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Department of Environmental Conservation

Division of Hazardous Waste Remediation

IIWA Report

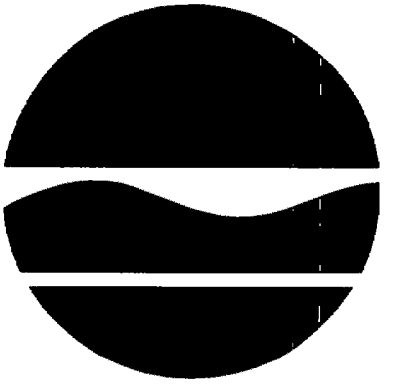
Niagara Mohawk Right of Way Site
Town of Niagara, Niagara County

February 2001

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* John P. Cahill, *Commissioner*

Immediate Investigative Work Assignment (IIWA)

Niagara Mohawk Right of Way Site Town of Niagara, Niagara County



John P. Cahill
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Executive Summary

The Preliminary Site Assessment Supplemental Final Report prepared by E&E in November 1996 for the NYSDEC on the UCAR site #932035 indicated the presence of volatile organic compounds in the bedrock groundwater upgradient of the UCAR site. The report recommended further investigation of the Niagara Mohawk ROW area to the north of the UCAR site to determine the source of the groundwater contamination.

This IIWA Investigation was implemented to evaluate the Niagara Mohawk ROW to determine the presence and location of any waste/fill areas and to determine if the Niagara Mohawk ROW is the source of the volatile organic contamination found in the UCAR well BW-4.

Utilizing the resources of the NYSDEC Division of Operations for site clearing and the Division of Real property for survey layout and topographic map preparation, staff from the NYSDEC Region 9 Division of Environmental Remediation conducted the investigation of the Niagara Mohawk ROW area. A standby push-probe contractor was used to collected soil and waste samples and a consultant with a well drilling sub-contractor was retained to install 2 overburden and bedrock monitoring wells. All samples collected were sent to a NYSDEC laboratory for analysis.

The results of this investigation determined that there is no evidence that the Niagara Mohawk ROW area is the source of the volatile organic compounds detected in the UCAR well BW-4. However, waste disposal was determined to have occurred on this area of the Niagara Mohawk ROW which has led to additional concerns. A Phase II investigation is recommended that will evaluate elevated mercury contamination in the surface soil and potential pesticide contamination in the groundwater in the area.

Section 1 - Introduction and Site History

The Niagara Mohawk Right of Way (ROW) Site is a parcel of land of approximately 8 acres located on a Niagara Mohawk power transmission Right of Way. The site is situated between two New York State Department of Environmental Conservation (NYSDEC) listed inactive hazardous waste sites, being north of the Union Carbide Corporation (UCAR) Landfill Site #932035 and south of the Vanadium Corporation of America Site #932001. Refer to Figure 1- Location Map and Figure 2 November 1999 Air Photo.

In 1995 a Preliminary Site Assessment (E&E April 1995) was completed for the UCAR site. This investigation was followed up by a Supplemental Assessment in 1996. These investigations determined that the groundwater under the UCAR site is contaminated with chlorinated hydrocarbons. The assessments also indicated that the source of this groundwater contamination may originate off of the UCAR site, most likely in the adjacent Niagara Mohawk ROW. Information provided by UCAR during the assessments alleges that during the 1960's the Town of Niagara dumped incinerator ash on the Niagara Mohawk ROW.

Elevated levels of chromium in soil/waste and high pH groundwater may also exist in the ROW due to the site's proximity to the Vanadium site.

Section 2 -Immediate Investigative Work Assignment

The objectives of this IIWA project are:

- determine if waste materials are present in the Niagara Mohawk ROW site, and if present determine the areal extent of the waste; and

- determine if the Niagara Mohawk ROW Site is the source of the groundwater contamination found on the adjacent UCAR site.

This project was conducted in two phases, reflecting contracting options available to NYSDEC.

The first phase consisted of the installation of two bedrock and overburden groundwater monitoring well pairs (MW106 A&B, MW107 A&B). The wells are located within the site and were used in conjunction with existing area wells bordering or close to the site. An IIWA contract requiring the hiring of a consultant contractor to subcontract a well drilling company was utilized. Further information on the well installation and sapling data can be found in Section 4.

The second phase included an on-site soil/waste investigation, site survey/mapping, soil/waste sampling and laboratory analysis. The soil/waste investigation was conducted utilizing a push-probe contractor under direct contract and supervision of the NYSDEC. Site surveying/mapping and sample collection was performed by NYSDEC staff, with laboratory analyses conducted by NYSDEC contract laboratory. Additional information on the soil/waste data can be found in Section 3.

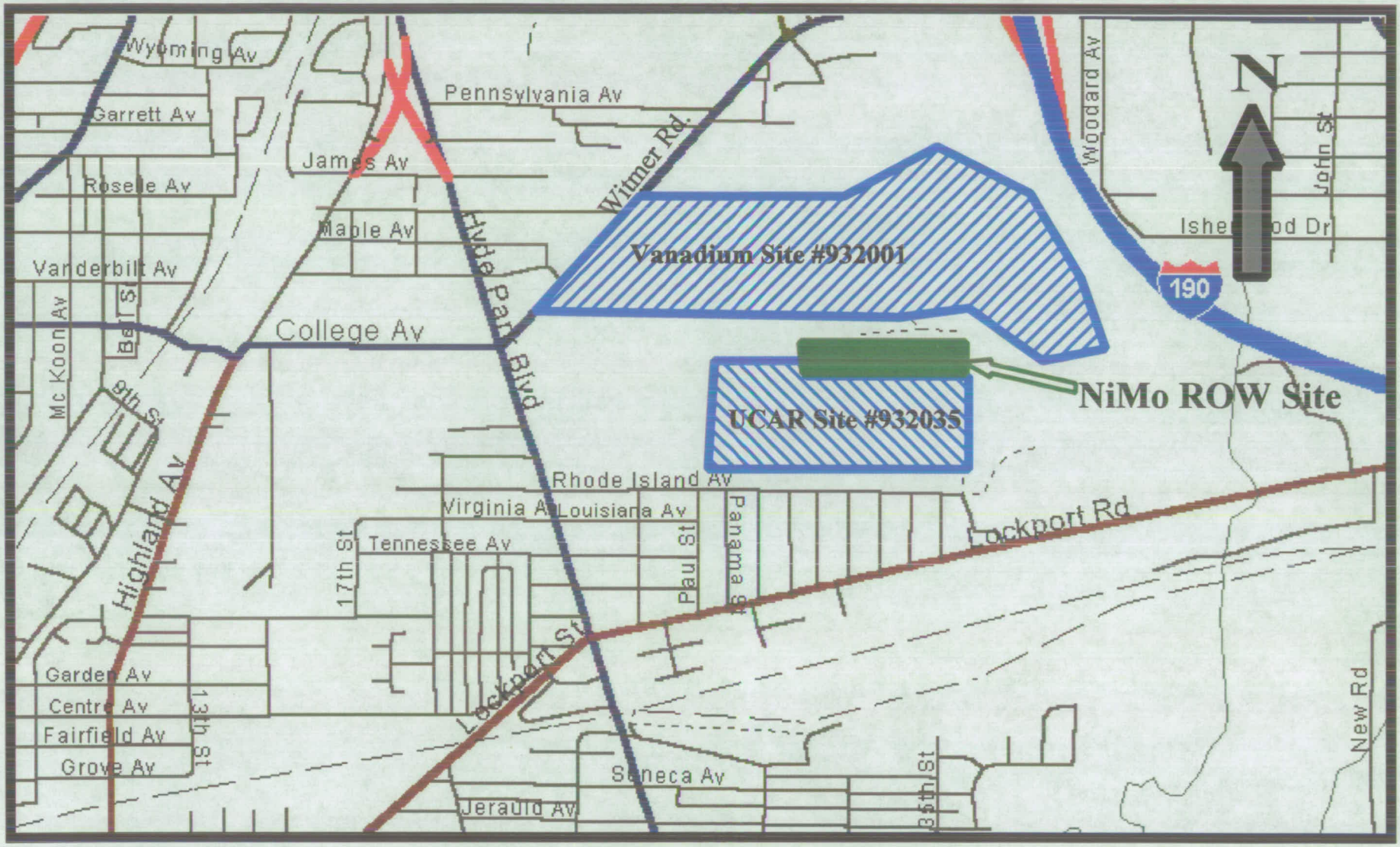


Figure 1 - Location Map (NTS)

Figure 2 - November 1999 Air Photo

Section 3 - Soil and Waste Sampling Results

The following sub-sections present the results of sampling and analysis of surface soils, waste and sub-soils in the Niagara Mohawk ROW site. In evaluating these results, data was compared to soil clean-up guidance contained in NYSDEC Technical and Guidance Memo (TAGM) #4046. In addition, select waste samples were evaluated pursuant to 6NYCRR Part 371 to determine if hazardous waste was present.

To evaluate the extent and significance of waste and/or fill material deposited in the Niagara Mohawk right of way, the site was first cleared by the NYSDEC Region 9 Division of Operations personnel to allow the establishment of a survey grid by the NYSDEC Region 9 Real Property Division surveyors, (refer Figure 3 Push Probe Locations and Appendix E Site Topographic Map). A 300 foot wide by 1300 foot long grid was established on the site to guide and locate the push-probe soil boring locations and to prepare the Site Topographic Map, (Appendix E). The grid layout covered the area evaluated during the E&E Supplemental PSA investigation (Appendix C) that included soil sampling and a soil gas survey in the Niagara Mohawk ROW area. The soil gas survey indicated the presence of volatile organic compounds in the soil on the Niagara Mohawk ROW site.

Zebra Environmental was retained by the NYSDEC to collect soil samples from each grid point to determine the presence and significance of any waste and/or fill on the site. A total of 43 soil borings were performed and samples of surface soil, waste/fill and sub-soil were collected at selected locations (refer Table 1). The logs for the push-probe borings are found in Appendix A. A total of 16 soil and waste/fill samples were collected and analyzed for volatile organic contaminants (VOCs), semi-volatile organic contaminants (SVOCs) and inorganic contaminants In addition 4 or the waste/fill samples collected were analyzed for hazardous waste constituents (toxicity, ignitability, reactivity and corrosivity).

Surface Soil

Generally 2" to 6" of topsoil was encountered throughout the site. Eight samples of the surface soil were collected during this investigation. Four of these samples (A-2, A-5, B-4A and C-12) were collected in areas outside of identified fill areas. The remaining samples (B-1, C-0, C-5 and Mound 1) were collected from soil in areas where waste/fill was found.

Levels of semi-volatile compounds (refer Table 3) above TAGM 4046 guidance were detected in all surface soil samples with the most significant contamination noted in waste/fill areas. The compounds detected are known as Polycyclic aromatic hydrocarbons (PAHs) and are found in products such as fuel oil, motor oils and other petroleum based products, and can result from the use of internal combustion engines and fires. Total PAHs detected ranged from 3916 ug/kg (B-4A) to 1,012,830 ug/kg (C-0). Air deposition from industrial activity, ROW maintenance activities and the frequent use of the site by recreational vehicles are possible sources of these compounds, however, the most significant levels of PAHs are associated the disposal activity that has occurred on site.

Elevated levels of inorganic compounds (refer Table 4) were also detected in the surface soil samples collected in the waste/fill areas, with chromium detected in all four surface samples (B-1, C-0, C-5 and Mound 1) at concentrations ranging from 38.7 to 65.4 mg/kg. The NYSDEC TAGM 4046 cleanup guidance sets 10 mg/kg or site background for chromium. No attempt was made during this investigation to establish chromium background levels. However, the IIWA Investigation conducted on the Niagara Mohawk and Power Authority portions of the Vanadium Corp of America site #932001 in 1996 found surface soil concentrations ranging from 42 mg/kg to 11,800 mg/kg. In addition, TAGM 4046 establishes expected background in New York State for Chromium to range from 1.5 to 40 mg/kg. An elevated mercury concentration was detected in surface soil at location B-1 at a level of 11.8 mg/kg. This is a significant exceedence of the TAGM 4046 cleanup guidance of 0.1 mg/kg. Additional sampling to verify the presence of mercury contamination and to perform TCLP analysis should be considered. In addition, the sampling plan did not include inorganic sampling in the surface soil (A-5, A-2, B-4A and C-12) collected from non waste/fill areas. Additional inorganic samples from these areas should be

considered to fill an apparent data gap. Other inorganic compounds (refer Table 6) were detected in the surface soil during this investigation but are not considered significant.

Waste

Waste/fill material was found in the south western corner of the site (refer Figure 4). An ash type material was found at location B-0, B-1, B-2, B-3, C-5 and C-6. The Union Carbide Corporation alleges that the Town of Niagara dumped ash on this site from the Town's incinerator with the permission of the Niagara Mohawk Power Corporation. (Preliminary Site Assessment Volume 1, April 1995, Ecology and Environment Engineering P.C.). The ash type material found is consistent with the anecdotal evidence that municipal incinerator ash was disposed on the Niagara Mohawk ROW.

The waste/fill that was identified in borings B-0, B-1, B-2, B-3, C-0, C-1, C-2, C-3, C-4, C-5, C-6 and C-7 is predominately a black carbonaceous material and slag that appears to be consistent with material disposed at the UCAR landfill located immediately to the south of the site.

Two isolated mounds were investigated as part of this investigation. Mound 1, known prior to the start of the investigation, is approximately 140 feet long, 20 feet wide and 3 feet high and is located between grid points C-7 and C-8. Borings were advanced through Mound 1 at each end and middle to assess the character of the material in the mound. The borings revealed no visual indication of waste or other fill type materials. The material in Mound 1 appears to be topsoil pushed up into a ridge during past site activities. A second mound, Mound 2, was found during the investigation and is located at boring B-4A, which is 70 feet east of grid point B-4 and 2 feet south of the "B" grid line. Mound 2 is approximately 10 feet in diameter and about 1 foot high. A boring through Mound 2 indicated that it was apparently also a topsoil pile left over from past site activity.

Trace levels of trichloroethene at 7J ug/kg and tetrachloroethene at 3J ug/kg was found in the Mound 1 soil (refer Table 2). Neither of these contaminants exceeded the TAGM 4046 cleanup

guidelines. Several semi-volatile compounds (refer Table 3)were detected in Mound 1 soil above the TAGM 4046 cleanup criteria. In addition, inorganic compounds (refer Table 4), chromium at 59.4 mg/l and mercury at 0.36 mg/l were detected above the cleanup criteria as indicated in TAGM 4046 (10 or SB and 0.1 ug/l respectively). TAGM 4046 establishes expected background in New York State for Chromium to range from 1.5 to 40 mg/l. Finally, Mound 1 soil did not exhibit any characteristics of hazardous waste (refer Table 5) as defined in 6NYCRR Part 371, toxicity, ignitability, reactivity or corrosivity. Based on the results of this investigation of Mound 1, it is unlikely that the contaminant levels found in Mound 1 would cause the TCE groundwater contamination found in the UCAR well BW-4.

Slightly elevated levels of semi-volatile compounds were detected in the soil in Mound 2 (refer Table 5). Benzo(a)anthracene at an estimated concentration of 320 ug/kg, benzo(a)pyrene at 410 ug/kg and dibenzo(a,h)anthracene at an estimated concentration of 47 ug/kg were detected in the soils found in Mound 2 above TAGM 4046 guidance. These levels are not considered significant and do not warrant further action.

The ash found at grid location B-1/B-2 was analyzed as a composite sample. No volatile organic compounds (refer Table 2) were detected in the ash and semi-volatile compounds (refer Table 3) slightly above TAGM 4046 guidelines were detected. Inorganic compounds (refer Table 4), arsenic, barium, cadmium, chromium, lead and mercury were found above the TAGM 4046 guidelines and expected NYS background levels. Mercury was detected in the ash at 16.8 mg/l which is significantly above the cleanup guidance of 0.1 mg/l. Finally, the ash in B-1/B-2 did not exhibit any characteristics of hazardous waste (refer Table 5) as defined in 6NYCRR Part 371, toxicity, ignitability, reactivity or corrosivity. The elevated levels of mercury found in B-1/B-2 may require additional investigation, although the ash did not fail TCLP analysis for mercury.

The black carbonaceous waste found in C-0 through C-7 appears to be spill over from the adjacent UCAR landfill immediately to the south. Black carbon like material was found in the probe cores as well as off spec carbon products observed on the surface. Trace levels of toluene,

ethylbenzene and total xylenes were found in boring C-0. These trace levels were far below the TAGM 4046 guidelines for these compounds. Several semi-volatile compounds were detected in boring C-0 and C-5 that are significantly above the cleanup guidelines. Chromium and mercury contaminants were found in boring C-0 while arsenic, barium, cadmium and chromium were detected in boring C-5 above the soil cleanup guidance. The inorganic contaminants found in C-5 can be attributed to the suspected ash found in the boring. Waste from boring C-5 did not exhibit any characteristics of hazardous waste as defined in 6NYCRR Part 371. However, waste from boring C-0 failed the toxicity test for endrin. The TCLP result for endrin was 0.038 mg/l which exceeds the toxicity value of 0.02 mg/l for endrin. This TCLP failure alone does not indicate that consequential amounts of hazardous waste was disposed on this site. However, it is recommended that groundwater monitoring wells in the vicinity be sampled for the presence of pesticides to further evaluate the significance of the endrin detection. No other hazardous waste characteristics levels were exceeded for the waste in boring C-0.

Sub-soil

Native soil from below the waste was sampled to determine the effect waste disposal has had on the underlying native soils. Samples were collected from borings B-1, B-2, C-5 and a composite of Mound 1. Due to push-probe refusal in boring C-0, a sub-soil sample could not be collected. Trace level of trichloroethene (refer Table 2) at 3J ug/kg was detected in the Mound 1 sub-soil which is below the soil cleanup criteria. Slightly elevated level of phenol at 47J ug/kg (refer Table 3) was detected in boring C-5. The soil cleanup criteria for phenol is 30 ug/kg. Chromium was detected (refer Table 4) in all sub-soil samples ranging from 20.1 mg/kg to 37.5 mg/kg which exceed the soil cleanup criteria of 10 mg/kg or site background. Again, TAGM 4046 establishes expected background in New York State for chromium to range from 1.5 to 40 mg/kg. Elevated mercury was detected in the sub-soil from Mound 1 at a concentration of 0.14 mg/kg which is slightly above the soil cleanup guidance value of 0.1 mg/kg.

The soil sampling performed as part of this IIWA investigation of the Niagara Mohawk ROW site does not confirm the presence of significant levels of volatile organic compounds that the E&E Supplemental PSA report suggests.

Figure 3 - Push Probe Locations/Site Map

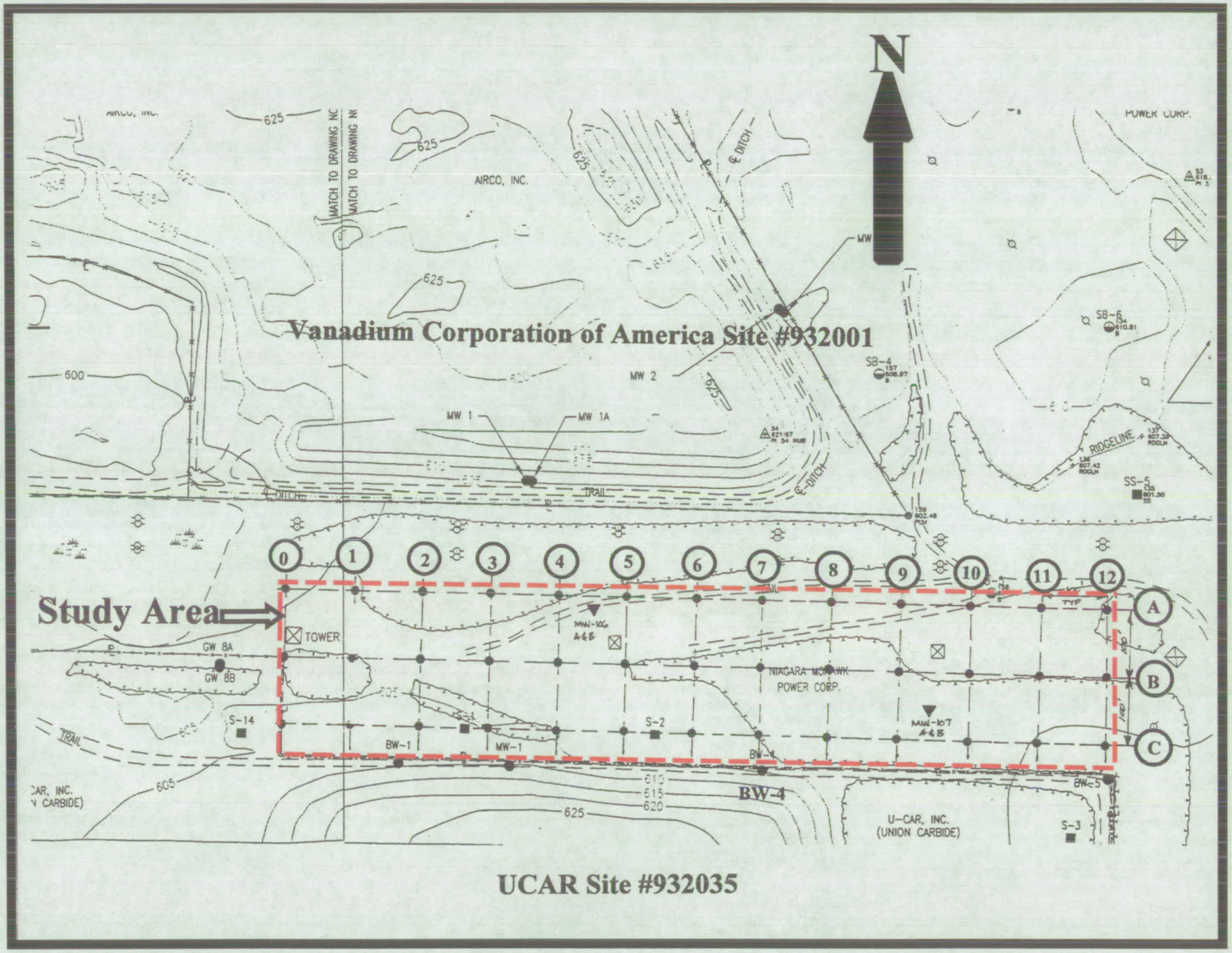


Table 1
Soil Boring Sample Location

Grid Location	Sample Number	Zone	Depth	Parameters
A-5	B081-01	Surface Soil	0 - 3"	Semi-volatiles, hex-chrome
A-2	B081-02	Surface Soil	0 - 3"	Semi-volatiles, hex-chrome
B-4A Mound 2	B081-03	Surface Soil	0 - 3"	Semi-volatiles, hex-chrome
B-1	B081-04	Surface Soil	0 - 3"	Semi-volatiles, inorganics, hex-chrome
C-0	B081-12	Surface Soil	0 - 3"	Semi-volatiles, inorganics, hex-chrome
C-5	B081-11	Surface Soil	0 - 3"	Semi-volatiles, hex-chrome
Mound 1	B081-13	Surface Soil composite	0 - 3"	Semi-volatiles, inorganics, hex-chrome
C-12	B081-16	Surface Soil	0 - 3"	Semi-volatiles, hex-chrome
B-1 & B-2	B081-05	Waste	3 - 12"	Volatiles, Semi-volatiles, inorganics, hex-chrome, TCLP, ignitability, corrosivity and reactivity
C-0	B081-08	Waste		Volatiles, Semi-volatiles, inorganics, hex-chrome, TCLP, ignitability, corrosivity and reactivity
C-5	B081-10	waste		Volatiles, Semi-volatiles, inorganics, hex-chrome, TCLP, ignitability, corrosivity and reactivity
Mound 1	B081-14	waste composite	3 - 24"	Volatiles, Semi-volatiles, inorganics, hex-chrome, TCLP, ignitability, corrosivity and reactivity
B-1	B081-06	sub-soil	10"	Volatiles, Semi-volatiles, inorganics, hex-chrome
B-2	B081-07	sub-soil	18"	Volatiles, Semi-volatiles, inorganics, hex-chrome
C-5	B081-09	sub-soil	120"	Volatiles, Semi-volatiles, inorganics, hex-chrome
Mound 1	B081-15	sub-soil composite	18 - 30"	Volatiles, Semi-volatiles, inorganics, hex-chrome

Figure 4 - Waste/Fill Area (NTS)

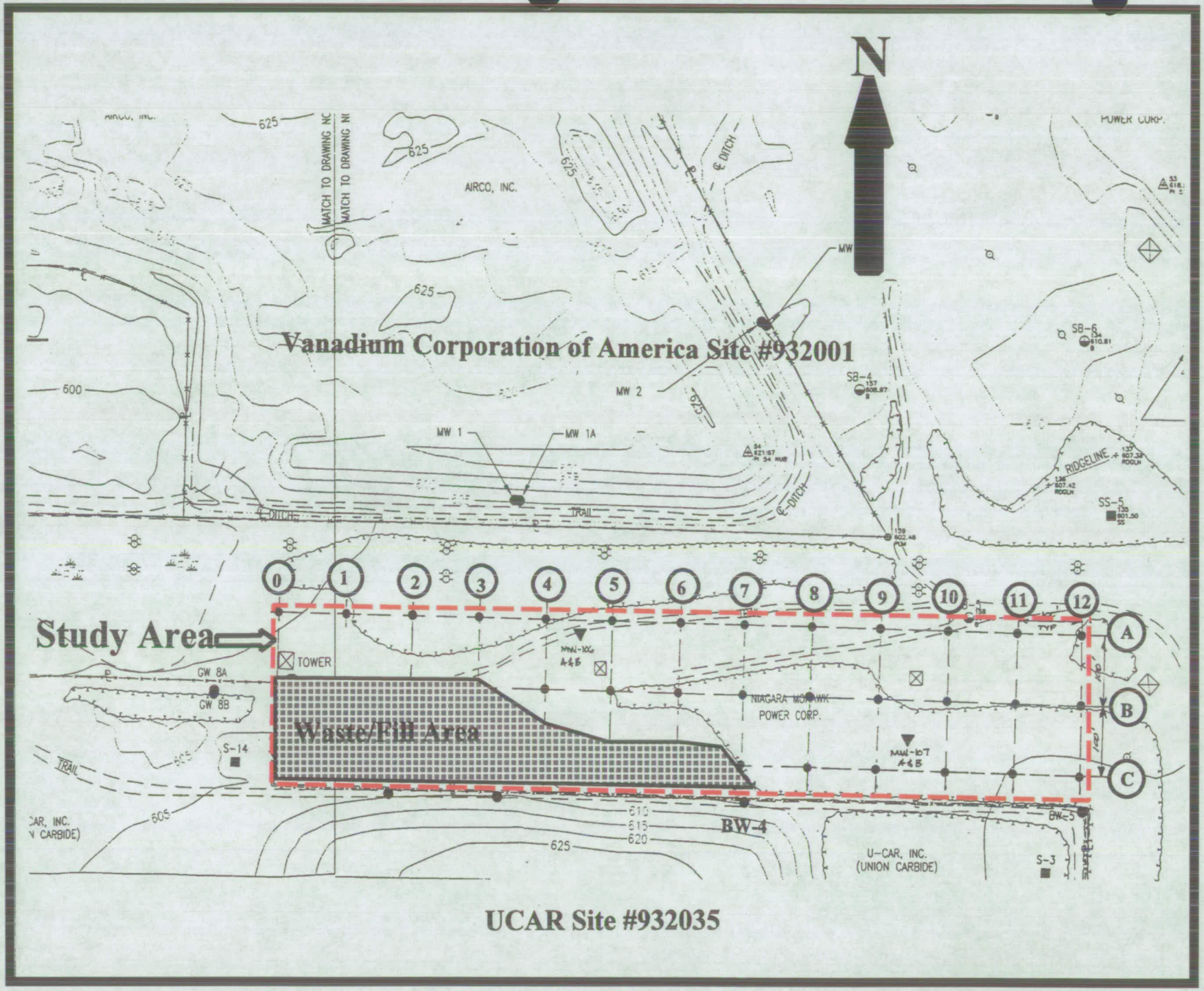


Table 2
Soil/Waste Volatile Organic Contaminants
Detected Compounds
ug/kg

Parameter	B-1 & B-2 Composite Waste	B-1 Sub-soil	B-2 Sub-soil	C-0 Waste	C-5 Sub-soil	C-5 Waste	Mound 1 Waste	Mound 1 Sub-soil	TAGM 4046 Cleanup Guidance
toluene	ND	12U	12U	2J	12U	13U	13U	12U	700
ethylbenzene	ND	12U	12U	1J	12U	13U	13U	12U	5000
(total) Xylenes	ND	12U	12U	23	12U	13U	13U	12U	1200
trichloroethene	ND	12U	12U	12U	12U	13U	7J	3J	700
tetrachloroethene	ND	12U	12U	12U	12U	13U	3J	12U	1400

ND - No Data
J - indicates an estimated value
U - indicates compound was analyzed for but not detected

Table 3
Soil/Waste Semi-volatile Organic Contaminants
Detected Compounds
ug/kg

Parameter	A-5 Surface soil	A-2 Surface soil	B-4A Surface soil	B-1 Surface soil	B-1 & B-2 Composite Waste	B-1 Sub-soil	B-2 Sub-soil	C-0 Waste	TAGM 4046 Cleanup Guidance
acenaphthene	2400U	170J	55J	13000J	2000U	400U	410U	11,000	50,000
dibenzofuran	2400U	480U	410U	4100J	2000U	400U	410U	8600	6200
flourene	2400U	82J	410U	7300J	2000U	400U	410U	14,000	50,000
phenanthrene	1200J	900	340J	61,000	500J	400U	410U	130,000D	50,000
anthracene	240J	200J	62J	16,000J	2000U	400U	410U	29,000	50,000
carbazole	2400U	160J	52J	10,000J	2000U	400U	410U	16,000	
flouranthene	2400	1700	600	100,000	1000J	400U	410U	180,000D	50,000
pyrene	2600	1600	540	84,000	1000J	400U	410U	160,000D	50,000
butyl benzyl phthalate	2400U	480U	410U	23000U	220J	400U	410U	4000U	
benzo(a)anthracene	1500J	930	320J	52,000	610J	400U	410U	97,000D	224
chrysene	1500J	1100	390J	52,000	630J	400U	410U	87,000D	400
bis(2-ethylhexyl) phthalate	2400U	87J	410U	23000U	490J	400U	410U	4000U	50,000
benzo(b)flouranthene	2400	1800	560	77,000	1300J	400U	410U	130,000D	1,100
benzo(k)flouranthene	780J	700	190J	30,000	2000U	400U	410U	26,000	1,100
benzo(a)pyrene	1900J	1400	410	22,000J	610J	400U	410U	88,000D	61
Indeno(1,2,3-cd)pyrene	550J	430J	170J	22000J	2000U	400U	410U	11,000	3200

Table 3 (cont)
Soil/Waste Semi-volatile Organic Contaminants
Detected Compounds
ug/kg

Parameter	A-5 Surface soil	A-2 Surface soil	B-4A Surface soil	B-1 Surface soil	B-1 &B-2 Composite Waste	B-1 Sub-soil	B-2 Sub-soil	C-0 Waste	TAGM 4046 Cleanup Guidance
dibenzo(a,h)anthracene	2400U	110J	47J	6,700J	2000U	400U	410U	3,800J	14
benzo(g,h,i)perylene	550J	400J	180	19,000J	530J	400U	410U	83,000	50,000
naphthalene	2400U	480U	410U	2,700J	2000U	400U	410U	9,700	13,000
2-methylphenol	2400U	480U	410U	23000U	2000U	400U	410U	4000U	100
4-methylphenol	2400U	480U	410U	23000U	2000U	400U	410U	4000U	900
2-methylnaphthalene	2400U	480U	410U	23000U	2000U	400U	410U	2,700J	36,400
acenaphthylene	2400U	480U	410U	23000U	2000U	400U	410U	2100J	41,000
phenol	2400U	480U	410U	23000U	2000U	400U	410U	410U	

J - indicates an estimated value
U - indicates compound was analyzed for but not detected
E - concentrations exceed the calibration range
D - analysis at a secondary dilution factor
Shaded box indicates exceedence of TAGM 4046

Table 3 (cont)
Soil/Waste Semi-volatile Organic Contaminants
Detected Compounds (ug/kg)

Parameter	C-5 Sub-soil	C-5 Waste	C-5 Surface soil	C-0 Surface soil	Mound 1 Surface soil	Mound 1 Waste	Mound 1 Sub-soil	C-12 Surface soil	TAGM 4046 Cleanup Guidance
acenaphthene	370U	2100U	3300J	3000	250J	65J	390U	200J	50,000
dibenzofuran	370U	2100U	810J	1300J	2200U	420U	390U	520U	6200
flourene	370U	2100U	1600J	1800J	2200U	420U	390U	89J	50,000
phenanthrene	370U	220J	23,000	60,000D	1600J	390J	390U	950	50,000
anthracene	370U	2100U	4600	8900	280J	77J	390U	220J	50,000
carbazole	370U	2100U	2100J	3800	2200U	67J	390U	170J	
flouranthene	370U	350J	27,000D	240,000D	4,300	700	390U	2200	50,000
pyrene	370U	2100U	21,000	120,000D	5,900	620	390U	2000	50,000
butyl benzyl phthalate	370U	2100U	4200U	2000U	2200U	420U	390U	520U	
benzo(a)anthracene	370U	240J	30,000	120,000D	3,300	360J	390U	1300	224
chrysene	370U	220J	18,000D	180,000D	3,300	450	390U	1300	400
bis (2-ethylhexyl) phthalate	240J	1200J	430J	640J	2200U	420U	390U	520U	50,000
benzo(b)flouranthene	370U	330J	33,000D	200,000D	4,800	700	390U	2400	1,100
benzo(k)flouranthene	370U	2100U	20,000	56,000D	1,400J	260J	390U	880	1,100
benzo(a)pyrene	370U	2100U	8,300	10,000	1,800J	470	390U	1900	61
Indeno(1,2,3-cd)pyrene	370U	2100U	4,200	3,200	450J	150J	390U	770	3200

Table 3 (cont)
Soil/Waste Semi-volatile Organic Contaminants
Detected Compounds
ug/kg

Parameter	C-5 Sub-soil	C-5 Waste	C-5 Surface soil	C-0 Surface soil	Mound 1 Surface soil	Mound 1 Waste	Mound 1 Sub-soil	C-12 Surface soil	TAGM 4046 Cleanup Guidance
dibenzo(a,h)anthracene	370U	2100U	3,500J	2,900	230J	44J	390U	190J	14
benzo(g,h,i)perylene	73J	2100U	4200U	2000U	2200U	150J	390U	780	50,000
naphthalene	370U	2100U	550J	920J	2200U	420U	390U	520U	13,000
2-methylphenol	370U	2100U	4200U	2000U	2200U	420U	390U	520U	100
4-methylphenol	370U	220J	4200U	2000U	2200U	420U	390U	520U	900
2-methylnaphthalene	370U	2100U	4200U	370J	2200U	420U	390U	520U	36,400
acenaphthylene	370U	2100U	4200U	2000U	2200U	420U	390U	520U	41,000
phenol	47J	2100U	4200U	2000U	2200U	420U	390U	520U	30

J - indicates an estimated value
U - indicates compound was analyzed for but not detected
E - concentrations exceed the calibration range
D - analysis at a secondary dilution factor
Shaded box indicates exceedence of TAGM 4046

Table 4
Soil/Waste Inorganic Contaminants
Detected Compounds
mg/kg

Parameter	A-5 Surface soil	A-2 Surface soil	B-4A Surface soil	B-1 Surface soil	B-1 & B-2 Composite Waste	B-1 Sub-soil	B-2 Sub-soil	C-O Waste	TAGM 4046 Cleanup Guidance
aluminum	ND	ND	ND	5030*	13,800*	23,800*	26,700*	4270*	SB
antimony	ND	ND	ND	1.7N	7.6BN	1.5UN	1.5UN	1.5UN	SB
arsenic	ND	ND	ND	4.6	14.7	5.8	4.1	6.8	7.5 or SB
barium	ND	ND	ND	138E	473E	154E	138E	33.5BE	300 or SB
beryllium	ND	ND	ND	0.28U	0.26B	1.2B	1.2B	0.25U	0.16 or SB
cadmium	ND	ND	ND	0.61B	1.6	0.17U	0.18U	0.18U	1 or SB
calcium	ND	ND	ND	21,100	50,000	2460*	6320*	7620*	SB
chromium	ND	ND	ND	48E*	62.3E*	30.6E*	35.9E*	37.5E*	10 or SB
cobalt	ND	ND	ND	4.7B	11B	16.6	11.3B	5.6B	30 or SB
copper	ND	ND	ND	104	257	36.8	26.6	141	25 or SB
iron	ND	ND	ND	17,300E*	123,000E*	33,000E*	34,000E*	20,900E*	2000 or SB
lead	ND	ND	ND	167	1870	86.9	9.3	28.8	SB
magnesium	ND	ND	ND	11,000*	8330*	6850*	10,100	2600*	SB
manganese	ND	ND	ND	336EN	948EN	870EN	467EN	230EN	SB
mercury	ND	ND	ND	11.8	16.8	0.12U	0.12U	0.15	0.1
nickel	ND	ND	ND	40.9*	46.2*	31.7*	31.8*	51.4*	13 or SB

Table 4 (cont)
Inorganic Contaminants
Detected Compounds
mg/kg

Parameter	A-5 Surface soil	A-2 Surface soil	B-4A Surface soil	B-1 Surface soil	B-1 & B-2 Composite Waste	B-1 Sub-soil	B-2 Sub-soil	C-0 Waste	TAGM 4046 Cleanup Guidance
potassium	ND	ND	ND	798BE	1220BE	3790E	4250E	726BE	SB
selenium	ND	ND	ND	1.4U	1.2U	1.2U	1.3U	1.2U	2 or SB
silver	ND	ND	ND	0.66B	2.0B	0.37U	0.38U	0.38U	SB
sodium	ND	ND	ND	1090B	1390	834B	806B	764B	SB
thallium	ND	ND	ND	2.3U	2.0U	2.0U	2.0U	2.0U	SB
vanadium	ND	ND	ND	17.6	21.0	42.1	45.0	37.8	150 or SB
zinc	ND	ND	ND	323E	1090E	84.2	74.4E	698E	20 or SB
hexavalant chromium	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	

B - indicates a value greater than or equal to the instrument detection limit, but less than the contract required detection limit
U - indicates compound was analyzed for but not detected
N - indicates spike sample recovery was not within the control limits
* - indicates duplicate analysis not within control limits
E - indicates a value estimated or not reported due to the presence of interference
SB - soil background
ND - No Data
Shaded Box indicates exceedence of TAGM 4046

Table 4 (cont)
Inorganic Contaminants (cont)
Detected Compounds
mg/kg

Parameter	C-5 Sub-soil	C-5 Waste	C-5 Surface soil	C-0 Surface soil	Mound 1 Surface soil	Mound 1 Waste	Mound 1 Sub-soil	C-12 Surface soil	TAGM 4046 Cleanup Guidance
aluminum	14,600*	5930*	15,600*	9,200*	21,800*	22,700*	21,400*	ND	SB
antimony	1.4UN	1.6UN	1.7UN	1.5UN	1.6UN	1.6UN	1.4UN	ND	SB
arsenic	4.2	18.6	18.0	6.7	6.0	6.7	2.7	ND	7.5 or SB
barium	108E	370E	904E	96.0E	108E	110E	76.6E	ND	300 or SB
beryllium	1.0B	0.26U	0.79B	0.44B	0.80B	0.85B	0.67B	ND	0.16 or SB
cadmium	0.22B	1.1B	0.65B	0.17U	0.19U	0.18U	0.17U	ND	1 or SB
calcium	60,100*	26,900*	7,670*	31,600*	2,450*	3,670*	2,100*	ND	SB
chromium	20.1E*	855E*	63.8E*	38.7E*	65.4E*	59.4E*	26.3E*	ND	10 or SB
cobalt	10.3B	4.0B	88.9	6.9B	8.8B	10B	7.6B	ND	30 or SB
copper	20.9	197	100	58.7	27.0	22.1	7.6	ND	25 or SB
iron	20,600E*	37,500E*	48,200E*	16,700E*	24,100E*	29,400E*	26,700E*	ND	2000 or SB
lead	15.4	237	166	57.9	44.2	36.3	7.5	ND	SB
magnesium	12,500*	5,460*	3,740*	13,200*	4,140*	4,710*	5,570*	ND	SB
manganese	608EN	364EN	8950EN	433EN	566EN	808EN	355EN	ND	SB
mercury	0.11U	0.13U	0.12U	0.12U	0.14U	0.36	0.14	ND	0.1
nickel	21.2*	15.2*	54.1*	31.7*	31.9*	26.0*	18.6*	ND	13 or SB

Table 4 (cont)
Inorganic Contaminants
Detected Compounds
mg/kg

Parameter	C-5 Sub-soil	C-5 Waste	C-5 Surface soil	C-0 Surface soil	Mound 1 Surface soil	Mound 1 Waste	Mound 1 Sub-soil	C-12 Surface soil	TAGM 4046 Cleanup Guidance
potassium	3820E	937BE	2220E	2280E	2950E	3000E	3720E	ND	SB
selenium	1.1U	1.3U	1.4U	1.2U	1.4U	1.3U	1.2U	ND	2 or SB
silver	0.34U	6.7	1.7B	0.37U	0.50B	0.39U	0.36U	ND	SB
sodium	758B	1750	900B	818B	577B	752B	918B	ND	SB
thallium	1.8U	2.1U	2.3U	2.0U	2.2U	2.1U	1.9U	ND	SB
vanadium	28.3	18.0	43.9	25.3	38.9	43.5	33.9	ND	150 or SB
zinc	96.1E	824E	633E	133E	85.7E	94.7E	63.9E	ND	20 or SB
hexavalant chromium	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	

B - indicates a value greater than or equal to the instrument detection limit, but less than the contract required detection limit
U - indicates compound was analyzed for but not detected
N - indicates spike sample recovery was not within the control limits
* - indicates duplicate analysis not within control limits
E - indicates a value estimated or not reported due to the presence of interference
SB - soil background
ND - No Data
Shaded box indicates exceedence of TAGM 4046

Table 5 Hazardous Waste Characteristics					
Parameter	B-1 & B-2 Composite Waste	C-0 Waste	C-5 Waste	Mound 1 Waste	6NYCRR Part 371
TCLP (mg/l)					
benzene	0.008U	0.008U	0.008U	0.008U	0.5
2-butanone	0.020U	0.020U	0.020U	0.020U	
carbon tetrachloride	0.013U	0.013U	0.013U	0.013U	0.5
chlorobenzene	0.0083U	0.0083U	0.0083U	0.0083U	100.0
chloroform	0.0080U	0.0080U	0.0080U	0.0080U	6.0
1,2-dichloroethane	0.0095U	0.0095U	0.0095U	0.0095U	0.5
1,1-dichloroethene	0.013U	0.013U	0.013U	0.013U	0.7
tetrachloroethene	0.011U	0.12	0.011U	0.011U	0.73
trichloroethene	0.010U	0.028	0.010U	0.010U	0.5
vinyl chloride	0.011U	0.011U	0.011U	0.011U	0.2
1,4-dichlorobenzene	0.010U	0.010U	0.010U	0.010U	7.5
2,4-dinitrotoluene	0.010U	0.010U	0.010U	0.010U	0.13
hexachlorobenzene	0.010U	0.010U	0.010U	0.010U	0.13
hexachlorobutadiene	0.010U	0.010U	0.010U	0.010U	0.5
hexachloroethane	0.010U	0.010U	0.010U	0.010U	3.0
3-methylphenol	0.016U	0.016U	0.016U	0.016U	
2-methylphenol	0.016U	0.016U	0.016U	0.016U	
4-methylphenol	0.016U	0.016U	0.016U	0.016U	
nitrobenzene	0.010U	0.010U	0.010U	0.010U	2.0
pentachlorophenol	0.050U	0.050U	0.050U	0.050U	100.0
pyridine	0.010U	0.010U	0.010U	0.010U	5.0
2,4,5-trichlorophenol	0.025U	0.025U	0.025U	0.025U	400.0
2,4,6-trichlorophenol	0.011U	0.011U	0.011U	0.011U	2.0

Table 5 (cont)
Hazardous Waste Characteristics

Parameter	B-1 & B-2 Composite Waste	C-0 Waste	C-5 Waste	Mound 1 Waste	NYSDEC Part 371
TCLP (mg/l)					
arsenic	0.0038	0.004B	0.0035U	0.005B	5
barium	2.09E	0.704E	1.440E	1.950E	100
cadmium	0.007	0.0034B	0.00070U	0.00070U	1
chromium	0.002UE*	0.0049BE*	0.002UE*	0.0045BE*	5
lead	0.182E	0.0032E	0.119E	0.0194E	5
mercury	0.00020U	0.00020U	0.00020U	0.00020U	0.2
selenium	0.005U	0.0050U	0.005U	0.005U	1
silver	0.0015U	0.0015U	0.0015U	0.0015U	5
TCLP (mg/l)					
gamma-BHC (lindane)	0.0001U	0.0001U	0.0001U	0.0014U	0.40
chlordane	0.0012U	0.0012U	0.0012U	0.0017U	0.03
endrin	0.0022B	0.038B	0.0011B	0.013B	0.02
heptachlor	0.0001U	0.0001U	0.0001U	0.0014U	0.008
heptachlor epoxide	0.0001U	0.0001U	0.0001U	0.0014U	0.008
methoxychlor	0.0005U	0.0005U	0.0005U	0.0005U	10.0
toxaphene	0.001U	0.001U	0.001U	0.001U	0.5
2,4 D	0.000001U	0.000001U	0.000001U	0.000001U	10.0
2,4,5-TP(silvex)	0.000001U	0.000001U	0.000001U	0.000001U	1.0
ignitability (^{0}F)	200U	200U	200U	200U	<140^{0}F
reactivity (H2S released)	10U	10U	10U	10U	
reactivity (HCN released)	10U	10U	10U	10U	
corrosivity (leachable pH)	7.7	7.4	ND	6.3	<2 or >12.5

Shaded Box indicates exceedence of Part 371 hazardous waste criteria

Section 4 - Monitoring Well Installation and Ground Water Sampling

The following sub-sections present the results of sampling and analysis of overburden and bedrock groundwater at the Niagara Mohawk ROW site. In evaluating these results, data was compared to the NYSDEC groundwater standards and guidance values found in 6 NYCRR Part 703.5 and the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1).

Four groundwater monitoring wells were installed in December 1999 and sampled in March of 2000 as part of this investigation to evaluate the deep overburden and upper bedrock water bearing zones. MW-106A and MW-107A were installed in the overburden and completed at top of the underlying bedrock. MW-106A was completed at 11 feet below ground surface and MW-7A was completed at 9.5 feet below ground surface. MW-106B and MW-107B were installed to intercept the first water bearing bedrock fracture zone. MW-106B was installed to a depth of 23 below ground surface while MW-107B was installed to a depth of 22.5 feet below ground surface.

Groundwater levels and samples were collected from these wells in March of 2000 along with MW-103A and MW-103B installed as part of the adjacent Vanadium Corp of America IIWA project and MW-1 installed on the Airco Properties landfill. These wells were sampled for volatile organic compounds, semi-volatile organic compounds and inorganic compounds. In addition groundwater in the overburden and bedrock zones located on the UCAR site immediately to the south of the site were also sampled in March of 2000 by the UCAR Corporation as part of their long term Operation and Maintenance requirements under NYCRR Part 360 regulations. UCAR sampled these wells for selected volatile organic compounds and selected inorganic compounds.

Overburden Groundwater

The sample results (refer Tables 6, 7 and 9) of the overburden groundwater indicated that no volatile or semi-volatile organic compounds were detected in the site wells, MW-106A and MW-107A, the Vanadium well MW-103A, nor the overburden wells located on the UCAR property.

MW-1 located on the Airco portion of the Vanadium site indicated the presence of benzene at an estimated concentration of 4 ug/l. The groundwater standard for benzene is 1 ug/l. MW-1 no longer exists as it was destroyed during the closure of the Airco landfill during the summer of 2000. Replacement wells were installed as part of that closure project. These wells will be evaluated for the presence of benzene and other compounds during the initial baseline sampling to be performed in December 2000 and the spring of 2001. Inorganic compounds (refer Table 8) were detected in all overburden groundwater samples at low levels that are not considered significant. The data collected from the overburden groundwater does not indicate that the overburden groundwater in the Niagara Mohawk ROW is a source of the TCE contamination found in the shallow bedrock monitoring wells on the UCAR site.

Bedrock Groundwater

Sample results from the bedrock groundwater (refer Tables 6 and 7) indicate that no volatile or semi-volatile organic compounds were detected in the site wells, MW-106B and MW-107B, nor the adjacent Vanadium well, MW-103A. However, (refer Figure 5 and Table 9) tetrachloroethene at 135 ug/l, trichloroethene at 178 ug/l, cis-1,2-dichloroethene at 180 ug/l and vinyl chloride at 115 ug/l were detected in BW-4 located on the UCAR site. In addition volatile organic compounds were detected in bedrock wells BW-2 (chloroethane at 22 ug/l), BW-3 (vinyl chloride at 15 ug/l) and GW-8B (cis-1,2-dichloroethene at 14 ug/l). Inorganic compounds (refer Table 8) were detected in all bedrock groundwater samples at low levels that are not considered a concern.

Based on the review of the data from this investigation it is unlikely that the volatile organic contamination found in BW-4 on the UCAR property is caused by disposal activities in the Niagara Mohawk ROW. While this well is hydraulically down gradient of the Niagara Mohawk ROW site, soil/waste and overburden analysis do not suggest that these media are a source of the contaminants found in BW-4.

TABLE 6
GROUNDWATER VOLATILE ORGANIC COMPOUNDS - 3/9/00
(ug/l)

Parameter	GW STD/*GV*	MW-1 Vanadium	MW-103A Vanadium	MW-103B Vanadium	MW-106A	MW-106B	MW-107A	MW-107B
Acetone	*50*	10U	10U	10U	10U	10U	10U	10U
Bromodichloromethane	*50*	10U	10U	10U	10U	10U	10U	10U
Bromoform	*50*	10U	10U	10U	10U	10U	10U	10U
Bromomethane	5	10U	10U	10U	10U	10U	10U	10U
2-butanone		10U	10U	10U	10U	10U	10U	10U
Carbon disulfide		10U	10U	10U	10U	10U	10U	10U
Carbon tetrachloride	5	10U	10U	10U	10U	10U	10U	10U
Chloroethane	5	10U	10U	10U	10U	10U	10U	10U
Chloroform	7	10U	10U	10U	10U	10U	10U	10U
Chloromethane		10U	10U	10U	10U	10U	10U	10U
cis-1,3-dichloropropene		10U	10U	10U	10U	10U	10U	10U
dibromochloromethane	*50*	10U	10U	10U	10U	10U	10U	10U
1,1-dichloroethane	5	10U	10U	10U	10U	10U	10U	10U
1,2-dichloroethane	0.6	10U	10U	10U	10U	10U	10U	10U
1,1-dichloroethene	5	10U	10U	10U	10U	10U	10U	10U
1,2-dichloroethene (total)	5	10U	10U	10U	10U	10U	10U	10U
1,2-dichloropropane	1	10U	10U	10U	10U	10U	10U	10U
2-hexanone	*50*	10U	10U	10U	10U	10U	10U	10U
Methylene chloride	5	10U	10U	10U	10U	10U	10U	10U
4-methyl-2-pentanone		10U	10U	10U	10U	10U	10U	10U
Styrene	5	10U	10U	10U	10U	10U	10U	10U
trans-1,3-dichloropropene	0.4	10U	10U	10U	10U	10U	10U	10U
tetrachloroethene	5	10U	10U	10U	10U	10U	10U	10U
1,1,2,2-tetrachloroethane	5	10U	10U	10U	10U	10U	10U	10U
1,1,1-trichloroethane	5	10U	10U	10U	10U	10U	10U	10U
1,1,2-trichloroethane	1	10U	10U	10U	10U	10U	10U	10U
trichloroethene	5	10U	10U	10U	10U	10U	10U	10U
vinyl chloride	2	10U	10U	10U	10U	10U	10U	10U
benzene	1	4J	10U	10U	10U	10U	10U	10U
chlorobenzene	5	10U	10U	10U	10U	10U	10U	10U
ethylbenzene	5	10U	10U	10U	10U	10U	10U	10U
toluene	5	10U	10U	10U	10U	10U	10U	10U
total xylenes	5	10U	10U	10U	10U	10U	10U	10U

TABLE 7
GROUNDWATER SEMI-VOLATILE ORGANIC COMPOUNDS - 3/9/00
(ug/l)

Parameter	GW STD/*GV*	MW-1 Vanadium	MW-103A Vanadium	MW-103B Vanadium	MW-106A	MW-106B	MW-107A	MW-107B
N-nitrosodiphenylamine	*50*	9U	9U	9U	9U	9U	9U	9U
N-nitroso-di-n-propylamine		9U	9U	9U	9U	9U	9U	9U
4-chloroaniline	5	9U	9U	9U	9U	9U	9U	9U
2-nitroaniline	5	23U	23U	23U	23U	23U	23U	23U
3-nitroaniline	5	23U	23U	23U	23U	23U	23U	23U
4-nitroaniline	5	23U	23U	23U	23U	23U	23U	23U
3,3'-dichlorobenzidine	5	9U	9U	9U	9U	9U	9U	9U
2-chloronaphthalene	*10*	9U	9U	9U	9U	9U	9U	9U
dibenzofuran		9U	9U	9U	9U	9U	9U	9U
1,2-dichlorobenzene	3	9U	9U	9U	9U	9U	9U	9U
1,3-dichlorobenzene	3	9U	9U	9U	9U	9U	9U	9U
1,4-dichlorobenzene	3	9U	9U	9U	9U	9U	9U	9U
hexachlorobenzene	0.04	9U	9U	9U	9U	9U	9U	9U
hexachlorobutadiene	0.5	9U	9U	9U	9U	9U	9U	9U
hexachloroethane	5	9U	9U	9U	9U	9U	9U	9U
hexachlorocyclopentadiene	5	9U	9U	9U	9U	9U	9U	9U
2-methylnaphthalene		9U	9U	9U	9U	9U	9U	9U
1,1,4-trichlorobenzene		9U	9U	9U	9U	9U	9U	9U
butyl benzyl phthalate	*50*	9U	9U	9U	9U	9U	9U	9U
bis(2-ethylhexyl) phthalate	5	1J	9U	9U	9U	9U	1J	9U
diethyl phthalate		2J	9U	9U	9U	9U	9U	9U
dimethyl phthalate	*50*	9U	9U	9U	9U	9U	9U	9U
di-n-butyl phthalate	50	9U	9U	9U	9U	9U	9U	9U
di-n-octyl phthalate	*50*	9U	9U	9U	9U	9U	9U	9U
carbazole		9U	9U	9U	9U	9U	9U	9U
2,4-dinitrotoluene	5	9U	9U	9U	9U	9U	9U	9U
2,6-dinitrotoluene	5	9U	9U	9U	9U	9U	9U	9U
isophorone	*50*	9U	9U	9U	9U	9U	9U	9U
nitrobenzene	0.4	9U	9U	9U	9U	9U	9U	9U
acenaphthylene		9U	9U	9U	9U	9U	9U	9U
acenaphthene	20	9U	9U	9U	9U	9U	9U	9U
anthracene	*50*	9U	9U	9U	9U	9U	9U	9U

TABLE 7 (cont)
GROUNDWATER SEMI-VOLATILE ORGANIC COMPOUNDS - 3/9/00
(ug/l)

Parameter	GW STD/*GV*	MW-1 Vanadium	MW-103A Vanadium	MW-103B Vanadium	MW-106A	MW-106B	MW-107A	MW-107B
benzo (a) anthracene	*0.002*	9U	9U	9U	9U	9U	9U	9U
benzo (a) pyrene	ND	9U	9U	9U	9U	9U	9U	9U
benzo (b) fluoranthene	0.002	9U	9U	9U	9U	9U	9U	9U
benzo (ghi) perylene		9U	9U	9U	9U	9U	9U	9U
benzo (k) fluoranthene	*0.002*	9U	9U	9U	9U	9U	9U	9U
chrysene	*0.002*	9U	9U	9U	9U	9U	9U	9U
dibenzo (a,h) anthracene		9U	9U	9U	9U	9U	9U	9U
fluoranthene	*50*	9U	9U	9U	9U	9U	9U	9U
fluorene	*50*	9U	9U	9U	9U	9U	9U	9U
ideno (1,2,3-cd) pyrene	*0.002*	9U	9U	9U	9U	9U	9U	9U
naphthalene	*10*	9U	9U	9U	9U	9U	9U	9U
phenanthrene	*50*	9U	9U	9U	9U	9U	9U	9U
pyrene	*50*	9U	9U	9U	9U	9U	9U	9U
4-chloro-3-methylphenol		9U	9U	9U	9U	9U	9U	9U
2-chlorophenol		9U	9U	9U	9U	9U	9U	9U
2,4-dichlorophenol	5	9U	9U	9U	9U	9U	9U	9U
2,4-dimethylphenol	*50*	9U	9U	9U	9U	9U	9U	9U
2,4-dinitrophenol	*10*	24U	23U	24U	23U	23U	23U	23U
4,6-dinitro-2-methylphenol		24U	23U	24U	23U	23U	23U	23U
2-methylphenol	1	9U	9U	9U	9U	9U	9U	9U
4-methylphenol	1	9U	9U	9U	9U	9U	9U	9U
2-nitrophenol	1	9U	9U	9U	9U	9U	9U	9U
4-nitrophenol	1	24U	23U	24U	23U	23U	23U	23U
pentachlorophenol	1	24U	23U	24U	23U	23U	23U	23U
phenol	1	9U	9U	9U	9U	9U	9U	9U
2,4,5-trichlorophenol	1	24U	23U	24U	23U	23U	23U	23U
2,4,6-trichlorophenol	1	9U	9U	9U	9U	9U	9U	9U
bis(2-chloroethyl) ether	1	9U	9U	9U	9U	9U	9U	9U
2,2'-oxybis (1-chloropropane)		9U	9U	9U	9U	9U	9U	9U
bis(2-chloroethoxy) methane		9U	9U	9U	9U	9U	9U	9U
4-bromophenyl phenyl ether		9U	9U	9U	9U	9U	9U	9U
4-chlorophenyl phenyl ether		9U	9U	9U	9U	9U	9U	9U

U- compound not detected
J - compound detected below sample quantitation limit
Shaded areas indicate exceedence of NYSDEC groundwater standards
Italics indicates Guidance value

TABLE -8
GROUNDWATER SAMPLE RESULTS - 3/9/00
Inorganic Compounds (ug/l)

Parameter	GW STD/*GV*	MW-1 Vanadium	MW-103A Vanadium	MW-103B Vanadium	MW-106A	MW-106B	MW-107A	MW-107B
Aluminum	100	943	832	113B	1750	88.5B	1190	86.2B
Antimony	3	8.0U	8.0U	8.0U	8.0U	8.0U	8.0U	10.9B
Arsenic	25	5.5U	5.5U	5.5U	5.5U	5.5U	5.5U	5.5U
Barium	1000	26.6B	106B	101B	38.7B	66B	48.1B	104B
Beryllium	*3*	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U
Cadmium	5	1.0U	1.0U	1.0U	1.0U	1.2B	1.1B	1.0U
Calcium		221000E	111000E	88700E	81400E	84600E	88100E	78600E
Chromium	50	2.3B	1.5U	1.5U	1.7B	1.5U	3.8B	1.5U
Cobalt		2.3B	1.5U	1.5U	1.6B	1.9B	1.8B	2.4B
Copper	200	5.1B	3.5B	3.3B	5.5B	5.2B	8.6B	4.1B
Iron	300	802	968	111	1480	87.4B	989	306
Lead	25	4.0	3.0U	3.0U	4.1	3.0U	8.3	6.1
Magnesium	*35,000*	115000E	99000E	47700E	26200E	36500E	47700E	35500E
Manganese	300	16.6	251	112	147	44.6	22.4	72.1
Mercury	0.7	0.20U	0.20U	0.20U	0.20U	0.20U	0.20U	0.20U
Nickel	100	2.9B	4.2B	1.7B	5.2B	4.1B	4.7B	4.0B
Potassium		1570B	1290B	2900B	1690B	1940B	1390B	1480B
Selenium	10	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Silver	50	4.6B	2.0U	2.5B	2.0B	3.6B	4.9B	2.0B
Sodium	20000	125000	43000	38200	5690	28000	11300	29600
Thallium	*0.05*	10U	10U	10U	10U	10U	10U	10U
Vanadium		2.0U	2.0U	2.0U	5.8B	2.7B	4.7B	2.0U
Zinc	*2000*	151	63.6	9.4B	90.4	115	40.9	5.1B
Hexavalent Chromium	50	10U	10U	10U	10U	10U	10U	10U

Note: Shaded areas indicate concentration exceed groundwater standard
B - value greater than or equal to instrument detection limit but less than contract required detection limit
U - element analyzed for but not detected
E - Estimated above quantitation limit
Iron and Manganese total concentration - 500ug/l
italics indicate guidance value

TABLE 9
UNION CARBIDE VOLATILE ORGANIC COMPOUNDS - 3/30/00
(ug/l)

Parameter	GW STD/*GV*	GW-8A	MW-1	GW-8B	BW-1	BW-4	BW-5
Chloroethane	5	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
cis-1,2-Dichloroethene	5	ND 10	ND 10	14	180	ND 10	ND 10
Tertrachloroethene	5	ND 10	ND 10	ND 10	135	ND 10	ND 10
Trichloroethene	5	ND 10	ND 10	ND 10	178	ND 10	ND 10
Vinyl Chloride	2	ND 10	ND 10	ND 10	115	ND 10	ND 10

UNION CARBIDE INORGANIC COMPOUNDS - 3/30/00
(mg/l)

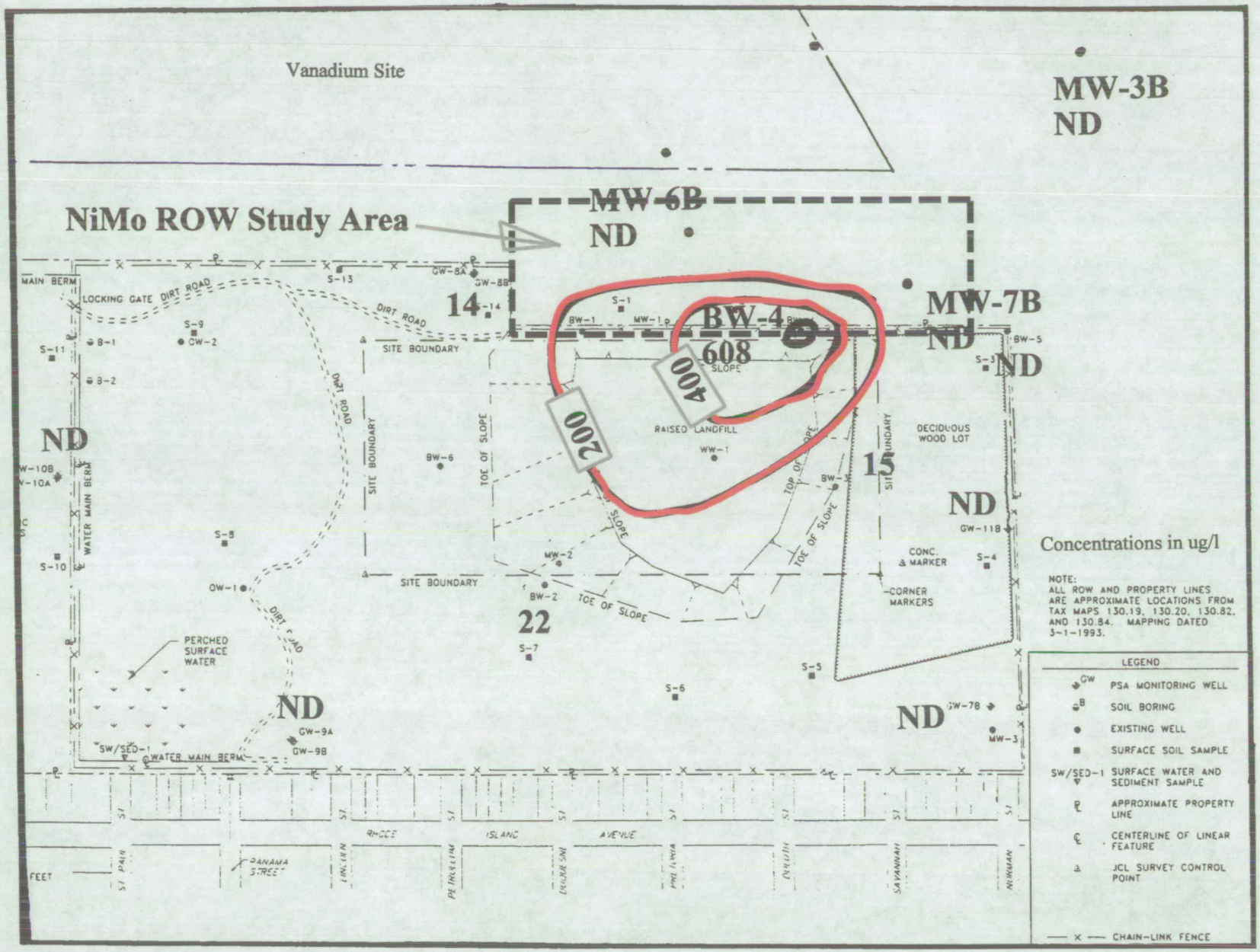
Parameter	GW STD/*GV*	GW-8A	MW-1	GW-8B	BW-1	BW-4	BW-5
Iron (total)	3	NA	4.64	NA	3.02	2.41	2.79
Potassium (total)		NA	37.9	NA	4.64	11.9	2
Zinc (total)	2	NA	0.05	NA	3.54	0.06	0.18
Iron (dissolved)		NA	NA	NA	2.45	NA	NA
Potassium (dissolved)		NA	NA	NA	5.27	NA	NA
Zinc (dissolved)		NA	NA	NA	3.75	NA	NA

UNION CARBIDE Geo-chemical Properties - 3/30/00

Parameter		GW-8A	MW-1	GW-8B	BW-1	BW-4	BW-5
Turbidity (NTU)		75.7	31.2	122	57.6	0.4	14.6
Ammonia (mg/l)	2	NA	ND 0.4	NA	ND 0.4	2.5	ND 0.4
Nitrite (mg/l)	1	NA	NA	NA	ND 0.04	ND 0.04	ND 0.04
TKN (mg/l)		NA	0.82	NA	1.06	3.1	ND 0.8

ND - not detected at indicated concentration
NA - Not Analyzed
NTU - Nephelometric Turbidity Units
TKN - Total Kjeldahl Nitrogen
Italics indicates Guidance value

Figure 5 - Bedrock VOC Levels



Section 5 - Geology

Surficial Geology

Geologic evidence suggests that at least four major glacial episodes covered parts of North America during the Pleistocene Epoch (Buehler and Tesmer, 1963). In western New York there is evidence of only two such episodes. The last glacial event in the area, the Wisconsin, eroded and modified the earlier glacial deposits to such an extent that little evidence of their existence remains. These glacial events also resulted in the widening of preexisting valleys and basins, and led to the development of the present day drainage system in western New York (La Sala, 1968).

A complex sequence of proglacial lakes that formed during the final retreat of the Wisconsin ice sheet also inundated an extensive area of western New York. These lakes were responsible for the deposition of stratified lacustrine clays, silts, sands and gravels that now cover western New York. Also, these deposits often contain horizontal laminations and sand lenses that can produce perched water table conditions, or if areally extensive, can be utilized as sources of water (La Sala, 1968).

The Pleistocene Epoch presented a variety of environments that resulted in the deposition of several types of unconsolidated deposits. In the Niagara Falls area these deposits include the following (Snyder Engineering 1987; Ecology and Environment, 1989; Woodward-Clyde and Conestoga-Rovers & Associates, 1992; Ecology and Environment, 1995):

- Glacial till, consisting of a non-sorted, non-stratified mixture of sand, silt, clay, gravel and rock fragments deposited directly from glacial ice;

- Glaciolacustrine deposits, consisting primarily of silt, sand and clay deposited in lakes that formed during melting of the ice sheets; and

- Glaciofluvial deposits, consisting of sand and gravel deposited either by glacial meltwater streams or by the reworking of till and other glacial deposits along the shore of former glacial lakes.

The thickness of these deposits varies considerably, ranging from less than 10 feet near the Niagara Gorge and Escarpment to approximately 65 feet in the Town of Tonawanda south of Niagara Falls (GeoTrans, 1990; Smith, 1990; Ecology and Environment, 1995).

Bedrock Geology

The bedrock underlying the glacial deposits is characterized as a thick sequence of shales, sandstones, limestones and Dolostone deposited in ancient seas during the Silurian and Devonian Periods (439-360 million years ago) (Buehler and Tesmer, 1963). The bedrock bedding generally strikes in an east-west direction, approximately paralleling the Niagara and Onondaga Escarpments, and dips to the south at approximately 30 to 40 feet per mile (Johnson, 1964; La Sala, 1968; Yager and Kappel, 1987).

The uppermost bedrock formation underlying the site is the Eramosa Dolostone of the Lockport Group, which was deposited in a shallow sea environment during the Middle Silurian Period (439-408 million years ago) (Brett et al., 1995). The Lockport Group varies in thickness from 20 to 175 feet (Johnson, 1964; Brett et al., 1995), and is believed to be approximately 140 feet thick beneath the site. Brett et al (1995, page 45) describes the Lockport Group as a "massive- to medium-bedded, argillaceous dolomite with minor amounts of dolomite and shale." The upper 10 to 25 feet of the Lockport Group contains abundant bedding planes and vertical fractures enlarged by dissolution and glacial scour (Miller and Kappel, 1987).

Site Geology

The stratigraphy of the Niagara Mohawk ROW site has been evaluated by examining stratigraphic logs (Appendix A) obtained from 43 test borings and 4 monitoring wells (Appendix B) completed by the Department as part of this IIWA.

Fill

Fill material overlies the native deposits in the southwest corner of the Niagara Mohawk ROW site (Figure 4) and consists primarily of off spec carbon and carbonaceous type waste, brick, glass, slag, ash, ceramic, concrete and metal. Thickness of the fill layer, where encountered, ranges from 0.3 to 15.8 feet.

Glaciolacustrine Deposit

A succession of glaciolacustrine deposits either underlies the fill material or is found directly at the surface. This deposit represents the largest percentage of native deposits beneath the site, and consists of reddish brown silty clay containing gray and tan mottling. The thickness of this deposit in the two monitoring wells clusters installed at the site was 11.1 feet at MW-6 and 9.25 feet at MW-7.

Lockport Dolostone

The bedrock beneath in the area is nearly flat lying and consists of the Eramosa Dolostone of the Lockport Dolostone Group. This dolostone is characterized as a weathered to dense, medium to dark gray, fine to coarse, crystalline, thin to massively bedded dolostone, limestone, and shaly dolostone with vugs containing gypsum, dolomite, and calcite crystals. The depth to bedrock beneath the Niagara Mohawk ROW site ranges from 9.25' to 11.1' (Appendix B) as determined from well clusters MW-6 and MW-7, respectively.

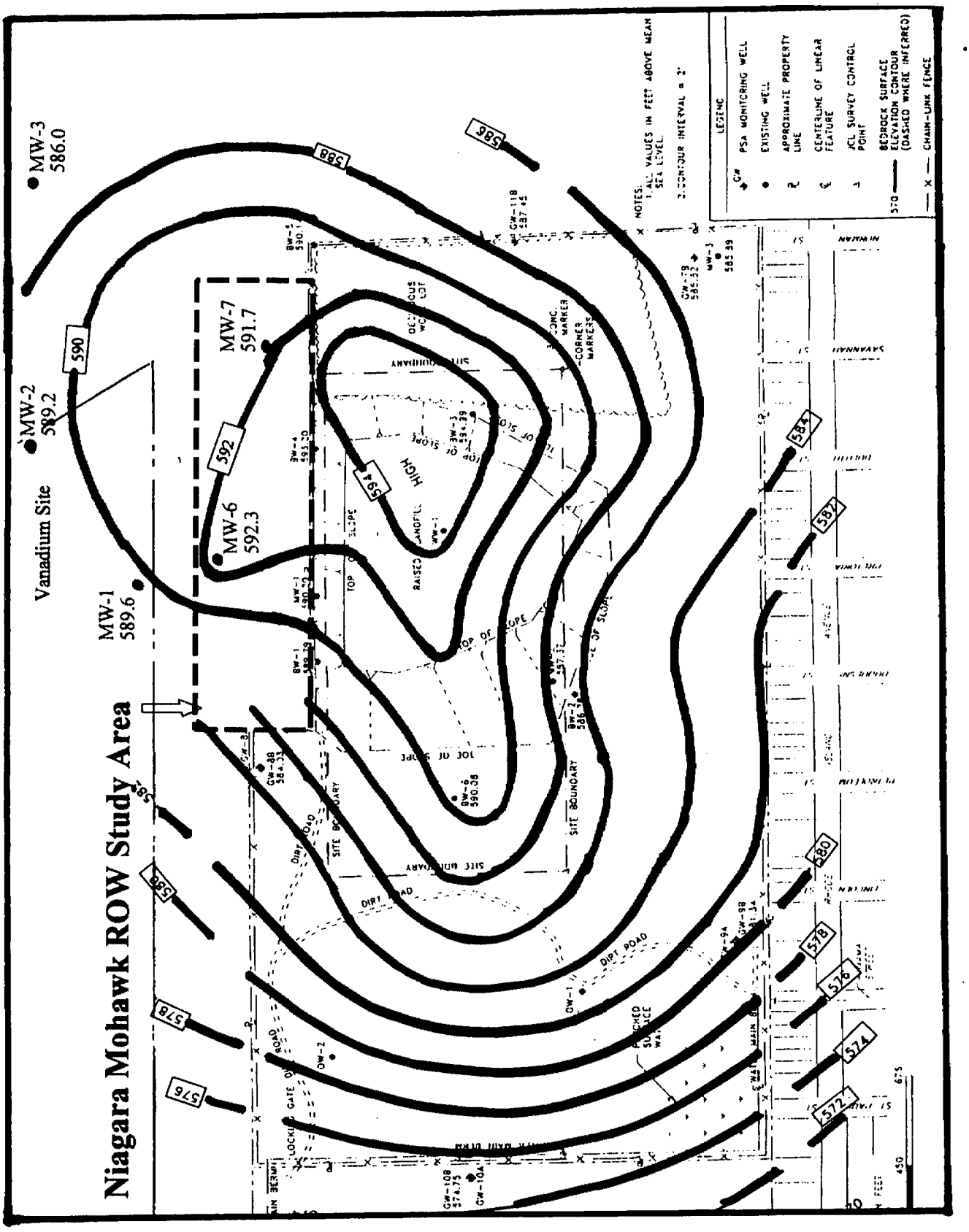


Figure 6 - Bedrock Contours

Section 6 - Groundwater Hydrology

Regional Hydrogeology

The principal aquifers in the Niagara Falls area include unconsolidated glacial deposits and bedrock of the Lockport Group (Johnson, 1964; Woodward-Clyde and Conestoga-Rovers & Associates, 1992). Most of the unconsolidated deposits, however, consist of fine grained lacustrine and glacial deposits with hydraulic conductivities on the order of 10^{-7} cm/s or less (Woodward-Clyde and Conestoga-Rovers & Associates, 1992). Thin seams of silt and sand within the glacial deposits allow minor horizontal groundwater movement, however, these seams are infrequent and typically not areally extensive. (Woodward-Clyde and Conestoga-Rovers & Associates, 1992).

The Lockport Group consists predominantly of dolostone, however, thin beds of limestone and shaly dolostone, and small irregularly shaped masses of gypsum are common. These thin beds and masses are subject to dissolution by groundwater, resulting in the enlargement of fractures and the formation of migration pathways that transmit large quantities of groundwater. Groundwater wells completed in the Lockport Group have yields commonly ranging from 10 to 100 gpm (Miller and Kappel, 1987), with yields up to 950 gpm reported (Yager and Kappel, 1987). Reported transmissivity values range from 330 to 68,000 gpd/ft (Johnson, 1964). Groundwater in the Lockport Group is typically either a calcium-sulfate or calcium-bicarbonate water, is very hard, and is highly mineralized; calcium, bicarbonate, magnesium, sulphate and chloride are present in significant concentrations (Johnson, 1964). Due to this poor water quality and the proximity of the Niagara River, an important source of municipal drinking water throughout Western New York, bedrock groundwater is not extensively utilized as a domestic water source in the Niagara Falls area. Because of the significant well yields, however, groundwater is commonly utilized for industrial purposes (i.e., non-contact cooling).

Regional Influences on Groundwater Flow

There are several natural features and man-made structures that greatly influence bedrock groundwater flow in the Niagara Falls area, including the Niagara River and Gorge; the Falls Street Tunnel (FST); and Power Conduits, Forebay Canal, and Reservoir constructed for the New

York Power Authority (NYPA) Niagara Power Project. Prior to construction of the Niagara Power Project, Miller and Kappel (1987) speculate that regional groundwater flow in the Lockport Group was toward the Niagara River and Gorge, with more localized flow into the FST.

The Niagara Power Project was constructed between 1958 and 1962. Twin Power Conduits divert river water from the upper Niagara River to the Robert Moses Generating Stations in the Town of Lewiston. These conduits were constructed of poured concrete in two separate parallel open cut trenches approximately 4 miles long (Miller and Kappel, 1987). Each trench is 52 feet wide and penetrates 100 (at the Niagara River) to 160 feet (at the Forebay Canal) into bedrock (Woodward-Clyde and Conestoga-Rovers & Associates, 1992). The deepest section of the Power Conduits is at the intersection of the FST. The top of the conduits averages more than 40 feet below ground surface (Miller and Kappel, 1987).

Surrounding each conduit is a drain system designed to reduce the hydrostatic pressure on the outside walls of the conduits. These drains were formed into the concrete-conduit structure and are open to the excavation face. The conduit drain system is hydraulically connected to the Power Conduits at two pumping stations: one immediately south of the Forebay Canal (Pump Station B), and the other immediately south of Royal Avenue (Pump Station A). Each pump station is equipped with a set of balancing weirs that allows water to flow into the drain system if the hydraulic head in the Power Conduits exceeds the elevation of the weir.

The Power Conduit drain system, because it is in direct hydraulic contact with the Lockport Group bedrock, significantly influences the bedrock groundwater flow pattern in the Niagara Falls area. Groundwater within ½ mile of the conduits now flows toward the conduits and discharges into the drain system (Miller and Kappel, 1987). To the north, groundwater that collects in the drain system flows southward and discharges into the FST, while water from the upper Niagara River flows northward to the FST (Miller and Kappel, 1987).

The Forebay Canal is an L-shaped unlined excavation located between the Robert Moses Generating Station and the NYPA Reservoir. This canal is approximately 4,000 feet long, 500 feet wide and 110 feet deep, and penetrates the Lockport Group bedrock and the upper portion

of the Rochester Shale. Water enters the Forebay Canal from the Power Conduits and is diverted either to the Robert Moses Generating Station or Reservoir depending upon the seasonal diversion schedule and power demand. Water levels in the canal are regulated on a 24-hour cycle, with highs occurring during periods of peak power demand (8:00 a.m. to 4:00 p.m.) when water is released from the Reservoir, and lows occurring during periods of low power demand when water is pumped from the Forebay into the Reservoir.

The NYPA Reservoir covers an area of approximately 3 miles^2 and can store up to 60,000 acre-feet of water (Miller and Kappel, 1987). The reservoir containment dike is approximately 55 feet high and constructed of a compacted clay core capped by crushed rock and topsoil. During construction, the existing overburden material was stripped down to bedrock, with the exposed bedrock forming the floor of the Reservoir. The bedrock directly beneath the dike was sealed with a grout curtain to minimize leakage from the Reservoir. Water levels in the Reservoir fluctuate daily, averaging approximately 640 feet AMSL, while ranging between 620 feet AMSL and 650 feet AMSL (Miller and Kappel, 1987). The NYPA Reservoir acts as a regional source of groundwater recharge to the Lockport Group bedrock. Water level fluctuations in the Reservoir affect groundwater levels southwest of the Reservoir, and to a lesser degree, to the south. These groundwater fluctuations are generally minor, however, ranging from 0.1 to 1.0 feet (Johnson, 1964; Miller and Kappel, 1987).

Regional Groundwater Flow

Groundwater in the upper Lockport Group bedrock flows toward the Niagara River and Gorge. The completion of the Niagara Power Project in 1962, however, created recharge and discharge zones that have modified groundwater flow in the Niagara Falls area. Groundwater within ½ mile of the conduits flows toward the conduits and into the drain system that surrounds them. To the north, groundwater that collects in the drain system flows southward and discharges into the FST, while water from the upper Niagara River flows northward to the FST. The FST also acts as a groundwater discharge zone; upper bedrock groundwater north of the FST flows south toward the tunnel, while groundwater south of the FST flows to the north.

Site Hydrogeology

Data previously compiled from the UCAR, Vanadium and Carborundum Globar sites suggest that four distinct hydrogeologic zones underlie the area: a shallow water bearing zone consisting of miscellaneous fill and the upper portion of the glaciolacustrine deposit; an intermediate zone consisting exclusively of the glaciolacustrine deposit; a deep water bearing zone consisting of saturated soils immediately above bedrock; and the upper bedrock water bearing zone (NYSDEC 1997). The designation of the deep water bearing zone as a separate hydrogeologic unit is highly generalized as this zone may be in hydraulic connection with the upper bedrock water bearing zone in some areas. The intermediate zone can be characterized as a confining layer, restricting the downward movement of groundwater from the shallow to the deep water bearing zone. At the Niagara Mohawk ROW site, monitoring wells were only installed in the deep and upper bedrock hydrogeologic zones. As a result only these zones will be discussed.

Deep Hydrogeologic Zone

Data collected during the Vanadium IIWA (NYSDEC 1997), suggest that groundwater in the deep hydrogeologic zone flows from a roughly north-south trending groundwater divide centered over the eastern portion of the Airco and UCAR properties. From this divide deep zone groundwater flows east toward the conduits, while groundwater under the SKW and Airco properties flows west toward the Niagara Gorge. This flow pattern is consistent with the flow pattern identified during the Niagara Mohawk ROW site IIWA (Figure 7). The most recent data (Table 10) indicates that the divide is located at approximately the center of the site near MW-106A. The location of the groundwater divide, however, can vary due to seasonal effects on the local groundwater elevations. As stated previously, the Power Conduits influence upper bedrock groundwater flow within ½ mile of the conduits; deep zone water level data suggest that the conduits also influence groundwater flow in the deep hydrogeologic zone.

In situ hydraulic conductivity tests from nine wells that monitor the deep hydrogeologic zone underlying the area indicate that deep zone soils are relatively permeable, with hydraulic conductivity averaging 10^{-4} cm/sec. Based upon the stratigraphy of this deposit, we believe that vertical hydraulic conductivities would be on the same order of magnitude. As a result, groundwater discharge from the deep hydrogeologic zone under the site will be relatively high.

Upper Bedrock Hydrogeologic Zone

Data collected during the Vanadium IIWA (NYSDEC, 1997), suggest that groundwater in the upper bedrock hydrogeologic zone flows from a groundwater divide roughly coincident with the deep zone groundwater divide. The most recent groundwater elevation data (Table 11) indicates that the bedrock groundwater divide is located in the easterly end of the site near MW-107B (Figure 8). The majority of the bedrock groundwater from the site will flow westerly toward the Niagara River, while bedrock groundwater in the eastern section of the site will flow easterly toward the NYPA tunnel drain. The location of the groundwater divide can and does vary due to seasonal effects on the local groundwater elevations.

In situ hydraulic conductivity tests from four wells that monitor the upper bedrock hydrogeologic zone in the area indicate that the upper bedrock zone is relatively permeable with hydraulic conductivity averaging 10^{-3} cm/sec. Due to the presence of vertical fractures and horizontal bedding planes, hydraulic conductivities are expected to vary significantly throughout the area. As a result, groundwater discharge from the upper bedrock hydrogeologic zone under the site can be extremely variable, but overall will be extremely high, especially from the area influenced by the Power Conduits.

Table 10 Overburden Ground Water Elevation					
Well #	Ground Elevation	Riser Elevation	Depth to Bottom of Well (ft)	Depth to Ground Water (ft)	Ground Water Elevation
Niagara Mohawk ROW 3/9/00					
MW-106A	603.3	605.77	14.19	4.14	601.63
MW-107A	601.2	603.59	11.77	5.55	598.04
Vanadium Corporation of America Site #932001 3/9/00					
MW-1		607.87	16.9	4.76	603.11
MW-103A		605.96	18.86	6.11	599.85
Union Carbide Site #932035 3/30/00					
MW-1		609.43	21.02	7.81	601.62
MW-2		607.54	24.59	23.85	583.69
MW-3		601.61	15.35	3.30	598.31
OW-1		608.81	N/A	5.97	602.84
OW-2		607.06	N/A	5.85	601.21
GW-8A		604.04	20.11	5.80	598.24
GW-9A		603.29	22.51	7.98	595.31
GW-10A		603.17	32.80	12.40	590.77

Table 11 Bedrock Ground Water Elevation					
Well #	Ground Elevation	Riser Elevation	Depth to Bottom of Well	Depth to Ground Water	Ground Water Elevation
Niagara Mohawk ROW 3/9/00					
MW-106B	603.2	604.98	24.35	4.77	600.21
MW-107B	601.1	602.87	24.64	4.74	598.13
Vanadium Corporation of America Site #932001 3/9/00					
MW-103B		606.15	35.44	11.44	594.71
Union Carbide Site #932035 3/29/00					
BW-1		610.72	24.38	14.92	595.80
BW-2		608.43	26.54	12.30	596.13
BW-3		604.72	24.85	7.80	596.92
BW-4		607.08	22.65	13.03	594.05
BW-5		603.33	28.77	5.77	597.56
BW-6		607.04	24.94	12.58	594.46
GW-7B		603.08	32.32	5.84	597.24
GW-8B		603.90	25.48	7.57	596.33
GW-9B		603.40	32.05	11.25	592.15
GW-10B		603.29	30.20	12.54	590.75
GW-11B		601.89	28.14	4.58	597.31

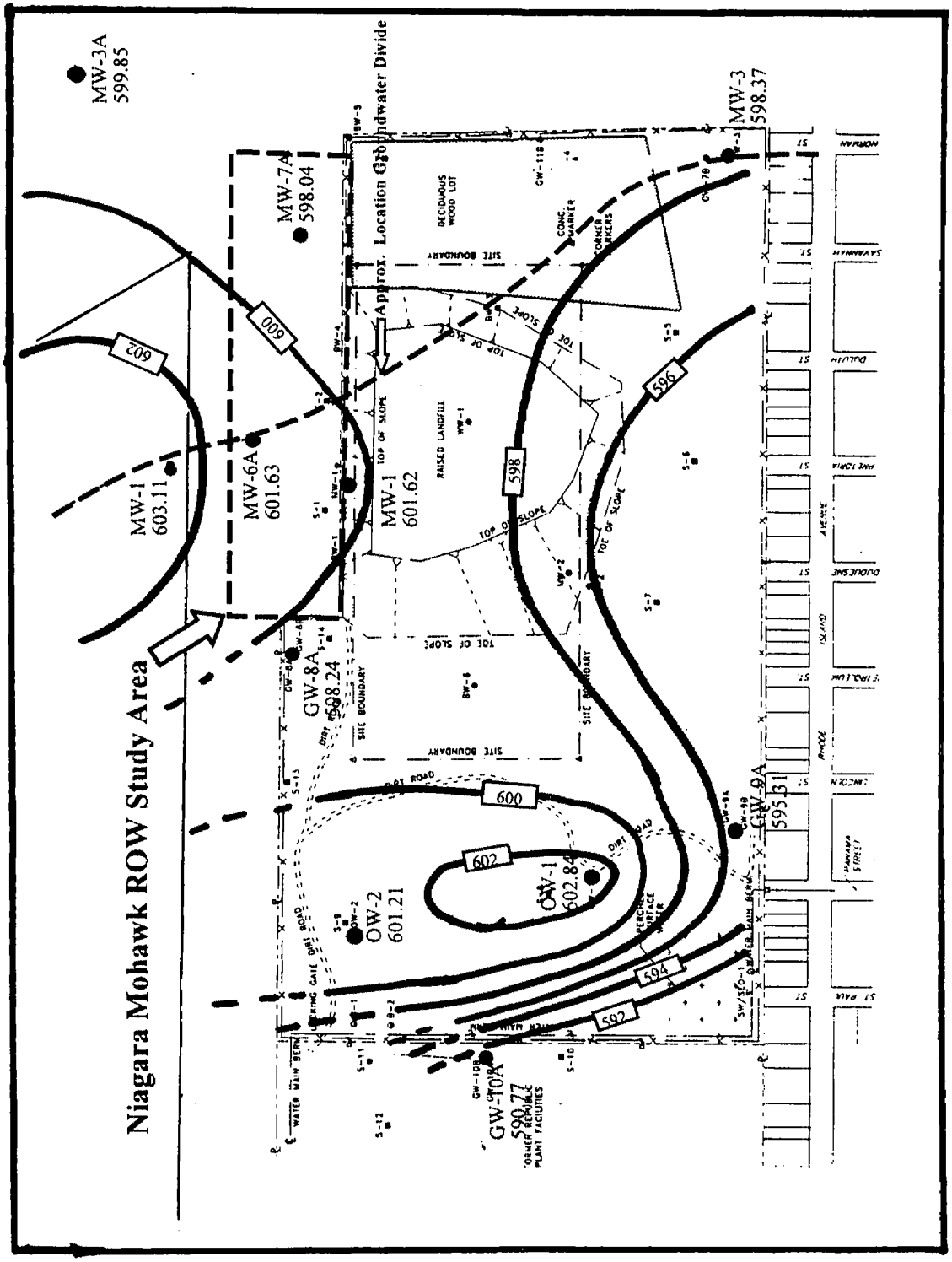


Figure 7 - Overburden Groundwater Contour

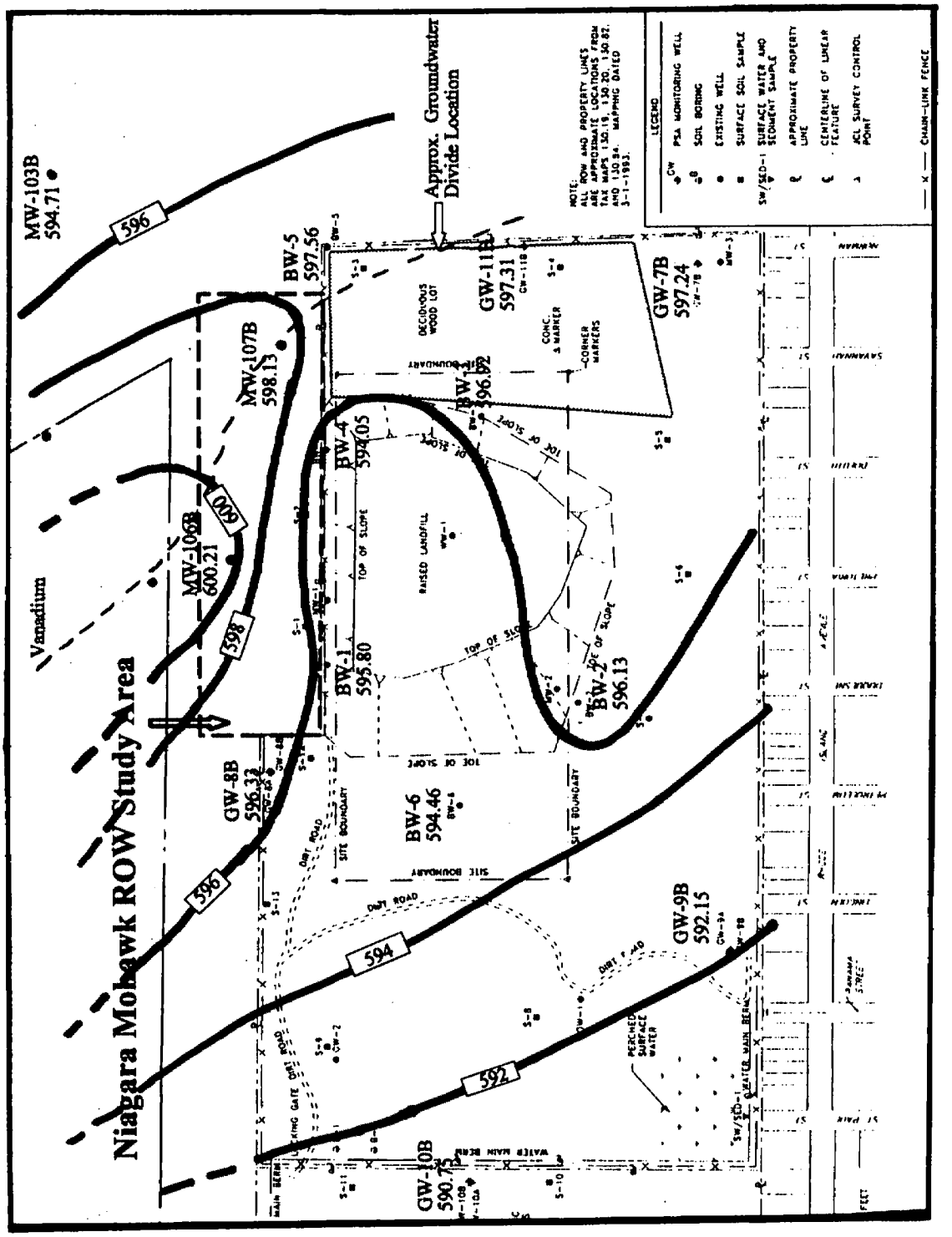


Figure 8 - Bedrock Groundwater Contours

Section 8 - Conclusions and Recommendations

Conclusions

The objectives of this IIWA project were:

- determine if waste materials are present and the aerial extent in this portion of the Niagara Mohawk ROW; and
- determine if the Niagara Mohawk ROW site is the source of the groundwater contamination found on the adjacent UCAR site.

The investigation determined that there is waste material from past disposal activities present on the southwest portion of the Niagara Mohawk ROW site immediately north of the UCAR site. The waste material is a carbonaceous type waste similar to the waste found on the UCAR site and an ash type material from unknown sources. None of the waste materials contained significant levels of volatile organic compounds that have been historically detected in UCAR well BW-4. In addition, groundwater in both the deep overburden and upper bedrock zones were found to be free of volatile organic contaminants. Therefore it has been determined that it is unlikely that the volatile organic contamination found in BW-4 is from the Niagara Mohawk ROW area.

This investigation did not detect the presence of consequential amounts of hazardous waste on the Niagara Mohawk ROW site.

Recommendations

No further investigation is necessary to evaluate the potential impact of the Niagara Mohawk ROW site on the adjacent UCAR site. However, the investigation did reveal waste disposal on the ROW site that requires further evaluation.It is recommended that a followup Phase II investigation be conducted to examine the significance of mercury found in the surface soil, pesticide contamination found in the groundwater and to fill data gaps in surface soil inorganic analysis.

The Phase II evaluation will include the following elements:

- Collection of surface soil samples around grid location B-1 to confirm the presence of elevated mercury contamination, determine the extent of the elevated mercury and to perform TCLP analysis to determine if mercury in the surface soil is a hazardous waste;
- Collection of Surface soil samples for inorganic analysis at grid locations A-2, A-5, B-4A and C-12 to fill the apparent data gap from the initial investigation; and finally,
- Collect a round of groundwater samples from MW-106 A&B, MW-107 A&B, MW-108 A&B and BW-4 for volatile organic and pesticide compounds to determine if endrin is present in the groundwater.

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Appendix A

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**599.7**				
0 - 5"	Topsoil - dark brown sandy topsoil with small roots, moist	48" recovery				0
5 - 24"	brown silty clay with brown mottling, small roots					0
24 - 48"	brown silty clay with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-1
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.9**				
0 - 4"	topsoil	3.3' recovery				0
4 - 48"	brown silty clay moist to wet, many rootlets. Lighter brown silty clay with orange and grey mottling, moist, stiff. Grading to reddish brown silty clay with multi-colored mottling, less moist, vertical dessication cracks.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-2
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.5**				
0 - 5"	dark/black sandy topsoil with roots Surface soil sample #B081-02 collected (0-3")	42" core recovery				0
5 - 12"	brown silty clay, moist, very stiff with small roots					0
12 -48"	reddish brown silty clay w/ grey mottling very stiff, dry					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ . Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-3
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.3**				
0 - 8"	topsoil	full recovery				
8 - 48"	medium brown silty clay, moist, many rootlets. This soil grades to a lighter brown silty clay, moist, with reddish brown mottling. Few rootlets near top. Grades to reddish brown silty clay, less moist, vertical dessication cracks with grey mottling along cracks. No stones observed.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-4
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	BNU
	Ground Surface	**602.8**				
0 -6"	dark/black sandy topsoil with roots	36" recovery				0
6 - 24"	brown silty clay with roots, very stiff					0
24 - 48"	red silty clay, very stiff with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-5
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.1**				
0 -8"	Topsoil surface soil sample # B081-01 collected (0-3")					0
8 - 48"	Brown sitly clay, moist, grey and orange mottling, rootlets near surface. Grading to reddish brown at depth with grey mottling and vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-6
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.8**				
0 - 4"	dark/black sandy topsoil	full recovery				0
4 - 24"	brown silty clay, very stiff, small roots and stones w/ grey mottling					0
24 - 48"	reddish brown silty clay, very stiff w/ small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-7
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.4**				
0 -6"	brown silty clay topsoil, moist w/ rootlets	full recovery				0
6 -48"	brown to reddish brown silty clay, moist, stiff, grey mottling extensive near top of core. No mottling at bottom. Few small rock fragments, rounded.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-8
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.8**				
0 - 6"	black/dark brown sandy topsoil w/ roots	full recovery				0
6 - 48"	very stiff brown silty clay, small roots in 6 - 12" zone, small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-9
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.2**				
0 - 6"	brown sitly clay, moist, rootlets, small amount of topsoil on surface					
6 - 48"	yellow brown, moist, stiffsilty clay with mottling grading to reddish brown silty clay with extensive mottling and vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-10
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.0**				
0 -1"	dark/black topsoil	recovery 46"				0
1 -48"	very stiff brown sitly clay with small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-11
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	topsoil	full recovery				
7 - 48"	brown silty clay with wood and rootlets. Rest of core is reddish brown silty clay with roots, mottling, moist, native, very stiff.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-12
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.3**				
0 -6"	topsoil, dark brown to black	full recovery				0
4 -48"	brown sitly clay with grey mottling, small roots in 4 -16" zone, small stones					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.4**				
0 -6"	dark/black gravely topsoil	42" recovery				0
6 -10"	red brick					0
10 -12"	dark black fill material(coal/carbon)					0
12 -48"	grey silty clay with reddish brown mottling, deep roots					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-1
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.1**				
0 - 3"	mainly plant material with some soil, moist. Surface soil sample collected B081-04	38' recovery				
3 - 7"	fill consisting of glass, slag some gypsum(?), brick, rootlets Sample B081-05 collected composite of B-1 & B-2 fill material					
7 - 48"	reddish brown silty clay, moist, black and orange mottling. Grey and greenish grey mottling near bottom of core and drier. Native silty clay is stiff and dense. Sample collected of native soil, sample # B081-06					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-2
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.7**				
0 - 3"	gravelly dark topsoil w/ small stones	full recovery				0
3 - 12"	fill, brown to red, pieces of glass, ash type material. Sample # B081-05 composite with B-1					0
12 -18"	concrete pieces					0
18 -48"	very stiff brown silty clay with grey mottling, sample #B081-07					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-3
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 - 4"	thin zone of black topsoil	43" recovery				
4 -48"	fill containing silty clay, glass, slag, ceramic with rootlets, moist.					0
	Silty clay with grey, rusty orange, black and brown mottling. So mottled it is difficult to determine color of soil. Moist and stiff.					
	Bottom of core is reddish brown silty clay, less moist w/ grey mottling and grey mottled vertical cracks					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-4
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.3**				
0 -8"	dark grey topsoil, PID response is in area with ants and evidence of fill material at 7 - 8"	full recovery				3
8 -24"	brown silty clay w/ grey mottling, very fine grained					0
24 -48"	reddish brown silty clay with grey mottling, very firm, vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-4A
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
	Soil mound					
0 -24"	brown silty clay pushed into pile, some mottling evident surface soil collected sample #B081-03	full recovery				0
24 -48"	reddish brown silty clay w/ grey mottling and some roots. Native soil, suspect near original surface					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-5
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.8**				
0 - 5"	grey silty clay, moist, rootlets, some orange mottling					
5 -48"	reddish brown silty clay, moist, orange and grey mottling, stiff. Vertical dessication cracks. Grades to silty dlay that is brown, less moist and mottled, red and grey.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-6
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.7**				
0 - 6"	dark brown silty clay, some roots	full recovery				0
6 -26"	reddish brown silty clay, very firm, moist, some roots w/ rusty to grey mottling					0
26 - 48"	reddish brown silty clay, soft, dry with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-7
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.2**				
0 - 6"	topsoil	38" recovery				
6 - 48"	brown silty clay, moist, rootlets, grading to stiff brown silty clay, moist w/ grey mottling and vertical dessication cracks. Bottom of core is more reddish brown with grey and pinkish brown mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-8
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.8**				
0 - 5"	dark sandy topsoil w/ roots and small stones	full recovery				0
5 - 48"	reddish brown silty clay with rusty to grey mottling, vertical fractures and roots full depth					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-9
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.2**				
0 - 5"	topsoil, dark brown silty clay, moist rootlets.	47" recovery				
5 - 48"	Grey silty clay, moist, brown mottling grading into reddish brown silty clay with little or no mottling w/ few rock fragments.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-10
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.0**				
0 - 9"	dark brown sandy silty topsoil with roots and small stones	full recovery				0
9 - 48"	brown silty clay with reddish to grey mottling and roots, very firm.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-11
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	dark brown silty clay moist soft, rootlets	44" recovery				
7 - 48"	silty clay mottled orange, brown, black and grey, rootlets near top of core, moist. Grades to very stiff, brown silty clay, some grey and pink mottling, moist. Bottom of core is much drier.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-12
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	dark brown topsoil sandy with roots	full recovery				0
7 - 48"	brown sitly clay, very firm, moist reddish to grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	120"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**605.6**				
0 -4"	dark grey topsoil surface soil sample #B081-12 collected					0
4 -14"	red brick and slag					0
14 - 23"	sandy dark grey dry					0
23 - 27"	red slag, dry					0
27 - 48"	black carbon, moist					0
48 - 69"	black carbon w/ red slag					0.3
69 - 75"	yellow slag waste sample #B081-08 collected					0.5
75 - 96"	black carbon material, moist					0.1
96 - 120"	black carbon, very wet, core refusal					0.1

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-1
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	228" (19")	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**606.2**				
0 - 3"	sandy loam topsoil	30" recovery				0
3 - 10"	red granular slag					0
10 - 15"	yellowish brown slag, stone					0
15 - 19"	blue grey slag					0
19 - 26"	clayey soil					0
26 - 48"	carbon					0
48 - 57"	black carbon, slag, firm	full recovery				0
57 - 83"	grey paste like material					0
83 - 88"	carbon slag					0
88 - 91"	red brick					0
91 - 96"	carbon slag					0
96 - 99"	carbon slag	14" recovery				0
99 - 109"	slag fill, broken concrete					0
109 - 110"	grey paste					0
144" - 192"		Zero recovery				
192 - 198"	very wet silty clay w/ roots, small stones, suspect native soil	6" recovery				0
228"	core refusal					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-2
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	192" (16')	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**607.6**				
0 - 3"	Topsoil	33" recovery				0
3 - 13"	clayey soil w/ broken brick and stone					
13 - 24"	clayey soil w/ red slag					
24 - 29"	brown silty clay					
29 - 33"	black carbon					
48 - 60"	black carbon	35" recovery				0
60 - 83"	moist granular fill of carbon, brick, glass, ash and clayey soil					
96 - 103"	red stone/slag w/carbon	23" recovery				0
103 - 119"	wood, carbon					
144 - 151"	reddish brown silty clay w/ grey mottling	7" recovery				0
192"	Boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-3
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	144" (12 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**604.8**				
0 - 2"	black topsoil	30" recovery				0
2 - 24"	fill, brown w/ black streaking, glass, stone, firm					
24 - 30"	fill grey w/ white glass, stone ,firm					
48 - 49"	black gravelly like material, moist	1" recovery				0
96 - 97"	black fill material w/ metal shards and stone, very wet	12" recovery				0
97 - 108"	reddish brown silty clay, soft, very wet					0
144"	boring completed in native soil					
	Note: Sample location offset from grid point 10' west due to rubble					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-4
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	144" (12 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.1**				
0 - 5"	dark grey clay soil, moist	19" recovery, metal shards in shoe				0
5 - 19"	brown to grey fill w/ white glass, metal shards and stones					
48 - 96"		Zero recovery				
96 - 102"	fill, black w/ small stones, moist	20" recovery				0
102 - 116"	grey to brown silty clay w/ shale shards					
144"	boring completed in native soil					
	Note: sample location offset from grid point C-4 20' to the east					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-5
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	132" (11 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 - 3"	dark brown moist sandy topsoil. Sample collected from surface soil (0-3") Sample #A8081-11	29" recovery				0
3 - 48"	fill, grey to brown ash to black carbon, moist. Sample collected from fill material Sample # B081-10					
48 - 96"		Zero recovery				
120 -132"	reddish brown silty clay, very stiff w/ small stones, soil sample collected sample #A8081-09	10" recovery				0
132"	refusal, boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-6
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	96" (8 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.5**				
0 - 7"	dark grey sandy topsoil	24" recovery				0
7 - 24"	slag, ash, pieces of metal, carbon fines, red to black in color					0
48 - 51"	carbon fines, black, moist	15" recovery				0
51 - 63"	red sandy silty clay with small stones, very firm, moist					0
96"	boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-7
Site Number:	No Number Assigned	**Date Completed:**	11/25/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	102" (8.5 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 -1"	black, moist topsoil	14" recovery				0
1" - 14"	brown to grey fill, slightly moist, firm					
48 - 96"	possible core blockage 95 - 96" black moist shale subsoil, metal shards and small stones.	1" recovery				0
96 - 102"	Black rock fragments	1" recovery				0
102"	refusal					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-8
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.3**				
0 - 5"	topsoil	42" recovery				0
5 - 48"	mottled firm brown clay					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-9
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.5**				
0 - 3"	dark brown to black topsoil w/ plant material	46" recovery				0
3 - 48"	med brown clay, tight and moist w/ some grey to orange (rust) mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-10
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.5**				
0 - 4"	dark brown to black topsoil w/ plant material	46" recovery				
4 - 46"	tan to brown clay, some rust and grey mottling, firm					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-11
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.3**				
0 - 5"	dark grey to black topsoil, moist	47" recovery				0
5 - 48"	tan to brown to reddish brown clay, firm, moist					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-12
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.2**				
0 -4 "	dark grey sandy soil, moist Surface soil (0-3") sample #A8081-16 collected	44" recovery				0
4 - 48"	tan to brown to reddish brown clays, tight/firm, moist some grey mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound North
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	VALUE	HNU
	Ground Surface					
0 - 19"	topsoil	43" recovery				0
19 - 48"	brown mottled clay					
	Surface soil sample collected (0-3") #A8081-13 composite from Mound North, Mound Center and Mound South locations.					
	Waste (topsoil) sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations.					
	Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound Center
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/ M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
0 - 2"	topsoil, dark brown	33" recovery				0
2 - 26"	brown sandy re-worked soil					
26 - 33"	native brown silty clay w/ rusty to yellow mottling					
	Surface soil sample collected (0-2") #A8081-13 composite from Mound North, Mound Center and Mound South locations.					
	Waste (topsoil 2 -26") sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations.					
	Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound South
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
0 -3"	Dark grey sandy silt soil	32" recovery				0
3 - 26"	dark brown re-worked soil, some brick fragments and roots					
26 - 48"	brown silty clay, firm, moist w/ rusty to grey mottling					
	Surface soil sample collected (0-3") #A8081-13 composite from Mound North, Mound Center and Mound South locations.					
	Waste (topsoil 3 -26") sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations.					
	Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

Appendix B

General file
Niagara Mohawk Row
(T) Niagara

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
INDEPENDENT ENVIRONMENTAL ENGINEERS, SCIENTISTS & CONSULTANTS

January 14, 2000

MTH Myst

Mr. Michael Hinton
Senior Engineering Geologist
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

RECEIVED
JAN 18 2000
NYSDEC - REG. 9
FOIL
X REL ___ UNREL

Re: Niagara Mohawk Right-of-Way IIWA Project
Work Assignment No. D002852-20
Town of Niagara, Niagara County, New York

Dear Mr. Hinton:

Malcolm Pirnie, Inc. (Malcolm Pirnie) is pleased to provide the New York State Department of Environmental Conservation (NYSDEC) the attached well installation and development information pertaining to the above-referenced work assignment. As per our conversation on January 12, 2000, the attached submittal fulfills and completes the requirements of the work assignment.

All field tasks were performed in accordance with the August 1999 Work Plan prepared by the NYSDEC. We have attached the following data generated during the field work performed on December 16 through 21, 1999:

- Summary of Final Well Development Parameter Measurements (Table 1).
- Monitoring Well Construction Information (Table 2).
- Boring Logs (4 pages).
- Well Development Logs (6 pages).
- Well Construction Diagrams (4 pages).
- Malcolm Pirnie's Field Notes (7 pages).

It has been our pleasure to provide our services to the NYSDEC and we welcome the opportunity to do so again in the future. If you have any questions or require additional information, please call us at 716-667-0900.

Very truly yours,

MALCOLM PIRNIE, INC.

Jim Richert

James J. Richert, P.G.
Senior Project Geologist

Jim Richert for

Daniel E. Riker
Hydrogeologist

Enclosures

c: A. McManus, MPI
File

0266-342/JJR01140.L5

Table 1

New York State Department of Environmental Conservation
Niagara Mohawk Right-of-Way

Summary of Final Well Development Parameter Measurements

Location	MW-6A	MW-6B	MW-7A	MW-7B
Total Volume Purged (gallons)	100	320	10	95
pH	7.30	7.45	7.28	7.46
Conductivity (µS)	0.339	0.489	0.353	0.732
Temperature (°C)	9.9	9.8	8.4	9.1
Turbidity (NTUs)	288	1	206	134

Table 2

New York State Department of Environmental Conservation
Niagara Mohawk Right-of-Way

Monitoring Well Construction Information

Location	MW-6A	MW-6B	MW-7A	MW-7B
Well Depth	11	23	9.5	22.5
Screened Interval	6 - 11	15 - 23	4.5 - 9.5	14.5 - 22.5
Sand Pack	5 - 11	14 - 23	4 - 9.5	13 - 22.5
Bentonite Chips	3 - 5	11 - 14	1.5 - 4	10.5 - 13
Cement-Bentonite Grout	1 - 3	1 - 11	1 - 1.5	1 - 10.5
Depth To Bedrock	11	11	9.5	9.5
Casing Bottom	NA	13.0	NA	12.5
Measured Bottom(*)	14.17	24.10	11.78	24.22

Notes:
Measurements in feet below grade except (*).
(*) Measured in feet below top of inner casing.
NA - Not Applicable.

FIELD BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, NY

Surface Elev.: ____
Reference Elev.: ____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-6A
Date Started: 12/16/99
Date Finished: 12/16/99
Method of Boring: 4¼" HSA, 2" SS

Depth (BGS)	Sample Collected	Sample ID	Blows (6")	Recovery (Inches)	Description and Remarks Density/Consistency, Color, Plasticity, Soil Types, Texture, Fabric, Bedding, Moisture, Other Characteristics	Moisture	Soil Classification	HNu (ppm) Scan	HNu (ppm) Headspace
			1	16	0-7 GRAY-BROWN SILTY CLAY			0	
1			1		7-16 TAN & GRAY SILTY CA CLAY, COHESIVE.				
			2						
2			3						
			3	14	0-14 RED-BROWN SILTY CLAY, SOME TAN &			0	
3			5		SOME GRAY MOTTLING, COHESIVE.				
			5						
4			4						
			3	18	0-18 SAME AS ABOVE.			0	
5			3						
			4						
6			5						
			5	15	0-15 SAME AS ABOVE			0	
7			5		- SILT CONTENT INCREASES (8-15")				
			4						
8			5						
			1	16	0-16 RED-BROWN SILTY CLAY, MINOR TAN,			0	
9			1		MINOR BLACK, AND MINOR GRAY				
			2		MOTTLING. MODERATELY COHESIVE.				
10			3						
			5	12	0-7 SAME AS ABOVE.			0	
11			7		7-12 RED-BROWN CLAYEY SILT, MINOR				
			50/1		VERY FINE SAND.				
12					GRAVEL-SIZED PIECES OF DOLOSTONE IN SHOE.				
					REFUSAL - END OF BORING				
13									
14									

BEDROCK BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, New York

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-6B
Date Started: 12/16/99
Date Finished: 12/20/99
Method of Boring: HQ Coring

Depth (BGS)	Core Run Number	Recovery (feet)	RQD	Fractures	Description and Remarks Rock Type, Fractures, Bedding Planes, Other Characteristics	PID (ppm) Scan
					AUGER TO 11', ROLLER BIT TO 13'	
					- OVERBURDEN DESCRIBED IN ADJACENT WELL MW-6A	
					START CORING AT 13 Feet	
	1	9.0	85%		13-23' DARK GRAY DOLOSTONE, COMPETENT, HORIZONTAL BEDDING	0
14					SOME VERTICAL FRACTURES, SOME VUGS (1 mm TO 15 mm IN	
					DIAMETER). PRECIPITATED MINERALS IN SOME FRACTURES & VUGS. BIOTURBATED	
15					- HORIZONTAL JOINTING ALONG BEDDING PLANES AT 2.2, 3.6, 4.0, 4.2,	
				1	4.4, 5.9, 6.0, 6.5, 6.9, 8.0, 8.6 & 8.8 FEET BELOW TOP OF CORE.	
16					- VERTICAL FRACTURES AT 2.4-2.6, 4.0-4.2, 6.0-6.3 & 8.8-9.0	
					30° FRACTURE AT 4.2-4.4, AND 60° AT 6.2. ALL FRACTURES	
17					SMALL (< 3 mm), AND SOME INFILLED.	
				1	- SOLUTION CAVITIES: 0.5-0.8 (< 3 mm), 3.9, 4.4-4.7, 5.4-5.5	
18					(< 3 mm); 6.0 (up to 1 cm); 6.9-8.6 MANY	
					SMALL VUGS (< 3 mm) WITH SOME LARGER (up to	
19					1.5 cm) VUGS, SOME OF LARGER VUGS INFILLED	
				1	- WITH PRECIPITATED MINERAL.	
20					- STYLOLITES - 0.1-0.2, 0.9, 1.7, 1.9, 2.6, 3.1, 3.9, 5.8,	
					6.4, 6.6-6.7 AND 8.6-8.8.	
21						
22				1		
23						
					END OF BORING	

FIELD BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, NY

Surface Elev.: ____
Reference Elev.: ____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-7A
Date Started: 12/17/99
Date Finished: 12/17/99
Method of Boring: 4¼" HSA, 2" SS

Depth (BGS)	Sample Collected	Sample ID	Blows (6")	Recovery (In)	Description and Remarks Density/Consistency, Color, Plasticity, Soil Types, Texture, Fabric, Bedding, Moisture, Other Characteristics	Moisture	Soil Classification	HNu (ppm) Scan	HNu (ppm) Headspace
			1	5	0-2 DARK GRAY TO BLACK SILTY CLAY	VM		0	
1			2		2-5 GRAY TO TAN COHESIVE SILTY CLAY	M			
			3						
2			5						
			5	13	0-13 RED-BROWN SILTY-CLAY, SOME GRAY	M		0	
3			5		AND SOME TAN MOTTLING, COHESIVE				
			7						
4			7						
			5	21	0-21 SAME AS ABOVE	M		0	
5			6						
			7						
6			8						
			11	16	0-6 SAME AS ABOVE	M		0	
7			9		6-16 RED-BROWN CLAYEY SILT SOME GRAY				
			11		& SOME TAN MOTTLING.				
8			12						
			3	7	0-7 SAME AS ABOVE, WITH SOME ANGULAR	M		0	
9			4		GRAVEL-SIZED PIECES OF DARK GRAY				
			50/3		DOLOSTONE.				
10									
					REFUSAL - END OF BORING				
11									
12									

BEDROCK BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, New York

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-7B
Date Started: 12/17/99
Date Finished: 12/20/99
Method of Boring: HQ Coring

Depth (BGS)	Core Run Number	Recovery (feet)	RQD	Fractures	Description and Remarks Rock Type, Fractures, Bedding Planes, Other Characteristics	PID (ppm) Scan
					AUGER TO APPROX 9.5 FEET. ROLLER BIT TO 12.5 FEET	
					- OVERBURDEN DESCRIBED IN ADJACENT WELL MW-7A	
					- CORING INITIATED AT 12.5 FEET	
12	(1)	10.0	74%		12.5 → 22.5 DARK GRAY DOLOSTONE, COMPETENT, HORIZONTALLY BEDDED, BIOTURBATED, SOME SOLUTION CAVITIES (1 MM TO 15 MM DIAMETER), PRECIPITATED MINERALS IN SOME FRACTURES AND VUGS.	0
13						
14						
					- HORIZONTAL JOINTING ALONG BEDDING PLANES AT 0.5, 1.1,	
15					1.2, 1.3, 1.6, 2.5, 2.7, 2.8, 3.4, 4.0, 5.9, 6.2, 6.8, 7.0, 7.6,	
					8.3, 8.4, 8.9, 9.4, 9.6 FEET BELOW TOP OF CORE.	
16						
					- VERTICAL FRACTURES (SMALL < 5 MM) AT 2.8-3.4, 7.6-7.9,	
17					8.4-9.2 AND 9.4-9.6'. 15° FRACTURE AT 5.6', AND	
					30° AT 9.8. SOME PARTLY OR COMPLETELY INFILLED.	
18					- GRAVEL - 5-350 PIECES OF BEDROCK & FRACTURES AT 12-13, 7.9-8.1	
					AND 9.8-10.0'.	
19					- SOLUTION CAVITIES (VUGS) AT 0.4' (< 0.3 cm), 1.3-2.5 (UP TO 1.5	
					CM, SOME INFILLED), 3.4-4.0 (0.5 cm), 4.5-6.0 (< 0.3 cm)	
20					6.2-6.8 (FEW, UP TO 1.5 cm, INFILLED), 7.4 (UP TO 0.5 cm)	
					AND 8.1-8.3 (UP TO 0.5 cm).	
21					- STYLOLITES - 0.5-1.1, 1.5, 2.6, 2.7-2.8, 3.3, 4-4.2, 5.7, 6.5,	
					7.1, 7.4, 8.3, 9.1, AND 9.6-9.8.	
22						
23					END OF BORING	

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NYSDEC Niagara Mohawk Right-of-Way Well Installation Project

PROJECT NO. : 0266-342

STAFF: Daniel E. Riker

DATE: 12/20/99 - 12/21/99

WELL NO.: MW-6A

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 14.17

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 3.90

(4) VOLUME OF WATER IN CASING (gal.): 1.75

WELL I.D.	VOL. . GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5
Time	1000	1010	1015	1018	1020	1025	1030	1035	1038	1040	1042
pH	7.17	7.31	7.37	7.39	7.38	7.38	7.37	7.39	7.37	7.36	7.37
CONDUCTIVITY	0.345	0.320	0.317	0.317	0.317	0.320	0.320	0.319	0.319	0.319	0.319
TEMPERATURE	9.6	9.7	9.8	9.9	10.1	10.2	10.1	9.9	10.0	10.1	10.1
TURBIDITY	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000
APPEARANCE	VERY TURBID	RED-BROWN	-	CLEARING SLIGHTLY	-	-	-	-	-	-	-

COMMENTS: PURGE WITH DEDICATED BAILER

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NYSDEC Niagara Mohawk Right-of-Way Well Installation Project

PROJECT NO. : 0266-342

STAFF: Daniel E. Riker

DATE: 12/20/99 - 12/21/99

WELL NO.: MW-6A

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 14.17

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 3.90

(4) VOLUME OF WATER IN CASING (gal.): 1.75

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 \, | \, (2)^2 \times \{ (1) - (3) \} \, | \, =$ _____ GAL.

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS	35	40		5 (45)	10	15	20	25	30	35	40
Time	1045	1050	12/21/99	0945	0950	0955	1000	1005	1010	1015	1020
pH	7.37	7.37	R E	7.29	7.29	7.27	7.28	7.28	7.28	7.28	7.29
CONDUCTIVITY	0.318	0.319	S U	0.323	0.323	0.326	0.331	0.336	0.342	0.344	0.345
TEMPERATURE	10.0	10.0	M E	8.2	9.0	9.2	9.3	9.4	9.4	9.4	9.4
TURBIDITY	>1000	>1000		>1000	>1000	724	785	804	850	977	>1000
APPEARANCE	-	-		-	-	-	-	-	-	-	-

COMMENTS: DTW AFTER 40 GALLONS PURGED = 4.32

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NYSDEC Niagara Mohawk Right-of-Way Well Installation Project

PROJECT NO.: 0266-342

STAFF: Daniel E. Riker

DATE: 12/20/99 - 12/21/99

WELL NO.: MW-6A

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 14.17

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 3.90

(4) VOLUME OF WATER IN CASING (gal.): 1.75

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 \{ (2)^2 \times \{ (1) - (3) \} \} =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	5	10	15	20						
Time	1500	1505	1510	1515	1520						
pH	7.32	7.31	7.30	7.32	7.30						
CONDUCTIVITY	0.340	0.340	0.341	0.340	0.339						
TEMPERATURE	9.8	9.8	9.8	9.8	9.9						
TURBIDITY	85	352	276	269	288						
APPEARANCE	CLEARING SLIGHTLY										

COMMENTS: PURGED WITH PUMP 1500 - 1520 (12/21/99). APPROXIMATE RATE OF 1.25 GPM.

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NIMO ROW (NYSDEC)

PROJECT NO.: 0266-342

STAFF: DANIEL RINDA

DATE: 12/21/99

WELL NO.: MW-6S

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 24.10

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 6.24

(4) VOLUME OF WATER IN CASING (gal.): 3.0

WELL I.D.	VOL. GAL/DAY
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	5	10	15	20						
pH	7.46	7.45	7.45	7.46	7.45						
CONDUCTIVITY	0.482	0.488	0.485	0.489	0.489						
TEMPERATURE	9.4	9.8	9.8	9.9	9.8						
TURBIDITY	0	1	1	0	1						
APPEARANCE	CLEAR	—	—	—	—						

COMMENTS: BEGIN TAKING MEASUREMENTS AFTER PURGING 300 GALLONS FROM THE WELL.

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NYSDEC Niagara Mohawk Right-of-Way Well Installation Project

PROJECT NO.: 0266-342

STAFF: Daniel E. Riker

DATE: 12/20/99 – 12/21/99

WELL NO.: MW-7A

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 11.78

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 8.15

(4) VOLUME OF WATER IN CASING (gal.): 0.6

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS	1	2	3	4	5		5 (10)				
Time	1345	1348	1355	1409	1415		0925				
pH	7.56	7.52	7.49	7.49	7.42		7.28				
CONDUCTIVITY	0.376	0.377	0.345	0.334	0.326		0.353				
TEMPERATURE	8.8	9.1	9.2	9.4	9.3		8.4				
TURBIDITY	850	>1000	560	322	318		206				
APPEARANCE	FAIRLY TURBID	ABO - RAPID	← CLEARING →				SLIGHTLY TURBID				

COMMENTS: PURGED 5 GALLONS EACH DAY

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: NYSDEC NIMO ROW

PROJECT NO.: 0266-342

STAFF: DANIEL F. KINGR

DATE: 12/21/99

WELL NO: RW-7B

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 24.22

(2) CASING INTERNAL DIAMETER (in.): 6.51 → 2"

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 2"

(4) VOLUME OF WATER IN CASING (gal.): 3.0

WELL I.D.	VOL. GAL/DAY
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	5	10	15	20	25	30	35	40	45	
pH	7.44	7.47	7.47	7.46	7.48	7.45	7.43	7.43	7.45	7.46	
CONDUCTIVITY	0.721	0.737	0.740	0.733	0.734	0.733	0.733	0.732	0.731	0.732	
TEMPERATURE	8.3	6.8	9.0	8.9	9.0	9.1	9.1	9.1	9.1	9.1	
TURBIDITY	327	257	258	233	185	161	159	124	136	134	
APPEARANCE	LT. GRAY	-	-	-	-	-	-	-	-	-	

COMMENTS: PURGED 50 GALLONS THIS WELL (WATER USED DURING DRILLING) PRIOR TO COLLECTING MEASUREMENTS.

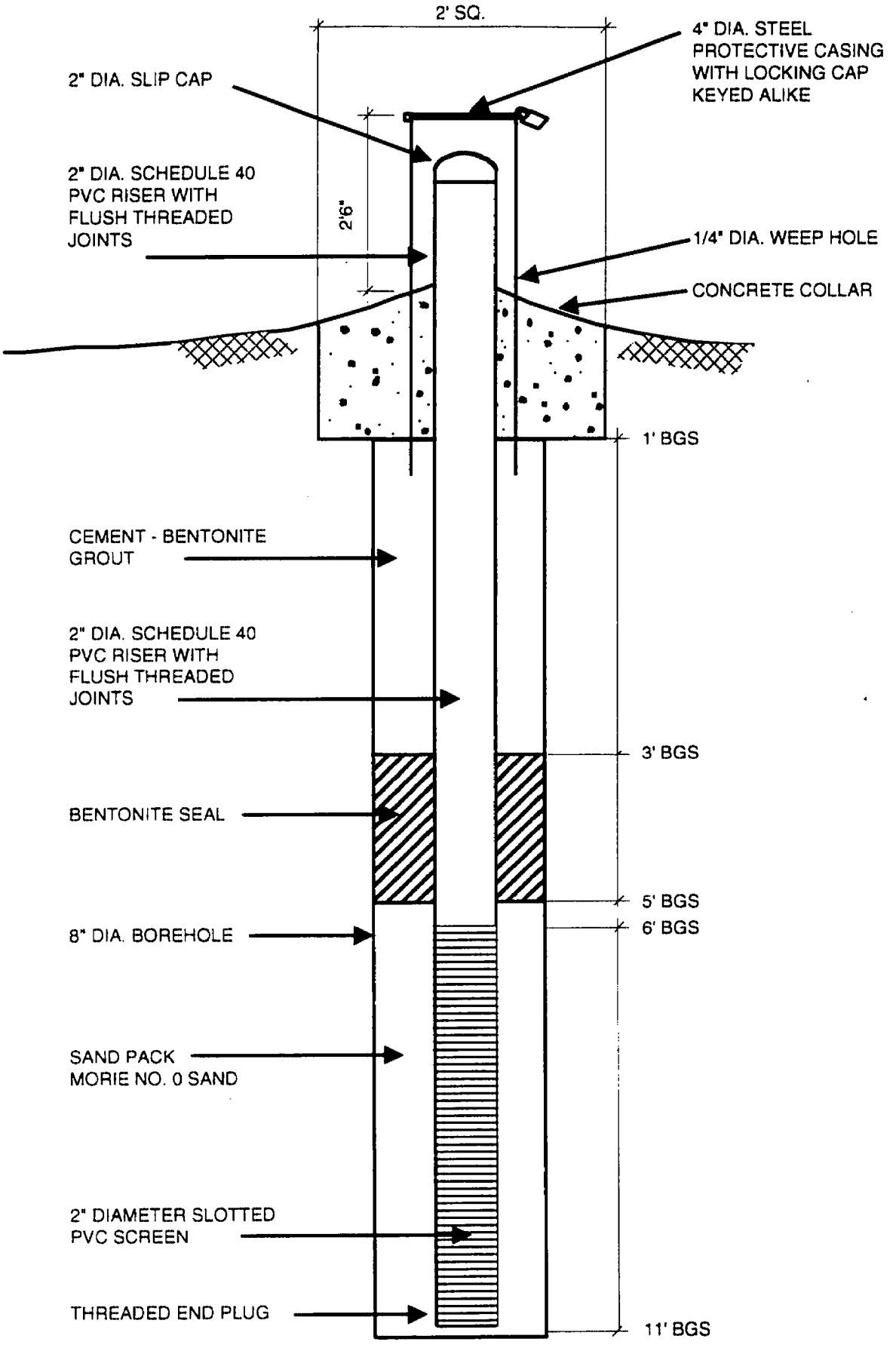


FIGURE B-1
MONITORING WELL MW-6A DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

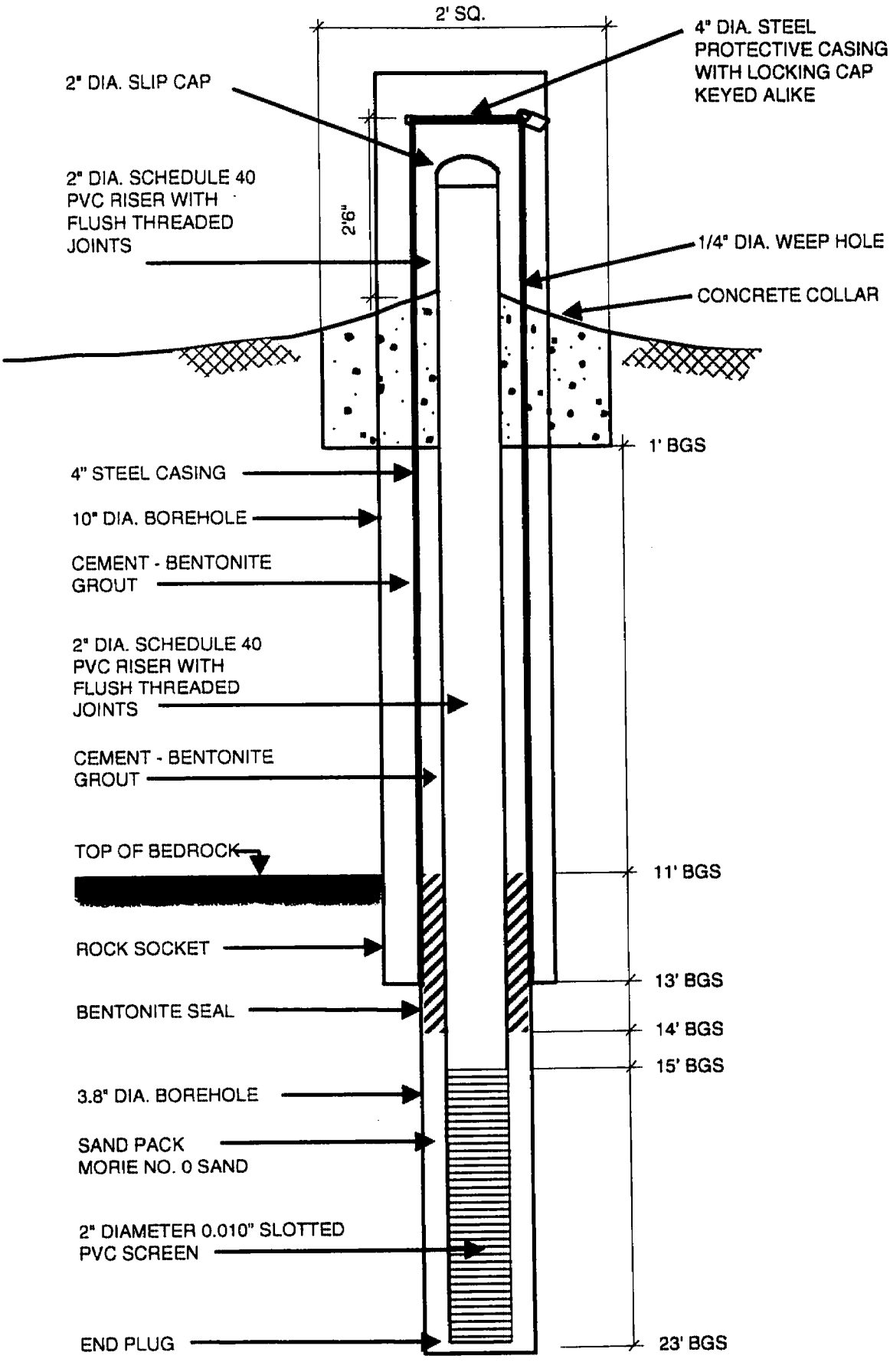


FIGURE B-2
MONITORING WELL MW-6B DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

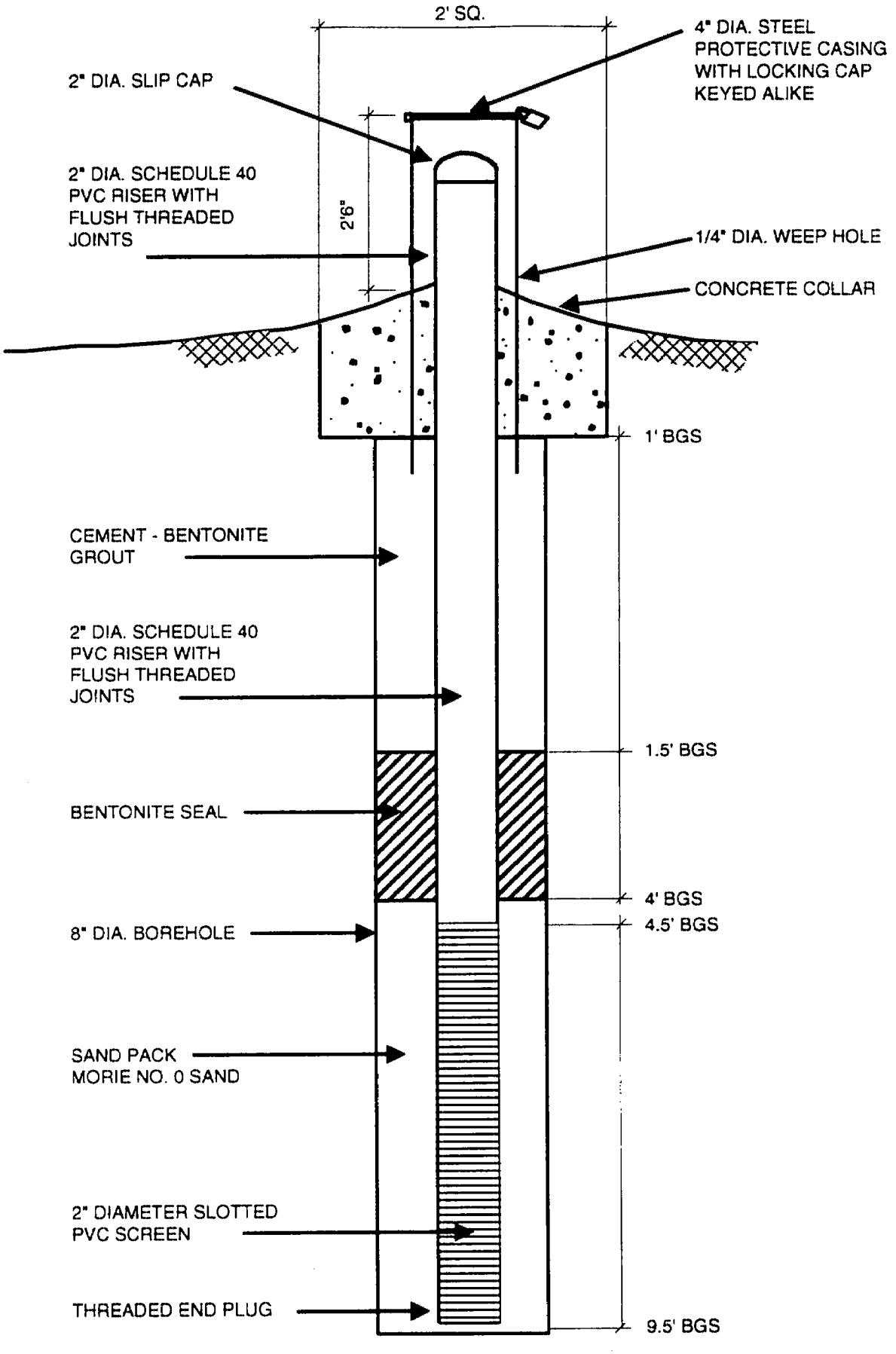


FIGURE B-3
MONITORING WELL MW-7A DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

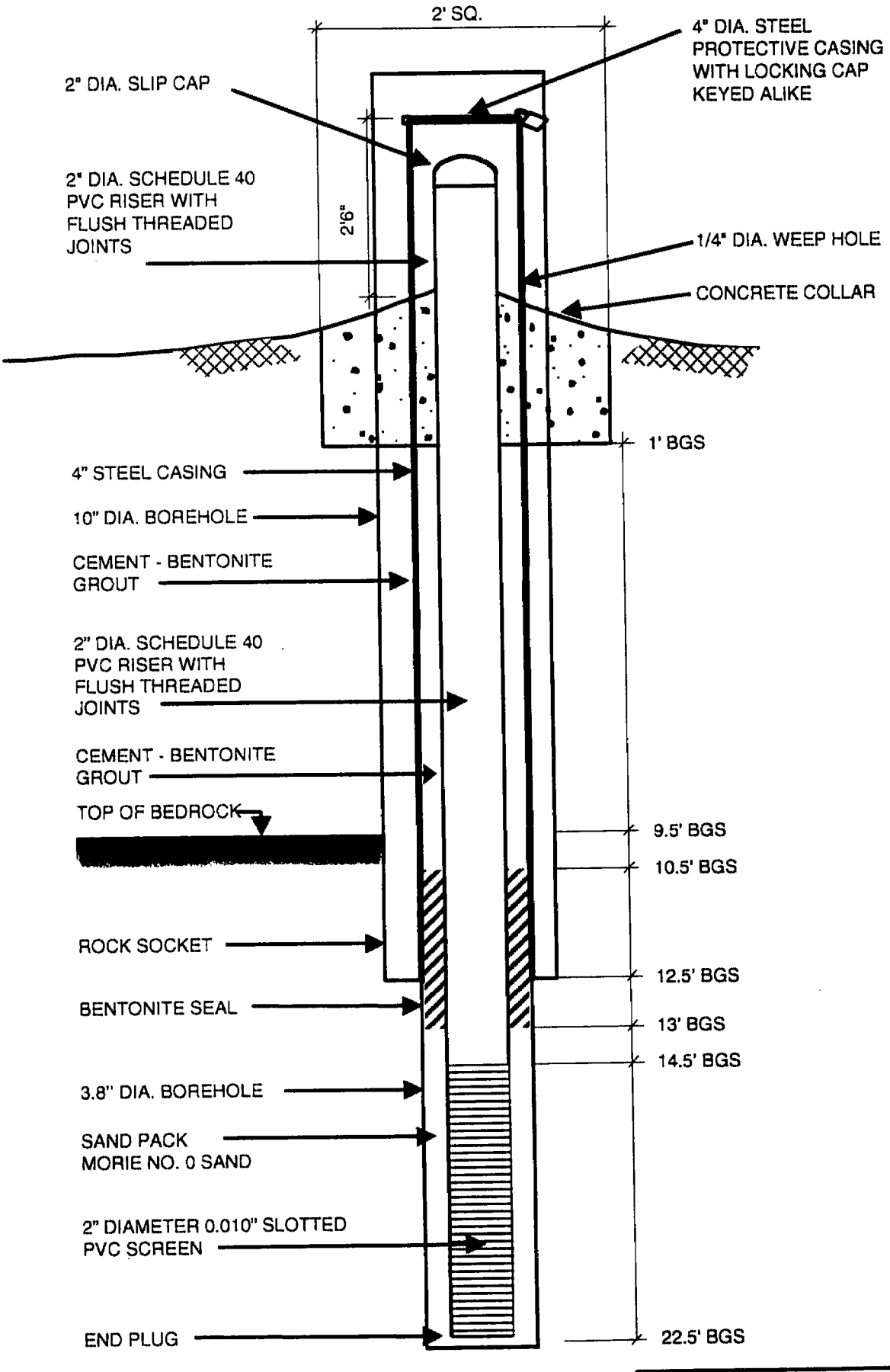


FIGURE B-4
MONITORING WELL MW-7B DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

Projects (continued)

12/16/99 NIMO ROW 1 OF 3 (1)

0750 D. RIKER ONSITE FOR DAY 1 OF WELL INSTALLATIONS. - CLOUDY SKIES, STRONG BREEZE (20) WIND, FREEZING RAIN, 4-6 INCHES OF SNOW PREDICTED FOR TOP OF DAY. CALIBRATE PID (MINIRAE 2000)

0755 SJB ONSITE

DALE & MATT MATTHIES - THEY SEE LOCATIONS, WILL START ON DEEP WELL AT WELL PAIR MW-6 A & B

I CALIBRATE DUST MONITOR

SJB BEGINS DECONNING

0905 MIKE HINTON (NYSDEC) ONSITE

1000 FINISH DECON - SET UP ON MW-6B GROUND RIG USING REBAR POUNDED INTO GROUND AND ATTACH TO RIG WITH WIRE

1010 AMBIENT AIR PID: 0.0 ppm DUST MONITOR = 0.044 mg/m3

1010 - MIKE OFFSITE TO VISIT DIFFERENT SITE.

1015 BEGIN DRILLING - USE 6¼" HSA RIG - CME-750X

DR Eckl 12/16/99

(3)

Nimo Row 2 of 3 12/16/99

1030
0-10' LEA BROWN SILTY CLAY, ROCK FRAGMENT AT 9'
PID = 0.0
1040 AT 11 - 11.5 FEET, APPEAR TO BE ON BEDROCK
- WILL CREATE A ROCK SOCKET
1040 MARK GOODS ONSITE TO LOOK AT CASING WATER IN TO USE AS DRILLING.
1105 BEGIN USING ROLLER BIT (5 7/8" BIT)
1125 MARK ONSITE
1130 MIKE BACK ONSITE
1135 FINISHING ROLLER BIT 2' INTO (11-13') BEDROCK (HARD) ROCK (MIFFICULT DRILLING)
ENCART FOR SMALL (2") SECTION AT 11.5'
1150 NO WATER TO MIX GROUT LEFT
- DRILLERS WILL BRING WATER IN TO RIG USING A CENTRIFUGAL PUMP.
TAKE LUNCH
- DURING LUNCH PUMP ARRIVES.
1230 AROUND ACTIVITIES.
1310 PLACE CASING (4" LOW CARBON STEEL)

12/16/99

(6)

12/16/99 Nimo Row 3 of 3

GROUT IN PLACE
1400 FINISH SETTING CASING, MOVE TO OVERBURDEN WELL NW-6A
PID = 0.0 AT OUTLET = 0.071 ppm
1410 HAMMER NOT WORKING. DRILLERS REMARK TWO HYDRAULIC LINES
1420 BEGIN DRILLING NW-6A → HAMMER STILL NOT WORKING.
1430 HAMMER WORKING - START DRILLING
PID = 0.0 OUT = 0.049
1500 FINISH DRILLING NW-6A
PID = 0.0 OUT = 0.065
BEGIN CONSTRUCTING WELL.
SCREEN 11.6' BGS (10 SLOT)
SAND 11-5' BGS (#0)
5-3' BENTONITE CHIPS @ 5-3'
GROUT 3'-SURFACE
1555 FINISH PLACING WELL.
DRILLERS BEGIN CLEANUP, winterizing.
1600 I CALL IN TO OFFICE.
1615 OFF SITE.

12/16/99

12/16/99

0755 D. RIGGS ~~EOR~~ (SJB) ONSITE FOR CONTINUED (DAY 2) DRILLING ACTIVITIES.

SJB ALREADY ONSITE (DALE & MATT MATTHIES)

- THEY ARE PREPARING TO MOVE TO NEXT LOCATION (MW-7A & B)

- PARTLY CLOUDY SKIES, MODERATE WIND, LOW 20's.

0830 SET UP ON MW-7B.

CALIBRATE DUST MONITOR & PID

PID = 0.0 DUST: 0.048 mg/m³

0835 MIKE IRWIN (NMED) ONSITE

0845 BEGIN DRILLING MW-7A - 6¼" HSA

0855 PID OF CUTTINGS = 0.0 (0-5')

0900 PID OF CUTTINGS = 0.0 ppm (5-9')

- BEGIN ROCK AT ~~9'5"~~ 9' (~~FT~~) / WILL ROLLER BIT TO CONFIRM & TO MAKE ROCK SOCKET).

- STOPPED DRILLING AT 9'10"

- PID = 2.1 IN CASING (0.0 IN BREATHING ZONE).

DUST MONITOR: 0.049 mg/m³

DJ & DL 12/17/99

0915 DUST MONITOR STOPS WORKING.

- WILL CHANGE BATTERY

0930 ROLLER BIT FOR SOCKET AT ~~APPROX~~ APPROXIMATELY 11', A SOFT ZONE (2' THICK) WAS ENCOUNTERED. BECAUSE OF WATER LOSS, ROCK SOCKET WILL BE 3' IN LENGTH.

0935 PID = 0.0 IN BREATHING ZONE & IN AUGERS

1005 AT LEAST 1' PAST THE SOFT ZONE, END ROLLER BIT DRILLING. (APPROX 12' BGS).

PID IN AUGERS = 0.0

- MEASURE BOTTOM - ~~12'~~ (6-9) = 12.5'

- USED ABOUT 200-230 GALLONS DURING ROLLER BIT DRILLING.

1045 MW GROUT ~ 45 GALLONS H_2O + 3 BAGS PORTLAND + ½ BAG BENTONITE PLACE CASING & CUT CASING

~~- 1ST~~ GROUT FLOWING OUT QUICKLY ADD ANOTHER 35-40 GALLONS.

THEN ADD 1 BAG OF BENTONITE POWDER THEN 1 BAG BENTONITE CHIPS.

DJ & DL 12/17/99

1135 MIKE HINTON OFFSITE
1150 BREAK FOR LUNCH, CALL IN TO OFFICE.
1255 AFTER MOVING RIG, BEGIN DRILLING MW-7A
PID: 0.0 ppm
1335 COMPLETE DRILLING OF MW-7A TO 9.5'
PID: 0.0 ppm
BEGIN WELL CONSTRUCTION
SCREEN 9.5-4.5' BGS
SAND 9.5-4.0' BGS
BENTONITE 4-1.5' BGS (GROUT TO SURFACE
1345 MIKE HACK ONSITE
- DAVE ASKS IF USE OF WATER FROM ONSITE HYDRANTS IS ACCEPTABLE FOR USE IN MAKING PADS & COMPLETING THE GROUTING WE NEED TO DO TODAY.
MIKE SAID THATS NO PROBLEM.
1415 FINISH GROUTING, CLEAN EQUIPMENT
1440 MIKE OFFSITE
1450 CUT MW-6B TO SIZE, ALSO CREATE PAD FOR MW-6A, PUT MORE GROUT IN MW-6B. HOLE LOWERED ABOUT 2').

[signature] 12/17/98

1520 BEGIN CLEANUP OF EQUIPMENT, WINTERIZING.
1540 CALL INTO OFFICE.
1600 OFFSITE

[signature] 12/17/98

12/20/99 NIMO ROW 1 OF 3

0800 D. RIKER ONSITE FOR CONTINUED (DAY 3) OF DRILLING ACTIVITIES
- STE ALREADY ONSITE, THEY (DALE & MATT MATTHIES) ARE USING HYDRANT TO FILL TANK ON TRUCK WITH WATER.
- CLOUDY SKIES, LOW 40's, STRONG WIND.

0810 CALIBRATE PID, DUST MONITOR, pH METER (MORIBA WATER CHECKER U-10).

0830 MIKE HINTON (NYSDEC) ONSITE

0840 RAIN BEGINS

0900 STW IN MW-6A = 3.90'
DEPTH TO BOTTOM = 14.17
BELOW TOP OF INNER CASING
SET UP TO CORE MW-6B

0915 BEGIN CORING

0945 FINISH CORING TO 1' BELOW BOTTOM OF CASING (APPROX 27.9' BGS)

0945 - BEGIN DEVELOPING MW-6A USING A DISPOSABLE, DEDICATED BAILER (EXAMINE CORE - FRACTURES THROUGHOUT, SO LIKELY WILL PRODUCE SUFFICIENT WATER.

12/20/99

12/20/99 NIMO ROW 2 OF 3

1015 WELL CONSTRUCTION DETAILS
SCREEN 23 - 15 BGS (2" PVC)
SAND PACK 23 - 14 BGS
BENTONITE CHIPS 14 - 11 BGS
GROUT TO SURFACE

1030 DRILLERS BEGIN CLEANUP.
CONTINUE TROUBLESHOOTING MW-6A (LOG ON SEPARATE SHEET)

1100 DRILLERS GET WATER FROM HYDRANT. WILL TRUCK LUNCH AFTER THAT

1105 MIKE HINTON OFFSITE.
- DALE SAID USED (LOST) 250 GALLONS ON MW-6B

1215 SET UP ON MW-7B FOR CORING OPERATIONS.

1315 FINISH CORING 10' OF MW-7B
- LOST ABOUT 50 GALLONS OF WATER AT STARTING AT ABOUT 7' ABOVE START OF CORING.

1330 MIKE BEGINS BAILING (DEVELOPING) MW-7A.
DTW: 8.15 (FROM TOC)
DTB: 11.78

12/20/99

(10)

12/20/91 NINO 40W 3 OF 3

1410 DRILLERS CLEANUP EQUIPMENT, PREPARE TO MAKE PADS FOR WELL INSTALLATION
SCREEN 22.5 - 14.5
SAND 22.5 - 13
BENT. CHIPS 13 - 10.5
GROUT 10.5 - SURFACE

1415 ANISA ARRIVING NW-7A FOR NOW - DRY - ABOUND 5 GALLONS.
DTW = 10.45'

1420 DTW = 10.05'

1430 MIKE HINTON OFFSITE
I CALL INTO OFFICE FOR UPDATE

1515 BEGIN TO MAKE PAD FOR NW-6B

1520 DTW 5.8 (TOC) IN NW-6B
DTB 24.10

1530 MOVE TO NW-7A/7B

1535 NW-7B - DTW = 6.26
DTB = 24.22
(FROM TOP OF INNER CASING)
CREATE PADS FOR NW-7A/7B. CLEANUP.

1610 OFFSITE

DJ & RK 12/20/91

(11)

12/21/91 NINO RAW 1 OF 3

0755 D. RINAR ONSITE
- SJB (DRILL & MAT MATTHIRS)
AL ARRAY ONSITE
PREPARING EQUIPMENT FOR WELL INSTALLMENT
- CALIBRATE ANIT WATER, PID & HORIBA.
CLOUDY SKIES, COOL 20°, STRONG WIND

0830 MIKE HINTON ONSITE (NYSDEC)
SJB will AECOM AUGERS & RIG BEFORE THEIR WATER FREEZES.
MIKE & I PREPARE TO CONTINUE INSTALLMENT OF NW-7A.

0840 DTW IN NW-7A = 7.66' PID=0.0 ppm
DTW IN NW-7B = 6.51 PID = 1.1 ppm
BAIL 5 GALLONS FROM NW-7A TO TRY TO REDUCE TURBIDITY.

0930 DTW IN NW-8A = 4.49
DTW IN NW-6B = 6.24
BEGIN BAILING NW-6A TO HELP CLEAR TURBIDITY

0955 PUT WHALE PUMP DOWN NW-6B
BEGIN PURGING AT 2-3 GPM.

DJ & RK 12/21/91

(12)

12/21/99 NMO ROW 2 OF 3

1000 WE WILL PURGE ALL WATER FROM DRILLING OUT FIRST, THEN WELL START COLLECTING PARAMETER MEASUREMENTS (DRILLING USED 250-300 GALLONS)

1005 FLOW RATE MEASUREMENT 5 GALLONS IN 2.5 MINUTES

1040 FLOW RATE IS SLIGHTLY SLOWER 5 GALLONS IN 3.5 MINUTES.

1100 BEGIN PURGING MW-7B USING A BAILER. WE WILL REMOVE 50 GALLONS LOST DURING DRILLING, THEN BEGIN COLLECTING PARAMETER MEASUREMENTS.

1240 END PURGING OF MW-7B.

1300 MEASURE FLOW RATES ON MW-6A = 0.67 GPM

FROM 10-10:30 2 GPM (60 GAL)
10:30-12:30 1.5 GPM (120 GAL)
12:30-1300 0.67 GPM (20 GAL)

1305 MIKE MINTON OFFSITE

1305 PULL PUMP, CHECK OPERATION, PLACE BACK IN WELL, TURN THROTTLE DOWN WARDER LOCKED AS

12/21/99

(13)

12/21/99 NMO ROW 3 OF 3

GENERATOR

1310 FLOW RATE IS NOW 1 GPM

1425 CHECK FLOW RATE 5 GALLONS IN 4 MINUTES

1440 BEGIN COLLECTING PARAMETER MEASUREMENTS

1500 END PURGING OF MW-6B, PLACE PUMP IN MW-6A PURGE AT RATE OF 5 GALS PER 4 MINUTES (1.25 GPM)

1520 END PUMPING
- WHILE WE WERE PUMPING, SJB WELDED LOCKING PIECE ONTO THE DEEP WELL, AND CUT WEEP HOLES IN BOTH WELLS.

1545 MOVE TO MW-7A/7B, ATTACH LOCKING PIECE & CUT WEEP HOLES IN BOTH WELLS.

I PLACED A BAILER IN EACH WELL FOR USE, AND EACH WAS LOCKED WITH LOCK # 3232.

1550 FINISH TASKS, PACK EQUIPMENT FOR DEPARTURE

CALL INTO OFFICE

1615 OFFSITE

12/21/99

Appendix C

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

PRELIMINARY SITE ASSESSMENT SUPPLEMENTAL REPORT

Union Carbide Corporation
Carbon Products Division Site
Site Number 932035
Town of Niagara, Niagara County

November 1996

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233

Michael D. Zagata, Commissioner

Division of Hazardous Waste Remediation

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

Prepared by:

Ecology and Environment Engineering, P.C.

ecology and environment engineering, p.c.

BUFFALO CORPORATE CENTER
368 Pleasantview Drive, Lancaster, New York 14086
Tel: 716/684-8060, Fax: 716/684-0844

December 5, 1996

Ms. Valerie Woodward
Senior Engineering Geologist
Western Investigation Section
Bureau of Hazardous Site Control
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New york 12233

Re: Soil Gas Screening Survey Letter Report
Union Carbide Corporation, Carbon Products Division Site, No. 932035

Dear Ms. Woodward:

Under New York State Department of Environmental Conservation (NYSDEC) Standby Contract, (No. D002625-17), Ecology and Environment Engineering , P.C., (E & E) conducted a soil gas survey at the Union Carbide Corporation, Carbon Products Division Site (Site No. 932035). The UCAR Carbon Company, Inc. is the current owner of the Union Carbide Site. The purpose of the soil gas survey was to provide addition data to help determine the source of volatile Organic Compounds (VOCs) in the groundwater beneath the Union Carbide Site. Upon review of the soil gas results, NYSDEC requested that 10 near-surface soil samples be collected to confirm and supplement the soil gas data.

This letter report summarizes the soil gas screening survey and supplemental near-surface soil sampling and is divided into the following four sections and three Appendices:

Text Section:

1 Introduction;
2 Soil Gas Screening Survey;
3 Near-Surface Soil Sampling; and
4 Conclusions

Appendices:

Appendix A Gore Sorber Screening Survey Final Report
Appendix B CRA Duplicate Soil Gas Sample Results
Appendix C Near-Surface Soil Sample Results

1. INTRODUCTION

A Preliminary Site Assessment (PSA) was performed by E & E for NYSDEC at this site with the final PSA report being published in April, 1995. The report summarized the site history and all environmental investigations performed at the site to date. The report concluded that groundwater beneath the Union Carbide Site contains organic contaminants at levels above NYSDEC class GA groundwater standards. Of most concern are chlorinated solvents and their breakdown products including Trichloroethene (TCE), Tetrachloroethene (PCE), total 1,2-Dichloroethene (total 1,2-DCE), cloroethane, chloroform, and vinyl chloride. The most highly contaminated on-site monitoring well is BW-4 which is hydrologically upgradient of the landfill. The source of this groundwater contamination has yet to be determined and may be, at least in part, off-site to the north.

The PSA report recommended additional studies to the north of the site to assist in determining the hydrology of the area and if the site is affected by an off-site source of contamination. A soil gas screening survey was recommended as a cost efficient method to delineate the possible off-site contaminant source and provide information which could be used for optimal placement of off-site monitoring wells, if such wells are deemed necessary.

The soil gas screening survey results provided helpful information which is very useful in understanding the possible source or sources of groundwater contamination at the Union Carbide Site. The qualitative soil gas results were tested, in part, by the collection of near-surface soil samples. Ten soil samples were collected in order to verify and compliment the soil gas data. The locations of some of the ten soil samples were chosen at the time of sample collection based on field observations of unusual surface features. Two features in particular, a small group of three empty drums, and a narrow raised mound of soil/fill, were both found on the NiMo property.

2. SOIL GAS SCREENING SURVEY

In July 1996 a passive soil gas screening survey was performed by E & E using the Gore-Sorber Screening technology patented by W.L. Gore and Associates, Inc. (Gore). The purpose of the survey was to provide qualitative data both on the Union Carbide Site and off site to the north to determine if there is evidence of an off-site source of groundwater contamination.

2.1 SAMPLE LOCATIONS

A total of 50 soil gas sample modules were installed and collected as part of the screening survey, 30 were located on or along the northern property line of the UCAR property and 20 were located off site to the north of the UCAR property. Fifteen of the off-site samples were located on Niagara Mohawk Power Company (NiMo) property and five were on the Airco landfill property, see Figure 1.

Most of the samples on the UCAR property were positioned in two rings around the landfill. An inner"A Ring", containing 14 samples labeled A1 through A13 (including A6A) was installed encircling the landfill directly off of the edge of the clay landfill cap. A second, outer "B Ring", containing 19 samples labelled B1 through B19, was placed approximately 200 feet out from the inner "A Ring". Due to a jog in the northern UCAR property line, five of the samples in the "B Ring" were placed on NiMo property. Two samples, C1 and C2,

were placed through the clay cap of the landfill at its approximate highest elevation. Two east-west lines of sample modules, Lines D and E, were placed off of the UCAR property to the north to test the soil gas near the SKW and Airco landfills north of the site. Line E was located approximately 125 feet north of the northern edge of the "B Ring" and contained seven samples, E2 through E8. Line D was located 125 feet north of- and parallel to the E line and generally overlaid the property line between NiMo and the SKW and Airco landfills. This sample line contained eight samples, D1 through D8.

2.2 SAMPLING PROCEDURES

Installation of the 50 sample modules was performed on July 16 and 17, 1996. Each sample module was placed approximately three feet below the ground surface into a 0.5-inch diameter pilot hole which was created using a hand operated slide hammer.

Immediately after creation of the pilot hole, the air from within the hole was monitored using an Organic Vapor Analyzer (OVA) to measure the total concentration of volatile organic compounds (VOCs) in units of parts per million (PPM). Twenty six sample locations yielded detectable VOCs from the pilot hole as measured with the OVA. Measurements ranged from 0.1 PPM to 1000+ PPM. Because some of the OVA readings were encountered at locations were the soil gas sample detected nothing, it is suspected that some of the readings are the result of naturally occurring methane gas from decaying vegetation in the soil. The soil gas samples were not analyzed for methane. The five highest OVA readings were encountered at samples C1, A6A, B3, B5, and B17 which measured total VOCs of 350, 400, 1000+, 1000+, and 1000+ respectively.

Also at the time of sample installation, the presence of water in the pilot hole was noted where applicable. At seven sample locations water was noted in the pilot hole. Six of these seven were in a wetland area located at the northwestern portion of the survey area. The seventh was on the top of the landfill.

The Final Gore-Sorber Screening Survey Report (Appendix A) contains a listing of each sample with information on the presence of water in pilot holes, and the OVA readings from within the pilot holes.

The modules were placed at the bottom of the pilot holes using a thin stainless steel insertion rod provided by Gore. Upon installation of the, shoelace-like, Gore-Sorber module, the pilot hole was sealed from the ambient air by pounding a new, oversized cork into the top of the pilot hole. The slide hammer and insertion rod were thoroughly decontaminated between sampling locations using alconox soap and distilled water.

On July 30, 1996, after allowing the sample modules to set in the ground for 13 to 14 days, they were retrieved and returned to Gore for analysis. Four trip blanks accompanied the 50 field samples during the sample shipments both from and to Gore.

2.3 SOIL GAS SAMPLE RESULTS

All 50 field samples and four trip blanks were analyzed by Gore for their standard A5 target list which includes 18 VOCs, including vinyl chloride, and eight Semivolatiles (SVOCs). The analysis of these compounds was accomplished using thermal desorption, gas chromatography, and mass selective detection.

The complete Gore Sorber Screening Survey Final Report is provide in Appendix A and contains a complete listing of analytes tested and found as well as color contour maps of trichloroethene (TCE), and tetrachloroethene (PCE), and total concentrations of benzene, toluene, ethylbenzene, and xylene, (BTEX). A plume edge map is also provided and shows an overlay of the plume edges of the three maps mentioned above.

Concentrations were reported by Gore in units of micrograms (μg) detected on the adsorbent material of the module. Several volatile and semivolatile compounds were detected above the method detection limit (MDL) at one or more sample locations. Most prevalent was PCE which was detected at 19 of the 50 locations at concentrations ranging from 0.02 to 102.13 μg. The highest concentration of this compound was found at the sample point nearest the most highly contaminated groundwater monitoring well, BW-4. This compound was detected at most sample points on and near the landfill and was not detected in any of the points north of the site in the D line or E line, see the PCE contour map in Appendix A. TCE, a breakdown product of PCE, was found at 14 sample locations at concentrations ranging from 0.10 μg to 49.94 μg. Again, the highest concentration of TCE was found at the sample point nearest well BW-4. The distribution of this compound was similar to that of PCE with a second high concentration point at the northwest corner of the capped landfill, see the TCE contour map in Appendix A.

Because of its known toxicity and consistent presence in the groundwater at this site, vinyl chloride was of particular interest during the soil gas screening.

Vinyl chloride, however, because of its extreme volatility at standard temperature and pressure, is difficult to detect in soil gas. This compound was detected, however, in one sample (B17) at a concentration of 1.93 μg, slightly above the MDL of 1.77μg.

Benzene, toluene, ethylbenzene, and xylene (BTEX) were detected at several sample locations both on and off the UCAR property. BTEX are constituents of fuels and are commonly found at low levels in urban areas. BTEX was found at highest concentrations at sample points B8 and B9 which are on the NiMo property north and northeast of well BW-4. Two lesser "hot spots" of BTEX were found on the UCAR property at sample points A2 and B17, both of which are located very near site roads, see the BTEX contour map in Appendix A. At this time BTEX is not of primary concern at this site because it is not found in the groundwater. Additionally, the presence of BTEX in soil gas is suspected to be the result of incidental surface contamination from vehicular traffic as apposed to past landfilling or dumping practices. The highest concentrations of BTEX found in soil gas are located near existing site roads and on NiMo property which is traversed with several trails used by all terrain vehicles.

The composite plume edge map prepared by Gore overlays the edges of the three mapped contaminant plumes, see Appendix A. The purpose of this map is to show the aerial extent and relationship of the three plumes of interest. This map shows that the PCE and TCE plumes overlay each other very closely and indicate that these compounds appear to be limited to the UCAR property and part of the NiMo property near- and adjacent to the northeast portion of the landfill. The BTEX plume edge covers a larger area than the PCE and TCE edges and includes three sample points to the north of the PCE and TCE plumes, two on the NiMo and one on the Airco property.

The limits of the PCE and TCE soil gas plumes within the study area have been defined to the north, east, and south but not to the west where uncapped fill material is known to exist. Conversely, the limits of the BTEX soil gas plume are poorly defined and appear to extend, at least partially, in all directions.

Several other VOCs, primarily isomers of DCA, DCE, and TCA and SVOCs were detected in the soil gas at various sample locations, most of which were on UCAR property. These compounds were found at less frequency and concentration than those already discussed.

As a quality check of the soil gas screening, UCAR Carbon Company had their consultant, CRA, perform a scaled down soil gas screening survey along side of the E & E survey. Fifteen of the E & E soil gas sample locations were "duplicated" by CRA using the same Gore-Sorber method. The duplicate samples were placed in separate pilot holes adjacent to the E & E sample locations and retrieved at approximately the same time as the E & E samples.

The CRA samples were analyzed for a shorter list of eight compounds compared to the E & E samples which were analyzed for 26 compounds.

In general, the duplicate results obtained by CRA agreed with the results obtained by E & E. Only one compound (PCE) at one location (A6) was an order of magnitude lower in the duplicate sample than the E & E sample. The concentrations of both samples were doubled checked by Gore and found to be correct. Appendix B contains a listing of the CRA soil gas results as compared to the E & E results.

3. NEAR SURFACE SOIL SAMPLING

On August 26, 1996, per the request of NYSDEC, E & E and NYSDEC collected 10 near-surface soil samples and shipped them to the NYSDEC laboratory in Albany, New York for VOC analysis. These 10 samples were collected from locations on NiMo property, northeast of the Union Carbide landfill at 2-foot depths. Five of the sample locations (SS-1, SS-2, SS-3, SS-7, and SS-9) overlapped soil gas sample points to confirm existing soil gas data. The remaining five samples were collected from other areas in order to provide analytical information additional to the soil gas survey. Two samples SS-5 and SS-10 were collected at suspicious surface features. Sample SS-5 was collected from under a group of three empty drums which were covered with a black, tar-like substance. Sample SS-10 was collected from a soil/fill mound approximately 20 feet wide by 100 feet long by four feet high. This soil/fill mound is oriented in a north-south direction and is located approximately between soil gas samples A6A and B6. The contents of this mound is suspected to be similar to the surrounding soils which were observed to also contain fill material. Figure 1 provides the locations of the 10 near surface soil samples.

Only two of the 10 near-surface soil samples contained detectible levels of organic constituents, SS-2 and SS-10. Sample SS-2 was collected at the hottest soil gas sample point, A6A. Sample SS-10 was collected from the soil/fill mound discussed above. Nothing was detected from soil sample SS-5, at the location of the drums. Both of the samples which contained organic compounds contained the same three chlorinated organics, cis-1,2-DCE, TCE, and PCE, and at similar concentrations, ranging from 12 to 100 μg/Kg. These same compounds were found at highest concentrations in the soil gas at sample location A6A, where soil sample SS-2 was collected, and very near to where SS-10 was collected from the soil/ fill

mound. Table 3-1 contains a summary of analytical results and Appendix C contains the complete listings of analytical results for the near-surface soil samples as provided by NYSDEC.

4. CONCLUSIONS

- The soil gas screening survey proved to be a very useful and cost effective tool for gaining a better understanding of potential sources of groundwater contamination at the Union Carbide Landfill site.

- The results of the CRA duplicate soil gas samples validated the results of the samples collected by E & E. The single variance of one compound at one location is statistically insignificant and does not diminish the results of either survey. The reason for the variance remains undetermined at this time.

- BTEX compounds were found in the soil gas both on- and off of the UCAR property but are not of concern at this time. These compounds have not been found in the groundwater and are suspected to be the result of isolated gasoline spills or leaks from vehicles being driven over the properties.

- TCE and PCE soil gas plumes are well defined to the north, east and south within the survey area. Areas to the west and southwest of the study area, where uncapped fill material is known to exist, also may contain these same contaminants in the soil gas and or soil. To date no studies have been conducted in that area.

- Soil gas samples collected from the top of the capped landfill contained contaminants similar to those found in the groundwater on site. The relatively low concentrations of these contaminants, however, indicates that the landfill may not be the only possible source of groundwater contamination.

- The source(s) of groundwater contamination found beneath the Union Carbide Landfill are not likely limited to the UCAR property but may also include the Nimo property adjacent to- and to the north of the Union Carbide Landfill. The near-surface soil sample results confirm that organic contamination exists in off-site soils similar to that found in the soil gas and groundwater on the Union Carbide Site. The compounds found in the soil/fill mound, located on NiMo property, match those found in the most highly contaminated groundwater monitoring well (BW-4) and soil gas collected near this well. This indicates that the contaminated soil/fill material on the NiMo property is a potential source of groundwater contamination to both the NiMo property and the Union carbide Site and should be investigated further to determine its extent and effects, if any, on the groundwater.

- There is no indication by the soil gas and near-surface soil sample results that the SKW or Airco landfills are a source of groundwater contamination to the Union Carbide Site.

If you have any questions concerning this report, please call me at (716) 684-8060.

Sincerely,

Jim Richert

James J. Richert, P.G.
Site Manager

JJR/kvk/YR9060

xc: H. Shapiro
J. Griffis
M. Hinton, NYSDEC Region 9
CTF: YR9000

Table 3-1

Near-Surface Soil Sample Analytical Results

Union Carbide Corporation, Carbon Products Division Site (NYSDEC Site Number 932035)

Volatile Organic Compound	Sample Number/Concentration (in µg/kg)									
	SS 01	SS 02	SS 03	SS 04	SS 05	SS 06	SS 07	SS 08	SS 09	SS 10
acetone	u	u	u	u	u	u	u	u	u	u
benzene	u	u	u	u	u	u	u	u	u	u
bromoform	u	u	u	u	u	u	u	u	u	u
bromomethane	u	u	u	u	u	u	u	u	u	u
bromodichloromethane	u	u	u	u	u	u	u	u	u	u
2-butanone	u	u	u	u	u	u	u	u	u	u
carbon Disulfide	u	u	u	u	u	u	u	u	u	u
carbon Tetrachloride	u	u	u	u	u	u	u	u	u	u
chlorobenzene	u	u	u	u	u	u	u	u	u	u
chloroethane	u	u	u	u	u	u	u	u	u	u
chloroform	u	u	u	u	u	u	u	u	u	u
2-chlorotoluene	u	u	u	u	u	u	u	u	u	u
4-chlorotoluene	u	u	u	u	u	u	u	u	u	u
dibromodichloro-methane	u	u	u	u	u	u	u	u	u	u
1,3-dichlorobenzene	u	u	u	u	u	u	u	u	u	u
1,1-dichloroethane	u	u	u	u	u	u	u	u	u	u
1,2-dichloroethane	u	u	u	u	u	u	u	u	u	u
1,1-dichloroethene	u	u	u	u	u	u	u	u	u	u
cis-1,2-dichloroethene	u	**19**	u	u	u	u	u	u	u	**36**
trans-1,2-dichloroethene	u	u	u	u	u	u	u	u	u	u

Table 3-1

Near-Surface Soil Sample Analytical Results

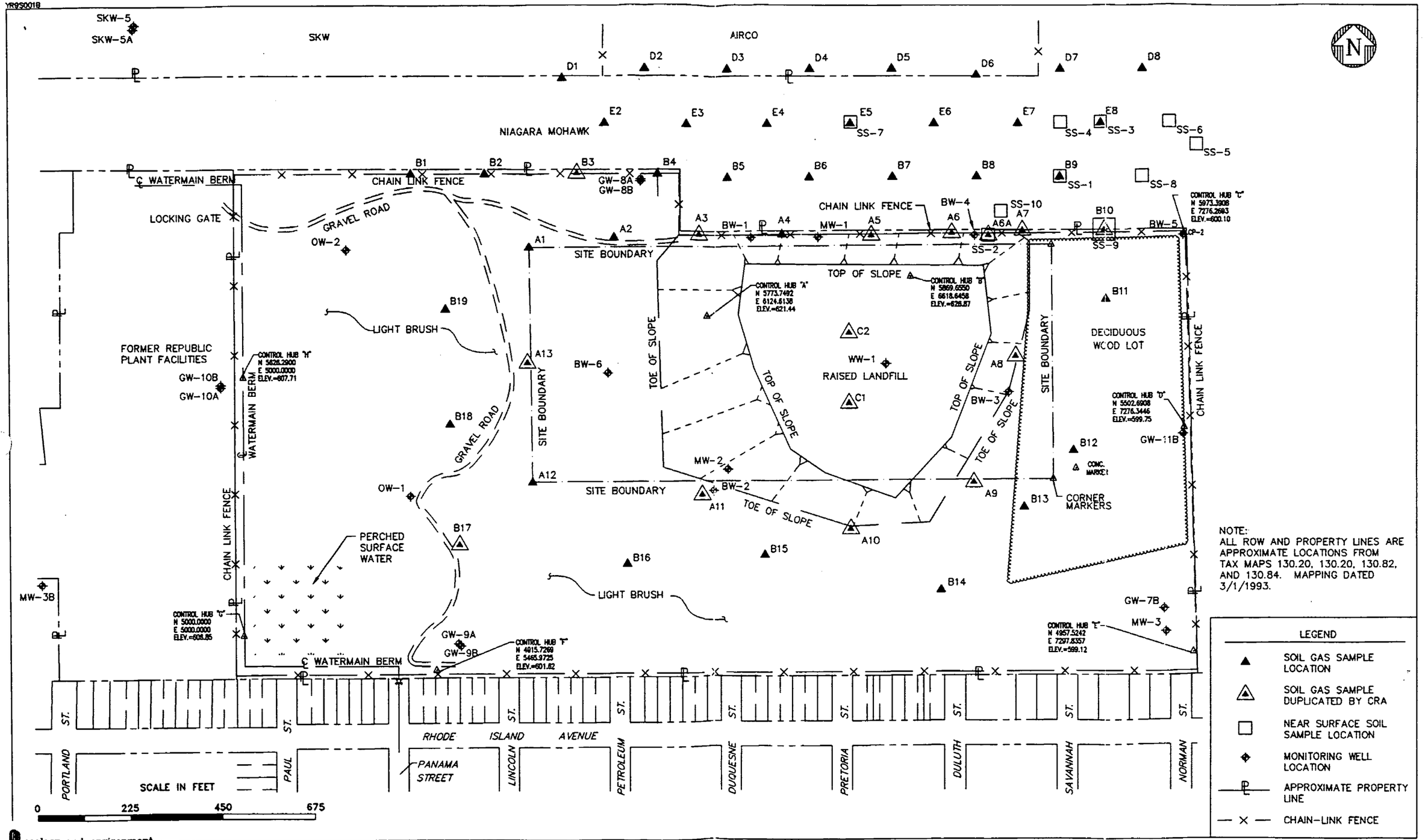
Union Carbide Corporation, Carbon Products Division Site (NYSDEC Site Number 932035)

Volatile Organic Compound	Sample Number/Concentration (in µg/kg)									
	SS 01	SS 02	SS 03	SS 04	SS 05	SS 06	SS 07	SS 08	SS 09	SS 10
1,2-dichloropropane	u	u	u	u	u	u	u	u	u	u
cis-1,3-dichloropropene	u	u	u	u	u	u	u	u	u	u
trans-1,3-dichloropropene	u	u	u	u	u	u	u	u	u	u
ethylbenzene	u	u	u	u	u	u	u	u	u	u
2-hexanone	u	u	u	u	u	u	u	u	u	u
4-methyl-2-pentanone	u	u	u	u	u	u	u	u	u	u
methylene chloride	u	u	u	u	u	u	u	u	u	u
styrene	u	u	u	u	u	u	u	u	u	u
tetrachloroethene	u	**100**	u	u	u	u	u	u	u	**12**
1,1,2,2-tetrachloroethane	u	u	u	u	u	u	u	u	u	u
toluene	u	u	u	u	u	u	u	u	u	
1,1,1-trichloroethane	u	u	u	u	u	u	u	u	u	u
1,1,2-trichloroethane	u	u	u	u	u	u	u	u	u	u
trichloroethene	u	**43**	u	u	u	u	u	u	u	**19**
trichloroflouromethane	u	u	u	u	u	u	u	u	u	u
vinyl acetate	u	u	u	u	u	u	u	u	u	u
vinyl chloride	u	u	u	u	u	u	u	u	u	u
o-xylene	u	u	u	u	u	u	u	u	u	u
m,p-xylene	u	u	u	u	u	u	u	u	u	u

Notes:

Near-surface soil samples collected from the 2-foot depth on August 26, 1996.
U = compound not detected above the quantitation limit.

YR9S0018



NOTE:
ALL ROW AND PROPERTY LINES ARE APPROXIMATE LOCATIONS FROM TAX MAPS 130.20, 130.20, 130.82, AND 130.84. MAPPING DATED 3/1/1993.

LEGEND

- ▲ SOIL GAS SAMPLE LOCATION
- △ SOIL GAS SAMPLE DUPLICATED BY CRA
- □ NEAR SURFACE SOIL SAMPLE LOCATION
- ◆ MONITORING WELL LOCATION
- PL APPROXIMATE PROPERTY LINE
- — × — CHAIN-LINK FENCE

ecology and environment

Figure 1 SOIL GAS AND NEAR SURFACE SOIL SAMPLE LOCATION MAP UNION CARBIDE SITE

APPENDIX A

GORE-SORBER SCREENING SURVEY FINAL REPORT

W. L. GORE & ASSOCIATES, INC.
101 LEWISVILLE ROAD • P.O. BOX 1100 • ELKTON, MARYLAND 21922-1100 PHONE: 410/392-3300
FAX: 410/996-3325 • TELEX 467637 GORE FB ELKT
ENVIRONMENTAL PRODUCTS GROUP

GORE-SORBER[SM] Screening Survey
Final Report

Union Carbide Site
Niagara County, NY

August 23, 1996

Prepared For:
Ecology and Environment Engineering, P.C.
Buffalo Corporate Center
368 Pleasantville Drive
Lancaster, NY 14086

W.L. Gore & Associates, Inc.
Written/Submitted by

Jay W. Hodny, M.S.
Associate

W.L. Gore & Associates, Inc.
Reviewed/Approved by

Ray F. Fenstermacher, P.G.
Associate

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FORM 11R.3
Rev 06/13/96

GORE-SORBER[sm] Screening Survey
Final Report

REPORT DATE: August 23, 1996 **AUTHOR:** JWH

SITE INFORMATION

Site Reference: Union Carbide Site, Niagara County, NY
Customer Purchase Order Number: 11795
Gore Production Order Number: 069273 **Gore Site Code:** QX

FIELD PROCEDURES

 # Modules shipped: 55
Installation Date(s): July 16, 17, 1996 **# Modules Installed:** 50
Field work performed by: Ecology & Environment

Retrieval date(s): July 30, 1996 **Exposure Time:** 13-14 [days]
 # Modules Retrieved: 50 **# Trip Blanks Returned:** 4
 # Modules Lost in Field: 0 **# Unused Modules Returned:** 1*

Date/Time Received by Gore: July 31, 1996 **By:** CJF
Recorded Cooler/Water Temperature Control Blank temperature: 4.0 [°C]
Chain of Custody Form attached: √
Chain of Custody discrepancies: None.
Comments: * - COC module indicates 123004 was retained by Ecology and Environment.

GORE-SORBER℠ Screening Survey
Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990. The Laboratory is audited regularly by a quality system design, development and auditing company.

Instrumentation consists of Hewlett-Packard 5890 gas chromatographs and 5971 mass selective detectors, as well as Perkin-Elmer ATD 400 automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Screening Method Quality Assurance:

Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in our methods before samples can be analyzed. A sorber containing BFB is also analyzed after every 30 samples and/or trip blanks, as is a method blank. Standards containing the selected target compounds at three calibration levels of 5, 20, and 50µg are analyzed at the beginning of each run. The criterion for each target compound is less than 35% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 20µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by the presence of the target ion and at least two secondary ions, retention time versus reference standard, and the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Quality Assurance Level: 2 (ANA-4)
Instrument ID: # 2 **Chemist:** JW **Data Subdirectory:** 069273
Compounds/mixtures requested: Gore GS3; Standard VOCs and SVOCs target list (A5).
Deviations from Standard Method: None.
Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 4).

GORE-SORBER[sm] Screening Survey Final Report

DATA TABULATION

 # CONTOUR MAPS ENCLOSED: Four (4) B-size maps
LIST OF MAPS ENCLOSED:

- BTEX
- TCE
- PCE
- Soil Gas Plume Edges**

Compound Name	Method Detection Limit [µg]	Low Map (gray) Limit [µg]	Highest Detect Level [µg]	Upper Map (purple) Limit [µg]
BTEX	0.01	0.01	34.53	34.53
TCE	0.02	0.02	49.94	49.94
PCE	0.02	0.02	102.13	102.13

* - the edges are defined as the contour line representing the method detection limit (MDL)

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE-SORBER Screening Modules received and analyzed by W.L. Gore, as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on either a single-level (QA Level 1) or three-level (QA Level 2) standard calibration.

Comments:

- The minimum (gray) contour level, for each mapped analyte or group of analytes, was set at the maximum blank level observed or the MDL, whichever was greater. The maximum contour level was set at the maximum value observed.
- The map labeled, Soil Gas Plume Edges, was constructed at the request of Ecology and Environment. The word "edge" refers to the contour line representing the method detection limit. It represents the contour boundary calculated during the interpolation steps, and separates levels of target analytes reported above and below the method detection limit.

GORE-SORBER℠ Screening Survey
Final Report

KEY TO DATA TABLE
Union Carbide Site, Niagara County, NY

UNITS	
µg	micrograms (per sorber), reported for compounds using external standards.
MDL	method detection limit
ANALYTES	
VC	vinyl chloride
BTEX	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
C11-C15	combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
MTBE	methyl t-butyl ether
t12DCE	trans-1,2-dichloroethene
11DCA	1,1-dichloroethane
c12DCE	cis-1,2-dichloroethene
ct12DCE	cis- & trans-1,2-dichloroethene
$CHCl_3$	chloroform
111TCA	1,1,1-trichloroethane
12DCA	1,2-dichloroethane
BENZ	benzene
CCl_4	carbon tetrachloride
TCE	trichloroethylene
TOL	toluene
OCT	octane
PCE	tetrachloroethene
ClBENZ	chlorobenzene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene
135TMB	1,3,5-trimethylbenzene
124TMB	1,2,4-trimethylbenzene
TMBs	1,2,4- & 1,3,5-trimethylbenzene
N&2MN	naphthalene & 2-methylnaphthalene
14DCB	1,4-dichlorobenzene
UNDEC	undecane
NAPH	naphthalene
TRIDEC	tridecane
2MeNAPH	2-methyl naphthalene
PENTADEC	pentadecane
BLANKS	
TB n	unexposed trip blanks, which traveled with the exposed modules
method blank	method blank, retained at Gore

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 19273

W. L. Gore & Associates, Inc., Environmental Products Group
101 Lewisville Road • Elkton, Maryland 21921 • Tel: (410) 392-3300 • Fax (410) 996-3325

Instructions: Customer must complete ALL shaded cells

Customer Name: ECOLOGY & ENVIRONMENT	Site Name: UNION CARBIDE LANDFILL
Address: 368 PLEASANT VIEW DR	Site Address:
LANCASTER NY 14086	NIAGRA COUNTY NY
	Project Manager: JIM RICHERT
Phone: 716 684 8060	Customer Project No.:
FAX: 716 684 0844	Customer P.O. #: 11745 Quote #: BK 6662

Serial # of Modules Shipped			# of Modules for Installation 50 # of Trip Blanks 5
# 12945	through	# 12964	Total Modules Shipped: 55 Pieces
# 12970	through	# 12984	Total Modules Received: 54 5 AR Pieces
#	through	#	Total Modules Installed: 50 Pieces
#	through	#	Serial # of Trip Blanks (*Client Decides*) # —
#	through	#	# 12300 # 12304 # —
#	through	#	# 12301 # — # —
#	through	#	# 12302 # — # —

Installation Performed By:	Installation Method(s) (*circle those that apply*):
Name (*please print*): Jim Richert/Rick Watt	(Slide Hammer) Hammer Drill Auger
Company/Affiliation: Ecology & Environment	Other:
Installation Start Date and Time: 7 / 16 / 96 09 : 35 (AM) PM	
Installation Complete Date and Time: 7 / 17 / 96 11 : 51 (AM) PM	
Retrieval Performed By:	Total Modules Retrieved: 50 Pieces
Name (*please print*): Jim Richert/Rick Watt	Total Modules Lost in Field: 0 Pieces
Company/Affiliation: Ecology & Environment	Total Unused Modules Returned: 0 Pieces
Retrieval Start Date and Time: 7 / 30 / 96 09:09 (AM) PM	
Retrieval Complete Date and Time: 7 / 30 / 96 12:25 AM (PM)	

Target Analytes to be Mapped (*Check Options or List as appropriate*):	To Be Determined Pending Completion of Lab Analysis ☒ or write "None", if applicable. Remember VINYL CHLORIDE	
Analyte #1:	Analyte #2:	Analyte #3:

Other Instructions, if any: Particularly interested in TCE, PCE, V.C. BTEX & TPH

Relinquished By C. Jenkins	Date 7/12/96	Time 1500	Received By: J. Richert	Date 7-15-96	Time 1400
Affiliation: W.L. Gore & Associates, Inc.			Affiliation: E+E		
Relinquished By Jim Richert	Date 7/30/96	Time 1200	Received By:	Date	Time
Affiliation: E+E			Affiliation:		
Relinquished By	Date	Time	Received By: C. Jenkins	Date 7/31/96	Time 10:30
Affiliation			Affiliation: W.L. Gore & Associates, Inc.		
			Temperature of Samples When Received By Gore	4 C	°C

FORM 8R2

GORE-SORBER® Screening Survey
Installation and Retrieval Log

Page 1 of 2

SITE NAME & LOCATION
UNION CARBIDE CORPORATION
CARBON PRODUCTS DIVISION SITE
TOWN OF NIAGARA, NIAGARA COUNTY, NY

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS * E+E SAMPLE #	
				LPH	ODOR	NONE	YES	NO		OVA
1.	122945	7-16-96 1100	7-30-96 0958	NO	NO	✓		✓	B12	0
2.	46	" 1107	0953			✓		✓	A9	0
3.	47	" 1115	0947			✓		✓	B13	0
4.	48	" 1128	1010			✓		✓	B11	0
5.	49	" 1210	0914			✓		✓	A13	12
6.	50	" 1220	0916			✓		✓	B19	0
7.	51	" 1228	0920			✓		✓	B18	1
8.	52	" 1239	0927			✓		✓	A12	0.2
9.	53	" 1252	0923			✓		✓	B17	1000
10.	54	" 1327	0932			✓		✓	B16	0
11.	55	" 1342	0936			✓		✓	A11	5.5
12.	56	" 1352	0941			✓		✓	B15	0
13.	57	" 1406	0946			✓		✓	A10	0
14.	58	" 1415	0950			✓		✓	B14	0.2
15.	59	" 0935	0909			✓		✓	A1	4
16.	60	" 0950	1024			✓		✓	A2	0.2
17.	61	" 0957	1022			✓		✓	A3	1.0
18.	62	" 1005	1020			✓		✓	A4	0.5
19.	63	" 1012	1018			✓		✓	A5	0
20.	64	" 1018	1016			✓		✓	A6	0
21.	122970	" 1026	1014			✓		✓	A6A	400
22.	71	" 1035	1007			✓		✓	A7	0
23.	72	" 1042	1009			✓		✓	B10	0
24.	73	" 1052	1004			✓		✓	A8	0.8
25.	74	" 1430	1306			✓		✓	C1	350
26.	75	" 1440	1313			✓	✓	Dry	C2	0.5
27.	76	" 1457	1035			✓	✓		B4	0
28.	77	" 1504	1040			✓	✓		B3	1000
29.	78	" 1519	1043			✓		✓	B2	0
30.	79	" 1523	1045			✓		✓	B1	0
31.	80	7-17-96 0911	1108			✓	✓	✓	D1	3.5
32.	81	0920	1110			✓		✓	D2	0.2
33.	82	0924	1113			✓	✓		D3	0.4
34.	83	0932	1115			✓		✓	D4	20
35.	84	0938	1117			✓		✓	D5	0.1
36.	85	0945	1119			✓		✓	D6	2.8
37.	86	1004	1125			✓		✓	D7	0
38.	87	615	1129			✓		✓	D8	0
39.	88	1023	1131			✓		✓	E8	0
40.	89	1031	1135			✓		✓	E7	0
41.	90	1041	1138			✓		✓	E6	0.1
42.	91	1050	1141			✓		✓	E5	0

GORE-SORBER® Screening Survey
Installation and Retrieval Log

SITE NAME & LOCATION
Union Carbide Corporation
Carbon Products Division Site
Town of Niagara, Niagara County, New York

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS	
				LPH	ODOR	NONE	YES	NO	E+E #	OVA (PPM)
43.	62992	7-17-96 1059	7-30-96 1144			✓		✓	E4	0
44.	93	1105	1150			✓		✓	E3	1.8
45.	94	1119	1153			✓	✓		E2	60
46. *	95	1129	1159			✓	✓		B5	1000 +
47.	96	1135	1201			✓		✓	B6	2.0
48.	97	1140	1204			✓		✓	B7	0
49. *	98	1146	1211			✓		✓	B8	0
50. *	99	1151	1215			✓		✓	B9	0
51.	12300	NA	NA			✓	NA	NA	TRIP1	NA
52.	01	NA	NA			✓	NA	NA	TRIP2	NA
53.	02	NA	NA			✓	NA	NA	TRIP3	NA
54.	03	NA	NA			✓	NA	NA	TRIP4	NA
55.	12304	Retained by E+E will not analyze								
56.										
57.										
58.										
59.										
60. *	JAR JACKEN	NEW JNR + NEW LID								
61. *	" "	BLUE LID								
62. *	JAR JACKEN	NEW JAR + LID								
63.										
64.										
65.										
66.										
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GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
ECOLOGY AND ENVIRONMENT, LANCASTER, NY
VINYL CHLORIDE PLUS A1 (A5)
UNION CARBIDE LANDFILL, NIAGARA COUNTY, NY
SITE QX - 069273

DATE ANALYZED		MODULE NUMBER	VC, ug	BTEX, ug	MTBE, ug	ct12DCE, ug	t12DCE, ug	11DCA, ug	c12DCE, ug	CHCl3, ug	111TCA, ug	12DCA, ug	BENZ, ug	CCl4, ug	TCE, ug	TOL, ug	OCT, ug	PCE, ug	CIBENZ, ug
		MDL =	1.77	0.01	0.10	0.02	0.06	0.06	0.02	0.03	0.08	0.02	0.02	0.07	0.02	0.02	0.02	0.02	0.01
08/05/96	B12	122945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/05/96	A9	122946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/05/96	B13	122947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/05/96	B11	122948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/05/96	A13	122949	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.62	0.00
08/05/96	B19	122950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00
08/05/96	B18	122951	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	1.06	0.00
08/05/96	A12	122952	0.00	0.48	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	2.80	0.40	0.00	2.08	0.00
08/05/96	B17	122953	1.93	2.49	0.00	0.30	0.14	0.42	0.16	0.00	0.00	0.11	0.54	0.00	0.28	1.09	2.96	0.04	0.00
08/06/96	B16	122954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	A11	122955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	2.87	0.00
08/06/96	B15	122956	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00
08/06/96	A10	122957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	B14	122958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	A1	122959	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	15.15	0.24	0.00	3.87	0.00
08/06/96	A2	122960	0.00	8.60	0.00	2.22	1.20	0.00	1.02	0.00	0.00	0.00	5.91	0.00	0.95	1.09	3.02	1.77	0.20
08/06/96	A3	122961	0.00	1.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.07	0.98	0.87	0.83	0.00
08/06/96	A4	122962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
08/06/96	A5	122963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	3.09	0.00	0.00	5.28	0.00
08/06/96	A6	122964	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.08	0.00	60.86	0.00
08/06/96	A6A	122970	0.00	0.15	0.00	8.26	0.54	0.00	7.72	0.05	0.00	0.00	0.15	0.00	49.94	0.00	0.00	102.13	0.00
08/06/96	A7	122971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	B10	122972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	A8	122973	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	C1	122974	0.00	3.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.10	0.62	1.15	0.31	0.00
08/06/96	C2	122975	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	B4	122976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	B3	122977	0.00	2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.21	0.00	0.00	0.05
08/06/96	B2	122978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00
08/06/96	B1	122979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
08/06/96	D1	122980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D2	122981	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D3	122982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D4	122983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D5	122984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D6	122985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D7	122986	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	D8	122987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	E8	122988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96	E7	122989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	E6	122990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
ECOLOGY AND ENVIRONMENT, LANCASTER, NY
VINYL CHLORIDE PLUS A1 (A5)
UNION CARBIDE LANDFILL, NIAGARA COUNTY, NY
SITE QX - 069273

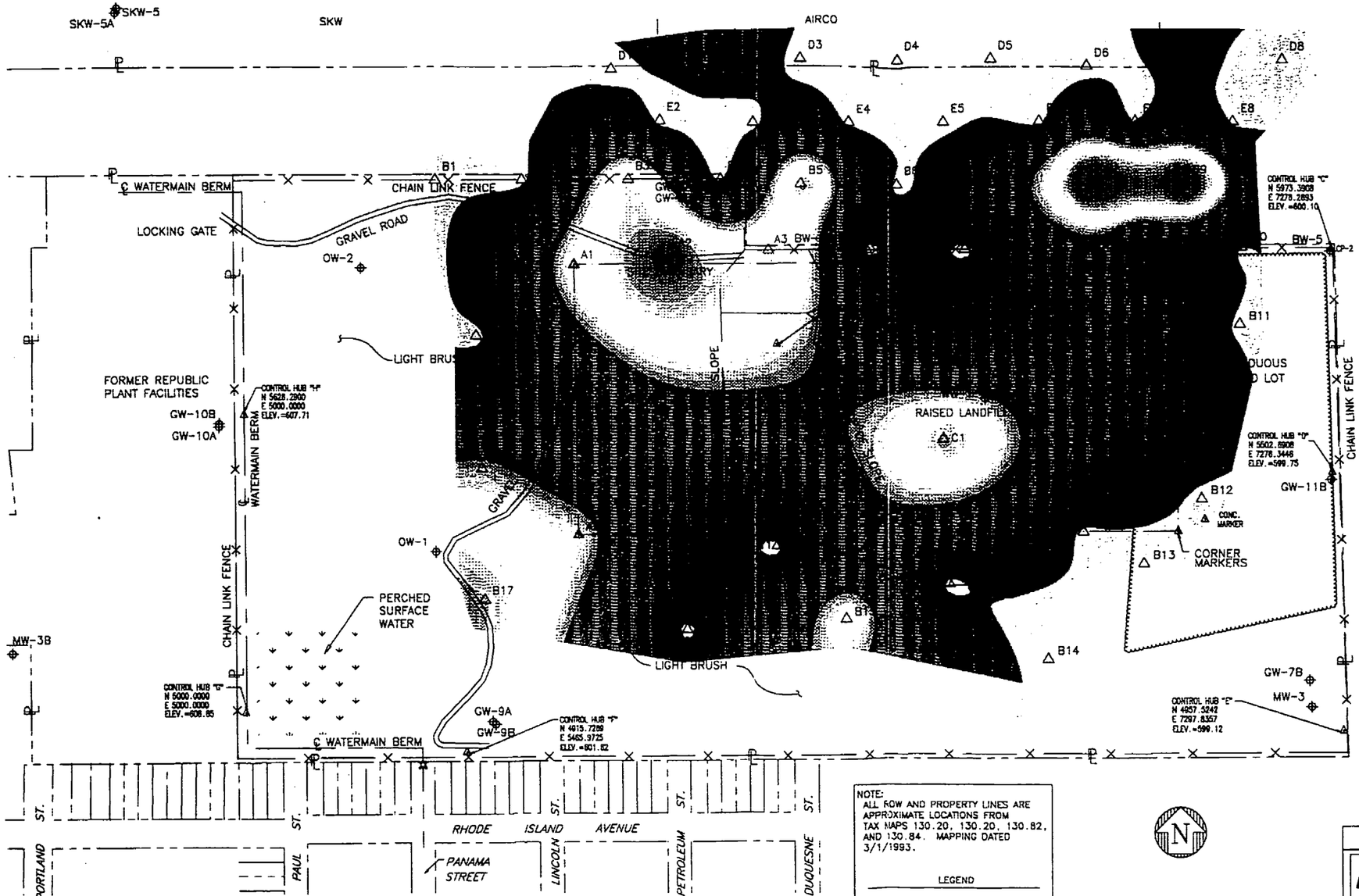
DATE ANALYZED		MODULE NUMBER	VC, ug	BTEX, ug	MTBE, ug	c12DCE, ug	t12DCE, ug	11DCA, ug	c12DCE, ug	CHCl3, ug	111TCA, ug	12DCA, ug	BENZ, ug	CCl4, ug	TCE, ug	TOL, ug	OCT, ug	PCE, ug	CIBENZ, ug
		MDL =	1.77	0.01	0.10	0.02	0.06	0.06	0.02	0.03	0.08	0.02	0.02	0.07	0.02	0.02	0.02	0.02	0.01
08/07/96	E5	122991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	E4	122992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	E3	122993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	E2	122994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	B5	122995	0.00	3.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.31	0.07	0.02	0.00
08/07/96	B6	122996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/96	B7	122997	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
08/07/96	B8	122998	0.00	26.69	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.09	0.00	0.13	26.27	0.14	0.03	0.00
08/07/96	B9	122999	0.00	34.53	0.00	0.00	0.00	0.00	0.00	0.00	1.78	0.00	0.36	0.00	0.64	33.36	0.35	0.09	0.05
08/05/96		TB1-123000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96		TB2-123001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96		TB3-123002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96		TB4-123003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/05/96		method blank	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/96		method blank	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Max Observed	1.93	34.53	0.00	8.26	1.20	0.42	7.72	0.11	1.78	0.11	5.91	0.00	49.94	33.36	3.02	102.13	0.20

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
ECOLOGY AND ENVIRONMENT, LANCASTER, NY
VINYL CHLORIDE PLUS A1 (A5)
UNION CARBIDE LANDFILL, NIAGARA COUNTY, NY
SITE QX - 069273

	MODULE NUMBER	EtBENZ, ug	mpXYL, ug	oXYL, ug	N&2MN, ug	TMBs, ug	135TMB, ug	124TMB, ug	14DCB, ug	C11-C15, ug	UNDEC, ug	NAPH, ug	TRIDEC, ug	2MeNAPH, ug	PENTADEC, ug
	MDL =	0.01	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01
B12	122945	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.04	0.04	0.00	0.00	0.00	0.00
A9	122946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
B13	122947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00
B11	122948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00
A13	122949	0.00	0.04	0.00	5.42	0.08	0.04	0.05	0.00	0.19	0.10	4.27	0.04	1.15	0.04
B19	122950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
B18	122951	0.06	0.11	0.07	42.71	0.29	0.13	0.16	0.07	1.10	0.45	32.49	0.49	10.21	0.16
A12	122952	0.01	0.04	0.03	2.54	0.04	0.00	0.04	0.00	0.07	0.07	1.98	0.00	0.57	0.00
B17	122953	0.14	0.44	0.28	0.22	0.23	0.13	0.10	0.00	0.23	0.23	0.17	0.00	0.05	0.00
B16	122954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
A11	122955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
B15	122956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00
A10	122957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
B14	122958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00
A1	122959	0.00	0.14	0.09	6.42	0.18	0.09	0.09	0.00	0.09	0.06	6.49	0.00	1.93	0.00
A2	122960	0.36	0.91	0.32	1.60	0.53	0.20	0.33	0.08	2.88	2.00	1.12	0.59	0.46	0.29
A3	122961	0.13	0.31	0.15	4.73	0.31	0.12	0.18	0.00	0.00	0.00	1.98	0.00	2.75	0.00
A4	122962	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.07	0.07	0.11	0.00	0.00	0.00
A5	122963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
A6	122964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
A6A	122970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00
A7	122971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00
B10	122972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
A8	122973	0.00	0.06	0.03	0.00	0.03	0.00	0.03	0.00	0.12	0.12	0.00	0.00	0.00	0.00
C1	122974	0.55	0.86	0.74	4.17	0.48	0.21	0.27	0.00	1.91	1.38	2.74	0.31	1.43	0.21
C2	122975	0.00	0.05	0.00	0.23	0.00	0.00	0.00	0.00	0.09	0.09	0.21	0.00	0.02	0.00
B4	122976	0.00	0.00	0.00	0.80	0.03	0.00	0.03	0.00	0.07	0.07	0.61	0.00	0.19	0.00
B3	122977	0.05	0.39	0.42	0.40	0.39	0.09	0.30	0.01	0.06	0.06	0.34	0.00	0.06	0.00
B2	122978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00
B1	122979	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.06	0.06	0.07	0.00	0.00	0.00
D1	122980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
D2	122981	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00
D3	122982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
D4	122983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
D5	122984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
D6	122985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.00	0.00
D7	122986	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
D8	122987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
E8	122988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
E7	122989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
E6	122990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
ECOLOGY AND ENVIRONMENT, LANCASTER, NY
VINYL CHLORIDE PLUS A1 (A5)
UNION CARBIDE LANDFILL, NIAGARA COUNTY, NY
SITE QX - 069273

	MODULE NUMBER	EtBENZ, ug	mpXYL, ug	oXYL, ug	N&2MN, ug	TMBs, ug	135TMB, ug	124TMB, ug	14DCB, ug	C11-C15, ug	UNDEC, ug	NAPH, ug	TRIDEC, ug	2MeNAPH, ug	PENTADEC, ug
	MDL =	0.01	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01
E5	122991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.00	0.00	0.00	0.00
E4	122992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
E3	122993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00
E2	122994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00
B5	122995	0.14	1.20	1.10	0.17	0.94	0.41	0.53	0.00	0.13	0.12	0.13	0.01	0.04	0.00
B6	122996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00
B7	122997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00
B8	122998	0.06	0.20	0.07	0.00	0.06	0.02	0.04	0.00	0.20	0.20	0.00	0.00	0.00	0.00
B9	122999	0.17	0.48	0.16	0.00	0.14	0.05	0.10	0.03	0.67	0.67	0.00	0.00	0.00	0.00
	TB1-123000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00
	TB2-123001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00
	TB3-123002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00
	TB4-123003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00
	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	method blank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Max Observed	0.55	1.20	1.10	42.71	0.94	0.41	0.53	0.08	2.88	2.00	32.49	0.59	10.21	0.29



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0.084
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0.047
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0.032
0.026
0.022
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0.015
0.012

BTEX
[ug]

NOTE:
ALL ROW AND PROPERTY LINES ARE APPROXIMATE LOCATIONS FROM TAX MAPS 130.20, 130.20, 130.82, AND 130.84. MAPPING DATED 3/1/1993.

LEGEND

- △ GORE-SORBER Screening Module Location
- ⊕ EXISTING MONITORING WELL LOCATION
- ℄ APPROXIMATE PROPERTY LINE
- × CHAIN-LINK FENCE

N

Scale 1:3000
100 0 100 200 300
(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

GORE-SORBER SCREENING SURVEY

W.L. GORE & ASSOCIATES, INC.
P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

UNION CARBIDE SITE, NIAGARA COUNTY, NY

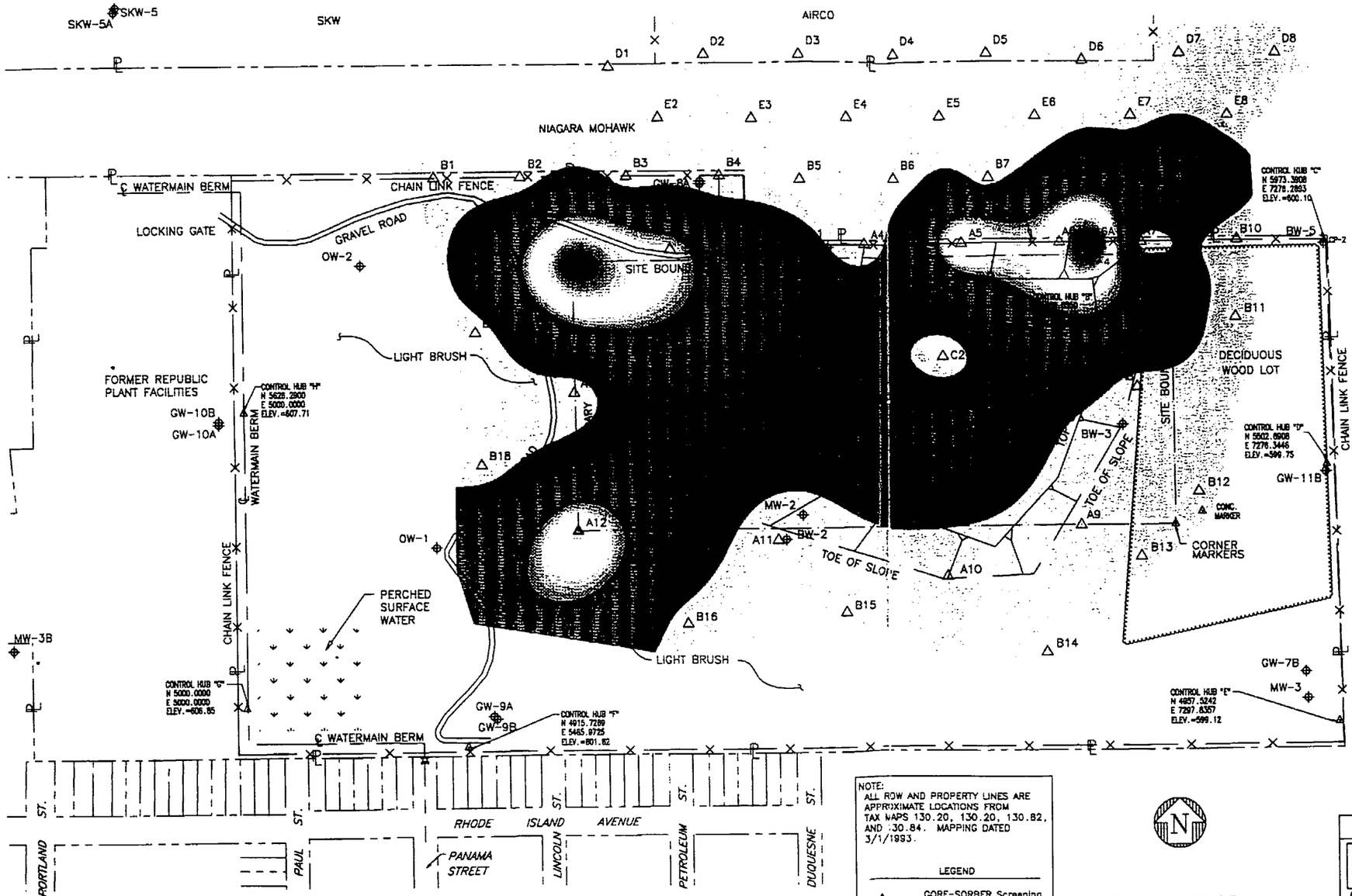
BTEX

ECOLOGY AND ENVIRONMENT ENGINEERING, PC, LANCASTER, NY

REV. #: 0
REV. DATE:

DATE DRAWN:	9 AUG 1996	GRID FILE:	BTO1.GRD
DRAWN BY:	JH	PLOT FILE:	BTC.PLT
DATE GRIDDED:	16 AUG 1996	PROJECT NUMBER:	069273
GRIDDED BY:	JH	SITE CODE:	QX

ORIG. CAD: YR95GOR.DWG



TCE [ug]
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2.535
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1.746
1.450
1.203
0.999
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0.187
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0.107
0.089
0.074
0.061
0.051
0.042
0.035
0.029
0.024
0.020

NOTE:
ALL ROW AND PROPERTY LINES ARE APPROXIMATE LOCATIONS FROM TAX MAPS 130.20, 130.20, 130.82, AND 130.84. MAPPING DATED 3/1/1993.

LEGEND

- △ GORE-SORBER Screening Module Location
- ⊕ EXISTING MONITORING WELL LOCATION
- P APPROXIMATE PROPERTY LINE
- CHAIN-LINK FENCE

N

Scale 1:3000

100 0 100 200 300

(feet)

GORE-SORBER SCREENING SURVEY

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P.O. BOX 1100
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ELKTON, MD 21922-1100
(410) 392-3300

UNION CARBIDE SITE, NIAGARA COUNTY, NY

TRICHLOROETHENE

ECOLOGY AND ENVIRONMENT ENGINEERING, PC, LANCASTER, NY

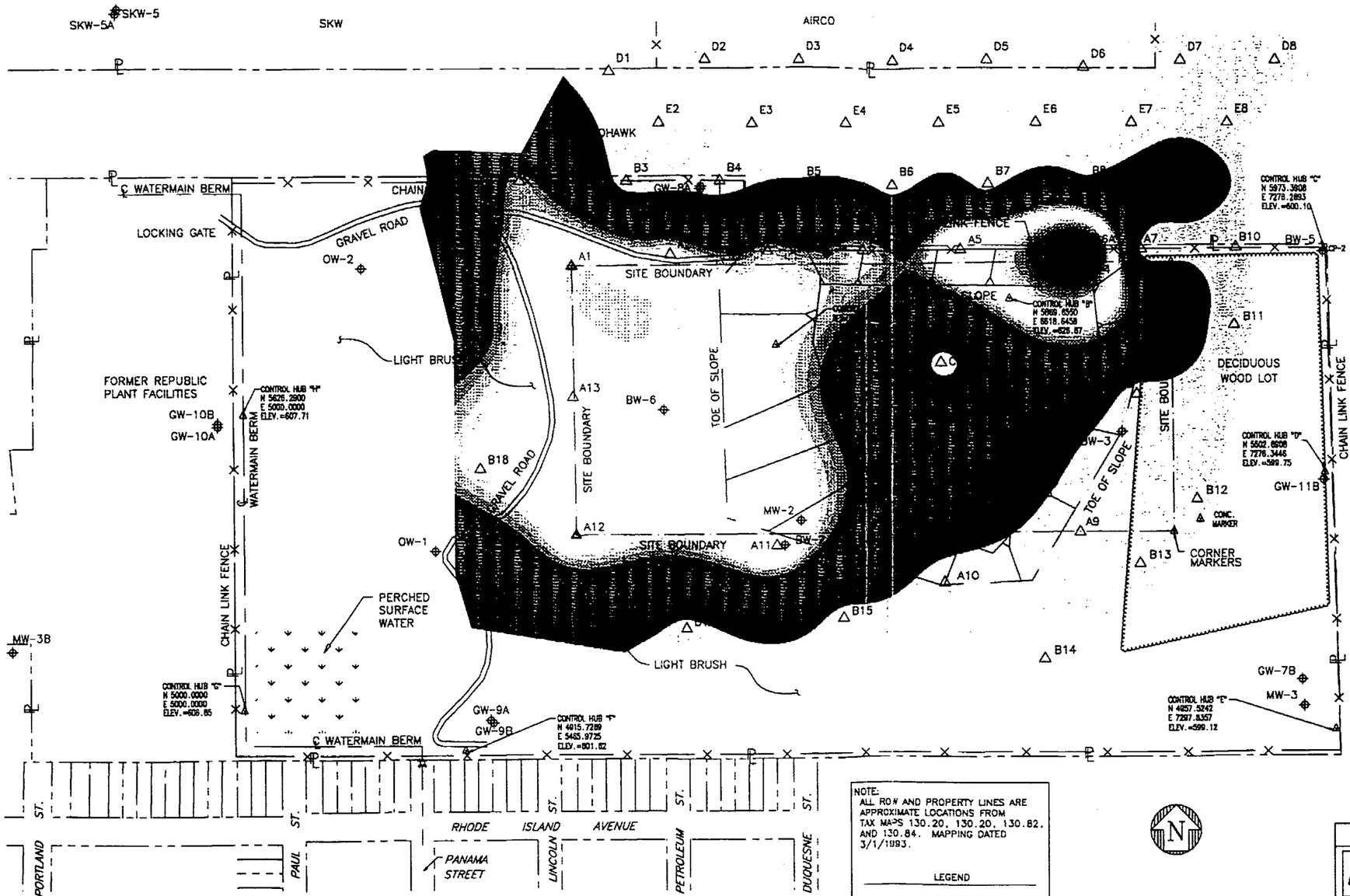
REV. #: 0

REV. DATE:

DATE DRAWN:	9 AUG 1996	GRID FILE:	TE01.GRD
DRAWN BY:	JH	PLOT FILE:	TEC.PLT
DATE GRIDDED:	16 AUG 1996	PROJECT NUMBER:	069273
GRIDDED BY:	JH	SITE CODE:	QX

ORIG. CAD: YR9SGOR.DWG

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.



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3.948
3.222
2.629
2.146
1.751
1.429
1.166
0.952
0.777
0.634
0.517
0.422
0.344
0.281
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0.125
0.102
0.083
0.068
0.055
0.045
0.037
0.030
0.025
0.020

NOTE:
ALL ROW AND PROPERTY LINES ARE APPROXIMATE LOCATIONS FROM TAX MAPS 130.20, 130.20, 130.82, AND 130.84. MAPPING DATED 3/1/1993.

LEGEND

- △ GORE-SORBER Screening Module Location
- ⊕ EXISTING MONITORING WELL LOCATION
- —P— APPROXIMATE PROPERTY LINE
- —X— CHAIN-LINK FENCE

N

Scale 1:3000

100 0 100 200 300

(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

GORE-SORBER SCREENING SURVEY

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ELKTON, MD 21922-1100
(410) 392-3300

UNION CARBIDE SITE, NIAGARA COUNTY, NY

REV. #: 0

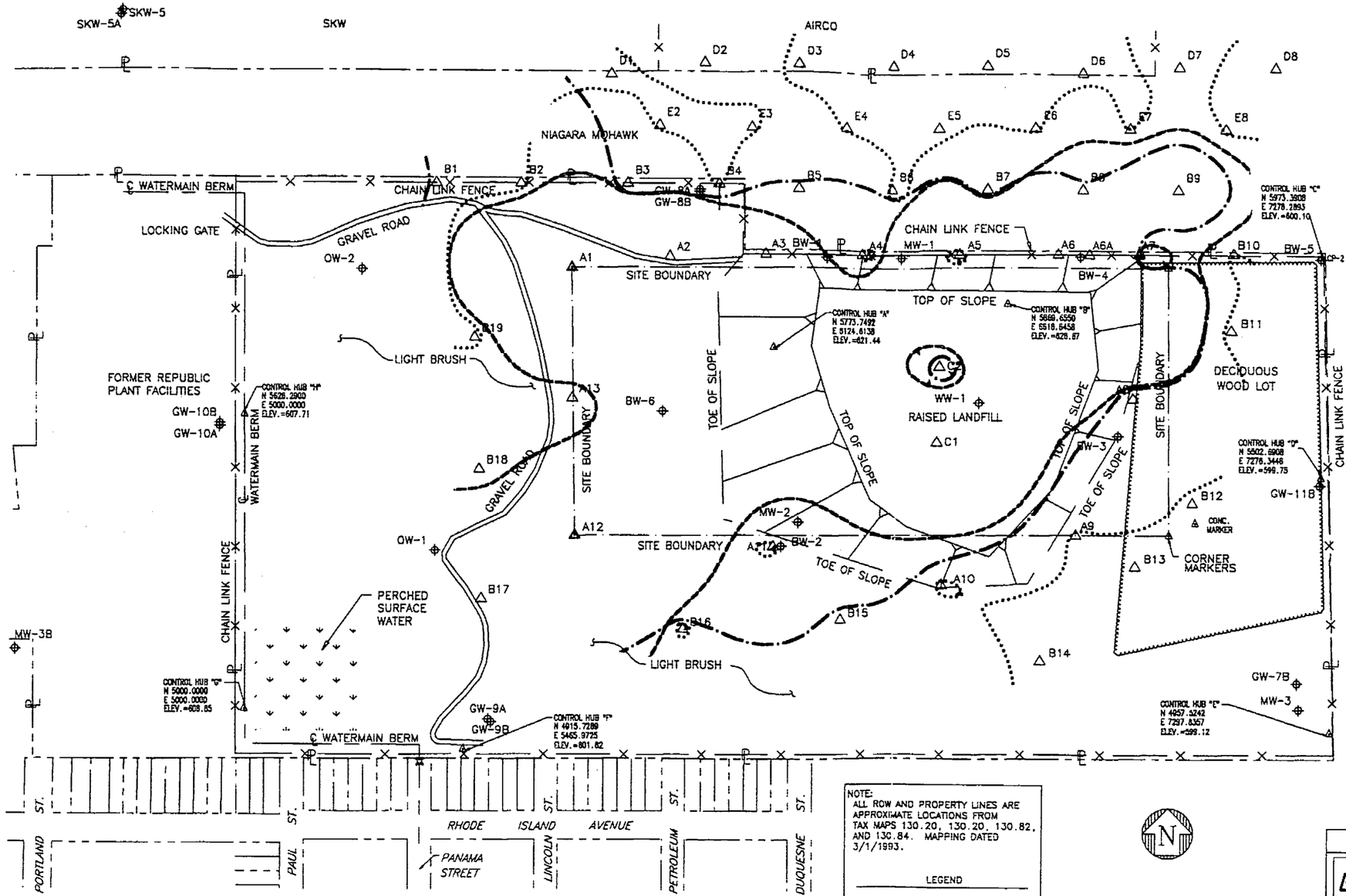
TETRACHLOROETHENE

REV. DATE:

ECOLOGY AND ENVIRONMENT ENGINEERING, PC, LANCASTER, NY

DATE DRAWN:	9 AUG 1996	GRID FILE:	PC01.GRD
DRAWN BY:	JH	PLOT FILE:	PCC.PLT
DATE GRIDDED:	16 AUG 1996	PROJECT NUMBER:	069273
GRIDDED BY:	JH	SITE CODE:	QX

ORIG. CAD: YR95GOR.DWG



BTEX
TCE
PCE

NOTE:
ALL ROW AND PROPERTY LINES ARE APPROXIMATE LOCATIONS FROM TAX MAPS 130.20, 130.20, 130.82, AND 130.84. MAPPING DATED 3/1/1993.

LEGEND

- △ GORE-SORBER Screening Module Location
- ⌖ EXISTING MONITORING WELL LOCATION
- —P— APPROXIMATE PROPERTY LINE
- —X— CHAIN-LINK FENCE

N

Scale 1:3000

100 0 100 200 300

(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

ORIG. CAD: YR9SCOR.DWG

GORE-SORBER IS REG. U.S. PAT. & T.M. OFF.
GORE-SORBER SCREENING SURVEY IS A SERVICE MARK OF W.L. GORE & ASSOCIATES
GORE-SORBER SCREENING MODULE IS A TRADEMARK OF W.L. GORE & ASSOCIATES

GORE-SORBER SCREENING SURVEY

GORE Creative Technologies Worldwide
W.L. GORE & ASSOCIATES, INC.
P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

UNION CARBIDE SITE, NIAGARA COUNTY, NY

SOIL GAS PLUME EDGES (mdl)

ECOLOGY AND ENVIRONMENT ENGINEERING, P. LANCASTER, NY

REV. #: 0
REV. DATE:

DATE DRAWN:	9 AUG 1996	GRID FILE:	
DRAWN BY:	JH	PLOT FILE:	LINEPLOT.PLT
DATE GRIDDED:		PROJECT NUMBER:	069273
GRIDDED BY		SITE CODE:	

APPENDIX B

CRA DUPLICATE SOIL GAS SAMPLE RESULTS

CRA
2055 Niagara Falls Boulevard
Suite Three
Niagara Falls, NY 14304
716-297-6150

MEMO

TO: Al Ogg

REFERENCE NO.: 5513

FROM: Carol Dunnigan/js/1

DATE: September 27, 1996

RE: Soil Gas Survey Analytical Data
UCAR Carbon SWMF - Niagara Falls, New York

C.C.: R. Bolton, J. Kay

We have received and reviewed the results of the soil gas survey which was conducted in July 1996 at the Solid Waste Management Facility (SWMF) on Hyde Park Boulevard. The information reviewed included the final analytical data report from W.L. Gore & Associates (Gore) for the samples collected by Conestoga-Rovers & Associates (CRA), the sampling program summary memo prepared by K. Sullivan (July 22, 1996), and the preliminary analytical data results for the New York State Department of Environmental Conservation (NYSDEC) samples collected by Ecology & Environment (E&E). The attached Table 1 presents a comparison of the results for the CRA and E&E samples. These data are referenced to the sample locations presented by E&E on the figure provided by them. For reference purposes, that figure is also attached.

OBSERVATIONS

1. With one exception, tetrachloroethene (PCE) at location A6, the CRA and E&E sample data are in agreement. The discrepant results(6.71 µg versus 60.66 µg) may be a decimal reporting or typographical error. We contacted Gore and confirmed that the results of the CRA sample are correct. It is suggested that E&E be asked to do the same.

2. The only location with significantly elevated concentrations of chemicals (primarily PCE) in the soil gas samples is A6A which is immediately east of monitoring well B4. These results are not unexpected and are reflective of the groundwater chemistry reported for the sampling of well B4. The concentration of PCE at sample location A6, which is located west of well B4 is lower than at A6A (6.71 µg versus 132.27 µg). The samples collected by E&E on the property north of B4 (B7, B8, and B9) exhibit low concentrations of toluene (26.27 µg at B8 and 33.36 µg at B9) but no PCE.

3. There was only one compound detected in the samples collected from the top of the landfill: PCE at 7 µg in sample C1.

4. There are essentially no compounds detected in the samples collected from rows D and E on the Niagara Mohawk property north of UCAR.

5. There are several compounds which were detected in E&E samples from the UCAR property which were not analyzed in the CRA samples (vinyl chloride, 1,1-dichloroethane, chloroform, 1,2-dichloroethane, toluene, octane, chlorobenzene, xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, undecane, naphthalene, tridecane, 2-methyl naphthalene, and pentadecane). Of these compounds, the most significant were naphthalene and 2-methyl naphthalene at location B18 at concentrations of 32.49 µg and 10.21 µg, respectively. Location B18 is located west of the boundary of the SWMF, approximately in the middle of the Site in the north-south direction. The only other detections greater than 1 µg of the compounds not analyzed for in the CRA samples are:

Compound	*Concentration (µg)*	*Location*
Vinyl chloride	1.93	B17
Toluene	1.09	B17
	1.09	A2
Octane	2.96	B17
	3.02	A2
	1.15	C1
Undecane	2.00	A2
Naphthalene	4.27	A13
	1.98	A12
	6.49	A1
	1.12	A2
2-Methyl naphthalene	1.15	A13
	1.93	A1
	1.43	C1

CONCLUSIONS

Based upon the preliminary data, the presence of PCE at significant concentrations is limited to the immediate area of monitoring well B4. This is expected based upon the historic groundwater data.

No unexpected results were obtained from the soil gas survey.

Should you have any questions or require additional information, please do not hesitate to contact us.

TABLE
COMPARISON OF SOIL GAS ANALYTICAL RESULTS (ug)
UCAR CARBON SWMF
NIAGARA FALLS, NEW YORK

E&E Module No.	CRA Module No.	Sample Location	Benzene	Ethyl Benzene	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	1,4-Dichlorobenzene
122977	123005	B3	0.57 / 0.00	0.00 \ 0.05	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.01
122953	123006	B17	0.19 / 0.54	0.13 \ 0.14	0.00 \ 0.14	0.06 \ 0.18	0.08 \ 0.04	0.00 \ 0.00	0.16 \ 0.28	0.00 \ 0.00
122961	123007	A3	0.00 / 0.33	0.00 \ 0.13	0.00 \ 0.00	0.00 \ 0.00	2.01 \ 0.83	0.00 \ 0.00	0.00 \ 0.07	0.00 \ 0.00
122963	123008	A5	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	1.03 \ 5.28	0.00 \ 0.02	6.96 \ 3.09	0.00 \ 0.00
122964	123009	A6	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	6.71 \ 60.66	0.00 \ 0.00	0.00 \ 1.31	0.00 \ 0.00
122970	123010	A6A	0.00 / 0.15	0.00 \ 0.00	0.15 \ 0.54	2.57 \ 7.72	132.27 \ 102.13	0.00 \ 0.00	33.97 \ 49.94	0.00 \ 0.00
122971	123011	A7	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122972	123012	B10	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122973	123013	A8	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122975	123014	C2	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122974	123015	C1	0.13 / 0.65	0.00 \ 0.55	0.00 \ 0.00	0.00 \ 0.00	7.00 \ 0.31	0.00 \ 0.00	0.00 \ 0.10	0.00 \ 0.00
122946	123016	A9	0.00 / 0.00	0.07 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122957	123017	A10	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00
122955	123018	A11	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	1.28 \ 2.87	0.00 \ 0.09	0.00 \ 0.00	0.00 \ 0.00
122949	123019	A13	0.00 / 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 2.62	0.00 \ 0.00	0.00 \ 0.00	0.00 \ 0.00

NOTES:
1.10/0.12 CRA analytical result/E&E analytical result

9/27/96

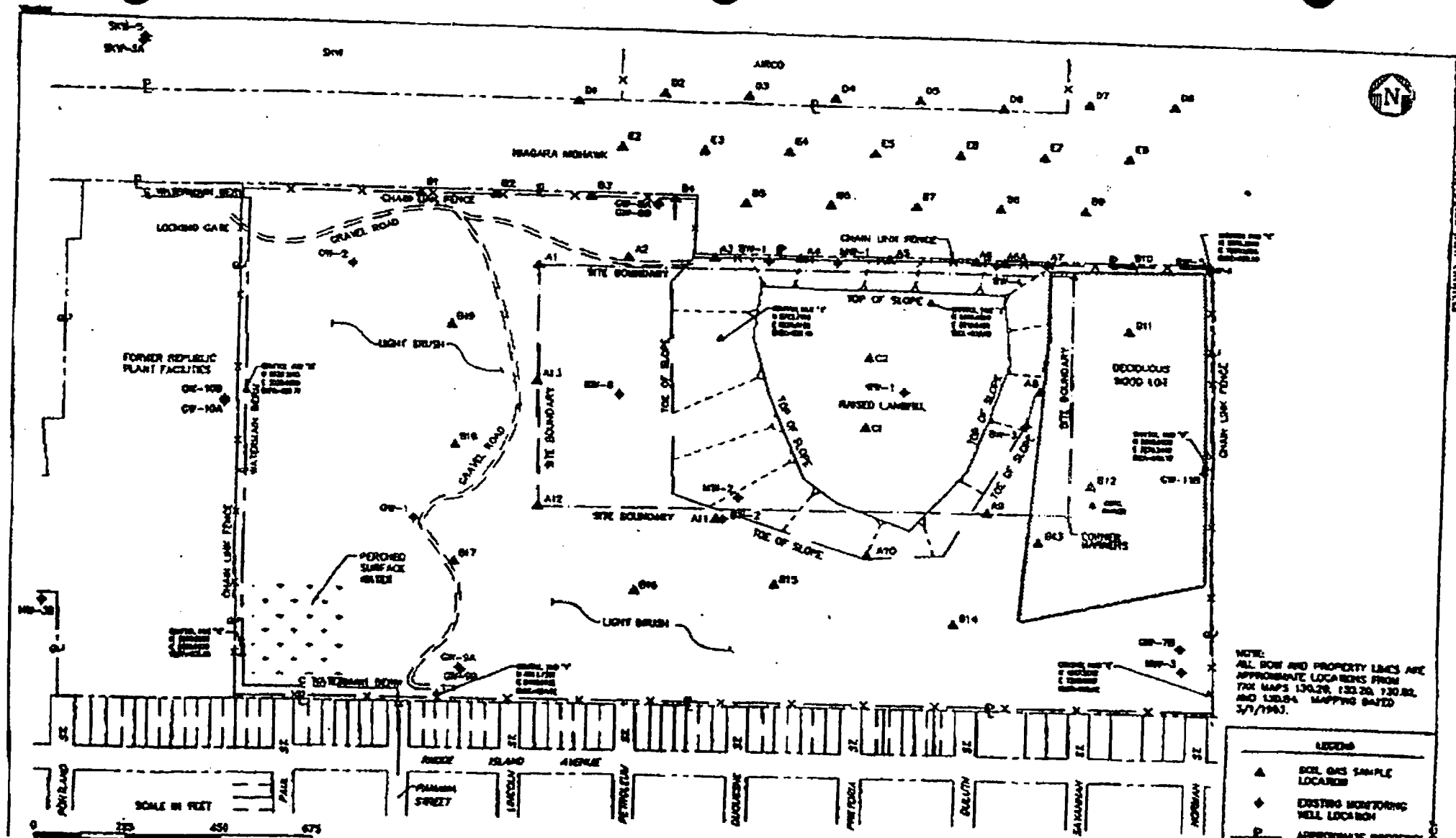


Figure 1 SOIL GAS SAMPLE LOCATION MAP UNION CARBIDE SITE

recycled paper

APPENDIX C

NEAR-SURFACE SOIL SAMPLE RESULTS

COVER SHEET

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE

Jim, We have lists of location
[illegible] Val

TO: Jim Richard	FOR INFORMATION, CALL: 518 457 9538
FROM: Val Woodward	AT: NYSDEC
PAGES (including cover sheet): 31	FAX NUMBER: 716 684 0844

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-01

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 14

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: _____ (uL)

Lab Sample ID: 996-240-04

Lab File ID: 9602C95A.D

Date Received: 08/27/96

Date Analyzed: 08/30/96

Dilution Factor: 1.0

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Q
	vinyl chloride	10 U
	bromomethane	10 U
	chloroethane	10 U
	trichlorofluoromethane	10 U
	acetone	10 U
	1,1-dichloroethene	10 U
	carbon disulfide	10 U
	methylene chloride	10 U
	trans-1,2-dichloroethene	10 U
	1,1-dichloroethane	10 U
	vinyl acetate	10 U
	2-butanone	10 U
	cis-1,2-dichloroethene	10 U
	chloroform	10 U
	1,1,1-trichloroethane	10 U
	carbon tetrachloride	10 U
	1,2-dichloroethane	10 U
	benzene	10 U
	trichloroethene	10 U
	1,2-dichloropropane	10 U
	bromodichloromethane	10 U
	4-methyl-2-pentanone	10 U
	cis-1,3-dichloropropene	10 U
	toluene	10 U
	trans-1,3-dichloropropene	10 U
	1,1,2-trichloroethane	10 U
	2-hexanone	10 U
	tetrachloroethene	10 U
	dibromochloromethane	10 U
	chlorobenzene	10 U
	ethylbenzene	10 U
	m,p-xylenes	10 U
	o-xylene	10 U
	styrene	10 U
	bromoform	10 U
	1,1,2,2-tetrachloroethane	10 U
	2-chlorotoluene	10 U
	4-chlorotoluene	10 U
	1,3-dichlorobenzene	10 U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-01

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-04

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C95A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 14 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-01

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 14

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: 1 (uL)

Lab Sample ID: 996-240-04

Lab File ID: 9602C95A.D

Date Received: 08/27/96

Date Analyzed: 08/30/96

Dilution Factor: 1.0

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-02

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-05

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C96A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	19	
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	43	
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	100	
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-02

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-05

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C96A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-02

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 19

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: 1 (uL)

Lab Sample ID: 996-240-05

Lab File ID: 9602C96A.D

Date Received: 08/27/96

Date Analyzed: 08/30/96

Dilution Factor: 1.0

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-03

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-06

Sample wt/vol: 2.9 (g/ml) G Lab File ID: 9602C97A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 16 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Q
	vinyl chloride	10 U
	bromomethane	10 U
	chloroethane	10 U
	trichlorofluoromethane	10 U
	acetone	10 U
	1,1-dichloroethene	10 U
	carbon disulfide	10 U
	methylene chloride	10 U
	trans-1,2-dichloroethene	10 U
	1,1-dichloroethane	10 U
	vinyl acetate	10 U
	2-butanone	10 U
	cis-1,2-dichloroethene	10 U
	chloroform	10 U
	1,1,1-trichloroethane	10 U
	carbon tetrachloride	10 U
	1,2-dichloroethane	10 U
	benzene	10 U
	trichloroethene	10 U
	1,2-dichloropropane	10 U
	bromodichloromethane	10 U
	4-methyl-2-pentanone	10 U
	cis-1,3-dichloropropene	10 U
	toluene	10 U
	trans-1,3-dichloropropene	10 U
	1,1,2-trichloroethane	10 U
	2-hexanone	10 U
	tetrachloroethene	10 U
	dibromochloromethane	10 U
	chlorobenzene	10 U
	ethylbenzene	10 U
	m,p-xylenes	10 U
	o-xylene	10 U
	styrene	10 U
	bromoform	10 U
	1,1,2,2-tetrachloroethane	10 U
	2-chlorotoluene	10 U
	4-chlorotoluene	10 U
	1,3-dichlorobenzene	10 U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-03

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-06

Sample wt/vol: 2.9 (g/ml) G Lab File ID: 9602C97A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 16 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-03

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: 996-240-06

Sample wt/vol: 2.9 (g/ml) G

Lab File ID: 9602C97A.D

Level: (low/med) LOW

Date Received: 08/27/96

% Moisture: not dec. 16

Data Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm)

Dilution Factor: 1.0

Soil Extract Volume: 1 (uL)

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

SS-04

VOLATILE ORGANICS ANALYSIS DATA SHEET

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-07

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C88A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 14 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

FIELD ID:

SS-04

VOLATILE ORGANICS ANALYSIS DATA SHEET

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-07

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C98A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 14 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-04

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 998-240-07

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C98A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 14 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: 1 (ul.) Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-05

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water) SOIL Lab Sample ID: 996-240-08

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9602C99A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 17 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-05

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 17

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: _____ (uL)

Lab Sample ID: 996-240-08

Lab File ID: 9602C99A.D

Date Received: 08/27/96

Date Analyzed: 08/30/96

Dilution Factor: 1.0

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-05

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 17

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: 1 (uL)

Lab Sample ID: 996-240-08

Lab File ID: 9602C99A.D

Date Received: 08/27/96

Date Analyzed: 08/30/96

Dilution Factor: 1.0

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-06

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-09

Sample wt/vol: 2.9 (g/ml) G Lab File ID: 9603C01A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 22 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND (ug/L or ug/Kg) UG/KG	Q
	vinyl chloride	11 U
	bromomethane	11 U
	chloroethane	11 U
	trichlorofluoromethane	11 U
	acetone	11 U
	1,1-dichloroethene	11 U
	carbon disulfide	11 U
	methylene chloride	11 U
	trans-1,2-dichloroethene	11 U
	1,1-dichloroethane	11 U
	vinyl acetate	11 U
	2-butanone	11 U
	cis-1,2-dichloroethene	11 U
	chloroform	11 U
	1,1,1-trichloroethane	11 U
	carbon tetrachloride	11 U
	1,2-dichloroethane	11 U
	benzene	11 U
	trichloroethene	11 U
	1,2-dichloropropane	11 U
	bromodichloromethane	11 U
	4-methyl-2-pentanone	11 U
	cis-1,3-dichloropropene	11 U
	toluene	11 U
	trans-1,3-dichloropropene	11 U
	1,1,2-trichloroethane	11 U
	2-hexanone	11 U
	tetrachloroethene	11 U
	dibromochloromethane	11 U
	chlorobenzene	11 U
	ethylbenzene	11 U
	m,p-xylenes	11 U
	o-xylene	11 U
	styrene	11 U
	bromoform	11 U
	1,1,2,2-tetrachloroethane	11 U
	2-chlorotoluene	11 U
	4-chlorotoluene	11 U
	1,3-dichlorobenzene	11 U

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-06

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-09

Sample wt/vol: 2.9 (g/ml) G Lab File ID: 9603C01A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 22 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	11	U
	1,2-dichlorobenzene	11	U
	1,2,4-trichlorobenzene	11	U
	1,2,3-trichlorobenzene	11	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-08

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-09

Sample wt/vol: 2.9 (g/ml) G Lab File ID: 9603C01A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 22 Date Analyzed: 08/30/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: 1 (uL) Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-07

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-10

Sample wt/vol: 3.1 (g/ml) G Lab File ID: 9603C05A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/KG Q

	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-07

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water) SOIL Lab Sample ID: 996-240-10

Sample wt/vol: 3.1 (g/ml) G Lab File ID: 9603C05A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-07

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-10

Sample wt/vol: 3.1 (g/ml) G Lab File ID: 9603C05A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: 1 (uL) Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-08

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 998-240-11

Sample wt/vol: 3.1 (g/ml) G Lab File ID: 9603C06A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 14 Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-08

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water) SOIL

Sample wt/vol: 3.1 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 14

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: _____ (uL)

Lab Sample ID: 996-240-11

Lab File ID: 9603C06A.D

Date Received: 08/27/96

Date Analyzed: 09/02/96

Dilution Factor: 1.0

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-08

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water) SOIL

Sample wt/vol: 3.1 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 14

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: 1 (uL)

Lab Sample ID: 998-240-11

Lab File ID: 9603C06A.D

Date Received: 08/27/96

Date Analyzed: 09/02/96

Dilution Factor: 1.0

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

SS-09

VOLATILE ORGANICS ANALYSIS DATA SHEET

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-12

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9603C07A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 13 Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	10	U
	chloroform	10	U
	1,1,1-trichloroethane	10	U
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	10	U
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	10	U
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD ID: SS-09

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 13

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: _____ (uL)

Lab Sample ID: 998-240-12

Lab File ID: 9603C07A.D

Date Received: 08/27/96

Date Analyzed: 09/02/96

Dilution Factor: 1.0

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-09

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: 996-240-12

Sample wt/vol: 3.0 (g/ml) G

Lab File ID: 9603C07A.D

Level: (low/med) LOW

Date Received: 08/27/96

% Moisture: not dec. 13

Date Analyzed: 09/02/96

GC Column: _____ ID: _____ (mm)

Dilution Factor: 1.0

Soil Extract Volume: 1 (uL)

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

1A

FIELD ID:

VOLATILE ORGANICS ANALYSIS DATA SHEET

SS-10

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-13

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9603C11A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 09/03/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	vinyl chloride	10	U
	bromomethane	10	U
	chloroethane	10	U
	trichlorofluoromethane	10	U
	acetone	10	U
	1,1-dichloroethene	10	U
	carbon disulfide	10	U
	methylene chloride	10	U
	trans-1,2-dichloroethene	10	U
	1,1-dichloroethane	10	U
	vinyl acetate	10	U
	2-butanone	10	U
	cis-1,2-dichloroethene	36	
	chloroform	10	U
	1,1,1-trichloroethane	10	J
	carbon tetrachloride	10	U
	1,2-dichloroethane	10	U
	benzene	10	U
	trichloroethene	19	
	1,2-dichloropropane	10	U
	bromodichloromethane	10	U
	4-methyl-2-pentanone	10	U
	cis-1,3-dichloropropene	10	U
	toluene	10	U
	trans-1,3-dichloropropene	10	U
	1,1,2-trichloroethane	10	U
	2-hexanone	10	U
	tetrachloroethene	12	
	dibromochloromethane	10	U
	chlorobenzene	10	U
	ethylbenzene	10	U
	m,p-xylenes	10	U
	o-xylene	10	U
	styrene	10	U
	bromoform	10	U
	1,1,2,2-tetrachloroethane	10	U
	2-chlorotoluene	10	U
	4-chlorotoluene	10	U
	1,3-dichlorobenzene	10	U

1A

FIELD ID: SS-10

VOLATILE ORGANICS ANALYSIS DATA SHEET

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 996-240-13

Sample wt/vol: 3.0 (g/ml) G Lab File ID: 9603C11A.D

Level: (low/med) LOW Date Received: 08/27/96

% Moisture: not dec. 19 Date Analyzed: 09/03/96

GC Column: _____ ID: _____ (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
	1,4-dichlorobenzene	10	U
	1,2-dichlorobenzene	10	U
	1,2,4-trichlorobenzene	10	U
	1,2,3-trichlorobenzene	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD ID: SS-10

SITE: UNION CARBIDE LANDFILL Contract: _____

CODE: 932035 Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL

Sample wt/vol: 3.0 (g/ml) G

Level: (low/med) LOW

% Moisture: not dec. 19

GC Column: _____ ID: _____ (mm)

Soil Extract Volume: 1 (uL)

Lab Sample ID: 998-240-13

Lab File ID: 9603C11A.D

Date Received: 08/27/96

Date Analyzed: 09/03/96

Dilution Factor: 1.0

Soil Aliquot Volume: 1 (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NO.	COMPOUND	RT	EST. CONC.	Q

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

PRELIMINARY SITE ASSESSMENT
Volume 1

Union Carbide Corporation, Carbon Products Division Site
Site No. 932035
Town of Niagara, Niagara County

April 1995

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York 12233
Michael D. Zagata, Commissioner

Division of Hazardous Waste Remediation
Michael J. O'Toole, Jr., P.E., Director

ecology and environment engineering, p.c.

BUFFALO CORPORATE CENTER 368 Pleasantview Drive, Lancaster, New York 14086
Tel: 716/684-8060, Fax: 716/684-0844

1. SITE ASSESSMENT SUMMARY

1.1 INTRODUCTION

Under the New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract, Ecology and Environment Engineering, P.C., (E & E) conducted a Preliminary Site Assessment (PSA) at the Union Carbide Corporation, Carbon Products site (site No. 932035). This report summarizes PSA activities conducted to date at the site.

1.2 PURPOSE

The purpose of the PSA is to provide NYSDEC with the information necessary to properly assess and classify a site according to one of the following categories of hazardous waste sites pursuant to Section 27-1305 of the Environmental Conservation Law:

- **Class 1**: Causing or presenting an imminent danger or causing irreversible or irreparable damage to the public health or environment - immediate action required;
- **Class 2**: Significant threat to the public health or environment - action required;
- **Class 3**: Does not present a significant threat to the public health or environment - action may be deferred;
- **Class 4**: Site properly closed - requires continued management; or
- **Class 5**: Site properly closed, no evidence of present or potential adverse impact - no further action required.

If one of the above categories does not apply to the site or if disposal of consequential amounts of hazardous waste were not documented, the site may be deleted from the Registry of Inactive Hazardous Waste Disposal Sites.

1.3 SITE DESCRIPTION

The Union Carbide Corp., Carbon Products Division site is an inactive 16.48-acre capped landfill located within the 64-acre parcel near the southeast corner of the intersection of Hyde Park Boulevard and Witmer Road (see Figure 1-1). The site is owned by UCAR Carbon Corporation (UCC) formerly Union Carbide Corp., who was the exclusive owner and operator since the landfill's inception in 1934. Formerly part of Union Carbide Corp.'s 90-acre Republic Plant facility, the plant is now inactive, and the 26-acre portion of the 90-acres which contained all plant facilities was sold to Niagara Vest in 1987. The remaining 64-acre UCC parcel includes the 16.48-acre landfill site and is essentially undeveloped (see Figure 1-2). PSA work conducted for the capped landfill included the entire 64-acre property to characterize contaminant distribution.

The 16.48-acre landfill is a NYSDEC-permitted solid waste management facility (SWMF), which was properly capped in 1987. The capped landfill is a rectangular in shape and includes a 30-foot high, flat-topped mound. The bottom perimeter of the raised landfill slope does extend out of the 16.48-acre site boundaries to the north and south, but appears to be properly capped throughout its aerial extent. The remainder of the 64-acre UCC property is generally flat with the exception of a 6- to 7-foot high "L" shaped berm which rises above grade along the western and part of the southern property boundaries. This berm contains a municipal waterline.

During E & E's 1993 PSA field investigation, no indications of leachate from the landfill or evidence of surface water flow from or to the site were observed. A marshy area of shallow standing water in the southwest corner of the property is adjacent to and presumably caused by the aboveground municipal waterline berm which acts as a dike.

The site contains no buildings and is covered with various types of vegetation. Mowed grass covers the entire 16.48-acre capped landfill, and tall grass, brush, and trees cover the remainder of the 64 acre UCC property. Currently, 20 groundwater monitoring wells are located around the site, and one gravel covered road is used to access the site. An 8-foot-high, chain-link fence with barbed wire completely surrounds the generally rectangular

shaped UCC property, and a locked gate restricts vehicular access to the site. The only activity performed at the site is quarterly sampling of groundwater monitoring wells. The landfill has been owned and operated exclusively by UCC since its inception in 1934. Industrial wastes, primarily carbon and graphite dust, firebrick, and packaging products, were brought from three area manufacturing plants and buried in the landfill (NYSDEC 1981).

The UCC site is bound on the north and east by Niagara Mohawk Power company property which contains large steel towers that support high-voltage electrical power lines. The western property boundary adjoins the former 26-acre Republic Plant facility now owned by Niagara Vest, a holding company. Many residential homes are present south of the site along Rhode Island Avenue. Evidence of unauthorized use of the UCC property exists along the southern boundary, including brush and other yard wastes, and holes cut into the southern site fence which have been repaired by UCC more than once (E & E 1991).

Site inspections performed by E & E and others have consistently shown air quality readings (i.e., OVA, HNu, O_2/explosimeter, and rad-mini) at background levels within the breathing zone (E & E 1991).

Residents within 3 miles of the site are supplied with municipal drinking water that is obtained from surface water intakes in the Niagara River, which is located more than 3 miles south and upstream of the site (USGS 1980).

1.4 HAZARDOUS WASTE SITE DISCUSSION

The landfill was permitted first by the Town of Niagara in 1973 and properly closed in 1987. The landfill site was used exclusively by UCC from 1934 to 1987 to dispose of wastes from its three area manufacturing plants. The wastes primarily consisted of carbonaceous dust and scraps, fire brick, and packaging materials. Wastes known to have been deposited include coke, pitch, coal tar, petroleum tars, and phenols. Documentation pertaining to hazardous waste disposed of on site includes disposal of 400 pounds of spent sludges from degreasing which contain 1,1,1-trichloroethane, and 320 pounds of Halowax 1006 (chlorinated naphthalene solid). Halowax is reportedly chemically stable, resistant to acids and alkalies. It is believed that the D003 waste listed on the generator form (Appendix H, Record 10) includes Halowax mixed with other spent maintenance waste. This waste was reactive; however, Halowax itself does not exhibit any RCRA characteristics. In addition, up to 200 gallons of drummed waste oil were brought to the site each month and either deposited

in the landfill or spread over site roadways for dust control purposes during summer months until 1978 (E & E 1991). Maps of the landfill indicate fill was deposited west of and north of presently capped 16.48-acre landfill (UCAR 1993).

A study conducted by Conestoga-Rovers and Associates (CRA) in 1987 and 1988 concluded that fill material was also present over an approximately 20-acre area west of the landfill. Fill thicknesses ranged from 0 to 12 feet (averaging 5.4 feet) and consisted primarily of solids similar to those known to have been deposited in the capped landfill (CRA 1988). Three buried 55-gallon steel drums of waste were also discovered during CRA's investigation. The drums contained a black solid, tar-like material mixed with miscellaneous trash. Sample analyses performed on the drummed waste and soils surrounding the drums indicated that the drummed material was an off-specification material. This material may be an altered form of an impregnating compound called code 88, which was formerly used at the UCC facilities. Code 88 is known to contain coal tar pitch, diethyl sulfate, and furfural. The drum samples contained, xylene, naphthalene, anthracene, phenol, ammonia, and diethyl sulfate. The drums were overpacked and properly disposed of off site (CRA 1988). Surface and subsurface soils collected during the CRA were found to contain several pesticides, polyaromatic hydrocarbons (PAHs), and metals above background levels.

Groundwater samples have been collected quarterly from on-site monitoring wells for several years. Results have consistently shown the presence of chlorinated hydrocarbons and metals at levels above state class GA water standards (UCAR 1993).

1.5 SUMMARY OF PSA WORK

The PSA Task 1 report was submitted to NYSDEC in October 1991 (E & E 1991). Based on the document review and site inspection, E & E concluded that hazardous waste had been disposed of on site and recommended reclassification to a Class 3 site (NYSDEC 1984). However, the report stated that hydrogeologic conditions at the site were not fully understood and would require additional study. E & E performed additional PSA activities in 1993 in accordance with NYSDEC's abbreviated work plan to obtain further information. The field tasks included geophysical surveys, monitoring well installation, groundwater elevation monitoring, and sampling of surface water, sediment, surface soils, subsurface soils, and groundwater.

A surface water sample collected in 1993 contained a trace of one pesticide (beta-BHC), and/or iron which exceeded the NYSDEC Class D surface water standard. The sediment sample contained low levels of chloroform and 2-butanone as PAHs and diethylphthalate. Calcium, lead, and magnesium were also detected in the sediment sample at levels above the upper limit of the 90th percentile for soils in the eastern United States (Shacklette and Boerngen 1984).

Surface and subsurface soil samples contained low levels of three volatile organic compounds (VOCs), moderate-to-high levels of PAHs, dibenzofuran, carbazole, 1,2,4-trichlorobenzene, hexachlorobenzene, and 14 separate pesticides. Metals detected in surface and subsurface soils at concentrations above the 90th percentile included calcium, chromium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, selenium, and zinc. Of these metals, cobalt, lead and magnesium were detected in surface soil samples at a concentration above the observed range in background samples. RCRA hazardous waste characteristics tests were performed on some of the more highly contaminated surface and subsurface soil samples. None of the samples failed these tests.

Groundwater samples from overburden and interface wells contained three VOCs, but at levels below NYSDEC Class GA standards. Five metals were detected in one or more of these wells at concentrations exceeding their respective Class GA standard or guidance value.

Groundwater samples collected from bedrock monitoring wells contained six VOCs, one semivolatile organic compound, and six metals at concentrations exceeding NYSDEC Class GA standards. Of the metals, lead and zinc are not believed to be naturally occurring at such levels in groundwater.

Based on sample results, the history and condition of the site (i.e., it is properly capped, vegetated, and fenced), it is recommended that the site be reclassified as a Class 3 and that further investigation and groundwater monitoring be performed both on site and north of the site to determine the source and extent of the contamination. Regular patrols by the site owner are also recommended to minimize unauthorized site entry by vandals.

Upon the completion of the PSA field tasks, a PA score was calculated for the site. The PA score is designed to provide a means to differentiate sites based on potential threats to human health and the environment. The Union Carbide site received an overall PA score of 4, out of a possible 100. (See Section 3.7 for more information about the PA score.)

1.6 NYSDEC SITE CLASSIFICATION FORMS

The NYSDEC Registry Site Classification Decision Form and Classification Worksheet, are presented on pages 1-7 and 1-8. These forms provide information necessary to properly classify the site in accordance with 6 NYCRR 375.

EXECUTIVE SUMMARY

Under the New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract, Ecology and Environment Engineering, P.C., (E & E) conducted a Preliminary Site Assessment (PSA) at the Union Carbide Corporation, Carbon Products Division site (site No. 932035).

The Union Carbide Corp., Carbon Products Division site is a 16.48-acre inactive, capped landfill located on a 64-acre parcel of undeveloped land in the Town of Niagara, Niagara County, New York. The entire 64-acre parcel has been owned and operated exclusively by the UCAR Carbon Company (UCC), formerly Union Carbide, and it includes the landfill which began operation in 1934. The PSA investigation involved the entire 64-acre UCC property in order to effectively characterize the landfill and any on- or off-site contaminant migration.

The site is a NYSDEC-permitted solid waste management facility (SWMF) which was properly capped in 1987 and includes a 30-foot mound. No buildings exist on the UCC property, which is covered with various types of vegetation and surrounded by an 8-foot high chain-link fence with a locked gate.

The site was part of Union Carbide's Republic Plant, which manufactured carbon and graphite products. Carbon and graphite wastes from two other Union Carbide plants were also landfilled on the Republic Plant property. Waste products included carbonaceous waste (primarily as dust from dust collectors), fire brick waste, raw materials, and packaging (composed mostly of wooden pallets). Other waste types generated and deposited at the site include coke, pitch, cafeteria waste, silica sand, coal tars, petroleum tars, machining oils, spent sludges (F001) from degreasing operations (1,1,1-trichloroethane), and halowax 1006 (D003) (chlorinated naphthalene solid) waste. In addition, approximately 200 gallons of oil

month were collected in 55-gallon drums and taken to the landfill or used for dust control on site roadways during summer months.

Site maps and sketches provided by UCC show that active dumping occurred west and north of the present day landfill boundary (UCC 1993). In 1978, the landfill was issued state permit No. 32N03 as a SWMF. This permit was renewed as necessary throughout the active life of the landfill.

In 1984 the site was added to the NYSDEC registry of Inactive Hazardous Waste sites and designated as a Class 2a site. Wehran Engineering began a Phase I investigation of the landfill for NYSDEC in 1984 and concluded that the site posed a potential threat to groundwater. A phase II investigation was recommended to better characterize the site.

Conestoga-Rovers and Associates (CRA) performed an investigation in 1987. The study showed that approximately 20 acres of the 64-acre UCC property located between the closed landfill site and the western property boundary were covered with an average of 5.4 feet of fill material. Three buried drums were also sampled, overpacked, removed from the site, and properly disposed of. Sample results indicated that the drum contents exhibited characteristics of an off-specification material that may be an altered form of the impregnating compound Code 88, which was formerly used at the UCC facilities. Contaminants found in the fill included polynuclear aromatic hydrocarbons (PAHs) and pesticides at levels which were consistent with those found in the closed landfill. The CRA investigation report concluded that the site did not pose hazards and that remedial measures were not required. In 1987, the United States Environmental Protection Agency (EPA) performed a site investigation at the landfill under the Field Investigation Team (FIT) program. The field investigation included a site inspection and sampling of groundwater and surface soil. Low levels of PAHs were detected in surface soil samples. The report concluded that the landfill site did not pose concern as a significant source of off-site contaminant migration.

The 1991, PSA Task 1 report prepared by E & E recommended reclassification of the site as a Class 3 site with continued quarterly monitoring of groundwater, but it conceded that understanding of the site hydrogeology was limited. As a result additional PSA activities were performed by E & E. Field tasks included geophysical surveys, monitoring well installation, groundwater elevation monitoring, and sampling of surface water, sediment, surface and subsurface soils, and groundwater. The surface water sample results indicated the presence of one pesticide (beta-BHC) at a very low level, and the presence of iron at a concentration above the NYSDEC Class D surface water standard. The sediment sample

contained low levels of chloroform, 2-butanone, PAHs, and diethylphthalate. Calcium, lead, and magnesium were also detected in the sediment sample at levels above the upper limit of the 90th percentile of the range observed in eastern United States soils (Shacklette and Boerngen 1984).

Surface and subsurface soil samples contained low levels of three volatile organic compounds (VOCs), and moderate to high levels of PAHs, dibenzofuran, carbazole, 1,2,4-trichlorobenzene, hexachlorobenzene, and 14 separate pesticides. Metals detected in surface and subsurface soils at concentrations above background levels included calcium, chromium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, selenium, and zinc. Of these metals, cobalt, lead and magnesium were detected at concentrations exceeding the observed range in background soil samples. None of the samples failed tests for Resource Conservation and Recovery Act (RCRA) hazardous waste characteristics. Groundwater samples contained six VOCs, one semivolatile organic compound, and six metals at levels above NYSDEC Class GA standards.

As required by NYSDEC, post-closure groundwater sampling has been performed quarterly on some of the on-site well since 1987. Results of these sampling events consistently show that upgradient well BW-4 contains VOCs, specifically vinyl chloride, at levels above state class GA groundwater standards (NYSDEC 1989; UCC 1991).

A Preliminary Assessment (PA) score of 4 was calculated for the Union Carbide site. Based on the sample results discussed above and the history and condition of the site (i.e., inactive, properly capped, vegetated, and fenced), it has been determined through the PSA investigation that the Union Carbide site does not present a significant threat to the public health or the environment. Based on further data obtained, E & E confirms that the site be reclassified as a Class 3 site with further investigation and groundwater monitoring to determine the source and extent of the contamination.

2. SITE HISTORY

In 1910 the National Carbon Company, now the UCAR Carbon Company, Inc., (UCC) began manufacturing operations in Niagara County, New York. The Republic Plant was built in 1919 by the Republic Carbon Company, which sold it in 1925 to the Aluminum Corporation of America (ALCOA). ALCOA sold the plant to National Carbon in 1934. National Carbon changed its name to the Union Carbide Corporation in 1963, and changed it again to UCAR Carbon Company, Inc., (UCC) in 1989.

The Republic Plant was one of three area facilities owned and operated by Union Carbide under the name of Niagara Plant. The listed address of the Republic Plant is 3501 Hyde Park Boulevard, Town of Niagara, New York. The National Plant is located at 3625 Highland Avenue, and the Acheson Plant is located at 1930 Buffalo Avenue, both in the City of Niagara Falls, New York. The Acheson Plant closed in 1982 and the Republic Plant closed in 1987; the National Plant remains active.

Carbon and graphite manufacturing occurred at each of the three Niagara plants, and wastes from all three plants were landfilled on the Republic Plant property. The plants manufactured coal-based carbon products which were used by alloy reduction smelters (i.e., carbon and graphite). Industrial processes at the plants included calcining, milling, mixing, forming carbon products, baking and graphitizing, pitch impregnation, and machining of carbon products. Raw materials used in the process include anthracite coal, petroleum coke, and coal tar pitch. Products manufactured at the plants included specialty machined graphite, carbon liners, cathode blocks and electrodes for furnacing. Waste products from plant operations included carbonaceous waste, primarily as dust from dust collectors, fire brick waste, and raw materials packaging which was composed mostly of wooden pallets but included steel banding, cardboard, styrofoam, plastic, and raw materials bags. Other waste

types generated and deposited at the site include coke, pitch, cafeteria waste, silica sand, coal tars, petroleum tars, machining oils, spent sludges from degreasing operations (1,1,1-trichloroethane), and halowax 1006 (chlorinated naphthalene solid). Halowax is reportedly chemically stable, resistant to acids and alkalies. It is believed that the D003 waste listed on the generator form (Appendix H, Record 10) include Halowax mixed with other spent maintenance waste. This waste was reactive; however, Halowax itself does not exhibit any RCRA characteristics. The degreasing sludges were deposited in the landfill in 1975 and 1976 and totaled 400 pounds. The halowax 1006 was deposited over an eight-year period from 1968 to 1976 and totaled 320 pounds. Also, approximately 200 gallons of oil per month were collected in 55-gallon drums and taken to the landfill or used for dust control on site roadways in the summer. This practice stopped in 1978.

The 16.48-acre landfill reportedly began operations in 1934 and was used exclusively by Union Carbide Corp. However, site maps and sketches provided by UCC show that in 1958 fill was placed in an area west of the landfill boundary. A 1964 map shows an area where landfilling took place on what is now Niagara Mohawk (NIMO) land, which is adjacent to the northern site property boundary and near the capped landfill area (see Appendix H). UCC alleges that this dumping was performed by the Town of Niagara, who at the time, had permission from NIMO to dump ash waste from the town's incinerator. A 1978 map shows a perimeter fence which was installed in 1975 (UCAR 1993).

The landfill was first permitted by the Town of Niagara as a solid waste landfill in 1973, and this permit was renewed in 1981 and again in 1985. In 1978, shortly after the SWMF permit process was centralized by NYSDEC, the landfill was issued state permit No. 32N03 as a SWMF and the permit was renewed as required throughout its active life. In 1978 the volume of waste in the landfill was calculated at 148,800 cubic yards, and the remaining capacity was calculated at 280,000 cubic yards. Between 1978 and 1984, only 37,000 cubic yards (approximately 5,000 cubic yards/year) had been used, leaving 243,000 cubic yards of available space.

Since obtaining a permit from the state in 1978, groundwater sampling of on-site wells has been performed. The site was added to the NYSDEC Registry of Inactive Hazardous Waste sites in 1984 and designated as a 2a site, which means that additional information is needed to assign a classification (NYSDEC 1992). Also in 1984, Wehran Engineering began a Phase I investigation of the 16.48-acre landfill for NYSDEC. The phase

I report was finalized in 1987 and concluded that the site posed a potential threat to groundwater. A phase II investigation was recommended (Wehran 1987).

Upon the closing of the Republic Plant in 1987, Union Carbide officially closed the landfill under an approved NYSDEC closure plan. As required by NYSDEC, post-closure groundwater sampling has taken place quarterly since the closure and results of these sampling events consistently showed that well BW-4 contained volatile organics, specifically vinyl chloride, at levels above state class GA groundwater standards (see Figure 1-2).

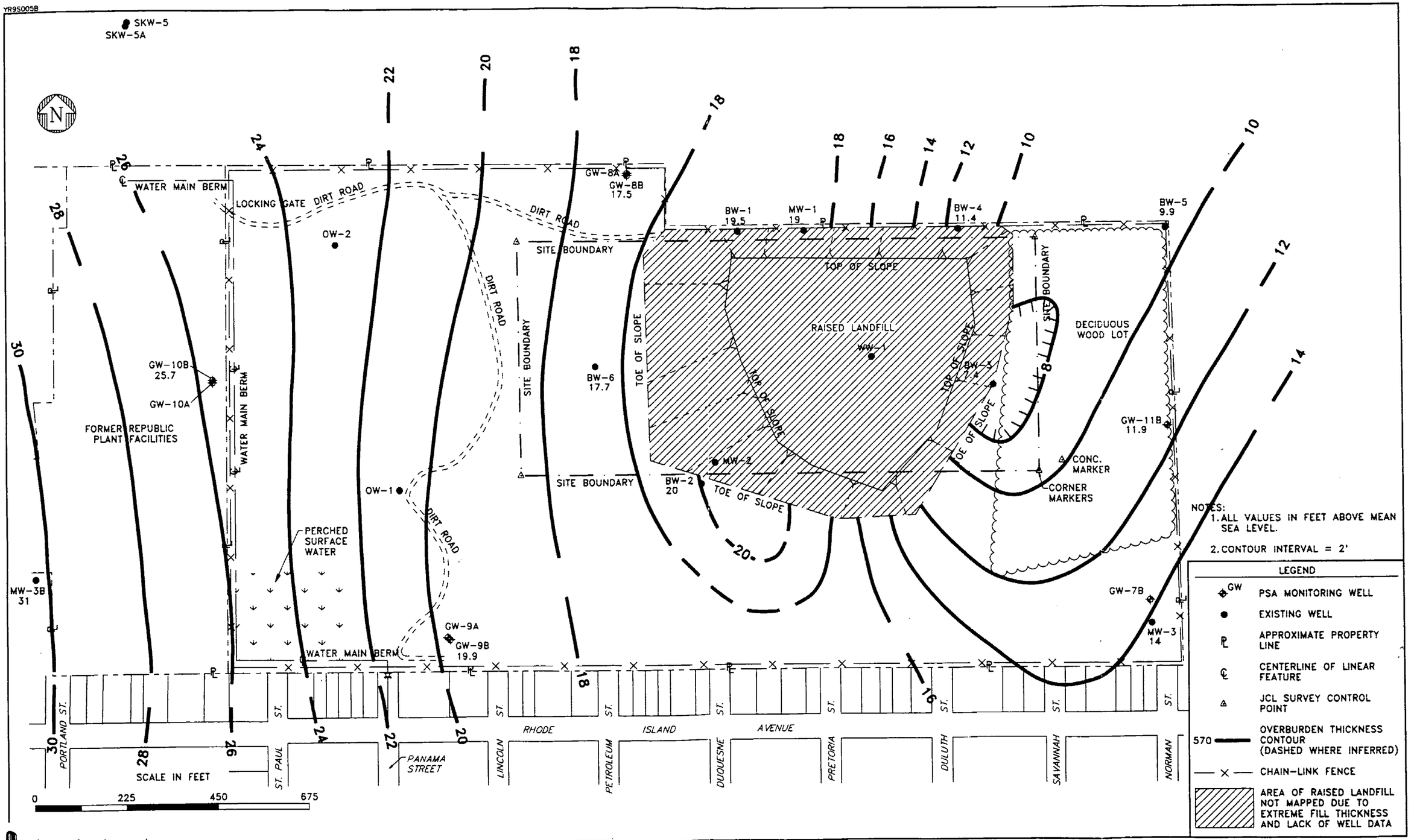
After the closing of the Republic Plant in 1987. Union Carbide sold the western 26-acre portion of the 90-acre lot which contained all plant structures to Niagara Vest, a holding company. The remaining 64 acres contains the 16.48 acre closed landfill and no structures. In 1987, Union Carbide allowed the Town of Niagara to construct a portion of a municipal water supply line along the western edge of the property. During the excavation for the pipeline, waste material was encountered well outside of the capped landfill boundaries. As a result, the waterline was installed in an aboveground berm and a field investigation was performed to assess the nature and extent of the waste material outside of the closed landfill (Union Carbide 1987).

CRA was contracted by UCC to perform the investigation which included a geophysical survey, 30 test pit excavations, well installation, and sampling of soil in wastes from three buried drums, surface water, groundwater, and water from the watermain both upstream and downstream of the site. The investigation determined that approximately 20 acres of the property between the closed landfill and the western property boundary were covered with an average of 5.4 feet of fill material. In addition, three buried drums were sampled, overpacked, removed from the site, and properly disposed of. Sample results indicated that the drum contents exhibit characteristics of an off-specification material and may be an altered form of the impregnating compound, Code 88, formerly used at the UCC facilities (Union Carbide 1987). The investigation concluded that the watermain was unaffected by the fill material buried adjacent to it; groundwater quality in a shallow perched zone is unaffected by the fill material; and soil contaminants found, including PAHs and pesticides, are consistent with levels found in the closed landfill. The CRA investigation report concluded that the study area was nonhazardous and that remedial measures were not required (CRA 1988).

In 1988, the United States Environmental Protection Agency (EPA) published a Site Inspection Report which summarized a 1987 investigation performed at the landfill by the NUS Corporation under the Field Investigation Team (FIT) program. The field investigation included a site inspection and sampling of groundwater and surface soil. Low levels of PAHs were detected in surface soil samples. The EPA report included a Hazard Ranking System (HRS) score which was well below the minimum score necessary for inclusion on the National Priorities List (NPL). The report concluded that the landfill site is not believed to pose a significant concern as source of off-site contaminant migration (NUS 1988; Santella 1990).

In 1991, a NYSDEC Task 1 PSA was performed by E & E. The purpose of the PSA was to provide information sufficient to reclassify the site. The Task 1 PSA report recommended reclassification of the site to a Class 3 site with continued quarterly groundwater monitoring.

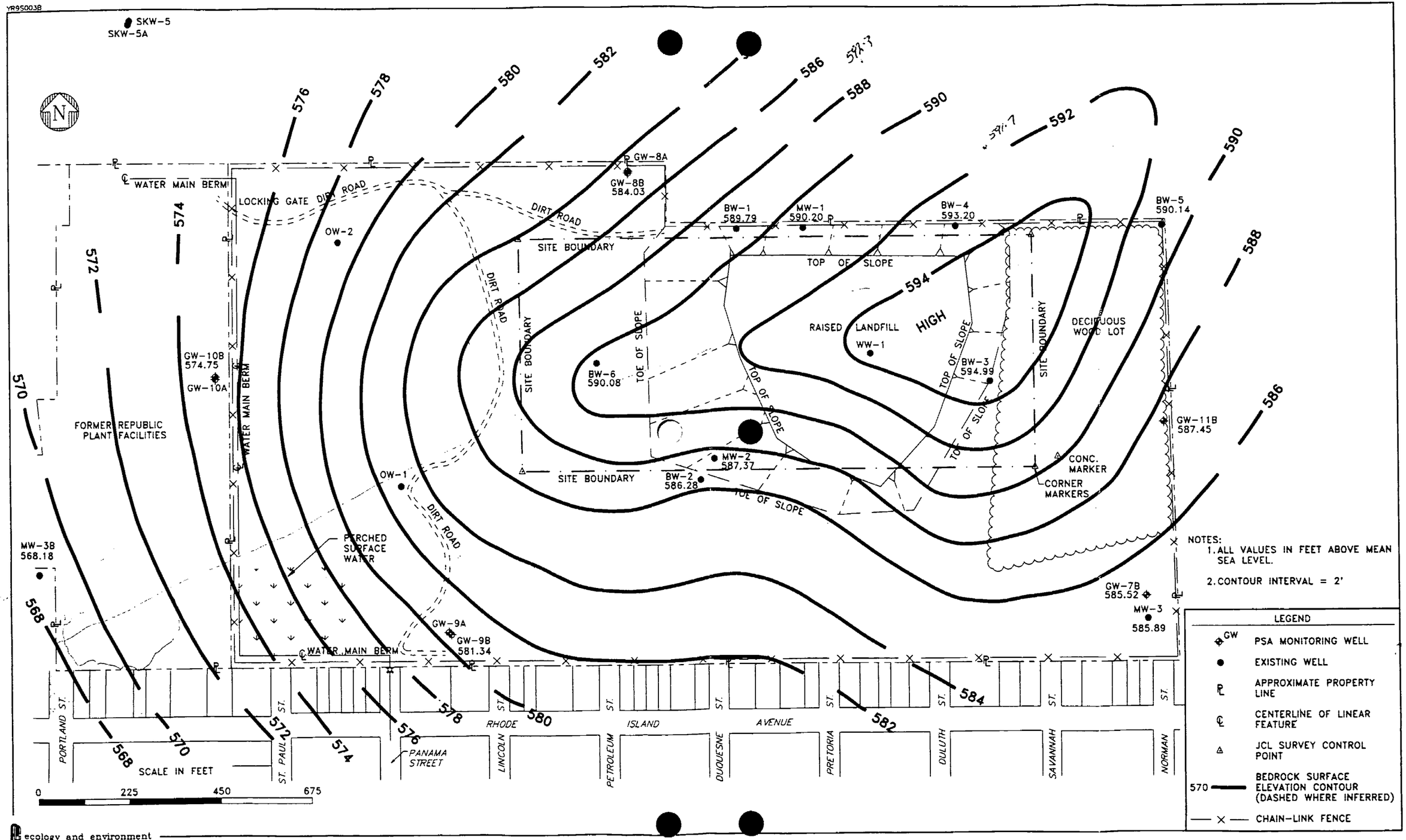
YR9S005B



ecology and environment

Figure 3-2 OVERBURDEN THICKNESS MAP
UNION CARBIDE SITE

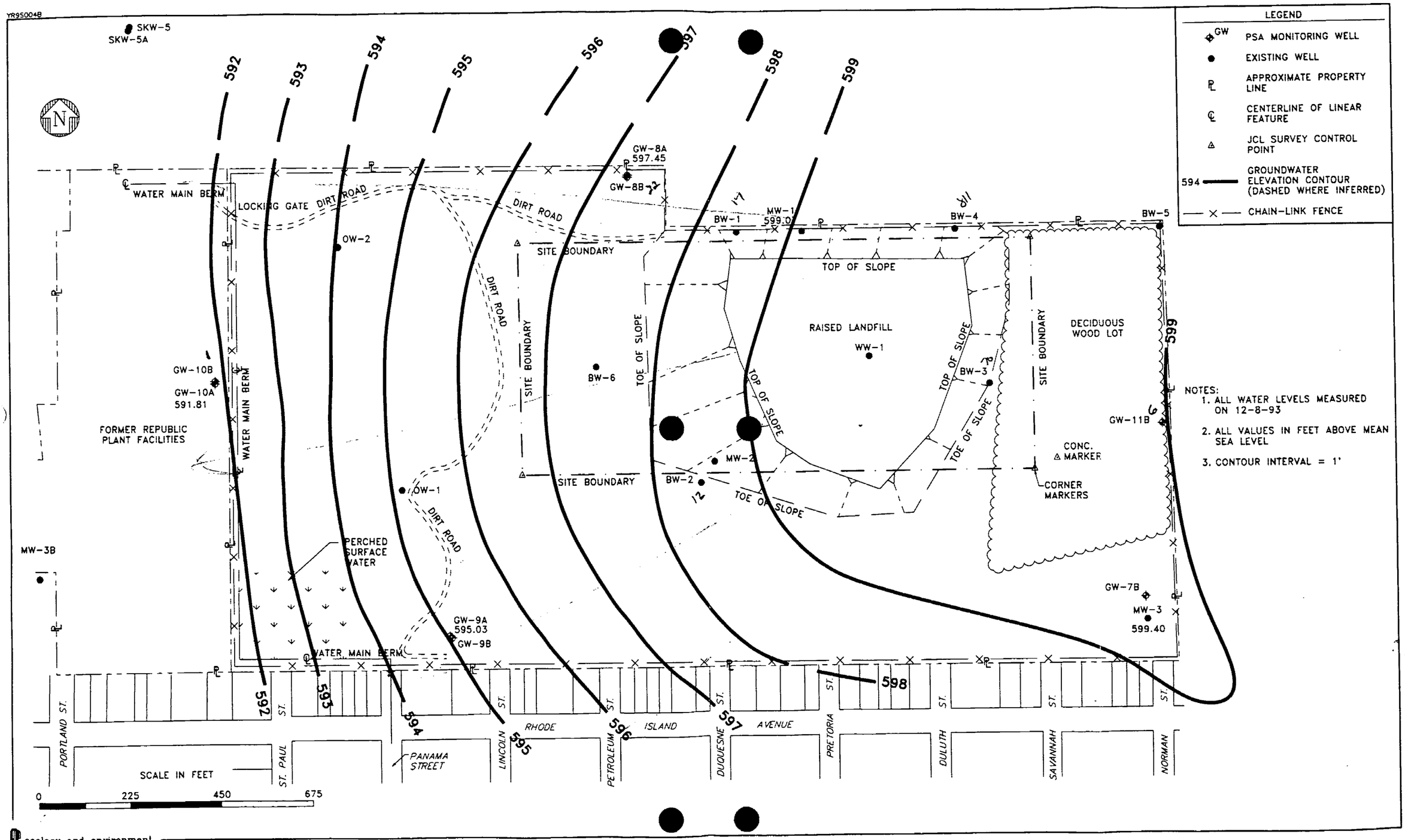
YR95003B



ecology and environment

Figure 3-3 TOP OF BEDROCK CONTOUR MAP
UNION CARBIDE SITE

YR95004B



LEGEND

- GW — PSA MONITORING WELL
- EXISTING WELL
- APPROXIMATE PROPERTY LINE
- CENTERLINE OF LINEAR FEATURE
- JCL SURVEY CONTROL POINT
- 594 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- CHAIN-LINK FENCE

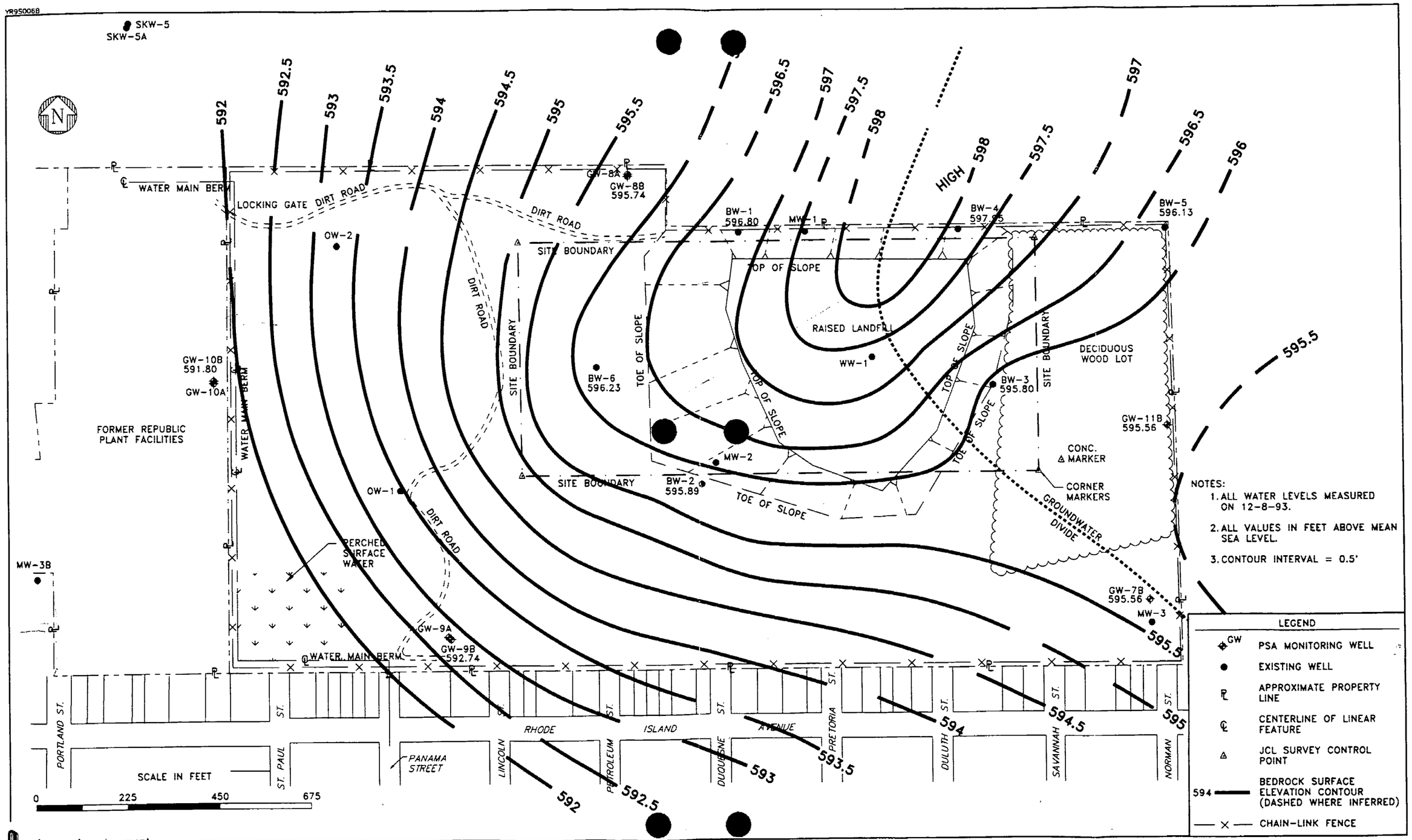
NOTES:

1. ALL WATER LEVELS MEASURED ON 12-8-93
2. ALL VALUES IN FEET ABOVE MEAN SEA LEVEL
3. CONTOUR INTERVAL = 1'

ecology and environment

Figure 3-6 INTERFACE ZONE POTENTIOMETRIC SURFACE MAP UNION CARBIDE SITE

YR9S0068



NOTES:

1. ALL WATER LEVELS MEASURED ON 12-8-93.
2. ALL VALUES IN FEET ABOVE MEAN SEA LEVEL.
3. CONTOUR INTERVAL = 0.5'

LEGEND

- GW — PSA MONITORING WELL
- EXISTING WELL
- APPROXIMATE PROPERTY LINE
- CENTERLINE OF LINEAR FEATURE
- JCL SURVEY CONTROL POINT
- 594 — BEDROCK SURFACE ELEVATION CONTOUR (DASHED WHERE INFERRED)
- CHAIN-LINK FENCE

ecology and environment

Figure 3-10 BEDROCK AQUIFER POTENTIOMETRIC SURFACE MAP UNION CARBIDE SITE

Appendix D

32NO3.64'55

UCAR

UCAR CARBON COMPANY INC.

P.O. Box 887, Niagara Falls, NY 14302-0887

932035
Corres. file

May 3, 2000

Mr. Mark Hans, PE
Regional Solid Materials Engineer
NYS Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2999

SUBJECT: UCAR Republic Landfill #32NO3

Dear Mr. Hans,

Please find enclosed a copy of the sampling results that were sent to Mary E. McIntosh, Engineering Geologist II of the New York State Department of Environmental Conservation Region 9 Office.

Modifications to the Post Closure Sampling Program have been made and approved by the New York State Department of Environmental Conservation. We will no longer be taking quarterly samples. They will now be taken on a semi-annual basis.

If you have any questions please feel free to call me at 278-3486.

Very truly yours,

Robert Bucci
Site Manager

R. Bucci
nm
enc.
cc: Mr. Jim Devald, Dir. of Environmental Health
Niagara County Health Department
Environmental Division
5467 Upper Mountain Road.
Lockport, New York 14094-1899

UCAR

UCAR CARBON COMPANY INC. P.O. Box 887, Niagara Falls, NY 14302-0887

May 2, 2000

Ms. Mary F. McIntosh
Engineering Geologist II
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
270 Michigan Avenue
Buffalo, NY 14203-2999

Dear Ms. McIntosh:

Re: Baseline Monitoring Event
UCAR Republic SWMF #32N03

The baseline monitoring event for the above-referenced site was conducted March 29-30, 2000. With two exceptions, the sample collection and analyses were performed in accordance with the program outlined in the letters from M. McIntosh (New York State Department of Environmental Conservation [NYSDEC]) to R. Bucci (UCAR) dated January 18, 2000 and February 23, 2000. The exceptions to the program were:

i) due to insufficient well recovery volume, no sample was collected from monitoring well MW-2; and

ii) due to insufficient sample volume, nitrite analysis was not performed for MW-1.

A sample collection and analysis summary is presented in Table 1.

The analytical laboratory report for this sampling event is enclosed and the data are summarized in Table 2. The data obtained from this monitoring event are consistent with previous data.

As described in the letter dated January 18, 2000, samples were collected from each of the Environmental Remediation Program (ERP) wells to determine whether volatile organic compounds (VOCs) were present. One VOC, cis-1,2-dichloroethene, was detected in one of the ERP wells (GW-8B). The concentration of cis-1,2-dichloroethene detected in GW-8B was 14 micrograms per liter (µg/L). Due to the detected presence of a VOC compound, well GW-8B will be added to the monitoring program in the annual event. A summary of the Post-Closure Monitoring Program is presented in Table 3 and the analytical parameter list is presented in Table 4. The next Post-Closure Monitoring event will be conducted in September 2000.

Should you have any questions or require additional information please do not hesitate to contact the undersigned.

Yours truly,

Robert Bucci, Site Manager

TABLE 1
SAMPLE COLLECTION AND ANALYSIS SUMMARY
UCAR REPUBLIC SWMF #32N03

Well ID.	Purge Date	Sampling Date	One Well Volume (gals)	Number of Volumes Purged	Total Volume Purged (gals)	Turbidity (NTUs)	Analytical Parameters				Comments
							VOCs	Total Metals	Dissolved Metals	Misc. Parameters	
MW-3	3/29/2000	3/29/2000	2	10	20	245	X	X	X	X	
GW-7B	3/29/2000	3/29/2000	10	3	30	3.9	X				
GW-11B	3/29/2000	3/29/2000	8.8	3	27	2.9	X				
GW-9A	3/29/2000	3/29/2000	2.4	3	7.5	747	X				
GW-9B	3/29/2000	3/29/2000	7.8	3	24	39.8	X	X		X	
GW-8A	3/29/2000	3/29/2000	2.4	3	7	75.7	X				
GW-8B	3/29/2000	3/29/2000	6.7	3	20	122	X				
GW-10A	3/29/2000	3/29/2000	3.3	3	10	1550	X				
GW-10B	3/29/2000	3/29/2000	7.6	3	20	24.8	X				
MW-1	3/29-30/00	3/30/2000	2.25	1+	3.25	31.2	X	X(Partial)	X(Partial)	X(Partial)	Limited volume for sampling
MW-2	3/29-30/00	N/S	0.12	4+	0.5	N/M					Not sampled, insufficient volume
BW-5	3/30/2000	3/30/2000	15	3	45	14.6	X	X		X	MS/MSD
BW-3	3/30/2000	3/30/2000	11.1	3	35	5.4	X	X		X	
BW-2	3/30/2000	3/30/2000	10.6	3	33	2.9	X	X		X	
BW-6	3/30/2000	3/30/2000	8.1	3	24	9.8	X	X		X	
BW-4	3/30/2000	3/30/2000	9.7	3	33	0.4	X	X		X	Occasional oily sheen
BW-1	3/30/2000	3/30/2000	6.2	3	20	57.6	X	X	X	X	

Notes:

Gals.	Gallons.
MS	Matrix Spike.
MSD	Matrix Spike Duplicate.
NTUs	Nephelometric turbidity units.
VOCs	Volatile Organic Compounds.

GW 8A
MW-1

GW 8B
BW-1
BW-4
BW-5

SUMMARY OF GENERAL PARAMETERS AND COMPOUNDS DETECTED
UCAR REPUBLIC SWMF #32N03

Parameters	*Units*	*BW-1 03/30/00*	*BW-2 03/30/00*	*BW-3 03/30/00*	*BW-4 03/30/00*	*BW-5 03/30/00*	*BW-6 03/30/00*	*MW-1 03/30/00*	*MW-3 03/29/00*
Turbidity	NTU	57.6	2.9	5.4	0.4	14.6	9.8	31.2	245
Ammonia	mg/L	ND 0.4	ND 0.4	ND 0.4	2.5	ND 0.4	ND 0.4	ND 0.4	ND 0.4
Nitrite	mg/L	ND 0.04	ND 0.04	ND 0.04	ND 0.04	ND 0.04	ND 0.04	NA [1]	ND 0.04
TKN	mg/L	1.06	0.94	1.39	3.1	ND 0.8	0.98	0.82	1.36
Iron, total	mg/L	3.02	0.87	1.21	2.41	2.79	2.67	4.64	10.1
Potassium, total	mg/L	4.64	8.47	1.85	11.9	2	0.83	37.9	2.86
Zinc, total	mg/L	3.54	0.1	1.11	0.06	0.18	0.02	0.05	0.07
Iron, dissolved	mg/L	2.45	NA	NA	NA	NA	NA	NA	2.11
Potassium, dissolved	mg/L	5.27	NA	NA	NA	NA	NA	NA	2.29
Zinc, dissolved	mg/L	3.75	NA	NA	NA	NA	NA	NA	0.11
Chloroethane	ug/L	ND 10	22	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
Vinyl chloride	ug/L	ND 10	ND 10	15	ND 10	ND 10	ND 10	ND 10	ND 10
cis-1,2-Dichloroethene	ug/L	ND 10	ND 10	ND 10	180	ND 10	ND 10	ND 10	ND 10
Tetrachloroethene	ug/L	ND 10	ND 10	ND 10	135	ND 10	ND 10	ND 10	ND 10
Trichloroethene	ug/L	ND 10	ND 10	ND 10	178	ND 10	ND 10	ND 10	ND 10
Vinyl chloride	ug/L	ND 10	ND 10	ND 10	115	ND 10	ND 10	ND 10	ND 10

SUMMARY OF GENERAL PARAMETERS AND COMPOUNDS DETECTED
UCAR REPUBLIC SWMF #32N03

Parameters	*Units*	*GW-7B 03/29/00*	*GW-8A 03/29/00*	*GW-8B 03/29/00*	*GW-9A 03/29/00*	*GW-9B 03/29/00*	*GW-10A 03/29/00*	*GW-10B 03/29/00*	*GW-11B 03/29/00*
Turbidity	NTU	3.9	75.7	122	747	39.8	24.8	1550	2.9
Ammonia	mg/L	NA	NA	NA	NA	ND 0.4	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA	ND 0.04	NA	NA	NA
TKN	mg/L	NA	NA	NA	NA	ND 0.8	NA	NA	NA
Iron, total	mg/L	NA	NA	NA	NA	0.47	NA	NA	NA
Potassium, total	mg/L	NA	NA	NA	NA	6.20	NA	NA	NA
Zinc, total	mg/L	NA	NA	NA	NA	ND 0.016	NA	NA	NA
Iron, dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	ug/L	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
Vinyl chloride	ug/L	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
cis-1,2-Dichloroethene	ug/L	ND 10	ND 10	14	ND 10	ND 10	ND 10	ND 10	ND 10
Tetrachloroethene	ug/L	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
Trichloroethene	ug/L	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
Vinyl chloride	ug/L	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10

Notes:

(1)	Insufficent sample volume.
NA	Not Analyzed.
NDx	Non-detect at associated value.
NTU	Nephelometric Turbidity Units.
TKN	Total Kjeldahl Nitrogen.

TABLE 3

POST-CLOSURE MONITORING PROGRAM SUMMARY
UCAR REPUBLIC SWMF #32N03

	Annual	*Semi-Annual*
MW-1	X	X[(1)]
MW-2	X	X[(1)]
MW-3	X	X[(1)]
BW-1	X	X
BW-2	X	X[(1)]
BW-3	X	X
BW-4	X	X
BW-5	X	X[(1)]
BW-6	X	X
GW-8B	X	X[(1)]
GW-9B	X	X[(1)]

Notes:
(1) VOC analyses not performed in this event.

TABLE 4

MONITORING PARAMETERS
UCAR REPUBLIC SWMF #32N03

Water Level Elevation

Turbidity
Ammonia
Nitrite
Total Kjeldahl Nitrogen

Iron[(1)]
Potassium[(1)]
Zinc[(1)]

Volatile Organic Compounds[(2)]

Notes:
(1) Total and soluble analyses to be performed when turbidity is > 50 NTU
(2) Method 8260

CRA SERVICES

REPUBLIC WASTE MANAGEMENT FACILITY

POST CLOSURE MONITORING PROGRAM

ANNUAL EVENT + INITIAL BASELINE EVENT

SAMPLE DATE: MARCH 30, 2000

Prepared By:

ADVANCED ENVIRONMENTAL SERVICES INC.

"A Company Dedicated to Honesty, Quality and Service"

April 13, 2000
REF: CTC01NJ
Lab ID No. 10233

QA/QC VERIFICATION FOR PROJECT ID 01NJ

The following report, as well as the supporting data, have been carefully reviewed for accuracy, adherance to the cited methods, and completeness. All data contained in this report was generated in accordance with the AES Laboratory Quality Assurance/Quality Control Program.

Kevin McKay

Metals Department

Kevin McKay

Inorganic Chemistry

Organic Chemistry

W. Joseph McDougall

Quality Control

Project Manager

All 'Total' results on soil matrices are calculated on a dry weight basis, unless otherwise noted.
Analyses noted as 'Performed in the laboratory' require immediate testing and should be performed in the field.

The following are standard abbreviations:

- BQL - Below Quantifiable Limits
- ND - None Detected
- NG - No Growth of Colonies
- NR - Not Requested
- D - Indicates a dilution was required

Advanced Environmental Services, Inc.
2186 Liberty Drive
Niagara Falls, New York 14304
(716) 283-3120

QUARTERLY GROUNDWATER MONITORING - FIELD PARAMETER INFORMATION
March29/30 2000

UCAR CARBON COMPANY, INC.

Hyde Park Boulevard
Niagara Falls, New York

AES Code: CTC **Project I.D. # 01NJ**

Monitoring Well I.D.	Sampling Date	Sampling Time	Water Level (ft.)	Turbidity (NTU)	Filter Time	Field Comments/Observations
BW-1	03/30/00	3:15 PM	20.10	57.6	4:30 PM	Grey Tint
BW-2	03/30/00	11:00 AM	20.50	2.9	NR	Clear/Yellow Tint
BW-3	03/30/00	10:25 AM	16.20	5.4	NR	Clear
BW-4	03/30/00	2:50 PM	15.00	0.4	NR	Clear
BW-5	03/30/00	2:40 PM	7.50	14.6	NR	Clear
BW-6	03/30/00	11:55 AM	18.10	9.8	NR	Clear
MW-1	03/29/00	2:45 PM	31.20	31.2	NR	Clear
MW-2	03/29/00	3:00 PM	Dry	N/A	N/A	Dry
MW-3	03/29/00	10:45 AM	13.50	245.0	4:15 PM	Cloudy,Brown
Blind Dup	NR					
Trip Blank	NR					

NR= Not required

N/A= Not Available

Field Technician 4/1/00 Date

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QUARTERLY GROUNDWATER MONITORING - FIELD PARAMETER INFORMATION
March29/30 2000

UCAR CARBON COMPANY, INC.

Hyde Park Boulevard
Niagara Falls, New York

AES Code: CTC **Project I.D. # 01NJ**

Monitoring Well I.D.	Sampling Date	Sampling Time	Water Level (ft.)	Turbidity (NTU)	Filter Time	Field Comments/Observations
GW-7B	03/29/00	10:45 AM	5.90	3.9	NR	Clear
GW-11B	03/29/00	10:30 AM	6.50	2.9	NR	Clear
GW-9B	03/29/00	11:40 AM	28.50	39.8	NR	Clear
GW-9A	03/29/00	11.30 AM	20.90	747.0	NR	Muddy,Brown
GW-8A	03/29/00	11:55 AM	17.20	75.7	NR	Sl. Cloudy
GW-8B	03/29/00	12:30 PM	24.30	122.0	NR	Cloudy
GW-10A	03/29/00	2:55 PM	25.50	24.8	NR	Clear
GW-10B	03/29/00	2:45 PM	26.50	1550.0	NR	Muddy,Brown

Field Technician 4/1/00 Date

Advanced Environmental Services, Inc
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Niagara Falls, New York 14304
(716) 283-3120

QUARTERLY GROUNDWATER MONITORING - WELL INFORMATION
March 29130,2000

UCAR CARBON COMPANY, INC.

Hyde Park Boulevard
Niagara Falls, New York

AES Code: CTC **Project I.D. # 01NJ**

Monitoring Well I.D.	Evacuation Date	Top of Inner Casing Elevation (ft.)	Monitoring Well Diameter	Water Level (ft.)	Water Elevation (ft.)	Bottom of Well (ft.)	Volume of Standing Water (gallons)	Volume of Evacuated Water (gallons)	Recharge Rate
BW-1	3/30/00	610.72	4	14.92	595.80	24.38	6.18	20.0	C
BW-2	3/30/00	608.43	4	12.30	596.13	26.54	10.60	33.0	C
BW-3	3/30/00	604.72	4	7.80	596.92	24.85	11.10	35.0	C
BW-4	3/30/00	607.08	4	13.03	594.05	22.65	6.28	19.0	C
BW-5	3/30/00	603.33	4	5.77	597.56	28.77	15.01	45.0	C
BW-6	3/30/00	607.04	4	12.58	594.46	24.94	8.07	24.0	C
MW-1	3/29/00	609.43	2	7.81	601.62	21.02	2.17	3.00(Dry)	VS
MW-2	3/29/00	607.54	3	23.85	583.69	24.59	0.27	0.4(Dry)	VS
MW-3	3/29/00	601.61	2	3.30	598.31	15.35	1.98	20.0	C
OW-1 SOUTH	3/30/00	608.81	2	5.97	602.84	NR	NR	NR	NR
OW-2 NORTH	3/30/00	607.06	2	5.85	601.21	NR	NR	NR	NR

Abbreviations:
VS = Very Slow ----- Recharge Rate longer than 24 hr period.
S = Slow ---------- Recharge Rate within 24 hr period.
R = Rapid --------- Recharge Rate within 1 hr period.
C = Continuous ---- Recharge Rate immediate.
NR = Not Required
N/A = Not Applicable

Technician 4/1/00 Date

Advanced Environmental Services, Inc.
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QUARTERLY GROUNDWATER MONITORING - WELL INFORMATION
March 29,30 2000

UCAR CARBON COMPANY, INC.

Hyde Park Boulevard
Niagara Falls, New York

AES Code: CTC **Project I.D. # 01NJ**

Monitoring Well I.D.	Evacuation Date	Top of Outer Casing Elevation (ft.)	Monitoring Well Diameter	Water Level (ft.)	Water Elevation (ft.)	Bottom of Well (ft.)	Volume of Standing Water (gallons)	Volume of Evacuated Water (gallons)	Recharge Rate
GW-7B	3/29/00	603.08	3	5.84	597.24	32.32	9.93	30.0	C
GW-8A	3/29/00	604.04	2	5.80	598.24	20.11	2.35	7.0	C
GW-8B	3/29/00	603.90	3	7.57	596.33	25.48	6.72	20.0	C
GW-9A	3/29/00	603.29	2	7.98	595.31	22.51	2.38	7.5	C
GW-9B	3/29/00	603.40	3	11.25	592.15	32.05	7.80	24.0	C
GW-10A	3/29/00	603.17	2	12.40	590.77	32.80	3.33	10.0	C
GW-10B	3/29/00	603.29	3	12.54	590.75	30.20	7.60	21.0	C
GW-11B	3/29/00	601.89	3	4.58	597.31	28.14	8.84	27.0	C

Abbreviations:
VS = Very Slow ----- Recharge Rate longer than 24 hr period.
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C = Continuous ---- Recharge Rate immediate.
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Technician Date

Appendix E