932092

YQ-7080 D3259

ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK

PHASE II INVESTIGATIONS

Town of Royalton Landfill
Site No. 932092
Town of Royalton, Niagara County

August 1991

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233

Thomas C. Jorling, Commissioner

Division of Hazardous Waste Remediation

Michael J. O'Toole, Jr., P.E., Director

Prepared by:

Ecology and Environment Engineering, P.C.

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368 PLEASANTVIEW DRIVE, LANCASTER, NEW YORK 14086, TEL. 716/684-8060

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1. EXECUTIVE SUMMARY

1.1 SITE DESCRIPTION AND BACKGROUND

The Town of Royalton Landfill site (I.D. No. 932092) is located on Griswold Street between Mountain Road and Route 31 in the Town of Royalton, Niagara County, New York (see Figures 1-1 and 1-2). The 5-acre site was leased from Douglas Ortman, the current owner, from 1958 through 1978 by the Town of Royalton for use as a municipal landfill. Prior to this period, the site was operated as a limestone quarry. Wastes disposed of at the site include such items as stoves, refrigerators, and wood. No hazardous waste is known to have been disposed of at the site. The landfill is assumed to be unlined, with waste placed directly on the bedrock floor of the former quarry.

During the years of its operation, numerous problems were reported with the landfill, including lack of adequate cover, leachate outbreaks, and unrestricted site access. In 1973, the New York State Department of Environmental Conservation (NYSDEC) ordered corrections and upgrading of site conditions because of these problems. Landfill operations were ceased at the site in 1978. In 1980, a final closure report was released by Tallamy, Van Kuren, Gertis, and Thielman. Since closure, unrestricted site access and leachate outbreaks have been recurrent problems at the site. Past unauthorized dumping has also been observed at the site.

In 1982, NYSDEC collected one soil and two water samples from the drainage ditch along the northern site boundary. Levels of chromium, copper, iron, and zinc detected in the downstream sample were significantly (more than three times) above the levels detected in the upstream sample. The soil sample contained low levels of halogenated organic compounds and detectable quantities of several metals.

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A Phase I investigation, which included a site inspection during March 1985, was conducted by Engineering-Sciences for NYSDEC. After review of the Phase I report, it was decided that additional work at the site was warranted.

1.2 PHASE II INVESTIGATION

The Phase II field investigation conducted by Ecology and Environment Engineering, P.C. (E & E) in the spring of 1990 included an initial site reconnaissance, electromagnetic terrain conductivity (EM31) survey, and portable proton magnetometer survey to define the site geological conditions, locate any buried materials, and determine the presence of contaminant plumes. One overburden and three bedrock groundwater monitoring wells were installed. Groundwater and leachate/sediment samples were collected and analyzed.

1.3 SITE ASSESSMENT

During the Phase II site reconnaissance, leachate outbreaks were observed along the northern border of the site, and evidence of minor unauthorized dumping was noted in the northwest corner of the site. The air-monitoring surveillance conducted during the site reconnaissance and subsequent field activities indicated the absence of organic vapors at levels above background throughout the Phase II investigation. The site inspection also revealed easy accessibility to the site, which is not secured by a fence and has only a cable across the access road to discourage vehicular traffic.

The geophysical survey performed at the site indicated several electromagnetic terrain conductivity and total earth field magnetic anomalies. These anomalies are assumed to represent ferrous material on or near the surface of the site.

Natural surficial deposits in the site area consist of glacial till made up of poorly sorted sand and silt with varying amounts of gravel and clay. Bedrock at the site consists of the lower members of the Silurian Lockport group. The younger Gasport member consists of coarse-grained limestone, and the older DeCew member consists of shaly dolomite. Based on the location and topography of the site and subsurface information gathered during the Phase II investigation, the site is

interpreted as spanning the crest of the Niagara Escarpment, with bedrock from approximately 2 to 10 feet below ground surface. Removal of stone during past quarrying operations may have exposed the relatively impermeable Rochester shale before materials were disposed of at the site.

During the Phase II investigation, three bedrock groundwater monitoring wells were installed to the southwest, southeast, and northwest of the site, and one overburden well was installed to the northeast of the site. Groundwater elevations measured in these wells during September 1990 indicate that groundwater flows to the north beneath the site, moving from bedrock on the escarpment to overburden deposits to the north.

Groundwater, leachate, and sediment samples collected at the site (see Figure 3-1) were analyzed for full Target Compound List (TCL) parameters, including volatile and semivolatile organics, pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide.

Analysis of water samples from monitoring wells detected only inorganic elements, with iron, lead, magnesium, manganese, and sodium exceeding NYSDEC Class GA groundwater standards. However, the highest concentrations of these elements were found in the wells upgradient of the site (GW-1 and GW-4). Analysis of leachate (soil) samples from the slope along the northern site boundary and one upgradient and one downgradient sediment sample from the northern drainage ditch detected only inorganic elements, none of which exceeded standard ranges for soils and other surficial materials of the Eastern United States. Levels of cadmium, iron, vanadium, and zinc in one or more leachate and/or downgradient sediment samples were significantly (more than three times) higher than levels in upgradient sediment.

In summary, the types and concentrations of inorganic compounds detected are consistent with the Town of Royalton Landfill site's former use as a municipal solid waste landfill. No hazardous wastes are known to have been disposed of at the site.

1.4 HAZARD RANKING SYSTEM SCORE

The Hazard Ranking System (HRS) score was compiled to quantify risks associated with the Town of Royalton Landfill site. The HRS score

is applied to inactive hazardous waste sites in New York State to prioritize those needing additional investigation and remediation. The system evaluates site characteristics, containment measures, waste types, and potential contaminant receptors.

Under the HRS, three numerical scores are computed to express the site's relative risk of damage to the population and the environment. The three scores are described below:

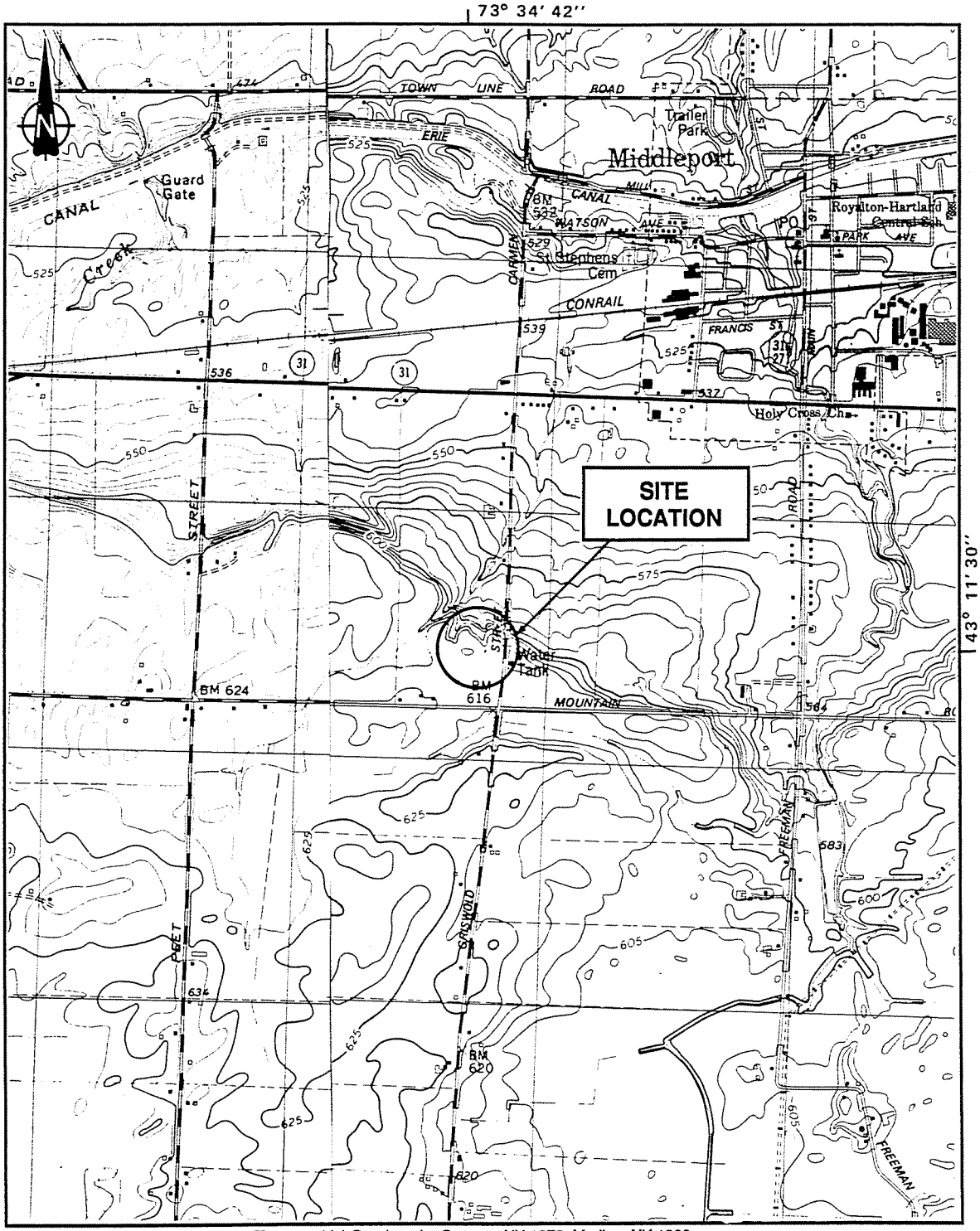
- S_M reflects the potential for harm to humans or the environment from migration of a hazardous substance away from the facility via groundwater, surface water, or air. It is a composite of separate scores for each of the three routes (S_{gw} = groundwater route score, S_{sw} = surface water route score, and S_a = air route score).
- S_{FE} reflects the potential for harm from substances that can explode or cause fires.
- S_{DC} reflects the potential for harm from direct contact with hazardous substances at the facility (i.e., no migration need be involved).

Based on the results of this and previous studies, the HRS scores for the Town of Royalton Landfill site have been calculated as follows:

$S_M = 0$ $\quad (S_{gw} = 0;\ S_{sw} = 0;\ S_a = 0)$

$S_{FE} = 0$

$S_{DC} = 25.0$



SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle, Gasport, NY 1979, Medina, NY 1980.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

Figure 1-1
SITE LOCATION MAP

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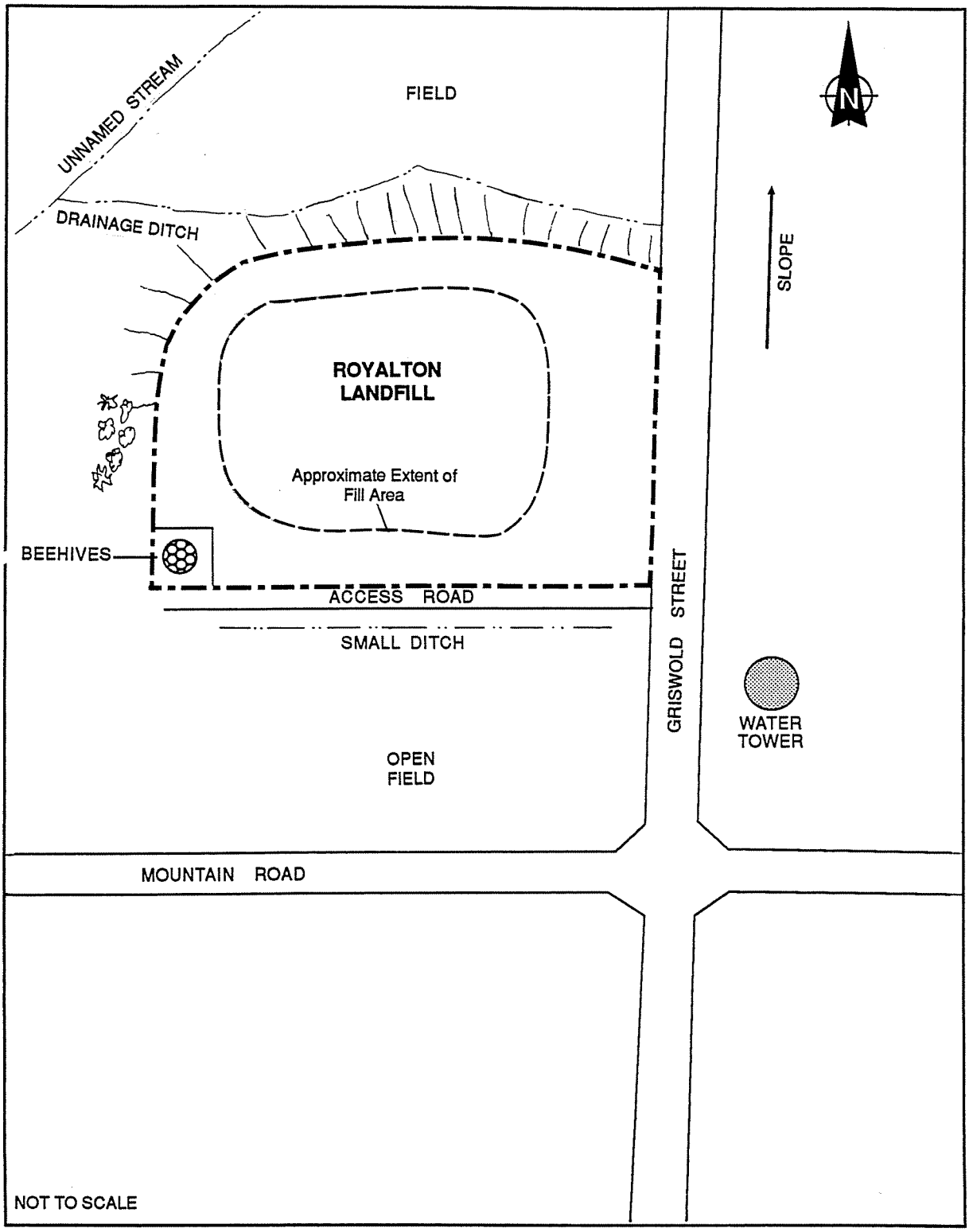

Figure 1-2
SITE SKETCH, TOWN OF ROYALTON LANDFILL SITE

47-15-25 (11/90)-9d

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

ADDITIONS/CHANGES TO REGISTRY OF INACTIVE HAZARDOUS WASTE DISPOSAL SITES

Original-BHSC
Copy-REGION
Copy-DEE
Copy-DOH
Copy-PREPARER

1. Site Name	2. Site Number	3. Town	4. County
Town of Royalton Landfill	932092	Royalton	Niagara

5. Region	6. Classification	7. Activity
9	Current 2a /Proposed _____	[ ] Add [ ] Reclassify [ ] Delist [ ] Modify _____

8a. Describe location of site (attach USGS topographic map showing site loca ion).
The site is located on the west side of Griswold Street, 0.6 mile south of Route 31 and 0.1 mile north of Mountain Road in the Town of Royalton.

b. Quadrangle Medina c. Site Latitude 43°11'30" Longitude 73°34'42" d. Tax Map Number 99-1-17

9a. Briefly describe the site (attach site plan showing disposal/sampling locations)
The site is a former stone quarry that was subsequently filled with municipal waste, thereby returning the area to approximately the original grade. The site slopes to the north and northwest into a drainage ditch that enters an unnamed stream. This stream ends in the Village of Middleport, presumably entering the storm sewer system.

b. Area 5 acres c. EPA ID number NYD000514430 d. PA/SI [ ] Yes [ ] No

e. Completed: [X] Phase I [X] Phase II [ ] PSA [X] Sampling

10. Briefly list the type and quantity of the hazardous waste and the dates that it was disposed of at this site.
No hazardous wastes are known to have been disposed of at the site.

11a. Summarized sampling data attached

[ ] Air [X] Groundwater [X] Surface Water [X] Soil [ ] Waste [ ] EP Tox [ ] TCLP

b. List contravened parameters and values
NYSDEC Class GA standards for iron, magnesium, manganese, and sodium are exceeded in downgradient well samples; however, upgradient levels of these parameters also exceeded standards.

12. Site impact data

a. Nearest surface water: Distance 400 ft. Direction NW Classification Unnamed Stream

b. Nearest groundwater: Depth 2-10 ft. Flow direction N [ ] Sole source [ ] Primary [X] Principal

c. Nearest water supply: Distance 1,000 ft. Direction N Active [X] Yes [ ] No

d. Nearest building: Distance 1,000 ft. Direction N Use residence

e. Crops/livestock on site? [ ] Yes [X] No

f. Exposed hazardous waste? [ ] Yes [X] No

g. Controlled site access? [ ] Yes [X] No

h. Documented fish or wildlife mortality? [ ] Yes [X] No

i. Impact on special status fish or wildlife resource? [ ] Yes [X] No

j. Within a State Economic Development Zone? [ ] Yes [X] No

k. For Class 2A: Code _____ Health model score _____

l. For Class 2: Prority category _____

m. HRS Score Sm = 0

n. Significant threat [ ] Yes _____ [X] No
[ ] Unknown

13. Site owner's name	14. Address	15. Telephone Number
Douglas Ortman	4240 Griswold Street	( ) -

16. Preparer
Ralinda Leichner, Geologist Ecology and Environment Engineering, P.C.
Name, title, and organization

1-14-91
Date

Ralinda Leichner
Signature

17. Approved

_____
Name, title, and organization

_____ _____
Date Signature

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2. PURPOSE

This Phase II investigation was conducted under contract to the NYSDEC Division of Hazardous Waste Remediation, Bureau of Hazardous Site Control. The purpose of the Phase II investigation was to determine if hazardous waste has been disposed of at this site, if contaminants exist in the various site media, and whether or not threats to human health or the environment exist. Information gathered relative to the Town of Royalton Landfill site will allow NYSDEC to reclassify the site or, if warranted, delist it.

The Phase II investigation was designed to supplement existing data for the site and update the HRS score. Information such as depth of fill materials, stratigraphy and permeability of overburden materials, and depth to bedrock were collected or supplemented during the Phase II study. Geophysical surveying to determine the presence of buried waste had not been conducted prior to this investigation.

3

3. SCOPE OF WORK

3.1 INTRODUCTION

Field work for the Phase II investigation at the Town of Royalton Landfill site began in May 1990 and was completed by September 1990. A Quality Assurance Project Plan (QAPP) was submitted to NYSDEC for approval prior to the start of field work. In addition, a site-specific Health and Safety Plan (HSP) was prepared prior to the start of field work (see Appendix A). NYSDEC prepared the scope of work for the Phase II field investigation at the Town of Royalton Landfill site. With minor exceptions, all field activities were performed in accordance with this scope of work. Variations from the plan occurred as a result of judgments made in the field, with the concurrence of NYSDEC representatives.

3.2 PHASE II SITE INVESTIGATION

3.2.1 Records Search/Data Compilation

Available information from state, county, municipal, and private files was collected and reviewed prior to the initiation of field work. Records from local and state agency files were reviewed to supplement the Phase I report prepared by Engineering-Science in 1986. The data review allowed for the proper completion of the field investigation, site assessment, and calculation of the final HRS score. Specific contacts are listed in Table 3-1.

3.2.2 Site Reconnaissance

On May 2, 1990, E & E personnel conducted a site reconnaissance. The purposes of this site visit were to:

- o Identify potential drill-rig access problems;
- o Identify tentative locations for monitoring wells and other sampling locations;
- o Determine if underground utilities may impact drilling by visually inspecting well locations, using a portable magnetometer, and contacting utilities;
- o Identify a suitable nearby water supply for drilling; and
- o Conduct a limited air-monitoring study using a photoionization detector and radiation detection unit.

While conducting the site reconnaissance, E & E personnel identified several logistical factors relevant to the Phase II investigation. These included the following:

- o Rig access to the GW-2 well location will be difficult and may require an all-terrain vehicle (ATV) rig;
- o Cultural features (metal debris and overhead power lines) at the site may interfere with surface geophysical surveying methods;
- o Well GW-1 had to be moved due to its original position over fill material;
- o Locations of leachate outbreaks were flagged for subsequent sampling; and
- o Beehives near the GW-1 location pose a physical hazard at the site.

Air-monitoring responses above background levels were not observed during the site reconnaissance.

3.2.3 Geophysical Survey

A geophysical investigation was conducted at the Town of Royalton Landfill site on May 2, 1990. The geophysical investigation consisted of an EM31 (electromagnetic terrain conductivity) survey and a portable proton precession magnetometer (total earth field magnetics) survey. The objectives of the geophysical methods used were to optimize the locations of the proposed on-site groundwater monitoring wells; improve the accuracy and confidence of the investigation by reducing the risks

associated with drilling into unknown terrain and wastes; and determine if vertical and/or horizontal anomalies were present that could delineate buried waste boundaries. Several electromagnetic terrain conductivity and total earth field magnetic anomalies were observed during the geophysical survey. These anomalies are assumed to represent ferrous material on or near the surface of the site. Based on ground conductivity and geomagnetic anomalies, it was deduced that the proposed GW-1 location was over fill material. The location for well GW-1 was therefore moved approximately 50 feet to the southeast to avoid drilling into fill. Detailed geophysical survey methodologies and results are presented in the geophysical survey report included as Appendix B.

3.2.4 Monitoring Well Installation

One overburden and three bedrock monitoring wells labeled GW-1 through GW-4 were installed in the vicinity of the Town of Royalton Landfill site between August 20, 1990 and August 23, 1990 by American Auger and Ditching Company (see Figure 3-1). Locations of monitoring wells were generally as proposed in the work plan. The location of GW-1 was moved approximately 50 feet to the southeast to an area outside the landfill boundary in order to avoid geophysical anomalies interpreted as representing fill material.

The drilling program was designed to obtain quality soil and water samples for environmental analysis while providing the maximum level of safety for personnel working on site. Prior to commencement of drilling activities, a decontamination pad was constructed, and all drilling equipment, including augers, rods, bits, rigs, casings, and tools, was steam-cleaned at this pad in agreement with the NYSDEC work plan and QAPP.

The four groundwater monitoring wells were drilled and constructed in accordance with NYSDEC guidelines.

Continuous split-spoon sampling through the overburden was performed in conjunction with a standard penetration test as outlined in ASTM 1586-84. A 2-foot by 2.5-inch outer diameter (OD) hardened steel sample barrel and shoe were driven in specified 2-foot-deep intervals by a 140-pound hammer falling 30 inches. A plastic retainer basket was

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used to improve sample recoveries. The split-spoon recoveries were logged in the field by an on-site geologist. Soil sample depths, descriptions, and other pertinent information are included in the subsurface boring logs (see Appendix C). At each well location, a small decontamination station was set up, for split-spoon rinsing. The stations consisted of a work table covered with plastic sheeting and a set of three tubs set out on plastic sheeting. After the pertinent information was logged, the split-spoon was subjected to the following decontamination procedure:

- o Initial cleaning of all foreign material; and
- o Sanitizing with a high-pressure steam cleaner.

The cleaned split-spoon parts were reassembled and placed back in the rack of clean spoons on the drilling rig. The plastic sheeting on the work table was changed after the completion of each borehole to prevent cross-contamination. One soil sample from each boring was obtained for grain size analysis, and one sample was collected for Atterburg limits analysis. These samples were placed in 8-ounce, precleaned, labeled, Teflon-lined, screw-cap, glass jars and sent for geotechnical analysis (see Appendix D).

The drilling of bedrock monitoring wells GW-1, GW-2, and GW-4 involved the advancement of 4.5-inch ID augers through overburden to bedrock, followed by the coring of a rock socket with an HQ (3 7/8-inch OD) core barrel. A 5-foot rock socket was drilled, into which a 3-inch PVC casing was placed. The casing was pressure-grouted into place by pumping grout consisting of Portland type I cement with 10% bentonite through a tremie line. Following a set-up period of at least 24 hours, the bedrock was cored into the water-bearing zone with an NQ core barrel. The monitoring interval remained as an open-bedrock hole, without the use of a screen.

The drilling of overburden monitoring well GW-3 involved the advancement of 4.25-inch ID hollow-stem, continuous-flight augers to a depth of 28 feet. Within the augers, 10 feet of 2-inch ID PVC screen with 0.010-inch slots and 8 feet of 2-inch ID PVC flush-joint casing was installed. A filter pack of quartz/silica sand was then poured to 1

foot above the top of the screen as the augers were withdrawn. A 2-foot bentonite seal was then placed above the sand, and the remainder of the annulus around the casing was filled with grout consisting of Portland type I cement and 10% bentonite.

Locking surface casings were grouted into place at all four monitoring wells, extending approximately 2 feet above grade, with sloping concrete drainage pads to divert surface runoff away from the well.

Each monitoring well was developed no sooner than 24 hours after completion of the well using the drilling rig pump or a precleaned hand bailer for a period of 2 hours or until a high degree of water clarity (less than 50 nephelometric turbidity units [NTUs]) and the stabilization of temperature, specific conductance, and pH measurements had occurred.

3.2.5 Groundwater Sampling and Analysis

After waiting a minimum of seven days after development, groundwater samples were collected from all four monitoring wells installed as part of the Phase II investigation of the Town of Royalton Landfill site. These samples were analyzed for full TCL parameters, including volatile and semivolatile organics, pesticides, PCBs, metals, and cyanide by E & E's Analytical Services Center (ASC). Quality assurance/quality control (QA/QC) samples consisting of a duplicate sample from GW-4 for matrix spike and matrix spike duplicate analyses (MS/MSD) also were analyzed for organic parameters only.

Groundwater samples were collected at each monitoring well using a dedicated, decontaminated, PVC bailer with new, dedicated nylon rope. Prior to sample collection, groundwater level and total depth-of-well measurements were obtained. An amount equal to three standing well volumes was calculated and purged from the monitoring well before sample collection. To monitor stabilization during purging, pH, temperature, conductivity, and turbidity measurements were recorded.

Samples for metals analysis were preserved by adding concentrated nitric acid to the sample until its pH was lowered to less than 2.0 standard units. Samples for cyanide analysis were preserved by the addition of sodium hydroxide until the pH was raised to greater than 12.0 standard units.

Groundwater samples were placed in appropriate precleaned, labeled, screw cap glass containers, with Teflon-lined lids, placed on ice, and delivered to E & E's ASC under proper chain-of-custody. As a check on the quality of the water used in drilling, a sample of drill water was obtained from the subcontractor's water tank that had been filled at the fire hydrant (Town of Royalton water supply) located approximately three miles west of the site on Route 31. The drill water was analyzed for TCL organics and inorganics. Analyses and reporting were performed following the NYSDEC Contract Laboratory Protocol (CLP).

3.2.6 Leachate/Sediment Sampling and Analysis

Two leachate and two sediment samples were collected from the area of the drainage ditch to the north of the site. The leachate samples, L-1 and L-2, were soil samples collected at flagged areas where leachate had been observed during the site reconnaissance. No water was present at these locations at the time of sampling; however, stained soils were observed. Two sediment samples, SED-1 and SED-2, were collected from the drainage ditch. SED-1 was collected downgradient of the leachate seeps, and SED-2 was collected upgradient of the site, east of GW-3. No surface water was present to sample at the time of collection. Sample locations are shown in Figure 3-1.

Leachate and sediment samples were collected with precleaned, dedicated, stainless steel spoons and placed in the appropriate 8-ounce and 40-milliliter precleaned, labeled, screw-cap glass containers with Teflon-lined lids. These samples were placed on ice and transported under proper chain-of-custody to E & E's ASC for full TCL analysis.

Table 3-1

SOURCES CONTACTED FOR THE NYSDEC PHASE II INVESTIGATION AT THE TOWN OF ROYALTON LANDFILL SITE

New York State Department of Environmental Conservation
584 Delaware Avenue
Buffalo, New York 14202
Contact: Jaspal Singh Walia/Joseph Sciascia/Martin Doster
Telephone: (716) 847-4585
Date: April 4, 1990
Information Gathered: File search for NYSDEC Phase II report preparation

New York State Department of Environmental Conservation
Bureau of Hazardous Site Control
50 Wolf Road
Albany, New York 12233
Contact: Mike Ryan/Jane Thapa/Valerie Lauzze
Telephone: (518) 457-9538
Date: April 11, 1990
Information Gathered: File search for additional data and NYSDEC Phase I reports

New York State Department of Environmental Conservation
National Heritage Program
700 Troy-Schenectedy Road
Albany, New York 12110
Contact: Burrell Buffington
Telephone Number: (518) 783-3932
Date: April 10, 1990
Information Gathered: Information on designated critical habitats with respect to NYSDEC Phase II sites

United States Department of Agriculture
Soil Conservation Service
Niagara County District
4487 Lake Avenue
Lockport, New York 14094
Contact: Edward Oliver
Telephone: (716) 434-4949
Date: April 3, 1990
Information Gathered: File search for Erie County DEC Phase II site report preparation

New York State Department of Health
Bureau of Environmental Exposure
11 University Plaza - Room 205
Albany, New York 12203
Contact: Andrew Carlton
Telephone: (518) 458-6306
Date: April 3-4, 1989
Information Gathered: Viewed site inspection reports for NYSDEC Phase I sites

Niagara County Environmental Management Council
County Courthouse
Lockport, New York 14094
Contact: Susan Casey/Celeste Richardson
Telephone: (716) 439-6170
Dates: March 30, 1990
Information Gathered: Land use, historical landmark, and wetland information

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Table 3-1 (Cont.)

Niagara County Public Health Department
10th Street and Falls Street
Niagara Falls, New York
Contact: Paul Dickey
Telephone Number: (716) 284-3128
Date: April 2, 1990
Information Gathered: Information from files pertaining to NYSDEC sites

Niagara County Public Health Department
5467 Upper Mountain Road
Lockport, New York 14094
Contact: Ronald Gurozdek
Telephone Number: (716) 439-6109
Date: April 2, 1990
Information Gathered: File search for NYSDEC Phase II sites within Niagara County's water service

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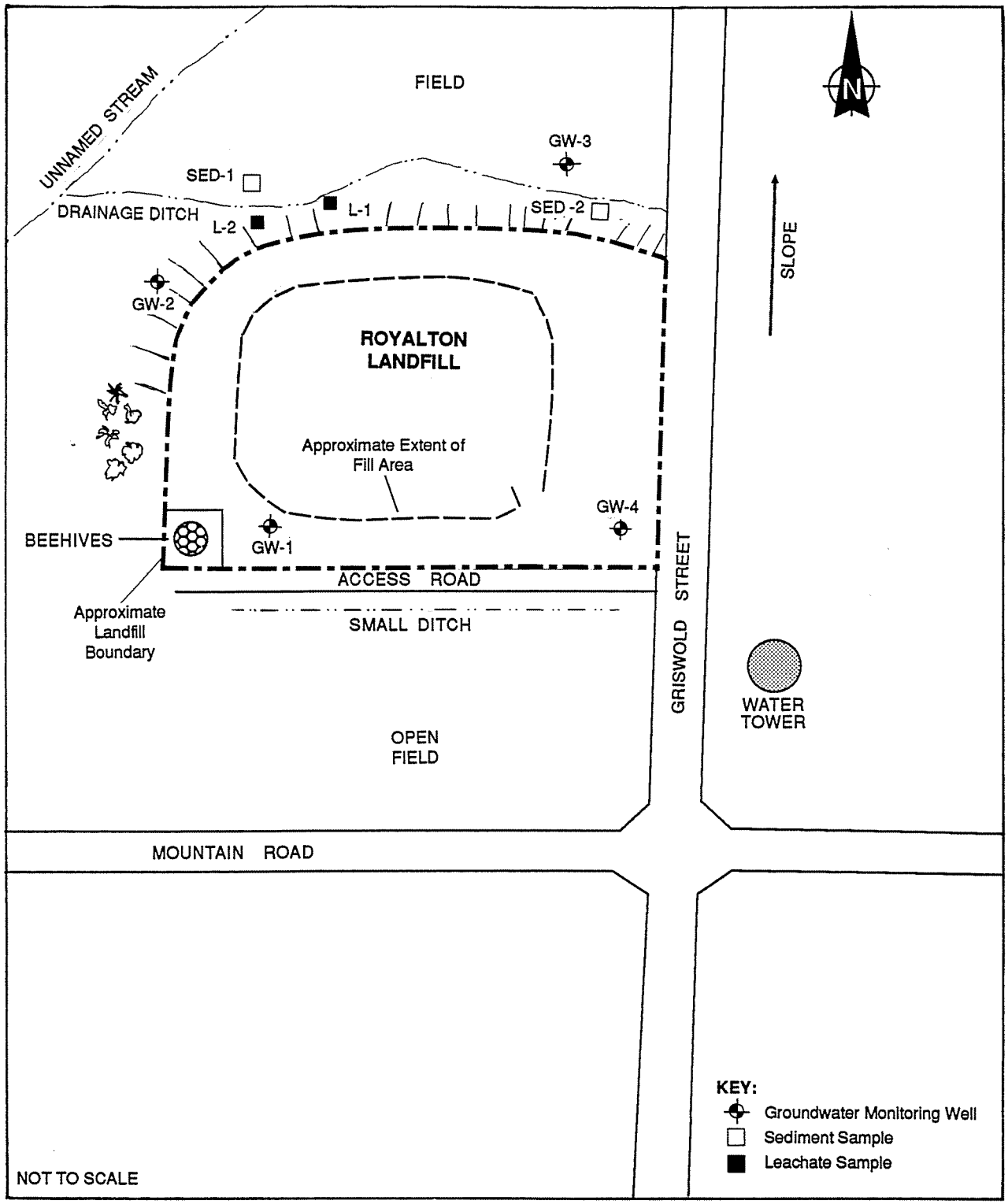

Figure 3-1
MONITORING WELL AND SAMPLING LOCATIONS, TOWN OF ROYALTON LANDFILL SITE

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4. SITE ASSESSMENT

4.1 SITE HISTORY

The Town of Royalton Landfill site is located on Griswold Street 0.6 mile south of Route 31 and 0.1 mile north of Mountain Road in the Town of Royalton, Niagara County, New York. The 5-acre site was leased from the current owner, Douglas Ortman of Middleport, from 1958 through 1978 by the Town of Royalton for use as a municipal landfill. Before landfilling, the site was operated as a limestone quarry. The site was used one day a week by residents of the Town of Royalton and the Villages of Gasport and Middleport for disposal of items such as stoves, refrigerators, wood, and other municipal waste. The landfill is assumed to be unlined, with waste placed directly on the bedrock floor of the former quarry. The depth of waste burial is unknown. No hazardous waste is known to have been disposed of at the site.

In 1964, a Niagara County Health Department (NCHD) inspection revealed that open burning was practiced and cover was applied monthly. From 1964 to 1972, numerous operating problems were reported, the most common being lack of adequate cover, leachate outbreaks, and unrestricted site access.

Because of these problems, NYSDEC ordered corrections and upgrading of operations in 1973. From 1973 to 1978, the landfill operated essentially in compliance with state regulations. The site ceased landfill operations in 1978. A final closure report was released in 1980 by Tallamy, Van Kuren, Gertis, and Thielman. Since closure, unrestricted access and leachate outbreaks have been recurrent problems at the site. Evidence of past unauthorized dumping is also apparent at the site.

In 1982, NYSDEC collected one soil and two water samples from the drainage ditch along the northern property boundary. One water sample

was collected upstream of the site, and one water and one soil sample were collected at a point where leachate entered the ditch. Levels of chromium, copper, iron, and zinc in the downstream water sample were significantly (more than three times) higher than the levels in the upstream sample (NYSDEC 1986). Halogenated organic compounds and total organic carbon were detected in both water samples; levels were not significantly increased from the upstream to the downstream sample. The soil sample contained low levels of halogenated organics and detectable amounts of several metals.

The site is currently used by the owner for the spreading of manure and becomes overgrown with weeds and tall grasses in the summer. Potential future uses of the site include crop or pasture land.

4.2 REGIONAL GEOLOGY AND HYDROGEOLOGY

Niagara County lies within the Central Lowlands physiographic province, which is a plains area covered by glacial sediments and underlain by horizontal to gently dipping strata of Paleozoic sedimentary rock. Specifically, the county is in the Eastern Lake section of the province, occupying part of the Ontario and Tonawanda plains. The topography of the area, called the Niagara Frontier, is relatively flat with the exception of two north-facing escarpments trending east-west across the region. The Niagara Escarpment, to the north, extends from near Rochester, New York to the western shore of Lake Michigan. The less prominent Onondaga Escarpment is evident east of Buffalo but becomes less obvious through the city.

The Ontario Plain extends from the shore of Lake Ontario to the foot of the Niagara Escarpment, and the Tonawanda Plain extends from the crest of the Niagara Escarpment to the foot of the Onondaga Escarpment.

Sediments in this area consist mainly of lacustrine deposits and glacial tills. The lacustrine deposits (i.e., silts and clays that settled to the bottom of the postglacial lake) are generally olive and brownish sediments overlying a red clay. The olive and brownish lacustrine sediments were deposited in glacial Lake Tonawanda following the Wisconsin Ice Age. These sediments blanket a red clay that was deposited following an earlier ice age in glacial Lake Lundy, which at one time covered the entire county. Glacial till also occupies a large part

of the surface area in the county and underlies most areas of lake sediments. The glacial till deposits consist of ground moraines, drumlins, eskers, and terminal moraines. Ground moraines occupy the low undulating till plain and are approximately 10 to 15 feet thick. Drumlins are rounded hills of bedrock or till that were molded beneath the ice and are elongated in the direction of ice flow. Drumlins in Niagara County are very subdued due to modification by the glacial lakes. Eskers are thin elongated ridges of pebbly till trending northeast-southwest. These ridges may be related to giant flutings (furrows or grooves cut by glaciers) in the underlying Queenston shale. The terminal moraines have a general east-west trend and were formed when the ice stagnated for a long period of time. Other deposits, consisting of glacial outwash and beach deposits, exist in large belts (up to 8 miles in length) and are generally 1 to 10 feet thick (Higgins et al. 1972).

The lacustrine sediments and glacial till of the Niagara Frontier are underlain by sedimentary rocks varying in thickness from 1,980 to 4,200 feet (see Figure 4-1) and are Ordovician, Silurian, and Devonian in age.

The Ontario Plain is underlain by the Upper Ordovician Queenston formation composed of red shales overlying older Ordovician and Cambrian sedimentary rocks. Beneath these units are the Proterozoic basement rocks that form the Canadian Shield. The cap rock of the Niagara Escarpment is the Silurian Lockport group, made up of dolostone and shaly dolostone. The Lockport is underlain by the Silurian, Clinton, and Medina groups. The Clinton group is composed of limestones, shales, and dolostones, and the Medina group consists of sandstones, shales, and siltstones. Above the Lockport group, south of the escarpment, is the younger Silurian Salina group, made up of shales, siltstones, dolostones, gypsum, anhydrite, and salt beds.

Rocks of the Devonian Period overlie Silurian rocks to the south of Niagara County. The formation at the Devonian-Silurian contact is the Onondaga limestone, which is a massive cherty limestone that outcrops across most of northern Erie County (Tesmer 1981).

Surface drainage of the Ontario Plain is northward into Lake Ontario, and soil drainage is relatively poor. Surface drainage of the

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Huron Plain is southward into Tonawanda Creek and is also not well developed (USDA 1972).

Niagara County has abundant surface waters bordering it: Tonawanda Creek to the south, the Niagara River to the west, and Lake Ontario to the north. The county's municipal water district draws most of its water from the Niagara River. However, rural residents depend on both bedrock and overburden wells. The bedrock wells north of the Niagara Escarpment are dug or drilled into the Queenston shale. The yields of water are often inadequate during extended dry periods and may contain high levels of salt or sulfate. Bedrock wells to the south of the escarpment are drilled into the Lockport dolomite. Yields are generally higher, but the water is hard from high calcium and other base concentrations. Shallow dug wells and springs are common in the three most permeable of the 11 soil associations in Niagara County: the Otisville-Altmar-Fredon-Stafford association, the Howard-Arkport-Phelps association, and the Hilton-Ovid-Ontario association. The shallow wells are less desirable than bedrock wells due to increasing pollution of shallow groundwater, primarily by seepage (USDA 1972).

4.3 SITE GEOGRAPHY

4.3.1 Topography

The Town of Royalton Landfill site is located within the Eastern Lake section of the Central Lowlands topographic province in the Town of Royalton, Niagara County, New York. The lowlands are characterized by a low, flat-lying topography resulting from preglacial erosion of the bedrock and subsequent topographic modification by glaciation. Landfilling after quarrying operations has raised the ground surface at the site to approximately the original grade. To the north and northeast of the site, topography slopes at apprxoimately 5% to 8% as the crest of the Niagara Escarpment is crossed (see Figure 1-1). Most of the site is approximately 620 feet above mean sea level.

4.3.2 Soils

Original soils were removed from the site during quarrying operations. Soil types in the area include Farmington silt loams and Ontario loams. Farmington soils are shallow, well-drained, medium-textured soils that formed in thin glacial till deposits over limestone bedrock.

Ontario soils are deep, well-drained, and medium textured and formed in calcareous, loamy glacial till deposits.

Boring logs (Appendix C) and geotechnical analyses (Appendix D) reveal that overburden material at the site consists of glacial till made up of poorly sorted sand, silt, gravel, and clay. Surficial deposits at GW-1 are made up of 2 feet of clayey silt with little sand and a trace of gravel. At GW-2, surficial deposits consist of silty sand, clay, and gravel to a depth of 9.5 feet. Bedrock was not encountered during the drilling of GW-3. Overburden deposits are till consisting of various mixtures of sand, silt, and clay and gravel, cobbles, and boulders. At GW-4, surficial deposits are made up of sand, gravel, and clayey silt to a depth of 2.65 feet.

4.4 SITE HYDROGEOLOGY

The information used to develop the discussion in this subsection includes the Phase II geophysical survey, United States Geological Survey (USGS) topographic maps, geological survey maps, and regional groundwater reports.

The geophysical survey results are presented in Appendix B, and the geotechnical analysis results are presented in Appendix D.

4.4.1 Geology

The Town of Royalton Landfill site is located at the crest of the Niagara Escarpment. The cap rock of this escarpment is the Silurian Lockport Group. This unit has been eroded to a thickness of approximately 20 feet along the escarpment and consists of dolomite, limestone, and shaly dolomite. The Lockport can be divided into five lithologic units. The two youngest units are made up of gray fine- to coarse-grained dolomites. The Gasport Limestone Member is a light gray, coarse-grained limestone, and the DeCew Limestone Member is a light gray, shaly dolomite. Gypsum, occurring as irregularly shaped nodules 0.5 to 5 inches in diameter, and as selenite, is common in the Lockport. Sulfide minerals, particularly sphalerite, galena, and pyrite, occur as particles disseminated throughout the formation (LaSala 1968; Johnston 1964). Because of quarry excavation, the filled area of the site may be floored in the Rochester shale (NYSDEC 1986). The Rochester shale is a

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Silurian shale in the Clinton group consisting of dark bluish- to brownish-gray calcareous shale with argillaceous limestone layers (Tesmer 1981).

Along the southern boundary of the site, bedrock was encountered during drilling at 2 and 2.65 feet below ground surface in GW-1 and GW-4, respectively. Bedrock at these locations was the Gasport Member of the Lockport Group, consisting of light- to medium-gray limestone with horizontal fractures and solution cavities.

The thickness of this member was 10.9 feet at GW-1 and 5 feet at GW-4, and the rock quality designation (RQD) ranged from 52 to 68%. Below the Gasport Member in GW-1 and GW-4 is the DeCew Member of the Lockport Group. This unit also forms the bedrock underlying the GW-2 location to the northwest of the site. During drilling at the site, the DeCew was shown to consist of dark gray shaly dolomite with horizontal and occasional vertical fractures. Some of these fractures were weathered and clay-filled. The DeCew was more than 16.3 feet thick at GW-1, more than 16 feet thick at GW-2, and more than 23.25 feet thick at GW-4. RQD values ranged from 17 to 100%. Bedrock was not encountered during the drilling of GW-3 to the north of the site. A graphic interpretation of the site geology based on the location and topography of the site and interpretation of subsurface boring logs is presented in Figure 4-3. As shown in this figure, wells GW-1 and GW-4 are interpreted as being on the crest of the Niagara Escarpment, GW-2 just off of the escarpment with bedrock still in the Lockport Group, and GW-3 beyond or nearly beyond the escarpment where thicker overburden deposits are encountered.

4.4.2 Hydrology

Groundwater

The Lockport Group is the principal water-bearing unit in the site area. The lower part of this unit underlies the site and contains water in bedding joints, fractures, and solution cavities. Most water, however, is yielded from bedding joints, which are fractures along prominent bedding planes. This is because fractures and solution cavities neither cover as extensive an area nor are as interconnected as bedding

joints. Well yields from the Gasport and DeCew members range from 0.5 to 20 gallons per minute (gpm), averaging 7 gpm. Yields are usually adequate for domestic supplies, except immediately adjacent to the escarpment, where only the Gasport and DeCew members, the lowest and least permeable zones of the Lockport, are encountered. The Rochester shale, which is below the Lockport and may have been exposed at the floor of the quarry, is almost impermeable and acts as a confining layer for the more permeable units below (Johnston 1964).

One overburden and three bedrock groundwater monitoring wells were installed at the site to determine groundwater flow conditions and assess groundwater quality. Well locations are shown in Figure 3-1. Well summary data are presented in Table 4-1. Groundwater level elevations and contours are shown in Figure 4-2 and summarized in Table 4-2.

Groundwater elevations measured in the one overburden and three bedrock monitoring wells were used to develop a potentiometric map depicting the probable direction of groundwater movement in the site area. Based on groundwater elevations and information about site and regional geology, groundwater flow appears to be to the north beneath the site (see Figure 4-2). Due to the unique situation of the site, straddling the crest of the Niagara Escarpment, groundwater in the bedrock wells at the crest is assumed to be hydrologically connected with water in the overburden well to the north and off of the crest of the escarpment (see Figure 4-3). This situation is supported by topographic, geologic, and hydrologic data from the site. A groundwater divide is assumed to exist to the south of the escarpment crest, and groundwater south of the divide flows generally to the south (see Figure 4-3). In areas north of the divide, including the site area, water flows generally to the north.

Based upon these flow conditions, wells GW-1 and GW-4 are upgradient of the site, and GW-2 and GW-3 are downgradient of the site.

Surface Water

Surface runoff from the site enters a drainage ditch along the northern site boundary. Runoff in this ditch flows west into an unnamed stream. This stream flows northeast before ending in the Village of Middleport, presumably entering the Middleport storm sewer system.

4.5 SITE CONTAMINATION ASSESSMENT

Analytical data for the site contamination assessment are presented in Appendix E. For TCL organic and inorganic analyses, all positive reported values and qualifiers for field samples and field and laboratory QA/QC samples are presented on data summary forms.

All CLP data packages were reviewed to determine whether qualified data were acceptable for the intended use. In general, common laboratory contaminants, including methylene chloride, acetone, and phthalate compounds, are considered background contamination and not evaluated if the values are qualified with a "B," indicating levels less than 10 times the amount detected in the associated method blank. Diethylphthalate in DW-1 and di-n-butylphthalate in GW-3 are not attributable to laboratory contamination; however, at the low levels detected (4 µg/L and 1 µg/L, respectively), they are probably due to field contamination from sampling gloves.

4.5.1 Groundwater

Groundwater samples were collected on September 14, 1990 from each of the four monitoring wells as part of the Phase II study. These samples were analyzed for TCL parameters including volatile and semivolatile organics, pesticides, PCBs, metals, and cyanide.

No organic compounds (volatile, semivolatile, pesticide, or PCB) were found above quantitation limits in groundwater samples. Thirteen inorganic elements were detected in groundwater at the site (see Table 4-3). Five metals, iron, lead, magnesium, manganese, and sodium were found in concentrations exceeding NYSDEC Class GA groundwater standards or guidance values. Values of iron exceeded the Class GA standard in wells GW-1 (the upgradient well) at 7,200 µg/L, GW-2 at 921 µg/L, and GW-3 at 965 µg/L. Lead exceeded the Class GA standard in GW-1 at 38.2 µg/L. Magnesium was found above its guidance values in GW-1 at 86,000 µg/L, GW-3 at 72,000 µg/l, and GW-4 at 62,000 µg/L. Manganese exceeded the Class GA standard in GW-1 at 861 µg/L, GW-3 at 659 µg/L, and GW-4 at 355 µg/L. Levels of sodium exceeded the Class GA standard in GW-2 at 27,600 µg/L, GW-3 at 29,100 µg/L, and GW-4 at 116,000 µg/L. Saline waters are characteristic of the Gasport and DeCew members of the Lockport Group (Johnston 1964).

4.5.2 Leachate/Sediment

Two soil samples, L-1 and L-2, were collected at previously observed points of leachate outbreaks along the drainage ditch to the north of the site. Two sediment samples, SED-1 and SED-2 also were collected from the drainage ditch downgradient and upgradient of the site, respectively.

No organic compounds were found above quantitation limits in leachate/sediment samples from the site. Sample SED-2 contained low levels of PAHs below quantification limits. Sixteen inorganic elements were detected in leachate/sediment samples. None of these was found at levels exceeding common ranges in soils and other surficial material from the Eastern United States (see Table 4-4). Comparing concentrations to the upgradient sample, SED-2, cadmium, iron, vanadium, and zinc are found significantly (more than three times) above levels in one or more downgradient samples. Cadmium, iron, and zinc were found at levels significantly above background in sample L-2. Vanadium was found significantly above background levels in SED-1 and L-1.

4.5.3 Drill Water

Analysis of the drill water showed chloroform and trihalomethanes at low concentrations. These compounds are a product of the chlorination process for potable water supplies and are not considered significant due to the trace amounts present. Ten inorganic elements were detected in the drill water sample. Of these, only iron exceeded NYSDEC Class GA groundwater standards.

4.5.4 Contaminant Assessment Summary

No organic compounds were detected above quantitation limits in groundwater or leachate/sediment samples from the site.

In groundwater, iron, lead, magnesium, manganese, and sodium were detected above NYSDEC Class GA groundwater standards. The highest concentrations of iron, lead, magnesium, and manganese were found in GW-1, an upgradient well. The level of sodium was highest in GW-4, which is also upgradient of the site. These elements are all naturally occurring in the earth's crust, and since the highest levels were found in the

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upgradient wells, their presence cannot be attributed to releases from the site.

No inorganic elements were found in leachate/sediment samples from the site at levels above common ranges. However, four metals--cadmium, iron, vanadium, and zinc--were found in one or more downgradient leachate/sediment samples (L-1, L-2, SED-1) at levels significantly (more than three times) above that of the upgradient sediment sample (SED-2). Cadmium, iron, and zinc were significantly higher in sample L-2 at 14.5 mg/kg, 84,000 mg/kg, and 456 mg/kg, respectively. The concentration of vanadium in L-2, 27.8 mg/kg, was significantly above the upgradient concentration of 6.1 mg/kg in SED-2. These increases in metals concentrations may be due to leachate generated from runoff passing through municipal waste in the landfill.

In summary, the types and concentrations of organic and inorganic substances detected are consistent with the former use of the site as a municipal solid waste landfill.

4.6 CONCLUSIONS AND RECOMMENDATIONS

Minimal possible threats to human health and the environment posed by the Town of Royalton Landfill site include direct dermal contact with contaminated sediment and potentially contaminated leachate at the site. Contaminants detected (i.e., heavy metals) are consistent with those expected based on the former use of the site as a municipal landfill. Considering these facts and in the absence of documented hazardous waste disposal at this site, it is recommended that the Town of Royalton Landfill site be delisted from the New York State Registry of Inactive Hazardous Waste Sites and be referred to the NYSDEC's Division of Solid Waste for appropriate action. The following paragraphs recommend measures for consideration to mitigate the risk associated with the site.

At present, vehicular access to the site is restricted only by a cable across the entrance road. The installation of a fence around the site would prevent unauthorized access.

Any future action at the site should include consideration of the proposed future land use. Evaluation of post-closure maintenance should take into consideration future land use.

In summary, proper closure under 6 NYCRR Part 360, including an upgrading of the site's cover material, is recommended. Proper closure would alleviate contaminant migration and further reduce or eliminate any threats caused by the site.

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Table 4-1

MONITORING WELL SUMMARY

Well Number	Ground Elevation (feet)	Date Drilled	PVC Casing		Depth to Bedrock (feet)	Depth Drilled (feet)	Depth to Groundwater From Top of Casing (feet)	Comments
			Diameter (inches)	Depth (feet)				
GW-1	618.90	8/20/90 - 8/22/90	3	6.7	2.0	29.2	12.33	Bedrock open-hole construction
GW-2	600.90	8/21/90 - 8/22/90	3	14.5	9.5	25.5	7.97	Bedrock open-hole construction
GW-3	593.90	8/22/90	2	18.0	--	28.0	7.63	Overburden
GW-4	620.27	8/20/90 - 8/23/90	3	8.0	2.65	31.25	11.05	Bedrock open-hole construction

02[UZ]YQ7080:D3259/4431/5

Note: Elevations are generated from BM MON 18DMW, elevation 617.00, located in center of a headwall at the southwest corner of Mountain Road and Griswold Road.

Table 4-2

MONITORING WELL AND GROUNDWATER ELEVATIONS

Well Number	Ground Elevation (feet)	Top of Casing (feet)	Depth to Groundwater From Top of Casing* (feet)	Groundwater Elevation (feet)
GW-1	618.9	622.22	12.3	609.5
GW-2	600.9	602.69	8.0	594.8
GW-3	593.9	595.97	7.6	588.4
GW-4	620.27	622.06	11.1	611.0

02[UZ]YQ7080:D2359/4432/30

*Groundwater levels taken on September 14, 1990.

Note: Water levels measured with an electronic water level indicator.

Table 4-3

INORGANIC ELEMENTS IN GROUNDWATER SAMPLES

Element	Range (µg/L)	NYSDEC Class GA Groundwater Standard (µg/L)	Samples Exceeding NYSDEC Standard	
			Sample Number	Concentration (µg/L)
Aluminum	131 - 1,750	NA	--	--
Arsenic	2.7 - 3.8*	25	--	--
Barium	19.9 - 149	1,000	--	--
Calcium	19,400 - 146,000	NA	--	--
Cobalt	ND - 48	NA	--	--
Copper	ND - 16	200	--	--
Iron	ND - 7,200	300	GW-1	7,200
			GW-2	921
			GW-3	965
Lead	ND - 38.2*	25	GW-1	38.2
Magnesium	34,300 - 86,000	35,000**	GW-1	86,000
			GW-3	72,000
			GW-4	62,000
Manganese	64.4 - 861	300	GW-1	861
			GW-3	659
			GW-4	355
Potassium	5,800 - 12,600	NA	--	--
Sodium	9,680 - 116,000	20,000	GW-2	27,600
			GW-3	29,100
			GW-4	116,000
Zinc	10.5 - 267	300	--	--

[UZ]YQ7080:D3259/4437/22

*Results and detection limits are considered low estimates due to low spike recoveries.
**Guidance value.

Table 4-4

INORGANIC ELEMENTS IN LEACHATE/SEDIMENT SAMPLES

Element	Range (mg/kg)	Standard Range in Soils and Other Surficial Materials from Eastern United States (mg/kg)	Samples Above Standard Range with Concentration (mg/kg)
Aluminum	3,440 - 6,180	7,000 - 100,000	--
Arsenic	2.5 - 4.5**	<0.1 - 73	--
Barium	101 - 206	10 - 1,500	--
Cadmium	3.3 - 14.5	NA	--
Calcium	23,200 - 30,900	10 - 280,000	--
Chromium	4.8 - 8.6	1 - 1,000	--
Cobalt	3.2 - 5.9	<0.1 - 70	--
Copper	10.7 - 31.3	<1 - 700	--
Iron	17,700 - 84,000	100 - >100,000	--
Lead	12.8 - 28.6**	<10 - 300	--
Magnesium	3,960 - 13,900	50 - 50,000	--
Manganese	487 - 3,540***	<2 - 7,000	--
Nickel	8.3 - 11.9	<5 - 700	--
Potassium	366 - 634	50 - 37,000	--
Vanadium	6.1 - 27.8	<7 - 300	--
Zinc	121 - 456	<5 - 2,900	--

[UZ]YQ7080:D3259/4438/24

*Source: Shacklette and Boerngen, 1984, "Elemental Concentrations in Soils and Other Surficial Materials in the Conterminous United States," USGS Professional Paper 1270.
**Results are considered low estimates due to low spike recoveries.
***Results are high estimates due to high spike recoveries.

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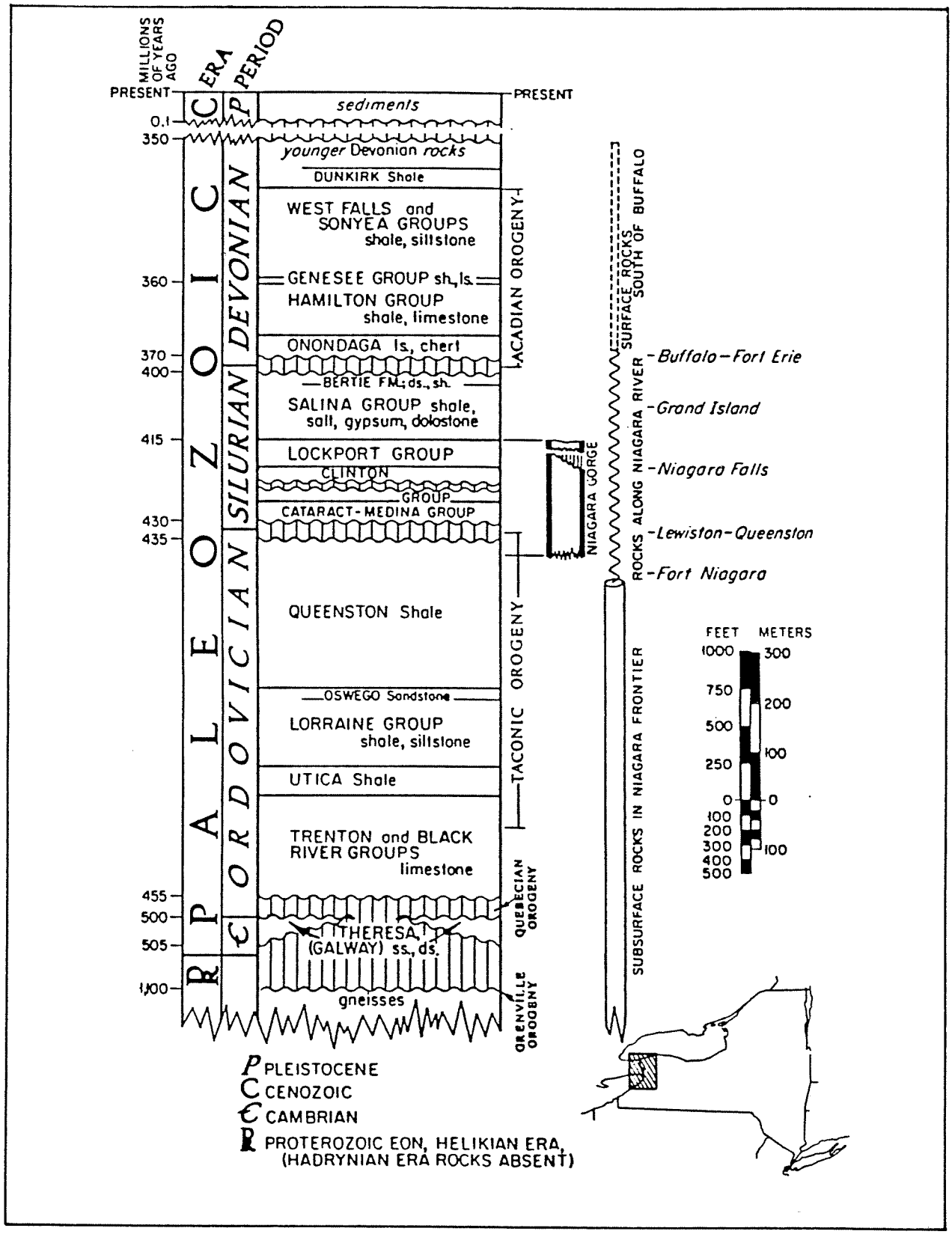

Figure 4–1
STRATIGRAPHIC COLUMN, NIAGARA FRONTIER

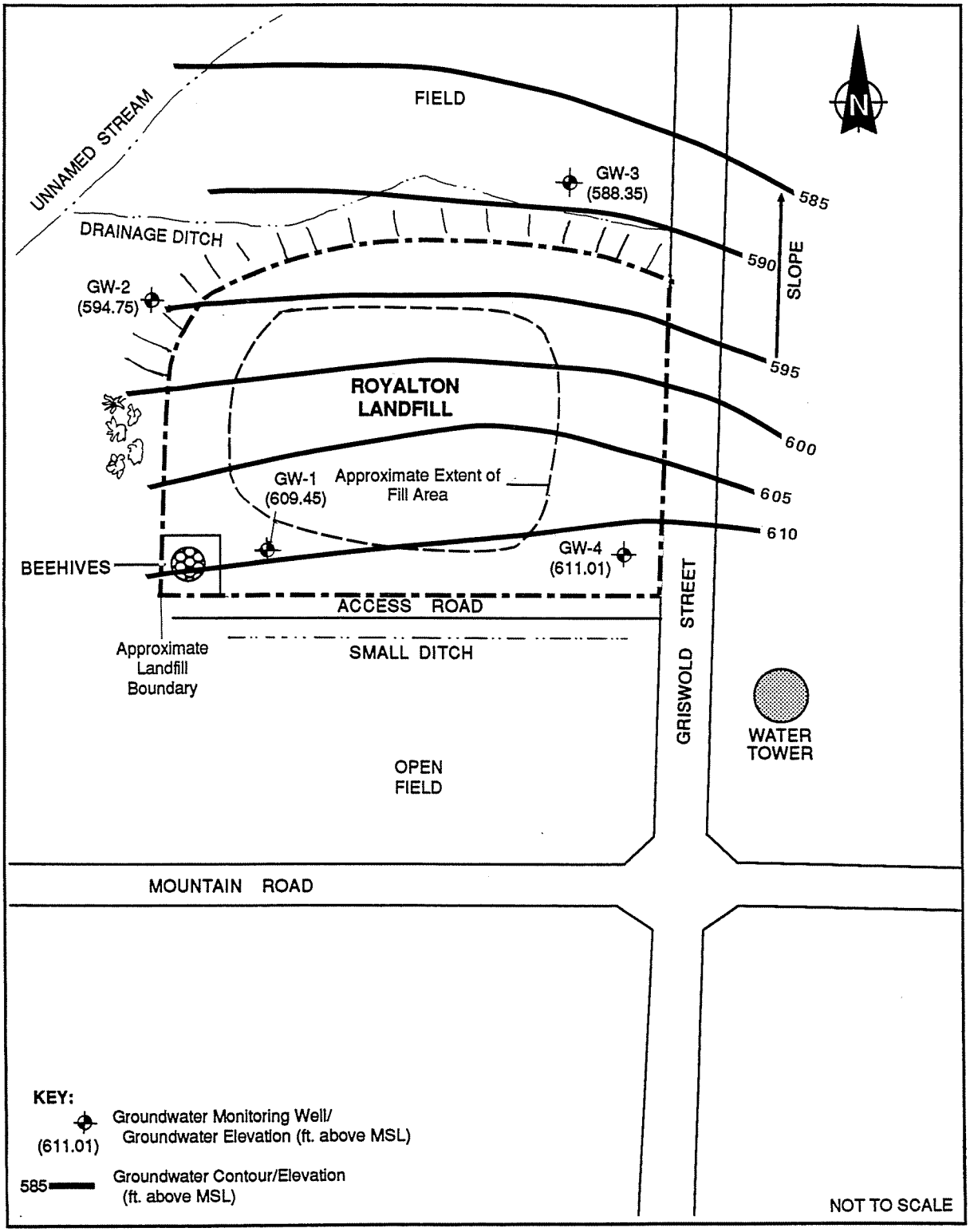

Figure 4-2
GROUNDWATER ELEVATION CONTOUR MAP,
TOWN OF ROYALTON LANDFILL SITE

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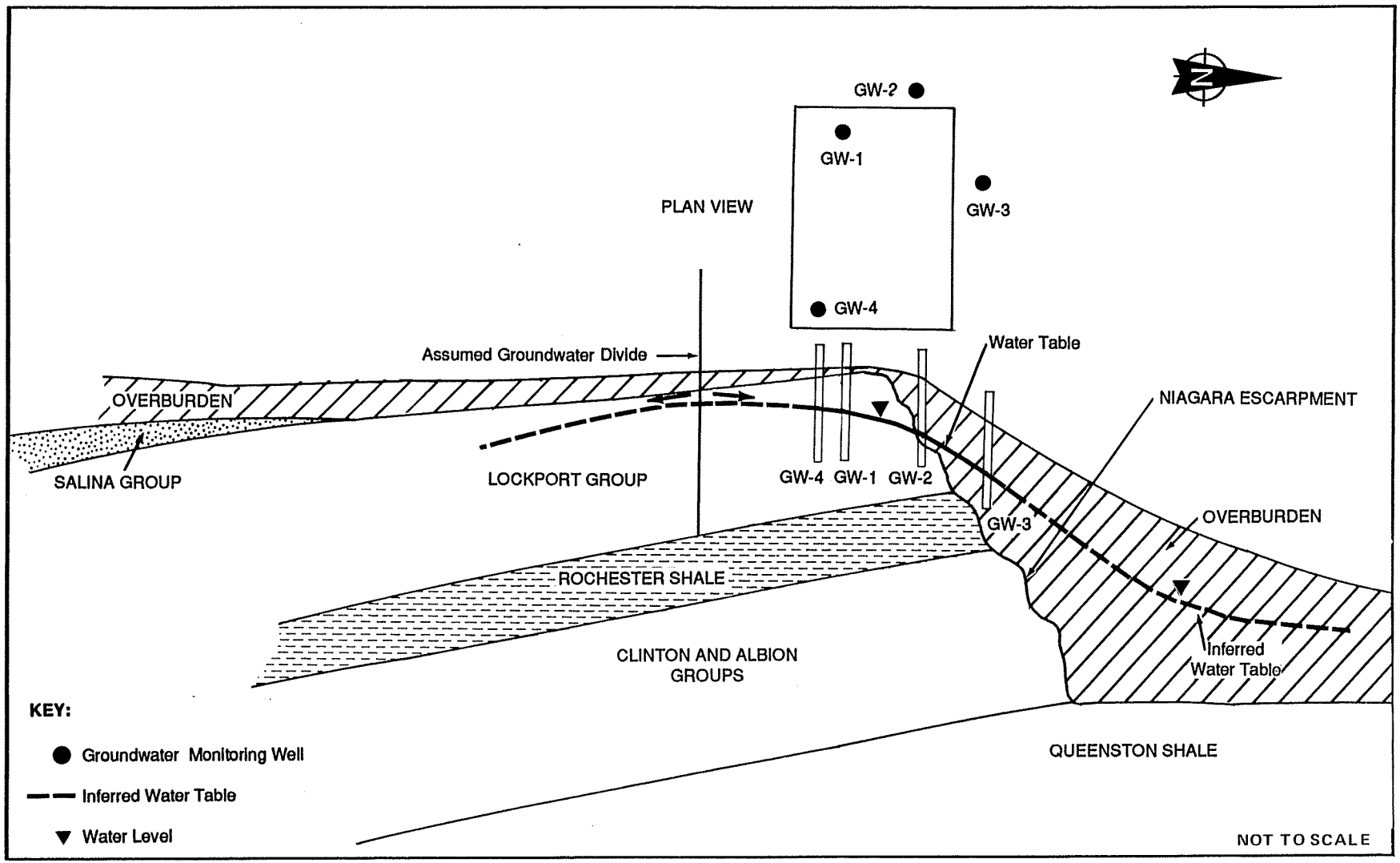

Figure 4-3
SIMPLIFIED CROSS SECTION, TOWN OF ROYALTON LANDFILL SITE

5. FINAL APPLICATION OF HAZARD RANKING SYSTEM

5.1 NARRATIVE SUMMARY

The Town of Royalton Landfill site encompasses a former quarry approximately 5 acres in size on Griswold Street in the Town of Royalton, Niagara County, New York. The site is owned by Douglas Ortman of Middleport, who leased it to the Town of Royalton between 1958 and 1978 for use as a municipal landfill. Waste disposed of at the site includes household appliances, wood, and other municipal wastes. No hazardous wastes are known to have been disposed of at the site.

During landfilling operations, the site had frequent problems such as lack of adequate cover, leachate outbreaks, and unrestricted site access. In 1973, NYSDEC ordered corrections and upgrading of site conditions. Operations ceased at the site in 1978. Since closure, the site has had recurrent problems with leachate outbreaks, unrestricted site access, and to a lesser extent, unauthorized dumping.

Analysis of water samples from monitoring wells at the site detected only inorganic elements with iron, lead, magnesium, manganese, and sodium exceeding NYSDEC Class GA standards. However, the highest concentrations of these elements were found in upgradient wells and thus cannot be attributed to waste disposal at the site.

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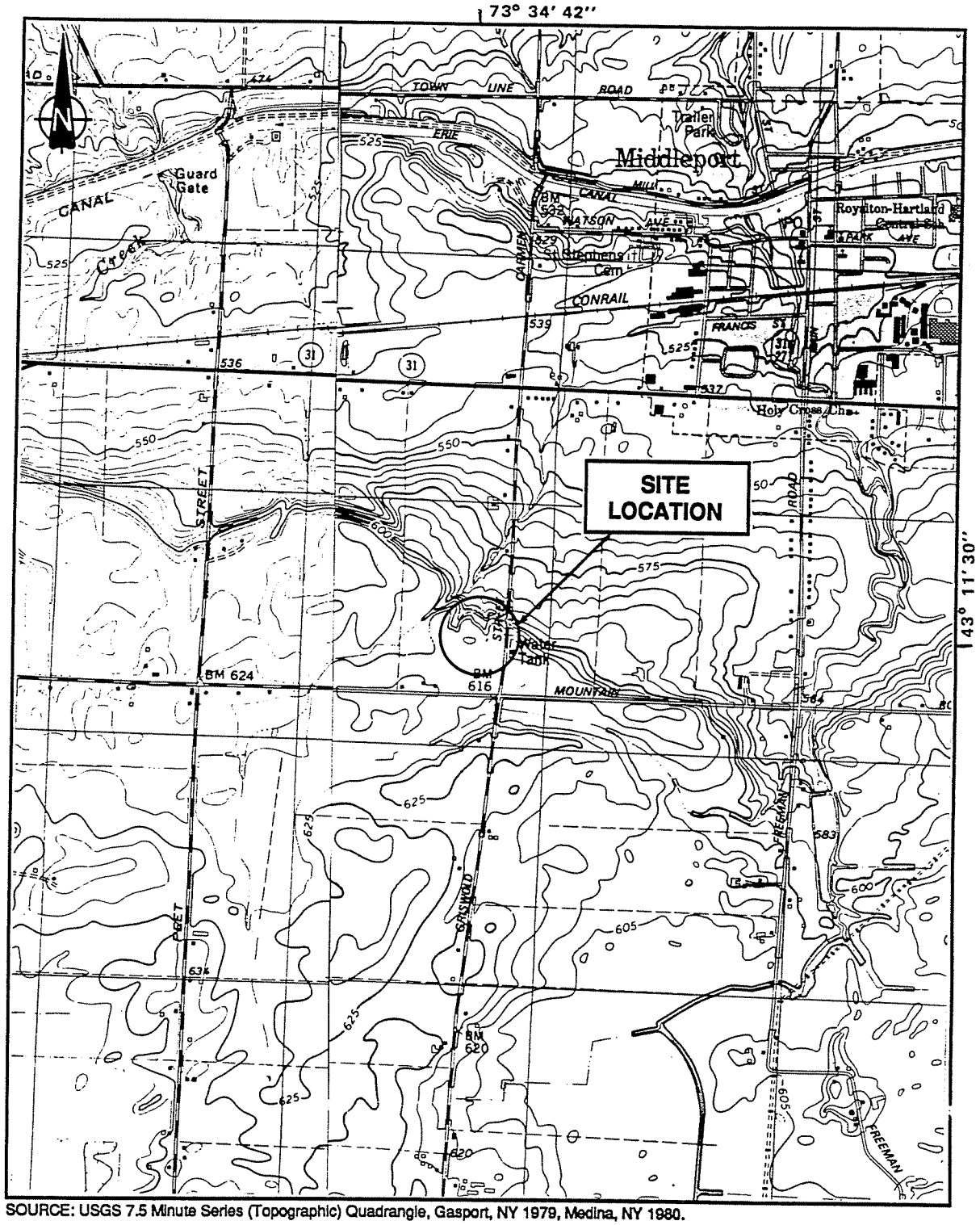

SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle, Gasport, NY 1979, Medina, NY 1980.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

Figure 5-1
SITE LOCATION MAP

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FIGURE 1

H R S C O V E R S H E E T

Facility Name: Town of Royalton Landfill

Location: Griswold Road

EPA Region: II

Person(s) in Charge of Facility: Douglas Ortman

Griswold Road

Royalton, New York

Name of Reviewer: _____ Date: _____

General Description of the Facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action; etc.)

The 5-acre Town of Royalton Landfill is located on Griswold Street in the Town of Royalton, Niagara County. The Royalton Highway Department operated a municipal landfill in a former stone quarry from 1958 to 1978. Residents of Middleport, Gasport, and the Town of Royalton reportedly brought their household garbage for dumping on Saturdays. The fill consists of items like stoves, refrigerators, and wood. No hazardous waste is known to have been dumped at the site. The site was operated until 1978, when it was closed and capped with local soils by the Royalton Highway Department. Unauthorized dumping has occurred since then, and leachate outbreaks in the northwest corner have been observed. Site acccess is not controlled.

Scores: $S_M = 0$ ($S_{gw} = 0$ $S_{sw} = 0$ $S_a = 0$)

$S_{FE} = 0$

$S_{DC} = 25.00$

[UZ]YQ7080:D3259/4440

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 (3)		2	6	6	
Net Precipitation	0 1 (2) 3		1	2	3	
Permeability of the Unsaturated Zone	0 (1) 2 3		1	1	3	
Physical State	0 (1) 2 3		1	1	3	
Total Route Characteristics Score				10	15	
3 Containment	0 1 2 (3)		1	3	3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	(0) 3 6 9 12 15 18		1	0	18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8		1	0	8	
Total Waste Characteristics Score				0	28	
5 Targets						3.5
Ground Water Use	0 1 (2) 3		3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 (32) 35 40		1	32	40	
Total Targets Score				38	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				0	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 0			

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1		45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 (1) 2 3	1	1	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 (1) 2 3	1	1	3	
Total Route Characteristics Score			10	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	(0) 3 6 9 12 15 18	1	0	18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	0 (1) 2 3	2	2	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			8	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			0	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	0		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:	No air samples collected for analysis.				
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	(0) 1 2 3	1	0	3	
Toxicity	(0) 1 2 3	3	0	9	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 (18) 21 24 27 30	1	18	30	
Distance to Sensitive Environment	0 (1) 2 3	2	2	6	
Land Use	0 1 2 (3)	1	3	3	
Total Targets Score			23	39	
4 Multiply 1 x 2 x 3			0	35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

FIGURE 9
AIR ROUTE WORK SHEET

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	S	S^2
Groundwater Route Score (S_{gw})	0	0
Surface Water Route Score (S_{sw})	0	0
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		0
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		0
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		0

FIGURE 10
WORKSHEET FOR COMPUTING S_M

This site is not known to be a fire or explosion hazard.

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score				24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} =		

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

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Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	(0) 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 (3)	1	3	3	8.2
3 Containment	0 (15)	1	15	15	8.3
4 Waste Characteristics Toxicity	0 1 2 (3)	5	15	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 (2) 3 4 5	4	8	20	
Distance to a Critical Habitat	(0) 1 2 3.	4	0	12	
Total Targets Score			8	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			5,400	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} =	25		

FIGURE 12
DIRECT CONTACT WORK SHEET

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DOCUMENTATION RECORDS

FOR

HAZARD RANKING SYSTEM

Instructions: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,320 drums plus 80 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

Facility Name: Town of Royalton Landfill

Location: Griswold Road, Town of Royalton, Niagara County

Date Scored: 10/90

Person Scoring: Judith Vangalio/Ralinda Leichner

Primary Source(s) of Information (e.g., EPA region, state, FIT, etc.):

NYSDEC records, Ecology and Environment site-specific investigations, previous site studies, published reports

Factors Not Scored Due to Insufficient Information:

None

Comments or Qualifications:

None

GROUNDWATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (3 maximum):

No observed release. No compounds detected downgradient in levels significantly above upgradient levels.

Rationale for attributing the contaminants to the facility:

NA
Assigned value = 0

* * *

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

Lockport Group, Gasport and DeCew Members. Gasport is a light-gray, coarse-grained dolomite; DeCew is a light-gray shaly dolomite.
Ref. 3

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

5.5 - 9.5 feet
Ref. 18

Depth from the ground surface to the lowest point of waste disposal/storage:

Unknown
Ref. 4
Assigned value = 3 (waste is within aquifer of concern in quarry)

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

36 inches
Ref. 1

Mean annual or seasonal evaporation (list months for seasonal):

27 inches
Ref. 1

Net precipitation (subtract the above figures):

9 inches
Assigned value = 2

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Poorly sorted silty sand with varying amounts of gravel and clay, till
Ref. 5

Permeability associated with soil type:

10^{-5} - 10^{-7} cm/sec
Ref. 1
Assigned value = 1

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Solids (municipal waste) unconsolidated or unstabilized
Ref. 4, 7, 8
Assigned value = 1

* * *

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Landfill - no liner
Landfill - no runoff control

Method with highest score:

Both score 3
Ref. 4, 5, 7, 8, 11

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

No organic compounds or metals detected downgradient of the site at levels significantly above upgradient levels.

Compound with highest score:

NA
Ref. 15
Assigned value = 0

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0. (Give a reasonable estimate even if quantity is above maximum.):

No hazardous waste is known to have been disposed of at the site.

Basis of estimating and/or computing waste quantity:

NA
Ref. 7, 8, 15
Assigned value = 0

* * *

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5. TARGETS

Groundwater Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Drinking water, with municipal water from unthreatened source presently available.
Ref. 7, 19
Assigned value = 2

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Bontempi residence

Distance to above well or building:

Approximately 1,000 feet north on Griswold Street
Ref. 9
Assigned value = 4

Population Served by Groundwater Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

208 houses within 3 miles downgradient, not supplied by municipal water.
208 houses x 3.8 residents/house $\simeq$ 790 residents.
Ref. 19, 12, 13 (Based on house count, excluding houses identified as being supplied by municipal water mains).
Note: The Village of Middleport well, located within 3 miles of the site, is a spring-fed well that supplies water to approximately 2,000 people.

Ref. 19, 22

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

None
Ref. 10

Total population served by groundwater within a 3-mile radius:

2,790 people
Assigned Value = 3
Matrix value (distance to nearest well/population served) = 32

SURFACE WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Surface water samples were not collected due to lack of water in drainage ditch to the north of the site.

Rationale for attributing the contaminants to the facility:

NA
Assigned value = 0

* * *

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

0 - 3%
Ref. 13

Name/description of nearest downslope surface water:

Drainage ditch to the north of the site that enters an unnamed stream that presumably flows into the Village of Middleport storm sewer system.
Ref. 9, 13

Average slope of terrain between facility and above-cited surface water body in percent:

5 - 8%
Ref. 9, 13
Assigned value = 1

Is the facility located either totally or partially in surface water?

No
Ref. 9, 13

Is the facility completely surrounded by areas of higher elevation?

No
Ref. 9, 13

1-Year 24-Hour Rainfall in Inches

2.1 inches
Ref. 1, 7
Assigned value = 2

Distance to Nearest Downslope Surface Water

Unnamed stream approximately 400 feet northwest of the site.
Ref. 13
Assigned value = 3

Physical State of Waste

Solid - unconsolidated and unstabilized
Ref. 4, 7, 8
Assigned value = 1

* * *

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Landfill - no liner
Landfill - no runoff control
Ref. 4, 7, 8, 9, 11

Method with highest score:

Both score 3

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

No organic compounds or metals were detected downgradient of the site at levels significantly above upgradient levels.

Compound with highest score:

NA
Ref. 15
Assigned value = 0

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0. (Give a reasonable estimate even if quantity is above maximum.):

No hazardous waste is known to have been disposed of at the site.

Basis of estimating and/or computing waste quantity:

NA
Ref. 7, 8, 15
Assigned value = 0

* * *

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

No known uses of unnamed stream. Erie Barge Canal (1.05 miles north) used for recreation and transportation.
Ref. 4, 7
Assigned value = 2

Is there tidal influence?

No
Ref. 13, 14

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None within 2 miles.
Ref. 13, 14

Distance to 5-acre (minimum), fresh-water wetland, if 1 mile or less:

Approximately 0.5 mile southwest of site
Ref. 16
Assigned value = 1

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

None within 1 mile.
Ref. 17

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

Closest surface water intakes are more than 3 miles away on the Niagara River.
Ref. 4, 10, 12

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

NA

Total population served:

None.

Name/description of nearest of above water bodies:

NA

Distance to above-cited intakes, measured in stream miles:

More than 3 miles.
Ref. 10, 12
Assigned value = 0

AIR ROUTE

1. OBSERVED RELEASE

Contaminants detected:

No air samples collected for analysis.

Date and location of detection of contaminants:

NA

Methods used to detect the contaminants:

NA

Rationale for attributing the contaminants to the site:

NA
Assigned value = 0

* * *

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

No air samples collected.

Most incompatible pair of compounds:

No air samples collected.

Toxicity

Most toxic compound:

No air samples collected.

Hazardous Waste Quantity

Total quantity of hazardous waste:

No hazardous waste is known to have been disposed of at the site.

Basis of estimating and/or computing waste quantity:

NA
Ref. 7, 8, 15
Assigned value = 0

* * *

3. TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi | 0 to 1 mi | 0 to 1/2 mi | 0 to 1/4 mi

5,478 people
Ref. 7
Assigned value = 18

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None within 2 miles.
Ref. 13, 14, 16

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Approximately 0.5 mile southwest of site.
Ref. 16
Assigned value = 1

Distance to critical habitat of an endangered species, if 1 mile or less:

None within 1 mile.
Ref. 17

Land Use

Distance to commercial/industrial area, if 1 mile or less:

0.7 mile northeast.
Ref. 16

Distance to national or state park, forest, wildlife reserve, if 2 miles or less:

None within 2 miles.
Ref. 16

Distance to residential area, if 2 miles or less:

Residence approximately 800 feet north of site on Griswold Street.
Ref. 9, 13

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Adjacent to site.
Ref. 16
Assigned value = 3

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

None within 2 miles.
Ref. 16

Is a historic or landmark site (National Register of Historic Places and National Natural Landmarks) within the view of the site?

None within view.
Ref. 20

A state or local Fire Marshall has not certified this site as a fire or explosion threat.

FIRE AND EXPLOSION

1. CONTAINMENT

Hazardous substances present: Not scored.

Type of containment, if applicable:

* * *

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Reactivity

Most reactive compound:

Incompatibility

Most incompatible pair of compounds:

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

Basis of estimating and/or computing waste quantity:

* * *

3. TARGETS

Distance to Nearest Population

Distance to Nearest Building

Distance to a Sensitive Environment

Distance to wetlands:

Distance to critical habitat:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register of Historic Places and National Natural Landmarks) within the view of the site?

Population Within 2-Mile Radius

Buildings Within 2-Mile Radius

DIRECT CONTACT

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

None.
Assigned value = 0

* * *

2. ACCESSIBILITY

Describe type of barrier(s):

No fence around site. Cable across access road to prevent vehicular traffic.
Ref. 4, 7, 9

* * *

3. CONTAINMENT

Type of containment, if applicable:

Lack of adequate cover, as evidenced by leachate outbreaks.
Ref. 4, 7, 9
Assigned value = 15

* * *

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Iron, cadmium, vanadium, and zinc were detected in downgradient sediment and leachate (soil) samples at levels significantly above upgradient sediment levels.
Ref. 15

Compound with highest score:

Iron, cadmium, and zinc all score maximum.
Assigned value = 3

* * *

5. TARGETS

Population Within One-Mile Radius

265 people.
Ref. 7
Assigned value = 2

Distance to Critical Habitat (of endangered species)

None.
Ref. 17
Assigned value = 0

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REFERENCES

If the entire reference is not available for public review in the EPA regional files on this site, indicate where the reference may be found.

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2	Rickard, L.V. and D.W. Fisher, 1970, Geologic Map of New York, New York State Museum and Science Service, Map Series No. 15. Document location: Ecology and Environment, Inc., Buffalo, New York.
3	Johnston, R.H., 1964, Groundwater in the Niagara Falls Area, New York, State of New York Conservation Department Water Resources Commission, Basin Planning Report GW-53. Document location: Ecology and Environment, Inc., Buffalo, New York.
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18	Ecology and Environment, Inc., 1990, Phase II Investigation - Town of Royalton Landfill, Drill Log Book. Document location: Ecology and Environment, Inc., Buffalo, New York.
19	Droman, Margaret, 1990, Village of Middleport, Interview Acknowledgement Form, Document location: Ecology & Environment, Inc., Buffalo, New York.
20	National Register of Historic Places 1966-1988, 1989, United States Park Service, National Conference of State Historic Preservation, and American Association for State and Local History. Document location: Ecology and Environment, Inc., Buffalo, New York.
21	Sax, N.I., Sixth Edition, Dangerous Properties of Industrial Materials. Document location: Ecology and Environment, Inc., Buffalo, New York.
22	New York State Department of Health, 1990, Public Water System Annual Inspection Form for Middleport Village Well. Document location: Ecology and Environment, Inc., Buffalo, New York.

REFERENCE 1

TD
811.5
EPA
HW-10
Ref 1

Uncontrolled Hazardous Waste Site Ranking System

A Users Manual
(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

1984

RECEIVED
1989

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[illegible] ENVIRONMENT

REFERENCE 2

Reb 2

Thirty Mile Point Light
Lakeside Park
Breeze
Shadigee
Kuckville
Carlton
Morgan Creek
West Kendall
Sawyer
Carlton Station
Central Basin
Lake Road
Barker Trade School
Gaines
Ashwood
Platter
Waterport
Orchard
Canyonville
West Gaines
Oak Orchard
Eagle Harbor
Gaines Basin
Five Corners
East Gaines
Murray
North Hartland
Ridgeway
Oak
Knowlesville
Glenwood Lake
Pine Corners
Hartland
Medina
Millville
Barre Center
Manning
Clarendon
East Shelby
South Barre
West Barre
Shelby
Gaines Basin
Oak Orchard
Swamp Creek
Langton Corners
East Oakfield
Elba
Wheatville
Alabama
West Alabama
Oakfield
Norton Field
Byron
South Byron
Newkirk
Pumpkin Hill
Rapids
Wolcottville
Sand Hill
Swifts Mills
TONAWANDA INDIAN RESERVATION
Community Center
Basom
Indian Falls
North Pembroke
Batavia
Dob
Dows
Batavia
Horseshoe Lake
Morganville
Bushville
Akron
Hunts Corners
Ransom
Clarence Center
East Clarence
Murray
Pembroke
East Pembroke
West Batavia
Clarence
South Newstead
Peters Corners
Crittenden
Murder Creek
Mill Grove
Bowmansville
Sky Harbor
North Darien
Darien City
Darien Center
Alden Center
Alden
Alexander
East Alexander
East Bethany
Roanoke
Scott
East Lancaster
West Alden
Akron Reservoir
Danley Corners
Attica
Cowlesville
Bennington
Fonomdale
Madila
Elma Center
East Elma
Elma
Josson
Buffalo
Dhmo
Dhnr
Dhsk
Dhid
Dhmr
Dhnd
Dg
Dj
Dl
Dwf
Dr
Dt
Dv
Dx
Sm
Sl
Scy
Sr
Sv
Sw
Sx
Sy
Sz
Ds
Dn
Dp
Dq
Dw
Dy
Dz
GENESEE CO
ERIE CO
ORLEANS CO
WYOMING CO
COUNTY
NEW YORK CENTRAL
LACKAWANNA
DELAWARE
LEHIGH VALLEY
NYC
WESTERN
Tonawanda Creek
Oak Orchard Creek
Black Creek
Murder Creek
Bowmansville Creek
Eighteen Mile Creek
Buffalo Creek
Little Buffalo Creek
Ransom Creek
Sandy Creek
Whitney Creek
Bigelow Creek
Godfrey Pond
Roanoke Creek
Little Creek
Big Creek
Spring Creek
Murder Creek
Mill Creek
Sawyer Creek
Gaines Basin
Five Corners
Eagle Harbor
Oak Orchard
Ridgeway
Knowlesville
Glenwood Lake
Pine Corners
Hartland
Medina
Millville
Barre Center
Manning
Clarendon
East Shelby
South Barre
West Barre
Shelby
Gaines Basin
Oak Orchard
Swamp Creek
Langton Corners
East Oakfield
Elba
Wheatville
Alabama
West Alabama
Oakfield
Norton Field
Byron
South Byron
Newkirk
Pumpkin Hill
Rapids
Wolcottville
Sand Hill
Swifts Mills
TONAWANDA INDIAN RESERVATION
Community Center
Basom
Indian Falls
North Pembroke
Batavia
Dob
Dows
Batavia
Horseshoe Lake
Morganville
Bushville
Akron
Hunts Corners
Ransom
Clarence Center
East Clarence
Murray
Pembroke
East Pembroke
West Batavia
Clarence
South Newstead
Peters Corners
Crittenden
Murder Creek
Mill Grove
Bowmansville
Sky Harbor
North Darien
Darien City
Darien Center
Alden Center
Alden
Alexander
East Alexander
East Bethany
Roanoke
Scott
East Lancaster
West Alden
Akron Reservoir
Danley Corners
Attica
Cowlesville
Bennington
Fonomdale
Madila
Elma Center
East Elma
Elma
Josson
Buffalo
Dhmo
Dhnr
Dhsk
Dhid
Dhmr
Dhnd
Dg
Dj
Dl
Dwf
Dr
Dt
Dv
Dx
Sm
Sl
Scy
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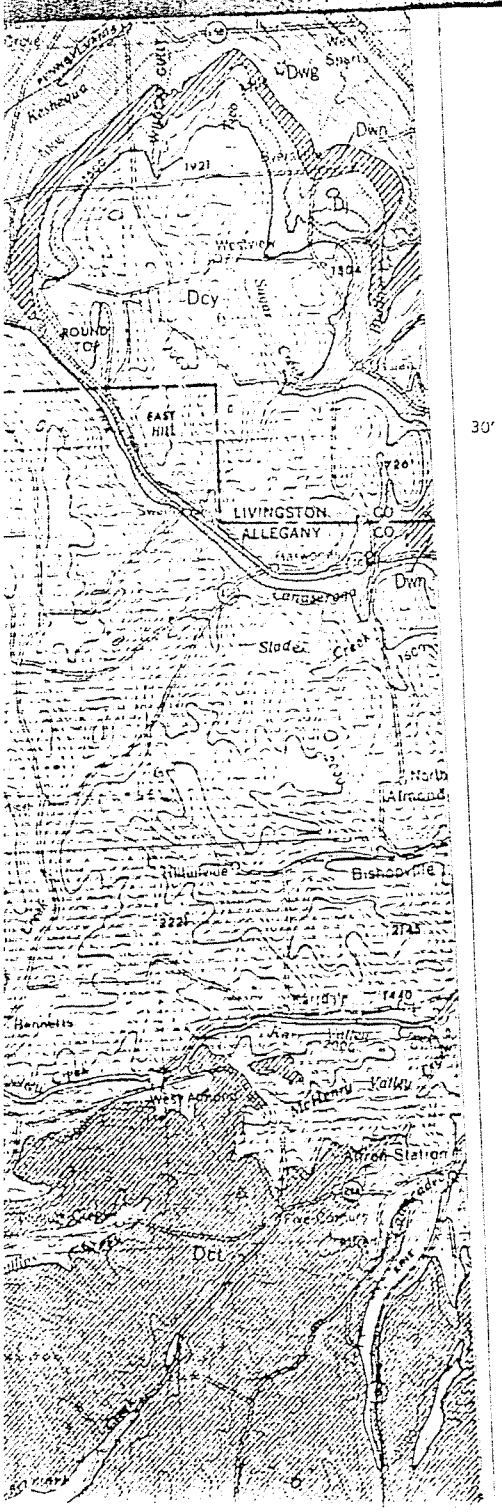
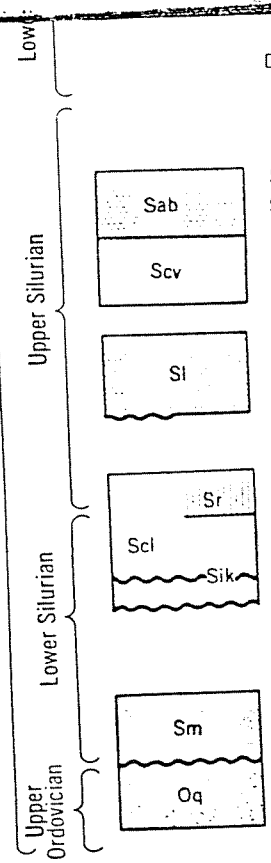
Sz
Ds
Dn
Dp
Dq
Dw
Dy
Dz
GENESEE CO
ERIE CO
ORLEANS CO
WYOMING CO
COUNTY
NEW YORK CENTRAL
LACKAWANNA
DELAWARE
LEHIGH VALLEY
NYC
WESTERN
Tonawanda Creek
Oak Orchard Creek
Black Creek
Murder Creek
Bowmansville Creek
Eighteen Mile Creek
Buffalo Creek
Little Buffalo Creek
Ransom Creek
Sandy Creek
Whitney Creek
Bigelow Creek
Godfrey Pond
Roanoke Creek
Little Creek
Big Creek
Spring Creek
Murder Creek
Mill Creek
Sawyer Creek





stone (Springvale).

Do — Oriskany Sandstone.

AKRON DOLOSTONE AND SALINA GROUP
400-700 ft. (120-210 m.)

Sab — Akron Dolostone; Bertie Formation—dolostone, shale.

Scv — Camillus, Syracuse, and Vernon Formations—shale, dolostone, salt, and gypsum.

LOCKPORT GROUP
150-200 ft. (45-60 m.)

Sl — Guelph, Oak Orchard, Eramosa, and Goat Island Dolostones; Gasport Limestone—local bioherms.

CLINTON GROUP
100-150 ft. (30-45 m.)

Scl — Decew Dolostone; Rochester Shale; Irondequoit and Merriton Limestones.

Sr — Decew Dolostone; Rochester Shale.

Sik — Irondequoit Limestone; Rockway Dolostone; Hickory Corners Limestone; Neahga Shale; Kodak Sandstone.

MEDINA GROUP AND QUEENSTON FORMATION
800 ft. (250 m.)

Sm — Thorold Sandstone; Grimsby Formation—sandstone, shale; Power Glen and Cabot Head Shales; Whirlpool Sandstone.

Oq — Queenston Shale.

MAP SYMBOLS

Observed or approximately located contact

Conjectural contact; includes projections beneath extensive Quaternary cover and many contacts based on reconnaissance mapping.

REFERENCE 3

Ref 3

GROUND WATER IN THE NIAGARA FALLS AREA, NEW YORK

With Emphasis on the Water-Bearing Characteristics of the Bedrock

BY

RICHARD H. JOHNSTON

GEOLOGIST

U.S. GEOLOGICAL SURVEY

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STATE OF NEW YORK

CONSERVATION DEPARTMENT

WATER RESOURCES COMMISSION

BULLETIN GW-53

1964

5-30

million. However, the ability of the reservoir water to dissolve dolomite, and thus to increase its bicarbonate content, is roughly equal to the dissolving ability of rain water. This results from the fact that the ability of water to dissolve dolomite and limestone is largely dependent upon its carbon-dioxide content which is roughly equal in both rain water and the reservoir water. Because of this, water infiltrating into the Lockport from the reservoir has a "headstart" of 125 ppm bicarbonate. Therefore, an increase in bicarbonate content, such as that observed in the four wells listed in the preceding table, may represent the arrival at the wells of water from the reservoir.

CLINTON AND ALBION GROUPS

The Clinton and Albion Groups are a series of shales, sandstones, and limestones which crop out along a narrow belt parallel to the Niagara escarpment. The Clinton rocks are composed principally of the dark-gray Rochester Shale, but also contain two thin limestones and a thin shale unit. The Albion Group consists of two thin sandstones which are separated by a sequence of alternating shale and sandstone. The names and distinguishing lithologic features of the formations making up the Clinton and Albion Groups are given in figure 5.

The Clinton and Albion Groups are little utilized as sources of ground water, mainly because they are overlain everywhere, except along the Niagara escarpment, by the more productive Lockport Dolomite. Accordingly, not much is known about their water-bearing properties. In general, the limestones and sandstones are the most permeable units in the Clinton and Albion Groups. The abundance of both vertical and bedding joints in outcrops and quarries in the limestones and sandstones suggests that they are as permeable as the Lockport. However, the position of the relatively impermeable Rochester Shale at the top of the Clinton Group drastically limits recharge to the more permeable sandstones and limestones below. As a result the uppermost part of the more permeable limestone units in the Clinton Group is dry in many places. Because of the lack of recharge, the average yield of wells in the Clinton and Albion Groups is only 2 to 3 gpm which is adequate only for small domestic and farm supplies.

The water in the Clinton and Albion rocks is highly mineralized and very hard. As shown in table 2, the average hardness and chloride content of water from the Clinton and Albion Groups is the highest in the Niagara Falls area.

QUEENSTON SHALE

The Queenston Shale consists mostly of brick-red, sandy shale and thin beds of greenish-gray shale and greenish-gray sandstone. The thickness of the Queenston is 1,200 feet. However, only 200 feet are exposed in the area; the remainder of the formation crops out under Lake Ontario.

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REFERENCE 4

Ref 4

Ref 4

NCHD - 1983

NAME:

Town of Royalton (DEC #932092)

LOCATION:

This site is a five acre parcel located west of Griswold Street and 0.5 mile south of Rochester Road in Royalton, NY.

A site sketch is attached.

OWNERSHIP:

The property is owned by Mr. Douglas Ortman, 4240 Griswold Street, Middleport, NY. The site was operated by the Town of Royalton Highway Department.

HISTORY:

This site was used to dispose of municipal refuse collected by Bancroft and individual residents from the Town of Royalton and the Villages of Gasport and Middleport. The site was in use in the early 1960's and was officially open until 1978. No disposal of hazardous materials is known.

A 1964 NCHD inspection report states that open burning was being practiced and that cover was applied monthly at that time. From 1964 to 1972, numerous operating problems were reported. A hearing held in July 1973 ordered corrections and upgrading of the operation. From 1973 to 1978, reports indicate that the operation was essentially in compliance with existing codes. The site was closed in 1978.

Recent inspections show that the site is now inactive. Minor scavenger dumping of refuse has occurred since closure. Minor leachate problems ahve been noted. Except for these problems, the site is adequately closed.

PREVIOUS SAMPLING:

Soil and water samples were taken by DEC in 1982. The results of the analyses are attached. The water samples were taken from the drainage ditch; Sample No. 1 from the point of leachate entry and Sample No. 2 150 feet upstream. The results show an increase in each of the detectable parameters in the downstream sample (No. 1) although all concentrations except iron are within effluent standards. The iron concentration increases from 1.5 mg/l upstream to 130 mg/l downstream.

SOILS/GEOLOGY:

This site was originally a stone quarry prior to landfilling. It is expected that wastes were placed directly on bedrock. Surrounding areas have shallow soils (Farmington and Ontario/Limestone series) which are 20" to 40" deep over limestone substratum. Some of the limestone has probably been removed during the quarrying operation. The depth of waste burial is not known.

The site is on the Clinton outcropping forming part of the Niagara Escarpment. Bedrock is the portion of the Clinton Group which is typically below the Rochester Shale. Limestone, sandstone and shale stratum are present.

GROUNDWATER:

Little information is available on groundwater within the Clinton Group. According to Johnston (1964) this formation is physically capable of transmitting substantial volumes of groundwater, particularly within the limestone and sandstone members. However, this formation is overlain everywhere except along the Excarpment outcropping by the impervious Rochester Shale. Therefore, recharge of aquifers is severely limited. Reportedly, wells in this formation generally have low yields (often inadequate yields) and water quality is poor due to hardness and salinity.

Several wells are located south of the site; however, these tap the Lockport Dolomite which outcrops above the site. Therefore, this site poses no threat of contamination of these wells.

SURFACE WATER:

The ditch adjacent to the north side of the site enters a stream which flows into the Barge Canal at Middleport. There are no major users of water from the creek. The Barge Canal is an emergency source of water for the City of Lockport.

The site is not in a 100 year flood plain. There are no significant wetlands near this site.

AIR/FIRE/EXPLOSION:

No air emissions or odor problems have been noted since the site was closed. The potential of fire occurring is minimal.

The surrounding area is agricultural. The Village of Middleport is over one mile northeast. Population within one mile is estimated as under 100.

SECURITY/DIRECT CONTACT:

No toxic materials are known to be present. All wastes are covered. Small amount of leachate are exposed. Vehicular traffic is prevented by a cable across the access road. The site may eventually be used as pastureland.

CONCLUSIONS:

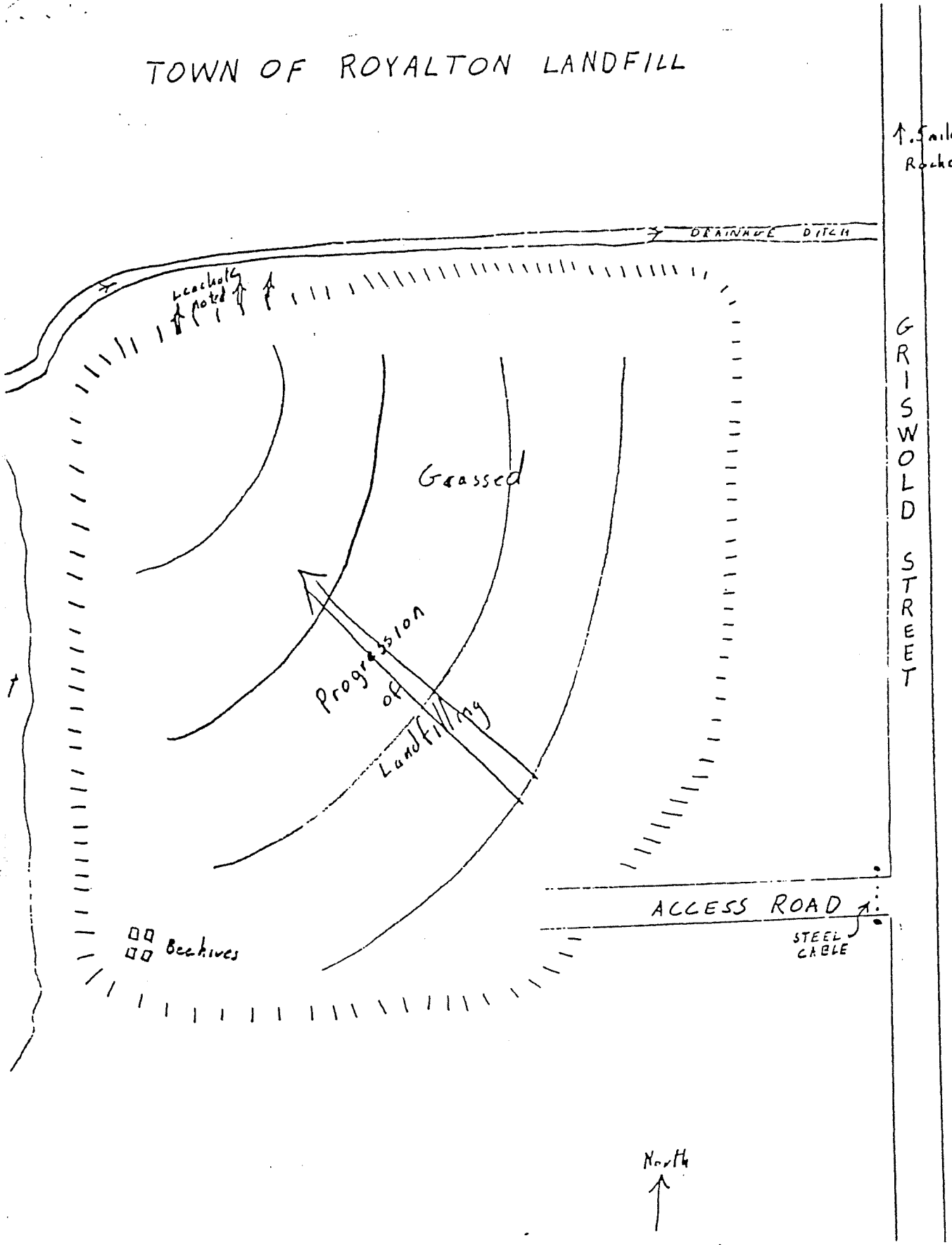
This site is an inactive municipal landfill which served about 7000 people for about 15 years. No hazardous materials are known to be present. The site is covered and grassed. Minor leachate problems have been noted.

RECOMMENDATIONS:

Periodic monitoring of leachate along the drainage ditch should continue. If the extent of the problems increases, remedial action should be considered. No other actions are considered necessary.

932092

TOWN OF ROYALTON LANDFILL



Not to scale
sketch only

Michael E Hopkins, NCHD
4/15/83

TOWN OF ROYALTON - Soil Analyses

COMPOUND	UNITS	SITE LOCATION #1
Antimony	ug/g dry	<5
Arsenic	ug/g dry	1.1
Beryllium	ug/g dry	<0.3
Cadmium	ug/g dry	0.29
Chromium	ug/g dry	7.5
Copper	ug/g dry	15
Iron	ug/g dry	29,000
Lead	ug/g dry	9.5
Mercury	ug/g dry	<0.06
Nickel	ug/g dry	3.8
Selenium	ug/g dry	<0.3
Silver	ug/g dry	<0.3
Thallium	ug/g dry	<3
Zinc	ug/g dry	160
Halogenated Organic Scan	ug/g dry as Cl_2 Lindane Standard	0.58
Dry Weight	%	51

TOWN OF ROYALTON LANDFILL - Water Analyses

COMPOUND	UNITS	SITE LOCATION (1)	(2)	EFFLUENT STANDARD
Antimony	mg/l	<0.2	<0.2	
Arsenic	ug/l	<5	<5	.05 mg/l
Beryllium	mg/l	<0.01	<0.01	
Cadmium	mg/l	<0.004	<0.004	.02 mg/l
Chromium	mg/l	0.020	0.004	.10 mg/l
Copper	mg/l	0.022	<0.005	1.0 mg/l
Iron	mg/l	130	1.5	0.6 mg/l
Lead	mg/l	<0.03	<0.03	0.05 mg/l
Mercury	ug/l	<1	<1	0.004 mg/l
Nickel	mg/l	<0.03	<0.03	2.0 mg/l
Selenium	ug/l	<5	<5	0.04 mg/l
Silver	mg/l	<0.01	<0.01	0.1 mg/l
Thallium	mg/l	<0.1	<0.1	
Zinc	mg/l	0.701	0.063	5.0 mg/l
Halogenated Organic Scan	ug/l as Cl_2 Lindane Standard	1.5	0.75	
Total Organic Carbon	mg/l	30	19	

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NYDEC Profile report - 1982

NAME OF SITE: Town of Royalton Landfill

LOCATION: Griswold Road, Royalton (T), Niagara County

CURRENT OWNER: Town of Royalton

HISTORY

This site was used by the Town of Royalton for the disposal of municipal wastes until 1979. For most of the time it was operating the site was plagued with operational problems. In 1979, landfilling operations at this site ceased and the site was supposed to be properly closed. However, since landfilling operations ceased, problems with leachate and midnight dumping have been reported by the Niagara County Health Department.

INVESTIGATION

This site was inspected on March 31, 1982 by Messrs. Senior and Christoffel of DEC - Region 9. Samples were taken from two locations. Soil and water samples were taken from the shore of a drainage ditch adjacent to the landfill, at the point where leachate was leaking into the ditch. The second location was in the drainage ditch, approximately 150 feet upstream from the first location.

SOILS & GEOLOGICAL INFORMATION

This site is located on Hilton Silt Loam and Ontario Loam. The Hilton series consists of deep, moderately well drained, medium textured soils. These soils are formed in calcareous glacial till, containing sandstone and limestone fragments. The Ontario series consists of deep, well-drained, medium textured soils that were formed in calcareous, loamy, glacial till deposits. The glacial material contains semi-rounded and angular rock fragments that are mostly sandstone and limestone.

The bedrock in this area is of the Lockport group. It is dolomite and dolomitic limestone, locally cherty. The Gasport Limestone at the base is locally reefy.

SAMPLE ANALYSES

The samples taken at the leachate breakout contained high concentrations of iron in both the water and soil samples. There was a noticeable difference between samples taken at the breakout and upstream for chromium, copper, iron, zinc, halogenated organics and total organic carbon. Detectable concentrations of halogenated organics were found in both the soil and water samples.

DISCUSSION OF RESULTS

On the day of this investigation a sizable leachate breakout was observed in the northwest corner of the landfill. The leachate and the soil around it were discolored red, nnd this discoloration extended into the drainage ditch adjacent to the landfill. Also, garbage and various debris were observed in this section of the landfill left by so-called "midnight dumpers". Erosion channels were evident in the area of the breakout.

This site is approximately 1 mile southwest of the Village of Middleport, and is in a fairly rural area. However, access to the site is not restricted, as is evidenced by the presence of garbage on the site. The leachate drained into a ditch wiich drained into a stream which flowed into Middleport. The possibility exists that the stream could be contaminated by the leachate. This site is not within the 100 year flood level of any streams in the area.

RECOMMENDATIONS

The fact that leachate, contaminated with iron, zinc, and other compounds, is getting into a drainage ditch that flows into an open body of water is unacceptable. It is recommended that the Town of Royalton cover the area of the breakout, grade it, and seed it to discourage erosion. Further, the steel cable rope that is suppose to be across the access road on the site should be repaired so as to limit access to the site and discourage illegal dumping.

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TOWN OF ROYALTON LANDFILL - Water Analyses

COMPOUND	UNITS	SITE LOCATION (1)	(2)	EFFLUENT STANDARD
Antimony	mg/l	<0.2	<0.2	
Arsenic	ug/l	<5	<5	.05 mg/l
Beryllium	mg/l	<0.01	<0.01	
Cadmium	mg/l	<0.004	<0.004	.02 mg/l
Chromium	mg/l	0.020	0.004	.10 mg/l
Copper	mg/l	0.022	<0.005	1.0 mg/l
Iron	mg/l	130	1.5	0.6 mg/l
Lead	mg/l	<0.03	<0.03	0.05 mg/l
Mercury	ug/l	<1	<1	0.004 mg/l
Nickel	mg/l	<0.03	<0.03	2.0 mg/l
Selenium	ug/l	<5	<5	0.04 mg/l
Silver	mg/l	<0.01	<0.01	0.1 mg/l
Thallium	mg/l	<0.1	<0.1	
Zinc	mg/l	0.701	0.063	5.0 mg/l
Halogenated Organic Scan	ug/l as Cl_2 Lindane Standard	1.5	0.75	
Total Organic Carbon	mg/l	30	19	

TOWN OF ROYALTON - Soil Analyses

COMPOUND	UNITS	SITE LOCATION #1
Antimony	ug/g dry	<5
Arsenic	ug/g dry	1.1
Beryllium	ug/g dry	<0.3
Cadmium	ug/g dry	0.29
Chromium	ug/g dry	7.5
Copper	ug/g dry	15
Iron	ug/g dry	29,000
Lead	ug/g dry	9.5
Mercury	ug/g dry	<0.06
Nickel	ug/g dry	3.8
Selenium	ug/g dry	<0.3
Silver	ug/g dry	<0.3
Thallium	ug/g dry	<3
Zinc	ug/g dry	160
Halogenated Organic Scan	ug/g dry as Cl_2 Lindane Standard	0.58
Dry Weight	%	51

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REFERENCE 5

Subsurface Boring Logs

Appendix C
This Report

REFERENCE 6

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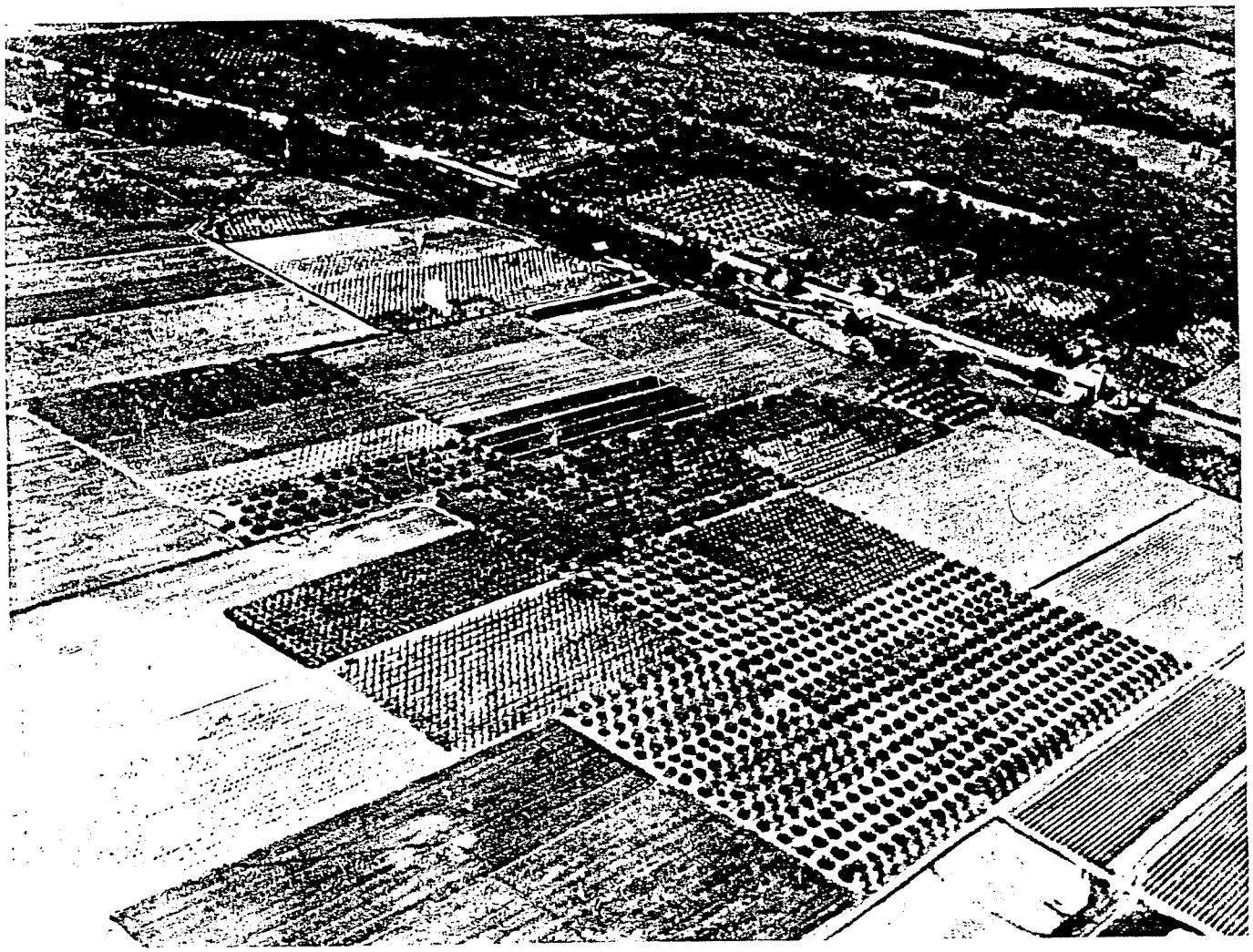
.N5

SOIL SURVEY OF

Niagara County, New York



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Issued October 1972

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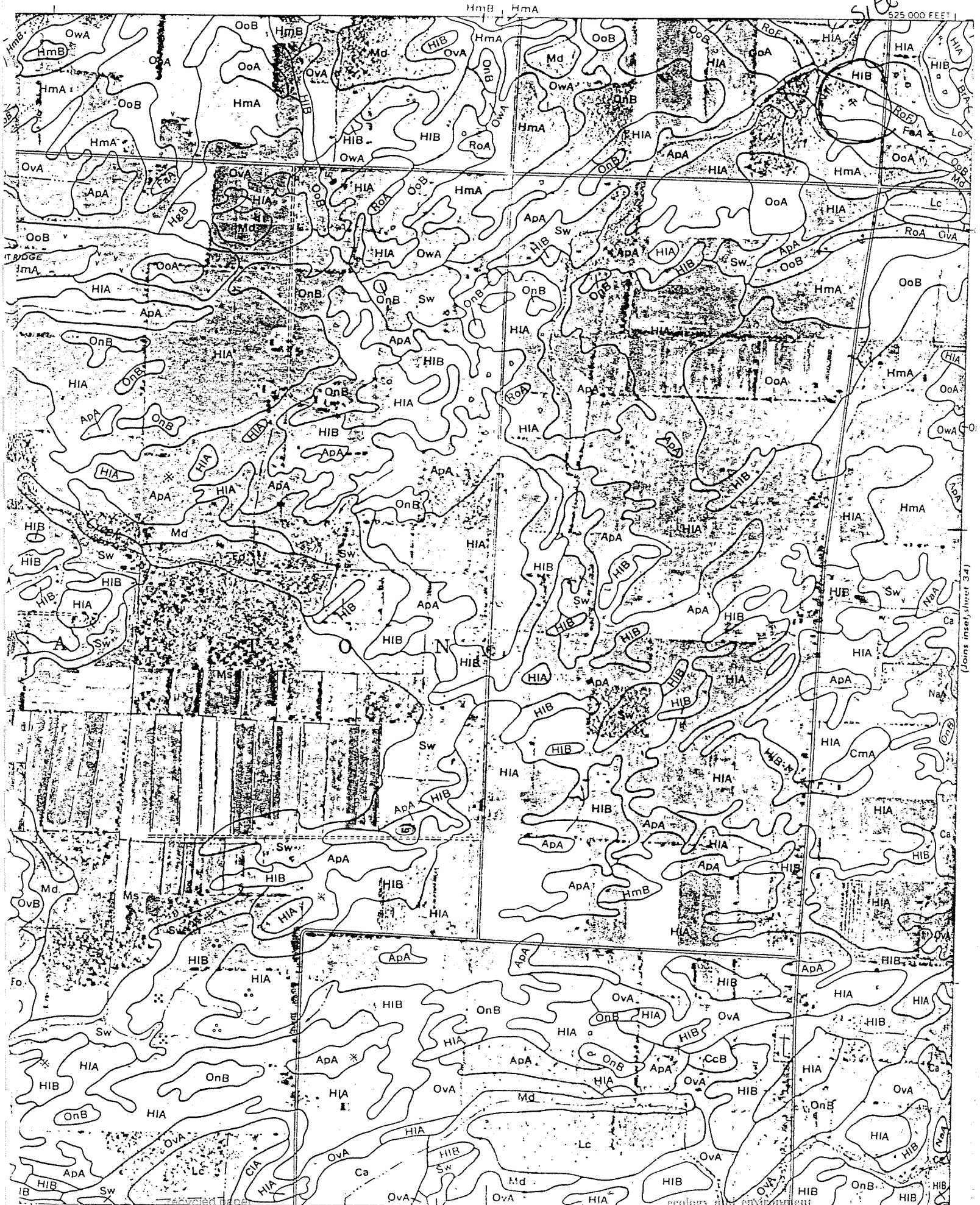

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soils and the somewhat poorly drained Stafford soils. Elnora soils lack the clayey IIC horizon of Claverack and Cosad soils. They are coarser textured than the Galen soils. Elnora soils are better drained and coarser textured than Minoa soils and lack the gravel that is characteristic of the Altmar soils.

Elnora loamy fine sand, 0 to 2 percent slopes (ElA).--This soil has the profile described as representative for the series. Areas are irregular or roughly rectangular. Most areas are less than 20 acres in size.

Most commonly included with this soil in mapping are small knolls of well-drained Colonie soils. Also included are Minoa or Stafford soils in areas along drainageways and in depressional areas. Areas of similar Galen soils are included where thin, finer textured layers are present in the lower part of the subsoil. Claverack and Cosad soils are in small included areas. Included near the town of Newfane are areas of a soil that has gravel layers within a depth of 40 inches. The symbol for gravel is used on the soil map to indicate areas where gravel is in the surface layer. Other inclusions are a few areas where the soil is moderately deep to glacial till.

This Elnora soil is suited to most field crops and cash crops. It is well suited to specialized vegetable or fruit crops. If this soil is cropped intensively, random drainage of the wetter inclusions is essential. In some places a complete drainage system is desirable. Soil blowing is a hazard, and the soil is droughty during dry periods in some places. A most important need is adequate liming and fertilizing. (Capability unit IIw-1; woodland suitability group 4s1)

Elnora loamy fine sand, 2 to 6 percent slopes (ElB).--This soil has more complex slopes than Elnora loamy fine sand, 0 to 2 percent slopes. It dries out fairly quickly in the spring and it is often more droughty in summer than that soil. Areas are generally circular or roughly oblong and normally are less than 20 acres in size.

Included with this soil in mapping are the somewhat poorly drained Minoa soils or Stafford soils in the lower, wetter areas. Also included, in the northeastern part of the county near areas of Lockport and Claverack soils, are many areas of soils that are similar to this Elnora soil but are underlain by clay. Near the village of Newfane are included areas of soils that have gravel layers or are underlain by gravel. In some places inclusions of Altmar or Fredon soils occur. Also included are slightly higher knolls of well-drained Colonie soils. In a few scattered areas, inclusions are underlain by glacial till at a depth of less than 40 inches. Galen soils similar to this Elnora soil are common inclusions where thin, finer textured layers are present in the lower part of the subsoil.

This soil is suited to most field crops and cash crops. It is well suited to vegetables or fruit crops. A most important need is the timely use of adequate amounts of lime and fertilizer. Protection against soil blowing is needed, and there is a slight hazard of erosion by water. Random drainage of included wet areas is desirable if this soil is used intensively. During dry periods, this soil is droughty in some places. (Capability unit IIw-1; woodland suitability group 4s1)

Farmington Series

The Farmington series consists of shallow, well-drained, medium-textured soils. These soils are nearly level to moderately sloping. They formed in thin glacial till deposits over limestone bedrock that is within 20 inches of the surface. These soils are on bedrock-controlled landscapes influenced by the Lockport limestone formation. Slopes range from 0 to 8 percent.

A representative profile of a Farmington soil that is idle has a very dark grayish brown silt loam surface layer 8 inches thick. This layer contains a few limestone fragments and is slightly acid to neutral. Between depths of 8 to 16 inches, the subsoil is brown to yellowish-brown, friable silt loam. At a depth of 16 inches a 2-inch layer of the subsoil occurs, and it is brown, friable loam that is neutral. Gray, hard limestone occurs at a depth of 18 inches. It is fractured, and some soil material and roots penetrate the small cracks.

Water is sometimes present above the limestone rock early in spring or in very rainy periods. As the growing season progresses, and the soil above the limestone dries out, these soils become droughty. Roots are confined mostly to the soil above the limestone, but a few fine roots penetrate cracks. Permeability is moderate to moderately rapid and the available moisture capacity is low. Cultivation is difficult because of stones on the surface and in the profile and because of the limestone bedrock near the surface.

Representative profile of Farmington silt loam, 0 to 8 percent slopes, 900 feet east of the junction of State Routes 93 and 31 and 200 yards south of State Route 31, about one-half mile north of Frontier Dolomite Limestone Quarry; idle area:

Ap--0 to 8 inches, very dark grayish brown (10YR 3/2) silt loam; dark grayish brown (10YR 4/2) when rubbed; moderate, medium, granular structure; friable; abundant fine roots; few limestone fragments; slightly acid; clear, smooth boundary. 6 to 9 inches thick.

B21--8 to 16 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silt loam; weak, fine and medium, subangular blocky structure that has pressure faces; friable; plentiful fine roots; few limestone fragments; slightly acid to neutral; clear, wavy boundary. 4 to 10 inches thick.

B22--16 to 18 inches, brown (10YR 5/3) loam; weak, fine, subangular blocky structure; friable; plentiful fine roots; few limestone and sandstone fragments; neutral; abrupt, wavy boundary. 0 to 5 inches thick.

IIR--18 inches, fractured limestone bedrock; some soil material and roots penetrate the small cracks.

Thickness of the solum and depth to limestone range from 10 to 20 inches. The solum ranges from fine sandy loam to silt loam. Clayey material may be more abundant in joints and cracks in the rock where the underlying rock is fractured than it is in other parts of the profile. The solum ranges from 10 to 27 percent in clay content. Content of coarse fragments ranges from less than 5 to about 25 percent in any horizon above the rock.

The Ap horizon has a hue of 10YR and chroma of 2 or 3. Value is 3 or 4 when the horizon is moist and is more than 5.5 when it is dry. Unless limed, the Ap horizon is medium acid or slightly acid.

The B horizon has hues ranging from 2.5Y to 7.5YR; value of 4 or 5, and chroma of 3 or 4. Reaction below a depth of 12 inches or within 2 inches of the bedrock is slightly acid to neutral.

The Farmington soils have formed in materials similar to those of soils derived from glacial till, such as the Ontario, Hilton, Cayuga, Ovid, and Appleton soils. Farmington soils lack the Bt horizon of these soils and are less than 20 inches deep to rock.

Farmington silt loam, 0 to 8 percent slopes (FaA).--Areas of this soil range from less than 5 to more than 50 acres in size. The dominant slope is less than 5 percent.

Included in this soil in mapping are areas of soils that are more than 20 inches deep to rock and of soils that are less than 10 inches to rock. Also included are some small areas of Rock land. Wet spots are included in some areas, and most of them are shown on the soil map by the symbol for wet spots.

Runoff is slow to moderately rapid and depends on the slope. The hazard of erosion is moderate in the more sloping areas.

This soil is poorly suited to most long-season cultivated crops because it is shallow, stony, and droughty. In some areas where the underlying bedrock is well fractured, this soil is suited to grain, pasture, and hay. (Capability unit IIIs-2; woodland suitability group 5d1)

Fonda Series

The Fonda series consists of deep, very poorly drained, medium-textured soils. These soils formed in calcareous, lake-laid clay and silt. The silt and clay were deposited in fairly shallow areas of postglacial lakes. These soils occupy swampy, depressional areas that are mainly south of the limestone escarpment.

A representative profile of a Fonda soil that has been cultivated has a black, neutral mucky silt loam surface layer 7 inches thick. The upper part of the subsoil is greenish-gray silty clay 8 inches thick. It is neutral and contains prominent, yellowish-red mottles. The lower part of the subsoil is olive-gray, neutral to moderately alkaline silty clay that is firm when moist and sticky when wet. It extends to a depth of 29 inches. This layer is distinctly mottled with light olive brown. The substratum is brown and grayish-brown, firm silty clay loam to silty clay that is strongly calcareous.

These soils have a seasonal high water table that is perched above the slowly permeable subsoil and substratum. Unless these soils are artificially drained, the water table remains on or just under the surface for about 9 months a year. Runoff from Fonda soils is very slow, and many areas are ponded. The depth of soil available for rooting is related to the depth to the water table. The root zone is mainly the uppermost 10 inches of soil. If drainage is adequate, roots may extend to a depth of 30 inches or more. The available moisture capacity is low to moderate.

Representative profile of Fonda mucky silt loam in the town of Cambria, 200 feet east of State Route 425 and one-fourth mile north of State Route 31; idle area:

Ap--0 to 7 inches, black (10YR 2/1) mucky silt loam, very dark gray (10YR 3/1) when dry; moderate, medium and coarse, granular structure; friable; abundant roots; neutral; abrupt, smooth boundary. 6 to 8 inches thick.

B21g--7 to 15 inches, greenish-gray (5GY 5/1) silty clay; few, fine, prominent, yellowish-red (5YR 5/6) mottles; moderate, very coarse, prismatic structure; firm; few fine roots along prism faces; few fine pores; neutral; gradual, smooth boundary. 3 to 9 inches thick.

B22g--15 to 29 inches, olive-gray (5Y 5/2) silty clay; greenish-gray (5GY 5/1) and gray (10YR 5/1) ped coats; common, medium, distinct, light olive-brown (2.5Y 5/4), mottled ped interiors; moderate, very coarse, prismatic structure breaking to weak, coarse, blocky structure; unmottled ped faces have few to no clay films; firm, sticky; very few roots; neutral to moderately alkaline; clear, smooth boundary. 12 to 20 inches thick.

Cg--29 to 50 inches, brown (7.5YR 5/2) and grayish-brown (10YR 5/2) silty clay loam and silty clay; common, medium, faint, brown (7.5YR 5/4) mottles; weak, thick, platy structure; firm; strongly calcareous.

The solum ranges from 24 to 36 inches in thickness. Depth to carbonates generally corresponds to this thickness, but the lower part of the B horizon is calcareous in some profiles. Depth to bedrock is more than 40 inches and typically is more than 6 feet. Coarse fragments are normally absent, but erratic pebbles and stones are present in some profiles. Clay content between depths of 10 and 40 inches (control section) averages between 35 and 55 percent.

The Ap horizon is 10YR or 7.5YR in hue and 1 or 2 in chroma. It ranges from 1 to 3 in value when moist and is 4 or 5 when dry. Thickness of the Ap

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Hilton Series

The Hilton series consists of deep, moderately well drained, medium-textured soils. These soils formed in calcareous glacial till containing sandstone and limestone fragments. They are nearly level to gently sloping and are on the till plain in all parts of the county. The largest acreage is in three general areas of the county. One is parallel to the limestone escarpment, another is in the west-central part of Newfane, and the other is near the southeastern part of Somerset.

A representative profile of a Hilton soil has a dark-brown gravelly loam surface layer 9 inches thick. The surface layer is underlain by brown, friable loam that has a few light yellowish-brown mottles and is 6 inches thick. This layer is medium acid and contains some angular and semirounded rock fragments. At a depth of 15 inches, it merges with a reddish-brown subsoil that is firm heavy loam and contains reddish-yellow mottles. The subsoil also contains semirounded rock fragments, is slightly acid in the upper part, and is neutral in the lower part. At a depth of 30 inches a calcareous substratum occurs. It is a reddish-brown gravelly light loam that is about 20 percent semirounded fragments.

Permeability is moderate or moderately rapid in the upper part of Hilton soils and is moderately slow or slow in the lower part of the subsoil and in the substratum. The seasonal high water table rises to within 18 inches of the surface and is perched above the slowly permeable underlying glacial till. The Hilton soils are wet for brief but significant periods after prolonged wet weather. The depth of soil available for rooting is restricted mainly to the uppermost 15 to 24 inches early in the growing season, but as the water table drops, a few fine roots extend to as much as 40 inches below the surface or to the depth of the underlying glacial till. The available moisture capacity is high. In some areas there are enough coarse fragments to interfere with tillage and other cultural operations. These soils generally are well suited to most crops grown in the county.

Representative profile of Hilton gravelly loam, 0 to 3 percent slopes, in the town of Somerset, 100 feet south of West Somerset Road and three-tenths of a mile west of its junction with Hartland Road; cultivated area:

Ap--0 to 9 inches, brown to dark-brown (10YR 4/3) gravelly loam, pale brown (10YR 6/3) when dry; weak, fine and medium, granular structure; friable; abundant fine roots; 15 to 20 percent coarse fragments; medium acid; clear, smooth boundary. 6 to 10 inches thick.

A2--9 to 15 inches, brown (10YR 5/3) light loam; few, fine, faint, light yellowish-brown (10YR 6/4) mottles; weak, thin, platy structure or massive; friable; plentiful fine roots; about 10 percent coarse fragments; medium acid; clear, irregular boundary. 0 to 8 inches thick.

B&A--15 to 19 inches, reddish-brown (5YR 5/3) loam; moderate, medium and coarse, subangular blocky structure; firm; interfingering of brown (10YR 5/3) silt and very fine sand coatings that are thickest in upper part; patchy clay films on about 10 percent of ped faces; plentiful roots; about 10 percent coarse fragments; slightly acid; clear, wavy boundary. 2 to 6 inches thick.

B2t--19 to 30 inches, reddish-brown (5YR 5/3) heavy loam; common, medium, distinct, reddish-yellow (7.5YR 6/6) mottles; moderate, medium and coarse, subangular blocky structure; firm; thin clay films on about 20 percent of ped faces and thicker films in the pores; few clay flows along vertical channels; plentiful roots in upper part of horizon and few roots in lower part; about 10 percent coarse fragments; slightly acid in upper part, neutral in lower part; clear, wavy boundary. 8 to 17 inches thick.

C--30 to 60 inches, reddish-brown (5YR 5/3) gravelly light loam; weak, medium and thin, platy structure; firm; about 20 percent coarse fragments; no roots; calcareous.

Thickness of the solum and depth to carbonates range from 24 to 36 inches. Bedrock is at a depth of more than 40 inches. Content of coarse fragments ranges from less than 5 percent to as much as 35 percent in any horizon. Coarse fragments typically are more than 5 percent throughout the solum and are more than 10 percent in the underlying glacial till. The Ap horizon ranges from gravelly loam to silt loam. It is 10YR or 7.5YR in hue and, when moist, 3 or 4 in value. Chroma is 2 or 3. When the Ap horizon is dry, values are more than 5.5. Reaction ranges from medium acid to neutral. The A2 horizon ranges from fine sandy loam or gravelly fine sandy loam to loam or gravelly loam. It ranges from 10YR to 5YR in hue and has a matrix value of 4 or 5 and a chroma of 4 or 3. The A2 horizon is faintly mottled in some places. It has platy or weak, blocky structure, or it is massive. Reaction is medium acid to slightly acid. The A2 horizon is absent in some places where the soil is plowed deeply or is eroded.

In the B&A horizon, the A part has the same range in color, texture, and other characteristics as the A2 horizon, and the B part has the same range as the B horizon. The B horizon is loam or silt loam averaging 18 to 27 percent clay. Hue ranges from 10YR to 2.5YR, value of the matrix is 4 or 5, and chroma is 3 or 4. In the B horizon the chroma of mottles is more than the chroma of the matrix. Mottles of low chroma are present in some profiles, but mottles that have a chroma of 2 do not occur in the upper 10 inches of the B2t horizon. Clay films are patchy or nearly continuous on the ped surfaces of some profiles. The B horizon has moderate, medium or coarse, blocky structure. It ranges from medium acid to neutral.

The C horizon is generally firm or very firm gravelly fine sandy loam or loam, but it is stony

or nongravelly in places. Hues range from 10YR to 2.5YR, value of the matrix is 4 or 5, and chromas range from 2 to 4. The C horizon is mottled in some profiles. It is calcareous.

Hilton soils formed in deposits similar to those of the well-drained Ontario, the somewhat poorly drained Appleton, and the poorly to very poorly drained Sun soils. Hilton soils have a coarser textured Bt horizon than Cazenovia and Cayuga soils. They are finer textured in the A horizon than Bombay soils. Hilton soils are better drained and have a coarser textured Bt horizon than Ovid and Churchville soils.

Hilton gravelly loam, 0 to 3 percent slopes (HgA).--This soil has the profile described as representative for the series. The soil occurs mostly in areas that range from less than 3 to about 30 acres in size and are normally oblong. These areas occupy the tops of knolls and foot slopes where water accumulates for short periods.

Most commonly included with this soil in mapping are areas of Appleton and Sun soils in wet spots or along drainways. Also included are areas of Howard or Phelps soils. Other inclusions are small areas of Cazenovia soils that contain more clay in the subsoil than this Hilton soil. Small areas of Bombay soils also are included, but these soils have less clay in the subsoil than the Hilton soil. The included Bombay soils are principally in the town of Newfane. In some places soils that have a nongravelly or very gravelly surface layer are included.

This soil is suited to most crops grown in the county and to pasture or trees. The gravel may interfere with some kinds of cultivation, and it is hard on machinery in many places. The gravel content may interfere with the growth of certain vegetable crops. Because runoff is slow, random drainage of included wet spots may be needed. (Capability unit IIw-2; woodland suitability group 2o1)

Hilton gravelly loam, 3 to 8 percent slopes (HgB).--This gently sloping soil is similar to the one described as representative but has a higher gravel content in places. Most areas of this soil range from less than 3 to about 10 acres in size. The soil occupies small knolls in a generally flat landscape or occurs in narrow strips along drainageways.

Most commonly included with this soil in mapping are wetter associates, such as the Appleton and Sun soils in drainways. Also included are areas of a Hilton soil that has less than 15 percent gravel in the surface layer. In some places, especially where this Hilton soil is associated with the Howard soils, there are small included areas of gravel deposits. Included areas of coarser textured Bombay soils are in the town of Newfane. Other inclusions are small areas where the soil is very gravelly, cobbly, or stony. Most of these inclusions are the result of the modification of the original glacial till by water, wind, or wave action.

This soil can be used for crops, pasture, or trees. It is suited to most crops grown in the county. The gravel interferes with some kinds of cultivation, and it is hard on machinery in many places. The gravel interferes with the growth of some vegetable root crops. Runoff is moderate, and erosion is a hazard, especially where slopes are long. Random drainage may be needed for included wet spots. (Capability unit IIe-3; woodland suitability group 2o1)

Hilton silt loam, 0 to 3 percent slopes (HlA).--This soil has a profile similar to that described as representative for the series, except that it lacks the gravelly loam surface layer. The surface or plow layer normally has some coarse fragments, mostly less than 15 percent by volume. The individual areas range from less than 5 to more than 100 acres in size. They occupy the tops of ridges and, in some places, make up the entire glacial till ridge.

Included in mapping, within large areas of this soil near Colonial Village in the southern part of Lewiston, are areas of Cayuga soils and areas of a soil that is less than 40 inches to limestone rock. Also included are areas of better drained Ontario soils on knolls or of wetter Appleton, Ovid, or Churchville soils in depressions or along drainageways. Other inclusions are fairly large areas of soils that are less than 6 feet to rock, especially near the limestone escarpment. Inclusions that have a gravelly or stony surface layer occur and are indicated on the soil map by the appropriate symbol.

This soil is suited to most crops grown in the county and to pasture and trees. The seasonal wetness may briefly delay planting. The soil is easily cultivated. It is not used so much for vegetables and fruit as the gravelly Hilton soils, because the largest areas are south of the escarpment, away from the climatic influence of Lake Ontario. Random drainage may be needed for included wet spots. (Capability unit IIw-2; woodland suitability group 2o1)

Hilton silt loam, 3 to 8 percent slopes (HlB).--This soil has a profile that is similar to the profile described as representative for the series, but it lacks the gravelly surface layer. The surface or plow layer normally contains some coarse fragments, but less than 15 percent by volume. This soil commonly occupies narrow strips along the side of a ridge similar to the one along Chestnut Ridge Road in the town of Royalton. It also is on small knolls in a generally flat landscape, and some large areas make up an entire ridge. Areas range from less than 5 to more than 50 acres in size.

Included in mapping are areas of the better drained Ontario soils on knolls. Also included, in the general area of Slayton Settlement Road, are areas of a soil that contains much more silt than this Hilton soil, as well as small areas of Collamer soils. Inclusions of Cayuga soils occur where clay caps the glacial till. Other inclusions are the wetter Appleton or Ovid soils along drainageways; some spots that have a gravelly or stony soil surface layer; and soils that are less than 40 inches deep to hard rock.

This soil is well suited to most crops grown in the county and to pasture or trees. Erosion is a serious hazard if this soil is cultivated and not protected. The seasonal wetness may briefly delay planting. Random drainage of included wetter soils normally is desirable, especially if this soil is used intensively for cultivated crops. Erosion control is needed on long slopes. This soil is especially well suited to hay and grain crops. (Capability unit IIe-3; woodland suitability group 2o1)

Hilton and Cayuga silt loams, limestone substratum, 0 to 3 percent slopes (HmA).--Areas of this undifferentiated group are all Hilton soil, all Cayuga soil, or some of both. The Hilton soil has a profile similar to that described as representative for the series, except that it lacks the gravelly surface layer. Both soils are underlain by hard bedrock, mainly 3 1/2 to 6 feet below the surface. They have more large stones or boulders in or on the surface layer than representative Hilton and Cayuga soils.

This mapping unit is near to the limestone escarpment. Most areas parallel the escarpment and are within 1 mile either to the north or south of the main escarpment area. One of the largest areas is between the villages of Pekin and Sanborn. Areas range from about 5 to 50 acres in size.

Most commonly included in mapping are areas of similar soils that are less than 40 inches deep to rock. One fairly large included area of these similar soils is east of Bond Lake. Another is between Gasport and Middleport and south of State Route 31. In this area the soil is underlain in many places by the softer Rochester shale formation instead of the hard Lockport dolomitic limestone. Also included are spots of better drained Ontario soils and areas of wetter Ovid soils. Both kinds of soil are over rock. Other inclusions are areas of soils that are coarser textured than either the Hilton or the Cayuga soil and areas of Cazenovia soils that are finer textured than the Hilton soils but coarser textured than the Cayuga. In areas close to the limestone escarpment, spots of shallow Farmington soils are common inclusions.

The soils in this mapping unit can be used for crops, pasture, or trees, though in most places they are not so desirable for cropping as the deeper Hilton and Cayuga soils. Limestone near the surface causes droughty spots. Stones and a few rock outcrops interfere with cultivation in some areas. The drainage of included wet spots is difficult because of stones or bedrock.

Corn, alfalfa, and small grains are the principal crops. Crops are generally not so well suited to these soils as they are to the deeper Hilton or Cayuga soils. (Capability unit IIw-2; woodland suitability group 2o1)

Hilton and Cayuga silt loams, limestone substratum, 3 to 8 percent slopes (HmB).--Areas of this undifferentiated group consist of Hilton silt loam, Cayuga silt loam, or both soils. The soils have profiles similar to those described for their respective series, except that hard bedrock is at a depth of 3 1/2 to 6 feet. Large stones or boulders are more common in areas of this mapping unit than in areas of typical Hilton or Cayuga soils.

Most commonly included in this mapping unit are small areas of similar soils that are less than 40 inches to hard rock. Major areas of these moderately deep or shallow included soils are near Bond Lake and along the escarpment between Gasport and Middleport. Also included are spots of better drained Ontario and of Ovid soils. Both kinds of soil are over rock.

The soils in this mapping unit can be used for crops and pasture, though they are not so desirable for these uses as normal Hilton or Cayuga soils. Limestone near the surface causes droughty spots. Stones and a few rock outcrops interfere with cultivation in some areas. (Capability unit IIe-3; woodland suitability group 2o1)

Howard Series

The Howard series consists of deep, well-drained to somewhat excessively drained, medium-textured, gravelly soils. These soils developed in glacial outwash or in glacial beach deposits of sand and gravel. The gravel deposits were derived from sandstone and some limestone and shale. These soils occupy the better drained parts of postglacial beaches and glacial outwash areas. Most of the acreage is north of U.S. Highway No. 104 (Ridge Road). Howard soils are level to sloping and have slopes of 0 to 15 percent.

In a representative profile, a level Howard soil has a dark-brown, slightly acid gravelly loam surface layer 8 inches thick. It is underlain by brown, friable, slightly acid gravelly loam 5 inches thick. The subsoil begins at a depth of 13 inches. The upper part consists of brown to dark-brown, friable, slightly acid gravelly loam that is 16 inches thick and contains tongues of the soil material from the layer above. Between depths of 24 and 29 inches, the subsoil is reddish-brown, firm, neutral gravelly loam. Between depths of 29 inches and 44 inches, the subsoil is brown to dark-brown, firm very gravelly loam that is sticky when wet and neutral. The calcareous substratum is at a depth of 44 inches and consists of grayish-brown, stratified sand and gravel.

The water table is generally below a depth of 40 inches in these soils. The depth to water depends upon the thickness of the gravel deposit and position in the landscape. The available moisture capacity is low to moderate. Rooting depth is generally unrestricted, and deep-rooted plants can obtain moisture below normal rooting depth. Permeability is moderately rapid in the surface layer and rapid in the subsoil.

Representative profile of Howard gravelly loam, 0 to 3 percent slopes, in the town of Newfane, 100 feet north of Hoffman Road and 400 yards east of Hess Road; cultivated area:

erosion has dissected the landscape. A few areas are on foot slopes below glacial till ridges. Areas range from about 5 to 50 acres in size and are oblong in many places. The average-sized area is about 20 acres.

Commonly included are small areas of poorly drained Lakemont soils in depressions or along drainageways and of better drained Schoharie or Cayuga soils on knolls. Also included are areas of Churchville soils where the lake deposits are moderately deep to glacial till. South of the city of Lockport near Robinson and Donner Roads, included areas are moderately deep to silt. In these areas reddish silt is between depths of about 2 to 4 feet, and at 4 feet there is reddish, silty glacial till. In areas north of the limestone escarpment, areas of Niagara and Rhinebeck soils are included.

This soil is best suited to hay, grain, pasture, or trees. In most places random drainage of wet spots is needed. This soil is poorly suited to vegetables and fruits because of texture and surface wetness. Grapes grow fairly well on this soil. Drainage normally is easier on this soil than on Odessa silty clay loam, 0 to 2 percent slopes.

Because this soil is sticky when wet and hard when dry, it needs to be cultivated at a favorable moisture content. If this soil is worked when wet, hard clods and crusty surfaces are formed. If this soil is planted when dry, poor germination of seeds can be expected. In cultivated but unprotected areas of this soil, the erosion hazard is moderate. (Capability unit IIIw-5; woodland suitability group 3w1)

Ontario Series

The Ontario series consists of deep, well-drained, medium-textured soils that formed in calcareous, loamy glacial till deposits. The glacial material contains semirounded and angular rock fragments that are mostly sandstone and limestone. These soils are mainly in the central part of Niagara County. They parallel the Lockport limestone escarpment and generally occupy the sloping areas that are associated with the limestone formation. Another fairly large part occupies the higher till ridges, such as Chestnut Ridge in the southern part of the county. Slopes range from 0 to 30 percent.

In a representative profile, a cultivated Ontario soil has a brown to dark-brown loam surface layer 8 inches thick. This layer is slightly acid and contains between 5 and 10 percent stone fragments. It is underlain by very friable, brown loam that is neutral and 6 inches thick. This layer contains about the same amount of stone fragments as the surface layer. The subsoil is between depths of 14 and 32 inches. It consists of friable, reddish-brown heavy gravelly loam. The substratum is at a depth of 32 inches and consists of firm, dark reddish-brown gravelly loam that is calcareous.

In nearly level or gently sloping Ontario soils, the water table may be perched above the slowly permeable glacial till or the moderately slowly permeable subsoil for short periods. These periods are mostly early in spring and in excessively wet periods. Rooting depth is generally unrestricted above the calcareous substratum, which is at a depth of 30 to 42 inches. Very few roots penetrate into the substratum. The available moisture capacity is high. Permeability is moderate in the surface layer and is moderately slow in the subsoil. These soils respond well to fertilization and other good practices of management.

Representative profile of Ontario loam, 2 to 8 percent slopes, 300 yards north of Mountain Road and 250 yards west of Peet Road; cultivated area:

Ap--0 to 8 inches, brown to dark-brown (10YR 4/3) loam; moderate, fine, granular structure; very friable; 5 to 10 percent coarse fragments; abundant roots; slightly acid; abrupt, smooth boundary. 7 to 10 inches thick.

B&A--8 to 14 inches, brown (7.5YR 5/4) loam; weak, fine, subangular blocky structure; friable; ped coats of light brown (7.5YR 6/4) are one-half inch thick at top of the horizon but are thinner as depth increases; 5 to 10 percent coarse fragments; plentiful roots; neutral; gradual, discontinuous boundary. 3 to 16 inches thick.

B2t--14 to 32 inches, reddish-brown (5YR 4/3) heavy gravelly loam; moderate, medium, subangular blocky structure; firm; clay films on ped faces and in pores; 20 percent gravel and some cobblestones up to 8 inches in diameter; plentiful fine roots; neutral; clear, wavy boundary. 12 to 24 inches thick.

C--32 to 54 inches, dark reddish-brown (5YR 3/4) gravelly loam; moderate, thick, platy structure; firm; few, grayish-brown (10YR 5/2) and yellowish brown (10YR 5/4), weathered shale fragments; 20 to 30 percent gravel and some cobblestones and stones up to 12 inches in diameter; calcareous; very few roots.

Thickness of the solum ranges from 30 to 42 inches and corresponds well with the depth to calcareous glacial till. Depth to bedrock is more than 40 inches. Depth to rock in the limestone substratum phases is mainly between 40 inches and 6 feet. Content of coarse fragments ranges from about 5 to 30 percent in the solum and from 10 to 35 percent in the substratum.

The Ap horizon is 10YR or 7.5YR in hue and ranges from 3 to 5 in chroma. Value is 2 or 3 when the Ap horizon is moist and is more than 5.5 when this horizon is dry.

The A2 horizon is destroyed by cultivation in some areas. Where present, the A2 horizon ranges from 10YR to 5YR in hue, is 5 or 6 in value, and is 3 or 4 in chroma. Texture ranges from fine sandy loam to loam.

The B&A horizon is very thin or is in the upper few inches of the Bt horizon as interfingering. The B part has the same range in texture as the B2t horizon, and the A part has the same range as the A2

horizon. The B2t horizon has hues ranging from 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. The overall texture is loam or gravelly loam that has an average clay content ranging from 18 to 28 percent. Reaction ranges from medium acid to neutral. Clay films cover 5 to 30 percent of ped faces in the B2t horizon, but they are continuous in only a few places.

The C horizon has the same color range as the B2t horizon. Consistence is firm or extremely firm, and structure is strong and platy. The C horizon ranges from fine sandy loam to loam in the gravelly soils.

The Ontario soils formed in deposits similar to those of the moderately well drained Hilton soils and the somewhat poorly drained Appleton soils. The Bt horizon is coarser textured in the Ontario soils than in the Cazenovia or Cayuga soils. The Ontario soils have a Bt horizon but Farmington soils do not, and Ontario soils are more than 3 1/2 feet to rock.

Ontario loam, 2 to 8 percent slopes (OnB).--This soil has the profile described as representative for the series. It normally is on the top of glacial till ridges south of the limestone escarpment. Some of these ridges are used for highways, such as Chestnut Ridge Road, Bear Ridge Road, and Beach Ridge Road. Many areas are cigar shaped or roughly circular. Areas range from about 5 to 50 acres in size. The average-sized area is about 15 acres.

Most commonly included with this soil in mapping are small areas of the finer textured Cazenovia soils and the moderately well drained Hilton soils. Also included are a few areas of coarser textured Bombay soils. In a few areas near Chestnut Ridge and near the village of Gasport, there are inclusions of gravelly Howard soils, silty Dunkirk soils, and sandy Arkport soils. Other inclusions are of Ontario soils that have a silt loam surface layer. Areas that have a sandy, gravelly, or stony surface layer are normally indicated on the soil map by the appropriate symbols.

This is one of the better soils in the county for farming. Most crops can be successfully grown, and alfalfa, corn, and small grains grow especially well. This soil is not used much for fruits and vegetables, partly because of the climate and partly because of the underlying, firm glacial till. Runoff is generally moderate, and there is a hazard of erosion if this soil is cultivated and not protected. This soil responds well to fertilization. Irrigation is needed for best crop growth, especially in dry years or during dry periods.

This soil is easily cultivated and can be plowed fairly early in the spring. Locally, stones may interfere with cultivation. (Capability unit IIe-1; woodland suitability group 2o1)

Ontario loam, 8 to 15 percent slopes (OnC).--The profile of this soil is similar to that described as representative, except that the surface layer is thinner in some places. In many places this soil is on the side slopes of glacial till ridges. In many places it is near the limestone escarpment and slopes to the north. Most areas are roughly oblong and are less than 20 acres in size.

Most commonly included with this soil in mapping are areas of the finer textured Cazenovia or Cayuga soils. Included in a few areas are coarser textured Bombay soils. Inclusions of Hilton or Appleton soils are in drainageways or depressional areas. Commonly included are areas where the surface layer has a texture other than loam and areas that are less than 6 feet to limestone rock. Stony and gravelly soils and bedrock outcrops are normally indicated on the soil map by symbols.

This soil is not so desirable for farming as the gently sloping Ontario soil. Crops are more difficult to plant and to harvest because of slope. Runoff is moderate to rapid, and erosion is a constant hazard. This soil is suited to alfalfa, pasture, some kinds of grain, and trees. Locally, stones or bedrock may be a problem. (Capability unit IIIe-1; woodland suitability group 2o1)

Ontario loam, 8 to 15 percent slopes, eroded (OnC3).--This soil has a profile that differs from that described as representative for the series in that the surface layer is thinner and contains less organic matter. Also, the content of coarse fragments in the surface layer normally is greater. Part of the subsoil is mixed with the original surface layer in many places. Gullies occur, and there are other indications of past erosion. This soil is generally in the same areas as Ontario loam, 8 to 15 percent slopes, and in many places it is closely associated with it. Areas generally are roughly oblong and less than 20 acres in size.

Most commonly included with this soil in mapping are areas of finer textured Cazenovia or Cayuga soils. A few areas have inclusions of Bombay soils. Included areas of Hilton or Appleton soils are in drainageways or depressional areas. Common inclusions are of Ontario soils that have a surface layer other than loam, noneroded areas, and small areas that are less than 6 feet deep to limestone. Stony and gravelly areas and bedrock outcrops are indicated on the soil map by symbols.

This soil has serious limitations for cultivated crops. It is eroded and is susceptible to continuing erosion. Runoff is moderate to rapid. In its present condition, this soil is best suited to hay, pasture, trees, or wildlife. (Capability unit IVe-1; woodland suitability group 2o1)

Ontario loam, 15 to 30 percent slopes, eroded (OnD3).--This soil has a profile that differs from the one described as representative for the series in that the surface layer normally is thinner and contains less organic matter. Also, the content of coarse fragments in the surface layer is generally greater. Gullies or other indications of past erosion can be seen in most places. This soil is located near the limestone escarpment or near areas of glacial till dissected by streams. Most areas are less than 10 acres in size. In many places near dissected areas, this soil occurs in roughly oblong

strips. The dissected areas normally contain one or more drainageways or gullies.

Most commonly included with this soil in mapping are areas of Cayuga and Cazenovia soils. Alluvial land is included in some of the drainageways. The major inclusions are slightly eroded areas, areas that are less than 6 feet deep to rock, and slopes that are less than 15 percent or more than 30 percent. Gravel, stones, bedrock outcrops, and springs are generally indicated on the soil map by symbols.

This soil is not suited to cultivated crops, because of slope and the erosion hazard. It is suited to some hay crops, pasture, trees, or wildlife. It is best to keep this soil in some kind of permanent vegetation. Permeability is somewhat slower than in other Ontario soils. Runoff is generally rapid or very rapid. (Capability unit VIe-1; woodland suitability group 2r2)

Ontario loam, limestone substratum, 0 to 3 percent slopes (OoA).--This soil has a profile similar to that described as representative for the Ontario series but is underlain by limestone bedrock at a depth ranging from 3 1/2 to 6 feet. It is near limestone rock outcrops. Areas range from less than 5 to more than 50 acres in size. They commonly are roughly rectangular, and they parallel the bedrock formation.

Most commonly included with this soil in mapping are areas that are 20 to 40 inches deep to rock. Also included are a few areas of shallow Farmington soils and of Ontario soils that are deeper than 6 feet to rock. Minor inclusions are of the moderately well drained Hilton soils and finer textured Cazenovia or Cayuga soils. Stony or rock outcrop inclusions are indicated on the soil map by symbols.

This soil is suited to most crops grown in the county. It is well suited to hay, grain, and other forage crops, but these crops do not grow as well as on the deeper Ontario soils. This soil is droughty during extended dry periods, especially in areas that have shallower spots included. Stones or bedrock interfere with cultivation of some crops in some areas. For these reasons, vegetables are not frequently grown on this soil. Some fruit, especially cherries and grapes, are grown. Freeze damage to trees may occur because this soil is too far south of Lake Ontario to get the full effect of the lake-moderating temperatures. This soil responds well to fertilization and other good practices of management. Crop response to irrigation is good. (Capability unit I-1; woodland suitability group 2o1)

Ontario loam, limestone substratum, 3 to 8 percent slopes (OoB).--This soil has a profile that differs from that described as representative for the series, mainly by being underlain by bedrock at a depth of 3 1/2 to 6 feet. Also, the surface layer contains a higher percentage of coarse fragments than that in the representative profile. This soil is near limestone areas. The topography is somewhat controlled by the underlying rock. Areas range from less than 5 to more than 50 acres in size. They have no characteristic shape, but many of them are roughly oblong.

Most commonly included with this soil in mapping are areas that are 20 to 40 inches deep to rock. Included in a few places are shallow Farmington soils and a few areas of Ontario soils that are deeper than 6 feet to rock. Minor inclusions are of the moderately well drained Hilton soils and the finer textured Cazenovia or Cayuga soils. Stony or rock outcrop inclusions are generally indicated on the soil map by symbols.

This soil is suited to most crops grown in the county. Hay, grain, and other forage crops grow well. This soil is droughty, especially during extended dry periods and in areas where the underlying limestone rock varies in depth. Locally, stones and bedrock interfere with the cultivation of crops. Because of stones and droughtiness, this soil is generally not used for vegetables. Some fruits, especially cherries, peaches, and grapes, are grown. Freeze damage to trees often occurs, because this soil is too far south of Lake Ontario to get the full benefit of the lake-tempered climate. The hazard of erosion is moderate if this soil is cultivated and not protected.

This soil responds well to fertilization and other good practices of management. Crop response to irrigation is good. (Capability unit IIe-1; woodland suitability group 2o1)

Otisville Series

The Otisville series consists of deep, excessively drained, moderately coarse textured soils. These soils formed in glacial beach deposits that are mainly sand and gravel. They are confined mainly to the former glacial Lake Iroquois beach ridge (U.S. Highway No. 104) and to some offshore bars adjacent to the former beach. They are level to gently sloping.

A representative profile of an Otisville soil has a dark grayish-brown gravelly sandy loam surface layer. It is slightly acid and is 9 inches thick. The subsoil is very friable, brown and reddish-brown gravelly loamy sand. It is medium acid and extends to a depth of 28 inches. The substratum consists of stratified sand and gravel that is loose and slightly acid.

In these rapidly permeable soils, the seasonal high water table seldom rises to within 4 feet of the surface and is usually at a depth of more than 5 feet. The depth of soil available to roots is related to the depth to calcareous material or to the water table, whichever is less. Most roots, however, are in the surface layer where the major sources of plant nutrients are located. The available moisture capacity is low.

These excessively drained, gravelly soils are some of the first soils to be ready for cultivation in the spring, and they respond well to fertilization and irrigation. For these reasons, they are well suited to early truck crops or early fruit. They are well suited to cherries, peaches, and other specialty crops. Unless these soils are irrigated, most crops are damaged by drought during extended dry periods.

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TOWN OF ROYALTON LANDFILL
NYS SITE NUMBER 932092
TOWN OF ROYALTON
NIAGARA COUNTY
NEW YORK STATE

Prepared For

DIVISION OF SOLID AND HAZARDOUS WASTE
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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DATE OF SUBMITTAL: JANUARY, 1986

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Facility Name: Town of Royalton Landfill

Location: Griswold St., Royalton, NY

EPA Region: II

Person(s) in charge of the facility: Douglas Ortman, Owner

Name of Reviewer: S. J. Tiffany Date: 4/18/85

General Description of the facility:

Site was operated as a municipal landfill for 20 years. An estimated 97,000 cubic yards of refuse has been landfilled on-site. No hazardous wastes are known to have been disposed of in the municipal landfill. Leachate seeps have been a reocurring problem and heavy metals (i.e., iron, zinc) were detected in soil and water samples collected at the site. Significant concentrations of TOC were also found in the leachate sample collected.

Scores: $S_M = 6.19$ ($S_{gw} = 7.16$ $S_{sw} = 7.96$ $S_a = 0$)

$S_{FE} = 0$

$S_{DC} = 0$

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Facility Name: Town of Royalton Landfill Date: 5/21/85

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)	1	3	3	
Physical State	0 (1) 2 3	1	1	3	
Total Route Characteristics Score			12	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 1 (2) 3	3	6	9	
Distance to Nearest Well/Population Served	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
Total Targets Score			6	49	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			4,104	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 7.16		

GROUND WATER ROUTE WORK SHEET

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Facility Name: Tn of Royalton Landfill Date: 5/21/85

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 (45)	1	45	45	4.1
If observed release is given a value of 45, proceed to line [4]. If observed release is given a value of 0, proceed to line [2].					
[2] Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 (2) 3	1	2	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 (1) 2 3	1	1	3	
Total Route Characteristics Score			11	15	
[3] Containment	0 1 2 (3)	1	3	3	4.3
[4] Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 [1] 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
[5] Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/ Distance to Water	(0) 4 6 8 10 12 16 18 20	1	0	40	
Intake Downstream	24 30 32 35 40				
Total Targets Score			6	55	
[6] If line [1] is 45, multiply [1] x [4] x [5]. If line [1] is 0, multiply [2] x [3] x [4] x [5]			5130	64,350	
[7] Divide line [6] by 64,350 and multiply by 100			S_{sw} = 7.96		

SURFACE WATER ROUTE WORK SHEET

Facility Name: Tn of Royalton Landfill Date: 5/21/85

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location: TOWN OF ROYALTON LANDFILL - 3/25/85					
Sampling Protocol: HNU METER					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]			0	35,100	
[5] Divide line [4] by 35,100 and multiply by 100			S_a = (0)		

AIR ROUTE WORK SHEET

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Facility Name: Town of Royalton Landfill Date: 5/21/85

Worksheet for Computing S_M

	S	S^2
Groundwater Route Score (S_{gw})	7.16	51.27
Surface Water Route Score (S_{sw})	7.96	63.52
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		114.79
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		10.71
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		6.19

WORK SHEET FOR COMPUTING S_M

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Facility Name: In of Royalton Landfill Date: 5/21/82

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1	0	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score				24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} = 0		

FIRE AND EXPLOSION WORK SHEET

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Facility Name: Tn of Royalton Landfill Date: 5/21/85

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	(0) 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 (3)	1	3	3	8.2
3 Containment	0 (15)	1	15		8.3
4 Waste Characteristics Toxicity	(0) 1 2 3	5	0	15	8.4
5 Targets					8.5
Population Within 1-Mile Radius	0 1 (2) 3 4 5	4	8	20	
Distance to a Critical Habitat	(0) 1 2 3	4	0	12	
Total Targets Score			8	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	21,600	
7 Divide line 6 by 21,600 and multiply by 100			S_{DC} = 0		

DIRECT CONTACT WORK SHEET

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DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

FACILITY NAME: Town of Royalton Landfill

LOCATION: Griswold St., Royalton, NY

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GROUNDWATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (5 maximum):

Groundwater not analyzed for contamination (NYSDEC Registry Sheet, 12/83).

Rationale for attributing the contaminants to the facility:

Not applicable.

* * *

2. ROUTE CHARACTERISTICS

(Niagara County Health Department, Site Profile Report)

Depth to Aquifer of Concern

Name/description of aquifer(s) in concern:

Bedrock aquifer in either limestone or shale.

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Unknown, possibly approximately 20 to 30 feet (ES and D&M Site visit, 3/25/85).

Depth from the ground surface to the lowest point of waste disposal/ storage:

Unknown, possibly 20' (Site Visit, 1985, and estimated based on quarry history).

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Net Precipitation

(U.S. Dept. of Commerce, National Climatic Center, Climatic Atlas of the United States, 1979).

Mean annual or seasonal precipitation (list months for seasonal):

Mean annual precipitation is 36".

Mean annual lake or seasonal evaporation (list months for seasonal):

Mean annual lake evaporation is 27".

Net precipitation (subtract the above figures):

9" (36" - 27" = 9").

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

None, waste is directly on top of bedrock.

Permeability associated with soil type

Waste material probably very permeable (10^{-1} to 10^{-3} cm/sec) (estimated based on Site Visit, 1985).

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Solid (municipal refuse) (NCHD Site Profile Report).

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3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Unlined landfill, no run-on control (Niagara County Health Department, Site Profile Report).

Method with highest score:

Unlined landfill, no run-on control - 3.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Heavy metals (iron, zinc, chromium, and copper).

Compound with highest score:

Heavy metals (toxicity = 3; persistence = 3) - 18.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Approximately 10^6 cubic ft = 97,000 cubic yards (excluding 20% fill and intermediate and final cover) = 48,500 tons of municipal waste (it is not known what portion of wastes, if any, is hazardous). (Site Inspection conducted by ES and D&M, 3/25/85).

Basis of estimating and/or computing waste quantity:

Assume a square 5 acre site with a right triangle cross section, 30 feet in depth. Calculate using formula of (1/2) (base) (height) for cross section and multiply by the square root of 5 acres. Subtract 20% for fill (shape of landfill is based on site visit, 3/25/85). Also assume 1,000 lbs/cubic yards for in place disposal weight for municipal solid waste. (Estimates based on site dimensions and ES and D&M site inspection, 3/25/85). For purposes of rating the site, 1 to 10 cubic yards of hazardous wastes were assumed to be disposed on-site because contaminants have been detected.

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5. TARGETS

Groundwater Use

Uses(s) of aquifer(s) of concern within a 3-mile radius of the facility:

There are private drinking water supply wells in use within 3 miles of the site (Ontman, 1985). However, the bedrock aquifer, the aquifer of concern, is not the same aquifer that local residences and the Town of Middleport use. Middleport is on the Niagara County Municipal Water Supply System (Hopkins, 1987).

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Not applicable. The wells within 3 miles of the site do not withdraw water from the bedrock aquifer (Hopkins, 1987).

Distance to above well or building:

Not applicable.

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

No municipal wells within 3 miles, numerous private wells, however, these wells do not obtain water from the bedrock aquifer (NYS Atlas of Community Water System Sources, 1982 and Site Visit, 1985).

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

None.

Total population served by ground water within a 3-mile radius:

None (Hopkins, 1987).

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SURFACE WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Iron, zinc, chromium, and copper detected in downstream sample (NCHD, Site Profile Report, samples collected by NYSDEC, 1982).

Rationale for attributing the contaminants to the facility:

Samples were collected in the ditch at the point of entry and at a point approximately 150 feet upstream from the point of entry (NYSDEC Site Profile Report).

2. ROUTE CHARACTERISTICS

(USGS Topographic Maps: Lockport and Medina Quadrangles)

Facility Slope and Intervening Terrain

Average slope of facility in percent:

3.8%.

Name/description of nearest downslope surface water:

Man-made drainage ditch which flows to an unnamed stream. The stream in turn flows to Jeddo Creek which flows through a culvert under the Barge Canal (Hopkins, 1987).

Average slope of terrain between facility and above-cited surface water body in percent:

10%.

Is the facility located either totally or partially in surface water?

No.

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Is the facility completely surrounded by areas of higher elevation?

No.

1-Year 24-Hour Rainfall in Inches

2.1" (U.S. Department of Commerce Technical Paper No. 40).

Distance to Nearest Downslope Surface Water

0.08 mile to the drainage ditch which connects to an unnamed stream. This stream flows to Jeddo Creek (Hopkins, 1987).

Physical State of Waste

Solid (municipal refuse and possibly industrial waste).
Note: No records exist which indicate that industrial/hazardous wastes were disposed of in the Town of Royalton Landfill.

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Unlined landfill; diversion system and cover unsound (ES and D&M Site Inspection, 3/25/85).

Method with highest score:

Unlined landfill; diversion system and cover unsound.

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4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Heavy metals (i.e., iron, zinc, chromium, and copper) (NCHD Site Profile Report).

Compound with highest score:

Heavy metals (toxicity = 3, persistence = 3) - 18.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Approximately 10^6 cubic ft = 97,000 cubic yards (excluding 20% fill, intermediate cover and final cover) = 48,500 tons of municipal waste (it is not known what portion of wastes, if any, are hazardous). (Estimated, based on site dimensions and ES and D&M site inspection, 3/25/85.) For purposes of rating the site, 1 to 10 cubic yards of hazardous waste were assumed to be disposed on-site because contaminants have been detected.

Basis of estimating and/or computing waste quantity:

Assume a square 5 acre site with a right triangle cross section, 30 feet in depth. Calculate using formula of (1/2) (base) (height) for cross section and multiply by the square root of 5 acres. Subtract 20% for fill. Assume 1,000 lbs/cubic yards for in place disposal weight for municipal solid waste. (Shape of landfill is based on site visit, 3/25/85.)

* * *

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreation.

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Is there tidal influence?

No.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None within 2 miles (western NYS not a coastal area).

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

None within 1 mile (NYS Wetlands Maps).

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

None within 1 mile (NYSDEC Region 9, Division of Fish & Wildlife Files).

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

None within specified distances (NYS Atlas of Community Water System Sources, 1982).

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Computation of land area by above-cited intake(s) and conversion to population (1.5 people per acre):

Not applicable.

Total population served:

Not applicable.

Name/description of nearest of above water bodies:

Not applicable.

Distance to above-cited intakes, measured in stream miles:

Not applicable.

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AIR ROUTE

1. OBSERVED RELEASE

Contaminants detected:

None.

Date and location of detection of contaminants:

ES and D&M site visit, 3/25/85.

Methods used to detect the contaminants:

HNu meter readings were taken and all readings were less than 1 ppm, indicating no air releases

Rationale for attributing the contaminants to the site:

Not applicable.

* * *

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

No reactive compounds are known to exist on-site.

Most incompatible pair of compounds:

No incompatible compounds are known to exist on-site.

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Toxicity

Most toxic compound:

No known toxic compounds accessible to the air pathway are known to exist on-site.

Hazardous Waste Quantity

Total quantity of hazardous waste:

Unknown, no records are known to exist which indicate that hazardous wastes were disposed on-site.

Basis of estimating and/or computing waste quantity:

Not applicable.

* * *

3. TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

(0 to 4 mi) 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

5,478 people (Compiled from 1980 US Bureau of the Census Data).

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None within 2 miles (western NYS not a coastal area).

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

None within 1 mile (NYS Wetlands Maps).

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Distance to critical habitat of an endangered species, if 1 mile or less:

None within 1 mile (NYSDEC Region 9, Division of Fish & Wildlife Files).

Land Use

Distance to commerical/industrial area, if 1 mile or less:

Approximately 1 mile.

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

More than 2 miles (USGS Topographic Map: Medina, NY Quadrangle).

Distance to residential area, if 2 miles or less:

Approximately 1 mile to Village of Middleport, NY (USGS Topographic Map: Medina, NY Quadrangle).

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Approximately 100', adjacent to site (ES and D&M Site Inspection, 3/25/85).

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Unknown.

Is a historic or landmark site (National Register of Historic Places and National Natural Landmarks) within view of the site?

No.

FIRE AND EXPLOSION

1. CONTAINMENT

Hazardous substances present:

No information was discovered during the Phase I study which indicates that a fire and explosion situation existed or presently exists at the site.

Type of containment, if applicable:

Not applicable, see above comment.

* * *

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

No measurements to determine the fire and explosion potential were taken on-site.

Ignitability

Compound used:

No ignitable compounds are known to exist on-site.

Reactivity

Most reactive compound:

No reactive compounds are known to exist on-site.

Incompatibility

Most incompatible pair of compounds:

No incompatible compounds are known to exist on-site.

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Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

No hazardous waste are known to be disposed on-site that create a potential fire and explosion situation.

Basis of estimating and/or computing waste quantity:

No applicable, see above comment

* * *

3. TARGETS

Distance to Nearest Population

Approximately 1 mile to the Village of Middleport, NY (USGS Topographic Map: Medina, NY Quadrangle).

Distance to Nearest Building

0.2 mile (ES and D&M Site Inspection, 3/25/85).

Distance to Sensitive Environment

Distance to wetlands:

None within 1 mile of the site (NYS Wetlands Maps).

Distance to critical habitat:

None within 1 mile (NYSDEC, Region 9, Department of Fish and Wildlife, 1985).

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Approximately 1 mile to the Village of Middleport, NY (USGS Topographic Map: Medina, NY Quadrangle).

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Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

More than 2 miles (USGS Topographic Map: Medina, NY Quadrangle).

Distance to residential area, if 2 miles or less:

Approximately 1 mile to the Village of Middleport, NY (ES and D&M Site Inspection, 3/25/85).

Distance to agricultural and in production within past 5 years, if 1 mile or less:

Approximately 100 feet, adjacent to site (ES and D&M Site Inspection, 3/25/85).

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Unknown.

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

No.

Population with 2-Mile Radius

926 people (US Census Data, 1980).

Buildings Within 2-Mile Radius

244 buildings (USGS Topographic Map: Medina, NY Quadrangle).

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DIRECT CONTACT

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

There is no confirmed instance in which contact with hazardous substances at this site has caused injury, illness or death to humans or domestic or wild animals.

* * *

2. ACCESSIBILITY

Describe type of barrier(s):

Barriers do not completely surround the site (ES and D&M Site Inspection, 3/25/85).

* * *

3. CONTAINMENT

Type of containment, if applicable:

* * *

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

There are no hazardous wastes known to be disposed on-site that pose a direct contact threat.

Compound with highest score:

Not applicable.

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5. TARGETS

Population within one-mile radius

265 people (US Census Data, 1980).

Distance to critical habitat (of endangered species)

None within 1 mile (NYSDEC Region 9, Division of Fish and Wildlife, 1985).

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REFERENCE 8

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Phase II (Fifth Round) Work Plan
Engineering Investigations and Evaluations at
Inactive Hazardous Waste Disposal Sites

Town of Royalton Landfill

Town of Royalton, Niagra County

NYSDEC ID No.: 932092

Prepared For:

New York State Department of Environmental Conservation

Prepared by:

Western Site Investigation Section
Bureau of Hazardous Site Control
Division of Hazardous Waste Remediation
August, 1989

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Appendix A: Phase II Report Format

Appendix B: Figure 1, Site Location Map
Figure 2, Plot Plan
Figure 3, Sample Location Plan

Appendix C: Table 1, Tasks
Table 2, Sample Summary
Table 3, Parameters for Analysis

Appendix D: Figure 4, Rock Well Installation

1.0 INTRODUCTION

All work will be conducted in conformance with the NYSDEC Phase II Generic Work Plan and Guidelines presented in Schedule 4 of the Contract, and this document.

The Town of Royalton Landfill, (NYS ID# 932092), is located on Griswold Street, across the street from the Village of Middleport Water Tower, north of Mountain Road in the Town of Royalton, Niagra County. A municipal landfill was operated in a former stone quarry by the Royalton Highway Department from 1958 to 1978. The 5 acre site, a portion of a large plot of agricultural land, was leased from Douglas Ortman, the current owner.

Residents of Middleport, Gasport and the Town of Royalton reportedly brought their household garbage for dumping on Saturdays. The fill consists of items like stoves, refrigerators and wood. No hazardous waste is known to have been dumped at the site. In 1973, after noting unrestricted access to the site, lack of adequate daily cover, and improper drainage at the site, DEC initiated an order on consent. The site was operated until 1978 when the site was closed and capped with local soils by the Royalton Highway Department.

Unauthorized dumping has occurred since then and leachate outbreaks in the northwest corner have been observed and sampled. Samples taken in 1982 show elevated levels of iron, zinc, copper, and chromium as well as halogenated organic compounds. Contamination of groundwater and surface water through leachate seeps are the routes of concern. Drainage from the site goes to Jeddo Creek, located about 1 mile northeast of the site.

The original ground surface reportedly sloped steeply to the north. The present ground surface drops down about 20 feet at the north end of the site. It appears that the fill material has returned the quarry to the original grade. The rest of the site is almost at grade. Since the fill is in a rock quarry and there is no record of any lining, it is expected that the fill is resting on bedrock.

A Phase I Investigation has been completed for this site. The report was prepared by Engineering-Science in 1986. A final report is available.

2.0 OBJECTIVES

The objective of a Phase II investigation is to determine if hazardous wastes have been disposed of in the site, if contaminants exist in the various mediums (air, groundwater, surface water, or soils) and whether or not threats to human health or the environment exist. Information gathered relative to the above will allow the Department to reclassify the site or, if warranted, delist it.

REFERENCE 9

Site Inspection

Section 5.5

This Report

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REFERENCE 10

Ref 10

INTERVIEW ACKNOWLEDGMENT FORM

SITE NAME:	Town of Royalton	I.D. NUMBER:	932092
PERSON CONTACTED:	Jim Mahar	DATE:	April 20, 1990
AFFILIATION:	Village of Middleport Water Superintendent	PHONE NUMBER:	735-3303 or 735 3373
ADDRESS:	P.O. Box 186 Middleport, NY 14105	CONTACT PERSON(S):	Judy Vangalio
TYPE OF CONTACT:	phone interview		

INTERVIEW SUMMARY

The Village of Middleport has a public well located approximately 1 mile southwest of the site on Mountain Road. Within a one mile radius of the site, there is approximately a dozen residences on private wells. The wells of most concern are located below the escarpment on Giswold Street and route 31. These are downstream of the site. The population served by the municipal well is 2000.

Only two active dairy farms in the area and they do not irrigate.

ACKNOWLEDGMENT

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to Ecology and Environment, Inc. interviewer(s) (as revised below, if necessary).

Revisions (please write in any corrections needed to above transcript)

Signature: James Mahar Date: 5-29-90

Note: The Village of Middleport well noted above is no longer in use (see Reference 19).

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REFERENCE 11

Ref 11

INTERVIEW ACKNOWLEDGMENT FORM

SITE NAME:	Town of Royalton Landfill	I.D. NUMBER:	932092
PERSON CONTACTED:	Mr. Paul Dickey	DATE:	4/2/90
		PHONE NUMBER:	284-3128
AFFILIATION:	Niagara County Department of Health		
ADDRESS:	10th and Falls St. Niagara Falls	CONTACT PERSON(S):	J. Vangalio R. Leichner

TYPE OF CONTACT: personal interview and file search

INTERVIEW SUMMARY

Mr. Dickey recommended contacting the Town Water Supervisor for information about water sources. He suggested asking if they kept a record of residences who don't pay water bills. He stated that the Village of Middleport uses a municipal well for its water supply.

The Department of Health files contained many Facility Inspection Reports prepared by DEC personnel in the Division of Solid and Hazardous Waste. Recurring problems at the site included leachate breakout, often entering the drainage ditch on the north side of the site, lack of assess control, occasional soil erosion in the northwest corner, and unauthorized dumping after closure of the facility. The owner of the land was listed as Douglas Ortman of 4240 Griswold Street, Middleport.

Mr. Dickey recommended STANDARD POST CLOSURE MAINTENANCE AND MONITORING OF THE SITE. [redacted] NIAGARA CTY H.D. would appreciate being informed of any fieldwork prior to E & E personnel arriving at the site.

ACKNOWLEDGMENT

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to Ecology and Environment, Inc. interviewer(s) (as revised below, if necessary).

Revisions (please write in any corrections needed to above transcript)

Signature: [signature] Date: May 1, 1990

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REFERENCE 12

Ref 12

INTERVIEW ACKNOWLEDGMENT FORM

SITE NAME:	Town of Royalton Landfill	I.D. NUMBER:	932092
PERSON CONTACTED:	Ronald Gwozdek	DATE:	4-2-90
		PHONE NUMBER:	439-6109
AFFILIATION:	Niagara County Health Department		
ADDRESS:	5467 Upper Mountain Rd.	CONTACT PERSON(S):	J. Vangalio R. Leichner
TYPE OF CONTACT:	Personal Interview		

INTERVIEW SUMMARY

Mr. Gwozdek told us that there is only one municipal well in the county which is in the Town of Royalton, Village of Middleport. The rest of the county is on municipal water from the Niagara River. We had copies made of a file containing test data from the Village of Middleport well.

Water intakes for Niagara County are on U.S.G.S. maps. The Niagara Falls quad shows the Niagara Falls and Niagara County intakes. The Tonawanda West Quad shows the Lockport and North Tonawanda intakes and also the Tonawanda intakes which are not in Niagara County. Mr. Gwozdek recommended that we contact Mr. Paul Dickey, of the Department of Health in Niagara Falls, for specific water information relating to hazardous waste sites. The Department of Health has no list of people using well water because they test wells only on request. Mr. Gwozdek suggested that we contact the Town Water Superintendents to find out who is connected to the water supply. He provided us with a list of the water superintendents.

ACKNOWLEDGMENT

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to Ecology and Environment, Inc. interviewer(s) (as revised below, if necessary).

Revisions (please write in any corrections needed to above transcript)

Signature: Ronald Gwozdek Date: 04-16-90

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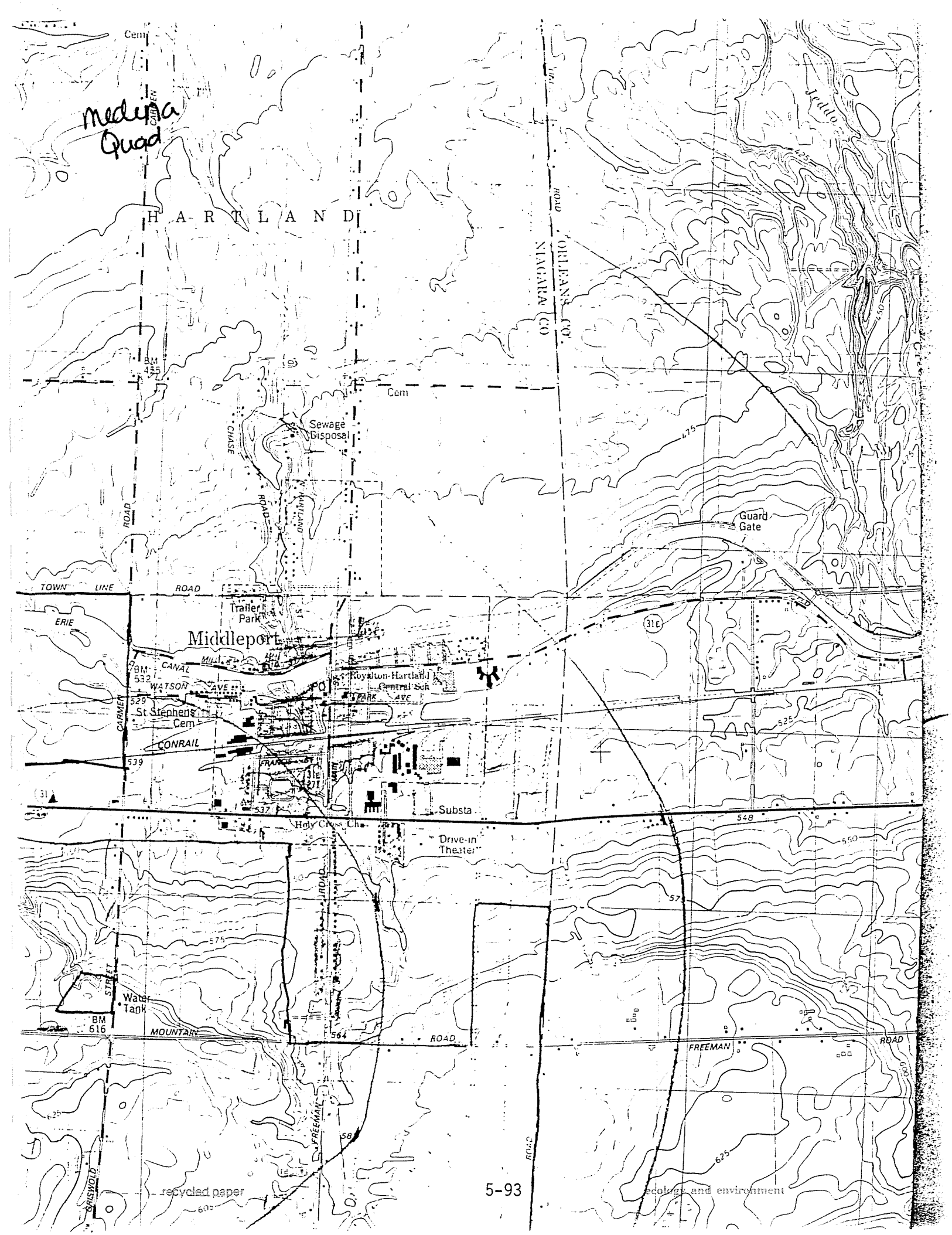
REFERENCE 13


Medina Quad
HARTLAND
NIAGARA CO.
ORLEANS CO.
Cem
Sewage Disposal
Guard Gate
TOWN LINE ROAD
Trailer Park
Middleport
ERIE
CANAL
WATSON AVE
PARK AVE
Royalton-Hartland Central Sch
St Stephens Cem
CONRAIL
FRANCE
Substa
Holy Cross Ch
Drive-in Theater
Water Tank
MOUNTAIN ROAD
FREEMAN ROAD
CHASE ROAD
CARMEN ROAD
STREET
BM 616
BM 532
BM 455
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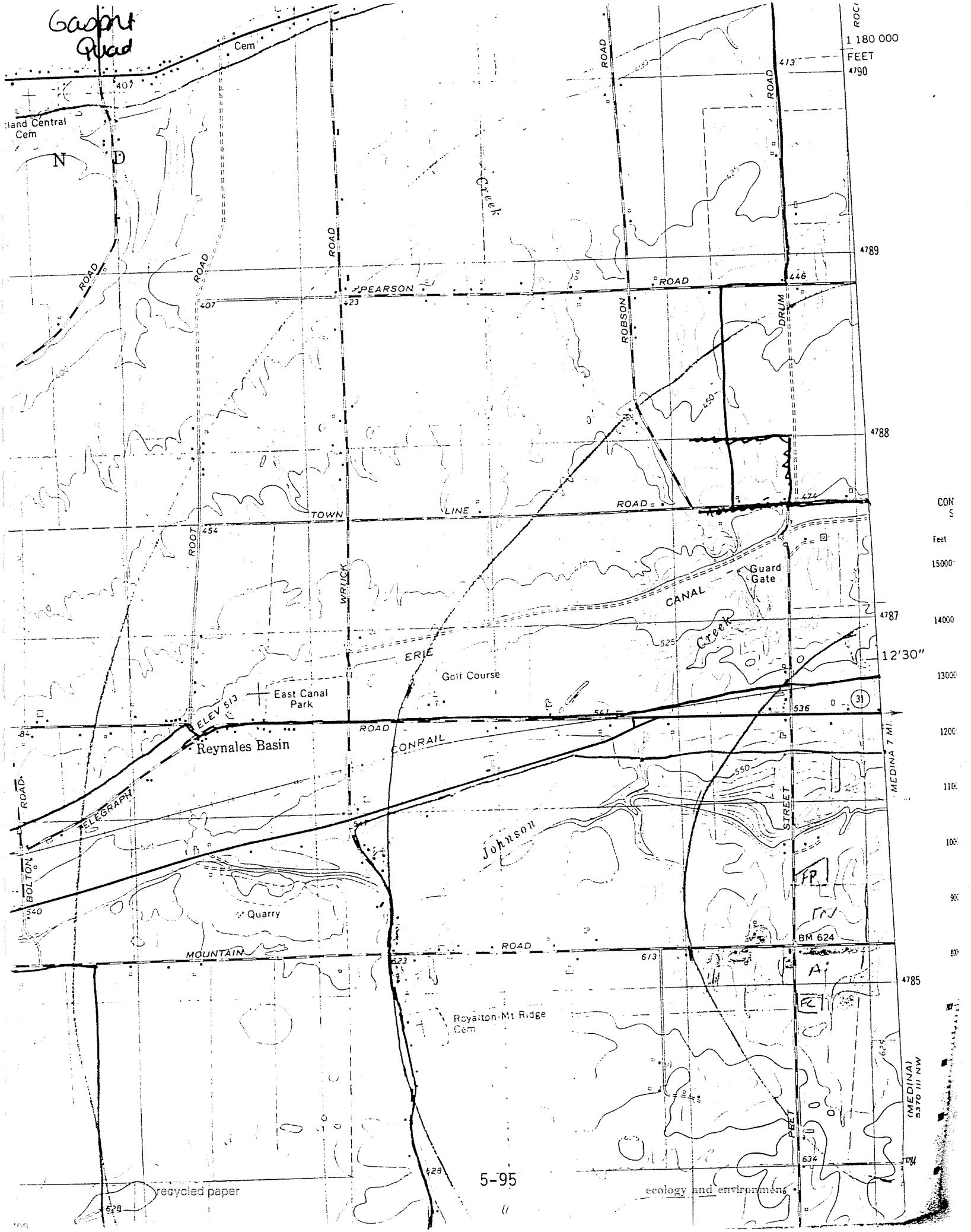
5-93
ecology and environment

REFERENCE 14



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REFERENCE 15

Analytical Data

Appendix D
This Report

REFERENCE 16

recycled paper

Rec 16

INTERVIEW ACKNOWLEDGMENT FORM

SITE NAME:	Town of Royalton Landfill	I.D. NUMBER:	932092
PERSON CONTACTED:	Sue Casey	DATE:	3/30/90
		PHONE NUMBER:	716-439-6170
AFFILIATION:	Niagara County Environmental Mgmt. Council		
ADDRESS:	County Courthouse Lockport, NY	CONTACT PERSON(S):	Judy Vangalio Kirsten Neumaier Ralinda Leichner

TYPE OF CONTACT: personal interview and file search

INTERVIEW SUMMARY

We were informed that the Highway Department, located at 225 S. Niagara Street, Lockport, NY had aerial photos of the county over several years. We were also told that the Health Department at 5467 Upper Mountain Road, Lockport, NY might have water information and that we could pickup a directory of county phone numbers in the legislative offices at the Courthouse.

We gathered land use information from maps at this office on 3/30, 4/3 and 4/4/90.

ACKNOWLEDGMENT

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to Ecology and Environment, Inc. interviewer(s) (as revised below, if necessary).

Revisions (please write in any corrections needed to above transcript)

Signature: Claire Kirkham Date: 4/24/91

REFERENCE 17

recycled paper

Ref 7

INTERVIEW ACKNOWLEDGMENT FORM

SITE NAME:	Royalton Landfill	I.D. NUMBER:	932092
PERSON CONTACTED:	Burrell Buffington	DATE:	4/10/90
AFFILIATION:	NY Natural Heritage Program	PHONE NUMBER:	518-783-3932
ADDRESS:	700 Troy-Schenectady Road Albany, NY 12110	CONTACT PERSON(S):	Judy Vangalio Ralinda Leichner
TYPE OF CONTACT:	map search		

INTERVIEW SUMMARY

No significant habitats were found within 1.5 miles of the site after looking at the Significant Habitat Maps (1980) prepared by the Habitat Inventory Unit for the NYSDEC, Division of Fish and Wildlife, Bureau of Wildlife.

No endangered species wildlife management or wildlife refuge areas are located within 1.5 miles of the site. This information was based on the Natural Heritage Maps.

ACKNOWLEDGMENT

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to Ecology and Environment, Inc. interviewer(s) (as revised below, if necessary).

Revisions (please write in any corrections needed to above transcript)

Signature: Burrell B. Buffington Date: 4/25/90

REFERENCE 18

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ecology and environment, inc.

International Specialists in the Environment

Job Number YQ 704C

ROYALTON LANDFILL
NIAGARA COUNTY

08-16-90 ROYALTON LANDFILL

1108 E & E CREW ARRIVE ON SITE:
LISA HELTON - GEOLOGIST
JIM RICKERT - GEOLOGIST
SYBIL NEWCHURCH - SSO
JOHN HOOD - IN TRAINING (SSO)
DRILL RIG (CME) IS ON SITE BUT, DRILLERS ARE NOT PRESENT. DEC REPRESENTATIVE, YAVUZ ERK, IS ON SITE.

1125 GEORGE STEINER, TOWN SUPER. (SITE CONTACT), ARRIVE ON SITE. GEORGE GUIDED THE SITE "WALK-OVER" AND DISCUSSED THE LANDFILL DIMENSIONS WITH LISA AND JIM.

1156 JIM AND SYBIL DEPART SITE TO LOCATE WATER SOURCE (HYDRANT) FOR DRILLERS.

1213 Y. ERK DEPART SITE.

1219 JIM AND SYBIL RETURN TO SITE. WATER SOURCE IS A FIRE HYDRANT LOCATED APPROXIMATELY 3 MILES WESTON ROUTE 31 ON THE NORTH SIDE OF THE ROAD ACROSS FROM "DRUM OIL" A GAS STATION.

1230 RICKERT & SYBIL DEPART TO BUY ICE, PAPER CUPS, AND PAPER TOWELS. DRILLERS STILL NOT HERE YET

1245 RICKERT DEPARTS TO PHONE TO CALL BARB TOPOR, GET MESSAGES AND CALL DRILLING COMPANY.

1250 RICKERT ARRIVES AT PHONE & CALLS ITE. RICKERT HAS NO MODEX MESSAGES. BARB TOPOR NOT AT HER DESK.

1300 RICKERT CALLS DRILLING CO. & SPEAKS TO JUDY BAY - OWNER OF AMERICAN AUGER.

J. Rickert

THURS. 8-16-90 YQ-2040 J Rickert

1301 Judy Bay says: The driller, LEE, left their office late ~ 10:30 AM BECAUSE THE DRILLERS HELPER - FRED, SUDDENLY QUIT. ALSO, JUDY SAID THAT THE DRILLER WILL ARRIVE ON SITE SOON (0330) BUT WILL BE ALONE, SO NO DRILLING CAN HAPPEN TODAY.

1308 RICKERT ARRIVES BACK ON SITE AND TELLS DEC REP. THE NEWS.

1310 DEC REP. YAVUZ ERK DEPARTS SITE FOR THE DAY. E&E SHOULD CALL HIM EARLY TOMORROW MORNING WITH PLANS FOR THE DAY.

1315 LISA HELTON, SYBIL NEWCHURCH, & JOHN HOOD DEPART SITE FOR THE DAY, RICKERT WILL REMAIN & WAIT FOR DRILLER TO ARRIVE.

1340 LEE THE DRILLER & HIS GIRLFRIEND PAULA ARRIVE ON SITE

1350 RICKERT, & LEE & PAULA WALK SITE TO FIND 4 PROPOSED WELL LOCATIONS. ONLY COULD FIND GW-1 & GW-4.

1415 LEE UNLOADS RIG FROM FLAT BED TRAILER

1425 ALL DEPART TO GET WATER TANKS FILLED

1435 ARRIVE AT FIRE HYDRANT TO FILL 2 WATER TANKS

1455 BOTH WATER TANKS ARE FULL 1200 + 800 = 2000 GALLONS TOTAL

500 LEE & PAULA DEPART BACK TO SITE TO DELIVER WATER TRUCK AND LOCK UP RIG. RICKERT RETURNS HYDRANT BUCKET TO TOWN CLERK AND ASKS HER TO GIVE TO GEORGE STEINER, SHE SAID SHE WILL SEE THAT HE GETS IT.

510 LEE & PAULA & RICKERT MEET AT PHONE BOOTH TO FIND OUT THE PLAN FOR TOMORROW

J. Rickert

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5-103

THURS 8-16-90 YQ-7040 J. Richert

1320 LEE THE DRILLER STATES THAT HIS OFFICE SAID THAT THEY CAN'T HAVE ANY DRILLER'S HELPER OUT UNTIL MONDAY. WE ARRANGED TO START AT 10:00 AM MON

1535 RICHERT LEAVES AN UPDATE MESSAGE FOR BARB TOPOR. GR

1540 RICHERT DEPARTS SITE FOR THE DAY.

1545 Richert stops at Frontier Signs inc. a sign company located ≈ 5 miles due west of the site along the Niagara escarpment & MR. JERRY CLARE THE PLANT MANAGER GIVES RICHERT A GUIDED TOUR & THE ROCK QUARRY & INFORMATION ~~RELATED~~ LEARNED. JD

① OVERBURDEN = ≈ 5' ave 0-15 FEET

② LOCKPORT DOLOSTONE IS HIGHLY FRACTURED

③ AND FRACTURES ARE PRIMARILY ORIENTED HORIZONTAL & VERTICLE W/ VERT. BEING PREDOMINANT.

④ LOCKPORT RANGED FROM 10 TO 40' THICK

5' BENEATH LOCKPORT IS A 13' THICK BED CALLED THE DEQUE, IT'S A DARK GREY SHALEY DOLOMITE. THE LOCKPORT IS LIGHT GRAY TO YELLOWISH

⑥ BELOW THE DEQUE IS THE ROCHESTER SHALE DARK GREY & VERY FISSIL.

1655 RICHERT DEPARTS QUARRY.

1730 RICHERT ARRIVES AT ETF.

J. Richert.

5-104

MON 8-20-90 YQ-7040 Jim Richert

1020 JIM RICHERT AND SYBIL NEWCHURCH OF ETE ARRIVE ON SITE

DRILLERS ARE HERE PREPARING DRILLING EQUIPT FOR DAY'S WORK. DRILLING CO. IS AMICAN AUGER AND DITCHING. (AA)

DRILLER = LEE PENROD

HELPER = DARICK GREEVES

1030 NYSDEC REPRESENTATIVE YAVUZ ERK ARRIVES ON SITE

WEATHER: CLOUDY ≈ 65°F WIND ≈ 15 MPH SW

FORECAST: MOSTLY CLOUDY HIGH 70°F

30% CHANCE OF RAIN.

GOALS FOR TODAY: DRILL & SET 3" CASING INTO ROCK SOCKET AT GW-1A & GW-4.

1100 Rig IS MOVED TO GW-1A GRID LOCATION TO DRILL GW-1 WELL

1102 RICHERT & NEWCHURCH START UP AIR MONITORING EQUIPT. OVA, MSA EQUIPT

Background OVA 3.0 ppm

HNu - cal with Cal Span to 54 ppm on 10.2 eV probe

Explosimeter - 20.8% O_2 / 0% LEL

Rad. Meter - normal 15 counts/min

1115 Safety Meeting - all employees - 2 E+E, 2 AA

Discussed - History of the site

- location & map to hospital, Keys in van & location of first aid kit.
- Accessability to fire extinguisher.
- Location of the kill switch.
- Heat stress & safety glasses during coring.
- All readings will be taken with the OVA if there is anything above background a second reading will be taken with the HNu.

S. Newchurch

20 August 1990 Monday YQ 7040 S Newchurch

1130 Split spoon @ 0-2' 0ppm AB (OVA) + hit bedrock @ 2 ft.
1135 Start drilling with 4½" ID rollers
1140 DRILLERS PREPARE TO BEGIN CORING
5" ROCK SOCKET USING HQ-CASE BIT
HQ = 4" ROCK HOLE DIAMETER.
1151 RICHERT COLLECTED SOIL SAMPLES AT 1135
1 4oz JAR FOR STORAGE AT EPIC AND 1 SC2 JR
FOR GRAIN SIZE ANALYSIS. SAMPLE # S-1 (0-2')
1155 BEGIN CORING HQ CORE
1157 OCCASIONALLY WHILE CORING ATX 2-3' THE
DRILL BIT MAKES A SCREECHING NOISE. LEE THE
DRILLER SAYS IT IS CAUSED BY THE BIT CUTTING
THROUGH A FRACTURE.
1220 Core sample @ 2'-4.75' 0ppm AB, Bottle 0ppm AB,
BZ 0ppm AB.
1230 RICHERT EXAMINES & DESCRIBES ROCK CORE
AS DOLOSTONE, LIGHT GREY, COMPETENT
1240 DRILLERS MIXING CEMENT GROUT FOR 3" PVC
CASING.
1300 WELL 3" PVC GROUTED IN PLACE, USED
2 BAGS OF CEMENT + 1/5 TH BAG BENTONITE
3' STICK-UP BELOW GROUND. ROCK IS AT 2' FEET
1301 RICHERT & NEWCHURCH DEPART FOR LUNCH.
DRILLERS STEAM CLEAN & MOVE TO GW-4
1340 JR RICHERT & NEWCHURCH RETURN ON SITE
1345 RICHERT & NEWCHURCH SEARCH FOR AND FIND
WELL STAKE FOR GW-4
1350 DRILLERS MOVE RIG TO GW-4.
1415 Split spoon @ 0-2' 0ppm AB
1420 Start drilling

S Newchurch

5-105

20 August 1990 YQ 7040 Monday Sigfd Newchurch

1430 BEDROCK REFUSAL AT 2.65'
1435 Prepare to begin coring but the rig is not functioning correctly.
1500 Drillers began coring
1515 Explosimeter alarm went off for no apparent reason. There was a low oxygen % but nothing was picked-up on the OVA.
1530 Core sample @ 3'-8' 0ppm AB, BH 0ppm AB, BZ 0ppm AB
1545 DRILLERS MIXING GROUT
1557 DRILLERS TREMIE IN GROUT ≈ 20 GALLONS CEMENT AND 10% BENTONITE 2 BAGS CEMENT
½ BAG BENTONITE PELLETS
1630 Jim Richert left the site to call Barb Jopes after SN + JR walk around & tried to find the site for GW-3. The drillers are decoring
1700 JR return to site. BT will be on site tomorrow around 1430 so tomorrow morning we will start GW-2. The drillers + JR walk to the site to determine the difficulty of mobilization.
1715 S+E Depart site for the day.
1815 JR + SN arrive at E+C.

S Newchurch
8/20/90

9

8

TUES 8-21-90 YQ-7040 JR

0810 JIM RICHERT, SYBIL NEWCHURCH, AND TOM ABBEY OF ETE DEPART HEADQUARTERS.

0900 PASS SITE ROAD AND DRIVE ROUTE TO HOSPITAL IN MEDINA, IT IS 6.4 MILES FROM SITE.

0910 STOP FOR DRINKS, ICE, + MAPPER + 7.13

0920 ETE ARRIVES ON SITE, DEC + DRILLERS ARE ON SITE. RIG SET UP AT GW-2

0930 BENCHARCH + ABBEY SETTING UP MONITORING EQUIPMENT.

0943 RICHERT CHECKS GEOPHYSICAL REPORT RE WELL LOCATION, DRILLER WOULD LIKE TO SET UP 16' SW OF STAKE LOOKS OK ON REPT. WILL PROCEED AT ALTERNATE LOCATION (16' SW). FOR BETTER RIG ACCESS.

0945 BEGIN DRILLING GW-2

Safety Meeting - all employees attended: 3 ETE, 2 HA
Discussed Location + distance of hospital
Supply of fluids available + need for drinks.
Background readings: Cal of HNu w/ 10.2eV probe to 54 ppm w/ Cal Span. 0ppm background
OVA 3.0ppm ; Explosimeter 20.8% O_2 / 0% LEL
Mini Rad 22 counts/min - normal

0948 Split spoon @ 0'-2' 0ppm AB, BZ 0ppm AB
- All readings will be taken with the OVA if there is a reading above background a second reading will be taken with the HNu.

0955 Split spoon @ 2'-4' 0ppm AB, BZ 0ppm AB: little recovery

1005 Split spoon @ 4'-6' 0ppm AB, BZ 0ppm AB

1015 Split spoon @ 5.5'-7.5' 0ppm AB, BZ 0ppm AB

1030 Split spoon @ 7.5'-9.5 1.0ppm AB, BZ 0ppm AB, BH 0ppm AB. HNu 0ppm AB (55), 0ppm AB (BZ), 0ppm AB (BH)

S. Newchurch

5-106

21 August 1990 Tuesday YQ 7040 Sybil Newchurch

1040 Auger refusal at 9.5'.

1100 Explosimeter went off. The oxygen meter was at 20.0%, but when taken to the clean zone the alarm still sounded. The instrument may need recalibration.

1110 1ST CORE RUN OUT OF HOLE (9.5'-14.5')

1120 Core sample 0ppm AB, BZ 0ppm AB, BH 0ppm AB.

1130 Drillers start mixing grout for GW-2.

1210 WELL GW-2 IS GROUTED.
OVERBURDEN IS 9.5' THICK
ROCK SOCKET INTO SHALE FROM 9.5 TO 14.5'
USED 3" ID PVC RISER W/ 2' STICK-UP
LOCKING 4" STEEL PROTECTIVE CASING
LOCKED WITH MASTER PADLOCK KEY #3252

1225 JR, SN + TA left site for lunch while drillers decon.

1300 JR, SN + TA arrive back on site. Drillers still decon-ing JR + TA painted well caps.

1345 Mobilize to GW-1.

1400 DRILLER HAVING TROUBLE LOOSENING DRILL ROD ASSEMBLY

1430 CAN'T BREAK CONNECTION AFTER ½ HR OF TRYING. WILL CHANGE HEAD OF RIG INSTEAD. READON WE DID NOT MOVE TO GW-3 TO AID CORE AND THE LOCATION STAKE CAN NOT BE FOUND, + BARB TAPE WILL BE CUT SOMETIME TODAY TO RE-STAKE LOCATION, SO IN THE MEAN TIME WE DECIDED TO NX CORE GW-1.

1510 DEC REP. YAVUZ ERK DEPARTS SITE FOR THE DAY

1520 THE KEEPER OF BEE HIVES ARRIVES ON SITE TO TAKE OUT THE HONEY, HE SAID IT STIRS THE BEE'S UP + HE WILL COME BACK NEXT WEEK.

1330 BEGIN CORING NX SIZE CORES.

1540 CORE BARREL PLUGGED UP. AFTER 35' OF CORING

J. Richert

TUES. 8-21-90 YQ-7040 J.R.

1550 RESUME CORING AT ≈ 7.1'
1605 OUT WITH RUN #2 6.7'-9.2' Sample Oppm AB, BZ 0 AB, BH Oppm AB.
1620 Barb Soper + Herbert came on site. JR shows them the progress on the other wells + conformation on GW-3.
1645 Core sample @ 9.2'-14.2' Oppm AB, BZ Oppm AB, BH Oppm AB
1715 Core sample @ 14.2'-19.2' Oppm AB, BZ Oppm AB, BH Oppm AB.
1720 Turn off drill rig + prepare to leave for the day. Clear site.
1730 Drillers leave site for water. E+E leaves site.
1825 EYE ARRIVES AT HEAD QUARTERS.

J. Richert

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5-107
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WED 8-22-90 YQ-7040 J.R

0730 Jim RICHERT, SYBIL NEWCHURCH, + TOM ABBEY OF EYE ALL MEET AT HEAD QUARTERS JR
0740 EYE DRIVES TO TOPS MARKE TO BUY GATERAID + ICE $7.17 PAID BY SYBIL.
0750 EYE ARRIVES AT EYE'S DEMBAY AVE. EQUIPT WAREHOUSE. TO FILL UP OVA WITH HYDROGEN.
0800 EYE DEPARTS EQUIPT. WAREHOUSE W/ FULL OVA.
0805 EYE STOPS TO FILL RENTAL VAN WITH GAS + BUY 1 GALLON OF WIPER FLUID FOR VAN. TOTAL COST = $24.72 PAID ON CREDIT CARD BY JIM RICHERT.
0810 EYE DEPARTS FOR SITE.
0850 EYE ARRIVES ON SITE, NYSDEC REP. YAVUZ ERK IS ON SITE AS ARE THE DRIVERS FROM AMERICAN AUGER.
WEATHER: CLOUDY, LIGHT BREEZE OUT OF THE WEST
TEMP. 65°F. FORECAST = CLOUDY, HIGH 70-75°F
GOALS FOR TODAY: ① FINISH CORING GW-1
② SET CASING IN GW-3
③ BEGIN NX CORING GW-4
0900 BEGIN CORING GW-1 AT 19.2'. RUN #5
Background readings: hNu set 10.2eV probe cal to 54 ppm with cal span gas. Oppm background OVA 3ppm; Mine Lab 20 counts/min-normal Explosimeter 20.8% O_2 / 0% LEL
-All readings will be taken with the OVA, if there are any above background a second reading will be taken with the hNu.
0930 Core sample @ 19.2'-24.2' .5ppm AB, BZ Oppm AB, BH Oppm AB; hNu Core sample Oppm AB, BZ Oppm AB.
1005 Core sample @ 24.2'-29.2' .25 ppm AB, BZ Oppm AB, BH Oppm AB; hNu Core sample Oppm AB, BZ Oppm AB.
AT 1000 CORE RUN #5 OUT OF HOLE AT 29.2'
10.5 WATER LEVEL is AT 7' BGS. ☺ JR.

R. J. Richert

USED 8.22-90 YQ-2046 1/2
10" WITH AT WATER LEVEL AT 7.0' BGS
+ AE 3" WELL = 8 GALLONS of WATER
WILL EVALUATE THIS + RECORD
WATER LEVELS + RECOVERY.
AFTER PUMPING 8 GALLONS OUT TOOK WATER LEVELS
TIME AT START.
MEASURED FROM TOP of DRILL PIPE. 54" AGS

TIME	WATER LEVEL (FT)
1021	30
1022	27.6
1022.5	26
1022.7	25.5
1023	25
1023.5	22
124.25	20

VERY GOOD WATER RECOVERY. WILL STOP CORING THIS WELL AND LEAVE AS AN OPEN CORE BEDROCK WELL, TOTAL DEPTH IS ≈ 29'.
1030 DRILLERS BEGIN PULLING OUT DRILL RODS.
1115 DRILLERS MOVE OFF HOLE.
1120 RICHERT MEASURE WATER LEVEL OF GW-1 AT 7.55' BELOW GROUND + TOTAL DEPTH OF WELL AT 28.8' BGS. DRILLERS STEAM CLEANING
1130 DRILLERS DECON. RIG
1200 DRILLERS MOVE TO GW-3
1215 DRILLERS SET UP ON WELL STAKE GW-3
STAKE IS ON SOUTH EDGE OF CUT ALFALFA FIELD.
1225 BEGIN DRILLING GW-3 Split spoon @ 0'-2' Oppm AB, BZ Oppm AB, BH Oppm AB
1240 Split spoon @ 4'-6' Oppm AB, BZ Oppm AB, BH Oppm AB.

S Newchurch

5-108

22 August 1990 Wednesday YQ 7040 S. Newchurch

1300 Split spoon @ 9.0-11.0' Oppm AB, BZ Oppm AB, BH Oppm AB.
1310 Split spoon @ 14'-16' Oppm AB, BZ Oppm AB, BH Oppm AB. Little recovery.
1325 BEDROCK REFUSAL AT 14.33'. BEGAN HQ CORING AT 14.5'
1410 RECOVERED CORE 14.5 - 19.5 TOP 2' WAS BOULDER + COBBLES REST NO RECOVERY DECAUSE WE ENCOUNTERED TILL AGAIN. MUST RETURN TO AUGER DRILLING
1410 RESUME AUGERING AT 14.5'
1432 19.5 FT TO 19'10" SPLIT SPOON Oppm NOISE BACKGROUND OVA
1500 24' TO 26' SPLIT SPOON COLLECTED 0.6ppm AB-OVA; 0 ppm HNU
1515 JR left site to call Barb Topor at E-E office + DEC in Albany to see if we could set GW-3. We did not hit bedrock but we do have water.
1545 JR return to site. He had to tell DEC about the recovery. Drillers augered down to 26'.)
1555 JR left site again to call DEC
1605 Richert returns on site after talking to VALERIE LAZZIE of ALBANY DEC. HER INSTRUCTIONS WERE TO AUGER 2 FEET DEEPER TO 28' AND SET A 10' SCREEN FROM 28-TO 18' IF WE HIT BEDROCK BEFORE 28' I (RICHERT) MUST CALL HER BACK FOR FURTHER INSTRUCTION. DEC ~~rep~~ SM YARUZ ERK, left the site SM He just moved his vechical.
1615 JR left site to call Jim Griffis at E+E office.
1620 Split spoon @ 26'-28' Oppm AB, BZ Oppm AB, BH Oppm AB.
1645 Derek Greve, drillers helper, was hit in left side with theater bar while Lee Linwood (driller) was trying to loosen a rod. He can walk around but he might have bruised his ribs.

S Newchurch

WED. 8-22-90 YQ-7040 J.R.

1700 RICHERT PASES OFF LOCATION OF WELL GW-3 AT 75 PASES DUE WEST OF CENTERLINE OF GRISWALD ROAD 75 PASES ≈ 225 FEET WELL IS OFF OF CUT HAY FIELDS 4 SOUTH OF THIS FIELD IN THE HIGH GRASS

1710 DRILLER SAYS HE COULD CONTINUE CONTINUE COMPLETING WELL, WHICH WOULD TAKE 2 MORE HOURS OF STOP NOW SINCE HE HAS A GOOD HEAD OF SAND IN THE HOLE NOW + THE WELL WOULD BE SAFE OVER NIGHT. ETE DECIDES TO CALL IT A DAY + WILL START AT GW-3 TOMORROW,

1725 ETE + DEC DEPART SITE FOR THE DAY,

1815 ETE ARRIVES AT HEADQUARTERS.

Jim Richert

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THURS. 8-23-90 YQ-7040 J.R.

0700 ETE ARRIVES AT HEAD QUARTERS.
↳ JIM RICHERT, SYBIL NEWCHURCH, TOM ABREY

0718 ETE APPT JR DEPARTS HEADQUARTERS.

0750 ARRIVE ON SITE, AMERICAN AUGER ON SITE

0755 NYSDEC REP ARRIVES ON SITE YAMRZERK

WEATHER: CLEAR SUNNY, TEMP ≈ 65°F TO BE 78°F, WINDS LIGHT AND VARIABLE

0800 DRILLERS BEGIN OPERATIONS - EXPLOSIMETER CALIBRATED O_2 20.9%, LEL 0% IN AMBIENT AIR

NOTE OVA, HNU WILL BE CALIBRATED AND USED TO MONITOR DRILLING @ EXIT LOCATION

0805 WATER LEVEL CHECKED ON WELL GW-3 AT 6.6' BELOW GROUND SURFACE

0840 SAND PACK POURED OVER 10' SCREEN.
SCREEN 2" PVC #10 SLOTS FROM 28' TO 18'
SAND = #3 QUARTZ SAND FROM 28 up TO 16'
BENTONITE SEAL = CHIPS + WATER FROM 16' up TO 13.75'
BENTONITE/CEMENT GROUT TO SURFACE.
4" STEEL LOCKED PROTECTIVE CASING

0930 WELL GW-3 IS NOW COMPLETED + LOCKED.

0945 DRILLERS MOVE TO GW-4 AREA TO DECONN. +
ETE DEPARTS TO PHONE + STORE

1010 ETE ARRIVES BACK ON SITE, DRILLERS

1115 DECONNING RIG ETC.

~~1215~~ 1230 DRILLERS FINISHED DECONNING.

~~1230~~ 1130 DRILLERS MOVE RIG OVER GW-4

HNU CALIBRATED @ ISOBUTYLENE 100ppm NO ADJUSTMENTS NECESSARY BACKGROUND 0.4ppm
GW-4 CLEARED @ HNU 0ppm ABOVE BKG.

1146 DRILLERS BEGIN OPERATIONS - CORING

1148 OVA STARTED BKG. 3.0ppm

NOTE: ALL READINGS DOCUMENTED WILL BE RECORDED AS ABOVE BKG.

1152 BREATHING ZONE (BZ) 0ppm - OVA

1200 3'9" CORE REMOVED 0ppm - OVA SAMPLE; WITHIN TOP CASING 0ppm OVA

1220 CORE RUN REMOVED 0ppm OVA SAMPLE; 0ppm OVA @ STICK up

1242 3RD CORE REMOVED 0ppm OVA, BZ IN WORK AREA 0ppm OVA

1301 4TH CORE REMOVED 0ppm TOP, 0ppm BUNCH HOLE - TOP OF CASING

THURS. 082390 YQ-7040 TA

1322 5TH CORC RETRIEVED Qpp- IN STICK-UP OVA; SAMPLE Qppm OVA
1345 6(77) GW PERFORM SAMPLE, WORK BZ, STICK-UP Qppm OVA
1346 check water level on GW-4 AT 4.6' BGS
will PUMP out all water in well & water recovery. MUST PUMP 10 GALLONS.

10 GALLONS EVACUATED AT 1354

FEET	TIME
25.3	1354
23.5	1355
22.0	1355.25
21.0	1355.5
20.0	1355.75
15.0	1357.0 min

MAKING WATER QUICKLY. will STOP CURING NOW AT 31.25', TOTAL DEPTH.
1420 check water in GW-4 AT 5.9' BGS.
1426 Jim R. & Sybil N. LEAVE SITE TO CONTACT OFFICE
1433 DRILLERS HAVE TO GET WATER
1445 Jim & Sybil RETURN TO SITE
1450 JR + TA print the well cover + Erik, NYSDEC, leave site.
1505 DEC return to site mobilizing to GW-2
1520 RIG + SUPPORT TRUCK MOVE TO GW-2
1525 MR GEORGE STIEMER (TOWN SUPERVISOR) ARRIVES ON SITE + SPEAKS W/ J. RICHERT + DEC REP. HE SAID: 1) HE SAW ALL 4 WELL LOCATIONS & ADVISED PLACING A HIGH POLE NEAR GW 1+4 TO MARK THEM SO VEHICLES (TRACTORS) DO NOT HIT THEM IN THE HIGH GRASS
2) Robert told him that the drillers used a total of 4,400 GALLONS OF WATER.
J. Reinert

9-23-90 THURS. YQ-7040 JR

1530 MR. STIEMER SAID THERE will BE NO CHARGE FOR THE WATER USED.
③ When asked why this site is a post-May waste site he said, because there is a house north of the site caused a local pesticide plant located on Middleton of dumping waste. PLANT NAME IS FMC.
MR. STIEMER SAID HE CHECKED THE LANDFILL REGULARLY & SAW NO SIGNS of ILLEGAL DUMPING
1540 BEGIN NO CORING AT 15'
1550 OUT with RUN #2 AT 15' DARK GRAY DOLOSTONE competent.
1620 RUN #3 OUT AT 20.5'
1621 check water level at 5.45' BGS
will EVACUATE ALL WATER + see if formation water flows.
1630 WATER WAS ENTERING THE WELL AT A SLOW RATE ≈ 0.16 GAL/MIN
1635 RICHERT INSTRUCTS DRILLERS TO DRILL 1 MORE 5-FOOT RUN.
1635 Qppm IN CASING STICK-UP; Qppm BZ WORK AREA (OVA READINGS) Run #3.
1655 RUN #4 ON BOTTOM AT 25.5'
1700 DOLOSTONE IS VERY COMPETENT DOLOSTONE
will PUMP ALL WATER OUT + WATCH RECOVERY
1700 Qppm OVA on CORE; Qppm OVA BZ WORK AREA
NO FURTHER INTRUSIVE ACTIVITIES PLANNED. NO ADDITIONAL MONITORING will BE CONDUCTED
AREA CLEANED - WELL LOCKED
1738 E+C FROM LONGS SITE

08 23 90

FRI 8-24-90 YQ-7040 JR.

0715 RICHERT OF E&E ARRIVES AT ETELAB TO PICKUP SAMPLE PRESERVATIVES.

0730 RICHERT & ARREY MEET AT E&E EQUIPMENT WARE HOUSE TO PICK-UP SAMPLE BOTTLES, & DROP OF SOME EQUIPT.

& GET TEMP, PH, COND METER REPAIRED.

0827 RICHERT & ARREY DEPART WAREHOUSE.

0910 E&E ARRIVES ON SITE, DRILLERS ON SITE

WEATHER: CLOUDY, WARM 70° OCCASIONAL LIGHT SHOWERS

GOALS FOR TODAY:

- DEVELOPE ALL 4 WELLS
- COLLECT A DRILLING WATER SAMPLE
- RETURN VAN & SAMPLES & EQUIPT

0925 WELL GW CLEARED @ APP NONE BKG HNu

CALIBRATE CHECKED @ 10ppm ISOBUTYLENE 5ppm REQUIRED ✓

BKG. 0.2ppm IN BOREHOLE REMOVED NONE BKG.

0935 MOVE TO GW-2, CHECK WELL HEAD SPACE WITH HNu = 0 PPM.

WATER LEVEL AT 5.75' BGS.

TD = 25.5' WATER COLUMN = 19.75' OR 7.25 GAL.

GW-2 DEVELOPEMENT BEGINS AT 0940

TIME	CUM. VOLUME	°F TEMP	pH	µS/cm COND	NTU's TURB.	COMMENTS
0940	0 GAL	63.7°F	7.72	6.76 x100	>200	DIRTY GRAY
0942	1	63.1	7.89	6.46 x100	>200	"
0944	2	60.9	7.84	6.40 x100	>200	"
0945	3	61.0	7.84	6.07 x100	>200	"
0947	5	60.1	7.86	6.31 x100	>200	
1017	10	64.0	7.56	7.67 x100 final	>200	
1108	15	69.0	7.38	12.28 x100	124	CLOUDS
1140	20	69.4	7.91	7.22 x100	152	FINISHED 2 HOURS DEVELOPEMENT

D. Richert

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FRI 8-24-90 YQ-7040 JR

GW-2 DEVELOPEMENT CONT.

TIME	CUM VOL	TEMP	PH	COND.	TURB	COMMENTS

1055 ARRIVE AT GW-1 WATER AT 8.2' BGS

TD = 28.5' = 20.3' of WATER = 7.45 GALLONS

JR

BEGIN DEVELOPING GW-1

TIME	CUM. VOL.	TEMP (°F)	PH	COND.	TURB.	COMMENTS
1004	0	70.4	7.17	14.64 x100	>200	
1005	1	66.8	7.19	9.69 x100	186	
1005	2	64.8	7.13	9.37 x100	129	
1005	3	64.5	7.19	9.30 x100	119	
1007	5	64.3	7.25	9.14 x100	>200	
1013	10	69.9	7.10	10 x70 x100	>200	
1022	15	70.5	7.17	10.30 x100	>200	HIGH TEMP. CAUSED
1031	20	75.7	7.23	11.11 x100	>200	BY RIG WATER PUMP
1041	25	80.6	7.18	11.36 x100	7200	WHEN WATER FLOW IS LO
1052	30	80.3	7.20	11.15 x100	>200	
1100	35	79.4	6.98	12.62 x100	>200	

D. Richert

FRI 8-24-90 YQ-7040 JR

WELL GW-1 RECORD CONTINUED.

TIME	VOLUME (GALLONS)	TEMP (°F)	PH	COND (µS/cm)	TURB NTUS	COMMENTS
1111	40	79.6	6.88	12.01x100	>200	
1121	45	83.5	7.06	1252x100	143	
1132	50	83.4	6.78	14.53x100	166	
1143	55	82.5	6.80	13.68x100	151	
1151	60	80.2	7.07	12.18	190	
12:04	65	84.0	6.96	12.20	7200	END DEVELOPMENT AFTER 2 HRS

well GW-2 was hand BAILED FOR DEVELOPMENT
WELLS GW-1, 3, & 4 All developed with Rig Pump.
1215 DRILLERS DECON. PVC TUBING, WATER HOSE FOR NEXT WELL.
1225 MOVE RIG OVER GW-4 & PREPARE TO DEVELOPE.

1227 RIG HEAT CHECK WATER LEVEL
. WATER LEVEL OF GW-4 = 8.7' FEET BGS
TOTAL DEPTH IS 31.25' = 22.55 FEET OF WATER OR 8.28 GALLONS.
TZ JR
1229 CLEAR GW-4 0.6ppm Hnu ABOVE RIG. 1M CASING & ppm IN BZ. LEVEL.
START DEVELOPMENT AT. 1233

TIME	VOLUME	TEMP.	PH	COND	TURB.	COMMENTS
1233	0	91.5	7.22	7.36x100	158	
1237	1	79.6	7.41	12.62x100	60	PUMPING
1235	2	74.3	7.46	12.63x100	70	"
1236	3	72.6	7.53	12.91	78	"
1242	5	73.5	7.25	14.60x100	>200	CAN'T PUMP will START BAILING

J. Reckert

FRI 8-24-90 YQ-7040 J.R.

GW-4 DEVELOPMENT TABLE CONTINUED.

TIME	VOL	TEMP.	PH	COND.	TURB	COMMENT
1301	10	67.8	7.34	17.38x100	>200	BAILING
1325	15	69.5	7.37	18.11x100	176	★ SULFER SMELLIN
1433	20	66.7	7.68	17.24x100	115	" "
						2 HRS DEVELOPE

J. Reckert

1315 ARRIVE AT GW-3 HNU READ 0PPM FROM WELL HEAD SPACE. WATER IS AT 4.8' BGS TOTAL DEPTH = 28.0' = 23.2' of WATER = 8.5 GALLONS PER VOLUME.
1321 BEGIN DEVELOPING w/ RIG PUMP.

TIME	VOLUME GALLONS	TEMP °F	PH	COND. µS/cm	TURB. NTUS	COMMENTS
1321	0	94.8	7.34	12.05x100	>200	USING DRILL RIG
1322	1	83.8	7.41	10.39x100	>200	PUMP.
1323	2	81.7	7.37	10.35x100	>200 JR	"
1324	3	81.0	7.24	6.40x100	>200	"
1325	5	81.0	7.57	6.73x100	>200	↓
1335	10	84.4	7.28	9.08x100	>200	"
1348	15	84.7	7.21	11.15x100	>200	"
1401	20	86.9	7.22	11.8x100	>200	
1414	25	86.2	7.03	15.32x100	88	CLEARING UP.

J. Reckert

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FRI 8-24-90 YG-7040 JR

WELL GW-3 DEVELOPEMENT TABLE CONTINUED.

TIME	VOL	TEMP.	PH	COND	TURB.	COMMENTS
1426	30	85.0	7.15	1223 x 100	55	HIGH TEMP.
1440	35	83.2	7.12	14.44 x 100	47	FROM RIG PUMP
1453	40	84.4	7.06	1554 x 100	38.5	
1505	45	87.8	7.09	15.72 x 100	33	
1518	50	89.4	4.36	14.08 x 100	27	END DEVELOPMENT

1520 water level after Development 20.3' BGS.
1525 DRILLS BEGIN PACKING UP. will leave RIG & BOX TRUCK ON SITE FOR WEEKEND.
1526 EYE DEPARTS SITE FOR DAY.
~~1615~~ ARRIVE AT EYE EQUIPT. WAREHOUSE TO UNLOAD EQUIPT & CORES.
1635 EYE DEPARTS WAREHOUSE TO EYE LAB.
1640 FILLED UP VAN W/ GAS
1655 RICHERT & ABREY DROP OFF WATER SAMPLE AT ~~EYE~~ ASC.
1700 ARRIVE AT CAR RENTAL AGENCY TO DROP OFF VAN
1715 ARRIVE AT EYE HEADQUARTERS.

J. Richert

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THURSDAY SEPT. 13 1990

WEATHER SUNNY, WARM - UP TO 80° EXPECTED
0800 C. EICH ARRIVES AT ACTION TO PICK UP VAN
0830 ARRIVE AT EYE TO PICK UP EQUIPMENT + PERSONNEL
0845 LEFT EYE FOR WAREHOUSE
0915 C.EICH, M.WITNAUER + J. RICHERT LEAVE FOR SITE
1005 ARRIVED ON-SITE LOCATED WELLS + SAMPLE LOCATN
1033 OPENED WELL GW-4 Oppm ON HNu
1035 WL IN GW-4 10.9' (TOP OF PVC)
9.05' BGS
TD GW-4 32.9' TOC
31.0' BGS
~22' OF WATER
x 36.72 (~~FT~~ GAL/FT IN 3" WELL)
44
1540
6200
66000
807.84
x 3
2423.52 GALS TO PURGE

1100 BEGAN PURGING GW-4

Time	pH	Temp	X1000 COND	TURB	GALS PURGED	COMMENTS
1100	7.02	64.3°	1.44	53	0	CLEAR TINT TO WATER
1119	7.27	64.4	1.39	>200	12	GREYISH / WHITE
1122	7.26	64.4	1.39	>200	14.25 est	H_2S ODOR
						BAILED DRY

1134 AT WELL GW-1 . Oppm ON HNu
WL 8.9' BGS
TD 28.3'

Time	PH	TEMP	X1000 COND	TURB	GALS PURG	COMMENTS
1150	6.78	63.4	.96	>200	0	grey tint to H2O
1156	6.93	63.3	.95	>200	10	Same as above
1210	6.98	63.2	1.10	>200	22	grey, Slight H_2S odor

Chad Tull 9-13-90

9-13-90

28.3
8.9
19.4

.3672
19.4
14688
330480
367200
7.123568
3
21.37104 GALS TO PURGE FROM GW-1

1250 AT WELL GW-2 - Oppm on HNU
WL 6.0' BGS
T.D 25.1'
~ 21 GALS TO PURGE

TIME	pH	TEMP	COND X1000	TURB	GALS PURGED	COMMENTS
1308	8.21	69.6	0.75	14	0	H_2S odor, clear
1317	7.74	66.8	0.80	7200	12	Grayish white, bailed dry, H_2S odor

1346 AT WELL GW-3 - Oppm on HNU
W.L. = 5.45
T.D = 27.55 so 22.1' water in well
~1 gal. to purge

Time	pH	Temp	COND X1000	Turb	Gals purged	Comments
1350	7.08	66.7	1.19	>200	0	Light gray
1357	7.13	63.3	1.09	>200	5.5	Light Brown
1409	7.04	61.3	.98	>200	11	Light Brown

PACKED UP EQUIPMENT
1430 LEAVING SITE FOR LAB
1520 ARRIVE AT LAB, PICKED UP DI WATER + PRESERVED WATER BOTTLES

Chad Tw 9-13-90

5-114

9-13-90

1550 ARRIVE AT WAREHOUSE. DROPPED OFF EXTRA WATER BOTTLES, REFILLED pH PROBE PRESERVATIVE
1616 ARRIVE AT E+E HQ. WENT TO TALK TO J. GRIFFIS (HE'S LEFT FOR DAY). TOLD J. RICHERT HOW IT WENT, + WHAT'S GOING ON TOMORROW.

Chad Tw 9-13-90

FRIDAY SEPTEMBER 14, 1990

WEATHER: HAZY, HUMID, BREEZY, SOUTH WIND 10 mph

PERSONNEL: C. EICH, M. WITNAUER

EQUIPMENT: HNU -

pH/TEMP/COND METER -

WATER LEVEL IND. - 13-03-11

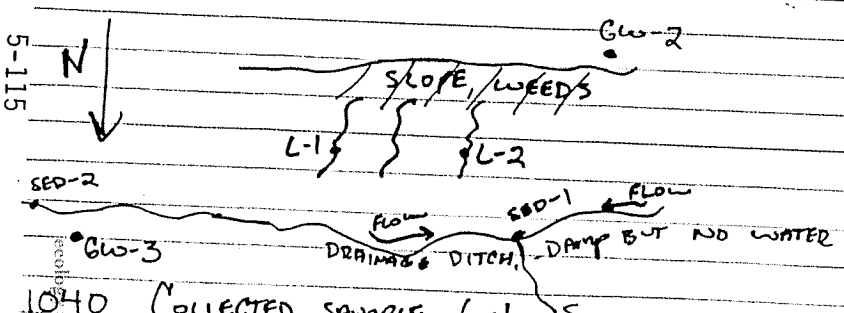
RENTAL VAN - DODGE RAM LIC. # ZEY-518

0830 C. EICH PICKED UP M. WITNAUER AT E+R - ESC. CALLED HQ NO NEED TO TAKE ANY EP TOX SAMPLES

0840 LEFT ESC FOR SITE. PICKED UP ICE

0930 ARRIVE ON-SITE. PREPARED SAMPLE LABELS + BOTTLES FOR SEDIMENT + LEACHATE SAMPLES

1025 COLLECTED SAMPLE L-2 FROM LEACHATE SEEP NEAREST TO WELL GW-2. NO VISIBLE LEACHATE (LIQUID) BUT SOIL IS A RUSTY ORANGE COLOR. L-2 IS A SOIL SAMPLE



1040 COLLECTED SAMPLE L-1. SOIL SAMPLE FROM EASTERNMOST LEACHATE SEEP. NO VISIBLE LIQUID. SAMPLE L-1 IS A SOIL SAMPLE. COLLECTED EXTRA VOLUME FOR MS/MSD.

Chad Eich 9-14-90

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9-14-90

1052 COLLECTED SAMPLE SED-1. IN DRAINAGE DITCH, BELOW LEACHATE SEEPS AT POINT WHERE DITCH SPLITS. NO WATER IN DITCH SO NO SW SAMPLE TAKEN. DRAINAGE DITCH NOT WELL DEFINED WEST OF WHERE SAMPLE SED-1 TAKEN.

1100 COLLECTED SAMPLE SED-2. FROM DRAINAGE DITCH NEAR N.E. CORNER OF SITE. NO WATER IN DITCH SO NO S.W. SAMPLE TAKEN. SAMPLE TAKEN JUST EAST OF WELL GW-3

1120 AT WELL GW-4 - OPENED CAP - 0ppm ON HNU.

WATER LEVEL 9.26' BGS

1125 Temp pH COND TURB
71.3 7.05 1.58x1000 20 NTU'S (1ST BAILER)

1128 COLLECTED SAMPLE GW-4. COLLECTED EXTRA VOLUME FOR MS/MSD. SAMPLES PUT ON ICE. LABELED BOTTLES FOR NEXT WELLS.

1200 AT WELL GW-1. OPENED WELL CAP 0 ppm ON HNU.

WATER LEVEL 9.45' BGS

Temp pH COND x1000 TURB
64.3°F 6.84 1.04 87 (1ST BAILER)

1210 BEGAN COLLECTING SAMPLE GW-1.

1240 DUCT TAPED A 2"x3"x8' POST TO WELLS GW-1 + GW-4 AS PER THE SITE OWNERS REQUEST. POSTS PAINTED ORANGE + FLAGGED W/ ORANGE FLAGGING TAPE.

1300 OPENED WELL GW-2. 0ppm ON HNU

W.L. IN GW-2 6.15' B.G.S.

Temp pH COND x.... TURB
65.3°F 7.50 0.70 >200. (1ST BAILER)

Chad Eich 9-14-90

1310: COLLECTED SAMPLE GW-2
PACKAGED SAMPLES
COMPLETED COC FORM
1400: AT WELL GW-3 - OPENED CAP.
0.ppm ON HNU.
W.L. IN GW-3 5.55' BGS

TEMP	pH	COND x1000	TURB	
67.1°F	6.92	1.18	130	(1ST BAILER)

1410 COLLECTED SAMPLE GW-3
GEORGE STEIMER (TOWN SUPER.)
STOPPED BY AS WE FINISHED.
ASKED HOW IT WAS GOING & WHERE
ALL WERE - WE TOLD HIM AND
HE LEFT.
1430: LEFT SITE FOR LAB.

REFERENCE 19

ecology and environment, inc.
BUFFALO CORPORATE CENTER
368 PLEASANTVIEW DRIVE, LANCASTER, NEW YORK 14086, TEL. 716/684-8060
International Specialists in the Environment

RECEIVED
JAN 28 1991
VILLAGE OF MIDDLEPORT

January 22, 1991

Margaret Droman
P.O. Box 186
Middleport, NY 14105

Dear Ms. Droman:

Please use a marker to show the extent of water main lines that service the residents within the 3-mile radius which is drawn on the enclosed map.

This information will prove to be very useful in completing the Phase II Investigation on the Town of Royalton Landfill (site #932092). We have also enclosed a completed Federal Express form for your convenience.

If you have any questions, please do not hesitate to call me or Ralinda Leichner at (716) 684-8060.

Sincerely,

Barbara Topor

Barbara Topor

djr/YQ7070
Enclosures

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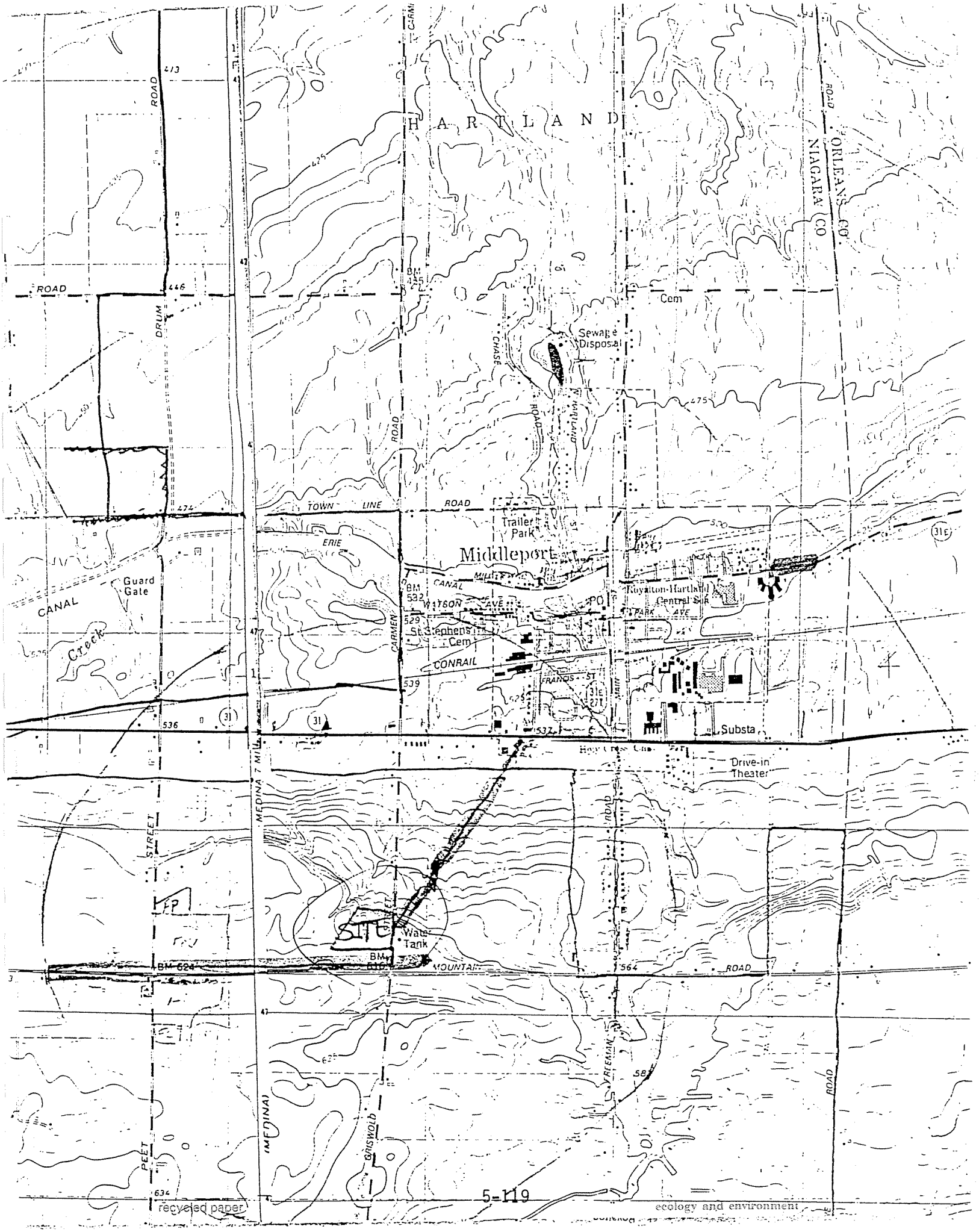

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REFERENCE 20

NATIONAL REGISTER OF HISTORIC PLACES 1966-1988

New York County—Continued

Stuyvesant Square Historic District, Roughly bounded by Nathan D. Perleman Pl., 3rd Ave., E. 18th and E. 15th Sts., New York, 11/21/80, C, 80002723
Surrogate's Court, 31 Chambers St., New York, 1/29/72, C, NHL, 72000888
Sutton Place Historic District, 1—21 Sutton Pl. & 4—16 Sutton Sq., New York, 9/12/85, C, 85002294
Theodore Roosevelt Birthplace National Historic Site, 28 E. 20th St., New York, 10/15/66, B,c,e, 66000054
Third Judicial District Courthouse, 425 Avenue of the Americas, New York, 11/09/72, C, NHL, 72000875
Tiffany and Company Building, 401 5th Ave., New York, 6/02/78, A,C, NHL, 78001886
Tilden, Samuel J., House, 14—15 Gramercy Park South, New York, 5/11/76, B,C, NHL, 76001251
Town Hall, 113—123 W. 43rd St., New York, 4/23/80, A,C, 80002724
Trinity Chapel Complex, 15 W. 25th St., New York, 12/16/82, C,a, 82001205
Trinity Church and Graveyard, Broadway and Wall St., New York, 12/08/76, A,C,a,d, NHL, 76001252
Tudor City Historic District, Roughly bounded by Fourty-third St., First Ave., Fourty-first St., and Second Ave., New York, 9/11/86, C, 86002516
Turtle Bay Gardens Historic District, 226-246 E. 49th St. and 227-245 E. 48th St., New York, 7/21/83, A,C, 83001750
Tweed Courthouse, 52 Chambers St., New York, 9/25/74, B,C, NHL, 74001277
U.S. Customhouse, Bowling Green, New York, 1/31/72, C, NHL, 72000889
U.S. General Post Office, 8th Ave. between 31st and 33rd Sts., New York, 1/29/73, C, 73002257
US Courthouse, 40 Foley Sq., New York, 9/02/87, A,C, 87001596
USS INTREPID (aircraft carrier), Intrepid Sq., New York, 1/14/86, A,g, NHL, 86000082
Union Theological Seminary, W. 120th St. and Broadway, New York, 4/23/80, A,C,a, 80002725
United Charities Building Complex, 105 E. 22nd St,. 289 Park Ave. S. and 111-113 E. 22nd St., New York, 3/28/85, B,C, 85000661
University Club, 1 W. 54th St., New York, 4/16/80, C, 80002726
University Settlement House, 184 Eldridge St., New York, 9/11/86, A, 86002515
Upper East Side Historic District, Roughly bounded by 3rd and 5th Aves., 59th and 79th Sts., New York, 9/07/84, C, 84002803
Van Rensselar, Stephen, House, 149 Mulberry St., New York, 6/16/83, C, 83001751
Vanderbilt, Mrs. Graham Fair, House, 60 E. 93rd St., New York, 10/29/82, C, 82001206
Villard Houses, 29 1/2 50th St., 24—26 E. 51st St., and 451, 453, 455, and 457 Madison Ave., New York, 9/02/75, B,C,a, 75001210
WAVERTREE, Pier 17, foot of Fulton St., New York, 6/13/78, A,C, 78001887
Waldo, Gertrude Rhinelander, Mansion, 867 Madison Ave., New York, 5/06/80, C, 80002727
Warburg, Felix M., Mansion, 1109 5th Ave., New York, 10/29/82, C, 82001207
Watson, James, House, 7 State St., New York, 7/24/72, C,a, 72000891
Webster Hotel, 40 W. 45th St., New York, 9/07/84, C, 84002806
West 67th Street Artists' Colony Historic District, 1—39 and 40—50 W. 67th St., New York, 7/11/85, A,C, 85001522
West 73rd-74th Street Historic District, 73rd, 74th Sts. and Columbus Ave., New York, 9/08/83, C, 83001752
West 76th Street Historic District, W. 76th St., New York, 7/24/80, C, 80002728
West End Collegiate Church and Collegiate School, W. End Ave. and W. 77th St., New York, 5/06/80, C,a, 80002729
Westchester House, 541—551 Broome St., New York, 3/20/86, A,C, 86000450
Woolworth Building, 233 Broadway, New York, 11/13/66, A,C, NHL, 66000554
Yiddish Art Theatre, 189 Second Ave., New York, 9/19/85, A,C, 85002427

Niagara County

Adams Power Plant Transformer House, Buffalo Ave. near Portage Rd., Niagara Falls, 6/11/75, A,C, NHL, 75001212
Deveaux School Historic District, 2900 Lewiston Rd., Niagara Falls, 6/05/74, A,a, 74001281
Fort Niagara Light [U.S. Coast Guard Lighthouses and Light Stations on the Great Lakes TR], Niagara River, Youngstown, 7/19/84, A,C, 84002809
Frontier House, 460 Center St., Lewiston, 7/05/74, A,C, 74001278
Herschell, Allan, Carousel Factory, 180 Thompson St., North Tonawanda, 4/18/85, A,C, 85000856
Holley-Rankine House, 525 Riverside Dr., Niagara Falls, 10/04/79, B,C, 79003793
Lewiston Mound, Address Restricted, Lewiston vicinity, 1/21/74, D, 74001279
Lewiston Portage Landing Site, Address Restricted, Lewiston vicinity, 7/18/74, A,D, 74001280
Lockport Industrial District, Bounded roughly by Erie Canal, Gooding, Clinton, and Water Sts., Lockport, 11/11/75, A,C, 75001211
Lowertown Historic District, Roughly bounded by Erie Canal and New York Central RR, Lockport, 6/04/73, A,C, 73001225
Moore, Benjamin C., Mill, Pine St. on the Erie Canal, Lockport, 6/19/73, A,C, 73001226
Niagara Falls Public Library, 1022 Main St., Niagara Falls, 6/05/74, A,C, 74001282
Niagara Reservation, Niagara Reservation, Niagara Falls, 10/15/66, A, NHL, 66000555
Old Fort Niagara, N of Youngstown on NY 18, Youngstown vicinity, 10/15/66, A,D, NHL, 66000556
Riviera Theatre, 27 Webster St., North Tonawanda, 3/20/80, A,C, 80002731
Thirty Mile Point Light [U.S. Coast Guard Lighthouses and Light Stations on the Great Lakes TR], Niagara River, Somerset, 7/19/84, A,C, 84003922
U.S. Customhouse, 2245 Whirlpool St., Niagara Falls, 7/16/73, A,C, 73001227
Union Station, 95 Union Ave., Lockport, 12/02/77, A,C, 77000966
Whitney Mansion, 335 Buffalo Ave., Niagara Falls, 1/17/74, B,C, 74001283
Williams, Johann, Farm, 10831 Cayuga Dr., Niagara Falls, 1/10/80, A,C,a, 80002730

Oneida County

Arsenal House, 514 W. Dominick St., Rome, 7/18/74, A,C, 74001284
Boonville Historic District, Schuyler, Post, W. Main and Summit Sts., Boonville, 11/16/79, A,C, 79001608
Clinton Village Historic District, North, South, East, West Park Rows, Marvin, Williams, Chestnut, Fountain, College and Utica Sts., Clinton, 6/14/82, A,C, 82003389
Conkling, Roscoe, House, 3 Rutger St., Utica, 5/15/75, B, NHL, 75001214
Erwin Library and Pratt House, 104 and 106 Schuyler St., Boonville, 8/14/73, A,B,C, 73001228
First Baptist Church of Deerfield, Herkimer Rd., Utica, 7/11/85, C,a,d, 85001497
First Congregational Free Church, 177 N. Main St., Oriskany Falls, 1/25/79, A,C,a, 79001609
First Presbyterian Church, 1605 Genesee St., Utica, 11/03/88, C,a, 88002172
Five Lock Combine and Locks 37 and 38, Black River Canal, NY 46, Boonville, 3/20/73, A,C, 73001229
Floyd, Gen. William, House, W side of Main St., Westernville, 7/17/71, B, NHL, 71000549
Fort Stanwix National Monument, Bounded by Dominick, Spring, Liberty, and James Sts., Rome, 10/15/66, A,e, NHL, 66000057
Fountain Elms, 318 Genesee St., Utica, 11/03/72, B,C, 72001599
Gansevoort-Bellamy Historic District, Roughly bounded by Liberty, Stuben, and Huntington Sts. to Bissel, Rome, 11/12/75, C,a,g, 75001213
Hamilton College Chapel, Hamilton College campus, Clinton, 11/03/72, A,C,a, 72000892
Jervis Public Library, 613 N. Washington St., Rome, 11/04/82, B,C, 82001208
Lower Genesee Street Historic District, Roughly bounded by Genesee, Liberty, Seneca, and

REFERENCE 21

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ecology and environment

Dangerous Properties of Industrial Materials

Sixth Edition

N. IRVING SAX

Assisted by:

Benjamin Feiner/Joseph J. Fitzgerald/Thomas J. Haley/Elizabeth K. Weisburger

VAN NOSTRAND REINHOLD COMPANY

NEW YORK CINCINNATI TORONTO LONDON MELBOURNE

5-124

TABLE I

EPA Hazard Ranking System Waste Characteristics Values
(Toxicity/Persistence Matrix)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Acenapthene	9	3
Acetaldehyde	6	6
Acetic Acid	6	6
Acetone	6	6
2-Acetylaminoflourene	18	9
Aldrin	18	9
Ammonia	9	9
Aniline	12	9
Anthracene	15	9
Arsenic	18	9
Arsenic Acid	18	9
Arsenic Trioxide	18	9
Asbestos	15	9
Barium	18	9
Benzene	12	9
Benzidine	18	9
Benzoapyrene	18	9
Benzopyrene, NOS	18	9
Beryllium & Compounds NOS	18	9
Beryllium Dust, NOS	18	9
Bis (2-Chloroethyl) Ether	15	9
Bis (2-Ethylheryl Phthalate	12	3
Bromodichloromethane	15	6
Bromoform	15	6
Bromomethane	15	9
Cadmium	18	9
Carbon Tetrachloride	18	9
Chlordane	18	9
Chlorobenzene	12	6
Chloroform	18	6
3-Chlorophenol	12	6
4-Chlorophenol	15	9
2-Chlorophenol	12	6
Chromium	18	9
Chromium, Hexavalent (Cr^{+6})	18	9

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Table 1 (cont.)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Chromium, Trivalent (Cr^{+3})	15	6
Copper & Compounds, NOS	18	9
Creosote	15	6
Cresols	9	6
4-Cresol	12	9
Cupric chloride	18	9
Cyanides (soluble salts), NOS	12	9
Cyclohexane	12	6
DDE	18	9
DDT	18	9
Diaminotoluene	18	6
Dibromochloromethane	15	6
1, 2-Dibromo, 3-chloropropane	18	9
Di-N-Butyl-Phthalate	18	6
1, 4-Dichlorobenzene	15	6
Dichlorobenzene, NOS	18	6
1, 1-Dichloroethane	12	6
1, 2-Dichloroethane	12	9
1, 1-Dichloroethene	15	9
1, 2-cis-Dichloro-ethylene	12	3
1, 2-trans-Dichloro-ethylene	12	3
Dichloroethylene, NOS	12	3
2, 4-Dichlorophenol	18	6
2, 4-Dichlorophenoxyacetic Acid	18	9
Dicyclopentadiene	18	9
Dieldrin	18	9
2, 4-Dinitrotoluene	15	9
Dioxin	18	9
Endosulfan	18	9
Endrin	18	9
Ethylbenzene	9	6
Ethylene Dibromide	18	9
Ethylene Glycol	9	6
Ethyl Ether	15	3
Ethylmethacrylate	12	6

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Fluorine	18	9
Formaldehyde	9	9
Formic Acid	9	6
Heptachlor	18	9
Hexachlorobenzene	15	6
Hexachlorobutadiene	18	9
Hexachlorocyclohexane, NOS	18	9
Hexachlorocyclopentadiene	18	9
Hydrochloric Acid	9	6
Hydrogen Sulfide	18	9
Indene	12	6
Iron & Compounds, NOS	18	9
Isophorone	12	6
Isopropyl Ether	9	3
Kelthane	15	6
Kepone	18	9
Lead	18	9
Lindane	18	9
Magnesium & Compounds, NOS	15	6
Manganese & Compounds, NOS	18	9
Mercury	18	9
Mercury Chloride	18	9
Methoxychlor	15	6
4, 4-Methylene-Bis-(2-Chloroaniline)	18	9
Methylene Chloride	12	6
Methyl Ethyl Ketone	6	6
Methyl Isobutyl Ketone	12	6
4-Methyl-2-Nitroaniline	12	9
Methyl Parathion	9	9
2-Methylpyridine	12	6
Mirex	18	9

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Naphthalene	9	6
Nickel & Compounds, NOS	18	9
Nitric Acid	9	9
Nitroaniline, NOS	18	9
Nitrogen Compounds, NOS	12	0
Nitroguanidine	12	9
Nitrophenol, NOS	15	9
m-Nitrophenol	15	
o-Nitrophenol	12	
p-Nitrophenol	15	
Nitrosodiphenylamine	12	6
Parathion	9	9
Pentachlorophenol (PCP)	18	9
Pesticides, NOS	18	9
Phenanthrene	15	9
Phenol	12	9
Phosgene	9	9
Polybrominated Biphenyl (PBB), NOS	18	9
Polychlorinated Biphenyls (PCB), NOS	18	9
Potassium Chromate	18	9
Radium & Compounds, NOS	18	9
Radon & Compounds, NOS	15	9
RDX (Cyclonite)	15	
2, 4-D, Salts & Esters	18	9
Selenium	15	9
Sevin (Carbaryl)	18	9
Sodium Cyanide	12	9
Styrene	9	6
Sulfate	9	0
Sulfuric Acid	9	9
2, 4, 5-T	18	9
1, 1, 2, 2-Tetrachloroethane	18	9
Tetrachloroethane, NOS	18	9
1, 1, 2, 2-Tetrachloroethene	12	6

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Tetraethyl Lead	18	9
Tetrahydrofuran	15	6
Thorium & Compounds, NOS	18	9
Toluene	9	6
TNT	12	
Toxaphene	18	9
Tribromomethane	18	9
1, 2, 4-Trichlorobenzene	15	6
1, 3, 5-Trichlorobenzene	15	6
1, 1, 1-Trichloroethane	12	6
1, 1, 2-Trichloroethane	15	6
Trichloroethane, NOS	15	6
Trichloroethene	12	6
1, 1, 1-Trichloropropane	12	6
1, 1, 2-Trichloropropane	12	6
1, 2, 2-Trichloropropane	12	6
1, 2, 3-Trichloropropane	15	9
Uranium & Compounds, NOS	18	9
Varsol	12	6
Vinyl Chloride	15	9
Xylene	9	6
Zinc & Compounds, NOS	18	9
Zinc Cyanide	18	9

REFERENCE 22

02/26/90 * * * * * NEW YORK STATE DEPARTMENT OF HEALTH PUBLIC WATER SYSTEM ANNUAL INSPECTION * * * * * PAGE 1 OF 4

001 PROG CODE -- 100 STATION NO - 00826000 SUPPLY NAME -- MIDDLEPORT VILLAGE COUNTY-31- NIAGARA

NAME
MIDDLEPORT VILLAGE

LOCATED IN: CITY OR TOWN
ROYALTON (T)

LASTINSP DATE 12 06 89 (MONTH DAY YEAR)

TYPE CODE 03 VILLAGE 002

POP SERVED 1990 / 2000

NO SERVICES 718 / 695

SUPPLIERS SERVED

GAZETTEER CODE NAME 3120 MIDDLEPORT V.

THIS INSP DATE 12 06 90 (MONTH DAY YEAR)

PERCENT CUSTOMERS METERED
INDUS 100 COMM 100 RESID 100

AVE DAILY PROD'N-GPD 153000 / 7 9 (illegible)

PUBLIC WATER SUPPLY IN CHARGE OF
LAST NAME HOLAHAN FIRST NAME WILLIAM MI

AVE DAILY CONSPTN-GPD 358000 / 440000

MAX DAY PROD'N-GPD 225000 / 112000 (illegible)

AGENCY, CORP., CO., OR MUNICIPBODY
VILLAGE OF MIDDLEPORT

DIST'N STORAGE-GAL 650000 / 6500

SYS TYPE A,B,C,D: B

DISINFECTION WAIVER: 3 (1=YES 2=NO 3=CL)

MAILING ADDRESS - ST. OR PO BOX
24 MAIN STREET

CITY - POST OFFICE
MIDDLEPORT

STATE NY ZIP CODE 14105

SUPPLIER PHONE NO. 7167353303

SOURCE OF SUPPLY NUMBER OF EACH
GRD 1 SURF 0 PURCH 1

OPERATOR GRADE 'D'
REQD 2B ACTUAL 2B

1=YES 2=NO

CHIEF OPERATOR
LAST NAME MAHAR FIRST NAME JAMES MI E CERT NO 8503

SYSTEM PHONE NO. 7167353303

EMER. PHONE NO. 7167353592

DATES OF WATER ANALYSES
MOST RECENT SAMPLE DATE

	MONTH	DAY	YEAR
RADIOLOGICAL	10	24	86
INORGANIC	05	24	88
ORGANIC			
TTHM OR MTP	12	18	85

MONTH	DAY	YEAR
10	29	90

USE BLUE, GREEN, OR RED INK ONLY

DO NOT SUBMIT PHOTOCOPIES

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

II. SITE NAME AND LOCATION

01 Site Name (Legal, common, or descriptive name of site)	02 Street, Route No., or Specific Location Identifier
Town of Royalton Landfill	Griswold Street, north of Mountain Road

03 City	04 State	05 Zip Code	06 County	07 County Code	08 Cong. Dist.
Royalton	NY		Niagara	063	36

09 Coordinates Latitude	Longitude	10 Type of Ownership (Check One)
43 11 30.__	078 34 42.__	[X] A. Private [ ] B. Federal [ ] C. State [ ] D. County [ ] E. Municipal [ ] F. Other _____ [ ] G. Unknown

III. INSPECTION INFORMATION

01 Date of Inspection	02 Site Status	03 Years of Operation
5 / 2 / 90 (Month Day Year)	[ ] Active [X] Inactive	1958 (Beginning Year) | 1978 (Ending Year) [ ] Unknown

04 Agency Performing Inspection (Check all that apply)
[ ] A. EPA [ ] B. EPA Contractor _____ (Name of Firm) [ ] C. Municipal
[ ] D. Municipal Contractor _____ (Name of Firm) [ ] E. State [X] F. State Contractor Ecology and Environment Engineering, P.C. (Name of Firm)
[ ] G. Other (Specify) _____

05 Chief Inspector	06 Title	07 Organization	08 Telephone No.
Barbara Topor	Geologist	E & E	(716) 684-8060
09 Other Inspectors	**10 Title**	**11 Organization**	**12 Telephone No.**
Scott Thorsell	Geologist	E & E	(716) 684-8060
Christine Lewicki	Env. Scientist	E & E	(716) 684-8060
Ralinda Leichner	Geologist	E & E	(716) 684-8060
			( )
			( )

13 Site Representatives Interviewed	14 Title	15 Address	16 Telephone No.
Douglas Ortman	Owner	4240 Griswold St.	( )
George Steimer	Royalton Tn. Supr.		( )
William Bontempi	homeowner	4258 Griswold St.	( )
			( )
			( )

17 Access Gained by (Check one)	18 Time of Inspection	19 Weather Conditions
Permission	0845	Sunny, 40°F, Winds 15-20 mph, low humidity

IV. INFORMATION AVAILABLE FROM

01 Contact	02 Agency/Organization	03 Telephone No.
Barbara Topor	E & E	(716) 684-8060

04 Person Responsible for Site Inspection Form	05 Agency	06 Organization	07 Telephone No.	08 Date
James Griffis		E & E	(716) 684-8060	1 / 14 / 91 (Month Day Year)

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 Physical States (Check all that apply)

[X] A. Solid
[ ] B. Powder, Fines
[ ] C. Sludge
[ ] D. Other _____ (Specify)
[ ] E. Slurry
[ ] F. Liquid
[ ] G. Gas

02 Waste Quantity at Site (Measure of waste quantities must be independent)

Tons _____
Cubic Yards 97,000
No. of Drums _____

03 Waste Characteristics (Check all that apply)

[ ] A. Toxic
[ ] B. Corrosive
[ ] C. Radioactive
[ ] D. Persistent
[ ] E. Soluble
[ ] F. Infectious
[ ] G. Flammable
[ ] H. Ignitable
[ ] I. Highly volatile
[ ] J. Explosive
[ ] K. Reactive
[ ] L. Incompatible
[ ] M. Not applicable

III. WASTE TYPE

Category	Substance Name	01 Gross Amount	02 Unit of Measure	03 Comments
SLU	Sludge			
OLW	Oily waste			
SOL	Solvents			
PSD	Pesticides			
OCC	Other organic chemicals			
IOC	Inorganic chemicals			
ACD	Acids			
BAS	Bases			
MES	Heavy Metals			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 Category	02 Substance Name	03 CAS Number	04 Storage/Disposal Method	05 Concentration	06 Measure of Concentration
	No known hazardous wastes disposed of at the site.				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

Category	01 Feedstock Name	02 CAS Number	Category	01 Feedstock Name	02 CAS Number
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Phase I Report

NCHD, Site Profile Report

[UZ]YQ7080:D3259/4560

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [ ] A. Groundwater Contamination 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description

Unlined landfill within the principal aquifer of the area.

01 [ ] B. Surface Water Contamination 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

Leachate seeps observed along northern site slope. Drainage ditch in this area drains into unnamed stream.

01 [ ] C. Contamination of Air 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

None observed or expected.

01 [ ] D. Fire/Explosive Conditions 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

None observed or expected.

01 [ ] E. Direct Contact 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

Leachate seeps along northern site boundary. Site access unrestricted.

01 [ ] F. Contamination of Soil 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Area Potentially Affected _____ 04 Narrative Description:

Soil in area of leachate outbreaks may be affected.

01 [ ] G. Drinking Water Contamination 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

Several residences in the area on drinking water wells.

01 [ ] H. Worker Exposure/Injury 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
03 Workers Potentially Affected _____ 04 Narrative Description:

None reported or expected. Site is inactive.

01 [ ] I. Population Exposure/Injury 02 [ ] Observed (Date _____) [X] Potential [ ] Alleged
03 Population Potentially Affected _____ 04 Narrative Description:

Site is unsecured.

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS (Cont.)	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. HAZARDOUS CONDITIONS AND INCIDENTS (Cont.)

01 [ ] J. Damage to Flora 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

None observed or expected.

01 [ ] K. Damage to Fauna 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

None observed or expected.

01 [ ] L. Contamination of Food Chain 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

None observed or expected.

01 [ ] M. Unstable Containment of Wastes (Spills/Runoff/Standing liquids, Leaking drums) 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
03 [ ] Population Potentially Affected _____ 04 Narrative Description:

None observed or expected.

01 [ ] N. Damage to Offsite Property 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

None observed or expected.

01 [ ] O. Contamination of Sewers, Storm/ Drains, WWTPs 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

None observed or expected.

01 [ ] P. Illegal/Unauthorized Dumping 02 [ ] Observed (Date _____) [ ] Potential [ ] Alleged
04 Narrative Description:

Some scavenger dumping apparent. Site access is not controlled.

05 Description of Any Other Known, Potential, or Alleged Hazards

III. TOTAL POPULATION POTENTIALLY AFFECTED 5,478 people within 4 miles

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC, Phase I Report

E & E Site Inspection

[UZ]YQ7080:D3259/4560

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

II. PERMIT INFORMATION

01 Type of Permit Issued (Check all apply)	02 Permit Number	03 Date Issued	04 Expiration Date	05 Comments
[ ] A. NPDES NA				
[ ] B. UIC				
[ ] C. AIR				
[ ] D. RCRA				
[ ] E. RCRA Interim Status				
[ ] F. SPCC Plan				
[ ] G. State (Specify)				
[ ] H. Local (Specify)				
[ ] I. Other (Specify)				
[ ] J. None				

III. SITE DESCRIPTION

01 Storage Disposal (Check all that apply)	02 Amount	03 Unit of Measure	04 Treatment (Check all that apply)	05 Other
[ ] A. Surface Impoundment			[ ] A. Incineration	[ ] A. Buildings On Site
[ ] B. Piles			[ ] B. Underground Injection	No
[ ] C. Drums, Above Ground			[ ] C. Chemical/Physical	
[ ] D. Tank, Above Ground			[ ] D. Biological	
[ ] E. Tank, Below Ground			[ ] E. Waste Oil Processing	
[X] F. Landfill	97,000	cu. yds.	[ ] F. Solvent Recovery	06 Area of Site
[ ] G. Landfarm			[ ] G. Other Recycling Recovery	
[ ] H. Open dump			[ ] H. Other (specify)	5 Acres
[ ] I. Other (Specify)				

07 Comments

IV. CONTAINMENT

01 Containment of Wastes (Check one)

[ ] A. Adequate, Secure [ ] B. Moderate [X] C. Inadequate, Poor [ ] D. Insecure, Unsound, Dangerous

02 Description of Drums, Diking, Liners, Barriers, etc.

Unlined landfill on bedrock of former quarry.

V. ACCESSIBILITY

01 Waste Easily Accessible: [X] Yes [ ] No

02 Comments:
Site access unsecured. Cover incomplete or inadequate.

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

E & E Site Inspection, 1990
NYSDEC Phase I Report

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

II. DRINKING WATER SUPPLY

01 Type of Drinking Supply (Check as applicable)

	Surface	Well
Community	A. [ ]	B. [X]
Non-community	C. [ ]	D. [X]

02 Status

Endangered	Affected	Monitored
A. [ ]	B. [ ]	C. [ ]
D. [ ]	E. [ ]	F. [ ]

03 Distance to Site

A 1 (mi)

B 0.2 (mi)

III. GROUNDWATER

01 Groundwater Use in Vicinity (Check one)

[ ] A. Only Source for Drinking

[X] B. Drinking (Other sources available) Commercial, industrial, irrigation (No other water sources available)

[ ] C. Commercial, industrial, irrigation (Limited other sources available)

[ ] D. Not Used, Unusable

02 Population Served by Groundwater ~790

03 Distance to Nearest Drinking Water Well 0.2 (mi)

04 Depth to Groundwater	05 Direction of Groundwater Flow	06 Depth to Aquifer of Concern	07 Potential Yield of Aquifer	08 Sole Source Aquifer
5.5 - 9.5 (ft)	N	2 - 10 (ft)	unknown (gpd)	[ ] Yes [X] No

09 Description of Wells (including usage, depth, and location relative to population and buildings)

Residential wells - other information unknown.

10 Recharge Area		11 Discharge Area	
[X] Yes	Comments:	[ ] Yes	Comments:
[ ] No		[ ] No	

IV. SURFACE WATER

01 Surface Water (Check one)

[X] A. Reservoir, Recreation, Drinking Water Source

[ ] B. Irrigation, Economically Important Resources

[ ] C. Commercial, Industrial

[ ] D. Not Currently Used

02 Affected/Potentially Affected Bodies of Water

Name:	Affected	Distance to Site
Unnamed tributary to Barge Canal	[ ]	0.08 (mi)
Erie Barge Canal	[ ]	1.05 (mi)
	[ ]	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 Total Population Within

One (1) Mile of Site	Two (2) Miles of Site	Three (3) Miles of Site
A. 265	B. 926	C. 2,842
No. of Persons	No. of Persons	No. of Persons

02 Distance to Nearest Population 0.2 (mi)

03 Number of Buildings Within Two (2) Miles of Site	04 Distance to Nearest Off-Site Home
244	0.2 (mi)

05 Population Within Vicinity of Site (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

Site is in a sparsely populated rural area. Village of Middleport, a small rural village, is ~1 mile north of site.

[UZ]YQ7080:D3259/4560

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA (Cont.)

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

VI. ENVIRONMENTAL INFORMATION

01 Permeability of Unsaturated Zone (Check one)

[ ] A. 10^{-6} - 10^{-8} cm/sec [X] B. 10^{-4} - 10^{-6} cm/sec [ ] C. 10^{-4} - 10^{-3} cm/sec [ ] D. Greater than 10^{-3} cm/sec

02 Permeability of Bedrock (Check one)

[ ] A. Impermeable (Less than 10^{-6} cm/sec) [ ] B. Relatively Impermeable (10^{-4} - 10^{-6} cm/sec) [X] C. Relatively Permeable (10^{-2} - 10^{-4} cm/sec) [ ] D. Very Permeable (Greater than 10^{-2} cm/sec)

03 Depth to Bedrock	04 Depth of Contaminated Soil Zone	05 Soil pH
2 - 10 (ft)	NA	Unknown

06 Net Precipitation	07 One Year 24-Hour Rainfall	08 Site Slope	Direction of Site Slope	Terrain Average Slope
9 (in)	2.1 (in)	0 - 3 %	N - NW	5 - 8 %

09 Flood Potential

Site is in >100 Year Floodplain

10 [ ] Site is on Barrier Island, Coastal High Hazard Area, Riverine Floodway

11 Distance to Wetlands (5 acre minimum)

ESTUARINE	OTHER
A. _____ (mi)	B. 0.5 (mi)

12 Distance to Critical Habitat (of endangered species)

NA (mi)

Endangered Species: _____

13 Land Use in Vicinity

Distance to:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREA; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND Adjacent
A. 0.7 (mi)	B. 0.2 (mi)	C. _____ (mi)	D. cent (mi)

14 Description of Site in Relation to Surrounding Topography

The site is located at the crest of the Niagara Escarpment. The land surface is relatively flat to the south and slopes downward to the north.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Phase I Report, 1986

E & E Site Inspection, 1990

U.S.G.S. Topographic Map, Gasport Quad. 1979

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 6 - SAMPLE AND FIELD INFORMATION	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. SAMPLES TAKEN

Sample Type	01 Number of Samples Taken	02 Samples Sent to	03 Estimated Date Results Available
Groundwater	4	Ecology and Environment, Inc. ASC	11/90
Surface Water			
Waste			
Air			
Runoff			
Spill			
Soil			
Vegetation			
Other	4 Sediment	Ecology and Environment, Inc. ASC	11/90

III. FIELD MEASUREMENTS TAKEN

01 Type	02 Comments
OVA	No readings above background.
HNu	No readings above background.
MiniRad	No source of radioactivity noted.

IV. PHOTOGRAPHS AND MAPS

01 Type [ ] Ground [ ] Aerial	02 In Custody of _____ (Name of Organization or Individual)
03 Maps [ ] Yes [ ] No	04 Location of Maps _____

V. OTHER FIELD DATA COLLECTED (Provide narrative description of sampling activities)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 7 - OWNER INFORMATION	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. CURRENT OWNER(S)			PARENT COMPANY (if applicable)		
01 Name Douglas Ortman	02 D+B Number		08 Name	09 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.) 4240 Griswold St.	04 SIC Code		10 Street Address (P.O. Box, RFD #, etc.)	11 SIC Code	
05 City Middleport	06 State NY	07 Zip Code	12 City	13 State	14 Zip Code
01 Name	02 D+B Number		08 Name	09 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		10 Street Address (P.O. Box, RFD #, etc.)	11 SIC Code	
05 City	06 State	07 Zip Code	12 City	13 State	14 Zip Code
01 Name	02 D+B Number		08 Name	09 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		10 Street Address (P.O. Box, RFD #, etc.)	11 SIC Code	
05 City	06 State	07 Zip Code	12 City	13 State	14 Zip Code
01 Name	02 D+B Number		08 Name	09 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		10 Street Address (P.O. Box, RFD #, etc.)	11 SIC Code	
05 City	06 State	07 Zip Code	12 City	13 State	14 Zip Code

III. PREVIOUS OWNER(S) (List most recent first)			IV. REALTY OWNER(S) (if applicable, most recent first)		
01 Name	02 D+B Number		01 Name	02 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	
05 City	06 State	07 Zip Code	05 City	06 State	07 Zip Code
01 Name	02 D+B Number		01 Name	02 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	
05 City	06 State	07 Zip Code	05 City	06 State	07 Zip Code
01 Name	02 D+B Number		01 Name	02 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	
05 City	06 State	07 Zip Code	05 City	06 State	07 Zip Code

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Phase I Report, 1986

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 8 - OPERATOR INFORMATION - NA

I. IDENTIFICATION

01 State	02 Site Number
NY	932092

II. CURRENT OPERATOR (if different from Owner)			OPERATOR'S PARENT COMPANY (if applicable)		
01 Name	02 D+B Number		10 Name	11 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		12 Street Address (P.O. Box, RFD #, etc.)	13 SIC Code	
05 City	06 State	07 Zip Code	14 City	15 State	16 Zip Code
08 Years of Operation	09 Name of Owner				

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)			PREVIOUS OPERATORS' PARENT COMPANIES (if applicable)		
01 Name Town of Royalton	02 D+B Number		10 Name	11 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.) 5316 Royalton Center Rd.	04 SIC Code		12 Street Address (P.O. Box, RFD #, etc.)	13 SIC Code	
05 City Middleport	06 State NY	07 Zip Code 14105	14 City	15 State	16 Zip Code
08 Years of Operation 1958 - 1978	09 Name of Owner During This Period Douglas Ortman				
01 Name	02 D+B Number		10 Name	11 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		12 Street Address (P.O. Box, RFD #, etc.)	13 SIC Code	
05 City	06 State	07 Zip Code	14 City	15 State	16 Zip Code
08 Years of Operation	09 Name of Owner During This Period				
01 Name	02 D+B Number		10 Name	11 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code		12 Street Address (P.O. Box, RFD #, etc.)	13 SIC Code	
05 City	06 State	07 Zip Code	14 City	15 State	16 Zip Code
08 Years of Operation	09 Name of Owner During This Period				

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC & NYSDOH Site Files

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

EPA

PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 State: NY	02 Site Number: 932092

II. ON-SITE GENERATOR - NA

01 Name	02 D+B Number	
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	
05 City	06 State	07 Zip Code

III. OFF-SITE GENERATOR(S) - NA

01 Name	02 D+B Number	01 Name	02 D+B Number
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code
05 City / 06 State / 07 Zip Code		05 City / 06 State / 07 Zip Code	
01 Name	02 D+B Number	01 Name	02 D+B Number
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code
05 City / 06 State / 07 Zip Code		05 City / 06 State / 07 Zip Code	

IV. TRANSPORTER(S) - NA

01 Name	02 D+B Number	01 Name	02 D+B Number
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code
05 City / 06 State / 07 Zip Code		05 City / 06 State / 07 Zip Code	
01 Name	02 D+B Number	01 Name	02 D+B Number
03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code	03 Street Address (P.O. Box, RFD #, etc.)	04 SIC Code
05 City / 06 State / 07 Zip Code		05 City / 06 State / 07 Zip Code	

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 10 - PAST RESPONSE ACTIVITIES	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. PAST RESPONSE ACTIVITIES

01 [ ] A. Water Supply Closed 04 Description:	02 Date _____	03 Agency _____
01 [ ] B. Temporary Water Supply Provided 04 Description:	02 Date _____	03 Agency _____
01 [ ] C. Permanent Water Supply Provided 04 Description:	02 Date _____	03 Agency _____
01 [ ] D. Spilled Material Removed 04 Description:	02 Date _____	03 Agency _____
01 [ ] E. Contaminated Soil Removed 04 Description:	02 Date _____	03 Agency _____
01 [ ] F. Waste Repackaged 04 Description:	02 Date _____	03 Agency _____
01 [ ] G. Waste Disposed Elsewhere 04 Description:	02 Date _____	03 Agency _____
01 [ ] H. On-Site Burial 04 Description:	02 Date _____	03 Agency _____
01 [ ] I. In Situ Chemical Treatment 04 Description:	02 Date _____	03 Agency _____
01 [ ] J. In Situ Biological Treatment 04 Description:	02 Date _____	03 Agency _____
01 [ ] K. In Situ Physical Treament 04 Description:	02 Date _____	03 Agency _____
01 [ ] L. Encapsulation 04 Description:	02 Date _____	03 Agency _____
01 [ ] M. Emergency Waste Treatment 04 Description:	02 Date _____	03 Agency _____
01 [ ] N. Cutoff Walls 04 Description:	02 Date _____	03 Agency _____
01 [ ] O. Emergency Diking/Surface Water Diversion 04 Description:	02 Date _____	03 Agency _____
01 [ ] P. Cutoff Trenches/Sump 04 Description:	02 Date _____	03 Agency _____

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 10 - PAST RESPONSE ACTIVITIES (Cont.)	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. PAST RESPONSE ACTIVITIES (Cont.)

01 [ ] Q. Subsurface Cutoff Wall 04 Description:	02 Date _____	03 Agency _____
01 [ ] R. Barrier Walls Constructed 04 Description:	02 Date _____	03 Agency _____
01 [ ] S. Capping/Covering 04 Description:	02 Date _____	03 Agency _____
01 [ ] T. Bulk Tankage Repaired 04 Description:	02 Date _____	03 Agency _____
01 [ ] U. Grout Curtain Constructed 04 Description:	02 Date _____	03 Agency _____
01 [ ] V. Bottom Sealed 04 Description:	02 Date _____	03 Agency _____
01 [ ] W. Gas Control 04 Description:	02 Date _____	03 Agency _____
01 [ ] X. Fire Control 04 Description:	02 Date _____	03 Agency _____
01 [ ] Y. Leachate Treatment 04 Description:	02 Date _____	03 Agency _____
01 [ ] Z. Area Evacuated 04 Description:	02 Date _____	03 Agency _____
01 [ ] 1. Access to Site Restricted 04 Description:	02 Date _____	03 Agency _____
01 [ ] 2. Population Relocated 04 Description:	02 Date _____	03 Agency _____
01 [ ] 3. Other Remedial Activities 04 Description:	02 Date _____	03 Agency _____

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT EPA PART 11 - ENFORCEMENT INFORMATION	I. IDENTIFICATION	
	01 State NY	02 Site Number 932092

II. ENFORCEMENT INFORMATION

01 Past Regulatory/Enforcement Action [X] Yes [ ] No

02 Description of Federal, State, Local Regulatory/Enforcement Action

In 1973, NYSDEC and the Town of Royalton entered into a consent agreement that entailed improvement of landfill maintenance practices such as adequate cover, site security, and proper drainage.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Phase I Report, 1986

6. REFERENCES

Cadwell, Donald H., 1988, Surficial Geologic Map of New York, Niagara Sheet, New York State Geological Survey.

Johnston, R.H., 1964, Groundwater in the Niagara Falls Area, New York, State of New York Conservation Department, Bulletin GW53.

LaSala, A.M., Jr., 1968, Groundwater Resources of the Erie-Niagara Basin, New York, State of New York Conservation Department, Water Resources Commission, Basin Planning Report ENB-3.

New York State Department of Environmental Conservation, 1986, Engineering Investigations at Inactive Hazardous Waste Sites, Phase I Investigation, Town of Royalton Landfill, Site No. 932092, prepared by Engineering-Science.

Pirkle, E.C. and W.H. Yoho, 1975, Natural Regions of the United States, 2nd ed., Kendall/Hunt Publishing Company, Dubuque, Iowa.

Rickard, Lawrence V. and Donald W. Fisher, 1970, Geologic Map of New York, Niagara Sheet, New York State Geological Survey.

Tesmer, I.H., Ed., 1981, Colossal Cataract, State University of New York Press, Albany, New York.

U.S. Department of Agriculture, 1972, Soil Survey of Niagara County, New York, Soil Conservation Service in Cooperation with Cornell University Agricultural Experiment Station.

U.S. Geological Survey, 1979, 7.5-Minute Series (Topographic), Gasport Quadrangle, New York's Niagara County, U.S. Department of the Interior.

U.S. Geological Survey, 1980, 7.5-Minute Series (Topographic), Medina Quadrangle, New York, U.S. Department of the Interior.

Appendices

APPENDIX A

SITE-SPECIFIC SAFETY PLAN

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EXISTING SITE SAFETY PLAN ADDENDUM FORM

Site Name: Town of Royalton Landfill TDD/Pan/Project Number: YQ8030

Date of original SSP: 4/30/90

Date of amendment: 8/10/90

Date of proposed new work: 8/15/90

Added activities and hazard evaluations: Drilling and well development. Drilling: Overhead and other rig-related hazards. Contact with potentially contaminated soil and water. Well development: Splash hazard of potentially contaminated water.

Added monitoring activities: OVA, HNU, Explosimeter/O_2 meter, Mini Rad Monitor for heat stress

Level of protection: ___ A ___ B [X] C X D

Reason for up/downgrading: Upgrade to C if OVA/HNU shows 1-5 ppm above background

PPE: Hard hat, safety glasses, steel-toed boots, Tyvek, booties, gloves.

Decon: Steam cleaning OR Water, TSP, & Methanol rinse Surgical gloves for sample Handling/Packaging.

Team Members	Responsibility
Jim Richert	Team leader
Sybil Newchurch.	SSO.
John Hood	Team member.

Equipment	Quantity	Equipment	Quantity
OVA	1		
HNu	1		
Minirad	1		
Explosimeter	1		

E TERMS OF THE ORIGINAL SSP SHALL BE IN EFFECT EXCEPT AS NOTED ON THIS FORM.

Prepared by: B. Leichner Date: 8/10/90

Reviewed by: B. Wright H+S group Date: 8/16/90

RUCTIONS: This form to be approved through normal channels and attached to original plan. Form SSP-A

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S I T E S A F E T Y P L A N

Version 988

A. GENERAL INFORMATION

Project Title: Royalton Landfill Project No.: YQ-7020

TDD/Pan No.: _____

Project Manager: Barb Topor Project Dir.: J. Griffis

Location(s): Griswold Rd., Royalton, Niagara Co., New York

Prepared by: Jim Richert Date Prepared: _____

Approval by: C. Foley Date Approved: 4/30/90

Site Safety Officer Review: [signature] CIH Date Reviewed: 30 April 90

Scope/Objective of Work: To perform a site reconnaissance and a geophysical survey

Proposed Date of Field Activities: 5/2 and 5/3/90

Background Info: Complete: [ ] Preliminary (No analytical data available) [ ]

Documentation/Summary:

Overall Chemical Hazard:	Serious [ ] Low [x]	Moderate [ ] Unknown [ ]
Overall Physical Hazard	Serious [ ] Low [x]	Moderate [ ] (Drilling) Unknown [ ]
Overall Radiation Hazard:		Moderate [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

Liquid [x]	Solid [x]	Sludge [ ]	Gas/Vapor [ ]

Characteristic(s):

Flammable/ Ignitable [ ]	Volatile [ ]	Corrosive [ ]	Acutely Toxic [ ]
Explosive [ ]	Reactive [ ]	Carcinogen [x]	Radioactive* [ ]

Other: _____

Physical Hazards:

Overhead [ ]	Confined* Space [ ]	Below Grade [ ]	Trip/Fall [x]
Puncture [x]	Burn [ ]	Cut [ ]	Splash [ ]
Noise [x]	Other: Poison ivy; bee wasp stings; ticks, etc.		

*Requires completion of additional form and special approval from the Corporate Health/Safety group. Contact RSC or HQ.

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Site History/Description and Unusual Features (see Sampling Plan for detailed description): 5-acre abandoned municipal landfill, inactive since 1979, presently: farmer spreads manuer, bee hives in SW corner

Locations of Chemicals/Wastes: Leachate seeps and leachate contaminated drainage ditch

Estimated Volume of Chemicals/Wastes: Unknown but suspected to be low.

Site Currently in Operation Yes: [ ] No: [x]

C. HAZARD EVALUATION

List Hazards by Task (i.e., drum sampling, drilling, etc.) and number them. (Task numbers are cross-referenced in Section D)

Physical Hazard Evaluation:

(1) Site recon - trip fall, bee stings

(2) geophysical survey - trip fall, bee stings

Chemical Hazard Evaluation:

Compound	PEL/TWA mg/m3	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
Chromium	1.0/0.5	Ingestion,eye Inhalation, dermal	Dematitis, eye Irritant	None	-
Zinc	None estab.	Eye and skin & Inhalation	Muscle ache, fever. nausea, thirst	None	-
Copper	0.1/0.2	Inhalation, eye ingestion, skin	Skin irritant & eye irritant	-	-

Note: Complete and attach a Hazard Evaluation Sheet for major known contaminant.

D. SITE SAFETY WORK PLAN

Site Control: Attach map, use back of this page, or sketch of site showing hot zone, contamination reduction, zone, etc. See Attachment 1.

Perimeter identified? [Y] Site secured? [N]

Work Areas Designated? [Y] Zone(s) of Contamination Identified? [N]

Personnel Protection (TLD badges required for all field personnel):

Anticipated Level of Protection (Cross-reference task numbers to Section C):

	A	B	C	D
Task 1			( )	X
Task 2		( )		X
Task 3		( )		
Task 4		( )		
			( )	

{ To be determined from { Task 1 monitoring { results.

Modification: Recommend insect (bee) repellant

Action Levels for Evacuation of Work Zone Pending Reassessment of Conditions: See Attachment 7.

- Level D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulates > 0.1 mg/m^3, other: tritium >5.0 x 10^{-6} uCi/ml (5 uCi/m^3); radioactive particulates > 25% DAC.
- Level C: O_2 <19.5% or >25%, explosive atmosphere >25% LEL_3(California-20%), unknown organic vapor (in breathing zone) >5 ppm, particulates >_____ mg/m^3, other: tritium >5.0 x 10^{-6} uCi/ml (5 uCi/m^3); particulate concentrations exceeding cartridge protection factor.
- Level B: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors (in breathing zone) >500 ppm, particulates >_____ mg/m^3, other _____.
- Level A: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors >500 ppm, particulates >_____ mg/m^3, other _____.

Air Monitoring (daily calibration unless otherwise noted): See Attachment 8.

Contaminant of Interest	Type of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling
Volatile organics	Area	OVA & HNu	Continuous
Radiation	Area	Rad-Mini	Continuous
Explosive gases	Area	Explosimeter	Continuous

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.:

No decon solutions to be used during site recon or geophysics. Monitoring equipment will be kept off of suspected contaminated soil. If direct contact is made between contaminants & equipment the equipment will be clean with distilled water and dry with paper towels (while wearing surgical gloves.)

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Personnel Decon Protocol: Dry decon:

(1) Remove disposables

(2) Double bag and deliver to E & E ASC

(3) Wash face and hands with soap and water ASAP

Decon Solution Monitoring Procedures, if Applicable: N/A

Special Site Equipment, Facilities, or Procedures (Sanitary Facilities and Lighting Must Meet 29 CFR 1910.120):

N/A

Site Entry Procedures and Special Considerations: Vegetation may be overgrown, team, members will stay within eyesite of each other at all times.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements:

All field work will be performed during day light hours and will stop for electrical storms.

General Spill Control, if applicable: N/A

Investigation-Derived Material Disposal (i.e., expendables, decon waste, cuttings):

Clean Tyvek, etc. Will be bagged separately from soiled Tyvek and booties. All disposables will be double bagged, labeled, and delivered to the E & E ASC.

Sample Handling Procedures Including Protective Wear:

N/A

Team Member*	Responsibility
Barb Topor	Team Leader
Chris Lewicki	Site Safety Officer
Ralinda Leichner	Field Team Member
Scott Thorsell	Field Team Member

*All entries into exclusion zone require Buddy System use. All E & E field staff participate in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory protection program meets requirements of 29 CFR 1910.134, and ANSI Z88.2 (1980).

E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

LOCAL RESOURCES

(Obtain a local telephone book from your hotel, if possible)

Ambulance 911

Hospital Emergency Room Medina Memorial Hospital - 798-2000

Poison Control Center 911

Police (include local, county sheriff, state) 911

Fire Department 911

Airport N/A

Agency Contact (EPA, State, Local USCG, etc.) Ms. Valerie Lauzze (518) 457-9538

Local Laboratory E & E ASC

UPS/Fed. Express N/A

Client/EPA Contact Albany DEC Office Ms. Lauzze (518) 457-9538

Site Contact Mr. Douglas Ortman - 4240 Griswold St., Missleport, NY (716) 735-7414

SITE RESOURCES

Site Emergency Evacuation Alarm Method 3 blows on car horn

Water Supply Source

Telephone Location, Number

Cellular Phone, if available N/A

Radio N/A

Other N/A

* To be used for serious or life-threatening situations only.

EMERGENCY CONTACTS

1. Dr. Raymond Harbison (Univ. of Florida) ..... (501) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-8263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jonmaire ..... (716) 684-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact ..... Buffalo ..... To come (home)
   ..... To come (home)

4. Office Manager ..... Buffalo ..... To come (home)

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MEDTOX HOTLINE

1. Twenty-four hour answering service: (501) 370-8263

   What to report:

   - State: "this is an emergency."
   - Your name, region, and site.
   - Telephone number to reach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature of emergency.
   - Action taken.

2. A toxicologist, (Drs. Raymond Harbison or associate) will contact you. Repeat the information given to the answering service.

3. If a toxicologist does not return your call within 15 minutes, call the following persons in order until contact is made:

   a. **24 hour hotline - (716) 684-8940**
   b. Corporate Safety Director - Paul Jonmaire - home # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

Directions to hospital (include map) (To get to Medina Memorial Hospital) Exit site onto Griswold Street, turn left (north), go 0.6 miles to Route 31. Turn right (east). Go 0.7 miles to Main Street, turn left (north) go 0.5 miles to Route 31E. Turn right (east) , go 4.0 miles into Medina, turn left (north) on Ohio Street go 1000 feet. hospital on left. (500 Ohio).

Emergency Egress Routes to Get Off-Site Use entrance road off of Griswold Street

F. EQUIPMENT CHECKLIST

PROTECTIVE GEAR

Level A	No.*
SCBA	
SPARE AIR TANKS	
ENCAPSULATING SUIT (Type _____)	
SURGICAL GLOVES	
NEOPRENE SAFETY BOOTS	
BOOTIES	
GLOVES (Type _____)	
OUTER WORK GLOVES	
HARD HAT	
CASCADE SYSTEM	
5-MINUTE ESCAPE COOLING VEST	

Level B	o.
SCBA	
SPARE AIR TANKS	
PROTECTIVE COVERALL (_____)	
RAIN SUIT	
BUTYL APRON	
SURGICAL GLOVES	
GLOVES (Type _____)	
OUTER WORK GLOVES	
NEOPRENE SAFETY BOOTS	
BOOTIES	
HARD HAT WITH FACE SHIELD	
CASCADE SYSTEM	
MANIFOLD SYSTEM	

Level C	
ULTRA-TWIN RESPIRATOR	X
POWER AIR PURIFYING RESPIRATOR	
Cartridge (Type GMC-H _____)	X
5-MINUTE ESCAPE MASK	
PROTECTIVE COVERALL (Type)	
RAIN SUIT	
BUTYL APRON	
SURGICAL GLOVES	
GLOVES (Type _____)	
OUTER WORK GLOVES	
NEOPRENE SAFETY BOOTS	
HARD HAT WITH FACE SHIELD	
BOOTIES	
HARDHAT	
*No. dependent on task and number of field team members.	

Level D	
ULTRA-TWIN RESPIRATOR (Available)	X
CARTRIDGES (Type GMC-H _____)	X
5-MINUTE ESCAPE MASK (Availble)	
PROTECTIVE COVERALL (Type Tyvek _____)	X
RAIN SUIT	X
NEOPRENE SAFETY BOOTS	
BOOTIES	X
WORK GLOVES	X
HARD HAT	X
SAFETY GLASSES	

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INSTRUMENTATION	No.
OVA	X
THERMAL DESORBER	
O2/EXPLOSIMETER W/CAL. KIT	X
PHOTOVAC TIP	
HNu (Probe 10.2 Ev—	X
MAGNETOMETER	
PIPE LOCATOR	
WEATHER STATION	
DRAEGER PUMP, TUBES _____	
BRUNTON COMPASS	
MONITOX CYANIDE	
HEAT STRESS MONITOR	
NOISE EQUIPMENT _____	
PERSONAL SAMPLING PUMPS	
MINIRAM	
RADIATION EQUIPMENT	
DOCUMENTATION FORMS	
PORTABLE RATEMETER	
SCALER/RATEMETER	
NaI Probe	
ZnS Probe	
GM Pancake Probe	
GM Side Window Probe	
MICRO R METER	
ION CHAMBER	
ALERT DOSIMETER	
POCKET DOSIMETER	
TRITIUM MONITOR	
FIRST AID EQUIPMENT	
FIRST AID KIT	X
OXYGEN ADMINISTRATOR	
STRETCHER	
PORTABLE EYE WASH	
BLOOD PRESSURE MONITOR	
FIRE EXTINGUISHER	

DECON EQUIPMENT	No.
WASH TUBS	
BUCKETS	
SCRUB BRUSHES	
PRESSURIZED SPRAYER	
DETERGENT (Type _____)	
SOLVENT (Type _____)	
PLASTIC SHEETING	
TARPS AND POLES	
TRASH BAGS	X
TRASH CANS	
MASKING TAPE	
DUCT TAPE	X
PAPER TOWELS	X
FACE MASK	
FACE MASK SANITIZER	
FOLDING CHAIRS	
STEP LADDERS	
DISTILLED WATER	
SAMPLING EQUIPMENT	
8 OZ. BOTTLES	
HALF-GALLON BOTTLES	
VOA BOTTLES	
STRING	
HAND BAILERS	
THIEVING RODS WITH BULBS	
SPOONS	
KNIVES	
FILTER PAPER	
PERSONAL SAMPLING PUMP SUPPLIES	
SPLIT SPOON SAMPLERS	
BRASS SLEEVES FOR SPLIT-SPOONS	
(wax and caps)	

VAN EQUIPMENT	No.
TOOL KIT	
HYDRAULIC JACK	X
LUG WRENCH	X
TOW CHAIN	
VAN CHECK OUT	
Gas	
Oil	
Antifreeze	
Battery	
Windshield Wash	
Tire Pressure	
MISCELLANEOUS	
PITCHER PUMP	
SURVEYOR'S TAPE	X
100 FIBERGLASS TAPE	X
300 NYLON ROPE	
NYLON STRING	
SURVEYING FLAGS	X
FILM	X
WHEEL BARROW	
BUNG WRENCH	
SOIL AUGER	
PICK	
SHOVEL	
CATALYTIC HEATER	
PROPANE GAS	
BANNER TAPE	X
SURVEYING METER STICK	
CHAINING PINS & RING	
TABLES	
WEATHER RADIO	
BINOCULARS	
MAGAPHONE	

MISCELLANEOUS (Cont.)	No.
RADIATION WARNING TAPE	
RADIATION DECON SUPPLIES	
SHIPPING EQUIPMENT	
COOLERS	
PAINT CANS WITH LIDS, 3 CLIPS EACH	
VERMICULITE	
SHIPPING LABELS	
DOT LABELS: "DANGER"	
"UP"	
"INSIDE CONTAINER COMPLIES ..."	
"HAZARD GROUP"	
STRAPPING TAPE	
BOTTLE LABELS	
BAGGIES	
CUSTODY SEALS	
CHAIN-OF-CUSTODY FORMS	
FEDERAL EXPRESS FORMS	
CLEAR PACKING TAPE	

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ON-SITE SAFETY MEETING

Project _____ TDD/Pan _____

Date _____ Time _____ Job No. _____

Address _____

Specific Location _____

Type of Work _____

_____

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment _____

_____

Chemical Hazards _____

_____

Radiation Hazards _____

_____

Physical Hazards _____

_____

Emergency Procedures _____

_____

Hospital/Clinic _____ Telephone _____

Hospital Address _____

Special Equipment _____

Other _____

Checklist

1. Emergency information reviewed? _____ and made familiar to all team members? _____
2. Route to nearest hospital driven? _____ and its location known to all team members? _____
3. Site safety plan readily available and its location known to all team members? _____

Meeting shall be attended by all personnel who will be working within the exclusion area. Daily informal update meetings will be held when site tasks and/or conditions change.

Chemical Name Chromium (metal) Date

OT Classification Job Number

CAS Number 7440-47-3

REFERENCES CONSULTED (circle; also include MSDS if approprate.)
(NIOSH/OSHA Pocket Guide) Merck Index (Hazardline) Christ(vol III)
(ACGIH TLV Booklet) Toxic & Hazardous Safety Manual (SAX) (Aldrich)
RTECS other: Sittig

CHEMICAL PROPERTIES: (Synonyms: Chromiun metal, insoluble salts)
Chemical Formula Cr MW 52 Ionization Potential N/A
Physical State variable Boiling Point 4842° F Freezing Point 3339° F
Flash Point variable Flammable Limits LEL-.23% Vapor Pressure variable
Specific Gravity/Density 7.2@82° F Odor/Odor Threshold none

Solubility-water: Insoluble Solubility-other:
Incompatabilities & Reactivity: strong oxiders, powdered metal is explosive

TOXICOLOGICAL PROPERTIES:
Exposure Limits: TLV-TWA (ACGIH) 0.5 mg/m³ PEL (OSHA) 1.0 mg/m³
STEL none est. Ceiling Limits none est. IDLH 500 mg/m³
Toxicity Data: (Indicate duration of study)
Human; IHL Dermal Oral
Rat/Mouse; IHL Dermal Oral
Aquatic: Other:
Carcinogen N/A Mutagen N/A Reproductive Toxin N/A
Route(s) of exposure - (circle all that apply): (Inhalation) (Ingestion)
(Dermal Contact) (Eye(ocular)) Dermal Absorption Other

HANDLING RECOMMENDATIONS: (personal protective measures)
Respirators: 5 mg/m³ - SCBA
Protective Clothing: Prevent skin/eye contact.
Special Equipment: Wear impervious clothing.

DISPOSAL, FIRE and SPILLS: (Use numbered codes; see attached sheets for explanation.)
Disposal P,O Fire 13 Leaks&Spills 3,4,6,7,8,9
Decomposition Products:

FIRST AID:
ING: Large amounts of water, induce vomiting, medical attent. immed.
IHL: Move to fresh air, artificial resp. if necessary, medical atten.
Eye/Skin: Irrigate/rinse with large amounts of water. Wash skin thoroughly with soap & water.

SYMPTOMS:
acute(immediate) exposure effects: Contact dermatitis, ulceration of skin & nasal mucosa, irritation of eyes & mucous membranes.

Chronic(long term) exposure effects: Not often encountered with the 3+ state since chromium compounds in this state are of a lower order toxicity

reproductive effects: None specified for humans.

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HAZARD EVALUATION OF CHEMICALS

Chemical Name Copper Date

DOT Name/U.N. No. Job No.

CAS Number 7440-50-8

References Consulted (circle):

NIOSH/OSHA Pocket Guide Verschueren (Merck Index) Hazardline Chris (Vol. II)

(Toxic and Hazardous Safety Manual) ACGIH Other: Handbook of Hazardous Chemicals +

Chemical Properties: (Synonyms: AMNF)

Chemical Formula $CuSO_4 \cdot 5H_2O$ / C.CL Molecular Weight 249.69

Physical State metal dust / metal powder Solubility (H_2O) insoluble Boiling Point 2595°C

Flash Point — Vapor Pressure/Density 8.94 Freezing Point —

Specific Gravity 8.92 Odor/Odor Threshold — Flammable Limits —

Incompatabilities Acetylene GAS; Magnesium metal Reacts with Copper dust + salts.

Biological Properties:

TLV-TWA 0.2 mg/m³ PEL 0.1 mg/m³ Odor Characteristic —

IDLH — Human TDLo LDLo Aquatic 5.6 mg/L Rat/Mouse "

Route of Exposure INhalation Ingestion, SKIN or EYE Contact

Carcinogen Teratogen Mutagen

Handling Recommendations: (Personal protective measures)

Wear protective clothing, Eye protection. Respiratory protection.

Monitoring Recommendations:

Disposal/Waste Treatment:

1st Method is Copper Recovery. If that is not feasible the Copper can be precipitated through the use of caustic and the sludge deposited in a chemical waste landfill.

Health Hazards and First Aid:

Edathamil calcium disodium Recommended GASTRIC LAVAGE

Followed by SALINE Cathartic induce vomiting Remove victim Immediately + wash skin with soap. Inhalation-Move to Fresh Air + provide Artificial Respiration

Symptoms: Acute: SKIN Irritation, Eye Irritation + Nasal Irritation

Chronic: Respiratory Irritation Metallic Taste Nausea Fever

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HAZARD EVALUATION OF CHEMICALS

Chemical Name ZINC Date 4-21-89

DOT Name/U.N. No. UN1436 Job No. 4N4000

CAS Number

References Consulted (circle):

NIOSH/OSHA Pocket Guide Verschueren Merck Index Hazardline Chris (Vol. II)

Toxic and Hazardous Safety Manual ACGIH (Other:) OHS DATA BASE

Chemical Properties: (Synonyms: Blue Powder, C.I 77945, JASAD)

Chemical Formula ZN Molecular Weight 65.37

Physical State Solid Solubility (H_2O) Insoluble Boiling Point 1665°C

Flash Point NON-FLAMABLE Vapor Pressure/Density mm@ 909°F Freezing Point 787°C

Specific Gravity 7.14 Odor/Odor Threshold Flammable Limits

Incompatabilities Acids, Sodium Peroxide, Chlorine, Water, Sulfur [illegible]

Biological Properties:

TLV-TWA — PEL None established Odor Characteristic

IDLH Not specified Human Aquatic Rat/Mouse

Route of Exposure Eye, Skin Contact, Inhalation

Carcinogen Teratogen Mutagen

Handling Recommendations: (Personal protective measures)

Prevent repeated or prolonged skin contact. Wear impervious clothing, gloves, & Faceshield

Monitoring Recommendations:

Disposal/Waste Treatment:

Place contaminated clothing in closed containers for storage until laundered or disposed

Health Hazards and First Aid:

If it gets in eyes wash with large amts of water & get Medical Attention immediately

Symptoms: Acute: Skin irritation, thirst coughing, weakness muscular Ache Fever, NAUSEA [illegible]

Chronic: None specified.

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(12/83,DLD)

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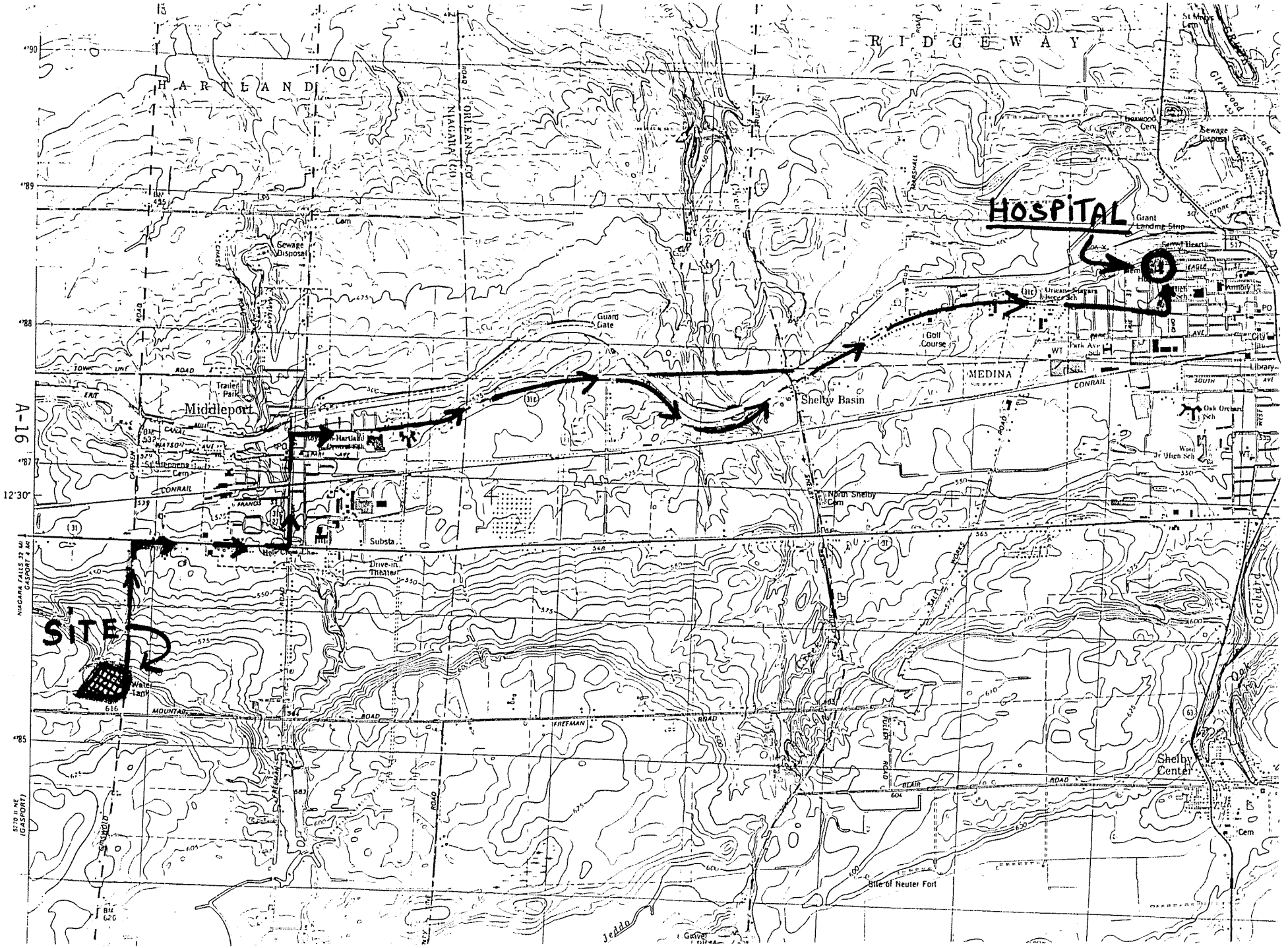
HOSPITAL
SITE
A-16
HARTLAND
RIDGEWAY
Middleport
MEDINA
Shelby Basin
Guard Gate
Golf Course
Sewage Disposal
Trailer Park
Drive-in Theater
Substa
Water Tank
Site of Neuter Fort
Shelby Center
Orchard
Oak Orchard
Grant Landing Strip
Lake Ontario
Seaway
CONRAIL
MOUNTAIN ROAD
FREEMAN ROAD
NIAGARA ORLEANS CO
TOWNLINE ROAD
MARGE
CAPLON
WATSON AVE
Cem
Sch
Hosp
PO
Library
Armory
Park Ave Sch
Oak Orchard Sch
Jr High Sch
Grammar Sch
Sewage Disposal
Glenwood Cem
Lakewood Cem
St Mary's Cem
Sacred Heart Cem
Eagle St
Main St
South Ave
Park Ave
Maple St
Fruit Belt
Bear Rd
Jeddo
Gaines
NIAGARA FALLS 32 MI
GASPORT 4 MI
5720 II NE
(GASPORT)

APPENDIX B

GEOPHYSICAL SURVEY

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ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK

PHASE II INVESTIGATIONS
GEOPHYSICAL SURVEY

Town of Royalton Landfill
Site Number 932092
Town of Royalton, Niagara County

June 1990

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233

Thomas C. Jorling, Commissioner

Division of Hazardous Waste Remediation

Michael J. O'Toole, Jr., P.E., Director

Prepared by:

Ecology and Environment Engineering, P.C.

ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK

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Prepared by:

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B	MAGNETOMETER AND EM31 SURVEY CONTOUR MAPS	B-1

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1. INTRODUCTION

This geophysical investigation report for the Town of Royalton Landfill site (I.D. No. 932092) on Griswold Road in the Town of Royalton, Niagara County, New York, was prepared by Ecology and Environment Engineering, P.C. (E & E), under contract to the New York State Department of Environmental Conservation (NYSDEC). The geophysical investigation consisted of an EM31 (electromagnetic terrain conductivity) survey and a portable proton magnetometer (total earth field magnetics) survey. This report includes field data (Appendix A) and contour maps (Appendix B) for the geophysical survey performed at this site on May 2, 1990 as part of the Phase II Investigation. Additionally, interpretations of the data generated, along with conclusions, are provided in this report.

2. OBJECTIVES

The geophysical survey program at the Town of Royalton Landfill site was designed to achieve several general goals. The main objectives of the geophysical methods used were to optimize the locations of the four proposed groundwater monitoring wells; reduce the risks associated with drilling into unknown terrain and wastes; reduce overall project time and cost; improve the accuracy and confidence of the investigation; identify the existence and boundaries of buried waste or groundwater contamination plumes; and determine vertical and horizontal anomalies.

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3. METHODS

For the purpose of performing ground conductivity (EM31) and geomagnetic (magnetometer) surveys, grid coordinates were established in locations which correspond to the four proposed on-site groundwater monitoring wells. Survey grid No. 1 was determined to be unsatisfactory due to anomalous readings; therefore, an additional survey grid (No. 1A) was subsequently constructed.

Survey grids 1A through 4 include the proposed locations of monitoring wells GW-1 through GW-4 as follows:

Geophysical Survey Grid No.	Proposed Monitoring Well Included
1A	GW-1
2	GW-2
3	GW-3
4	GW-4

All geophysical survey grids were 1,600 square feet in area. The X and Y axes of each survey grid were oriented east-west and north-south, respectively. These orientations are indicated on the geophysical contour maps (see Appendix B). Survey grid coordinate 0,0 is located in the southwest corner of each contour map. Semi-permanent wooden stakes mark the proposed monitoring well locations for reference during drilling.

Horizontal and vertical dipole readings in north-south and east-west orientations were recorded at each node while performing the electromagnetic ground conductivity survey with a Geonics, Ltd., EM31 ground conductivity meter. The effective depths of penetration provided by the EM31 in the vertical and horizontal dipole modes are $\leq$ 18 feet and $\leq$ 9 feet, respectively. Geomagnetic readings were recorded at each node using an EG+G Unimag II (Model G-846) Portable Proton Magnetometer oriented north. The response of the magnetometer is proportional to the mass of the ferrous target. The effective depths of the EM31 and magnetometer were considered adequate to delineate any buried materials that may be encountered while drilling.

All geophysical field data were recorded in two logbooks dedicated to this site investigation. Magnetometer data were reduced by averaging the station readings and correcting these values for diurnal variations by comparing them to background station readings. EM31 ground conductivity data were averaged for north-south and east-west orientations for the vertical and horizontal dipole positions. The reduced geophysical data were then plotted and contoured for each magnetometer and EM31 survey (see Appendices A and B).

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4. DATA INTERPRETATION

EM31 and Magnetometer Interpretations

The purpose of interpreting the results of the EM31 and magnetometer surveys at the Town of Royalton Landfill site is to provide a probable explanation for anomalous data contours. The presence of buried waste, metal objects, and utilities is often manifested as relatively increased or decreased nodal readings and gradient values.

The following interpretations are based on the geophysical contour maps (see Appendix B) generated from the ground conductivity and geomagnetic field measurements listed in Appendix A. These five geophysical survey grids encompass the four proposed groundwater monitoring well locations as proposed by NYSDEC in the Phase II Investigation Work Plan for the site (see Figure 4-1).

The following discussion provides details of each of the five geophysical survey grids.

Survey Grid Area No. 1. A review of magnetometer data contours at survey grid No. 1 indicates that this 1,600-square-foot survey area contains significant anomalies. Magnetometer readings vary widely across the survey area, ranging from 55,465 to 59,071 gammas. Steep geomagnetic gradients are observed in the northeast, south, southwest, and northwest areas of the survey grid. The source of these increases in geomagnetic field strength may be attributed to shallow ferrous objects in these areas.

Contours of EM31 data show a very steep ground conductivity gradient across the grid area in both the vertical and horizontal dipole survey modes. In the vertical dipole mode, readings at all coordinates

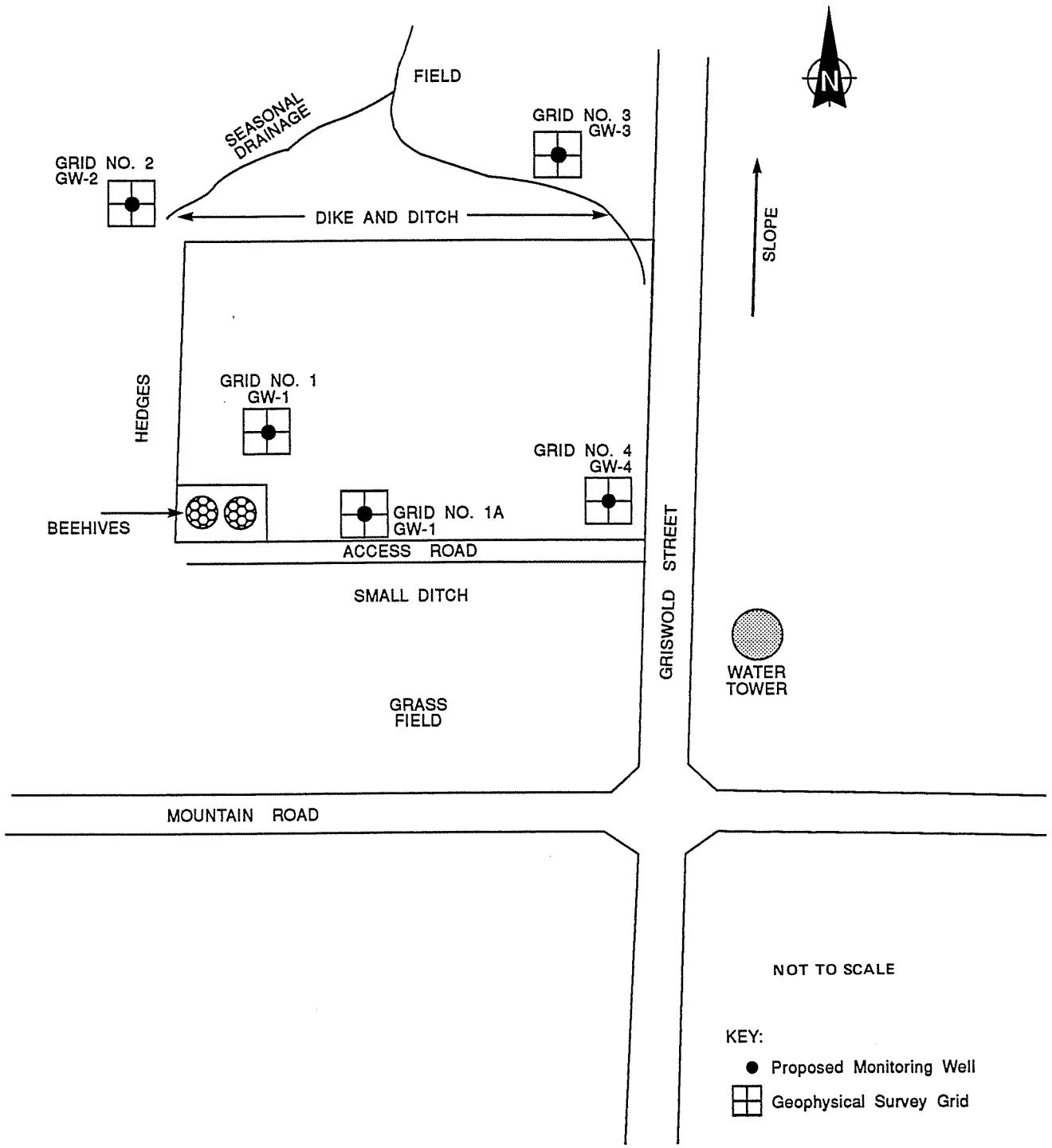

Figure 4-1
GEOPHYSICAL SURVEY GRID AND GROUNDWATER MONITORING WELL LOCATIONS, TOWN OF ROYALTON LANDFILL SITE

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except 0,0 were negative. Negative ground conductivity readings indicate high conductivities (>1,000 millimhos/meter), beyond the capabilities of the analog scale of the instrument. In the horizontal dipole, readings increased from 13.75 millimhos/meter at coordinate 0,0 to a high of 68.5 at coordinate 40,40. The highest gradients occurred in the south-central and northeastern areas of the survey grid.

The installation of proposed groundwater monitoring well GW-1 in survey grid No. 1 is unsuitable due to the presence of geomagnetic and ground conductivity anomalies. Because of the high ground conductivity values in both survey modes and the variability of geomagnetic readings, it was deduced that survey grid No. 1 was located over fill material. The location for proposed monitoring well GW-1 was moved approximately 50 feet to the southeast and resurveyed as survey grid No. 1A (see below).

Survey Grid Area No. 1A. A review of geomagnetic data contours at survey grid No. 1A indicates a fairly steep geomagnetic field gradient along the north and west sides of the survey area. This area is closest to survey grid No. 1, which was assumed to lie over fill material. The anomalous readings to the north and west may be attributed to small ferrous objects at shallow depths within fill. Magnetometer readings ranged from 56,405 to 57,688 gammas in this survey grid.

Contours of the EM31 data show anomalous readings along the northern border of survey grid No. 1A. In the vertical dipole mode, negative values were recorded at coordinates 0,40, 10,40, and 20,40. In the horizontal dipole mode, conductivities increased toward the north, with the highest readings corresponding to high vertical dipole readings in the northwest corner. Readings remained low (8 to 10 millimhos/meter) and relatively constant in the southern three-quarters of the survey grid for both survey modes, indicating the absence of near-surface metal debris and/or contamination.

The installation of proposed groundwater monitoring well GW-1 at the location shown on the contour map of survey grid No. 1A is acceptable. The well location may be moved to any area within the southern one-half of the survey grid except coordinates 0,0 to 0,20, if necessary, to facilitate drill-rig access.

Survey Grid Area No. 2. A review of magnetometer data contours at survey grid No. 2 indicates that this 1,600-square-foot survey area contains several geomagnetic anomalies. The increase in geomagnetic field strength in the southwest corner and the decrease in field strength in the north-central area are most likely due to surface metal debris scattered around the survey area. Increases in field strength to the northeast and southeast corners, as well as the isolated anomaly near grid coordinates 10,30, 20,30, and 30,30, may be attributed to small ferrous objects buried at shallow depths. Magnetic contours range from 55,600 to 57,600 gammas in this survey grid.

Contours of EM31 data indicate a steep ground conductivity gradient in the horizontal and vertical dipole survey modes in the northwest corner of survey grid No. 2. A negative meter reading occurred at grid coordinate 0,40. Negative readings indicate very high conductivities (>1,000 millimhos/meter) beyond the capabilities of the analog scale of the instrument. A slight gradient occurs between grid coordinates 30,0 to 30,40. This anomalous area is better defined in the horizontal dipole plot, thus indicating shallow metallic material as confirmed by the magnetometer readings.

The installation of proposed groundwater monitoring well GW-2 at the location indicated on the contour map is acceptable. If the well location needs to be moved to facilitate drill-rig access, it can be placed to the south of grid coordinates 0,30 to 30,30 and west of coordinates 30,0 to 30,30.

Survey Grid Area No. 3. A review of magnetometer data contours at survey grid No. 3 indicates that this 1,600-square-foot survey area contains several geomagnetic anomalies. An anomaly is present between grid coordinates 10,10 and 30,20, where geomagnetic readings increase to a high of 59,934 gammas. Magnetic field changes also occur in the northwest and southeast portions of the survey grid. These anomalies are suspected to represent small, shallow ferrous objects not readily detected with the EM31.

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Low electromagnetic conductivity values measured with the EM31 were observed in both the horizontal and vertical dipole survey modes at survey grid No. 3. Ground conductivity ranges from 12 to 17.5 millimhos/meter within this survey area. The magnetic anomalies discussed above are not well defined; therefore, the objects indicated by the magnetometer are very small and shallow and do not appear on the ground conductivity maps.

The installation of the proposed groundwater monitoring well GW-3 at the location indicated on the contour map is acceptable. However, the well location may be moved to the northeast portion of the survey grid to facilitate drill-rig access. Any of the following coordinates is acceptable: 0,0 to 20,0, 0,10, 30,10, 40,10, 10,10, 20,30, 30,30, and 10,40 to 40,40.

Survey Grid Area No. 4. A review of magnetometer data contours at survey grid No. 4 indicates that this 1,600-square-foot survey area exhibits a low geomagnetic field gradient; therefore, no significant geomagnetic anomalies exist. Magnetic contours range from 56,400 to 56,700 gammas. Variations in geomagnetic field strength are observed in the southwest and south-central areas of the grid, and isolated increases are observed at coordinates 10,40, 30,40, 20,10, and 40,0. These geomagnetic field variations may represent shallow ferrous objects.

Ground conductivity values are relatively low and consistent in both the vertical and horizontal survey modes across (9.5 to 15.35 millimhos/meter) the survey grid area. Conductivity values increase slightly in the central to west-central portion of the grid area; however, there are no significant electromagnetic anomalies present in this grid area.

The installation of proposed groundwater monitoring well GW-4 at the location indicated on the contour map is acceptable. If necessary, the well location may be moved to any other area within the survey grid to facilitate drill-rig access.

5. CONCLUSIONS AND RECOMMENDATIONS

Drilling in survey grid No. 1 is unacceptable at any location due to very high magnetic and electromagnetic gradients throughout the grid area. The well location was moved and resurveyed in grid No. 1A. The proposed well locations in grids 1A, 2, 3, and 4 are all acceptable with minimal risk of drilling into subsurface ferrous debris. Alternative drilling locations within each survey grid have been designated in Section 4, if needed. Prior to drilling, the local underground-utility locating service should be contacted to indicate possible public utilities buried in the vicinity of the drill sites.

All proposed well locations should be confirmed with a NYSDEC representative prior to the commencement of drilling.

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APPENDIX A

MAGNETOMETER AND EM31 SURVEY DATA

Table A-1

MAGNETOMETER READINGS

TOWN OF ROYALTON LANDFILL

Grid No. 1

Station #	Reading (Gammas)	Corrected Data* (Gammas)
0,0	56,906	56,913
0,10	56,867	56,880
0,20	57,167	57,187
0,30	57,637	57,664
0,40	58,256	58,289
10,40	56,361	56,401
10,30	56,354	56,400
10,20	57,987	58,040
10,10	58,528	58,588
10,0	56,447	56,513
20,0	58,229	58,302
20,10	56,540	56,620
20,20	56,664	56,750
20,30	56,426	56,519
20,40	56,768	56,868
30,40	57,367	57,473
30,30	57,296	57,409
30,20	57,346	57,466
30,10	55,339	55,465
30,0	57,560	57,693
40,0	56,614	56,753
40,10	57,108	57,254
40,20	57,672	57,825
40,30	58,912	59,071
40,40	56,079	56,245

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Key at end of table.

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Table A-1 (Cont.)

MAGNETOMETER READINGS

TOWN OF ROYALTON LANDFILL

Grid No. 1A

Station #	Reading (Gammas)	Corrected Data* (Gammas)
0,0	56,612	56,611
0,10	56,552	56,550
0,20	57,691	57,688
0,30	57,112	57,085
0,40	57,460	57,432
40,0	56,543	56,539
40,10	56,473	56,467
40,20	56,476	56,469
40,30	56,578	56,570
40,40	56,961	56,952
30,40	57,242	57,232
30,30	56,703	56,692
30,20	56,522	56,510
30,10	56,418	56,405
30,0	56,528	56,514
20,0	56,532	56,516
20,10	56,547	56,530
20,20	56,571	56,553
20,30	56,770	56,751
20,40	57,186	57,166
10,40	57,566	57,545
10,30	56,887	56,865
10,20	56,589	56,566
10,10	56,588	56,564
10,0	56,523	56,497

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Key at end of table.

Table A-1 (Cont.)

MAGNETOMETER READINGS

TOWN OF ROYALTON LANDFILL

Grid No. 2

Station #	Reading (Gammas)	Corrected Data* (Gammas)
0,0	56,843	56,842
0,10	57,005	57,003
0,20	56,594	56,591
0,30	56,660	56,656
0,40	56,562	56,557
10,40	56,287	56,281
10,30	56,991	56,984
10,20	56,568	56,560
10,10	56,631	56,621
10,0	56,773	56,762
20,0	56,474	56,462
20,10	56,556	56,543
20,20	56,555	56,541
20,30	56,958	56,943
20,40	56,111	56,095
30,40	NA	NA
30,30	55,525	55,508
30,20	56,489	56,471
30,10	56,801	56,782
30,0	56,840	56,820
40,0	57,265	57,244
40,10	56,776	56,754
40,20	56,549	56,526
40,30	56,706	56,682
40,40	57,803	57,778

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Key at end of table.

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Table A-1 (Cont.)

MAGNETOMETER READINGS

TOWN OF ROYALTON LANDFILL

Grid No. 3

Station #	Reading (Gammas)	Corrected Data* (Gammas)
40,40	56,733	56,733
40,30	57,262	57,263
40,20	56,685	56,686
40,10	56,906	56,908
40,0	58,203	58,205
30,0	57,873	57,875
30,10	56,537	56,540
30,20	58,682	58,685
30,30	56,612	56,616
30,40	56,711	56,715
20,40	56,685	56,689
20,30	56,534	56,539
20,20	56,681	56,686
20,10	57,339	57,344
20,0	56,269	56,275
10,0	56,814	56,820
10,10	59,927	59,934
10,20	56,245	56,252
10,30	57,560	57,567
10,40	56,619	56,627
0,40	58,120	58,128
0,30	57,652	57,661
0,20	55,507	55,516
0,10	56,800	56,809
0,0	56,547	56,457

UZ]YQ7030:D2976, #3262, PM=30

Key at end of table.

Table A-1 (Cont.)

MAGNETOMETER READINGS

TOWN OF ROYALTON LANDFILL

Grid No. 4

Station #	Reading (Gammas)	Corrected Data* (Gammas)
40,40	56,592	56,593
40,30	56,666	56,668
40,20	56,581	56,584
40,10	56,589	56,594
40,0	56,699	56,705
30,0	56,550	56,557
30,10	56,612	56,620
30,20	56,596	56,605
30,30	56,642	56,652
30,40	56,734	56,745
20,40	56,623	56,635
20,30	56,628	56,642
20,20	56,642	56,657
20,10	56,716	56,732
20,0	56,515	56,522
10,0	56,517	56,535
10,10	56,594	56,613
10,20	56,595	56,615
10,30	56,634	56,656
10,40	56,715	56,738
0,40	56,556	56,580
0,30	56,627	56,652
0,20	56,599	56,625
0,10	56,605	56,632
0,0	56,354	56,382

UZ]YQ7030:D2976, #3262, PM=30

*Data has been corrected for natural magnetic fluctuations (i.e., drift) by using data obtained at an off-site base station.

NA = Reading unobtainable.

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Table A-2

AVERAGE NORTH-SOUTH/EAST-WEST
GROUND CONDUCTIVITY READINGS
WITH EM31

TOWN OF ROYALTON LANDFILL

Survey Grid No. 1

Station #	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)
0,0	11.25	13.75
0,10	Negative*	15.5
0,20	Negative	20
0,30	Negative	34
0,40	Negative	45
10,0	Negative	36
10,10	Negative	28.5
10,20	Negative	43
10,30	Negative	29
10,40	Negative	39
20,0	Negative	61.5
20,10	Negative	67.5
20,20	Negative	48.5
20,30	Negative	52
20,40	Negative	39
30,0	Negative	38.5
30,10	Negative	45
30,20	Negative	41
30,30	Negative	42.5
30,40	Negative	47
40,0	Negative	30
40,10	Negative	36
40,20	Negative	39
40,30	Negative	42
40,40	Negative	68.5

[UZ]YQ7030:D2976, #3263, PM=30

Key at end of table.

Table A-2 (Cont.)

AVERAGE NORTH-SOUTH/EAST-WEST
GROUND CONDUCTIVITY READINGS
WITH EM31

TOWN OF ROYALTON LANDFILL

Survey Grid No. 1A

Station #	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)
0,0	9.75	8.25
0,10	10	8.5
0,20	11.5	9.5
0,30	8.75	12
0,40	Negative*	26.5
10,0	10	8.75
10,10	9	9.1
10,20	11.5	9.5
10,30	12	12
10,40	Negative	25.5
20,0	8.5	8.5
20,10	9.5	8.35
20,20	10.25	8.75
20,30	10.5	11
20,40	Negative	17
30,0	8.5	8.25
30,10	10	7.5
30,20	10	9
30,30	12	10
30,40	5	15.25
40,0	8	8.5
40,10	9.5	8.5
40,20	10	9
40,30	11	10
40,40	10	12.5

[UZ]YQ7030:D2976, #3263, PM=30

Key at end of table.

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Table A-2 (Cont.)

AVERAGE NORTH-SOUTH/EAST-WEST
GROUND CONDUCTIVITY READINGS
WITH EM31

TOWN OF ROYALTON LANDFILL

Survey Grid No. 2

Station #	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)
0,0	18	13.5
0,10	17	12
0,20	17	12
0,30	14	14.5
0,40	Negative*	21.5
10,0	19	15
10,10	17.5	13.5
10,20	17	12.5
10,30	16.5	12
10,40	6	23
20,0	18.5	15
20,10	18	14.5
20,20	16	13
20,30	15	13
20,40	16	15
30,0	17	16
30,10	18.5	17.5
30,20	17.5	16.5
30,30	15	16.5
30,40	16	14
40,0	19	17
40,10	NA	NA
40,20	15.5	15.5
40,30	17.5	13.5
40,40	18	13.5

[UZ]YQ7030:D2976, #3263, PM=30

Key at end of table.

Table A-2 (Cont.)

AVERAGE NORTH-SOUTH/EAST-WEST
GROUND CONDUCTIVITY READINGS
WITH EM31

TOWN OF ROYALTON LANDFILL

Survey Grid No. 3

Station #	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)
0,0	17.5	14.5
0,10	16.5	14.5
0,20	17	14.5
0,30	16.5	13
0,40	16	13.5
10,0	16.5	14.5
10,10	16.5	13.5
10,20	16.1	13.4
10,30	16	13
10,40	16	13
20,0	16.5	14
20,10	17	13.5
20,20	16	12.5
20,30	16	12
20,40	16	12.5
30,0	16	14
30,10	16	13
30,20	16	12.5
30,30	15	12
30,40	15	12
40,0	16	14
40,10	16	13
40,20	15	12.5
40,30	15	12
40,40	15.1	12.6

[UZ]YQ7030:D2976, #3263, PM=30

Key at end of table.

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Table A-2 (Cont.)

AVERAGE NORTH-SOUTH/EAST-WEST
GROUND CONDUCTIVITY READINGS
WITH EM31

TOWN OF ROYALTON LANDFILL

Survey Grid No. 4

Station #	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)
0,0	13.5	13.25
0,10	14	14.1
0,20	12.15	13.1
0,30	14	11.25
0,40	13	10.6
10,0	14.75	12.5
10,10	11.25	15
10,20	14.5	12.1
10,30	12.5	12
10,40	13.9	10.5
20,0	13.75	11.4
20,10	13.5	12.75
20,20	15.35	12
20,30	13	11.25
20,40	12.9	11.25
30,0	10.25	12.65
30,10	12.5	11.75
30,20	12	11.5
30,30	12.5	10.5
30,40	12.5	10.85
40,0	12.1	9.5
40,10	10.15	10.25
40,20	11.85	10.25
40,30	12	10
40,40	12	10.25

[UZ]YQ7030:D2976, #3263, PM=30

*Negative meter readings indicate very high conductivities beyond the capabilities of the instrument.

NA = Reading unobtainable.

APPENDIX B

MAGNETOMETER AND
EM31 SURVEY CONTOUR MAPS

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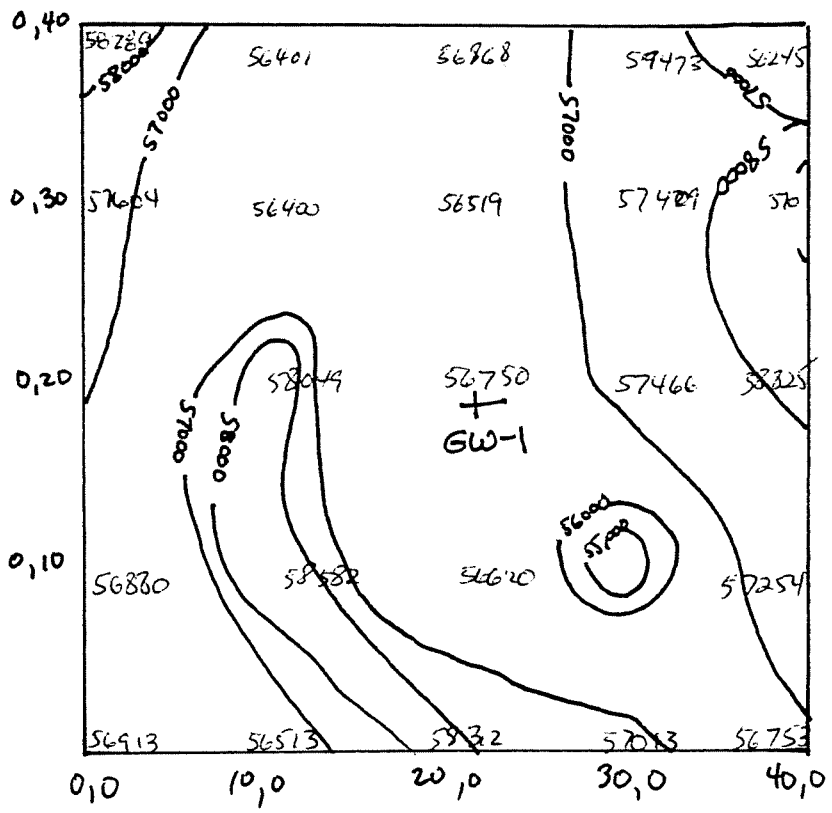
ecology and environment

TOWN OF ROYALTON
LANDFILL

MAGNETOMETER SURVEY

GRID # 1
(gammas)



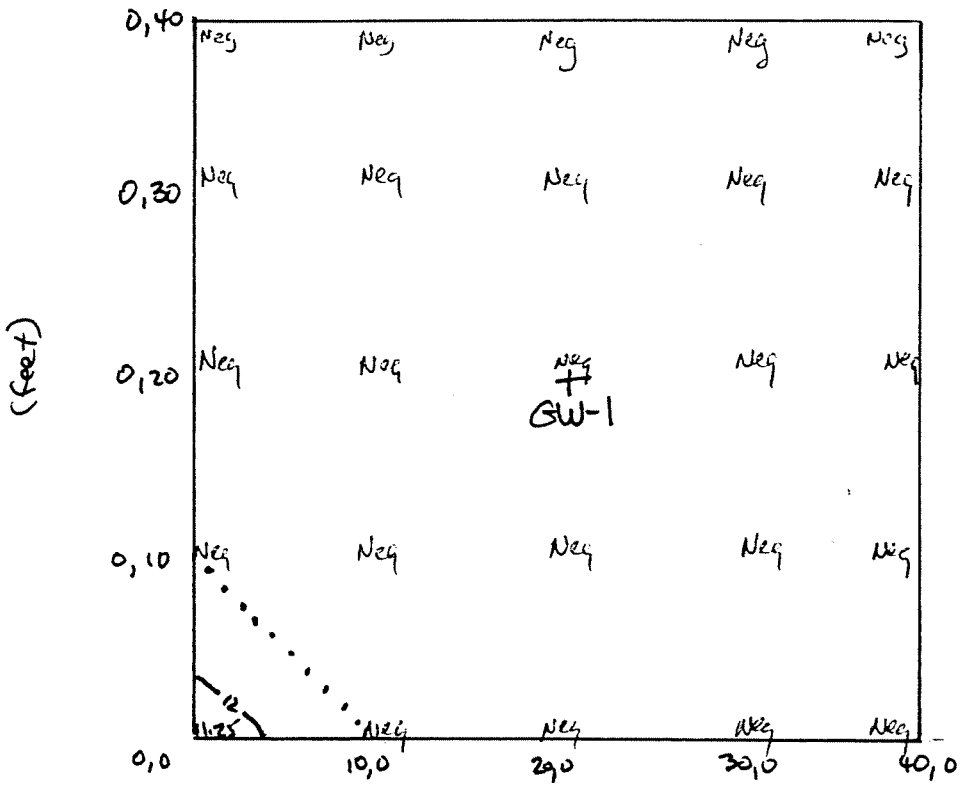
C.I. = 1000 gammas
+ = Proposed well location

TOWN OF ROYALTON
LANDFILL

EM-31 SURVEY

GRID #1

Vertical dipole
(millimhos/meter)



C.I = 2 millimhos/meter
..... = Negative meter readings
† = Proposed well location

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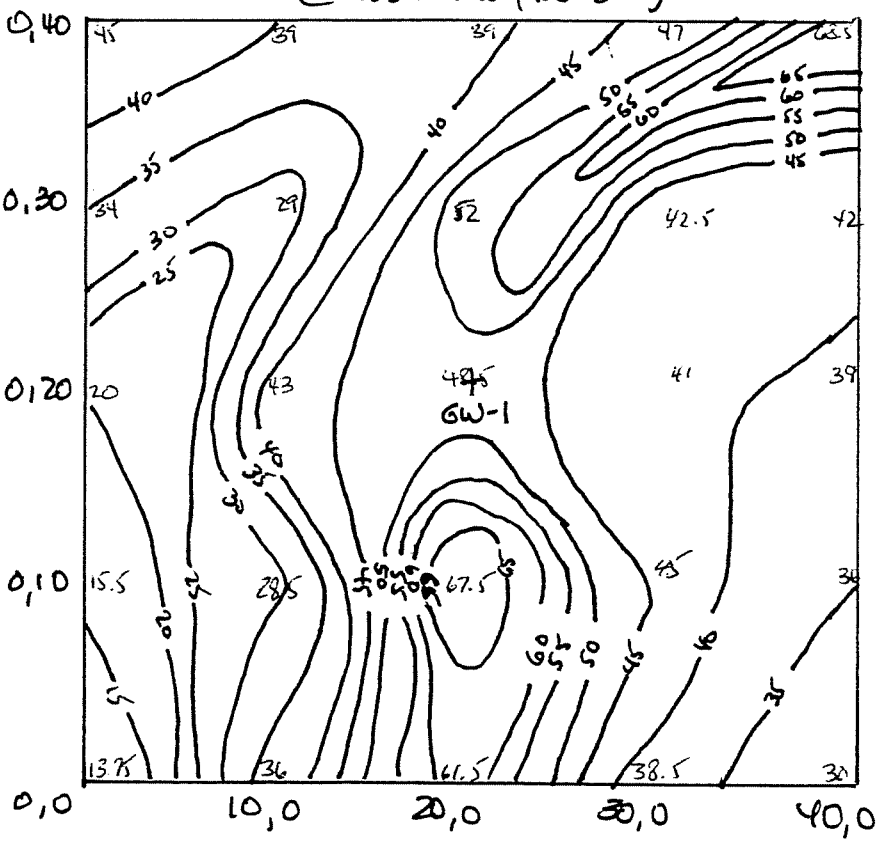
TOWN OF ROYALTON
LANDFILL

EM-31 SURVEY

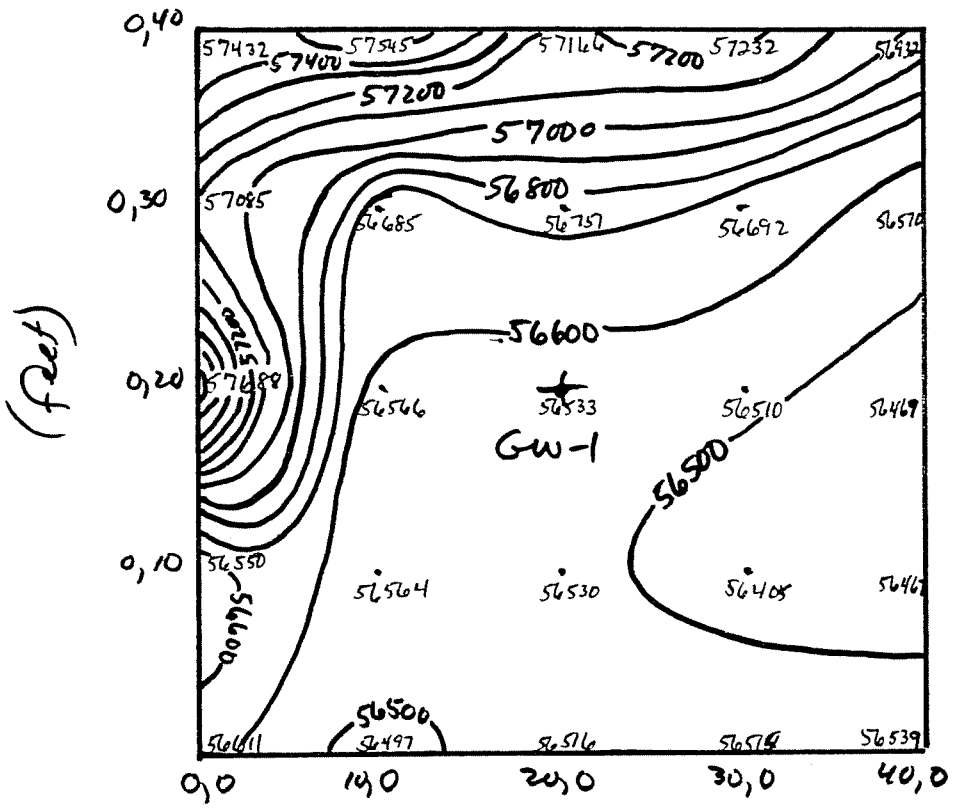
GRID #1

Horizontal dipole
(millimhos/meter)



C.I = 5 millimhos/meter
+ = Proposed well location

TOWN OF ROYALTON
LANDFILL
MAGNETOMETER SURVEY
GRID # 1A
(gammas)



C.I. = 100 gammas

+ = proposed well location

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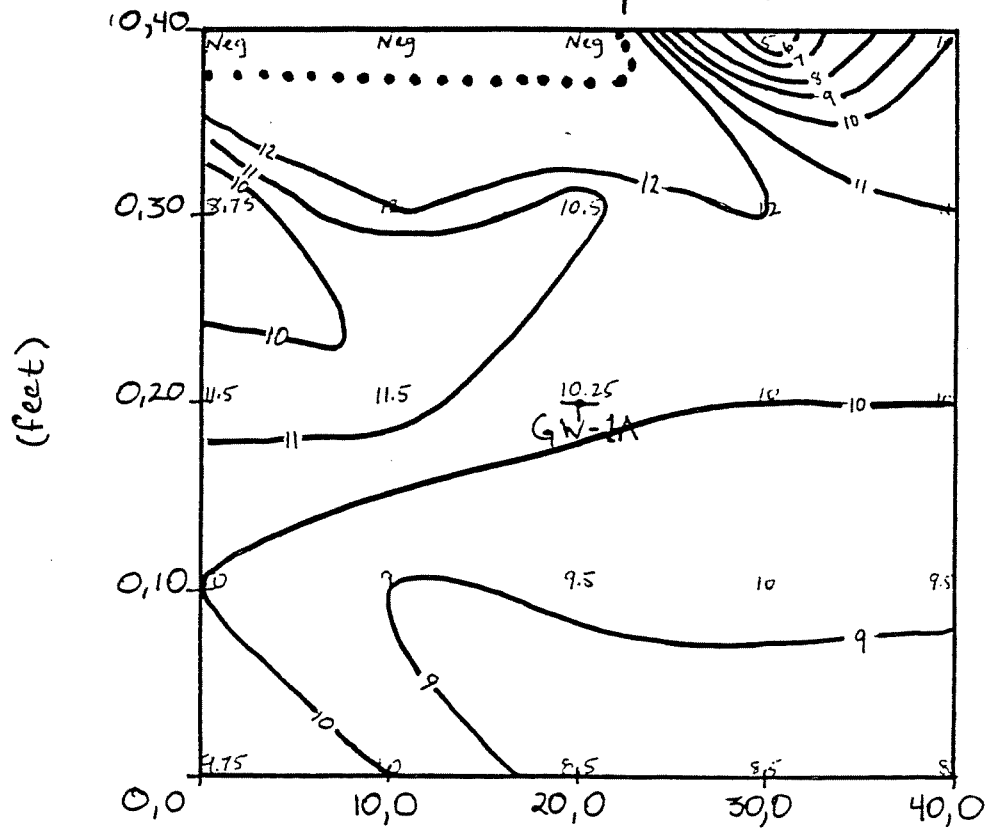
TOWN OF ROYALTON LANDFILL

EM-31 SURVEY

GRID #1A

Vertical dipole
(millimhos/meter)



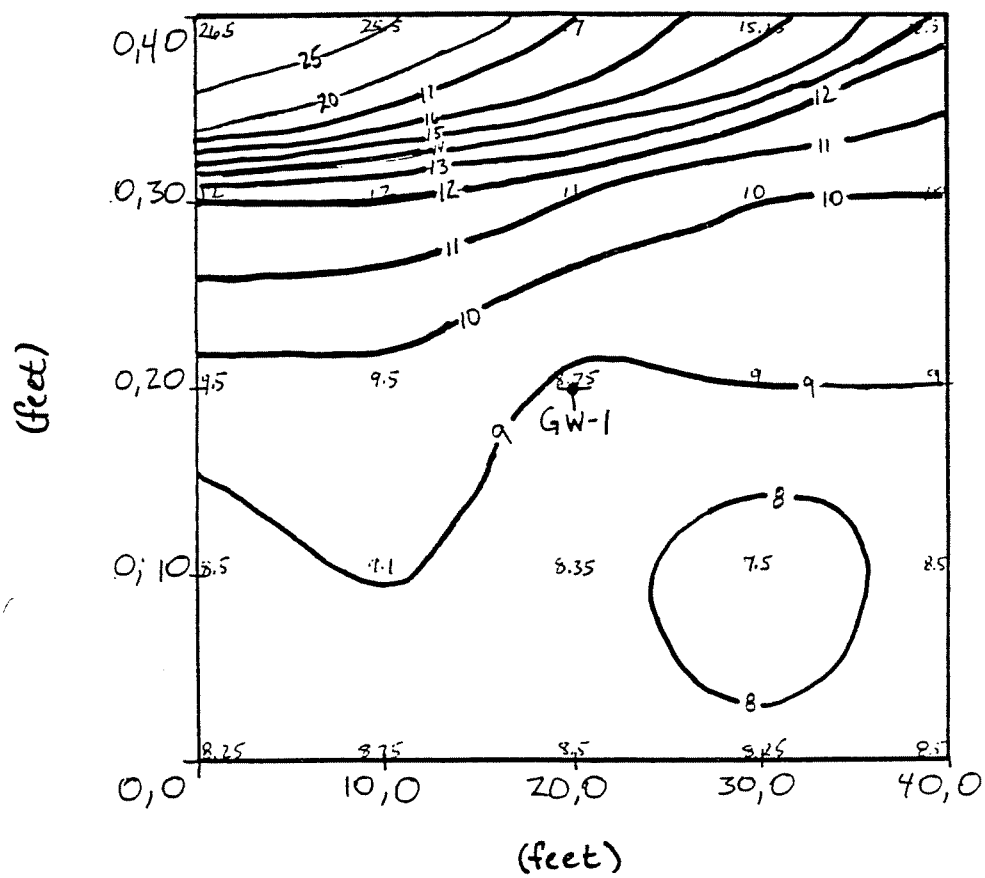
C.I. = 1 millimho/meter
• • • = Negative meter readings
+ = Proposed well location

TOWN OF ROYALTON LANDFILL

EM-31 SURVEY

GRID #1A

Horizontal dipole (millimhos/meter)



—C.I. = 1 millimho/meter
—C.I. = 5 millimho/meter
+ = Proposed well location

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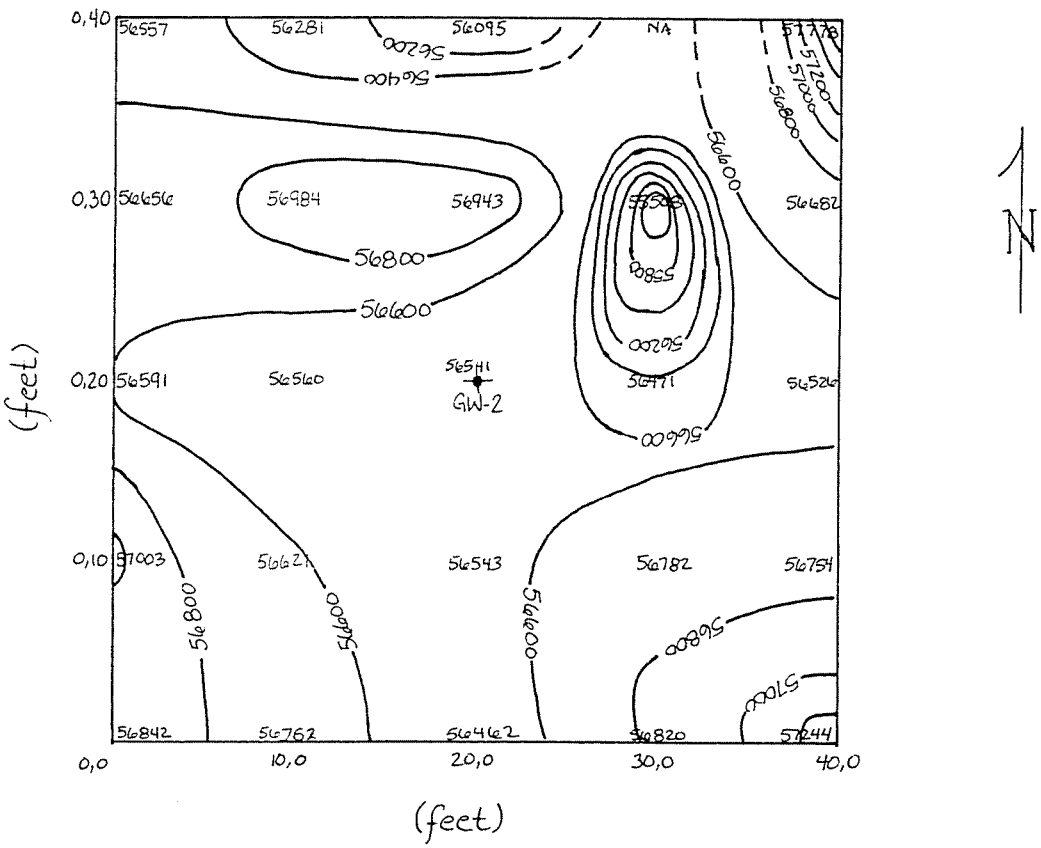
TOWN OF ROYALTON
LANDFILL

MAGNETOMETER SURVEY

GRID NO. 2

(gammas)



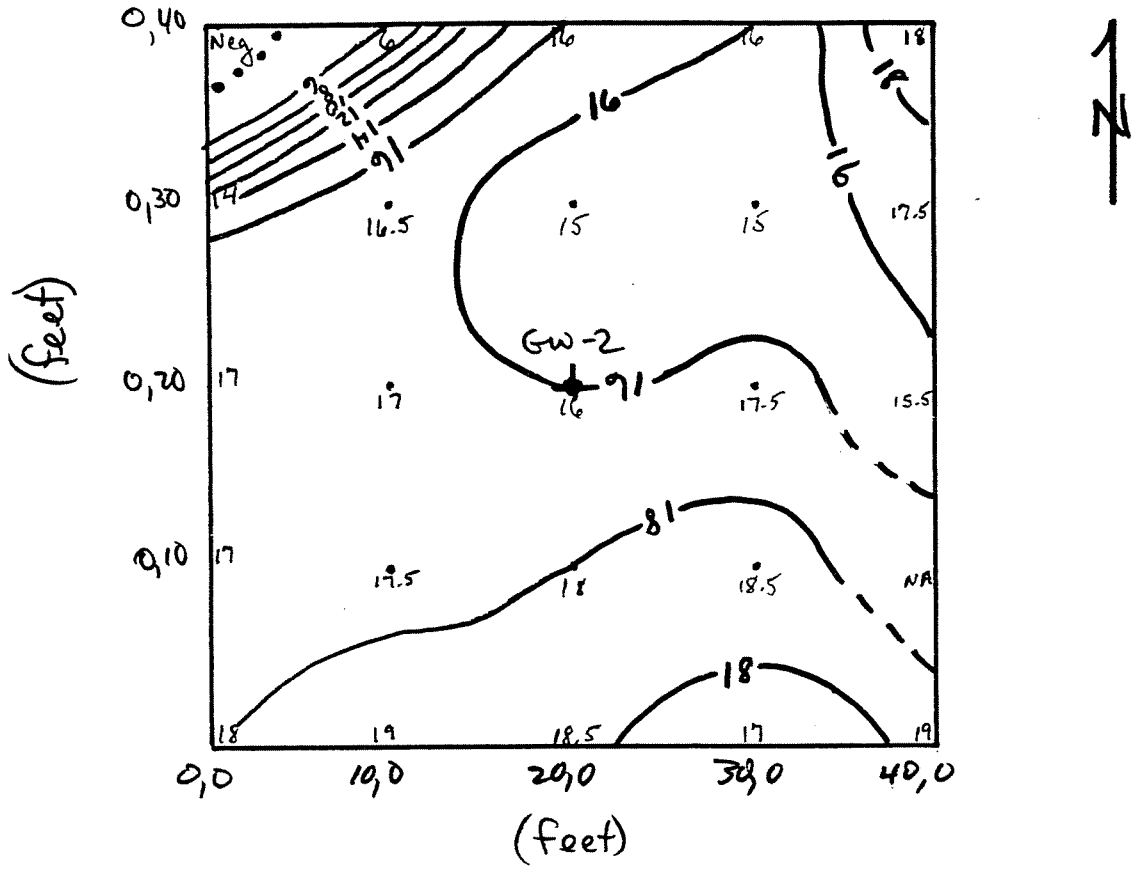
C I. = 200 gammas

--- Assumed Contour

✦ Proposed Well Location

TOWN OF ROYALTON
LANDFILL
EM 31 SURVEY
GRID #2

VERTICAL DIPOLE
(millimhos/meter)



C.I. = 2 millimhos/m
• • • = negative meter reading
✦ = Proposed well location
– – – = assumed contour

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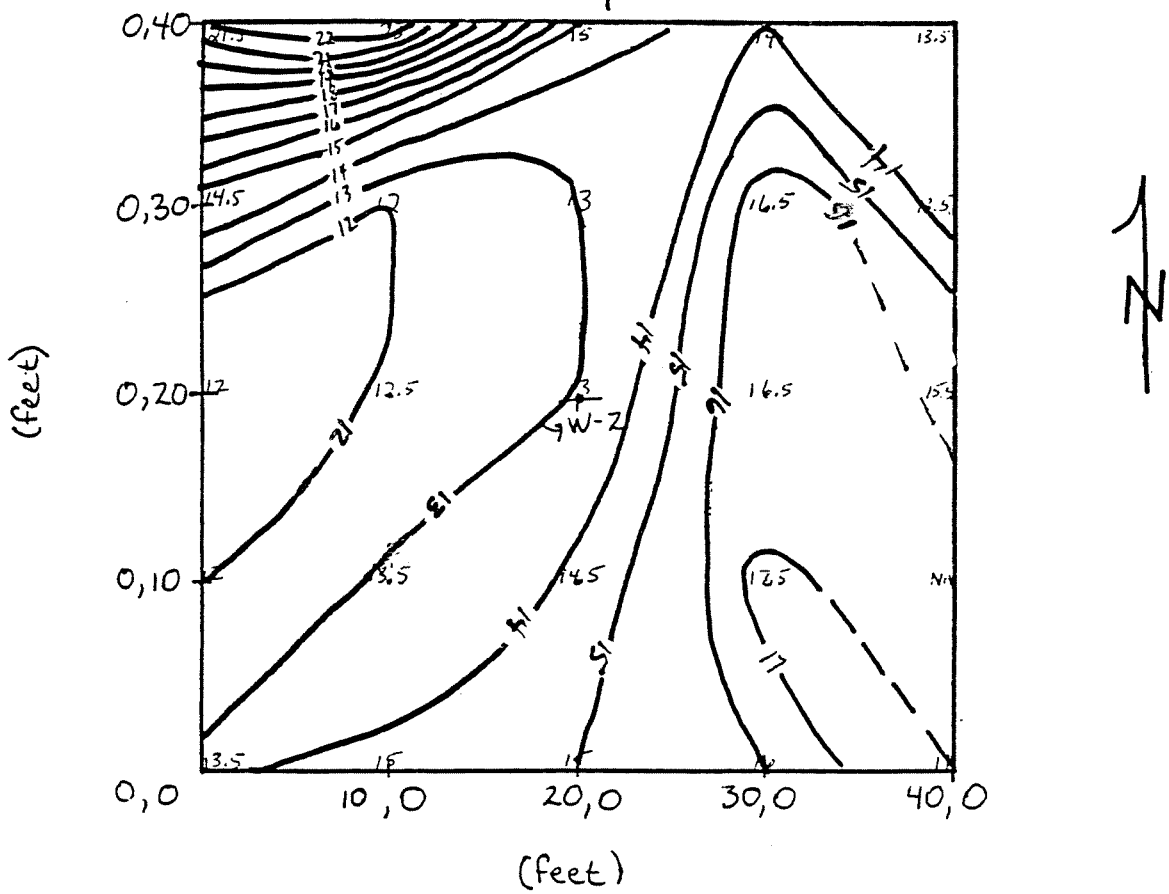
TOWN OF ROYALTON LANDFILL

EM-31 SURVEY

GRID #2

Horizontal dipole
(millimhos/meter)

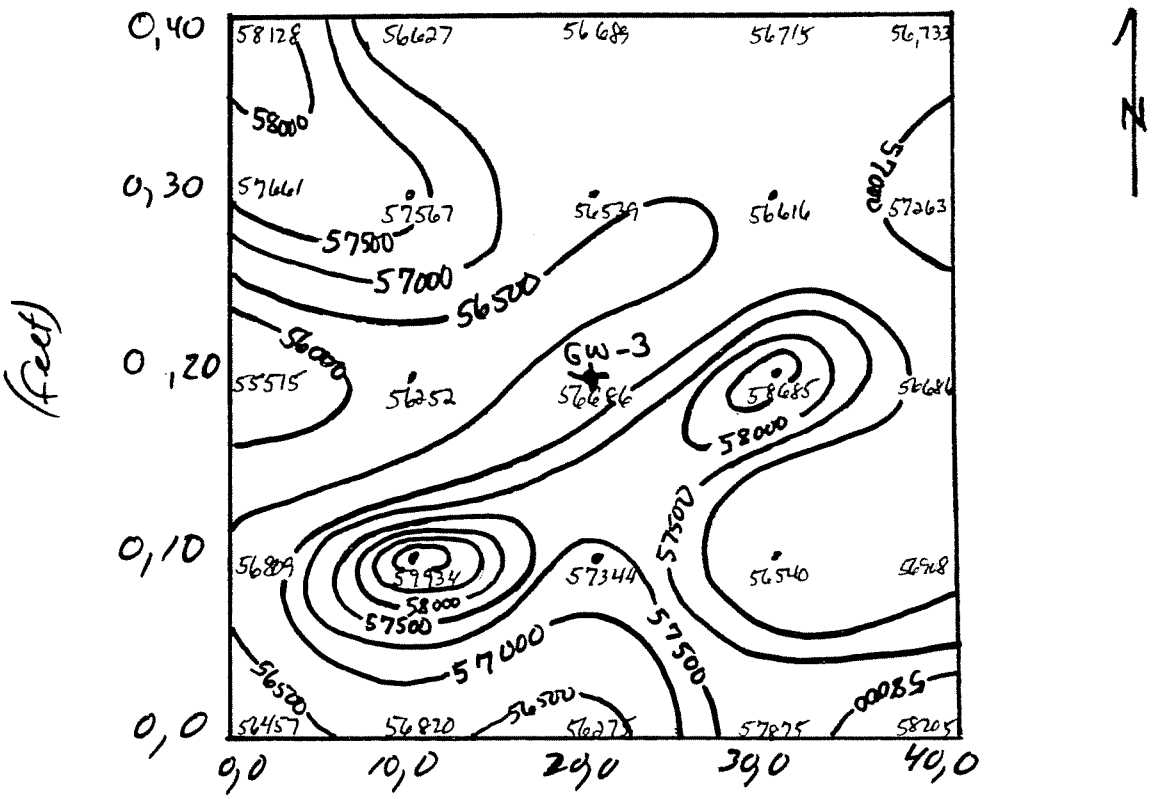


C.I. = 1 millimho/meter
--- = Assumed contour
+ = Proposed well location

TOWN OF ROYALTON LANDFILL

MAGNETOMETER SURVEY (GAMMAS)

GRID #3



Contour Interval = 500 gammas
+ = proposed well location

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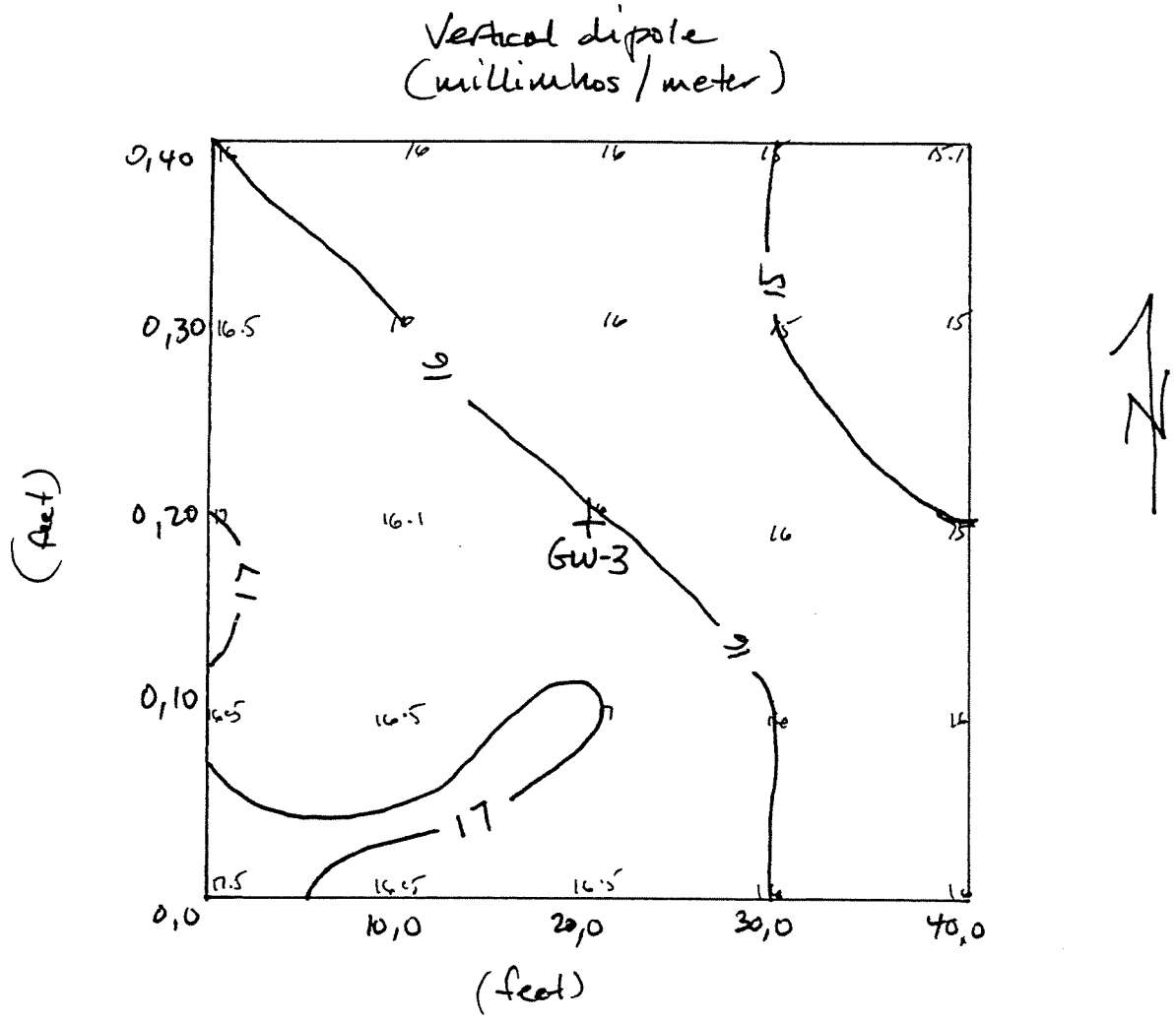
TOWN OF ROYALTON
LANDFILL

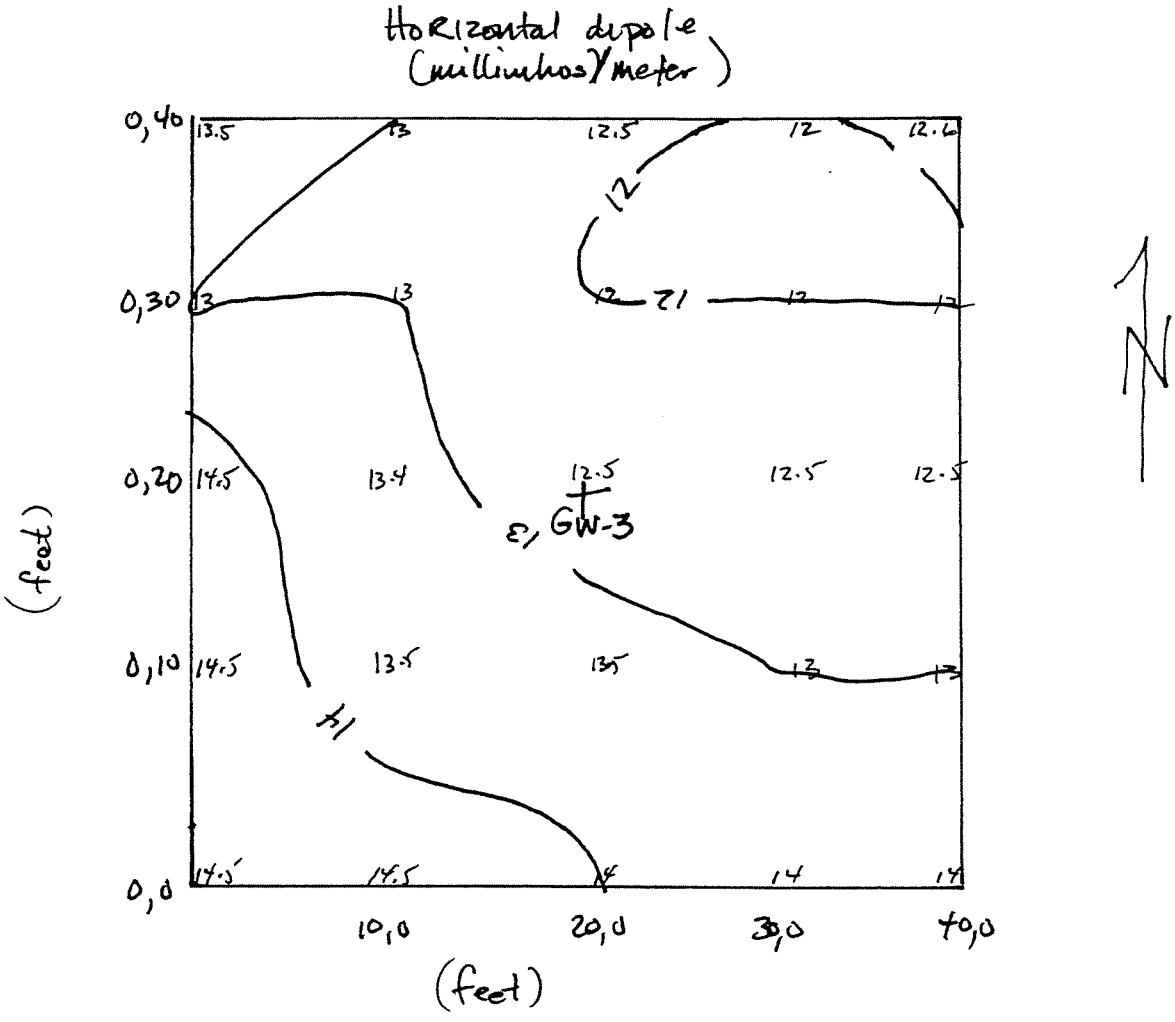
EM-31 SURVEY

GRID # 3



TOWN OF ROYALTON
LANDFILL

EM-31 SURVEY
GRID #3



C.I = 1 millimhos/meter
F = Proposed well location

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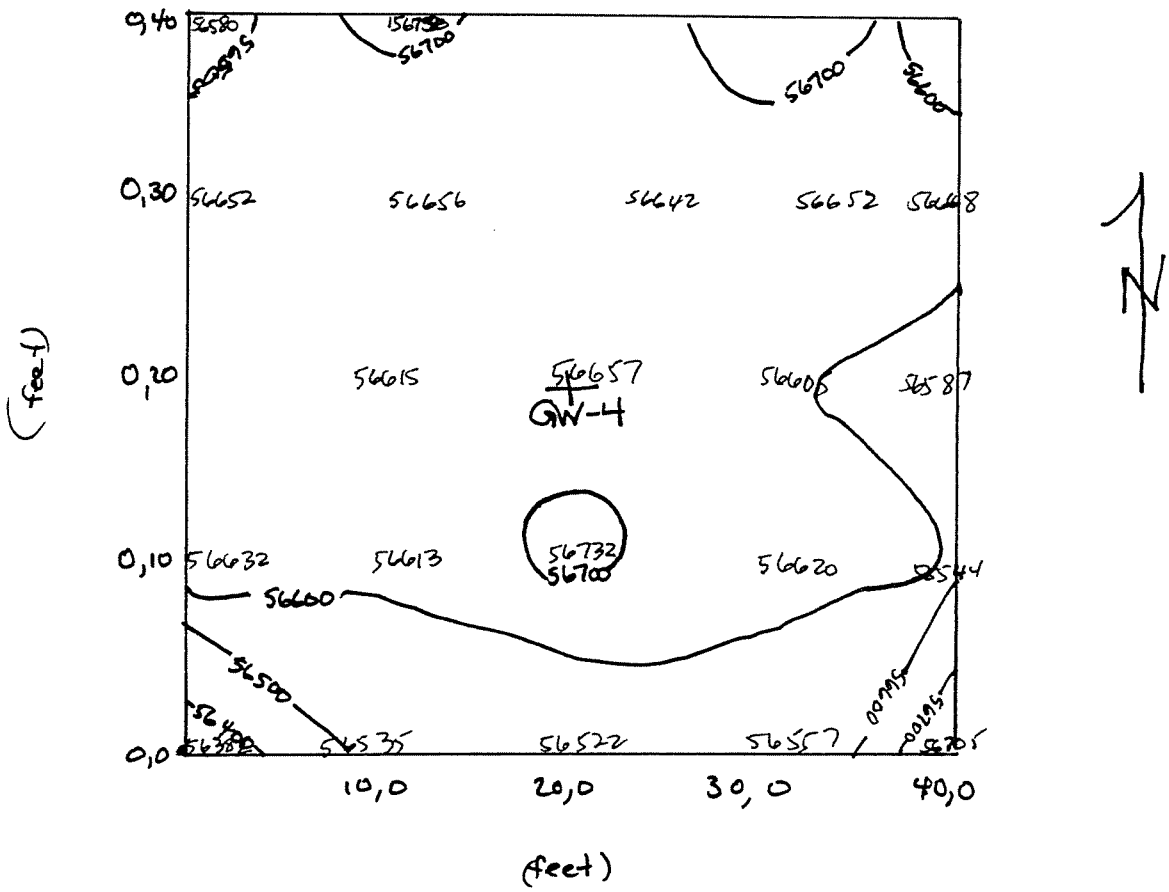
TOWN OF ROYALTON
LANDFILL

MAGNETOMETER SURVEY

GRID # 4

(gammas)

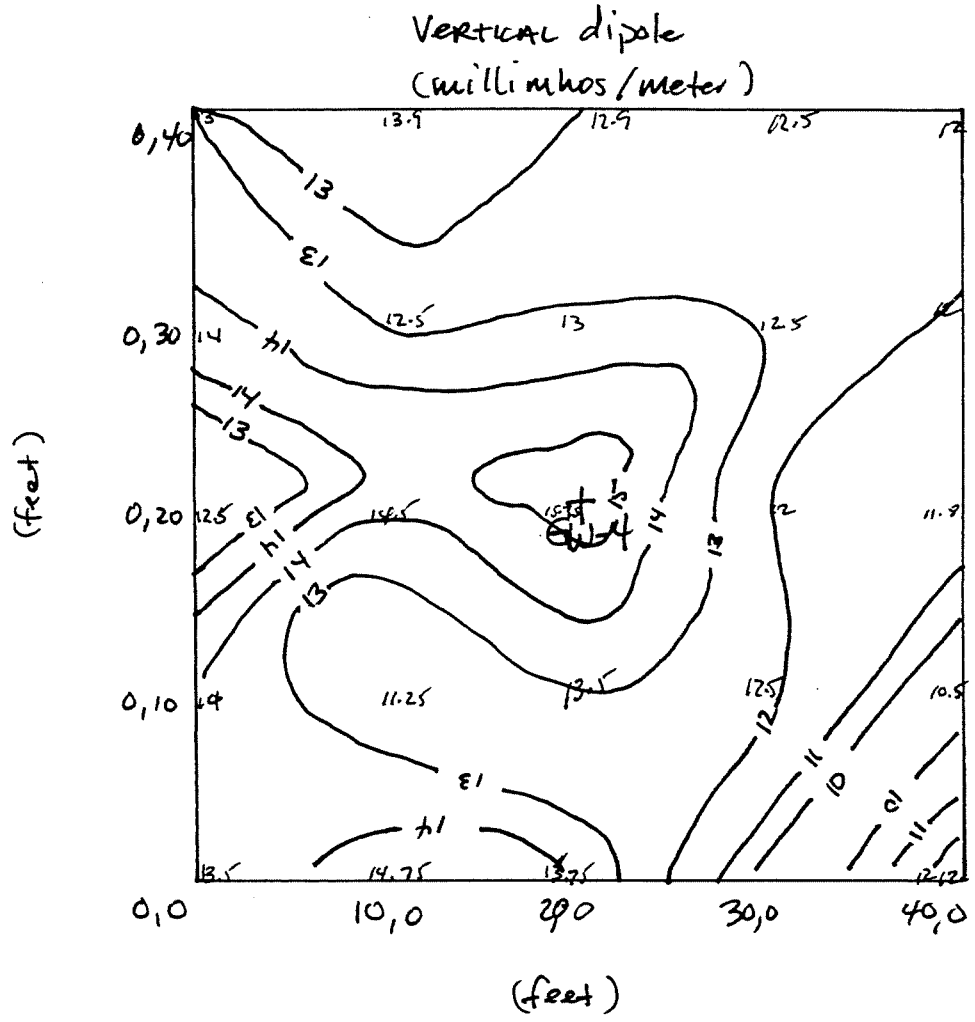


C.I. = 100 gammas
+ = Proposed well location

TOWN OF ROYALTON
LANDFILL

EM-31 SURUEY

GRID # 4



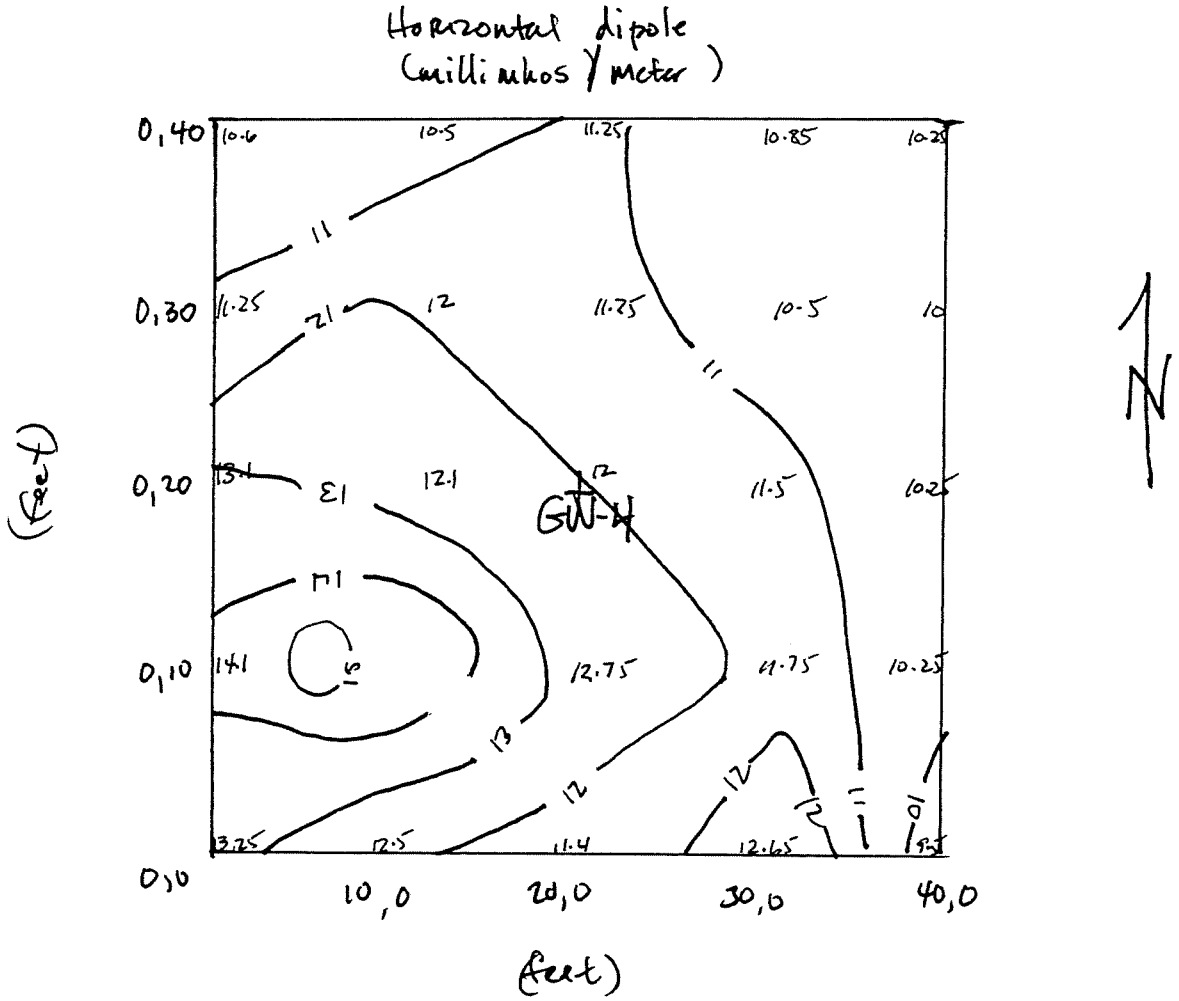
C.I. = 1 millimhos/meter
+ = Proposed Well Location

recycled paper
ecology and environment

TOWN OF ROYALTON
LANDFILL

EM-31 SURVEY

GRID #4



C.I. = 1 millimhos/meter
+ = Proposed Well Location

APPENDIX C

WELL BORING LOGS

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ecology and environment

DATE
STARTED 8-20-90
FINISHED 8-22-90
SHEET 1 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-1
SURFACE ELEVATION
GROUNDWATER DEPTH ( )

PROJECT ROYALTON LANDFILL
YQ-7040

LOCATION GRISWOLD STREET
ROYALTON, NY

DEPTH – FT	WELL DIAGRAM	OVA ppm	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE Cl Si Sd Gr	FIELD IDENTIFICATION OF SOILS	NOTES
0				4		SS-1 | 0-2' | REC. 1.6'	BEGAN DRILLING ON 8-20-90 AT 1125.
				8		0-0.2' TOP SOIL, BROWN, DAMP, ORGANIC RICH	REFUSAL AT 2.0' BGS
1	OVERBURDEN	0	SS 1	12		0.2'-2.0 CLAYEY SILT, REDDISH BROWN DAMP	RIG = MOBILE DRILL B-57 ON ATV TRUCK
				50/5			4¼" AUGERS
2					BEDROCK AT 2.0-FEET BGS		2" SPLIT SOONS
						RUN-1 | 2.0-6.7' | REC. 4.25'	1155 BEGIN HQ CORING W/ 5' BARREL FOR ROCK SOCKET
3						100% DOLOSTONE, SECONDARY POROUSITY, LIGHT GRAY, COMPETANT	
						RQD: 2.55 + .35 / 2.90 ÷ 4.25 × 100 = 68%	GOOD WATER RETURNS
4	3" ID PVC CASING						RATE ≈ 4 MIN/FT
		0	1		DOLOSTONE		
5							
6	DOLOSTONE BEDROCK						
							1215 OUT
7	NQ CORE HOLE					RUN-2 | 6.7-9.2' | REC. 2.2'	ON 8-21-90 AT 1530 RESUMED CORING W/ NQ SIZE CORES
						DOLOSTONE AS ABOVE (LOCKPORT FM) 9 PIECES OF CORE, HORIZONTAL FRACTURES	
8						RQD: .35 + .45 + .34 / 1.15 ÷ 2.2 × 100 = 52%	
		0	2			MORE FRACTURED + LESS POROUS THAN RUN #1	
9							1605 OUT

640088

C-2 CLASSIFICATION/BY Jim Richert

DATE STARTED 8-20-90 FINISHED 8-22-90 SHEET 2 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-1
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION GRISWOLD STREET ROYALTON, NY

DEPTH – FT	WELL DIAGRAM	OVA	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE Cl Sl Sd Gr	FIELD IDENTIFICATION OF SOILS	NOTES
10	NQ CORE HOLE					RUN #3 | 9.2 – 14.2' | REC. 5.0'	1640
						9.2 – 12.9 = DOLOSTONE AS ABOVE - GASPORT MEMBER	
11						12.9 – 14.2' = DOLOSTONE, DARK GRAY MASSIVE, HARD, DECEW, MEMBER	
		0	3			WEATHERED CONTACT AT 12.9 FEET	
12						RQD': 0.40, 0.475, 0.50, 0.35, 0.375, 0.35, + 0.35 = 2.80' ÷ 5.0 × 100 = 56%	
					GASPORT MEMBER OF LOCKPORT		
13					DECEW MEMBER OF LOCKPORT FORMATION		
14	DOLOSTONE					RUN-4 | 14.2 – 19.2 | REC 5.0'	1715
						SHALEY DOLOSTONE, DARK GRAY	
15						RQD': 0.4, 0.45, 0.475, 0.45, 0.35, 0.35, + 0.40 = 2.857' ÷ 5.0 × 100 = 55%	
16		0	4				
17							
18							

640088

C-3 CLASSIFICATION/BY Jim Richard

DATE
STARTED 8-20-90
FINISHED 8-22-90
SHEET 3 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-1
SURFACE ELEVATION
GROUNDWATER DEPTH
( )

PROJECT ROYALTON LANDFILL
YQ-7040

LOCATION TOWN OF ROYALTON
GRISWALD ST. NEW YORK

DEPTH – FT	WELL DIAGRAM	OVA ppm	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
19	NQ CORE HOLE						
20						RUN #5 | 19.2'–24.2' | REC 5.0'	ON 8-22-90 RESUMED DRILLING AT 0900 USING NQ CORING BIT
21		0.5	5		SHALEY DOLOSTONE	100% BLACK SHALEY DOLOSTONE AS ABOVE. RECOVERED 15 ROCK PIECES TOTALING 5.0' IN LENGTH RQD: 1.2, .4, .375, .4, .35, .4, + .35 3.475 ÷ 5 × 100 = 69.5	
22							"
23						CLAY FILLED FRACTURE AT 19.3' YIELDED OVA READING OF 0.5 PPM ABOVE BACK GROUND	
24							0925 END
25						RUN #6 | 24.2–29.2' | REC 5.0' DARK GRAY SHALEY DOLOSTONE WITH HORIZONTAL FRACTURES. GRAY CLAY FILLED FRACTURES AT 24.4, 24.5, 28.9–29.00 OVA READ 0.25 FROM CLAY FRACTURE FILLINGS RQD: .324, .45, + .325 1.099 ÷ 5 × 100 = 21%	0935 START RATE IS 4 MIN/FT
26		0.25	6				
27							

640088

C-4 CLASSIFICATION/BY

DATE
STARTED 8-20-90
FINISHED 8-22-90
SHEET 4 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-1
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROYALTON LANDFILL
YQ-7040

LOCATION GRISWALD STREET
TOWN OF ROYALTON, NY

DEPTH – FT	WELL DIAGRAM	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Sl Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
28'	NQ CORE HOLE / DOLOSTONE			SHALEY DOLOSTONE	SEE PAGE 3 FOR ROCK DESCRIPTION	
29					TOTAL DEPTH 29.2'	1000 END RUN END WELL
30						

640088

C-5 CLASSIFICATION/BY Jim Reichert

DATE STARTED 8-21-90
FINISHED 8-23-90
SHEET 1 OF 3

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-2
SURFACE ELEVATION
GROUNDWATER DEPTH ( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NEW YORK

DEPTH – FT	WELL DIAGRAM	OVA SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE Cl Si Sd Gr	FIELD IDENTIFICATION OF SOILS	NOTES
0	OVERBURDEN TO 9.5 FEET; 3" ID PVC CASING; CEMENT/BENTONITE GROUT			5	SAND	SS-1 | 0-2' | REC 1.8'	ON 8-21-90 AT 0945 BEGIN DRILLING 4¼" AUGERS 2" SPLIT SPOONS
1				4		0.-0.8' TOP SOIL, BROWN, ORGANIC DAMP.	
		0	1	4		0.8-2' SAND, FINE w/CLAY AND SILT.	
2				5		SS-2 | 2-4' | REC. 0.5	0955
						100% GRAVEL, TRACE CLAY & SAND	
3		0	2		GRAVEL		
4				8		SS-3 | 4-5.5 | REC. 1.1'	1005
		0	3	7		4-5.5 GRAVEL, w/CLAY AND SAND, REDDISH BROWN. WET.	HOLE IS NOT STRAIGHT SO COULD ONLY GET 18" OF S-3 SAMPLE
5				14			
				38 31			
				5		S-4 | 5.5-7.5 | REC 1.3	1012
6						5.5-6.2 GRAVEL AS ABOVE.	
		0	4	7		6.2-6.8' CLAY, GRAY DAMP	
				9	CLAY		
7				9			
				7		S-5 | 7.5-9.5 | REC. 1.3	1025
8		1	5	27		7.5-8.5 - GRAVEL, w/CLAY & SAND.	
				21	GRAVEL		
				50		8.5-9.5 - BEDROCK GRAY DOLOSTONE, FINE GRAINED SHALE	JS
9							

640088

C-6

CLASSIFICATION/BY _____

DATE STARTED 8-21-90 FINISHED 8-23-90 SHEET 2 OF 3

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-2
SURFACE ELEVATION
GROUNDWATER DEPTH ( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NIAGARA CO. NY

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Sl Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
9					GRAVEL	BEDROCK 9.5	1025 BEDROCK REFUSAL AT 9.5'
					BEDROCK AT 9.5'	RUN# 1 | 9.5' – 14.5' | REC 5.0'	
10						9.5 – 9.8 COBBLES – ROUNDED, GLACIAL RED, GRAY	
						9.8 – 14.5 SHALE ~~DOLOSTONE~~ JR MED GREY, SOFT ZONES AT 11.2' & 12.3' > HORIZ FRACTURES	1045 BEGIN HQ CORING
11							
12						RQD .7 .95 .45 .85 .75 3.70 / 5 = 74% RQD 1 VERTICLE FRACTURE FROM 11.3–11.7	
13						COMPARED CORE TO SAMPLES OF NEARBY QUARRY, LOOKS LIKE ROCHESTER SHALE	
14							
		O				RUN# 2 | 14.5 – 15.5 | REC. 1.0'	1110 END RUN# 1 ON 8-23-90 AT 1340 RESUMED CORING WITH NQ BIT
15						DARK GRAY DOLOSTONE 1 HORIZONTAL BREAK AT 15.1' RQD = 100%	
						RUN# 3 | 15.5 – 20.5 | REC. 4.95	
16						100% DOLOSTONE AS ABOVE 12 PIECES HIGHLY FRACTURED FROM 15.5 – 18.0 18.0 – 20.5 VERY COMPETENT 3 PIECES RQD = .45 1.725 .65 2.825 ÷ 4.95 = 57%	
17							
18							

640088

C-7 CLASSIFICATION/BY Jim Richert

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DATE
STARTED 8-21-90
FINISHED 8-23-90
SHEET 3 OF 3

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-2
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROY ALTON LANDFILL YQ-7040

LOCATION TOWN OF ROY ALTON NIAGARA COUNTY NY

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE Cl Si Sd Gr	FIELD IDENTIFICATION OF SOILS	NOTES
18						SEE PAGE 2 FOR CORE DESCRIPTION	
19		O			SHALEY DOLOSTONE	2 CLAY FILLED FRACTURES AT 16.5 & 16.6 PROBOBLE WATER BEARING ZONE	
20						20.5 25.5	1620 OUT WITH RUN #3
						RUN #4 [illegible] - 25.5' REC. 5.0'	BEGIN RUN 4 AT 1635
21						DARK GRAY DOLOSTONE PRIMARILY COMPETANT, MORE SO AT LAST 2 FEET. NO WEATHERED FRACTURES	
22		O				RQD: .325 .5 .95 1.7 3.475 ÷ 5 = 69.5%	
23							
24							
25					T.D.	TOTAL DEPTH AT 25.5'	RUN 4 ON BOTTOM 1655
26							
27							

640088

C-8

CLASSIFICATION/BY Jim Richert

DATE STARTED 8-22-90
FINISHED 8-22-90
SHEET 1 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-3
SURFACE ELEVATION ____
GROUNDWATER DEPTH ____ ( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NIAGARA CO. NY

DEPTH – FT	WELL DIAGRAM	~~OVA~~ SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE (CL SI Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
0				2 / 2	SILT	SS-1 | 0-2' | REC. 1.6	BEGAN 4¼" AUGERING AT 1295 ON 8-22-90
				2		0-.8 TOP SOIL, DRK BRWN, ORGANIC, SILTY.	
1		0	1	2		.8-2.0' SILT w/ CLAY + ORGANIC RICH SOIL AMP.	
				3			
2							
3							
4						SS-2 | 4-6' | REC. 2.0'	1238
					CLAY	4.0-4.8 DARK CLAY SILTY CLAY	
		0	2			4.8-5.8 REDDISH SILT w/ SAND	
5				13		~~SS-3 | 5-7' | REC. 1.4'~~ JR	~~1238~~ JR
				23	SAND	5.8-6.0 - MED SAND WHITE + LIGHT GREY	
6							
				27			
				37			
7						JR	
8							
9							

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C-9

CLASSIFICATION/BY Jim Reichert

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ecology and environment

DATE
STARTED 8-22-90
FINISHED 8-22-90
SHEET 2 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-3
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROYALTON LANDFILL
YQ-7040

LOCATION TOWN OF ROYALTON
NIAGARA COUNTY NY

DEPTH – FT	WELL DIAGRAM	OVA / SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
9				22		SS-3 | 9-11' | REC, 1.3	1255
		0	3	23 33 R		9.0 - 9.1 RED. CLAYEY SILT	
10				13	TILL	9.1 - 9.3 - COBBLE - GREY LIMESTONE	
				11		9.3 - 11. TILL - SILT, w/CLAY + GRAVEL DAMP.	
11							
12							
13							
14				50 / .33	14.3'	SS-4 | 14-16' | REC. 0'	1310
					~~BEDROCK~~ TR BOULDER	REFUSAL AT 14.33'	1325 BEGIN HQ CORING AT 14.5'
15							
16					TILL COBBLE	CORED FROM 14.5 TO 19.5 TOP 2' = BOULDER OF RED SANDSTONE MEDIUM REST = TILL WITH COBBLES of GREY LS + WHITE QUARTZITE	1335 AT 16.5'
17							
18							

640088

C-10

CLASSIFICATION/BY Jim Pickert

DATE
STARTED 8-22-90
FINISHED 8-22-90
SHEET 3 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-3
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROYALTON LANDFILL YG-7040

LOCATION TOWN OF ROYALTON NIAGARA CO. NY

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
18							
					Till		
19				50 / 4			
						SS-5 | 19-21' | REC 0.3	1410 WILL RESUME AUGER DRILLING AT 19' IN TILL
						REFUSAL AT 19.33' HARD TILL WASHED, WET SAND- MED GRAIN. ROCK FRAGMENTS, RED SANDSTONE, MEDINA FORMATION	
20							
21							
22							
23							
24						SS-6 | 24-26' | REC 2.0	1450
				7			
		0		7		24-26' 100% MED. COARSE SAND. WET	
25				23			
				50 / 1			
26						SS-7 | 26-28' | REC. 0.3'	1615
		0		50 / 3		GRAVEL + COBBLES, SAND SATURATED	
27							

6-20088

C-11 CLASSIFICATION/BY Jim Pickart

DATE
STARTED 8-22-90
FINISHED 8-22-90
SHEET 4 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER G4-3
SURFACE ELEVATION
GROUNDWATER DEPTH
( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NIAGARA CO. NY

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	PROFILE Cl Sl Sd Gr	FIELD IDENTIFICATION OF SOILS	NOTES
0					GRAVELLY TILL	SEE PAGE 3	TOTAL DEPTH REACHED AT 0615
28						TOTAL DEPTH = 28' OVERBURDEN WELL.	

640088

C-12 CLASSIFICATION/BY Don Reichert

DATE STARTED 8-20-90 FINISHED 8-23-90 SHEET 1 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-4
SURFACE ELEVATION
GROUNDWATER DEPTH ( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NEW YORK

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Sl Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
0				6		SS-1 | 0-2' | REC. 1.5'	STARTED DRILLING ON 8-20-90 AT 1115
				8		0-0.4 TOP SOIL, DARK BROWN ORGANIC, DAMP,	
1			1			0.4 – 1.5' CLAYEY SILT, REDISH COLOR, SMALL ROCK FRAGMENTS	
		O		13			
2				10		AUGERED TO 2.65' REFUSAL	1430 BEDROCK REFUSAL AT 2.65'
					BED ROCK AT 2.65'	RUN #1 | ~~2.65'~~ 3.0-8.0 | REC. 4.6'	
3						HQ CORED FOR ROCK SOCKET	1530 OUT W/ RUN #1
						100% DOLOSTONE LIGHT + MED GREY VISABLE MINERALIZATION + POROSITY (1 mm) SEVERAL HORIZONTAL FRACTURES	
4						RQD = .35, .67, .4, .4, .4, .35 = 2.57 RQD = 55.8%	
5		O	2				
6							
7							
8						RUN #2 | 8-~~11.5~~ 11.3 (JR) | REC. 3.0	ON 8-23-90 AT 1145 BEGAN CORING
		O			SHALEY DOLOSTONE	8-8.2 DOLO AS ABOVE, 8.2-11.3' DARK GRAY DOLO. WEATHERED FRACTURES AT 8.2 & 9.9 11 PIECES	
9							

640088

C-13 CLASSIFICATION/BY Jim Reinert

recycled paper ecology and environment

DATE
STARTED 8-20-90
FINISHED 8-23-90
SHEET 2 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-4
SURFACE ELEVATION ____
GROUNDWATER DEPTH ____ ( )

PROJECT ROYALTON LANDFILL YQ-7040

LOCATION TOWN OF ROYALTON NIAGARA COUNTY, NY

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
9						PRIMARILY HORIZONTAL FRACTURES WITH SOME VERTICAL.	FREQUENT CORE BARREL BLOCKAGE AT 11.5-12.0
10						RQD = .425 .425 .350 .425 1.625 ÷ 30 = 54% C	
11							
12					DOLOSTONE	RUN #3 | 11.3-16.3' | REC. 4.9' 100% DARK GRAY DOLOMITE VERY FRACTURED, WITH WEATHERING IN FRACTURE AT 12.0' AND 12.8. 4.9' RECOVERY IN 7 PIECES.	
13		O				RQD: .325 .375 .325 1.025 ÷ 4.9 × 100 = 21%	
14							
15							
16						RUN #4 | 16.3-21.3 | REC. 4.9'	OUT w/ IRON F3 AT 1240
17						SEE PAGE 3	
18							

640088

CLASSIFICATION/BY Jim Richert

DATE STARTED 8-20-90
FINISHED 8-23-90
SHEET 3 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-4
SURFACE ELEVATION
GROUNDWATER DEPTH

PROJECT ROYALTON LANDFILL YQ-2040

LOCATION TOWN OF ROYALTON NIAGARA COUNTY N.Y.

DEPTH – FT	WELL DIAGRAM	SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
18						RECOVERED 4.9' IN 21 PIECES. ROCK IS SAME AS ABOVE MANY VERT & HORIZ. FRACTS. ~~AT~~ SR AT 18.5' A CLAY FILLED FRACTURE VERY THIN, HORIZONTAL. RQD: .55 .325 .875 ÷ 4.9 = 17%	
19		O					
20							
21						LOTS VERT FRACT. FROM 16.3-18.0	OUT AT 1300
						RUN #5 | 21.3-26.3 | REC. 5.0'	
22						SAME ROCK TYPE AS ABOVE. NO VERTICAL FRACT.'S REC 5.0' IN 18 PIECES NO WEATHERED FRACTURES MORE COMPETANT ROCK THAN RUNS 3 & 4	
23		O					
24							
25						RQD: .40 .325 .375 .4 .55 .375 + .35 = 2.78 ÷ 5 = 55.5%	
26							OUT AT 1320
						RUN 6 | 26.3-31.3 | REC.	START 1326
27						SEE PAGE 4	

640088

C-15 CLASSIFICATION/BY Jim Richert

DATE
STARTED 8-20-90
FINISHED 8-23-90
SHEET 4 OF 4

E + E DRILLING AND TESTING CO., INC.
SUBSURFACE LOG

HOLE NUMBER GW-4
SURFACE ELEVATION
GROUNDWATER DEPTH ( )

PROJECT ROYALTON LANDFILL
YQ-7040

LOCATION TOWN OF ROYALTON
NIAGARA COUNTY, NY

DEPTH – FT	WELL DIAGRAM	OVM / SAMPLE TYPE	SAMPLE NO.	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	PROFILE (Cl Si Sd Gr)	FIELD IDENTIFICATION OF SOILS	NOTES
27						ROCKAS ABOVE WITH LESS FRACTURES, NONE WEATHERED.	
28						RQD: .475 .70 .6 .4 .325 .325 .35 +.55 3.755 ÷ 5 = 74.5%	CHECKED WATER RECOVERY AT 31.25' VERY GOOD. TOTAL DEPTH is REACHED
29		0			DOLOSTONE		
30							
31					T.D.	TOTAL DEPTH is 31.25'	OUT WITH RUN 6 AT 1340 ~~1315~~ JR
32							
33							
34							
35							
36							

640088

C-16

CLASSIFICATION/BY Jim Richert

APPENDIX D

GEOTECHNICAL ANALYSES

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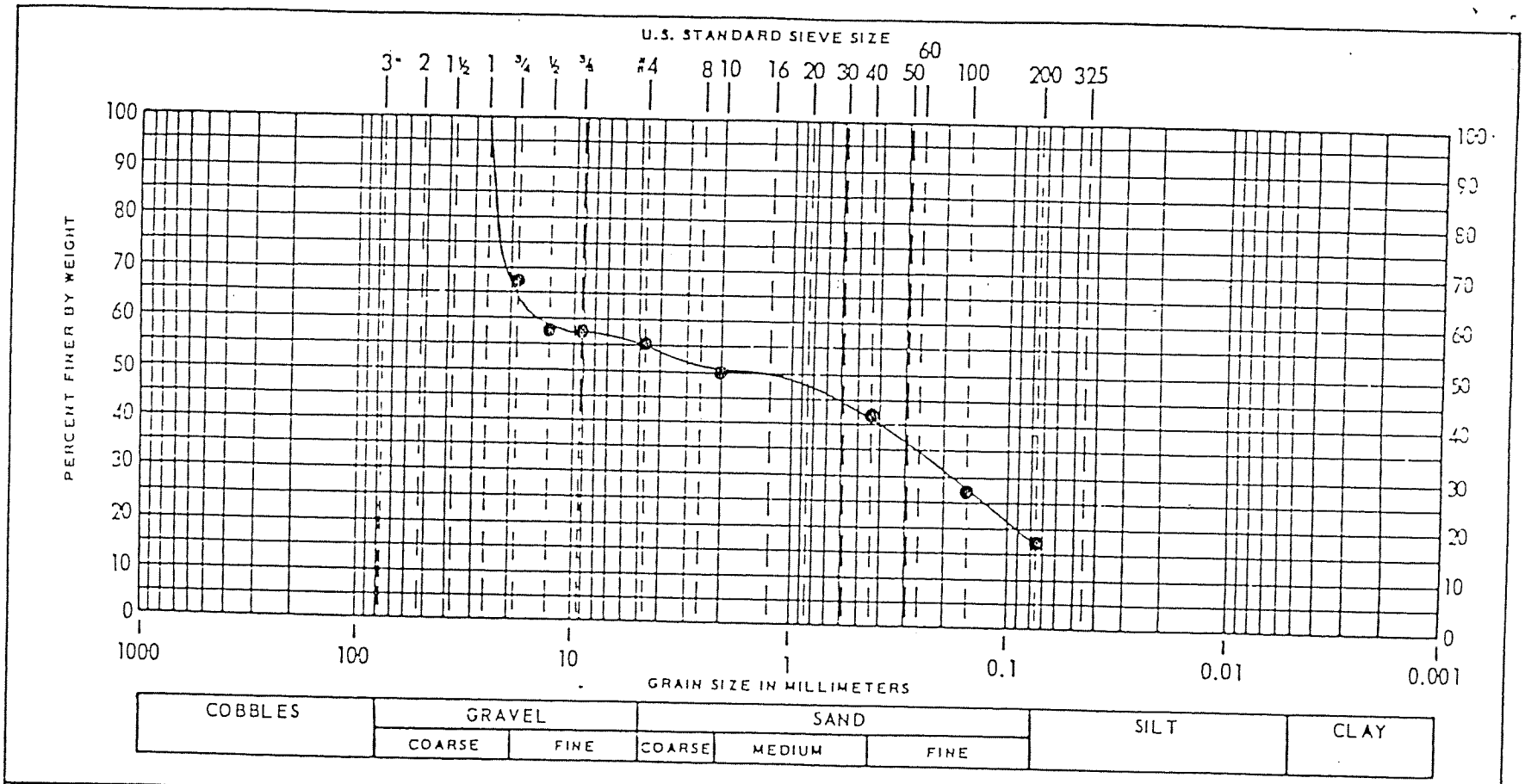


PROJECT Royalton Landfill
Your Project No. YQ-7040

BORING NO.

SAMPLE NO. GW-4, S-1

DEPTH 0.0' to 2.0'

CLASSIFICATION Sand and gravel, little clayey silt

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

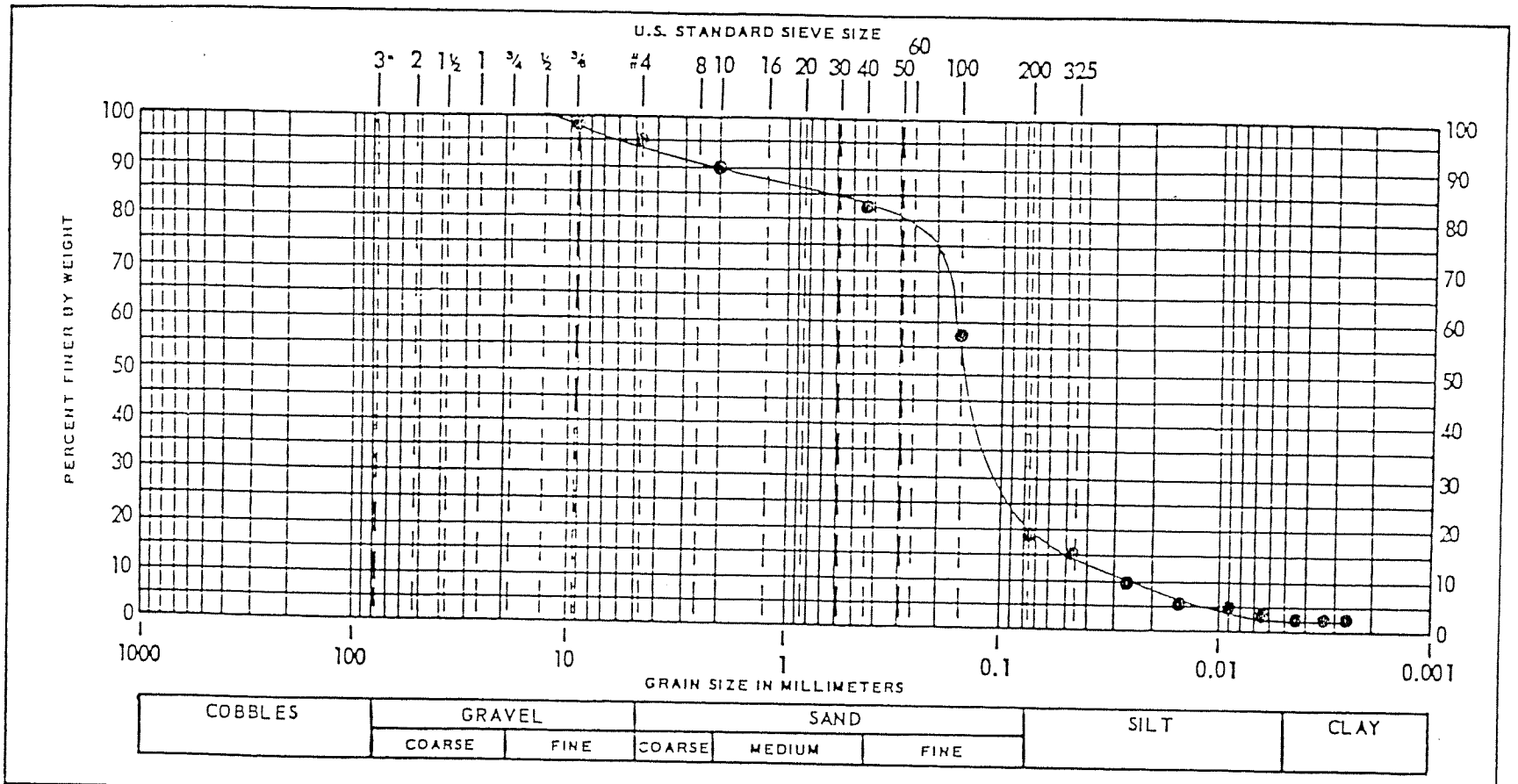
REMARKS T.T.L. Job No. 11420
Your P.O. No. 54964

Toledo Testing Laboratory, Inc.

D-2

Figure 5

SOIL CLASSIFICATION SHEET



PROJECT Royalton Landfill
Your Project No. YQ-7040

BORING NO.

SAMPLE NO. GW-3, S-6

DEPTH 24.0' to 26.0'

CLASSIFICATION Silty sand, trace of clay and gravel

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR Brown

REMARKS T.T.L. Job No. 11420
Your P.O. No. 54964

Toledo Testing Laboratory, Inc.

D-3

Figure 4

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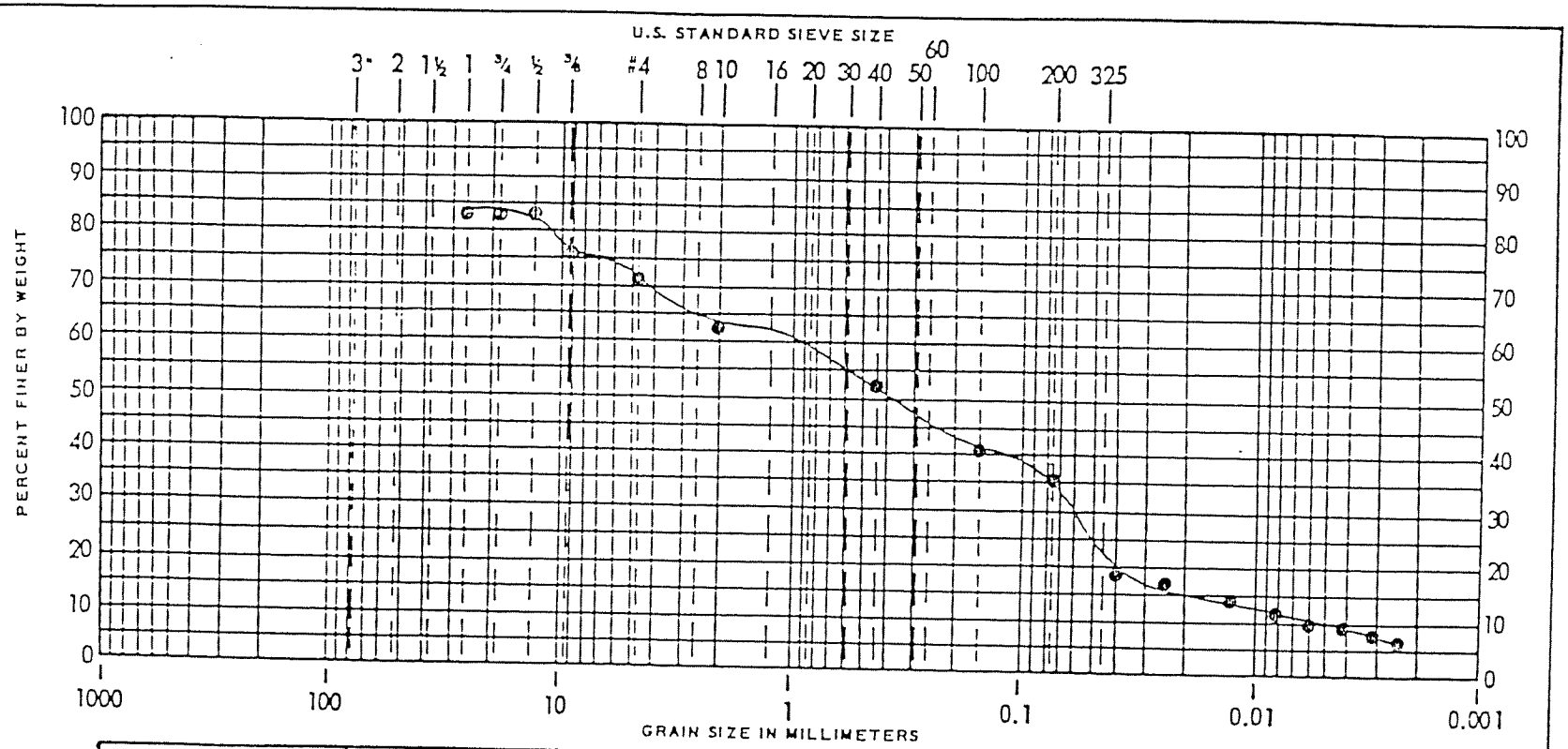
SOIL CLASSIFICATION SHEET



PROJECT Royalton Landfill
Your Project No. YQ-7040

BORING NO.

SAMPLE NO. GW-2, S-3

DEPTH 4.0' to 5.5'

CLASSIFICATION Silty sand, some gravel, trace of clay

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR Brown

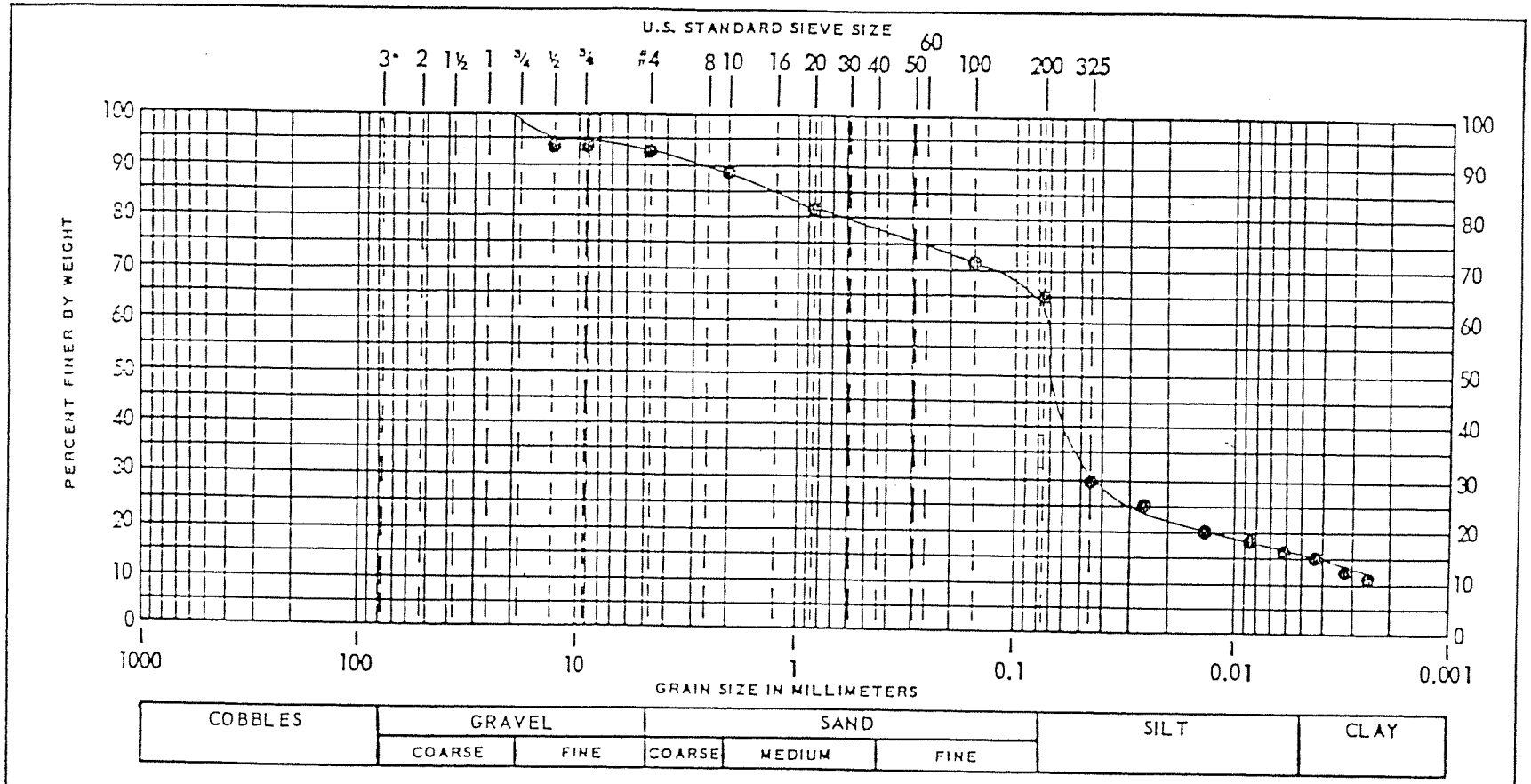
REMARKS T.T.L. Job No. 11420
Your P.O. No. 54964

Toledo Testing Laboratory, Inc.

D-4

Figure 3

SOIL CLASSIFICATION SHEET



PROJECT Royalton Landfill
Your Project No. YQ-7040

BORING NO.

SAMPLE NO. GW-1, S-1

DEPTH 0.0' to 2.0'

CLASSIFICATION Clayey silt, little sand, trace of gravel

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR Brown

REMARKS T.T.L. Job No. 11420
Your P.O. No. 54964

Toledo Testing Laboratory, Inc.

D-5

Figure 2

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APPENDIX E

ANALYTICAL DATA SUMMARY SHEETS

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GLOSSARY OF DATA QUALIFIERS

CODES RELATING TO IDENTIFICATION

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm results.

CODES RELATING TO QUANTITATION

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value expected to be higher.

[]= Inorganic analyte present. As values approach the IDL the quantitation may not be accurate.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

DATA SUMMARY FORM: VOLATILES 1

Site Name: Town of Royalton Landfill

Case #: 9002.136 9002.298 Sampling Date(s): _____

WATER SAMPLES (ug/L)

To calculate sample quantitation limit: (CRQL * Dilution Factor)

CRQL	COMPOUND	Sample No.	DW-1		GW-1		GW-2		GW-3		GW-4		VBLKW1		VBLKW2		GW4MS		GW4MSD	
		Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
		Location																		
10	Chloromethane																			
10	Bromomethane																			
10	*Vinyl Chloride																			
10	Chloroethane																			
5	*Methylene Chloride		3	B	11	B	10	B	11	B	11	B	8		5		19	B	18	B
10	Acetone		12	B			7	B	9	B			25		13				7	B
5	Carbon Disulfide																			
5	*1,1-Dichloroethene																			
5	1,1 Dichloroethane																			
5	*Total-1,2-Dichloroethene																			
5	Chloroform		31														1	J	1	J
5	*1,2-Dichloroethane																			
10	*2-Butanone																			
5	*1,1,1-Trichloroethane																			
5	*Carbon Tetrachloride																			
10	Vinyl Acetate																			
5	Bromodichloromethane		10																	

CRDL = Contract Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

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DATA SUMMARY FORM: V O L A T I L E S 2

Site Name: Town of Royalton Landfill
9002.136
Case #: 9002.298 Sampling Date(s): _____

WATER SAMPLES
(ug/L)

To calculate sample quantitation limit:
(CRQL * Dilution Factor)

CRQL	COMPOUND	Sample No.	DW-1		GW-1		GW-2		GW-3		GW-4		VBLKW1		VBLKW2		GW4MS		GW4MSD	
		Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
		Location																		
5	*1,2-Dichloropropane																			
5	Cis-1,3 Dichloropropene																			
5	Trichloroethene																			
5	Dibromochloromethane		4	J																
5	1,1,2 Trichloroethane																			
5	*Benzene																			
5	Trans-1,3 Dichloropropene																			
5	Bromoform																			
10	4-Methyl 2 pentanone																			
10	2 Hexanone																			
5	*Tetrachloroethene																			
5	1,1,2,2 Tetrachloroethane																			
5	*Toluene																			
5	*Chlorobenzene																			
5	*Ethylbenzene																			
5	*Styrene																			
5	*Total Xylenes																			

CRDL = Contract Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 12/88

DATA SUMMARY FORM: B N A S 1

Site Name: Town of Royalton Landfill

Case #: 9002.136 9002.298 Sampling Date(s): _____

WATER SAMPLES (ug/L)

To calculate sample quantitation limit: (CRQL * Dilution Factor)

	Sample No.	DW-1		GW-1		GW-2		GW-3		GW-4		SBLKW1		SBLKW2		GW-4MS		GW4MSD	
	Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
	Location																		
CRQL	COMPOUND																		
10	Phenol																		
10	bis(2-Chloroethyl)ether																		
10	2 Chlorophenol																		
10	*1,3-Dichlorobenzene																		
10	*1,4-Dichlorobenzene																		
10	Benzyl Alcohol																		
10	1,2 Dichlorobenzene																		
10	2 Methylphenol																		
10	bis(2-Chloroisopropyl)ether																		
10	4 Methylphenol																		
10	N Nitroso di n propylamine																		
10	Hexachloroethane																		
10	Nitrobenzene																		
10	Isophorone																		
10	2 Nitrophenol																		
10	2,4 Dimethylphenol																		
50	Benzoic Acid																		
10	bis(2-Chloroethoxy)methane																		
10	2,4 Dichlorophenol																		
10	1,2,4-Trichlorobenzene																		
10	Naphthalene																		
10	4-Chloroaniline																		

CRDL = Contract Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

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DATA SUMMARY FORM: B N A S 2

Site Name: Town of Royalton Landfill

Case #: 9002.136 9002.248 Sampling Date(s): _____

WATER SAMPLES (ug/L)

To calculate sample quantitation limit: (CRQL * Dilution Factor)

CRQL	COMPOUND	Sample No.	DW-1		GW-1		GW-2		GW-3		GW-4		SBLKW1		SBLKW2		GW4MS		GW4MSD	
		Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
		Location																		
10	Hexachlorobutadiene																			
10	4-Chloro-3-methylphenol																			
10	2-Methylnaphthalene																			
10	Hexachlorocyclopentadiene																			
10	2,4,6-Trichlorophenol																			
50	2,4,5-Trichlorophenol																			
10	2-Chloronaphthalene																			
50	2-Nitroaniline																			
10	Dimethylphthalate																			
10	Acenaphthylene																			
10	2,6 Dinitrotoluene																			
50	3-Nitroaniline																			
10	Acenaphthene																			
50	2,4-Dinitrophenol																			
50	4-Nitrophenol																			
10	Dibenzofuran																			
10	2,4-Dinitrotoluene																			
10	Diethylphthalate		4	J																
10	4-Chlorophenyl-phenylether																			
10	Fluorene																			
50	4-Nitroaniline																			
50	4,6 Dinitro-2-methylphenol																			

CRDL = Contract Required Detection Limit

*Action Level Exists

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DATA SUMMARY FORM: B N A S 3

Site Name: Town of Royalton Landfill
9002.136
Case #: 9002.198 Sampling Date(s): _____

WATER SAMPLES
(ug/L)

To calculate sample quantitation limit:
(CRQL * Dilution Factor)

CRDL	COMPOUND	Sample No.	DW-1		GW-1		GW-2		GW-3		GW-4		SBLKW1		SBLKW2		GW-4MS		GW-4MSD	
		Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
		Location																		
10	N Nitrosodiphenylamine																			
10	4 Bromophenyl phenylether																			
10	*Hexachlorobenzene																			
50	*Pentachlorophenol																			
10	Phenanthrene																			
10	Anthracene																			
10	Di n butylphthalate								1	J										
10	Fluoranthene																			
10	Pyrene																			
10	Butylbenzylphthalate																			
20	3,3 Dichlorobenzidine																			
10	Benzo(a)anthracene																			
10	Chrysene																			
10	bis(2 Ethylhexyl)phthalate		4	B	3	B	3	B	11	B	10	B	5	J	2	J	4	B	3	B
10	Di-n-octylphthalate																			
10	Benzo(b)fluoranthene																			
10	Benzo(k)fluoranthene																			
10	Benzo(a)pyrene																			
10	Indeno(1,2,3-cd)pyrene																			
10	Dibenz(a,h)anthracene																			
10	Benzo(g,h,i)perylene																			

CRDL = Contract Required Detection Limit

*Action Level Exists

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DATA SUMMARY FORM: P E S T I C I D E S A N D P C B S

Site Name: Town of Royalton Landfill
9002.136
Case #: 9002.298 Sampling Date(s): _____

WATER SAMPLES
(ug/L)

To calculate sample quantitation limit:
(CRQL * Dilution Factor)

CRQL	COMPOUND	Sample No. / Dilution Factor / Location																					
		DW-1 1.0		GW-1 1.0		GW-2 1.0		GW-3 1.0		GW-4 1.0		PBLKW1 1.0		PBLKW2 1.0		GW-4MS 1.0		GW-4MSD 1.0					
0.05	alpha-BHC																						
0.05	beta-BHC																						
0.05	delta-BHC																						
0.05	*Gamma-BHC (Lindane)																						
0.05	*Heptachlor																						
0.05	Aldrin																						
0.05	Heptachlor Epoxide																						
0.05	Endosulfan I																						
0.10	Dieldrin																						
0.10	4,4'-DDE																						
0.10	*Endrin																						
0.10	Endosulfan II																						
0.10	4,4'-DDD																						
0.10	Endosulfan Sulfate																						
0.10	4,4'-DDT																						
0.5	*Methoxychlor																						
0.10	Endrin ketone																						
0.5	*Alpha-Chlordane																						
0.5	*Gamma-Chlordane																						
1.0	*Toxaphene																						
0.5	*Aroclor-1016																						
0.5	*Aroclor-1221																						
0.5	*Aroclor-1232																						
0.5	*Aroclor-1242																						
0.5	*Aroclor-1248																						
1.0	*Aroclor-1254																						
1.0	*Aroclor-1260																						

CRDL = Contract Required Detection Limit

*Action Level Exists

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DATA SUMMARY FORM: I N O R G A N I C S

Site Name: Town of Royalton Landfill 9002.136

Case #: 9002.298 Sampling Date(s): _____

WATER SAMPLES (ug/L)

*Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

CRDL	ANALYTE	Sample No. / Dilution Factor / Location																					
		DW-1 1.0		GW-1 1.0		GW-2 1.0		GW-3 1.0		GW-4 1.0													
200	Aluminum	1343		1750		717		281		[131]													
60	Antimony																						
10	*Arsenic		UL	[3.4]	L	[3.2]	L	[2.7]	L	[3.8]	L												
200	Barium	[34.1]		[149]		[19.9]		[97.5]		[116]													
5	Beryllium																						
5	*Cadmium																						
5000	Calcium	33,750		19,400		75,400		140,000		146,000													
10	*Chromium																						
50	Cobalt			[48]																			
25	Copper			[116]																			
100	Iron	380		7,200		921		965		432	B												
5	*Lead	[2.0]	L	38.2	L	[2.2]	L		UL		UL												
5000	Magnesium	8,068		86,000		34,300		72,000		62,000													
15	Manganese	187.8		861		64.4		659		355													
0.2	Mercury																						
40	*Nickel																						
5000	Potassium	[1255]		5,800		12,600		6,040		6,390													
5	Selenium		UL		UL		UL		UL		UL												
10	Silver																						
5000	Sodium	8,729		9,680		27,600		29,100		116,000													
10	Thallium		UL		UL		UL		UL		UL												
50	Vanadium																						
20	Zinc	[10.6]		267		[10.5]		[18.9]		[17.2]													
10	*Cyanide																						

CRDL = Contract Required Detection Limit

*Action Level Exists

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DATA SUMMARY FORM: V O L A T I L E S 1

Site Name: Town of Royalton Landfill 9002.136

Case #: 9002.298 Sampling Date(s): _____

SOIL SAMPLES (ug/Kg)

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	L-1		L-2		L-2 RE		SED-1		SED 1RE		SED-2		SED-2RE		VBLKS1		
	Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		
	% Moisture	24		18		18		36		36		38		38		-		
	Location			more acceptable				more acceptable				more acceptable						
CRQL	COMPOUND																	
10	Chloromethane																	
10	Bromomethane																	
10	Vinyl Chloride																	
10	Chloroethane																	
5	Methylene Chloride	35	B	34	B	19	B	37	B	39	B	38	B	23	B	15		
10	Acetone	22	B	22	B			24	B			100	B	12	B	9	J	
5	Carbon Disulfide																	
5	1,1 Dichloroethene																	
5	1,1 Dichloroethane																	
5	Total-1,2 Dichloroethene																	
5	Chloroform																	
5	1,2 Dichloroethane																	
10	2 Butanone																	
5	1,1,1-Trichloroethane																	
5	Carbon Tetrachloride																	
10	Vinyl Acetate																	
5	Bromodichloromethane																	

CRDL = Contract Required Detection Limit

SEE NARRATIVE FOR CODE DEFINITIONS

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DATA SUMMARY FORM: V O L A T I L E S 2

Site Name: Town of Royalton Landfill SOIL SAMPLES (ug/Kg)

Case #: 9002.136 9002.298 Sampling Date(s): _____

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

CRQL	COMPOUND	L-1	L-2	L-2RE	SED-1	SED-1RE	SED-2	SED-2RE	VBLKS1
	Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	% Moisture	24	18	18	36	36	38	38	-
	Location								
5	1,2-Dichloropropane								
5	Cis-1,3-Dichloropropene								
5	Trichloroethene								
5	Dibromochloromethane								
5	1,1,2-Trichloroethane								
5	Benzene								
5	Trans-1,3-Dichloropropene								
5	Bromoform								
10	4-Methyl-2-pentanone								
10	2-Hexanone								
5	Tetrachloroethene								2 J
5	1,1,2,2-Tetrachloroethane								
5	Toluene		1 J						
5	Chlorobenzene								
5	Ethylbenzene								
5	Styrene								
5	Total Xylenes		3 B		2 B				3 J

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: VOLATILES 1

Site Name: Town of Royalton Landfill SOIL SAMPLES (ug/Kg)

Case #: 9002.136 9002.298 Sampling Date(s): _____

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

CRQL	COMPOUND																			
	Sample No.	VBLKS2		L-1 MS		L-1 MSD														
	Dilution Factor	1.0		1.0		1.0														
	% Moisture	-		24		24														
	Location																			
10	Chloromethane																			
10	Bromomethane																			
10	Vinyl Chloride																			
10	Chloroethane																			
5	Methylene Chloride	9		38	B	35	B													
10	Acetone	10		22	B	17	B													
5	Carbon Disulfide																			
5	1,1 Dichloroethene																			
5	1,1-Dichloroethane																			
5	Total-1,2 Dichloroethene																			
5	Chloroform																			
5	1,2 Dichloroethane																			
10	2 Butanone																			
5	1,1,1 Trichloroethane																			
5	Carbon Tetrachloride																			
10	Vinyl Acetate																			
5	Bromodichloromethane																			

CRDL = Contract Required Detection Limit

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DATA SUMMARY FORM: V O L A T I L E S 2

Site Name: Town of Royalton Landfill SOIL SAMPLES (ug/Kg)

Case #: 9002.136 9002.298 Sampling Date(s): _____

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	VBLKS2	L-1MS	L-1MSD						
	Dilution Factor	1.0	1.0	1.0						
	% Moisture	—	24	24						
	Location									
CRQL	COMPOUND									
5	1,2-Dichloropropane									
5	Cis-1,3-Dichloropropene									
5	Trichloroethene									
5	Dibromochloromethane									
5	1,1,2-Trichloroethane									
5	Benzene									
5	Trans-1,3-Dichloropropene									
5	Bromoform									
10	4-Methyl-2-pentanone									
10	2-Hexanone									
5	Tetrachloroethene									
5	1,1,2,2-Tetrachloroethane									
5	Toluene									
5	Chlorobenzene									
5	Ethylbenzene									
5	Styrene									
5	Total Xylenes									

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S 1

Site Name: Town of Royalton Landfill
9002.136
Case #: 9002.298 Sampling Date(s): _____

SOIL SAMPLES (ug/Kg)

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	L-1	L-1RE	L-2	SED-1	SED-1RE	SED-2	SBLKSI	L-1MS	L-1MSD
	Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	% Moisture	24	24	18	36	36	38	-	24	24
	Location		more acceptable			more acceptable				
CRQL	COMPOUND									
330	Phenol									
330	bis(2-Chloroethyl)ether									
330	2-Chlorophenol									
330	1,3-Dichlorobenzene									
330	1,4-Dichlorobenzene									
330	Benzyl Alcohol									
330	1,2 Dichlorobenzene									
330	2-Methylphenol									
330	bis(2-Chloroisopropyl)ether									
330	4-Methylphenol									
330	N-Nitroso di-n propylamine									
330	Hexachloroethane									
330	Nitrobenzene									
330	Isophorone									
330	2 Nitrophenol									
330	2,4 Dimethylphenol									
1600	Benzoic Acid									
330	bis(2 Chloroethoxy)methane									
330	2,4 Dichlorophenol									
330	1,2,4-Trichlorobenzene									
330	Naphthalene									
330	4-Chloroaniline									

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S 2

Site Name: Town of Royalton Landfill

Case #: 9002.136 9002.298 Sampling Date(s): _____

SOIL SAMPLES (ug/Kg)

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	L-1	L-1RE	L-2	SED-1	SED-1RE	SED-2	SBLKS1	L-1MS	L-1MSD
	Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	% Moisture	24	24	18	36	36	38	-	24	24
	Location									
CRQL	COMPOUND									
330	Hexachlorobutadiene									
330	4-Chloro-3-methylphenol									
330	2-Methylnaphthalene									
330	Hexachlorocyclopentadiene									
330	2,4,6-Trichlorophenol									
1600	2,4,5-Trichlorophenol									
330	2-Chloronaphthalene									
1600	2-Nitroaniline									
330	Dimethylphthalate									
330	Acenaphthylene									
330	2,6-Dinitrotoluene									
1600	3-Nitroaniline									
330	Acenaphthene									
1600	2,4-Dinitrophenol									
1600	4-Nitrophenol									
330	Dibenzofuran									
330	2,4-Dinitrotoluene									
330	Diethylphthalate									
330	4-Chlorophenyl-phenylether									
330	Fluorene									
1600	4-Nitroaniline									
1600	4,6-Dinitro-2-methylphenol									

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S 3

Site Name: Town of Royalton Landfill 9002.136

Case #: 9002.298 Sampling Date(s): _____

SOIL SAMPLES (ug/Kg)

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

CRQL	COMPOUND	L-1		L-1RE		L-2		SED-1		SED-1RE		SED-2		SB1KS1		L-1 MS		L-1 MSD	
	Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
	% Moisture	24		24		18		36		36		38		-		24		24	
	Location																		
330	N-Nitrosodiphenylamine																		
330	4-Bromophenyl phenylether																		
330	Hexachlorobenzene																		
1600	Pentachlorophenol																		
330	Phenanthrene											90	J						
330	Anthracene																		
330	Di-n-butylphthalate	71	B	81	B			84	B	93	B			43	J	86	B	63	B
330	Fluoranthene											130	J						
330	Pyrene											100	J						
330	Butylbenzylphthalate																		
1600	3,3 Dichlorobenzidine																		
330	Benzo(a)anthracene											62	J						
330	Chrysene											60	J						
330	bis(2 Ethylhexyl)phthalate	79	B	93	B	58	B	86	B	110	B	71	B	47	J	93	B	68	B
330	Di-n-octylphthalate																		
330	Benzo(b)fluoranthene											160	J						
330	Benzo(k)fluoranthene																		
330	Benzo(a)pyrene											84	J						
330	Indeno(1,2,3-cd)pyrene											71	J						
330	Dibenz(a,h)anthracene																		
330	Benzo(g,h,i)perylene											79	J						

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: P E S T I C I D E S A N D P C B S

Site Name: Town of Royalton Landfill SOIL SAMPLES (ug/Kg)

Case #: 9002.136 9002.298 Sampling Date(s): _____

To calculate sample quantitation limit:
(CRQL * Dilution Factor) / ((100 - % moisture)/100)

CRQL	COMPOUND	Sample No.	L-1		L-2		SED-1		SED-2		PBLKS3		L-1MS		L-1MSD					
		Dilution Factor	1.0		1.0		1.0		1.0		1.0		1.0		1.0					
		% Moisture	24		18		36		38		-		24		24					
		Location																		
8	alpha-BHC																			
8	beta-BHC																			
8	delta-BHC																			
8	Gamma-BHC (Lindane)																			
8	Heptachlor																			
8	Aldrin																			
8	Heptachlor Epoxide																			
8	Endosulfan I																			
16	Dieldrin																			
16	4,4'-DDE																			
16	Endrin																			
16	Endosulfan II																			
16	4,4'-DDD																			
16	Endosulfan Sulfate																			
16	4,4' DDT																			
80	Methoxychlor																			
16	Endrin ketone																			
80	Alpha-Chlordane																			
80	Gamma-Chlordane																			
160	Toxaphene																			
80	Aroclor-1016																			
80	Aroclor-1221																			
80	Aroclor-1232																			
80	Aroclor-1242																			
80	Aroclor-1248																			
160	Aroclor-1254																			
160	Aroclor-1260																			

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: I N O R G A N I C S

Site Name: Town of Royalton Landfill

Case #: 9002.136 9002.248 Sampling Date(s): _____

SOIL SAMPLES (mg/Kg)

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

| CRDL | ANALYTE | | |

APPENDIX F

PHOTOGRAPHIC LOGS

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PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 1

Comments: GW-2 location, facing northwest.

[UZ]YQ7080:D3259/4439

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PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 2

Comments: GW-2 location, facing west.

[UZ]YQ7080:D3259/4439

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P H O T O G R A P H I C R E C O R D

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 3

Comments: Leachate seeps along slope to drainage ditch, facing north.

[UZ]YQ7080:D3259/4439

ecology and environment, inc.

PHOTOGRAPHIC RECORD

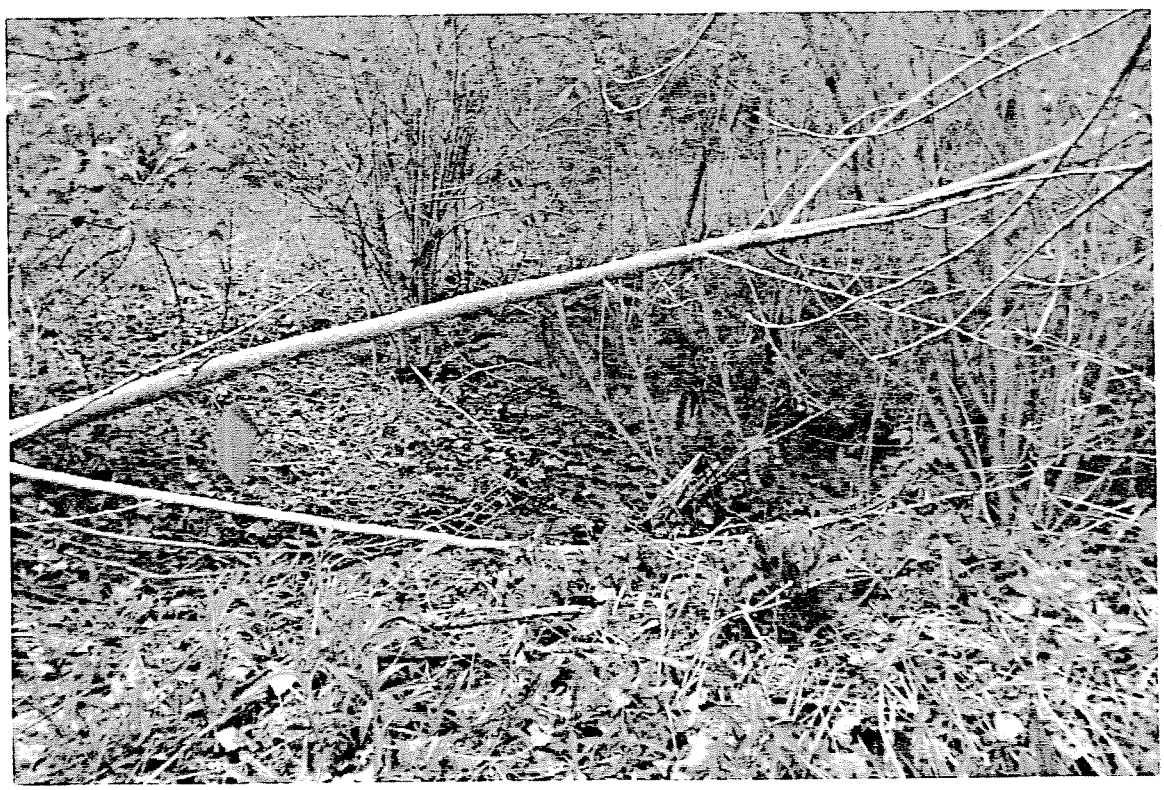
Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 4

Comments: Leachate seep marked with flag; drainage ditch in center. Facing north-northwest.



[UZ]YQ7080:D3259/4439

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PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 5

Comments: Leachate seep, facing north-northwest.

[UZ]YQ7080:D3259/4439

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PHOTOGRAPHIC RECORD

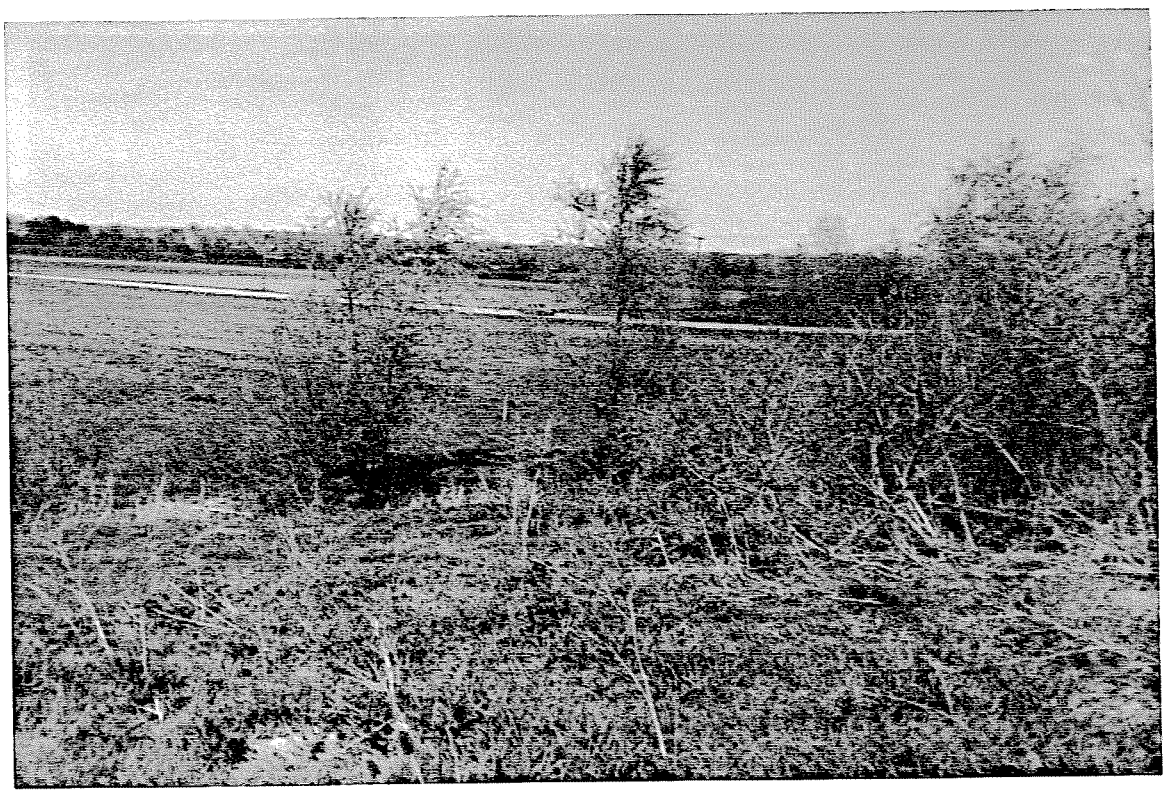
Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 7

Comments: Geophysical survey grid 3. Note Griswold Street in background. Facing northeast.



[UZ]YQ7080:D3259/4439

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PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 8

Comments: Slope crossing the Niagara Escarpment. Site in foreground; open field to the north in background. Facing north.

[UZ]YQ7080:D3259/4439

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 10

Comments: Slope to the north of the site, facing north.

[UZ]YQ7080:D3259/4439

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PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 15

Comments: Drainage ditch along the northern border of the site, facing southwest.

[UZ]YQ7080:D3259/4439

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 18

Comments: Geophysical survey grid 3, facing southwest.

[UZ]YQ7080:D3259/4439

recycled paper ecology and environment

ecology and environment, inc.

PHOTOGRAPHIC RECORD

Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 19

Comments: GW-1 location. Note beehives in background. Facing west.

[UZ]YQ7080:D3259/4439

ecology and environment, inc.

PHOTOGRAPHIC RECORD

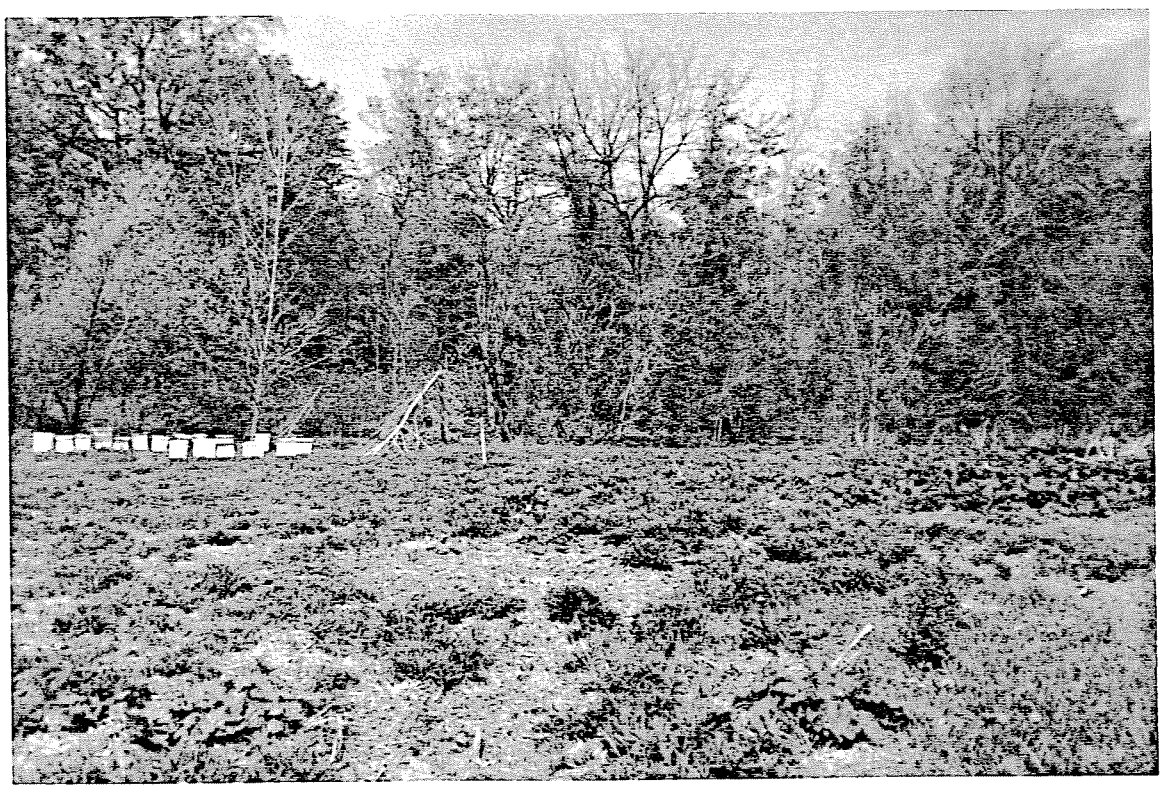
Client: NYSDEC E & E Job No.: YQ-7070

Camera: Make Kodak Fling SN:

Photographer: Barb Topor Date/Time: 5-2-90

Lens: Type 35 mm SN: Frame No.: 20

Comments: Geophysical survey grid 1. Note beehives in background. Facing west-southwest.



[UZ]YQ7080:D3259/4439

recycled paper ecology and environment

APPENDIX G

SITE SURVEY MAP

recycled paper

ecology and environment

N 3500 E 4000

E 4500

E 5000

SED-1
588.0

WOODED AREA

L-1
596.7

L-2
593.3

GW-2
600.9 GROUND
602.69 TOP CASING
602.72 TOP RISER

GW-3
593.9 GROUND
595.97 TOP CASING
595.98 TOP RISER

DRAINAGE DITCH

SED-2
593.0

TRUE NORTH

WOODED AREA

OPEN AREA

STREET BOUNDARY

DRAINAGE DITCH

E.P.

STREET BOUNDARY

E.P.

GW-4
620.3 GROUND
622.06 TOP CASING
622.06 TOP RISER

SITE BM
R.R.S. IN PP
SW 7759 A-100
ELEV.=618.78'

N 3000

GW-1
618.9 GROUND
622.22 TOP CASING
621.78 TOP RISER

ACCESS ROAD

DRAINAGE DITCH

HEDGE ROW

GATE

SIGN

GRISWOLD ROAD

N 00°00'00" E
(ASSUMED)

WATER TANK

OPEN AREA
(CORN FIELD)

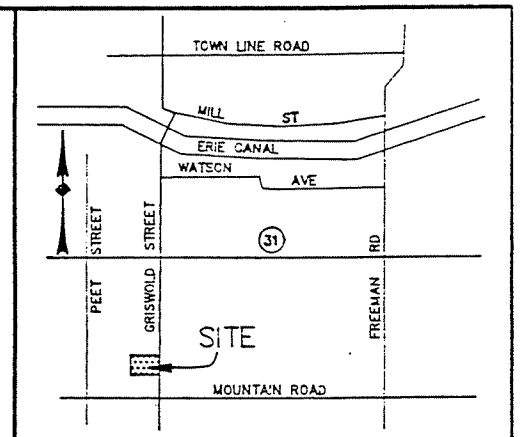
STREET BOUNDARY

STREET BOUNDARY

SURVEY

MOUNTAIN ROAD

COORDINATE LIST		
NAME	NORTH	EAST
GW-1	2931	4383
GW-2	3400	4318
GW-3	3407	4709
GW-4	2992	4928
SED-1	3499	4436
SED-2	3352	4754
L-1	3411	4426
L-2	3426	4461
PK 1	2210.02	5000.00
PK 2	3000.00	5000.00



LOCATION MAP
N.T.S.

NOTES: Coordinate grid system is assumed.

Elevations are referenced to monument 18 DMW located at center headwall at SW corner of intersection of Griswold and Mountain Roads, Stamped elev. 617'.

Site BM is a railroad spike in PP SW 7759 A-100 Elevation=618.78'.

Baseline points 1 & 2 are PK nails.

Property lines shown are approximate and were derived from a tax map provided by Ecology and Environment Eng., P.C.

LEGEND

- MONITORING WELL
- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- LEACHATE SAMPLE LOCATION

ENGINEERING INVESTIGATIONS AT TOWN OF ROYALTON LANDFILL Site No.932092

New York State Department of Environmental Conservation

Prepared for:
Ecology and Environment Eng., P.C.
368 Pleasantview Drive
Lancaster, New York 14086

DATE	SCALE	SHEET
01/14/91	1"=100'	1

Prepared by:
OM P. POPLI, P.E.,F.L.S.
2140 South Clinton Avenue
Rochester, New York 14618
Tel. No. 716-442-6940

APPENDIX H

SITE LOG BOOKS

recycled paper

ecology and environment

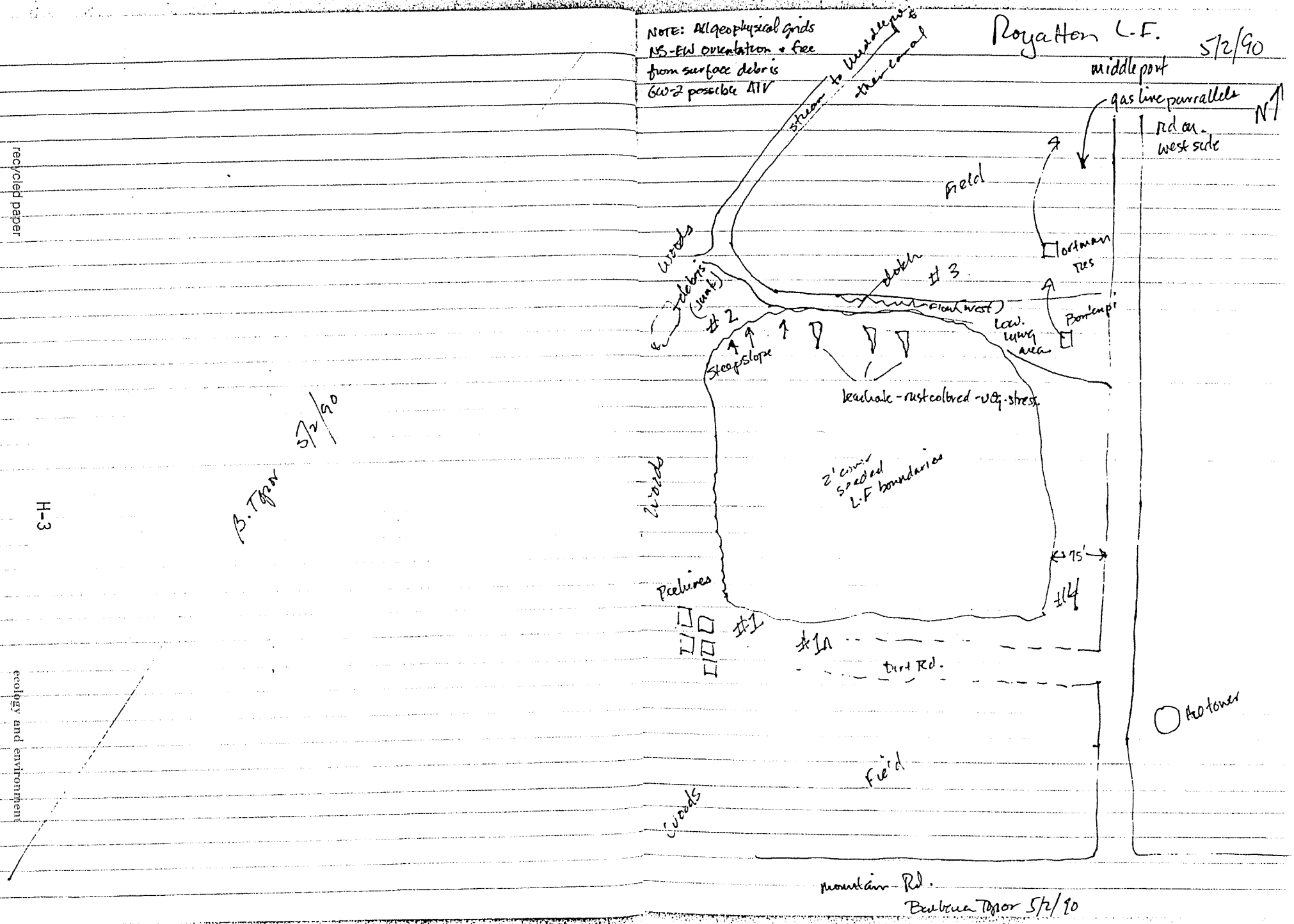
ecology and environment, inc.
International Specialists in the Environment

Job Number YC 7030

Royalton Landfill

SITE RECONNAISSANCE
& GEOPHYSICAL SURVEY

Book 1 of 3


NOTE: All geophysical grids NS-EW orientation + free from surface debris
GW-2 possible ATV
Royalton L.F. 5/2/90
middle port
gas line parrallels
Rd on west side
N
Field
Woods
debris (junk)
#2
#3
Steep slope
Low lying area
Leachate - rust colored - veg. stress
2' cover seeded L.F boundaries
75'
#4
#1
#1a
Dirt Rd.
Field
Woods
Mountain Rd.
Barbara Taylor 5/2/90
B. Taylor 5/2/90
H-3
recycled paper
ecology and environment

5/2/90

0845 E&E arrives on site.

B. Topor, R. Leechner, C. Lewicki, S. Thorsell

Weather: 40°F Winds 15-20 mph Southerly
Sunny, Low Humidity

Equipment: HNU = √cal
OVA = √cal
Rad Mini
Level D PPE

Chris & Rolinda check & calibrate equipment.
Scott & Barb go to Douglas Ortman Residence.
Informed no site boundaries - verbally.
Owns surrounding property. Quarried sand & gravel? Rock?
a cover applied
Mrs. Ortman
Called town Supervisor ~~original about today~~.

Owner - 4258 - William Bontemp.
5.5 yrs.
3x prior moving in (clean)
50' bedrock 12'
front yard / septic used on side Redy.

George Stiner - town Supervisor - 21 yrs.
1800 — Quarry
Engineer closed site.

H2O source in ½ of Middleport.

Barbara Topor 5/2/90

H-4

B. Topor 5/2/90

5/2/90

Barbara T. and George S. (Town Supv.) walk site and discuss proposed new locations. leachate observed and staked along northern edge of property. H2O in ditch clear. No HNu readings on leachate 3rd OVA = 100 ppm. CH4 none S.

Grid 1 moved to a more convient location ± 75 east of proposed locations. Several anomalies (avg.) readings so may be in fill area. Grid 1A surveyed Grid 2 surveyed Grid 3 surveyed and Grid 4 moved to a more central location on northern edge of property vs. the corner.

1345 NYSDEC arrives on site. Jane Thapa, Valerie Lauzze and Hyatt (Bflo Region) Walk site monitoring well locations o.k'd. Discussed several other points of issues. Jane Thapa in agreement if overburden is thick enough than perhaps one overburden wells should be installed as well.

1700 E+E depart site. B. Tozer call J. Griffes to inform him of NYSDEC visit and days activities.

B Tozer 5/2/90

5/2/90

H-5

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ecology and environment

5/90

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Job Number YQ7030

Royalton

Geophysical Survey
EM-31

Book 3 of 3

H-6

Re Page 1129

5/2/90

0845 E+E ARRIVES on site.
See field notebook (Book 1)

1100 EM-31 survey performed
by C. Lewicki & S. Thorsell.

GRID #1

Node	N-S V	N-S H	E-W V	E-W H	Comments

B. Topper 5/2/90

Rolinda Leichner 5-2-90

recycled paper

ecology and environment

GRID #1 5/2/90

Node	N-S V	N-S H	E-W V	E-W H	Comments
0,0	10	15	12.5	12.5	South West corner to start.
0,10	Negative All scales	17	13	14	
0,20	All Negative	24	All Neg.	16	
0,30	All Neg.	45	All Neg.	23	
0,40	All Neg.	45	All Neg.	45	
10,40	7	43	All Neg.	35	
10 30	All Neg.	26	All Neg.	32	
10 20	All Neg.	36	Negative	50	
10,10	Neg.	40	Neg.	17	
10,0	Neg.	34	Neg.	38	
20,0	Neg.	68	Neg.	55	

5/2/90 Robin Leahner

Robin Leahner 5/2/90

5/2/90

Noise	N-S V	N-S H	E-W V	E-W H	Comment
BG Area	9	7.6	9	7	
20,10	Neg.	65	Neg.	70	
20,20	Neg.	45	2	52	
20,30	Neg.	50	Neg.	54	
20,40	Neg.	48	13	30	
30,40	Neg.	50	Neg.	44	
30,30	Neg.	35	Neg.	50	
30,20	Neg.	38	Neg.	44	
30,10	Neg.	36	Neg.	54	
30,0	Neg.	43	Neg.	34	
40,0	Neg.	32	Neg.	28	
40,10	Neg.	38	~~Neg.~~ 13	34	
40,20	Neg.	40	Neg.	38	
40,30	Neg.	42	5.9	8.42	
40,40	Neg.	67	Neg.	70	

Calinda Leichner 5-2-90

Calinda Leichner 5-2-90

recycled paper
ecology and environment

5/2/90 9

13:25 begin survey of Grid 2
0,0 is SW corner

Node	N+S V	N+S H	E+W V	E+W H	Comment
0,0	18	13	18	14	in swale
0,10	17	12	17	12	
0,20	17	12	17	12	
0,30	10	16	18	13	5' from metal pin
0,40	4	13	negative	30	overmetal debris
10,40	7	22	5	24	5' from metal debris
10,30	16	12	17	12	
10,20	17	12	17	13	
10,10	17	14	18	13	
10,0	19	15	19	15	
20,0	18	15	19	15	
20,10	18	15	18	14	
20,20	16	13	16	13	
20,30	14	13	16	15	
20,40	14	15	18	15	
30,40	17	15	15	13	
30,30	17	15	13	18	
30,20	17	16	18	15	
30,10	18	17	19	18	
30,0	17	16	17	16	

Kalinda Lechner 5-2-90

Kalinda Lechner 5-2-90

Kalinda Lechner 5-2-90

H-10

5/2/90

Node	W+S V	W+S H	E+W V	E+W H	Comments
40,0	19	16	19	18	
40,10	can't be done due to thick vegetation				
40,20	15	16	16	15	
40,30	17	13	18	14	
40,40	18	13	18	14	

90

5'

Kalinda Leichner

90

5'

Kalinda Leichner

recycled paper

ecology and environment

12

SE corner of site 1

1415 Group # 4 5/2/90

Node	N-S V	N-S H	E-W V	E-W H	Comments
0,0	13.5	13.00	13.5	13.5	
0,10	14	14.2	14	14	
0,20	12	13	12.3	13.2	
0,30	14	11.5	14	11	
0,40	13	11	13	10.2	
10,40	14.8	11	13	10	
10,30	13	12.5	12	11.5	
10,20	16	12.2	13	12	
10,10	11.5	13	11	17	
10,0	15	13	14.5	12	
20,0	13.5	11	14	11.8	
20,10	13	11	14	14.5	
20,20	15	11.5	15.7	12.5	well
20,30	13	11.5	13	11	
20,40	12.8	11.5	13	11	
30,40	11.5	13	12	10.2	
30,30	13	11	12	10	
30,20	12	12	12	11	
30,10	12.5	12	12.5	11.5	
30,0	11	11.5	9.5	13.5	
40,0	12.2	9.5	12	9.5	

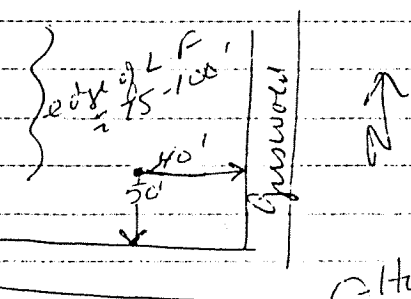
Kalinda Leichner

recycled paper

5/2/90

Node	N-S V	N-S H	E-W V	E-W H
40,10	10.3	10.5	10	10
40,20	12.5	10.5	11.2	10
40,30	12	10.5	12	9.5
40,40	12	10.5	12	10

1430 End of Survey



Calibrator Technician

Rabinda Lichnet

No Surface debris
Gas lines may be present
along road edge
in N S direction
on eastern edge of site

Rabinda Lichnet 5-2-90

ecology and environment

5/2/90

Jim Hyatt
Valerie + Jane Thapa

Moved GW-1 to a more convenient location due anamoly found (ie. neg. readings.)

GRID 1A

SOUTHwestern section of site

1441

Node	N-S Vert	N-S Horiz	E-W Vert	E-W Horiz	Comments
0,0	9.5	8.0	10	8.5	
0,10	10	8.0	10	9	
0,20	11	9	12	10	
0,30	7.5	15	10	9	
0,40	Neg	22	Neg	25	Close to area of pre yr.
10,40	Neg	25	Neg	26	
10,30	12	12	12	12	
10,20	11	9.8	12	9.2	
10,10	9	9	9	9.2	
10,0	10	8.5	10	9	
20,0	8	8	9	9	
20,10	9	8.2	10	8.5	

5/2/90

Palmola Terrace

5' 2'

H-14

Kalinda Leichner 5-2-90

Node	N-S Vert	N-S Horiz	E-W Vert	E-W Horiz	Comments
20,20	10	9	10.5	8.5	Proposed well pt.
20,30	9.5	12.5	11.5	9.5	
20,40	Neg	20	Neg	14	Near field line
30,40	7	15	3	15.5	
30,30	12	10	12	10	
30,20	10	9	10	9	
30,10	10	7.5	10	7.5	
30,0	9	7.5	8	9	
40,0	8	8	8	9	
40,10	9	8	10	9	
40,20	10	9	10	9	
40,30	11	10	11	10	
40,40	11	13.5	9	11.5	

1559 Finish Grid #1A
1459

C. Leviathi departs site

Kalinda Leichner 5-2-90

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ecology and environment

Grid #3 5/2/90

N/E section of property free of surface debris open field / wet in areas

1525

5' 2' 90°

Rebrata Kirchner

Node	N/S VH	E-W VH	Comments
0,0	17 15	18, 14	near ditch
0,10	16 14	17, 15	wet
0,20	17 14	17, 15	
0,30	16 13	17, 13	
0,40	16, 14	16, 13	
-10,40	16 13	16, 13	
-10,30	16 13	16, 13	
-10,20	16 13	16,2 13.8	
-10,10	16 13	17 14	
~~-10,0~~	~~17 15~~		
-10,0	16 14	17 15	
-20,0	16 14	17 14	
-20,10	17 14	17 13	
-20,20	16 12	16 13	wet
-20,30	16 12	16 12	

Barbara Boyer 5-2-90

Node	N/S V	N/S H	E-W V	E-W H
20,40	16	13	16	13
30,40	15	12	15	12
30,30	15	12	15	12
30,20	16	13	16	12
30,10	16	13	16	13
30,0	16	14	16	14
40,0	16	14	16	16
40,10	16	13	16	13
40,20	~~16~~ 15	~~13~~ 13	15	12
40,30	15	12	15	12
40,40	15	12.3	15.2	12.9

1540 END OF SURVEY

EM-31

Over seeps N side 19,17
21,20

Moving up Slope

Cover 30

38,63

38,62

48,62

Kalinda Leuchner 5-2

Kalinda Leuchner 5-2

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ecology and environment

5/50

ecology and environment, inc.
International Specialists in the Environment

Job Number YQ 7030

Royalton Landfill

Geophysical Survey

Magnetometer

Book 2 of 3

H-18

Recycled Paper / 568129

5/2/90

0845 E+E Arrives on site
See Field notebook

1100 Grids set up MW-1 x MW-2

Magnetometer Survey
R. Leichner

1120 Background Grid 2
56338
56311
56314
56321
5628_ - new #
56304

N-S - E-W grid

Belinda Leichner 5-2-90

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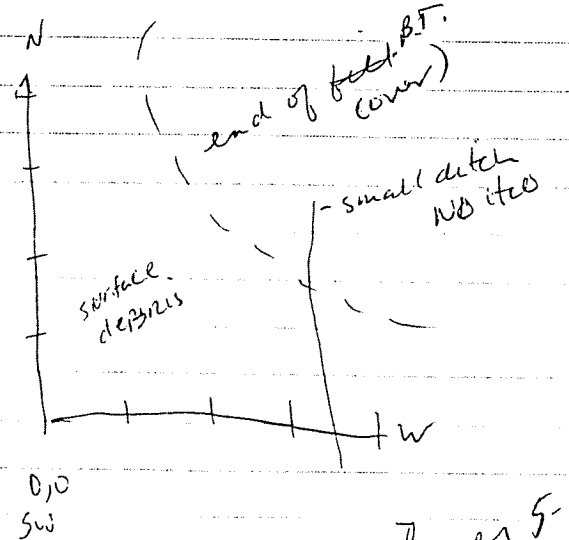
ecology and environment

5-2-90

Grid #2



Kalinda Leichner 5-2-90

5/2/90 Grid #2

1124

Node	Reading		Comments
0,0	56843	56808	Surface debris
0,10	57005	56614	"
0,20	56594	56290	"
0,30	56660	56680	
0,40	56562	56569	
10,40	56287	56634	
10,30	56991	56976	
10,20	56568	56621	
10,10	56631	56611	
10,0	56773	56784	
20,0	56474	56577	
20,10	56556	56562	
20,20	56555	56545	weed # GW-2
20,30	56958	56729	
20,40	56111	56250	
30,40	UNOBTAINABLE		
30,30	55525	56028	53704
30,20	56489	56942	
30,10	56801	56769	ditch
30,0	56840	56938	
40,0	57265	57573	ditch
40,10	56776	56683	
40,20	56548	57191	cover

5/2/90

Valerie A. Luckner

5/2/90

40,30	56706	55082	Cover
40,40	57803	55987	Cover

1140 End of Survey

Back

1142 56344
56357
56358
56357
56347

1143

1323 ft² Background Grid # 1
56555
56533
57759
57691
57235

5/2/90

Valerie A. Luckner

recycled paper

ecology and environment

5/2/90
324

Node	Reading 2		Comments
0,0	56906	56934	
0,10	56935	56922	
0,20	60133	54534	
327	Stop to change battery		
0,0	56906	56904	1330
0,10	56867	56881	
0,20	57167	58384	
0,30	57637	57940	
0,40	58256	58225	
10,40	56361	56411	
10,30	56354	56127	
10,20	57987	57935	
10,10	58528	58686	
10,0	56447	56461	
20,0	58229	55700	
20,10	56540	56367	
20,20	56664	56654	
20,30	56426	56431	
20,40	56768	56916	
30,40	57367	57339	
30,30	57296	57346	
30,20	57546	57345	

Rebuilt System 5/2/90

5/2/90

5/2/90

Node	Readings		Comments
30,10	55339	58089	Took a few more readings fluctuated in same range
30,0	57560	57663	
40,0	56614	55933	
40,10	57108	57324	
40,20	57672	57730	
40,30	58912	57476	
40,40	56079	55842	

1343 Background Grid # 1

56682
57302
58269
55311
56932

1344 End

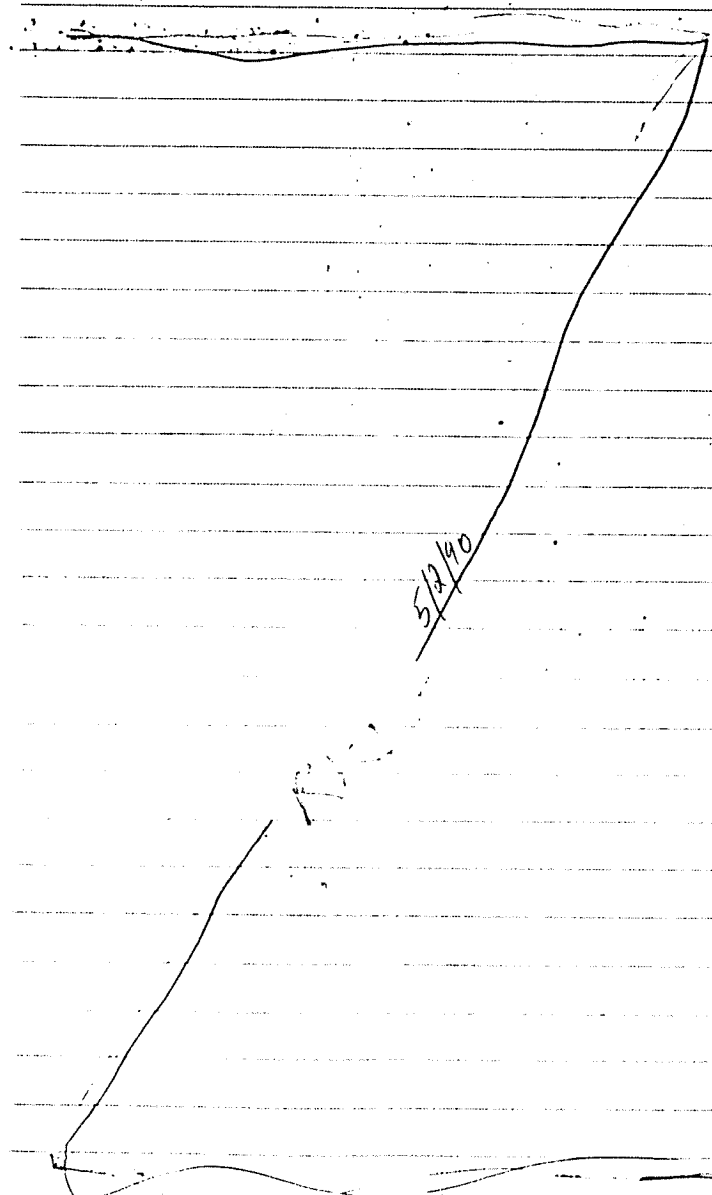
5/2/90

Rebecca Lesher

5/2/90

recycled paper

ecology and environment



5/2/90

Grid 4

1415 Background Readings

56655, 56656, 56641, 56641, 56619,

Node	Reading	Comment
40,40	56592	
40,30	56666	
40,20	56581	
40,10	56589	
40,0	56699	
30,0	56550	
30,10	56612	
30,20	56596	
30,30	56642	
30,40	56734	
20,40	56623	
20,30	56628	
20,20	56642	well location
20,10	56716	
20,0	56515	
10,0	56517	
10,10	56594	

5-2-90

5/2/90

Node	Reading	Comment
10,20	56595	
10,30	56634	
10,40	56715	
0,40	56556	
0,30	56627	
0,20	56599	
0,10	56605	
0,0	56354	

1426 Background Readings

56668, 56663, 56673, 56678, 56672

5/2/90

Chris Lawter

5/2/90

Background time 1445

56428
56466
56404 Ave: _____
56591
~~56047~~
56663

Node	Reading	Time
0,0	56612	1446
0,10	56552	
0,20	56691	
0,30 }	See last two	
0,40 }	Readings.	
40,0	57543	1448
40,10	56473	
40,20	56476	
40,30	56578	
40,40	56961	
30,40	57242	
30,30	56703	
30,20	56522	
30,10	56418	
30,0	56--8	145

Rolinda Kriebel 5-2-90

5/2/90 17

Node	Reading	Time
20,0	56532	1450
20,10	56547	
20,20	56571	
20,30	56770	
20,40	57186	
10,40	57566	
10,30	56887	
10,20	56589	
10,10	56588	
10,0	56523	
0,30	57112	
0,40	57460	1455
Background	56583	1457
	56538	
	56540	
	56545	
	56531	

Rolinda Kriebel 5-2-90

5/2/90

522 Background Grid #3

56705
56709
56707
56706
56704

525

5/2/90

Node	Readings		Comments
40,40	56733	56769	
40,30	57262	57182	
40,20	56685	56720	
40,10	56906	56821	Took several more readings - closer to
40,0	58203	56257	
30,0	57873	57671	
30,10	56837	56318	
30,20	58682	55692	
30,30	56612	56662	
30,40	56711	56718	
20,40	56685	56664	
20,30	56534	56477	
20,20	56681	56680	Proposed well location
20,10	57739	56804	

Rebecca Fenske 5/2/90

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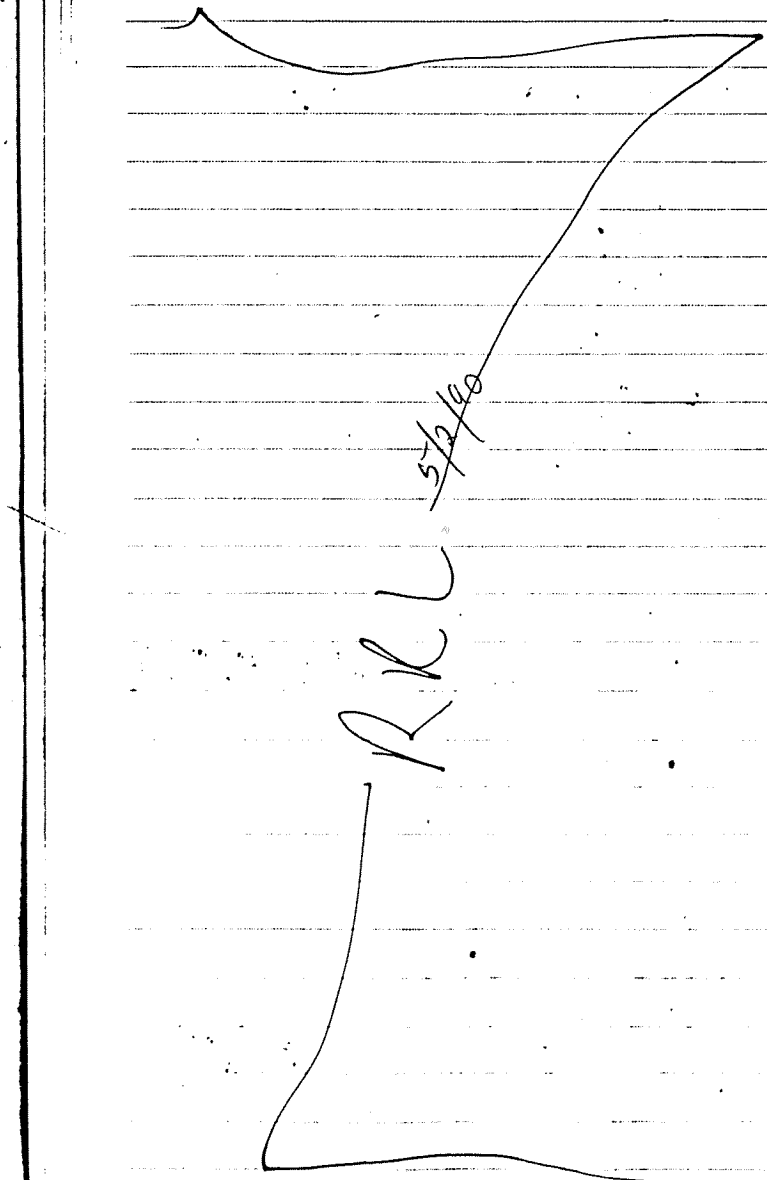

5/2/90

Node	Readings		Comments
20,0	56269	53702	
10,0	56814	59396	
10,10	59927	56172	
10,20	56245	56950	
10,30	57560	56747	
10,40	56619	56675	
0,40	58120	55705	
0,30	57652	56597	
0,20	55507	57460	
0,10	56800	56714	
0,0	56547	56988	

1538 Background Grid #3
56694
56701
56683
56696
1539 56693
finish grid.

Rolande Lechner 5-2-90

7.27.21.56

11.3

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H-29

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International Specialists in the Environment

Job Number YQ 7040-

ROYALTON LANDFILL
NIAGARA COUNTY

FRIDAY SEPTEMBER 14, 1990

WEATHER: HAZY, HUMID, BREEZY, SOUTH WIND 10 mph

PERSONNEL: C EICH, M. WITNAUER

EQUIPMENT: HNU -

pH/TEMP/COND METER -

WATER LEVEL IND. - 13-03-11

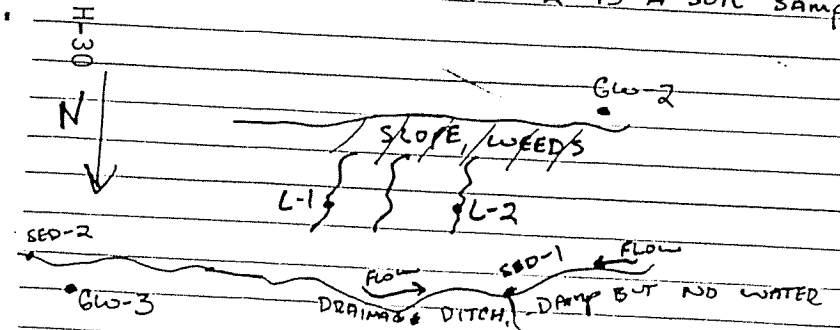
RENTAL VAN - DODGE RAM LIC. "ZEY-518.

0830 C. EICH PICKED UP M. WITNAUER AT E+R. ESC. CALLED HQ NO NEED TO TAKE ANY EP TOX SAMPLES

0840 LEFT ESC FOR SITE. PICKED UP ICE

0930 ARRIVE ON-SITE. PREPARED SAMPLE LABELS + BOTTLES FOR SEDIMENT + LEACHATE SAMPLES

1035 COLLECTED SAMPLE L-2 FROM LEACHATE SEEP NEAREST TO WELL GW-2. NO VISIBLE LEACHATE (LIQUID) BUT SOIL IS A RUSTY ORANGE COLOR. L-2 IS A SOIL SAMPLE



1040 COLLECTED SAMPLE L-1. SOIL SAMPLE FROM EASTERNMOST LEACHATE SEEP. NO VISIBLE LIQUID. SAMPLE L-1 IS A SOIL SAMPLE. COLLECTED EXTRA VOLUME FOR MS/MSD.

Chad Witnauer 9-14-90

9-14-90

1052 COLLECTED SAMPLE SED-1. IN DRAINAGE DITCH, BELOW LEACHATE SEEPS AT POINT WHERE DITCH SPLITS. NO WATER IN DITCH SO NO SW SAMPLE TAKEN. DRAINAGE DITCH NOT WELL DEFINED WEST OF WHERE SAMPLE SED-1 TAKEN.

1100 COLLECTED SAMPLE SED-2. FROM DRAINAGE DITCH NEAR N.E. CORNER OF SITE. NO WATER IN DITCH SO NO S.W. SAMPLE TAKEN. SAMPLE TAKEN JUST EAST OF WELL GW-3

1120 AT WELL GW-4 - OPENED CAP - Oppm ON HNU.

WATER LEVEL 9.26' BGS

1125 Temp pH COND TURB

71.3 7.05 1.58x1000 20 NTU'S (1ST BAILER)

1128 COLLECTED SAMPLE GW-4. COLLECTED EXTRA VOLUME FOR MS/MSD. SAMPLES PUT ON ICE. LABELED BOTTLES FOR NEXT WELLS.

1200 AT WELL GW-1. OPENED WELL CAP Oppm ON HNU.

WATER LEVEL 9.45' BGS

Temp pH COND x1000 TURB

64.3°F 6.84 1.04 87 (1ST BAILER)

1210 BEGAN COLLECTING SAMPLE GW-1.

1240 DUCT TAPED A 2"x3"x8' POST TO WELLS GW-1 + GW-4 AS PER THE SITE OWNERS REQUEST. POSTS PAINTED ORANGE + FLAGGED W/ ORANGE FLAGGING TAPE.

1300 OPENED WELL GW-2. Oppm ON HNU

W.L. IN GW-2 6.15' B.G.S.

Temp pH COND x1000 TURB

65.3°F 7.50 0.70 >200. (1ST BAILER)

Chad Witnauer 9-14-90

08-16-90 ROYALTON LANDFILL

1108 E & E CREW ARRIVE ON SITE:
LISA HELTON - GEOLOGIST
JIM RICKERT - GEOLOGIST
SYBIL NEWCHURCH - SSO
JOHN HOOD - IN TRAINING (SSO)
DRILL RIGS ARE ON SITE BUT, DRILLERS ARE NOT PRESENT. DEC REPRESENTATIVE, YAVUZ ERK, IS ON SITE.
1125 GEORGE STEIMER, TOWN SUPER. (SITE CONTACT), ARRIVE ON SITE GEORGE GUIDED THE SITE "WALK-OVER" AND DISCUSSED THE LANDFILL DIMENSIONS WITH LISA AND JIM.
1156 JIM AND SYBIL DEPART SITE TO LOCATE WATER SOURCE (HYDRANT) FOR DRILLERS.
1213 Y. ERK DEPART SITE.
1219 JIM AND SYBIL RETURN TO SITE. WATER SOURCE IS A FIRE HYDRANT LOCATED APPROXIMATELY 3 MILES WESTON ROUTE 31 ON THE NORTH SIDE OF THE ROAD ACROSS FROM "DUBAY OIL" A GAS STATION.
1230 RICKERT & SYBIL DEPART TO BUY ICE, PAPER CUPS, AND PAPER TOWELS.
DRILLERS STILL NOT HERE YET
1245 RICKERT DEPARTS TO PHONE TO CALL BARB TOPOR, GET MESSAGES AND CALL DRILLING COMPANY.
1250 RICKERT ARRIVES AT PHONE & CALLS ITE. RICKERT HAS NO ACOEX MESSAGES
BARB TOPOR NOT AT HER DESK.
1310 RICKERT CALLS DRILLING CO. & SPEAKS TO JUDY BAI - OWNER OF AMERICAN AUGER.

J. Rickert

THURS. 8-16-90 YQ - 2040 J. Rickert

1301 Judy Bay says: T. the driller - LEE left their office late ≈ 10:30 AM BECAUSE THE DRILLERS HELPER - FRED, SUDDENLY QUIT. ALSO, JUDY SAID THAT THE DRILLER WILL ARRIVE ON SITE SOON (0330) BUT WILL BE ALONE, SO NO DRILLING CAN HAPPEN TODAY.
1308 RICKERT ARRIVES BACK ON SITE AND TELLS DEC REP. THE NEWS.
1310 DEC REP. YAVUZ ERK DEPARTS SITE FOR THE DAY. E&E SHOULD CALL HIM EARLY TOMORROW MORNING WITH PLANS FOR THE DAY.
1315 LISA HELTON, SYBIL NEWCHURCH, & JOHN HOOD DEPART SITE FOR THE DAY, RICKERT WILL REMAIN & WAIT FOR DRILLER TO ARRIVE.
1340 LEE THE DRILLER & HIS GIRLFRIEND PAULA ARRIVE ON SITE
1350 RICKERT, & LEE & PAULA WALK SITE TO FIND & PROPOSED WELL LOCATIONS. ONLY COULD FIND GW-1 & GW-4.
1415 LEE UNLOADS RIG FROM FLAT BED TRAILER
1425 ALL DEPART TO GET WATER TANKS FILLED
1435 ARRIVE AT FIRE HYDRANT TO FILL 2 WATER TANKS
1455 BOTH WATER TANKS ARE FULL 1200 + 800 = 2000 GALLONS TOTAL
1500 LEE & PAULA DEPART BACK TO SITE TO DELIVER WATER TRUCK AND LOCK UP RIG. RICKERT RETURNS HYDRANT KEY KIT TO TOWN CLERK AND ASKS HER TO GIVE TO GEORGE STEINER, SHE SAID SHE WILL SEE THAT HE GETS IT.
1510 LEE & PAULA & RICKERT MEET AT PHONE BOOTH TO FIND OUT THE PLAN FOR TOMORROW

J. Rickert

THURS 8-16-90 YQ-7040 J. Richert

1320 LEE THE DRILLER STATES THAT HIS OFFICE SAID THAT THEY CAN'T HAVE ANY DRILLER'S HELPER OUT UNTIL MONDAY. WE ARRANGED TO START AT 10:00 AM MON

1535 RICHERT LEAVES AN UPDATE MESSAGE FOR BARB TOPOR. JR

1540 RICHERT DEPARTS SITE FOR THE DAY.

1545 Richert stops at Frontier Asphalt inc. a stone quarry located ≈ 5 miles due west of the site along the Niagara escarpment & MR. JERRY CLARK THE PLANT MANAGER GIVES RICHERT A GUIDED TOUR OF THE ROCK QUARRY & INFORMATION ~~REVIEWED~~ LEARNED. JR

① OVERBURDEN = ≈ 5' ARE 0-15 FEET

② LOCKPORT DOLOSTONE IS HIGHLY FRACTURED

③ AND FRACTURES ARE PRIMARILY ORIENTED HORIZONTAL & VERTICLE W/ VERTICLE BEING PREDOMINATE.

④ LOCKPORT RANGES FROM 10 TO 40' THICK 5' BENEATH LOCKPORT IS A 13' THICK BED CALLED THE DEQUE, ITS DARK GREY SHALEY DOLOMITE. THE LOCKPORT IS LIGHT GREY TO YELLOW IN COLOR

⑤ BELOW THE DEQUE IS THE ROCHESTER SHALE DARK GREY & VERY FISSIL.

1655 RICHERT DEPARTS QUARRY.

1730 RICHERT ARRIVES AT EFF.

J. Richert

MON 8-20-90 YQ-7040 Jim Richert

1020 JIM RICHERT AND SYBIL NEWCHURCH OF E&E ARRIVE ON SITE

DRILLERS ARE HERE PREPARING DRILLING EQUIPT FOR DAY'S WORK. DRILLING CO. IS AMICAN AUGER AND DITCHING. (AA)

DRILLER = LEE RENROD

HELPER = DARICK GREEVES

1030 NYSDEC REPRESENTATIVE YAVOZ ERK ARRIVES ON SITE

WEATHER: CLOUDY ≈ 65°F WIND ≈ 15 MPH SW

FORECAST: MOSTLY CLOUDY HIGH 70°F 30% CHANCE OF RAIN.

GOALS FOR TODAY: DRILL & SET 3" CASING INTO ROCK SOCKET AT GW-1A & GW-4.

1100 Rig is moved to GW-1A grid location to drill GW-1 hole

1102 RICHERT & NEWCHURCH START UP AIR MONITORING EQUIPT: OVA, HNU & EQUIPT

Background OVA 3.0 ppm

HNU - cal with Cal Span to 54 ppm on 10.2 eV probe

Explosimeter - 20.8% O_2 / 0% LEL

Rad. Meter - normal 15 counts/min

1115 Safety Meeting - all employees - 2 E&E, 2 AA

Discussed - History of the site

- location & map to hospital, keys in van & location of first-aid kit.
- Accessibility to fire extinguisher.
- Location of the kill switch.
- Hat ettiquette & safety glasses during coring.
- All readings will be taken with the OVA if there is anything above background a second reading will be taken with the HNU.

S Newchurch

20 August 1990 Monday YQ 7040 S Newchurch

1130 Split spoon @ 0'-2' 0ppm AB (OVA) + hit bedrock @ 2 ft.
1135 Start dulling with 4¼" ID Rollers
1140 DRILLERS PREPARE TO BEGIN CORING
5" ROCK SOCKET USING HQ-CORE BIT
HQ = 4" ROCK HOLE DIAMETER
1151 RICHERT COLLECTED SOIL SAMPLES AT 1135
1 4OZ JAR FOR STORAGE AT SITE AND 1 8OZ JAR FOR GRAIN SIZE ANALYSIS. SAMPLE # S-1 (0-2')
1155 BEGIN CORING HQ CORE
1157 OCCASIONALLY, WHILE CORING AT 2-3' THE DRILL BIT MAKES A SCREECHING NOISE. LEE THE DRILLER SAYS IT IS CAUSED BY THE BIT CUTTING THROUGH A FRACTURE.
1220 Core sample @ 2'-4.75' 0ppm AB, Background 0ppm AB, BZ 0ppm AB.
1230 RICHERT EXAMINES & DESCRIBES ROCK CORE AS DOLOSTONE, LIGHT GREY, COMPETENT
1241 DRILLERS MIXING CEMENT GROUT FOR 3" PVC CASING.
1300 WELL 3" PVC GROUTED IN PLACE, USED 2 BAGS OF CEMENT + 1/5 TH BAG BENTONITE
3' STICK-UP BECAUSE ROCK IS AT 2-FEET
1301 RICHERT & NEWCHURCH DEPART FOR LUNCH.
DRILLERS STEAM CLEAN & MOVE TO GW-4
1340 JR RICHERT & NEWCHURCH RETURN ON SITE
1345 RICHERT & NEWCHURCH SEARCH FOR AND FIND WELL STAKE FOR GW-4
1350 DRILLERS MOVE RIG TO GW-4.
1415 Split spoon @ 0-2' 0ppm AB
1420 Start dulling

S Newchurch

20 August 1990 YQ 7040 Monday Sybil Newchurch

1420 BEDROCK EQUIVAL AT 0 2.6'
1435 Prepare to begin coring but the rig is not functioning correctly.
1500 Drillers began coring
1515 Explosimeter alarm went off for no apparent reason. There was a low oxygen % but nothing was picked-up on the OVA.
1530 Core sample @ 3'-8' 0ppm AB, BH 0ppm AB, BZ 0ppm AB
1545 DRILLERS MIXING GROUT
1557 DRILLERS TREMIE IN GROUT ≈ 20 GALLONS CEMENT AND 10% BENTONITE 2 BAGS CEMENT
½ BAG BENTONITE PELLETS
1630 Jim Richert left the site to call Barb Jopes after SN + JR walk around & tried to find the site for GW-3. The drillers are decon
1700 JR return to site. BT will be on site tomorrow around 1430 so tomorrow morning we will start GW-2. The drillers + JR walk to the site to determine the difficulty of mobilization.
1715 F+E D contacts for the Day.
1815 JR + SN arrive at E+C.

S Newchurch
8/20/90

9

TUES 8-21-90 YQ-7040 JR

0810 JIM RICHERT, SYBIL NEWCHURCH, AND TOM ABBEY OF ETE DEPART HEADQUARTERS.
0900 PASS SITE ROAD AND DRIVE ROUTE TO HOSPITAL IN MEDINA. IT IS 6.4 MILES FROM SITE.
0910 STOP FOR DRINKS, ICE, + MAPS @ 9.13
0920 ETE ARRIVES ON SITE, DEC + DRILLERS ARE ON SITE. RIG SET UP AT GW-2
0930 NEWCHURCH + ABBEY SETTING UP MONITORING EQUIPMENT.
0943 RICHERT CHECKS GEOPHYSICAL REPORT FOR WELL LOCATION, DRILLERS WOULD LIKE TO SET UP 16' SW OF STAKE LOOKS OK ON REPORT. WILL PROCEED AT ALTERNATE LOCATION (16' SW). FOR BETTER R16 ACCESS.
0945 BEGIN DRILLING GW-2
Safety Meeting - all employees attended: 3 E+E, 2 AH
Discussed location + distance of hospital
Supply of fluids available + need for drinks
Background readings: Calc of HNu w/ 10.2eV probe to 54 ppm w/ Cal Span - 0ppm background
OVA 3.0ppm + Explosimeter 20.8% O2 / 0% LEL
Mini Rad 22 counts/min - normal
0948 Split spoon @ 0'-2' 0ppm AB, BZ 0ppm AB
- All readings will be taken with the OVA if there is a reading above background a second reading will be taken with the HNu.
0955 Split spoon @ 2'-4' 0ppm AB, BZ 0ppm AB; little recovery
1005 Split spoon @ 4'-6' 0ppm AB, BZ 0ppm AB
1015 Split spoon @ 5.5'-7.5' 0ppm AB, BZ 0ppm AB
1030 Split spoon @ 7.5'-9.5' 1.0ppm AB, BZ 0 ppm AB BH 0ppm AB. HNu 0ppm AB (55), 0ppm AB (BZ), 0ppm AB (BH)

S. Newchurch

21 August 1990 Tuesday YQ 7040 Sybil Newchurch

1040 Augers refusal at 9.5'.
1100 Explosimeter went off. The oxygen meter was at 20.0%, but when taken to the clean gas the alarm still sounded. The instrument may need recalibration.
1110 1ST CORE RUN OUT OF HOLE (9.5'-14.5')
1120 Core sample 0ppm AB, BZ 0ppm AB, BH 0ppm AB.
1130 Drillers start mixing grout for GW-2.
1210 WELL GW-2 IS GROUTED.
OVERBURDEN is 9.5' THICK
ROCK SOCKET INTO SHALE FROM 9.5 TO 14.5'
USED 3" ID PVC RISER W/ 2' STICK-UP
LOCKING 4' STEEL PROTECTIVE CASING
LOCKED WITH MASTER PADLOCK KEY #3052
1225 JR, SN + TA left site for lunch with drillers decon.
1300 JR, SN + TA arrive back on site. Drillers still decon-ing. JR + TA painted well caps.
1345 Mobilize to GW-1.
1400 DRILLER having TROUBLE LOOSENING DRILL ROD ASSEMBLY
430 CAN'T BREAK CONNECTION AFTER ½ HR OF TRYING. WILL CHANGE HEAD OF R16 INSTEAD. READ GW-2 WE DID NOT MOVE TO GW-3 TO AS CORE WAS THE LOCATION STAKE CAN NOT BE FOUND, A BARB WIRE WILL BE CUT SOMETIME TODAY TO RE-STAKE LOCATION, SO IN THE MEAN TIME WE DECIDED TO NX CORE GW-1.
1510 DEC REP. YAVUZ ERK DEPARTS SITE FOR THE DAY
1520 THE KEEPER OF BEE HIVES ARRIVES ON SITE TO TAKE OUT THE HONEY, HE SAID IT STIRS THE BEE'S UP + HE WILL COME BACK NEXT WEEK.
1530 BEGIN CORING NX SIZE CORES.
1540 CORE BARREL PLUGGED UP AFTER 35' OF CORING

J. Richert

TUES. 8-21-90 YQ-7040 J.R.

1550 RESUME CORING AT ≈ 7.1'
1605 OUT WITH RUN #2 6.7'-9.2' Sample Oppm AB, BZ O
AB, BH Oppm AB.
1620 Barb Sopa + Herbert came on site. JR shows them the progress on the other wells + conformation on GW-3.
1645 Core sample @ 9.2'-14.2' Oppm AB, BZ Oppm AB, BH Oppm AB
1715 Core sample @ 14.2'-19.2' Oppm AB, BZ Oppm AB, BH Oppm AB.
1720 Turn off drill rig + prepare to leave for the day. Clean site.
1730 Drillers leave site for water. E+E leaves site.
1825 EFE ARRIVES AT HEADQUARTERS.

Rec'd

WED 8-22-90 YQ-7040 J.R.

0730 JIM RICHERT, SYBIL NELLE HURLA, + TOM ABBEY OF EFE ALL MEET AT HEADQUARTERS JR
0740 EFE DRIVES TO TOPS MARKET TO BUY GATERADE + ICE $7.17 PAID BY SYBIL.
0750 EFE ARRIVES AT EFE'S DEMARK AVE. EQUIPT. WAREHOUSE TO FILL UP OVA WITH HYDROGEN.
0800 EFE DEPARTS EQUIPT. WAREHOUSE W/ FULL OVA.
0805 EFE STOPS TO FILL RENTAL VAN WITH GAS + BUY 1 GALLON OF WIPER FLUID FOR VAN. TOTAL COST = $24.72 PAID ON CREDIT CARD BY JIM RICHERT.
0810 EFE DEPARTS FOR SITE.
0850 EFE ARRIVES ON SITE, NYSDEC REP. YAVUZ ERK IS ON SITE AS ARE THE DRILLERS FROM AMERICAN AUGER.
WEATHER: CLOUDY, LIGHT BREEZE OUT OF THE WEST
TEMP. 65°F FORECAST = CLOUDY, HIGH 70-75°F
GOALS FOR TODAY: ① FINISH CORING GW-1
② SET CASING IN GW-3
③ BEGIN NX CORING GW-4
0900 BEGIN CORING GW-1 AT 19.2' RUN #5
Background readings: hNu set 10.2eV probe cal to 54 ppm with Cal Span gas. Oppm background, OVA 3ppm, Mine Rad 20 counts/min = normal
Explosimeter 20.8% O_2 / 0% LEL
All readings will be taken with the OVA, if there are any above background a second reading will be taken with the hNu.
0930 Core sample @ 19.2'-24.2' .5ppm AB, BZ Oppm AB, BH Oppm AB; hNu Core sample Oppm AB, BZ Oppm AB
1005 Core sample @ 24.2'-29.2' .25 ppm AB, BZ Oppm AB, BH Oppm AB; hNu Core sample Oppm AB, BZ Oppm AB
AT 1000 CORE RUN #6 OUT OF HOLE AT 29.2'
WATER LEVEL IS AT 7' BGS. W/ JR.

10.5

R. J. Vincent

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WED 8-22-90 YQ-2946 1/62

10M WITH AT WATER LEVEL AT 20.36'BGS
+ A 3" WELL = 8 GALLONS of WATER.
WILL EVACUATE THIS + RECORD
WATER LEVELS + RECOVERY.
AFTER PUMPING 8 GALLONS OUT TOOK WATER LEVELS
TIME AT START.
MEASURED FROM TOP OF DRILL PIPE 54" AGS

TIME	WATER LEVEL (FT)
1021	30
1022	27.6
1022.5	26
1022.7	25.5
1023	25
10235	22
1024.25	20

VERY GOOD WATER RECOVERY. WILL STOP
CORING THIS WELL AND LEAVE AS AN OPEN CORE
BEDROCK WELL, TOTAL DEPTH IS @ 29'
1030 DRILLERS BEGIN PULLING 6 OUT DRILL RODS.
1115 DRILLERS MOVE OFF HOLE.
1120 RICHEST MEASURE WATER LEVEL OF GW1
AT 7.55' BELOW GROUND + TOTAL DEPTH
OF WELL AT 28.8' BGS. DRILLERS STEAM CLEANING
1130 DRILLERS DECON. RIG
1200 DRILLERS MOVE TO GW-3
1215 DRILLERS SET UP ON WELL STAKE GW-3
STAKE IS ON SOUTH EDGE OF CUT ALFALFA FIELD.
1225 BEGIN DRILLING GW-3 Split spoon @ 0'-2' Oppm
AB, BZ Oppm AB, BH Oppm AB
1240 Split spoon @ 4'-6' Oppm AB, BZ Oppm AB, BH Oppm
AB

S Kwochuck

22 August 1990 Wednesday YQ 7040 S. Kwochuck

1300 Split spoon @ 9.0-11.0' Oppm AB, BZ Oppm AB, BH Oppm AB.
1310 Split spoon @ 14'-16' Oppm AB, BZ Oppm AB, BH Oppm AB. Little recovery.
1325 BEDROCK REFUSAL AT 14.33'. BEGAN HQ CORING AT 14.5'
1410 RECOVERED CORE 14.5 - 19.5 TOP 2' WAS BOULDER + COBBLES REST NO RECOVERY. DECAYED ZONE ENCOUNTERED TILL AGAIN. MUST RETURN TO AUGER DRILLING
1410 RESUME AUGERING AT 14.5'
1432 19.5 FT TO 19'10" SPLIT SPOON Oppm NOISE BACKGROUND OVA
1500 24' TO 26' SPLIT SPOON COLLECTED 0.6ppm AB-OVA; Oppm HNU
1515 JR left site to call Barb Topor at E&E office + DEC in Albany to see if we could set GW-3. We did not hit bedrock but we do have water.
1545 JR return to site. He had to tell DEC about the recovery. Drillers augered down to 26'.)
1555 JR left site again to call DEC.
1605 Richest returns on site after talking to VALERIE LAZZIE of ALBANY DEC. HER INSTRUCTIONS WERE TO AUGER 2 FEET DEEPER TO 28' AND SET A 10' SCREEN FROM 28-TO 18' IF WE HIT BEDROCK BEFORE 28' I (RICHEST) MUST CALL HER BACK FOR FURTHER INSTRUCTION. DEC ~~rep~~ SW YARUZ ERK, left the site SW He just moved his vechical.
1615 JR left site to call Jim Griffis at E+E office.
1620 Split spoon @ 26'-28' Oppm AB, BZ Oppm AB, BH Oppm AB.
1645 Derek Grieve, drillers helper, was hit in left side with theater bar while Lee Linnel (driller) was trying to loosen a rod. He can walk around but he might have bruised his ribs.

S Kwochuck

WED. 8-22-90 YQ-7040 J.R.

1200 RICHERT PASES OFF LOCATION OF WELL GW-3 AT 75 PASES DUE WEST OF CENTERLINE OF GRISWALD ROAD 75 PASES ≈ 225 FEET WELL IS OFF OF CUT HAY FIELD 4' SOUTH OF THIS FIELD IN THE HIGH GRASS

1710 DRILLER SAYS HE COULD CONTINUE CONTINUE COMPLETING WELL, WHICH WOULD TAKE 2 MORE HOURS OR STOP NOW SINCE HE HAS A GOOD HEAD OF SAND IN THE HOLE NOW + THE WELL WOULD BE SAFE OVER NIGHT. ETE DECIDES TO CALL IT A DAY + WILL START AT GRR TOMORROW.

1725 ETE + DEC DEPART SITE FOR THE DAY.

1815 ETE ARRIVES AT HEADQUARTERS.

Jim Richert

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THURS. 8-23-90 YQ-7040 J.R.

0700 ETE ARRIVES AT HEAD QUARTERS.
4) JIM RICHERT, SYBIL NEWCHURCH, TOM ABREY

0718 ETE ARRIVES DEPARTS HEADQUARTERS.

0750 ARRIVE ON SITE, AMERICAN AUGER ON SITE

0755 NYSDEC REP ARRIVES ON SITE YANIZ ERK

WEATHER: CLEAR SUNNY, TEMP ≈ 65°F TO BE 78°F, WINDS LIGHT AND VARIABLE

0800 DRILLERS BEGIN OPERATIONS - EXPLOSIMETER CALIBRATED O_2 20.9%, LEL 0% in AMBIENT AIR

NOTE OVA, HNU WILL BE CALIBRATED AND USED TO MONITOR DRILLING @ EACH LOCATION

0805 WATER LEVEL CHECKED ON WELL GW-3 AT 6.6' BELOW GROUND SURFACE

0840 SAND PACK POURED OVER 10' SCREEN.
SCREEN 2" PVC #10 SLOTS FROM 28' TO 18'
SAND = #3 QUARTZ SAND FROM 28 up TO 16'
BENTONITE SEAL = CHIPS + WATER FROM 16' up TO 13.75'
BENTONITE/CEMENT GROUT TO SURFACE.
4" STEEL LOCKED PROTECTIVE CASING

0930 WELL GW-3 IS NOW COMPLETED + LOCKED.

0945 DRILLERS MOVE TO GW-4 AREA TO DECONN. +
ETE DEPARTS TO PHONE + STORE

1010 ETE ARRIVES BACK ON SITE, DRILLERS

1115 DECONNING RIG ETC.

~~1215~~ 1130 DRILLERS FINISHED DECONNING.

~~1230~~ 1130 → DRILLERS MOVE RIG OVER GW-4

HNU CALIBRATED @ ISOBUTYLENE 100ppm NO ADJUSTMENTS NECESSARY Background 0 ppm
GW-4 CLEARED @ Hnu 0 ppm above BKG.

1146 DRILLERS BEGIN OPERATIONS - CORING

1148 OVA STARTED BKG. 3.0 ppm

NOTE: ALL READINGS DOCUMENTED WILL BE RECORDED AS ABOVE BKG.

1152 BREATHING ZONE (BZ) 0 ppm - OVA

1200 3'9" CORE RECOVERED 0 ppm - OVA SAMPLE; WITHIN TOP CASING 0 ppm OVA

1220 CORE RUN RECOVERED 0 ppm OVA SAMPLE; 0 ppm OVA @ STICK UP

1242 3RD CORE RECOVERED 0 ppm OVA, BZ IN HOLE AREA 0 ppm OVA

1301 4TH CORE RECOVERED 0 ppm BZA, 0 ppm BUBBLE HOSE - TO PVC CASING

THURS. 082390 YQ-7040 TA

1322 5TH core Retrieved Opp- IN STICK-UP OVA; SAMPLE @ ppm OVA
1345 6TH ga Pressure SAMPLE, WORK BZ, STICK-UP @ ppm OVA
1346 check water level in GW-4 AT 4.6' BGS
will PUMP out all water in well evaluate recovery. MUST PUMP 10 GALLONS.

10 GALLONS EVACUATED AT 1354

FEET	TIME
25.3	1354
23.5	1355
22.00	1355.25
21.00	1355.5
20.00	1355.75
15.0	13570 n.s.p

MAKING WATER QUICKLY. will STOP CORING NOW AT 31.25'. TOTAL DEPTH.
1420 check water in GW-4 AT 5.9' BGS.
1426 JIM R. & SYRIN LONG SITE TO COMING OFFICE
1433 DRILLERS LEAVE TO GET WATER
1440 JIM & SYRIN RETURN TO SITE
1450 JR + TA print the well cover + Erk, NYSDEC, Lisa site.
1505 DEC return to site Mobilizing to GW-2
1520 R16 + SUPPORT TRUCK MOVE TO GW-2
1525 MR GEORGE STIEMER (TOWN SUPERVISOR) ARRIVES ON SITE + SPEAKS W/ J. RICHERT + DEC REP. HE SAID: 1) HE SAW ALL 4 WELL LOCATIONS & ADVISED PLACING A HIGH POLE NEAR GW 1+4 TO MARK THEM SO VEHICLES (TRACTORS) DO NOT HIT THEM IN THE HIGH GRASS
2) Robert told him that the drillers used a total of 4400 GALLONS OF WATER.
J. Richert

8-23-90 THURS. YQ-7040 JR

1530 MR. STIEMER SAID THERE will BE NO CHARGE FOR THE WATER USED.
3) When asked why this site is a post. Haz. waste site he said, because they is't above north of the site around a plant pesticide plant located in Middletown of dumping waste PLANT NAME is FMC.
MR. STIEMER SAID HE CHECKED THE LANDFILL REGULARLY + SAW NO SIGNS of ILLEGAL DUMPING
1540 BEGIN NQ CORING AT #5'
1550 OUT WITH RUN #2 AT 15' DARK GRAY DOLOSTONE competent.
1620 RUN #3 OUT AT 20.5'
1624 check water level at 5.45' BGS will EVACUATE ALL WATER + seal formation water quality.
1635 WATER WAS ENTERING THE WELL AT SLOW RATE ~ 0.1 GAL/MIN
1635 RICHERT INSTRUCTS DRILLERS TO DRILL 1 MORE 5-FOOT RUN.
1635 @ ppm IN CASING STICK-UP; @ ppm BZ WORK AREA (OVA READINGS) Run #3.
1655 RUN # 4 ON BOTTOM AT 25.5'
1700 CORE IS VERY COMPETENT DOLOSTONE will PUMP ALL WATER OUT + WATCH RECOVERY
1700 @ ppm OVA on CORE; @ ppm OVA BZ WORK AREA
NO FURTHER INTRUSIVE ACTIVITIES PLANNED; NO ADDITIONAL MONITORING will BE CONDUCTED
AREA CLEANED - WELL LOCKED
1738 E & E TEAM LEAVES SITE

082390

FRI 8-24-90 YQ-7040 JR.

0715 RICHERT OF ETE ARRIVES AT ETELAB. TO PICKUP SAMPLE PRESERVATIVES.

0730 RICHERT & ABREY MEET AT ETE EQUIPMENT WAREHOUSE TO PICK-UP SAMPLE BOTTLES, & DROP OF SOME EQUIPT.

& GET TEMP, PH, COND METER REPAIRED

0827 RICHERT & ABREY DEPART WAREHOUSE.

0910 ETE ARRIVES ON SITE, DRILLERS ON SITE

WEATHER: CLOUDY, WARM 70° OCCASIONAL LIGHT SHOWERS.

GOALS FOR TODAY:

- DEVELOPE ALL 4 WELLS
- COLLECT A DRILLING WATER SAMPLE
- RETURN VAN & SAMPLES & EQUIPT

0925 WELL GW CLEARED @ PPM Meter Back Hose

CALIBRATION CHECKED @ 100 ppm Isobutylene Span Portable ✓

Back 0.2 ppm Instrument Reading After Back

0935 MOVE TO GW-2, CHECK WELL HEAD SPACE WITH HNu & 0 PPM.

WATER LEVEL AT 5.75' BGS

TD = 25.5' WATER COLUMN = 19.75' OR 7.25 GAL

GW-2 DEVELOPMENT BEGINS AT 0940

TIME	CUM. VOLUME	°F TEMP	pH	µs/cm COND	NTU's TURB.	COMMENTS
0940	0 GAL	63.7°F	7.22	6.76 x100	>200	DIRTY GRAY
0942	1	63.1	7.89	6.46 x100	>200	"
0944	2	60.9	7.84	6.10 x100	>200	"
0945	3	61.0	7.84	6.07 x100	>200	"
0947	5	60.1	7.86	6.32 x100	>200	
1017	10	64.0	7.56	7.61 x100	>200	
1028	15	68.0	7.38	12.28 x100	124	CLOUDY
1140	20	69.4	7.91	7.27 x100	152	FINISHED 2 HOURS DEVELOPING

Dr Richart

FRI 8-24-90 YQ-7040 JR

GW-2 DEVELOPEMENT CONT.

TIME	CUM VOL	TEMP.	PH	COND.	TURB	COMMENTS
1004	0	70.4	7.17	14.64 x100	>200	
1005	1	66.8	7.19	9.69 x100	186	
1005	2	64.8	7.13	9.37 x100	129	
1005	3	64.5	7.19	9.30 x100	119	
1007	5	64.3	7.25	9.14 x100	>200	
1013	10	69.9	7.10	10 x20 x100	>200	
1022	15	70.5	7.17	10.30 x100	>200	HIGH TEMP. CAUSED
1031	20	75.7	7.23	11.11 x100	>200	BY RIG WATER PUMP
1041	25	80.6	7.18	11.36 x100	7200	WHEN WATER FLOW IS L
1052	30	80.3	7.20	11.15 x100	>200	
1100	35	79.4	6.98	12.62 x100	>200	

1055 ARRIVE AT GW-1 WATER AT 8.2' BGS

TD = 28.5' = 20.3' of WATER = 7.45 GALLONS

JR

AFTER DEVELOPING GW-1

Dr Richart

FRI 8-24-90 YQ-7040 JR

WELL GW-1 RECORD CONTINUED.

TIME	VOLUME (GALLONS)	TEMP. (°F)	PH	COND (µs/cm)	TURB. NTU's	COMMENTS
1111	40	79.6	6.88	12.01x100	>200	
1121	45	83.5	7.06	1252x100	143	
1132	50	83.4	6.78	14.53x100	166	
1143	55	82.5	6.80	13.68x100	151	
1151	60	80.2	7.07	12.18	190	
12:04	65	84.0	6.96	12.20	7200	END DEVELOPMENT AFTER 2 HRS

well GW-2 was hand BAILED FOR DEVELOPMENT WELLS GW-1, 3, + 4 All Developed with Rig Pump. 12 15 DRILLERS DECON. PVC TUBING, WATER HOSE FOR NEXT WELL.

1225 MOVE Rig OVER GW-4 + PREPARE TO DEVELOPE.

1227 RECHECK CHECK WATER LEVEL. WATER LEVEL OF GW-4 = 8.7' FEET BGS TOTAL DEPTH IS 31.25' = 22.55 FEET OF WATER = OR 8.28 GALLONS.

TZ JR

1229 CLEAR GW-4 0.6 PPM Above BG IN CASING & PPM IN BZ : LOAD.

START DEVELOPMENT AT. 1233

TIME	VOLUME	TEMP.	PH	COND	TURB.	COMMENTS
1233	0	91.5	7.22	7.36x100	150	PUMPING
1234	1	79.6	7.41	12.62x100	60	"
1235	2	74.3	7.46	12.63x100	20	"
1236	3	72.6	7.53	12.91	78	"
1242	5	73.5	7.25	14.60x100	>200	CAN'T PUMP will START BAILING

J. Reichert

FRI 8-24-90 YQ-7040 J.R.

GW-4 DEVELOPEMENT TABLE CONTINUED.

TIME	VOL	TEMP.	PH	COND.	TURB	COMMENT
1301	10	67.8	7.34	17.38x100	>200	BAILING
1325	15	69.5	7.37	18.11x100	176	★ SULFER SMELLIN
1433	20	66.7	7.68	17.24x100	115	" "
						2 HRS DEVELOP.

J. Reichert

1315 ARRIVE AT GW-3 HNU READ 0PPM FROM WELL HEAD SPACE. WATER is AT 4.8' BGS TOTAL DEPTH = 28.0' = 23.2' of WATER = 8.5 GALLONS PER VOLUME.

1321 BEGIN DEVELOPING w/ Rig PUMP.

TIME	VOLUME GALLONS	TEMP °F	PH	COND. µs/cm	TURB. NTU's	COMMENTS
1321	0	94.8	7.34	12.05x100	>200	USING Drill Rig
1322	1	83.8	7.41	10.39x100	>200	PUMP.
1323	2	81.7	7.37	10.35x100	>200	"
1324	3	81.0	7.24	6.10x100	>200	"
1325	5	81.0	7.57	6.73x100	>200	↓
1335	10	84.4	7.28	9.08x100	>200	"
1343	15	84.7	7.21	11.15x100	>200	"
1401	20	86.9	7.22	11.8x100	>200	
1414	25	86.2	7.03	15.32x100	88	CLEARING UP

J. Reichert

22

FRI 8-24-90 YC-7040 JR

WELL GW-3 DEVELOPEMENT TABLE CONTINUED.

TIME	VOL	TEMP.	PH	COND	TURB.	COMMENTS
1426	30	85.0	7.15	1223x100	55	HIGH TEMP.
1440	35	83.2	7.12	1444x100	47	FROM RIG PUMP
1453	40	84.4	7.06	1554x100	38.5	
1505	45	87.8	7.09	1572x100	33	
1518	50	89.4	4.36	1408x100	27	END DEVELOPMENT

recycled paper

1520 water level after Development 20.3' BGS.

1525 DRMES BEGIN PACKING UP. will leave this x BOX TRUCK ON SITE FOR WEEKEND.

1526 ETE DEPARTS SITE FOR DAY.

1615 ARRIVE AT ETE EQUIPT. WAREHOUSE. TO UNLOAD EQUIPT & CORES.

1635 ETE DEPARTS WAREHOUSE TO ETE LAB.

1640 FILLED UP VAN w/ GAS

1655 RICHERT + ABREY DROP OFF WATER SAMPLE AT ~~ETE~~ ASC.

1200 ARRIVE AT CAR RENTAL AGENCY TO DROP OFF VAN

1715 ARRIVE AT ETE HEAD QUARTERS.

ecology and environment

2

THURSDAY SEPT. 13 1990

WEATHER: SUNNY, WARM - UP TO 80° EXPECTED

0800 C. EICH ARRIVES AT ACTION TO PICK UP VAN

0830 ARRIVE AT ETE TO PICK UP EQUIPMENT + PERSONNEL

0845 LEFT ETE FOR WAREHOUSE

0915 C. EICH, M. WITNAUER + J. RICHERT LEAVE FOR SITE

1005 ARRIVED ON-SITE LOCATED WELLS + SAMPLE LOCAT

1033 OPENED WELL GW-4 0 ppm ON HNu

1035 WL IN GW-4 10.9' (TOP OF PVC)
9.05' BGS

TD GW-4 32.9' TOC
31.0' BGS

~22' OF WATER
x .3672 (~~FT~~ GAL/FT IN 3" WELL)
44
1540
6200
66000
8078.4
x 3
24~~2~~.2 GAL TO PURGE

1100 BEGAN PURGING GW-4

TIME	pH	TEMP	X1000 COND	TURB	GALS PURGED	COMMENTS
1100	7.02	64.3°	1.44	53	0	CREAM TAN TO WHITE
1119	7.27	64.4	1.39	>200	12	GRAYISH WHITE
1122	7.26	64.4	1.39	>200	14.25	H_2S ODOR
						BAILED DRY

1134 AT WELL GW-1 - 0ppm ON HNu
W.L 8.9' BGS
T.D 28.3'

TIME	PH	TEMP	X1000 COND	TURB	GALS PURG	COMMENTS
1136	6.78	63.4	.96	>200	0	gray tint to water
1156	6.93	63.3	.95	>200	10	same as above
1210	6.98	63.2	1.10	>200	22	gray, Slight H_2S odor

Charlie 9-13-90

H-41

9-13-90

28.3
8.9
19.4
.3672
19.4
14688
330480
367200
7.123568
3
21.37104 GALS TO PURGE FROM GW-1

1250 AT WELL GW-2 - 0ppm ON HNU
W.L. 6.0' BGS
T.D. 25.1'
~ 21 GALS TO PURGE

TIME	pH	TEMP	COND X1000	TURB	GALS. PURGED	COMMENTS
1308	8.21	69.6	0.75	14	0	H_2S ODOR, CLEAR
1317	7.74	66.8	0.80	>200	12	GRAYISH WHITE, BAILED DRY, H_2S ODOR

1346 AT WELL GW-3 - 0ppm ON HNU
W.L. = 5.45
T.D. = 27.55 SB 22.1' WATER IN WELL
~ 11 gal. to purge

Time	pH	Temp	X1000 Cond.	Turb	gals purged	Comments
1350	7.08	66.5	1.19	>200	0	
1357	7.13	63.3	1.09	>200	5.5	Light gray
1409	7.04	61.3	.98	>200	11	Light Brown

PACKED UP EQUIPMENT
1430 LEAVING SITE FOR LAB
1520 ARRIVE AT LAB, PICKED UP DI WATER + PRESERVED WATER BOTTLES

Chad Ent 9-13-90

1550 ARRIVE AT WAREHOUSE. DROPPED OFF EXTRA WATER BOTTLES, REFILLED pH PROBE PRESERVATIVE
1616 ARRIVE AT E+E HQ. WENT TO TALK TO J. GRIFFIS (HE'S LEFT FOR DAY). TOLD J. RICHERT HOW IT WENT, + WHAT'S GOING ON TOMORROW.

Chad Ent 9-13-90

recycled paper
recycled paper

FRIDAY SEPTEMBER 14, 1990

WEATHER: HAZY, HUMID, BREEZY, SOUTH WIND 10 mph

PERSONNEL: C. EICH, M. WITNAUER

EQUIPMENT: HNU -

pH/TEMP/COND METER -

WATER LEVEL IND. - 13-03-11

RENTAL VAN - DODGE RAM LIC. # ZEY-518

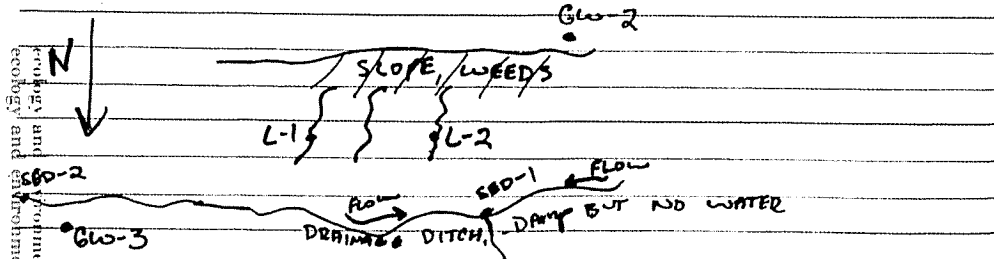
0830 C. EICH PICKED UP M. WITNAUER AT E+E · ESC. CALLED HQ NO NEED TO TAKE ANY EP TOX SAMPLES

0840 LEFT ESC FOR SITE. PICKED UP ICE

0930 ARRIVE ON-SITE. PREPARED SAMPLE LABELS + BOTTLES FOR SEDIMENT + LEACHATE SAMPLES

1025 COLLECTED SAMPLE L-2 FROM LEACHATE SEEP NEAREST TO WELL GW-2. NO VISIBLE LEACHATE (LIQUID) BUT SOIL IS A RUSTY ORANGE COLOR. L-2 IS A SOIL SAMPLE

I-43



1040 COLLECTED SAMPLE L-1. SOIL SAMPLE FROM EASTERN-MOST LEACHATE SEEP. NO VISIBLE LIQUID. SAMPLE L-1 IS A SOIL SAMPLE. COLLECTED EXTRA VOLUME FOR MS/MSD.

Chad Eich 9-14-90

kruger and associates ecology and environment

9-14-90

1052 COLLECTED SAMPLE SED-1. IN DRAINAGE DITCH, BELOW LEACHATE SEEPS AT POINT WHERE DITCH SPLITS. NO WATER IN DITCH SO NO SW SAMPLE TAKEN. DRAINAGE DITCH NOT WELL DEFINED WEST OF WHERE SAMPLE SED-1 TAKEN.

1100 COLLECTED SAMPLE SED-2. FROM DRAINAGE DITCH NEAR N.E. CORNER OF SITE. NO WATER IN DITCH SO NO S.W. SAMPLE TAKEN. SAMPLE TAKEN JUST EAST OF WELL GW-3

1120 AT WELL GW-4 - OPENED CAP - 0ppm ON HNU.

WATER LEVEL 9.26' BGS

1125 TEMP PH COND TURB

71.3 7.05 1.58 x 1000 20 NTU'S (1ST BAILER)

1128 COLLECTED SAMPLE GW-4. COLLECTED EXTRA VOLUME FOR MS/MSD.

SAMPLES PUT ON ICE. LABELED BOTTLES FOR NEXT WELLS

1200 AT WELL GW-1. OPENED WELL CAP 0ppm ON HNU.

WATER LEVEL 9.45' BGS

TEMP PH COND x1000 TURB

64.5°F 6.84 1.04 87 (1ST BAILER)

1210 BEGAN COLLECTING SAMPLE GW-1.

1240 DUCT TAPED A 2"x3"x8' POST TO WELLS GW-1 + GW-4 AS PER THE SITE OWNERS REQUEST. POSTS PAINTED ORANGE + FLAGGED W/ ORANGE FLAGGING TAPE.

1300 OPENED WELL GW-2. 0ppm ON HNU

W.L. IN GW-2 6.15' B.G.S.

TEMP PH COND x1000 TURB

65.3°F 7.50 0.70 >200 (1ST BAILER)

Chad Eich 9-14-90

9-14-90

1310 COLLECTED SAMPLE GW-2
PACKAGED SAMPLES
COMPLETED COC FORM
1400 AT WELL GW-3 - OPENED CAP.
0 ppm ON HNU
W.L. IN GW-3 5.55' BGS

TEMP	pH	COND x1000	TURB
67.1°F	6.92	1.18	130 (1ST BAILER)

1410 COLLECTED SAMPLE GW-3
GEORGE STEIMER (TOWN SUPER.)
STOPPED BY AS WE FINISHED.
ASKED HOW IT WAS GOING & WHERE
ALL WERE - WE TOLD HIM AND
HE LEFT
1430 LEFT SITE FOR LAB.

Chad Ely
9-14-90

RECEIVED

SEP 12 1991

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