Post-Closure Monitoring and Facility Maintenance Plan for the Witmer Road Landfill Niagara Falls, New York

Prepared for

The BOC Group
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Murray Hill, New Jersey 07974

Prepared by

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January 2001
Revision: REVISED FINAL
Project No. 12040.68

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1. INTRODUCTION

1.1 STATEMENT OF PURPOSE

This Post-Closure Monitoring and Facility Maintenance Plan has been prepared for the Witmer Road Landfill located on Witmer Road in the Town of Niagara Falls, New York. This plan describes the tasks necessary for maintenance of the site, periodic inspections, and the monitoring of ground water and surface water at the facility. The intended use for this plan is to provide a guide to the current landfill owners for maintenance and facility monitoring for a period of 30 years. The plan will be re-evaluated within the first 5 years of quarterly monitoring.

In general, the following is required as part of the Post-Closure Monitoring and Facility Maintenance Plan:

- All drainage structures and ditches must be maintained to prevent ponding and erosion of the final landfill soil cap.
- Soil cover integrity, slopes, cover vegetation, drainage structures, and the perimeter road must be maintained during the post-closure monitoring and maintenance period.
- Environmental monitoring points must be maintained and sampled during the post-closure period. Quarterly and annual summary reports must be submitted to Ms. Mary E. McIntosh, Engineering Geologist II, Division of Solid and Hazardous Materials, New York State Department of Environmental Conservation (NYSDEC) Division of Solid Waste, Region 9.
- A vegetative cover must be established and maintained on all exposed final cover material, and adequate measures must be taken to ensure the integrity of the final vegetated cover, topsoil layer, and underlying barrier protection layer.
- Records must be maintained of all sampling and analysis results.

1.2 ORGANIZATION

Section 1 outlines the purpose of this Post-Closure Monitoring and Facility Maintenance Plan, and identifies applicable regulatory provisions. Section 2 includes a discussion of the maintenance inspections. Section 3 outlines the environmental monitoring program. The proposed sampling frequency and data reporting are presented in Section 4. Attachments A.1 and A.2 contain the field forms (Field Record of Well Gauging, Purging, and Sampling; and Landfill Cap Inspection Checklist), and Attachment B outlines the standard operating procedures for low flow and sampling method. Attachment C includes the cost estimates for the Post-Closure Monitoring and Facility Maintenance Plan.

2. MAINTENANCE INSPECTIONS

Quarterly landfill inspections, and inspections after major rainfall events (5-year storms), shall be performed at the facility during the minimum 30-year post-closure period, unless specific approval is given by NYSDEC to eliminate some or all of these requirements. The inspections shall be performed on the facility to ensure that the final landfill cover materials, the site drainage structures, and onsite monitoring wells are maintained and functioning within the design standards. Advance notification of inspections will be made to NYSDEC 72 hours prior to commencement of inspection-related activities in the event NYSDEC attendance is desired. An example of the inspection checklist is provided in Attachment A.2. The quarterly landfill inspection reports will be submitted to NYSDEC along with the quarterly ground-water and surface water monitoring reports.

2.1 DRAINAGE STRUCTURES

The inspections will include visual checks of culverts, drainage swales, and berms/benches, if present, to ensure erosion problems are not occurring. Any material defects and erosion occurrences discovered at the facility will be repaired immediately and restored to "new" condition. Eroded soil or cover material will be replaced as soon as possible. Exposed or unvegetated soil will be re-seeded, fertilized, and mulched.

2.2 COVER SYSTEM

Areas of concern within the final landfill cover system could include erosion, exposure, loss of vegetative cover, settlement, gravity sliding, or cracking on the top or side slopes of the landfill. Each quarter, the cover system, including topsoil layer and barrier protection layer, the geocomposite drainage layer, and the 40-mil linear low density polyethylene (LLDPE) membrane, will be inspected and records will be maintained.

Minor repairs to the cover system will be done by hand, utilizing materials from the original borough source or newly approved borough source. The areas of minor erosion, sloughing, or cracking will be excavated by hand to allow for a concise repair. Materials will be placed, compacted appropriately by hand, and re-seeded. Additional erosion control measures, such as straw or hay bales, will be used accordingly to prevent future damage to the repaired areas.

In the event that major erosion, sloughing, or slumping is noted during an inspection, NYSDEC personnel will be notified within 48 hours of the problems observed. An action plan detailing the remedial measures to be taken to rectify the problem will be developed and submitted to NYSDEC for approval, prior to implementation of the remedy. Any repairs requiring patching or seaming of the LLDPE membrane or geocomposite drainage layer will be conducted in accordance with manufacturers' construction specifications and outlined in the action plan.

2.3 VECTORS

The vector inspection in December 1999 indicated that vectors do not appear to pose a threat to the proposed landfill cap section. However, it is recognized that the habitat will be significantly improved after closure has been completed. The presence of any vectors (e.g., rodents, flies, etc.) on the site will be determined during the quarterly inspection. If present, extermination or treatment that will remove the vecting population(s) shall be implemented.

2.4 OTHER FACILITIES AND STRUCTURES

All monitoring well casings, casing locks, concrete aprons, site fences, and gates will be inspected to ensure that they are undamaged and functional. Damages will be repaired immediately and structures re-secured. Mowing of the cap system will occur twice during the first growing season to allow for re-germination of the vegetative cover, and annually thereafter. Annual mowing will be performed after 1 September to allow for enhancement of avian wildlife habitat.

2.5 QUARTERLY INSPECTION REPORTS

After each quarterly inspection, a report will be prepared and submitted to NYSDEC Division of Solid and Hazardous Materials Region 9 office. The inspection report will include, at a minimum, the date and time of the inspection, personnel conducting the inspection, visual observations of the inspectors, a list of items inspected, and a brief description of any repair work, if required, including the nature of the damage, the repairs completed, and the estimated cost of the repairs. The report will also describe any items that will need future attention or repairs not completed during the course of the inspection, along with any other pertinent comments. Three copies of the quarterly inspection and quarterly monitoring reports will be submitted to NYSDEC Region 9; one copy to the State of New York Department of Health in Albany, New York; and one copy included in the document repository located at the Town of Niagara Town Clerk's Office at 7105 Lockport Road, Niagara Falls, New York.

2.6 ANNUAL INSPECTION REPORTS

A brief summary report will be prepared annually and submitted outlining the previous year's monitoring and maintenance activities. The report will describe the previous year's trends with regards to constituents of concern, inspection report findings, and associated remedies, if required. Three copies of the quarterly inspection and quarterly monitoring reports will be submitted to NYSDEC Region 9; one copy to the State of New York Department of Health in Albany, New York; and one copy included in the document repository located at the Town of Niagara Town Clerk's Office at 7105 Lockport Road, Niagara Falls, New York.

3. ENVIRONMENTAL MONITORING PROGRAM

This section provides a summary of the field activities that will be conducted during the post-closure period at the Witmer Road Landfill. During the construction of the landfill closure system, the 8 existing monitoring wells were abandoned, and 8 new monitoring wells installed, in accordance with the approved plans and specifications. The environmental monitoring points at the facility will continue to be sampled and analyzed on a quarterly basis. This quarterly sampling schedule will take place for a maximum initial period of 5 years. During the first 5-year period, the analytical results will be evaluated and, in conjunction with the NYSDEC Division of Environmental Remediation and Division of Solid and Hazardous Materials Region 9 Office, a more appropriate monitoring frequency and monitoring plan will be developed for the site. Currently, monitoring to be conducted during the post-closure period will include:

- Ground-water sampling
- Ground-water gauging
- Surface water sampling
- Relief pipe sampling.

3.1 GROUND-WATER SAMPLING

The new ground-water monitoring wells at the site (MW-1B through MW-8B) will be sampled and analyzed for two rounds of baseline parameters. Sampling for baseline parameters will be performed in accordance with NYSDEC NYCRR Part 360-2.11(d)(6), including volatile organic compounds by U.S. Environmental Protection Agency Method 8260B, metals by U.S. Environmental Protection Agency Series 6010/7000, and additional parameters provided in *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020), including total organic carbon, total dissolved solids, chemical oxygen demand, specific conductivity, and pH. In addition, because of the presence of silica slag and dust in the landfill, silica will be included in the inorganic parameter list. Table 1 includes a list of baseline parameters that will be analyzed.

The first round of baseline parameter sampling will take place during the fourth quarter of 2000 (between October and December 2000), after closure activities have been completed. The second round of baseline parameter sampling will be conducted in the Spring 2001. The monitoring wells at the site will be sampled using the low-flow sampling methods, presented in Attachment B. Prior to sampling, each well will be monitored until temperature, pH, specific conductivity, and turbidity parameters have stabilized. Results will be logged on the Field Record of Well Gauging, Purging, and Sampling included in Attachment A.1.

The initial baseline parameter sampling results will be evaluated and a modified parameter list will be developed in conjunction with the NYSDEC Division of Environmental Remediation and Division of Solid and Hazardous Materials Region 9 Office. As the ground water beneath the

Witmer Road Landfill has been sampled and analyzed for the past 20 years, the current parameter list includes:

- pH
- Specific conductivity
- Total dissolved solids
- Chemical oxygen demand
- Total organic carbon
- Barium
- Hexavalent chromium
- Total chromium
- Iron
- Manganese
- Silica
- Zinc.

Of the above list, metals are currently analyzed and reported in both the total and soluble phase concentrations. The new ground-water monitoring program may include these parameters (listed above); however, additional parameters may be added on the basis of the results of the two rounds of baseline parameter sampling. If constituents of concern are reported in the overburden monitoring wells, then the installation of at least 1 bedrock well may be required to determine if impacts to the bedrock aquifer have occurred. An addendum to this plan will be issued detailing the necessary information for bedrock well installation, if required.

3.2 GROUND-WATER GAUGING

In order to evaluate the ground-water flow direction at the site, ground-water level gauging will be performed on the onsite wells prior to sample collection. An electronic water level meter will be used for this field task capable of recording water elevations to within +/- 0.01-in. accuracy. A complete round of water elevation measurements will also be recorded 1 day following completion of well installation activities. During each gauging event, the depth to the bottom of the well will be determined, and compared to the original depth determined from well installation. If sediment is observed in the well casing, the sediment will be removed via well development when the depth of sediment is greater than 10 percent of the well screen.

3.3 SURFACE WATER SAMPLING

Surface water sampling is designed to evaluate the chemical quality surface water runoff which may collect in the drainage swales prior to exiting the site to the southwest. Surface water samples will be collected at two locations (Figure 1), if surface water is present during sampling events. The first location noted is the confluence point for the southern and western drainage swales. The second location is immediately downstream of the discharge point of the relief pipe. Samples will be collected using a decontaminated stainless steel or Teflon dipper.

During the first two quarters, the surface water sample will be analyzed for Part 360 Baseline parameters plus silica. Unlike ground water, surface water has the ability to transport suspended material, therefore, surface water samples will be collected for total metals only. This will provide a more realistic scenario when determining impact to human health and the environment.

During the second two quarters, analytical requirements may be modified slightly based on the data collected during the first two quarters. It is anticipated that after the first two baseline sampling rounds, future samples will be analyzed for the following parameters:

- pH
- Specific conductivity
- Total dissolved solids
- Chemical oxygen demand
- Total organic carbon
- Barium
- Hexavalent chromium
- Total chromium
- Iron
- Manganese
- Silica
- Zinc.

3.4 RELIEF PIPE SAMPLING

Field parameters will be recorded at the relief pipe sampling location (Figure 1), including pH, turbidity, Eh, and specific conductivity. A single leachate sample will be collected and field parameters recorded during the four rounds of sampling. During the first two rounds, the leachate sample will be analyzed for baseline parameters noted in the ground-water sampling section above.

During the first two quarters, the surface water sample will be analyzed for Part 360 baseline parameters plus silica. During the second two quarters, analytical requirements may be modified slightly based on the data collected during the first two quarters. It is anticipated that, after the first two baseline sampling rounds, future samples will be analyzed as noted under surface water sampling.

3.5 FIELD QUALITY CONTROL SAMPLES

These samples are not included specifically as laboratory quality control samples but are analyzed when submitted. Data for these quality control samples are reported with associated samples.

3.5.1 Water Source Sample

Water source samples are samples of water used for field decontamination purposes. Specifically, water source samples will include potable, site-supplied water used in decontamination activities and laboratory-supplied, reagent-grade, de-ionized water used for final rinse in decontamination activities. Water source samples will be analyzed for the parameters sampled during the field mobilization period. One water source sample will be collected from the source of potable water used for equipment decontamination per sampling event. The water source sample will be collected early in the field effort to assess the quality of this potable water supply.

3.5.2 Rinsate Blanks

A rinsate blank is a water sample collected after having been poured through or over a decontaminated piece of sampling equipment to assess and document the thoroughness of the decontamination process. At least one rinsate blank per sampling event will be collected.

3.5.3 Field Duplicates

Field duplicates are two samples of the same matrix which are collected, to the extent possible, from the same location at the same time using the same techniques. Field duplicates provide information on the precision of the sampling and analysis process. Field duplicates will be collected at a frequency of 1 duplicate per 20 sample media. Quality control samples will be filled from the same discrete sample or composite mixture as the field samples.

3.5.4 Trip Blanks

Trip blanks are samples used when shipping samples for volatile organic compound analysis, in order to determine if volatile organics were released during shipment. These samples consist of a 40-ml sample vial containing laboratory grade deionized water. One trip blank will accompany each sample shipment (cooler) containing volatile organic compounds.

3.5.5 Sample Labels

Field samples collected will each be assigned a unique sample tracking number. Sample designation will be an alpha-numeric code which will identify each sample by site and location.

Sample Codes:

WRL = Witmer Road Landfill
MW = Monitoring well
SS = Surface water
RB = Rinsate blank
TB = Trip blank
DUP = Duplicate
SWB = Source water blank.

For example, the ground-water sample from MW-1B will be labeled WRL-MW-1B. Quality control samples will be labeled by the type of sample followed by a sequential numerical identification. For example, the first trip blank will be named TB-01. In order to ensure blind laboratory analysis of duplicate samples from specific matrixes, "DUP" will replace the sample identification number. This will ensure that the laboratory cannot identify the location of the duplicate sample. For example, the first ground-water duplicate sample collected will be identified as DUP-01.

3.6 SAMPLE KITS AND HANDLING

Sample kits, which are coolers containing chain-of-custody forms, custody seals, sample containers (with preservatives), and packing material, are prepared by the laboratory. The chain-of-custody procedure begins with the preparation of sample containers and preservatives to be used in sample collection. Unless superseded by specific project requirements, the contracted laboratory purchases and distributes pre-cleaned sample containers. Vendors are required to provide documentation of analysis for each lot of containers, and the documentation is kept on file.

For the analyses specified for this project, Table 2 shows general guidelines for the type of sample container required, preservation techniques, and holding times for analytical samples collected. Preservatives will be added to the sample containers in the laboratory prior to shipment.

After the samples are collected, they are split as necessary among containers and preservatives appropriate to the parameters to be determined. Each container is provided with a sample label that is filled out at the time of collection. At this time, a chain-of-custody form is initiated. The collected samples are cooled, if necessary, and returned to the laboratory by the most expedient means to ensure that holding times will be met. The chain-of-custody form is signed and dated as necessary as the samples pass from the collectors to those persons responsible for their transportation.

3.7 SAMPLE DOCUMENTATION IN THE FIELD

Field personnel will be issued serialized weatherproof logbooks. Field personnel are responsible for recording all pertinent project information including, but not limited to, field work documentation; field instrumentation readings; calculations; calibration records; work plan distributions; photograph references; sample tag/label numbers; meeting information; and important times and dates of telephone conversations, correspondence, or deliverables. This field logbook will also contain an abbreviated version of notes listed in the team or individual field logbooks. The sample team or individual performing a particular sampling activity is required to maintain a field logbook that will be filled out at the location of sample collection immediately after sampling. It will contain sample particulars including sample number, sample collection time, sample location, sample descriptions, sampling methods used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field logbook will also address deviations from this Plan or the Health and Safety Plan, including authorization obtained and the rationale for the deviation, visitor's names, or community contacts during sampling, and geologic and other site-specific information determined by field personnel as noteworthy. A sample log sheet will be filled out for each sample from the information recorded in the field logbook. In addition, field personnel will use appropriate forms applicable to field activities. These include boring logs, sampling data sheets, and calibration records.

3.8 DECONTAMINATION PROCEDURES

To minimize the potential for cross-contamination between sample locations, dedicated sampling equipment will be utilized. The procedure for decontaminating field measuring equipment, including stainless steel pumps, dippers, water quality measurement equipment, and water level/interface probes, is as follows:

- Wash with potable water and laboratory-grade detergent (e.g., Alconox® detergent)
- Rinse with potable water
- Rinse with deionized water
- Rinse with methanol
- Rinse with deionized water
- Air dry
- Wrap in aluminum foil if equipment will be stored.

The decontamination area will contain a wash solution collection system. The collected material will be contained in U.S. Department of Transportation-approved 55-gal drums.

3.9 SAMPLING-DERIVED WASTES

Waste materials generated during field investigation will include:

- Decontamination fluids
- Monitoring well purge water
- Used personal protective equipment.

These wastes will be contained, labeled, and handled in the following manner:

- All liquid and decontamination fluids will be collected and contained in U.S. Department of Transportation-approved 55-gal drums. Filled drums will be dated, labeled as "non-hazardous," and temporarily stored at an onsite staging area. Disposal options for the well development and purging fluids will be based on results of the analytical sampling program.

- All used personal protective equipment will be double-bagged and disposed offsite as general refuse.

Containerization of monitoring well purge water will continue until water quality has been established and documented. Future purge water containerization will be performed according to the established ground-water quality. If a monitoring well does not contain analytes or compounds in excess of applicable regulations, the purged water will be discharged to ground surface.

3.10 LOCATION SURVEYING

The new 8 monitoring well locations, and the designated surface water sampling locations were surveyed. At each monitoring well location, the ground surface elevation, along with the top of the metal casing and top of the inner polyvinyl chloride casing, was surveyed.

The surveyor marked the inner polyvinyl chloride casing with a black marker to designate the point on the casing that has been surveyed. This mark will act as a reference point during the well gauging events. Surveying was completed to provide as-built information for the landfill closure project and was performed by a State of New York Licensed Land Surveyor. A supplemental survey will be performed if, during monitoring sampling events or engineering inspections, a monitoring well is determined to be suspect (i.e., differential settlement, significant concrete cracking, and significant variations in water level readings).

3.11 RELIEF PIPE ABANDONMENT PROCEDURES

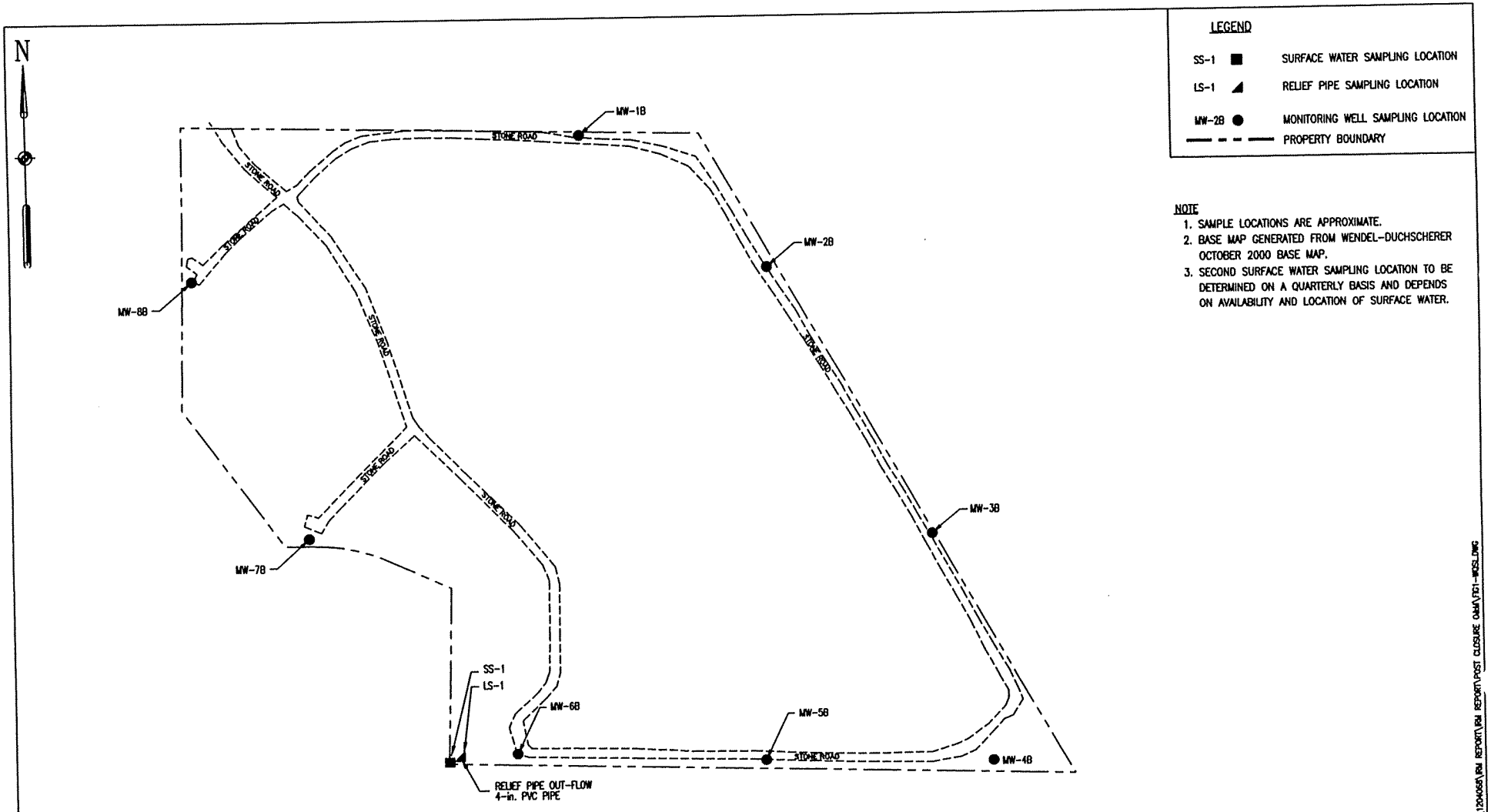
The relief pipe was installed to allow positive drainage of pore water pressure from under the cap. The discharge from the relief pipe is a temporary condition that should subside after closure, since precipitation is prevented from entering the waste via the cap system. After equilibrium has been achieved, the relief pipe will be filled with a concrete and bentonite mixture to effectively seal the conduit and prevent water from backflowing under the cap.

4. DATA REPORTING

The results of the two rounds of baseline parameter ground-water sampling and the subsequent quarterly site ground-water and surface monitoring will consist of the field data sheets, chain-of-custody forms, and the laboratory analysis results. Results will be sent to NYSDEC Division of Solid and Hazardous Materials Region 9 and The BOC Group. A New York State certified laboratory will be retained to analyze the ground-water and surface water samples. The laboratory will be determined prior to commencement of field activities associated with the fourth quarterly sampling event for 2000.

The results from the first two quarterly sampling events will be summarized in a letter report detailing the findings of the baseline sampling. This letter report will outline the revised parameter list recommended for future sampling events.

An annual report will be prepared that will summarize the analytical results and provide a discussion of the notable changes and trends in the ground-water and surface water quality that have occurred throughout the year. This annual report will also be sent to NYSDEC Division of Solid and Hazardous Materials Region 9.



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EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 1 WATER QUALITY SAMPLING LOCATION MAP	DESIGNED BY MJG	DRAWN BY JBS	DATE 03-21-00	PROJECT NO. 12040.68
			CHECKED BY PAP	PROJECT MGR. CEM	SCALE AS SHOWN	FIGURE 1

TABLE 1 SUMMARY OF ANALYTICAL METHODS, REPORTING LIMITS, AND STANDARDS FOR BASELINE PARAMETERS FOR GROUND-WATER SAMPLES COLLECTED AT WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Parameter	Suggested Laboratory Method	Project Reporting Limit[a]	NYSDEC Ground-Water Standards for GA Classified Waters[b]
VOLATILE ORGANIC COMPOUNDS (µg/L)			
Acetone	8260B	5	50
Acrylonitrile	8260B	5	5
Benzene	8260B	1	1
Bromochloromethane	8260B	1	5
Bromodichloromethane	8260B	1	50
Bromoform	8260B	1	50
Carbon disulfide	8260B	1	---
Carbon tetrachloride	8260B	1	---
Chlorobenzene	8260B	1	5
Chloroethane	8260B	1	5
Chloroform	8260B	1	7
Dibromochloromethane	8260B	1	5
1,2-Dibromo-3-chloropropane	8260B	25	0.04
1,2-Dibromoethane	8260B	1	5
1,2-Dichloropropane	8260B	1	1
cis-1,3-Dichloropropene	8260B	1	<0.4[c]
trans-1,3-dichloropropene	8260B	1	<0.4[c]
0-Dichlorobenzene	8260B	1	3
p-Dichlorobenzene	8260B	1	3
trans-1,4-Dichloro-2-butene	8260B	5	5
1,1-Dichloroethane	8260B	1	5
1,2-Dichloroethane	8260B	1	0.6
1,1-Dichloroethene	8260B	1	5
1,2-Dichlorethene Total	8260B	1	5
1,2-Dichloropropene	8260B	1	1
Ethylbenzene	8260B	1	5
2-Hexanone	8260B	5	50
Iodomethane	8260B	5	5
Bromomethane	8260B	1	5
Chloromethane	8260B	1	---
Dibromomethane	8260B	1	5

(a) Project Reporting Limit is either the laboratory Reporting Limit or Method Detection Limit determined according to 40 CFR 136.
(b) NYSDEC standards for GA classified waters taken from NYCRR Title 6, Chapter X, Parts 700-705.
(c) This value represents the sum of *cis* and *trans* isomers.

NOTE: NYSDEC = New York State Department of Environmental Conservation.
Dashes (---) indicate no standards applicable.

Parameter	Suggested Laboratory Method	Project Reporting Limit[a]	NYSDEC Ground-Water Standards for GA Classified Waters[b]
VOLATILE ORGANIC COMPOUNDS (μg/L) (Continued)			
Dichloromethane	8260B	1	5
2-Butanone	8260B	5	---
Methyl isobutyl ketone	8260B	5	---
Styrene	8260B	1	5
1,1,1,2-Tetrachloroethane	8260B	1	5
1,1,2,2-Tetrachloroethane	8260B	1	5
Trichlorofluoromethane	8260B	1	5
Tetrachloroethene	8260B	1	5
Toluene	8260B	1	5
1,1,1, Trichloroethane	8260B	1	5
1,1,2 Trichloroethane	8260B	1	1
Trichloroethene	8260B	1	5
1,2,3-Trichloropropane	8260B	1	0.04
Vinyl acetate	8260B	1	---
Vinyl chloride	8260B	1	2
Xylenes	8260B	1	5
INORGANIC COMPOUNDS (μg/L)			
Aluminum	6010B	10	100
Antimony	6010B	3.4	3
Arsenic	6010B	2.6	25
Barium	6010B	20	1,000
Beryllium	6010B	3	3
Cadmium	6010B	0.4	5
Calcium	6010B	40	---
Chromium	6010B	0.5	50
Chromium (Hexavalent)	3500-CRB	0.4	50
Cobalt	6010B	70	---
Copper	6010B	60	200
Cyanide	4500-CNE	200	200
Iron	6010B	100	300
Lead	6010B	1.5	300
Magnesium	6010B	4	35,000
Manganese	6010B	40	300
Mercury	7470	0.2	0.7
Nickel	6010B	1.1	100
Potassium	6010B	40	---
Selenium	270.2	1.6	10
Silver	6010B	1.6	50
Sodium	6010B	8	20,000
Thallium	6010B	2.3	0.5
Vanadium	6010B	80	---
Zinc	6010B	20	2,000

Parameter	Suggested Laboratory Method	Project Reporting Limit[a]	NYSDEC Ground-Water Standards for GA Classified Waters[b]
LEACHATE INDICATORS			
Total Kjeldahl Nitrogen	LAC 107-06-2D	1.0	---
Ammonia	4500-NH3E	1.0	2,000
Nitrate	LAC 107-04-1	0.2	10,000
Chemical Oxygen Demand	HACH 8000	10	---
Biochemical Oxygen Demand	5210B	2.0	---
Total Organic Carbon	5310B	1.0	---
Total Dissolved Solids	160.1	2.0	---
Sulfate	375.4	5.0	250,000
Alkalinity	2320B	3.8	---
Phenols	LAC 210-00-1	0.01	1
Chloride	4500-CLB	5.0	250,000
Bromide	300	1.0	2,000
Total hardness as CaCO3	6010B	2.0	---
Color	110.1	2.5	---
Boron	6010B	50	1,000
FIELD PARAMETERS (μg/L)			
Eh	---	---	---
Dissolved Oxygen	---	---	---
Turbidity	---	---	---
pH[d]	150.1	2.0	6.5-8.5[e]
Specific Conductance	---	---	---

(d) pH to be measured in the field to determine stability of water quality. pH also to be tested by the laboratory for confirmation of field results.

(e) pH shall not be lower than 6.5 or the pH of the natural ground water, whichever is lower, nor shall be greater than 8.5 of the pH of the natural ground water, whichever is greater.

TABLE 2 SUMMARY OF SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES FOR GROUND-WATER SAMPLES COLLECTED AT WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

Suggested Laboratory Method	Sample Holding Time	Sample Preservation (cool to 4°C+/–2°C)	Type and Number of Containers[a]
Volatile Organic Compounds –			
Method 8260B	14 days	HCl	3, 40-ml glass
Inorganic Compounds –			
Method 6010B	6 months	HNO_3	1-L Plastic
Method 3500-CRB	24 hours	None	1-L Plastic
Method 4500-CNE	14 days	NaOH	1-L Plastic
Method 7470	28 days	HNO_3	1-L Plastic
Method 270.2	6 months	HNO_3	1-L Plastic
Leachate Indicators –			
Method LAC 107-06-2D	28 days	H_2SO_4	1-L Glass[b]
Method 4500-NH3E	28 days	H_2SO_4	1-L Glass[b]
Method LAC 107-04-1	28 days	H_2SO_4	1-L Glass[b]
Method HACH 8000	28 days	H_2SO_4	1-L Glass[b]
Method 5210B	48 hours	None	1-L Plastic
Method 5310B	28 days	H_2SO_4	2, 40-ml glass
Method 160.1	7 days	None	1-L Plastic
Method 375.4	28 days	None	1-L Plastic
Method 2320B	14 days	None	1-L Plastic
Method LAC 210-00-1	28 days	H_2SO_4	1-L Amber Glass
Method 4500-CLB	28 days	None	1-L Plastic
Method 300 (Br)	28 days	None	1-L Plastic
Method 200.7	6 months	HNO_3	1-L Plastic
Method 110.1	48 hours	None	1-L plastic
Additional Parameters –			
Method 9040	Immediate	None	Field Analysis
Method 9050	28 days	None	1-L Plastic
Method 410.1	28 days	H_2SO_4	1-L Glass[b]
Method 5310B	28 days	H_2SO_4	2, 40-ml glass

(a) All containers must have Teflon-lined lids.
(b) Multiple analysis can be completed utilizing (one) sample container.

Attachment A

Field Forms

A.1 Field Record of Well Gauging, Purging, and Sampling
A.2 Landfill Cap Inspection Checklist

Attachment A.1

Field Record of Well Gauging, Purging, and Sampling

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:		Project Number:	
Well ID:		Well Lock Status:	
Well Condition:		Weather:	

Gauge Date:		Gauge Time:	
Sounding Method:		Measurement Ref:	
Stick Up/Down (ft):		Well Diameter (in.):	

Purge Date:		Purge Time:	
Purge Method:		Field Personnel:	
Ambient Air VOCs (ppm):		Well Mouth VOCs (ppm):	

WELL VOLUME

A. Well Depth (ft):		D. Well Volume/ft (L):	
B. Depth to Water (ft):		E. Well Volume (L) (C*D):	
C. Liquid Depth (ft) (A-B)		F. Three Well Volumes (L) (E*3):	

G. Measurable LNAPL? Yes _____ /ft No _____

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
PH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L):			
Samplers:		Sampling Time (Start/End):	
Sampling Date:		Decontamination Fluids Used:	
Sample Type:		Sample Preservatives:	
Sample Bottle IDs:			
Sample Parameters:			

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: _____	Project Number: _____	Date: _____
Well ID:	Field Personnel:	

Parameter	6	7	8	9	10	11
Time (min.)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

Attachment A.2

Landfill Cap Inspection Checklist

LANDFILL CAP INSPECTION CHECKLIST
WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

EA Personnel: _____

Date: _____

Weather: _____

1. Inspection of ground surface for exposure of geotextile cover (cap erosion):

2. Inspection of ground surface for differential settlement resulting in soil cracking or ponded water:

3. Identification of stressed vegetation:

4. Identification of seeps, rooted vegetation (trees), and/or animal burrows:

5. Identification of deteriorating equipment (i.e., monitoring wells, fencing, or drainage structures):

6. Inspection of stormwater drainage swales for erosion, sloughing, or flow-through:

7. Inspection of east side of the landfill (Niagara Mohawk Power Corporation parcel) along the intermittent stream for the presence of erosion or sloughing:

8. Inspection of access roads:

Attachment B

Standard Operating Procedures for Low Flow and Sampling Method

ATTACHMENT B

STANDARD OPERATING PROCEDURES FOR LOW-FLOW AND SAMPLING METHOD

B.1 SCOPE OF APPLICATION

The purpose of this Standard Operating Procedure is to establish the protocol for collecting ground-water samples with minimum turbidity, and is also intended to be used in conjunction with the analyses for the most common types of ground-water contaminants (semivolatile organic compounds and inorganic compounds).

B.2 EQUIPMENT/MATERIALS

- Operations and Maintenance Plan.
- Well construction data and location map.
- Field logbook and Field Record of Well Gauging, Purging, and Sampling forms.
- Water level measuring device, 0.01 ft accuracy (electronic preferred) for monitoring water level during pumping operations.
- Pumps: adjustable rate, variable displacement submersible centrifugal pumps constructed of stainless steel and Teflon® or peristaltic pump.
- Tubing: Teflon or Teflon-lined polyethylene must be used to collect samples for organic analysis. For samples collected for inorganic analysis, Teflon or Teflon-lined polyethylene, polyvinyl chloride, Tygon, or polyethylene tubing may be used.
- Flow measurement supplies (e.g., graduated container and stopwatch).
- Power source (e.g., generator).
- Water quality indicator parameter monitoring instruments—pH, turbidity, specific conductances, temperature, oxidation-reduction potential, and dissolved oxygen. Water quality indicator parameters will be measured in the field in accordance with U.S. Environmental Protection Agency (EPA)-600/4-79-020 (1983) using the following methods: temperature (Method170.1), pH (Method 150.1), turbidity (Method 180.1), specific conductance (Method 120.1), and dissolved oxygen (Method 360.1).
- Decontamination supplies (for monitoring instruments).

- Sample bottles and sample preservation supplies (as required by the analytical method).
- Sample tags of labels.

B.3 PRELIMINARY ACTIVITIES

The following site activities are required prior to performing well purging and ground-water sampling. Field logbooks and sampling forms should be filled out as the procedure is being preformed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate: site name, project number, field personnel, well identification, weather conditions, date and time, equipment used, and quality assurance/quality control data for field instrumentation.
- Check well for damage or evidence of tampering; record pertinent observations in field logbook and on sample form.
- Lay out sheet of polyethylene for monitoring and sampling equipment.
- Unlock well and remove well cap (if applicable).
- If the well casing does not have a reference point (usually a v-cut or indelible mark in the well casing), make one.
- Measure and record the height of the protective casing above the concrete pad or ground surface, as appropriate. This reading is compared to that recorded during well installation as an indication of possible well damage or settling that may have occurred.
- Measure and record the depth to water (to 0.01 ft) in each well to be sampled before purging begins. Care should be taken to minimize disturbance of any particulate attached to the side or at the bottom of the well. The depth to well bottom should not be measured because of the potential to stir up sediment at the bottom of the well.

B.4 SAMPLING PROCEEDURE

The following general procedure will be followed to obtain representative ground-water samples. Field logbooks and sampling forms should be filled out as the procedure is being performed, as noted:

- Enter the following information in the field logbook and sampling form, as appropriate, prior to purging: purge date and time, purge method, and depth to water.

- Prepare the pump by checking electrical connections, discharge tubing, and motor. Locate the generator (if applicable) downwind of the well; connect the power converter to the generator.

- Connect the instrumentation header to the pump discharge and begin purging the well at 0.2-0.5 L/minute. Measure and record the water level and time with the pump in well before starting the pump. Continue pumping the well at 0.2-0.5 L/minute.

- Establish that the water level has not dropped significantly such that the pump is dry (bubbles in discharge) or water is heard cascading down the inside of the well. This may be accomplished by setting the sensor of the water level meter approximately 3-6 in. below the static water level and monitoring for a continuous audible alarm, which indicates the sensor is in water and the level has not dropped more than 6 in. Ideally, the pump rate should cause little or no water level drawdown in the well (>0.5 ft and the water level should stabilize). The water level should be monitored every 3-5 minutes (or as appropriate) during pumping. Care should be taken not to cause entrainment of air in the pump system. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (e.g., 0.1-0.2 L/minute) to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. The well will not be purged dry as this may affect analytical parameters.

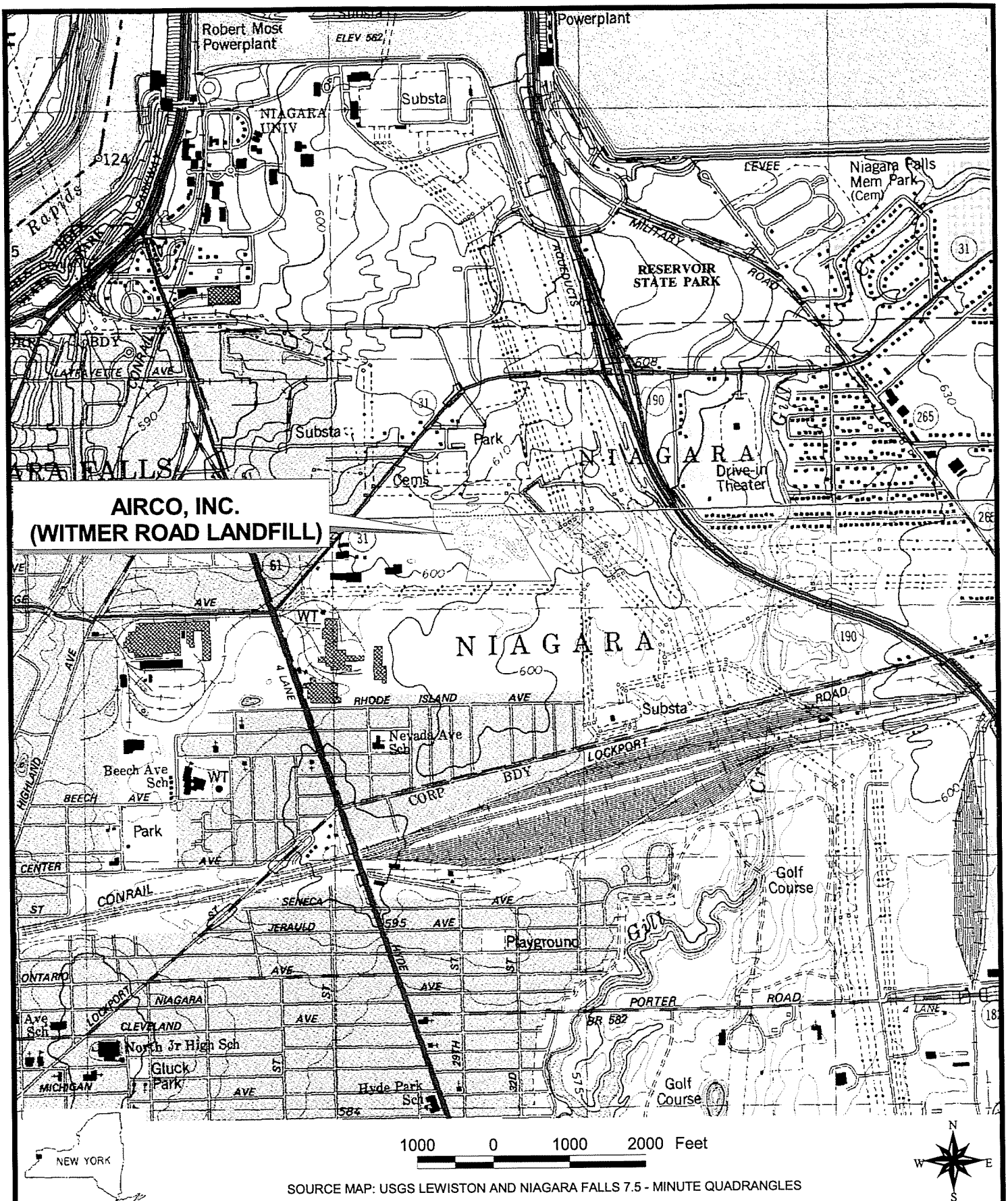
- During purging of the well, monitor the water quality indicator parameters (turbidity, temperature, specific conductance, and pH) every 3-5 minutes. Record in the field logbook and on the Field Record of Well Gauging, Purging, and Sampling the pumping rate, drawdown, water quality indicator parameters values, and clock time at 3- to 5-minute intervals in the field logbook and sampling record. Purging of the standing well water is considered complete when three consecutive readings of the water quality indicator parameters agree within approximately 10 percent. Turbidity readings consistently below 10 nephelometric turbidity units (NTU) are considered to represent stabilization of discharge water for this parameter. If the parameters have stabilized, but the turbidity is not in the range of the 10 NTU goal, the pump flow rate should be decreased and measurement of the parameters should continue every 3-5 minutes. Measurements should be obtained using a flow-through cell.

- Reduce the pump flow rate to the lowest practical setting, usually about 0.1 L/minute. Remove the in-line sensor, if applicable. If the water discharged by the pump is silty, wait for the water to clear before sampling. Ensure that bubbles are not observed in the discharge tubing. Record pertinent observations in the field logbook and on sampling records.

- Begin filling sample containers from the pump discharge, allowing the water to fill the containers by allowing the pump discharge to flow gently down the inside of the container with as little agitation or aeration as possible. Collect the sample aliquots for the analytical parameter categories in the order below, as applicable:

  — Volatile organic compounds
  — Metals
  — All other analytes.

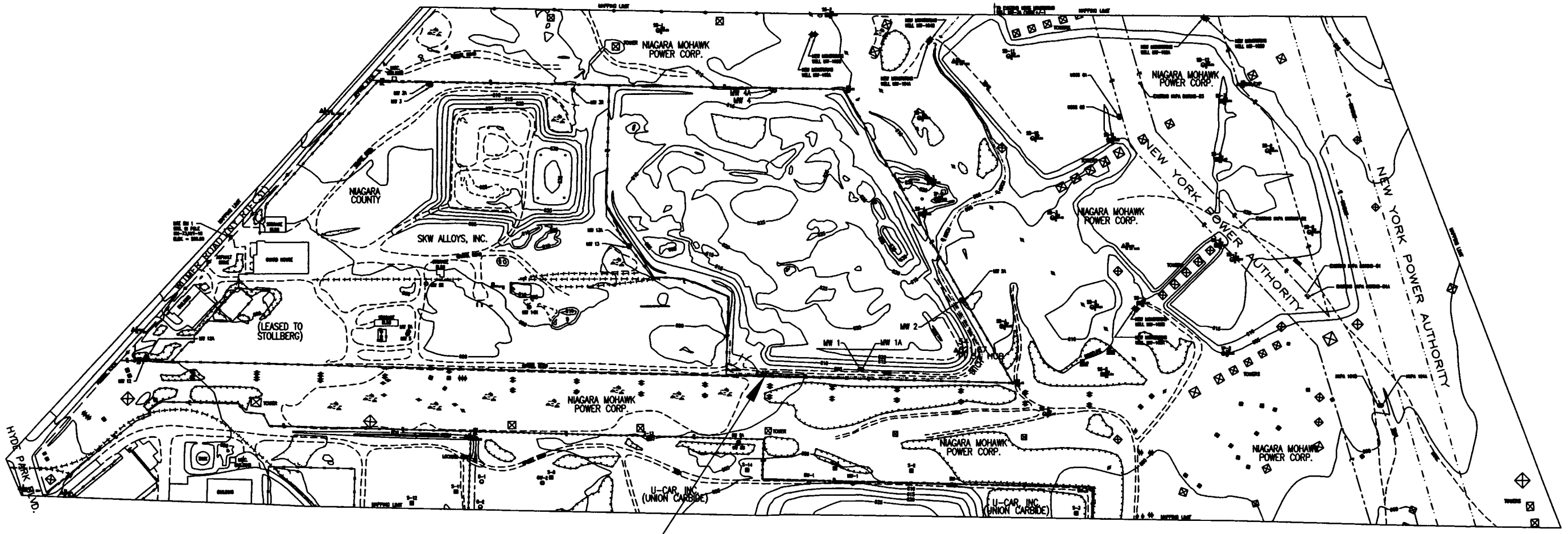
- Complete remaining portions of Field Record of Well Gauging, Purging, and Sampling Form after each well is sampled, including sample team members, sample date and time, total quantity of water removed, well sampling sequence and time of sample collection, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of sampling event.



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	13 DEC. 2000	12040.68	I:\BOC-NIAGARA -GIS\BOC.APR



LEGEND

- UTILITY POLE
- PROPERTY IRON PIN
- TREE LINE
- APPROXIMATE PROPERTY LINE
- JCL SURVEY CONTROL POINT
- CHAIN LINK FENCE

REFERENCES:

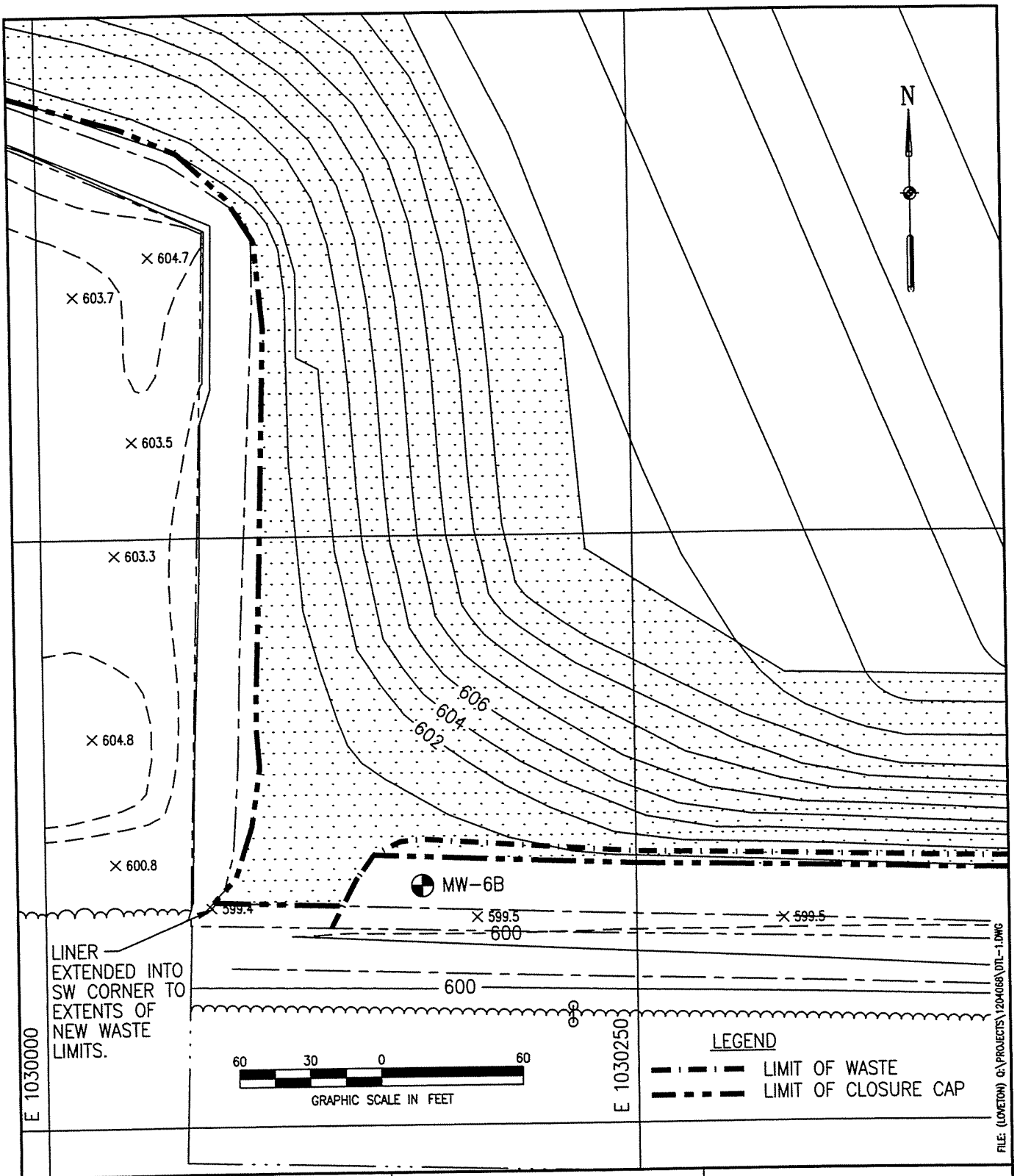
1. HORIZONTAL CONTROL FOR THIS PROJECT WAS TIED INTO NAD 1983. MONUMENTS SMC-20A AND SMC-45 FROM A GIS CONTROL PROJECT IN 1991 FOR THE CITY OF NIAGARA FALLS WAS USED.
2. VERTICAL CONTROL FOR THIS PROJECT WAS TIED INTO NGVD 1929. MONUMENT SMC-20A WITH AN ELEVATION OF 588.52 WAS USED. A SECONDARY BENCHMARK (RAILROAD SPIKE IN POLE NM-73, NYT-10) WAS SET BY LU ENGINEERS WITH AN ELEVATION OF 599.00.
3. TOPOGRAPHIC MAPPING AND 5-FT CONTOURS FOR THIS PROJECT WERE BASED ON 1"=500' PHOTOGRAPHY OBTAINED IN THE SPRING OF 1992.
4. ALL PROPERTY LINE LOCATIONS ARE APPROXIMATE. NO BOUNDARY SURVEY WAS DONE. EXISTING SURVEYS WERE UTILITIZED FROM SKW ALLOYS, INC. DATED 18 FEBRUARY 1988, UNION CARBIDE LANDFILL SITE PLAN DATED 30 DECEMBER 1993, AND NEW YORK STATE POWER AUTHORITY DRAWING "NPPSKW.DWG."

400 200 0 400

GRAPHIC SCALE IN FEET

FILE: F:\INDUSTRIAL\OTHER\DOC CASES\12040.68\RM REPORT\RM REPORT\FIG-2.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 2 VANADIUM SITE	DESIGNED BY MJG	DRAWN BY JBS	DATE 12-15-00	PROJECT NO. 12040.68
			CHECKED BY PAP	PROJECT MGR. CEM	SCALE AS SHOWN	FIGURE 2

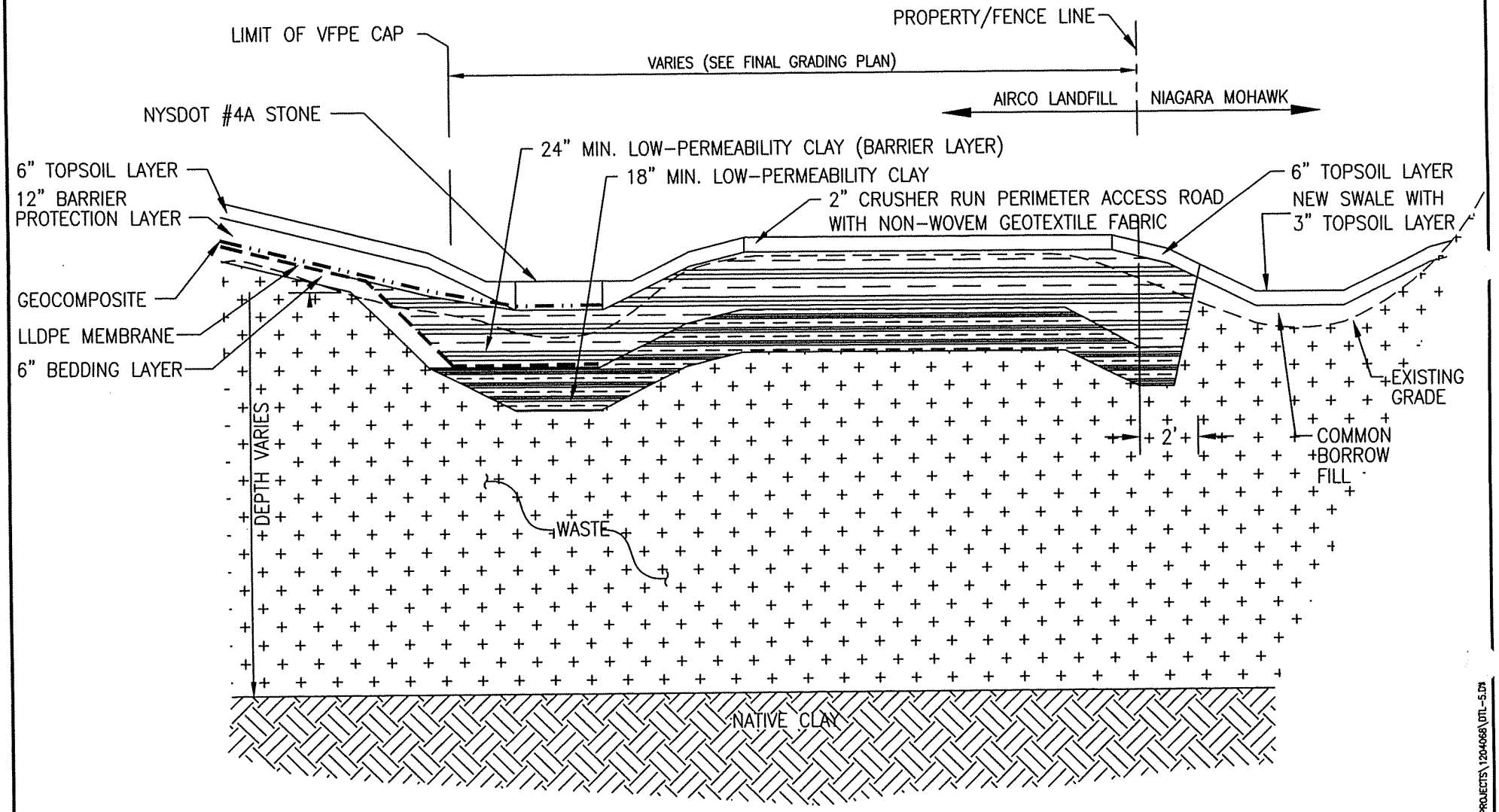


EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL
DESIGN-BUILD SITE CLOSURE
NIAGARA FALLS, NEW YORK

FIGURE 3
SOUTHWEST CORNER
REVISED LIMITS OF WASTE

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
CEM	CEM	FDV	MRG	AS SHOWN	8-14-00	12040.68	3

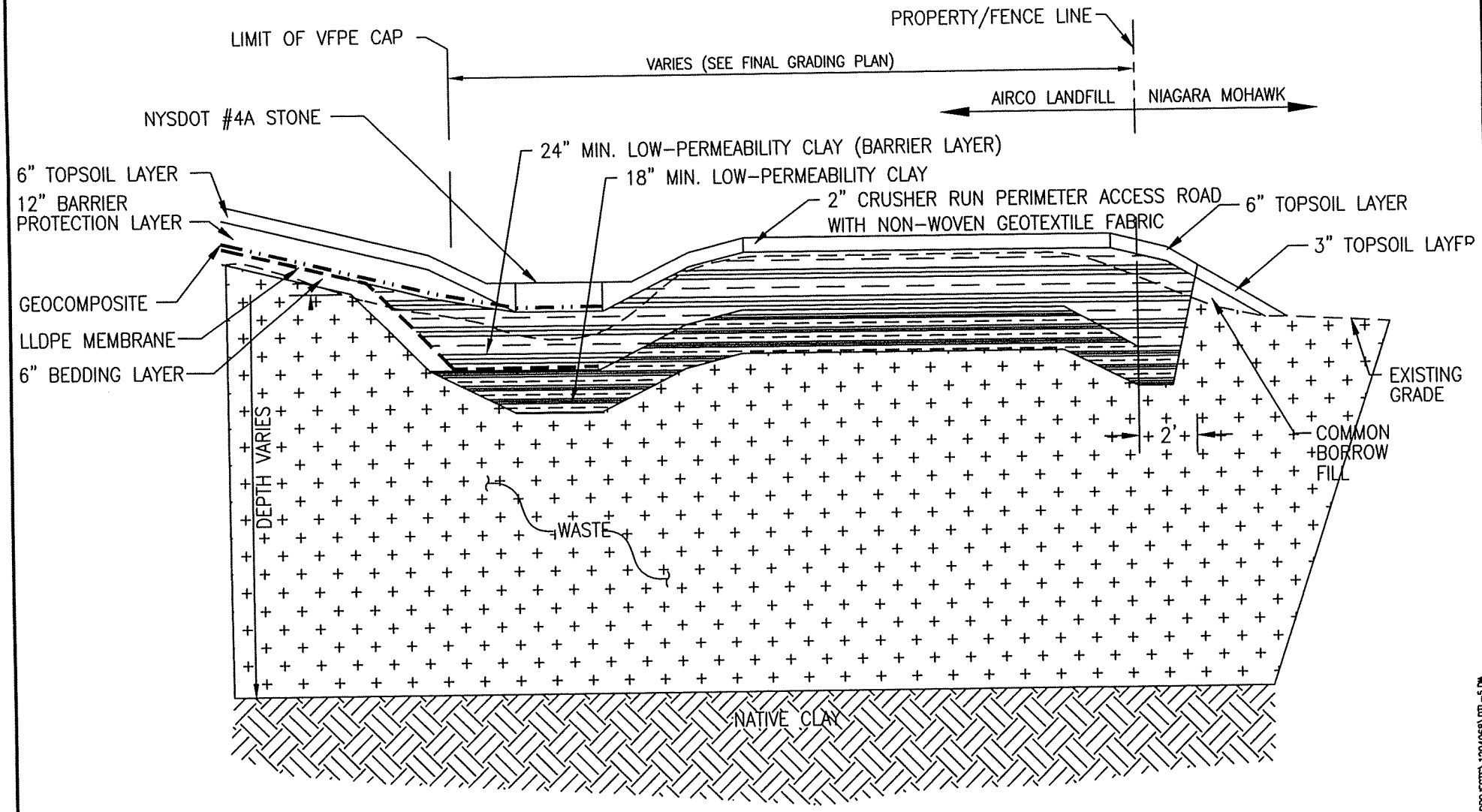


CAP TERMINATION DETAIL 'A'

SCALE: 1"=5'

FILE: (LOVETON) Q:\PROJECTS\1204068\DTL-5.DN

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 4 AS-BUILT CAP TERMINATION DETAIL "A"	DESIGNED BY CEM	DRAWN BY FDV	DATE 1-18-01	PROJECT NO. 12040.68
			CHECKED BY CEM	PROJECT MGR. MRG	SCALE AS SHOWN	FIGURE 4

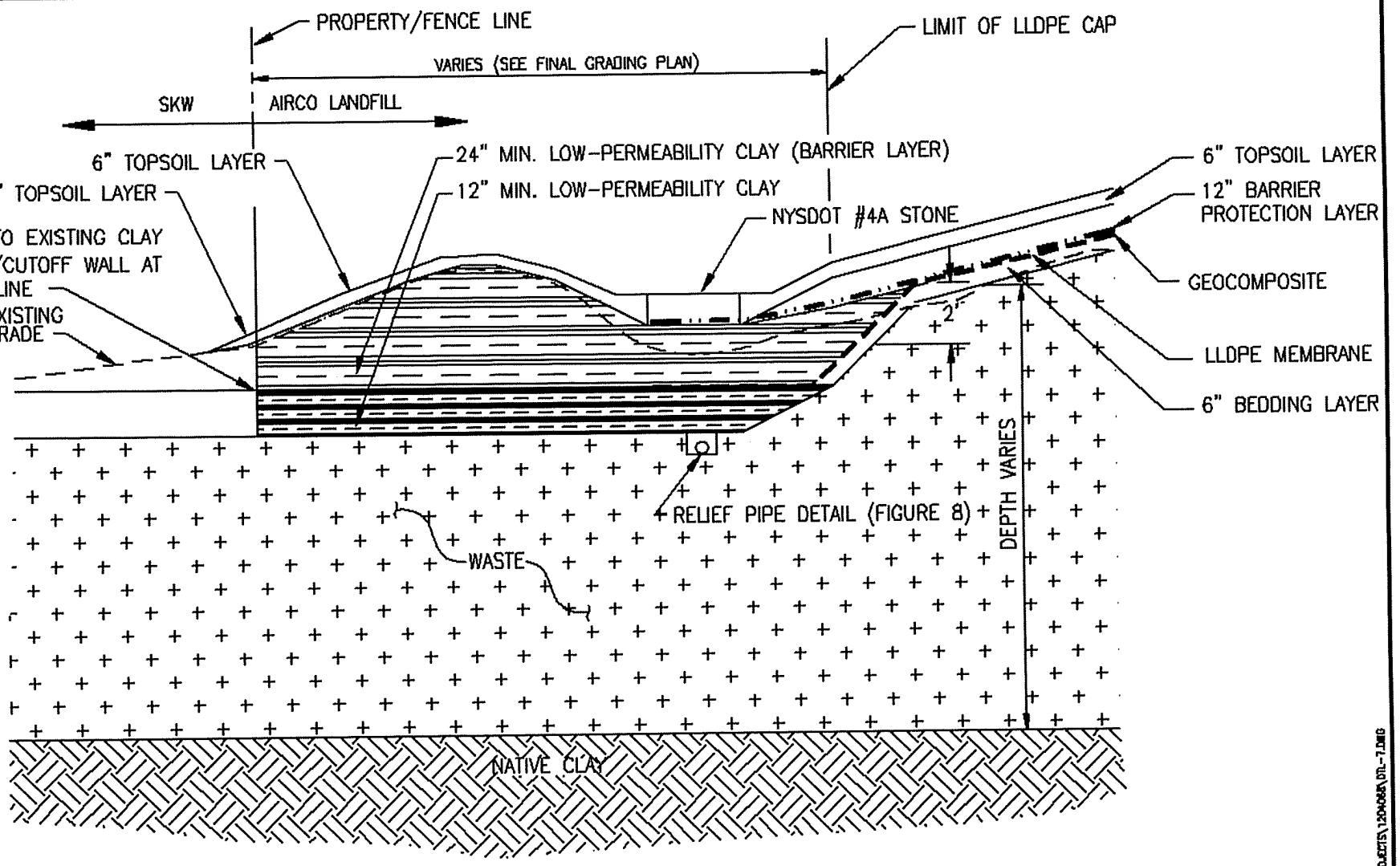


CAP TERMINATION DETAIL 'B'

SCALE: 1"=5'

FILE: (LOVETON) C:\PROJECTS\12040.68\UTL-5.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 5 AS-BUILT CAP TERMINATION DETAIL "B"	DESIGNED BY CEM	DRAWN BY FDV	DATE 1-18-01	PROJECT NO. 12040.68
			CHECKED BY CEM	PROJECT MGR. MRG	SCALE AS SHOWN	FIGURE 5



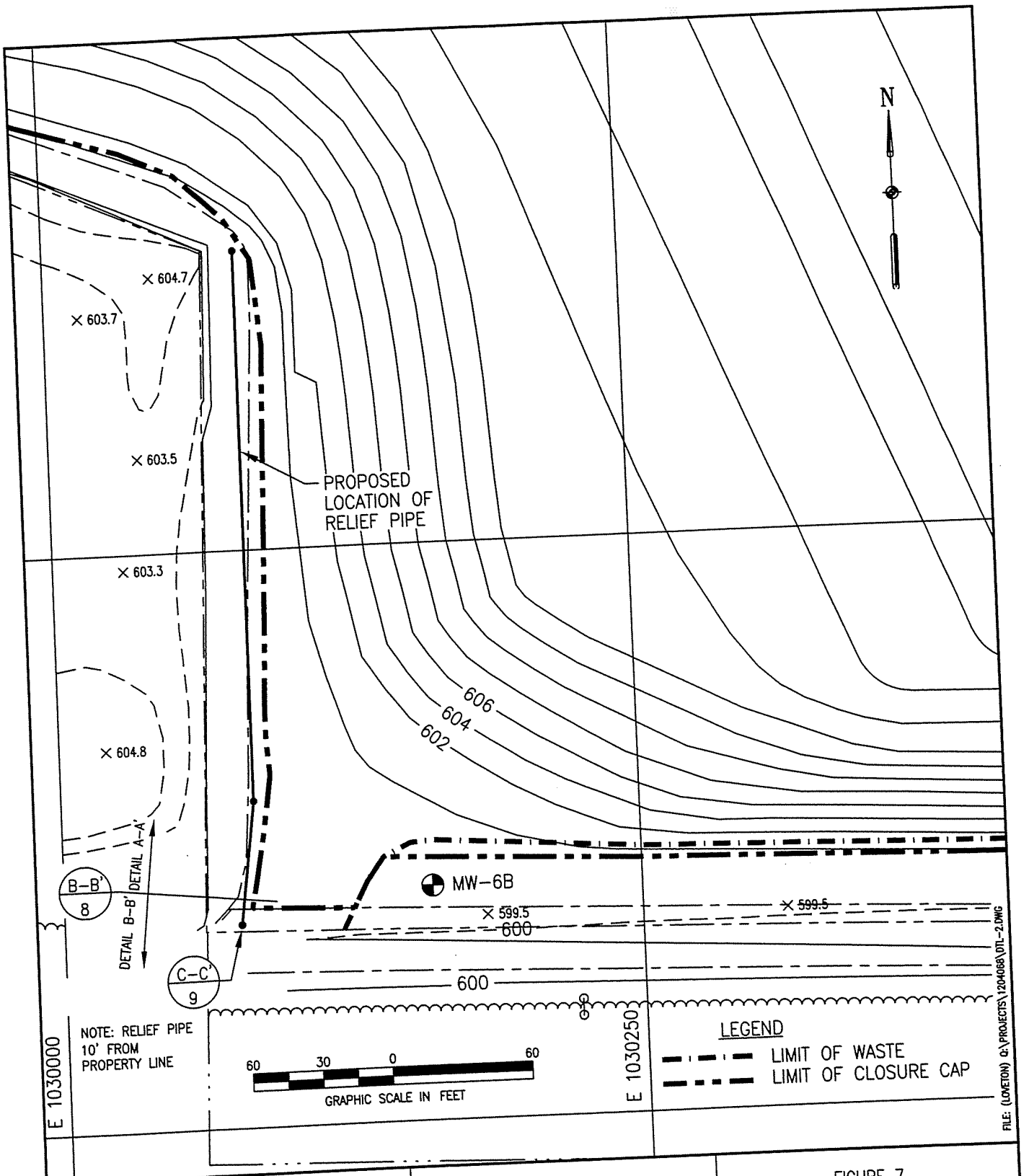
NOTE:
EXCAVATION SHALL BE AS NEAR VERTICAL AS PRACTICAL WITHOUT DESTABILIZING SKW PROPERTY.

CAP TERMINATION DETAIL 'D'

SCALE: 1"=5'

FILE: (LOMETON) Q:\PROJECTS\12040.68\DTL-7.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 6 AS-BUILT CAP TERMINATION DETAIL "D"	DESIGNED BY CEM	DRAWN BY FDV	DATE 1-18-01	PROJECT NO. 12040.68
			CHECKED BY CEM	PROJECT MGR. MRG	SCALE AS SHOWN	FIGURE 6

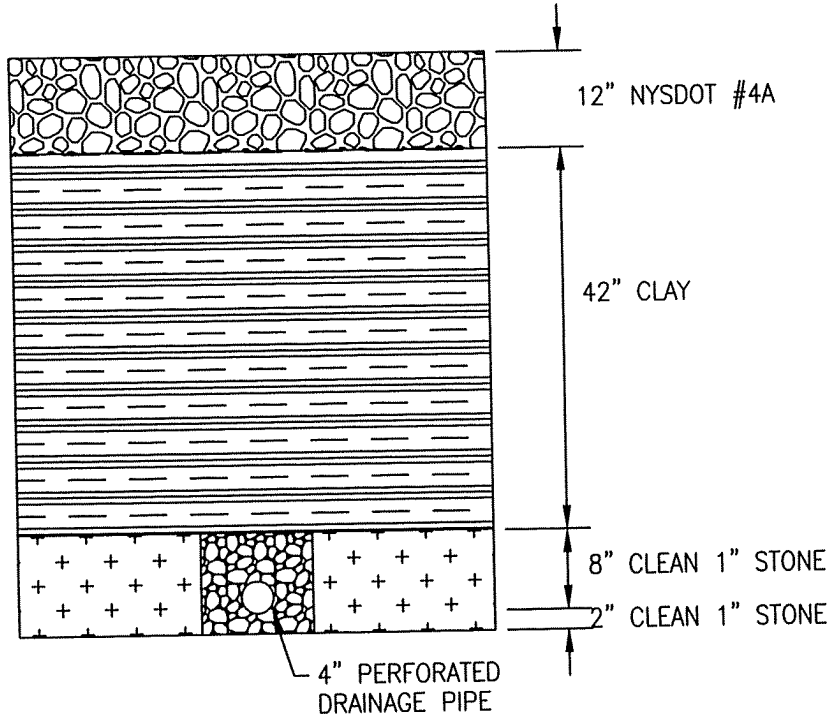


EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL
DESIGN-BUILD SITE CLOSURE
NIAGARA FALLS, NEW YORK

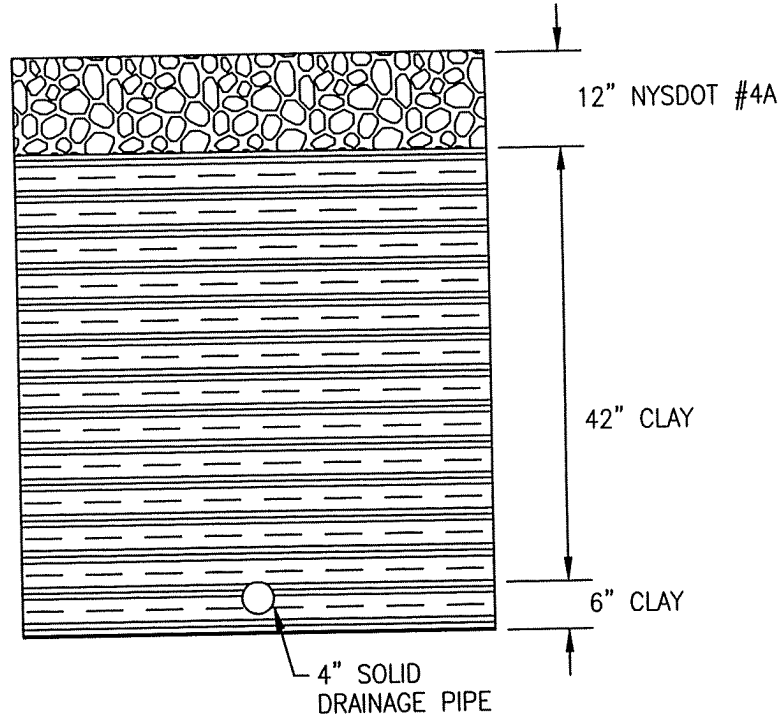
FIGURE 7
PLAN VIEW
RELIEF PIPE SYSTEM

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
CEM	CEM	FDV	MRG	AS SHOWN	1-18-01	12040.68	7



DETAIL "A–A"

NOT TO SCALE

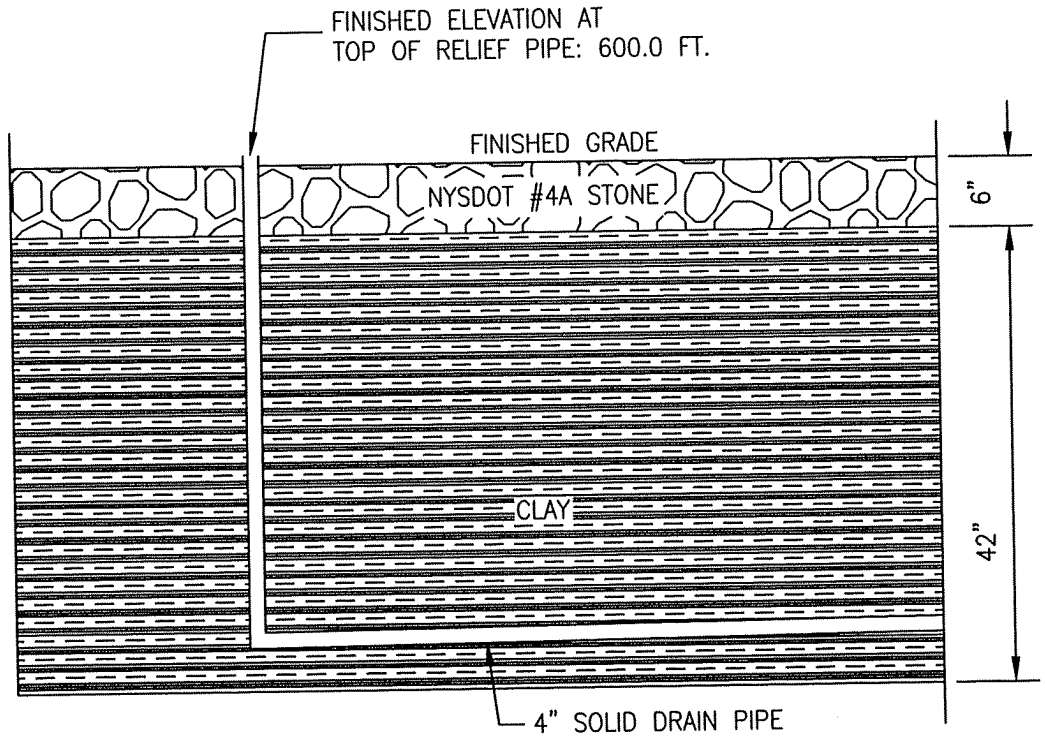


DETAIL "B–B"

NOT TO SCALE

FILE: (LOVETON) Q:\PROJECTS\12040868\DTL-3.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN–BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 8 RELIEF PIPE DETAILS	DESIGNED BY CEM	DRAWN BY FDV	DATE 8–14–00	PROJECT NO. 12040.68
			CHECKED BY MRG	PROJECT MGR. CEM	SCALE NONE	FIGURE 8



DETAIL "C–C"

NOT TO SCALE

FILE: (LOVETON) Q:\PROJECTS\12040.68\DTL-4.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	WITMER ROAD LANDFILL DESIGN–BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK	FIGURE 9 RELIEF PIPE DETAIL AT THE OUTLET POINT	DESIGNED BY CEM	DRAWN BY FDV	DATE 8–14–00	PROJECT NO. 12040.68
			CHECKED BY MRG	PROJECT MGR. CEM	SCALE NONE	FIGURE 9