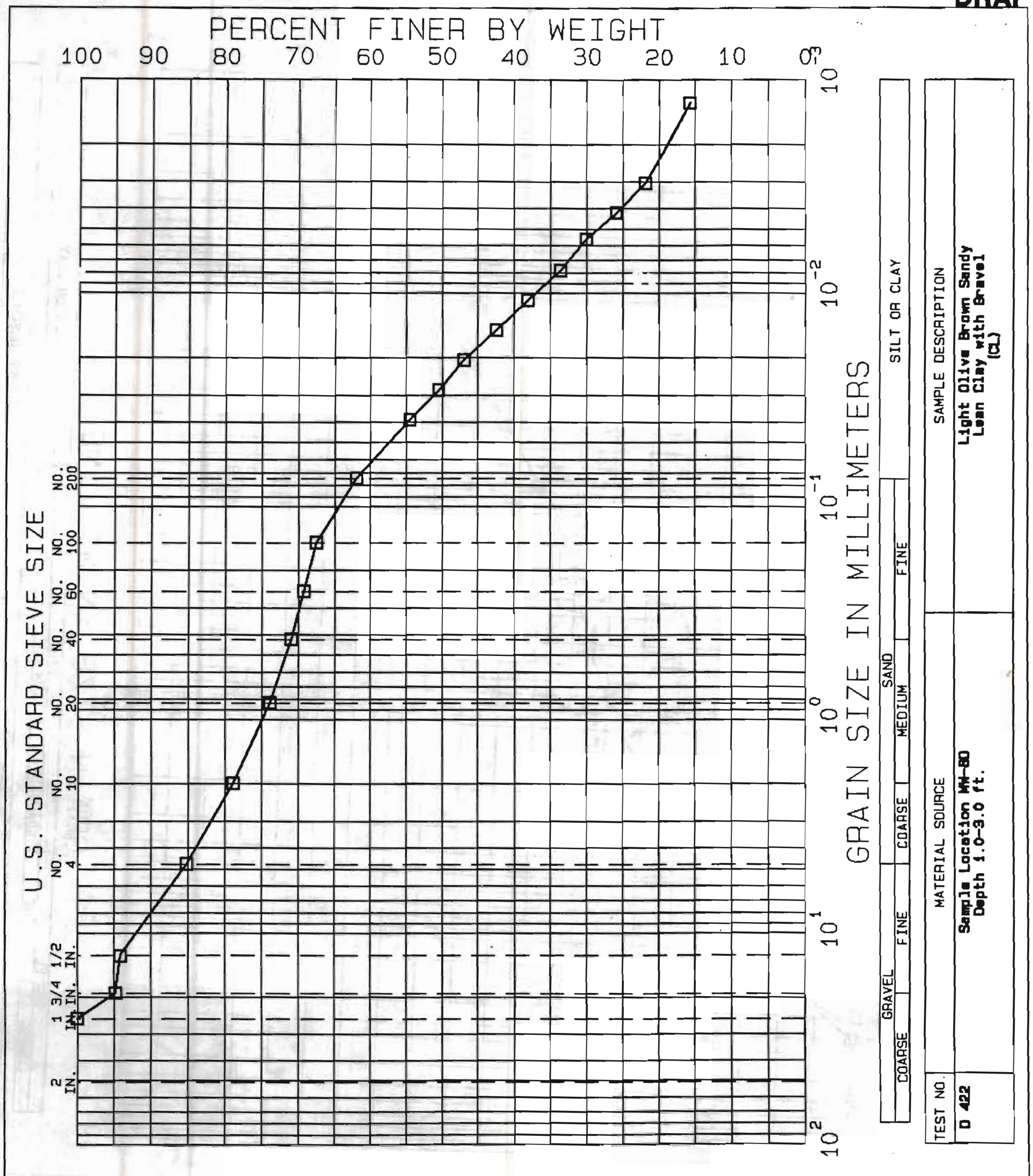
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-7D	WORK ORDER	
SAMPLE NO.	7Db	NO.	1552
DEPTH	20.0-22.0 ft.	DATE	1/2/92
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

GZA GeoEnvironmental of New York
Engineers and Scientists

DRAFT



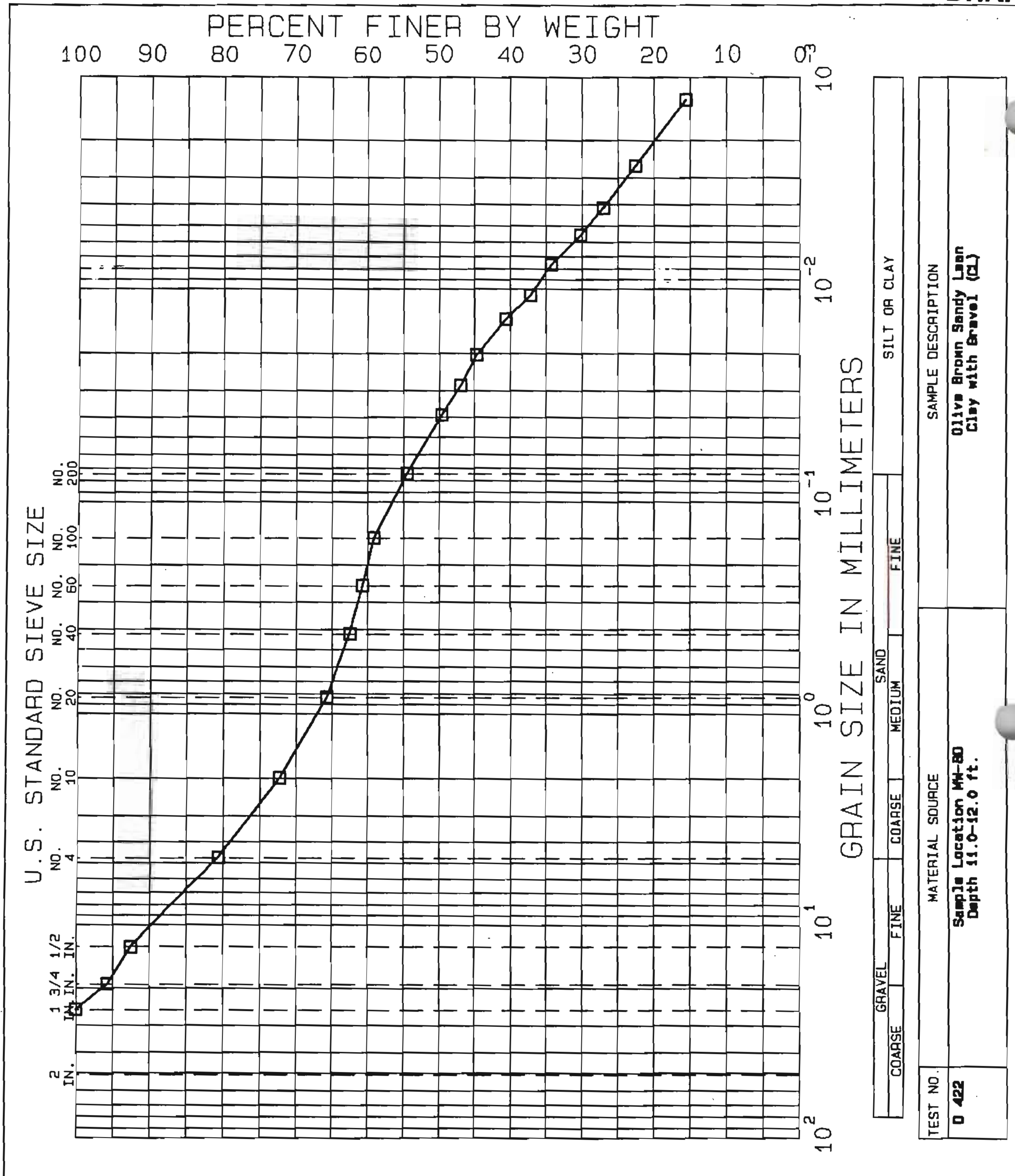
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-8D	WORK ORDER NO.	1552
SAMPLE NO.	8Da	DATE	1/2/92
DEPTH	1.0-3.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

GZA GeoEnvironmental of New York
Engineers and Scientists

DRAFT

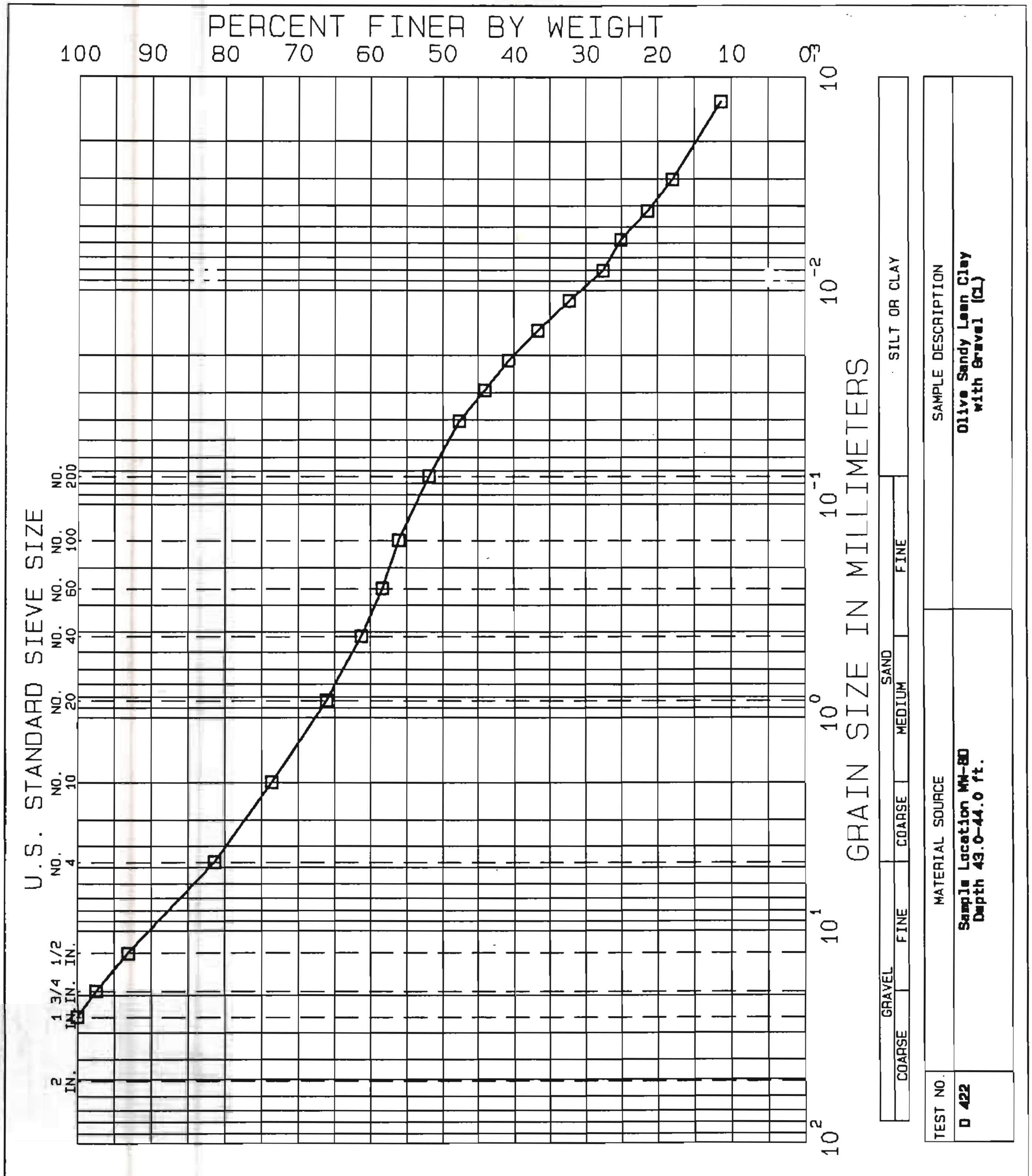


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	**MW-8D**	WORK ORDER NO.	**1552**
SAMPLE NO.	**8Db**	DATE	**1/2/92**
DEPTH	**11.0-12.0 ft.**		
TECH.	**WGL**		
REVIEWER	**RAR**	FILE	**R5977.10**

DRAFT

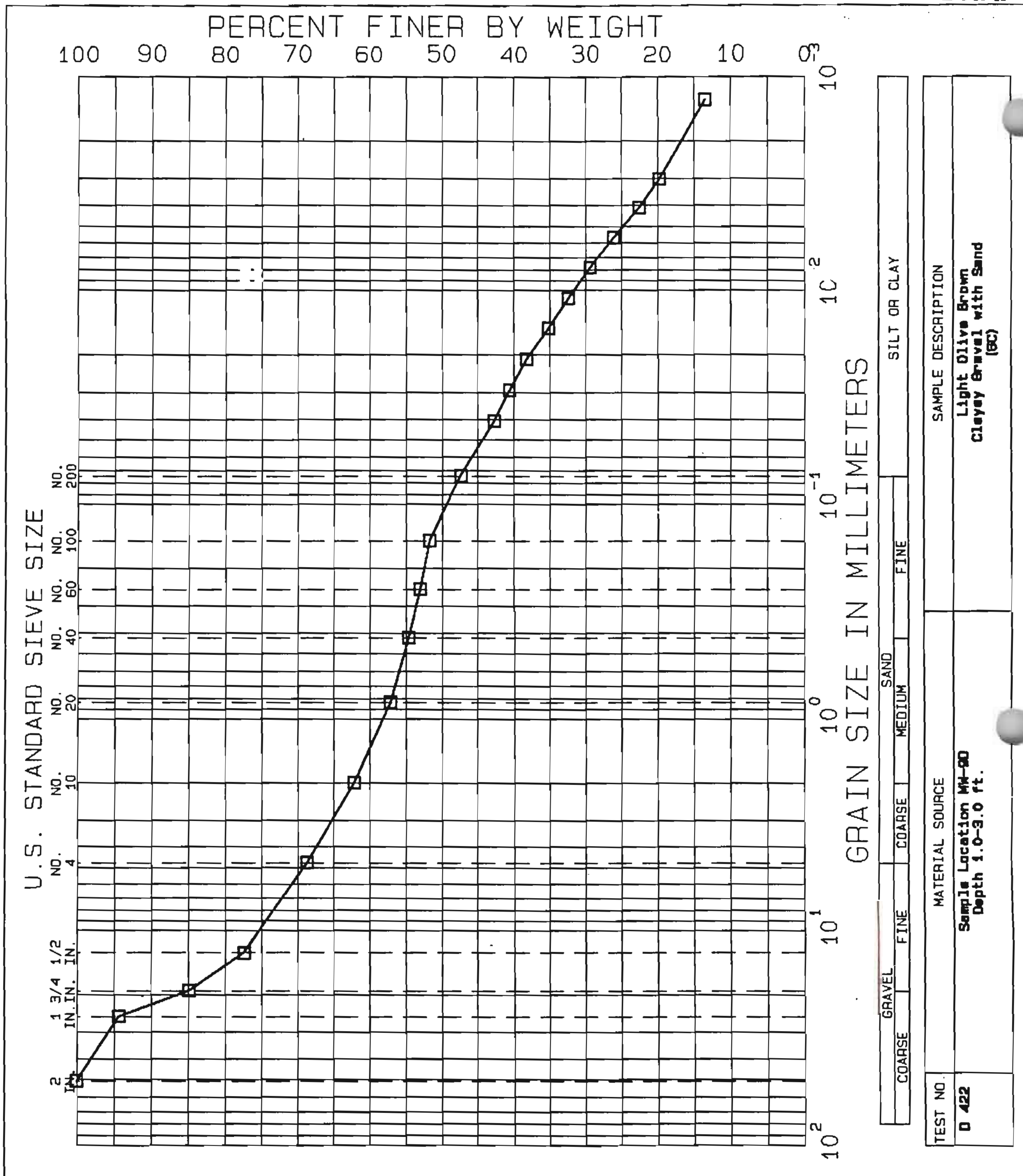


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-8D	WORK ORDER NO.	1552
SAMPLE NO.	8Dc	DATE	1/2/92
DEPTH	43.0-44.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT

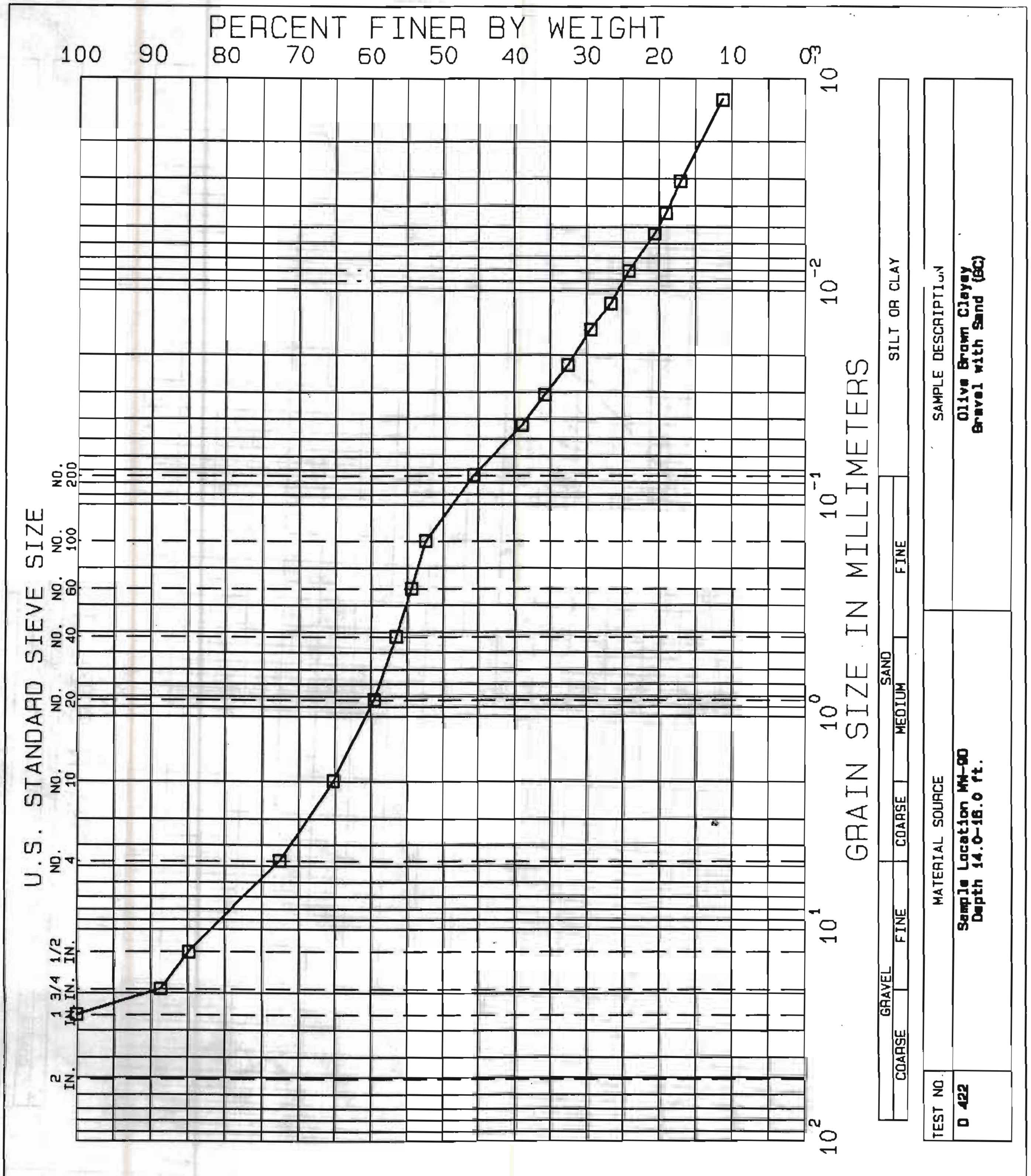


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-9D	WORK ORDER NO.	1552
SAMPLE NO.	9Da	DATE	1/2/92
DEPTH	1.0-3.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.16

DRAFT

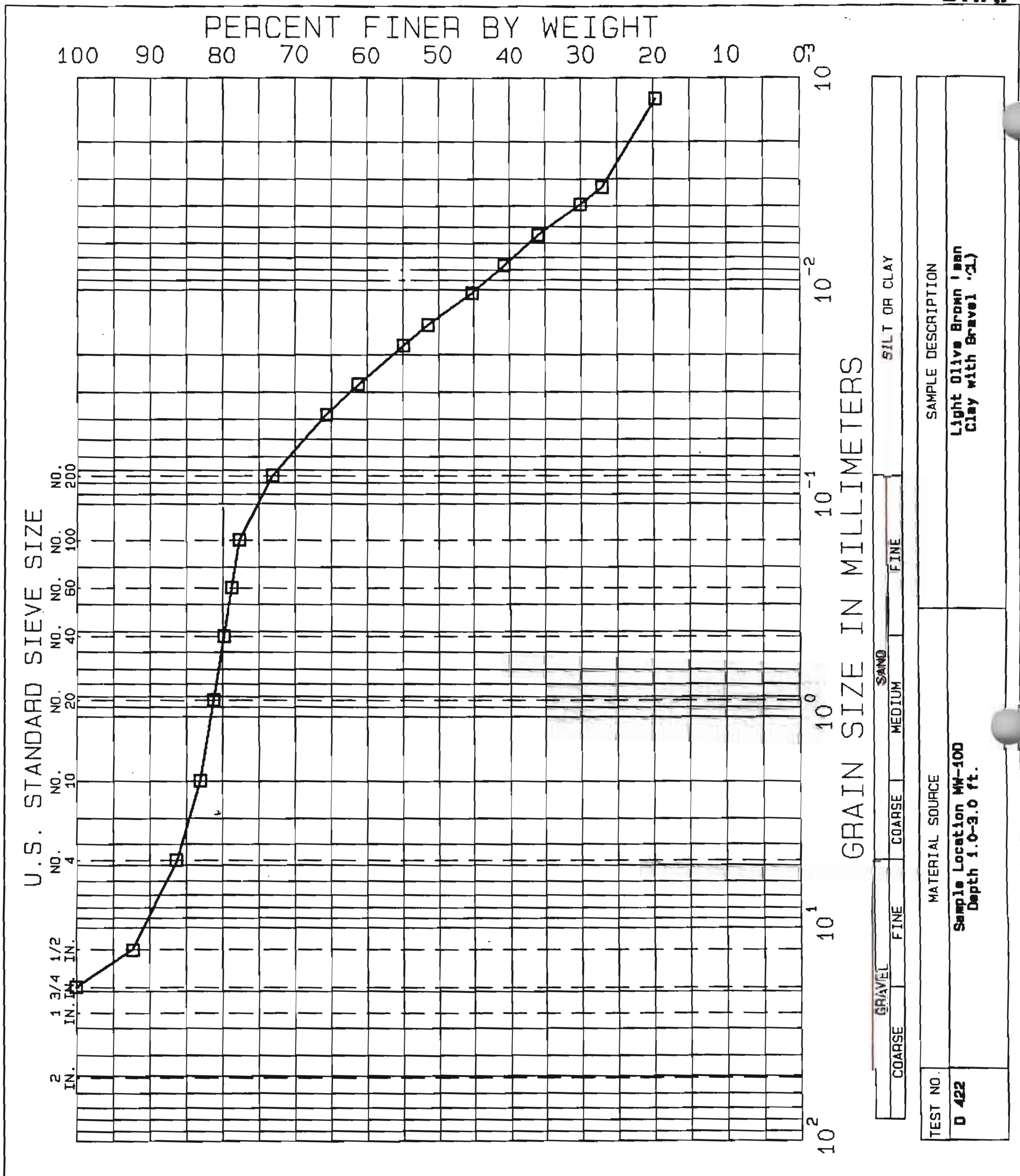


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-9D	WORK ORDER NO.	1552
SAMPLE NO.	9Db	DATE	1/6/92
DEPTH	14.0-16.0 ft.		
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT

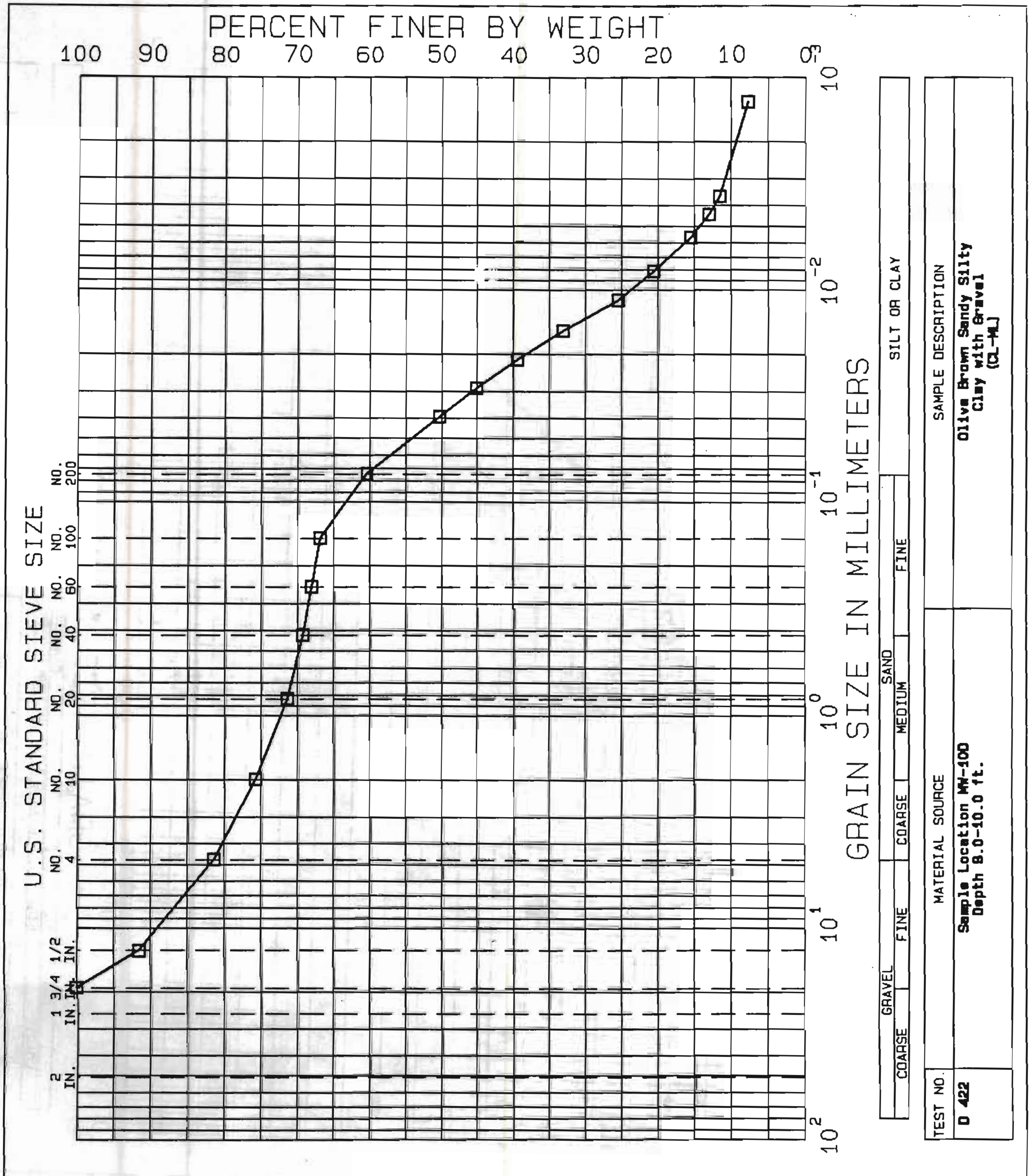


WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	MW-10D	WORK ORDER NO.	1552
SAMPLE NO.	10Da		
DEPTH	1.0-3.0 ft.	DATE	1/6/92
TECH.	WGL		
REVIEWER	RAR	FILE	R5977.10

DRAFT



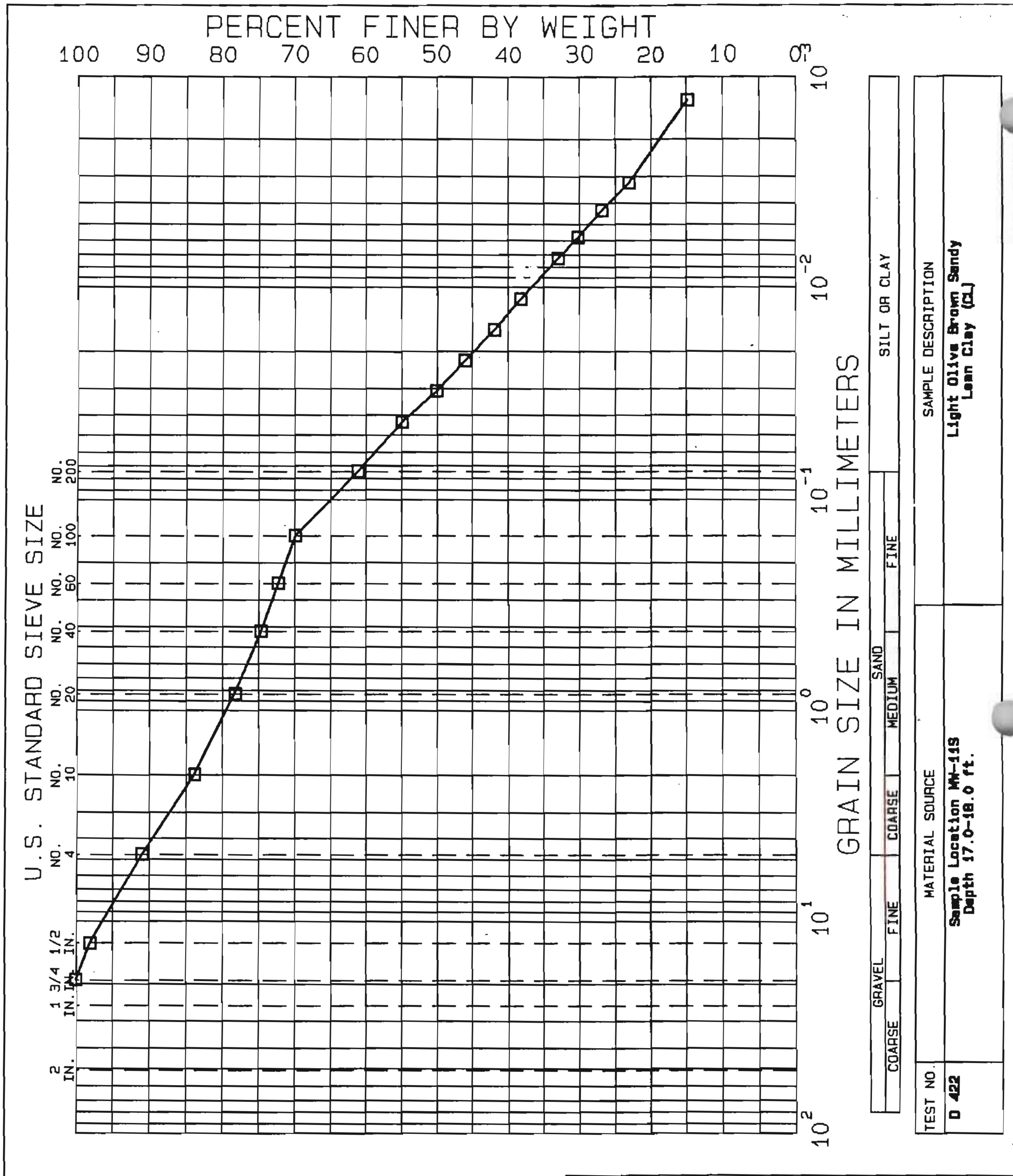
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO. **MW-10D**
SAMPLE NO. **100b**
DEPTH **8.0-10.0 ft.**
TECH. **WGL**
REVIEWER **RAR**

WORK ORDER NO. **1552**
DATE **1/6/92**
FILE **R6977.10**

DRAFT



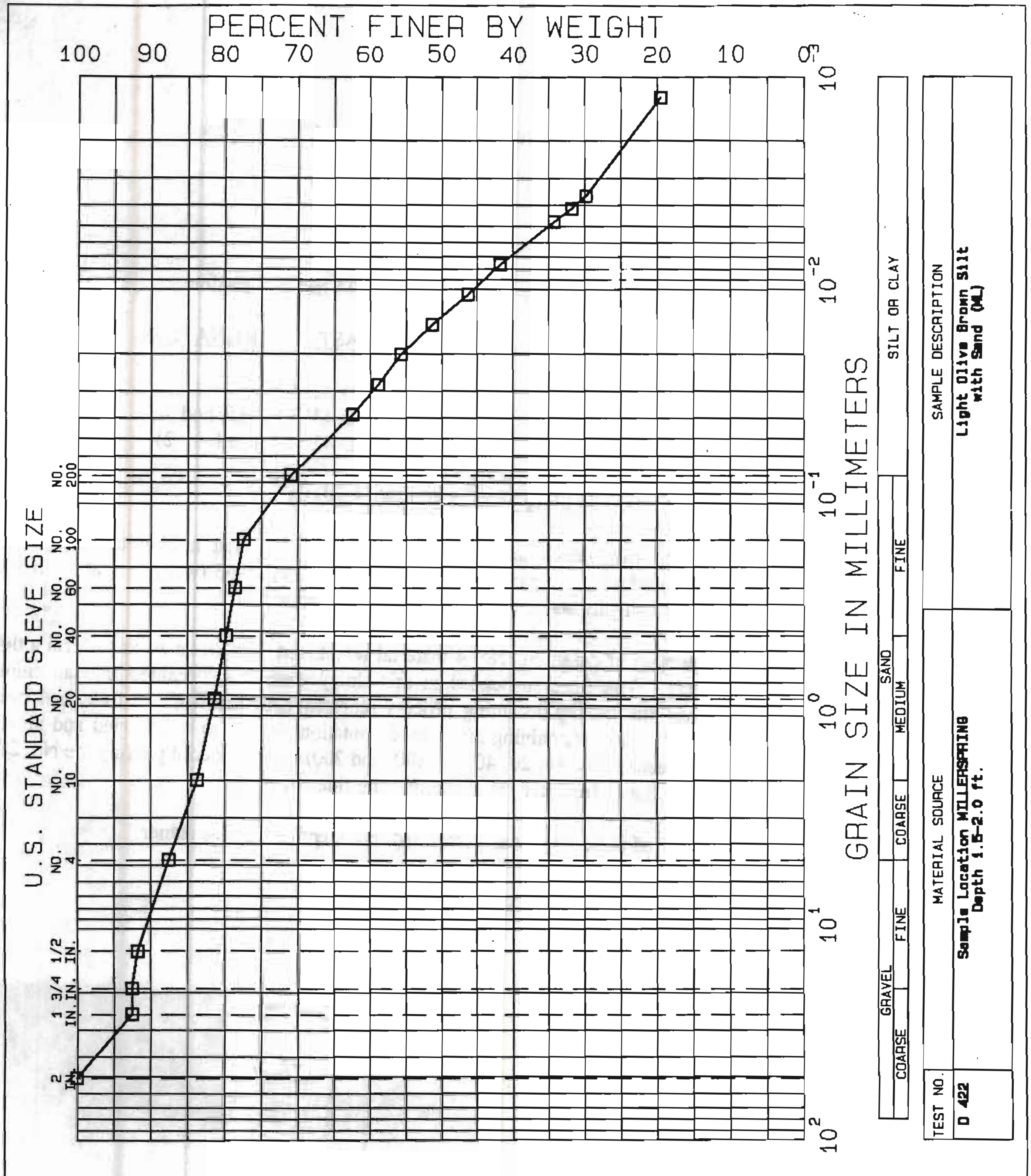
WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO. MW-11S
SAMPLE NO. 11Sa
DEPTH 17.0-18.0 ft.
TECH. WGL
REVIEWER RAR

WORK ORDER NO. 1552
DATE 1/6/92
FILE R6977.10

DRAFT



WELLSVILLE-ANDOVER LANDFILL

GRADATION TESTS

EXPLOR. NO.	M.S.	WORK ORDER NO.	1552
SAMPLE NO.	CL-1	DATE	1/6/92
DEPTH	1.5-2.0 ft.		
TECH.	WGL	FILE	R5977.10
REVIEWER	RAR		

GZA GeoEnvironmental of New York
Engineers and Scientists

GEOTECHNICAL LABORATORY TEST PROCEDURES

WELLSVILLE-ANDOVER LANDFILL
File No. R5977.10

1. The following tests were performed with the noted ASTM test designation:

TEST	ASTM DESIGNATION
Moisture Content	D 2216-80
Liquid and Plastic Limits	D 4318-84 (method A)
Grain Size	D 422-63 (see Item 2)

2. Test Procedures for Combined Sieve and Hydrometer Analysis

When both sieve and hydrometer analyses are required a combined mechanical analysis is performed. This procedure is, in part, similar to ASTM's D 2217-66 (wet preparation of soil sample for grain-size analysis and determination of soil constants-B).

A representative portion of the minus No. 4 material was mixed with water so as to form a thin homogeneous slurry. The fines suspended in this slurry were then decanted into an empty hydrometer jar, and the mixing-decanting process repeated until most of the fines had been removed. Coarser fractions remaining after the decantation were then oven dried and sieved through a nest of screens (Nos. 10, 20, 40, 60, 100, and 200). Any material passing the No. 200 screen was added to the hydrometer jar containing the finer fraction.

Hydrometer analysis of these fines was performed in the conventional manner.

APPENDIX F

RESULTS OF AIR SAMPLE ANALYSIS

DRAFT

9112069 Ecology & Environ.

AIR TOXICS LTD.

SAMPLE NAME: A-1

ID#: 9112069-01A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	1123104	Date of Collection: 12/19/91
Dil. Factor:	1400	Date of Analysis: 12/31/91

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	1400	Not Detected
Freon 114	1400	Not Detected
Chloromethane	1400	Not Detected
Vinyl Chloride	1400	12000
Bromomethane	1400	Not Detected
Chloroethane	1400	Not Detected
Freon 11	1400	Not Detected
1,1-Dichloroethene	1400	Not Detected
Freon 113	1400	Not Detected
Methylene Chloride	1400	Not Detected
1,1-Dichloroethane	1400	1700
cis-1,2-Dichloroethene	1400	55000
Chloroform	1400	Not Detected
1,1,1-Trichloroethane	1400	2300
Carbon Tetrachloride	1400	Not Detected
Benzene	1400	Not Detected
1,2-Dichloroethane	1400	Not Detected
Trichloroethene	1400	Not Detected
1,2-Dichloropropane	1400	Not Detected
trans-1,3-Dichloropropene	1400	Not Detected
Toluene	1400	5300
cis-1,3-Dichloropropene	1400	Not Detected
1,1,2-Trichloroethane	1400	Not Detected
Tetrachloroethene	1400	Not Detected
Ethylene Dibromide	1400	Not Detected
Chlorobenzene	1400	Not Detected
Ethyl Benzene	1400	15000
m,p-Xylene	1400	1800
o-Xylene	1400	Not Detected
Styrene	1400	Not Detected
1,1,2,2-Tetrachloroethane	1400	Not Detected
1,3,5-Trimethylbenzene	1400	Not Detected
1,2,4-Trimethylbenzene	1400	Not Detected
1,3-Dichlorobenzene	1400	Not Detected
1,4-Dichlorobenzene	1400	Not Detected
Chlorotoluene	1400	Not Detected
1,2-Dichlorobenzene	1400	Not Detected
1,2,4-Trichlorobenzene	1400	Not Detected
Hexachlorobutadiene	1400	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	106	70-130
4-Bromofluorobenzene	109	70-130
1,2-Dichlorobenzene-d4	126	70-130

AIR TOXICS LTD.

SAMPLE NAME: A-2

ID#: 9112069-02A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	5122713	Date of Collection: 12/19/91
Dil. Factor:	210	Date of Analysis: 12/27/91

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	210	2700
Freon 114	210	Not Detected
Chloromethane	210	Not Detected
Vinyl Chloride	210	9700
Bromomethane	210	Not Detected
Chloroethane	210	Not Detected
Freon 11	210	210
1,1-Dichloroethene	210	Not Detected
Freon 113	210	Not Detected
Methylene Chloride	210	860
1,1-Dichloroethane	210	1400
cis-1,2-Dichloroethene	210	87000 E
Chloroform	210	Not Detected
1,1,1-Trichloroethane	210	800
Carbon Tetrachloride	210	Not Detected
Benzene	210	240
1,2-Dichloroethane	210	Not Detected
Trichloroethene	210	390
1,2-Dichloropropane	210	Not Detected
trans-1,3-Dichloropropene	210	Not Detected
Toluene	210	4200
cis-1,3-Dichloropropene	210	Not Detected
1,1,2-Trichloroethane	210	Not Detected
Tetrachloroethene	210	Not Detected
Ethylene Dibromide	210	Not Detected
Chlorobenzene	210	Not Detected
Ethyl Benzene	210	7700
m,p-Xylene	210	370
o-Xylene	210	Not Detected
Styrene	210	Not Detected
1,1,2,2-Tetrachloroethane	210	Not Detected
1,3,5-Trimethylbenzene	210	Not Detected
1,2,4-Trimethylbenzene	210	Not Detected
1,3-Dichlorobenzene	210	Not Detected
1,4-Dichlorobenzene	210	Not Detected
Chlorotoluene	210	Not Detected
1,2-Dichlorobenzene	210	Not Detected
1,2,4-Trichlorobenzene	210	Not Detected
Hexachlorobutadiene	210	Not Detected

Container Type: 6 Liter SUMMA Canister

E = Exceeds instrument calibration range, but within linear range.

Surrogates	% Recovery	Method Limits
Octafluorotoluene	107	70-130
4-Bromofluorobenzene	94	70-130
1,2-Dichlorobenzene-d4	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: A-3

ID#: 9112069-03A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	**5122812**	**Date of Collection:**	**12/19/91**
Dil. Factor:	**3700**	**Date of Analysis:**	**12/28/91**

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	3700	Not Detected
Freon 114	3700	Not Detected
Chloromethane	3700	Not Detected
Vinyl Chloride	3700	1700
Bromomethane	3700	Not Detected
Chloroethane	3700	Not Detected
Freon 11	3700	Not Detected
1,1-Dichloroethene	3700	Not Detected
Freon 113	3700	Not Detected
Methylene Chloride	3700	Not Detected
1,1-Dichloroethane	3700	Not Detected
cis-1,2-Dichloroethene	3700	100000
Chloroform	3700	Not Detected
1,1,1-Trichloroethane	3700	Not Detected
Carbon Tetrachloride	3700	Not Detected
Benzene	3700	Not Detected
1,2-Dichloroethane	3700	Not Detected
Trichloroethene	3700	Not Detected
1,2-Dichloropropane	3700	Not Detected
trans-1,3-Dichloropropene	3700	Not Detected
Toluene	3700	8600
cis-1,3-Dichloropropene	3700	Not Detected
1,1,2-Trichloroethane	3700	Not Detected
Tetrachloroethene	3700	Not Detected
Ethylene Dibromide	3700	Not Detected
Chlorobenzene	3700	Not Detected
Ethyl Benzene	3700	21000
m,p-Xylene	3700	Not Detected
o-Xylene	3700	Not Detected
Styrene	3700	Not Detected
1,1,2,2-Tetrachloroethane	3700	Not Detected
1,3,5-Trimethylbenzene	3700	Not Detected
1,2,4-Trimethylbenzene	3700	Not Detected
1,3-Dichlorobenzene	3700	Not Detected
1,4-Dichlorobenzene	3700	Not Detected
Chlorotoluene	3700	Not Detected
1,2-Dichlorobenzene	3700	Not Detected
1,2,4-Trichlorobenzene	3700	Not Detected
Hexachlorobutadiene	3700	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	**106**	**70-130**
4-Bromofluorobenzene	**96**	**70-130**
1,2-Dichlorobenzene-d4	**100**	**70-130**

9112069 Ecology & Environ.

AIR TOXICS LTD.

SAMPLE NAME: A-4

ID#: 9112069-04A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	**1123105**	**Date of Collection: 12/19/91**	
Dil. Factor:	**28**	**Date of Analysis: 12/31/91**	

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	28	1500
Freon 114	28	980
Chloromethane	28	Not Detected
Vinyl Chloride	28	1300
Bromomethane	28	Not Detected
Chloroethane	28	820
Freon 11	28	180
1,1-Dichloroethene	28	Not Detected
Freon 113	28	Not Detected
Methylene Chloride	28	Not Detected
1,1-Dichloroethane	28	55
cis-1,2-Dichloroethene	28	190
Chloroform	28	Not Detected
1,1,1-Trichloroethane	28	Not Detected
Carbon Tetrachloride	28	Not Detected
Benzene	28	Not Detected
1,2-Dichloroethane	28	Not Detected
Trichloroethene	28	Not Detected
1,2-Dichloropropane	28	Not Detected
trans-1,3-Dichloropropene	28	Not Detected
Toluene	28	520
cis-1,3-Dichloropropene	28	Not Detected
1,1,2-Trichloroethane	28	Not Detected
Tetrachloroethene	28	Not Detected
Ethylene Dibromide	28	Not Detected
Chlorobenzene	28	Not Detected
Ethyl Benzene	28	7900 E
m,p-Xylene	28	1600
o-Xylene	28	290
Styrene	28	Not Detected
1,1,2,2-Tetrachloroethane	28	Not Detected
1,3,5-Trimethylbenzene	28	Not Detected
1,2,4-Trimethylbenzene	28	34
1,3-Dichlorobenzene	28	Not Detected
1,4-Dichlorobenzene	28	Not Detected
Chlorotoluene	28	Not Detected
1,2-Dichlorobenzene	28	Not Detected
1,2,4-Trichlorobenzene	28	Not Detected
Hexachlorobutadiene	28	Not Detected

Container Type: 6 Liter SUMMA Canister

E = Exceeds instrument calibration range, but within linear range.

Surrogates	% Recovery	Method Limits
Octafluorotoluene	**114**	**70-130**
4-Bromofluorobenzene	**113**	**70-130**
1,2-Dichlorobenzene-d4	**116**	**70-130**

9112069 Ecology & Environ.

AIR TOXICS LTD.

SAMPLE NAME: A-5

ID#: 9112069-05A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	1123110	Date of Collection: 12/19/91
Dil. Factor:	3.7	Date of Analysis: 12/31/91

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	3.7	16
Freon 114	3.7	3.8
Chloromethane	3.7	Not Detected
Vinyl Chloride	3.7	16
Bromomethane	3.7	Not Detected
Chloroethane	3.7	74
Freon 11	3.7	Not Detected
1,1-Dichloroethene	3.7	Not Detected
Freon 113	3.7	Not Detected
Methylene Chloride	3.7	Not Detected
1,1-Dichloroethane	3.7	6.9
cis-1,2-Dichloroethene	3.7	4.6
Chloroform	3.7	Not Detected
1,1,1-Trichloroethane	3.7	Not Detected
Carbon Tetrachloride	3.7	Not Detected
Benzene	3.7	150
1,2-Dichloroethane	3.7	Not Detected
Trichloroethene	3.7	4.4
1,2-Dichloropropane	3.7	Not Detected
trans-1,3-Dichloropropene	3.7	Not Detected
Toluene	3.7	5.7
cis-1,3-Dichloropropene	3.7	Not Detected
1,1,2-Trichloroethane	3.7	Not Detected
Tetrachloroethene	3.7	Not Detected
Ethylene Dibromide	3.7	Not Detected
Chlorobenzene	3.7	Not Detected
Ethyl Benzene	3.7	26
m,p-Xylene	3.7	46
o-Xylene	3.7	6.4
Styrene	3.7	Not Detected
1,1,2,2-Tetrachloroethane	3.7	Not Detected
1,3,5-Trimethylbenzene	3.7	Not Detected
1,2,4-Trimethylbenzene	3.7	Not Detected
1,3-Dichlorobenzene	3.7	Not Detected
1,4-Dichlorobenzene	3.7	Not Detected
Chlorotoluene	3.7	Not Detected
1,2-Dichlorobenzene	3.7	Not Detected
1,2,4-Trichlorobenzene	3.7	3.8
Hexachlorobutadiene	3.7	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	98	70-130
4-Bromofluorobenzene	103	70-130
1,2-Dichlorobenzene-d4	122	70-130

9112069 Ecology & Environ.

AIR TOXICS LTD.

SAMPLE NAME: A-6

ID#: 9112069-06A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	1123113	Date of Collection: 12/19/91	
Dil. Factor:	3.0	D[illegible] of Analysis:	

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	3.0	7.2
Freon 114	3.0	Not Detected
Chloromethane	3.0	Not Detected
Vinyl Chloride	3.0	6.6
Bromomethane	3.0	Not Detected
Chloroethane	3.0	46
Freon 11	3.0	Not Detected
1,1-Dichloroethene	3.0	Not Detected
Freon 113	3.0	Not Detected
Methylene Chloride	3.0	Not Detected
1,1-Dichloroethane	3.0	Not Detected
cis-1,2-Dichloroethene	3.0	Not Detected
Chloroform	3.0	Not Detected
1,1,1-Trichloroethane	3.0	Not Detected
Carbon Tetrachloride	3.0	Not Detected
Benzene	3.0	76
1,2-Dichloroethane	3.0	Not Detected
Trichloroethene	3.0	Not Detected
1,2-Dichloropropane	3.0	Not Detected
trans-1,3-Dichloropropene	3.0	Not Detected
Toluene	3.0	Not Detected
cis-1,3-Dichloropropene	3.0	Not Detected
1,1,2-Trichloroethane	3.0	Not Detected
Tetrachloroethene	3.0	Not Detected
Ethylene Dibromide	3.0	Not Detected
Chlorobenzene	3.0	Not Detected
Ethyl Benzene	3.0	11
m,p-Xylene	3.0	21
o-Xylene	3.0	3.2
Styrene	3.0	Not Detected
1,1,2,2-Tetrachloroethane	3.0	Not Detected
1,3,5-Trimethylbenzene	3.0	Not Detected
1,2,4-Trimethylbenzene	3.0	Not Detected
1,3-Dichlorobenzene	3.0	Not Detected
1,4-Dichlorobenzene	3.0	Not Detected
Chlorotoluene	3.0	Not Detected
1,2-Dichlorobenzene	3.0	Not Detected
1,2,4-Trichlorobenzene	3.0	Not Detected
Hexachlorobutadiene	3.0	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	122	70-130
4-Bromofluorobenzene	110	70-130
1,2-Dichlorobenzene-d4	117	70-130

AIR TOXICS LTD.

SAMPLE NAME: A-7

ID#: 9112069-07A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	**1010208**	**Date of Collection: 12/19/91**	
Dil. Factor:	**310**	**Date of Analysis: 1/2/92**	

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	310	Not Detected
Freon 114	310	Not Detected
Chloromethane	310	Not Detected
Vinyl Chloride	310	2600
Bromomethane	310	Not Detected
Chloroethane	310	Not Detected
Freon 11	310	Not Detected
1,1-Dichloroethene	310	Not Detected
Freon 113	310	Not Detected
Methylene Chloride	310	Not Detected
1,1-Dichloroethane	310	Not Detected
cis-1,2-Dichloroethene	310	16000
Chloroform	310	Not Detected
1,1,1-Trichloroethane	310	Not Detected
Carbon Tetrachloride	310	Not Detected
Benzene	310	Not Detected
1,2-Dichloroethane	310	Not Detected
Trichloroethene	310	Not Detected
1,2-Dichloropropane	310	Not Detected
trans-1,3-Dichloropropene	310	Not Detected
Toluene	310	1500
cis-1,3-Dichloropropene	310	Not Detected
1,1,2-Trichloroethane	310	Not Detected
Tetrachloroethene	310	Not Detected
Ethylene Dibromide	310	Not Detected
Chlorobenzene	310	Not Detected
Ethyl Benzene	310	5600
m,p-Xylene	310	990
o-Xylene	310	Not Detected
Styrene	310	Not Detected
1,1,2,2-Tetrachloroethane	310	Not Detected
1,3,5-Trimethylbenzene	310	Not Detected
1,2,4-Trimethylbenzene	310	Not Detected
1,3-Dichlorobenzene	310	Not Detected
1,4-Dichlorobenzene	310	Not Detected
Chlorotoluene	310	Not Detected
1,2-Dichlorobenzene	310	Not Detected
1,2,4-Trichlorobenzene	310	Not Detected
Hexachlorobutadiene	310	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	99	70-130
4-Bromofluorobenzene	116	70-130
1,2-Dichlorobenzene-d4	89	70-130

DRAFT

AIR TOXICS LTD.

SAMPLE NAME: A-8

ID#: 9112069-08A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	1123112	Date of Collection: 12/20/91	
Dil. F[illegible]tor:	1.0	Date of Analysis: 12/[illegible]/91	

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	1.0	Not Detected
Freon 114	1.0	Not Detected
Chloromethane	1.0	Not Detected
Vinyl Chloride	1.0	Not Detected
Bromomethane	1.0	Not Detected
Chloroethane	1.0	Not Detected
Freon 11	1.0	Not Detected
1,1-Dichloroethene	1.0	Not Detected
Freon 113	1.0	2.8
Methylene Chloride	1.0	1.6
1,1-Dichloroethane	1.0	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected
Chloroform	1.0	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected
Carbon Tetrachloride	1.0	Not Detected
Benzene	1.0	Not Detected
1,2-Dichloroethane	1.0	Not Detected
Trichloroethene	1.0	Not Detected
1,2-Dichloropropane	1.0	Not Detected
trans-1,3-Dichloropropene	1.0	Not Detected
Toluene	1.0	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected
Tetrachloroethene	1.0	Not Detected
Ethylene Dibromide	1.0	Not Detected
Chlorobenzene	1.0	Not Detected
Ethyl Benzene	1.0	Not Detected
m,p-Xylene	1.0	Not Detected
o-Xylene	1.0	Not Detected
Styrene	1.0	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected
1,3,5-Trimethylbenzene	1.0	Not Detected
1,2,4-Trimethylbenzene	1.0	Not Detected
1,3-Dichlorobenzene	1.0	3.6
1,4-Dichlorobenzene	1.0	Not Detected
Chlorotoluene	1.0	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected
1,2,4-Trichlorobenzene	1.0	Not Detected
Hexachlorobutadiene	1.0	Not Detected

Container Type: 6 Liter SUMMA Canister

Surrogates	% Recovery	Method Limits
Octafluorotoluene	113	70-130
4-Bromofluorobenzene	107	70-130
1,2-Dichlorobenzene-d4	114	70-130

9112069 Ecology & Environ.

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 9112069-09A

Summa CANISTER EPA METHOD TO-14 GC/MS Full Scan

File Name:	5122803	Date of Collection: NA
Dil. Factor	1.0	Date of Analysis: 12/28/91

Compound	MDL (ppbv)	Amount (ppbv)
Freon 12	1.0	Not Detected
Freon 114	1.0	Not Detected
Chloromethane	1.0	Not Detected
Vinyl Chloride	1.0	Not Detected
Bromomethane	1.0	Not Detected
Chloroethane	1.0	Not Detected
Freon 11	1.0	Not Detected
1,1-Dichloroethene	1.0	Not Detected
Freon 113	1.0	Not Detected
Methylene Chloride	1.0	Not Detected
1,1-Dichloroethane	1.0	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected
Chloroform	1.0	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected
Carbon Tetrachloride	1.0	Not Detected
Benzene	1.0	Not Detected
1,2-Dichloroethane	1.0	Not Detected
Trichloroethene	1.0	Not Detected
1,2-Dichloropropane	1.0	Not Detected
trans-1,3-Dichloropropene	1.0	Not Detected
Toluene	1.0	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected
Tetrachloroethene	1.0	Not Detected
Ethylene Dibromide	1.0	Not Detected
Chlorobenzene	1.0	Not Detected
Ethyl Benzene	1.0	Not Detected
m,p-Xylene	1.0	Not Detected
o-Xylene	1.0	Not Detected
Styrene	1.0	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected
1,3,5-Trimethylbenzene	1.0	Not Detected
1,2,4-Trimethylbenzene	1.0	Not Detected
1,3-Dichlorobenzene	1.0	Not Detected
1,4-Dichlorobenzene	1.0	Not Detected
Chlorotoluene	1.0	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected
1,2,4-Trichlorobenzene	1.0	Not Detected
Hexachlorobutadiene	1.0	Not Detected

Container Type: NA

Surrogates	% Recovery	Method Limits
Octafluorotoluene	103	70-130
4-Bromofluorobenzene	94	70-130
1,2-Dichlorobenzene-d4	86	70-130

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

11325 SUNRISE GOLD CIRCLE, SUITE 'E'
RANCHO CORDOVA, CA 95742
(916) 638-9892 • FAX (916) 638-9917

CHAIN OF CUSTODY RECORD

PROJECT # 0B3030 PO # ______ COLLECTED BY (Signature) ~~[signature]~~ Richard M. Watt

REMARKS Wellsville - Andover Landfill
All samples except A-8 are most likely in the 1-50 ppm range.

FIELD SAMPLE I.D.#	SAMPLING MEDIA (Tenax, Canister etc.)	DATE/TIME	ANALYSIS	VAC./PRESSURE	LAB I.D. #
A-1	Canister # 11302	12-19-91/1225	VOC's TO-14	2.0"Hg ~~H₂O" Hg~~	9112269-01A
A-2	" # 11303	12-19-91/1237	"	11.0"Hg	-02A
A-3	" # 11306	12-19-91/1246	"	9.0"Hg	-03A
A-4	" # 11305	12-19-91/1252	"	1.5"Hg	-04A
A-5	" # 11300	12-19-91/1305	"	3.0"Hg	-05A
A-6	" # 11301	12-19-91/1305	"	3.5"Hg	-06A
A-7	" # 11299	12-19-91/1320	"	4.0"Hg	-07A
A-8	" # 11298	12-20-91/1400	"	4.0psi	-08A

RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME	RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME
Richard M. Watt 12-20-91/1500	[signature] 12/22/91 1355		

LAB USE ONLY

SHIPPER NAME	AIR BILL #	OPENED BY: DATE/TIME	TEMP(°C)	CONDITION
FEDERAL EXPRESS	7985706276			

CUSTOMER PACKAGE TRACKING NUMBER — PULL UP PURPLE TAB

REMARKS

DRAFT

recycled paper

ecology and environment

APPENDIX G

PHOTOGRAPHIC LOG

The following are representative photos of various field activities performed during the Phase I RI. Additional photos are available upon request.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

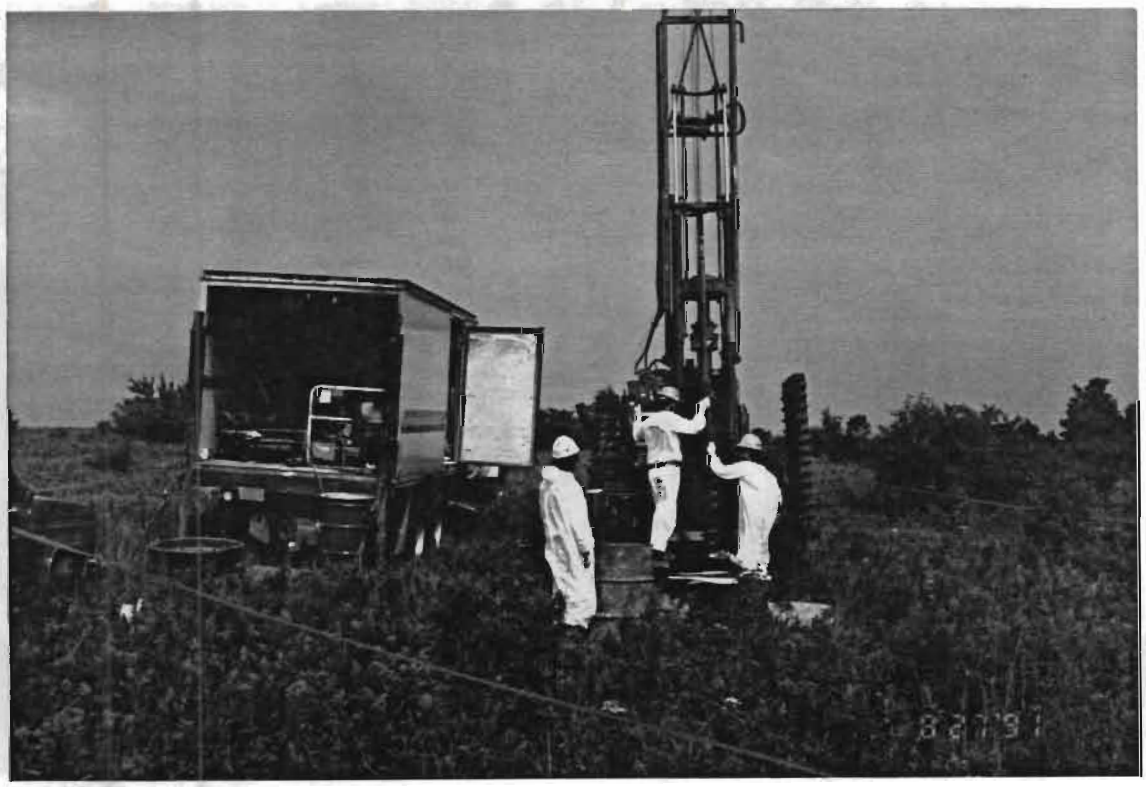
Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: J. Hood Date/Time: 8-27-91 / 1420

Lens: Type 38-105 mm SN: NA Frame No.: 1/1

Comments: View northeast of MW-1D drilling location during augering and split spoon sampling.



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

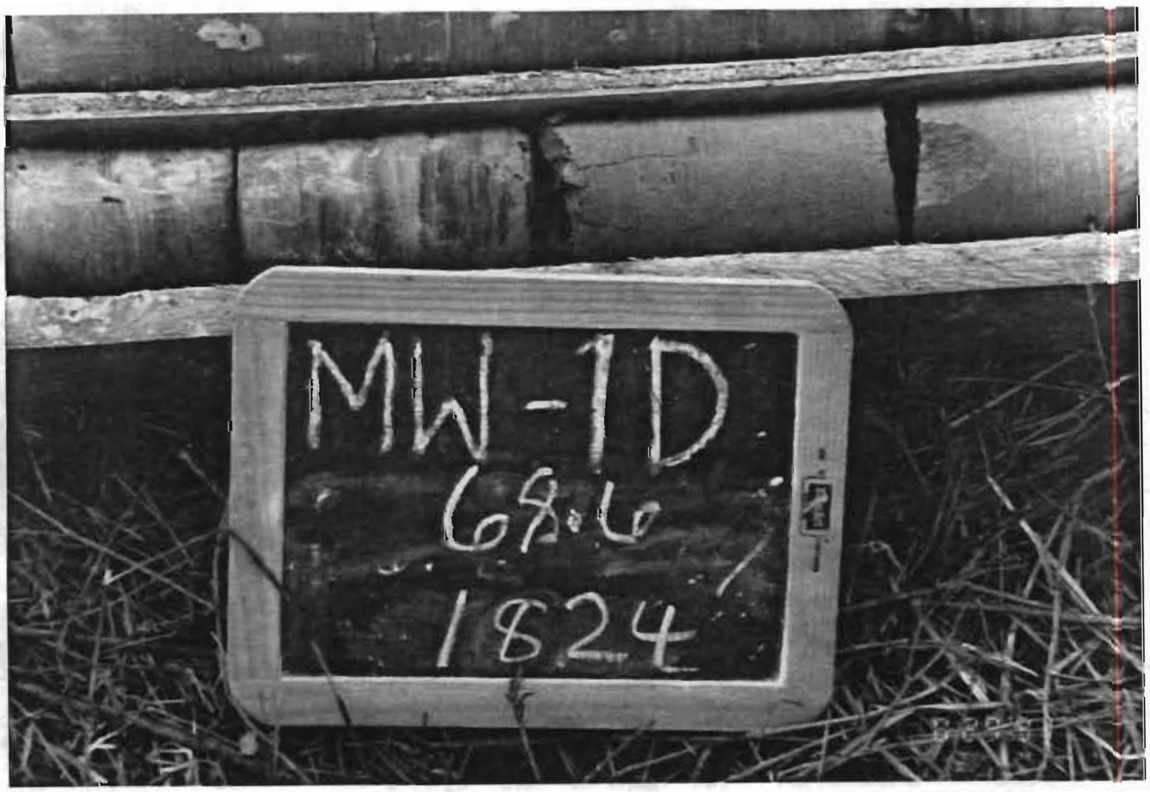
Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: C. Waddell-Sheets Date/Time: 8-29-91 / 1824

Lens: Type 38-105 MM SN: NA Frame No.: 1/15

Comments: MW-1D; core run #8 at 68.6'. Clay-filled fracture at boundary between shale and siltstone. Down-core is to the right.



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

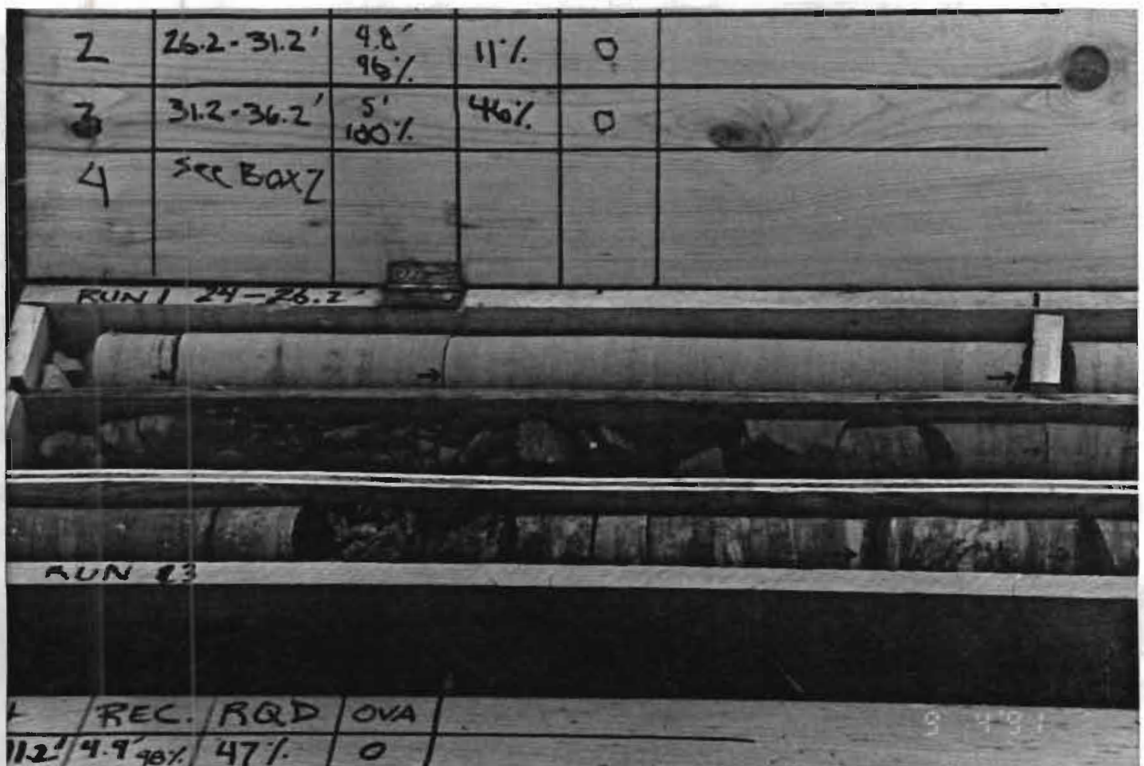
Client: New York State Department of Environmental Conservation E & E Job No.: 0B3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-4-91 / 1210

Lens: Type 38-105 mm SN: NA Frame No.: 1/19

Comments: MW-2D; heavily fractured zone from 27-28' in center trough. Down core is to the right.



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: 0B3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-4-91 /1211

Lens: Type 38-105 mm SN: NA Frame No.: 1/21

Comments: MW-2D; vertical clay-filled fracture at 47' (in bottom trough). Down core is to the right.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: 0B3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-4-91 /1742

Lens: Type 38-105 mm SN: NA Frame No.: 1/24

Comments: View north from MW-2D across northern borrow pit. Ridge along skyline is northeast fill area.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

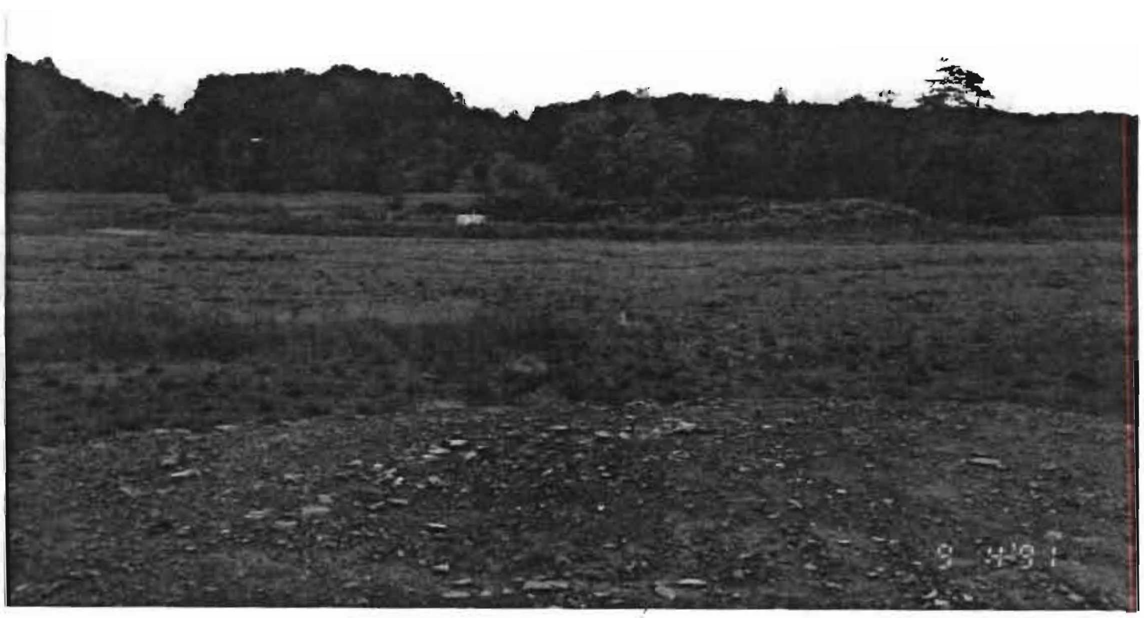
Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-4-91 / 1742

Lens: Type 38-105 mm SN: NA Frame No.: 1/25

Comments: View west across northern borrow pit from MW-2D. Silver cylindrical structure at center is above-ground "manhole" in leachate collection system.



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-6-91 / 1215

Lens: Type 38-105 mm SN: NA Frame No.: 1/34

Comments: View east across excess leachate holding pond after pond has been pumped dry.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: 0B3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-6-91/ 1215

Lens: Type 38-105 mm SN: NA Frame No.: 1/35

Comments: View west across excess leachate holding pond. The late summer high water-line is evident. In background is pump house, pump truck and RI field trailer (from left to right).

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-9-91 / 1642

Lens: Type 38-105 mm SN: NA Frame No.: 2/3

Comments: MW-4D; Top of core run #2 (11.3') is center left; bottom of run #2 (16.3') in bottom right. Note heavy weathering below competent rock.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-11-91 / 1454

Lens: Type 38-105 mm SN: NA Frame No.: 2/10

Comments: Close up of escaping gases at head of leachate seep pictured in Frame no. 2/9.

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-17-91 / 1120

Lens: Type 38-105 MM SN: NA Frame No.: 2/20

Comments: MW-10D; oxidized fracture at approx. 37' (center trough) in shaley sandstone/siltstone. Upper trough contains light grey, fine-grained sandstone; lower trough contains dark grey silty/sandy shale.

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: New York State Department of Environmental Conservation E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-18-91 / 1205

Lens: Type 38-105 mm SN: NA Frame No.: 2/22

Comments: View northeast of MW-9D during augering.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 9-27-91 /1320

Lens: Type 38- 105 mm SN: N/A Frame No.: 3/5

Comments: MW-8D; Core Run #3 (71-76'); irregular black shale interbeds at 73.0'. Down is to right

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill
E & E Job No.: 0B 3030

Camera: Make Olympus infinity Super Zoom 330
SN: 1481609

Photographer: R. Watt
Date/Time: 10-1-91 / 1610

Lens: Type 38-105 mm
SN: N/A
Frame No.: 3/9

Comments: View to the west from MW-7; Rosini house at left

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

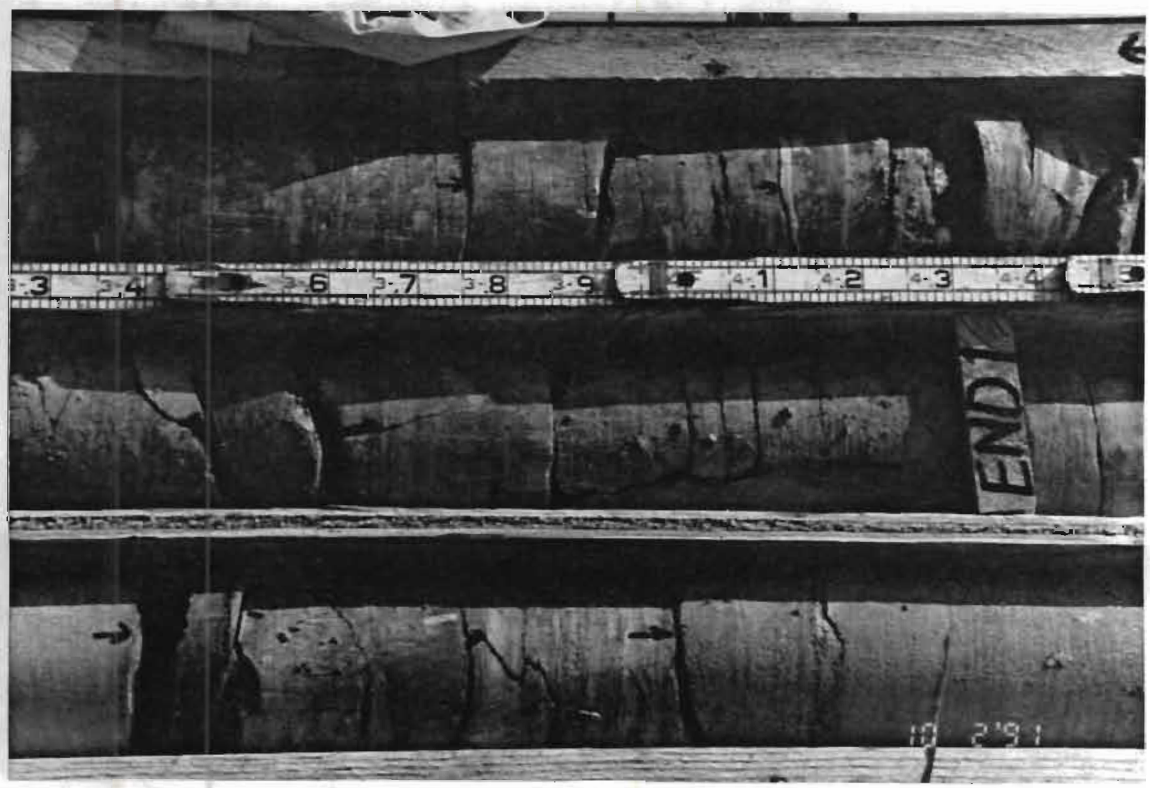
Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 10-2-91 / 0900

Lens: Type 38- 105 mm SN: N/A Frame No.: 3/11

Comments: MW-7D; Core Run #1 (26 - 30.3') Note vertical Fracture at end of Run 1, down to right



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

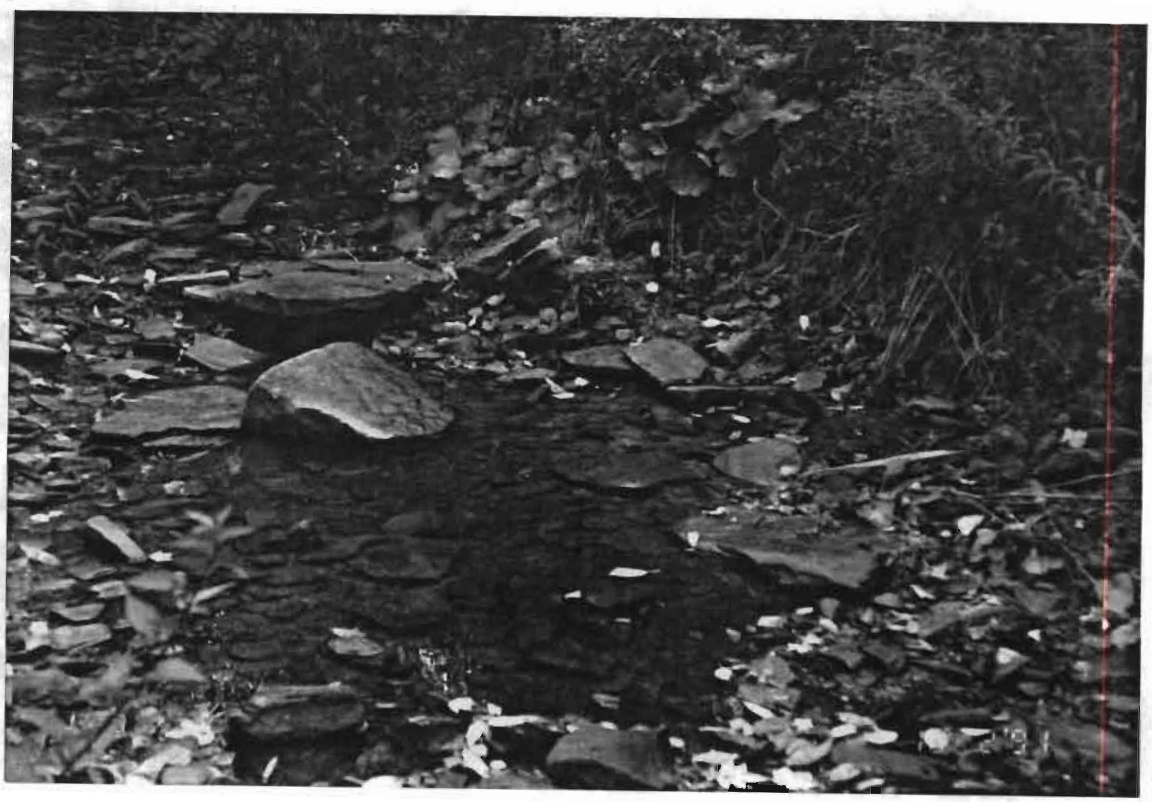
Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 10-2-91 / 0955

Lens: Type 38-105 mm SN: N/A Frame No.: 3/13

Comments: Sampling location SW/Sed-6; view upstream



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

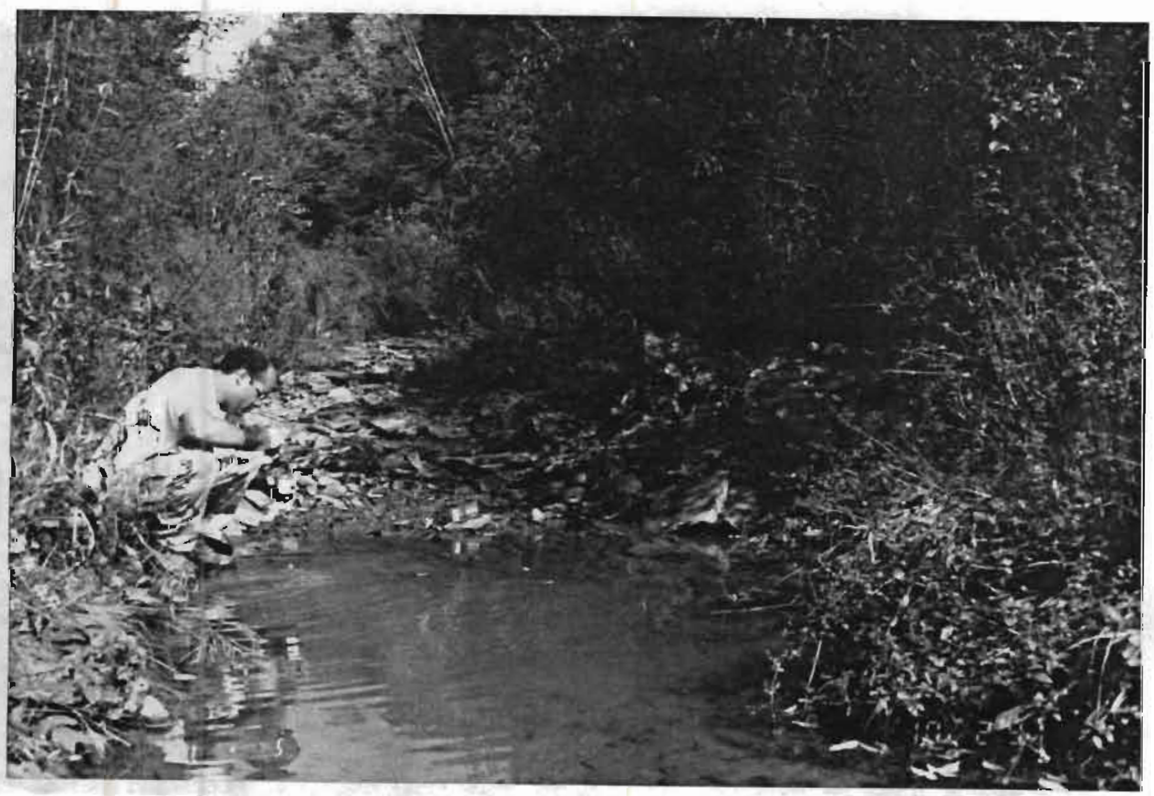
Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 10-2-91/1124

Lens: Type 38- 105 mm SN: N/A Frame No.: 3/15

Comments: R. Meyers sampling at SW/sed 4; view upstream



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 10-2-91 / 1445

Lens: Type 38-105mm SN: N/A Frame No.: 3/20

Comments: Sample location sw/sed-1; view upstream

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: 0B 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-18-91 / 1510

Lens: Type 38-105mm SN: N/A Frame No.: 4/4

Comments: Drum uncovered in TP-4; view from east

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-18-91 /1510

Lens: Type 38- 105 mm SN: N/A Frame No.: 4/6

Comments: Plastic buttons ~ 1" diameter at TP-4

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

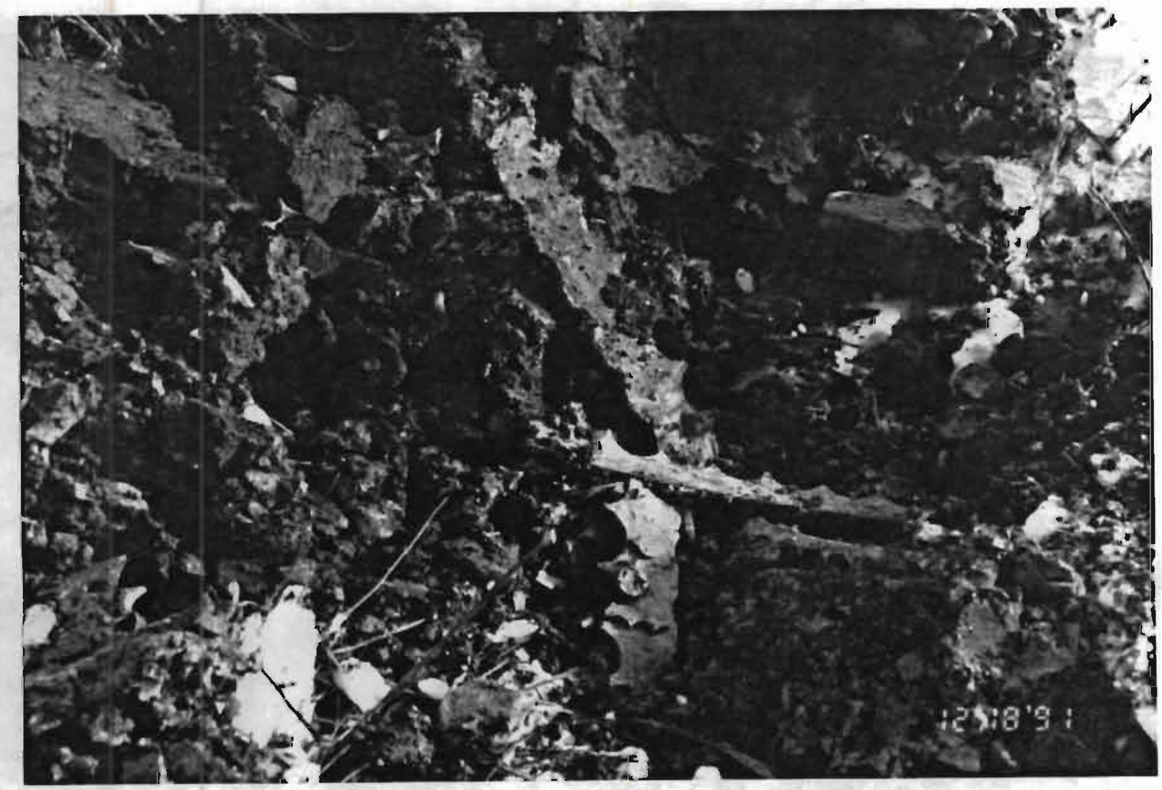
Client: NYSDEC - Wellsville-Andover Landfill   E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330   SN: 1481609

Photographer: R. Watt   Date/Time: 12-18-91 / 1518

Lens: Type 38-105 mm   SN: N/A   Frame No.: 4/7

Comments: Close up (105 mm lens) of plastic buttons and forms in TP-4



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

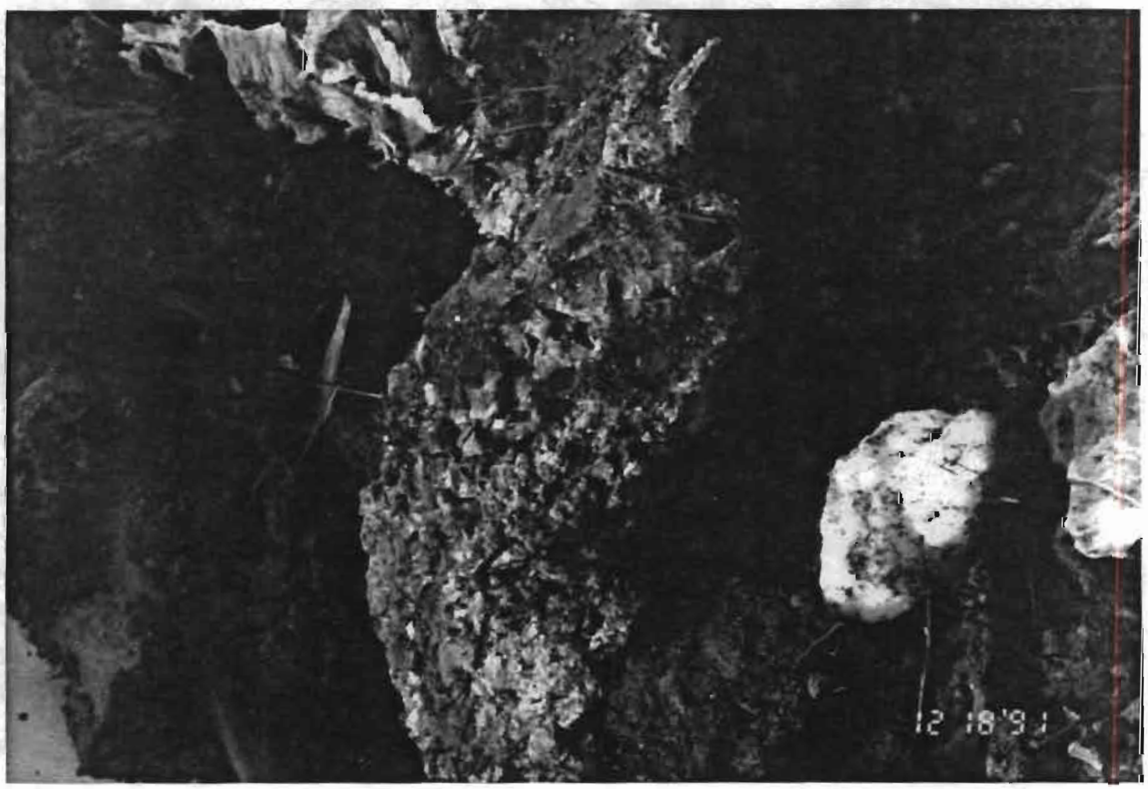
Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-18-91 / 1518

Lens: Type 38-105 mm SN: N/A Frame No.: 4/8

Comments: Close up of pink solid material from drums in TP-4



DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC - Wellsville-Andover Landfill E & E Job No.: OB 3030

Camera: Make Olympus infinity super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-19-91/1020

Lens: Type 38-105 mm SN: N/A Frame No.: 4/10

Comments: Trenching at TP-1; view to the north

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-19-91 / 1400

Lens: Type 38-105 mm SN: NA Frame No.: 4-19

Comments: Close-up of Material excavated from TP-2

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC-- Wellsville-Andover Landfill E & E Job No.: OB3030

Camera: Make Olympus Infinity Super Zoom 330 SN: 1481609

Photographer: R. Watt Date/Time: 12-19-91 / 1600

Lens: Type 38-105 mm SN: NA Frame No.: 4-24

Comments: View east from Snyder Road across leachate holding pond

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 083030

Camera: Make Nikon Nikkormat EL SN: 5284465

Photographer: Judy Vangalio Date/Time: 10-24-91/1136

Lens: Type 50 mm SN: NA Frame No.: H-3

Comments: Looking South along Duffy Creek at upstream benthos sampling location.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 083030

Camera: Make Nikon Nikkormat EL SN: 5284465

Photographer: Larry Western Date/Time: 10-24-91/ 1307

Lens: Type 50 MM SN: NA Frame No.: H-6

Comments: Looking east along tributary to Duffy Creek, showing benthos sampling point.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 083030

Camera: Make Nikon Nikkormat EL SN: 5284465

Photographer: Larry Western Date/Time: 10-24-91/1400

Lens: Type 50 MM SN: NA Frame No.: H-8

Comments: Looking south towards south area. Foreground shows typical patch of reduced grass cover due to gravel and moss growth.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 083030

Camera: Make Nikon Nikkornat EL SN: 5284465

Photographer: Larry Western Date/Time: 10-24-91/ 1415

Lens: Type 50 MM SN: NA Frame No.: H-9

Comments: Looking west across drainage collection pond. Swale drainpipe in foreground.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 0B3030

Camera: Make Nikon Nikkormat EL SN: 5284465

Photographer: Larry Western Date/Time: 10-24-91/ 1505

Lens: Type 50 MM SN: NA Frame No.: H-13

Comments: Looking north along westernmost leachate collection system line.

DRAFT

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC -- Wellsville-Andover Landfill E & E Job No.: 083030

Camera: Make Nikon Nikkormat EL SN: 5284465

Photographer: Larry Western Date/Time: 10-24-91/ 1631

Lens: Type 50 mm SN: NA Frame No.: H-18

Comments: Sump dug on Miller property showing water perched on clay layer. Miller spring sample (DW-6) collected here.