EA Engineering, P.C.

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15 February 2000

Mr. Michael Resh
Manager of Environmental Remediation
BOC Gases
100 Mountain Avenue
Murray Hill, New Jersey 07974

RE: Summary Report, Pre-Design Investigation Performed from 6 to 15 December 1999
Witmer Road Landfill, Niagara Falls, New York
EA Project No. 12040.33

Dear Mr. Resh:

EA Engineering, P.C. and its Affiliate EA Engineering, Science, and Technology, were retained by the BOC Group to perform an interim remedial closure design for the Witmer Road Landfill parcel in Niagara Falls, New York. A pre-design investigation was performed from 6 through 15 December 1999 to determine the extent of waste fill materials and conduct leachate, vector, wetlands, and topographic surveys. In addition to the waste delineation, data were gathered to support two design variances that were to be requested.

1. PRE-DESIGN INVESTIGATION

The follow sections outline the pre-design activities that were performed during this field event.

1.1 LEACHATE AND VECTOR SURVEY

A surface condition investigation was conducted to identify the presence of uncontrolled leachate at, or emanating from, the landfill, and a vector investigation was conducted to identify the presence of any vectors at the landfill, including rodents, insects, and birds. Uncontrolled leachate seeps identified during the survey were documented, flagged, and located during the topographic survey. This information will be utilized during the design phase to address and correct the leachate seeps.

1.2 EXTENT OF WETLANDS

A preliminary determination of the extent of wetlands regulated under the Code of Federal Regulations, Title 40, Section 6.302 (a) (40 CFR 6.302 [a]) was completed by field delineation during the pre-design activities. An EA wetland delineator determined wetland limits using the 3-parameter approach described in the U.S. Army Corps of Engineers *Wetland Delineation Manual* (USACE 1987[1]). The delineation identified wetland areas that developed adventitiously on the landfill parcel and the limit of adjacent wetlands that may be affected by the design. On the landfill

1. U.S. Army Corps of Engineers (USACE). 1987. Wetland Delineation Manual.

itself, the determination was based on vegetation and hydrology since site soils have been disturbed and any wetlands may be considered to be special areas. A final wetland delineation will be conducted in Spring 2000, approximately 1 month following vegetative growth.

The fillward limit of wetlands was flagged on all sides of the landfill. The delineator completed U.S. Army Corps of Engineers data sheets including vegetation, soil, and hydrologic characteristics for each area. A location survey of the flags was completed and wetland limits were mapped on design drawings. A wetland delineation report will be included with the 60 percent design.

1.3 EXTENT OF WASTE FILL MATERIALS

In order to minimize the lateral extent of the landfill cap, EA conducted a test pitting program around the perimeter of the site to determine fill material thickness and lateral extent. This information will be used to determine where waste consolidation is feasible, and where the footprint of the landfill can be reduced. This information was used during the design to determine the extent of the landfill cap. The test pits were dug utilizing a backhoe, an operator, and a supervising engineer. Test pits were dug starting onsite where it is likely waste has been placed, and continue away from the landfill until no further waste was encountered.

EA's supervising engineer monitored each excavation and work space with appropriate monitoring equipment to ensure safe site operations. The supervising engineer field-staked where the test pit began, where waste placement ended, and where the test pit excavation ended; depth of the waste was recorded as much as possible. These stakes were surveyed shortly thereafter to accurately delineate the edge of the waste. Excavated soil and waste were stockpiled alongside the test pit, and backfilled into the same excavation following completion of each test pit.

The test pit information was utilized to locate areas where additional investigation was performed utilizing a drill rig. As necessary, borings were installed to determine the vertical extent of waste material and the geotechnical and physical characteristics of the fill and overburden materials. This information was required at some locations to determine landfill stability and the depth of the waste mass.

1.4 SURVEYING

The site was surveyed to provide current topographic information as the basis for site civil design. An aerial survey was performed by a New York-licensed surveyor with a 2-ft contour interval, supplemented as necessary by a field survey to verify the results of the aerial survey and to locate utilities and other site features, as necessary. The survey located woodlands, streams, structures, monitoring wells, roads, utilities, fencelines, property boundaries, and other appropriate site features. Field run surveys were also performed to locate extent of wetlands, test pit locations, and other features which may be generated as part of the pre-design activities.

2. SUMMARY OF RESULTS

The pre-design investigation was conducted from 6 through 15 December 1999. This section outlines the results that were found from the pre-design investigation. The following findings will be used to develop the closure plan and final design.

2.1 LEACHATE AND VECTOR SURVEY

2.1.1 Leachate Survey

A surface condition investigation was conducted on 7 December 1999 to identify the presence of uncontrolled leachate at, or emanating from, the landfill. Two leachate seeps were identified at the Airco parcel. Leachate seep LS-1 is located on the southwestern side of the property and leachate seep LS-2 is located on the eastern side of the property (Figure 1). Both seeps discharge directly into the perimeter swale, which ultimately flows into the adjoining wetlands beyond the property boundary. Both leachate seeps will be addressed during the design phase in order to eliminate uncontrolled leachate discharge from the Airco property.

2.1.2 Vector Survey

The vector survey was conducted on 7 December 1999. The survey consisted of walking the perimeter of the site four times and crossing diagonally from several directions over the landfill surface. The presence of vectors was based on direct observation of organisms and secondary observation of wildlife signs (tracks, scat, burrows, etc.). Remnant plant material indicated that the common reed *Phragmites* was the dominant vegetation. Specimens of the following fauna were observed on or immediately adjacent to the site:

- Coyote (*Canis latrans*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Muskrat (*Ondatra zibethicus*)
- Canada goose (*Branta canadensis*).

Signs of the following vertebrates were observed on the landfill:

- Humans (all terrain vehicle tracks, bottles)
- Coyote/dog (tracks, scat)
- Rabbit (tracks)
- Mouse/mole (burrows, tracks).

The majority of these species do not permanently dwell on the Airco parcel, but gain access to and through the property under or through damaged portions of the perimeter fence. However, mouse/mole burrows were observed at various locations in and around the waste materials. Attachment A provides site photographs. These species are not part of the threatened or endangered list and, therefore, will not be protected during the design or construction phases.

2.2 EXTENT OF WETLANDS

The fillward limit of wetlands was staked and flagged on 7 December 1999. In general, wetlands were observed along the southwestern, southern, and eastern perimeter of the property. A location survey of the wetland stakes was completed and the wetland limits will be mapped on design drawings. Wetland limits were based primarily on the extent of remnant *Phragmites*. On the eastern and southwestern portions of the site, wetlands consisted of linear drainage swales. On the southern side of the site, the wetland boundary was formed by the edge of the access road along the foot of the previously capped portion of the landfill. The wetlands in this area extend beyond the site boundary fence line and appeared to be primarily a monotype strand of *Phragmites*. It will be necessary to encroach on the perimeter wetlands in order to excavate waste materials along the perimeter. This issue will be addressed in the design, and the wetlands will be restored as much as is practicable.

2.3 EXTENT OF WASTE FILL MATERIALS

During the period 7-9 December 1999, 29 test pits were excavated around the perimeter of the landfill. Excavation of the test pits was started on the site where it was likely that waste has been placed, and continued away from the landfill until no further waste was encountered. The depth of each test pit depended upon the depth to native clay or refusal. Test pit data were also used to refine the location of the borings to define the extent of the waste materials. Monitoring of excavation activities for the presence of volatile organic compounds and methane was performed utilizing a Foxboro TVA-1000 combination photoionization detector/flame ionization detector, and a Landtec GA-90 methane detector. Air monitoring data collected at the test pits included the breathing zone, background, and headspace analysis for each material/layer encountered across the site. No indication of methane gas generation and no organic waste was observed in the test pits. Test pits logs are provided in Attachment B. The summarized data of the test pit locations can be found in Table 1. The locations of the test pits are depicted on Figure 2. The locations are approximate and were generated from field notes. The actual locations of the test pits were staked, flagged, and surveyed.

During the period 8-10 December 1999, 16 borings were installed. Borings were advanced to native clay material or refusal. Split-spoon samples were monitored for the presence of volatile organic compounds and methane utilizing a Foxboro TVA-1000 combination photoionization detector/flame ionization detector, and a Landtec GA-90 methane detector. Low level flame ionization detector responses were recorded, with no corresponding detection of methane noted with the GA-90 methane detector. These minor responses are most likely due to elevated moisture content within the waste sample during the headspace analysis. The locations of the borings are depicted on Figure 2. Boring logs are provided in Attachment C. The locations are approximate and were generated from field notes. The summarized data at the 16 boring locations can be found in Table 2. The actual boring locations were flagged and surveyed as part of the investigation.

2.4 ANALYTICAL RESULTS

On 6 and 7 December 1999, 4 waste samples, 2 seep samples, and 2 sediment samples were collected. These samples were shipped to Severn Trent Laboratories for analysis of baseline parameters as per 6 NYCRR 360-2.11. The analytical results are presented in Tables 3 through 5. Notable results of analysis are as follows.

2.4.1 Waste Samples

- One volatile organic compound (methylene chloride) was detected in waste samples at concentrations less than 7 μg/kg. Methylene chloride is a common laboratory contaminant and, based upon historical site activities, it is considered a laboratory artifact.
- Twenty-one metals were detected in the samples at various concentrations.
- Hexachromium was found in Sample 1 at 8.9 mg/Kg and Sample 2 at 0.2 mg/Kg.

The results are shown in Table 3.

2.4.2 Seep Samples

- Acetone was detected in 1 sample and, based upon historical site activities, is considered to be a laboratory artifact.
- Two metals (chromium and selenium) were detected in excess of New York State Department of Environmental Conservation (NYSDEC) water quality standards.
- Additional baseline parameters were detected within normal ranges below NYSDEC water quality standards.

These results are provided in Table 4.

2.4.3 Sediment Samples

- Two volatile organic compounds (naphthalene and 4-isopropotoluene) were detected in sediment samples at less than 2 μg/kg.
- Three metals (chromium, copper, and manganese) were detected in excess of NYSDEC standards.
- Additional baseline parameters were detected within normal ranges below NYSDEC standards.

These results are provided in Table 5.

2.5 GEOTECHNICAL SAMPLE ANALYSIS

On 6 December 1999, 4 waste samples and 1 soil sample were collected. Geotechnical tests were run on the 4 waste samples and 1 sample of the cap material. The physical characteristics of the waste and soil samples are depicted in Table 6. None of the waste samples exhibited unusual physical characteristics that would inhibit construction of the cap system.

The clay soil sample collected exhibited a permeability of 3.6×10^{-8}, which exceeds the 1.0×10^{-7} requirement depicted in 6 NYCRR Part 360-2.13(P). Some of this material could be mined for use within the cap system, particularly for use within the drainage swales. This will then be taken into consideration during the design phase.

2.6 SURVEYING

The site was surveyed from 13 to 15 December 1999 to provide current topographic information as the basis for site civil design. An aerial survey was performed on 10 December 1999 by a New York-licensed surveyor, supplemented by a field survey, to verify the results of the aerial survey and to locate utilities and other site features. The survey located woodlands, streams, structures, monitoring wells, roads, utilities, fencelines, property boundaries, and other appropriate site features. A copy of the combined survey is provided in Attachment D.

If you require additional information, or have questions with regard to this summary report, please contact either of the undersigned (David Santoro at 410-584-7000, or Charles McLeod at 914-565-8100).

Sincerely,

EA ENGINEERING, P.C.

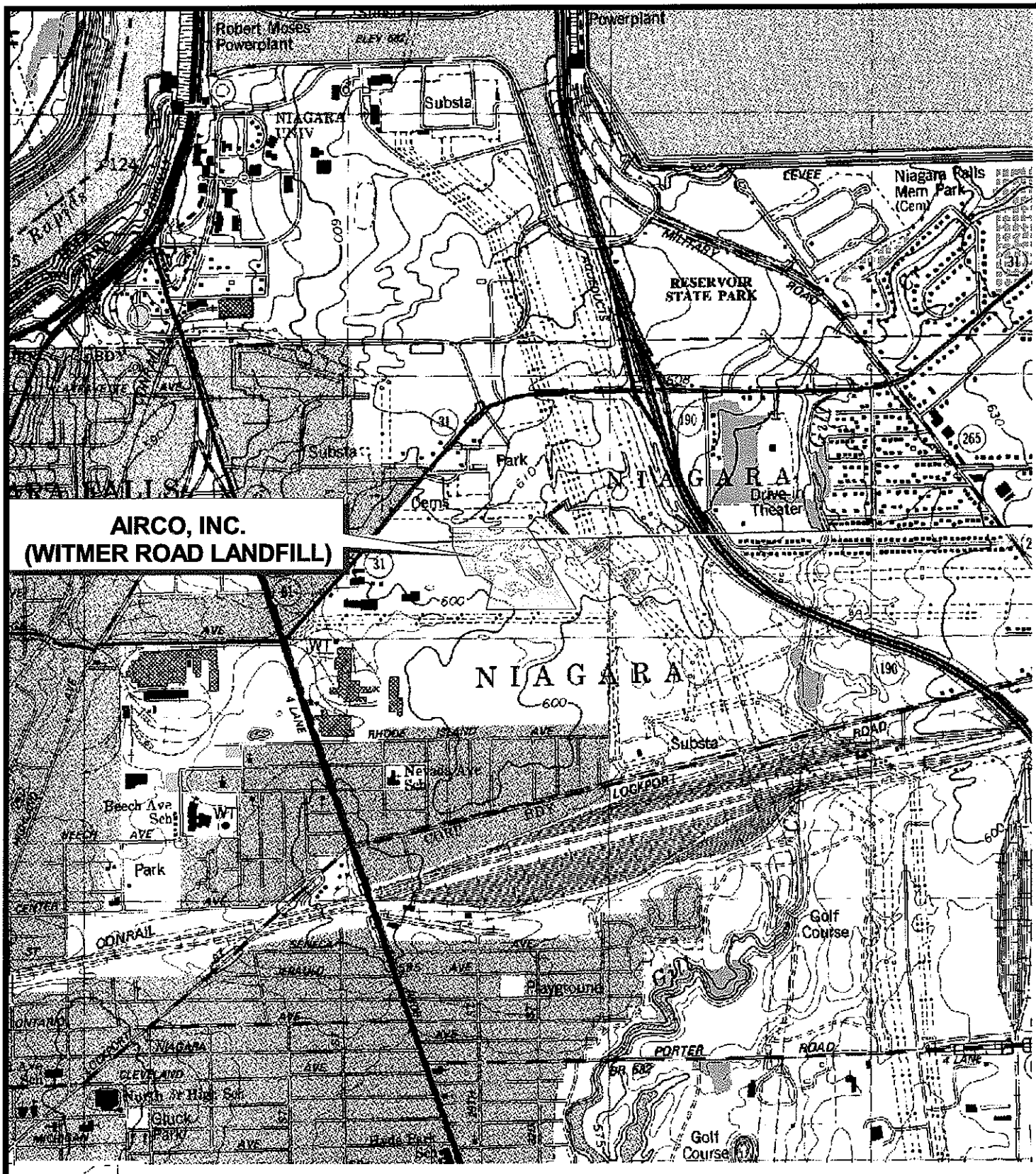
David S. Santoro, P.E., L.S.
President

EA ENGINEERING, SCIENCE,
AND TECHNOLOGY

Charles E. McLeod, Jr., P.E.
Manager, Environmental Engineering

DSS/caw
Attachments

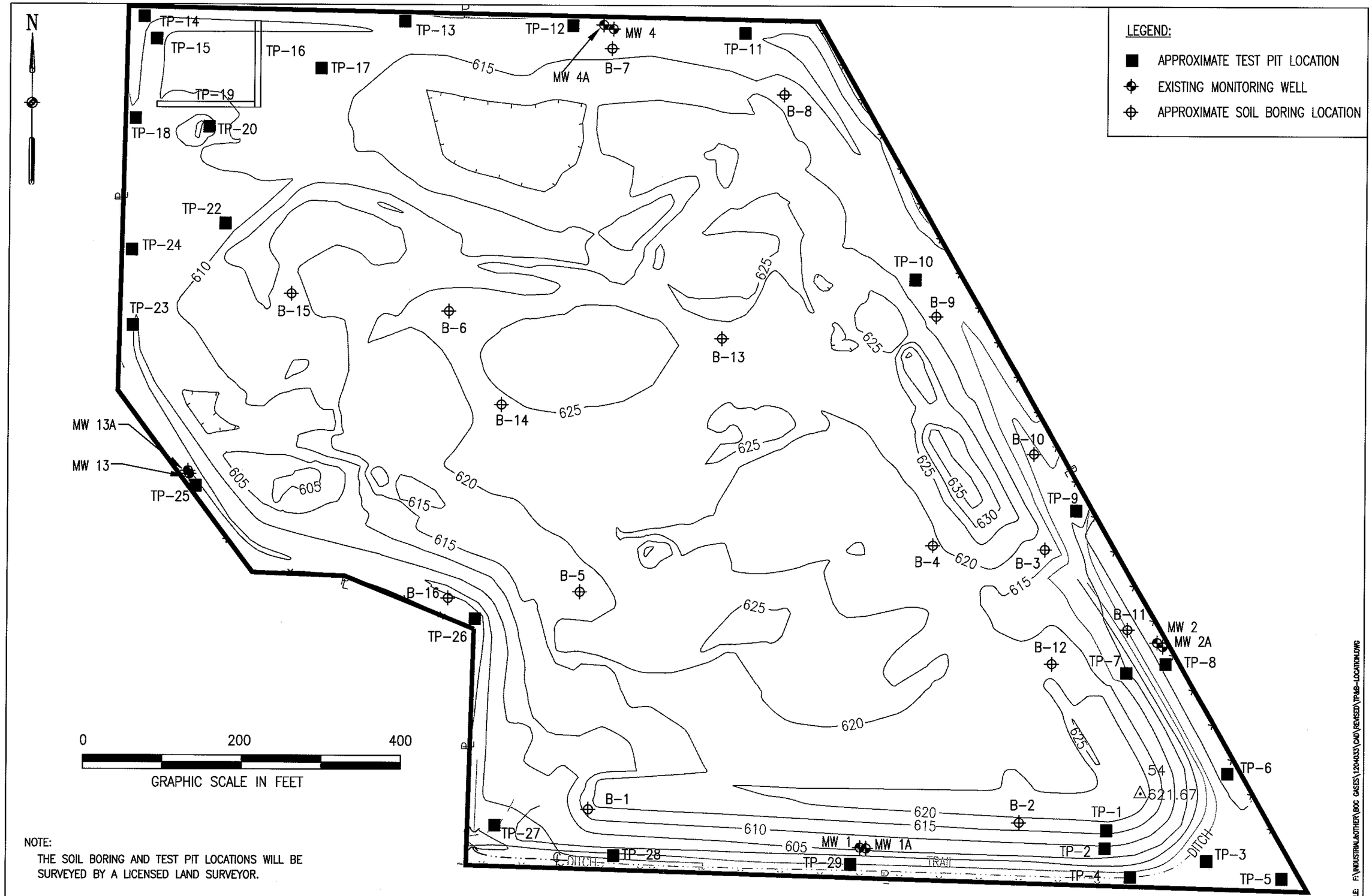
cc: M. Gutbertlet (EA)



SOURCE MAP: USGS LEWISTON AND NIAGARA FALLS 7.5 MINUTE QUADRANGLES

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 1 SITE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
CEM	BT	BT	CEM	AS SHOWN	30 NOV. 1999	12040.33	I:\BOC-NIAGARA -GIS\BOC.APR



NOTE:
THE SOIL BORING AND TEST PIT LOCATIONS WILL BE SURVEYED BY A LICENSED LAND SURVEYOR.

FILE: F:\INDUSTRIAL\ANOTHER\BOC CASES\12040.33\CAD\REVISED\TP&B-LOCATION.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 2 APPROXIMATE TEST PIT AND BORING LOCATIONS	DESIGNED BY GMC	DRAWN BY BT	DATE 2 FEBRUARY 2000	PROJECT NO. 12040.33
			CHECKED BY GMC	PROJECT MGR. CEM	SCALE AS SHOWN	FIGURE 2

TABLE 1 SUMMARY OF HEADSPACE ANALYSIS FROM TEST PITS COLLECTED DURING THE PERIOD 7-10 DECEMBER 1999, WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Location	PID (ppm)	FID (ppm)
TP-01-BZ	0	0
TP-01 Headspace	0	0
TP-02-BZ	0	0
TP-03-BZ	0	0
TP-03 Headspace	0	0
Background TP-01 – TP-03	0	0
TP-04-BZ	ND	ND
TP-05-BZ	0	0
TP-06-BZ	0	0
TP-07-BZ	0	0
TP-08-BZ	0	0
TP-08 Headspace	0	1
Background TP-05 – TP-08	0	0
TP-09-BZ	0	0
TP-09 Headspace	0	0
TP-10-BZ	0	0
TP-10 Headspace	0	0
TP-11-BZ	0	0
TP-12-BZ	0	0
TP-12 Headspace	0	0
TP-13-BZ	0	0
TP-14-BZ	0	0
TP-15-BZ	0	0
TP-16-BZ	0	0
TP-17-BZ	0	0
TP-18-BZ	0	0
TP-19-BZ	0	0
TP-21-BZ	0	0
TP-21 Headspace	0	0
TP-22-BZ	0	0
TP-22 Headspace	3	0
TP-23-BZ	0	0
TP-24-BZ	0	0
TP-25-BZ	0	0
TP-26-BZ	0	0
TP-26 Headspace	0	1.5
TP-27-BZ	0	1.5
TP-27 Headspace	0	1.0

NOTE: PID = Photoionization detector.
FID = Flame ionization detector.
BZ = Breathing zone.
ND = No data available.

TABLE 2 SUMMARY OF HEADSPACE ANALYSIS FROM BORINGS
COLLECTED DURING THE PERIOD 7-10 DECEMBER 1999
WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Location	Depth (ft)	PID (ppm)	FID (ppm)	Methane (%)
B-1	0-2	1.50	3.80	0
	2-4	6.80	59.00	0
	4-6	5.20	11.20	0
	6-8	4.70	16.20	0
	8-10	1.80	0.48	0
	10-12	1.20	0.32	0
	12-14	1.30	0.00	0
B-2	0-2	2.70	1.30	0
	2-4	3.40	2.80	0
	4-6	0.00	0.00	0
	6-8	0.00	0.00	0
	8-10	2.80	3.10	0
B-3	0-2	0.00	0.20	0
	2-4	0.83	1.13	0
	4-6	0.66	0.98	0
	6-8	0.50	0.31	0
	8-10	0.36	0.11	0
B-4	0-2	0.00	0.41	0
	2-4	0.00	1.80	0
	4-6	2.80	0.00	0
	6-8	0.00	0.80	0
	8-10	No data	No data	No data
	10-12	0.00	0.41	0
	12-14	0.40	0.00	0
	14-16	0.00	0.74	0
	16-18	0.00	2.30	0
	18-20	0.00	6.60	0
B-5	0-2	0.00	0.00	0
	2-4	1.20	3.80	0
	4-6	0.00	0.00	0
	6-8	0.00	0.00	0
	8-10	0.00	68.00[a]	0
B-6	0-2	No data	No data	No data
	2-4	0.00	0.00	0
	4-6	0.00	0.00	0
	6-8	0.00	0.30	0
	8-10	0.00	0.30	0
	10-12	0.00	0.20	0
B-7	0-2	0.00	0.00	0
	2-4	0.00	0.14	0
	4-6	0.00	7.90	0
	6-8	3.00	61.40[a]	0
	8-10	0.00	8.30	0
B-8	0-2	0.00	0.00	0
	2-4	0.00	0.00	0
	4-6	0.00	0.00	0
	6-8	0.00	0.00	0
	8-10	1.30	1.90	0
	10-12	1.20	3.05	0
	12-14	2.13	14.30[a]	0
	14-16	2.90	20.40[a]	0

(a) Possible high FID reading due to presence of water.

NOTE: PID = Photoionization detector.
FID = Flame ionization detector.

TABLE 3 SUMMARY OF ANALYTICAL RESULTS FOR WASTE SAMPLES COLLECTED ON 10 DECEMBER 1999, WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK.

Analyte	Waste-1	Waste-2	Waste-3	Waste-4
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260 (μg/kg)				
Methylene Chloride	(<1.4U)	(<1.6U)	5	6.6
METALS BY EPA SERIES 6010/700 (mg/kg)				
Aluminum	10,100	2,400	20,200	2,430
Antimony	162	32.0	111	57.6
Arsenic	(<13.6U)	15.2	(<16.0U)	6.2
Barium	(<271U)	(<64.2U)	(<321U)	77.8
Beryllium	(<6.8U)	1.6	(<8.0U)	(<1.9U)
Cadmium	(<6.8U)	45.9	(<8.0U)	(<1.9U)
Calcium	192,000	5,590	274,000	1,880
Chromium	6,570	1,070	4,840	2,340
Copper	(<33.9U)	75.2	107	14.5
Iron	5,190	7,200	26,600	1,340
Lead	(<102U)	1140	(<120U)	433
Magnesium	62,100	20,400	25,000	32,000
Manganese	297	863	4,530	475
Nickel	54.5	257	1,810	21.6
Potassium	(<678U)	2300	(<802U)	2220
Selenium	(<1.4U)	(<1.6U)	(<1.7U)	2.3
Silver	43.8	10.0	36.6	18.9
Sodium	(<678)	342	(<802U)	525
Thallium	(<13.6U)	(<3.2U)	(<16.0U)	5.6
Vanadium	(<67.8U)	(<16.0U)	173	(<19.4U)
Zinc	(<27.1)	782	79.0	1,180
CHEMICAL OXYGEN DEMAND BY METHOD HACH-8000 (mg/kg)				
Chemical Oxygen Demand	19,700	13,400	21,600	13,200
PERCENT SOLIDS BY EPA METHOD 160.3 (%)				
Percent Solids	73.8	62.3	75.6	51.4
TOTAL ORGANIC CARBON BY EPA METHOD 9060 (mg/Kg)				
Total Organic Carbon	263	568	233	712
HEXACHROMIUM BY SW846/7196 (mg/Kg)				
Hexachromium	8.9	0.2	(<0.1U)	(<0.1U)

NOTE: EPA = U.S. Environmental Protection Agency.
U = Not detected. Sample quantitation limits shown as (<_U).
Only those analytes detected in at least one of the samples are shown on this table.

TABLE 4 SUMMARY OF ANALYTICAL RESULTS FOR SEEP WATER SAMPLES COLLECTED ON 7 DECEMBER 1999, WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Analytes	Seep Water 1	Seep Water 2	NYSDEC Ambient Water Quality Standards Criteria[a]
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260 (μg/L)			
Acetone	31	(<1.0U)	50[b]
METALS BY EPA SERIES 200.7/270.2 /4500-CNE (mg/L)			
Calcium	601	23.9	---
Chromium	**0.536**	(<0.010U)	0.05
Cyanide, Total	0.01	(<0.01U)	0.2
Iron	(<0.180U)	0.124	0.3
Magnesium	(<1.5U)	5.9	35
Potassium	60.5	4.0	---
Selenium	**.0133**	(<0.005U)	0.01
Sodium	57.2	18.1	---
Zinc	(<0.060U)	0.0261	2
ALKALINITY BY EPA METHOD 2320B (mg/L)			
Alkalinity	1,550	75.6 (mg/L)	---
AMMONIA-NITROGEN BY NH3E 500 (mg/L)			
Ammonia-Nitrogen	**4.8**	(<1.0U)	2.0
CHEMICAL OXYGEN DEMAND BY HACH METHOD 8000 (mg/L)			
Chemical Oxygen Demand	20.5	35.9	---
CHLORIDES BY CLB METHOD 4500 (mg/L)			
Chlorides	32.3	26.6	250
COLOR BY METHOD 2120B (PT-CO)			
Color	20	50	---
HEXAVALENT CHROMIUM BY METHOD 3500 (mg/L)			
Hexavalent Chromium	**0.64**	(<0.01U)	---
NITRATE-NITRITE BY METHOD LAC107041 (mg/L)			
Nitrate-Nitrite	1.6	(<0.2U)	10
SULFATE BY EPA METHOD 375.4 (mg/L)			
Sulfate	23.0	6.0	250
TOTAL DISSOLVED SOLIDS BY EPA METHOD 160.1 (mg/L)			
Total Dissolved Solids	1,410	166	---
TOTAL HARDNESS BY EPA METHOD 200.7 (mg/L)			
Total Hardness	1,500	84.0	---
TOTAL KJELDAHL NITROGEN BY EPA METHOD 107-06-2 (mg/L)			
Total Kjeldahl Nitrogen	4.8	1.6	---
TOTAL ORGANIC CARBON BY METHOD 5310-B (mg/L)			
Total Organic Carbon	6.2	15.8	---
TOTAL PHENOLS BY METHOD LAC210001 (mg/L)			
Total Phenols	**0.01**	(<0.01)	0.001

(a) New York State Department of Environmental Conservation (NYSDEC). 1998. Ambient Water Quality Standards and Guidance Values Criteria for Class A Waterbody from Division of Water Technical and Operational Guidance Series (1.1.1). June.

(b) No standard applicable but a guidance value is given.

NOTE: EPA = U.S. Environmental Protection Agency.
U = Not detected. Sample quantitation limits shown as (<_U).
Values in bold indicate concentration in excess of NYSDEC remediation criteria.
Only those analytes detected in at least one of the samples are shown in this table.
Dashes (---) indicate no criteria applicable.

TABLE 5 SUMMARY OF ANALYTICAL RESULTS OF SEDIMENT SAMPLES WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Analytes	AIRCO-SED1	AIRCO-SED2	NYSDEC Sediment Criteria (Lowest Effect Level)[a]	NYSDEC Sediment Criteria (Severe Effect Level)[a]
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260 (µg/kg)				
Naphthalene	1.4J	(<1.9U)	---	---
4-Isopropotoluene	(<2.2U)	1.2J	---	---
METALS BY EPA SERIES 6010/700 (mg/kg)				
Aluminum	2,030	7,760	---	---
Calcium	340,000	166,000	---	---
Chromium	**136**	**170**	26	110
Copper	(<32.5U)	**20.3**	16	110
Iron	3,130	12,500	---	---
Lead	24.3	29.3	31	110
Magnesium	8,520	13,900	---	---
Manganese	106	**504**	460	1,100
Potassium	1,040	2,310	---	---
Sodium	370	163	---	---
Zinc	27.6	118	120	270
AMMONIA-NITROGEN BY METHOD 4500 (mg/kg)				
Ammonia-Nitrogen	120	(<115U)	---	---
CHEMICAL OXYGEN DEMAND BY HACH METHOD 8000 (mg/L)				
Chemical Oxygen Demand	810	3,564	---	---
CHLORIDES BY CLB METHOD 4500 (mg/kg)				
Chlorides	329	(<152U)	---	---
NITRATE/NITRITE BY EPA METHOD 300/354.1 (mg/kg)				
Nitrate	(<34.6U)	(<30.4U)	---	---
Nitrite	(<0.76U)	7.4	---	---
PERCENT SOLIDS BY METHOD 160.3 (%)				
Percent Solids	46.2	52.7	---	---
TOTAL KJELDAHL NITROGEN BY METHOD LAC107062 (mg/kg)				
Total Kjeldahl Nitrogen	(<1,080U)	1,720	---	---
TOTAL PHENOLS BY METHOD 210-00-1 (mg/kg)				
Total Phenols	13.3	32.5	---	---
TOTAL ORGANIC CARBON BY EPA METHOD 9060 (mg/kg)				
Total Organic Carbon	4,743	100,000	---	---
SULFATES BY 375.4 (mg/kg)				
Sulfate	519	380	---	---

(a) New York State Department of Environmental Conservation (NYSDEC). 1994. Sediment Criteria (Lowest and Severe Effect Levels) from Technical Guidance for Screening Contaminated Sediments. July.

NOTE: EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
U = Not detected. Sample quantitation limits shown as (<_U).
Results in bold indicate concentrations in excess of NYSDEC remediation criteria.
Only those analytes detected in at least one of the samples are shown on this table.
Dashes (---) indicate no criteria applicable.

TABLE 6 SUMMARY OF GEOTECHNICAL RESULTS OF WASTE AND CAP MATERIAL COLLECTED ON 6 DECEMBER 1999, WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Identification	Moisture-Density Relationship (Modified)			
Sample Number	Maximum Dry Density (pfc)	Opt. Water Content (%)	Permeability (cm/sec)	Laboratory Log and Soil Description
Waste-1	50.5	37.0	NA	Dark gray well-graded sand with gravel (SW)
Waste-2	61.0	57.5	NA	Bluish gray well-graded sand with silt (SW-SM)
Waste-3	57.5	29.0	NA	Dark gray well-graded gravel with sand (GW)
Waste-4	44.5	90.0	NA	Bluish gray silty sand (SM)
Cap Material	122.0	13.5	3.6E-08	Dark brown lean clay with sand (CL)

NOTE: NA = Not applicable.
SW = Well graded clean sand, gravely sand.
SM = Silty sand, poorly graded sand-silt mix.
GW = Well graded, clean gravels, grave-sand mixture.
CL = Inorganic clays of low to medium plasticity.

Attachment A

Site Photographs

Typical animal burrow.

Typical animal burrow.

Waste profile along the eastern property boundary.

Western seep looking south toward the receiving wetlands.

Western seep looking north toward the Niagara Mohawk parcel.

Western seep looking west toward SKW parcel.

Western seep looking northwest toward the SKW parcel.

TP-01 in the southern sloped area previously capped.

Attachment B

Test Pit Logs

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York

Time	Description of Location	Instrument	Reading
1332	TP-01 BREATHING ZONE	PID	0
		FID	0
		MR	0.06
	TP-01 10' N	↓	↓
	TP-01 10' W		
	TP-01 10' E		
	TP-01 20' S		
1340	TP-02 BREATHING ZONE	PID	0
		FID	0
		MR	0.06
	TP-02 10' N	↓	↓
	TP-02 10' W		
	TP-02 10' E		
	TP-02 20' S		
1460	TP-03 BZ	PID	0
		FID	0
	TP-03 10' N	MR	0.10
	TP-03 10' W	↓	0.02
	TP-03 10' E		0.07
	TP-03 20' S		0.06

Calibration Information:

Comments: MINIMUM BACKGROUND = 0.06
PID BACKGROUND = 0 FID BACKGROUND = 0

Technician: BCB Date: 1330

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York — PAGE #1

Time	Description of Location	Instrument	Reading
1800	TP-05 BZ	PID	0
		FID	0
		MR	0.0
	TP-05 10' N	MR	0.0
	10' S	CAN'T COLLECT - FENCE	
	10' E	"	"
	10' W	MR ~~0.0~~ BGS	0.0
0810	TP-06 BZ	PID	0
		FID	0
		M.R.	0.0
	TP-06 10' N	MR	0.0
	10' S	"	"
	10' W	"	"
	20' E	CANNOT COLLECT - FENCE	
0835	TP-07 BZ	PID	0
		FID	0
		MR.	0.0
	TP-07 10' N	MR	0.0
	10' S	↓	↓
	10' W		
	10' E	↓	↓
0850	TP-08 BZ	PID	0
		FID	0
		MR	0.0
	TP-08 10' N	MR	0.0
	10' S	↓	↓
	10' E	FENCELINE	↓
	10' W	~~MR~~ STAFFLINE	0.0

Calibration Information: BGS

Comments: MINIRAE BACKGROUND = 0.0 PID BACKGROUND = 0
FID BACKGROUND = 0

Technician: BLR Date: 12/8/99

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York — PAGE #2

Time	Description of Location	Instrument	Reading
0925	TP-09 BZ	PID	0
		FID	0
		MR	0.0
	TP-09 10' S	MR	0.0
	10' W	↓	↓
	10' N	↓	↓
	10' E	FENCELINE	
1007	TP-10 BZ	PID	0
		FID	0
		MR	0.0
	TP-10 10' N	MR	0.0
	10' E	↓	↓
	10' S	↓	↓
	10' W	↓	↓
1128	TP-11 BZ	PID	0
		FID	0
		MR	0.0
	TP-11 10' S	MR.	0.0
	10' E	↓	↓
	10' W	↓	↓
	20' N	FENCELINE	
1312	TP-12 BZ	PID	0
		FID	0
		M.R.	0.0
	TP-12 10' N	FENCELINE	
	10' S	MR	0.0
	10' W	↓	↓
	10 E	↓	↓

Calibration Information:

Comments:

Technician: B.B Date: 12/8/97

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York

Time	Description of Location	Instrument	Reading
1340	TP-13 BZ	PID	0
		FID	0
		M.R.	0.0
	TP-13 10' N	FENCELINE	
	10' W	M.R.	0.0
	10' S	↓	↓
	10' E	↓	↓
1407	TP-14 BZ	PID	0
		FID	0
		M.R.	0.0
	TP-14 10' N	FENCELINE	
	10' W	FENCELINE	
	10' S	MR	0.0
	10' E	↓	↓
1430	TP-15 BZ	PID	0
		FID	0
		MR.	0.0
1500	TP-16 BZ	PID	0
		FID	0
		M.R.	0.0
	TP-16 10' N	FENCELINE	
	10' W	MR	0.0
	10' S	↓	↓
	10' E	↓	↓

Calibration Information:

Comments:

Technician: RCB Date: 12/8/99

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York			PAGE 1
Time	Description of Location	Instrument	Reading
0805	TP-17 BZ	PID	0
		FID	0
		M.R.	0.16
	TP-17 10' N	MR	0.16
	10' W	↓	↓
	10' S		
	10' E	↓	↓
0814	TP-18 BZ	PID	0
		FID	0
		M.R.	0.16
	TP-18 10' W	FENCELINE	
	10' N	M.R	0.16
	10' E	↓	↓
	10' S		
0829	TP-19 BZ	PID	0.0
		FID	0.0
		M.R	0.02
	TP-19 10' W	MR	0.02
	10' N	↓	↓
	10' E		
	10' S	↓	↓
1016	TP-21 BZ	PID	0.0
		FID	0.0
		MR	0.02
	TP-21 10' W	MR	0.02
	10' N	↓	↓
	10' S		
	10' E	↓	↓

Calibration Information:

Comments:
MINIMUM BACKGROUND = 0.16 0822 REBOOTED MR = 0.02

Technician: BCB **Date:** 12/9/99

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York		PAGE 2	
Time	Description of Location	Instrument	Reading
BCB NP 1100	TP-22 BZ	PID	0
		FID	0
		MR	0.02
	TP-22 10 S	MR	0.02
	10 N	↓	0.02
	10 W	↓	0.04
	10 E	↓	0.02
1115	TP-23 BZ	PID	0
		FID	0
		MR.	0.02
	TP-23 10' N	MR	0.04
	10' W	FENCE	
	10' E	MR	0.02
	10' S	↓	↓
1334	TP-24 BZ	PID	0
		FID	0
		M.R	0.02
	TP-24 10' W	FENCE	
	10' N	MR	0.02
	10' S	↓	↓
	10' E	↓	↓
1349	TP-25 BZ	PID	0
		FID	0
		MR	0.02
	TP-25 10 W	FENCE	
	10 N	MR	0.02
	10 E	↓	↓
	10 S	↓	↓

Calibration Information:

Comments:

MIDMAN BACKGROUND = 0.02

Technician: BCB **Date:** 12/9/99

ENVIRONMENTAL MONITORING RECORD

SITE: Witmer Road Landfill, Niagara Falls, New York — PAGE 3

Time	Description of Location	Instrument	Reading
1413	TP-26 BZ	PID	0
		FID	0
		MR	0.02
	TP-26 10'W	FENCE	
	10'N	MR	0.02
	10'S	↓	↓
	10'E	↓	↓
1441	TP-27 BZ	PID	0
		FID	1.5
		MR	0.04
	TP-27 10'N	MR	0.06
	10'E	↓	0.02
	10'S	↓	0.04
	10'W	WATER→	

Calibration Information:

Comments: MINIMUM BACKGROUND = 0.02

Technician: BCB Date: 12/9/99

Attachment C

Boring Logs

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates:
Surface Elevation:
Casing Above Surface:
Reference Elevation:
Reference Description:

Job No.:
Client: Witmer Rd BOC - Landfill
Location: B-1
Boring No.: 1
Drilling Method: hollow Stem Auger, Split spoon
Sampling Method: 140 lb wgt, 30 in fall
Sheet 1 of 1
Water Level: 3.8 ft
Time:
Date:
Reference:
Surface Conditions:

Drilling	Start	Finish
Time	1143	1248
Date	12/8	12/8

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	Description
	24 / 19	0	0 / 2	2, 3, 3, 10	0–2		0-2" overborden topsoil; 2"-23" Clay red/br.; bottom 1" - Black ash; CH4 - 0%; PID - 1.50 ppm; FID 3.8 ppm
	24 / 11	2	2 / 4	18, 7, 5, 5	3–5		wet, c. gravel, grey fill; 4"-11" - grey clay; CH4 - 0%; PID - 6.8; FID - 59.0
	24 / 24	4	4 / 6	4, 4, 8, 9	6–7		3" Black fill; 3"-24" Red insitu clay w/ grey Mottling; CH4 - 0; PID - 5.2; FID - 11.2
	24 / 24	6	6 / 8	10, 10, 11, 12	8–10	Fill / Clay	4" Black silt; 4"-24" red clay to bottom; CH4 - 0; PID - 4.7; FID. 10.2
	24 / 24	8	8 / 10	3, 7, 8, 10	11–13	Clay	Red Clay; CH4 - 0; PID - 1.8; FID - 0.48
	24 / 24	10	10 / 12	7, 9, 11, 11	14–16	Clay	Red Clay; CH4 - 0; PID - 1.2; FID - 0.32
	24 / 24	12	12 / 14	7, 8, 8, 7	17–19		Red Clay, bottom grey/Red Clay; CH4 - 0; PID - 1.3; FID - 0.0
					20		end of Hole 14 ft

Drilling Contractor: W B [illegible]
Driller: Matt / Dale
Lic. No.

By: [illegible]
Checked By:
Date: 12/15/99

Water level in hole - 3.8 ft from Grade

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC - Witmer Rd Landfill	B-2
Drilling Method: Split Spoon		Boring No.
Sampling Method:		Sheet of
Water Level ↓		Drilling Start Time 1:24 / Finish Time
Time		
Date		Date 12/8/99 / Date
Reference		

Surface Conditions:

Drilling Contractor: GZA Lic.No. _____
Driller: Matt Dale

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No. / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/10	0	0/2	3/7	0		0-3" grey, m-c gravel PID - 2.7 3"-5" c-m gravel, FID - 1.3 5" - grey/br clay CH4 - 0
				50/3	1		
					2		M-C silt and clay
	24/1	2	2/4	24/9	3		PID - 2.8 CH4 - 0 FID - 3.4
				5/7	4		
					5		
	24/8	4	4/6	12/14	6		1" br. dense silt (some roots) 7" Red Silty Clay PID - 8 CH4 - 0 FID - 0
				11/14	7		
					8		
	24/24	6	6/8	17/12	9		1" black/br. m-f silt, some roots 23" Red clay, trace, v.f silt
				12/15	0		CH4 - 0 PID - 0 FID - 0
					1		
					2		
	24/24	8	8/10	7/7	3		1" tan m-c sand and silt 23" Red Clay trace silt - varved (in situ) PID - 2.6 FID - 3.1 CH4 - 0.0
				7/7	4		
					5		
					6		
					7		End of Hole in Red. Clay 10 Ft
					8		
					9		
					0		

Logged By: _____
Date: 12/15/99 Checked By: _____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC - Witner landfill	B-3
Drilling Method: Split Spoon		Boring No.
Sampling Method:		Sheet 1 of 1
Water Level ↓		Drilling Start Time 2:12pm Date 12/8
Time		Finish Time Date
Date		
Reference		

Surface Conditions:

Driller: Matt/Charlie Lic.No. _____ Checked By: _____ Date: 12/8/94

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No. / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/10	0	0/2	2 2	0		grey/black/brown m-c sand and gravel, ash-material
				50/3	1		CH4 – 0
					2		FID – 0.2
					3		PID – 0
	24/9	2	2/4	50/2	4		Brown/black ashy fill c-m gravel & sand greenish cast
					5		CH4 – 0
					6		FID – 1.13
					7		PID – 0.83
	24/12	4	4/6	50/2	8		Dense black/tan c-m gravel / some c-m sand (black)
					9		CH4 – 0
					0		FID – 0.98
					1		PID – 0.66
	24/4	6	6/8	50/1	2		very dense "extreme" augering white c. gravel some black sand
					3		CH4 – 0
					4		PID – 0.15
					5		FID – 0.31
	24/5	8	8/10	5 50/1	6		grey, tan m-f sand dense, some silt
					7		FID – 0.11
					8		PID – 0.36
					9		CH4 – 0
					0		Augers driven to 10 ft – Refusal

last Spoon – 8 ft – "Spoon Cracked"
Refusal – 10 ft

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-4
Drilling Method:		Boring No.
Sampling Method:		Sheet 1 of 2
Water Level ↓		Drilling Start Time 3:25 Date 12/8/97
Time		Finish Time
Date		Date
Reference		

Drilling Contractor: SJB INC Lic.No. _____
Driller: Matt / Dale

By: DAVID CALDERONE Checked By: _____
Date: 12/8/97

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	Surface Conditions: Black fine sand loose @ surface vegetated
	24/19	0	0/2	5, 10, 8, 15	0–3		Black, m-c sand and f gravel some rust color PID – 0 FID – 0.41 CH4 – 0
	24/9	2	3/4	17, 5, 4, 50/2	4–7		low recovery Black m-c sand and f gravel PID-0 FID-1.8 CH4-0
	24/8	4	4/6	35, 50/2	8–9		1" Black m-c sand 7" Grey tan m-f sand and M gravel. v. white dense material
	24/13	6	6/8	6, 2, 2, 2	0–4		PID -2.8 FID -0 CH4 -0 3' C.-white gravely fill 10" m-f Black sandy fill (bluish) metallic-look (xtalline) PID – 0 FID – 0.5 CH4 – 0
	24/12	10	10/12	4, 7, 1, 1	6–9		8" loose, fine, black sand Some m-f BLCK sand metallic-like CH4 – 0 PID – 0 FID – 0.41

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-4
Drilling Method:		Boring No.
Sampling Method:		Sheet 2 of 2
Water Level ↓		Drilling Start Time / Finish Time
Time		
Date		Date / Date
Reference		12/8/99

Surface Conditions:

Logged By: Date: 12/15/99 Checked By: _____

Driller: Matt / Dale Lic.No. _____

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/11	12	12/14	1, 11	0		m-f black sand some m. gravel loose material. CH4 - 0.0 FID - 0.0 PID - 0.4
				5, 2	1		
					2		
					3		
	24/3	14	14/16	14, 17	4		1"-2": S. gravel (3mm) m-c black sand some c. white sand CH4 - 0 PID - 0 FID - 0.74
				12, 9	5		
					6		
					7		
	24/12	16	16/18	9, 20	8		
				50/2	9		m-f black sand (top 4") bottom 8" green-tan, c. sand and m-f gravel. CH4 - 0 PID - 0 FID - 2.3
					0		
					1		
					2		
	24/18	18	18/20	15, 17	3		1" wood 3" grey-blue, f. sand / some silt 14" black, silt, v.f sand some. CH4 - 0 PID - 0 FID - 6.6 End of Hole @ 20'
				14, 14	4		
					5		
					6		
					7		
					8		
					9		
					0		

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Rd Landfill	B-5

Drilling Method: _____ Boring No. _____

Sampling Method: Black cover vertical

Sheet _____ of _____

Water Level ↓

Time			
Date			
Reference			

Drilling: Start Time 7:59 Date 12/9/99; Finish Time _____ Date _____

Surface Conditions: _____

Drilling Contractor: SJB Inc

Driller: Matt/Dale Lic.No. _____

By: Laing/Lawler Date: 12/9/99 Checked By: _____

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/12	0	0/2	1, 5	0		Black, m-c sand
				50/1	1		some m-f gravel
					2		PID - 0
					3		FID - 0
							CH4 - 0
	24/8	2	2/4	9, 14	4		Black, m-c, sand
				11, 12	5		some m-f gravel
					6		Stone/Rock fragments (angular)
					7		PID - 1.2
							FID - 3.8
							CH4 - 0
	24/8	4	4/6	9, 2	8		
				7, 5	9		Same
					0		(less m-f gravel)
							PID - 0
					1	fill	FID - 0
	24/8	6	6/8	17, 18	2		CH4 - 0
				12, 14	3	Silt	4" Black m-f sand
							- some m-f gravel
					4		PID - 0
					5		FID - 0
							CH4 - 0
	24/16	8	8/10	25, 5	6		
				7, 7	7	clay	Red/brown clay
							trace f. gravel
					8		same mottled grey clay
							PID - 0
					9		FID - 68.0
					0		CH4 - 0

End of Hole 10ft

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Rd landfill	B-6

Drilling Method:

Sampling Method:

Boring No.

Sheet of

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time 9:04 Date 12/9/99; Finish Time ____ Date ____

Surface Conditions: loose black gravel m-c gravel

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/15	0	0/2	12, 12	0		Black m-c gravel, some c-sand (3")
				12, 14	1		12" compacted, white, greenish, pinkish v.f sand + silt (concrete-like)
					2		
	24/16	2	2/4	21, 21	3		16" compacted, white, green, pink v.f. sand and silt concrete-like fill PID – 0 FID – 0 CH_4 – 0
				11, 11	4		
					5		
					6		
	24/15	4	4/6	45, 35	7		same as above inclusions of pink, green white, nodules in matrix
				25, 30	8		
					9		PID – 0 CH_4 – 0 FID – 0
					10		
	24/13	6	6/8	50/4	11		2" Black f. sandy till some white-xtalline nodules + powder (tan) -11" white/pink compacted fine sandy till w/ nodules (green) in matrix
					12		
					13		
					14		FID – 0.3 PID – 0 CH_4 – 0
					15		
	24/18	8	8/10	18, 50/4	16		same - white compacted w/ filled nodules PID – 0 CH_4 – 0 FID – 0.3
					17		
					18		
	24/14	10	10/12	25, 50/3	19		same PID – 0, CH_4 – 0, FID – 0.2
					20		

End of Hole @ 12 ft.

Logged by: _____ Date: _____

Driller: Hall/Dale Lic.No. _____

Checked By: _____ Date: 12/15/99

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Rd-landfill	B-7

Drilling Method:

Sampling Method:

Boring No.

Sheet of

Water Level ↓		
Time		
Date		
Reference		

Drilling Start Time: 1024 Date: 12/9/99

Drilling Finish Time: 11:00 Date: 12/9/99

Surface Conditions: swale - drainage by MW-4/4A

Drilling Contractor: BJ's Inc
Driller: Matt/Dave Lic.No.

By: Jennifer Crane
Date: 2/19/99 Checked By:

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/24	0	0/2	2, 5	0		8" topsoil 8" red m-f sand/some silt 8" moist grey sand (m-f) and silt
				24, 17	1		
					2		FID - 0 PID - 0 CH4 - 0
					3		
	24/20	2	2/4	25, 21	4		
				50/1	5		20" white/grey v.f sand, some silt fill
					6		
					7		PID - 0 FID - 0.14 CH4
	24/24	4	4/6	14, 30	8		
				40, 21	9		white, reddish, v.f sand and silt very compacted fill material
					0		
					1		PID - 0 FID - 7.9 CH4 - 0
					2		
	24/10	6	6/8	7, 4	3	fill	
				7, 11	4	clay	4" grey/white fill (wet) 4"-10" Red Clay (native)
					5		PID - 3.0 FID - 61.4 CH4 - 0
					6		
	24/24	8	8/10	7, 11	7		5" grey/white m-f sand fill 19" Red Clay, some silt, fine mottling in situ
				14, 7	8		
					9		End of hole at 10 ft.
					0		FID - 8.30 CH_4 - 0 PID - 0

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC- Witmer Landfill	B-8
Drilling Method:		Boring No.
Sampling Method:		Sheet 1 of 2
Water Level ⊥		Drilling Start Time 1102 / Finish Time 1130
Time		
Date		Date 12/9/99
Reference		

Surface Conditions: Drainage ditch N.E. corner in swale

Drilling Contractor: Geo Eng, Inc.
Driller: Matt Doyle Lic.No. _____
Checked By: _____
Date: 12/15/99
B-8

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/2	0	0/2	1 3	0		7" topsoil Red/brown clay, some, dett white inclusions 5" brown/white, m-f sand fill PID - 0 FID - 0 CH4 - 0
				30 40	1		
					2		
					3		
	24/19	2	2/4	33 30	4		2" br/white M-f sand white fill intermixed w/ topsoil 17" white, pink, green compacted v.f. sand/silt powder chalky fill, PID - 0 FID - 0 CH4 - 0
				12 7	5		
					6		
					7		
					8		
	24/15	4	4/6	9 17	9		
				17 25	0		White/Green/Pink v.f sand Compact fill FID - 0 PID - 0 CH4 - 0
					1		
					2		
	24/14	6	6/8	14 50/3	3		-White/mint green/light pink v.f. silt./Powder/chalk chalk-like fill material PID - 0 PID - 0 CH4 - 0
					4		
					5		
					6		
	24/24	8	8/10	7 5	7		Same-finer grained denser/chalk darker white/grey, f. silt./chalk PID - 1.3 FID - 1.9 CH4 - 0
				50/4	8		
					9		
					0		

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-8

Drilling Method:

Sampling Method:

Boring No.

Sheet 2 of 2

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time 1102 Date 12/9/99; Finish Time 1130 Date 12/9/99

Surface Conditions:

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No. / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log
	24/13	10	10/12	27 5 3	0 1 2 3	
	24/14	12	12/14	22 15 2 3	4 5 6	
	24/17	14	14/16	7 7 9 10	7 8 9 0 1 2 3 4 5 6 7 8 9 0	

2" grey clay intermixed w/ chalky fill
11" white m-f sand / silty chalky fill
PID - 1.20
FID - 3.05
CH_4 - 0

white chalky fill material
14" R
PID - 2.13
FID - 14.3
CH_4 - 0

6" white chalky fill
11" Red Clay

PID - 2.9
FID - 20.4
CH_4 - 0

end of Hole 16 ft

Driller Matt Hale Lic.No. _____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC - Witmer Rd - Landfill	B-9

Drilling Method:

Sampling Method:

Boring No.

Sheet 1 of 2

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time 1120, Finish Time; Date 12/9/99, Date

Surface Conditions:

Driller: Matt/Dale Lic.No.

Logged By: [illegible] Checked By:

Date: 12/15/99

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log
	24/16	0	0/2	1, 2	0	
				11, 11	1	
					2	
					3	
	24/12	2	2/4	27, 12	4	
				15, 15	5	
					6	
					7	
	24/12	4	4/6	14, 50/2	8	
					9	
					0	
					1	
	24/24	6	6/8	25, 7	2	
				25, 15	3	
					4	
	24/17	8	8/10	7, 11	5	
				10, 3	6	
					7	
	24/24	10	10/12	7, 4	8	
				5, 7	9	
	24/24	12	12/14	8, 12	10	
	24/24	14	14/16	14, 7, 10	14	

2" Topsoil
8" Red Clay
6" White, green chalky fill
PID - 0
FID - 0.13
CH_4 - 0

12" Pink, white, green chalk material
v.f. sand / Silt (powder-like)

FID - 6
PID - 0
CH_4 - 0

Grey fill
Grey m-f sand and silt (moist) 3"
9" Pink, white loose, m-f sand chalk-like

PID - 0.6 CH_4 - 0
FID - 0.2

Same
FID - 0.31
PID - 6
CH_4 - 0

Same (more green color) - chromium?

PID - 0
FID - 0.68
CH_4 - 0

PID - 1.07 FID - 1.2 CH_4 - 0
Blows (12'-14') = 8, 12, 20, 14
Compact white, chalky, Pink w/ Black veining
f. Gravel & sandy fill

Same; (Pasty) Milky white green, Pink
Chalk-like - fill

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
		B-9
Drilling Method:		Boring No.
Sampling Method:		Sheet 2 of 2
Water Level ↓		Drilling Start Time 1150 Date 12/9/99
Time		Finish Time 2:26 Date
Date		
Reference		

Surface Conditions:

Drilling Contractor: SJD Driller: _____ Date/Matt Lic.No. _____

By: Sara Calabro Date: 2/15/00 Checked By: _____

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/24	16	16/18	17 28	0		wet at top 6" (green) m-f -sand. Chalky material
				25 27	1		18" dense white, grey, chalky - Fill
					2		PID - 0.6 FID - 118 CH4 - 0
	24/24	18	18/20	9 19	3		
				24 12	4		Top 10" wet loose grey m-c gravel (Fill) 14" dense grey/white, v.f. sand/silt chalky fill
					5		
					6		FID - 273 PID - 1.25 CH4 - 0
	24/11	20	20/22	10 7	7		
				11 8	8	V	Saturated Spoon 5" fill 5"-6" root zone (former ground surface) 6"-11" Black silty clay
					9		
					0		
					1		PID - 0.9 CH4 - 0 } Fill 20'-21' FID - 196
					2		
					3		PID - 0.2 CH4 0 } clay 21'-22' FID - 617 * --
					4		* Possibly high FID due to presence of H2O
	24/16	22	22/24	10 7	5		Saturated 8" Black clay w/ some f. silt
				11 8	6		8" Red Clay
					7		End of Hole @ 24'
					8		
					9		
					0		

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-10
Drilling Method:		Boring No.
Sampling Method:		Sheet of
Water Level		Drilling Start / Finish
Time		Time: 3:00 /
Date		Date: 12/9/91 /
Reference		

Surface Conditions: drain swale eastside

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/24	0	0/2	2, 2, 7	0		6" topsoil 18" grey silty chalk-like fill
				11, 10	1		
					2		FID - 0.22 CH4 - 0 PID - 0.06
	24/24	2	2/4	30, 50/4	3		white, pink, chalk-like fill green inclusions in matrix (xtalline green inclusions)
					4		
					5		FID - 0.31 CH4 - 0 PID - 0.20
					6		
	24/24	4	4/6	12, 17	7		24" White chalky-like fill Pink, yellow, green inclusions w/ brown oxidized rims m-f sand-sized grains. PID - 0.86 FID - 14.44 CH4 - 0
				24, 30	8		
					9		
					0		
	24/18	6	6/8	21, 30	1		white chalky fill (18")
				9, 7	2		
					3		PID - 0.3 FID - 10.51 CH4 - 0
	24/15	8	8/10	4, 4	4		
				3, 7	5		6" white ash / chalky fill 9" Br. Black clay sme silt
					6		
					7		PID - 0.31 FID - 13.12 CH4 - 0
	24/22	10	10/12	4, 4	8		
				9, 7	9		4" Black clay sme silt 18" Red clay
					0		END of Hole = 12f PID - 0.2 FID - 1.67 CH4 - 0

chromium (III or VI)? chromium oxide rims?

Logged By: _____ Date: 12/9/91

Checked By: _____

Driller: Dale Matt

Lic. No. _____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: ______

Surface Elevation: ______

Casing Above Surface: ______

Reference Elevation: ______

Reference Description: ______

Job No.	Client	Location
	BOC - Witmer Landfill	B-11

Drilling Method: ______

Sampling Method: ______

Boring No. ______

Sheet ___ of ___

Water Level			
Time			
Date			
Reference			

Drilling	Start	Finish
Time	3:40	4:00
Date	12/9/99	

Surface Conditions: ______

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 In Sampler	Depth in Feet	USCS Log	Description
	24 / 22	0	0 / 2	17	0		8" topsoil
				17			8" grey chalky - ash, m-f sand (fill)
				18	1		6" Black m-f sand/silt fill
				20			
					2		FID - 0.5 CH4 - 0
					3		PID - 0.3
	24 / 10	2	2 / 4	14	4		Wet - White chalky fill
				5			5" m-f sand and m-f gravel fill
				4	5		5" grey clay
				10			PID - 0.6
					6		FID - 44.1
					7		CH4 - 0
	24 / 22	4	4 / 6	7	8		4" grey chalky - fill
				5			6" Black/grey clay some silt
				7	9		12" Red clay mottling gleyed
				9			
					0		CH4 - 0
					1		PID - 0.8
					2		FID - 22.3
					3		- water level ~1.5 ft from grade
					4		
					5		End of Hole at 6 ft.
					6		
					7		
					8		
					9		
					0		

Drilling Contractor: SJB, Inc Lic. No. ______

Driller: Matt/Dale

By: Gina Creasy (?)

Date: 12/9/99 Checked By: ______

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC - Witmer Rd. landfill	B-12

Drilling Method:

Sampling Method:

Boring No.

Sheet of

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time 8:00 AM; Finish Time

Date: 12/10/99

Surface Conditions: RAIN ALL DAY Roofing Due to RAIN - No PID readings.

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log
	24 / 12	0	0 / 2	2, 3, 3, 2	0–3	
	24 / 12	2	2 / 4	4, 3, 3, 4	3–4	

Black fill

CH4 - .0
FID - 0.4
PID - 8

5" Fill
7" Red/grey clay

PID 8
FID - 0.3
CH4 - 0

End of Hole 4ft in Clay

Driller: Matt/Dale Lic.No.

Checked By:

Date: 12/10/99

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer landfill	B-13

Drilling Method: | Boring No.

Sampling Method: | Sheet 1 of 1

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time 0811 | Finish Time | Start Date 12/10/99 | Finish Date

Surface Conditions: Rain all day - No PID readings; Drainage swale on east side

Drilling Contractor: _____ Lic.No. _____

Driller: _____

By: _____ Checked By: _____

Date: 12/16/99

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/24	0	0/2	3	0		16" topsoil 18" fill
					1		
					2		PID - 0 FID - 0 CH4 - 0
					3		
	24/24	2	2/4	10 7	4		24" fill
				7 4	5		PID - 0 PID - 0 CH4 - 0
					6		
	24/15	4	4/6	14 18	7		
				9 5	8		2" grey fill 3" tan/orange fill 10" grey fill
					9		
					10		PID - 0 FID - 0 CH4 - 0
					11		
	24/15	6	6/8	2 2	12		5" fill 10" Red Clay
				5 5	13		
					14		FID - 0 CH4 - 0 PID - 0
					15		
					16		End of Hole 8 ft
					17		
					18		
					19		
					20		

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
		B-14
Drilling Method:		Boring No.
Sampling Method:		Sheet of
Water Level ↓		Drilling Start Time 0850 / Finish Time
Time		
Date		Date 12/10/99 / Date
Reference		

Surface Conditions: Rain - No PID

on top of Waste Mass.

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/15	0	0/2	3 3	0		V.f Sand and Silt Black fill
				3 5	1		
					2		PID - 0 FID - 0
					3		CH4 - 0
	24/18	2	2/4	4 2	4		same
				2 3	5		FID - 0 PID - 0
					6		CH4 - 0
	24/15	4	4/6	2 2	7		
				1 7	8		V.f. Silt / Powder Chalky fill Black last 1" coarse sand Black fill
					9		
					0		PID - 0 FID - 0
	24/13	6	6/8	17 20	1		CH4 - 0
				50/3	2		1" Black fill 12" white pink green, Chalky fill
					3		
					4		PID - 0 CH4 - 0 FID - 0
	24/24	8	8/10	11 11	5		
				21 50/4	6		white very dense chalky fill PID - 0 CH4 - 0
					7		FID - 0
	24/15	10	10/12	50/4	8		15" white/green fill
					9		FID - 0 CH4 - 0 PID - 0
	24/5	12	12/14	50/4	0		same PID - 0 FID - 0 CH4 - 0

24/12 14 14/16 24 24 50/4

same FID - 0 PID - 0 - CH4 - 0

END HOLE at 14ft

Driller: Wyatt / Waste Lic.No. _____

Date: 12/15/99 Checked By: _____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: ____

Surface Elevation: ____
Casing Above Surface: ____
Reference Elevation: ____
Reference Description: ____

Job No.: | Client: BOC Witmer Landfill | Location: B-15

Drilling Method: Split Spoon

Sampling Method:

Boring No.:

Sheet 1 of 2

Water Level / Time / Date / Reference:

Drilling Start Time: 10:02 | Finish Time:
Date: 12/10/99 | Date:

Surface Conditions:

Drilling Contractor: SJB Inc. Lic. No. ____
Driller: Matt/Dale

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	Description
	24 / 2	0	0 / 2	2, 10, 50/1	0–1		Black Fill; low recovery; PID - 0; FID - 0; CH4 - 0
	24 / 8	2	2 / 4	7, 8, 8, 4	2–4		same; FID - 0; PID - 0; CH4 - 0
	24 / 24	4	4 / 6	4, 4, 4, 4	5–8		4" c-f Black sandy fill; 20" powder-like Black v.f sand/silt fill; PID - 0; FID - 0; CH4 - 0
	24 / 24	6	6 / 8	4, 3, 3, 2	9–11		Black fill; v.f. grained silt-sized fill; CH4 - 0; PID - 0; FID - 0
	24 / 19	8	8 / 10	2, 2, 1, 1	12–15		Black light brown v.f silt / chalk-like fill; CH4 - 0; PID - 0; FID - 0
	24 / 24	10	10 / 12	2, 2, 1, 1	16–19		Black/br. v.f sand/silt fill with white xtalline solid inclusions; PID - 0; FID - 0; CH4 - 0
	24 / 24	12	12 / 14	4, 5, 7, 4	20		same (wet); FID - 0; CH4 - 0

By: ____ Date: 12/15/99 Checked By: ____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Rd landfill	B-15
Drilling Method:		Boring No.
Sampling Method:		Sheet 2 of 2
Water Level ⊥		Drilling Start Time 1032 Date 12/10/99
Time		Finish Time
Date		Date
Reference		

Surface Conditions:

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log
	24/24	H	14/16	1 4 4 4	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	

same

CH4-0
FID-0
PID-0

end of hole @ 16 ft

Drilling Contractor: Weaver Drilling Lic.No. _____

Driller: _____

Date: 12/10/99 Checked By: _____

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-16
Drilling Method:		Boring No.
Sampling Method:		Sheet 1 of 2
Water Level ⊥		Drilling Start / Finish
Time		Time: 1200 / Time
Date		Date: 12/9/99 / Date
Reference		

Surface Conditions:

On Perimeter
By Test Pit 16

Drilling Contractor: Matt Date: 12/9/99 Lic.No. _____

Driller: _____

By: SYLVESTER Date: 12/9/99 Checked By: _____

Sample Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log	
	24/24	0	0/2	10, 12, 12, 2	0–2		6" topsoil 8" fill FID - 0 PID - 0 CH4 - 0
	24/10	2	2/4	50/2	3–4		White dense fill
					5–6		FID - 0 PID - 0 CH4 - 0
	24/10	4	4/6	6, 4, 9, 29	7–9		5" White/Grey salt powder 5" m-c Black/Blue sandy fill
					0–1		CH4 - 0 FID - 0.16 PID - 0
	24/9	6	6/8	17, 17, 12, 15	2–3		9" c gravel and c. sandy fill FID - 9.3 PID - 0
					4–5		CH4 - 0
	24/0	8	8/10	50/1	5–6		No recovery
	24/4	10	10/12	10, 12, 11, 7	7–8		c. gravel - fill FID - 53 PID - 0
					9–0		CH4 - 0
	24/0	12	12/14	7, 8	0		No Recovery

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Co-ordinates: _____

Surface Elevation: _____

Casing Above Surface: _____

Reference Elevation: _____

Reference Description: _____

Job No.	Client	Location
	BOC-Witmer Landfill	B-16

Drilling Method:

Sampling Method:

Boring No.

Sheet 2 of 2

Water Level ↓			
Time			
Date			
Reference			

Drilling: Start Time / Date; Finish Time / Date

Surface Conditions:

Sampler Type	Inches Driven / Inches Recovered	Depth of Casing	Sample No / Sample Depth	Blows/6 in Sampler	Depth in Feet	USCS Log
	24/24	14	17/16	19	0	
				9		
				8	1	
				17		
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					0	
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					0	

2" Black fill

22" Red dense clay

FID - 0

PID - 8

CH_4 - 0

End of Hole @ 16 ft.

Drilling Contractor: Hall/Beale Lic.No.

Driller:

Date: 2/14/89 Checked By:

Attachment D

Topographic Survey