2021 Hazardous Waste Scanning Project

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Report.HW.932026.1988-04-29.Phase_II.pdf

932026

ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

PHASE II INVESTIGATION

Niagara County R.D. Wheatfield
Site No. 932026
Town of Wheatfield, Niagara County

Final - April 1988

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., Acting Director

Prepared by:

EA SCIENCE AND TECHNOLOGY
A Division of EA Engineering, Science, and Technology, Inc.

EA Report DEC52N

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

PHASE II INVESTIGATIONS
NIAGARA COUNTY R.D. WHEATFIELD
TOWN OF WHEATFIELD, NIAGARA COUNTY
NEW YORK ID NO. 932026

Prepared for

Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

Prepared by

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Middletown, New York 10940

A Division of EA Engineering, Science, and Technology, Inc.

April 1988

CONTENTS

1. EXECUTIVE SUMMARY

The Niagara County R.D. Wheatfield Site (New York State ID No. 932026) is located in the Town of Wheatfield and the City of North Tonawanda in Niagara County, New York (Figures 1-1 and 1-2). It is situated to the west of Witmer Road and generally north of Warner Avenue. The property is owned by the Town of Wheatfield.

The site was operational from 1968 until it was closed in 1976. Over 100 waste generators are believed to have used this site. The City of Niagara Falls, North Tonawanda, and Niagara Sanitation used this site for disposal of municipal refuse. Carborundum, Bell Aerospace, Goodyear, E.I. Dupont, Hooker-Durez, Olin Chemicals, NL Industries, and Roblin Steel were among the industrial users of the site. Contained in the waste are phenolic resins and molding compounds; offgrade polyvinyls; tetrachloroethylene and still residue with tetrachloroethylene; PVC skins and emulsions; brine sludge with mercury; municipal sludges; and other industrial waste. Residue from the Niagara Falls Incinerator was also dumped at the site.

The Phase II investigation consisted of a record and background information search; a site inspection and site interview to observe and document current conditions at the site, field activities to evaluate waste characteristics and the potential for ground-water contamination; and analytical determinations of leachate, surface water, soil and waste samples.

The field activities included geophysical surveys (conductivity and proton magnetometer); installation of test borings/monitoring wells within the landfill material, and environmental sampling of surface water, soil, leachate, and waste at the site.

Public drinking water supplies within the 3-mi radius of the site are primarily surface water supplies. No ground-water supplies are known to exist near the site. The Lockport City water intake is located nearest to the site. The intake is approximately 1.5 mi upstream of the site on the Niagara River. The North Tonawanda intake is located farther upstream approximately 2 mi from the site. The only downstream drinking water intakes are located on the Niagara River approximately 5-6 mi from the site.

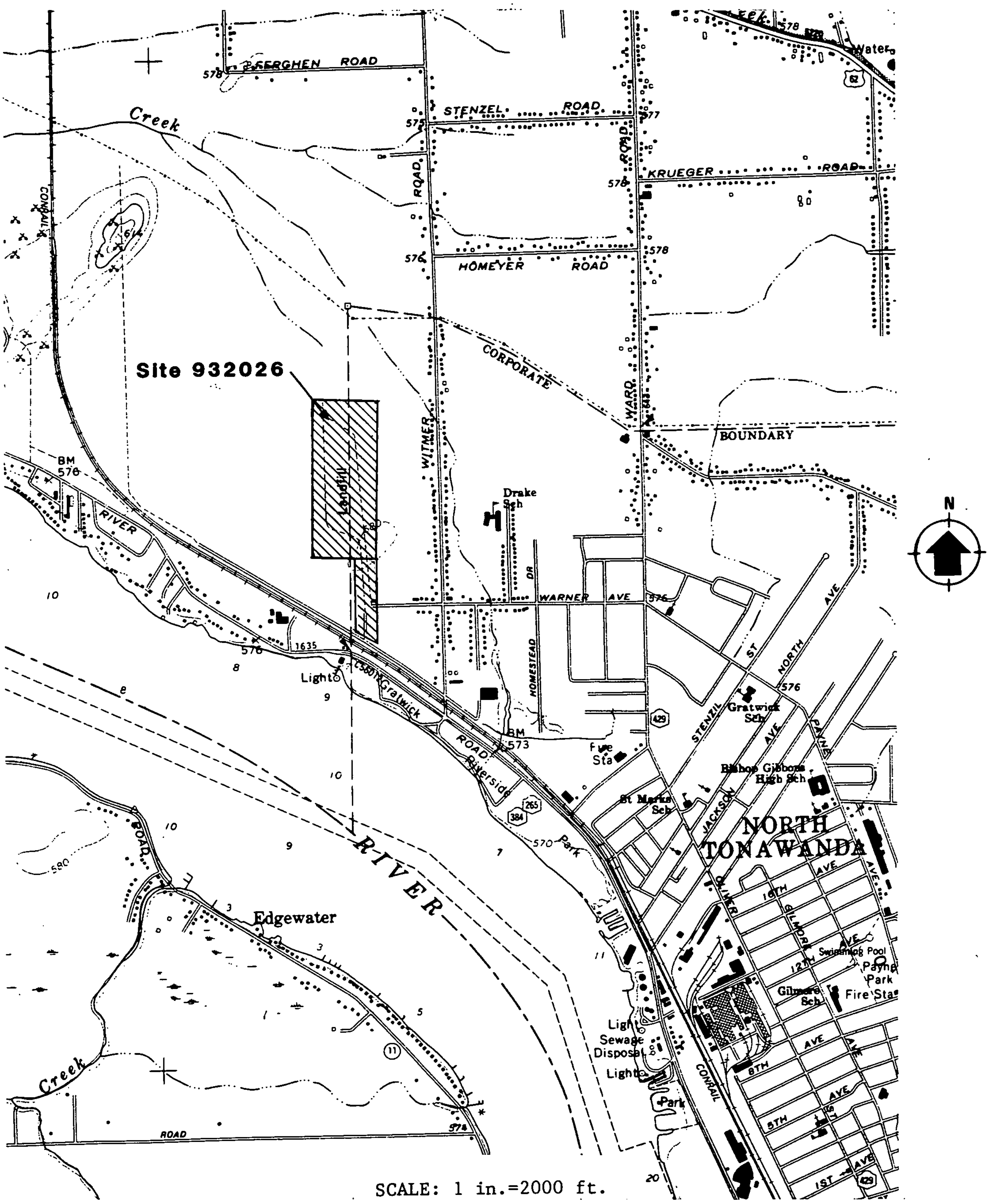
Previous studies at the site have included installation of wells/borings and sampling of ground water, surface water, and soil on and near the perimeter of the site. The Phase II investigation, however, was limited to the investigation of the material in the fill, and waste and leachate characteristics. Chemical analyses of the samples are presented in Section 4.4. The Niagara County R.D. Wheatfield Site is on the National Priority List, and has a U.S. EPA lead for an RI/FS Study.

The final HRS scores for the site are as follows: Migrations Score (S_M) = 7.91; Direct Contact Score (S_{DC}) = 37.50; Fire and Explosion Score (S_{FE} = 50.00). The S_M score is relatively low because no surface or ground water drinking water supplies were identified within the 3-mi radius of the site.

S_{DC} is high because the site is easily accessible to the public, and leachate flowing in drainage ditches and swales was found to contain heavy metals, elevated levels of total phenols, and priority pollutant organics.

COORDINATES:
Latitude: 43 03'55'
Longitude: 78 54'22'

NIAGARA COUNTY R.D.-WHEATFIELD SITE



SCALE: 1 in.=2000 ft.

Figure 1-1. Site locator map

Tonawanda West Quad
NYSDOT 7.5 Minute Series
1976 Edition

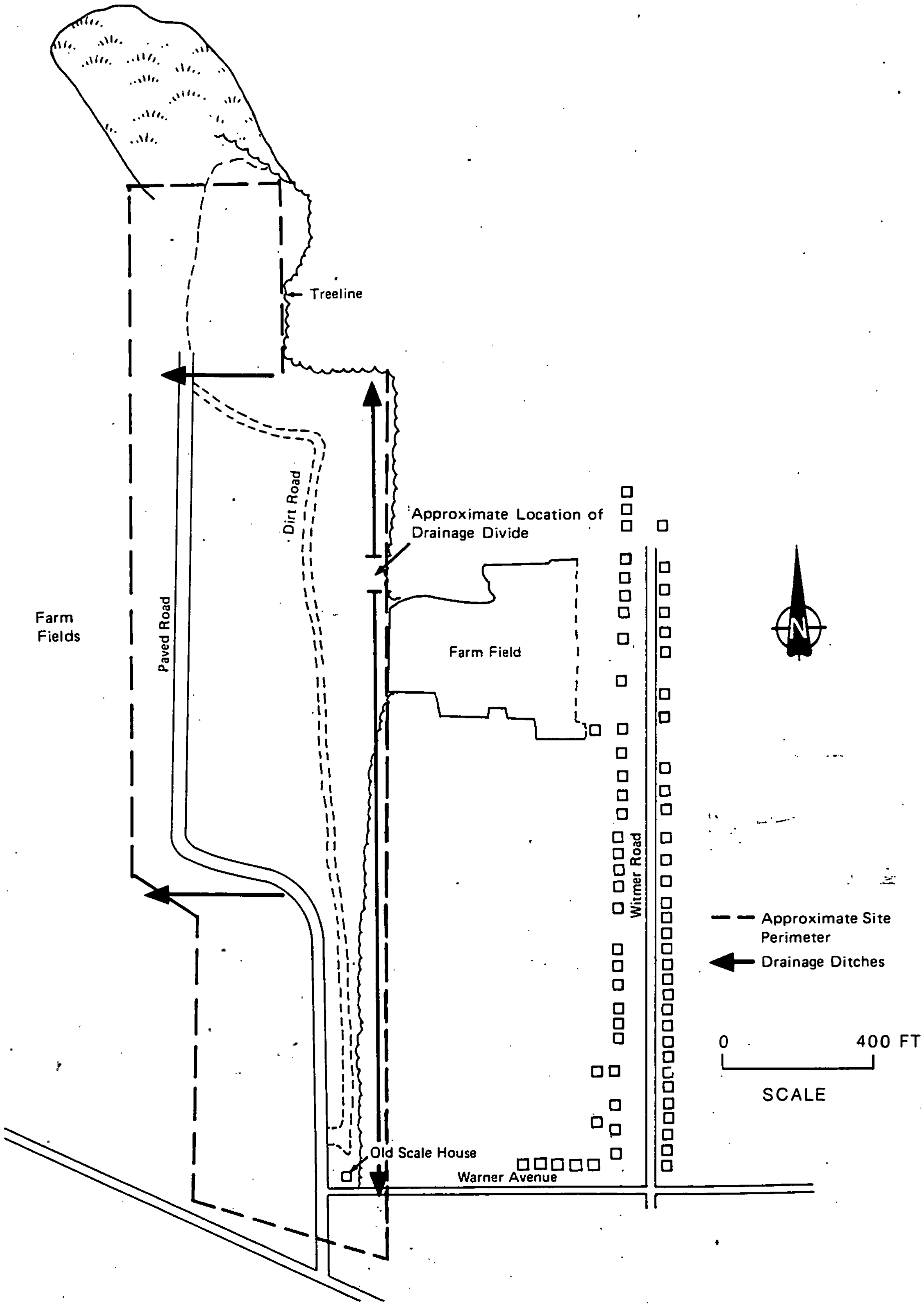


FIGURE 1-2. Site sketch Niagara/Wheatfield site.

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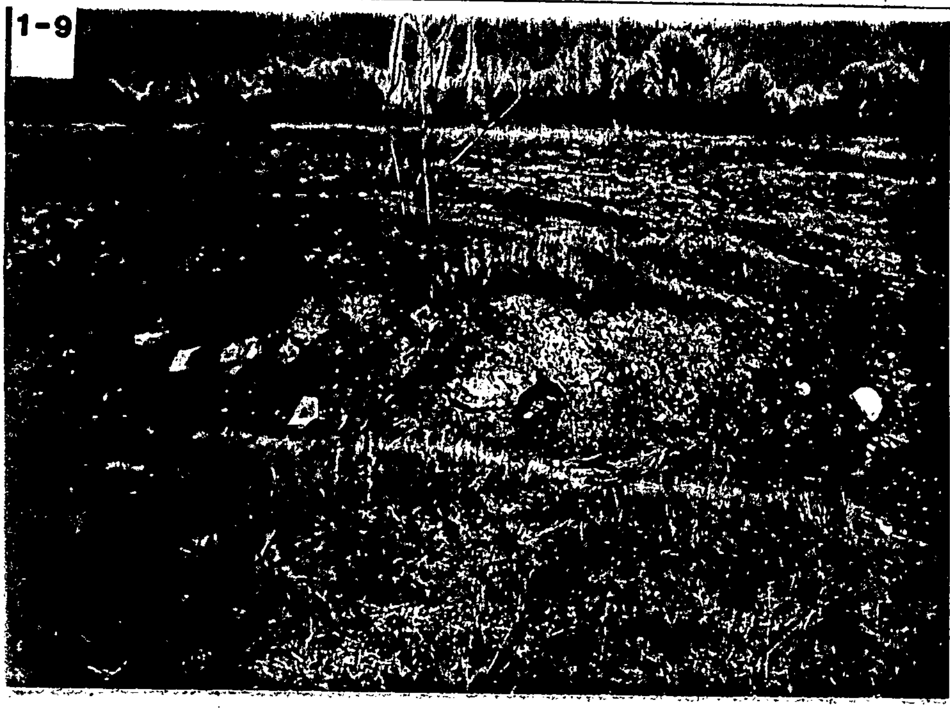

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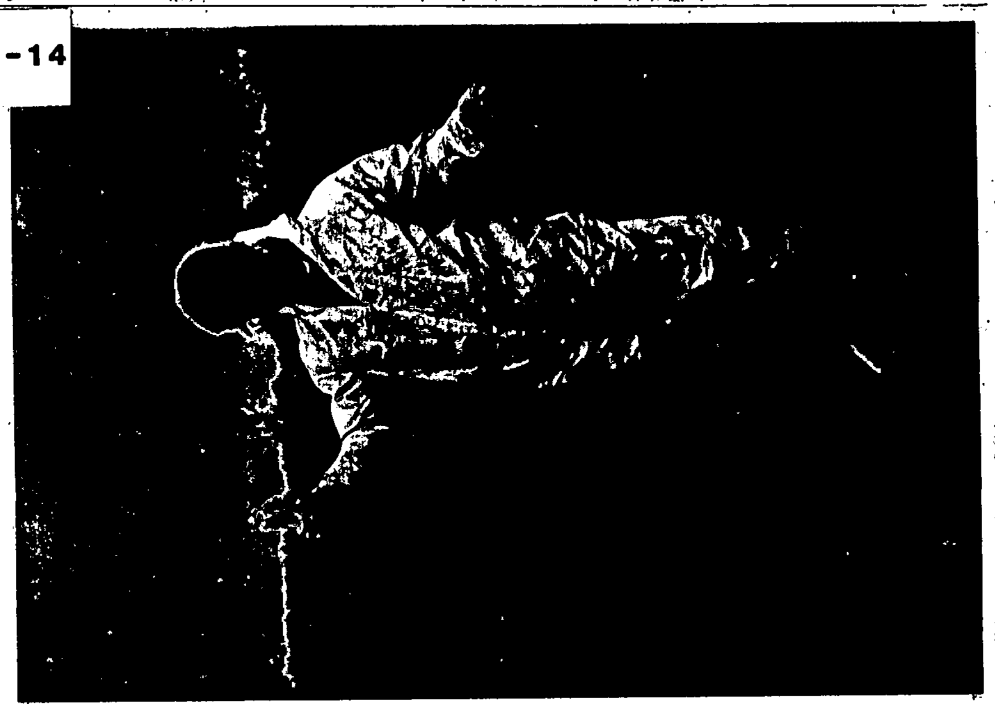


1-15

1-16

PHOTO LOG - NIAGARA/WHEATFIELD

Photo	Description
1-1	Southern-most end of site, paved road lined with debris.
1-2	View north from southern portion of site.
1-3	View northwest across southern portion of site.
1-4	View north along eastern slope of site.
1-5	View of drainage ditch west between two landfill cells.
1-6	Same ditch, west of access road off site. Open fields on either side of ditch.
1-7	Same ditch as Photos 1-5 and 1-6 looking east; surface water sample NW-S1 collected from ditch near rock in foreground.
1-8	View of the eastern edge of the landfill's north cell.
1-9	Dry seep in central portion of site view from west cell looking east.
1-10	Drainage ditch between two landfill cells trending north-south.
1-11	Seep on eastern edge of site.
1-12	Western slope of north cell, cap is eroding.
1-13	Monitoring Well NW-A and wastewater discharge drum shot full of holes.
1-14	EA personnel collecting sample from Monitoring Well NW-D.
1-15	Drum at southern end of site (sample NW-D1).
1-16	View east across site, homes visible in background.

2. PURPOSE

The goal of the Phase II investigation of this site was to: (1) obtain available records on the site history from state, federal, county, and local agencies; (2) obtain additional information on site topography, geology, local surface and ground-water use, contamination assessments, and local demographics; (3) interview site owners, operators, and other groups or individuals knowledgeable of site operations; (4) conduct a site inspection to observe current conditions; (5) perform geophysical surveys at the site to aid in selecting safe locations for drilling monitoring wells; (6) install test borings/monitoring wells and perform leachate and environmental sampling to evaluate the character of the landfill leachate and surface water as requested by NYSDEC; and (7) prepare a Phase II report. The Phase II report includes a Hazard Ranking Score (HRS), an assessment of the available information, and a recommendation for remedial work. The Phase II investigation focused on the waste characterization and environmental sampling of surface water/soils adjacent to the site.

3

3. SCOPE OF WORK

3.1 RECORD SEARCH/DATA COMPILATION

A record search/data compilation and interviews were conducted as part of the Phase II investigation at the Niagara County R.D. Wheatfield site. Appendix 1.3.1-1 contains a list of agencies or individuals contacted during Phase II.

3.2 FIELD ACTIVITIES

3.2.1 Site Reconnaissance

EA Science and Technology conducted a site reconnaissance on 17 April 1985 to familiarize key project personnel with the site. During the site reconnaissance, visible wastes and leachate seeps were located, tentative locations for test borings/observation wells and sampling points were selected, accessibility was evaluated, and surficial organic vapor measurements were taken to enable the Safety Officer to develop specific health and safety requirements for the field activities. Organic vapors were detected at seeps and cracks in the fill during the site reconnaissance. Photographs were taken of the site and significant features were noted. A photo log is provided in Chapter 1.

3.2.2 Geophysical Survey

A proton magnetometer survey was performed in four selected areas by Delta Geophysical, Inc. under EA Science and Technology supervision on 26-28 June 1985. These areas were potential drilling areas within the fill, and were labelled A, B, C, and D (Figure 3-1). Areas C and D were covered by a single blanket grid pattern because of their proximity to each other. The purpose of the geophysical survey was to non-destructively, accurately, and cost-effectively evaluate the subsurface conditions of these areas of the site with regard to buried ferrous material, possible drums. These surveys were performed in order to determine areas relatively free of buried ferrous material so that four monitoring wells could be located. The results of this work and the chosen well locations are contained within Appendix 1.3.2-1.

3.2.3 Observation Well Installation

Based on the available data from previous studies and the magnetometer survey, four test borings/monitoring wells were installed at the site on 21-23 August and 26 August 1985. The proton-magnetometer survey was conducted over the landfill in order to determine zones relatively free of buried ferrous material so that the four monitoring well locations could be established. Locations of the wells are shown in Figure 3-1. Four monitoring wells were installed in the fill material with a CME-75, truck- mounted, drill rig. The drilling was performed by Drill & Test of Orchard Park, New York, under the fulltime supervision of an EA geologist.

No upgradient or downgradient well locations were chosen as such, since the purpose as determined by NYSDEC was to install wells within the landfill. Four areas were chosen to randomly cover the site. The specific locations within these four areas were then selected based on the proton-magnetometer survey. The wells were located away from areas of apparent buried metal to the extent possible. Well NW-A (Figure 3-1) is located in the south end of the main fill area. Well NW-B is located north of NW-A, in the central section of the main fill area. Wells NW-C and NW-D are located in the northern 'cell' area. This area is mounded and located somewhat apart from the rest of the main fill area.

Split-spoon (24 in. length, 2 in O.D.) samples were taken every 5 ft in the fill. Split-spoon samples, air around the boring, and headspace over the boring were monitored with a flame ionization detector (with organic filter cartridge) during drilling operations. Organics were detected at wells B, C, and D, and Level C protection was worn during drilling operations. In addition, the borehole was monitored for explosive levels of gases with a combustible gas indicator. Readings beyond the explosive limit were recorded, especially at NW-C. When these levels were approached, drilling was stopped until the gases dissipated to a safe level. During drilling, all fluids and wastes from each borehole were placed in 55-gallon drums, sealed, and bolted closed. These drums were labelled and left at each well site for disposal by NYSDEC. Boring logs and well schematics are provided as Figures 3-2 through 3-5. Because all four monitoring wells were installed in the fill material, no soil samples were collected for sieve analysis. Appendix 1.3.2-2 provides details of the field procedures used.

Upon the completion of the wells, the vertical elevation of the upper rim of each PVC well casing was surveyed. Well casings were surveyed at the Niagara/Wheatfield site on 21 October 1985 by a 2-man team using a Kern Swiss GKOA surveying instrument and surveying rod. An elevation of 100 ft was assumed at well NW-D (Table 3-1).

In-well pumping tests were attempted at the Niagara/Wheatfield site on 19-20 October 1985. A 3/4-in. polyethelene hose was attached to a centrifugal pump at ground level. The hose was lowered down to the bottom of the well. An initial static water level was recorded with an electronic sounder. Pumping was begun and changes in static water level (drawdown) were measured and recorded over time. However the sounding probe malfunctioned due to the high conductivity or turbidity of the leachate. All fluids were discharged into 55-gallon drums. The drums were sealed, bolted closed, labelled, and left near the wells for disposal by NYSDEC. Pumping tests were not attempted on NW-A or NW-C because there was only 4 inches of water in NW-A, and water level in NW-C was too deep for the centrifugal pump to draw water. The polyethylene hose used for one well was discarded (into waste drums). Due to the sounding probe malfunction, insufficient drawdown data were obtained to reliably estimate the local hydraulic characteristics of the fill materials.

3.2.4 Sampling

Sampling of the Niagara County R.D. Wheatfield site was initially completed in one day on 8 November 1985. The sampling program included four leachate from the wells, two surface water, four soil, and one drum samples. Not enough drum sample was collected during initial sampling, therefore, additional sample was collected from the drum on 3 April 1986. The locations are noted on Figure 3-1. A surficial leachate sample was planned for collection from the site, however, there was insufficient flow at the time of EA's sampling to collect a sufficient volume of sample. Therefore, no leachate sample was collected. Due to missed holding times (PCB, pesticides, and BNAs), the site was resampled on 13 March 1987. Three well samples (NW-A, NW-C, and NW-D) and two surface water samples (NW-S1 and NW-S2) were analyzed for PCB and pesticides of the Hazardous Substance List. Well NW-B could not be sampled because the PVC well casing was damaged by shifting fill material and a bailer would not fit down the well. One drum sample (NW-D1) and two soil samples (NW-S1 and NW-S2) were analyzed for PCBs, pesticides, and BNA's of the Hazardous Substance List.

Purging of monitoring wells for the initial sampling was completed on 7 November 1985 using clean Teflon bailers at each of the wells, NW-A, NW-C, and NW-D. A centrifugal pump with clean 1/2-in. diameter polyethylene discharge hose was used at well NW-B. Approximately one bore hole volume (bailed dry) from Well NW-A and four bore hole volumes each from Wells NW-B, NW-C, and NW-D were removed during purging. Purging for the resampling effort was completed on 12 March 1987. EA's Field Records of purging and sampling are presented in Figures 3-6 and 3-11. All fluids were discharged into new 55-gal drums, sealed, bolted closed, labelled, and left onsite. The wells were allowed to recharge and clear overnight, and were sampled the following day. The sampling procedures are detailed in Appendix 1.3.2-3.

The analytical program for the monitor wells, surface water, soil, and drum samples included both organic and inorganic parameters of the Hazardous Substance List (HSL).

TABLE 3-1 NIAGARA COUNTY R.D. WHEATFIELD SITE
SUMMARY OF MONITORING WELL DATA

	Observation Well				Liquid Level/Leachate	
Well No.	Stickup (ft above Ground Surface)	Total Depth (ft below Ground Surface)	Elevation of MP* (ft)	Date	Depth (ft below MP*)	Elevation** (ft)
NW-A	1.33	17.0	95.48	11/7/85	16.70	78.78
NW-B	1.86	23.0	96.43	11/7/85	9.01	87.42
NW-C	1.90	43.0	105.66	11/7/85	25.10	80.06
NW-D	1.80	38.0	99.88	11/7/85	15.30	84.58
NW-A	1.33	17.0	95.48	3/12/87	8.97	86.51
NW-B	1.86	23.0	96.43	3/12/87	7.64	88.79
NW-C	1.90	43.0	105.66	3/12/87	25.85	79.81
NW-D	1.80	38.0	99.88	3/12/87	10.10	89.78

* MP = Measuring point (top of PVC).
** Vertical Benchmark (BM), Assumed Datum = 100.00, Top of Steel Casing - Well NW-D.

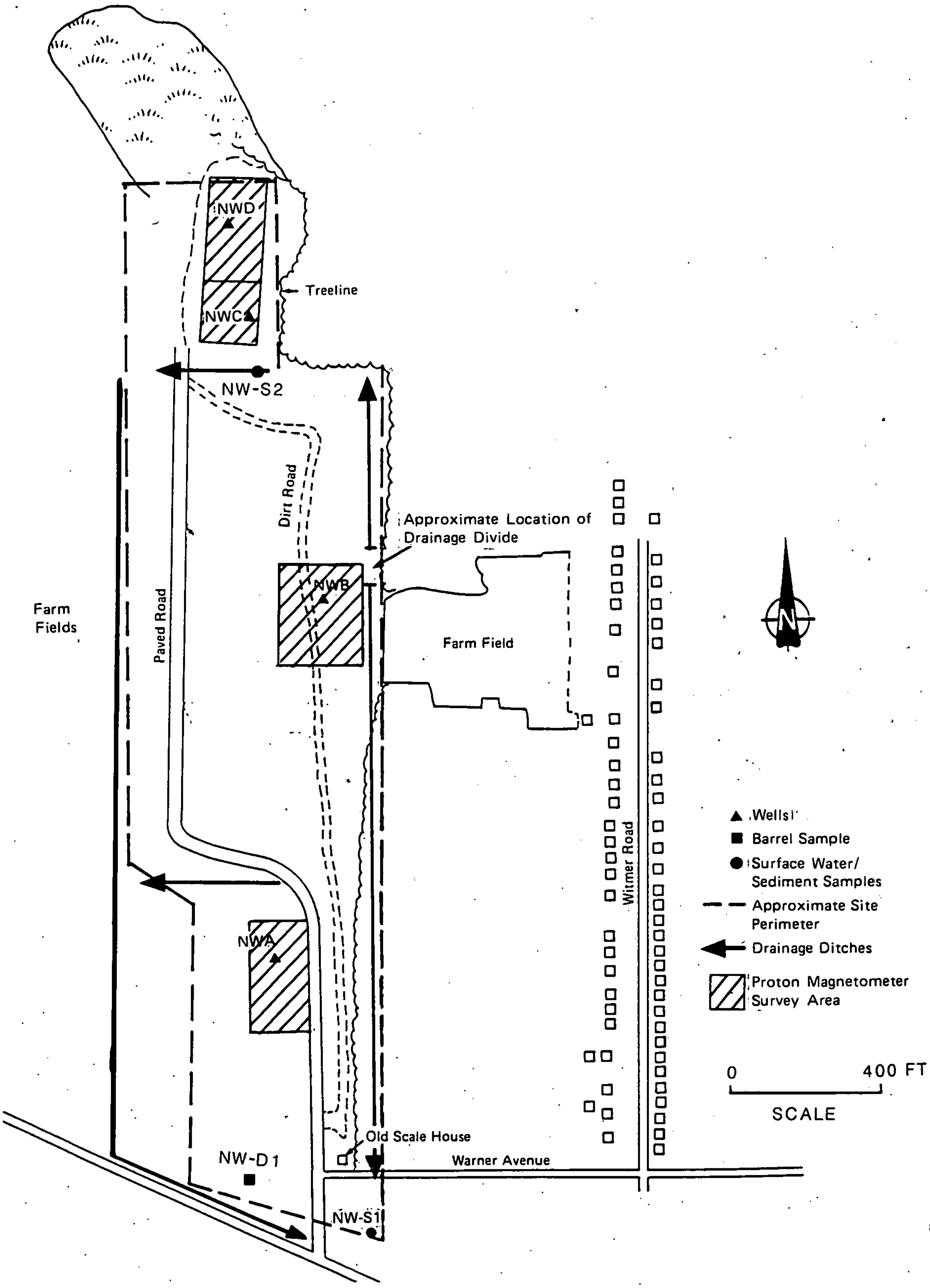


FIGURE 3-1. Monitoring well and sample locations.

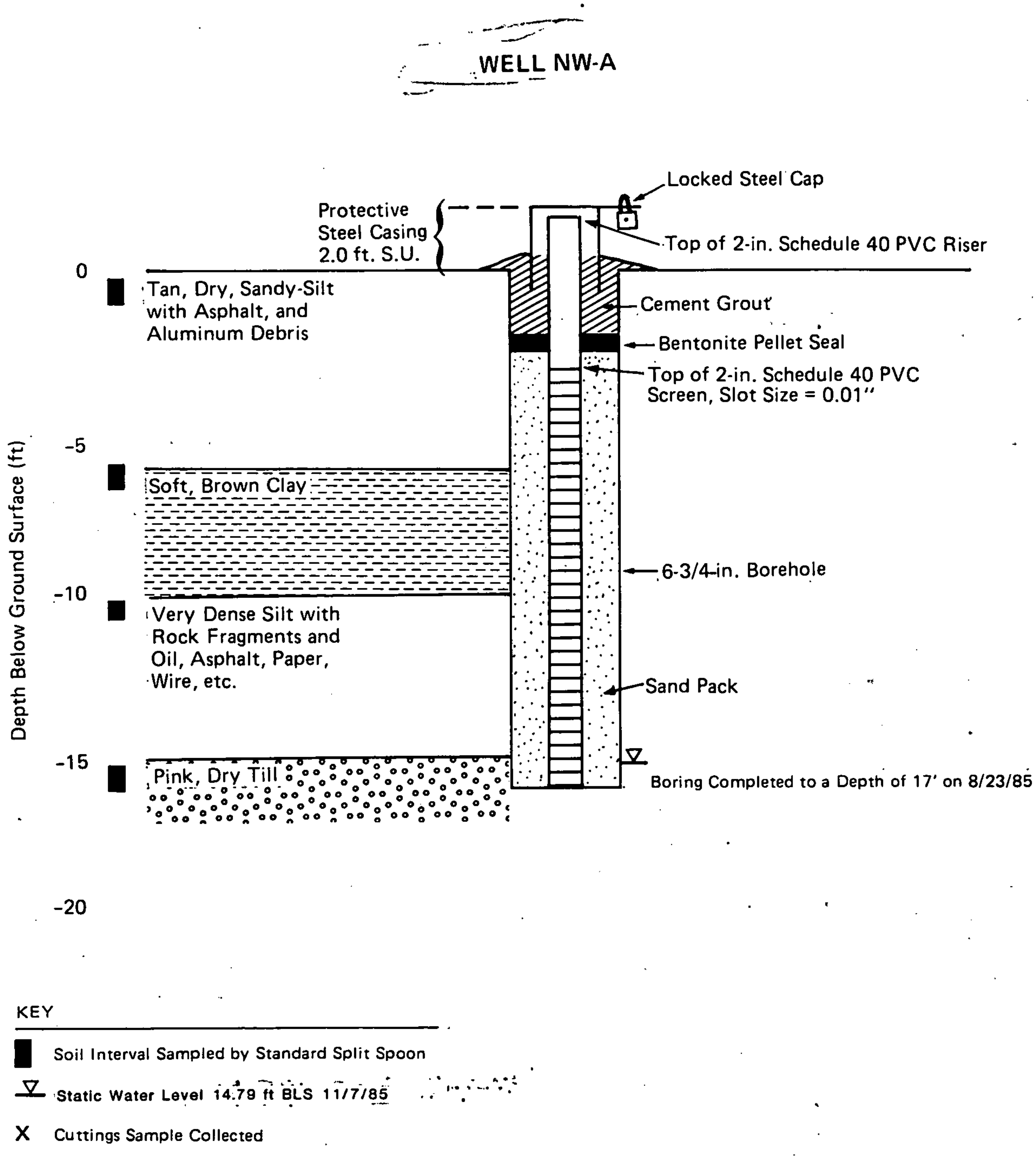
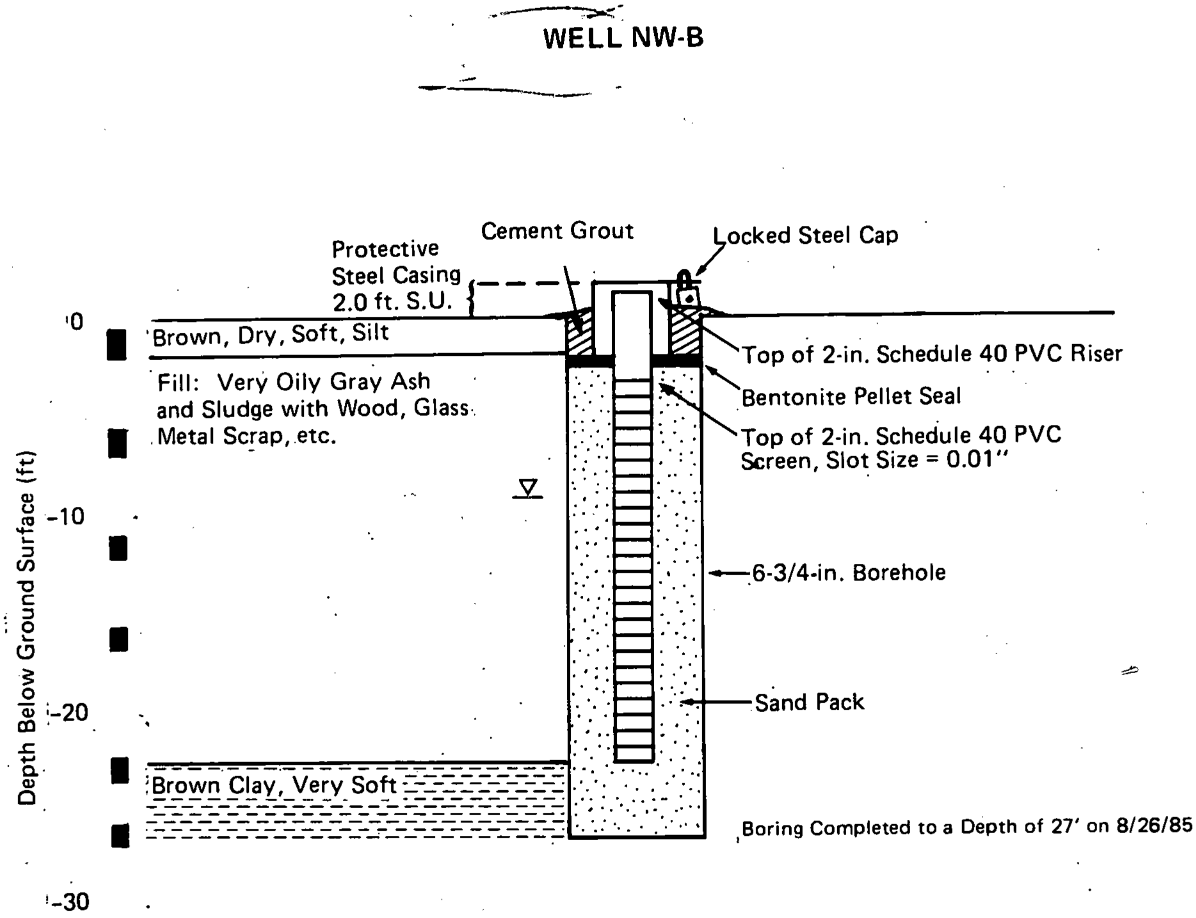


Figure 3-2. Boring log and well schematic, Niagra County R.D. Wheatfield Site.



KEY

- ▮ Soil Interval Sampled by Standard Split Spoon
- ∇ Static Water Level 7.11 ft BLS 11/7/85
- X Cuttings Sample Collected

Figure 3-3. Boring log and well schematic, Niagra County R.D. Wheatfield Site.

WELL NW-C

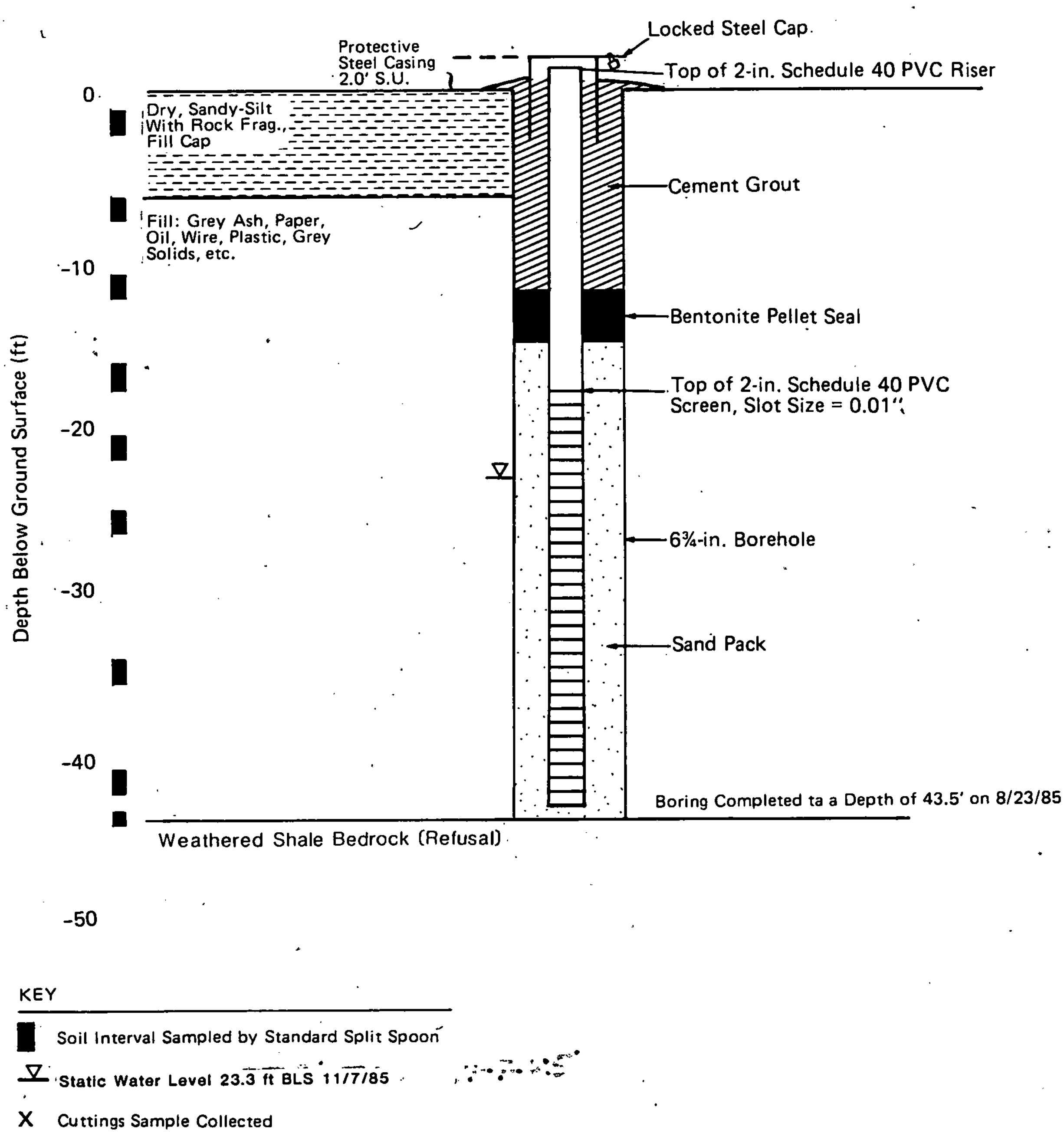
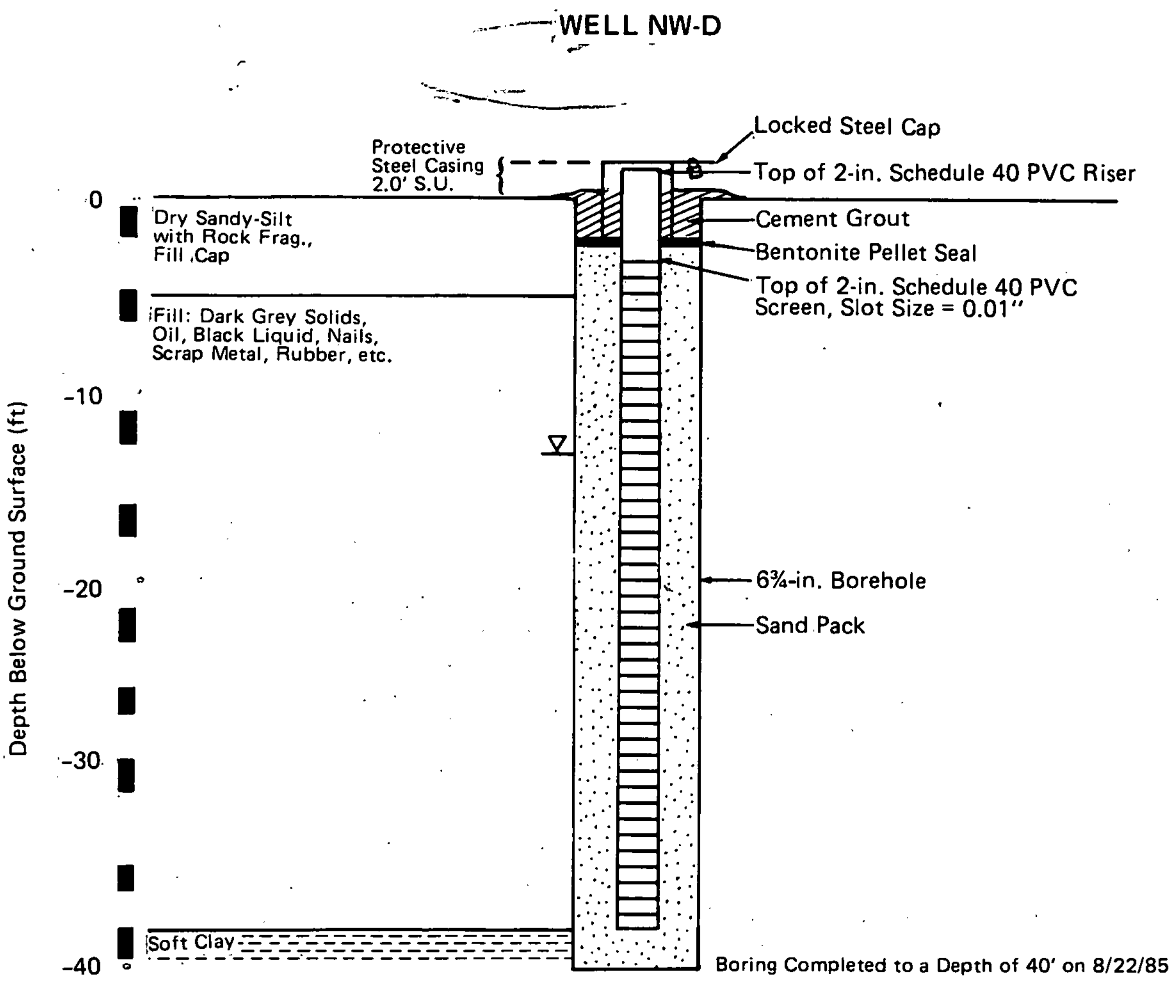


Figure 3-4. Boring log and well schematic, Niagra County R.D. Wheatfield Site.



KEY

■ Soil Interval Sampled by Standard Split Spoon

▽ Static Water Level 13.42 ft BLS 11/7/85

X Cuttings Sample Collected

Figure 3-5. Boring log and well schematic, Niagra County R.D. Wheatfield Site.

FIELD RECORD OF WELL PURGING

Site: NIAGARA/WHEATFIELD Project No: DEC52N3 Date: 11-7-85 Measured by: SNK, CRG

Comments: Weather Condition: RAIN; 40's

Page 1 of 2

Well No./ Permit No.	Depth to Water	Time	Measurement Reference	BOTTOM OF BOREHOLE	Purge Method	*25% BOREHOLE VOLUME (GAL)	Cal. H_2O X 4	Purged Volume	REMARKS
NW-A	16.70'	1200	TOPVC	17.0'	1½" TEFLON BAILER	6.24	24.97	BAILED DRY (≅ 5 GAL)	WATER FAIRLY CLEAR
NW-B	9.01'	1340	TOPVC	27.0'	CENTRIFUGAL PUMP	9.91	39.66	≅40	BAD ODOR; LIQUID GREY WITH MANY PARTICLE & SEDIMENT
NW-C	25.10'	1050	TOPVC	43.8'	1½" TEFLON BAILER	16.08	64.33	BAILED ≅55	
NW-D	15.30'	0820	TOPVC	40.0'	1½" TEFLON BAILER	14.69	58.75	BAILED ≅55	HOT WATER (? CHEM RXN WITHIN FILL OR FILL ON FIRE UNDERGRN (UNLIKELY))
									*ESTIMATED POROSITY OF GRAVEL PACK USED

Figure 3-6

FIELD RECORD OF GROUND-WATER SAMPLING

Site: NIAGARA/WHEATFIELD Project No: DEC 52N3 Date: 11-8-85 Measured by: JNK, CKJ

Comments: Weather Condition: SUNNY, 50°

Page 2 of 2

Well No./ Permit No.	Depth. to Water	Time	Measurement Reference	Purging	Sample Method	°Temp °	pH	Specific Conduct.	REMARKS
NW-A	—	1200	—	—	1½" TEFLON BAILER	—	5.82	1,380	
NW-B	—	1130	—	—	"	—	6.16	7,200	
NW-C	—	1000	—	—	"	—	5.40	16,500	
NW-D	—	0930	—	—	"	—	6.32	3,250	
SURFACE WATER									
NW-S1	—	1300	—	—	CLEAN 'C' BOTTLE	—	5.45	335	
NW-S2	—	0850	—	—	"	—	7.89	210	
NW-S3	—	—	—	—	—	—	—	—	NOT ENOUGH SEEP AVAILABLE TO SAMPLE
NW-S4	—	—	—	—	—	—	—	—	

Figure 3-7

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Niagara/Wheatfield

Well No: NW-A Gauge Date: 3-12-87 Time: 0830

Weather: Sunny ~ 20°F

Well Condition: Well locked; holes shot in steel casing. PVC casing broken about 1' from top.

Well Diameter (inches): 2" PVC well in 6 3/4" dia. borehole

Odor (describe): No HNu reading above background

Sounding Method: QED water level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.33' above ground surface

(1) Well Depth (ft): 18.33 Purge Date: 3-12-87 Time: 0915

(2) Depth to Liquid (ft): — Purge Method: Centrifugal pump

(3) Depth to Water (ft): 8.97' Purge Rate (gpm): 1 gpm

(4) Liquid Depth [(1)-(2)]: 9.36 Purge Time (min): 3.5 min.

(5) borehole Liquid Volume [(4)xF] (gal): 5.63 Purge Volume (gal): 3.5

Did Well Pump Dry? Describe: Yes, initial discharge clear after 2 gal. turn cloudy black.

Samplers: Tom Porter / Lori Rogers

Sampling Date: 3-13-87 Time: 0900 hrs.

Sample Type: GRAB Split? No With Whom: —

Comments and Observations:

FIGURE 3-8

*Conversion: Liquid Depth to Volume

Well Diameter	Gallon/ft
2"	0.16
4"	0.65
6"	1.47
8"	2.61
12"	5.87

Conversion Inches to Fractional Feet

1	.08	5	.42	9	.75
1 1/2	.12	5 1/2	.46	9 1/2	.79
2	.16	6	.50	10	.83
2 1/2	.21	6 1/2	.54	10 1/2	.87
3	.25	7	.58	11	.91
3 1/2	.29	7 1/2	.62	11 1/2	.95
4	.33	8	.56		
4 1/2	.37	8 1/2	.70		

* Multiply liquid depth by gallons/ft.

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Niagara/Wheatfield

Well No: NW-B Gauge Date: 3-12-87 Time: 0900

Weather: Sunny ~80 °F

Well Condition: Locked, holes shot in 55-gal. drums near well.

Well Diameter (inches): 2" PVC well in 6 3/4" borehole

Odor (describe): No HNu reading, smelled of methane

Sounding Method: QED electronic indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.86'

(1) Well Depth (ft): 24.86' Purge Date: 3-12-87 Time: 0945

(2) Depth to Liquid (ft): – Purge Method: ______

(3) Depth to Water (ft): 7.64 Purge Rate (gpm): ______

(4) Liquid Depth [(1)-(2)]: 17.22 Purge Time (min): ______

(5) one Liquid borehole Volume [(4)xF] (gal): 10.3 Purge Volume (gal): ______

Did Well Pump Dry? Describe: No, water level dropped below lift capacity of pump. Attempted to bail remainder, however unable to get bailer down well due to a bend in PVC well casing.

Samplers: ______

Sampling Date: ______ Time: ______

Sample Type: ______ Split? ______ With Whom: ______

Comments and Observations: Could not sample well due to bend in PVC well (possible cause by shifting within landfill).

FIGURE 3-9

*Conversion: Liquid Depth to Volume

Well Diameter	Gallon/ft
2"	0.16
4"	0.65
6"	1.47
8"	2.61
12"	5.87

Conversion Inches to Fractional Feet

1	.08	5	.42	9	.75
1 1/2	.12	5 1/2	.46	9 1/2	.79
2	.16	6	.50	10	.83
2 1/2	.21	6 1/2	.54	10 1/2	.87
3	.25	7	.58	11	.91
3 1/2	.29	7 1/2	.62	11 1/2	.95
4	.33	8	.56		
4 1/2	.37	8 1/2	.70		

* Multiply liquid depth by gallons/ft.

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Niagara / Wheatfield

Well No: NW-WC Gauge Date: 3-12-87 Time: 0840

Weather: Sunny ~ 20°F

Well Condition: locked,

Well Diameter (inches): 2" PVC well in 6 3/4" borehole

Odor (describe): no HNu above background, smell rotten

Sounding Method: QED electronic indicator Measurement Reference: Top PVC

Stick up/down (ft): 1.90'

(1) Well Depth (ft): 44.5 Purge Date: 3-12-87 Time: 1300 hrs.

(2) Depth to Liquid (ft): 25.85 Purge Method: Bailed

(3) Depth to Water (ft): " Purge Rate (gpm): -

(4) Liquid Depth [(1)-(2)]: 18.65 Purge Time (min):

(5) one Liquid borehole Volume [(4)xF] (gal): 11.19 Purge Volume (gal): 25 gal

Did Well Pump Dry? Describe: No, liquid in well ~~was~~ is leachate, black and smelled.

Samplers: Tom Porter / Lori Rogers

Sampling Date: 3-13-87 Time: 0830

Sample Type: Grab Split? No With Whom: ——

Comments and Observations:

FIGURE 3-10

*Conversion: Liquid Depth to Volume

Well Diameter	Gallon/ft
2"	0.16
4"	0.65
6"	1.47
8"	2.61
12"	5.87

Conversion Inches to Fractional Feet

1	.08	5	.42	9	.75
1 1/2	.12	5 1/2	.46	9 1/2	.79
2	.16	6	.50	10	.83
2 1/2	.21	6 1/2	.54	10 1/2	.87
3	.25	7	.58	11	.91
3 1/2	.29	7 1/2	.62	11 1/2	.95
4	.33	8	.56		
4 1/2	.37	8 1/2	.70		

* Multiply liquid depth by gallons/ft.

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Niagara / Wheatfield

Well No: NW-WD Gauge Date: 3-12-87 Time: 0950

Weather: Sunny ~20° F

Well Condition: No Lock, holes shot in 55 gal. drum near well.

Well Diameter (inches): 2" PVC well in 6 3/4" borehole

Odor (describe): 3 ppm above HNu Background. Putrid

Sounding Method: QED electronic indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.80

(1) Well Depth (ft): 39.9 Purge Date: 3-12-87 Time: 1350

(2) Depth to Liquid (ft): 10.10 Purge Method: Bailed

(3) Depth to Water (ft): ~~[illegible]~~ – Purge Rate (gpm): ____

(4) Liquid Depth [(1)-(2)]: ~~[illegible]~~ 29.8 Purge Time (min): ____

(5) Liquid Volume [(4)xF] (gal): 17.88 Purge Volume (gal): 56

Did Well Pump Dry? Describe: No, liquid from well was black and smelled bad (leachate)

Samplers: Tom Porter / Lori Rogers

Sampling Date: 3-13-87 Time: 0810

Sample Type: ____ Split? ____ With Whom: ____

Comments and Observations: ____

FIGURE 3-11

*Conversion: Liquid Depth to Volume

Well Diameter	Gallon/ft
2"	0.16
4"	0.65
6"	1.47
8"	2.61
12"	5.87

Conversion Inches to Fractional Feet

1	.08	5	.42	9	.75
1 1/2	.12	5 1/2	.46	9 1/2	.79
2	.16	6	.50	10	.83
2 1/2	.21	6 1/2	.54	10 1/2	.87
3	.25	7	.58	11	.91
3 1/2	.29	7 1/2	.62	11 1/2	.95
4	.33	8	.56		
4 1/2	.37	8 1/2	.70		

* Multiply liquid depth by gallons/ft.

4. SITE ASSESSMENT

4.1 SITE HISTORY

The Niagara County R.D. Wheatfield site, currently owned by the Town of Wheatfield, occupies approximately 50 acres off Witmer Road generally west and north of Warner Avenue (Figure 1-1). At the time the site was active, the owner of record was the County of Niagara. The Niagara County Refuse Solid Waste Agency opened the Wheatfield landfill in 1968. The site was closed in October 1976 after a history of operational problems and violations of Part 19 of the New York State Sanitary Code (and later Part 360 of the 6 NYCRR) (Appendix 1.4.1-1).

Over 100 waste generators are believed to have disposed at this site. The City of Niagara Falls, North Townawanda, and Niagara Sanitation used this site for disposal of municipal refuse. Carborundum, Bell Aerospace, Goodyear, E.I. Dupont, Hooker-Durez, Olin Chemicals, NL Industries, and Roblin Steel were among the industrial users of the site (Appendixes 1.4.1-1, 1.4.1-2, 1.4.1-3 and 1.4.1-4). It is estimated over 12,000 tons of industrial waste, including sludges, liquids, and solids, have been deposited (Appendix 1.4.1-4). During the site's operation, wastes accepted included municipal wastes, sewage sludge, and significant quantities of industrial and hazardous wastes (Appendixes 1.4.1-1, 1.4.1-3, and 1.4.1-4). Residue from the Niagara Falls Incinerator was also dumped at the site (Appendix 1.4.1-5).

Problems such as pooling of water and chemicals, odors, unrestricted access and leachate leaving the site were recorded while the facility was active (Appendixes 1.4.1-5 and 1.4.1-6). In 1972 and 1973, several reports show that leachate from this site entered the Niagara River in large quantities via drainage ditches. On at least one occasion, this leachate formed a large brown plume in the river. Odors have been detected along the shoreline. Oil was found in the ditches onsite on numerous occasions and water in these ditches was often strongly septic (Appendixes 1.4.1-1 and 1.4.1-7).

An incident involving a teenager who developed a rash after playing on the site was reported to the Niagara County Health Department. No cause for the rash was conclusively identified (Appendix 1.4.1-8).

The site was never properly closed and inspections revealed problems with scavenger dumping, protruding refuse, unrestricted access, erosion, lack of vegetation, pooling of water, clogged ditches and flowing leachate streams. Grading is rough and uneven and general site drainage is poor in many areas (Appendix 1.4.1-1 and EA Site Inspection).

4.2 SITE TOPOGRAPHY

The Niagara Wheatfield is an inactive landfill which received industrial and municipal wastes. The site has a slope varying from 5 to 30 percent with an average slope of less than 10 percent. The nearest downslope surface water is a wetland adjacent to the north edge of the site which drains north to Black

Creek which is approximately 0.25 mi northwest from the site. Two drainage ditches (one through the site and one on the perimeter of the site) drain runoff from the site south to the Niagara River (Figure 3-1).

The distance to the nearest residence is approximately 200 ft east of the site, and the nearest commercial establishment is 1,000 ft west of the site (Appendix 1.4.2-1). There are no community water supplies within 3 mi and down river of the site (Appendixes 1.4.1-1 and 1.4.2-2).

4.3 SITE HYDROGEOLOGY

The Niagara/Wheatfield site is located just west of North Tonawanda, New York, within the Erie-Niagara Basin of the Erie-Ontario Lowlands of the Interior Lowlands Physiographic Province (Appendix 1.4.3-1). The site is located upstream from Niagara Falls in the Niagara River Valley (Figure 1-1). The area is characterized by a surficial lacustrine clay deposit with thin sand stringers overlying the Camillus Shale of Paleozoic age (Appendixes 1.4.3-2 and 1.4.3-3).

In 1983, under a project for U.S. EPA, NUS Corporation installed five bedrock monitoring wells around the perimeter of the site. Depth to bedrock for the wells were reported to be as follows: Well No. 1 - 42.5 ft below ground surface (bgs), Well No. 2 - 36 ft bgs, Well No. 3 - 35 ft bgs, Well No. 4 - 38 ft bgs, and Well No. 5-55 ft bgs. The borings were completed 10 ft into bedrock. Type of bedrock was not indicated, only that bedrock was fractured in all five wells and all the wells had high rates of recharge (Appendix 1.4.3-4).

The lacustrine clay deposits in the Erie-Ontario Lowlands form a thin skin over till and bedrock. The clays are so impermeable as to yield no water to the wells (Appendix 1.4.3-1).

During EA's Phase II investigation, four wells were installed within the filled area. Fifteen ft of fill at NW-A rests on what appears to be a pink glacial till. Fill at NW-B (23 ft thick) rests on clay. Fill at NW-C (43.5 ft thick) rests on bedrock, and fill at NW-D (38 ft thick) rests on a gravel/sand/clay mixture (Figures 3-2 through 3-5).

The clay layer (over bedrock) seems to have been excavated at the north cell area (NW-C) with the deposited fill resting on bedrock. Also, the fill cap of sandy-silt is in a degrading condition, especially evident during the Phase II investigation at the northern cell where erosion on the west side has created several 1-ft deep channels.

Liquid levels reflect leachate level within the fill at a given point, and are not necessarily related to ground-water level. Liquid is probably perched at different depths within the fill. Well data suggests leachate may be moving locally west and south. A hydraulic gradient of 2 percent can be estimated but may not be meaningful due to the non-uniform distribution of liquid in the fill. Water levels in the wells fluctuate a great deal depending on the season, except for Well NW-C, which may indicate that the leachate is hydraulically connected to bedrock which directly underlies the fill in that well location (Table 3-1).

Leachate was relatively clear at well NW-A, but was dark grey at Wells B, C, and D. Leachate was found to be highly conductive at NW-C and had a low pH. Leachate at NW-B was also very conductive. Leachate at NW-D appeared to be smoking, possibly due to chemical reaction within the fill. Also, surface water sample S-1 exhibited a low pH.

Based on available data, there is potential for a hydraulic connection between the fill and the bedrock aquifer, as indicated in the north cell (NW-C), where fill rests on bedrock.

A short-term low-yield pump test was attempted at NW-B and NW-D, however due to the condition of the wells, accurate values could not be obtained (Section 3.2.3 and Appendix 1.3.2-2).

No known water supply wells are located in the vicinity (within 3 mi) of the site (Appendix 1.4.2-2).

4.4 SITE CONTAMINATION

The Niagara County R.D.-Wheatfield landfill site reportedly received a variety of industrial and hazardous waste. Waste disposal at the site included: caustic soda, perchloroethylene, tetrachloroethylene, phenolic wastes, and miscellaneous chemical wastes (Appendixes 1.4.1-1, 1,4.1-3, and 1.4.1-4). The Niagara County Health Department has sampled leachate and surface water at and near the site on numerous occasions in the past. Analysis was performed for 13 metals, phenol, COD, suspended residuals, and dissolved residuals. Chromium, lead, iron, and magnesium were detected in the leachate (surface water) entering the Niagara River. However, the concentrations were reportedly not significant. A sediment sample was also collected from a ditch at the center of the site and analyzed for PCB's. Only a low concentration of Aroclor 1260 (.25 mg/kg) was detected (Appendixes 1.4.1-1 and 1.4.4-1).

A number of limited studies have been conducted on the site. In September 1980 the U.S. EPA collected two surface water (leachate) and five sediment samples from ditches at the site. In June 1981, the New York State Department of Environmental Conservation (NYSDEC) collected four surface water and four sediment samples from the ditches. Thirteen priority pollutant organics were detected in the surface water. Phenol, trans-1,2-dichloroethylane, and heptachlor exceeded U.S. EPA critierion for maximum permissable concentration in drinking water. Several heavy metals were also detected. Elevated levels of heavy metals and a number of organic compounds were found in the sediment samples (Table 4-1 and Appendixes 1.4.3-2 and 1.4.4-2).

In 1982, the U.S. Geological Survey drilled 10 test holes at the site and collected 10 soil samples (substrate) as well as 2 ground-water samples. The samples were analyzed for organic compounds. Only three priority pollutants were found, all below quantifiable detection limits (Appendix 1.4.3-2).

NUS Corporation collected surface water and sediment from the in 1980, 1981, and 1983, for the U.S. EPA. The results of samples collected in 1983 found no organic priority pollutants on the site. However, sample results from 1980 and 1981 showed a number of PAH's, phthalates, and pesticides (Appendix 1.4.4-3).

In June 1985, a Geometrics G-856 proton magnetometer was used to evaluate subsurface conditions for large concentrations of buried ferrous material. Interpretation and analysis of the data pointed up zones where subsurface ferrous material may be present. Both high and moderate anomalous zones are shown in Plates 2-4 of Appendix 1.3.2-1. The high anomalous zones indicate larger amounts of ferrous material relative to the moderate anomalous zones.

Leachate in Fill Material

Liquid samples were taken from each of the four wells (NW-A, NW-B, NW-C, and NW-D) installed in the fill during the initial sampling on 2 November 1985. Wells NW-A, NW-C, and NW-D were resampled on 13 March 1985 for PCB and pesticide analysis. Well NW-B could not be resampled. Analytical results are presented in Table 4-2.

Elevated concentrations of the following volatile organic compounds were detected in the wells: methylene chloride, acetone, 2-butanone, toluene, benzene, 4-methyl-2 pentanone, ethylbenzene, chlorobenzene, m-xylene, o&p xylene, and styrene. Methylene chloride, acetone, and 2-butanone were detected in the method blank, however, the levels detected in the wells were at least two magnitudes higher in the well samples except for methylene chloride in Wells NW-A and NW-B which were similar to the levels detected in the method blanks. Toluene, benzene, 4-methyl-2 pentanone, and ethylbenzene were detected in all four wells; chlorobenzene, m-xylene, and o&p xylene in Wells NW-B, NW-C, and NW-D; and styrene in Well NW-C. Some of the concentrations of these volatile compounds were at levels below the increased detection limit affected by dilution due to the high concentration of some of the other compounds.

Elevated concentrations of the following semi-volatile compounds were detected in the well samples: phenol, 2-methyl phenol, and 4-methyl phenol in all of the wells; 2,4-dimethyl phenol in Wells NW-B and NW-D; and benzl alcohol, napthalene, diethyl phthalate, and pentachlorophenol in one well each at levels below the increased detection limit affected by dilution. Wells NW-C and NW-D located in the northern end of the site exhibited the higher organic concentration levels.

For metals concentrations, Well NW-C contained the highest concentrations with arsenic, barium, chromium, iron, lead, manganese, and zinc all above NYS quality standards for Class GA ground water, best use of water as a source of potable water supply (6NYCRR, Part 701). Total cyanide was detected in all the well samples at low levels, and total phenols were found in all wells with the highest levels in Well NW-C. No pesticides or PCB's were detected in any of the wells.

Ground Water

The monitoring wells east of the site were sampled by U.S. Geological Survey in September 1980. Only two priority pollutants were found, both below quantifiable detection limits. The samples contained 15 organic non-priority pollutants, of which only 4 were above quantifiable detection limits (Appendix 1.4.3-2).

The ground-water samples were collected by NUS Corporation from monitoring wells surrounding the site, in May 1983. The samples were analyzed for priority pollutants. Methylene chloride, acetone, and bis(2-ethylhexyl) phthalate were the only organics detected in the ground-water samples. Acetone was used for decontamination of field equipment and probably is a sampling artifact. Inorganic concentrations detected in the ground-water were not significant (Appendix 1.4.4-3).

Surface Water

The surface water samples S1 and S2, collected during EA's Phase II investigation, did not have concentrations of any organics (volatile or semi-volatile) greater than levels detected in the method blanks. The only elevated concentrations of contaminants were detected in sample S2 (surface water at the site's northern portion) which had levels of aluminum (3.0 mg/liter), iron (4.5 mg/liter), magnesium (18 mg/liter), and zinc (7.0 mg/liter). Of these, zinc is above quality standards for Class D, suitable for secondary contact recreation (6NYCRR, Part 701). Elevated levels of total phenols (0.21 mg/liter) were also detected in surface water sample S1 in (refer to Table 4-2 for summary of analytical results).

Soil

Soil samples were also taken at S1 and S2. Iron and magnesium concentrations were above average soil conditions, however, the concentrations were not out of the range of observed natural soil conditions. Three volatiles (methylene chloride, acetone, and 2-butanone) were detected in the soil samples. However, the method blanks had similar quantities. Six semi-volatile organic compounds were detected in soil sample S-1. However, none were present above the quantifiable detection limits (Table 4-2).

Air

No data available.

Waste

The drum sample was composed of relatively inert material and no significant concentrations of any of the HSL parameters were observed. However, the drum sample was ignitable (Table 4-2).

TABLE 4-1 PAST STUDY RESULTS-ANALYSES OF SURFACE WATER AND BOTTOM SEDIMENTS FROM DRAINAGE DITCHES AT NIAGARA COUNTY REFUSE DISPOSAL SITE, WHEATFIELD, N.Y., [Blanks indicate less than detection limit, dashes indicate not analyzed]

	U.S. EPA (1980) AND NYSDEC (1981)			
	Surface water (ug/L)		Bottom material (ug/kg)	
	Maximum	Mean	Maximum	Mean
Inorganic Constituents				
Antimony	--	--	4,000	2,600
Arsenic	30	25	7,800	6,300
Beryllium	--	--	16,000	10,600
Cadmium	--	--	3,800	800
Chromium	--	--	23,000	14,100
Copper	52	20	61,000	34,000
Lead	160+	32	84,000	47,000
Mercury	1.58	0.4	14,200	3,200
Nickel	100	20	45,000	16,400
Selenium	--	--	200	60
Silver	--	--	400	240
Zinc	174	61	1,500,000	390,000
Organic Compounds				
Priority pollutants				
Benzene	--	--	0.5	0.2
Chlorobenzene	--	--	5	1
Chloroform	--	--	4	2
1,2-Dichloroethane	--	--	4	1
Trans-1,2-dichloroethylene	37+	7+	12	2
1,2-Dichloropropane	--	--	1	1
Ethylbenzene	8	2	3	1
Methylene chloride	2	1	31	15
Tetrachloroethylene	56	11	19	4
Toluene	31	6	4	1
1,1,1-Trichloroethane	--	--	0.5	0.1
Trichloroethylene	8	2	5	2
Vinyl chloride	2	0.4		
b-BHC	--	--	58	6
w-BHC	--	--	90	10
4,4'-DDE	--	--	11	3
PCB-1248	--	--	320	53
PCB-1254	--	--	180	37
Phenol	34,000+	5,666+	1,900	333
Acenaphthene	--	--	17	4

Note: The analytical program [illegible] those parameters detected [illegible] Appendix [illegible] report for the complete [illegible] analytical data [illegible]

TABLE 4-1 (Cont.)

	Surface water (ug/L)		Bottom material (ug/kg)	
	Maximum	Mean	Maximum	Mean
Organic Compounds (continued)				
Priority pollutants (continued)				
Acenaphthylene	--	--	130	14
Anthracene	--	--	2,000	273
Benzo(a)pyrene	--	--	2,300	299
Benzo(b)fluoranthene	--	--	2,200	282
Benzo(ghi)perylene	--	--	7,605	845
Bis(2-ethylhexyl)phthalate	330	57	6,900	2,444
Butylbenzyl phthalate	0.8	0.1	330	64
Chrysene	--	--	3,200	356
1,2-Dichlorobenzene	--	--	39	8
1,3-Dichlorobenzene	--	--	59	17
1,4-Dichlorobenzene	--	--	59	17
Di-n-butyl phthalate	9	2	470	217
Di-n-octyl phthalate	10	2	170	19
Fluoranthene	--	--	2,500	319
Fluorene	--	--	93	15
Hexachlorobenzene	--	--	39	4
Naphthalene	--	--	160	34
Phenanthrene	--	--	2,000	273
Pyrene	--	--	2,000	254
1,2,4-Trichlorobenzene	--	--	47	6
Benzo(a)anthracene	--	--	3,200	356
Indeno(1,2,3-cd)pyrene	--	--	820	91
2,4-Dimthyl phenol	--	--	990	110
Heptachlor	0.13+	0.04+		
Nonpriority pollutants				
Trichlorofluoromethane	--	--	1	0.2
Diethyl phthalate	40	7	180	67

+ Exceeds U.S. EPA criterion for maximum permissable concentration in drinking water.

TABLE 4-2 NIAGARA WHEATFIELD -- SUMMARY OF PHASE II ANALYTICAL RESULTS

Parameter	11-12-85 Method Blank I	Trip Blank No. 1	Water Samples NW WA	NW WB	NW WC	NW WD	NW S1	NW S2
VOLATILE ORGANICS (ug/L)								
Methylene chloride	10	6B	51B	BDL[B]	3000B	150B	BCRDL[B]	BCRDL[B]
Acetone	28	BCRDL[B]	740B	1200B	6400B	1900B	BCRDL[B]	BCRDL[B]
2-Butanone	BCRDL	BCRDL[B]	250B	360B	1400B	920B		BCRDL[B]
Benzene			180	54	BDL	73		
Trans-1.2-Dichloroethene			BDL					
4-Methyl-2-Pentanone			210	BDL	BDL	210		
Toluene			150	180	2100	650		
Chlorobenzene				28	BDL	BDL		
Ethylbenzene			55	160	BDL	54		
Styrene					810			
M-Xylene				260	290	120		
o & p-Xylene				220	BDL	96		
SEMI VOLATILES 12-6-85								
Phenol			110	690	270,000	15,000		
Benzyl Alcohol						BDL		
2-Methyl Phenol			28	BDL	13,000	1,800		
4-Methyl Phenol			160	340	5,800	3,200		
2,4-Dimethyl Phenol				120		170		
Naphthalene				BDL				
Diethyl Phthalate					BDL			
Pentachlorophenol						BDL		
Di-N-Butyl Phthalate	550							
Bis(2-Ethylhexyl) phthalate	2,400	31B		BDL	230B	BDL		88B
Tot. Cyanide (mg/L)		<0.01	0.02	0.04	0.15	0.04	0.02	<0.01
Tot. Phenols (mg/L)		<0.05	0.74	385	744	46.8	0.21	0.08

TABLE 4-2 (Cont.)

Parameter	Method Blank I	Trip Blank No. 1	Water Samples NW WA	NW WB	NW WC	NW WD	NW S1	NW S2
METALS (mg/L)								
Aluminum			12.0	0.50	21.0	16.0	0.40	3.00
Antimony				BCRDL	0.45	BCRDL		
Arsenic		0.025		0.020	0.062	BCRDL		
Barium		1.0	0.62	0.42	3.10	0.26	0.05	0.15
Beryllium		0.005						
Cadmium			BCRDL	BCRDL	0.012	0.016	BCRDL	BCRDL
Calcium			280	250	3,000	490	90.0	60.0
Chromium		BCRDL	0.013	0.06	0.98	0.055	BCRDL	BCRDL
Cobalt					0.30			
Copper		0.032	0.046	BCRDL	0.16	0.064	BCRDL	0.032
Iron			180	68.0	1,400	140	0.38	4.50
Lead			0.016	0.015	0.36	0.074	BCRDL	0.023
Magnesium			170	130	1,000	200	18.0	18.0
Manganese		0.16	1.28	1.41	20.8	1.41	0.09	0.49
Mercury				0.0003	0.0002	0.001		
Nickel		0.56	0.07	0.07	0.86	0.05		0.14
Potassium			13.0	1,200	700	100	5.00	5.00
Silver					BCRDL			
Sodium			25.0	1,020	2,700	310	10.0	19.0
Thallium				0.005				
Vanadium					0.31	0.08		
Zinc		0.06	0.20	18.0	100	4.60	0.07	7.00

NOTE: BCRDL = Detected below contract required detection limit; BDL = indicates estimated value. Detected below increased detection limit affected by dilution (refer to CLP report); B = detected in method blank. The analytical program included the full HSL, however, this summary table includes only those parameters detected in at least one sample. Refer to Appendix 3 (bound separately) of this report for the complete CLP analytical data package.

TABLE 4-3 NIAGARA WHEATFIELD -- SUMMARY OF PHASE II ANALYTICAL RESULTS

Parameter	11-13-85 Method Blank II ug/L	Trip Blank No. 1	Soil Sample NW-S1	Soil Sample NW-S2	Drum NW-D1 Bulk	Drum NW-D1 EP TOX Extract mg/L
VOLATILE ORGANICS						
Methylene chloride	BCRDL	6 B	49 B	85 B	82 B	*
Acetone	BCRDL	BCRDL B	56 B	36 B	29 B	*
2-Butanone	BCRDL	BCRDL B	BCRDL B	BCRDL B	BCRDL B	*
SEMI VOLATILES[1] (ug/kg) 12-11-85						
Phenanthrene				BCRDL		*
Di-N-Butyl Phthalate				BCRDL		*
Fluoranthene				BCRDL		*
Pyrene				BCRDL		*
Benzo(a)Anthracene				BCRDL		*
Bis(2-Ethylhexyl) phthalate		31 B			BCRDL	*
Chrysene				BCRDL		*
Tot. Cyanide (mg/L)		<0.01	<0.2	<0.2	<0.2	
Tot. Phenols (mg/L)		<0.05	<2	<2	<2	
METALS (mg/kg)						
Aluminum			6,500	8,200	2,650	*
Antimony			BCRDL		BCRDL	*
Arsenic		0.025	4.5	3.6	1.6	
Barium		1.0	110	76	46.7	4.7

TABLE 4-3 (Cont.)

Parameter	11-13-85 Method Blank II ug/L	Trip Blank No. 1	Soil Sample NW-S1	Soil Sample NW-S2	Drum NW-D1 Bulk	Drum NW-D1 EP TOX Extract mg/L
METALS (mg/kg) (cont.)						
Berylium		0.005	0.35	0.34	BCRDL	*
Cadmium			0.82	0.17	2.1	
Calcium			43,000	3,200	3000	*
Chromium		BCRDL	7.0	9.5	3.24	0.026
Cobalt			3.3	2.6	BCRDL	*
Copper			24	10	10	*
Iron			14,000	9,400	12,000	*
Lead			110	31	20	
Magnesium			15,000	1,700	1,320	*
Manganese		0.16	274	106	145	*
Mercury			0.17	0.24		
Nickel		0.56	10	10	3.0	*
Potassium			890	850	583	*
Selenium			BCRDL	0.26	BCRDL	
Silver			BCRDL	0.076		
Sodium			86	75	BCRDL	*
Thallium						*
Tin			2.2			*
Vanadium			11	12		*
Zinc		0.06	220	74	29.6	*

Parameter	11-13-85 Method Blank II ug/L	Trip Blank No. 1	Soil Sample NW-S1	Soil Sample NW-S2	Drum NW-D1 Bulk	Drum NW-D1 EP TOX Extract mg/L
HAZARDOUS CHARACTERISTICS						
Corrosivity			* 5.3			
Ignitability			Ignitable (35C)			
Reactivity			Not Reactive			

* Not analyzed.

NOTE: BCRDL = detected below contract required detection limit (refer to CLP report); B = detected in method blank. The analytical program included the full HSL, however, this summary table includes only parameters detected in at least one sample. Refer to Appendix 3 (bound separately) of this report for the complete CLP analytical data package.

1 Results for the soil and drum samples are from the resampling on 13 March 1987.

** Note: For the following samples no pesticides and PCB were reported above the detection limit. However, in the QA/QC review, substantial peaks were noted in the retention time windows for delta-BHC, heptachlor and dieldrin.

Sample ID	Matrix	Analysis
NW-S1	Water	Pest./PCB's
NW-S2	Water	Pest./PCB's
NW-WA	Water	Pest./PCB's
NW-WC	Water	Pest./PCB's
NW-WD	Water	Pest./PCB's
NW-D1	Soil	BNA's, Pest./PCB's
NW-S1	Soil	BNA's, Pest./PCB's
NW-S2	Soil	BNA's, Pest./PCB's

For soil samples NW-D1, NW-S1, NW-S2, the holding times were exceeded for BNA's, Pesticides and PCB's, and the data is invalid. No data on these parameters is in Table 4-3. There is data in the EA QA/QC Appendix on these samples.

** CORRECTED VERSION WRITTEN BY NYSDEC

5.1

5. NARRATIVE SUMMARY

The Niagara Wheatfield site is located off Warner and Witmer Roads in the Town of Wheatfield, Niagara County, New York. The site is presently owned by the Town of Wheatfield, but Niagara County owned and operated the landfill while it was active. The site opened in 1968 and was closed in October 1976 after a history of operational problems and violations of Part 19 of the New York State Sanitary Code.

More than 100 waste generators, including the City of Niagara Falls, Niagara Sanitation, E.I. Dupont, Olin Chemicals, and Roblin Steel, used this site to deposit wastes containing phenolic resins and molding compounds, offgrade polyvinyls, PVC skins and emulsions, brine sludge with mercury and other various trash. The site was never properly closed and many of the operational problems which resulted in its closure still exist today. These include inadequate cover, unrestricted access, pooling of water and chemicals, odors and leachate leaving the site. Grading is rough and uneven and general site drainage is poor.

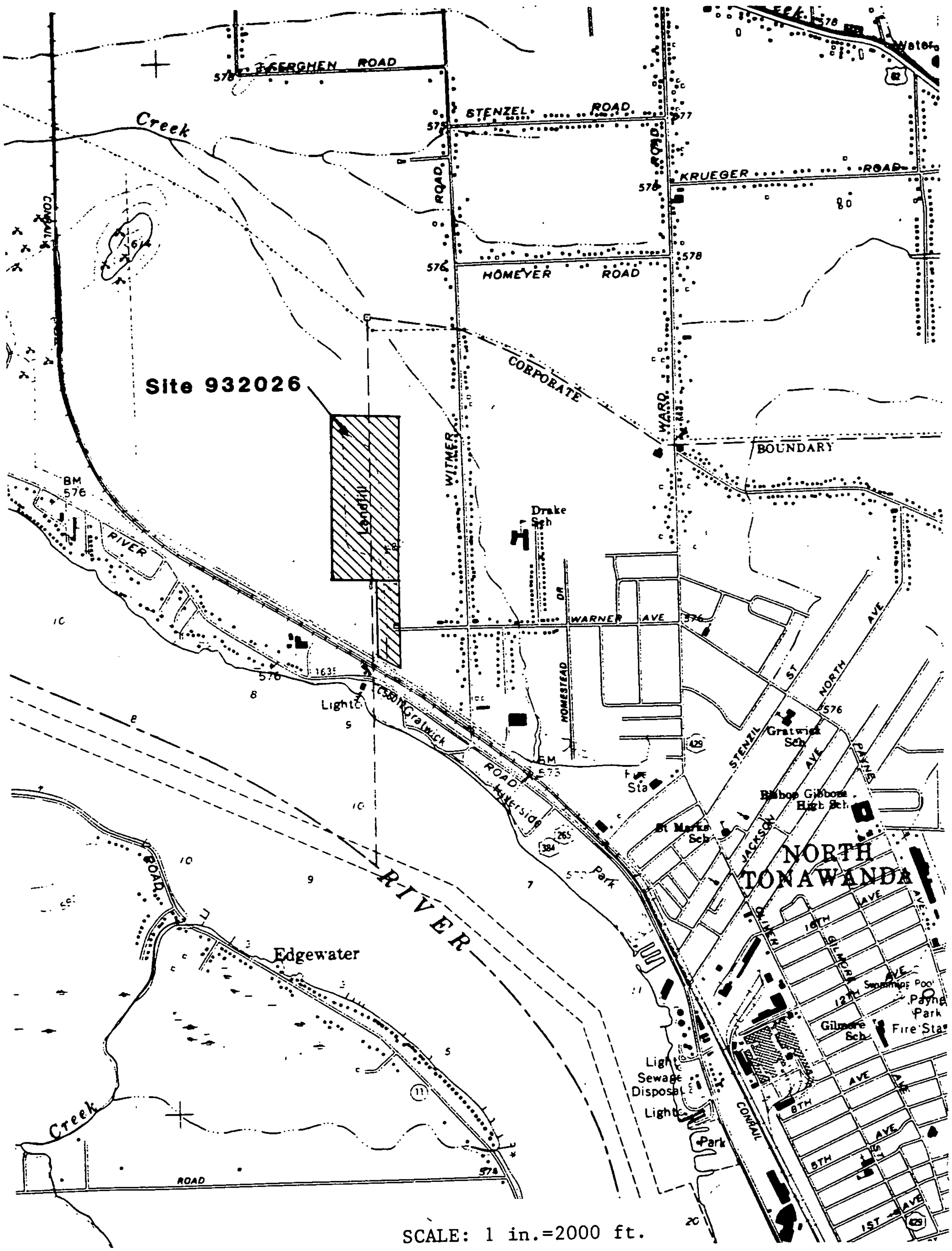
The site is less than a 0.5-mi from the Niagara River, the water source for North Tonawanda (upgradient of the site) and many surrounding communities. A wetland which drains to Black Creek is adjacent to the site. However, the distance to all water supply intakes is greater than 3 mi. Black Creek is 0.25 mi from the north slope of the landfill. There is a residence approximately 200 ft and a commercial establishment 1,000 ft from the landfill. Ground water is not a source of drinking water for the surrounding community.

Analysis of samples collected by EA from onsite monitoring wells, drainage ditches, and soil near the ditches detected elevated concentrations of several organic compounds, phenols, iron, and zinc in the fill.

5.2

COORDINATES:
Latitude: 43 03'55'
Longitude: 78 54'22'

NIAGARA COUNTY R.D.-WHEATFIELD SITE



SCALE: 1 in.=2000 ft.

Tonawanda West Quad
NYSDOT 7.5 Minute Series
1976 Edition

5.3

Facility name: Niagara Wheatfield

Location: Town of Wheatfield, Niagara County

EPA Region: II

Person(s) in charge of the facility: Town of Wheatfield
2800 Church Road
N. Tonawanda, New York 14120

Name of Reviewer: EA Engineering, Science and Technology, Inc. Date: 3 July 1986

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 Niagara Wheatfield is an inactive landfill which was operational from 1968 to 1976. The site was used by a number of industries and has received over one million tons of wastes containing phenolic resins, PVC skins & emulsions, sludge, and other various trash.

Scores: S_M = 7.91 S_{gw} = 1.50 S_{sw} = 13.60 S_a = 0)
S_{FE} = 50.00
S_{DC} = 37.50

FIGURE 1
HRS COVER SHEET

BILLING CODE 6560-50-C

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	0	3	
Physical State	0 1 2 (3)	1	3	3	
	Total Route Characteristics Score		11	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	8	8	
	Total Waste Characteristics Score		26	26	
5 Targets					3.5
Ground Water Use	0 (1) 2 3	3	1	9	
Distance to Nearest Well/Population Served	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
	Total Targets Score		1	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			858	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 1.50		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multiplier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	(0) 45	1	0	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	3	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	3	3	
	Total Route Characteristics Score		14	15	
3 Containment	0 1 (2) 3	1	2	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	8	8	
	Total Waste Characteristics Score		26	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	6	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		12	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			8,736	64,350	
7 Divide line 6 by 64,350 and multiply by 100	S_{sw} = 13.6				

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multiplier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
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		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	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			

FIGURE 9
AIR ROUTE WORK SHEET

BILLING CODE 6560-50-C

	s	s^2
Groundwater Route Score (S_{gw})	1.50	2.25
Surface Water Route Score (S_{sw})	13.6	184.96
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		187.21
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		13.68
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		7.91

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1 (3)	1	3	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 (3)	1	3	3	
Ignitability	0 (1) 2 3	1	1	3	
Reactivity	(0) 1 2 3	1	0	3	
Incompatibility	(0) 1 2 3	1	0	3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			12	20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 (4) 5	1	4	5	
Distance to Nearest Building	0 1 (2) 3	1	2	3	
Distance to Sensitive Environment	0 1 2 (3)	1	3	3	
Land Use	0 1 2 (3)	1	3	3	
Population Within 2-Mile Radius	0 1 2 3 (4) 5	1	4	5	
Buildings Within 2-Mile Radius	0 1 2 3 (4) 5	1	4	5	
Total Targets Score			20	24	
4 Multiply 1 x 2 x 3			720	1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} =	50.00		

FIGURE 11

FIRE AND EXPLOSION WORK SHEET

BILLING CODE 6560-50-C

Direct Contact Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multiplier**	**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	12	20	
Distance to a Critical Habitat	(0) 1 2 3	4	0	12	
Total Targets Score			12	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]			8,100	21,600	
[7] Divide line [6] by 21,600 and multiply by 100		S_{DC} =	37.5		

FIGURE 12
DIRECT CONTACT WORK SHEET

BILLING CODE [illegible]-C

5.4

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 = 4,230 drums plus 800 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: Niagara Wheatfield

LOCATION: Town of Wheatfield, Niagara County, New York

DATE SCORED: 3 July 1986

PERSON SCORING: Gloria D. McCleary

PRIMARY SOURCES(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.)

EA Science and Technology, Phase II Field Activities
Niagara County Health Department Files
New York State Department of Environmental Conservation Files

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Air.

COMMENTS OR QUALIFICATIONS:

Ground-water and surface water migration routes had low target values (i.e., no water supplies), but no detailed house to house survey of water supply sources was conducted.

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

None. Wells were placed in the landfill.

Assigned value = 0.

Rationale for attributing the contaminants to the facility:

***

2 ROUTE CHARACTERISTICS

<u>Depth to Aquifer of Concern</u>

Name/description of aquifer(s) of concern:

Bedrock; Camillus shale.

Reference: 2.

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

8 ft.

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

43.5 ft.

Reference: 3 (Figure 3-4).

Depth to Aquifer of Concern:

0 ft. Fill appears to be within perched ground water.

Assigned value = 3.

Reference: 1.

Net Precipitation

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

34 in.

Reference: 4.

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

26 in.

Reference: 1.

Net precipitation (subtract the above figures):

8 in.

Assigned value = 2.

Reference: 1.

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Clay and shale.

Reference: 3 (Section 4.3 and Figures 3-2 through 3-5).

Permeability associated with soil type:

Approximately 10^{-7} cm/sec.

Assigned value = 0.

Reference: 1.

Physical State

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

Liquids, solids, sludge.

Assigned value = 3.

References: 1, 5, 6 and 7.

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

No liner and leachate collection at the landfill.

Reference: 3 (well logs, Figures 3-2 through 3-5).

Method with highest score:

No liner and inadequate leachate collection (evidence of leachate on site inspection).

Assigned value = 3.

Reference: 1.

***

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Phenol	Benzene	m-xylene
Toluene	4-methyl-2-pentanone	o&p-xylene
Iron	ethylbenzene	styrene
Magnesium	chlorobenzene	2,4-dimethyl phenol
Zinc	Arsenic	Lead

Reference: 3 (Section 4.4 and Table 4-2).

Compound with highest score:

Zinc, arsenic, lead, and iron.

Assigned value = 18.

Reference: 1.

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):

12,494.3 tons.

Reference: 5.

Basis of estimating and/or computing waste quantity:

Records of waste disposal.

Assigned value = 8.

Reference: 1.

***

5 TARGETS

Ground Water Use

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

There are no known wells completed in the aquifer of concern within a 3-mi radius of the site, but aquifer is usable.

Assigned value = 1.

References: 1, 8, 9, and 10.

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.

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:

Population served by public water supply.

Assigned value = 0.

References: 1, 8, and 9.

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.

Reference: 11.

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

Zero.

Assigned value = 0.

Reference: 1.

SURFACE WATER ROUTE

1 OBSERVED RELEASE

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

None.

Assigned value = 0.

Reference: 1.

Rationale for attributing the contaminants to the facility:

***

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

5 to 30 percent.

Reference: 7.

Name/description of nearest downslope surface water:

Marsh, adjacent north, which discharges to Black Creek.

References: 7 and 12.

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

Wetland/pond adjacent to site.

Assigned value = 3.

Reference: 1.

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

Yes. Marshy area within/adjacent to the site.

Assigned value = 3.

References: 1 and 7.

Is the facility completely surrounded by areas of higher elevation?

No. Site and surrounding area are relatively flat.

Reference: 12.

<u>1-Year, 24-Hour Rainfall in Inches</u>

2.1 in.

Assigned value = 2.

Reference: 1.

<u>Distance to Nearest Downslope Surface Water</u>

Adjacent to site.

Assigned value = 3.

Reference: 7.

<u>Physical State of Waste</u>

Solids, liquids, and sludges.

Assigned value = 3.

References: 5, 6, 7, and 1.

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Runoff diversion and cover.

Method with highest score:

Inadequate cover and leachate discharging via ditches.

Assigned value = 2.

Reference 7.

***

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Phenol	Lead
Toluene	trans-1,2-dichloroethylene
Iron	Heptachlor
Magnesium	Tetrachloroethylene
Zinc	Arsenic

Reference: 3 (Section 4.4; Tables 4-1 and 4-2).

Compound with highest score:

Lead, arsenic, and heptachlor.

Assigned value = 18.

Reference 1.

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):

12,494.3 tons.

Reference: 5.

Basis of estimating and/or computing waste quantity:

Landfill records.

Assigned value = 8.

Reference: 1.

***

5 TARGETS

Surface Water Use

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

No known drinking water/irrigation uses. Recreation.

Assigned value = 2.

References: 1, 8, and 11.

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 mi.

Assigned value = 0.

Reference: 12.

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

Wetland adjacent to the site.

Assigned value = 3.

References: 7 and 15.

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

None within 1 mi.

Reference: 13.

Population Served by Surface Water

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

None.

Reference: 8.

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

None.

Reference: 11.

Total population served:

Zero.

Name/description of nearest of above waterbodies:

Niagara River.

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

Not applicable.

Assigned value = 0. Reference: 8.

AIR ROUTE

1 OBSERVED RELEASE

Not applicable based on available information. There is no information or analytical data in the files received during the record search indicating a problem with air contamination. No air sampling program was conducted during the Phase II investigation.

Contaminants detected:

None.

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

***

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

***

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

Distance to a Sensitive Environment

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

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

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

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 or Historic Places and National Natural Landmarks) within the view of the site?

FIRE AND EXPLOSION

1 CONTAINMENT

Hazardous substances present:

Drummed material - resin.

Type of containment, if applicable:

None.

Assigned value = 3.

References: 1 and 7.

***

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Sample of material onsite was collected.

Assigned value = 3.

References: 1 and 3 (Section 4.4; Table 4-2).

Ignitability

Compound used:

Ignitability test of drummed material onsite.

Assigned value = 1.

References: 1 and 3.

Reactivity

Most reactive compound:

Not applicable.

Assigned value = 0.

Reference: 3.

Incompatibility

Most incompatible pair of compounds:

Not applicable.

Assigned value = 0.

Reference: 3.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

12,494.3 tons.

Reference: 5

Basis of estimating and/or computing waste quantity:

Records of waste disposal.

Assigned value = 8.

Reference: 1.

***

3 TARGETS

Distance to Nearest Population

200 ft.

Assigned value = 4.

References: 1 and 7.

Distance to Nearest Building

200 ft.

Assigned value = 2.

References: 1 and 7.

Distance to Sensitive Environment

Distance to wetlands:

Adjacent to the site.

Assigned value = 3.

References: 1 and 7.

Distance to critical habitat:

None within 1 mi.

Reference: 3.

Land Use

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

1,000 ft.

Reference: 7.

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

>2 mi.

Reference: 12.

Distance to residential area, if 2 miles or less:

200 ft.

Reference: 7.

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

Adjacent to site.

Reference: 7.

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

Adjacent to site.

Assigned value = 3.

Reference: 7.

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

None.

Reference: 7.

Population Within 2-Mile Radius

(1,230 homes X 3.8) + (1/4 X 35,760 population of North Tonawanda) = 13,614.

Assigned value = 5.

References: 9 and 14.

Buildings Within 2-Mile Radius

>2,600.

Assigned value = 5.

References: 9 and 14.

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

None reported.

Assigned value = 0. References: 1 and 3.

***

2 ACCESSIBILITY

Describe type of barrier(s):

None. Site is actively used as a play area and dirt bike trail.

Assigned value = 3.

Reference: 7.

***

3 CONTAINMENT

Type of containment, if applicable:

Inadequate cover, exposed waste, and leachate discharge via ditches.

Assigned value = 15.

Reference: 7.

***

4 WASTE CHARACTERISTICS

<u>Toxicity</u>

Compounds evaluated:

Phenols.

Compound with highest score:

Phenol.

Assigned value = 3.

References: 1 and 3 (Section 4.4; Table 4-2).

***

5 TARGETS

Population Within 1-Mile Radius

2,812 people (740 homes X 3.8).

Assigned value = 3.

References: 1 and 12

Distance to Critical Habitat (of Endangered Species)

>1 mi.

Assigned value = 0.

References: 1 and 13.

REFERENCES

1. U.S. Environmental Protection Agency. 1984. Uncontrolled Hazardous Waste Site Ranking System. A Users Manual.

2. Fisher, D.W. et al. 1970. Geologic Map of New York, Niagara Sheet. New York State Museum and Science Service, Map and Chart Series No. 15. (Appendix 1.4.3-1.)

3. EA Science and Technology. 1985. Phase II Site Investigation Report.

4. Dethier, B.E. 1966. Precipitation in New York State: Cornell Univ., Agr. Expt. Sta., Bull.1009. Ithaca, New York.

5. New York State Department of Environmental Conservation. 1985. "Community Right-To-Know." Past Hazardous Waste Disposal Practices, January 1952 - December 1981. 1 April. (Appendix 1.4.1-4.)

6. Camp, Dresser & McKee, Inc. 1982. Remedial Action Master Plan (RAMP) for the Niagara County Refuse Disposal Site. (Appendix 1.4.4-1.)

7. EA Science and Technology. 1985. Site Reconnaissance. 17 April.

8. New York State Department of Health. 1982. New York State Atlas of Community Water System Sources. (Appendix 1.4.2-2.)

9. Niagara County Health Department. 1981. NCSWD-Wheatfield Site (DEC No. 932026). (Appendix 1.4.1-1.)

10. La Sala, A.M. Jr. 1968. U.S. Department of Interior Geological Survey (USGS). Ground-Water Resources of the Erie-Niagara Basin, New York. (Appendix 1.4.3-1.)

11. Oliver, E. 1986. USDA Soil Conservation Service. District Conservationist, Lockport Field Office. Personal Communication. 24 June. (Appendix 1.5-1.)

12. USGS. 1965. Tonawanda West, New York Quandrangle, 7.5-Minute Series.

13. Ozard, J.W. 1986. Senior Wildlife Biologist, NYSDEC. Personal Communication. 10 April. (Appendix 1.5.1-2.)

14. New York State Department of Transportation. 1983. New York State Map. Gazetteer.

15. Dietz, J. 1988. Senior Environmental Analyst, NYSDEC. Personal Communication. 25 April. (Appendix 1.5.1-3.)

5.5

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington, DC 20460

EPA Form 2070-13
July, 1981

EPA

Potential Hazardous Waste Site

Site Inspection Report

NIAGARA COUNTY R.D. -- WHEATFIELD SITE

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	Niagara Wheatfield
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER	West of Witmer Road
03 CITY	Town of Wheatfield
04 STATE	NY
05 ZIP CODE	14120
06 COUNTY	Niagara
07 COUNTY CODE	✓
08 CONG DIST	✓
09 COORDINATES LATITUDE	43 03 55.N
LONGITUDE	78 54 22.W
10 TYPE OF OWNERSHIP (Check one)	☐ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☒ F. OTHER Town Ownership ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION (MONTH DAY YEAR)	4 /17/ 85
02 SITE STATUS	☐ ACTIVE ☒ INACTIVE
03 YEARS OF OPERATION	1968 (BEGINNING YEAR) 1976 (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 ☒ F. STATE CONTRACTOR EA SCIENCE & TECHNOLOGY (Name of firm) ☐ G. OTHER ______ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Dr. C. W. Houlik, Jr.	Principal Investigator	EA	(301) 771-4950

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
Linda Rubin	Corp.Health & Safety Officer	EA	(301) 771-4950
John Kosloski	Geologist	EA	(301) 771-4950
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
None			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	12:30 p.m.	Sunny, Clear, 65 degrees

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
James Shultz	EA Science & Technology	(914) 692-6706

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE (MONTH DAY YEAR)
Gloria D. McCleary		EA Engineering, Science & Technology, Inc	(301)771-4950	7/ 3/ 86

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
- X A. SOLID
- ☐ B. POWDER, FINES
- X C. SLUDGE
- ☐ D. OTHER ______ (Specify)
- ☐ E. SLURRY
- X F. LIQUID
- X G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
- TONS >1million tons
- CUBIC YARDS ______
- NO. OF DRUMS Unknown

03 WASTE CHARACTERISTICS (Check all that apply)
- X A. TOXIC
- X B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- X G. FLAMMABLE
- X H. IGNITABLE
- X I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- X K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
(SLU)	SLUDGE	unknown		
(OLW)	OILY WASTE	unknown		
SOL	SOLVENTS			
PSD	PESTICIDES			
(OCC)	OTHER ORGANIC CHEMICALS	unknown		
IOC	INORGANIC CHEMICALS	unknown		
(ACD)	ACIDS	unknown		
BAS	BASES			
(MES)	HEAVY METALS	unknown		

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
	Methylene chloride		LF	3,000	ug/L
	Phenol	108-95-2	LF	270	mg/L
	Benzene	71-43-2	LF	180	ug/L
	4-Methyl-2-Pentanone		LF	210	ug/L
	Toluene	108-88-3	LF	2,100	ug/L
	Chlorobenzene	108-90-7	LF	28	ug/L
	Ethylbenzene	100-41-4	LF	160	ug/L
	Styrene	100-420-5	LF	810	ug/L
	Xylene	1330-20-7	LF	290	ug/L
	2-Methyl phenol		LF	13.0	mg/L
	4-Methyl phenol		LF	5.8	mg/L
	2,4 Dimethyl phenol		LF	170	ug/L
	Iron		LF	1,400	mg/L
	Zinc		LF	100	mg/L
	Magnesium		LF	1,000	mg/L

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	None		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

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

U.S. EPA, Site Inspection Report.
Remedial Action Master Plan by Camp, Dresser & McKee
NYSDEC, Right-To-Know, 1 April 1985.
EA Science and Technology Phase II Investigation.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	932026

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION

No bedrock wells samples, however, fill material was placed directly on bedrock.

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 9/6/79 & Sept. 1980) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION

Following substances found in surface water samples from ditches on site: Phenol, Toluene, Ethylbenzene, Zinc, Fluoranthene

01 ☒ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

No data available.

01 ☒ D. FIRE EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 13,614
04 NARRATIVE DESCRIPTION

Drummed material onsite is ignitable.

01 ☒ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☒ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 2,812
04 NARRATIVE DESCRIPTION

NCHD notified of incident. No confirmation.
Potential exists. Access not controlled, inadequate cover, seeps observed.

01 ☒ F. CONTAMINATION OF SOIL — 02 ☒ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres)
04 NARRATIVE DESCRIPTION

Elevated levels of priority pollutant organics and metals were found in samples from a drainage ditch onsite.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION

No drinking water source within 3-mi radius of site.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

None Reported

01 ☒ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☒ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 13,614
04 NARRATIVE DESCRIPTION

Complaints to Health Dept. in 1976, said burns and illness in people having entered the site were caused by exposed chemicals. These claims were not substantiated by evidence in subsequent investigation.
Estimated population with 2-mi radius of site.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(include name(s) of species)*

None reported.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None Reported.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES *(Spills Runoff Standing liquids Leaking drums)* — 02 ☒ OBSERVED (DATE: 12/5/79) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Leachate/runoff is apparent.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☒ OBSERVED (DATE: 12/5/79) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

EA Site Inspection. Access to the site is unrestricted and unauthorized dumping has occurred.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None

III. TOTAL POPULATION POTENTIALLY AFFECTED: 1000 people live within 1-mile of the site.

IV. COMMENTS

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

NCHD Files Report: NCSWD-Wheatfield Site (DEC #92026)
Report of Site Inspection of 12/5/79 by R. Flint
Report by RECRA Research, Inc., Jan 10, 1983
EA Site Inspection 4/17/85

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
X G. STATE (Specify) Landfill			1976	
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
X C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
X F. LANDFILL	50	acres
☐ G. LANDFARM		
☐ H. OPEN DUMP		
X I. OTHER (Specify) Surface dumping		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER ______ (Specify)

05 OTHER

- ☐ A. BUILDINGS ON SITE

06 AREA OF SITE

50 (Acres)

07 COMMENTS

Site was never properly closed. Grading is rough and uneven and site drainage is poor in areas. Seeps were observed as well as areas of inadequate cover and erosion of cover material in areas.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR X D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Drums are rusted and broken. There is no barrier or liner.
Not sufficient cover.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: X YES ☐ NO

02 COMMENTS

Site is totally accessible and frequently used by dirt bikers and there are numerous shotgun shells on site.

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

EA Site Inspection - 4/17/85
NCHD File
NYSDEC Files, Region III

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ☒	B. ☐
NON-COMMUNITY	C. ☒	D. ☐

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. 4 (mi)
B. 4 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING
☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)
☒ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL >5 (mi)

04 DEPTH TO GROUNDWATER 10 (ft)

05 DIRECTION OF GROUNDWATER FLOW south

06 DEPTH TO AQUIFER OF CONCERN ~~10~~ 10 (ft)

07 POTENTIAL YIELD OF AQUIFER unknown (gpd)

08 SOLE SOURCE AQUIFER ☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

No reported wells within 3-mi radius of site.

10 RECHARGE AREA
☒ YES ☐ NO
COMMENTS

11 DISCHARGE AREA
☒ YES ☐ NO
COMMENTS Black Creek

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ 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
Black Creek	☐	Adjacent (mi)
Niagara River	☐	0.1 (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. 1000 NO. OF PERSONS	B. >10,000 NO. OF PERSONS	C. ____ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 200ft ~~(mi)~~

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE >2600

04 DISTANCE TO NEAREST OFF-SITE BUILDING 200 ft ~~(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)

North Tonawanda (population >35,000) is within 3-miles of the site.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

- [X] A. $10^{-6} - 10^{-8}$ cm/sec
- [ ] 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
30-55 (ft)	unknown (ft)	unknown

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
8 (in)	2 (in)	< 10 %		< 2 %

09 FLOOD POTENTIAL

SITE IS IN N/A 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. Adjacent (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. 1000 ft ~~(mi)~~	B. 200 ft ~~(mi)~~	C. adjacent (mi)	D. adjacent (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

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

EA Phase II Investigation, Appendix 1.4.3-4.
NYSDOT Topographic Map. Tonawanda West Quad. 1976 Edition.
U.S. Department of Commerce - Climate Atlas of the United States; 1968.
NYS Atlas of Community Water System Sources, 1982.
La Sala, A.M. 1968. Ground-Water Resources of the Erie-Niagara Basin, New York.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	932026

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	0		
SURFACE WATER	2	EA Engineering,Science & Technology, Inc.	7/3/86
WASTE	1	EA Engineering,Science & Technology, Inc.	7/3/86
AIR			
RUNOFF			
SPILL			
SOIL	2	EA Engineering,Science & Technology, Inc.	7/3/86
VEGETATION			
OTHER Leachate - wells in fill	4	EA Engineering, Science, and Tech., Inc.	7/3/86

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
OVA	W/WO Methane Filter
Well Elevation	Surveyed well elevations
Magnetometer	Surveyed for location wells
Slope	Suunto Clinometer

IV. PHOTOGRAPHS AND MAPS

01 TYPE X GROUND X AERIAL

02 IN CUSTODY OF EA Science & Technology
(Name of organization or individual)

03 MAPS
☐ YES
☐ NO

04 LOCATION OF MAPS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

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

EA Science and Technology, Phase II Investigation

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Town of Wheatfield		2800 Church Road		North Tonawanda	NY	14120

PARENT COMPANY (if applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Niagara County Refuse Disposal District		423 Bewley Bldg.		Lockport	NY	14094

IV. REALTY OWNER(S) (if applicable; list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE

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

Phone Interview with Mrs. Marshall of Niagara County Refuse Disposal District (8/15/85)
NYSDEC Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME	02 D+B NUMBER
Not operated.	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY *(If applicable)*

10 NAME	11 D+B NUMBER

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) *(List most recent first; provide only if different from owner)*

01 NAME	02 D+B NUMBER
Niagara County R.D.	

03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES *(If applicable)*

10 NAME	11 D+B NUMBER

12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

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)*

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	932026

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
Not Applicable	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	**04 SIC CODE**

05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Carborundum Company		General Administrative Office		Niagara Falls	NY	14303
Bell Aerospace Company		Executive office Niagara Falls Blvd.		Niagara Falls	NY	14304
EI Dupont deNemours & Company		Industrial Chemical Dept. Buffalo Ave. & 26th Street		Niagara Falls	NY	14304
Hooker Chemicals & Plastics Corp.		Durez Div. Walack Road		North Tonawanda	NY	14150

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Booth Oil Co., Inc.		76 Robinson Street		North Tonawanda	NY	14150
Hasky Trucking Co., Inc.		10315 Lockport Road		Lockport	NY	14094
Ray F. Morningstar		528 Young Street		Tonawanda	NY	14150
Niagara Sanitation Co., Inc.		262 Woodward Avenue		Kenmore	NY	14217

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

Remedial Action Master Plan, Sept. 9, 1982

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	932026

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ L. ENCAPSULATION 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	932026

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ W. GAS CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ X. FIRE CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

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

EPA	POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 11 - ENFORCEMENT INFORMATION	I. IDENTIFICATION 01 STATE: NY 02 SITE NUMBER: 932026

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

10/29/76 Wheatfield Site Officially Closed.

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

Remedial Action Master Plan, Sept. 9, 1982
NCHD Files

EPA FORM 2070-13 (7-81)

6. REMEDIAL COST ESTIMATE

Based on the results of the Phase II investigation, four remedial options are considered suitable to the Niagara Wheatfield site. Conduct a more extensive hydrogeologic investigation, cap the site with clay, pump leachate and treat with activated carbon, and provide for periodic monitoring and site maintenance.

6.1 HYDROGEOLOGIC INVESTIGATION

To assess ground-water contamination, it is suggested that additional monitoring wells be installed around the landfill site to identify ground-water levels, any ground-water contaminant, and confirm aquifer flow direction. The cost of this phase is estimated to be $25,000-$50,000. This includes installation of six wells to a depth of 20-50 ft[1].

6.2 SITE CAPPING

This control option includes capping the site with clay over approximately 242,000 yds^2 (assumes 50-acre site) and a leachate collection system[3]. The installation of this system is expected to reduce leachate generation and reduce offsite erosive transport of cover material, and to control/reduce leachate flow towards the Niagara River. Moisture retention above the cap will be accomplished via a loam cover and vegetation. A detailed engineering plan would be the initial step in this effort and would include obtaining accurate site topography prior to designing the cap. It also would include information for site grading, drainage controls, surface stabilization, gas venting, and leachate collection.

Clay Cap

The unit cost for a clay cap which includes hauling, spreading, and compaction to 24-in. depth is estimated at \$15-\$25/yd^3 depending on the proximity of available capping material. The estimated costs for the approximate 50-acres vary between \$2,420,000 and \$4,100,000.

Surface Cover - Loam and Vegetation

The surface cover recommended for the clay cap is loam soil seeded with appropriate grasses. The unit cost for surface cover of the site is estimated at \$10-\$15/yd^3 and includes 6 in. of loam soil hauled to the site (within 20 mi of the site), spread on the site, and graded. The estimated costs for the surface cover vary between \$400,000 and \$610,000.

Unit costs for placement of vegetation as grasses, is estimated at \$1,405-\$9,263/acre. Costs for seeding are estimated to be between \$70,000 and \$460,000.

Surface Runon/Runoff Control

Surface runoff controls to limit infiltration and leachate production at the site should be installed at the site. Unit costs for drainage controls are estimated to be $1.17-$2.94/linear ft. Two drainage ditches which would discharge to the Niagara River with an estimated length of approximately 15,000 ft (1-ft depth) is estimated to cost $20,000-$44,000.

A leachate collection system at the landfill is expected to include installation of three wells within the landfill proper. Three wells would be placed at a cost of $20,000-$35,000[1] and would induce a cone of depression for leachate removal.[4] These wells would pump to a leachate treatment system.

The leachate generation at the site is estimated to be 21,800,000 gal/year. This estimate is conservative and assumes that 30 percent of rainfall volume enters the site and produces about 0.05 mgd. This is based on an area of 2,200,000 ft^2, and a 40-in./year rainfall.

The capital costs for activated carbon range from $165,000 to $350,000/ mgd and annual O&M costs from $357,000 to $413,000/mgd.

In the case where the leachate pumping system delivers about 100 gpm, the capital more closely approaches $165,000/mgd, and annual O&M costs total from $50,000 to $60,000[4].

Supporting the remedial options is the need to continue monitoring the ground water. In this case, it is assumed that the 5-6 perimeter wells are sampled and analyzed for HSL volatiles, BNA organics, and heavy metals 2-4 times each year. This sampling and analyses phase ranges from $50,000 to $100,000/year[2]. A summary of the options cost estimates are given in Table 6-1.

REFERENCES FOR SECTION 6

Compendium of Costs of Remedial Technologies at Hazardous Waste Sites, Final Report, Hazardous Waste Engineering Research Laboratory, Office of R & D, U.S. EPA, Cinn., Ohio, Sept. 1985. (Appendix 1.6-1.)

Leachate from Hazardous Waste Site, Cheremisinoff, Paul N. and Kenneth A. Giagliello, Technomic Publishing, Lancaster, PA. 1983. (Appendix 1.6-2.)

Handbook: Remedial Action at Waste Disposal Sites, U.S. EPA Technology Transfer, Cincinnati, Ohio. (Appendix 1.6-3.)

TABLE 6-1 REMEDIAL COST SUMMARY* FOR NIAGARA WHEATFIELD

	Capital ($)	O&M ($/yr)
Hydrogeologic Investigation	25,000-50,000	----
Clay cap, loam cover, and revegetate	3,000,000-5,200,000	100,000
Surface runon/runoff control	20,000-44,000	2,000
Leachate Collection (3 wells)	20,000-35,000	5,000
Leachate Treatment	20,000-35,000	50,000-60,000
Fence	120,000-180,000	5,000-10,000
Monitoring		50,000-100,000

* Assumes a 50-acre site.

APPENDIX 1

APPENDIX 1.3.1-1

CONTACTS

APPENDIX 1.3.1-1

The Phase II investigation of the Niagara Wheatfield site involved a site inspection by EA, geophysical studies, boring and monitoring well placement, and installation and sampling (soil, surface water, and air) as well as record searches and interviews. The following agencies or individuals were contacted.

Contact	Information Received
Mrs. Marshall Niagara County Refuse Disposal District Bewley Building Lockport, New York 14094 (716) 434-6568	No file
Mr. Edward Greinert Town Supervisor Town of Wheatfield Wheatfield, New York (716) 694-6440	No file
Mr. Marsden Chen, P.E./ Mr. James Tofflemire, P.E. New York State Department of Environmental Conservation Bureau of Site Control 50 Wolf Road Albany, New York 12233-0001 (518) 457-0639	Site file
Mr. Kevin Walter, P.E. New York State Department of Environmental Conservation 50 Wolf Road Albany, New York 12233-0001 (518) 457-5637	No file
Mr. Earl Barcomb, P.E. New York State Department of Environmental Conservation Landfill Operations Vatrano Road Albany, New York 12205	No file
Mr. John Iannotti, P.E. New York State Department of Environmental Conservation Bureau of Remedial Action 50 Wolf Road Albany, New York 12233-0001 (518) 457-2051	No file

Contact	Information Received
Mr. Jeffrey Dietz Senior Environmental Analyst New York State Department of Environmental Conservation Region 9 Office 600 Delaware Avenue Buffalo, New York 14202 (716) 847-4600	Regulated Wetland Classification
Mr. Charles Hudson Bureau of Toxic Substance Assessment New York State Department of Health Nelson A. Rockefeller Empire State Plaza Corning, Tower Building, Room 342 84 Holland Avenue (518) 473-8427	No file
Mr. Perry Katz U.S. Environmental Protection Agency Region II Room 757, 26 Federal Plaza New York, New York 10278 (212) 264-4595	No file
Ms. Diana Messina/ Mr. Douglas Stout, P.E. U.S. Environmental Protection Agency Region II Surveillance and Monitoring Branch Woodbridge Avenue Edison, New Jersey 08837 (201) 321-6776	Site file
Mr. Edward Oliver District Conservationist United States Department of Agriculture Lockport Field Office 4487 Lake Avenue Lockport, New York 14094	Irrigation use
Mr. John Ozard Senior Wildlife Biologist New York State Department of Environmental Conservation Wildlife Resources Center Delmar, New York 12054	Critical Habitat Information
Ms. Peggy Harris EPA - Great Lakes Program Chicago, Illinois (312) 353-3576	"Preliminary Evaluation of Chemical Migration to Ground Water and the Niagara River from Selected Waste Disposal Sites." Report #EPA 905/4-85-001

Contact	Information Received
Mr. Vince Petruzzello Chief New York Compliance U.S. Environmental Protection Agency 26 Federal Plaza New York, New York 10278 (212) 264-3984	Site file

APPENDIX 1.3.2-1

APPENDIX 1.3.2-1

GEOPHYSICAL FIELD EQUIPMENT AND GENERAL METHODOLOGY

The following geophysical instrument was used at the site to evaluate general subsurface conditions (buried ferrous materials).

Protom Magnetometer

A Geometrics G-856 proton magnetometer was used to evaluate subsurface conditons for large concentrations of buried ferrous material. This equipment measures the total intensity of the earth's magnetic field (gammas).

The proton magnetometer utilizes the precession of spinning protons or nuclei of the hydrogen atom to measure the intensity of the earth's magnetic field. The spinning of the protons act as small magnetic dipoles. When an electrical current is generated by the coil, the protons temporarily align themselves with respect to the coil. When the current is removed, the protons spin in the direction of the earth's magnetic field (which is influenced by external interference such as ferrous material). As the protons spin, they generate a small electrical signal. This signal produces a frequency which is proportional to the field intensity, and is converted into the gammas by the G-856.

The following twelve pages provide the Niagara-Wheatfield site geophysical report prepared by Delta Geophysical Services.

NIAGARA - WHEATFIELD SITE

MAGNETOMETER GRID SURVEY

Three areas (Areas A, B, and C-D) were surveyed at the landfill site. Plate 1 is a general site map with the locations of each area. The survey was performed in order to determine zones relatively free of buried ferrous material so that four monitoring well locations could be established. The approximate suggested well locations are also shown on Plate 1.

Proton magnetometer data were collected over each area using a 30-foot grid. Survey lines were run 30 feet apart in a general magnetic north/south direction, with data collected at 30-foot intervals along each line. A baseline along the southern edge of each area was staked out, and a metal spike was emplaced at the eastern end of each baseline. The raw magnetometer data for each area are presented in the Appendix. In addition, sections of each area which seemed relatively free of buried ferrous material were surveyed using a 15-foot grid to better determine a possible well location.

Interpretation and analysis of the data pointed up zones beneath each area where subsurface ferrous material may be present. These zones are shown on the map for each area (Plates 2-4) as high and moderate anomalous zones. The high anomalous zones indicate larger amounts of ferrous material relative to the moderate anomalous zones. In addition, the magnetometer data indicate that the remaining areas surveyed (including the suggested well locations) may contain small amounts of scattered ferrous material.

Initial suggested well locations were staked out at each area based on field analysis of the data. Upon further analysis and final interpretation of the data, suggested well locations B, C, and D have been relocated. These revised locations are shown on each site map.

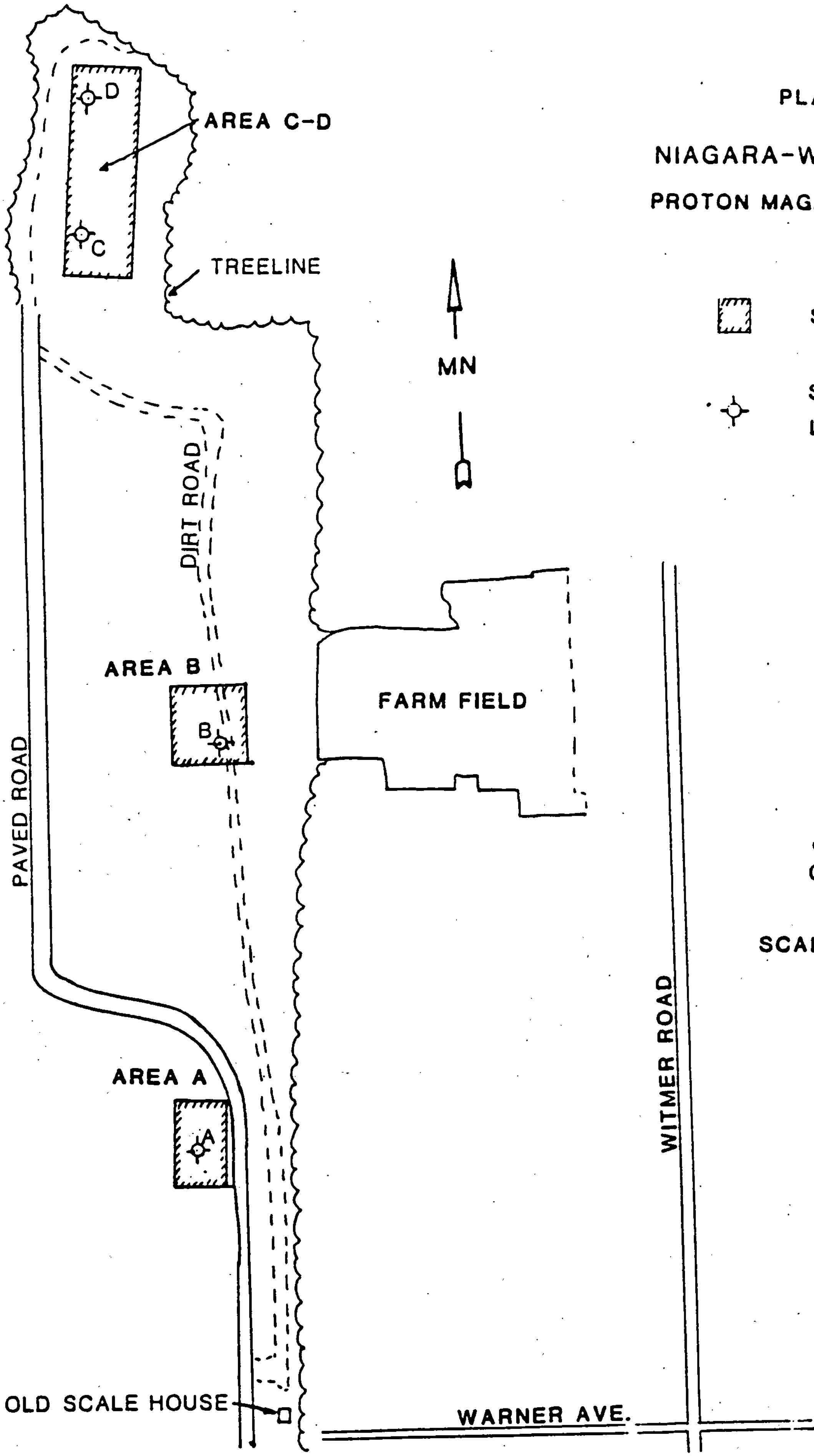


PLATE 1

NIAGARA-WHEATFIELD SITE

PROTON MAGNETOMETER SURVEY

SURVEY AREA

SUGGESTED WELL LOCATION

0' 400'

SCALE: 1 in.=400 ft.

DELTA GEOPHYSICAL SERVICES

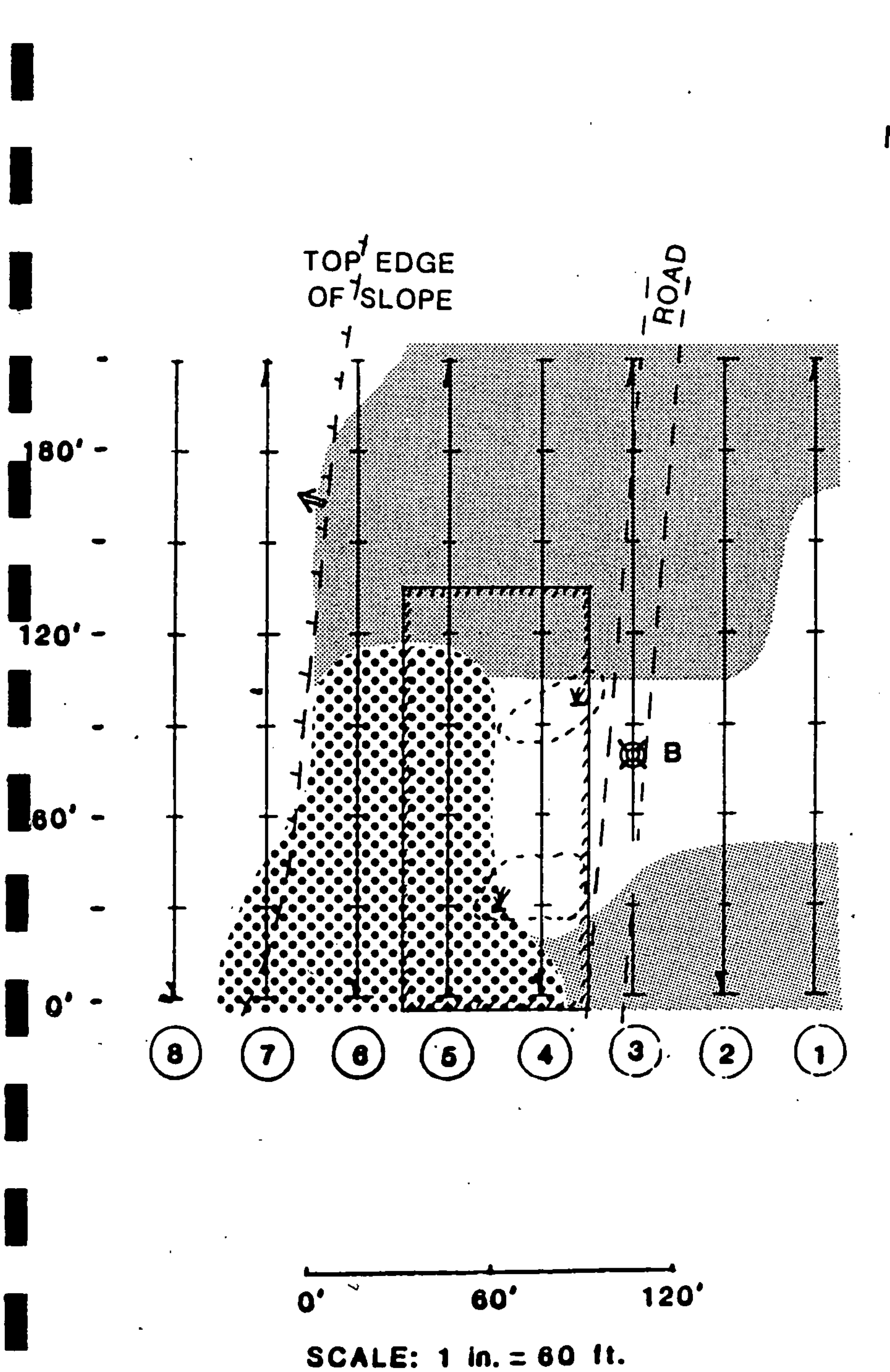


PLATE 3

NIAGARA-WHEATFIELD SITE

PROTON MAGNETOMETER SURVEY

AREA B

30 ft. INTERVAL

1 → LINE NUMBER AND DIRECTION

SUGGESTED WELL LOCATION

15 ft. GRID AREA

MODERATE ANOMALOUS ZON

HIGH ANOMALOUS ZONE

SEEP

DELTA GEOPHYSICAL SERVICES

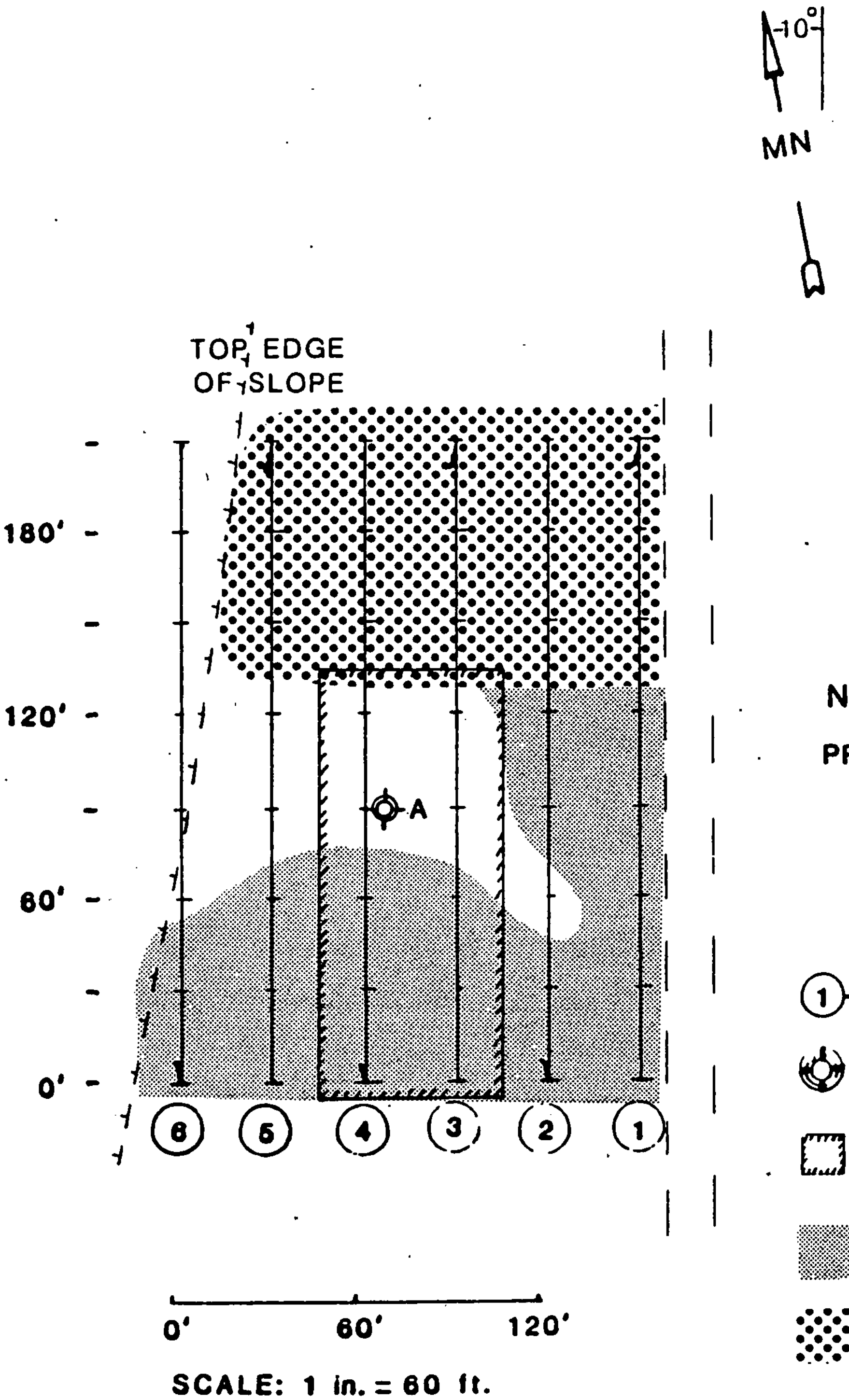


PLATE 2

NIAGARA-WHEATFIELD SITE

PROTON MAGNETOMETER SURVEY

AREA A

30 ft. INTERVAL

(1)→ LINE NUMBER AND DIRECTION

SUGGESTED WELL LOCATION

15 ft. GRID AREA

MODERATE ANOMALOUS ZONE

HIGH ANOMALOUS ZONE

DELTA GEOPHYSICAL SERVICES

Appendix 1.3.2
6 of 13

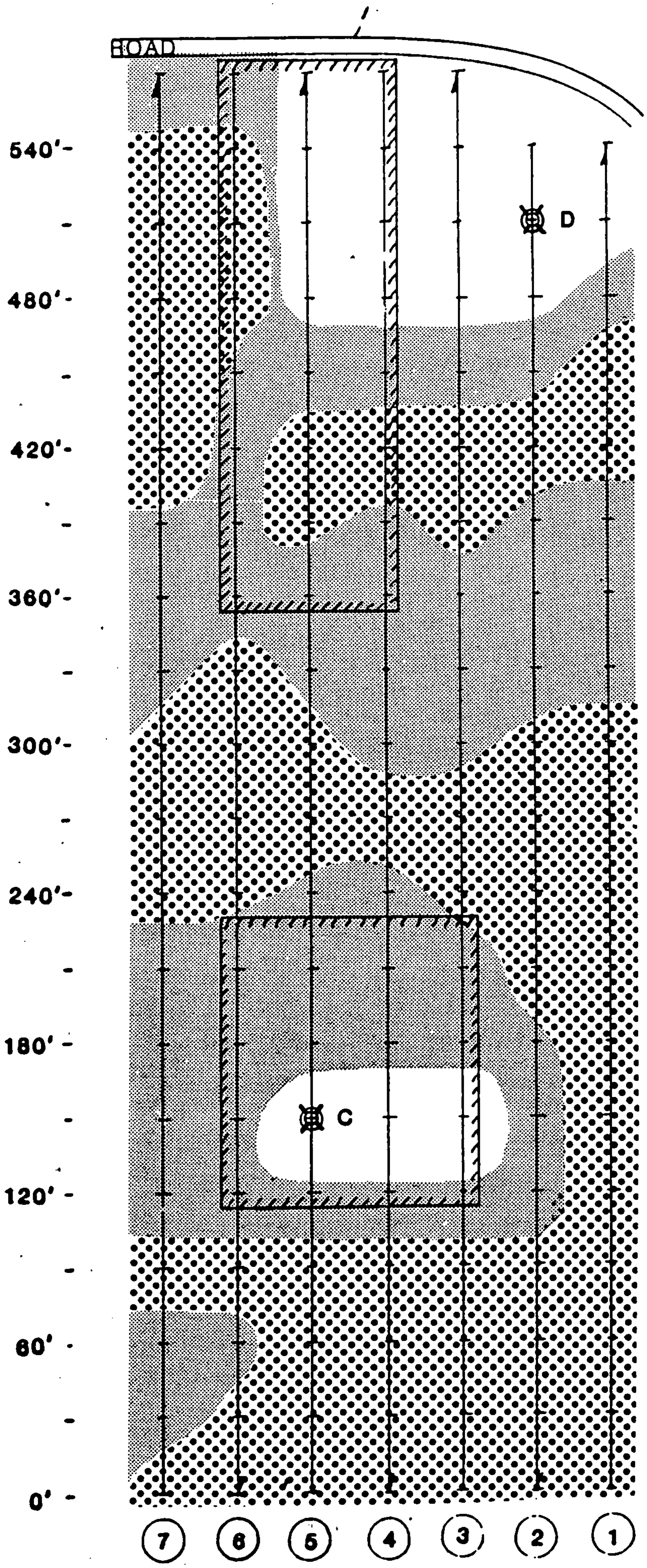


PLATE 4

NIAGARA-WHEATFIELD SITE
PROTON MAGNETOMETER SURVEY

AREA C-D
30 ft. INTERVAL

(1)→ LINE NUMBER AND DIRECTION

SUGGESTED WELL LOCATION

15 ft. GRID AREA

MODERATE ANOMALOUS ZONE

HIGH ANOMALOUS ZONE

0' 60' 120'

SCALE: 1 in. = 60 ft.

DELTA GEOPHYSICAL SERVICES

Appendix 1.3.2-1
7 of 13

APPENDIX

Appendix 1.3.2-1

NIAGARA-WHEATFIELD, Area A

** G-856 MAGNETOMETER DATA **
RAW FIELD Code: EAVI

Line	Date	Time	Site	Field	
1	176	11:43:17	107	57495.6	LINE #1
1	176	11:44:04	108	?57486.0	
1	176	11:44:27	109	?56392.0	S ↓ N
1	176	11:44:50	110	?56136.2	
1	176	11:45:16	111	?57115.4	
1	176	11:45:33	112	?58768.6	
1	176	11:46:14	113	?58590.2	
1	176	11:46:39	114	?56695.4	
2	176	11:49:09	115	56772.6	LINE #2
2	176	11:49:36	116	?56531.6	N ↓ S
2	176	11:49:55	117	?56509.2	
2	176	11:50:17	118	57685.0	
2	176	11:50:37	119	57876.8	
2	176	11:51:30	120	56417.6	
2	176	11:51:49	121	?55653.6	
2	176	11:52:14	122	56783.0	
3	176	11:53:25	123	?57539.8	LINE #3
3	176	11:54:21	124	56261.8	
3	176	11:54:43	125	56148.0	S ↓ N
3	176	11:58:05	126	57100.8	
3	176	11:58:27	127	57472.8	
3	176	11:58:50	128	?58241.4	
3	176	11:59:11	129	?58887.2	
3	176	11:59:43	130	?57074.4	
4	176	12:01:43	131	56420.4	LINE #4
4	176	12:02:09	132	57644.8	
4	176	12:02:31	133	57985.6	N ↓ S
4	176	12:03:00	134	56570.4	
4	176	12:03:24	135	55994.8	
4	176	12:03:48	136	56420.6	
4	176	12:04:05	137	56844.0	
4	176	12:04:23	138	56877.6	
5	176	12:05:36	139	?56724.4	LINE #5
5	176	12:05:57	140	56765.4	S ↓ N
5	176	12:06:16	141	?57522.4	
5	176	12:06:37	142	56140.6	
5	176	12:07:03	143	57125.2	
5	176	12:07:23	144	58116.6	
5	176	12:07:39	145	?58827.2	
5	176	12:08:01	146	?57023.0	
6	176	12:09:04	147	55591.6	LINE #6
6	176	12:09:23	148	55832.4	
6	176	12:09:42	149	?56239.0	N ↓ S
6	176	12:10:05	150	56091.4	
6	176	12:10:27	151	56299.2	
6	176	12:10:48	152	56451.2	
6	176	12:11:09	153	?57085.4	
6	176	12:11:27	154	?55899.4	

** G-856 MAGNETOMETER DATA **
RAW FIELD Code: EAVI

Line	Date	Time	Site	Field	
1	176	12:56:03	199	57458.2	LINE #1
1	176	12:56:27	200	?58526.2	S
1	176	12:56:46	201	57131.6	↓
1	176	12:57:03	202	57303.8	N
1	176	12:57:21	203	56864.0	
1	176	12:57:45	204	57371.6	
1	176	12:58:12	205	?56957.0	
1	176	12:58:37	206	?57991.6	
2	176	13:03:34	207	?56826.2	LINE #2
2	176	13:04:16	208	57960.0	
2	176	13:04:39	209	57219.2	N
2	176	13:04:58	210	?58119.8	↓ S
2	176	13:05:19	211	56830.8	
2	176	13:05:42	212	57232.4	
2	176	13:06:04	213	57891.0	
2	176	13:06:22	214	?58250.2	
3	176	13:12:44	215	56646.0	LINE #3
3	176	13:13:50	216	?57359.4	
3	176	13:14:09	217	56891.8	S
3	176	13:14:30	218	57008.4	↓
3	176	13:14:48	219	?57781.0	N
3	176	13:15:08	220	?56107.2	
3	176	13:15:27	221	57712.2	
3	176	13:15:46	222	57484.4	
4	176	13:18:20	223	57470.6	LINE #4
4	176	13:18:40	224	56845.2	
4	176	13:18:58	225	57287.6	N
4	176	13:19:17	226	?56521.4	↓
4	176	13:19:38	227	57150.2	S
4	176	13:19:55	228	56673.8	
4	176	13:20:40	229	57007.6	
4	176	13:21:45	230	?58330.4	

** G-856 MAGNETOMETER DATA **
RAW FIELD Code: EAVI

Line	Date	Time	Site	Field	
5	176	13:44:45	231	?58825.2	LINE #5
5	176	13:45:10	232	?58330.2	
5	176	13:45:36	233	56794.8	S
5	176	13:45:58	234	?58325.6	↓
5	176	13:46:18	235	?57538.4	N
5	176	13:46:39	236	57779.6	
5	176	13:47:01	237	57499.6	
5	176	13:47:21	238	?58230.8	
6	176	13:50:14	239	56556.2	LINE #6
6	176	13:50:39	240	?56491.6	N
6	176	13:51:01	241	56872.2	↓
6	176	13:51:21	242	?57217.0	S
6	176	13:51:44	243	?58421.8	
6	176	13:52:04	244	56747.0	
6	176	13:52:23	245	57208.4	
6	176	13:52:46	246	?58441.6	
7	176	13:56:27	247	57467.4	LINE #7
7	176	13:56:47	248	?53902.8	
7	176	13:57:12	249	55499.8	S
7	176	13:57:31	250	56646.2	↓ N
7	176	13:57:53	251	?55537.4	
7	176	13:58:12	252	55788.2	
7	176	14:00:05	253	55756.6	
7	176	14:00:30	254	56065.8	
8	176	14:01:35	255	56370.0	LINE #8
8	176	14:03:32	256	56370.2	
8	176	14:04:03	257	56207.4	N
8	176	14:04:47	258	56026.2	↓
8	176	14:06:30	259	56018.0	S
8	176	14:07:00	260	55937.0	
8	176	14:07:28	261	55698.4	
8	176	14:07:59	262	?55511.0	

** G-856 MAGNETOMETER DATA **
RAW FIELD Code: EAVI

Time	Site	Field	
15:59:04	263	?58846.6	LINE #1
15:59:37	264	?58528.6	
15:59:57	265	?57974.2	S
16:00:15	266	?58614.6	↓
16:00:33	267	?59577.4	N
16:00:51	268	?59386.6	
16:01:14	269	?57865.0	
16:01:32	270	?60199.6	
16:01:56	271	?58047.2	
16:02:43	272	?59294.0	
16:03:01	273	?58661.8	
16:03:24	274	?57509.0	
16:03:42	275	?57981.2	
16:04:07	276	?57983.2	
16:04:25	277	?59330.4	
16:04:50	278	?58014.8	
16:05:15	279	?57272.6	
16:05:33	280	57317.2	
16:05:51	281	?55083.0	
16:11:28	282	56916.4	LINE #2
16:11:56	283	56978.8	
16:12:29	284	?57007.8	N
16:12:53	285	?57657.2	↓
16:13:16	286	59028.2	S
16:14:54	287	58528.6	
16:15:30	288	57784.6	
16:15:50	289	58083.6	
16:16:44	290	58411.8	
16:17:12	291	58590.8	
16:17:34	292	?57871.2	
16:17:55	293	?59311.2	
16:18:12	294	?57622.4	
16:18:35	295	57716.2	
16:18:55	296	57654.2	
16:19:14	297	58673.2	
16:19:40	298	?58993.6	
16:19:59	299	58466.0	
16:20:18	300	58862.0	
16:22:01	301	59351.6	LINE #3
16:22:23	302	58863.6	S
16:22:40	303	57875.8	↓
16:23:06	304	?59264.2	N
16:23:23	305	57553.4	

16:23:40	306	?56498.0	
16:23:58	307	57656.8	
16:24:19	308	?57096.4	
16:24:43	309	?59899.8	
16:25:01	310	?58706.8	
16:25:25	311	?57646.6	
16:25:46	312	?57707.8	
16:26:03	313	58626.8	
16:26:30	314	?59230.0	
16:28:41	315	?58373.2	
16:28:59	316	?57419.2	
16:29:18	317	57380.4	
16:29:39	318	?57101.8	
16:29:58	319	56203.2	
16:30:19	320	?56530.8	
16:33:09	321	56046.0	LINE #4
16:33:32	322	56915.8	
16:33:54	323	56393.2	N
16:37:04	324	57418.8	↓
16:37:25	325	57643.4	S
16:37:51	326	58400.4	
16:38:16	327	58966.8	
16:39:20	328	?57766.2	
16:39:41	329	57341.8	
16:40:12	330	57627.6	
16:40:33	331	?58534.2	
16:40:54	332	?57309.0	
16:41:14	333	57610.6	
16:41:31	334	57373.6	
16:50:22	335	56866.2	
16:50:44	336	?57973.8	
16:51:04	337	58368.0	
16:51:23	338	?56348.0	
16:51:43	339	?59150.2	
16:52:02	340	?57994.6	
16:53:02	341	?57838.2	LINE #5
16:59:51	342	?58514.8	
17:00:09	343	58345.4	S
17:00:26	344	?58685.2	↓
17:00:44	345	57469.6	N
17:01:27	346	?56435.8	
17:01:53	347	57867.4	
17:02:22	348	57286.6	
17:02:40	349	?57383.0	
17:02:59	350	?59332.2	
17:03:23	351	58715.4	
17:03:46	352	57596.8	
17:04:03	353	58112.6	
17:04:20	354	58250.8	
17:05:54	355	?58462.4	
17:06:24	356	?57087.4	

17:06:43	357	57651.4	
17:07:01	358	57589.4	
17:07:21	359	57647.2	
17:07:40	360	56902.4	
17:08:43	361	?56996.4	
17:09:05	362	58391.8	LINE #6
17:09:25	363	57826.4	
17:09:43	364	?58805.2	N
17:10:07	365	57758.2	↓
17:10:27	366	?57938.2	S
17:10:51	367	?57338.6	
17:11:25	368	?57653.8	
17:11:45	369	?58766.2	
17:12:06	370	58819.0	
17:12:41	371	?58096.6	
17:12:59	372	?58953.4	
17:13:18	373	?56774.2	
17:13:36	374	?56459.6	
17:14:04	375	?56407.6	
17:14:22	376	?57894.4	
17:14:43	377	?57092.2	
17:15:01	378	57900.2	
17:15:19	379	?58216.8	
17:15:35	380	58134.4	
11:37:40	381	?58340.4	
11:38:24	382	56625.2	LINE #7
11:38:59	383	?56685.0	
11:39:16	384	?59225.8	S
11:39:41	385	57641.8	↓
11:39:56	386	56750.4	N
11:40:13	387	?58040.0	
11:40:52	388	?57791.4	
11:41:10	389	?58832.2	
11:41:27	390	?56060.6	
11:41:47	391	?58277.0	
11:42:24	392	57750.8	
11:42:42	393	56052.0	
11:44:24	394	?57795.2	
11:44:56	395	58512.0	
11:45:12	396	59145.6	
11:45:27	397	?58621.0	
11:45:43	398	58327.4	
11:46:00	399	57604.2	
11:46:16	400	57413.8	

APPENDIX 1.3.2-2

MONITORING WELL INSTALLATION AND TESTING PROCEDURES

Observation Well Drilling and Sediment Sampling

A truck-mounted CME-75 drill rig used hollow-stem auger drilling method with 3-3/4-in. I.D. auger to drill in the fill material.

Prior to the drilling of each boring/well, and at the completion of the last boring/well, the drilling equipment which came in contact with subsurface materials was pressure washed with hot potable water. Sampling of the fill material was performed using a split-spoon sampler, at approximately 5-ft intervals. The split-spoon sampler was pressure washed with hot potable water before and after each sample. A flame ionization detector (with filter cartridge) was used to monitor the potential organic vapors emitted during drilling operations and from each soil sample. Unless otherwise instructed, all drill cuttings, fluids, and development/purging water were collected and drummed for future appropriate disposal by NYSDEC.

Well Construction

Immediately prior to installation, the well pipe and screen were cleaned with a hot potable water pressure washer. Standard well construction consisted of an approximately 1-ft layer of sand placed at the bottom of the borehole below 10 ft of 2-in. diameter threaded-joint PVC well screen and an appropriate length of 2-in. diameter PVC riser with a bottom plug/cap. A sand pack was placed around the well screen up to 2 feet above the top of the screen, followed by a bentonite seal approximately 2 feet in thickness. A grout-bentonite mixture was then added to fill the annular space from the top of the bentonite seal up to grade. For the four PVC wells installed, the filter sand and bentonite pellets were carefully placed by hand down the annular space between the hollow-stem auger and the PVC well pipe as the augers were slowly withdrawn. The depth to the top of the filter sand or bentonite pellets was constantly monitored with a clean, weighted-tape and compared to the depth of the base of the hollow-stem auger. Because the PVC wells are shallow, the bentonite seal was generally close to ground surface and allowed for careful placement of the grout from ground surface.

Well Development

The monitoring wells were not developed because they were installed within the fill and the leachate.

Pump Tests of Monitoring Wells

A short-term, low-yield pumping test was attempted at the site. The test was comprised of: (1) a continuous discharge, pumped (drawdown) phase, and (2) a recovery phase. For such a test, pumping and water level measurement occurred in the same well.

In performing the short-term pumping test, first the static water level was measured and recorded prior to setting the centrifugal pump. The pump was then started at a discharge rate set compatible to the estimated amount of ground water yielded by the well, simultaneously a stop-watch was started. Accurate depth to water measurements during the drawdown phase were obtained and recorded at regular intervals. The discharge rate was also measured (using a calibrated bucket and a stop watch) at different times during the pumping phase. When little or no further drawdown occurred, the pump was stopped. Time and water level measurements of the recovery phase instantly began. Accurate depth to water measurements could not be recorded at regular intervals. Therefore, insufficient data was obtained to estimate the hydraulic characteristics of the fill material.

APPENDIX 1.3.2-3

SAMPLING PROCEDURES

A variety of sample types were collected. These included leachate from monitoring wells, surface water and sediment from the drainage ditches, and a drum sample. All sampling was conducted by EA personnel under supervision of the project manager. All sampling was accomplished under a rigorous chain-of-custody protocol. All samples were placed in containers of appropriate composition containing appropriate preservatives as presented in Table 7-1 of the Work/QA Project Plan for the current Amendment to Perform Phase II Work dated 16 January 1985. Refer also to Section 13, Sample Custody Procedures, of the Work QA/Project Plan.

Monitoring Well Sampling

One set of grab-type leachate samples were obtained for chemical analysis from PVC monitoring wells installed for this project.

The purging and sampling of each well was performed at least one week after completion of well installation. Each well was purged by a centrifugal pump or hand bailed to remove potentially stagnant fluid in the well and allow for the recharge of the fresh leachate to the well for sampling. Each sampled well was purged to dryness, or up to approximately four times the volume of the water column in the borehole, depending upon the well yield.

The volume of water to be purged was determined as follows: for wells completed in unconsolidated material, a sand-packed 2-in. diameter PVC well was installed in a 7-in. diameter borehole; assuming 25 percent porosity of the sand pack, there is approximately a 0.50-gallon/linear foot of water in the borehole.

Between wells, where a centrifugal pump was used, a new, clean length of polyethylene flexible pipe was used in each well as the suction line. A clean teflon bailer or a clean polyethylene flexible pipe with a clean foot valve was used for each well hand bailed.

Upon completion of the purging operation at each well, a sample of the leachate was obtained by using individual bottom-fill teflon bailers lowered into each well with new polypropylene rope for each well. For each well sampled, the bailer was handled with a new pair of disposable plastic surgical gloves. The bailer was lowered into each well slowly to minimize the potential for aeration of the water sample. Water samples were carefully transferred from the bailer to the sample containers to further minimize the potential for aeration of water samples, especially those for VOA. No "head space" was allowed in filled VOA water sample containers. Prior to arrival at the site, individual bottom-fill Teflon bailers were prepared in the laboratory for each well to be sampled. The preparation procedures were comprised of washing with hot water and Alkanox soap followed by a hot water rinse, acetone and hexane rinses, and air dried.

Surficial Soil Sampling

Surficial soil samples were collected from the ditch at each surface water sample location using new, individual, disposable polyethylene scoops. Prior to mobilization in the field, each scoop was cleaned in the laboratory, in the same manner as the teflon bailers. Each sample was handled with a new pair of disposable plastic surgical gloves and placed in appropriate containers (Section 7 of the Work/QA Project Plan).

Surface Water/Leachate Samples

Grab-type surface water samples were collected in containers of appropriate composition containing appropriate preservative for the parameters to be determined. Each sample was handled with a new pair of disposable plastic surgical gloves and placed in appopriate containers (Section 7 of the Work/QA Project Plan).

NCHD File Info.

Appendix 1.4.1-1

187

NAME

NCSWD - WHEATFIELD SITE (DEC #932026)

LOCATION

This site is a 50 acre inactive landfill, which stradles the Wheatfield - North Tonawanda city line north of the Town of Wheatfield Right-of-Way, which parallels River Road. The filled area extends to 100 yards west of Witmer Road.

A site sketch is attached.

OWNERSHIP

The property is currently owned by the Town of Wheatfield. At the time the site was active, the owner of record was the County of Niagara. Ownership was transfered from the County to a private firm prior to transfer to Wheatfield.

HISTORY

The Niagara County Solid Waste Agency opened the Wheatfield landfill in 1968. Wastes accepted included municipal wastes, sewage sludge and industrial wastes. The site was closed in October, 1976, after a history of operational problems.

From the time of opening, operating problems and violations of Part 19 of the NYS Sanitary Code (and later Part 360 of the 6 NYCRR) were common. The files of the Niagara County Health Department show that fires, inadequate cover, pooling of water and chemicals, odors, unrestricted access and leachate leaving the site were recorded while the facility was active. In 1972 and 1973 several reports show that leachate from this site entered the Niagara River in large quantity via drainage ditches. On at least one occasion, this leachate formed a large brown plume in the river and odors have been detectable along the shoreline. Oil was found in the ditchs on numerous occasions and water in these ditchs was often strongly septic.

Over 100 users are believed to have used this site (75 are recorded as using the site in December, 1971, alone). The City of Niagara Falls, North Tonawanda and Niagara Sanitation used this site for disposal of municipal refuse. Bell Aerospace, Carborundum, Hooker - Durez, DuPont, International Paper, Roblin Steel, NL Industries, Olin-Mathesion and Hooker Chemical (Niagara Falls) are recorded as industrial users of this site. Sewage sludges from Niagara Falls, North Tonawanda and possibly Lockport were received until closure.

The site was never properly closed and its condition appears to be detereorating with time. Recent inspections made by the Niagara County Health Department have revealed problems with scavenger dumping, protruding refuse, unrestricted access, erosion, lack of vegatation, pooling of water, clogged ditchs and flowing leachate streams. Grading is rough and uneven and general site drainage

HISTORY (continued)

is poor in many areas. Leachate was found to collect in low interior areas, but none was found leaving the site. The ditchs showed no sign of oil or leachate.

Area residents have been vocal in expressing concern for the impacts of this site. In 1976, several complaints were received by the Health Department alledging that burns and illness in people having entered the site were caused by exposed chemicals. These claims were not substantiated by evidence obtained in the subsequent investigation.

The financial burden for clean up and closure of this site may be beyond the resources of the current owner, the Town of Wheatfield. This site is presently under consideration for a possible superfund grant to fund clean up efforts.

Additional investigation has been conducted by the DEC Region 9 office.

REVIEW OF AERIAL PHOTOGRAPHS

Aerial photographs taken while the site was active are not available. Photographs taken by the US Department of Agriculture in 1966 show this area as farmland at that time.

PREVIOUS SAMPLING RESULTS

Samples have been taken from this site on numerous occasions. The Niagara County Health Department has sampled leachate and surface water near the site. A summary of these results is given below:

Samples obtained - April 30, 1973

#1) Leachate at outfall to river

COD - 100 | BOD_5 - over 45 | pH 7.9
Suspended residual | 13 mg/l (9 volatile, 4 fixed)
Dissolved Residual | 572 mg/l (147 volatile, 423 fixed)

#2) Niagara River - 50 ft. downstream from outfall

COD - 5 | BOD_5 - over 7 | pH 6.2
Suspended residual | 13 mg/l (8 volatile, 111 fixed)
Dissolved residual | 393 mg/l (5 volatile, 282 fixed)

#3) Niagara River - 50 ft. upstream of outfall

COD - 40 | BOD_5 - 2.2 | pH 6.8
Suspended residual | 5 mg/l (0 volatile, 5 fixed)
Dissolved residual | 204 mg/l (73 volatile, 131 fixed)

#4) Leachate at outfall

Barium LT 0.1 mg/l

PREVIOUS SAMPLING RESULTS (continued)

#4) Leachate at outfall (continued)

Cadmium	LT 0.5 mg/l
Total Chromium	0.1 mg/l
Copper	.06 mg/l
Iron	1.6 mg/l
Lead	LT 0.1 mg/l
Manganese	2.6 mg/l
Mercury	LT 0.0004 mg/l
Selenium	LT 0.01 mg/l
Silver	LT 0.1 mg/l
Zinc	0.9 mg/l
Cobalt	LT 0.1 mg/l
Nickle	LT .05 mg/l

Samples obtained - May 21, 1973

	#1 Leachate	River 50' DownStream
Barium	1.3 mg/l	LT 1.0 mg/l
Cadmium	LT 0.05 mg/l	LT 0.05 mg/l
Total Chromium	LT 0.1 mg/l	LT 0.1 mg/l
Copper	LT 0.1 mg/l	LT 0.1 mg/l
Iron	4.4 mg/l	0.23 mg/l
Lead	0.10 mg/l	LT 0.1 mg/l
Manganese	0.65 mg/l	0.02 mg/l
Mercury	0.0006 mg/l	0.0008 mg/l
Selenium	LT 0.01 mg/l	LT 0.1 mg/l
Silver	0.025 mg/l	LT 0.025 mg/l
Zinc	0.1 mg/l	LT 0.1 mg/l
Cobalt	0.1 mg/l	LT 0.1 mg/l
Nickle	LT 0.05 mg/l	LT 0.5 mg/l

Samples obtained - September 22, 1978 - Ditch sediment from near center of site

PCB, AROCLOR	1016/1242	LT 0.01 mcg/g
PCB, AROCLOR	1254	LT 0.01 mcg/g
PCB, AROCLOR	1221	LT 0.01 mcg/g
PCB, AROCLOR	1260	.25 mcg/g

The following samples were taken by Mr. John Tygert of DEC from a pond 50 feet from the northeast corner on July 2, 1978:

Phenol	LT 0.005 mg/l	LT .005 mg/l
Cadmium	LT 0.02 mg/l	LT 0.02 mg/l
Copper	LT 0.05 mg/l	LT 0.05 mg/l
Arsenic	LT 0.01 mg/l	0.01 mg/l
Barium	LT 0.50 mg/l	LT 0.50 mg/l

PREVIOUS SAMPLING RESULTS (continued) taken by Mr. John Tygert of DEC

Chromium	LT 0.10 mg/l		LT 0.10 mg/l
Lead	LT 0.10 mg/l		LT 0.10 mg/l
Zinc	LT 0.05 mg/l		LT 0.05 mg/l
Total Organic Halogen (as Cl)		390 mcg/l	470 mcg/l
Mercury	0.0011 mg/l		0.0013 mg/l

In the summer of 1979 the City of North Tonawanda obtained samples from two test wells behind Witmer Road homes. The results of the sample analysis are on file with the City Attorney and the DEC Region 9 Office.

Other sampling is believed to have been undertaken by the DEC and the EPA. These results were not available at this time.

SOILS/GEOLOGY

According to the USDA Soil Conservation Service Soil Survey for Niagara County, five soil types were found in this area prior to landfilling (1966). These included Canandaigua silt-loam, ovid silt loam, Hilton silt-loam, Raynham silt-loam and Lakemont silt clay loam. All of the above soil types exhibit slow permeability and a high seasonal water table to within two feet or less of the surface. Sand lenses are common in the substratum of several of these soil types.

In the landfilling operation, much of the waste material was placed below the original grade. The depth of waste material below grade is not known and the effect of landfilling on the native soils is not known.

Two wells were drilled by RECRA Research, Inc. under contract to the City of North Tonawanda, behind Witmer Road homes. Boring records for these wells show a profile of 18" of miscellaneous material over silt and sand to 4', over clay with some gravel to 10', over silt with some clay and sand in lenses to 35 feet.

Bedrock is likely to be Lockport Dolomite by extrapolation from nearby areas. Bedrock is expected at a depth of 35 feet below grade and the shallowest bedrock aquifer at least 10 feet below the surface of the Dolomite.

GROUNDWATER

According to the report written by RECRA (1979) for the City of North Tonawanda, a perched laterally flowing aquifer is present above the clay substratum. However, this aquifer is likely to disappear entirely in the summer and during dry periods. Similiar information is found in the Soil Conservation Service Soil Survey.

The Lockport Dolomite is likely to contain several water bearing zones. These zones are found in bedding joints at depths of 40 or more feet below the surface. Although the Dolomite allows horizontal passage of water, vertical movement is minimal (Johnston 1964).

GROUNDWATER (continued)

The direction of flow of the perched water table is not known, but it is possible that the groundwater may become influent to drainage ditchs at various points. The bedrock aquifers flow generally west or southwest, that is to say that they flow toward the Niagara River.

There are no known drinking water wells within 3 miles of this site. The two monitoring wells placed by RECRA were sampled in 1979 and showed detectible levels of THO and phenols. There is possibility that leachate from this site is partially responsible for the high phenol levels in well #13 in Gratwick Park (700 feet southeast).

SURFACE WATER

The nearest surface water body is Black Creek, which is adjacent to the northern limit of the landfill. Black Creek becomes a tributary to Cayuga Creek 3 miles downstream from the site. Cayuga Creek flows into the Niagara River 1 mile from the junction of Black Creek.

Apparently all drainage ditchs drain away from Black Creek, although some runoff may enter directly. The marshy area east of the site drains into Black Creek.

The Niagara River is 900 feet south of the site. Drainage ditchs serving the landfill enter the River via a 600 foot swale, which enters the river 200 feet north of Gratwick Park. This route has been confirmed to have been a source of contamination to the River as indicated in the "History" section of this report.

Analysis of samples of surface water obtained from ditchs shows negligible concentrations of heavy metals and THO concentrations of 390 to 470 ppb. These samples were taken in 1973 and 1979.

The Niagara River is used for industrial water and drinking water. The intakes for the City of Niagara Falls Water Plant are 3.5 miles downstream. Industrial intakes are found 3.5 to 5.0 miles downstream.

A wetland area is adjacent to the north and northeast portion of the site.

AIR

Odor problems were common while the site was active. Occasionally, odors are still detected on-site.

The site is located 200 feet from a residential area (Witmer Road), adjacent to an agricultural area and 1,000 feet from an industrial area (St. Mary's Manufacturing).

It is estimated that 1,000 people live within one mile of the site and that over 10,000 people live within two miles.

FIRE/EXPLOSION

The potential of a fire within the site spreading to off-site areas is unknown. The nearest off-site building is 200 feet away (home on Witmer Road). Roughly 1,000 buildings are located within two miles.

DIRECT CONTACT

Access is not restricted. Vehicles are driven into the site routinely. The site is used for hunting and target shooting by area residents. Tracks left by trail bikes were seen throughout the site.

Although the wastes are apparently covered, leachate has been found on the surface. Red-brown and bright blue leachate streams were noted in several locations during a recent inspection.

Area residents have complained of exposed chemicals after closure of the site, although none have been found. Pooling of sludges and other wastes were recorded while the site was active.

CONCLUSIONS/RECOMMENDATIONS

This is a large landfill containing a wide variety of wastes including significant quantities of industrial and hazardous wastes. The proximity of the site to residential areas and the Niagara River justifies further investigation to determine potential impacts.

Sampling wells are needed to facilitate groundwater monitoring. The wells behind homes on Witmer Road are servicable, however, additional wells along the west and south sides would allow more accurate predictions of ground-water movements.

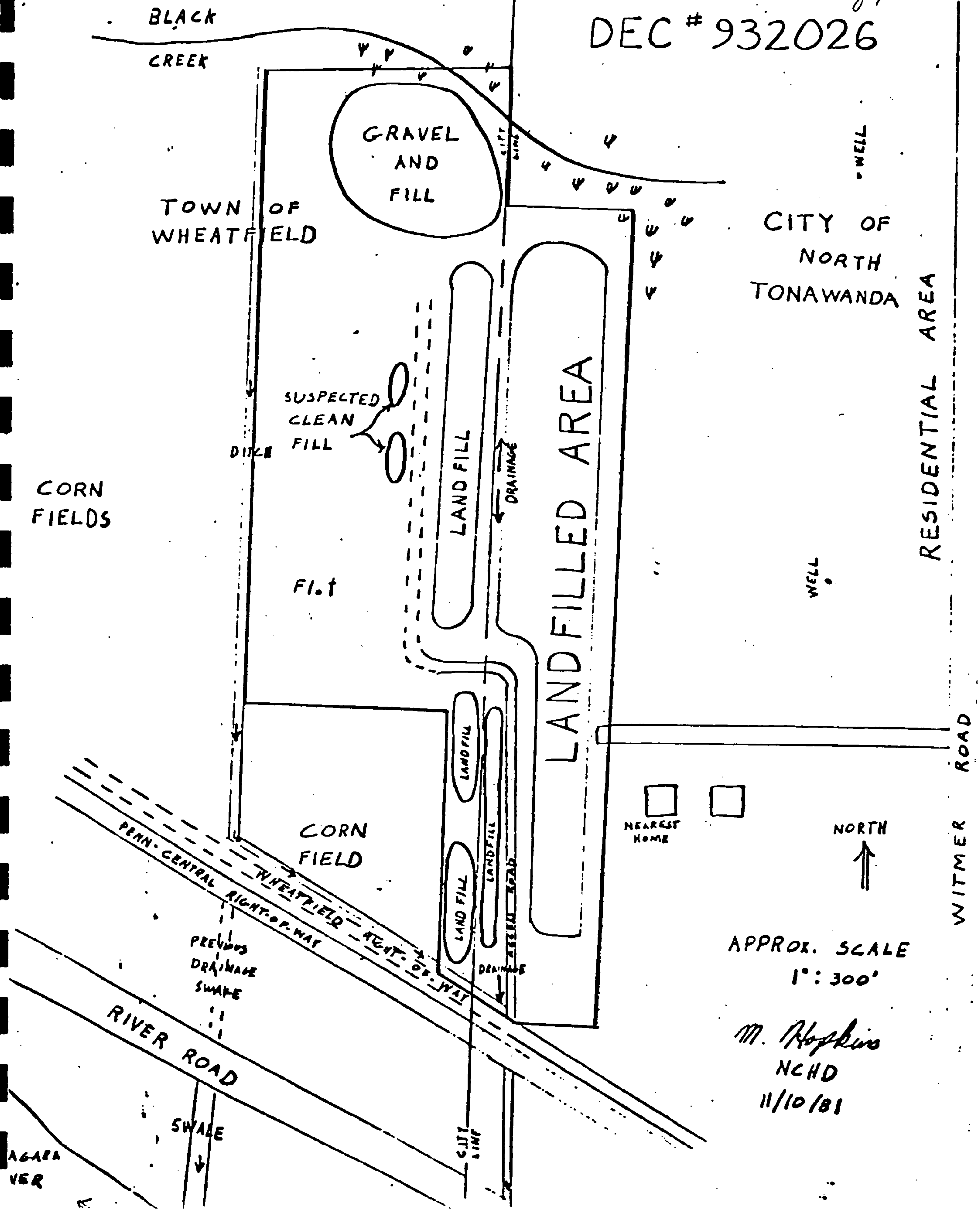
Additional samples could be taken nearly anywhere within the site from hand bored holes. Surface water samples from ditches or leachate samples could be obtained easily. Sediment samples from the swale leading to the Niagara River could reveal whether hazardous materials are being transmitted to the river via this route.

Proper closure including capping, drainage control, grading and seeding is needed. Leachate collection facilities may be necessary.

Periodic inspections should be continued.

NCSWD - WHEATFIELD SITE 7 of 7 18.

DEC # 932026



Appendix 1.4.1-2

1972

NIAGARA COUNTY REFUSE DISPOSAL DISTRICT

WHEATFIELD SITE - CUSTOMER QUANTITIES -

DECEMBER 1971

ACCOUNT	POUNDS	CUBIC YARDS
Balling Bros. Const	6,630	
Benman and Company	36,740	
Bell Aerospace	72,460	
Booth Oil Co.	197,840	
Boyko Const. Co.	5,290	
Cannon Distributors	11,100	
Carborundum Co. (N.F.)	778,530	
Carborundum Co. (Wheat.)	412,580	
Carborundum Co. (Hyde P.)	70,180	
Carborundum Co. (Cory R.)	75,830	
Caswell, John	4,770	
Clasen Supply Inc.	49,140	
Century Salvage	92,570	
DeGraff Memorial Hosp.	31,900	
Durez Plastics	672,730	
DelGatto, Anthony	3,860	
Downing Container	84,600	
DuPont	99,280	
Fairl Landscaping	2,580	
Frontier Railway Maint.	23,660	
Foster - Bodie	1,900	
Hooker Chem. Co.	346,620	15
Hurtibise Tire	45,550	
Holler Brothers	28,580	
International Filler	31,470	
International Paper	556,480	
Kinberley Clark	12,780	
Kunhs Storage	1,610	
Laur & Mack Const.	189,200	
Lawless Container	7,380	
L. & L. Builders	3,440	
Montileone & Marchetti	7,020	
Modern Disposal	434,820	
Maroon, James, Inc.	1,930	
McMahon, J. M.	1,800	
Monroe Tree Service	14,920	
N. F. Board of Educ.	37,280	
N. Tona. Board of Educ.	16,090	
M. F. Mission	9,220	
National Biscuit Co.	28,510	
National Grinding Wheel	57,750	
Niag. Co. Parks	970	
Niag. Sanitation Service	3,016,580	
N. F. City	2,715,160	3,055
N. Y. S. Transportation	1,990	
N. Tona Parks Dept.	1,040	

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Wheatfield Dec. 71, Customer Quantities Cont.

N. Tona. Sewar	10,230	
N. Tona. City	2,627,100	
Niag. Co. Water Dist.	890	
N. F. Housing Auth.	5,680	
Niagara University	56,390	
Olin Mathieson Corp.	848,040	
Paramount Drywall Co.	5,240	
Rapid Disposal	134,750	
Reback Scrap Metal Co.	11,890	
River Road Lumber Co.	2,830	
Stan's Tire and Battery	7,470	
Sicoli & Massaro Inc.	48,960	
Tiger Supply	7,160	
Thompson Roofing	80,600	
Tuscorora Roofing	2,820	
Twin City Glass Corp	1,210	
Tonawanda Roofing Co.	9,830	
Virtuoso Building Co.	8,040	
Wind Heating	2,530	
Wright Associates Bldg. Corp.	48,830	
Wright & Kremers	290,700	
Wagner, Carl	112,840	
West Roofing Co.	23,690	
Wurlitizer	37,110	
Total (CHARGED)	14,687,090	3,070
Total (CASH)	637,530	32
	15,324,620	3,102
Eight Four (84) Lumber	2,350	
Total (CHARGED)	15,326,970	

wnew file
Appendix 1.4.1-3
1874

REMEDIAL RESPONSE ACTIVITIES zone 1

UNCONTROLLED HAZARDOUS WASTE DISPOSAL SITES

Draft
Remedial Action Master Plan
for
Niagara County Refuse Disposal Hazardous Waste
Niagara County, New York
Work Assignment Z-1-12-6
under
Contract No. 68-03-1612

September 9, 1982

REMEDIAL ACTION MASTER PLAN

CAMP DRESSER & McKEE INC.
CH2M HILL
CONESTOGA-ROVERS & ASSOCIATES LIMITED
C. C. JOHNSON AND ASSOCIATES

Appendix 1.4.1-3
2 of 4

Table 1
GENERATORS FOR NIAGARA COUNTY REFUSE

Generators	Wastes
Carborundum Co. General Administrative Office Niagara Falls, NY 14304 716-278-2000	Empty Containers Abrasive Grain Scrap Sandpaper Scrap Resins Rags Paper Wood
Bell Aerospace Co. Div. of Textron Inc. Executive Office Niagara Falls Blvd. Niagara Falls, NY 14304 716-297-1000	Heat Treatment Salts Plating Tank Sludge Scrap Wood Clay Fly Ash
The Goodyear Tire & Rubber Co. 5408 Baker Ave. Niagara Falls, NY 14304 716-283-7682	Thiazole Polymer Blends Iron Catalyst Salts Accelerator Sewer Pumps Misc. PVC Wastes
E.I. DuPont de Nemours & Co. Industrial Chemical Dept. Buffalo Ave. & 26th Street Niagara Falls, NY 14304 716-278-5100	Off-Grade Polyvinyl Alcohol
Hooker Chemicals & Plastics Corp. Durez Div. Walack Road N. Tonawanda, NY 14150 716-696-6000	Oil and Grease Drippings Phenolic Molding Compound Phenolic Resin Rubbish
Olin Corp. Industrial Chemicals 2400 Buffalo Ave. Niagara Fall, NY 14303 716-278-6411	Graphite Lime Sludge Brine Sludge (with mercury)
Hooker Chemicals & Plastics Corp. Speciality Chemicals Div. Buffalo Ave. Niagara Falls, NY 14302 716-278-7777	Hypo Mud Soil & Misc. Chemical Wastes From Southern Section of Love Canal

Appendix 1.4.1-3
3 of 4

Table 1
GENERATORS FOR NIAGARA COUNTY REFUSE
(Continued)

National Lead Co. 4511 Hyde Park Blvd. Niagara Falls, NY 14305 716-694-0636	Fumed Silica Zircon-Zirconia Sludge Paper Bags (which may contain traces of heavy metals dusts) Wood Pallets Flint Pebbles Fiber Drums Steel Drums Brick
Roblin Steel Co. 101 East Ave. N. Tonawanda, NY 14150 716-696-9700	Miscellaneous Trash

RW12/42

Table 2
TRANSPORTERS FOR NIAGARA COUNTY
REFUSE SITE

Booth Oil Co., Inc.
76 Robinson Street
N. Tonawanda, New York 14150
716-693-0861

Hasley Trucking Co., Inc.
10315 Lockport Road
Lockport, New York 14094
716-297-1550

Modern Disposal
Unknown

Ray F. Morningstar
528 Yong Street
Tonawanda, New York 14150
716-693-4020

Niagara Sanitation Co., Inc.
262 Woodward Ave.
Kenmore, New York 14217
716-693-5185

Rapid Disposal Service, Inc.
22 Metcalf Street
Buffalo, New York 14206
716-852-6662

J. Vitullo Trucking Co.
3640 Packard Road
Grand Island, New York 14072
716-285-3744

DEC PUBLICATION

C Appendix 1.4.1-4

1 of 2

"COMMUNITY RIGHT-TO-KNOW"

VOLUME III

PAST HAZARDOUS WASTE DISPOSAL PRACTICES

January 1952 - December 1981

Appendices I - P

APRIL 1, 1985

New York State/Department of Environmental Conservation

Appendix 1.4.1 2 of 2

TRANSPORTERS - RESPONDING WITH QUESTIONNAIRE	ID NUMBER
HARRISON RADIATOR,200 UPPER MTN RD,LOCKPO	T0901662
FMC CORPORATION,100 NIAGARA ST,MIDDLEPORT	T0901668

SITE DESCRIPTION: MODERN DISPOSAL MODEL CITY RD. MODEL CITY NY 14107

SITE CODE: 9-32-025

WASTE DESCRIPTION	QUANTITY	U	L	S	D	GENERATOR NAME	ID
FLAMMABLE WASTE LIQUID (PAINT PIGMENT SOLVENTS)			X	-	X	GREIF BROS. CORPORATION	G0915060
GELLED PHENOLIC RESINS	105.00	T	X	X	X	REICHHOLD CHEMICALS INC.	G0914841
WASTE ACETONE			X	-	-	AN-COR INDUSTRIAL PLASTICS INC.	G0915334

* SITE DESCRIPTION: NIAGARA CO REFUSE DIST #1 (WHEATFIELD) TOWN OF WHEATFIELD

SITE CODE: 9-32-026

WASTE DESCRIPTION	QUANTITY	U	L	S	D	GENERATOR NAME	ID
BRINE MUD	12,093.00	T	-	X	-	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
CAUSTIC FILTER BACKWASH FILTER TUBES	157.00	T	-	X	X	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
CAUSTIC SODA			-	X	X	BELL AEROSPACE COMPANY	G0914885
GRAPHITE	5.80	T	-	X	-	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
METHYLATE FILTER RESIDUE	143.00	T	-	X	X	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
RETORT ASH	20.00	T	-	X	X	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
SECONDARY TREATMENT SLUDGE	49.00	T	-	X	X	OLIN CORP. CHEMICALS GROUP (NIAGA	G0914876
SLUDGE CONTAINING PERCHLOROETHYLENE	0.50	T	-	X	-	COSMO'S ONE-HOUR CLEANERS	G0914862
SPENT FILTER CARTRIDGES W/ FATTY ACIDS,PERCHLOROETHYLENE	0.50	T	-	X	-	COSMO'S ONE-HOUR CLEANERS	G0914862
TETRACHLORETHYLENE	0.50	T	-	X	-	CAPITOL CLEANERS	G0914859
TETRACHLOROETHYLENE IN STILL RESIDUE	20.00	T	X	-	-	WALKER LAUNDRY	G0914865
TETRACHLOROETHYLENE IN STILL RESIDUE	5.00	T	X	-	-	WALKER LAUNDRY	G0914865

SITE DESCRIPTION: NL INDUSTRIES INC,4511 HYDE PARK BLVD,N.F. ** TAM CERAMICS

SITE CODE: 9-32-028

WASTE DESCRIPTION	QUANTITY	U	L	S	D	GENERATOR NAME	ID
ZIRCONIUM TETRACHLORIDE RESIDUES	2.00	T	-	X	X	TAM CERAMICS INC.	G0914866

SITE DESCRIPTION: NOURY CHEMICAL CORP,2153 LOCKPORT-OLCOTT RD,BURT,NY

SITE CODE: 9-32-030

WASTE DESCRIPTION	QUANTITY	U	L	S	D	GENERATOR NAME	ID

Appendix 1.4.1-5
182
File

May 1, 1970

Mr. Kenneth Moss
Niagara County Solid
Waste Agency
Bewley Building
Lockport, New York 14094

Re: Niagara County Solid
Waste Agency Site
Town of Wheatfield

Dear Mr. Moss:

Due to problems which have occurred with incinerator waste being transported from the Niagara Falls incinerator site and disposed of at the Town of Wheatfield solid waste site, it is requested that your agency become involved in the corrections of these problems.

It has come to our attention that the Niagara County waste site is unmanned after 5:00 P.M. and left open to allow the vehicles from the City of Niagara Falls to dispose of incinerator residue waste. It has been noted that the residue waste on its arrival at this site is still smoldering and if not properly disposed of will cause continuous burning if not attended to.

The Niagara County Health Department has had several complaints from concerned citizens from the City of North Tonawanda living near this site as to the burning and acrid smoke odors which continue to emanate throughout the night. I myself have seen these vehicles dispose this waste at this site through the night. I have seen these trucks coming down River Road with burning particles flying through the air.

Since we cannot allow this to continue, some means of action will have to be taken. If this site is to be operating or to remain open 24 hours per day, it will have to operate in such a manner as to comply with Part 19 of the New York State Sanitary Code and Chapter IV of the Niagara County Sanitary Code.

2 of 2

The agency, as you are well aware, is fully responsible for all infractions or violations which occur at this site. You are advised, therefore, that some means must be taken to properly control this residue during the periods after 5:00 P.M.

If there are any questions, please call or write this office.

Yours very truly,

Michael Popovici
Acting Chief of Air
Pollution Control

MP:ms

Appendix 1.4.1-6

file

May 18, 1973

Mr. Kenneth Moss, Director
Niagara County Refuse Disposal Agency
Bewley Building
Lockport, New York 14094

Re: Site Inspection - May 10, 1973

Dear Mr. Moss:

On May 10, 1973, you conducted a tour of the Niagara County Refuse Disposal Town of Wheatfield site accompanied by Mr. J. Tygert, Engineer with the New York State Department of Environmental Conservation, Mr. Malinchock and myself. The following violations were noted:

1. Various areas of exposed and protruding refuse noted throughout the site.

2. Pooling water was noted in various areas on the site as well as leachate.

3. Drainage ditches along the north and west boundary contained leachate.

4. The leachate drainage from the site is still entering the Niagara River in front of Demler's Cider Mill, River Road, Town of Wheatfield.

5. Two feet of final cover was not placed on exhausted landfill areas.

6. Leachate discharges are occurring from the completed refuse landfill lift areas.

Work must begin immediately with the assistance of your engineering advisors to correct and bring into compliance (Title 6, Part 360, New York State Department of Environmental Conservation Rules and Regulations) all of the aforementioned violations.

Please submit a scheduled program showing the plan, work scheduled, and expected completion dates on all corrections.

Yours very truly,

Michael Popovici
Acting Chief of Air

MP:ms

Appendix 1.4.1-7
1 of 3

File NCSWD - Wheatfield

Code Activity

NIAGARA COUNTY
DEPARTMENT OF HEALTH

Code Location

Service Request No.

Date Received Complaint

Service Request: Inspection of Inactive Landfill - NCSWD - Wheatfield

Originator of Complaint: NCHD - Schedule C Address: —

Owner: Town of Wheatfield Address: —

Occupant: NCSWD - Wheatfield landfill Address: off Witmer Road, North Ton.

Date	Hours	REPORT OF INVESTIGATION
/82		An inspection of the NCSWD site, was made by the writer. The following problems were noted:
		1) Leachate is flowing off site via an east-west drainage ditch near the center of the property. The leachate is deep red-brown, nearly opaque and often with ½" of red brown "scum" on its surface.
		2) Leachate is collecting in a north-south swale in the northern section of the landfill. Leachate varied from blackish water, to water with oil film to a red brown leachate similar to that noted in #1. This leachate appears confined to site.
		3) As noted in previous inspections, scavenger dumping is severe and in several locations scavenger material is clogging drainage ditches.
		4) Odors were found in the swale noted in #2. The odors varied from a "sour milk" odor to a characteristic "garbage" odor.
		5) Erosion is a problem in some areas. Refuse has been exposed by erosion in one area. Some areas have no vegetative cover.

Date Abated .... By ....

Appendix 1.4.1-7
2 of 3

Code Activity ....
Code Location ....
Service Request No. ....
Date Received Complaint ....

NIAGARA COUNTY
DEPARTMENT OF HEALTH

Service Request: NCSWD - Wheatfield

Originator of Complaint .... Address ....

Owner .... Address ....

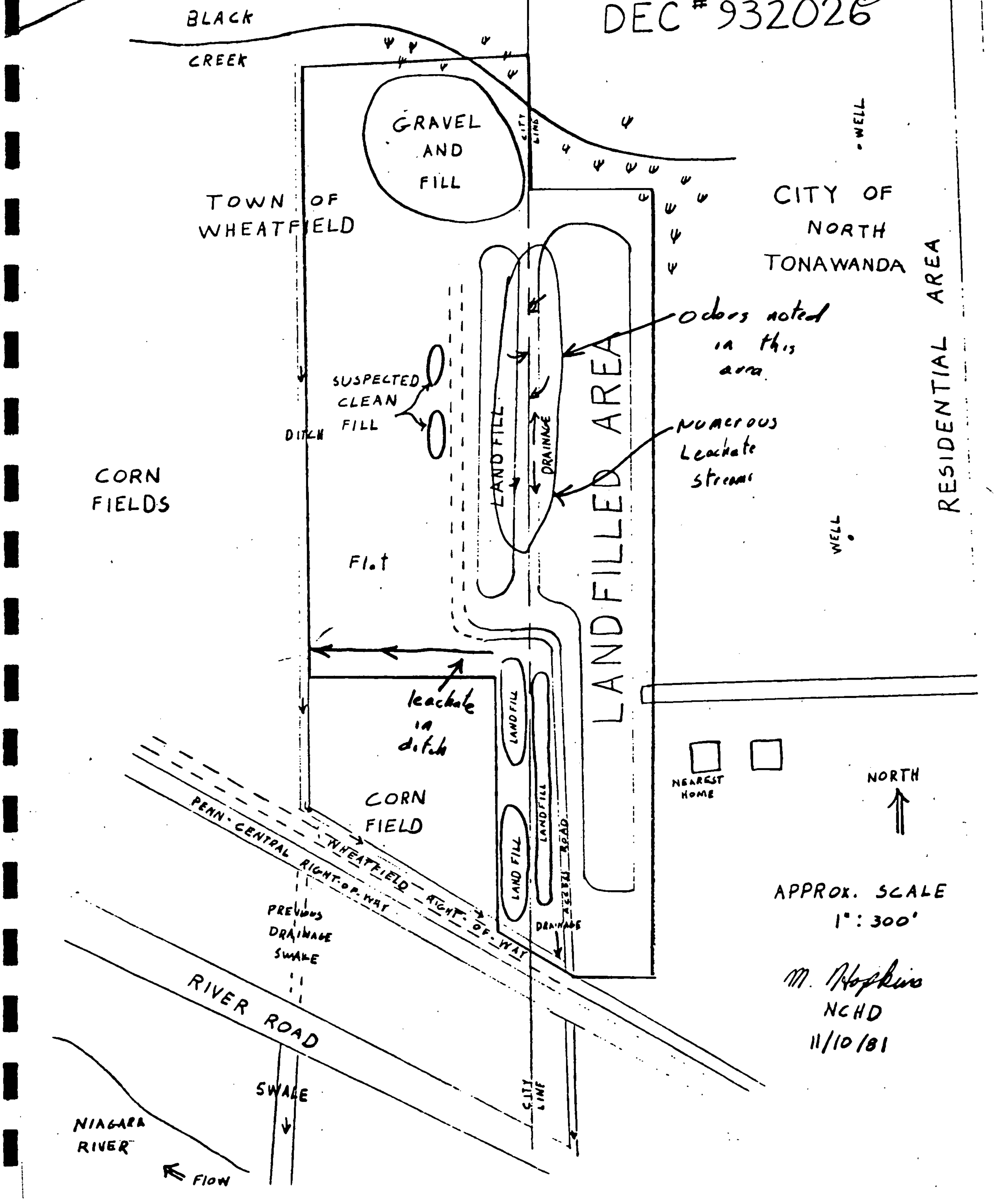
Occupant .... Address ....

Date	Hours	REPORT OF INVESTIGATION
		6) Access is unrestricted
		7) In general the site was dry at this time but it appears that drainage problems may occur in wet weather
		M. Hopkins

Date Abated .... By ....

NCSWD - WHEATFIELD SITE Appendix 1.4.1-7 3 of 3

DEC # 932026



M. Hopkins
NCHD
11/10/81

Pg. 1

Appendix 4.1-8

Code Activity 27

Code Location Wheatfield

Service Request No N.C. Refuse Disposal District

Date Received Complaint

NIAGARA COUNTY
DEPARTMENT OF HEALTH

Service Request: Possible Chem. Burns from Haz. Mat.

Originator of Complaint: Jean Kroetsch — Address: 504 Witmer Rd. N. Ton.

Owner: Niagara County Refuse Comm. — Address: Witmer Rd - Wheatfield Site

Occupant: — Address:

Date	Hours	REPORT OF INVESTIGATION
9/17	78	Spoke to Mrs. Jean Kroetsch at City Hall. She related that her son, Paul, was out at the Co. Dump along Witmer Rd. several weeks ago and after about three days of being out at the dump he developed a burn or a rash along his face and neck which they treated with Calamine lotion and disappeared in about 3 days. They felt this was caused by toxic materials at the dump. She told the writer Paul was at home and that he could show writer the area in question.
		Met Paul Kroetsch, 14, at his home and interviewed him with regards to the rash, activities, area involved, etc.
		Paul and his friends run field cars in the area of the dump. One day after being in the dump he developed a rash (red and itchy) which by the next morning spread to cover the left side of his face and neck. He could not recall any possibility of contacting poison ivy or oak and did not know of any allergic reactions which may cause the symptoms.
		For 3 days prior to the rash Paul and been riding in field cars in the dump area. The weather was dry and dusty and Paul had not sat or layed on the ground. He thought that any toxic chemicals involved would have been carried in the dust and only affected half his face because that was the side facing out the window of the car.

Date Abated .... By ....

Appendix 1.4.1-8

Code Activity 292

Code Location

Service Request No.

Date Received Complaint

NIAGARA COUNTY
DEPARTMENT OF HEALTH

Service Request: Ross Chem. Burns from Hay. Mat.

Originator of Complaint: Jean Kroetsch Address: 584 Witmer Rd. N.T.

Owner: Niagara County Refuse Comm. Address: Witmer Rd. - Wheatfield Si

Occupant Address

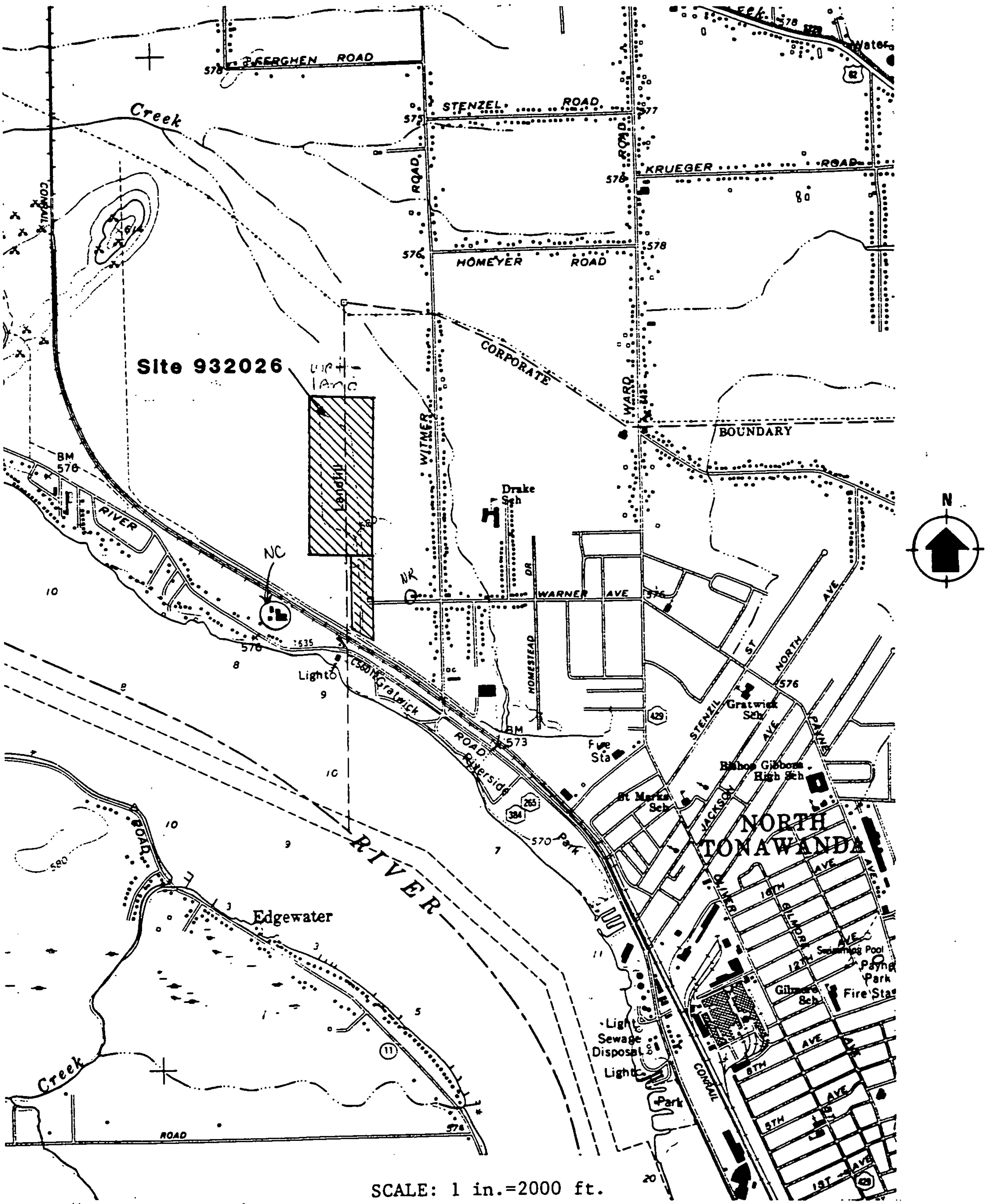
Date	Hours	REPORT OF INVESTIGATION
8/17/78		Paul related that as far as he knew, none of his friends had had any adverse reactions. He has been back to the dump on numerous occasions since the rash cleared but has not had any further reactions.
		Paul accompanied the writer on an inspection of the area he uses for field cars. Writer could not find any sign of any chemicals or sludges on the site. There is no standing water. Paul related that he never saw anything unusual at the dump, however, he said that in wet weather the drainage ditch along the south (Witmer) side of the dump has a sheen as if it contains oil. Writer suggests that this water course be analyzed in wet weather.
		Writer noted that the land fill site is quickly eroding and deep ruts cut into the top and sides of the land fill. If the rear portion (east half) of the landfill were ever seeded, it never took. Site is barren clay. Site should be finished and seeded and followed up to see that seed takes and prevents erosion. At one site the drain tile around the perimeter of the cells have been undermined and have collapsed.
		Writer also noted that dumping, apparently by private individuals, continues along roadway. Methods of control should be initiated such as a roadway gate, etc.
		T. Frank

Date Abated .... By ....

Appendix 1.4.2-1 (Site Inspection)

COORDINATES:
Latitude: 43 03'55'
Longitude: 78 54'22'

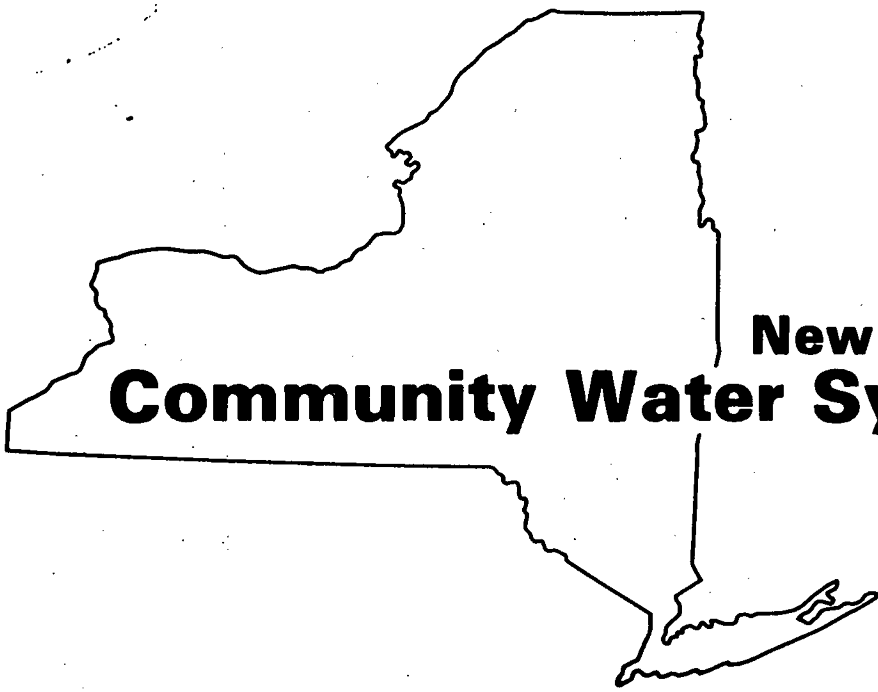
NIAGARA COUNTY R.D.-WHEATFIELD SITE



SCALE: 1 in.=2000 ft.

NR = Nearest Residence
NC = Nearest Commercial Bldg

Tonawanda West Quad
NYSDOT 7.5 Minute Series
1976 Edition



New York State Atlas of Community Water System Sources 1982

NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF PUBLIC WATER SUPPLY PROTECTION

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p. 1 of 3

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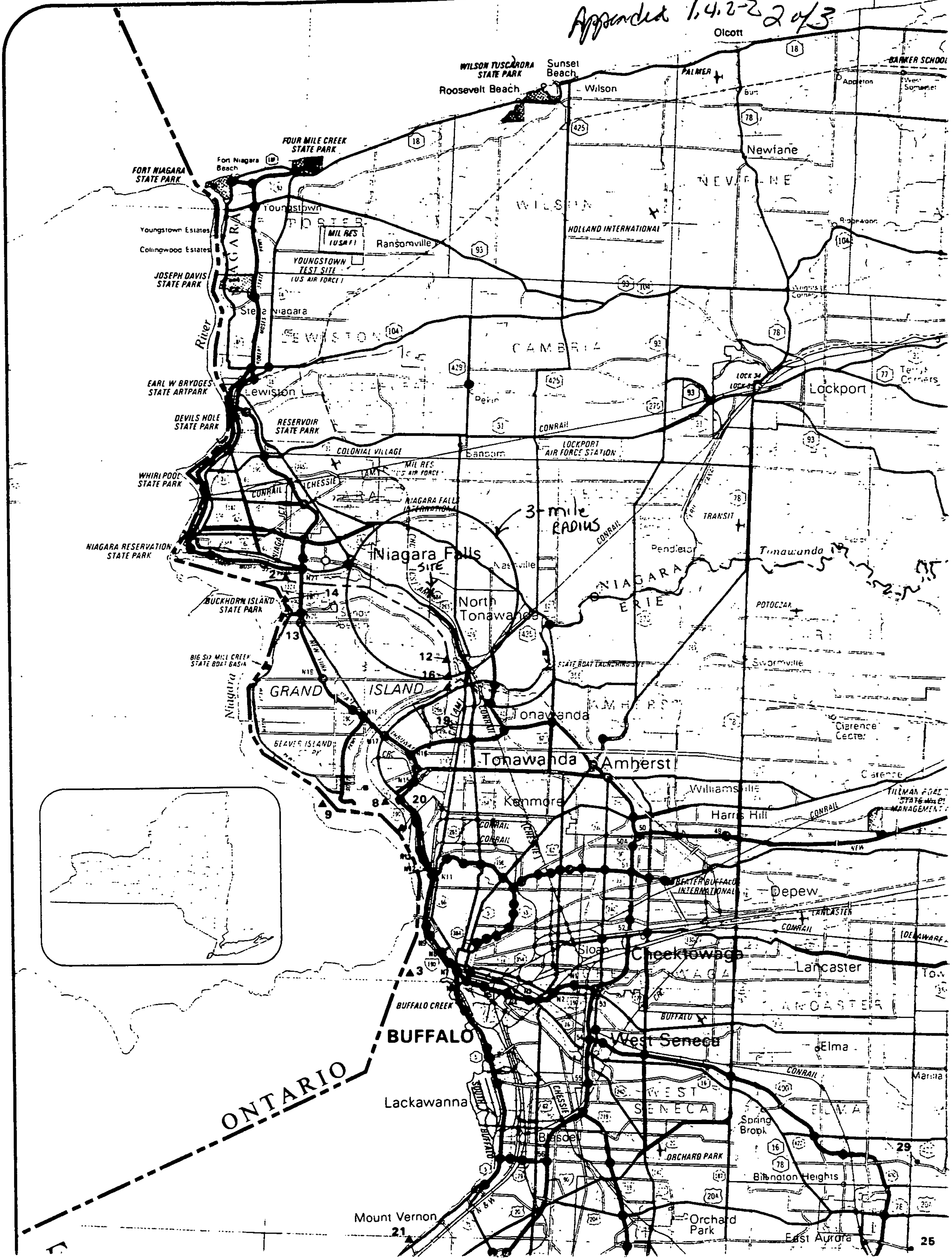

ERIE COUNTY

Appendix 1.4.2-2

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ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Municipal Community			
	Akron Village (See No 1 Wyoming Co, Page 10)	3640	
1	Alden Village	3460	Wells
2	Angola Village	8500	Lake Erie
3	Buffalo City Division of Water	357870	Lake Erie
4	Caffee Water Company	210	Wells
5	Collins Water District #3	704	Wells
6	Collins Water Districts #1 and #2	1384	Wells
7	Erie County Water Authority (Sturgeon Point Intake)	375000	Lake Erie
8	Erie County Water Authority (Van DeWater Intake)	NA	Niagara River - East Branch
9	Grand Island Water District #2	9390	Niagara River
10	Holland Water District	1670	Wells
11	Lawtons Water Company	138	Wells
12	Lockport City (Niagara Co)		Niagara River - East Branch
13	Niagara County Water District (Niagara Co)		Niagara River - West Branch
14	Niagara Falls City (Niagara Co)		Niagara River - West Branch
15	North Collins Village	1500	Wells
16	North Tonawanda City (Niagara Co)		Niagara River - West Branch
17	Orchard Park Village	3671	Pipe Creek Reservoir
18	Springville Village	4169	Wells
19	Tonawanda City	18538	Niagara River - East Branch
20	Tonawanda Water District #1	91269	Niagara River
21	Wanakah Water Company	10750	Lake Erie
Non-Municipal Community			
22	Aurora Mobile Park	125	Wells
23	Bush Gardens Mobile Home Park	270	Wells
24	Circle B Trailer Court	50	Wells
25	Circle Court Mobile Park	125	Wells
26	Creekside Mobile Home Park	120	Wells
27	Donnelly's Mobile Home Court	99	Wells
28	Gowanda State Hospital	NA	Clear Lake
29	Hillside Estates	160	Wells
30	Hunters Creek Mobile Home Park	150	Wells
31	Knox Apartments	NA	Wells
32	Maple Grove Trailer Court	72	Wells
33	Millgrove Mobile Park	100	Wells
34	Perkins Trailer Park	75	Wells
35	Quarry Hill Estates	400	Wells
36	Springville Mobile Park	114	Wells
37	Springwood Mobile Village	132	Wells
38	Taylors Grove Trailer Park	39	Wells
39	Valley View Mobile Court	42	Wells
40	Villager Apartments	NA	Wells

"NY State Department of Health, 1982. New York State Atlas of Community Water Resources

Appendix 1.4.3-1

GROUND-WATER RESOURCES OF THE ERIE-NIAGARA BASIN, NEW YORK

**Prepared for the
Erie-Niagara Basin Regional Water Resources
Planning Board**

by

A. M. La Sala, Jr.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
in cooperation with
THE NEW YORK STATE CONSERVATION DEPARTMENT
DIVISION OF WATER RESOURCES

**STATE OF NEW YORK
CONSERVATION DEPARTMENT
WATER RESOURCES COMMISSION**

Basin Planning Report ENB-3
1968

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CONTENTS (Continued)

(Appendix 1.4.3-1, 4/8/12

GROUND-WATER RESOURCES OF THE ERIE-NIAGARA BASIN, NEW YORK

By

A. M. La Sala, Jr.

ABSTRACT

The Erie-Niagara basin, New York, borders Lake Erie and the Niagara River and includes the principal part of their drainage basin in New York. The area extends from the Cattaraugus Creek basin on the south to the Tonawanda Creek basin on the north. The northern part of the area and a narrow belt along Lake Erie are in the Erie-Ontario Lowlands, a region of low relief. The remainder of the area lies in the Appalachian Uplands, an area of considerable relief.

The principal water-bearing formations in the area are glacial sand and gravel deposits; the Camillus Shale, which contains interbedded gypsum; a limestone aquifer unit consisting of the Onondaga Limestone, Akron Dolomite, and Bertie Limestone; and the Lockport Dolomite. A number of thick and permeable sand and gravel deposits lie in valleys of the upland region and will yield supplies of 500 to 1,400 gpm (gallons per minute) to individual wells that are properly constructed. Several communities now obtain public water supplies from such deposits. The Camillus Shale, limestone unit, and Lockport Dolomite vary widely in water-bearing characteristics. Generally, only small to moderate supplies (less than 50 gpm) are available from these formations. However, where the water-bearing openings have been widened by solution of gypsum and carbonate minerals, the rocks provided large supplies. In and near Buffalo and Tonawanda, the Camillus Shale yields 400 to 1,200 gpm to individual wells, and the limestone unit yields as much as 300 gpm but more usually 100 gpm. The Lockport Dolomite does not yield more than 90 gpm to individual wells in the area. Data from nearby areas indicate the Lockport only occasionally yields as much as 100 gpm. Only small yields from wells, about enough for individual domestic supplies, can be obtained from shale, lake deposits, and till.

Average annual recharge to the sand and gravel deposits in the upland region ranges from about half a million to 4 million gallons per day per square mile. As the larger deposits are each several square miles in extent, the potential for development is large. To this potential should be added infiltration from streams that could be induced by pumping large quantities of ground water.

The quality of ground water in the Appalachian Uplands is marked by a high hardness but generally not by other unfavorable characteristics. The ground water in the Erie-Ontario Lowland generally is harder and otherwise poorer in quality, being high in dissolved solids. The water in the Camillus Shale is objectionably high in sulfate and, in some areas, chloride. The chloride may be dissolved out of deeply buried salt beds by water circulating through a regional flow system from a recharge area in the Appalachian Uplands to a discharge area along Tonawanda Creek. Shallow ground water in carbonate rocks and sand and gravel deposits locally has been polluted by septic tank effluent.

Appendix 1.4.3-1
6/8/12

GEOLOGY AND TOPOGRAPHY

The Erie-Niagara basin is underlain by layers of sedimentary bedrock which are largely covered with unconsolidated deposits. Descriptions of the various bedrock units are given in figure 2. The bedrock consists mainly of shale, limestone, and dolomite; the Camillus Shale contains a large amount of interbedded gypsum. All the bedrock units were built up by fine-grained sediments deposited in ancient seas during the Silurian and Devonian Periods and, therefore, are bedded or layered. The dip of the rocks (inclination of the bedding planes) is gently southward at from 20 to 60 feet per mile, but the average dip is between 30 and 40 feet per mile. The dip is so gentle that it is hardly perceptible in outcrops.

The unconsolidated deposits are mostly glacial deposits formed during Pleistocene time about 10,000-15,000 years ago when an ice sheet covered the area. The glacial deposits consist of: (1) till, which is a nonsorted mixture of clay, silt, sand, and stones deposited directly from the ice sheet; (2) lake deposits, which are bedded clay, silt, and sand that settled out in lakes fed by the melting ice; and (3) sand and gravel deposits, which were laid down in glacial streams. The glacial sand and gravel deposits are of both the ice-contact and outwash types, as will be explained later in the report. The glacial deposits generally are less than 50 feet thick in the northern part of the basin. They are considerably thicker in some valleys in the southern part and reach a maximum known thickness of 600 feet near Chaffee. Other unconsolidated deposits are alluvium formed by streams in Recent times and swamp deposits formed by accumulation of decayed plant matter in poorly drained areas.

Relief of the present land surface is due to preglacial erosion of the bedrock and subsequent topographic modification by glaciation. In contrast to the southward dip of the rocks, the land surface rises to the south largely because preglacial erosion was more vigorous in the northern part of the basin. The shale in the southern part of the basin is somewhat more resistant to erosion than the rocks in the northern part of the basin but not significantly so. Figure 3 shows the relationship of the topography and rock structure and delineates the two topographic provinces of the basin: the Erie-Ontario Lowlands and the Appalachian Uplands. The rocks crop out in belts which trend generally east-west. The bedrock geologic map, plate 2, shows that the outcrop belts bend around to the southwest near Lake Erie. They assume this direction mainly because relatively intense erosion in the Erie-Ontario Lowland near Lake Erie has exposed the rock at lower elevations than farther east. The Lockport Dolomite and the Onondaga Limestone, because they are relatively resistant to erosion, form low ridges in the northern part of the basin. Tonawanda, Murder, and Ellicott Creeks descend the escarpment of the Onondaga at falls and cataracts.

In the hilly southern half of the basin (the Appalachian Uplands), preglacial valleys, deepened by glacial erosion, are cut into the shale. The valleys are partly filled with glacial deposits so that some of the present streams flow 200 to 600 feet above the bedrock floors of the valleys as shown in figure 3.

System	Series	Group	Formation	Thickness in feet	Section	
Devonian	Upper	Conneaut Group of Chadwick (1934)		500		Shale, siltstone, and fine-grained sandstone. Top is missing in area.
Devonian	Upper	Canadaway Group of Chadwick (1933)	Undivided	600		Gray shale and siltstone, interbedded. (section broken to save space)
Devonian	Upper	Canadaway Group of Chadwick (1933)	Perrysburg	400-450		Gray to black shale and gray siltstone containing many zones of calcareous concretions. Lower 100 feet of formation is olive-gray to black shale and interbedded gray shale containing shaly concretions and pyrite.
Devonian	Upper		Java	90-115		Greenish-gray to black shale and some interbedded limestone and zones of calcareous nodules. Small masses of pyrite occur in the lower part.
Devonian	Upper		West Falls	400-520		Black and gray shale and light-gray siltstone and sandstone. The lower part is petroliferous. Throughout the formation are numerous zones of calcareous concretions, some of which contain pyrite and marcasite.
Devonian	Upper		Sonyea	45-85		Olive-gray to black shale.
Devonian	Upper		Genesee	10-20		Dark-gray to black shale and dark-gray limestone. Beds of nodular pyrite are at base.
Devonian	Middle	Hamilton	Moscow Shale	12-55		Gray, soft shale.
Devonian	Middle	Hamilton	Ludlowville Shale	65-130		Gray, soft, fissile shale and limestone beds at top and bottom.
Devonian	Middle	Hamilton	Skaneateles Shale	60-90		Olive-gray, gray and black, fissile shale and some calcareous beds and pyrite. Gray limestone, about 10 feet thick is at the base.
Devonian	Middle	Hamilton	Marcellus Shale	30-55		Black, dense fissile shale.
Devonian	Middle	Unconformity	Onondaga Limestone	108		Gray limestone and cherty limestone.
Silurian	Cayuga	Unconformity	Akron Dolomite	8		Greenish-gray and buff fine-grained dolomite.
Silurian	Cayuga	Salina	Bertie Limestone	50-60		Gray and brown dolomite and some interbedded shale.
Silurian	Cayuga	Salina	Camillus Shale	400		Gray, red, and green thin-bedded shale and massive mudstone. Gypsum occurs in beds and lenses as much as 5 feet thick. Subsurface information indicates dolomite (or perhaps, more correctly, magnesian-lime mudrock) is interbedded with the shale (shown schematically in section). South of the outcrop area, at depth, the formation contains thick salt beds.
Silurian	Niagara		Lockport Dolomite	150		Dark-gray to brown, massive to thin-bedded dolomite, locally containing algal reef and gypsum nodules. At the base are light-gray limestone (Gasport Limestone Member) and gray shaly dolomite (DeCew Limestone Member).
Silurian	Niagara	Clinton	Rochester Shale	60		Dark-gray calcareous shale.

Figure 2.--Bedrock units of the Erie-Niagara basin.

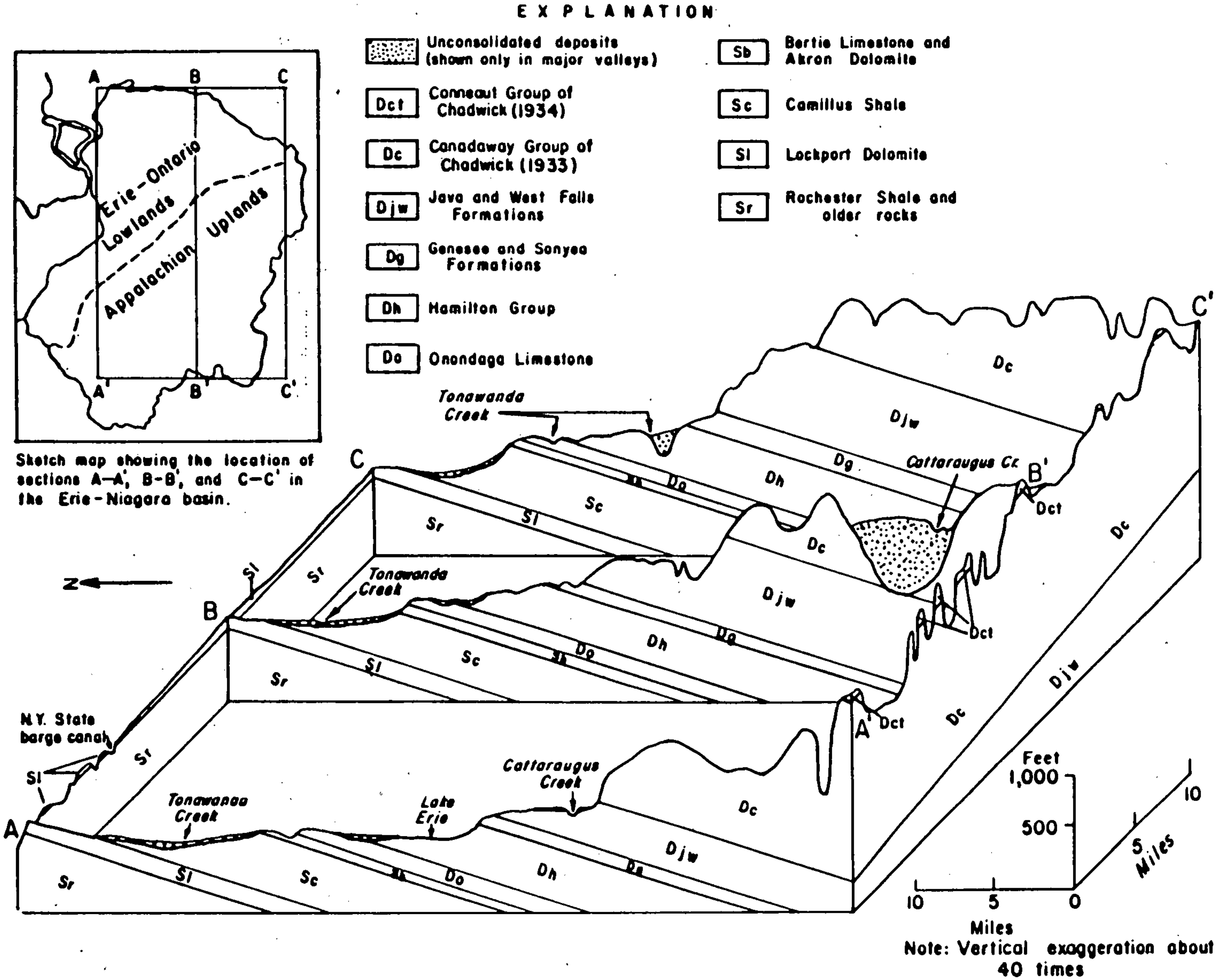

Figure 3.--Fence diagram of part of the Erie-Niagara basin.

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9-12

OCCURRENCE OF WATER IN UNCONSOLIDATED DEPOSITS

The unconsolidated deposits overlie the bedrock units previously discussed and consist of a variety of granular material. The bulk of the unconsolidated deposits are glacial in origin and include till, lake deposits, and sand and gravel deposits. The materials laid down since glaciation are thin and consist of alluvium and swamp deposits.

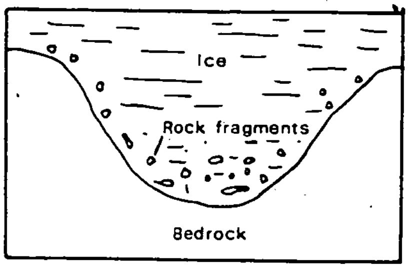
The deposits vary in their hydrologic characteristics because of differences in their lithology and thickness and because of their distribution and spatial relationships to one another. Plate 3 is a geologic map showing the division of the unconsolidated deposits into several groups on the basis of their origin. The distribution of these groups at the surface is readily apparent from the map. An understanding of the geologic processes that formed the deposits allows their subsurface distribution to be inferred. The map, therefore, can be read in three dimensions through proper interpretation.

An explanation of the origin and general features of the several types of deposits is given in figure 8. When the ice sheet advanced over the area, the ice tore and abraded the bedrock surface. The hills were somewhat reduced and rounded and the valleys were deepened. Some of the rock material eroded from the bedrock was redeposited by the ice and forms the poorly sorted mantle material that is called till (fig. 8A). Eventually, the ice began to wane with a change in climate. As the amount of snow nourishing it decreased, the ice sheet thinned. It had difficulty maintaining flow over rough topography along its marginal zone. The margin became scalloped, and some marginal zones grew so thin that they stagnated. These zones separated from the ice sheet and wasted away in place.

The sequence of deposition in an upland valley during retreat generally followed a particular order. A temporary valley was formed between the wasting ice and the rock wall of the valley. Melt water from the ice sheet, which at times of rapid melting was released in enormous quantities, flowed through the valley away from the retreating ice sheet. The melt water carried a heavy load of sediment washed out of the ice. It deposited sediment, mainly sand and gravel, and began to fill up the valley. This type of sand and gravel deposit is an ice-contact deposit (fig. 8B). In southward drained valleys, ice-contact deposits could form at low levels, even in the valley bottoms. In northward drained valleys, because of the divide to the south, the ice-contact deposits could form only high on the sides of the valley above the level of melt-water lakes impounded to the level of the spillway over the divides.

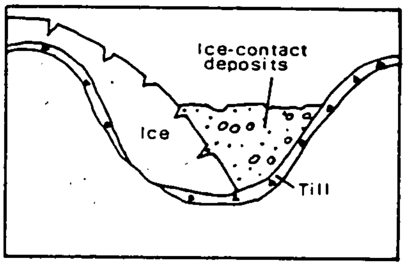
As the ice sheet melted back, a lower outlet for the melt water was uncovered. The melt-water stream was diverted from the ice-contact deposit. As the stagnant ice mass bordering the ice-contact deposits continued to melt away, the sand and gravel held up by the ice mass subsided toward the center of the valley. A lake formed in the open area left by the ice as it melted (fig. 8C). In a southward drained valley, the lake would be caused by a dam of earlier glacial deposits across the valley, perhaps part of the ice-contact deposits. In a northward drained valley, the lake would be formed between the divide to the south and the ice sheet to the north. Fine-grained sediments (clay, silt, and fine sand) settled out

A



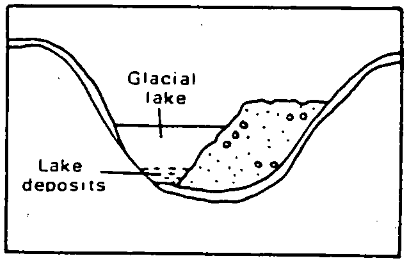
Ice advances over area and gathers load by eroding bedrock. Later, at the base of the ice, rock fragments are deposited to form till. (See B)

B



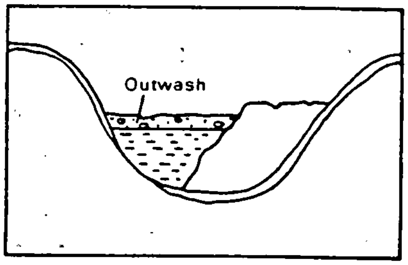
Ice begins to melt. Sand and gravel (ice-contact) deposits are laid down in a temporary valley between ice and valley wall.

C



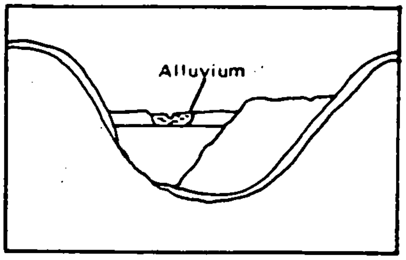
Stagnant ice melts. Ice-contact deposits slope toward center of valley. A glacial lake forms in which clay and silt accumulate.

D



Glacial lake is filled with sediment or is drained. Glacial streams flow over surface of lake deposits and lay down sand and gravel deposits.

E



Recent stream cuts into glacial deposits and lays down alluvium consisting of silt, sand and gravel.

Figure 8.--Origin of unconsolidated deposits.

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in the lake and gradually filled it (fig. 8D).

Eventually the lake deposits built up to the threshold of the dam, or the dam was cut away by the water spilling over it, or the ice sheet retreated northward opening up the valley. Streams could then flow over the surface of the lake deposits and lay down a second sand and gravel deposit, an outwash deposit (fig. 8D). The sources of the stream waters were the wasting ice sheet (particularly so in southward drained valleys), small masses of wasting ice remaining in tributary valleys, and precipitation. The thickest and most extensive outwash deposits were formed in southward drained valleys and in zones peripheral to the ice sheet. With time, the ice sheet retreated still farther northward, the glacial streams ceased to flow, and glacial deposition came to an end.

As the ice sheet retreated farther north, the climate more nearly approached that of the present. A drainage system developed in response to precipitation. Streams began to incise channels into the deposits. Vegetation took hold as the weather warmed and helped stabilize the slopes. In time, with a change in regimen, the streams began to lay down alluvium (fig. 8E).

The sequence of events discussed above and shown in figure 8 is generalized. Nevertheless, it is useful in understanding the occurrence of the unconsolidated deposits, particularly in valley areas where they constitute an important source of ground water. In the following sections the lithology and water-bearing characteristics of each of the major types of deposits in the Erie-Niagara basin will be discussed.

TILL

As shown in plate 3, till is the most widespread of all the unconsolidated deposits in the Erie-Niagara basin. Till is essentially a nonsorted material whose character depends principally upon the types of rocks over which the ice passed and the vigor with which the ice crushed and abraded the rock. Till overlying the shale is dark gray and clayey or silty. In some areas, mainly on hillsides and terraces south of Cattaraugus Creek, part of the till is stony material. Till on the soluble rocks is light red and silty; in some morainic ridges it is mostly fine sand.

Thickness of the till varies considerably from a thin cover of 2 or 3 feet to more than 200 feet along the divides between Cattaraugus Creek and the northwestward flowing streams, such as Tonawanda, Buffalo, and Eighteenmile Creeks. On flat terraces mapped as till in Buttermilk Creek valley, the stony till is as much as 30 feet thick.

Only small supplies of water are available from till. The permeability of till is so small that wells with large wall areas are required to obtain even small supplies. This requirement for a large wall area is met by digging large-diameter wells.

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LAKE DEPOSITS

Lake deposits consist of horizontally bedded clay, silt, and sand. They form a thin skin over till and bedrock in the Erie-Ontario Lowlands, but reach thicknesses of 300 feet or more in some valleys in the uplands. Thick sequences of clay (such as penetrated by well 229-842-1 near Springville) are so impermeable as to yield no water to wells. The lake deposits also contain thick sections of water-bearing fine sand in the major valleys of the Appalachian Uplands. This fine sand is called quicksand because it moves into wells. Small supplies can be developed from the fine sand by careful well construction, but usually these deposits are not utilized as sources of water.

GLACIAL SAND AND GRAVEL DEPOSITS

Glacial sand and gravel deposits include the ice-contact and outwash deposits shown in plate 3. In addition, deltaic deposits are present within the area. A prominent delta (lat 42°30', long 78°56') west of Collins, composed of sand and gravel, was built out from Clear Creek into a lake that occupied the Erie-Ontario Lowlands. Another delta (lat 42°50', long 78°34') was formed by Little Buffalo Creek, northeast of Marilla. These deltas are shown arbitrarily in plate 3 as ice-contact deposits. Deltaic deposits, presently concealed, probably interfinger with glacial lake deposits in the major valleys of the Appalachian Uplands where tributary streams deposited coarse-grained sediments in lakes. Subsurface data indicate deltaic deposits interfinger with lake deposits near the junction of Crow and Tonawanda Creeks south of the Attica State Prison. The sand and gravel deposits occur principally in the valleys of the Appalachian Uplands with only scattered, minor occurrences elsewhere. The relationship of the sand and gravel to the other unconsolidated deposits and to the bedrock is shown in figure 8. Where the deposits are thick and water bearing, they constitute the best aquifers found in the Erie-Niagara basin.

Lithology and thickness

The glacial sand and gravel deposits exhibit a variety of textures and sedimentary structures but they all are marked by stratification and a high degree of sorting. Characteristic of the deposits are horizontal beds of well-sorted sand, lenticular beds of cobble and boulder gravel, and scattered beds and lenses of open-work gravel. These various materials are interbedded in varying proportions, though boulder gravel is not present in most outwash deposits.

The deposits form thick fills in valleys of the upland section. In the valley bottoms the saturated thickness of the deposits exceeds 100 feet at many places. Thick deposits underlying terraces along the valley walls are to a large extent above the saturated zone. Buried sand and gravel deposits 10 to 40 feet thick underlie lake deposits in some valleys.

Agency
536 South Clark Street
Chicago, Illinois 60605

C. GODDARD

EPA

Preliminary Evaluation Of Chemical Migration To Groundwater and The Niagara River from Selected Waste-Disposal Sites

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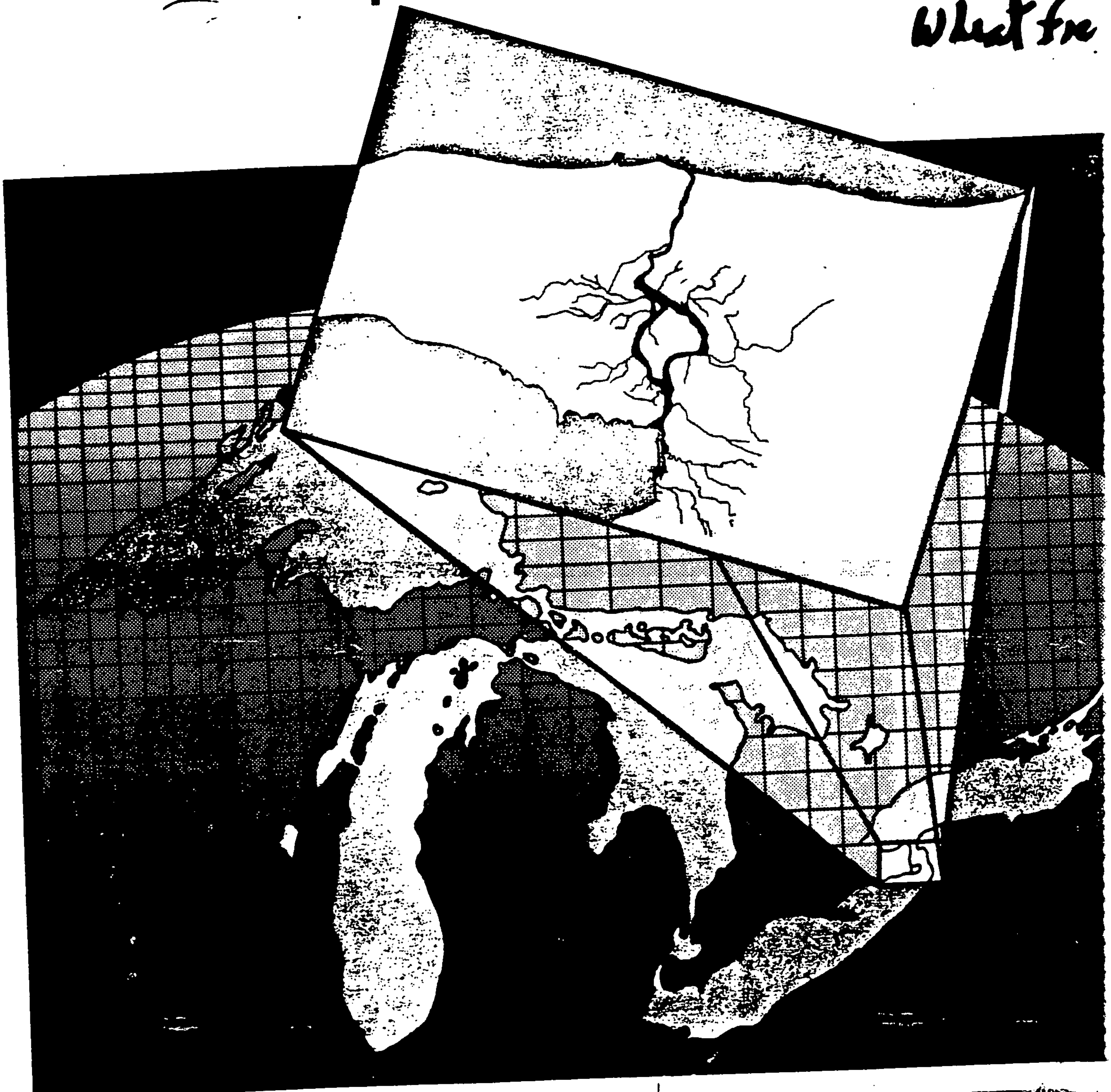

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"Preliminary Evaluation of Chemical Migration to Groundwater and the Niagara River from Selected Waste-Disposal Sites"

By

Edward J. Koszalka, James E. Paschal, Jr.,

Todd S. Miller and Philip B. Duran

Prepared by the U.S. Geological Survey

in cooperation with the

New York State Department of Environmental Conservation

for the

U.S. ENVIRONMENTAL PROTECTION AGENCY

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79. POWER AUTHORITY ROAD SITE (Li view) NYSDEC 952091

General information and chemical-mi ential.--The Power Authority Road Site, north of the Power Authority ervoir in the town of Lewiston, was a landfill for mostly general n fuse. No geologic, hydrologic, or chemical information is available; otential for contaminant migration is indeterminable.

Niagara Wheatfield

81. NIAGARA COUNTY REFUSE DISPOSAL SITE (USGS field reconnaissance) NYSDEC 932026

General information and chemical-migration potential.--The Niagara County Refuse Disposal site, in the town of Wheatfield, received thousands of tons of heat-treatment salts, plating-tank sludge, PVC skins and emulsion, thiazole polymer blends, polyvinyl alcohol, phenolic resins, and brine sludge with mercury during 1968-76. The site has been declared one of the U.S. Environmental Protection Agency "superfund" sites.

Although contaminant migration seems possible, preliminary sampling does not indicate that it has occurred. Most samples taken within the refuse area had elevated concentrations of organic compounds, but most samples taken along the perimeter did not. Additional drilling and monitoring would be needed to assess the effect of this site on the local or regional ground-water regime. The potential for contaminant migration is indeterminable.

Geologic information.--The site consists of lacustrine clay deposits with thin sand stringers overlying bedrock of Camillus Shale. The U.S. Geological Survey drilled 10 test holes on the site in 1982; locations are shown in fig. C-40 (p. 373). The geologic logs are on page 368.

Hydrologic information.--A seasonal water table perched upon the clay unit discharges into the bordering drainage ditches and into the swampy area to the east (fig. C-40). The saturated sand stringers within the clay unit are easily dewatered. A saturated zone near the base of the clay unit may represent a regional water table in which the direction of ground-water flow movement is probably southward toward the Niagara River.

Chemical information.--The U.S. Geological Survey collected two water samples and 10 soil samples for organic-compound analyses; results are given in table C-19. Only three priority pollutants were found, all below the quantifiable detection limit. The samples contained 18 organic nonpriority pollutants and 14 possibly naturally occurring compounds. In September 1980, the U.S. Environmental Protection Agency collected two water samples and five sediment samples from the ditches; in June 1981, New York State Department of Environmental Conservtion collected four sediment samples and four water samples from the ditches; results are given in table C-20.

Boring no.	Depth (ft)	Description
1	0 - 1.6	Topsoil.
	1.6 - 2.6	Fill.
	2.6 - 11.7	Clay, pink, tight, dry
	11.7 - 13.4	Clay, pink, wet
		SOIL SAMPLE: 11.7 ft.
2	0 - 1.5	Topsoil.
	1.5 - 10.9	Clay, tan, tight.
	10.9 - 11.4	Clay, tan, wet.
		SOIL SAMPLE: 10.9 ft.
3	0 - 1.5	Topsoil.
	1.5 - 9.5	Clay, pink, dry.
		SOIL SAMPLE: 1.5 ft.
4	0 - 0.75	Clay, pink.
	0.75 - 3.5	Organic material, black, wet.
	3.5 - 4.5	Clay, green.
	4.5 - 11.5	Clay, pink.
		SOIL SAMPLE: 3.5 ft.
6A	0 - 3.5	Clay, buff.
	3.5 - 16.5	Clay, pink.
		SOIL SAMPLE: 3.5 ft.
7	0 - 1.5	Topsoil.
	1.5 - 7.0	Clay, pink.
		SOIL SAMPLE: 1.5 ft.
8	0 - 1.5	Topsoil.
	1.5 - 6.5	Clay, pink, dry.
	6.5 - 11.5	Clay, pink, wet.
		SOIL SAMPLE: 11.5 ft.
9	0 - 1.5	Road fill.
	1.5 - 6.5	Clay, pink, dry.
	6.5 - 11.5	Clay, pink, wet.
		SOIL SAMPLE: 11.5 ft.
10	0 - 1.5	Clay, sandy, gray.
	1.5 - 3.0	Clay, pink.
		SOIL SAMPLE: 1.5 ft.
11	0 - 1.5	Clay, sandy, gray.
	1.5 - 3.0	Clay, pink.
		SOIL SAMPLE: 1.5 ft.

Table C-19.--Analyses of ground-water and substrate samples from Niagara County Refuse Disposal, site 81, Wheatfield, N.Y., June-August 1982. [Locations shown in fig. C-40. Concentrations are in µg/L and µg/kg, respectively; dashes indicate that constituent or compound was not found, LT indicates it was found but below the quantifiable detection limit. Blanks indicate not analyzed.]

	Substrate number and depth below land surface (ft)			
	1 (12.5)	2 (11.2)	3 (1.5)	4 (2.2)
Organic compounds				
Priority pollutants				
Naphthalene	LT	--	--	--
Dibutyl phthalate	--	LT		
Nonpriority pollutants				
2,4-dimethyl-4-heptanol[1]	--	LT	--	--
2-(1,1-dimethyl-4-methyl furan[1]	--	LT	--	--
Bromocyclohexane[1]	--	4,350	--	--

	Sample number and depth below land surface (ft)				
	Ground water			Substrate	
	5 (12.4)	6 (15.7)	(Duplicate)	6A	7
pH	9.2	8.4			
Specific conductance (µmho/cm)	475	620			
Temperature (°C)	10.0	10.0			
Organic compounds					
Priority pollutants					
Diethyl phthalate	--	LT	(LT)	--	--
Di-n-butyl phthalate	--	LT	(LT)	--	--
Nonpriority pollutants					
n-butylbenzene sulfonamide[1]	--	7.2	(LT)	--	--
butyl-2-methyl-propyl phthalate[1]	--	LT	(--)	--	--
3,5-Dimethoxy-α-(2-methyl-propyl)-benzenementhanol[1]	--	9.2	(--)	--	--

[1] Tentative identification based on comparison with the National Bureau of Standards (NBS) library. No external standard was available. Concentration reported is semiquantitative and is based only on an internal standard. GC/MS spectra were examined and interpreted by GC/MS analysts.

† Exceeds USEPA criterion for maximum permissible concentration in drinking wate

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Table C-19.--Analyses of ground-water and substrate samples from Niagara County Refuse Disposal, site 81, Wheatfield, N.Y., June-August 1982 (continued)

	Sample number				
	Ground water			Substrate	
	5	6	(Duplicate)	6A	7
Organic compounds (continued)					
Nonpriority pollutants (continued)					
Hexadecanoic acid, bis-(2-ethyhexl)-ester[1]	--	LT	(--)	--	--
Benzaldehyde[1]	--	LT	(LT)	--	--
3-methoxybenzoic acid, methylester[1]	--	--	(LT)	--	--
1-Heptyne[1]	LT	--	(--)	--	--
[1,1'-Biphenyl]-2-ol	7	--	(--)	--	--
2-(1,1-Dimethylethyl)-4-methylfuran[1]	--	--	(--)	104,000	--
1-(4-fluorophenyl)-ethanone[1]	--	--	(--)	55,900	--
(Z,Z)-3,4-Dimethyl-2,4-hexadiene[1]	--	--	(--)	LT	--
6-methyl-3,5-heptadien-2-one[1]	--	--	(--)	11,800	--
3-methyl-2-cyclohexen-1-one[1]	--	--	(--)	LT	--
3,5,5-Trimethyl-2-cyclohexen-1-one[1]	--	--	(--)	65,800	--
2-Bromoethylcyclohexane[1]	--	--	(--)	16,700	--
2-(2-Butoxyethoxy)ethanol[1]	--	--	(--)	--	430
1-(2-butoxyethoxy)ethanol[1]	LT	43	(84)	--	--
2-methylnapthalene[1]	--	LT	(--)	--	--
1-methylnapthalene[1]	--	LT	(--)	--	--
Butyl-cyclooctane[1]	--	LT	(LT)	--	--
2-methyl-propanoic acid, butyl ester[1]	--	LT	(--)	--	--
2-methoxy-benzoic acid, butyl ester[1]	--	LT	(--)	--	--
3-methoxy-benzoic acid, methyl ester[1]	--	LT	(--)	--	--
5-butyl-5-nonanol[1]	--	LT	(LT)	--	--
Cyclohexanone[1]	--	--	(--)	--	LT
Compounds potentially of natural origin					
1,7,7-Trimethyl-bicyclo[2.2.1]-heptan-2-one[1]	--	LT	(--)	--	--
1,2-octanediol[1]	--	LT	(LT)	--	--

	Substrate number and depth below land surface (ft)			
	8 (11.5)	9	10 (1.5)	11 (1.5)
Organic compounds	--	--	--	--

Table C-20.--Analyses of surface water and bottom samples from drainage ditches at Niagara County Refuse Disposal, site 81, Wheatfield, N.Y.
[Blanks indicate not analyzed.]

	Surface water (µg/L)		Bottom material (µg/kg)	
	Maximum	Mean	Maximum	Mean
Inorganic constituents				
Antimony			4,000	2,600
Arsenic	30	25	7,800	6,300
Beryllium			16,000	10,600
Cadmium			3,800	800
Chromium			23,000	14,100
Copper	52	20	61,000	34,000
Lead	160†	32	84,000	47,000
Mercury	1.58	0.4	14,200	3,200
Nickel	100	20	45,000	16,400
Selenium			200	60
Silver			400	240
Zinc	174	61	1,500,000	390,000
Organic compounds				
Priority pollutants				
Benzene			0.5	0.2
Chlorobenzene			5	1
Chloroform			4	2
1,2-Dichloroethane			4	1
Trans-1,2-dichloroethylene	37†	7†	12	2
1,2-Dichloropropane			1	1
Ethylbenzene	8	2	3	1
Methylene chloride	2	1	31	15
Tetrachloroethylene	56	11	19	4
Toluene	31	6	4	1
1,1,1-Trichloroethane			0.5	0.1
Trichloroethylene	8	2	5	2
Vinyl chloride	2	0.4		
β-BHC			58	6
δ-BHC			90	10
4,4'-DDE			11	3
PCB-1248			320	53
PCB-1254			180	37
Phenol	34,000†	5,666†	1,900	333
Acenaphthene			17	4
Acenaphthylene			130	14
Anthracene			2,000	273
Benzo(a)pyrene			2,300	299
Benzo(b)fluoranthene			2,200	282
Benzo(ghi)perylene			7,605	845
Bis(2-ethylhexyl) phthalate	330	57	6,900	2,444
Butylbenzyl phthalate	0.8	0.1	330	64
Chrysene			3,200	356
1,2-Dichlorobenzene			39	8
1,3-Dichlorobenzene			59	17

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Table C-20.--Analyses of ground-water and substrate samples from Niagara County Refuse Disposal, site 81, Wheatfield, N.Y., June-August 1982 (continued)

	Surface water (µg/L)		Bottom material (µg/kg)	
	Maximum	Mean	Maximum	Mean
Organic compounds (continued)				
Priority pollutants (continued)				
1,4-Dichlorobenzene			59	17
Di-n-butyl phthalate	9	2	470	217
Di-n-octyl phthalate	10	2	170	19
Fluoranthene			2,500	319
Fluorene			93	15
Hexachlorobenzene			39	4
Naphthalene			160	34
Phenanthrene			2,000	273
Pyrene			2,000	254
1,2,4-Trichlorobenzene			47	6
Benzo(a)anthracene			3,200	356
Indeno(1,2,3-cd)pyrene			820	91
2,4-Dimethyl phenol			990	110
Heptachlor	0.13†	0.04†		
Nonpriority pollutants				
Trichlorofluoromethane			1	0.2
Diethyl phthalate	40	7	180	67

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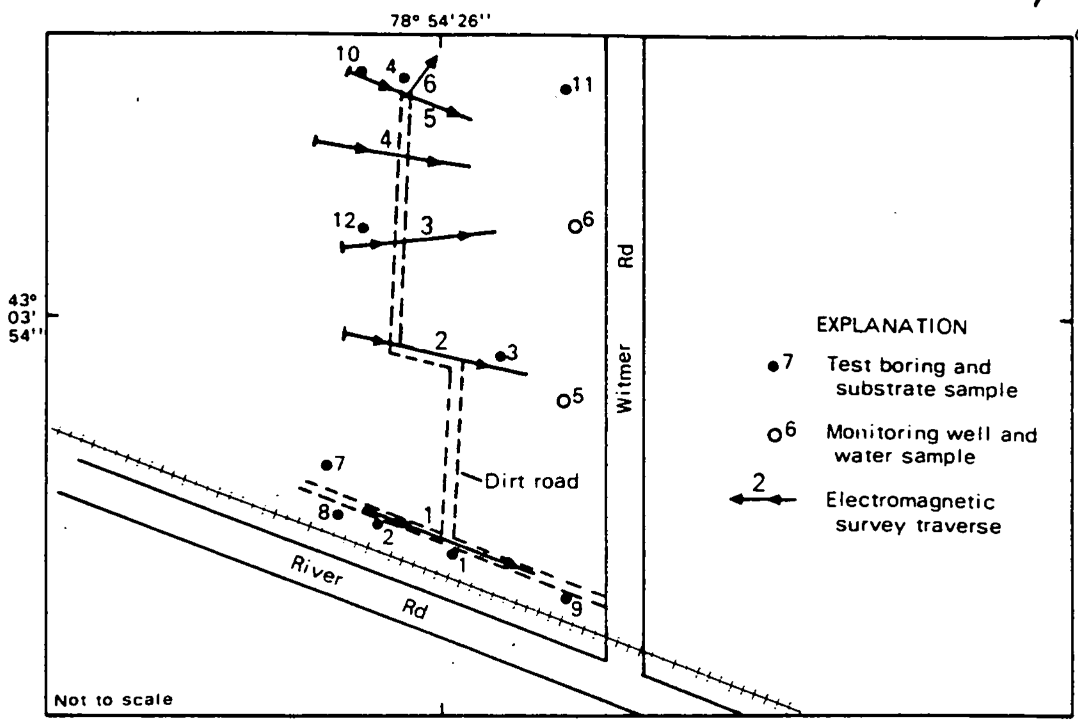

Base from USGS field sketch, 1982

Figure C-40. Location of monitoring wells, sampling holes, and electromagnetic-conductivity survey at Niagara County Refuse Disposal, site 81, Niagara Falls.

Electromagnetic survey.--The U.S. Geological Survey ran five electromagnetic traverses over the site. Locations are shown in fig C-40; results are plotted in fig. C-41.

Of all the sites investigated by electromagnetic traverses in this study, this landfill produced some of the most easily interpretable data. This can be attributed largely to the relatively undisturbed ground on three sides adjacent to the site. Only to the south of the landfill did cultural interference (railroad tracks, roads, powerlines) affect the reading.

Line 1.--The line most indicative of interferences was line 1, which ran partly along a paved road. Conductivity values (fig. C-41) show a steady increase from below background at the western end to above background between 450 and 700 ft. After 700 ft, the values hover near the upper ranges of background conductivity.

Line 2.--This site is unusual in having two zones of differing background conductivity. The western end of each line terminated within a cornfield showing background conductivity within the range indicated on each graph (fig. C-42), but the eastern part of lines 1 and 2 were in a wetland, which has a considerably lower background conductivity. This is probably because the wetlands are underlain by silt and organic material, whereas the cornfield is on clay.

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The lower conductivity of the wetlands shows up well in line 2 but is masked on the eastern end of line 1 by the roadbed upon which the traverse was conducted. Otherwise line 2 shows a classic pattern of low background conductivities on either side with much higher and more erratic values in between. This is the type of pattern most often associated with a conductivity traverse beginning and ending in an uncontaminated zone but crossing a landfill in between. The erratic pattern among the high conductivity values corresponds to the heterogeneity of buried materials.

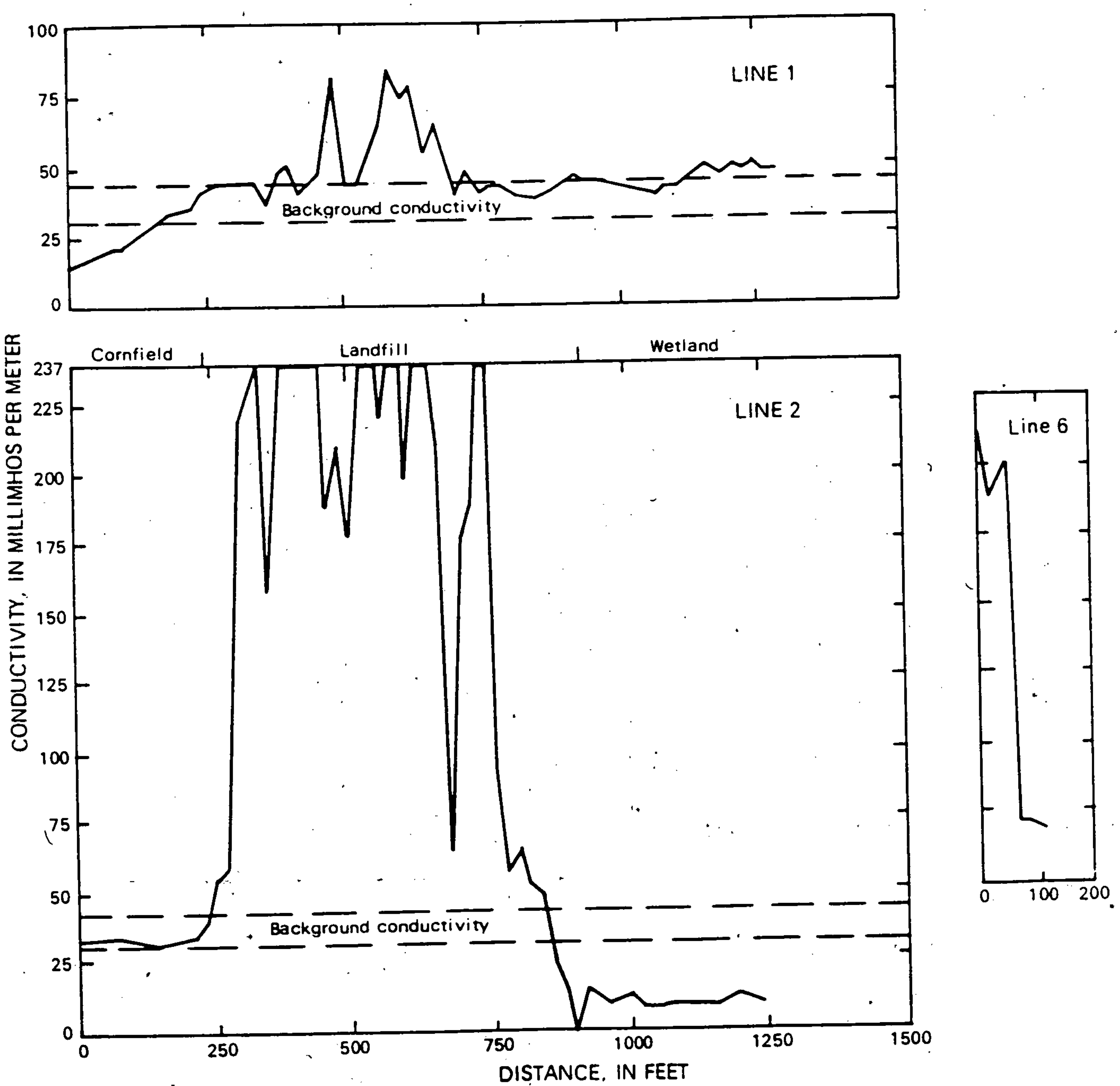

Figure C-41. Results of electromagnetic-conductivity survey at Niagara County Refuse Disposal, site 81, Wheatfield, lines 1, 2, and 6.

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Line 3.--The relatively low values at the western end of line 3 probably reflect the wetland and drainage ditch, which seem to act much as the wetland area in line 2. The high, erratic values of line 3 begin at 340 ft and continue to the dense woods around the 1,100-ft mark. The density of vegetation prevented the collection of additional data points within the wooded area.

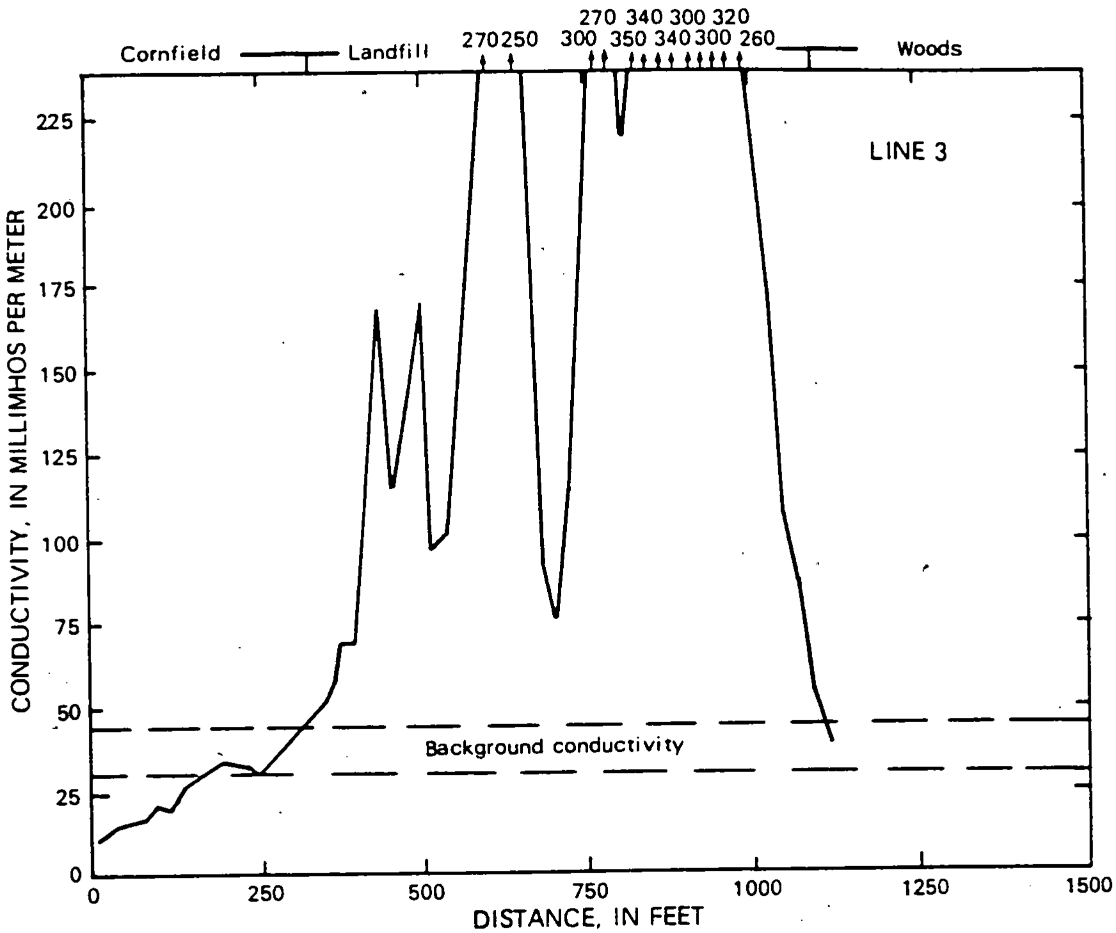

Figure C-41 (continued). Results of electromagnetic-conductivity survey at Niagara County Refuse Disposal, site 81, Wheatfield, line 3.

Line 4.--This traverse, which ran primarily along a dirt track paralleling a drainage ditch, shows conductivity values beginning to rise 40 ft before reaching the landfill area (at 460 ft) but not remaining extremely high along much of the traverse. This is probably due to the relatively nonconductive nature of the waste material in this area (indicated on the Niagara County Board of Health sketch map as a pile of gravel and fill). As before, when the traverse reached the wooded area at 800 ft, the conductivity values dropped to or below background values.

Line 5.--This line shows a pattern similar to line 2--the background values on the western end of the line begin to increase 40 ft before the boundaries of the landfill. This rise may correspond to contaminated ground water emanating from the site.

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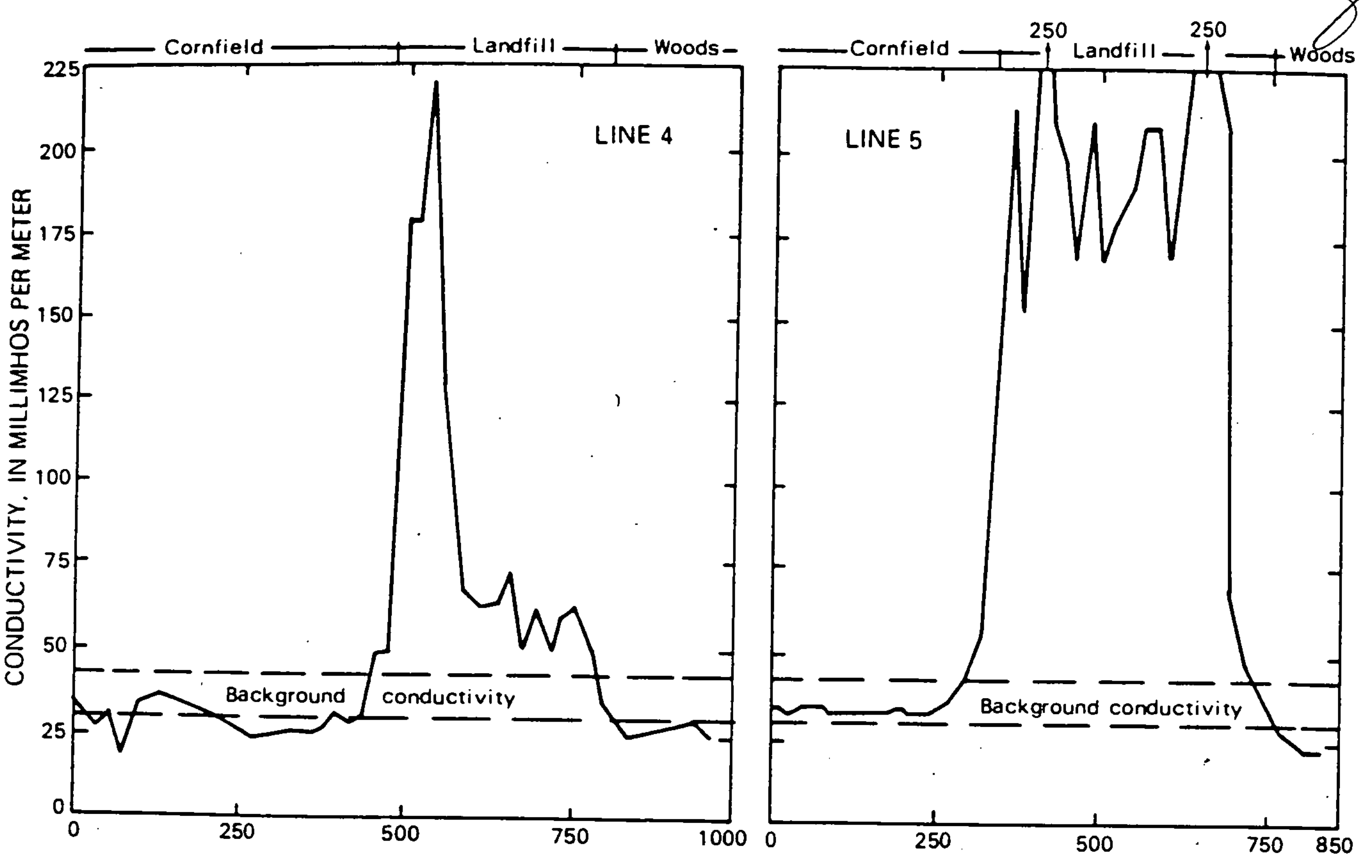


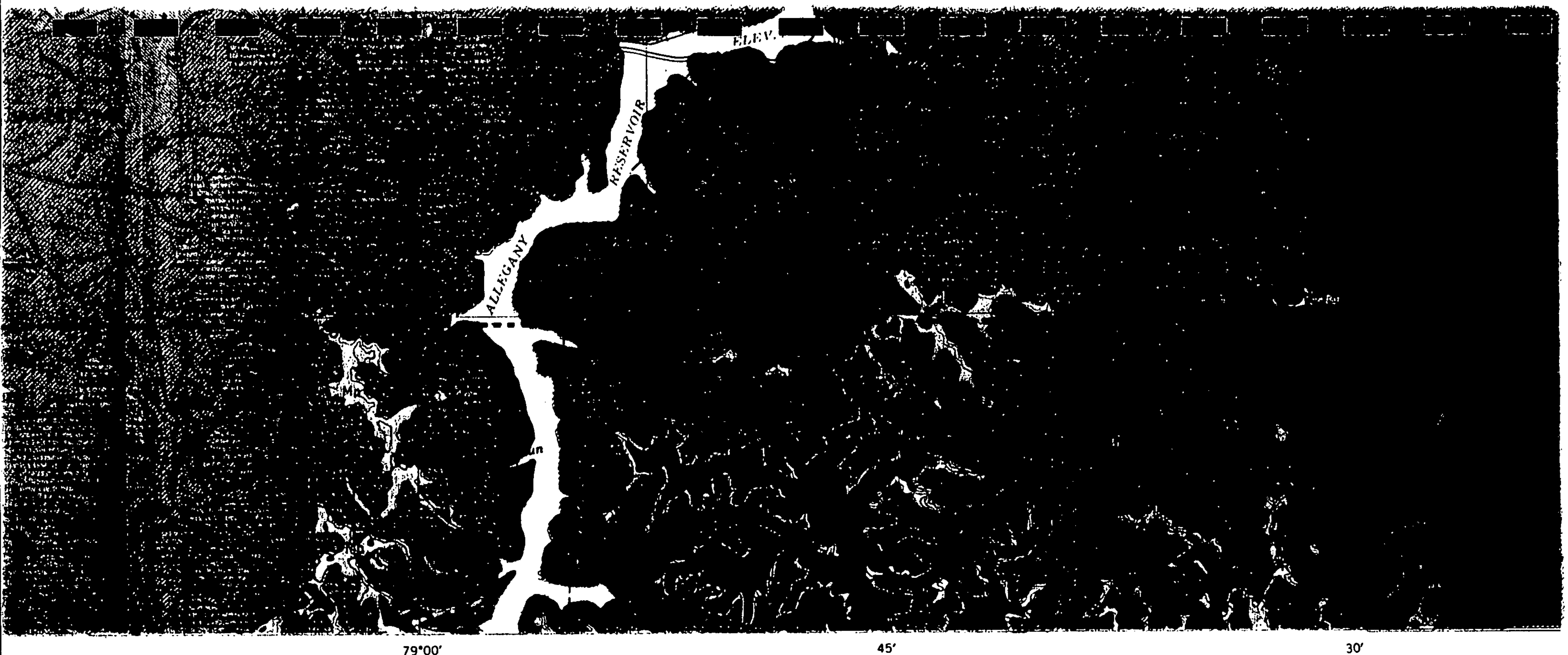
Figure C-41 (continued). Results of electromagnetic-conductivity survey at Niagara County Refuse Disposal, site 81, Wheatfield, lines 4 and 5.

Line 6.--This line (see p. 371) was run at right angles to the 420-ft mark of line 5 in an attempt to delineate the northern boundary of the landfill. Conductivity values drop precipitously at the 120 ft mark, but no futher data could be collected owing to the impassability of the terrain in this direction.

82. ADAMS GENERATING PLANT (USGS field reconnaissance) NYSDEC 932079

General information and contaminant-migration potential.--The Adams Generating Plant, in the city of Niagara Falls, is an inactive generating plant adjacent to the Niagara River. The City filled a forebay and two penstocks (444 yd^3 each) with incinerator residue and clean stone and rock in the early 1960's.

The potential for contaminant migration is indeterminable. Additional work would be needed to confirm contaminant migration.



GEOLOGIC MAP OF NEW YORK

1970

Niagara Sheet

Scale 1:250,000

5 0 5 10 15 Statute Miles 20

5 0 5 10 15 20 25 Kilometers 30

CONTOUR INTERVAL 100 FEET

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PALEOZOIC

50-200 ft. (15-60 m.)

Ds — Cashaqua and Middlesex Shales.

GENESEE GROUP
10-150 ft. (3-45 m.)

Dg — West River Shale; Genundewa Limestone; Penn Yan and Geneseo Shales; North Evans Limestone.

Middle Devonian

HAMILTON GROUP
200-500 ft. (60-150 m.)

Dhmo — Moscow Formation—Windom and Kashong Shales, Menteth Limestone Members.

Dhld — Ludlowville Formation—Deep Run Shale, Tichenor Limestone, Wanakah and Ledyard Shales, Centerfield Limestone Members.

Dhsk — Skaneateles Formation—Levanna Shale, Stafford Limestone Members.

Dhmr — Marcellus Formation—Oatka Creek Shale Member.

Lower Devonian

ONONDAGA AND BOIS BLANC LIMESTONES
150 ft. (45 m.)

Dob — In New York: Onondaga Limestone—Seneca, Morehouse (cherty), and Clarence Limestone Members, Edgecliff cherty Limestone Member, local coral bioherms; Bois Blanc Limestone—sandy, thin, discontinuous.
In Ontario: Dundee Limestone; Lucas Formation—dolostone, limestone (Anderdon); Amherstburg Formation—limestone, dolostone, sandstone (Sylvania); Bois Blanc Formation—dolostone, limestone, sandstone (Springvale).

Do — Oriskany Sandstone.

Upper Silurian

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.

Lower Silurian

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

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

Upper Ordovician

Oq — Queenston Shale.

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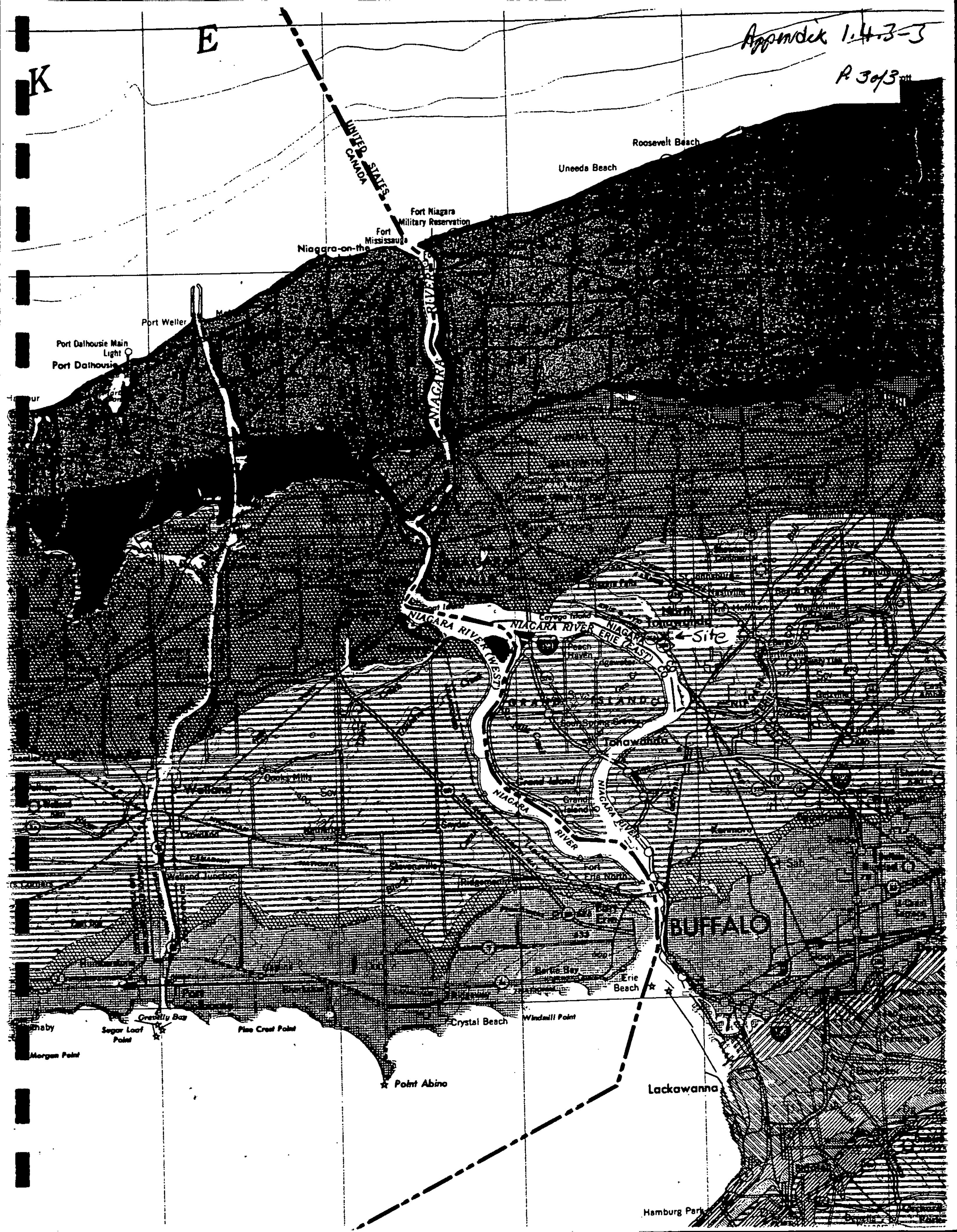

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JW

NIAGARA COUNTY HEALTH DEPARTMENT

DATE: May 13, 1983

TO: Peter Buechi

FROM: Michael Hopkins M. Hopkins

SUBJECT: NCSWD-WHEATFIELD SITE: SAMPLING AND BEDROCK WELL PLACEMENT

Attached is a copy of my field notes taken during observation of the NVS crew at NCSWD/Wheatfield from April 11 to May 6, 1983.

The project included placement of five monitoring wells to ten feet into competent bedrock. Wells were cased with 4" steel pipe to 2' into competent bedrock. The remainder of the hole was left open.

Surface water/sediment samples were taken at 10 locations including drainage ditches (6), the swamp north of the landfill (1), Black Creek (1) and the Niagara River (2). Wherever surface water samples were taken, sediment samples were also taken.

Attempts to dye test drainage ditches to determine the point of discharge to the River were inconclusive. The dye was not detected in the River.

The surface elevations of the well casings was determined by surveying. The water table elevations were obtained by NVS but this data was not obtained by this writer.

No odors, discoloration or visible organic/chemical material was found in any well or sample. There was leachate at the landfill surface. Apparently, this material was not sampled.

The condition of the landfill has deteriorated from previous inspections. Steel drums are floating to the surface particularly at the southwest corner. Leachate was noted in several locations. Scavenger dumping is worsening. About 100 empty 5 gallon solvent containers were found dumped here. Erosion problems are increasing.

Please contact me with any questions.

MH:cs

cc: M. Vaughan

NIAGARA COUNTY HEALTH DEPARTMENT

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INSPECTION REPORT

NAME Observe well boring operation (Field notes) DATE 4/11/83 →

ADDRESS NCSWD - Wheatfield site, Witmer Rd, Wheatfield

TIME START /

COMPLETED /

TYPE

:30AM 4/11 - I met with the NUS crew at the entrance to the NCSWD Wheatfield site. They advised me that they had all the equipment and could begin work after cleaning these equipment MEH

12:30 4/11 I checked the status of the drillers. At this time the equipment was unloaded and they were ready to begin. I was informed at this time that the field personnel would not release any maps or information unless first cleared by EPA MEH

8:30AM 4/12 NUS crew apparently not yet on site MEH

3:30pm 4/12 I found the crew at well location #1 outside of the ditch near the north west corner of the site. They were wearing hard hats, boots, gloves and disposable coveralls. From 3:30 to 5:00 pm they progressed to about 8'. They hoped to reach bedrock by 7:30pm and grout the casing tonight MEH

No odors were found. Water was encountered at two levels (≈ 2' and 5.5') although no recharge occurred. The soil was almost entirely dense clay to this point MEH

4:00pm 4/13 Attempted to locate drillers. Rig was still at hole #1 but drillers were not on-site MEH

8:30AM 4/15 I contacted the drillers near the site entrance. They were preparing to set up at site #2 in the south west corner. I was informed that hole #1 was temporarily abandoned until further instructions from EPA. The boring has not contacted bedrock at 41'. Glacial Till was found at 15' to 41'.

Page 1 of 5 Pages

[signature]
Signature of Inspector

NIAGARA COUNTY HEALTH DEPARTMENT

INSPECTION REPORT

NAME

DATE

ADDRESS NCSWD - Wheatfield.

TIME START

COMPLETED

TYPE

4/15 - 10:30 AM I contacted Peter Buechi and informed him of the problems encountered by the drillers. He felt that bedrock may be deeper than expected (40 to 60 ft ?). He said that he would try to obtain information on previous borings and that I would do the same

I checked with our files. The USGS well along Niagara Falls Boulevard reached refusal at 20'. The two wells placed by RECRA Research along Witmer Road were ≈35' deep although it is not known if bedrock was contacted

MEH

4/15 4:15 pm I contacted the NUS Crew. I was informed that they will have to obtain heavier equipment and expect to be back on site by Monday afternoon

MEH

4/18 8:30 AM & 4:00 pm - Unable to find drillers on site MEH

4/19 8:30 AM - I met with the NUS crew while obtaining water along Witmer Road. They obtained more auger flights over the weekend and are now preparing to continue on the previous holes. MEH

12:30 Bedrock contacted at 36' in hole #2 MEH

4/21 12:15 pm Augering is now complete to bedrock at hole #3. No problems found at this location. Soils were nearly all clay to 35'. Bedrock at 35'. Very little till found at this location MEH

Signature of Inspector

4/6

NIAGARA COUNTY HEALTH DEPARTMENT

INSPECTION REPORT

NAME

DATE

ADDRESS NCSWD - Wheatfield

TIME START

COMPLETED

TYPE

4/22 3pm - Bedrock was contacted at 45' in well #1. #1 was cored "a few feet" prior to stopping for the day to facilitate setting a casing. Soils were primarily till at this location. The incomplete well is covered with an inverted drum at this time

Well #3 is now cased to bedrock and ready for coring MEH

4/26 3pm well #1 being grouted at this time. By end of day, wells #1, 2 & 3 are complete to bedrock and are ready for coring of bedrock. No coring done yet except 2' sockets for casings. MEH

Bedrock was actually contacted at 42.5 feet not 45' as previously reported. Drillers report that depth was 48' a few feet away. This discrepancy is unaccounted for

Still no odors have been found in any sample MEH

4/29 2pm Unable to locate NUS crew, believed to have left the site

M Hopkins

5/4 1:30pm I located the NUS crew at well #3. They were preparing to purge this well. At this time all wells are complete. Wells #4 and #5 encountered bedrock at 38' and 55' respectively. All five wells were cored 10 feet into bedrock and left "open holed" from 2' to 10' into the bedrock. The bedrock was fractured in all wells. High rates of recharge were observed in all wells. NUS will sample wells and surface water today, tommorrow and Friday.

M. Hopkins

Page 3 of 5 Pages

Signature of Inspector

5/6

NIAGARA COUNTY HEALTH DEPARTMENT

INSPECTION REPORT

NAME NCSWD - Wheatfield

DATE

ADDRESS

TIME START

COMPLETED

TYPE

5/6/83 - 3:00 pm - I met Mr. Fahy at NCSWD. He informed me that NUS has completed there work at the site. In the last two days they have sampled the 5 wells, sampled both water and sediment at 10 locations (shown on sketch) including drainage ditches, 2 from the Niagara River and one from Black Creek. In addition the surface elevations at the wells was determined by surveying.

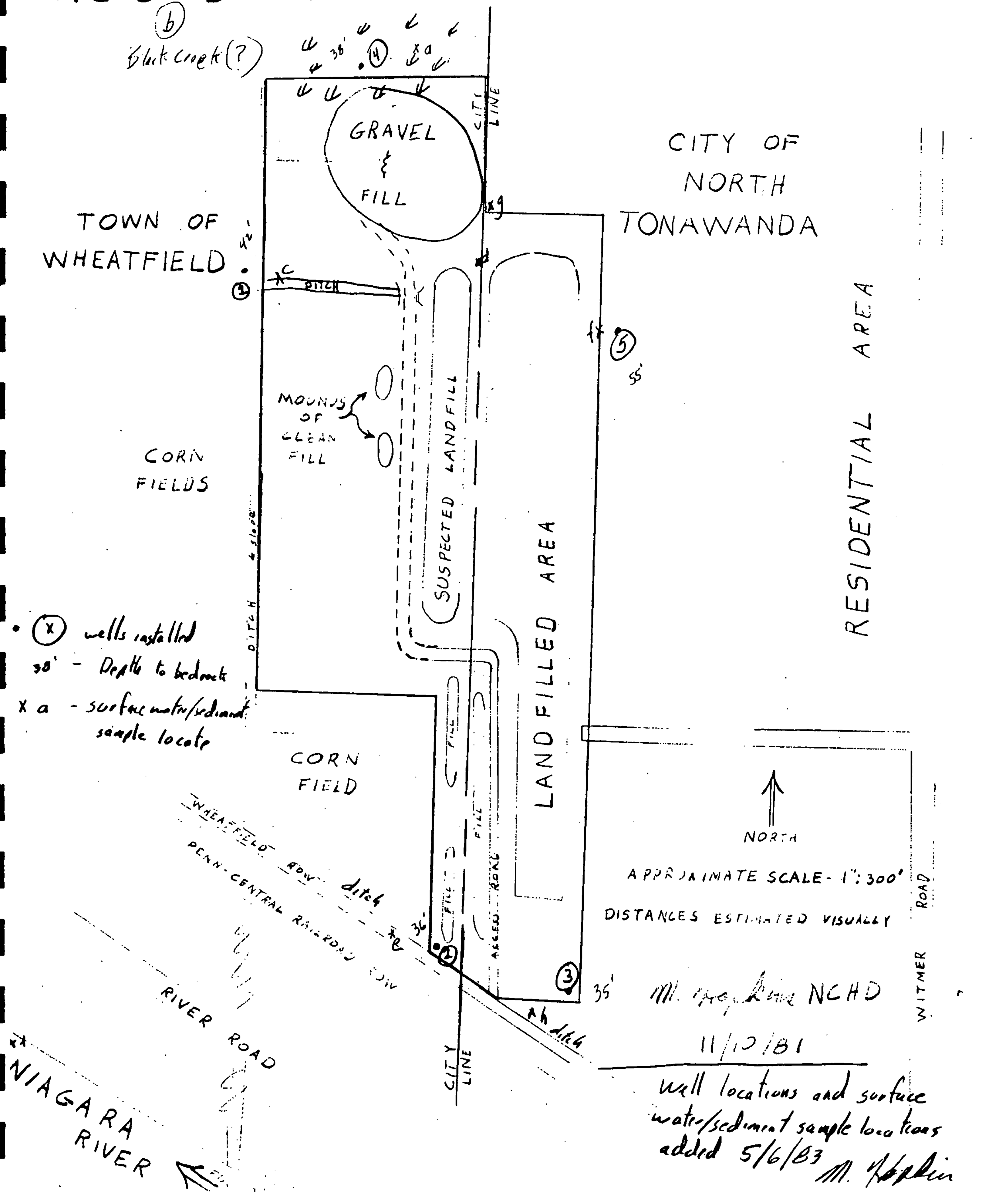
M. Hopkins

Page 4 of 5 Pages

Signature of Inspector

6 of 6

NCSWD - WHEATFIELD SITE #932026



Owners File
Appendix 1.4.4-1
1 of 8

REMEDIAL RESPONSE ACTIVITIES

zone 1

UNCONTROLLED HAZARDOUS WASTE DISPOSAL SITES

Draft
Remedial Action Master Plan
for
Niagara County Refuse Disposal Hazardous Waste
Niagara County, New York
Work Assignment Z-1-12-6
under
Contract No. 68-03-1612

September 9, 1982

REMEDIAL ACTION MASTER PLAN

CAMP DRESSER & McKEE INC.
CH2M HILL
CONESTOGA-ROVERS & ASSOCIATES LIMITED
C. C. JOHNSON AND ASSOCIATES

Appendix 1.4.4-1
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Table 1
GENERATORS FOR NIAGARA COUNTY REFUSE

Generators	Wastes
Carborundum Co. General Administrative Office Niagara Falls, NY 14304 716-278-2000	Empty Containers Abrasive Grain Scrap Sandpaper Scrap Resins Rags Paper Wood
Bell Aerospace Co. Div. of Textron Inc. Executive Office Niagara Falls Blvd. Niagara Falls, NY 14304 716-297-1000	Heat Treatment Salts Plating Tank Sludge Scrap Wood Clay Fly Ash
The Goodyear Tire & Rubber Co. 5408 Baker Ave. Niagara Falls, NY 14304 716-283-7682	Thiazole Polymer Blends Iron Catalyst Salts Accelerator Sewer Pumps Misc. PVC Wastes
E.I. DuPont de Nemours & Co. Industrial Chemical Dept. Buffalo Ave. & 26th Street Niagara Falls, NY 14304 716-278-5100	Off-Grade Polyvinyl Alcohol
Hooker Chemicals & Plastics Corp. Durez Div. Walack Road N. Tonawanda, NY 14150 716-696-6000	Oil and Grease Drippings Phenolic Molding Compound Phenolic Resin Rubbish
Olin Corp. Industrial Chemicals 2400 Buffalo Ave. Niagara Fall, NY 14303 716-278-6411	Graphite Lime Sludge Brine Sludge (with mercury)
Hooker Chemicals & Plastics Corp. Speciality Chemicals Div. Buffalo Ave. Niagara Falls, NY 14302 716-278-7777	Hypo Mud Soil & Misc. Chemical Wastes From Southern Section of Love Canal

Table 1
GENERATORS FOR NIAGARA COUNTY REFUSE
(Continued)

National Lead Co. 4511 Hyde Park Blvd. Niagara Falls, NY 14305 716-694-0636	Fumed Silica Zircon-Zirconia Sludge Paper Bags (which may contain traces of heavy metals dusts) Wood Pallets Flint Pebbles Fiber Drums Steel Drums Brick
Roblin Steel Co. 101 East Ave. N. Tonawanda, NY 14150 716-696-9700	Miscellaneous Trash

RW12/42

Appendix 1.4.4-1
4 of 8

Table 3
CHEMICAL ANALYSES RESULTS AT AND IN VICINITY OF THE SITE

Chemical	Groundwater Federal MCL	Groundwater NYS MCL	NYSDOH 5/21/73 Landfill Discharge Into River	NYSDOH 6/5/73 Leachate Discharge 50 Feet Upstream (Control)	NYSDOH 6/5/73 Leachate Discharge Into Niagara River	NYSDOH 6/5/73 50 Feet Downstream of Discharge Point
Ba (mg/l)			0.1	1.0	1.3	1.0
Cd (mg/l)	0.01	0.01	0.05	0.05	0.05	0.05
TCr (mg/l)	0.05	0.05	0.1	0.1	0.1	0.1
Cu (mg/l)		1.0	0.06	0.1	0.1	0.1
Fe (mg/l)	0.3	0.3	1.6	0.26	4.4	0.23
Pb (mg/l)	0.05	0.05	0.1	0.20	0.10	0.1
Mn (mg/l)	0.05	0.3	2.6	0.02	0.65	0.02
Hg (mg/l)	0.002	0.002	0.004	0.004	0.0006	0.008
Se (mg/l)		0.01	0.01	0.01	0.01	0.01
Ag (mg/l)			0.1	0.025	0.025	0.025
Zn (mg/l)		5.0	0.09	0.1	0.1	0.1
Co (mg/l)			0.1	0.1	0.1	0.1
Ni (mg/l)			0.05	0.05	0.05	0.05

RW12/44

Appendix 1.4.4-1
4 of 8

Appendix 1.4.4-1
5 of 8

Table 3
CHEMICAL ANALYSIS RESULTS AT AND IN VICINITY OF THE SITE
(Continued)

	Groundwater		Recra Research Gratewick Riverside Park Groundwater Well Samples 7/6/79			
Chemical	Federal MCL	NYS MCL	10	11	12	13
Phenol (mg/1)	3.5		9.10	14.60	11.08	118.5
THO as Chlorine (ppb)			11.5	2.78	0.12	22.8
CO (ppb) as Chlorine (ppb)						

RW12/44/2

Appendix 1.4.4-1
6 of 8

Table 3
CHEMICAL ANALYSIS RESULTS AT AND IN
VICINITY OF THE SITE
(Continued)

Chemical	Federal MCL	Groundwater NYS MCL	NYS DOH Results 9/6/79 Leachate at North End of Site 1	NYS DOH Results 9/6/79 Leachate at North End of Site 2
Ba (mg/l)			0.05	0.05
Cd (mg/l)	0.01	0.01	0.02	0.02
TCr (mg/l)	0.05	0.05	0.01	0.1
Cu (mg/l)		1.0	0.05	0.05
Fe (mg/l)	0.3	0.3		
Pb (mg/l)	0.05	0.05	0.1	0.1
Mn (mg/l)	0.05	0.3		
Hg (mg/l)	0.002	0.002	0.0011	0.0013
Se (mg/l)		0.01		
Zn (mg/l)		5.0	0.05	0.05
Phenol (mg/l)	3.5		0.005	0.005
THO (ppb) as Chlorine			390	470

RW12/44/3

Appendix 1.4.4-1
6 of 8

Appendix 1.4.4-1
7 of 8

Table 3
CHEMICAL ANALYSIS RESULTS AT AND IN
VICINITY OF THE SITE
(Continued)

Chemical	Groundwater Federal MCL	Groundwater NYS MCL	Recra Research Groundwater Well Samples 11/29/73 Well # 10	11/29/79 Well # 13	12/3/79 Well # 14	11/29/79 Well # 15	12/4/79 Well # 16
Phenol (mg/l)	3.5		1.26	63.1	0.003	0.007	
THO (ppb) As Chlorine			2.7	1,100	2.5	2.7	0.05
As (mg/l)		0.05					
Chloride (mg/l)	250	250	390	47.5	18.1	47.0	
TOC (mg/l)			32.2	378.	19	24	
CO (ppb) As Chlorine			340	-	-	0.01	
GC/MS Scan (See report)			Yes	Yes	Yes	Yes	Yes

RW12/44/4

Appendix 1.4.4-1
7 of 8

Table 4
RESULTS OF PRIORITY POLLUTANT ANALYSIS
OF
STANDING WATER AT THE NCR SITE
TAKEN BY EPA

Parameter	81-169-01	81-169-02	81-169-03	81-165-04
Cu (mg/l)	0.020	0.024	0.052	
Ni (mg/l)	0.10			
Zn (mg/l)	0.174	0.086	0.014	
Phenol (mg/l)				34,000
Ethylbenzene (mg/l)	8.0			
Toluene (mg/l)	31.0			
Diethylphthalate (mg/l)				40

See Figure 5 for sampling locations
Samples taken 6/81

RW12/45/1

15 (12/75)

Appendix 1.4.4-
1 of 6

New York State Department of Environmental Conservation

MEMORANDUM

TO: Robert J. Mitrey
FROM: Yavuz Erk
SUBJECT: EPA Testing Results for the Niagara County Refuse Disposal Site, Town of Wheatfield, Niagara County
DATE: December 29, 1980

The summary of the EPA findings on the dumpsite is as follows:

1. Liquid sample (EPA #56029) collected from the 24" drainage line under River Road shows contamination with heavy metals but the levels are well within the NYS effluent standards.

2. Liquid sample (EPA #56033) collected from pond at the north end of the landfill also shows contamination with heavy metals but the levels are well within the NYS effluent standards.

3. Sediment samples show various degrees of contamination with heavy metals. The highest concentration of Zn (1500 ppm) was found in a major swale crossing the landfill (EPA #56032).

4. Phenol was not detected in the liquid sample #56029.

5. Phenol was found in all sediment samples. Values vary from 89 ppb to 1,900 ppb found in sample #56032.

6. No PCB's were found in the liquid sample #56029. No value reported for sample #56033.

7. PCB's were found for sediment samples #56031, 56032, 56034 and 56030. The highest value for PCB-1248 was 320 ppb in sample #56032.

8. Several chlorinated organic compounds were found in both liquid and sediment samples:

<u>List of chlorinated organics found in liquid samples (ppb):</u>

	#56029	#56030
1,2 trans dichloroethylene	37	--
Methylene chloride	2	1
Tetrachloroethylene	56	--
Trichloroethylene	8	--
Vinyl chloride	2	--

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List or chlorinated organics found in sediment samples (ppb):

	#56030	#56031	#56032	#56034	#56035
Chlorobenzene	0.5	4.8	--	--	--
1,2 dichloroethane	--	--	--	3.8	--
1,1,1 trichloroethane	--	--	--	0.5	--
Chloroform	0.15	0.7	--	3.8	2.7
1,2 trans dichloroethylene	12	--	--	--	--
1,2 dichloropropene	--	0.8	--	--	--
Methylene chloride	1.5	24	16	4.1	31
Trichlorofluoromethane	--	--	1.2	--	--
Tetrachloroethylene	19	--	--	--	--
Trichloroethylene	5.2	0.4	0.7	1.4	0.3
4,4'-DDE*	11	3.3	5.3	9.1	--
β-BHC*	--	--	58	15K?	--
1,2,4-Trichlorobenzene	--	--	73	47	--
Hexachlorobenzene	--	--	39	--	--
1,2 Dichlorobenzene	--	--	39	30	--
1,3 Dichlorobenzene	--	54	59	41	--
1,4 Dichlorobenzene	--	54	59	41	--

(* pesticides)

Other organic compounds found in liquid and sediment samples (ppb):

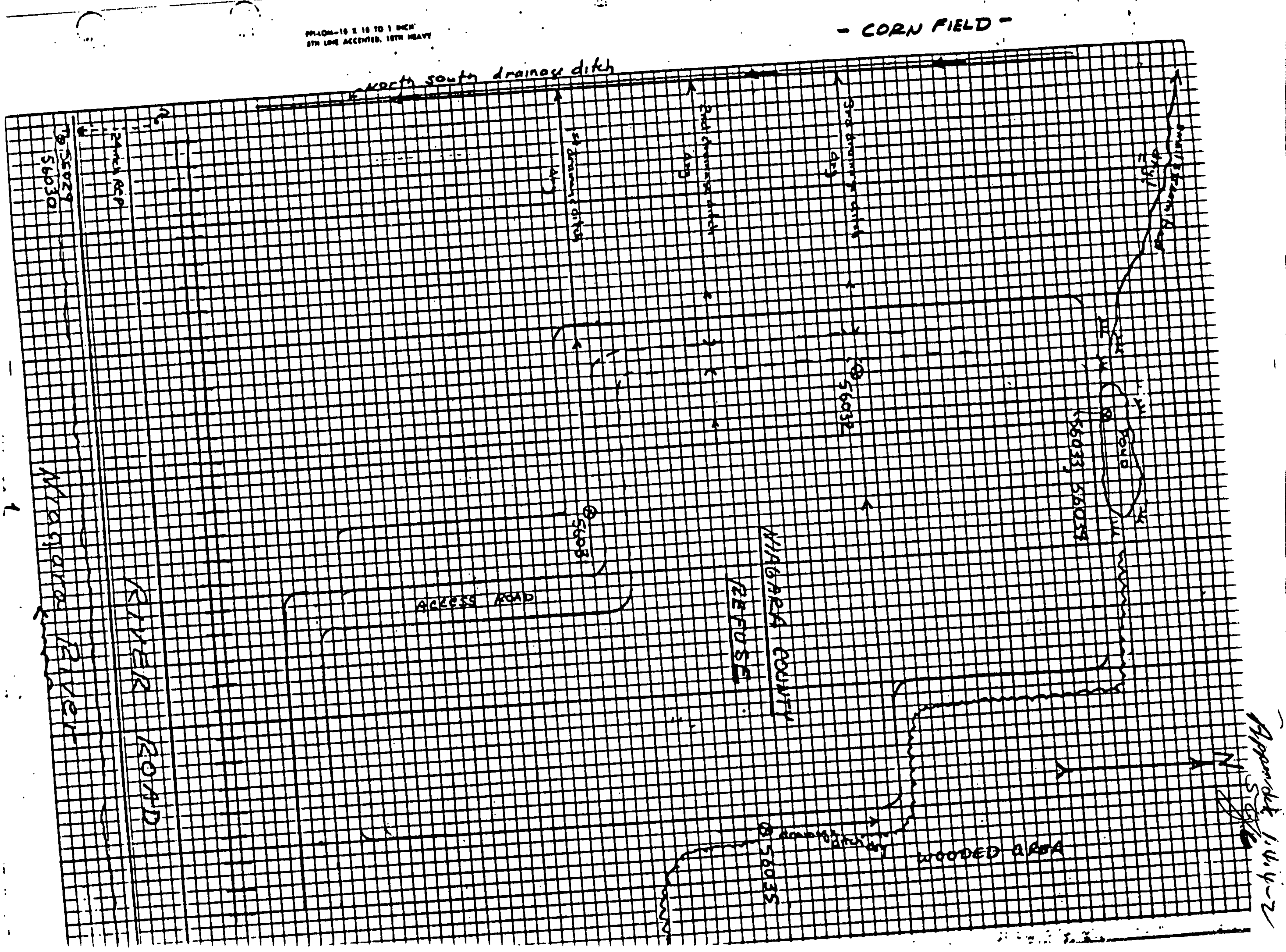
	Liquid		Sediment				
	#56029	#56033	#56030	#56031	#56032	#56034	#56035
Acenaphthene	--	--	11	--	8.2	17	--
Acenaphthene derived from coal tar, irritating to eyes and skin.							
Fluoranthene	--	--	2500	34	130	190	19
Fluoranthene derived from coal tar, moderately toxic.							
Naphthalene	--	--	76	17	50	160	--
Naphthalene is a narcotic agent.							
Anthracene	--	--	2000	40	140	260	21
Anthracene is a carcinogenic agent, derived from anthracene oil.							
Fluorene	--	--	93	--	12	33	--
Fluorene is derived from coal tar, used as resinous products, insecticides and dye stuff.							
Phenanthrene	--	--	2000	40	140	260	21
Phenanthrene is derived from coal tar, carcinogenic agent.							
Pyrene	--	--	2000	26	110	140	14
Pyrene is derived from coal tar, carcinogenic agent.							
P-Dioxic (TCDD)	--	--	--	--	--	--	--
Benzo (a) pyrene	--	--	2300	--	180	210	--
Benzo (a) pyrene is found in coal tar, carcinogenic agent.							

The following compounds are used as plasticizer for polyvinyl and cellulosic resins:

Bis (2-ethyhexyl) phthalate	330	14	6900	2500	4100	2300	440
Butyl benzyl phthalate	0.76	--	220	--	330	--	28
Di-n-butyl phthalate	9.0	5.2	400	350	350	470	38
Di-n-octyl phthalate	10	--	170	--	--	--	--
Diethyl phthalate	1.7	--	120	89	110	180	100

Based on the EPA analysis results, it seems that some of the wastes in the landfill have been leaching out and finding their ways into the Niagara River. The evidence we have on the presence of organic compounds points out to an immediate investigation on the integrity of the clay cap and the landfill itself. I feel that the original plan that was proposed back in March 1980 is a good starting point for future investigatory efforts to be taken by the Town of Wheatfield and/or the Niagara Refuse Disposal District.

YE:las


- CORN FIELD -
north south drainage ditch
1st drainage ditch
2nd drainage ditch
3rd drainage ditch
56029
56030
56031
56032
56033
56034
56035
ACCESS ROAD
NIAGARA COUNTY
REFUSE
RIVER ROAD
Niagara River
WOODED AREA
POND
N

Appendix 1.4.42
6 of 6

FIGURE 1

EPA Sample #	Sample Type and Location
#56029	Water samples taken from a 24-inch pipe running under River Road and into the Niagara River. This drainage line located south and east of the site is suspected to carry some of the surface run-off from the site. Flow rate is 2.25 gpm.
#56030	Sediment samples taken at the same location as sample #56029.
#56031	Sediment samples taken from the first east - west drainage ditch draining in a westerly direction from the site. No standing water present.
#56032	Sediment samples taken from the third east - west drainage ditch at a point just to the east of the access road, just before drainage enters conduit passing under roadway. No standing water present.
#56033	Water samples taken from pond in marshy area along the northern edge of fill.
#56034	Sediment samples taken at same location as sample #56033.
#56035	Sediment samples taken from drainage ditch running along the northeast edge of the fill. No standing water present.

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R-584-11-83-9

EVALUATION OF ANALYTICAL CHEMICAL DATA FROM NIAGARA COUNTY REFUSE WHEATFIELD, NEW YORK

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-8212-02C
CONTRACT NO. 69-01-6699

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

DECEMBER 2, 1983

NUS CORPORATION
SUPERFUND DIVISION

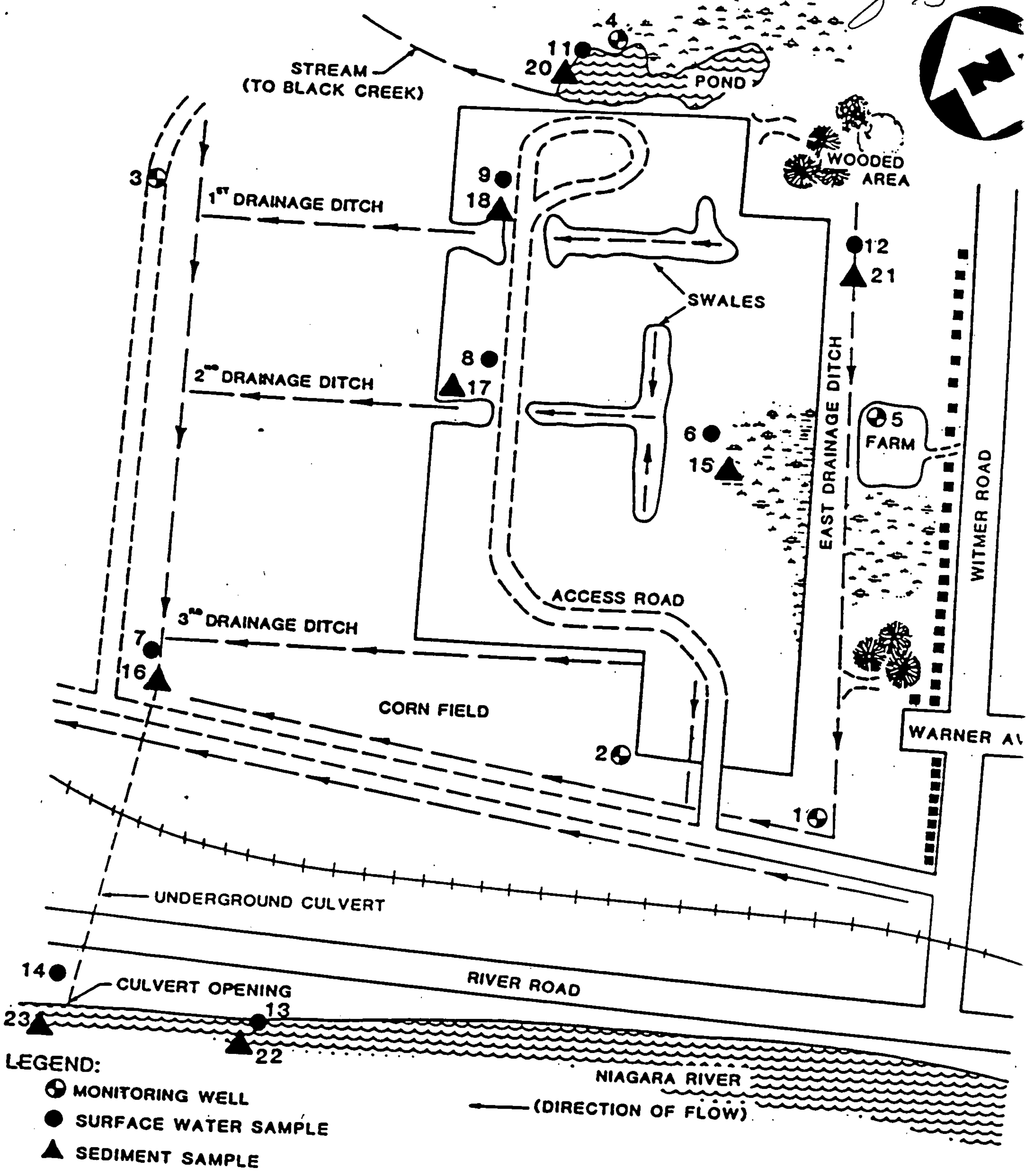
SUBMITTED BY

PATRICK SORENSEN, Ph.D
PROJECT MANAGER

REVIEWED/APPROVED BY

PETER FRANCONERI, P.E.
REGIONAL PROJECT MANAGER

Appendix 1.4.4-i 2 of 45



SAMPLE LOCATION MAP-(5/4-5/1983)

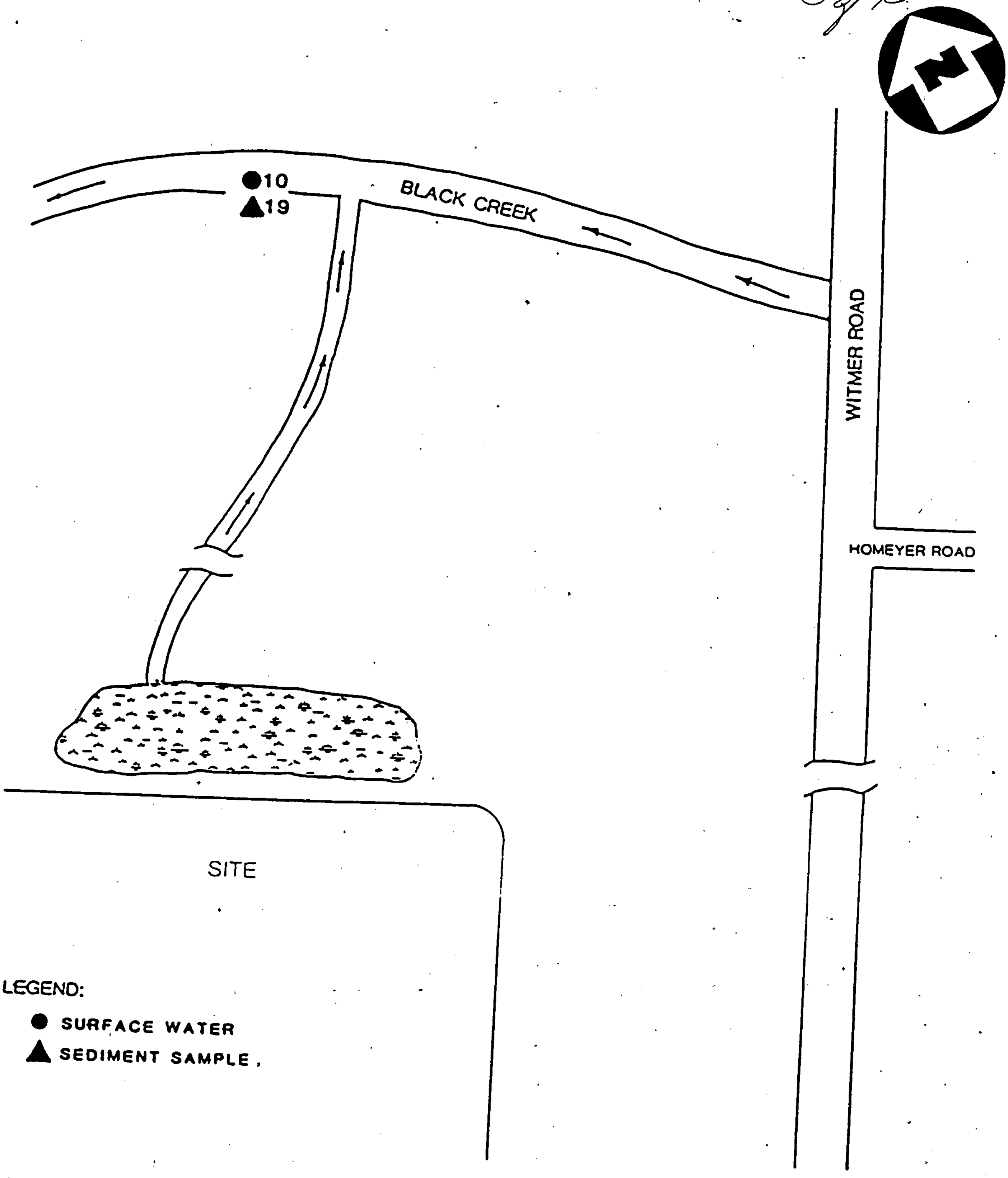
NIAGARA COUNTY REFUSE LANDFILL

WHEATFIELD, N.Y.

(NOT TO SCALE)

FIGURE 2

NUS CORPORATION
A Halliburton Company



SAMPLE LOCATION MAP – (5/4-5/1983)

NIAGARA COUNTY REFUSE LANDFILL

WHEATFIELD, N.Y.

(NOT TO SCALE)

FIGURE 3

NUS CORPORATION
A Halliburton Company

TABLE I
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
MAY 4-5, 1983

SAMPLE NUMBER	SAMPLE TYPE	SMO TRAFFIC REPORT NO. (CASE #1655)	LOCATION	ANALYSIS
1	Groundwater	B2742 MB9734	Monitoring Well #1	Priority Pollutants
2	Groundwater	B2743 MB9735	Monitoring Well #2	Priority Pollutants
3	Groundwater	B2744 MB9736	Monitoring Well #3	Priority Pollutants
4	Groundwater	B2746 MB9738	Monitoring Well #4	Priority Pollutants
5	Groundwater	B2745 MB9737	Monitoring Well #5	Priority Pollutants
6	Surface Water	B2747 MB9739	Ponded water on fill	Priority Pollutants
7	Surface Water	B2748 MB9740	Drainage ditch near culvert entrance	Priority Pollutants
8	Surface Water	B2749 MB9741	Southern swale	Priority Pollutants

TABLE I (cont'd)
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
MAY 4-5, 1983

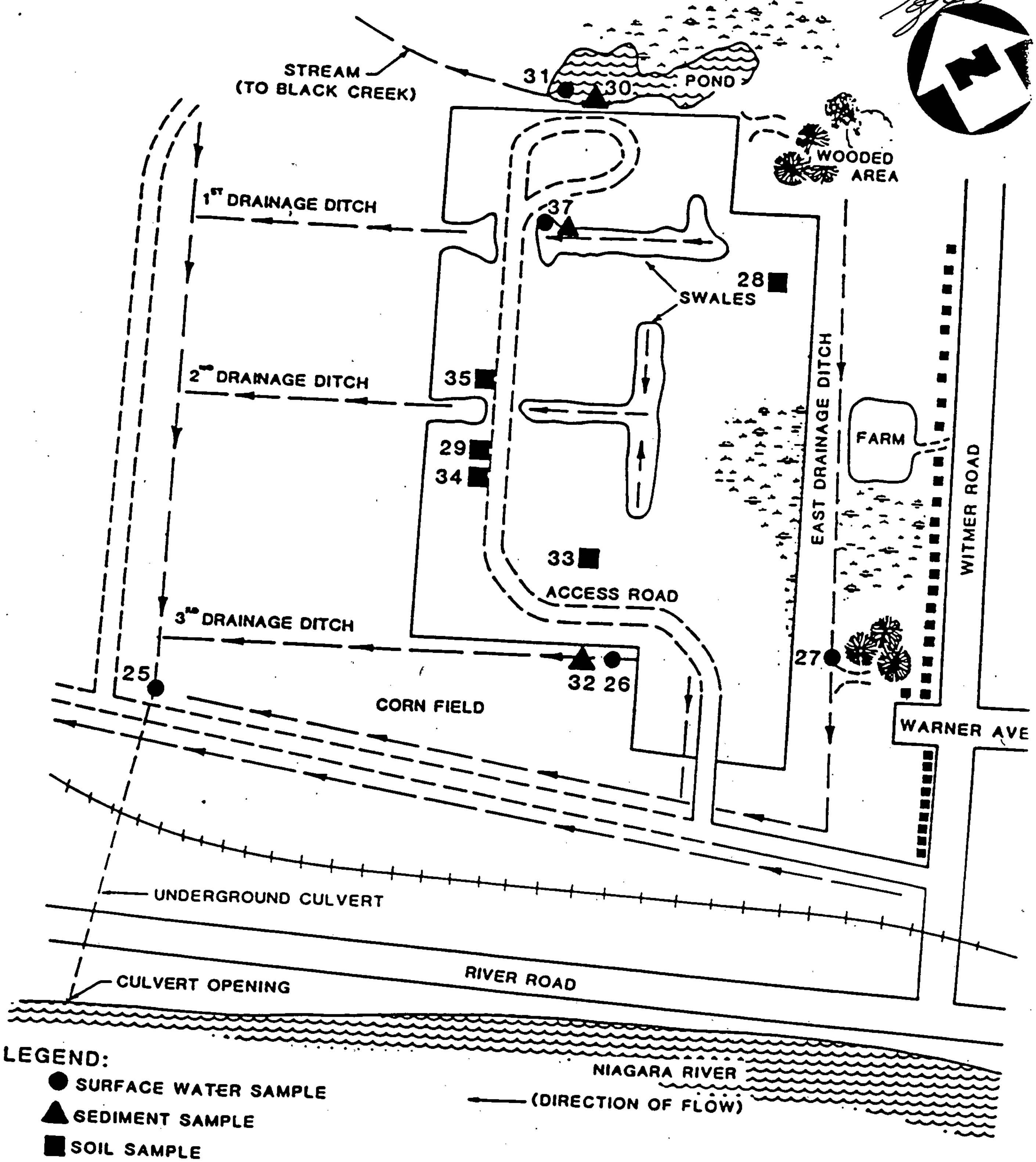
SAMPLE NUMBER	SAMPLE TYPE	SMO TRAFFIC REPORT NO. (CASE #1655)	LOCATION	ANALYSIS
9	Surface Water	B2750 MB9742	Northern swale	Priority Pollutants
10	Surface Water	B2751 MB9743	Black Creek	Priority Pollutants
11	Surface Water	B2752 MB9744	Pond adjacent to fill	Priority Pollutants
12	Surface Water	B2753 MB9745	East drainage ditch	Priority Pollutants
13	Surface Water	B2755 MB9747	Niagara River, upstream from culvert opening	Priority Pollutants
14	Surface Water	B2754 MB9746	Niagara River, downstream from culvert opening	Priority Pollutants
Water Field Blank	Double Distilled Water	B2741 MB9733	Chemical Supply House	Priority Pollutants
15	Sediment	B2757 MB9748	Ponded water on fill	Priority Pollutants

TABLE I (cont'd)
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
MAY 4-5, 1983

SAMPLE NUMBER	SAMPLE TYPE	SMO TRAFFIC REPORT NO. (CASE #1655)	LOCATION	ANALYSIS
16	Sediment	B2758 MB9749	Drainage ditch near culvert entrance	Priority Pollutants
17	Sediment	B2759 MB9750	Southern swale	Priority Pollutants
18	Sediment	B2760 MB9751	Northern swale	Priority Pollutants
19	Sediment	B2761 MB9752	Black Creek	Priority Pollutants
20	Sediment	B2762 MB9753	Pond adjacent to fill	Priority Pollutants
21	Sediment	B2763 MB9755	East drainage ditch	Priority Pollutants
22	Sediment	B2765 MB9757	Niagara River, upstream from culvert opening	Priority Pollutants
23	Sediment	B2764 MB9756	Niagara River, downstream from culvert opening	Priority Pollutants
Sediment Field Blank	Double Distilled Water	B2756 MB9754	Chemical Supply House	Priority Pollutants

8

Appendix 1.4H-3 79/45



SAMPLE LOCATION MAP -(3/18/1983)

NIAGARA COUNTY REFUSE LANDFILL

WHEATFIELD, N.Y.

(NOT TO SCALE)

FIGURE 4

NUS CORPORATION
A Halliburton Company

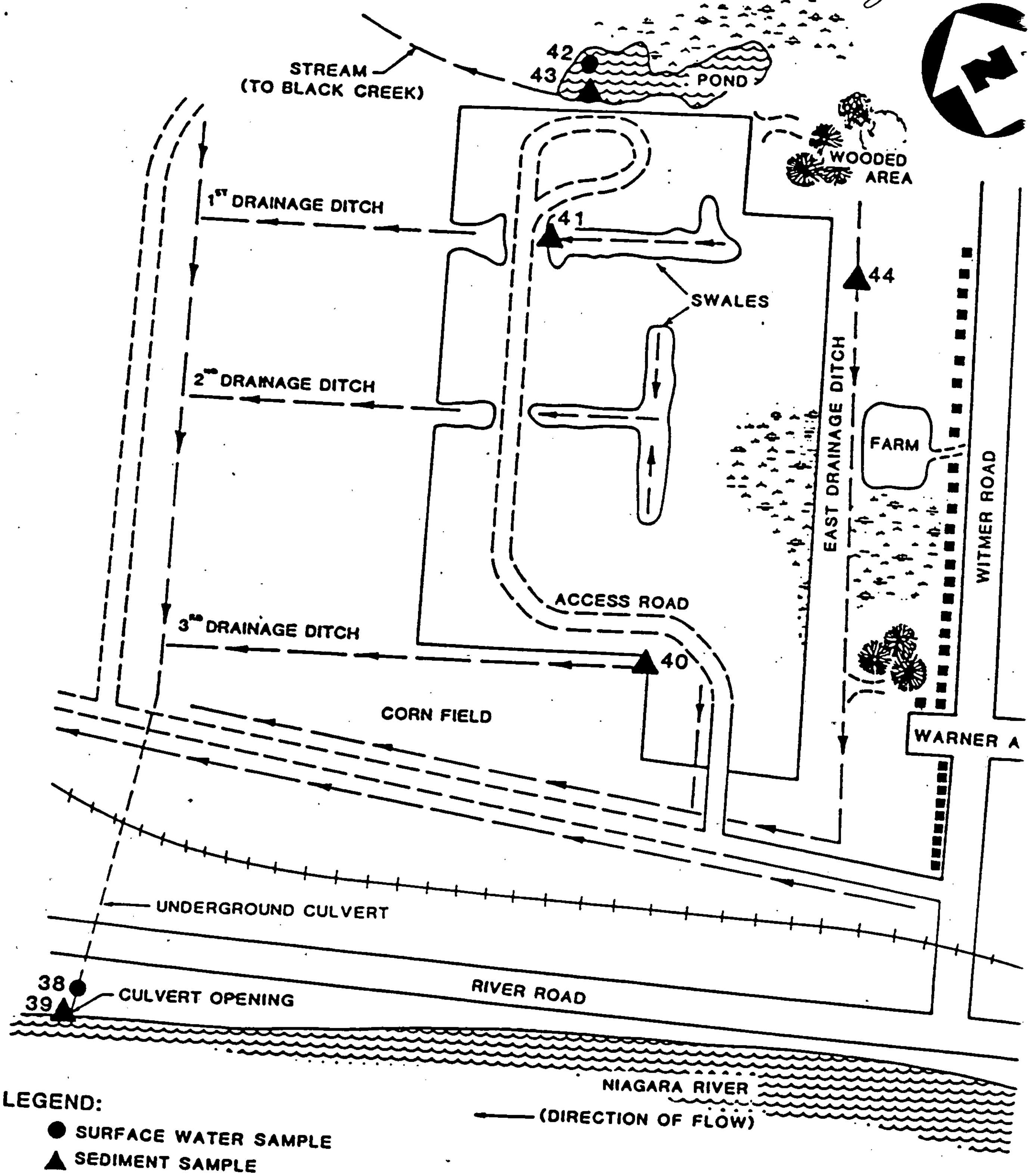
TABLE 2
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
MARCH 18, 1981

SAMPLE NUMBER	SAMPLE TYPE	EPA LAB SAMPLE NO.	LOCATION	ANALYSIS
Blank	Distilled Water	60451	EPA Lab, Edison, N.J.	Priority Pollutants
25	Surface Water	60230	Water entering culvert from western north-south drainage ditch	Priority Pollutants
26	Surface Water	60229	Water sample from Third River drainage ditch	Priority Pollutants
27	Surface Water	60228	Water sample collected from east drainage ditch	Priority Pollutants
28	Soil	60227	Soil sample from northwest area. 2 foot core sample with brown silty appearance	Priority Pollutants
29	Soil	60226	Soil sample from northeast area. 2 foot core sample of grey-brown clay	Priority Pollutants
30	Sediment	53400	Sediment from pond at north end of landfill	Priority Pollutants
31	Surface Water	53399	Water sample from pond at north end of landfill	Priority Pollutants

TABLE 2 (cont'd)
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
MARCH 18, 1981

SAMPLE NUMBER	SAMPLE TYPE	EPA LAB SAMPLE NO.	LOCATION	ANALYSIS
32	Sediment	52374	Sediment sample from Third drainage ditch	Priority Pollutants
33	Soil	52373	Soil sample from pile of soil and construction debris in center of landfill	Priority Pollutants
34	Soil	52372	Soil sample from northeast end of landfill	Priority Pollutants
35	Soil	52371	Soil sample from northeast end of landfill	Prioirty Pollutants
36	Sediment	52370	Sediment from first drainage ditch	Priority Pollutants
37	Surface Water	52369	Water from first drainage ditch	Priority Pollutants

Appendix 1.4.4-3



SAMPLE LOCATION MAP -(9/9/1980)

NIAGARA COUNTY REFUSE LANDFILL

WHEATFIELD, N.Y.

(NOT TO SCALE)

FIGURE 5

NUS CORPORATION

A Halliburton Company

TABLE 3
LOCATIONS SAMPLED - NIAGARA COUNTY REFUSE, WHEATFIELD, NEW YORK
SEPTEMBER 9, 1980

SAMPLE NUMBER	SAMPLE TYPE	EPA LAB SAMPLE NO.	LOCATION	ANALYSIS
38	Surface Water	56029	Drainage line under River Road	Priority Pollutants
39	Sediment	56030	Drainage line under River Road	Priority Pollutants
40	Sediment	56031	Third drainage ditch along west side of landfill	Priority Pollutants
41	Sediment	56032	First drainage ditch along west side of landfill	Priority Pollutants
42	Surface Water	56033	Pond at north end of landfill	Priority Pollutants
43	Sediment	56034	Pond at north end of landfill	Priority Pollutants
44	Sediment	56035	Drainage ditch along north-east side of landfill	Priority Pollutants
Blank	Blank	56036	Two blank VOA vials	Priority Pollutants

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FINDINGS

Complete analytical results for priority pollutants and other toxic compounds identified are provided in Table 4. Significant findings are discussed below.

Surface Water

Phthalates were found in a number of widely scattered surface water locations in the 1980 and 1981 sampling trips. Bis(2-ethylhexyl)phthalate concentrations ranged from not detected to 450 ug/l. Di-n-octyl phthalate was found at 10 ug/l in sample 38. Diethyl phthalate was found at 3.2 ug/l in sample 26 and 1.7 ug/l in sample 38. No phthalates were found in surface waters sampled during the 1983 trip.

Phthalates are among the most important industrial chemicals. They are commonly used as plasticizers. Physiologically, the phthalates represent one of the lowest toxicity classes used in industry. Generally, they have not presented dermal problems, are not absorbed through the skin, and are not appreciably hazardous by inhalation. The levels detected do not appear to present a public health hazard.

Trace levels of chlorobenzene, 1,1,2,2-tetrachloroethane, ethylbenzene, and trichloroethylene were detected in sample 13.

Sample 26, located at the southern edge of the site, contained 26 ug/l 1,3-dichlorobenzene, 1.4 ug/l isophorone, 7.0 ug/l naphthalene, 2.1 ug/l 2,4-dimethylphenol, 4.6 ug/l phenol, 27 ug/l chlorobenzene, 24 ug/l ethylbenzene. Sample 31 contained a trace chloroform.

Sample 38 contained 37 ug/l 1,2-trans-dichloroethylene, 56 ug/l tetrachloroethylene, 8 ug/l trichloroethylene and 2 ug/l vinyl chloride.

Methylene chloride was detected at 480 ug/l in sample 11, 7 ug/l in sample 13, 27 ug/l in sample 31. The blank for sample 31 contained 3.9 ug/l methylene chloride. Sample 38 contained 2 ug/l, sample 42 contained 1 ug/l and sample 44 contained 31 ug/l methylene chloride.

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Methylene chloride is the least toxic of the four chlorinated methanes, and there is no evidence to suggest that this compound is carcinogenic to humans. Methylene chloride is moderately toxic via ingestion, but is very dangerous to the eyes upon contact. Methylene chloride may have been used during sample bottle preparation and the levels found may be artifacts.

Inorganic concentrations found in surface water samples were not significant.

Groundwater

Bis (2-ethylhexyl) phthalate was detected in groundwater sample 2 at 35 ug/l.

Methylene chloride was detected in three groundwater samples. Well sample 1 contained 79 ug/l, sample 4 contained 5200 ug/l, and sample 5 contained 5.4 ug/l. Since methylene chloride is used for sample bottle preparation, this may be a sampling artifact. However, the lack of methylene chloride in the field blank and the high levels detected in some samples suggest that methylene chloride is a groundwater contaminant at Niagara County Refuse.

Well sample 4 contained 1900 ug/l of acetone. The field blank contained 420 ug/l acetone and well samples 1, 2, 3, and 5 contained trace levels of acetone, but failed EPA Region II quality assurance requirements. Acetone was used for decontamination of field equipment and is probably a sampling artifact in this case.

No other organics were detected in the groundwater.

Inorganic concentrations detected in the groundwater samples were not significant.

Soil

With the exception of endosulfan sulfate, no organic priority pollutants were detected in soil samples collected during the 1983 trip. Endosulfan sulfate was detected in sediment sample 16 at 288 ug/kg. However, this pesticide's presence could not be confirmed by GC/MS, and this finding could be erroneous.

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A number of organics were detected in soil and sediment samples collected during sampling trips in 1980 and 1981. However, much of this data could be in error, since no soil field blanks were included with the samples for analysis.

Phthalates were found in a number of widely separated location. Phthalate concentrations ranged from not detected to 6900 ug/kg.

A number of the soil samples collected during 1980 and 1981 also contained polynuclear aromatic hydrocarbons (PAHs) including: anthracene, benzo(a)anthracene, benzo(a)pyrene, 3,4 benzofluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, naphthalene, acenaphthylene, phenanthrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, pyrene.

Since several of these PAHs are potential carcinogens, their presence in soil is a source of public health concern. The highest PAH concentrations were detected in sample 39, a culvert opening to the Niagara River. PAH concentrations at this location included: 3,200 ug/kg benzo(a)anthracene, 2,300 ug/kg benzo(a)pyrene, 2,200 ug/kg benzo(k)fluoranthene, 3,4 benzo fluoranthene, 3,200 ug/kg chrysene, 2,000 ug/kg anthracene, 2,000 ug/kg phenanthrene, and 2,000 ug/kg pyrene.

Other organics detected in soil include: hexachloroethane, 1,2,4-trichlorobenzene, ocenaphthene, dichlorobenzene, benzo(ghi)perylene, phenol, 2,4-dimethylphenol. A number of volatile organics were detected in trace concentrations. Pesticides detected included PCB-1254, PCB-1248, B-BHC and trace levels of 4,4'-DDE.

No unusual inorganics concentrations were detected in the soil and sediments samples.

15845

TABLE 4

ORGANICS

SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES	Water Field Blank[a]	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]	7[a]	8[a]	9[a]	10[a]	11[a]	12[a]
Acenaphthene													
Benzidine													
1,2,4 - Trichlorobenzene													
Hexachlorobenzene													
Hexachloroethane													
Bis(2-chloroethyl)ether													
2-Chloronaphthalene													
1,2 - Dichlorobenzene													
1,3 - Dichlorobenzene													
1,4 - Dichlorobenzene													
3,3 - Dichlorobenzidine													
2,4 - Dinitrotoluene													
2,6 - Dinitrotoluene													
1,2 - Diphenylhydrazine													
Fluoranthene													
4 - Chlorophenyl phenyl ether													
4 - Bromophenyl phenyl ether													
Bis(2-chloroisopropyl)ether													
Bis(2-chloroethoxy)methane													
Hexachlorobutadiene													
Hexachlorocyclopentadiene													
Isophorone													
Naphthalene													
Nitrobenzene													
N-nitrosodimethylamine													
N-nitrosodiphenylamine													
N-nitrosodi-n-propylamine													
Bis(2-ethylhexyl) phthalate			35										
Butyl benzyl phthalate													
Di-n-butyl phthalate													
Di-n-octyl phthalate													
Diethyl phthalate													
Dimethyl phthalate													
Benzo(a)anthracene (1,2-benzanthracene)													
Benzo(a) pyrene													
3,4 Benzo fluoranthene													
Benzo(k) fluoranthene													
Chrysene													
Acenaphthylene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

168145

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES (cont'd.)	Water[a] Field Blank	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]	7[a]	8[a]	9[a]	10[a]	11[a]	12[a]
Anthracene													
Benzo(ghi) perylene (1,12-Benzoperylene)													
Fluorene													
Phenanthrene													
Dibenzo(a,h) anthracene (1,2,5,6-dibenzanthracene)													
Indeno (1,2,3-cd) pyrene													
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		•			•		•	•			•	•	
Pyrene													
NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES													
Aniline													
Benzyl Alcohol													
4-Chloroaniline													
Dibenzofuran													
2-Methylnaphthalene													
2-Nitroaniline													
3-Nitroaniline													
4-Nitroaniline													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- • - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

17845

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

ACID COMPOUNDS	Water Field Blank	1ª	2ª	3ª	4ª	5ª	6ª	7ª	8ª	9ª	10ª	11ª	12ª
2,4,6-Trichlorophenol				*								*	
p-Chloro-m-cresol				*								*	
2-Chlorophenol				*								*	
2,4-Dichlorophenol				*								*	
2,4-Dimethylphenol				*								*	
2-Nitrophenol				*								*	
4-Nitrophenol				*								*	
2,4-Dinitrophenol				*								*	
4,6-Dinitro-o-cresol				*								*	
Pentachlorophenol				*								*	
Phenol				*								*	
(NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES)													
Benzoic Acid				*								*	
Methylphenol				*								*	
Methylphenol				*								*	
Trichlorophenol				*								*	

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

PESTICIDES	Water[a] Field Blank	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]	7[a]	8[a]	9[a]	10[a]	11[a]	12[a]
Aldrin													
Dieldrin													
Chlordane													
4,4'-DDT													
4,4'-DDE													
4,4'-DDD													
α-Endosulfan													
β -Endosulfan													
Endosulfan sulfate													
Endrin													
Endrin aldehyde													
Heptachlor													
Heptachlor epoxide													
α-BHC													
β -BHC													
σ -BHC													
Δ -BHC													
PCB-1242													
PCB-1254													
PCB-1221													
PCB-1232													
PCB-1248													
PCB-1260													
PCB-1016													
Toxaphene													

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

VOLATILES	Water Field Blank[a]	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]	7[a]	8[a]	9[a]	10[a]	11[a]	12[a]
Acrolein													
Acrylonitrile													
Benzene													
Carbon tetrachloride													
Chlorobenzene													
1,2-Dichloroethane													
1,1,1-Trichloroethane	<5												
1,1-Dichloroethane													
1,1,2-Trichloroethane													
1,1,2,2-Tetrachloroethane													
Chloroethane													
2-Chloroethyl vinyl ether (mixed)													
Chloroform													
1,1-Dichloroethylene													
1,2-trans-Dichloroethylene													
1,2-Dichloropropane													
1,3-Dichloropropylene (1,3-Dichloropropene)													
Ethylbenzene													
Methylene chloride (Dichloromethane)		79			5200	5.4						420	
Methyl chloride (Chloromethane)													
Methyl bromide (Bromomethane)													
Bromoform (Tribromomethane)													
Bromodichloromethane													
Trichlorofluoromethane													
Dichlorodifluoromethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane													
Tetrachloroethene (Tetrachloroethylene)													
Toluene													
Trichloroethene (Trichloroethylene)													
Vinyl chloride													
(NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES)													
Acetone	420	*	*	*	1900	*							
Butanone													
Carbondisulfide													
Hexanone													
Methyl-2-Pentanone													
Styrene													
Vinyl Acetate													
[illegible]													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4

INORGANICS

SAMPLE NUMBER

	Water Field Blank[c]	1[c]	2[c]	3[c]	4[c]	5[c]	6[c]	7[c]	8[c]	9[c]	10	11	12
Aluminum		0.8	0.8	3.6	1.8	0.8	2.0	2.2	11.6	2.6	1.0	0.8	1.5
Chromium	0.01	0.01		0.02	0.01		0.01	0.01	0.02	0.01			
Barium									0.1				
Beryllium													
Cadmium				0.001									
Cobalt													
Copper									0.05				
Iron	0.05	1.05	0.90	3.65	1.80	0.80	2.40	2.45	18.10	3.45	1.60	1.60	2.40
Lead				0.025	0.0020	0.010			0.015	0.005			
Nickel													
Manganese		0.075	0.060	0.120	0.045	0.030	0.045	0.045	0.795	0.135	0.030	0.12[illegible]	[illegible]
Zinc	0.070	3.320	7.63	7.420	3.060	5.440	*	*	*	*	*	*	*
Boron		0.6	0.5	0.5	0.5	0.6	0.3	1.7	2.7	2.9		[illegible]	3.[illegible]
Vanadium													
Arsenic													
Antimony													
Selenium													
Thallium													
Mercury									0.0004	0.0002			
Tin													
Silver													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES	Water Field Blank[a]	13[a]	14[a]	Sediment Field Blank[b]	15[b]	16[b]	17[b]	18[b]	19[b]	20[b]	21[b]	22[b]	23[b]
Acenaphthene													
Benzidine													
1,2,4 - Trichlorobenzene													
Hexachlorobenzene													
Hexachloroethane													
Bis(2-chloroethyl)ether													
2-Chloronaphthalene													
1,2 - Dichlorobenzene													
1,3 - Dichlorobenzene													
1,4 - Dichlorobenzene													
3,3 - Dichlorobenzidine													
2,4 - Dinitrotoluene													
2,6 - Dinitrotoluene													
1,2 - Diphenylhydrazine													
Fluoranthene													
4 - Chlorophenyl phenyl ether													
4 - Bromophenyl phenyl ether													
Bis(2-chloroisopropyl)ether													
Bis(2-chloroethoxy)methane													
Hexachlorobutadiene													
Hexachlorocyclopentadiene													
Isophorone													
Naphthalene													
Nitrobenzene													
N-nitrosodimethylamine													
N-nitrosodiphenylamine													
N-nitrosodi-n-propylamine													
Bis(2-ethylhexyl) phthalate													
Butyl benzyl phthalate													
Di-n-butyl phthalate													
Di-n-octyl phthalate													
Diethyl phthalate													
Dimethyl phthalate													
Benzo(a)anthracene (1,2-benzanthracene)													
Benzo(a) pyrene													
3,4 Benzo fluoranthene													
Benzo(k) fluoranthene													
Chrysene													
Acenaphthylene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES (cont'd.)	Water Field Blank[a]	13[a]	14[a]	Sediment Field Blank[b]	15[b]	16[b]	17[b]	18[b]	19[b]	20[b]	21[b]	22[b]	23[b]
Anthracene													
Benzo(ghi) perylene (1,12-Benzoperylene)													
Fluorene													
Phenanthrene													
Dibenzo(a,h) anthracene (1,2,5,6-dibenzanthracene)													
Indeno (1,2,3-cd) pyrene													
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)				•		•			•		•		•
Pyrene													
NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES													
Aniline													
Benzyl alchohol													
4-Chloroaniline													
Dibenzofuran													
2-Methylnaphthalene													
2-Nitroaniline													
3-Nitroaniline													
4-Nitroaniline													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- • - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

23845

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

ACID COMPOUNDS	Water Field Blank[a]	13[a]	14[a]	Sediment Field Blank[b]	15[b]	16[b]	17[b]	18[b]	19[b]	20[b]	21[b]	22[b]	23[b]
2,4,6-Trichlorophenol													
p-Chloro-m-cresol													
2-Chlorophenol													
2,4-Dichlorophenol													
2,4-Dimethylphenol													
2-Nitrophenol													
4-Nitrophenol													
2,4-Dinitrophenol													
4,6-Dinitro-o-cresol													
Pentachlorophenol													
Phenol													
NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES													
Benzoic acid													
2-Methylphenol													
4-Methylphenol													
2,4,5-Trichlorophenol													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

PESTICIDES	Water Field Blank[a]	13[a]	14[a]	Sediment Field Blank[b]	15[b]	16[b]	17[b]	18[b]	19[b]	20[b]	21[b]	22[b]	23[b]
Aldrin													
Dieldrin													
Chlordane													
4,4'-DDT													
4,4'-DDE													
4,4'-DDD													
α-Endosulfan													
β-Endosulfan													
Endosulfan sulfate						288[e]							
Endrin													
Endrin aldehyde													
Heptachlor													
Heptachlor epoxide													
α-BHC													
β-BHC													
σ-BHC													
Δ-BHC													
PCB-1242													
PCB-1254													
PCB-1221													
PCB-1232													
PCB-1248													
PCB-1260													
PCB-1016													
Toxaphene													

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed
- e - Endosulfan Sulfate presence could not be confirmed by GC/MS.

TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

VOLATILES	Water Field Blank[a]	13[a]	14[a]	Sediment Field Blank[b]	15[b]	16[b]	17[b]	18[b]	19[b]	20[b]	21[b]	22[b]	23[b]
Acrolein													
Acrylonitrile													
Benzene													
Carbon tetrachloride													
Chlorobenzene		<5											
1,2-Dichloroethane													
1,1,1-Trichloroethane	<5			<5									
1,1-Dichloroethane													
1,1,2-Trichloroethane													
1,1,2,2-Tetrachloroethane		<5											
Chloroethane													
2-Chloroethyl vinyl ether (mixed)													
Chloroform													
1,1-Dichloroethylene													
1,2-trans-Dichloroethylene													
1,2-Dichloropropane													
1,3-Dichloropropylene (1,3-Dichloropropene)													
Ethylbenzene		<5											
Methylene chloride (Dichloromethane)		7		*	*	*	*	*	*	*	*	*	*
Methyl chloride (Chloromethane)													
Methyl bromide (Bromomethane)													
Bromoform (Tribromomethane)													
Bromodichloromethane													
Trichlorofluoromethane													
Dichlorodifluoromethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane													
Tetrachloroethene (Tetrachloroethylene)													
Toluene													
Trichloroethene (Trichloroethylene)		<5											
Vinyl chloride													
NON-PRIORITY POLLUTANT HAZARDOUS SUBSTANCES													
Acetone	420			210									
2-Butanone													
Carbondisulfide													
2-Hexanone													
4-Methyl-2-pentanone													
Styrene													
Vinyl acetate													
O-Xylene													

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

SAMPLE NUMBER

INORGANICS

	Water Field Blank[c]	13[c]	14[c]	Sediment Field Blank[d]	15[d]	16[d]	17[d]	18[d]	19[d]	20[d]	21[d]	22[d]	23[d]
Aluminum		1.6	32		12,600	11,000	8,330	10,800	9,290	5,830	6,580	28,000	2470
Chromium	0.01	0.01	0.01		17	8.6	10	15	9.4	5.7	8.3	4.7	9.0
Barium					67	98	37	84	64	42	43	32	30
Beryllium					0.6	0.9	0.6	0.6	0.4		0.3	0.2	0.3
Cadmium					0.099	0.17	0.12	0.25	0.23	0.21	0.061	0.14	0.16
Cobalt					11	5.9	6.7	10	6.0	4.0	7.8	5.8	7.7
Copper					19	15	15	27	12	6.1	11	10	200
Iron	0.05	1.95	3.30		19,100	13,500	13,000	16,900	6310	5950	10,300	5360	7800
Lead			0.005		14	33	14	30	12	10	7.0	35	148
Nickel					22	11	13	20	11	69	12	8.0	9.5
Manganese		0.075	0.090		270	340	240	330	53	52	280	300	440
Zinc	0.07	*	*	0.012	68	96	87	120	51	36	48	64	75
Boron			0.2										
Vanadium					24	12	24	18	19	14	23	16	19
Arsenic					30	20	15	26	12	11	13	6.6	6.3
Antimony					2.8	2.5	1.8	4.0	3.1	1.2	1.6	0.7	1.6
Selenium													
Thallium					-								
Mercury								1.7					0.2
Tin													
Silver					1.2	1.1		1.1			0.6	1.2	2.0

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
Acenaphthene													
Benzidine													
1,2,4 - Trichlorobenzene												40	40
Hexachlorobenzene													
Hexachloroethane						260							
Bis(2-chloroethyl)ether													
2-Chloronaphthalene													
1,2 - Dichlorobenzene													
1,3 - Dichlorobenzene			26										
1,4 - Dichlorobenzene													
3,3 - Dichlorobenzidine													
2,4 - Dinitrotoluene													
2,6 - Dinitrotoluene													
1,2 - Diphenylhydrazine													
Fluoranthene					18	180	290		110	220	43	16	390
4 - Chlorophenyl phenyl ether													
4 - Bromophenyl phenyl ether													
Bis(2-chloroisopropyl)ether													
Bis(2-chloroethoxy)methane													
Hexachlorobutadiene													
Hexachlorocyclopentadiene													
Isophorone			1.4										
Naphthalene			7.0			100	290					25	
Nitrobenzene													
N-nitrosodimethylamine													
N-nitrosodiphenylamine													
N-nitrosodi-n-propylamine													
Bis(2-ethylhexyl) phthalate		450	62	56	2600			4	9000	2700	3800	2500	5400
Butyl benzyl phthalate						290			42				74
Di-n-butyl phthalate		1.3	1.3		510	510				230	370	1100	1200
Di-n-octyl phthalate													
Diethyl phthalate			3.2		470				81	170	170	170	160
Dimethyl phthalate													
Benzo(a)anthracene (1,2-benzanthracene)					6.9					88	36		250
Benzo(a) pyrene						110				91	42		250
3,4 Benzo fluoranthene										180	85		370
Benzo(k) fluoranthene						13							
Chrysene						13				130	61		280
Acenaphthylene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES (cont'd.)	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
Anthracene										21	8.6		75
Benzo(ghi) perylene (1,12-Benzoperylene)						7.7				74	31		210
Fluorene													
Phenanthrene						160	180		58	140	47		320
Dibenzo(a,h) anthracene (1,2,5,6-dibenzanthracene)										19			64
Indeno (1,2,3-cd) pyrene										82	35		220
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)													
Pyrene					15	190	220		85	180	46	18	330

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

ACID COMPOUNDS	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
2,4,6-Trichlorophenol													
p-Chloro-m-cresol													
2-Chlorophenol													
2,4-Dichlorophenol													
2,4-Dimethylphenol			2.1										
2-Nitrophenol													
4-Nitrophenol													
2,4-Dinitrophenol													
4,6-Dinitro-o-cresol													
Pentachlorophenol													
Phenol			4.6		1100	2200	36		210	27	550	110	1800

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

PESTICIDES	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
Aldrin													
Dieldrin													
Chlordane													
4,4'-DDT													
4,4'-DDE													
4,4'-DDD													
α-Endosulfan													
β -Endosulfan													
Endosulfan sulfate													
Endrin													
Endrin aldehyde													
Heptachlor													
Heptachlor epoxide													
α-BHC													16
β -BHC													22
σ -BHC													
Δ -BHC													
PCB-1242													
PCB-1254													
PCB-1221													
PCB-1232													
PCB-1248													
PCB-1260													
PCB-1016													
Toxaphene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

VOLATILES	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
Acrolein													
Acrylonitrile													
Benzene													
Carbon tetrachloride													
Chlorobenzene			27										
1,2-Dichloroethane													
1,1,1-Trichloroethane													
1,1-Dichloroethane													
1,1,2-Trichloroethane													
1,1,2,2-Tetrachloroethane													
Chloroethane													
2-Chloroethyl vinyl ether (mixed)													
Chloroform								0.48					
1,1-Dichloroethylene													
1,2-trans-Dichloroethylene													
1,2-Dichloropropane													
1,3-Dichloropropylene (1,3-Dichloropropene)													
Ethylbenzene			24										
Methylene chloride (Dichloromethane)	3.9							27					
Methyl chloride (Chloromethane)													
Methyl bromide (Bromomethane)													
Bromoform (Tribromomethane)													
Bromodichloromethane													
Trichlorofluoromethane													
Dichlorodifluoromethane													
Chlorodibromomethane													
Tetrachloroethene (Tetrachloroethylene)													
Toluene													
Trichloroethene (Trichloroethylene)													
Vinyl chloride													

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

SAMPLE NUMBER

INORGANICS

	Blank	25a	26a	27a	28b	29b	30b	31a	32b	33b	34b	35b	36b
Aluminum					-	-	-		-	-	-	-	-
Chromium		7.0	7.0	7.0	-	-	-	9.0	-	-	-	-	-
Barium					-	-	-		-	-	-	-	-
Beryllium		0.5	3.9	0.5	-	-	-	1.0	-	-	-	-	-
Cadmium		4.0	5.0	3.0	-	-	-	4.0	-	-	-	-	-
Cobalt					-	-	-		-	-	-	-	-
Copper		0.8	0.8	3.0	-	-	-	6.5	-	-	-	-	-
Iron					-	-	-		-	-	-	-	-
Lead		30	50	30	-	-	-	30	-	-	-	-	
Nickel		20	20	20	-	-	-	20	-	-	-	-	-
Manganese					-	-	-		-	-	-	-	-
Zinc		9.0	94	10	-	-	-	10	-	-	-	-	-
Boron					-	-	-		-	-	-	-	-
Vanadium					-	-	-		-	-	-	-	-
Arsenic		0.4	0.9	1.0	-	-	-	1.0	-	-	-	-	-
Antimony		20	20	30	-	-	-	20	-	-	-	-	-
Selenium		0.4	6	1.2	-	-	-	2.5	-	-	-	-	-
Thallium		0.4	0.4	0.4	-	-	-	2	-	-	-	-	-
Mercury		0.2	0.2	0.2	-	-	-	0.2	-	-	-	-	-
Tin					-	-	-		-	-	-	-	-
Silver		3.0	3.0	3.0	-	-	-	3.0	-	-	-	-	-

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES	37a												
Acenaphthene													
Benzidine													
1,2,4 - Trichlorobenzene													
Hexachlorobenzene													
Hexachloroethane													
Bis(2-chloroethyl)ether													
2-Chloronaphthalene													
1,2 - Dichlorobenzene													
1,3 - Dichlorobenzene													
1,4 - Dichlorobenzene													
3,3 - Dichlorobenzidine													
2,4 - Dinitrotoluene													
2,6 - Dinitrotoluene													
1,2 - Diphenylhydrazine													
Fluoranthene													
4 - Chlorophenyl phenyl ether													
4 - Bromophenyl phenyl ether													
Bis(2-chloroisopropyl)ether													
Bis(2-chloroethoxy)methane													
Hexachlorobutadiene													
Hexachlorocyclopentadiene													
Isophorone													
Naphthalene													
Nitrobenzene													
N-nitrosodimethylamine													
N-nitrosodiphenylamine													
N-nitrosodi-n-propylamine													
Bis(2-ethylhexyl) phthalate	95												
Butyl benzyl phthalate													
Di-n-butyl phthalate													
Di-n-octyl phthalate													
Diethyl phthalate													
Dimethyl phthalate													
Benzo(a)anthracene (1,2-benzanthracene)													
Benzo(a) pyrene													
3,4 Benzo fluoranthene													
Benzo(k) fluoranthene													
Chrysene													
Acenaphthylene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES (cont'd.)	37a												
Anthracene													
Benzo(ghi) perylene (1,12-Benzoperylene)													
Fluorene													
Phenanthrene													
Dibenzo(a,h) anthracene (1,2,5,6-dibenzanthracene)													
Indeno (1,2,3-cd) pyrene													
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)													
Pyrene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

SAMPLE NUMBER

'ORGANICS

ACID COMPOUNDS	37a												
2,4,6-Trichlorophenol													
p-Chloro-m-cresol													
2-Chlorophenol													
2,4-Dichlorophenol													
2,4-Dimethylphenol													
2-Nitrophenol													
4-Nitrophenol													
2,4-Dinitrophenol													
4,6-Dinitro-o-cresol													
Pentachlorophenol													
Phenol													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

PESTICIDES	37a												
Aldrin													
Dieldrin													
Chlordane													
4,4'-DDT													
4,4'-DDE													
4,4'-DDD													
α-Endosulfan													
β -Endosulfan													
Endosulfan sulfate													
Endrin													
Endrin aldehyde													
Heptachlor													
Heptachlor epoxide													
α-BHC													
β -BHC													
σ -BHC													
Δ -BHC													
PCB-1242													
PCB-1254													
PCB-1221													
PCB-1232													
PCB-1248													
PCB-1260													
PCB-1016													
Toxaphene													

NOTES: Blank spaces indicate that the chemical was not detected

a - Concentrations in ug/l
b - Concentrations in ug/kg
c - Concentrations in mg/l
d - Concentrations in mg/kg
* - Analysis did not pass QA/QC requirements
(-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

VOLATILES	37a												
Acrolein													
Acrylonitrile													
Benzene													
Carbon tetrachloride													
Chlorobenzene													
1,2-Dichloroethane													
1,1,1-Trichloroethane													
1,1-Dichloroethane													
1,1,2-Trichloroethane													
1,1,2,2-Tetrachloroethane													
Chloroethane													
2-Chloroethyl vinyl ether (mixed)													
Chloroform													
1,1-Dichloroethylene													
1,2-trans-Dichloroethylene													
1,2-Dichloropropane													
1,3-Dichloropropylene (1,3-Dichloropropene)													
Ethylbenzene													
Methylene chloride (Dichloromethane)													
Methyl chloride (Chloromethane)													
Methyl bromide (Bromomethane)													
Bromoform (Tribromomethane)													
Bromodichloromethane													
Trichlorofluoromethane													
Dichlorodifluoromethane													
Chlorodibromomethane													
Tetrachloroethene (Tetrachloroethylene)													
Toluene													
Trichloroethene (Trichloroethylene)													
Vinyl chloride													

NOTES: Blank spaces indicate that the chemical was not detected

- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

INORGANICS

SAMPLE NUMBER

	17a												
Aluminum													
Chromium	8.0												
Barium													
Beryllium	0.9												
Cadmium	30												
Cobalt													
Copper	0.8												
Iron													
Lead	30												
Nickel	20												
Manganese													
Zinc	9.0												
Boron													
Vanadium													
Arsenic	10												
Antimony	20												
Selenium	0.7												
Thallium	2.3												
Mercury	0.2												
Tin													
Silver	4.0												

NOTES: Blank spaces indicate that the chemical was not detected

a - Concentrations in ug/l
b - Concentrations in ug/kg
c - Concentrations in mg/l
d - Concentrations in mg/kg
* - Analysis did not pass QA/QC requirements
(-) - Analysis was not performed

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TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES	38[a]	39[b]	40[b]	41[b]	42[a]	43[b]	44[b]
Acenaphthene		11		8.2		17	
Benzidine							
1,2,4 - Trichlorobenzene				7.3		47	
Hexachlorobenzene				39			
Hexachloroethane							
Bis(2-chloroethyl)ether							
2-Chloronaphthalene							
1,2 - Dichlorobenzene				39		30	
1,3 - Dichlorobenzene			54	59		41	
1,4 - Dichlorobenzene			54	59		41	
3,3 - Dichlorobenzidine							
2,4 - Dinitrotoluene							
2,6 - Dinitrotoluene							
1,2 - Diphenylhydrazine							
Fluoranthene		2500	34	130		190	19
4 - Chlorophenyl phenyl ether							
4 - Bromophenyl phenyl ether							
Bis(2-chloroisopropyl)ether							
Bis(2-chloroethoxy)methane							
Hexachlorobutadiene							
Hexachlorocyclopentadiene							
Isophorone							
Naphthalene		76	17	50		160	
Nitrobenzene							
N-nitrosodimethylamine							
N-nitrosodiphenylamine							
N-nitrosodi-n-propylamine							
Bis(2-ethylhexyl) phthalate	330	6900	2500	4100	14	2300	4400
Butyl benzyl phthalate	0.76	220		330		28	
Di-n-butyl phthalate	9.0	400	350	350	5.2	470	380
Di-n-octyl phthalate	10	170					
Diethyl phthalate	1.7	120	89	110		180	100
Dimethyl phthalate							
Benzo(a)anthracene (1,2-benzanthracene)		3200					
Benzo(a) pyrene		2300		180		210	
3,4 Benzo fluoranthene		2200		160		180	
Benzo(k) fluoranthene		2200		160		180	
Chrysene		3200					
Acenaphthylene		130					

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

BASE NEUTRAL EXTRACTABLES (cont'd.)	38[a]	39[b]	40[b]	41[b]	42[a]	43[b]	44[b]						
Anthracene		2000	40	140		260	21						
Behzo(ghi) perylene (1,12-Benzoperylene)		7605											
Fluorene		93		12		33							
Phenanthrene		2000	40	140		260	21						
Dibenzo(a,h) anthracene (1,2,5,6-dibenzanthracene)													
Indeno (1,2,3-cd) pyrene		820											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)													
Pyrene		2000	26	110		140	14						

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

ACID COMPOUNDS	38[a]	39[b]	40[b]	41[b]	42[a]	43[b]	44[b]
2,4,6-Trichlorophenol							
p-Chloro-m-cresol							
2-Chlorophenol							
2,4-Dichlorophenol							
2,4-Dimethylphenol				99			
2-Nitrophenol							
4-Nitrophenol							
2,4-Dinitrophenol							
4,6-Dinitro-o-cresol							
Pentachlorophenol							
Phenol		89	390	1900		420	200

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS — SAMPLE NUMBER

PESTICIDES	38[a]	39[b]	40[b]	41[b]	42[a]	43[b]	44[b]						
Aldrin													
Dieldrin													
Chlordane													
4,4'-DDT													
4,4'-DDE		11	3.3	5.3		9.1							
4,4'-DDD													
α-Endosulfan													
β -Endosulfan													
Endosulfan sulfate													
Endrin													
Endrin aldehyde													
Heptachlor													
Heptachlor epoxide													
α-BHC													
β -BHC				58									
σ -BHC													
Δ -BHC													
PCB-1242													
PCB-1254		160		180									
PCB-1221													
PCB-1232													
PCB-1248			80	320		78							
PCB-1260													
PCB-1016													
Toxaphene													

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

ORGANICS

SAMPLE NUMBER

VOLATILES	38[a]	39[b]	40[b]	41[b]	42[a]	43[b]	44[b]	Blank					
Acrolein													
Acrylonitrile													
Benzene		0.32				0.5	0.08	0.3					
Carbon tetrachloride													
Chlorobenzene		0.5	4.8										
1,2-Dichloroethane						3.8							
1,1,1-Trichloroethane						0.5							
1,1-Dichloroethane													
1,1,2-Trichloroethane													
1,1,2,2-Tetrachloroethane													
Chloroethane													
2-Chloroethyl vinyl ether (mixed)													
Chloroform		0.15	0.7			3.8	2.7						
1,1-Dichloroethylene													
1,2-trans-Dichloroethylene	37	12											
1,2-Dichloropropane			0.8										
1,3-Dichloropropylene (1,3-Dichloropropene)													
Ethylbenzene		0.4	3.0	0.5		0.7	0.4						
Methylene chloride (Dichloromethane)	2	1.5	24	16	1	4.1	31						
Methyl chloride (Chloromethane)													
Methyl bromide (Bromomethane)													
Bromoform (Tribromomethane)													
Bromodichloromethane													
Trichlorofluoromethane				1.2				2					
Dichlorodifluoromethane													
Chlorodibromomethane													
Tetrachloroethene (Tetrachloroethylene)	56	19											
Toluene		0.5		0.4		3.7	0.3						
Trichloroethene (Trichloroethylene)	8	5.2	0.4	0.7		1.4	0.3						
Vinyl chloride	2												

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

TABLE 4 (cont'd)

INORGANICS — SAMPLE NUMBER

	38[a]	39[d]	40[d]	41[d]	42[a]	43[d]	44[d]
Aluminum					-		
Chromium			5.7	13	19	23	10
Barium							
Beryllium			6.9	16	12	11	7.2
Cadmium					3.8		
Cobalt							
Copper	3.6		45	18	61	34	12
Iron							
Lead			38	46	84	63	4
Nickel			6		20	45	11
Manganese							
Zinc	30		120	78	1500	190	62
Boron							
Vanadium							
Arsenic	20	30	6.5	7.8	5.9	7.4	3.7
Antimony				4	3	4	2
Selenium			0.06	0.2			0.02
Thallium							
Mercury	0.63	1.58	-		14.2	1.64	0.33
Tin							
Silver			0.3	0.3		0.4	0.2

NOTES: Blank spaces indicate that the chemical was not detected
- a - Concentrations in ug/l
- b - Concentrations in ug/kg
- c - Concentrations in mg/l
- d - Concentrations in mg/kg
- * - Analysis did not pass QA/QC requirements
- (-) - Analysis was not performed

CONCLUSION

Methylene chloride, acetone, and bis (2-ethylhexyl) phthalate were detected in groundwater samples. Methylene chloride could be an artifact resulting from sample bottle preparation. Acetone could also be an artifact from field decontamination of equipment. Phthalates are common plasticizers and could be artifacts present from drilling. The lack of other contaminants in the groundwater suggests that there is little downward migration of contaminants at the site.

Examination of drilling cores from Niagara County Refuse shows dense and relatively impermeable subsurface materials beneath the site. These materials include till and clay/silt. The potential for groundwater contamination at this site from downward migration of surface contaminants is very slight to non-existent.

We recommend that the groundwater be monitored on a semi-annual basis (Fall/Spring) for one year, and yearly for two years to determine if there is groundwater contamination at this site.

Results of samples collected during 1983 showed few organic priority pollutants on site. However, sample results from 1980 and 1981 showed a number of surface contaminants including: PAHs, phthalates and pesticides. Since many of the PAH's are potential carcinogens, we recommend that additional surface water, sediment and soil samples be taken to resolve this discrepancy in contaminants and detail surface contamination at the site.

RECEIVED JUN 26 1986

Appendix 1.5-1
p. 1 of 2

United States Department of Agriculture

Soil Conservation Service, 4487 Lake Avenue, Lockport, NY 14094

June 24, 1986

EA Science and Technology
Mr. Thomas Porter
Box 91, RD #2
Goshen Turnpike
Middletown, NY 10940

Dear Mr. Porter:

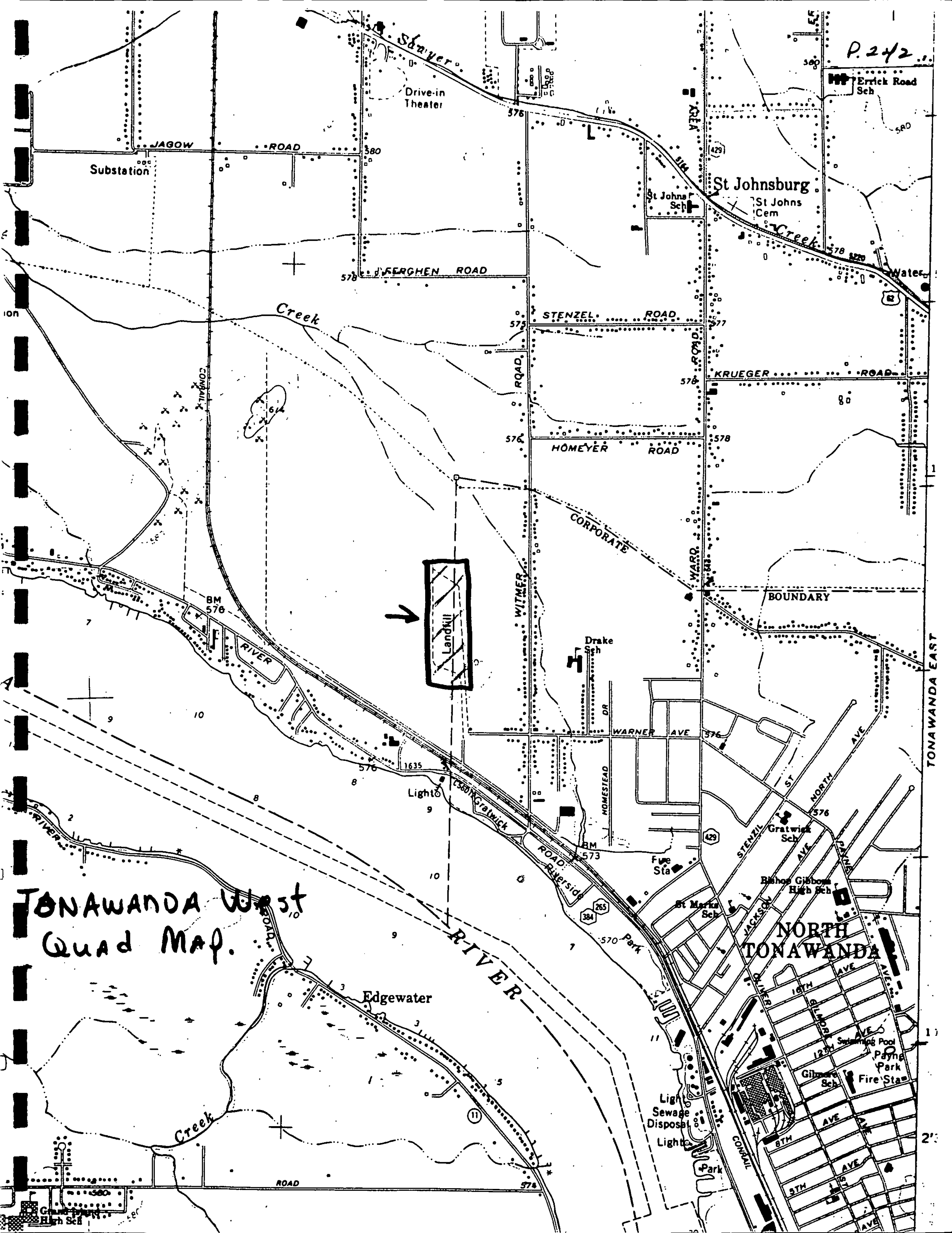
As follow up to our telephone conversation regarding irrigation from ground and/or surface water resources within three (3) miles of the landfill site identified on the occumpanying map. I have shown the map to the County Executive Directors of the Agricultrual Stabilization and Conservation Service of both Niagara and Erie Counties and we have determined that there is no agricultural irrigation from ground or surface water sources within a three (3) mile radius of the site in question.

If we can be of additional assistance please contact me at the above address. I apologize for the delay in providing you with the information.

Sincerely,

Ed Oliver, District Conservationist
Lockport Field Office

EO:sb


P. 242
Sawyer Creek
Drive-in Theater
JAGOW ROAD
Substation
Errick Road Sch
St Johnsburg
St Johns Sch
St Johns Cem
FERGHEN ROAD
STENZEL ROAD
KRUEGER ROAD
Creek
CONRAIL
ROAD
HOMEYER ROAD
WITMER
CORPORATE BOUNDARY
WARD ROAD
Landfill
Drake Sch
BM 576
RIVER ROAD
WARNER AVE
HOMESTEAD DR
Light
Gratwick ROAD
Riverside
Park
BM 573
Fire Sta
Gratwick Sch
Bishop Gibbons High Sch
St Marks Sch
NORTH TONAWANDA
TONAWANDA EAST
RIVER
Edgewater
Creek
Light
Sewage Disposal
Park
Swimming Pool
Payne Park
Gilmore Sch
Fire Sta
Grand Island High Sch
TONAWANDA West Quad Map.

Appendix 1.5.1-2
p. 101.

New York State Department of Environmental Conservation
Wildlife Resources Center
Delmar, NY 12054

Henry G. Williams
Commissioner

RECEIVED APR 1 5 1986

April 10, 1986

Mr. Thomas Porter
EA Science and Technology
RD2 Box 91
Goshen Turnpike
Middletown, NY 10940

Dear Tom:

We have reviewed the hazardous waste sites enclosed with your letter of 21 March 1986 for potential affects on "Federally listed endangered species" and "critical habitats". There were not any Federally listed species identified in the vicinity of the sites; however, several sites are in close proximity to significant habitats, including State listed endangered and threatened species. We have drawn the approximate locations of these habitats on the enclosed maps and described them on the back of each map.

In addition, these sites were reviewed by the New York Natural Heritage Program for proximity to rare plants. Information from their files is also included on the back of each map. Please treat the rare plant information as "confidential" and review the enclosed disclaimer statement. If you have any questions concerning the rare plants please contact Dr. Steve Clemants, Botanist, New York Natural Heritage Program, at this address or (518) 439-7488.

If we can be of further assistance please do not hesitate to contact us.

Sincerely,

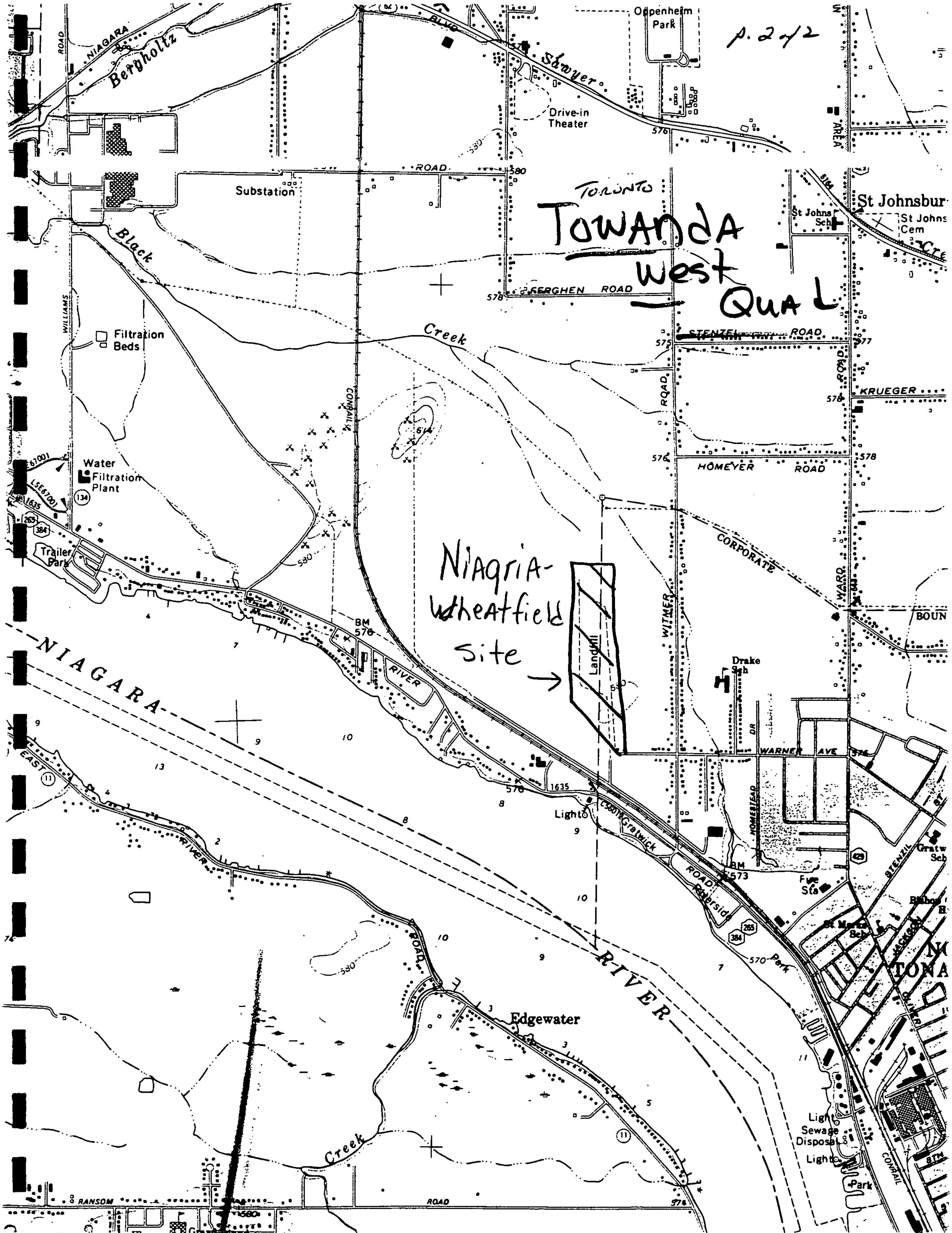
John W. Ozard

John W. Ozard
Senior Wildlife Biologist
Significant Habitat Unit

Enclosures

cc: NYNHP - S. Clemants

JWO:sjs


p. 2/2
Oppenheim Park
Sawyer
Bergholtz
Niagara
Drive-in Theater
Substation
Toronto
TOWANDA West QUAL
St Johnsbur
St Johns Sch
St Johns Cem
Black Creek
Ferghen Road
Stenzel Road
Krueger
Homeyer Road
Filtration Beds
Water Filtration Plant
Conrail
Corporate
Witmer Road
Ward Road
Trailer Park
Niagria-Wheatfield site
Landfill
Drake Sch
Warner Ave
Homestead Dr
Gratwick
Riverside
Light
Fire Sta
Park
Niagara River
East River Road
Edgewater
Creek
Ransom Road
Light
Sewage Disposal
Conrail

Appendix 1.5.1-3

EA SCIENCE AND TECHNOLOGY

A Division of EA Engineering, Science, and Technology, Inc.

COMMUNICATIONS RECORD FORM

Distribution: ( ) ____________, ( ) ____________

( ) ____________, ( ) ____________

( ) Author

Person Contacted: Jeffrey Dietz Date: 25 April 1988

Phone Number: (716) 847-4600 Title: Senior Environmental Analyst

Affiliation: Region 9 NYSDEC Type of Contact: Phone

Address: 600 Delaware Ave. Buffalo, NY 14202 Person Making Contact: Ellen Metzger

Communications Summary: Jeffrey said that the wetland adjacent to the North end of the landfill is a regulated wetland: Code No. TW4 Class 2

(see over for additional space)

Signature: Ellen B. Metzger

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1810
163/250

September 1985

COMPENDIUM OF COSTS OF REMEDIAL TECHNOLOGIES AT HAZARDOUS WASTE SITES

FINAL REPORT

HAZARDOUS WASTE ENGINEERING RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

63940

TABLE 4
SURFACE SEAL EXPENDITURES

(1982 Dollars)

DATA SOURCE	MATERIAL	THICKNESS	COVERAGE	UNIT COST
US EPA ELI/JRB 1981 Maryland	clay	6 inches	data not available	$15.84
US EPA ELI/JRB 1981	gravel over bentonite-soil	6 inches 4-6 inches	17,333 sq.yd.	$10.98
California	asphalt	data not available	15,000 sq.yd.	$11.18
US EPA ELI/JRB 1980 Arkansas	clay	1 foot	11,111 sq.yd.	$10.09

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2870

Appendix 1.6-1.
38/10

Surface-Water Control
Surface Sealing

The Radian estimates given Table 6 are based on using the following list of cost components to construct a surficial seal, the same specifications were established in the JRB-RAM scenario.

TABLE 6. SURFACE SEAL COSTS: MATERIAL VARIATIONS

Direct Capital Cost Items:	Cost
Topsoil (sandy loam), hauling, spreading, and grading (within 20 miles)	\$15/yd.^{3}
Clay hauling, spreading, and compaction	\$10/yd.^{3}
Sand hauling, spreading, and compaction	\$18/yd.^{3} (\$9-12,000/acre)
Portland concrete (4 - 6" layer), mixed, spread, compacted on-site	\$9 - 15/yd.^{2}
Bituminous concrete (4 - 6" layer), including base layer	\$4.50- 7.25/yd.^{2}
Lime or cement, mixed into 5" cover soil	\$2.15 - 3.00/yd.^{2}
Bentonite, material only; 2" layer, spread and compacted	\$1.90 yd.^{2}
Sprayed asphalt membrane (1/4" layer and soil cover), installed	\$2.00 - 3.40/yd.^{2}
PVC membrane (20 mil), installed	\$1.75 - 2.70/yd.^{2}
Chlorinated PE membrans (20-30 mil), installed	\$3.25 - 4.30/yd.^{2}
Elasticized polyolefin membrane, installed	\$3.10 - 4.15/yd.^{2}
Hypalon membrane, (30 mil), installed	\$7.40/yd.^{2}
Neoprene membrane, installed	\$7.25/yd.^{2}
Ethylene propylene rubber membrane, installed	\$3.60 - 4.70/yd.^{2}
Butyl rubber membrane, installed	\$3.60 - 5.10/yd.^{2}
Teflon-coated fiberglass (TFE) membrane (10 mil), installed	\$23/yd.^{2}
Fly ash and/or sludge, spreading, grading, and rolling	\$1.50 - 2.50/yd.^{2}

TABLE 8
DIVERSION DITCH COST ESTIMATES

(1982 Dollars)

DATA SOURCE	LINING	DEPTH	TOTAL COST	UNIT COST
US EPA Radian 1982	none	6 feet	$9,060	$6.04/LF
US EPA SCS (1) "Landfill" 1980	none	6.5 feet	$13,393 - $15,741	$4.39-5.16/LF
US EPA ORD-MERL 1979 New Jersey	gravel and stone filled	1 foot	$8,763	$1.27-2.54/LF

(1) Includes overhead (25%) and contingency allowance (15%).

Appendix 1.6-1

Appendix 1.6-1
58/10

2.4 REVEGETATION

2.4.1 Definition

Re-establishing a vegetative cover may stabilize the surface of hazardous waste disposal sites, especially when preceded by surface sealing and grading. Revegetation decreases wind and water erosion, and contributes to the development of a naturally fertile and stable surface, and reduces infiltration by enhancing evapotranspiration (i.e., increased loss of soil moisture). It also can be used to aesthetically upgrade the appearance of disposal sites that are being considered for re-use. Short-term vegetative stabilization (i.e., on a semiannual or seasonal basis) also can be used during ongoing remedial actions.

2.4.2 Units of Measurement

Costs are given in dollars per acre because revegetation is usually given in terms of acres.

2.4.3 Summary Statistics

2.4.3.1 Expenditures

No actual expenditure data are available at this time.

2.4.3.2 Estimates

The revegetation cost estimates ranged from:

Capital:	$1,214/acre	(1.76 acre site)
	to	
	$8,000/acre	(20 acre site)

TABLE 25
SUBSURFACE DRAIN COST ESTIMATES

(1982 Dollars)

Data Source	Length x trench (filter) depth	Width	Sump depth, etc.	Operation and maintenance	Unit Cost
US EPA SCS "Impoundment" 1980	197 feet x 16(4) feet (1)	3.3 feet	sump depth not given cement pipe in drain	$10,337-$11,293/year 50 gpm .	$113 - 218/LF (2)
US EPA SCS "Landfill" 1980	835 feet x 20(13) feet (1)	3.3 feet	depth not given 4 inch cement pipe in drain	$10,337-$11,293/year 50 gpm.	$26 - 38/LF
US EPA Radian 1982	1,000 feet x 20(10) feet (1)	4 feet	sump depth not given perforated pvc in drain	$70.88/Mgd 50 gpm	$28/LF
US EPA JRB-RAM 1980	3,300 feet (3) x 20(2) feet (1)	4 feet	4 manholes; 2 wet wells; 15 lateral drains (20' each)	not given 2 x 25 gpm	$15/LF

(1) Trench (filter) depth shows excavated volume vs of gravel installed,

(2) Includes geotechnical investigation (50%)

(3) Includes laterals

-85-

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8/10

TABLE 25

SUBSURFACE DRAIN COST ESTIMATES

(1982 Dollars)

Data Source	Length x trench (filter) depth	Width	Sump depth, etc.	Operation and maintenance	Unit Cost
US EPA SCS "Impoundment" 1980	197 feet x 16(4) feet (1)	3.3 feet	sump depth not given cement pipe in drain	$10,337- $11,293/year 50 gpm .	$113 - 218/LF (2)
US EPA SCS "Landfill" 1980	835 feet x 20(13) feet (1)	3.3 feet	depth not given 4 inch cement pipe in drain	$10,337- $11,293/year 50 gpm.	$26 - 38/LF
US EPA Radian 1982	1,000 feet x 20(10) feet (1)	4 feet	sump depth not given perforated pvc in drain	$70.88/ Mgd 50 gpm	$28/LF
US EPA JRB-RAM 1980	3,300 feet (3) x 20(2) feet (1)	4 feet	4 manholes; 2 wet wells; 15 lateral drains (20' each)	not given 2 x 25 gpm	$15/LF

(1) Trench (filter) depth shows excavated volume vs of gravel installed, respectively

(2) Includes geotechnical investigation (50%)

(3) Includes laterals

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TABLE 33

CARBON TREATMENT COST ESTIMATES

(1982 Dollars)

Data Source	Design	Capacity	Operation & Maintenance	Capital
US EPA Radian 1983	30 min. contact time; 1 lb per 5,000 gal; off-site regeneration	0.14 Mgd (100 gpm) 1.4 Mgd (1,000 gpm)	\$357,000/Mgd \$250,000/Mgd	\$143,000/Mgd \$643,000/Mgd
US EPA/NJDEP CDM Feasibility Study (F.S) 1983 New Jersey	SO_2 for Fe ppt. air stripping neutralization (3) 1 lb per 1,000 gall.	2 Mgd (1,389 gpm) 7 Mgd (4861 gpm)	\$1.5 million/ Mgd \$1.3 million/ Mgd	\$473,500/Mgd \$471,429/Mgd (4) \$138,000/Mgd (5)
US EPA CH_2 M Hill (vendor quote for F.S.) 1983 Illinois	sand filters carbon tanks rented system	0.28 Mgd (200 gpm) 2.16 Mgd (1,500 gpm)	\$11,786/Mgd (2) \$222,000/Mgd	\$346,429/Mgd (1) \$476,852/Mgd
US EPA SCS 1981 (mid 1978 dollars)	pressurized pretreated in situ regeneration	7.2 Mgd (5,000 gpm)	\$883,200	\$234,600

(1) Includes set-up and breakdown of all major equipment, piping, controls, utility, erection, transportation, carbon and sand. No purchase.

(2) System rental

(3) All costs included

(4) First 5 years

(5) After 5 years.

Appendix 1.6-1

TABLE 41

EXCAVATION EXPENDITURES (continued)

(1982 Dollars)

Data Source	Material	Quantity	Contaminant	Excavation Depth	Excavation Removal	Trans. (Distance)	Disposal Treatment (1	Total
US EPA OERR 1982 Florida	liquid; 5 gal. pails	18.7 cuyd; 757 pails	Ca oxide chlorinated lime	surface	$460/cuyd	$0.17/cuyd/mi. (2 trucks) $68/cuyd (4)	$356/cuyd	$18,155 (2,4) $884/cuyd
US EPA ELI/JRB 1981 Calif.	bottles, pellets	430 cuyd	pesticides (DBCP, etc.)	15 feet	$158/cuyd	$119/cuyd (140 miles)		$276/cuyd
US EPA ELI/JRB 1981 Mass.	soil sludge	1,052 cuyd and 151 drums (3)	chlorinated solvents	3-15 feet	$ 51/cuyd	$145/ton (513 mi.)	$90/ton	$285/ton
US EPA ELI/JRB 1981 Idaho	soil sludge	817 cuyd	pesticides solvents	13 feet	$207/cuyd (254 mi.)			$207/cuyd

(1) Landfilled unless other wise noted (3) 615 cuyd disposed; cuyd:ton ratio (4) If 400 miles assumed

TABLE 41
EXCAVATION EXPENDITURES (continued)

(1982 Dollars)

Data Source	Material	Quantity	Contaminant	Excavation Depth	Excavation /Removal	Trans. (Distance)	Disposal/ Treatment(1	Total
US EPA ELI/JRB Mass. 1981	drums soil	481 cuyd	solvents	surface	Not Available	$77/cuyd (480 miles)	$91/ton	--
US EPA ELI/JRB 1979 Missouri	soil	2,635cuyd	pentachloro-phenol	surface	$39-87/ cuyd	$29/cuyd (170 miles)	$61/ton	$110-159/cuyd
US EPA ELI/JRB 1978 Conn.	drums soil	4,770 cuyd	solvents metals	3-13 feet	$15/cuyd	$92/ton (497 mi.)	$55/ton	$164/ton
US EPA ELI/JRB 1982 NYC	oil	229 cuyd	solvents	surface	Not Available	$89/ton (818 mi.)	$17/cuyd (2)	--

(1) Landfilled unless otherwise noted (2) Incineration

Appendix 1.6-2
1 of 3

LEACHATE FROM HAZARDOUS WASTES SITES

PAUL N. CHEREMISINOFF   KENNETH A. GIGLIELLO

Appendix 1,6-2 20/3

gases must be considered in any landfill environmental impact, because methane can explode and inhibit vegetation growth, and carbon dioxide dissolves in water to form carbonic acid, becoming part of the leachate problem.

Oxygen (air) could be pumped into the deposited solid waste to create aerobic conditions as opposed to natural anaerobic decomposition processes. The end products formed during decomposition would be less harmful than by anaerobic means, but they would still be detrimental to a degree that their exit from the landfill should be prevented. Also, this method would be costly from the initial capital cost and operating costs would be prohibitive.

LINERS AND COLLECTION OF LEACHATE

Collection of leachate requires that a barrier exists between the solid wastes which produces leachate and the water that would become polluted. The barrier can be made from existing impervious soil or by installing some other construction materials. The most common barrier is made by constructing the land disposal site so that a "bathtub" is formed. The sides and bottom of the fill must be impermeable in order to contain the leachate. Also, provisions must be made to collect the leachate for subsequent treatment. The most common methods include sloping the bottom to a sump pump or installing a French drain system, an example of which is shown in Figure 5-1 [24].

The base of a landfill can be a hostile environment for liner materials. Anaerobic reducing conditions can be encountered so the durability and integrity of the liner can be questioned, especially over the long term. Even materials which are usually considered inert (i.e., clay), may react with leachate and result in a leak in the liner. Geswein [22], and Moore [49], and Cheremisinoff [48] discuss various liners, construction methods, costs and evaluate surface impoundments with regard to land disposal.

To date, clay liners have been the favored method of reducing or eliminating percolation of leachate [18]. Membrane liners also have been used, but they are expensive and require extreme precautions during installation to prevent physical damage [48].

By appropriately regulating the type of waste entering a land site, operating the site to minimize infiltration and installing an appropriate leachate liner and collection system, the production and control of leachate can be lessened to a great extent. Proper planning and site selection, combined with good engineering

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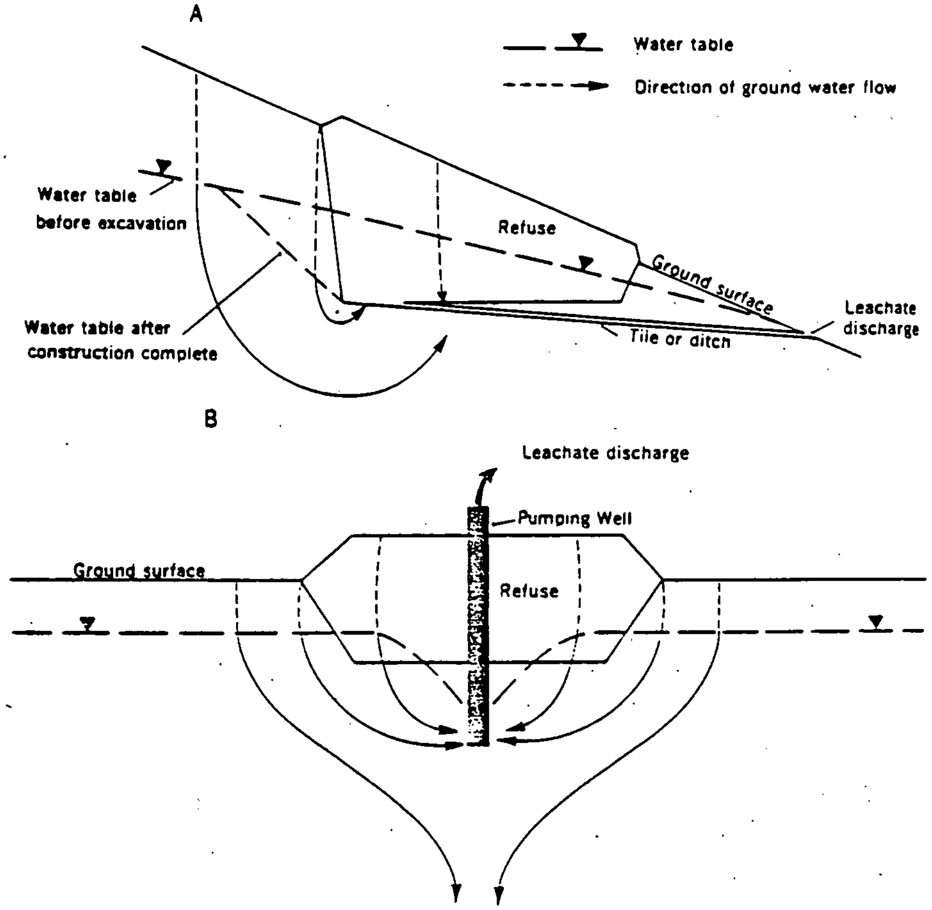


Figure 5-1. In landfills that intersect the top of the zone of saturation, leachate can be completely confined to the site by maintaining ground water gradients towards the landfill by (A-top) gravity drainage or by (B-bottom) a pumping well. Source: Hagerty, Joseph D., Solid Waste Management (1973) [24].

design and operation, can normally reduce to potential for surface and groundwater contamination [51]. The final step in the process involves treatment of the collected leachate to form an innocuous material which can be safely discharged to the environment.

LEACHATE TREATMENT

There is a large volume of information regarding leachate treatment methodologies in the literature [2,6,7,13,14,16,17,19,

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington DC 20460

Office of Research and
Development
Municipal Environmental Researc:
Laboratory
Cincinnati OH 45268

Technology Transfer

EPA

Appendix 1.6-3

1 of 3

Handbook

Remedial Action at Waste Disposal Sites

Appendix 1,6-3
2073

APPENDIX C

COST INDICES (Average Per Year)

Year	Marshall & Stevens Installed Equipment Indices 1926=100 All Industry	Engineering News-Record Construction Index 1913=100	Engineering News-Record Building Cost Index 1913=100	Chemical Engineering Plant Construction Index 1957-1959=100	EPA Sewage Treatment Plant Construction Index 1957-1959=100
1950	168	510	375	74	
1951	180	543	400	80	
1952	181	569	416	81	
1953	183	600	431	85	
1954	185	628	446	86	
1955	191	660	465	88	
1956	209	690	491	94	
1957	224	724	509	99	
1958	229	759	525	100	102
1959	235	797	548	101	104
1960	238	824	559	102	105
1961	237	847	568	101	106
1962	239	872	580	102	107
1963	239	901	594	102	109
1964	242	936	612	103	110
1965	245	971	627	104	112
1966	252	1,021	650	107	116
1967	263	1,070	672	110	119
1968	273	1,155	721	114	123
1969	285	1,269	790	119	132
1970	303	1,395	836	126	143
1971	321	1,581	948	132	160
1972	332	1,753	1,048	137	172
1973	344	1,895	1,138	144	182
1974	398	2,020	1,204	165	217
1975	444	2,212	1,306	182	250

--continued--

COST INDICES (Average Per Year) (continued)

Year	Marshall & Stevens Installed Equipment Indices 1926=100 All Industry	Engineering News-Record Construction Index 1913=100	Engineering News-Record Building Cost Index 1913=100	Chemical Engineering Plant Construction Index 1957-1959=100	EPA Sewage Treatment Plant Construction Index 1957-1959=100
1976	472	2,401	1,425	192	262
1977	505	2,577	1,545	204	.278
1978	545	2,776	1,674	219	305
1979	599	3,003	1,819	239	335
1980	660	3,159[1]	1,918[1]	261	358[2]
1981	721	3,705[1]	1,184[1]	273[1]	

[1]Based on December of year.
[2]Based on March of year.

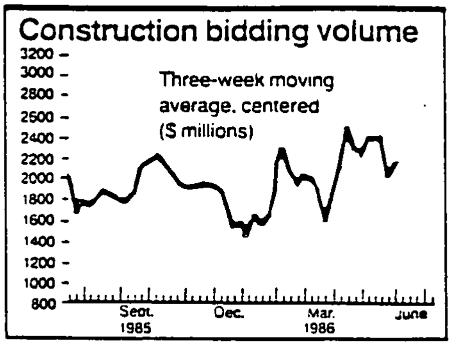
APPENDIX 2

ENR Market Trends

Appendix 1.15-4
13/1

Latest Week

COST INDEXES ENR 20-cities 1913 = 100	June 5 Index value	Change from last month %	year %
Construction Cost	4290.51	+0.7	+2.1
Building Cost	2492.67	+0.6	+2.6
Common labor (CC)	8594.74	+0.9	+2.1
Skilled labor (BC)	3863.06	+0.9	+2.7
Materials	1655.42	+0.1	+2.5



50-state totals ENR-reported	Week of June 5 ($ millions)	Cum. 24 weeks 1986 ($ millions)	change '85-'86 %
BIDDING VOLUME			
Total construction*	2,660.7	48,512.5	+ 1
Heavy & highway	935.5	19,075.4	+ 6
Nonresidential bldg	1,345.3	21,848.4	− 1
Housing, multiunit	379.9	7,588.7	− 3
NEW PLANS			
Total construction*	3,151.3	90,161.2	+ 4
Heavy & Highway, total	609.9	21,469.5	+ 14
Water use & control	335.2	10,035.3	+ 40
Waterworks	78.1	2,060.1	+ 15
Sewerage	187.4	4,939.2	+ 37
Treatment plants	36.3	2,495.1	+ 31
Earthwork, waterways	69.8	3,036.4	+ 72
Transportation	139.8	7,591.8	+ 0
Highways	84.0	3,814.1	+ 10
Bridges	18.9	945.2	+ 18
Airports	43.2	2,293.7	− 27
Terminals, hangars	15.8	1,580.6	− 12
Elec. gas, comm.	10.2	1,351.5	+ 15
Other heavy const	114.8	1,994.7	+ 8
Nonresidential bldg	1,760.6	48,499.1	+ 5
Manufacturing	84.8	2,998.0	− 19
Commercial	959.3	23,518.1	+ 3
Offices	568.3	11,876.7	− 11
Stores, shopping ctrs	308.8	7,857.9	+ 21
Educational	234.7	6,898.0	+ 32
College, university	37.8	2,295.3	+ 28
Medical	209.1	4,238.6	− 0
Hospital	96.6	2,460.9	− 9
Other	272.7	10,846.3	+ 9
Housing, multiunit*	780.8	20,192.7	− 6
Apartments	418.0	13,756.0	− 1

*Excludes 1-2 family houses. Minimum sizes included are: industrial plants, heavy and highway construction, $100,000; building, $500,000

NEW CONSTRUCTION CAPITAL

	Week of June 5 ($ millions)	Cum. 24 week 1986 ($ millions)	change '85-'86 %
Total new capital	1,081.9	44,635.8	− 181
Corporate securities	21.6	1,473.3	− 45
State and municipal	1,060.2	43,162.5	− 227
Housing	45.0	8,221.0	− 611
Other bldg and heavy	1,015.2	34,341.5	− 191

Latest Month

ENR COST INDEXES IN 22 CITIES

Based on 1913 U.S. average = 100

City	CONSTRUCTION COST June '86 Index	Percent change from last month	year	BUILDING COST June '86 index	Percent change from last month	year
Atlanta	2945.08	0	+1.5	2016.55	0	+2.1
Baltimore	3372.26	0	+2.9	2304.54	0	+2.9
Birmingham	3078.18	− 0.6	− 0.1	2059.03	− 0.9	− 0.1
Boston	4719.52	+1.3	+4.2	2698.49	0	+0.6
Chicago	4395.81	+0.5	+2.1	2531.94	+0.9	+3.1
Cincinnati	4312.24	+0.2	− 3.8	2425.85†	+0.3†	+4.1
Cleveland	5028.93	+0.8	− 4.3	2725.02	+1.5	+3.4
Dallas	3152.85	+0.5	+4.3	2108.78	+0.7	− 0.9
Denver	3454.85	+1.8	+6.7	2349.29	+2.1	+5.9
Detroit	4360.49	− 0.1	+0.3	2596.98	− 0.3	−2.5
Kansas City	4485.49	+1.2	+2.6	2453.36	0	−1.1
Los Angeles	5452.15	0	+3.6	2688.05	0	− 1.6
Minneapolis	4431.38	+1.8	−3.2	2483.33	+1.4	+3.8
New Orleans	3463.97	+0.4	+1.0	2227.39	+0.7	+2.3
New York	5409.08	+0.2	+4.7	3176.40	+1.4	+5.5
Philadelphia	4690.94	+2.7	+3.2	2647.68	+1.8	+4.1
Pittsburgh	4264.08	− 0.3	− 0.9	2571.03	− 0.6	+0.1
St. Louis	4873.81	+2.2	+5.1	2467.44	+1.8	+4.0
San Francisco	5309.31	0	+7.6	2924.21	0	+5.6
Seattle	4609.89	0	+0.9	2396.99	0	+2.7
U.S.—20-city avg.	**4290.51**	**+0.7**	**+2.1**	**2492.67†**	**+0.7†**	**+2.6†**
Montreal	4358.31	0	+1.6	2660.77	0	+2.7
Toronto	4849.53	0	+0.8	2607.16	+0.1	+1.4

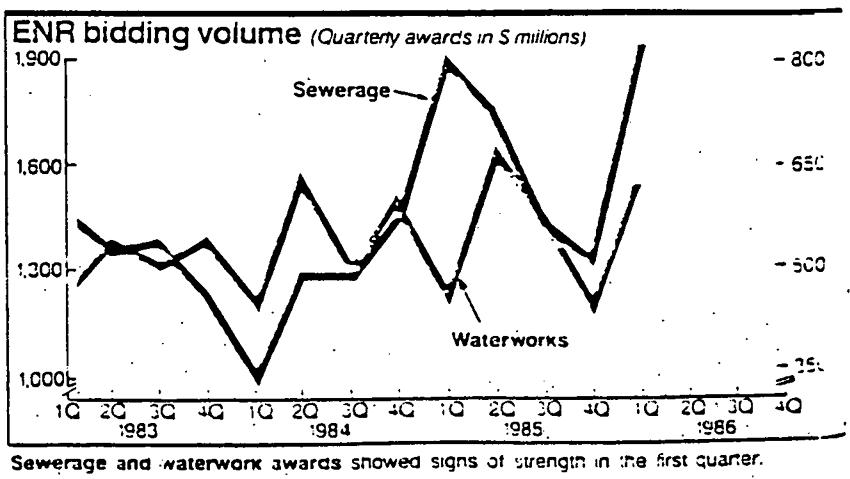
ENR WAGE, MATERIALS AND COST INDEXES 20 Cities

Based on each city's 1967 average = 100

City	COMMON LABOR June 86 Index	% chg fr June 85	SKILLED LABOR June 86 Index	% chg fr June 85	MATERIALS PRICES June 86 Index	% chg fr June 85	Const Cost Index	Bldg Cost Index
Atlanta	360.52	0	311.78	0	365.60	+4.4	361.99	336.03
Baltimore	411.11	+4.8	350.25	+6.7	372.53	− 1.0	382.29	360.46
Birmingham	382.72	0	343.12	+0.1	344.51	− 0.4	368.94	342.98
Boston	466.33	+7.2	422.44	+4.6	353.41	− 5.0	435.14	392.37
Chicago	387.13	+1.8	369.69	+3.2	306.69	−2.9	364.52	341.26
Cincinnati	415.51	− 7.3	378.05†	+0.8	365.61	+8.5	405.62	379.2†
Cleveland	426.22	− 5.1	419.15	+6.1	335.24	− 1.1	401.34	383.34
Dallas	428.29	+4.9	349.32	− 4.1	328.38	+3.1	398.98	349.09
Denver	366.36	+6.6	373.41	+4.9	349.69	+7.1	353.54	359.20
Detroit	358.17	− 0.5	377.03	+2.1	316.35	+3.0	348.11	351.31
Kansas City	471.33	+3.3	410.16	− 1.5	345.69	+0.5	433.68	378.94
Los Angeles	506.28	+4.0	437.95	− 3.1	339.17	+1.3	462.41	390.47
Minneapolis	416.67	+2.4	406.95	+2.5	338.75	+5.6	386.45	360.53
New Orleans	448.00	0	381.10	+1.3	351.68	+3.5	414.18	367.29
New York	381.79	+5.3	396.24	+7.1	402.51	+2.5	388.96	399.39
Philadelphia	488.00	+3.5	407.64	+5.3	373.37	+2.2	457.89	393.71
Pittsburgh	408.87	− 1.3	370.07	0	365.84	+0.4	383.13	349.09
St. Louis	420.13	+5.5	370.79	+4.3	349.65	+3.5	403.48	361.47
San Francisco	444.75	+6.2	433.33	+5.5	332.55	+5.8	419.46	393.02
Seattle	424.60	0	397.43	+1.6	353.77	+4.5	408.36	379.20

† = revised

Trends to Watch



Sewerage and waterwork awards showed signs of strength in the first quarter.

(47-15-11 (10/83)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SOLID AND HAZARDOUS WASTE

INACTIVE HAZARDOUS WASTE DISPOSAL SITE REPORT

PRIORITY CODE: ____________ SITE CODE: 932026

NAME OF SITE: Niagara Wheatfield REGION: 9

STREET ADDRESS: off of Witmer Road and River Road

TOWN/CITY: Town of Wheatfield COUNTY: Niagara

NAME OF CURRENT OWNER OF SITE: Town of Wheatfield

ADDRESS OF CURRENT OWNER OF SITE: 2800 Church Road in Tonawanda, N. Y., 14120

TYPE OF SITE: OPEN DUMP [ ] STRUCTURE [ ] LAGOON [ ]
LANDFILL [X] TREATMENT POND [ ]

ESTIMATED SIZE: 50 ACRES

SITE DESCRIPTION:

The Niagara Wheatfield is an inactive landfill which was operational from 1968 to 1976. The site was used by a number of industries and has received over one million tons of wastes containing phenolic resins, PVC skins and emulsions, sludge, and other various trash.

HAZARDOUS WASTE DISPOSED: CONFIRMED [X] SUSPECTED [ ]

TYPE AND QUANTITY OF HAZARDOUS WASTES DISPOSED:

TYPE	QUANTITY (POUNDS, DRUMS, TONS, GALLONS)
Phenolic resins	~~Unknown~~ Unknown
~~Brine sludges~~ Sludges	~~Unknown~~ Unknown

PAGE

TIME PERIOD SITE WAS USED FOR HAZARDOUS WASTE DISPOSAL:
________, 19 68 TO October 29, 19 76

OWNER(S) DURING PERIOD OF USE: Niagara County, R.D.

SITE OPERATOR DURING PERIOD OF USE: Same as Owner

ADDRESS OF SITE OPERATOR: unknown

ANALYTICAL DATA AVAILABLE: AIR [ ] SURFACE WATER [X] GROUNDWATER [X] SOIL [X] SEDIMENT [ ] NONE [ ] [X] Leachate

CONTRAVENTION OF STANDARDS: GROUNDWATER [ ] DRINKING WATER [ ] SURFACE WATER [ ] AIR [ ]

SOIL TYPE: ________

DEPTH TO GROUNDWATER TABLE: ________

LEGAL ACTION: TYPE: Closure STATE [X] FEDERAL [ ]
STATUS: IN PROGRESS [ ] COMPLETED [X]

REMEDIAL ACTION: PROPOSED [ ] UNDER DESIGN [ ]
IN PROGRESS [ ] COMPLETED [ ]

NATURE OF ACTION: ________

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Exposed waste and leachate discharges to adjacent wetlands.

ASSESSMENT OF HEALTH PROBLEMS:

Exposed wastes and leachate accessible by direct contact.

PERSON(S) COMPLETING THIS FORM:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION	NEW YORK STATE DEPARTMENT OF HEALTH
NAME EA Science & Technology, Inc.	NAME
TITLE	TITLE
NAME	NAME
TITLE	TITLE
DATE: 3 July 1986	DATE: