MALCOLM PIRNIE

BROCKPORT LANDFILL - SITE NO. 8-28-038
POST-CLOSURE MONITORING AND MAINTENANCE OPERATIONS MANUAL

VILLAGE OF BROCKPORT
TOWN OF SWEDEN
MONROE COUNTY, NEW YORK

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MALCOLM PIRNIE, INC.

P. O. Box 1938
Buffalo, New York 14219

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MALCOLM PIRNIE

VILLAGE OF BROCKPORT LANDFILL
POST CLOSURE MONITORING
AND MAINTENANCE OPERATIONS

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1.0 INTRODUCTION

1.1 GENERAL

The New York State Department of Environmental Conservation (NYSDEC) has determined that the Brockport Landfill site (the site) is an inactive hazardous waste site, as defined in ECL Section 27-130(2). Consequently, the site has been listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York as Site Number 8-28-038. The NYSDEC has classified the site as a classification "2" site pursuant to Article 27, Title 13 of the Environmental Conservation Law (ECL) of the State of New York. As a result of the classification, the Village of Brockport and three private parties (i.e., the General Electric Company [GE], Owens-Brockway Glass Container, Inc. [OI] and Minnesota Mining and Manufacturing, Inc. [3M], entered into an Order on Consent with the NYSDEC. The requirements of the Order on Consent include performance of a Remedial Investigation/Feasibility Study (RI/FS) and development of a remedial program. The RI/FS has been completed, and a Record of Decision (ROD) (NYSDEC, September 26, 1997) has been issued for the site. A closure remedy was selected and implemented. The Order on Consent and the ROD also requires preparation and implementation of a Post-Closure Monitoring and Maintenance Plan.

1.2 BACKGROUND

1.2.1 Site Description

The Brockport Landfill site occupies approximately 36 acres. The site contains two disposal areas. The main disposal area is located in the central portion of the site and comprises about 17.5 acres. A smaller area of about 2 acres in the southern part of the site south of Otis Creek was used for the disposal of brush and leaves after the main disposal area was shut down.

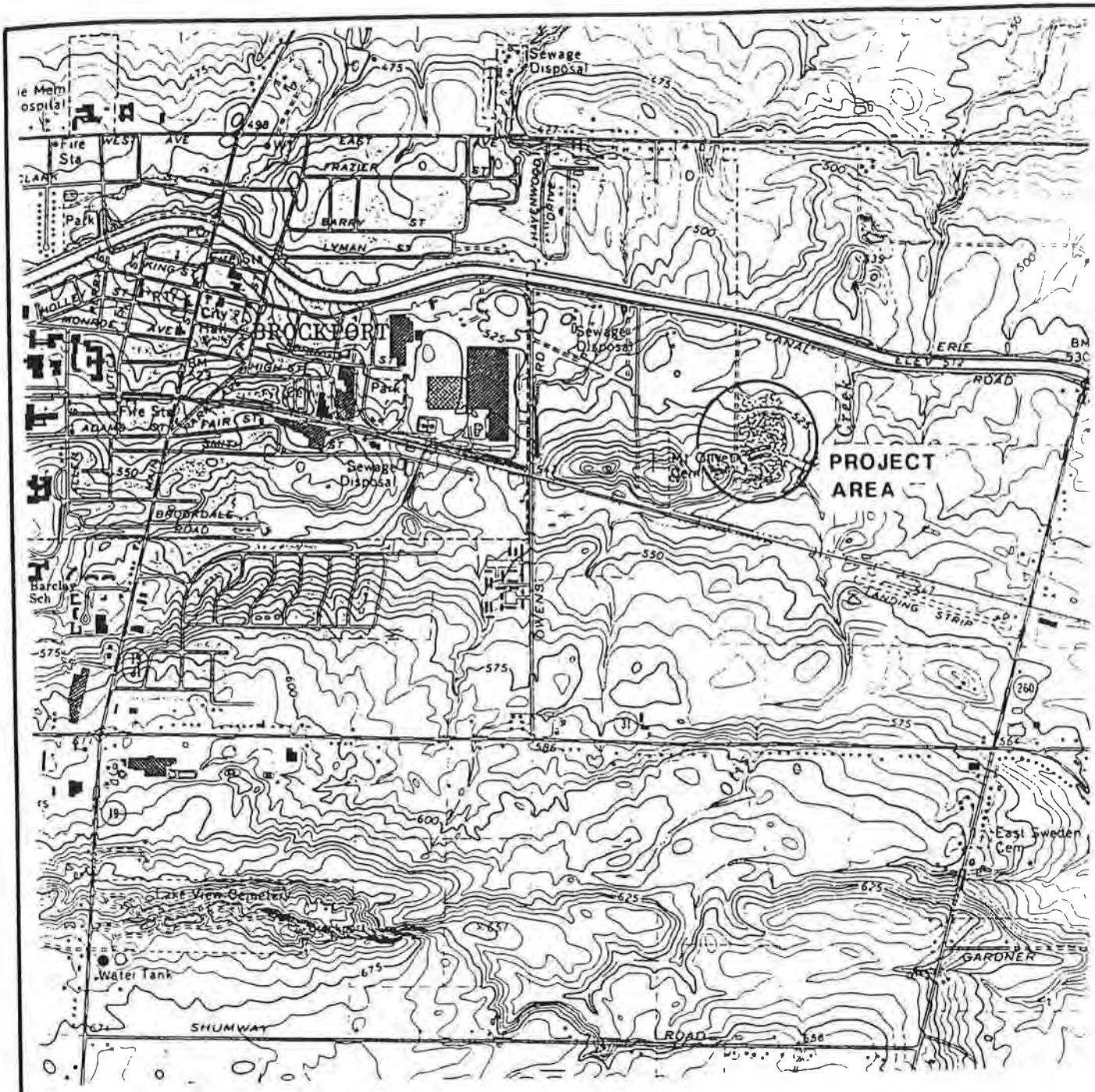
1.2.2 Site Location

The Brockport Landfill is located on East Canal Road, east of the Village of Brockport in the Town of Sweden, Monroe County, New York (see Figure 1-1). The site is bordered on the north by East Canal Road, which separates the site from the New York State Barge Canal. Residential private property lies to the northeast and rural private property lies east and west. The Mount Olivet Cemetery is just west of the site. A railroad right-of-way forms the southern border. Wetland areas occur in northern, northeastern and southern directions. The wetland north of the landfill is drained into the Barge Canal via a culvert beneath East Canal Road (see Table 1-1). An abandoned trolley roadbed runs east-west across the middle of the site. Otis Creek, an intermittent stream, flows northeasterly through the side toward the Barge Canal. It then flows parallel to it for approximately 700 feet and then enters a drop culvert which drains underneath the canal to the north.

During 1983 and 1984, NUS Corporation conducted a Preliminary Assessment and then a Site Inspection of the Brockport Landfill Site for the United States Environmental Protection Agency (USEPA). The Site Inspection included analysis of groundwater, surface water, sediment, and leachate samples collected at the site. Results of the Site Inspection included the reported detection of 172 µg/l of trichloroethene (TCE) in a residential well located north of the site. No follow-up sampling was performed. However, use of this and one other residential well was discontinued in late 1985 when the Village extended public water service to two nearby residences located along East Canal Road.

The NYSDEC added the Brockport Landfill Site to its Registry of Inactive Hazardous Waste Disposal Sites sometime in 1987. The site was designated as a Class "2a" site, meaning that sufficient information was not available to formally classify the site. The NYSDEC subsequently commissioned a Phase II Investigation of the site. Ecology and Environment (E&E) completed this study in early 1991. The Phase II Investigation included a geophysical survey, the installation of six groundwater monitoring wells, and the sampling and analysis of groundwater, surface water sediment, and leachate.

Analysis of samples from monitoring wells located in the vicinity of the main waste disposal area indicated concentrations of volatile organic compounds (VOCs) in excess of applicable groundwater standards. As a result of these findings and records indicating that



SCALE 1 24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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BROCKPORT LANDFILL
REMEDIAL INVESTIGATION
SITE LOCATION

VILLAGE OF BROCKPORT
BROCKPORT, NEW YORK

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TABLE 1-1

BROCKPORT LANDFILL SITE
POST-CLOSURE OPERATION AND MAINTENANCE

NEW YORK STATE FRESHWATER WETLANDS LOCATED WITHIN 2 MILES OF THE SITE

Wetland Identification Number	Distance (miles) and Direction from the Site	Wetland Size (acres)	Wetland Classification
SW-2	on the site	30.7	Class II
SW-3	1.0 east	29.2	Class I
SW-37	0.65 south	67.5	Class III
SW-38	1.7 south west	37	Class III
CK-20	1.1 north	218.5	Class II

hazardous waste may have been disposed of at the site, the NYSDEC reclassified the Brockport Landfill Site as a Class "2" site. Such a designation requires that a remedial program be developed, including the performance of a Remedial Investigation/Feasibility Study (RI/FS).

On May 13, 1995, the NYSDEC executed an Administrative Order on Consent with the Village of Brockport and three private parties (i.e., General Electric Company [GE], Owens-Brockway Glass Container, Inc. [OI], and Minnesota Mining and Manufacturing, Inc. [3M]) (the Private Parties) to conduct a RI/FS for the Brockport Landfill Site.

After completing the RI/FS, the NYSDEC prepared a Proposed Remedial Action Plan (PRAP) for the Brockport Landfill Site. This was released for public comment. Additionally, a public meeting was held on August 12, 1997 to review the RI/FS and discuss the PRAP with interested parties. The public comment period ended on September 2, 1997. Thereafter, the NYSDEC prepared a Responsiveness Summary and on September 26, 1997, issued a Record of Decision (ROD) for the site. The ROD presents the selected remedial action for the site. The selected remedial action provides for the protection of human health and the environment by reducing the volume of leachate generated at the site and by removing exposure to contaminants remaining at the site. Based on the results of the RI/FS, and the Evaluation of Remedial Alternative (Section 6 of the ROD), the NYSDEC selected the following remedy for the site:

- Construction of a new landfill cap that will comply with 6NYCRR Part 360.
- Install physical controls around the landfill to limit access.
- Institute a long-term monitoring program.

Construction of the landfill cap initiated May 3, 1999 and was substantailly completed by October 18, 1999. A final punch list was finished May 31, 2000. The Certification Report has been completed and is waiting final approval.

1.2.3 Site History

The main disposal area was used as a municipal waste landfill by the Village from about 1950 to 1984. In addition to the municipal waste, the landfill also reportedly received wastes from nearby industries during the period from 1950 through 1967. These wastes were alleged to have included degreaser still bottoms and paint solvents. The landfill was closed and covered in late 1984. More recently, the smaller 2 acre site was used for disposal of brush and leaves. This area is no longer used.

1.2.4 Selected Remedy

1.2.4.1 Subgrade Preparation

Existing cover soils were cleared, grubbed and regraded as necessary to achieve a minimum 4 percent slope

1.2.4.2 Final Cover System

The final cover system includes: a geotextile over the landfill subgrade; a 40 mil low density polyethylene (LDPE) geomembrane, and 18-inch barrier protection layer (with specific gradation and composition requirements on the lower 6-inches to prevent liner damages), and a 6-inch topsoil layer seeded to promote vegetative cover.

1.2.4.3 Gas Venting System

Gas venting is accomplished with a series of passive gas vents, spaced across the landfill at a minimum of one per acre. There is to be no gas venting layer on interconnecting trenches.

1.2.4.4 Storm Water Management

Due to the relatively flat terrain surrounding the landfill area, the storm water management system consists of perimeter drainage swales which divert the majority of the run-off to the low area adjacent to Otis Creek and minimize the potential for wet areas to be created or exaggerated on adjacent properties.

A stone-filled trench with pipe was installed under the cover system on the western edge of the landfill.

1.2.4.5 Entrance/Access Road

The asphalt entrance road was patched in two spots and a culvert was repaired. The access road along the southern perimeter of the landfill was maintained and a gravel road constructed over it. The drainage on the northern side of the landfill was modified as necessary to promote adequate drainage.

1.2.4.6 Security

A perimeter fence of 6-foot chain link construction was installed around the landfill to limit access to the site. A 30-foot wide gate on the access road and two 20-foot wide gates will provide authorized access for inspections and/or maintenance.

1.3 GENERAL SITE CONDITIONS

1.3.1 Site Topography and Hydrology

The Brockport Landfill is located in Lake Ontario Lowland physiographic province of New York State. The Lake Ontario Lowland is characterized as a series of bedrock plains bounded by east-west trending bedrock escarpments. The site location is approximately 10.5 miles south of Lake Ontario, and approximately one mile north of the Niagara escarpment, which forms a prominent ridge south of the Village of Brockport.

North of the Niagara escarpment, the bedrock ridges are subdued and topographic relief on the lake plain (Lake Ontario Lowland) generally occurs due to local deposits of unconsolidated glacial material. This lowland is a comparatively flat till plain, which is dissected by north flowing streams, and exhibits widely spaced glacial moraine deposits that stand above the general elevation of the plain.

The vicinity of the landfill is characterized by a glacial moraine deposit that stands up to 30-feet above the surrounding till plain, and extends approximately 3000-feet west from the landfill toward Owens Road. This is interpreted as a glacial kame deposit, which

is associated with the Albion Moraine (Caldwell, 1988: and Fairchild, 1928). The main landfill was developed on the east end of the kame. Mount Olivet Cemetery and a borrow pit are located near the center of the kame.

1.3.2 Site Geology/Hydrogeology

The unconsolidated deposits in the Lake Ontario Lowland are comprised of till, glacio-lacustrine, and outwash deposits. A regional stratigraphy of these glacial deposits for the Lake Ontario Lowland has been synthesized by Calkin and Muller (1992) based on exposures along the south shore of Lake Ontario. The subsurface materials in descending stratigraphic order include:

- Lower Glaciolacustrine Deposits.
- Furnaceville Till.
- Intertill Glaciolacustrine Deposits.
- Somerset Till.
- Outwash/Upper Glaciolacustrine Deposits.

Bedrock units underlying the Town of Clarkson in the vicinity of the Brockport Landfill are classified into four stratigraphic Groups as follows:

- Lockport Group - limestones and dolomites which underlie the Niagara Escarpment approximately 3000 feet south of the Village of Brockport.
- Clinton Group - limestones and shales, which subcrop north of the Niagara Escarpment.
- Medina Group - sandstones and shales, which subcrop beneath the Brockport Landfill and immediately north of the Barge Canal.
- Queenston Formation - shales with minor sandstones which underlie the Ontario plain northward to Lake Ontario.

The results of the hydrogeologic characterization indicate that the Brockport Landfill is situated on a sandy kame moraine. The moraine deposit is saturated and generally conforms with the topography and forms a groundwater ridge. The deposit is termed the moraine water-bearing zone. Groundwater in the moraine water-bearing zone discharges to

a tributary of Otis Creek, which is located immediately to the South of the landfill and to a wetland located to the north of the landfill. There is no evidence that the water table is in contact with the landfill waste material.

The upper 10 to 15 feet of the bedrock encountered at the site comprises the shallow bedrock water-bearing zone. This zone is in hydraulic communication with the moraine water-bearing zone. Groundwater in the shallow bedrock water-bearing zone discharges to the Barge Canal.

1.4 PURPOSE

The purpose of this Post-Closure Monitoring and Maintenance Operations Manual (hereafter Operations Manual) is to provide information needed to effectively maintain and monitor the Brockport Landfill site (i.e., final cover, gas venting system and storm water management system) for the duration of the post-closure period.

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2.0 POST-CLOSURE ACTIVITIES

2.1 DEED NOTICE

The Village of Brockport has filed a deed restriction with the County Clerk for the Brockport Landfill Site. The deed indicates the period of time during which the property was used as a landfill, briefly describing the types and amounts of wastes contained within it and noting that records of the facility have been filed with the NYSDEC. The deed also includes a map which clearly indicates the limits of the landfilled waste within the property boundary and indicates that transfer of, construction on or any change in use of the property requires prior NYSDEC approval.

2.2 FUTURE USE OF THE SITE

The Village of Brockport has no immediate plans for future use of the property. Any future use, however, shall not disturb the integrity of the final cover, or the function of the groundwater wells. Any potential threats to human health or the environment will be evaluated in proposed future uses of the property, and the use will be subject to approval by the NYSDEC.

2.3 RESPONSIBILITIES/SITE CONTACTS

2.3.1 Responsibilities

The Village of Brockport will be responsible for coordinating implementation of the Post-Closure Monitoring Maintenance Operations Manual. The contact person responsible for the implementation of the plan is:

Superintendent of Public Works
Village of Brockport Department of Public Works
38 East Avenue
Brockport, New York 14420
Telephone: (716) 637-1060

The Village Highway Department will perform routine site maintenance activities. The Village will contract for environmental monitoring, analytical and reporting services. Only NYSDOH ASP ELAP certified laboratories will be contracted for analytical services. Field sampling will be performed by NYSDOH ASP ELAP certified laboratory field personnel or under the direction of a professional engineer licensed in New York State. Semi-annual and annual monitoring reports as well as routine landfill inspections will be prepared by a professional engineer licensed in New York State and experienced in landfill design and construction.

All contractors performing on-site field work will be required to prepare and implement a health and safety plan in accordance with the health and safety requirements presented in Section 5.

2.3.2 Site Contacts

The following persons should be contacted at the following addresses for information regarding regulatory issues or requirements:

Mr. David Napier
NY State Dept. of Health
Rochester Field Office
42 South Washington St.
Rochester, New York 14608
Tele: (716) 423-8071

Mr. Gerald J. Rider
Chief, O&M Section
Div. of Environmental Remediation
NY State Dept. of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Ms. ~~Mary Jane Peachey~~ Barb Putzig
Regional Hazardous Waste Engineer
NY State Dept. of Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414
Tele: (716) 226-2466

Mr. Thomas Reamon
Chief, Western Investigation Section
Division of Environmental Remediation
NY State Dept. of Environmental Conservation
625 Broadway
Albany, New York 12233-7010

2.4 INSPECTION AND MAINTENANCE

2.4.1 Site Inspections

The Village of Brockport will be responsible for site inspection and maintenance. The inspections will be performed by persons experienced in landfill construction. The site will be inspected a minimum of 2 times per year and after major rainfall events throughout the entire post-closure period. The results of the inspections shall be submitted to the NYSDEC along with the Annual Monitoring and Maintenance Summary Report within 90 days following the first day of each year. The landfill site will be inspected for:

- Visible debris, litter and waste as a result of illegal dumping activities.
- Loss of vegetative cover or growth of undesirable species, such as trees or brush.
- Integrity of drainage ditches including:
  - Sediment buildup.
  - Pooling or ponding.
  - Slope integrity.
- Integrity of gas venting system and observations of potential gas migration problems as evidenced by stressed vegetation spots or odors.
- Condition of access roads, fence and gates.
- Integrity of landfill cap including erosion or settling of cap material and/or leachate breakthroughs.

A sample post-closure site inspection form is included in Appendix A.

2.4.2 Cover Maintenance

Cover maintenance will be performed as necessary by the Village over the post-closure care period. Any signs of erosion or other site maintenance problems detected during routine site inspections will be corrected as soon as possible. All eroded areas will be brought back to original grade according to the procedures originally used to construct the

final cover. All bare spots in the final cover will be reseeded and fertilized as necessary. Seed and fertilizer will be of the same general type and quality as originally specified and included as Appendix B. Vegetative growth will be mowed at least twice a year (with the first mowing after the grass has gone to seed and the second mowing in the fall) to prevent the development of deep-rooted vegetation. Any plant species (trees/brush) will be removed if their presence is suspected to deteriorate the integrity of the final cover.

The need for cover repairs due to subsidence and/or settling will be determined each time the site is inspected. Areas of subsidence will be repaired to ensure that the integrity of the final cover is maintained. These repair actions may include, but will not be limited to:

- Stripping and stockpiling topsoil and barrier protection layer material from the affected area.
- Regrading the affected area in accordance with the original grading plan.
- Repairing the 40-mil textured LLDPE geomembrane liner in accordance with the specifications in Appendix C and the manufacturer's manufacturing and installation QC/QA manual which is contained in the Brockport Landfill Certification Report.
- Replacing the topsoil and barrier protection layer material and revegetating the affected area in accordance with the specifications in Appendix B.

2.4.3 Maintenance of Site Structures

Eroded areas in the drainage swales will be repaired and regraded. Reseeding will be carried out using the recommended seed mixture given in Appendix B. Sediment build-up in the road side ditches will be removed if it restricts flow in the ditch. Any other areas in the ditches where the cross-section or slope has been altered to the extent that flow does not occur as desired will be reworked and regraded as necessary.

The access roads to the landfill site will be maintained in good condition so that routine inspections and required maintenance activities can be carried out. Gates will be kept in good repair to prevent unauthorized access onto the landfill site.

2.5 ENVIRONMENTAL MONITORING

Post-closure environmental monitoring will be performed at the Brockport Landfill site to monitor the effectiveness of the site remedial measures. Post-closure monitoring requirements such as sample locations, sample collection procedures, analytical parameters, analytical methods, and monitoring frequency are detailed in the Brockport Landfill Monitoring Plan included in Appendix D.

2.6 MONITORING WELL DECOMMISSIONING

If necessary, decommissioning of monitoring wells at the Brockport Landfill site will be performed in accordance with the most recent update of the NYSDEC report titled "NYS Superfund Standby Contract, NPL Site Monitoring Well Decommissioning".

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3.0 CONTINGENCY PLAN

3.1 GENERAL

The objective of this contingency plan is to establish procedures for handling events which occur outside the scope of the routine maintenance.

Natural occurrences such as storms, drought, and subsidence should be considered "expected occurrences" and are addressed under the routine maintenance program. Certain problems, which cannot be reasonably expected to occur such as earthquakes, are not addressed in this contingency plan.

The following problems are examples of occurrences that are not expected to occur but may be discovered during a routine post-closure inspection:

- Degradation of the cap integrity which may be a result of or indicated by the following:
  - Waste/contaminated soil protruding through the cover system.
  - Soil erosion or other drainage problems.
  - Uncontrolled burrowing by pests.
- Vegetative cover missing despite repeated efforts at revegetation.

The following guidelines are offered to determine when the contingency plan should be implemented and to determine possible corrective actions when responding to a contingency. All corrective actions, where appropriate, will be executed in a timely fashion after notifying the appropriate regulatory agencies.

3.2 EMERGENCY PHONE NUMBERS

The following telephone numbers should be used in the event of an emergency:

Lakeside Memorial Hospital	(716) 637-3131
Fire Department	(716) 637-1011
Ambulance	911
Police	(716) 637-1011

Emergency Coordinator:

Frederick E. Perrine (716) 637-1060
Superintendent of Public Works
Village of Borckport Department of Public Works

The site location is: Brockport Landfill
East Canal Road
Brockport, New York 14420

3.3 EMERGENCY PROCEDURES AND EVACUATION ROUTE

County employees, local fire, police, emergency response teams, hospitals or contractors who may be working at the site will be informed of the site location, facility layout, and potential site safety hazards. In case of an emergency, all employees will meet at the Front Gate and await further instruction. Directions to the hospital are as follows:

1. From Site make left turn (west) onto East Canal Road.
2. Travel approximately 1.5 miles to U. S. Highway 19. Make right turn onto U. S. Highway 19 (north).
3. Travel approximately 0.7 miles north to West Avenue.
4. Make left turn (west) onto West Avenue and travel approximately 0.4 miles.
5. Lakeside Memorial Hospital is on the right (north) side of the road. (See Appendix E, Attachment 2 for map of Hospital Route.)

3.4 LEACHATE BREAK OUT REPAIR PROCEDURE

Leachate breakouts through the landfill cover system, if any, will be discovered during regularly scheduled site inspections. Should such a breakout occur, the Village will repair the damage as quickly as possible. Areas where leachate breakouts have occurred will receive additional cover material, which shall be compacted and overlaid with topsoil for vegetative growth. Any cover system materials saturated with leachate shall be excavated

and replaced. The excavated material will be analyzed to determine whether it meets the definition of hazardous waste; i.e., ignitible, corrosive, reactive, or TCLP. If it does, excavated materials will be disposed of at a permitted Treatment, Storage, Disposal Facility, and if not, disposal will be at a permitted municipal landfill.

If the Village of Brockport or the NYSDEC determines that a substantial threat of water pollution exists as a result of leachate draining from the site or leachate breakouts becoming a persistent problem, the Village will prepare a work plan, for submittal to and approval by the NYSDEC, to determine appropriate response efforts including:

- Whether leachate needs to be characterized.
- Whether leachate should be collected and transported to an off-site treatment facility.
- Actions to control, minimize or eliminate the conditions which are contributing to leachate production."

3.5 FIRE

If practical, any fires at the site will be extinguished using landfill equipment by covering the area with soil. If the fire is too widespread or of such a nature that landfill equipment is inappropriate, the local fire department will be immediately contacted. Fires will be quenched according to approved fire department protocol. Damage to the gas vents, surface drainage system, or cap will be repaired where these systems have been compromised.

3.6 VANDALISM

Vandalism will be reported to the local law enforcement authorities. If vandals have gained entry to the disposal site, appropriate measures will be taken to eliminate or restrict future access. Vandalism to site structures including gas venting, groundwater monitoring and surfacing water management systems will be repaired as appropriate on a case specific

basis. Damage to the cap caused by off-road vehicles will be repaired where the damage is determined to have compromised the integrity of the cap or the function of the surface drainage system.

3.7 SEVERE EROSION AND COMPROMISE OF COVER SYSTEM INTEGRITY

Severe erosion of the disposal area cap, as well as the storm water management system, will be repaired to original specifications. The cause of severe erosion will be investigated and remedial measures, if needed, will be developed and implemented accordingly.

3.8 UNAUTHORIZED DUMPING OR DISPOSAL

Unauthorized dumping or waste disposal will be reported to the New York State Department of Environmental Conservation (NYSDEC), and local law enforcement officials. Appropriate measures will be taken to determine the waste characteristics, containment requirements and the necessary removal techniques. The waste will be removed and disposed of at an approved disposal facility. Efforts will be taken to eliminate further dumping and to restrict subsequent entry to the site. Persons found in the act of illegal dumping will be prosecuted according to the law and will be held responsible for all costs incurred in removing the waste.

3.9 VECTORS

During regularly scheduled site inspections the presence of any vector problems will be identified. Vectors include, but are not limited to, rodents, insects and birds. If a vector problem is present a remediation program will be implemented to mitigate the problem.

3.10 AIR CONTAMINATION

Methane gas venting to the atmosphere should not present a risk to human health due to the low concentration of methane gas expected to be present at vent locations. Should routine inspections and/or monitoring indicate that methane gas migration may be presenting an explosion or human health hazard, the Village of Brockport will notify the NYSDEC. Evidence of an explosion or human health hazard would include the sustained presence of explosive gas above the lower explosive limit (LEL) at any of the gas vent locations combined with readings in excess of 25% of the LEL at the downwind perimeter of the landfill.

If it is determined that a potential methane gas hazard is present, a work plan will be developed, for submission to and approval by the NYSDEC, to investigate the source of the problem, to determine of the venting system is functioning properly and to determine the appropriate response actions. The investigation would likely include a gas survey conducted by advancing a ½-inch diameter steel rod approximately one foot into the ground around the perimeter of the landfill, withdrawing the rod and lowering a gas collection probe into the hole. Care would need to be taken not to exceed a depth of one foot in order to protect the geomembrane from damage. Gas concentrations would be measured as a percentage of the gas's LEL using a portable combustible gas meter.

The aerial extent of the survey would likely include the landfill and an approximately 100- to 200- foot wide area along the perimeter of the landfill. A grid system would be used to determine sampling points. Sampling points will be pre-determined in concert with the NYSDEC. Monitoring locations would likely include points along the perimeter of the landfill and areas next to access roads, utilities poles, and underground utilities which could facilitate gas migration through porous backfill material.

Measurements of explosive gas levels would be plotted and contoured in order to evaluate areas of high concentrations and possible migration pathways. This assessment would consider the distance to adjacent structures, observed off-site and on-site vegetation damage, and potential for promoting extensive lateral migration.

Depending on the extent of the off-site gas migration potential, if any, the potential gas control options, which would be considered, include:

- Additional gas vents.
- Increased monitoring.
- Perimeter passive gas collection.
- Conversation of the existing passive system to an active gas collection system.

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4.0 HEALTH AND SAFETY PLAN

The full Health and Safety Plan (HASP) for the Brockport Landfill is presented as Appendix E. It addresses those site-specific hazards which at the time of this post-closure monitoring plan development, may potentially be encountered while performing the post-closure maintenance and monitoring tasks described herein. Neither the Village of Brockport nor Malcolm Pirnie accept responsibility for the Health and Safety of any individuals other than their own employees. Site representatives, contractors, and any other persons performing work at the site shall be required to provide their own site-specific HASP covering their employees and subcontractors.

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5.0 CITIZEN PARTICIPATION PLAN

A Citizen Participation Plan was prepared and implemented as part of the Brockport Landfill RI/FS project. A copy of the Citizen Participation Plan is available at the offices of the NYSDEC, the Village of Brockport, and Larsen Engineers. If actions other then routine monitoring and reporting are determined to be necessary, then the Village will utilize this Citizen Participation Plan to inform the public.

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6.0 RECORDKEEPING AND REPORTING REQUIREMENTS

6.1 SEMI-ANNUAL REPORTING

All specified monitoring data (see the Brockport Landfill Monitoring Plan included in Appendix D) will be submitted to the site contacts listed in Section 2.3 on a semi-annual basis approximately 60 days after completion of sampling activities unless otherwise agreed to with the NYSDEC. This information will be accompanied by a brief cover letter from the Village which summarizes the enclosed data, describes the reporting period and notifies the State of any problems/corrective measures taken. The letter will be signed by an authorized representative of the Village.

In addition, the Village will notify the NYSDOH of any results which indicate exceedances of NYS Drinking Water Standards within 14 days of receipt of validated analytical results. NYSDOH staff will coordinate with the Village to provide homeowners with the results of residential well sampling, if any.

6.2 ANNUAL REPORTING

An Annual Monitoring and Maintenance Summary Report, which will include the following, will be prepared and submitted to the site contacts listed in Section 2.3:

- Results of post-closure site inspections.
- A discussion of site maintenance activities.
- A summary of groundwater elevations measurements. These results will be tabulated and used to prepare groundwater isopotential contour maps.
- A summary of semi-annual monitoring results including comparison to New York State Water Quality Standards.
- A discussion of sample analytical results, including elevations of parameters above background concentrations, and a discussion of the results of statistical analyses discussed in the Brockport Landfill Monitoring Plan (Appendix E).

- A discussion of significant changes in leachate or water quality that has occurred throughout the year.
- Any proposed changes to the Brockport Landfill Monitoring Plan.

6.3 CLOSURE/POST-CLOSURE REGISTRATION REPORT

The Village will register with the NYSDEC upon final closure of the site. The registration report will include the following information:

- The facility's name and address.
- The Village's name, address, and telephone number, and the name, address, and telephone number, of the person who will be responsible for closure and post-closure of the landfill.
- A certification that the facility complies with all closure, post-closure criteria and corrective measures criteria contained in the "Record of Decision".
- Any other information that the NYSDEC determines to be necessary to protect the public health and welfare and the environment or natural resources.

This registration report will be renewed every five years until the department determines that the post-closure monitoring and maintenance period for the facility has ended. The registration is transferable to another party only upon prior written approval of the department, and a demonstration that the prospective transferee will be able to comply with all applicable laws, regulations and requirements to which the site is subject.

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7.0 REFERENCES

1. New York State Department of Environmental Conservation, May 8, 1995, "Order on Consent", Index No. B8-0375-91-06 - Brockport Landfill.

2. New York State Department of Environmental Conservation, September 26, 1997, "Record of Decision" - Brockport Landfill.

3. Larsen Engineers and Malcolm Pirnie, Inc., October 28, 1993, "Remedial Investigation/Feasibility Study Work Plan" - Brockport Landfill.

4. Larsen Engineers and Malcolm Pirnie, Inc., April 3, 1997, "Remedial Investigation Report" - Brockport Landfill.

5. Larsen Engineers, November 8, 1996, "Technical Summary of Proposed Presumptive Remedy" - Brockport Landfill.

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MALCOLM PIRNIE

APPENDIX A

POST-CLOSURE INSPECTION REPORT

MALCOLM PIRNIE

SAMPLE FORM

VILLAGE OF BROCKPORT LANDFILL

POST-CLOSURE INSPECTION REPORT

DATE:_____
WEATHER:_____
PERSONNEL:_____

Instructions: Complete the checklist of visual evaluation items and then complete specific data items. Field measurements should be made in accordance with the Standard Operating Procedures (SOPs) of Appendix E - Monitoring Plan. Estimated measurements shall be so noted. Attach hand sketches or photographs to further define conditions or problems.

	CONDITION (Check)				
I. VISUAL EVALUATION ITEMS	Acceptable	Not Acceptable	Not Present	Present	Remarks
1. Vegetative Cover					
a. Within Landfill Disposal Area					
b. Around Landfill Perimeter					
2. Integrity of Drainage Ditches					
a. Sediment Build-up					
b. Pooling or Ponding					
c. Slope Integrity					
d. Overall Adequacy					
3. Integrity of Gas Vents					
4. General Condition of Site					
a. Road Condition					
b. Gates/Locks					
c. Grass Height					
5. Integrity of Groundwater Monitoring Wells					
6. Integrity of Landfill Cap					
a. Erosion Damage					
b. Leachate Breakthrough					
c. Settlement					
d. Cracking					

MALCOLM PIRNIE

SAMPLE FORM (continued)

II. SPECIFIC DATA ITEMS (Write N.A. if not applicable)

A. Erosion and Settlement (Include a description of problem location):

1. Approximate size in feet of cap eroded area(s). (List separately)
   a. ___ feet by ___ feet
   b. ___ feet by ___ feet
   c. ___ feet by ___ feet

2. How deep is the most extreme point of erosion when measured from the adjacent surface. (List separately)
   a. ___ feet
   b. ___ feet
   c. ___ feet

3. Approximate size in feet of eroded areas outside the soil cap area such as drainage ditches, roads or slopes.

4. Attach a hand sketch or photograph showing the location of the eroded area(s). Identify each area by using the letter a, b, c, etc. from Question 1.

5. Approximate size in feet of leachate breakouts. (List separately).
   a. ___ feet by ___ feet
   b. ___ feet by ___ feet
   c. ___ feet by ___ feet

6. Approximate size in feet of any settlement areas within the soil cap area. (List separately).
   a. ___ feet by ___ feet
   b. ___ feet by ___ feet
   c. ___ feet by ___ feet

7. Approximate depth of each settlement area when measured from the adjacent surface (List separately).
   a. ___ feet
   b. ___ feet
   c. ___ feet

8. Attach a hand sketch or photograph showing the location of the settlement area(s). Identify each area by using the letter a, b, or c, etc. from Question 6.

B. Corrective Actions:

1. Describe corrective actions taken (write NA if not appropriate).

2. Date of corrective action: _____

MALCOLM PIRNIE

APPENDIX B

LANDSCAPING SPECIFICATIONS

- Section 02921, Topsoil
- Section 02930, Turf

SECTION 02921

TOPSOIL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install topsoil Work.
   2. The types of topsoil Work required include the following:
      a. Topsoil stockpiled for reuse under Section 02220, Excavation and Backfill.
      b. Topsoil from off-site sources.
      c. Topsoil testing to provide certified acceptability of topsoil for landscape Work.
      d. Topsoil amendments, as may be required by test results to provide topsoil acceptable for landscape Work.
      e. Spreading topsoil.
      f. Maintenance Work.

B. Coordination:
   1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the topsoil.

C. Related Sections:
   1. Section 02220, Excavation and Backfill.
   2. Section 02224, Final Cover Construction.
   3. Section 02930, Turf.

1.2 QUALITY ASSURANCE

A. Source Quality Control:
   1. Off-Site Topsoil: Obtain topsoil only from naturally well- drained sites; do not obtain from bogs or marshes.
   2. Topsoil Stockpiled for Reuse: Topsoil will be inspected by ENGINEER before reuse. At the time of inspection ENGINEER shall require representative soil samples to be tested as specified under Part 2 - Products, of this Section. The CONTRACTOR will not be permitted to use the topsoil for construction until after QA testing has been completed and approved by the ENGINEER. The CONTRACTOR shall pay for the cost of laboratory testing.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
   1. ASTM C 602, Agricultural Liming Materials.
   2. ASTM D 2487, Classifications of Soils for Engineering Purposes.
   3. Association of Official Analytical Chemists, Official Methods of Analysis.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
   1. Before delivery of off-site topsoil, written statement giving the location of the properties from which the topsoil is to be obtained, the names and address of the suppliers, the depth to be stripped and the crops grown during the past 2 years.
   2. Manufacturer's specifications and application instructions for all soil amendments required.

B. Certificates: Submit for approval certificates of inspection as may be required by governmental authorities to accompany shipments, and manufacturer's or vendors certified analysis for soil amendments. For standard products submit other data substantiating that materials comply with specified requirements.

1.4 JOB CONDITIONS

A. Environmental Requirements: Do not spread topsoil if condition is unsuitable due to frost, excessive moisture or other conditions. Cease Work until the topsoil is in a suitable condition as determined by ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil:
   1. Fertile, friable, natural loam, surface soil, capable of sustaining vigorous plant growth, free of any clods of hard earth, plants or roots, sticks or other extraneous material harmful to plant growth. Supply topsoil with the following analysis:
      a. 3-inch mesh: 100 passing by weight
         1-inch mesh: 85-100 percent passing by weight
         1/4-inch 65-90 percent passing by weight
         #200 sieve: 20 - 80 percent passing by weight
      b. Clay content of material passing #200 sieve not greater than 30 percent, as determined by hydrometer tests.

c. pH 5.0 to pH 6.5. If approved by ENGINEER, natural topsoil not having the hydrogen-ion value specified may be amended by CONTRACTOR as his own expense.
d. Organic content not less than 5 percent nor greater than 20 percent, as determined by ignition loss.
e. Free of pests and pest larvae.

2. Before delivery, assist the ENGINEER in collecting soil samples for every 5,000 cubic yards of Grade A topsoil provided by CONTRACTOR.

B. Soil Amendments:
1. Lime: Natural limestone containing not less than 85 percent of total carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.
2. Ferrous Sulfate: Commercial grade and unadulterated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove existing grass, vegetation and turf. Dispose of such material outside of OWNER'S property in a legal manner; do not turn over into soil being prepared for topsoiling.

B. Loosen subgrade of areas to receive topsoil to a minimum depth of 2 inches by discing, harrowing or other approved method to permit bonding of the topsoil to the subgrade. Operate the equipment used to scarify the subsoil so the ridges and depressions are parallel to the contours.

C. Remove stones over 2 inches in any dimension and sticks, roots, rubbish and other extraneous matter.

3.2 INSTALLATION

A. Place and spread topsoil, over the areas shown, to a minimum depth of 6 inches and a maximum depth of 7 inches after natural settlement and light rolling, in a manner that the completed work conforms to the lines and grades shown.

B. Do not spread topsoil while in a frozen condition or when moisture content is so great that excessive compaction will occur nor when so dry that dust will form in the air or that clods will not break readily.

C. Do not compact topsoil.

D. After the topsoil is spread, remove all large, stiff clods, rocks, roots or other foreign matter over 2-inches.

E. Apply soil amendments, as required by machine over all areas receiving topsoil, to bring the soil to a neutral pH. Work lightly into the top 3 inches of topsoil.

F. Manipulate topsoil to attain a properly drained surface.

G. Grade topsoil areas to smooth, even surface with loose, uniform, fine texture.

H. Roll and rake and remove ridges and fill all depressions, ruts, low spots or unsuitable areas which result after settlement so that the area is suitable for subsequent work.

3.3 THICKNESS VERIFICATION

A. Topographic surveys will be performed by a licensed land surveyor employed by the CONTRACTOR to verify the thickness of each topsoil layer using the same grid system and requirements specified in Sections 01050, 01025, 01720, and 02250.

B. Minimum thickness of each topsoil layer shall be 0.5 feet and maximum shall be 0.6 feet as measured perpendicular to the slope. Placement of material in excess of the maximum thickness shall be at no extra cost to the OWNER.

3.4 MAINTENANCE

A. Maintain topsoiled areas by filling in erosion channels and correcting drainage as required.

B. Maintain the topsoil in a loose, friable condition until the Work under other Sections begins.

3.5 CLEAN UP AND PROTECTION

A. During topsoiling Work, store materials and equipment where directed. Keep pavements clean and areas in an orderly condition.

B. Protection includes all temporary fences, barriers and signs and other Work incidental to proper protection.

3.6 INSPECTION AND ACCEPTANCE

A. When the topsoiling Work is completed, including maintenance, ENGINEER will make an inspection to determine acceptability.

B. Where inspected topsoil Work does not comply with the requirements, regrade rejected Work and maintain until reinspected by ENGINEER and found to be acceptable.

++ END OF SECTION ++

SECTION 02930

TURF

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install turf Work.
   2. The types of turf Work required include the following.
      a. Seeding all areas within project boundaries (the entire Old Bath Landfill and all other areas disturbed by construction activities).
      b. Erosion control fabric.
      c. Soil amendments.
      d. Mulch.
      e. Replant unsatisfactory or damaged turf.
      f. Guarantees.
      g. Maintenance for one (1) year from date of acceptance.

B. Related Sections:
   1. Section 02250, Final Cover Construction.
   2. Section 02921, Topsoil.

1.2 QUALITY ASSURANCE

A. Landscape Subcontractor Qualifications: If a Subcontractor is utilized, he shall have a minimum of five years of experience of producing substantially similar Work and shall show evidence of at least five satisfactory installations. Provide adequate supervision by a qualified foreman.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
   1. Association of Official Analytical Chemists, Official Methods of Analysis.
   2. American Joint Committee on Horticultural Nomenclature, Standardized Plant Names.
   3. ASTM D 977, Emulsified Asphalt.
   4. ASTM C 602, Agricultural Liming Materials.
   5. ASTM D 2487, Classification of Soils for Engineering Purposes.
   6. FSO-F-241D, Fertilizer, Mixed, Commercial.
   7. FSO-P-166E, Peat Moss; Peat, Humus; and Peat, Reed-sedge.
   8. Official Seed Analysists of North America, Standards of Quality.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
   1. Planting schedule for turf installation showing, scheduled planting dates for each type of turf.
   2. Manufacturer's specifications and installation instructions for all materials required.

B. Samples: Submit for approval 12-inch by 12-inch sheet of erosion control fabric with manufacturers selections of standard biogradeable filler papers, and yarns.

C. Certificates: Submit for approval the following:
   1. Certificates of inspection as may be required by governmental authorities to accompany shipments, and manufacturer's or vendors certified analysis for soil admendments and fertilizer materials. For standard products submit other data substantiating that materials comply with specified requirements.
   2. Certificates from seed vendors for each seed mixture required, stating botanical and common name, percentage by weight and percentages of purity, germination, and weed seed for each species.
   3. The CONTRACTOR shall provide a written certification for each separate source of soil material provided stating that the material does not originate from any NYSDEC listed inactive hazardous waste disposal site and that the soil material contains no known or suspected soil contaminants. Provide certification prior to transporting any material to the project site.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:
   1. Do not deliver seed until site conditions are ready for planting.
   2. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery.
   3. Furnish seed in sealed, standard containers.
   4. Notify ENGINEER of delivery schedule in advance so turf material may be inspected upon arrival at job site.
   5. Remove unacceptable material immediately from job site.

B. Storage of Materials:
   1. Store and cover materials to prevent deterioration. Remove packaged materials which have become wet or show deterioration or water marks from the project site.
   2. Seed that is wet or moldy or that has been otherwise damaged in transit or storage is not acceptable. Replace at no further cost to OWNER.

1.5 JOB CONDITIONS

A. Environmental Requirements:
   1. Proceed with and complete the turf Work as rapidly as portions of the site become available, working within the seasonal limitations for each type of turf required.
   2. Do not spread seed when wind velocity exceeds 5 miles per hour.
   3. Do not plant turf when drought, or excessive moisture, or other unsatisfactory conditions prevail.

1.6 ALTERNATIVES

A. Do not make substitutions. If specified turf material is not obtainable, submit to ENGINEER proof of non-availability and proposal for use of equivalent material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Grass Materials:
   1. Grass Seed Mixture: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.
   2. The entire surface of the landfill (including drainage ditches) shall be seeded with 100 lbs/acre of seed conforming to the following:

Name of Grass	Application Rate	Purity	Germination
Perennial Ryegrass	10 lbs/acre	95%	85%
Kentucky Bluegrass	20 lbs/acre	85%	75%
Strong Creeping Red Fescue	20 lbs/acre	95%	80%
Chewings Fescue	20 lbs/acre	95%	80%
Hard Fescue	20 lbs/acre	95%	80%
White Clover	10 lbs/acre	98%	75%

   a. Germination and purity percentages should equal or exceed the minimum seed standards listed. If it is necessary to use seed with a germination percentage less than the minimum recommended above, increase the seeding rate accordingly to compensate for the lower germinations.
   b. Weed seed content not over 0.25 percent and free of noxious weeds.
   c. All seed shall be rejected if the label lists any of the following grasses:

1) Timothy.
2) Orchard.
3) Sheep Fescue.
4) Meadow Fescue.
5) Canada Blue.
6) Alta Fescue.
7) Kentucky 31 Fescue.
8) Bent Grass.

3. The following species (in addition to the mix to be spread over the entire landfill surface) shall be sowed specifically in the drainage ditches to minimize ditch erosion.

Name of Grass	Application Rate	Purity	Germination
Tall Fescue (Kentucky 32)	20 lbs/acre	95%	80%
Creeping Red Fescue	20 lbs/acre	95%	80%
Red Top	4 lbs/acre	92%	80%
Empire Birdsfoot Trefoil	8 lbs/acre	98%	80%
Garrison Creeping Foxtail	10 lbs/acre	85%	75%
	62 lbs/acre		

a. Germination and purity percentages should equal or exceed minimum seed standards listed.

4. In addition to the seed mixtures listed above, one bushel per acre of oats or rye seed shall be sowed over the entire area, including drainage ditches, to provide a quick shade cover and to prevent erosion during turf establishment.

B. Fertilizers:

1. Commercial Fertilizer: Complete fertilizer of neutral character, with a minimum of 75 percent nitrogen derived from natural organic sources or ureaform; 40-50 percent of the nitrogen shall be water soluble. Available phosphoric acid derived from superphosphate, bone, or tankage. Potash derived from muriate of potash, containing 60 percent potash. Uniform in composition, freeflowing and suitable for application with approved equipment. Provide fertilizer with the following percentages of available plant nutrients:
   a. Not less than 4 percent phosphoric acid and not less than 2 percent potassium, and the percentage of nitrogen required to provide not less than 0.7 pounds of actual nitrogen per 1000 square feet of lawn area. Provide nitrogen in a form that will be available to the lawn during the initial period of growth.
2. Hydroseeding (Starter) Fertilizer:
   a. Commercial designation of 18-24-6. Provide a complete fertilizer of neutral character with a minimum of 75 percent nitrogen derived from natural organic sources.

b. Minimum 40-50 percent of nitrogen shall be water soluble.
c. Uniform in composition, free-flowing, and suitable for application with approved equipment.
d. Product and Manufacturer: Provde one of the following:
   1) Scotts Starter Fertilier by Scott and Sons Incorporated.
   2) Or approved equal.

C. Mulch:
1. Anti-Erosion Mulch: Provide clean, threshed straw of wheat, rye, oats or barley, free from noxious weeds. Materials which are low grade and unfit for farm use such as "U.S. Sample Grade" are acceptable.
2. Wood Cellulose Fiber Pulp (Hydromulch):
   a. Provide specially prepared wood cellulose fiber, processed to contain no growth or germination inhibiting factors, and dyed an appropriate color to facilitate visual metering of application of the materials.
   b. Supply in packages having a gross weight not in excess of 60 pounds.
   c. Moisture content not to exceed 10 percent air dry weight, manufactured so that after addition and agitation in slurry tank the fibers become uniformly suspended to form a homogeneous slurry that when hydraulically sprayed on the ground the material will form a blotter like ground cover impregnated uniformly with seed and which after application allows the absorbtion of moisture, either rainfall or mechanical watering, to percolate to the underlying soil.
   d. Product and Manufacturer: Provide one of the following:
      1) Conwed Virgin Wood Fiber Mulch by Conwed Incorporated.
      2) Silva Fiber by Weyerhaeuser Company.
      3) Or approved equal.

D. Mulch Adhesives/Tackifiers:
1. Straw Mulch Adhesive:
   a. Provide a mulch adhesive for all areas and slopes mulched with straw to control excessive effects of high winds, heat and torrential rain. The adhesive, when mixed with water, will form a slurry which is non-toxic to plants, grass and other living organisms when applied in accordance with manufacturer recommendations.
   b. Apply mulch adhesive as a tackifier when sprayed simultaneously through straw blowers or as an overspray after straw application.
   c. Products: Provide one of the following:
      1) Emulsified Asphalt
         a) Supply a homogenous material which shows no separation of asphalt after thorough mixing. Provide the slow-setting variety for fine graded aggregate mixer, conforming to ASTM D 977, Grade SS-1.
      2) Agro Tack MP by Agro-Dynamics, Inc.

3) Or approved equal.

2. Hydromulch Adhesive (Tackifier):
   a. On areas and slopes graded between 1:3 and 1:5 provide 8.25 pounds of adhesive per 1000 square yards of seedbed incorporated into the hydroseed slurry.
   b. Provide the following:
      1) A non-ionic galatomannan polysaccharide that forms a colloidal dispersion. Once adhesive film is formed and has been allowed to dry or cure, its resistance to solubility increases. Adhesive film shall be biodegradable, so that it eventually is broken down by water and/or by microbial action.
      2) Color: Off-white with orange specks dispersed throughout.
      3) Viscosity: 3000 CPS +/- 500 1 percent Sol. 25 degrees C 24 hours. Brookfield Viscometer #3 Spindle, 20 rpm.
      4) pH: 6 to 7.

E. Erosion Control Fabric: On areas and slopes graded between 1:3 and 1:5 provide erosion control fabric fabricated from 840 denier polypropylene yarn interwoven with paper strips. Provide hold down staples 6-inches long by 1-inch wide at the throat. Provide a complete selection of manufacturers standard biodegradable filler papers and yarns. Areas will be seeded before placement of erosion control fabrics.

F. Water: Potable.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

A. Apply commercial fertilizers in the following quantities:
   1. For grass apply only at a rate sufficient to supply 0.7 pounds of nitrogen per 1000 square feet (300 pounds per acre). For 10-20-10 use 7 pounds per 1000 square feet.

B. Apply commercial fertilizers within 10 days of seeding.

C. Thoroughly and evenly incorporate commercial fertilizers with the soil to depth of 3 inches by discing, or other approved method.
   1. In areas inaccessible to power equipment, use hand tools.
   2. Adjacent to existing trees, adjust depth to avoid disturbing roots.

D. Grade turf bed areas to smooth, even surface with loose, uniformly fine texture. Remove all stones and extraneous foreign material in excess of 3-inches in diameter.

Roll and rake and remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be seeded immediately after grading.

E. Moisten prepared turf bed areas before seeding, if soil is dry. Water thoroughly and allow surface moisture to dry before seeding. Do not create a muddy soil condition.

F. Restore turf bed areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

3.2 INSTALLATION

A. General: Maintain grade stakes until removal is mutually agreed upon by all parties concerned.

B. Seeding By Dry Method:
   1. Sow seed using a spreader or seeding machine.
   2. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
   3. Sow not less than the quantity of seed specified.
   4. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seedbed in one operation. In areas inaccessible to cultipacker:
      a. Rake the seed lightly into top 1/8 inch of soil, roll in two directions with a water ballast roller, weighing not less than 100 pounds per linear foot.
      b. Take care during raking that seed is not raked from one spot to another.
   5. Sow quick shade cover (oats or rye) using similar equipment and procedures specified above. All conservation seed and cover seed must be in contact with soil to germinate.
   6. Protect seeded areas against erosion by spreading specified straw mulch after completion of seeding operations.
      a. For slopes no greater than 1:5 spread anti-erosion mulch to form a continuous blanket not less than 1-1/2-inch loose measurement over seeded areas. Provide mulch with a partial coating of emulsified asphalt or adhesive. Place mulch using either of the following methods:
         1) Anchor straw mulch by spraying with asphalt or adhesive emulsion at the rate of 10 to 13 gallons per 1000 square feet.
         2) Place straw mulch with equipment that will blow or eject, by means of a constant air stream, controlled quantities of the mulch and asphalt/adhesive in a uniform pattern over the specified area. If the straw mulch is excessively cut or broken take measures to reduce the cutting or breakage to a limit approved by ENGINEER. Introduce the asphalt/adhesive into the air stream by means of a spray arranged so that it will partially coat the straw mulch with a spotty asphalt/ adhesive tack prior to the depositing of the mulch covering. Rate of application for asphalt adhesive shall not be less than 75 gallons per ton of mulch.

The application rate for other synthetic adhesives shall be in accordance with manufacturer's recommendations.

b. For slopes graded between 1:3 and 1:5 install erosion control fabric as follows:
   1) Vertically down slope without stretching fabric.
   2) Install hold down staples 3 per square yard minimum in center of fabric or as required to hold and shape the fabric to the contours of the slope. Install hold down staples along edges and overlaps of fabric at 9 inches on centers minimum, or as required to hold and shape the fabric to the contours of the slope.
   3) Lap fabric 4 inches minimum and turn edges of fabric into 8 inch deep by 16 inch wide earth trench and fill trench with earth.

7. Do not leave seeded areas unmulched for longer than 3 days. Reseed areas which remain without mulch for longer than 3 days.
8. The straw mulch blanket should contain void spaces such that 10 to 25 percent of the covered turf bed should be visible.
9. Prevent damage or staining of construction or other plantings adjacent to mulched areas.
10. Prevent foot or vehicular traffic, or the movement of equipment, over the mulched area. Reseed areas damaged as a result of such activity.
11. Water seeded and mulched areas thoroughly with a fine spray.

C. Seeding By Hydroseed Method:
   1. Prepare seedbed as described for turfbed under 3.2 above.
   2. Hydraulic seeding equipment shall arrive on the site empty and clean. Use hydraulic equipment with a power-driven built-in paddle agitation system with an operating capacity sufficient to agitate, suspend and homogenously mix the following slurry:
      a. 3000 gallons of water.
      b. Add sufficient amounts of the final seed mixture and quick shade cover to the slurry to satisfy the application rates specified in Section 2K, Paragraph 2.1.A.
      c. 3 - 44-lb. bags of 18-24-6 starter fertilizer.
      d. 21 - 60-lb. bags wood fiber pulp (1800 pounds per acre).
      e. 6 - 15-lb. bags tackifier (adhesive).
      f. Depending on installation conditions encountered, as specified, add an approved hydromulch adhesive.
   3. Immediately before seeding, rework the seedbed areas until they provide a finely pulverized smooth seedbed, varying not more than 1/2-inch in ten feet. All inequities and soft spots shall be corrected before seeding.
   4. With water filling the tank and equipment power at 1/3 to full throttle, begin agitation and load fertilizer, seed and mulch in that order.
   5. When tank is half full, add tackifier (adhesive), pouring sowly into tank into the area of most agitation.

6. Continue to fill with water until all components are loaded.
7. Spray the slurry over the area covering a "marked seedbed area", using a properly chosen nozzle, to ensure correct rate of application. Start spraying with power and agitation on full, then throttle down to proper rate of application.
8. Prevent damage or staining of construction or other planting adjacent to hydro seeded areas.
9. Prevent foot or vehicular traffic, or the movement of equipment over the seeded areas. Reseed areas damaged as a result of such activity.
10. Prevent the seeded areas from drying out. After seedlings appear in about 2-3 weeks, reseed all bare spots larger than 18-inches in diameter. Areas to be reseeded shal be hand raked to scarify the surface and seed shall be applied by cyclone spreader. Lightly rake the seed into the soil.

D. Reconditioning Existing Turf:
   1. Recondition existing turf areas damaged by CONTRACTOR'S operations including storage of materials or equipment and movement of vehicles. Also recondition existing turf areas where minor regrading is required.
   2. Recondition other existing turf areas as shown.
   3. Provide fertilizer, seed or sod and soil amendments as specified for new turf and as required to provide a satisfactorily reconditioned turf. Provide new planting soil as required to fill low spots and meet new finish grades.
   4. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.
   5. Remove diseased or unsatisfactory turf areas; do not bury into soil. Remove topsoil containing foreign materials resulting from CONTRACTOR'S operations including oil drippings, stone, gravel and other construction materials.
   6. In areas approved by ENGINEER, where substantial turf remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps and cultivate soil, fertilize, and seed. Remove weeds before seeding or if extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.
   7. Water newly planted areas and keep moist until new turf is established.

3.3 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain turf for not less than the period stated below, and longer as required to establish an acceptable stand, as determined by ENGINEER.
   1. Not less than 60 days.
   2. If planted in fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable turf is established.

C. Maintain seeded areas by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling regrading and replanting as required to establish a smooth, acceptable turf area, free of eroded or bare areas.
   1. Cutting Height: Mow as soon as there is enough top growth to cut with mower set at the specified height for the principal species planted. Repeat mowing as required to maintain specified height. Do not remove more than 1/3 of grass height. Do not mow when grass is wet. Time initial and subsequent mowings as required to maintain the following grass height:
      a. Mow grass at 2-inch to 6-inch height. Do not mow lower than 2 inches.
   2. Apply fertilizer after first mowing and when the grass is dry. Use fertilizer which will provide not less than 1.0 pound of actual nitrogen per 1000 square feet of lawn area.
   3. Maintain grass for at least one mowing.
   4. After grass has started, reseed repeatedly all areas greater than 8 inches square which fail to show a uniform stand of grass for any reason whatsoever until all areas are covered with a satisfactory stand of grass is achieved, as determined by ENGINEER.

D. Watering: Provide and maintain temporary piping hoses and watering equipment as required to convey water from water sources and to keep turf areas uniformly moist as required for proper growth.

3.4 CLEANUP AND PROTECTION

A. During turf Work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.

B. Protect turf Work and materials from damage due to operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged turf Work as directed.

C. Take all precautions to insure that hydroseed slurry, is only placed on the areas designated. Completely clean any overspray, on areas not designated to receive slurry, to the satisfaction of ENGINEER.

D. Remove all rubbish, equipment and rejected materials from the project site.

E. Protection includes all temporary fences, barriers and signs and other work incidental to proper maintenance.

3.5 INSPECTION AND ACCEPTANCE

A. When the turf Work is completed, including maintenance, ENGINEER will, make an inspection to determine acceptability.

B. Seeded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, uniform, close stand of the specified grass is established, free of weeds, bare spots and surface irregularities.

C. Where inspected turf Work does not comply with the requirements, replace rejected Work and continue specified maintenance until reinspected by ENGINEER and found to be acceptable.

D. CONTRACTOR shall be responsible for turf areas for one full year after final completion of the project. Any areas damaged by erosion or areas devoid of vegetation shall be repaired by the CONTRACTOR at no additional expense to the OWNER.

++ END OF SECTION ++

MALCOLM PIRNIE

APPENDIX C

GEOMEMBRANE SPECIFICATIONS

SECTION 02274

GEOMEMBRANE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to supply, install, and test 40 mil (nominal) low density polyethylene (LDPE) geomembrane as shown on the Drawings, described in the CQA Plan, and specified herein.

B. Related Work Specified Elsewhere:
   1. Section 02250, Final Cover System Soil Components.
   2. Section 02921, Topsoil.
   3. Section 02930, Turf.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
   1. Standards of American Society for Testing and Materials (ASTM); and
   2. National Sanitation Foundation, Standard 54 for Flexible Membrane Liners.
   3. Inspection Techniques for the Fabrication of Geomembrane Field Seams (EPA/530/SW-91/051/May 1991).

B. Single Source:
   1. All liner material shall be obtained from a single material supplier and all geomembrane sheets shall be manufactured by a single geomembrane manufacturer.

C. Manufacturer's Qualifications and Experience:
   1. CONTRACTOR shall provide the following information on the manufacturer of the geomembrane:
      a. Corporate background and information.
      b. Manufacturing capabilities:
         1) Information on plant size, equipment, personnel, number of shifts per day, and capacity per shift.
         2) Daily production quantity available for this contract.
         3) Quality control manual for manufacturing.
         4) List of material properties including notarized certified test results, to which are attached geomembrane samples.

c. A list of at least ten completed facilities totaling a minimum of 5,000,000 square feet for which the Manufacturer has manufactured and installed LDPE geomembrane. For each facility, the following information shall be provided:
   1) Name and purpose of facility, its location, and date of installation.
   2) Name of owner and phone number, project manager and phone number, designer and phone number, fabricator (if any), and installer.
   3) Thickness of LDPE geomembrane, surface area of geomembrane manufactured.
   4) Available information of the performance of the lining system and the facility.

d. Quality control during manufacturing:
   1) Prior to the installation of any geomembrane material, the CONTRACTOR shall submit for approval to the ENGINEER information obtained from the manufacturer:
      a) Origin (Resin Supplier's name, resin production plant), identification (brand name, number) and production date of the LDPE resin.
      b) Copy of quality control certificates issued by the LDPE Resin Supplier.
      c) Reports on the test conducted by the Manufacturer to verify the quality of the LDPE resin used to manufacture the geomembrane rolls tests shall include, specific gravity (ASTM D1505) and melt index (ASTM D1238 condition E), percent carbon (ASTM D1603) and carbon dispersion (ASTM D3015).

2. Random sampling shall be performed by the Manufacturer, at no additional cost to the OWNER, throughout the production run to assure proper quality control. The minimum frequency of such sampling shall be as follows:
   a. One (1) sample per roll, or
   b. Other sampling as proposed by the CONTRACTOR and approved by the ENGINEER.
3. The samples shall be tested for the following properties:
   a. Uniformity: Visual inspection to assure the material is free of holes, blisters, undispersed raw material, or foreign matter.
   b. Thickness: Measurement along the sample to assure that the sheet is within the specified tolerances (ASTM D751).
   c. Carbon Black: The proper amount, grade, and degree of dispersion are imperative to assure proper U.V. radiation protection (ASTM D1238E).
   d. Tensile Properties: One (1) dimensional tensile testing which measures tensile strength at yield and at break and elongation at yield and at break shall be made (ASTM D638).
4. All pre-assembled panel seams shall be tested at the factory in accordance with the destructive and nondestructive testing as specified herein.
5. The CONTRACTOR shall provide the OWNER and ENGINEER with notarized certified copies of the Manufacturer's test results.

6. The OWNER and ENGINEER, at their discretion, may employ and pay for an independent testing laboratory to perform additional testing of the liner materials. This testing may also include all properties specified herein and need not be limited to the testing performed by the Manufacturer. The CONTRACTOR shall, at no additional cost, provide samples to the OWNER or ENGINEER as required.
7. The CONTRACTOR shall be solely responsible to the OWNER for the quality of the material provided. Should any of the tests performed on the material yield unsatisfactory results, the CONTRACTOR will be responsible for replacing the material with satisfactory material without delaying the total project time and without any cost to the OWNER.

D. Installer's Qualifications and Experience:
   1. CONTRACTOR shall provide the following information on the installer of the geomembrane:
      a. Corporate background and information.
      b. If installer is not the geomembrane manufacturer, the CONTRACTOR shall provide information on the installer's history with the manufacturer product including:
         1) Authorization of the installer as an "approved" or "licensed" installer of the manufacturer's product.
         2) List of similar projects completed using the manufacturer's product and total amount of manufacturer's materials installed to date.
      c. A list of projects totaling a minimum of 10,000,000 square feet of successfully-installed manufacturer's geomembrane. For each project, the following information shall be provided:
         1) Name and location of facility.
         2) Name, address and phone number of an appropriate party to be used as a reference of the installer's performance on the project.
         3) Thickness and type of LDPE geomembrane and surface area of geomembrane installed.
      d. Installer's Quality Assurance Representative shall be a representative of the sheet manufacturer who will represent the installer on QA/QC issues. The CONTRACTOR shall submit documented qualifications of the Installer's Quality Assurance Representative which will at minimum document QA/QC experience of the individual on a minimum of 5,000,000 square feet of LDPE geomembrane. Installers Quality Assurance Representative shall be qualified by knowledge, experience and passed at a minimum the first level of NICET Certification with regards to liner installation. The quality assurance representative shall be independent of and not related in any manner to the geomembrane installer; however, the two may be employed by the same firm.
      e. All installer's personnel performing seaming operations shall be qualified by experience and shall have experience seaming a minimum of 10,000,000 square feet of LDPE geomembrane being installed and using the same

seaming procedures in use under this contract. The CONTRACTOR shall submit documented experience of all installer's seaming personnel to be used on this project meeting the above qualifications prior to any personnel or liner arriving on-site.

1.3 SUBMITTALS

A. Shop Drawings:
   1. Drawings showing layout of each individual liner sheets, gas vent, and pipe penetration details. Layout diagram shall indicate the location of pre-assembled panels and identify each sheet.
   2. Complete description of field seaming procedures.
   3. Work plan for geomembrane installation including manpower and equipment requirements.
   4. Detailed description of field testing methods to be performed.
   5. Samples of QA/QC documentation to be completed and submitted to the ENGINEER by the Installer's Quality Assurance Representative.
   6. Notarized certification that the resins in the extrusion welding process is the same resin used in the manufacture of the sheets.
   7. Notarized certification that the site manager, master seamer and quality assurance representative have reviewed the plans and specifications prior to pre-installation meeting.
   8. A sample of the proposed warranties.
   9. Notarized certification that the geomembrane is manufactured from virgin polyethylene resins.
   10. Geomembrane manufacturer shall provide a notarized certification, on an individual basis, that each specific roll delivered to the site has a uniform distribution of texturing and the adhesion of the texturing is sufficient to provide the required interface properties and meet the intent of the specifications.

B. Affidavit of Compliance:
   1. Provide six (6) copies of an affidavit, certifying that all geomembrane materials furnished for this project (reference project title and number) comply with all requirements specified in the Contract Documents, note all deviations from specifications.
   2. No geomembrane material shall be shipped until the affidavits are submitted to the ENGINEER.

C. Test Reports: Provide six (6) notarized copies of all factory, Field Quality Control Testing Reports and QA/QC field documentation completed by the Installer's Quality Assurance Representative.

D. As-Built: CONTRACTOR shall submit six (6) copies of the liner as-built conditions and one (1) reproducible copy having a scale of 1 inch equal to 100 feet including, but not limited to, actual layout of liner sheets, location and types of seams, sheet and

panel numbers, location and designation of destructive samples, location and reason for any repairs and patches and all other information as required by the ENGINEER.

1.4 WARRANTY

A. Material Warranty:
   1. The membrane manufacturer shall warrant the membrane against manufacturing defects and material degradation in the proposed environment for a period of 20 years, commencing from the date of final acceptance of the project.
   2. The membrane manufacturer shall provide new material, equipment and labor to replace the membrane which fails from the above causes within the warranty period at no additional cost to the OWNER.
   3. The membrane manufacturer shall submit a written warranty upon final acceptance of the project.

B. Installation Warranty:
   1. The membrane installer shall warranty the installation against defects in the workmanship for a period of five years, commencing from the date of final acceptance of the project.
   2. The membrane installer shall provide new material, equipment and labor required to repair any defects in the liner installation at no additional cost to the OWNER.
   3. The membrane installer shall submit a written warranty upon final acceptance of the project.

1.5 PRODUCT PACKAGING, DELIVERY, STORAGE, and HANDLING

A. The manufacturer shall identify all membrane rolls with the following information:
   - Manufacturer's Name
   - Product Identification
   - Date of Manufacture
   - Lot Number
   - Roll Number
   - Roll Dimensions
   - Directions for unrolling

B. Delivery including unloading, storage and handling shall be performed in accordance with the liner manufacturer's recommendations and shall be done in such a manner as to prevent damage to the geomembrane.

C. CONTRACTOR shall provide all labor and equipment required to assist ENGINEER in inspection of geomembrane materials upon delivery to the site.

D. Upon delivery at the site, the CONTRACTOR, Installer's Quality Assurance Representative, and the ENGINEER shall conduct a visual inspection of all materials

for defects and for damage. This inspection shall be conducted without unrolling rolls unless defects or damages are found or suspected. The ENGINEER will note all:

1. Rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws.
2. Rolls which include minor repairable flaws.

E. The geomembrane shall be stored under the responsibility of the CONTRACTOR. Storage space should be protected from theft, vandalism, passage of vehicles, etc. Store geomembrane on a smooth, flat surface (not wooden pallets) free from rocks or other protrusions. Stacks no more than two rolls high.

F. The Installer's Quality Assurance Representative shall collect an 18-inch by 48-inch sample of each roll of geomembrane as it is delivered to the site. On each sample, the roll number and date of delivery shall be recorded. The samples shall be archived at room temperature in a light-free environment for possible future testing and analysis. Upon completion of the installation, the Installer's Quality Assurance Representative shall submit all archived samples to the Quality Assurance Engineer.

G. CONTRACTOR shall be responsible for replacing all unacceptable or damaged material at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 LDPE RESIN

A. The LDPE geomembrane shall be manufactured from virgin polyethylene resins meeting the following minimum properties:

Property	Test Method	Value	Units
Geomembrane Density	ASTM D1505-96	0.918 (max.)	g/cm^3
Melt Flow Rate	ASTM D1238-95	1.3 (max)	g/10 Min
Percent Carbon Black	ASTM D1603-94	2-3	%
Carbon Dispersion	ASTM D3015-84(1990)e1	A-1, A-2, B-1	Rating

B. The resins used in manufacturing of the geomembrane shall be identical in all properties to the resin used to manufacture the extrusion welding "weld material".

C. The resin shall be from one source and supplier for all the material incorporated into this project.

2.2 LDPE SHEET MANUFACTURING

A. The LDPE geomembrane materials shall be formulated from the appropriate polymers and compounding ingredients to form LDPE sheet material that meets all requirements for use as a geomembrane for a landfill containing municipal solid waste (MSW). The sheet material shall be capable of being bonded to itself by

thermal bonding in accordance with the sheet manufacturer's recommendations and instructions.

B. The geomembrane shall be manufactured to a minimum thickness of 36 mil (40 mil nominal) when measured at **ANY POINT** of the cross section of the sheet, after application of an embossed, blown or spray texturing process.

C. Sheets which have repair patches upon delivery to the site shall not be accepted.

D. Extruded sheets shall be at least 14 feet in width. Individual geomembrane sheets may be pre-assembled at the factory into larger panels to minimize field seams. Sheet and pre-assembled panel sizes shall consider access to site and materials handling constraints.

E. Each roll shall be identified by a number and date of manufacture.

F. The completed smooth and textured sheet, upon thorough quality control testing specified herein, must demonstrate the following minimum average roll values (MARV):

Property	Test Method	Value	Units
1. Thickness	ASTM D751	0.036 (min)	Inches
2. Density	ASTM D1505-96	0.918	g/cm^3
3. Melt Flow Rate	ASTM D1238-95	1.3 (max)	g/10 Min
4. Carbon Black Dispersion [1]	ASTM 3015-95	A-1, A-2, B-1	Rating
5. Carbon Black Content [1]	ASTM D1603-94	2-3	%
6. Coefficient of Linear Thermal Expansion	ASTM D696-91e1	2.0 (max)	$°c^{-1}$
7. Tear Resistance	ASTM D1004-94a	24	lbs (min)
8. Dimensional Stability	ASTM D1204-94	±2	%
9. Percent Elongation at Break	ASTM D638-96*	750	%
10. Tensile Strength at Break [2]	ASTM D638-96*	152	(lbs/in width)
11. Puncture Resistance	FTMS 101B Method 2065	55	lbs

Notes: [1] To be tested per resin lot. All other properties to be tested per roll.
[2] If properties are given in the units of pounds per square inch (psi), multiply this value by the measured sheet thickness in inches to obtain pounds per inch width.
* Speed 20 IPM, Test Specimen, Type IV.

G. Use textured or smooth LDPE geomembrane as indicated on the construction drawings.

H. The LDPE geomembrane shall be manufactured by:
   1. Polyflex.
   2. GSE Lining Technology, Inc.
   3. National Seal Company.
   4. Or equal.

2.3 GAS VENT, MONITORING WELL, AND PIPE BOOTS

A. Extrusion Joining Resin: Resin used for extrusion joining sheets and sheet to pipe shall be the same resin used to produce the LDPE sheets. Physical properties shall be the same as those of the resin used in the manufacture of the LDPE geomembrane.

B. Sponge Rubber Sheeting: Sponge rubber sheeting shall be type SCE-41, Neoprene/EPT/SBR, Closed Cell Medium, 1/4-inch thick, one side adhesive.

C. Neoprene Adhesive: Neoprene adhesive such as PYTHON shall be used for gluing sponge rubber sheeting to LDPE surfaces.

D. Stainless Steel Strapping: Strapping shall be 1-inch wide stainless steel banding.

PART 3 - EXECUTION

3.1 PREPARATION FOR GEOMEMBRANE INSTALLATION

A. Prepare base material to receive the geomembrane in accordance with geomembrane manufacturer's recommendations.

B. The geomembrane Manufacturer shall certify in writing on a daily basis that the surface on which the geomembrane will be installed is acceptable. This certificate of acceptance shall be given to the ENGINEER prior to commencement of geomembrane installation for each individual day.

3.2 GEOMEMBRANE PLACEMENT

A. Panel Identification: A panel is the unit area of geomembrane which is to be seamed in the field. A panel is a roll or a portion of roll cut in the field. Each panel shall be given an "identification code" (number or letter-number) consistent with the layout plan. This identification code shall be agreed upon by the ENGINEER and CONTRACTOR. This identification code shall be as simple and logical as possible. The CONTRACTOR shall establish a table or chart showing correspondence between roll numbers and identification codes. The identification code shall be used for all quality assurance records.

B. Panel Placement:
   1. The CONTRACTOR shall verify that panels are installed at the location indicated on the drawings.
   2. Panels shall be placed with "shingle" overlaps to facilitate drainage.
   3. CONTRACTOR shall record on an as-built drawing the identification code, roll number, date and time of installation panel length and location of each panel.
   4. The CONTRACTOR shall immediately notify the ENGINEER of any deviations in panel placement inconsistent with the approved panel layout drawings and revise the panel layout drawings to reflect the change and resubmit the revised panel layout to the ENGINEER.
   5. The CONTRACTOR shall mark at the beginning and end of each panel placed, the panel number, roll number, length and date and time of placement.

C. Weather Conditions:
   1. Geomembrane placement shall not proceed at an ambient temperature below 0°C (32°F) or above 40°C (104°F) measured one foot above the liner, unless otherwise specified or approved by the ENGINEER. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog or dew), in an area of ponded water, or in the presence of winds in exceedance of 20 miles per hour, as determined by the ENGINEER.
   2. CONTRACTOR shall verify that the above conditions are fulfilled. Additionally, the CONTRACTOR shall verify that the supporting soil has not been damaged by weather conditions.
   3. CONTRACTOR shall provide acceptable instruments to accurately measure and record the weather conditions as specified.
   4. If CONTRACTOR is unable to complete the work within a single, continuous construction season, geomembrane shall be covered at a minimum, with 18-inches of barrier protection layer prior to demobilizing/discontinuing work over winter months.

D. Method of Placement: CONTRACTOR shall comply with the following:
   1. Any equipment used shall not damage the subgrade or geomembrane by handling, trafficking, leakage of hydrocarbons, or other means (i.e., by use of rub sheets or other suitable materials).
   2. All personnel working on the geomembrane shall not smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane.
   3. The method used to unroll the panels shall not cause scratches or crimps in the geomembrane and shall not damage the supporting soil.
   4. The method used to place the panels shall minimize wrinkles (especially differential wrinkles between adjacent panels).
   5. Adequate loading (e.g., sand bags), not likely to damage the geomembrane, shall be placed to prevent uplift by wind.
   6. Direct contact with the geomembrane shall be minimized (i.e., the geomembrane in traffic areas shall have a minimum of 12 inches of protective soil or other suitable materials).

7. No motorized vehicles shall be allowed to operate directly on the liner (including low ground pressure ATV's).
8. Rub sheets shall be provided of sufficient size below any equipment that has the potential to leak hydrocarbons.

E. Damage: The ENGINEER and Installer's Quality Assurance Representative will inspect each panel, after placement and prior to seaming, for damage. The ENGINEER will advise the installer which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels which have been rejected shall be marked and removed from the work area. The damaged materials will become the property of the CONTRACTOR and shall be removed from the site at the expense of the CONTRACTOR.

F. The geomembrane shall be installed in a relaxed (non-stressed) state and shall be free of tension or stress upon completion of that installation under the temperature conditions which range from 0°F to 100°F, with the geomembrane fully exposed to the environment.

G. CONTRACTOR shall seam two adjacent panels immediately after placement. CONTRACTOR shall not roll panels out in advance of the seaming process.

H. Any bridging of the geomembrane at any change in grade or at penetrations will not be accepted under any condition.

I. The CONTRACTOR shall be solely responsible for ensuring that the geomembrane is placed in accordance with the above criteria.

3.3 FIELD SEAMING

A. Seam Layout: CONTRACTOR shall provide the ENGINEER with a drawing of the facility to be lined showing fabricated seams and field seams in a manner which differentiates the seam types. Seams should be oriented parallel to the line of maximum slope (e.g, oriented along, not across, the slope). In corners and odd-shaped geometric locations, the number of field seams should be minimized. No horizontal seam should be less than five (5) feet from the toe of the slope. Where possible, seams shall be oriented to result in a "shingle" effect.

B. Requirements of Personnel: All personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. All seamers shall have experience seaming a minimum of 5,000,000 square feet of polyethylene geomembrane using the same type of seaming apparatus in use at the site. The most experienced seamer, the "master seamer", shall provide direct supervision, as required, over less experienced seamers. No field seaming shall take place without the master seamer and Quality Assurance Representative being present.

C. A field seam is defined as any approved method of joining one piece of liner to another regardless of the length or quantity of the weld. Both extrusion and fusion welds are considered seams. Extension welding should only be done on reparis, normal seaming should be done by fusion welding.

3.4 OVERLAPPING AND TEMPORARY BONDING

A. Panels of LDPE geomembrane shall be overlapped by a minimum of three (3) inches for extrusion welding and four (4) inches for fusion welding.

B. CONTRACTOR shall assure that the procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any spot welding apparatus is controlled such that the geomembrane is not damaged.

C. No solvent or adhesive shall be used to temporarily bond two seams together.

3.5 SEAM PREPARATION

A. Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material. The installer personnel shall clean area to be seamed, in advance of the welder. If required, grinding shall be completed within 10 minutes of the welding of the panels.

B. Where seam overlap bonding is required, the process shall be completed according to the Manufacturer's instructions and in a way that does not damage the geomembrane.

C. Seams shall be aligned with the fewest possible number of wrinkles and "fishmouths".

3.6 SEAMING EQUIPMENT AND PRODUCTS

A. General:
   1. Approved processes for field seaming are extrusion welding and fusion welding. Only apparatus that have been specifically approved by the liner manufacturer by make and model shall be used.

B. Extrusion Process:
   1. Welding apparatus shall be equipped with gauges indicating the temperature in the apparatus and at the nozzle, including the pre-heat temperature. Installer shall provide documentation regarding the LDPE extrudate to the Quality Assurance ENGINEER and shall certify that it complies with the specifications and is comprised of the same resin as the geomembrane. The installer shall also

log apparatus and extrudate temperatures, pre-heat temperatures, machine number and welder's initials.

2. Installer shall comply with the following:
   a. Maintain an adequate number of spare operable seaming apparatus on-site.
   b. Equipment used for seaming is not likely to damage the geomembrane.
   c. The extruder is purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel.
   d. The electric generator is placed on a rub sheet such that no damage occurs to the installed geomembrane.
   e. A smooth, insulating plate or fabric is placed beneath the welding apparatus after usage.
   f. The geomembrane is protected from damage in heavily trafficked areas.
   g. When grinding is required, no sand paper with grit coarser than #80 size shall be used.
   h. Extrusion welds that exhibit excessive "penetration" shall be deemed as unacceptable unless the installer can demonstrate quantitatively that the seam strength meets the requirements as specified.

C. Fusion Process:
   1. Fusion-welding apparatus shall be automated, vehicular-mounted devices which produce a double seam with an enclosed space. The seaming apparatus shall be equipped with gauges to monitor the applicable temperatures and speeds. The installer shall log ambient, seaming apparatus, and geomembrane surface temperatures, speed, machine number and welder's initials.
   2. Installer shall comply with the following:
      a. Spare operable seaming apparatus are available.
      b. Equipment used for seaming is not likely to damage the geomembrane.
      c. For cross seams, the edges of cross seams are ground to a smooth incline (top and bottom) prior to welding.
      d. The electric generator is placed on a smooth base rub sheet such that no damage occurs to the installed geomembrane.
      e. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage.
      f. The geomembrane is protected from damage in heavily trafficked areas.
      g. When grinding is required, no sand paper with a grit coarser than #80 size shall be used.

D. Weather Conditions for Seaming:
   1. Unless authorized in writing by the ENGINEER, no seaming shall be attempted below 0°C (32°F) or above 40°C (104°F).
   2. Between 0°C (32°F) and 10°C (50°F), seaming is possible if the geomembrane is preheated by either sun or hot air device, and if there is not excessive cooling resulting from wind (as determined by the ENGINEER).
   3. Above 10°C (50°F), no preheating is required.
   4. In all cases, the geomembrane shall be dry and protected from wind damage.

5. If approved by the ENGINEER, CONTRACTOR may perform seaming when the ambient temperatures is below 0°C (32°F), when using shelters. CONTRACTOR shall demonstrate to the ENGINEER that the low temperature seaming procedure does not cause any physical or chemical modification to the geomembrane that will generate any short- or long-term damage.

E. Test Seams:
   1. Test seams shall be made on fragment pieces of geomembrane liner to verify that seaming conditions are adequate. Such test seams shall be made at the beginning of each seaming period, at the ENGINEER'S discretion, and at least once each four (4) hours, for each seaming apparatus and type of material seamed that day. Each seamer shall perform a test seam on the specific seaming apparatus that the seamer intends to use and shall not use any other seaming apparatus without running a test seam. A test seam shall also be performed whenever a welding apparatus has been repaired or has not been used within the last hour, prior to returning the apparatus to service.
   2. Test seam sample shall be at least ten (10) feet long by one (1) foot wide for fusion welded seams and five (5) feet by one (1) foot wide for extruded welded seams, with the seam centered lengthwise. Six (6) randomly spaced specimens, each one (1) inch wide, shall be cut from the test seam sample by the installer. Three specimens shall be tested in peel and three in shear using a field tensiometer, and shall not fail in the seam. If a single specimen fails to meet seaming specifications, then the entire operation shall be repeated. If the additional test seam fails, the seaming apparatus or seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two (2) consecutive, successful, full test seams are achieved.
   3. ENGINEER will observe all test seam procedures. The remainder of the successful test seam sample shall be assigned a number and marked accordingly by the installer, who shall log the date, time, ambient temperature, number of seaming unit, the settings on the welding apparatus, name of seamer, and pass or fail description. The sample itself shall be labeled and submitted to the ENGINEER.
   4. All field tested specimens shall be cut using a sample die.
   5. The Installer's Quality Assurance Representative shall conduct the testing of test seams.

F. General Seaming Procedure:
   1. Seaming shall extend the full length of the overlapped sheets to the outside edge of panels to be placed.
   2. As required, a firm substrate shall be provided by using a flat board, or similar hard surface directly under the seam overlap to achieve proper support.
   3. Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched

with an oval or round patch of the same geomembrane extending a minimum of six (6) inches beyond the cut in all directions.

4. If grinding is required, grinding of the area to be seamed shall be completed no more than 10 minutes prior to seaming.
5. The intersection of all tee seams, or where two or more seams are joined, shall have a round patch of material extending six inches beyond the intersection in all directions welded into place.
6. Installer shall mark each seam with the date, seamer's name, equipment number, start and end times, and seam number.
7. When grinding, the orientation of the grinding marks shall be perpendicular to the seam and shall not be parallel to seam.
8. The depth of the grind marks shall be less than five percent of the sheet thickness and shall remove 100 percent of the surface oxides and waxes (surface sheen).
9. The grind marks shall not appear more than a 1/4 inch on each side beyond the extrudate after it has been placed.
10. The leading edge of the liner shall be beveled at a 45-degree angle prior to tacking the liner for extrusion welding.
11. The extruder shall be purged before beginning a seam, to remove all potentially heat-degraded extrudate from the barrel.

3.7 NON-DESTRUCTIVE SEAM TESTING

A. General:

1. Installer shall non-destructively test all field seams over their full length using a vacuum test unit, or air pressure test (fusion process) to verify the continuity of seams. Continuity testing shall be done as the seaming work progresses, not at the completion of all field seaming. All testing shall be witnessed by the ENGINEER.
2. Installer shall record location, date, start time and pressure, ending time and pressure, test unit number, name of tester, and outcome of all testing including starting and ending pressures and inform the ENGINEER of any required repairs.
3. Any seams requiring repairs shall be retested and the location marked and documented on the As-Built Drawings.
4. All locations where seams cannot be non-destructively tested shall be cap-stripped with the same geomembrane.
5. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.
6. Installer shall field demonstrate the air pressure testing method and vacuum box testing method to verify to the ENGINEER that the test procedures are valid. Non-destructive tests shall be performed by experienced personnel thoroughly familiar with the specified test methods and equipment to be used.
7. All inadequate seams or portions thereof shall be corrected in accordance with the approved method. Should differences of opinion between the installer and the ENGINEER develop during the installation relevant to seam integrity, the ENGINEER may, at his discretion, obtain samples of the seams in dispute for

field and/or laboratory testing by and independent testing laboratory. The installer shall be responsible for providing samples and patching the resulting void in accordance with the previously approved testing procedures at no additional cost.

8. The installer shall mark near the seam the starting time and pressure, ending time and pressure, tester name, and outcome of the test.

B. Vacuum Box Testing:
   1. All field seams shall be inspected for unbonded areas by applying a vacuum to a soaped section of seam.
   2. The vacuum shall be applied by a vacuum box equipped with a vacuum gage, a clear glass view panel in the top, and a soft rubber gasket on the periphery of the open bottom. The vacuum box shall be similar to the Series A 100 Straight Seam Tester as supplied by the American Parts and Service Company, 2201 West Commonwealth Avenue, P.O. Box 702, Alhambra, California 91802.
   3. A section of the seam shall be soaped thoroughly and the inspection box shall be placed over the soaped seam section and the gasket sealed to the liner.
   4. A vacuum of 5 psig or ten (10) inches of mercury (Hg) shall be applied to the box for not less than fifteen (15) seconds by use of a gasoline or electric driven power-vacuum pump apparatus. The applied vacuum will show bubbles over unbonded areas and the unbonded areas will then be marked by the CONTRACTOR for repair by the CONTRACTOR.
   5. Box shall have a minimum overlap of three (3) inches when advancing to the next test.

C. Air Pressure Testing: CONTRACTOR shall test all double fusion seams with an air pressure test by sealing both ends and applying air to a pressure between twenty-seven (27) and thirty (30) psi. Seam failure will be determined if loss of pressure exceeds three (3) psi over 5 minutes or the pressure does not stabilize. Upon completion of air pressure testing, the end of the air channel opposite of the air gauge shall be released from pressure first and the ends of the air channel will be patched and welded as required. Vacuum box testing shall be performed on the patches to verify the integrity of the patches. Double fusion seams that are unable to be pressure tested shall have flap extruded and then be vacuum tested.

3.8 DESTRUCTIVE SEAM TESTING

A. Location and Frequency of Samples:
   1. Installer shall submit to the ENGINEER a list of proposed locations where seam samples shall be cut out for laboratory testing. Samples shall be taken at a minimum frequency of one test location per 500 feet of seam length and a maximum frequency of one test location per 300 feet seam. In addition, extrusion welds may be sampled at the discretion of the ENGINEER at the maximum frequency of one sample per seam per day. The sample location will be determined in the field by the ENGINEER.

2. Additional test locations shall be determined during seaming at the ENGINEER'S discretion. Selection of such locations may be prompted by visual appearance of the weld, suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding. The installer shall not be informed in advance of the additional locations where the seam samples will be taken.
3. Samples shall be cut by the CONTRACTOR as the seaming progresses in order to have laboratory test results before completion of geomembrane installation. CONTRACTOR shall assign a number to each sample, mark it accordingly, record sample location on as-built drawing, and record reason for taking the sample at this location.
4. ENGINEER will witness all field tests and mark all samples and portions with their number. CONTRACTOR shall log the date and time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures and pressures, and pass or fail description, and attach a copy to each sample portion.
5. Samples shall be twelve (12) inches wide by forty (40) inches long with the seam centered lengthwise. Two 1-inch wide strips shall be cut from each end of the sample and these shall be tested in the field, by tensiometer, for peel and shear and shall not fail in the seam. The remaining sample shall be cut into two (2) parts and distributed as follows:
   a. One portion to the Quality Assurance Engineers, 12 inches x 18 inches.
   b. One portion, 12 inches x 18 inches, shall be archived by OWNER.
6. In addition to the above testing, at the ENGINEER's discretion, CONTRACTOR shall take and field test one (1) sample from the start and stop of each seam welded. Samples shall be one (1) inch wide and tested in peel and shear. Any failed seam shall be reconstructed.

B. Laboratory Testing:
   1. Installer shall forward five test samples to the Quality Assurance Engineer's laboratory. Testing shall include "Seam Strength" and "Peel Adhesion" by ASTM D4437 as modified in NSF Appendix A.

C. Procedures for Destructive Test Failure:
   1. The installer's sample will fail when:
      a. The specimen fails by any other method than a film tear bond (FTB) (i.e., failure of the parent material)
      b. The bonded seam strength peel values are less than the published values as provided in the material manufacturer's documentation.
      c. The bonded seam strength shear values are less than the published values as provided in the material manufacturer's documentation.
      d. More than one (1) out of five (5) specimen meets the above criteria.
   2. The following procedures shall apply whenever a sample fails a destructive test. The installer shall reconstruct the seam between the failed location and any passed test location. The installer shall retrace the welding path to a location at twenty (20) feet minimum from either side of the location of the failed test and

take two samples (each side) for additional field tests. If these additional samples pass the test, then the seam shall be reconstructed between the test locations. If this sample fails, then the process shall be repeated. In any case, all acceptable seams must be bounded by two passed test locations and one (1) test must be taken within the reconstructed area at the discretion of the ENGINEER.

3. Where samples fail a laboratory destructive test the above procedures shall be followed, considering laboratory tests exclusively. Since the final seam must be bounded by two (2) passed test locations, it may then be necessary to take one or more new samples for laboratory testing in addition to the one required in the reconstructed seam area at no additional cost to the Owner.
4. If the length between the passing test locations exceeds 100 feet, the entire length of the seam welded by the specific apparatus for that given day shall either be cut out and reconstructed or a cap strip shall be constructed over the entire length.

3.9 DEFECTS AND REPAIRS

A. The geomembrane surface shall be broomed or washed by the installer prior to inspection. All seams and non-seam areas of the geomembrane shall be inspected for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. No walk-downs or inspections of geomembrane will be conducted after sundown. Each suspect location, both in seam and non-seam areas, shall be non-destructively tested using the methods specified herein. If the ENGINEER has reason to question the seam strength, a destructive sample shall be taken through the area in question. Each location which fails the non-destructive testing shall be marked and repaired by the installer. All locations of destruction tests shall be repaired in accordance with the specifications at no additional cost to the OWNER.

B. Repair procedures shall be as follows:
   1. Defective seams shall be repaired by reconstruction as described below.
   2. Tears or pinholes shall be repaired by seaming or patching.
   3. Blisters, larger holes, undispersed raw materials, and contamination by foreign matter shall be repaired by patches.
   4. Surfaces of LDPE geomembrane which are to be patched shall be abraded no more than 10 minutes prior to the repair.
   5. All seams used in repairing procedures must be approved, extrusion welded seams and shall be subjected to the same destructive and non-destructive test procedures as outlined for all other seams.
   6. Each patch shall be numbered and logged. Patches shall be round or oval in shape, and made of the same geomembrane, and extend a minimum of six (6) inches beyond the edge of defects.
   7. Patches shall be applied using approved methods only.
   8. Where excessive penetration occurs, the affected seam length shall be cap-stripped. A cap strip is a minimum 18-inch wide piece of liner placed over the failed seam and welded to the two sheets.

9. The installer may propose an alternate method for repairs in writing to the ENGINEER. A minimum of two (2) weeks prior to starting field installation activities.

C. Each repair shall be non-destructively tested using the methods specified herein, as appropriate. Repairs which pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be redone and retested until a passing test result is achieved. The ENGINEER shall observe all non-destructive testing of repairs and the installer shall record the number of each patch, date, name of patcher, and test outcome.

3.10 INTERFACIAL FRICTION ANGLE TESTING

A. Prior to any placement of the 40 mil LDPE membrane, the CONTRACTOR will provide laboratory test results verifying the side slope stability of the landfill. The CONTRACTOR will provide the laboratory with the actual materials, including the actual geosynthetics and soils.

B. Required Interface Angles: The 40 mil LDPE Geomembrane and the materials these come into contact with, as shown on the Engineering drawings, shall be fabricated to achieve a minimum interface friction angle of:
   1. 31 degrees with a normal stress envelope of 150 psf between the 40 mil textured LDPE geomembrane and the underlying sand layer.
   2. 31 degrees with a normal stress envelope of 150 psf between the 40 mil textured LDPE geomembrane and the barrier protection layer.

   If it is determined by the Quality Assurance Engineer that the materials used in the preparation of the above tests are not identical to those used in construction or the material used has undergone significant change from the time the material was tested, the Quality Assurance Engineer will require that the above tests be repeated with the current materials being used at no additional cost to the OWNER or ENGINEER.

C. Test Methods: The friction angle testing outlined above shall be conducted using ASTM D3080, modified to be in general accordance with the following requirements and is intended to indicate the performance of various components by attempting to model the field conditions.
   1. The shear box shall be a minimum of 12-inch square in the plan direction.
   2. Each half of the shear box will be a minimum of three inches in depth.
   3. The barrier protection layer material will be compacted to 90% of the maximum index density.
   4. The geosynthetics and soil materials shall be placed in the same sequence as the constructed cap cross section. The particular interface in question will be connected to the respective upper and lower shear frame.
   5. The test will be performed for a minimum of three normal stress applied to the geosynthetic to bracket the normal stresses defined above, as required to define the failure plane friction angle. The peak and residual shear stresses shall be

recorded and plotted against the normal compressive stress used. A best fit straight line shall be constructed for each test series.

6. All samples will be normal consolidated under the applied load.
7. The direction of shear for each interface tested shall be in the direction of manufacture (machine direction) for each geosynthetic sample, unless otherwise specified.
8. Apply the shear force using a constant rate of displacement not to exceed 0.04 in/min for geosynthetic to soil interfaces.
9. All tests shall be continued until a constant shearing force is recorded.
10. All tests shall be conducted with the soil and geosynthetics in a saturated condition by saturating the specimen in water for 24 hours prior to testing.

The actual test methods and equipment used to conduct the test will be submitted to the Quality Assurance Engineer by the Contractor for approval prior to any testing.

3.11 DOCUMENTATION

A. At a minimum, the liner installer shall complete the following reports:
   1. A daily report detailing the quantity, type and location of materials installed. The personnel seaming and the apparatus used. The location and results of all testing. Daily reports shall be submitted prior to work commencing on the following work day.
   2. Subgrade acceptance report shall be submitted to the ENGINEER prior to the deployment of liner over the area the acceptance report covers.
   3. Liner acceptance reports by the general contractor shall be submitted when the liner is accepted.
   4. A cumulative installation report covering the following:
      a. Panel placement logs.
      b. Non-destructive test logs.
      c. Destructive test logs.
      d. Repair logs.
      e. Seam logs.
      f. Trial weld logs.
      g. Daily production logs.

3.12 GEOMEMBRANE ACCEPTANCE

A. At the conclusion of placement of geomembrane liner, installer shall prepare and submit six (6) copies of a written report of the work which includes the following:
   1. Complete identification of flexible membrane liner, including, but not limited to, resin type, physical properties and other pertinent data.
   2. Complete description of seaming system used including material, method, temperatures and seam overlap width.
   3. Complete description of field sampling and testing including test equipment used, location of field tests, copy of test results, conditioning procedure prior to

destructive seam testing, method of recording loading and determining average load for destructive test methods, and type of failure in tests (i.e., within the seam, within the sheet material, clamp edge, seam edge).

4. "As-built" drawings drawn at 1-inch equal to 60-foot, showing actual layout of liner sheets, monitoring well, pipe and gas vent penetrations, destructive samples, patches, machine welds, hand welds, and construction details.
5. An affidavit of compliance from the liner manufacturer, containing the following wording:
   "I (name and title), as the duly authorized representative of (Company name), hereby certify that the installation of the (40 mil smooth and textured) LDPE geomembrane has been completed in accordance with the terms and conditions of the Contract Documents entitled Brockport Landfill Remedial Measures, Final Cover System Construction.

By: _____
(signature)

(Corporate Seal) Witness: _____
(signature)

Date: _____

B. CONTRACTOR shall retain all ownership and responsibility for the geomembrane until acceptance by the Owner.

3.13 PROTECTION OF WORK

A. CONTRACTOR shall install barrier protection layer and topsoil layer over geomembrane to provide protection to the geomembrane. No equipment shall operate above the placed geomembrane with less than a 12-inch soil layer over the geomembrane. In no case shall the geomembrane be left exposed to winter weather between construction seasons.

++ END OF SECTION ++

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APPENDIX D

BROCKPORT LANDFILL
MONITORING PLAN

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APPENDIX D

BROCKPORT LANDFILL
SITE NO. 8-28-038
MONITORING PLAN

VILLAGE OF BROCKPORT
TOWN OF SWEDEN
MONROE COUNTY
NEW YORK

DECEMBER 2000
REVISED APRIL 2001

MALCOLM PIRNIE, INC.

P. O. Box 1938
Buffalo, New York 14219

MALCOLM PIRNIE

VILLAGE OF BROCKPORT LANDFILL MONITORING PLAN

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Monitoring Plan is to identify and document sampling locations, sample collection procedures, the analytical parameters, and the analytical methods that will be employed to monitor the effectiveness of the Brockport Landfill remediation.

1.2 PLAN ORGANIZATION

This Plan is organized into eight sections as follows:

- **Section 1.0** provides a description of the purpose of this Plan.
- **Section 2.0** provides a description of the site monitoring network.
- **Section 3.0** provides a summary of the monitoring strategy, a description of the facility and environmental monitoring plans, and a discussion of how the results of the monitoring will be evaluated.
- **Section 4.0** provides a summary of groundwater sampling procedures.
- **Section 5.0** describes the sample analytical program.
- **Section 6.0** describes the statistical methods that will be used to evaluate the monitoring results.
- **Section 7.0** describes the elements of the semi-annual and annual monitoring reports.

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2.0 DESCRIPTION OF THE MONITORING NETWORK

2.1 ENVIRONMENTAL MONITORING LOCATIONS

2.1.1 Groundwater Monitoring System

The Brockport Landfill is located on the eastern end of a kame moraine, a glacial deposit. This overburden material consists of layered silt and sand grading downward into dense sandy till. The overburden thickness ranges from 3 to 20 feet. Groundwater in this moraine deposit ultimately discharges to Otis Creek. There is no evidence that groundwater is in direct contact with landfill waste.

Bedrock beneath the site generally consists of sandstones, with some interbedded silty shale. The bedrock is nearly flat-lying, with a dip of approximately one-half degree to the south. The upper 10 to 15 feet of the bedrock comprises the shallow bedrock water-bearing zone. Groundwater in the shallow bedrock is in contact with groundwater in the moraine overlying the bedrock. Groundwater in the shallow bedrock water-bearing zone likely discharges to the Barge Canal.

Some groundwater was encountered in deep bedrock at the site. However, the low permeability of the intervening bedrock units comprises an aquitard. This aquitard limits the downward vertical migration of groundwater from the shallow bedrock water-bearing zone to the deeper regional flow zone.

Analytical results of the RI indicate that leachate is generated within the landfill waste and discharges to overburden and shallow bedrock groundwater. Overburden groundwater in the moraine and shallow bedrock water-bearing zone is contaminated by low concentrations of volatile organic compounds (VOCs). Groundwater in the deep bedrock zone does not appear to be affected by the landfill.

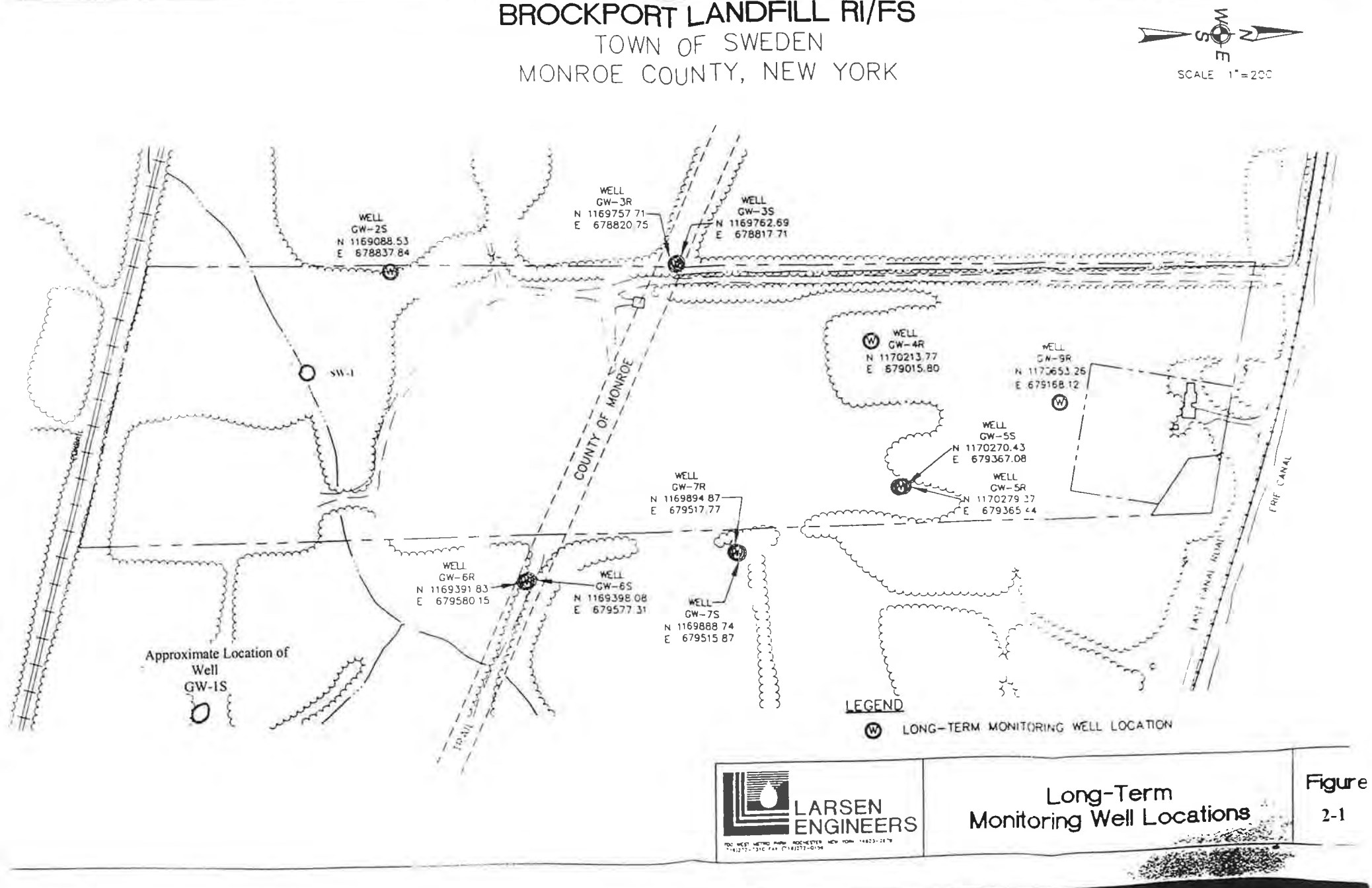
Monitoring Locations - Groundwater monitoring will be performed at the following locations (shown on Figure 2-1):

- Upgradient monitoring well GW-1S.
- Perimeter downgradient monitoring wells listed in Table 2-1.

BROCKPORT LANDFILL RI/FS

TOWN OF SWEDEN

MONROE COUNTY, NEW YORK



LARSEN ENGINEERS

Long-Term Monitoring Well Locations

Figure 2-1

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TABLE 2-1

BROCKPORT LANDFILL
MONITORING PLAN

PERIMETER MONITORING WELL SAMPLING LOCATIONS

Location	Shallow Overburden	Shallow Bedrock
GW-1	S	
GW-2	S	
GW-3	S	R
GW-4		R
GW-5	S	R
GW-6	S	R
GW-7	S	R
GW-9		R

S = Shallow Overburden Soil
R = Rock

Borehole logs for the groundwater monitoring wells for GW-3R, GW-4DR, GW-5S, GW-5R, GW-6R, GW-7S, GW-7R, GW-7DR, GW-8S, GW-8R, GW-8DR, GW-9R and LW-1 are included in Attachment A.

Surface Water

Surface water flow from the Brockport Landfill will be directed to drainage swales located along the perimeter of the landfill. Discharge from the drainage swales is to a low area next to Otis Creek.

Monitoring Points - Surface water samples will be collected from the following locations:

- Otis Creek next to discharge point of drainage swales.

The location of the monitoring point is (SW-1) shown on Figure 2-1.

2.1.2 Gas Vent Monitoring

The decomposition of solid wastes contained in the landfill may produce various gases, with methane being the gas of concern. The build-up and migration of methane gas must be controlled to prevent fire and explosion hazards. Gas control is accomplished through a gas venting system comprised of a total of 16 gas vents extending into the waste. Refer to the "Topographic Plan of Final Grades" included in the latest revision of the "Brockport Landfill Cover Certification Report" for gas vent labels and locations. During the first semi-annual monitoring event, landfill gas measurements will be obtained from each of the 16 gas vents. Based on the results of the first gas monitoring event, the 4 gas vents with the highest readings will be identified for future monitoring and reporting. Gas vent monitoring events will also include a visual survey of the area to locate signs of differential settlement, expansion of the geomembrane layer, vegetative stress, odors, septic soil, and hissing or bubbling gasses which may indicate improper venting or potential gas migration routes.

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3.0 MONITORING PLAN

3.1 SUMMARY OF MONITORING STRATEGY

The objective of the Brockport Monitoring Plan is to provide a strategy for evaluating the effectiveness of the landfill cap constructed at the Brockport Landfill in protecting human health and the environment. This evaluation will be based on a comparison of validated analytical data for groundwater with NYSDEC standards for groundwater and surface water in New York State and historical water quality results. Environmental monitoring will be conducted on specific upgradient and downgradient groundwater monitoring wells. Groundwater elevation data for all on-site monitoring wells will be used to construct isopotential maps. Groundwater monitoring will be conducted under the present plan for a minimum of three years. After the three year period, the Village may request that the NYSDEC modify the sampling and analysis requirements on the basis of the results obtained during that period.

3.2 ENVIRONMENTAL MONITORING

Details of the sampling and analysis plan for environmental monitoring are described below.

3.2.1 Groundwater Monitoring System

Groundwater monitoring will include both water quality and water level monitoring. Water level monitoring is intended to detect seasonal changes in the groundwater flow direction.

3.2.1.1 Locations

The long-term environmental monitoring program for the Village of Brockport Landfill involves the sampling and analysis of six overburden and six shallow bedrock groundwater monitoring wells as listed below and shown in Figure 2-1.

Overburden Wells	Shallow Bedrock Wells
GW-1S (upgradient)	GW-3R
GW-2S	GW-4R
GW-3S	GW-5R
GW-5S	GW-6R
GW-6S	GW-7R
GW-7S	GW-9R

Wells designated as "upgradient" are those wells that consistently occurred in the upgradient groundwater flow directions in both the overburden and shallow bedrock flow systems as determined from seven rounds of groundwater elevation measurements taken during the remedial investigation.

3.2.1.2 Frequency

Groundwater level monitoring of the 12 wells will be conducted semi-annually during monthes of April and October.

3.2.1.3 Parameters

Groundwater samples collected from the groundwater monitoring wells specified in Section 3.2.1.1 will be analyzed for the field parameters, leachate indicators, total metals, and volatile organic compounds listed in Table 3-1. The metals selected are those exhibiting exceedances of the 6NYCRR Part 703 Class GA groundwater standards which also showed elevated concentrations in downgradient monitoring wells as compared to upgradient wells, as determined from the results of monitoring during the remedial investigation.

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TABLE 3-1

BROCKPORT LANDFILL
MONITORING PLAN

LONG-TERM MONITORING ANALYTE LIST

FIELD PARAMETERS	
pH	Specific Conductance
Eh	Temperature
Dissolved Oxygen	Turbidity
Water Level	

TAL METALS	
Antimony	Magnesium
Arsenic	Manganese
Barium	Potassium
Calcium	Sodium
Iron	

TCL VOLATILE COMPOUNDS			
Chloromethane	1,2-Dichloroethene (total)	cis-1,3-Dichloropropene	2-Hexanone
Bromomethane	Chloroform	Trichloroethene	Tetrachloroethene
Vinyl Chloride	1,2-Dichloroethane	Dibromochloromethane	1,1,2,2-Tetrachloroethane
Chloroethane	2-Butanone	1,1,2-Trichloroethane	Toluene
Methylene Chloride	1,1,1- Trichloroethane	Benzene	Chlorobenzene
Acetone	Carbon Tetrachloride	trans-1,3-Dichloropropene	Ethylbenzene
Carbon Disulfide	Bromodichloromethane	Bromoform	Styrene
1,1-Dichloroethene	1,2-Dichloropropane	4-Methyl-2-Pentanone	Xylenes (total)
1,1-Dichloroethane			

LEACHATE INDICATORS	
Total Kjeldahl Nitrogen	Burn
Ammonia	Sulfate
Nitrate	Alkalinity
Chemical Oxygen Demand (COD)	Phenols
Total Organic Carbon (TOC)	Chloride
Total Dissolved Solids (TDS)	Hardness

3.2.2 Surface Water

The long-term environmental monitoring program for the Village of Brockport involves sampling Otis Creek.

3.2.2.1 Location

Otis Creek will be sampled near the wet area where drainage swales discharge. This location is shown on Figure 2-1.

3.2.2.2 Frequency

Sampling will be conducted on a semi-annual basis. Sampling will occur at the same time as groundwater sampling.

3.2.2.3 Parameters

Surface water samples will be analyzed for the VOCs and TAL Metals listed in Table 3-1. In addition, field parameters including pH, dissolved oxygen, temperature and turbidity will be collected.

3.2.3 Landfill Gas

Landfill gas monitoring will include semi-annual gas vent monitoring and visual inspections.

3.2.3.1 Location

Four gas vent locations with the highest readings will be identified based on the results of the first gas monitoring event.

3.2.3.2 Frequency

Monitoring will be conducted on a semi-annual basis. Monitoring will occur at the same time as groundwater sampling.

3.2.3.3 Parameters

Gas vents will be monitored for the presence of explosive gasses.

4.0 SAMPLING PROCEDURES

4.1 PRE-SAMPLING PREPARATION

Prior to any sampling event, the following steps will be taken by personnel responsible for sampling:

- Review the sampling procedures.
- Assemble and inspect all field equipment necessary for sample collection.
- Verify that equipment is clean and in proper working order.
- Note and replace any items that are in short supply or that are showing indications of wear; maintain an adequate supply of spare parts for all sampling equipment.
- Calibrate all equipment to manufacturer's specifications.
- Examine shuttles, bottles, labels, and preservatives; contact laboratory immediately if any problems are discovered.
- Confirm sample delivery time and method of shipment with the laboratory.
- Establish a sampling team of at least two people.
- Establish monitoring well evacuation and sampling schedule for the activities of each day.

4.2 GROUNDWATER SAMPLING

Sample collection equipment (disposable bailers) will be constructed of polyethylene designed to obtain samples with minimal agitation and contact with the atmosphere. Bailers will be cleaned and protected during transport to and from the sampling destination to avoid contamination, and will be checked for integrity before use. Monitoring well purging bailers will be constructed of polyvinylchloride (PVC).

Groundwater samples will be collected and stored in the order of the volatilization sensitivity of the analytical parameter. Applicable guidelines to be employed for collecting representative groundwater samples from monitoring wells are provided in Attachment B. Applicable guidelines include :

- Water Level Monitoring
- Well Purging Prior to Sampling
- Groundwater Sampling

The types and frequency of field QA/QC samples to be collected are discussed in Section 5.3. To ensure sample integrity, monitoring well sampling techniques will be consistently performed each time a particular well is sampled and sampling will comply with the following:

- Before the monitoring well is evacuated, ambient air will be checked for the presence of explosive or organic vapors if they are expected.

- Measurement of groundwater elevation will be made before any disturbance of the well or its contents.

- Evacuation of the well will replace stagnant water in the well and the sand pack with fresh water representative of the formation. Evacuation of the well will be conducted so as to create the least possible turbidity in the well and will not lower the water in the well below the top of the sand pack. Well evacuation procedures will be conducted in accordance with the applicable guideline for well purging.

- Samples intended for volatile organic compound analysis will be collected immediately after well evacuation.

- Field analysis will be performed on a sample collected from the well after the sample for volatile organics analysis has been collected.

- Field test equipment will be calibrated at the beginning of each sampling day and checked and recalibrated according to manufacturer's specifications. Calibration data will be reported with the analytical results. Field measurements including pH, Eh, specific conductivity, temperature and turbidity will be measured in the field using calibrated instrumentation. Field instrumen-

tation will be maintained and operated according to the applicable guidelines presented in Attachment B.

- Groundwater samples will not be filtered unless otherwise approved by the NYSDEC. If filtration is required, the following procedure will be used:

For monitoring wells with turbidity readings greater than 50 NTU, two sets of samples will be collected for metals analysis; one unfiltered and one field-filtered. The purpose of filtering is to remove suspended particulate matter which has been drawn through the well screen from the surrounding geologic materials during the process of evacuating and sampling the well. These particulates may include naturally occurring constituents that may desorb into the sample once an acid preservative is added. The applicable guideline for field filtration is (see Attachment B) is:

- Procedure for Field Filtration of Aqueous Metals Samples.

Samples will be preserved and will be delivered to the laboratory within proper holding times (see Section 5.2) and with proper chain-of-custody documentation. A chain-of-custody form (see Figure 4-1) will be completed for each bulk container (i.e., cooler) of collected samples. The chain-of-custody form will be signed and dated by the person who collected the samples, the person the samples were relinquished to for transport to the laboratory, and the laboratory sample custodian who receives the samples.

Applicable Guidelines (see Attachment B)

- Sample Labeling
- Sample Shipping (includes Chain of Custody information)

4.3 SURFACE WATER SAMPLING

Surface water sampling techniques must be consistently applied to all samples and must conform to the following:

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CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:	NO. OF CONTAINERS							REMARKS
SAMPLERS (SIGNATURE):									
STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION				

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:	

Distribution: Original accompanies shipment, copy to coordinator field files

FIGURE 4-1

Surface water will be collected using direct grab sampling methods (using precleaned sample jars) at the specific sample location. The surface water sample will be collected by directly filling each appropriate sample container. Surface water sampling procedures are included in Attachment B.

Samples collected from shallow water must not include bottom sediment. Each water body greater than three feet deep will be checked for stratification. Each stream exhibiting evidence of contamination using field instrumentation (dissolved oxygen meter, photoionization detector) will be separately analyzed. If no stratum exhibits such evidence, a composite sample having equal parts of water from each stratum will be analyzed.

4.4 LANDFILL GAS MEASUREMENTS

Landfill gas measurements in the gas vents will be obtained using an explosimeter. The gas monitoring will be performed with a natural gas indicator that measures concentration in percent lower explosive limit (LEL) of methane gas equivalent. The probe of the gas meter will be placed at the vent openings, and a direct measurement will be read and recorded.

4.5 FIELD MEASUREMENTS

Field measurements including groundwater elevation, pH, Eh, specific conductivity, temperature, turbidity and natural gas will be taken in the field using calibrated instrumentation. Field parameter samples will be collected immediately following the collection of volatile organic samples or first if no volatile organics are being analyzed. Field instrumentation will be operated and maintained according to the following applicable guidelines (see Attachment B):

- Water Level Monitoring.
- Calibration and Maintenance of Portable Field pH/Eh Meter.
- Calibration and Maintenance of Portable Conductivity Meter.
- Calibration and Maintenance of Portable Field Turbidity Meter.

4.6 FIELD EQUIPMENT AND TESTING

Purging equipment, leachate collection equipment and water level monitoring probes will be cleaned before each use in accordance with procedures presented in Attachment B:

- Sampling Equipment Decontamination.

Sampling bailers will be dedicated to each monitoring well and will not require decontamination.

4.7 DOCUMENTATION OF FIELD ACTIVITIES

The results of all field measurements and associated calculations will be recorded on standard forms included with the guidelines presented in Attachment B. During all activities, the following general information will be recorded in each log book:

- Date.
- Crew members.
- Meteorological conditions.
- Brief description of field activities planned for date indicated.
- Location where work is performed.
- Problems encountered and corrective actions taken.
- All field measurements or descriptions made.
- Any modifications made to sampling procedures.

All data will be recorded directly and legibly in field logbooks, with all entries signed and dated. If entries must be changed, the change should not obscure the original entry. The reason for the change will be stated, and the correction and explanation will be signed and dated at the time the correction is made.

The following information will be recorded by the sampling team leader and/or field technicians during the collection of all environmental samples:

- Sample locations and summary of the samples collected.
- Completeness of the sampling effort.
- Sample descriptions.
- Results of all field measurements.
- Results of field instrument calibrations.
- Sample preservation used (if applicable).
- Chain-of-custody information.

All original forms and field notebooks will be placed in the project record file that will be maintained at the office of the Village Engineer, Village of Brockport, Town of Sweden, Monroe County, New York.

MALCOLM PIRNIE

5.0 ANALYTICAL PROGRAM

5.1 PARAMETERS FOR PHYSICAL/CHEMICAL ANALYSIS

The analytical parameters that will be analyzed in the monitoring programs discussed in this Plan are listed in Table 3-1.

5.2 ANALYTICAL METHODS/PROTOCOLS

The methods that will be used for chemical analysis of all samples collected during this monitoring program are presented in Table 5-1. The sampling holding times, preservation and container requirements are also presented.

The following analytical method references are to be followed for any samples not specifically covered in this Plan:

a) Test Methods for Evaluating Solid Waste, SW-846, November 1986

b) Standard Methods for the Examination of Water and Wastes, (most recent edition

c) EPA Methods for Chemical Analysis of Water and Wastes, EPA 600/ 4-69-020, March 1983

d) 40 CFR Part 136

The procedure should be listed in the NYSDEC Analytical Services Protocol Manual, September 1989, Revised 1995.

5.3 FIELD QUALITY CONTROL SAMPLES

The following field quality control samples will be analyzed:

- A **trip blank** for volatile organic compound analysis will be prepared by the laboratory and delivered to the sampling team prior to a sampling event.

TABLE 5-1

BROCKPORT LANDFILL
MONITORING PLAN

ANALYTICAL PARAMETERS METHODS/PROTOCOLS FOR SURFACE WATER, GROUNDWATER, AND LEACHATE SAMPLES

Parameter	Method	Method Reference	Maximum Detection Limits (mg/L) (6)	Holding Time	Preservation (3)	Container (4)
Leachate Indicators:						
Phenols	Note 5	1	0.001	26 days	Cool to 4° C H_2SO_4 to pH <2	500 ml amberglass
Ammonia	Note 5		2.0	26 days	Cool to 4° C H_2SO_4 to pH <2	500 ml plastic or glass
Total Kjeldahl Nitrogen	Note 5			26 days	Cool to 4° C H_2SO_4 to pH <2	500 ml plastic or glass
Nitrate	Note 5			24 hours	Cool to 4° C H_2SO_4 to pH <2	100 ml plastic or glass
Total Organic Carbon (TOC)	9060	1		26 days	Cool to 4° C H_2SO_4 to pH <2	50 ml plastic or glass
Total Dissolved Solids (TDS)	160.1	2		7 days	Cool to 4° C	100 ml plastic or glass
Chloride	Note 5	2	250	26 days	Cool to 4° C	50 ml plastic or glass
Total Hardness as ($CaCO_3$)	Note 5	2		6 mos.	H_2SO_4 to pH <2	100 ml plastic or glass
Chemical Oxygen Demand (COD)	410.1	2		26 days	Cool to 4° C H_2SO_4 to pH <2	50 ml plastic or glass
Sulfate	Note 5		250	26 days	Cool to 4° C	50 mg plastic or glass
Alkalinity	Note 5			12 days	Cool to 4° C	100 ml plastic or glass
Metals:						
Arsenic	7060	1	0.025	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Sodium	7770	1	20	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Iron	7380	1	0.30	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Potassium	7610	1	0.30	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Manganese	7460	1	0.30	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Magnesium	7450	1		Note 2	HNO_3 to pH <2	500 ml plastic or glass
Antimony	Note 5		0.003	Note 2	HNO_3 to pH <2	500 ml plastic or glass
Barium	7080	1	1.0	Note 2	HNO_3 to pH <2	500 ml plastic or glass

TABLE 5-1

BROCKPORT LANDFILL
MONITORING PLAN

ANALYTICAL PARAMETERS METHODS/PROTOCOLS FOR SURFACE WATER, GROUNDWATER, AND LEACHATE SAMPLES

Parameter	Method	Method Reference	Maximum Detection Limits (mg/L) (6)	Holding Time	Preservation (3)	Container (4)
Volatile Organics	8015, 8260	1		Note 1	Cool to 4° C	2-40 ml glass VOA bottles with Teflon septums.

References:

(1) Test Methods for Evaluating Solid Wastes, USEPA SW-846, 3rd Edition, Revised 1991, as contained in the NYS Analytical Services Protocol, 1991.
(2) Methods for Chemical Analysis of Water and Wastes. USEPA, Cincinnati, Ohio. EPA 6600/4-69-020, Revised March 1983, as contained in the NYS Analytical Services Protocol, 1995.

Notes:

(1) All field samples will be delivered to the lab within one (1) day of their collection. VOA analysis of water samples must be completed within 7 days of VTSR (Validated Time of Sample Receipt). The VTSR shall be the date on which a sample is received at the laboratory, as recorded on the chain-of-custody form and the lab's central sample log.
(2) Analysis of water for all metals must be completed within 180 days of the VTSR.
(3) Preservatives will be added to the sample bottles before entering the field. Ice will be used to cool samples in the field and in transit to the laboratory.
(4) Containers shown are those necessary to satisfy volume requirements for water analysis.
(5) The concentrations given are the NYSDEC Ground Water Quality Regulation (GQR) (6NYCRR, Part 703) limits for the parameters indicated. The laboratory shall make every reasonable effort to achieve analytical detection limits that are less than the (GQR) limits. If a GQR is not cited, then the analytical quantitation limits shall be in conformance with SW-846, third edition.

- One sealed blank will be carried into the field per day along with the sample containers for each day that volatile organic samples are collected. Trip blanks will be transported and handled in the same manner as the actual samples. The results of the trip blank analysis will be reviewed to evaluate if the potential for sample contamination during transportation and handling exists.

- One **blind duplicate** will be collected and analyzed per sampling event. The field sample containers will be returned to the laboratory identified only as the "blind duplicate". The well or sample location will be recorded in the field notebook and the results will be compared to review analytical precision.

- A sufficient volume of sample will be collected at one sampling location per sampling event for **matrix spike/matrix spike duplicate (MS/MSD)** analysis. The laboratory will report the results of the MS/MSD analysis which will be reviewed for sampling and analysis precision and accuracy.

5.4 LABORATORY QUALITY CONTROL/REPORTING REQUIREMENTS

Laboratory quality control and reporting requirements will be as identified below.

5.4.1 General

- The laboratory will perform all standard in-house QA/QC necessary to control the introduction of contamination in the lab and to insure the accuracy and precision of the data.

- The laboratory will strictly adhere to the quality control requirements specified in the analytical method references given in Table 5-1.

- All laboratories involved in the monitoring program must be certified in the New York State Department of Health Environmental Laboratory Approval Program (ELAP). Sampling and analytical procedures must conform to the New York State Department of Environmental Conservation Analytical Services Protocol Manual (NYSDEC ASP), Revised 1995. The laboratory(ies) must also maintain NYSDEC ASP Contract Laboratory Program (CLP) certification status if applicable to the analytical methods being performed.

5.4.2 Quality Control Analyses

The laboratory will analyze the following quality control samples:

Matrix Spikes (MS) - Matrix spikes will be prepared and analyzed at least once per batch of collected analytical samples so that accuracy can be evaluated. The MS results also indicate the extent of matrix bias or interference on analyte recovery and sample-to-sample recovery. A field blank will not be used for this purpose.

Matrix Spike Duplicate (MSD) - A matrix spike duplicate will be prepared and analyzed at least once per batch to determine the extent of matrix bias or interference on analyte recovery and sample-to-sample recovery. MSD results are compared to MS results as an indicator of precision. Field blanks may not be used for this purpose.

Matrix Spike Blank (MSB) - The laboratory will supply an MSB for each set of investigative samples submitted for analysis according to Category B reporting and deliverable requirements. The MSB will consist of analyte-free water spiked with some of the compounds-of-interest to evaluate the integrity of the spiking solution.

Method Blanks - Method blanks will be analyzed at least once per batch. If a particular reagent or piece of analytical equipment used is changed during preparation of a sample batch, additional testing will be required. The results of the method blanks are to be reported according to Category B reporting and deliverable requirements.

Surrogates - For volatile and semi-volatile organic analyses, surrogate standards are added to each sample and recoveries are calculated for method performance accuracy. Surrogate standard recoveries will be reported according to Category B reporting and deliverable requirements.

5.4.3 Reporting and Deliverable Requirements

The laboratory(ies) must adhere to NYSDEC ASP Category B reporting and deliverable requirements unless otherwise directed by the Village. The laboratory will submit two (2) copies of the analytical report within 30 business days of receipt of the last batch of investigative samples. The analytical report submitted by the laboratory will

conform to Category B reporting and deliverable requirements specified in the NYSDEC ASP. The analytical report will also include for each sample:

- Sample location/sample number
- Date collected
- Date extracted or digested
- Date analyzed
- Analytical methodology (including preparation methodology)
- Method detection limits
- Sample dilution factor (if applicable)
- Chain-of-Custody forms

The analytical report also must contain a case narrative which will describe any and all QA/QC problems encountered during sample analysis. For each sample for which QA/QC problems are encountered, the following specific information will be reported in the case narrative:

- Sample identification number
- Sample matrix
- Parameters analyzed
- Data acceptance criteria exceeded
- Specific analytical problems that occurred
- Corrective action taken or attempted to resolve the problem(s)

6.0 EVALUATION OF RESULTS

6.1 GENERAL

Analytical data that is generated as part of the Brockport Landfill Monitoring program will be entered into a computer spreadsheet by Consultant. The spreadsheet will be used for performing statistical calculations on the data and for generating graphs showing the status and history of individual sampling points and compounds. These graphs will also be used for trend analysis.

Any analytical results which are returned as "Not Detected" will be recorded in the spreadsheet at the detection limit of the analytical method used with a footnote indicating that the compound was not detected at the detection limit. For the purposes of calculating the two year moving average, the detection limit shall be used for samples which have "Not Detected" as the analytical result in the calculation of the average footnote indicating the number of samples for which this was done. If all four sample results are "not detected," then the average will be reported as "less than (detection limit)."

If a compound is detected but is at a level below the quantitation limit, the analytical result will be recorded in the table with a descriptive footnote stating "compound detected below accurate quantitation limit." These results will be incorporated into the moving average in a manner similar to those which are "not detected" with a footnote describing the number of samples included in the average.

6.2 DATA VALIDATION

Data validation is the process of reviewing data and accepting or rejecting it on the basis of sound criteria. The validation methods may differ for various measurements but the chosen validation criteria must be appropriate to each type of data and the purpose of the measurement. Records of all data should be maintained, even those judged to be "outlying" or spurious values. Personnel assigned the responsibility of data validation should have sufficient knowledge of the particular measurement system to identify questionable values.

The validation process shall include mechanisms whereby data reduction is verified. In the case of computerized data reduction, this may include subjecting a surrogate data set to reduction by the software to ensure that valid results are produced.

The principal criteria that will be used to validate the integrity of the data during collection and reporting should be modeled from Functional Guidelines for Evaluating Organics Analyses, EPA, February 1, 1998 (EPA 68-01-6999) and Functional Guidelines for Evaluating Inorganics Analyses, EPA, July 1, 1988, or their updated versions. Source: The independent validation should be contracted for prior to reporting the data to the agency. NYS Department of Environmental Conservation Division of Hazardous Substances Regulation "RCRA Quality Assurance Project Plan Guidance" Revised August 1989.

6.2.1 Field Data Validation

Validation of field data should be performed on two different levels. First, all data should be validated at the time of collection by following standard procedures and QC checks. Second, data should be validated by supervisory personnel who will review the data to ensure that the correct codes and units have been included. After data reduction into tables or arrays, supervisory personnel should review data sets for anomalous values. Any inconsistencies discovered will be resolved immediately, if possible, by seeking clarification from the field personnel responsible for data collection, or by performing the measurement over again. The supervisory personnel are also responsible for ensuring that justifiable data is obtained by following the field objectives described below:

1. Adherence to the approved Sampling Plan.
2. Equipment and instruments are properly calibrated and in working order.
3. Samples are collected according to written standard operating procedures.
4. Sufficient sample volume is collected to maintain sample integrity and conduct all required analyses.
5. Samples are properly preserved.
6. All applicable field QC samples are provided with each sample set.
7. Complete chain-of-custody documentation is maintained throughout the duration of the field effort, and copies are included with each sample shipment.
8. Field samples will arrive at the laboratory in good condition.

Random checks of sampling and field conditions should be made by the supervisory personnel, who should check recorded data at that time to confirm observations.

Whenever possible, peer review should also be incorporated into the data validation process, in order to maximize data consistency between field personnel.

6.2.2 Laboratory Data Validation

Data validation will be performed by the specific analytical task leader, the Laboratory QC Officer, and the Laboratory QA Manager. Validation will be accomplished through routine audits of the data collection and flow procedures and monitoring of GC sample results. Data collection and flow audits include:

1. Review of sample documents for completeness by the analyst(s) at each step of the analysis scheme.
2. Daily review of instrument logs, performance test results, and analyst performance by the analytical task manager.
3. Unannounced audits of report forms, notebooks, and other data sheets by the Laboratory QA Manager.
4. Daily review of performance indicators such as blanks, surrogate recoveries, duplicate analyses, matrix spike analyses, etc. by the analytical task manager.
5. Checks on a random selection of calculations by the Laboratory QA manager.
6. Review by the Laboratory QA Manager of all reports prior to, and subsequent to, computerized data entry.
7. Review and approval of final report by the Laboratory QA Manager.

Results from the analysis of project and blind audit QC samples will be calculated and evaluated as reported. If these results indicate data quality problems, immediate corrective action will be taken, and all data collected since previous QC audits will be carefully reviewed for validity.

6.2.3 Independent Validation

Once field and analytical data have been combined, the resulting technical documentation will be validated against the following criteria by an independent validator:

1. Stated objectives of the Sampling Plan.
2. Stated QA objectives of the QAPP.
3. Analysis date versus the applicable holding times.
4. Percentage of QA analyses conducted.
5. Field and laboratory blank contamination.

6. Percent recoveries of laboratory QC spike samples.
7. Relative percent differences of laboratory QC samples and field replicates.

6.3 ENVIRONMENTAL MONITORING

The following statistical analyses will be used to assess the performance of the landfill cap.

6.3.1 Moving Average

The moving average (two year moving average for groundwater and surface water samples) of the four most recent monitoring data for each constituent will be compared to the New York State Class "GA" or Class "C" (for groundwater and surface water samples, respectively) Water Quality Standards to determine the status of each constituent. The moving average for any constituent is the arithmetic average of the current monitoring data and the three previously semi-annual monitoring data. The comparison of the moving average to the New York State Class "GA" or Class "C" Water Quality Standards will be comprised of the arithmetic difference between the two values. The moving average will provide information on the long-term trend of constituent concentrations in relation to the New York State Class "GA" or Class "C" Water Quality Standards while smoothing the normal fluctuations which may occur from sampling event to sampling event.

6.3.2 Trend Analysis

The trend analysis will involve charting the change of both the individual sample results and the moving average with respect to time. This will be evaluated to determine the long-term trend of the constituent concentrations at the various sample locations. The data will be presented on a graph of concentration vs. time.

MALCOLM PIRNIE

7.0 MONITORING REPORT REQUIREMENTS

7.1 SEMI-ANNUAL REPORTS

7.1.1 Analytical Results

A letter report which includes a summary of all groundwater and surface water monitoring data will be submitted to the NYSDEC and NYSDOH on a semi-annual basis. Information which will be submitted includes:

- Sample collection date
- Analytical results
- Upgradient well designation
- Sample location number
- Applicable Water Quality Standards and NYSDOH Guidance Values
- QA/QC Values
- Method Detection Limits
- CAS Numbers
- Field sampling notes
- Chain-of-Custody forms

7.1.2 NYSDEC Notification

A semi-annual letter report will be submitted to NYSDEC no later than 60 days after the completion of sampling activities. The letter will consist of the water level data, raw analytical data, and a data validation report.

7.1.3 NYSDOH Notification

A semi-annual letter report will be submitted to the NYSDOH no later than 60 days after the completion of sampling activities. The letter will consist of the water level data, raw analytical data, and a data validation report. In addition, the Village will notify the NYSDOH of any results which indicate exceedences of New York State Drinking Water Standards within 14 days of receipt of validated analytical results.

7.2 ANNUAL MONITORING AND MAINTENANCE SUMMARY REPORT

An Annual Monitoring and Maintenance Summary Report, which includes the following, will be prepared and submitted to the NYSDEC and NYSDOH site contacts:

- All raw data.
- A data validation report.
- A summary of groundwater elevation measurements. These results will be tabulated by the contractor and used to prepare groundwater isopotential contour maps from which the direction of flow can be determined.
- A summary of semi-annual monitoring results including contraventions of New York State Quality Standards.
- A discussion of sample analytical results including elevations of parameters above background concentrations, and a discussion of the results of statistical analyses discussed in Section 6.0.
- A discussion of changes in leachate or water quality that has occurred throughout the year.
- A discussion of any proposed changes to the Brockport Landfill Monitoring Plan.
- Results of Post-Closure site inspections.
- A discussion of site maintenance activities.

7.3 CLOSURE/POST CLOSURE REGISTRATION REPORT

The Village will register with the NYSDEC upon final closure of the site. The registration report will include the following information:

- The facility's name and address.

- The Village's name, address, and telephone number, and the name, address, and telephone number, of the person who will be responsible for closure and post-closure of the landfill.
- A certification that the facility complies with all closure, post-closure criteria and corrective measures criteria contained in the "Record of Decision".
- Any other information that the NYSDEC determines to be necessary to protect the public health and welfare and the environment or natural resources.

This registration report will be renewed every five years until the department determines that the post-closure monitoring and maintenance period for the facility has ended. The registration is transferable to another party only upon prior written approval of the department, and a demonstration that the prospective transferee will be able to comply with all applicable laws, regulations and requirements to which the site is subject.

7.4 SITE CONTACTS

Semi-Annual Monitoring Reports and annual Monitoring and Maintenance Summary Reports will be submitted to the following:

Mr. Gerald J. Rider
Chief, O&M Section
Div. of Environmental Remediation
NYSDEC
50 Wolf Road
Albany, NY 12233-7010

Ms. Mary Jane Peachey
Regional Hazardous Waste Engineer
NYSDEC
6274 East Avon-Lima Road
Avon, NY 14414

Mr. Richard E. Tuers
Bureau of Environmental Exposure Investigation
NYSDOH
2 University Place
Albany, NY 12203-3399

MALCOLM PIRNIE

Mr. Thomas Reamon
Chief, Wester Investigation Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233-7010

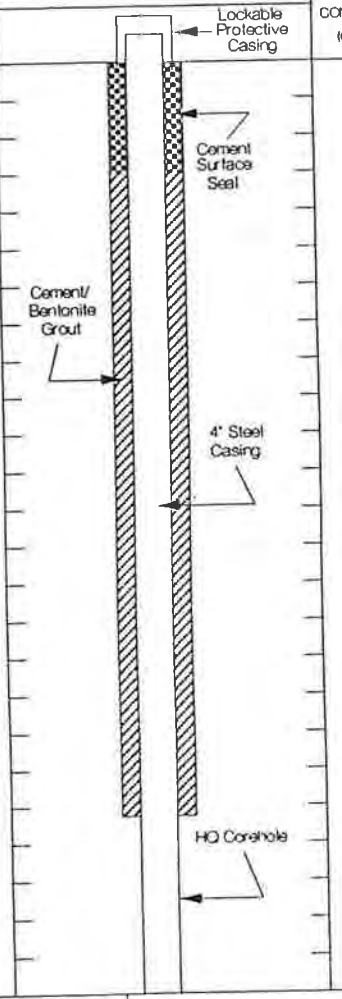
MALCOLM PIRNIE

ATTACHMENT A

BOREHOLE LOGS

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	HNU (PPM)
		1	4-3	1.2	0.0-1.0' Dusky brown SILT, some f/c gravel (A-SR, to 1-3/4"), little f/m sand, little organic matter, moist.		0.6
			4-7				
		2	9-7	1.5	1.0-2.0' Mod yel br to mod red brown SILT, some to little vf/f sand, trace c/sand and f/gravel (SR-SA, to 1/4"), moist.		2.6
			5-6		2.0-3.5' Mod yel br SILT and f/SAND, trace f/m gravel (SR-SA, to 5/8"), moist to wet at 3.5'.	▼	
5		3	6-7	1.2	3.5-4.0' Color above, SILT and vf/SAND, trace clay, tr c/sand and f/ gravel (SA-SR, to 1/4"), wet at 3.5'.		0.3
			10-14				
		4	10-10	1.5	4.0-6.5' Color above, vf/SAND and to some f/c gravel (A-SA, to 1-3/4"), little silt, wet.		0.5
			13-16				
		5	14-38	0.8	6.5' Color above, vf/f SAND, some to little silt, little to trace f/m gravel (SA, to 1/2"), wet.		0.5
			15-20				
10		6	10-14	1.3	10.0' Color grades to dk yel brown.		0.4
			15-19				
		7	22-20	1.9	12.0' Dk to mod yel br vf/f SAND, some to little m/c sand (inter-bedded, some size-sorting), little silt, little to tr f/m gravel (R-SR, to 5/8", embedded in silty sand) increasing with depth, wet, (SANDY TILL).		0.4
			23-50/0.4				
		8	25-47	1.8			0.3
15			45-50/0.3		16.5' Color grades to dk red br and gr grey, with angular, gravel-size sandstone, trace clay, dry.		
		9	45-50/0.1				0.3
				0.6			
		10	28-50/0.2				0.9
				0.5	19.2' TOP OF ROCK: 4" Steel Casing to 20.2'		
20					20.2' THOROLD SANDSTONE Pink to gray, fine-grained sandstone, heavily bioturbated (Scolithus burrows at 21.5-22.5', Deadalus burrows near base); horizontal partings at mud seams or moderately weathered friable sandstone at 21.6', 24.8', 27.5'-28.5'. High angle fractures/jointing with black staining and pyrite mineralization.		BG
25							



HYDRAULIC CONDUCTIVITY (CM/SEC)

NOTES

HNU readings are parts per million (ppm) above background (BG).
BG = 0.7 ppm

Auger borehole 19.2 - 20.2'; install 4" steel casing at 20.2' with cement/bentonite grout

Run No. 1
Core Interval: 20.1-30.1'
Recovery: 9.0/10.0' (90%)
RQD: 5.32/10.0' (53%)
Water Loss: 15 gal

Surface Elevation 532.97
Date Installed 10/20-10/25/95
Driller SJB SERVICES, INC.
Method 6-1/4" HSA; HQ Core
Classified By KJR
MPI Inspector KJR

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO GW-3R
SHEET 1 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					28.1' GRIMSBY SANDSTONE Interbedded dark red br (10R3/4), medium hard, silty, fine-grained sandstone and medium soft silty shale; green gray mottling. Thin to laminated bedding; very broken to blocky fracturing; weathering fresh (mud seams) to moderate; Daedalus worm burrows common; occasional cross-bedding.		HQ Corehole		BG	Run No. 1 Core Interval: 28.1-38.1' Recovery: 9.0/10.0' (90%) ROD: 5.32/10.0' (53%) Water Loss: 15 gal
35					28.1-29.5' Shaley (friable, weathered) 29.5-30.2' Sandstone, with Daedalus burrows 30.2-30.3' Green shale (mud seam) 30.3-30.6' Sandstone 30.6-30.9' Shale 30.9-31.4' Siltstone 31.4-32.0' Dark red brown shale 32.0-32.1' Brown shaley pebbles in red sandstone matrix 32.1-33.5' Sandstone (bioturbated) 33.5-34.0' Laminated shale and sandstone 34.0-35.2' Red/green very fine-grained sandstone and siltstone with cross-bedding				BG	Run No. 2 Core Interval: 38.1-35.2' Recovery: 4.9/5.1' (96%) ROD: 2.1/5.1' (41%) Water Loss: 15 gal
40					35.2' Bottom of Boring					WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-20.2' 4" Steel Casing: +2.7-20.2' HQ Open Rock Hole: 20.2-35.2' BOB/BOW: 35.2'
45										
50										

Surface Elevation 532.97 Classified By KJR

Date Installed 10/20-10/25/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-3R

SHEET 2 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY
		1	2-3	1.6
			7-10	
		2	16-17	2.0
			19-15	
5		3	34-50/0.5	1.0
10				
15				
20				
25				

SOIL OR ROCK DESCRIPTION

Moderate to dk yel br SILT and vf/f SAND, with lenses of dusky yel green (5GY5/2) vf/sand, little to tr c/sand (rounded) and f/m gravel (R-SR, to 1/2"), moist. (STRATIFIED SAND)

As above, with tr c/gravel (SA, to 1-1/2") and m/c sand lens at 3.0' (angular, grey/black, micas and quartz), wet at 3.7'.

4.0' Dk red br SILT and vf/SAND with lenses and nodules of yel grey (5Y7/2) silt and vf/sand, tr f/m gravel (A-SA, to 1/2"), moist to wet, dense. (SANDY TILL)

5.0' TOP OF ROCK: 4" Steel Casing to 21.0'

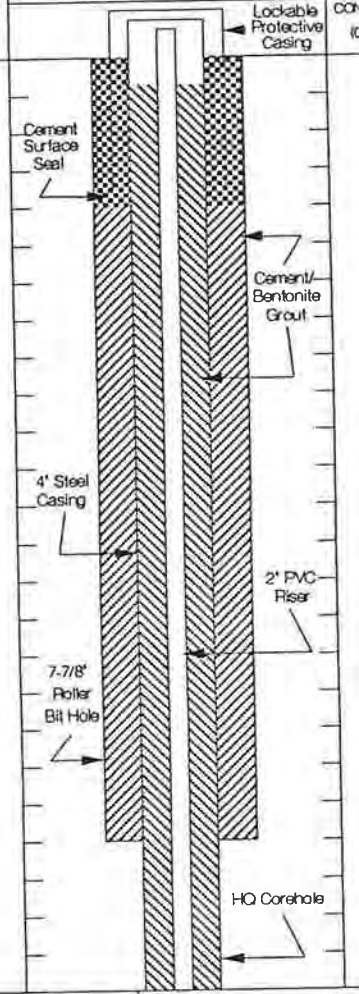
5.0' THOROLD SANDSTONE
Fine-grained sandstone; heavily bioturbated, with abundant Daedalus burrows. Maroon to pink with gray mottling. Bedding plane fractures at 5.5', 6.0', 6.5', 6.8', 7.0-7.4', 7.7', 8.0', and 8.4'.

8.5' GRIMSBY SANDSTONE
Interbedded fine-grained sandstone and soft, red, silty shale.

- 8.5-9.5' Interbedded sandstone and silty shale; bedding plane fractures at 8.7', 8.8' and 9.4'.
- 9.5-10.9' Fine-grained sandstone, bioturbated with Daedalus at 9.8-10.0'; highly broken and weathered.
- 10.9-12.0' Red silty shale; highly broken and weathered.
- 12.0-13.6' Fine sandstone, bioturbated, maroon with green mottling, highly broken and weathered.
- 13.6-14.3' Red silty shale, highly broken and weathered.
- 14.3-21.0' Fine-grained sandstone, bioturbated in thin beds. Shale partings at 15.4' and 15.5'. Mud seams at 17.0', 17.5' 17.9', 18.9', 19.2', 20.4', 20.7', and 20.8-21.0'. Shale parting at 19.3-19.4'. Prominant verticle burrow at 16.9-17.3'. Maroon with gray mottling.
- 21.0-23.3' Fine-grained sandstone, cross-laminated. Gray with red mottling. High angle fracture with black mineralization at 22.0-22.8'.
- 23.3-24.6' Interbedded red shale and fine sandstone.
- 24.6-26.6' Planar laminated fine sandstone with rounded brown shale interclasts at 24.8'.

WATER TABLE

MONITORING WELL CONSTRUCTION DETAILS



HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)
	0.5
	0.8
	0.7
	0.2
	0.7
	BG

NOTES

HNU readings are parts per million (ppm) above background (BG)
BG = 0.8 ppm.

5.0-21.0' HQ Coring followed by 7-7/8" Roller Bit; Install 4" steel casing at 21.0' with cement/ bentonite grout.

Run No. 1
Core Interval: 5.0-14.3'
Recovery: 8.75/9.3' (94%)
RQD: 2.81/9.3' (30%)
Water Loss: 0-5 gal

Run No. 2
Core Interval: 14.3-21.0'
Recovery: 6.7/6.7' (100%)
RQD: 4.19/6.7' (63%)
Water Loss: 50 gal

Run No. 3
Core Interval: 21.0-25.0'
Recovery: 3.6/4.0' (90%)
RQD: 1.42/4.0' (36%)
Water Loss: 10 gal

Surface Elevation 518.83 Classified By KJR
Date Installed 10/18-10/25/95 MPI Inspector KJR
Driller SJB SERVICES, INC.
Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-4DR
SHEET 1 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					26.6-27.3' Deep red silty shale. 27.3' DEVILS HOLE SANDSTONE (Equivalent) Pink to red with white mottling, very fine-grained sandstone. Planar to cross-laminated, Liesengang banding, very low porosity. Fractures healed with black mineralization. 27.3-31.8' Very fine sandstone, very hard, planar laminated, pink with light gray mottling; thin shale parting at 29.0'. 31.8-34.7' Very fine, cross-laminated sandstone, with well developed liesengang banding, negligable matrix porosity. Healed fracture at 32.6-33.2'. 34.7-35.3' Very fine sandstone, white with orange-brown stained climbing ripple sets, up to 1 cm. Ripple assemblage cross-cut by a deep brown shale interclast in fine-grained sandstone. Interclasts to 0.1' in diameter near top, disseminated and flattened near base. 35.3-41.0' Very fine-grained, planar laminated sandstone. Light gray with red mottling; small (<2-3 mm) brown shale interclasts at 36.3'. 41.0-41.8' Medium-grained, calcareous sandstone pitted with visible matrix porosity. 41.8-45.7' Fine to medium-grained, laminated to cross-bedded, pink sandstone with white mottling.		Cement/ Bentonite Grout 2" PVC Riser HQ Corehole Bentonite Seal #0 Morie Sand 2" PVC .01" Slot Screen		BG BG BG	Run No. 4 Core Interval: 25.0-35.0' Recovery: 9.9/10.0' (99%) RQD: 7.43/10.0' (74%) Water Loss: 20 gal Run No. 5 Core Interval: 35.0-45.0' Recovery: 9.8/10.0' (98%) RQD: 8.78/10.0' (88%) Water Loss: 25 gal Run No. 6 Core Interval: 45.0-50.0' Recovery: 5.0/5.0' (100%) RQD: 0.86/5.0' (17%) Water Loss: 75 gal
35										
40										
45					45.7' POWER GLENN SHALE (Equivalent) Fine to medium-grained calcareous sandstone, thinly bedded to laminated, poorly cemented with visible matrix porosity. Maroon to red with white mottling. Distinctive off-set bedding due to apparent cut and fill structures at 49.2-55.0'. Bedding plane fractures common, high angle fractures with black mineralization at 49.2-49.5' (pyrite), 51.1-51.5', 59.2-59.6', 53.2-53.6', and 53.8-54.5'.					
50										

Surface Elevation 518.83 Classified By KJR

Date Installed 10/18-10/25/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-4DR

SHEET 2 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU PPM	NOTES
55									BG	Run No. 7 Core Interval: 50.0-55.0' Recovery: 4.8/5.0' (96%) RQD: 1.45/5.0' (29%) Water Loss: 50 gal
60					58.0' WHIRLPOOL SANDSTONE (Equivalent) Medium-grained sandstone, pink with white mottling, massive, cross-bedded layers to 1 foot thick, brown shale clasts near base.		#0 Morie Sand; 2" PVC 0.010"Slot Screen; HQ Corehole		BG	Run No. 8 Core Interval: 55.0-60.0' Recovery: 5.0/5.0' (100%) RQD: 1.6/5.0' (32%) Water Loss: 50 gal
65					60.0' Bottom of Boring					WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-21.0' 4" Steel Casing: +2.7-21.0' Cement/Bentonite Grout: 0.0-44.7' Bentonite Seal: 44.7-47.7' #0 Morie Sand: 47.7-60.2' Screen: 49.7-59.7' BOW: 59.7' BOB: 60.2'
70										
75										

Surface Elevation 518.83 Classified By KJR

Date Installed 10/13-10/25/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

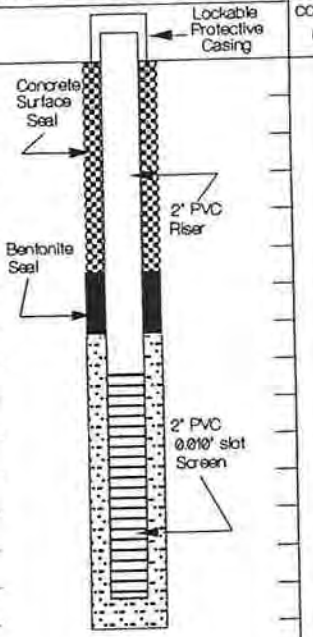
PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-4DR

SHEET 3 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
1–10				See GW-5R for Overburden Description.				BG	HNU readings are parts per million (ppm) above background (BG). BG = 0.7 ppm.
								BG	
								0.5	WELL CONSTRUCTION Concrete Surface Seal: 0.0-2.7 Bentonite Seal: 2.7-3.7 #0 Morie Sand: 3.7-7.7 Screen: 4.2-7.2' BOW: 7.2' BOB: 7.7
								0.4	
8				7.7' Bottom of Boring					

Surface Elevation 518.75 Classified By KJR

Date Installed 10/13/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-5S

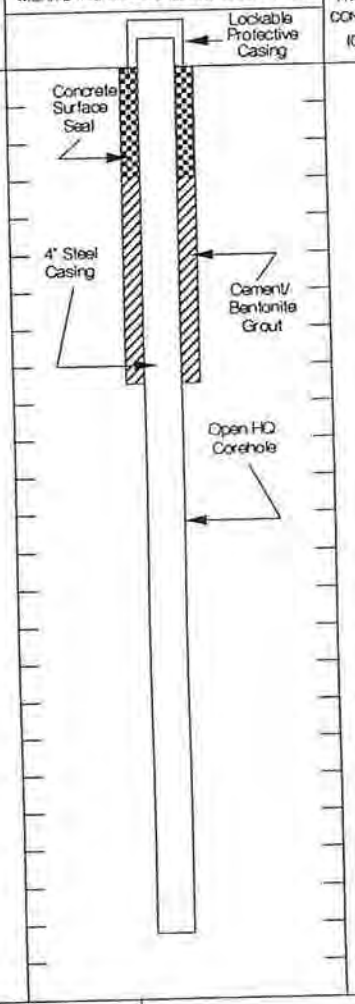
SHEET 1 OF 1

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION
0	1	1-2	1.9	Dark yel br with light olive br/greyish olive mottling SILT, and to some vf/sand, tr. c/sand and f/gravel (SR, to 1/4"), tr. organic matter, dry to moist.
		7-12		
	2	29-24	1.7	As above, becomes dense, laminar fabric defined by closely spaced parting surfaces and occasional thin, wispy silt layers. (TILL)
		30-30		4.0' Augered through boulder; gravel becomes f/m (SA-SR, to 1/2").
5	3	16-26	2.0	
		25-21		
	4	20-16	1.0	
		50/0.3		6.8' Colors above, SILT and to some CLAY, trace c/sand, dense, dry to moist; laminaar fabric defined by closely spaced parting surfaces, and occasional thin wispy silt layers.
				7.5' TOP OF ROCK: 4" Steel Casing to 8.5'
				8.5' THOROLD SANDSTONE
10				Pink to gray, heavily bioturbated, fine-grained sandstone. Daedalus burrows common. High angle fractures at 8.6-8.9', 11.3-11.8' Bedding plane fractures at 9.1-9.2', 10.5-10.7', 11.2-11.4'.
				10.5-10.7' Red, silty, broken shale
				11.1-11.4' Red, silty shale, extremely weathered
				12.1' GRIMSBY SANDSTONE
15				Interbedded dark red to light gray, medium hard, silty, fine-grained sandstone and medium soft silty shale. Shale partings typically <1-2 mm except as noted below. Bedding plane fractures at 13.1-13.2' and 15.5-16.5'. High angle fractures at 12.9-13.1', 14.5-14.9' (severely weathered).
				14.0' Shale interclasts in sandy matrix
				14.7-14.9' Vertical burrows in sandstone
				15.0' Shale interclasts in sandy matrix
				15.8' Shale interclasts
				16.2-16.5' Red silty shale
20				16.7' Shale interclasts
				18.0-18.7' Sandstone, heavily bioturbated w/ abundant shale clasts
				18.7-19.3' Red shale with interbedded siltstone
				19.3-20.5' Sandstone, planar to cross laminated, red with white mottling
				20.5-20.8' Red shale with interbedded siltstone
25				20.8-23.1' Maroon, bioturbated fine sandstone

WATER TABLE

MONITORING WELL CONSTRUCTION DETAILS



HYDRAULIC CONDUCTIVITY (CM/SEC)

HNU (PPM)
BG
BG
0.5
0.4
BG
BG

NOTES

HNU readings are parts per million (ppm) above background (BG).
BG = 0.7 ppm.

7.5-8.5' Auger borehole; Install 4" steel casing at 8.5' with cement/bentonite grout.

Run No. 1
Core Interval: 8.5-15.0'
Recovery: 6.4/6.5' (98%)
RQD: 3.1/6.5' (48%)
Water Loss: 50 gal

Run No. 2
Core Interval: 15.0-23.1'
Recovery: 7.6/8.1' (94%)
RQD: 3.2/8.1' (36%)
Water Loss: 50 gal

WELL CONSTRUCTION
Concrete Surface Seal: 0.0-3.0'
Cement/Bentonite Grout: 3.0-8.5'
4" Steel Casing: +2.7-8.5'
HQ Open Rock Hole: 8.5-23.1'
BOW/BOB: 23.1'

Surface Elevation 518.58 Classified By KJR
Date Installed 10/13/95 MPI Inspector KJR
Driller SJB SERVICES, INC.
Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

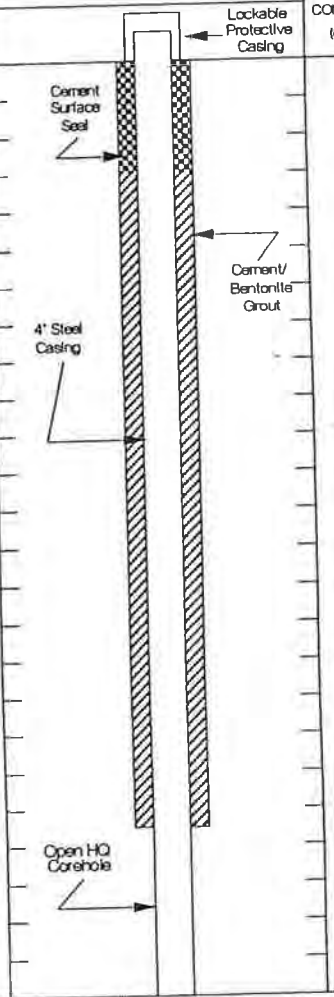
MALCOLM PIRNIE

LOCATION NO. GW-5R
SHEET 1 OF 1

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
		1	3-3	0.0	(FILL) 0.0-0.5' Dusky brown (5YR2/2) SILT and SAND, some organic matter. 0.5-1.5' GRAVEL (SA, to 2-1/2") "Track ballast" from abandoned trolley bed.			No Recovery	HNU readings are parts per million (ppm) above background (BG). BG = 0.8 ppm.
			2-1						
		2	1-3	1.7'	(STRATIFIED SAND) 1.5' Mod-dk yel br/lt gr olive vf/f SAND and SILT, little f/c gravel (SA-SR, to 1/2"; tr gravel to 1-3/4"), dry.			0.2	
			3-3						
5		3	2-3	1.0	F26.0' SILT, some to little vf/f sand, trace c/sand (rounded), trace f/gravel (SR-R, to 3/8"), dry. Note: At 8.5' little yel grey (5Y8/1) silt-size ash-like material embedded within silt and sand.			BG	5
			4-6						
		4	5-7	1.8	8.8' vf/f/SAND, some silt, tr f/m gravel (SR-R, to 3/4"), dry.			BG	
			10-12						
		5	4-8	2.0	9.2' SILT, trace to little vf-c/sand, tr clay, moist. (Note: grains of mica and quartz visible).			0.4	
			8-10		Grading to SILT and CLAY, with lenses of vf/f sand, moist.				
10		6	3-5	1.8	12.7-12.8' vf/f SAND lens, moist to wet.			0.3	10
			9-9						
		7	15-16	2.0	12.8' SILT, some to little vf/f sand, tr c/sand (rounded) and f/gravel (R-SR, to 3/8"), wet.			BG	
			22-24		(TILL) 13.2' Light to mod yel br (5Y5/6-5Y4/4) SILT, some to little clay, little f/c sand, tr f/m gravel (SR-SA, to 1/2"), some iron staining, dense, moist.			0.2	Split spoon refusal at 18.4'; noted weathered bedrock/soil while augering 18.4-19.5'.
		8	7-14	2.0	15.8' Becomes saturated, color change to dk red br/dk yel br/ greyish olive.	▼		0.2	15
			19-19		16.5' f/m GRAVEL (A, to 1", friable shale) and SILT, little to some vf/f sand, tr clay, moist.				
		9	23-24	2.0	17.2' vf/SAND and SILT, tr clay, tr f/m gravel (SA-A, to 3/8"), wet.			0.2	
			36-31		18.1' Dk red br f/m GRAVEL (A, siltstone/shale fragments), moist to dry.				
		10	50/0.4	0.4	19.5' TOP OF ROCK: 4" Steel Casing 20.5'			0.2	Auger borehole 19.5-20.5'; install 4" steel casing to 20.5' with cement/bentonite grout. 20
20					20.5' CAMBRIA SHALE Maroon fine silty sandstone with thin to laminated interbeds of red shale and siltstone. Calcareous sandstone near the top. Red shale at 20.5, 21.4, 22.0-21.0, 22.3-22.5, 23.1-23.3, 23.7 and 24.6 (broken and moderately weathered). High angle fracture at 21.2-21.4'.			BG	Run No. 1 Core Interval: 20.5-25.1' Recovery: 4.4/4.6' (96%) RQD: 19.5/4.6' (42%) Water Loss: 75 gal
					24.8' THOROLD SANDSTONE Red, mottled light gray, fine sandstone, heavily bioturbated. Bedding plane fractures common; high angle fracture at 26.0, 28.8-29.2'.				
25									25

MONITORING WELL CONSTRUCTION DETAILS



Surface Elevation 534.36 Classified By KJR

Date Installed 10/12-10/30/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-6R

SHEET 1 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					THOROLD SANDSTONE (continued) 24.8-26.2 Abundant Scolithus burrows 26.2-28.9' Heavy bioturbation, rare Daedalus 28.9-30.9' Abundant Daedalus burrows 30.9' GRIMSBY SANDSTONE Interbedded, dark red, silty, fine sandstone and silty shale. 30.9-32.0' Fine-grained silty sandstone with red-brown silty shale interbeds. Bedding plane fractures at 31.3' and 31.4'. Daedalus-bearing zone at 31.9-32.0'. 32.0-32.5' Medium-grained sandstone with thin shale partings. 32.5-35.5' Laminated to cross-laminated fine to very fine-grained sandstone. Red-brown grading to pink with light gray mottling. Brown shale clasts at 33.0'.		Open HQ Corehole		BG	Run No. 1 Core Interval: 20.5-25.1' Recovery: 4.4/4.6' (96%) RQD: 1.95/4.6' (42%) Water Loss: 75 gal Run No. 2 Core Interval: 25.1-35.5' Recovery: 9.45/10.4' (91%) RQD: 5.3/10.4' (51%) Water Loss: 150 gal WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-20.5' 4" Steel Casing: +2.7-20.5' HQ Open Rock Hole: 20.5-35.5' BOB/BOW: 35.3'
35					35.3' Bottom of Boring					
40										
45										
50										

Surface Elevation 534.36 Classified By KJR

Date Installed 10/12-10/30/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA, HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-6R

SHEET 2 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
5					See GW-7R for overburden description.	▼	Lockable Protective Casing; Concrete Surface Seal; 2" PVC Riser; Cement/ Bentonite Grout; Bentonite Seal; 2" PVC Ø.Ø1Ø"Slot Screen; #Ø Morie Sand		Ø.5	HNU readings are parts per million (ppm) above background (BG). BG = 1Ø ppm.
10									BG	
15									BG	
20					18Ø' TOP OF ROCK				BG	WELL CONSTRUCTION Concrete Surface Seal: ØØ-3Ø' Cement/Bentonite Grout: 3Ø-42' Bentonite Seal: 42-55' #Ø Morie Sand: 55-18Ø' Screen: 75-175' BOW: 175' BOB: 18Ø'
25									BG	

Surface Elevation 531.85 Classified By KJR

Date Installed 10/11/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7S

SHEET 1 OF 1

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY
0		1	2-3	1.2
			5-9	
		2	9-13	1.5
			10-13	
5		3	8-15	1.8
			8-20	
		4	21-29	1.9
			29-13	
		5	13-22	2.0
			24-26	
10		6	11-26	2.0
			31-48	
		7	20-41	2.0
			43-45	
		8	18-38	2.0
15			38-49	
		9	39-50/.3	
				0.8
20				
25				

SOIL OR ROCK DESCRIPTION

0.0-0.5' Dark yellow brown (10YR2/2)ORGANIC SILT, some f/m sand, moist.

0.5-2.0' Pale yel br (10YR6/2) to mod yel br (10YR5/4) vf/f/m SAND, some silt, trace c/gravel (SA, to 1-3/4"), moist.

2.0-3.5' Mottled mod yel br/pale yel br/ light olive grey (5Y5/2) vf/SAND and SILT, tr c/sand, moist.

3.5-4.0' Mottled lt ol grey/ mod yel br SILT, little f/c sand, little to trace yellow-grey ash-like material, dry to moist.

4.0-5.5' Mottled mod ol br (5Y4/4)/dk yel br SILT, some vf/m sand, trace f/gravel (SA-SR, to 1/2"), trace clay, dry to moist.

(SANDY TILL)

5.5' Mottled mod ol br/dk yel br vf/f SAND, some silt, trace f/gravel (SA-SR, to 1/2"), moist.

14.3' Becomes saturated; gravel increases with depth.

16.8' Split spoon refusal (gravel).

17.3' TOP OF ROCK 4" Steel Casing to 18.3'

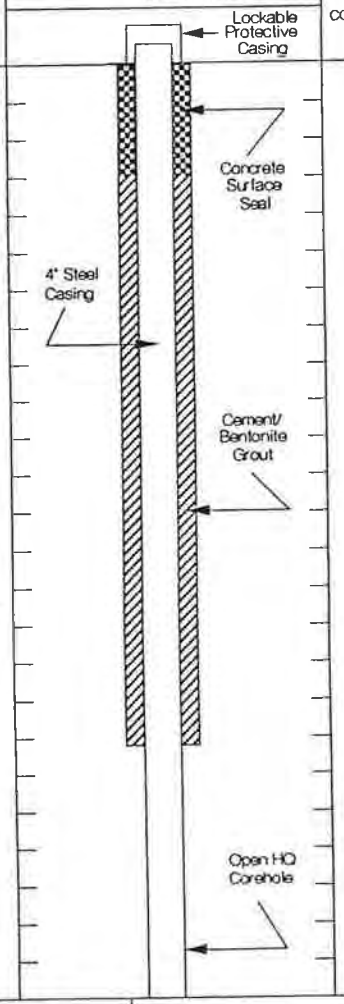
18.3' THOROLD SANDSTONE
Fine-grained sandstone, heavily bioturbated, red with white mottling; Scolithus burrows near top of core interval. Daedalus burrows near base.

23.8' GRIMSBY SANDSTONE
Medium hard, fine-grained sandstone with soft, silty shale interbeds. Dark red with gray to white mottling.

23.8-25.1' Sandstone with moderately weathered/broken shale interbeds.

WATER TABLE

MONITORING WELL CONSTRUCTION DETAILS



HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)
	0.5
	BG
	BG
	BG
	BG
	BG
	BG
	BG

NOTES

HNU readings are parts per million (ppm) above background (BG).
BG = 1.0 ppm.

Auger borehole 17.3-18.3'; install 4" steel casing at 18.3' with cement/bentonite grout

Run No. 1
Core Interval: 18.3-27.3'
Recovery: 8.55/9.0' (95%)
RQD: 7.17/9.0' (80%)
Water Loss: 10 gal

Surface Elevation 531.31 Classified By KJR
Date Installed 10/11-10/27/95 MPI Inspector KJR
Driller SJB SERVICES, INC.
Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7R
SHEET 1 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					GRIMSBY SANDSTONE (continued) 25.1-27.3' Fine sandstone, bioturbated with occasional Daedalus burrows and shale interclasts. 27.3-29.5' Planar laminated sandstone, pink with white mottling. 29.5-30.2' Shaley siltstone, maroon, soft. 30.2-33.3' Planar laminated sandstone, with occasional thin (<1 cm) shale partings and vertical burrows.		HQ Corehole			Run No. 2 Core Interval: 27.3-33.3' Recovery: 5.65/6.0' (94%) RQD: 3.18/6.0' 53%) Water Loss: 125 gal
35					33.3' Bottom of Borehole/Bottom of Well					WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-18.3' 4" Steel Casing: +2.7-18.3' HQ Open Rock Hole: 18.3-33.3' BOB/BOW: 33.3'
40										
45										
50										

Surface Elevation 531.31 Classified By KJR

Date Installed 10/11-10/27/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7R

SHEET 2 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
					See GW-7R for overburden description.		Lockable Protective Casing		0.5	
							Cement Surface Seal		BG	HNU readings are parts per million (ppm) above background (BG). BG = 1.0 ppm.
5							Cement/ Bentonite Grout		BG	
									BG	
							4" Steel Casing		BG	
10									BG	
							2" PVC Riser		BG	
									BG	
15									BG	
					18.0' TOP OF ROCK at GW-7DR Location. See GW-7R for rock description to 34.0'		7-7/8" Roller Bit Hole			Roller bit 18.0-34.0' inside temporary 8" casing; Install 4" steel casing at 34.0' with cement/ bentonite grout.
20										
25										

Surface Elevation 531.39 Classified By KJR

Date Installed 10/25-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7DR

SHEET 1 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					34.5' GRIMSBY SANDSTONE 34.5-34.7' Red shale, severely weathered 34.7-35.0' Planar laminated fine sandstone 35.0-37.3' Planar laminated sandstone with occasional vertical burrows. Red to pink with gray and green mottling. Weathered bedding plane fractures at 35.0, 37.2-37.4'. Vertical fractures with black mineralization at 36.4-37.3'. 37.3-38.4' Red silty shale, severely weathered 38.4-40.6' Planar laminated sandstone, with shale interclasts at 38.7' 40.6-40.7' Silty shale, severely weathered 40.7-41.2' Fine-grained sandstone 41.2-41.4' Dark red-brown shale, weathered 41.4-42.0' Planar laminated sandstone 42.0-42.1' Shale, weathered		4" Steel Casing 7-7/8" Roller Bit Hole Cement/ Bentonite Grout HQ Corehole 2" PVC Riser		BG	Run No. 1 Core Interval: 34.5-45.1' Recovery: 9.75/10.6' (92%) RQD: 5.2/10.6' (49%) Water Loss: 10 gal
35										
40					42.1' DEVILS HOLE SANDSTONE (Equivalent) Fine to very fine-grained, planar to cross laminated sandstone, pink, with lisengang banding. Hard, massive, with low visual porosity. 42.1-43.9' Planar laminated to cross laminated sandstone. Large (1-1/2" diam.) round, brown shale interclasts at 43.7-43.8'. 43.9-44.6' Medium-grained, calcareous sandstone with small (1/4-3/4") elongated shale interclasts. 44.6-45.2' Fine to very fine-grained sandstone, cross laminated with lisengang banding. 45.2-53.9' Planar laminated sandstone, green and red, minor cross-bedding, minor lisengang banding; mud seam at 47.6'. Shale interclasts in sand matrix at 47.7-47.8'. Vertical fracture with black mineralization at 47.8-47.9'. Elongated shale interclasts on bedding planes at 50.3-50.9'.				BG	Run No. 2 Core Interval: 45.1-55.1' Recovery: 10.0/10.0' (100%) RQD: 8.5/10.0' (85%) Water Loss: 15 gal
45										
50										

Surface Elevation 531.39 Classified By KJR

Date Installed 10/25-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7DR

SHEET 2 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
55					53.9' POWER GLENN SHALE (Equivalent) Thin-bedded, calcareous, fine to medium-grained sandstone. Broken along bedding plane fractures. Pitted with visible porosity. Red-brown with orange tint. Cross bedding with apparent cut and fill structures.		2" PVC Riser; Cement/ Bentonite Grout; Bentonite Seal; #0 Morie Sand; 2" PVC 0.010" Slot Screen; HQ Corehole		BG	Run No. 3 Core Interval: 55.1-65.1' Recovery: 10.0/10.0' (100%) RQD: 1.1/10.0 (11%) Water Loss: 20 gal
60										
65									BG	Run No. 4 Core Interval: 65.1-73.1' Recovery: 8.0/8.0' (100%) RQD: 3.93/8.0 (49%) Water Loss: 40 gal
70					71.7' WHIRLPOOL SANDSTONE Massive, cross-laminated fine-grained sandstone. Pink to white.					WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-34.0' 4" Steel Casing: +2.7-34.0' Cement/Bentonite Grout: 0.0-57.6' Bentonite Seal: 57.6-60.6' #0 Morie Sand: 60.6-73.1' Screen: 62.6-72.6' BOW: 72.6' BOB: 73.1'
75					73.1' Bottom of boring					

Surface Elevation 531.39 Classified By KJR

Date Installed 10/25-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-7DR

SHEET 3 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
5					See GW-8R for overburden description		Lockable Protective Casing; 2" PVC Riser; Concrete Surface Seal; Cement/ Bentonite Grout; Bentonite Seal; #0 Morie Sand; 2" PVC 0.01" Slot Screen		1.2	HNU readings are parts per million (ppm) above background (BG). BG = 1.0 ppm.
									BG	
10					10.5' TOP OF ROCK				1.2	
									0.2	
									BG	
15										
20										
25										

WELL CONSTRUCTION

Concrete Surface Seal: 0.0-2.0'
Cement/Bentonite Grout: 2.0-2.9'
Bentonite Seal: 2.9-3.9'
Sand Pack: 3.9-10.5'
Screen: 5.0-10.0'
BOW: 10.0'
BOB: 10.5'

Surface Elevation 530.78 Classified By KJR

Date Installed 10/10/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" Hollow Stem Augers

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-8S

SHEET 1 OF 1

is obtained. In addition, measure the temperature of the buffer solutions, and adjust the temperature setting of the meter accordingly. Typically, pH 4.0, 7.0 and 10.0 buffers will be used for calibration purposes. Two-point calibrate the meter in the field at the beginning and end of each group of measurements. Select the two points to bracket the range of expected field measurements. The narrowest range possible is desired to maximize accuracy.

4.0 MAINTENANCE

1. When not in use, or between measurements, keep the pH probe immersed in or moist with buffer solution.

2. Check the meter batteries at the end of each day and recharge when needed.

3. Replace the pH probe any time that the meter response time becomes greater than two minutes or the metering system consistently fails to retain its calibrated accuracy for a minimum of ten sample measurements.

4. If a replacement of the pH probe fails to resolve instrument response time and stability problems, the equipment officer will send the instrument to its manufacturer for maintenance and repair.

5. Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

5.0 DATA VALIDATION

Document all instrument calibrations in the field notebook, indicating the meter readings before and after the meter has been adjusted. Also document the pH buffers used to calibrate the meter. This is important, not only for data validation, but also to establish maintenance schedules and component replacement.

Appendix ____: Item _____ - _____TURBIDITY MEASUREMENT _____

Applicability: TREATABILITY STUDY Revision No.: 1 Date: 5/10/90

Prepared By: MMY Date: 12/19/89 Approved By: KLB Date: 12/26/89

1.0 INTRODUCTION

Limitations and specific procedures for turbidity measurement will vary according to the model of turbidimeter employed. General points concerning turbidity measurement are presented herein. For more specific instructions, refer to the operating manual for the individual turbidimeter and publications listed in the References section of this SOP.

2.0 EQUIPMENT

- laboratory turbidimeter
- sample cells for the appropriate turbidimeter. Cells to be used should be clean and free from scratches.
- turbidity standards to calibrate the instrument.

3.0 CALIBRATION

Calibration of a turbidimeter is discussed in the SOP for "Turbidimeter Maintenance and Calibration".

4.0 PROCEDURE

1. Rinse pipettes, syringes and sample cell between samples using deionized water.

2. Use the same turbidity cell for all samples. Orient the cell in the same direction each time it is placed in the turbidimeter. Lens paper is recommended for final cleaning of the outside of the cell just prior to placement into the turbidimeter.

3. Carefully pour sample into the turbidity cell immediately before measuring the turbidity. There should be no visible bubbles in the turbidity cell. If more than a minute passes between the time a sample is collected and it is poured into the cell, it will be necessary to gently swirl the sample before adding it to the turbidity cell to ensure homogenous suspension of solids in the sample solution.

5.0 DATA INTERPRETATION

In most cases, interpretation of turbidity measurements is straight-forward. However, if the readings appear to be lower than the sensitivity range of the instrument, it will be difficult to confidently evaluate results. The following changes may then be considered:

- use a more sensitive turbidimeter
- increase the sampling depth in the jar test container
- decrease the settling period

REFERENCES

1. Procedure Manual For Selection Of Coagulant, Filtration, and Sludge Conditioning Aids in Water Treatment. American Water Works Association Research Foundation (1986).

2. Standard Methods For The Examination Of Water And Wastewater. American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

3. Introduction To Water Quality Analyses. American Water Works Association (1982).

4. Methods For Chemical Analysis Of Water And Wastes. U.S. EPA. EPA-600/4-79-020, Revised March 1983.

2264-003/093

Appendix ____: Item _____ - CALIBRATION OF PORTABLE FIELD THERMOMETER

Applicability: GENERAL Revision No.: _____ Date: _____

Prepared By: RLD Date: 8/25/92 Approved By: RHF Date: 8/25/92

1.0 INTRODUCTION

This guideline presents a method for checking the calibration and accuracy of a Portable Field Thermometer. Normally, temperature measurements may be made with any good mercury-filled Celsius thermometer. For field operations use a thermometer having a metal case to prevent breakage.

2.0 ACCURACY

As a minimum, the thermometer should have a scale marked for every 0.1 °C, with markings etched on the capillary glass. The thermometer should have a minimal thermal capacity to permit rapid equilibration.

3.0 CALIBRATION

Twice annually check the thermometer against a precision thermometer certified by the National Institute of Standards and Technology (NIST) that is used with its certificate and correction chart.

2264-003/om.100

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY
		1	1-3	1.3
			4-5	
		2	5-7	1.0
			10-16	
		3	5-10	1.5
			12-15	
		4	12-16	1.7
			17-22	
		5	14-18	1.2
			50/.2	
		6	50/.1	0

SOIL OR ROCK DESCRIPTION

(STRATIFIED SAND)
0.0-1.0' Dusky brown (5YR2/2) SILT, some f/m sand, little organic matter, moist.
1.0-2.0' Moderate to dark yellow brown (10YR5/4-10YR4/2) f/SAND, little silt, tr. f/gravel (to 3/8"), moist.

(SANDY TILL)
2.0-6.0' Moderate yel br (10YR5/4) to greyish olive (10Y4/2) to light olive grey (5Y5/2) SILT interbedded with vf/f sand, tr. to some clay; colors mottled with occas. iron staining, wet at 6.0'.

Mod yel br vf/f SAND, some to little silt, trace f/gravel (SR-SA, to 1/2"), wet at 6.0'.

Light ol grey vf/SAND and SILT (becomes SAND with little silt at 9.0'), trace f/gravel (SR-SA, to 3/8"), wet.

10.0 TOP OF ROCK: 4" Steel Casing to 11.3'

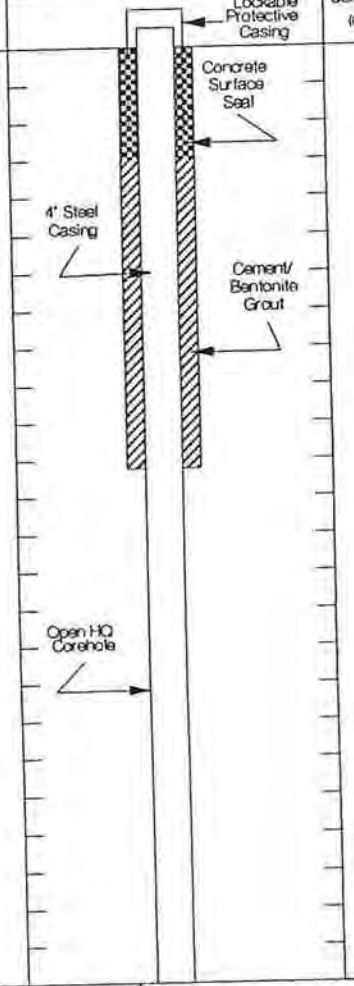
11.3' KODAK SANDSTONE
Fine-grained sandstone, heavily bioturbated with vertical burrows occasionally Daedalus. Red-brown with light grey mottling.

12.4' CAMBRIA SHALE
Soft, red, silty shale with interbedded fine-grained silty sandstone.
12.4-15.3' Soft, silty shale, occas. vertical burrows, laminated bedding where not bioturbated. Calcareous nodules at 13.0-13.4'
15.3-16.8' Fine-grained sandstone, maroon, Daedalus-bearing.
16.8-21.2' Soft, silty shale.
21.2-22.1' Fine-grained sandstone, Scolithus burrows at 21.2-21.6'
22.1-23.8' Red, silty shale.
23.8-24.2' Fine-grained sandstone.
24.2-24.3' Silty shale.

24.3' THOROLD SANDSTONE
Fine-grained sandstone, heavily bioturbated, abundant Scolithus burrows. Grey with red mottling. Contact with Cambria marked by absence of shale.

WATER TABLE ▼

MONITORING WELL CONSTRUCTION DETAILS



HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)
	1.2
	BG
	1.2
	0.2
	BG
	BG
	BG

NOTES

HNU readings are parts per million (ppm) above background (BG).
BG = 1.0 ppm.

Auger borehole 10.0-11.3'; install 4" steel casing at 11.3' with cement/bentonite grout.

Run No. 1
Core Interval: 11.3-20.3'
Recovery: 8.0/9.0' (89%)
RQD: 7.15/9.0' (79%)
Water Loss: 25 gal

Run No. 2
Core Interval: 20.3-26.3'
Recovery: 5.7/6.0' (95%)
RQD: 2.2/6.0' (37%)
Water Loss: 40-50 gal

Surface Elevation 530.68 Classified By KJR
Date Installed 10/10-10/16/95 MPI Inspector KJR
Driller SJB SERVICES, INC.
Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-8R
SHEET 1 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					26.3' Bottom of Boring		Open HQ Corehole			WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-11.3' 4" Steel Casing: +2.7-11.3' HQ Open Rock Hole: 11.3-26.3' BOB/BOW: 26.3'
35										
40										
45										
50										

Surface Elevation 530.68 Classified By KJR

Date Installed 10/10-10/16/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

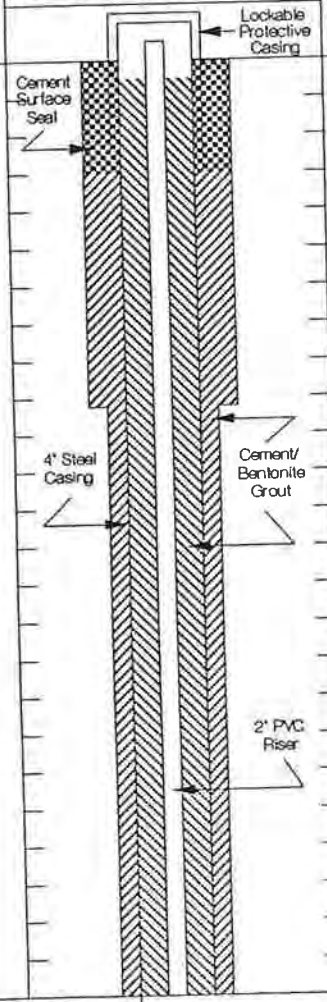
LOCATION NO. GW-8R

SHEET 2 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	HNU (PPM)	NOTES
0					See GW-8R for overburden description.		12	HNU readings are parts per million (ppm) above background (BG). BG = 1.0 ppm.
							BG	
5							12	
							02	
							BG	
10					9.3' TOP OF ROCK; 4" Steel Casing to 26.5'			Roller bit 9.3-26.5' inside temporary 8" casing; install 4" steel casing to 26.5' with cement/ bentonite grout.
					See GW-8R for rock description to 26.5'			
15								
20								
25								

MONITORING WELL CONSTRUCTION DETAILS



HYDRAULIC CONDUCTIVITY (CM/SEC)

Surface Elevation 530.68 Classified By KJR

Date Installed 10/16-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

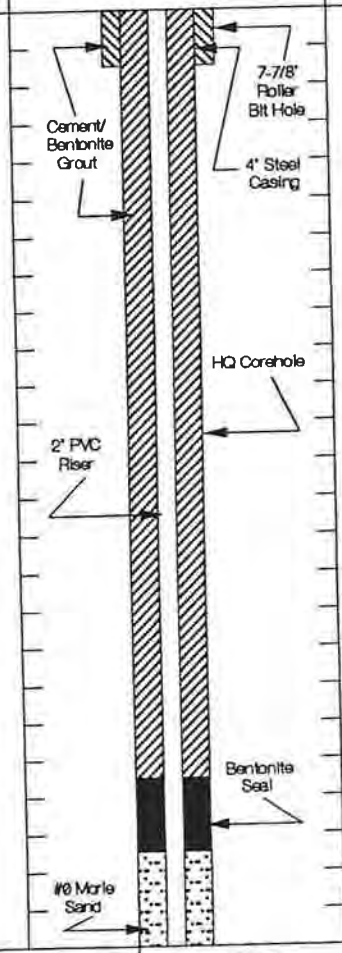
PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-8DR

SHEET 1 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
30					26.5' THOROLD SANDSTONE Fine to medium-grained sandstone, pink with light grey mottling, pitted core surface. 26.5-27.0' Scolithus burrows 27.0-27.5' Daedalus burrows 27.5' Shale interbed (<1 cm) 29.4' Shale interbed (<1 cm) 30.9' GRIMSBY SANDSTONE Fine-grained sandstone with interbedded soft, red, silty shale. 30.9-34.3' Alternating sandstone and silty shale interbeds, maroon with light grey mottling. Broken and weathered. Daedalus burrows at 32.7-33.1'. 34.3-37.4' Fine sandstone, red-brown, bioturbated. Shale parting at 35.9-36.3', weathered with low angle fracture. 37.4-38.2' Laminated red shale and siltstone. Severe weathering 38.2-40.5' Planar laminated, fine-grained sandstone, pink to red with grey mottling. Cross-bedding near base. Bioturbated at base of interval. 40.5-41.2' Red, silty shale with sandstone interbeds (<1 cm). 41.2-43.1' Fine-grained, pink to red sandstone, brown shale interclasts at 41.9-42.0', vertical burrows at 42.4-43.1'. 43.1-43.8' Red shale with sandstone interbeds, red with green mottling, convoluted bedding. 43.8-46.0' Ripple-laminated, fine-grained sandstone, pink, with abundant disseminated small brown shale interclasts (1-2 mm). 46.0-47.2' Red-brown shale with sandstone interbeds. 47.2' DEVIL'S HOLE SANDSTONE (Equivalent) Fine to very fine-grained sandstone, hard, planar laminated, pink to light grey. Lisengang banding common, low visual porosity. 47.2-48.1' Planar-laminated, fine sandstone, red to pink with green grey mottling. Occasional, thin, red-brown shale interbeds, green shale interclasts on bedding or laminae surfaces. 48.1-48.3' Large (0.1' diam.), brown shale interclasts, rounded, in red sandstone matrix, with tabular shale interclasts (1-2 mm) 48.3-50.2' Planar laminated, fine sandstone, red with white mottling and green streaks.				BG BG BG	Run No. 1 Core Interval: 26.5-35.3' Recovery: 8.8/8.8' (100%) RQD: 3.5/8.8' (40%) Water Loss: 10 gal HNU: Background Run No. 2 Core Interval: 35.3-45.1' Recovery: 9.8/9.8' (100%) RQD: 4.9/9.8' (50%) Water Loss: 50 gal HNU: Background
35										
40										
45										
50										

Surface Elevation 530.68 Classified By KJR

Date Installed 10/16-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO. GW-8DR

SHEET 2 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SOURCES: SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
55				DEVILS HOLE SANDSTONE (continued) 652-657' Fine to very fine-grained sandstone; hard, smooth core surface. Trough cross-bedding, rare shale interclasts; red-brown shale interclasts at 656-658'. Small tabular (<1 cm) shale clasts on bedding planes at 654.1-654.3', green shale parting (<1 cm) at 656'. 657-658' Fine to medium-grained, calcareous sandstone, pitted;some matrix porosity visible, small (1-2 mm diam) shale clasts on bedding planes. Grading downward to dark brown, wavy laminations. 658-665' Fine to medium-grained sandstone, planar laminated, pink with light gray mottling, rare shale clast. Healed vertical fracture with black mineralization at 658-661'. Calcareous, medium-grained sandstone interbed, dark red-brown with pitted surface at 662-664', 668-647, and 645-645'.		2" PVC 0.010" Slot Screen #8 Morie Sand HQ Corehole		BG	Run No. 3 Core Interval: 453-655' Recovery: 8.1/10.0' (82%) RQD: 6.65/9.0' (81%) Water Loss: 309 gal
60								BG	Run No. 4 Core Interval: 558-655' Recovery: 9.66/10.0' (97%) RQD: 8.53/10.0' (85%) Water Loss: 43 gal
65									WELL CONSTRUCTION Concrete Surface Seal: 0.0-3.0' Cement/Bentonite Grout: 3.0-26.5' 4" Steel Casing: +2.7-25.5' Cement/Bentonite Grout: 25.5-58.5' Bentonite Seal: 58.5-62.5' #8 Morie Sand: 62.5-65.0' Screen: 64.5-64.5' BOW: 64.5' BOB: 65.0'
70									
75									

Surface Elevation 688.08 Classified By KJR

Date Installed 10/16-10/31/95 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 8-1/4" HSA; 7-7/8" Roller Bit; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

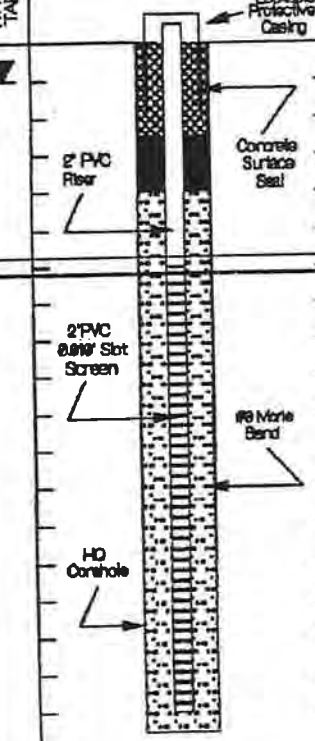
MALCOLM PIRNIE

LOCATION NO. GW-8DR

SHEET 3 OF 3

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	HYDRAULIC CONDUCTIVITY (DM/SEC)	HNU PPM	NOTES
5		1	1-1	15	Mod yel br SILT, some f/sand, little to trace c/sand, trace f/c gravel (SA, to 3/4"), wet at 1.8'.	▼		12	HNU readings are parts per million (ppm) above background (BG). BG = 0.4 ppm.
			8-4		Grades to Dk yel br SILT, some to little f/m sand, little f/gravel (SR-SA, to 1/2"), trace clay, wet.			1.8	Auger borehole 2.8-4.2'; install temporary 4" steel casing at 4.8' with cement/bentonite grout; 4" casing removed during well installation.
		2	6-50/0.4	0.9	2.9' TOP OF ROCK; 4" Steel Casing to 4.8'				
					2.9' THOROLD SANDSTONE Fine-grained sandstone, heavily bioturbated, maroon to pink with gray to green motting. Very broken and weathered, core block at 8.9'.				Run No. 1 Core Interval: 4.2-6.8' Recovery: 0.6/2.7' (30%) RQD: 0.0/2.7' (0%) Water Loss: <10 gal
10					7.8' GRIMSBY SANDSTONE Medium hard, fine-grained sandstone with soft, silty shale interbeds. Dark red with green to gray motting. Very broken and weathered; cross-laminated near top of core interval. 9.3-10.0' Mud seam; poor recovery. 10-11.5' Interbedded dark red shale and siltstone, soft and very weathered. 11.5-13.2' Fine-grained sandstone and siltstone. 13.0-13.5' Soft, weathered, dark red shale. 13.5-15.1' Fine-grained sandstone and siltstone with occasional shale interbeds; very broken. 15.4-15.5' Weathered shale/mud seam. 16.4' Mud seam (core block) 16.9' Mud seam. 17.6' Grades to siltstone with occasional shale pebble interclasts (1/4").				Run No. 2 Core Interval: 8.9-15.1' Recovery: 6.9/6.2' (84%) RQD: 0.35/6.2' (4%) Water Loss: 10-20 gal
15									Run No. 3 Core Interval: 15.1-16.4' Recovery: 1.3/1.3' (100%) RQD: 0.35/1.3' (27%) Water Loss: 10-20gal
20									Run No. 4 Core Interval: 16.4-18.8' Recovery: 2.4/2.4' (100%) RQD: 0.35/2.4' (15%) Water Loss: 10-20gal
25					18.8' Bottom of Boring				WELL CONSTRUCTION Concrete Surface Seal: 0.0-2.5' Bentonite Seal: 2.5-4.8' #8 Morie Sand: 4.8-18.5' Screen: 5.8-18.8' BOW: 18.6' BOB: 18.5'



Surface Elevation 518.18 Classified By KJR

Date Installed 07/01-07/03/96 MPI Inspector KJR

Driller SJB SERVICES, INC.

Method 6-1/4" HSA; HQ Core

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

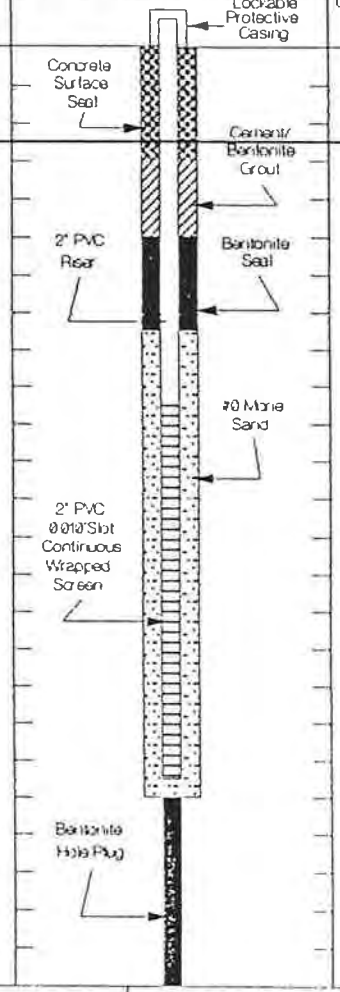
LOCATION NO. GW-9R

SHEET 1 OF 1

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	HYDRAULIC CONDUCTIVITY (CM/SEC)	HNU (PPM)	NOTES
		1	1-3	1.8	(COVER MATERIAL) 0.0 Brown f/m SAND, some silt, wet.				HNU/Headspace values were not measured.
			10-14		0.6' Reddish br SILT and GRAVEL, some f/sand, moist.				
		2	11-11	0.4	~~(WASTE/FILL)~~				
			8-7		2.0' Gray f/SAND and SILT mixed with WASTE, moist				
5		3	4-5	1.5	Brown f/m SAND mixed with paper WASTE, moist				
			4-3						
		4	3 3	1.2	WASTE mixed with reddish br gravel, wet				
			12-10						
		5	5-6	1.5	Brown f/m SAND mixed with layered WASTE; sand moist, waste wet				
10			6-7						
		6	4 3	0.0	No recovery (waste plug in end of spoon)				
			3 5						
		7	32-100/0.3		WASTE				
				0.2					
15		8	6-4	0.6	WASTE mixed with dark gray SILT and CLAY, moist to wet				
			3-3						
		9	5-7	1.2					
			13-14						
		10	8 9	1.5	(STRATIFIED NATIVE DEPOSITS) 18.3' Reddish br SILT and f/SAND, some clay, some f/gravel, moist to dry				
20			11-15						
		11	6-6	1.8	Reddish br SILT and CLAY, some f/sand, trace gravel, moist				
			7 9						
		12	9 9	1.8	As above, moist to wet, mottled orange and reddish br				
			11-12						
25		13	17-12	2.0	Brown f/m sand, moist, wet at 25.8'				

MONITORING WELL CONSTRUCTION DETAILS



Surface Elevation 501.39 Classified By DVF

Date Installed 11/01/95 MPI Inspector DVF

Driller SJB SERVICES, INC.

Method 6-1/4" Hollow Stem Augers

NOTE DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT: BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO LW-1

SHEET 1 OF 2

MONITORING WELL AND BOREHOLE SUMMARY SHEET

DEPTH (FEET)	SAMPLES	SAMPLE #	BLOWS	RECOVERY	SOIL OR ROCK DESCRIPTION	WATER TABLE	MONITORING WELL CONSTRUCTION DETAILS	HYDRAULIC CONDUCTIVITY (CM/SEC)	FIELD PPM
			11-10		Brown, f/m SAND, moist, wet at 25.8'.				
					26.0 Bottom of boring				

NOTES

WELL CONSTRUCTION

Concrete Surface Seal: 0.0-3.0'
Cement/Bentonite Grout: 3.0-5.0'
Bentonite Seal: 5.0-7.5'
#0 Morie Sand: 7.5-20.0'
Screen: 9.5-19.5'
BOW: 19.5'
BOB: 20.0'
Bentonite Hole Plug: 20.0-26.0'

Borehole augered to 20.0'; split spoon samples collected to 26.0', with bentonite used to backfill split spoon hole 20.0-26.0'

Surface Elevation 561.39 Classified By DVF
Date Installed 11/01/95 MPI Inspector DVF
Driller SJB SERVICES, INC.
Method 6-1/4" Hollow Stem Augers

NOTE: DATA ON THIS SUMMARY SHEET COMPOSITED FROM DRILLER'S LOGS, MPI-COLLECTED DATA AND FIELD OBSERVATIONS

PROJECT BROCKPORT LANDFILL REMEDIAL INVESTIGATION

MALCOLM PIRNIE

LOCATION NO LW-1
SHEET 2 OF 2

MALCOLM PIRNIE

ATTACHMENT B

STANDARD OPERATING PROCEDURES

Appendix ____: Item _____ - CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER

Applicability: GENERAL Revision No.: 1 Date: _____

Prepared By: THF Date: _____ Approved By: KLB Date: 12/18/90

1.0 INTRODUCTION

This procedure presents a method for calibration of the HACH Model 16800 Portable Turbidimeter. The turbidimeter is a portable instrument used to measure and provide a direct reading of the cloudiness or clarity of water samples. In order to ensure an accurate reading, the turbidity meter must be calibrated prior to use in the field.

2.0 ACCURACY

The calibrated accuracy of the turbidity meter will be within one percent of full-scale on all scale ranges.

3.0 CALIBRATION

All field test equipment must be calibrated at the beginning of each sampling day and checked and recalibrated according to the manufacturer's specifications [6NYCRR 360-2.11(a)(12)(v)(a)]. The turbidity meter will be two point calibrated by comparing the meter readings with the known values of zero and 0.9, nine (9), or ninety (90) NTU, depending on the meter scale to be used. The meter scale and two calibration points will be selected to bracket the range of field measurements.

The zero NTU check is obtained by operating the instrument without a sample in the cell holder. The other value (0.9, 9, or 90) check is obtained by comparing the instrument reading with the appropriate manufacturer prepared standard.

4.0 MAINTENANCE

1. Check the meter battery pack at the end of each day and recharge when needed.
2. When not in use, store the meter in a clean, dry area with the protective cover shut.
3. Clean the lens periodically with a dry cloth or tissue.
4. Maintain a log for each turbidity meter. All maintenance performed on the instrument will be recorded on this log with date and name of organization performing the maintenance.

5.0 DATA VALIDATION

All instrument calibrations will be documented, indicating the meter readings before and after adjustment. The calibration standard manufacturer and type will also be documented. Any problems or malfunctions occurring during the field use will be recorded and presented with the instrument readings obtained.

Appendix __: Item ____ - CALIBRATION AND MAINTENANCE OF PORTABLE CONDUCTIVITY METER

Applicability: GENERAL Revision No.: 2 Date: 2/23/98

Prepared By: THF Date: 12/29/89 Approved By: _____ Date: _____

1.0 INTRODUCTION

This guideline presents a method for checking the calibration of the Myron L Company DC4 portable field conductivity meter. The conductivity meter is factory calibrated and measures and provides a direct reading of the conductivity of a water sample. In order to ensure an accurate reading, the calibration of the conductivity meter must be checked prior to use in the field.

2.0 ACCURACY

The calibrated accuracy of the specific-conductance meter is within ±1 percent of full-scale, with repeatability of ±1 percent. The built in cell is automatically temperature compensated from 41° to 160°F (5° to 71°C).

3.0 CALIBRATION

The instrument has been calibrated by the manufacturer according to factory specifications. All test equipment must be field checked at the beginning of each sampling day using a calibration solution having a known specific conductivity and salinity. For maximum accuracy, use a Standard Solution Value closest to the samples to be tested. Check the factory calibration by turning the Range Switch to 20 mS. Test a sample of known conductivity. The Standard Solution should be discarded after use. If the reading

obtained does not agree with the known specific conductivity of the solution, proceed as follows:

- Clean the cell in accordance with the instruction manual. Rinse the cell thoroughly and re-test the Standard Solution.
- If the meter still does not indicate the correct value, recalibrate the meter.
- Calibration of the meter: Remove the bottom cover using fingernails or a small screwdriver to loosen the front or rear edge. Identify the calibration control (small dial within meter) so it can be adjusted while calibrating.
- Test another sample of the Standard Solution (be careful to not splash solution inside the meter).
- Adjust the Calibration Control until the meter displays the value that is on the Standard Solution label.
- If the above steps fail to adequately calibrate the meter, consult the manufacturer.

4.0 MAINTENANCE

1. Check the meter batteries at the end of each day and replace when needed.
2. Track the meter response time and stability to determine the need for instrument maintenance. When response time becomes greater than two minutes and the meter must be recalibrated more than once per day, send the instrument to the manufacturer for maintenance and repair.

3. Maintain a log for each specific-conductance meter. Record all maintenance performed on the instrument on this log with date and name of organization performing the maintenance.

5.0 RECORD

1. Maintain a record of all calibration readings for inclusion in the quarterly reports.

6.0 DATA VALIDATION

Document all instrument calibrations checks , indicating the meter readings before and after the meter has been adjusted. The standard solution used to calibrate the meter will also be documented.

Appendix ____: Item ____ - CALIBRATION AND MAINTENANCE OF AN EXPLOSIMETER/TOXIC GAS INDICATOR

Applicability: GENERAL Revision No.: _____ Date: _____

Prepared By: THF Date: 1/5/90 Approved By: _____ Date: 12/26/89

1.0 INTRODUCTION

This guideline presents a method for the calibration of an ENMET Model CGS-80 Tritector. The tritector is a portable field meter capable of monitoring atmospheric concentrations of oxygen, toxic gas (e.g. hydrogen sulfide) and combustible gas (e.g. methane). The tritector is factory calibrated, however it is necessary to check the factory calibration at a minimum of once every three (3) weeks in order to ensure maximum safety standards are upheld.

2.0 ACCURACY

Oxygen concentrations are measured in the range of 17 to 25 percent at an accuracy of ± 4%. Toxic gas concentrations are measured in the range of 10 to 20 ppm at an accuracy of ± 2 ppm. Combustible gas concentrations are measured over the range of 10 to 20 percent of the Lower Explosive Limit (LEL) at an accuracy of ± 2%.

3.0 CALIBRATION

Toxic and combustible gas calibration is checked in the following manner:

1. Remove the instrument back cover-plate.

2. Move the meter function switch to TOXIC and purge the sensors by holding the PURGE switch in the active position until all bars on the meter face disappear.

3. Fill the humidifier bottle (provided with the calibration kit) half-way with tap water.

4. Attach the calibration assembly to the toxic alarm level gas. Make sure the regulator valve is fully closed.

5. Turn the regulator valve on an let the gas flow at a moderate rate (bubbles flowing just a bit faster than can be counted) over the sensor for 4-5 minutes. Ignore the meter alarm at this point.

6. If the bars on the meter face do not stop at the 10 mark on the display, adjust the TOXIC gain pot. (see Figure 1, attached) with a small screwdriver so that the bars stop at the 10 mark.

7. With the gas still flowing, adjust the TOXIC alarm set pot. (see Figure 1) so that the unit alarms. Slowly turn it back to take it out of alarm, then dial back into alarm slowly. Leave the unit set so that it is just barely in alarm.

8. Remove the toxic alarm level gas. Toxic calibration is complete.

9. Move the meter function switch to COMB and attach the combustible alarm level gas. Adjust the flow rate (bubbles flowing just faster than can be counted) and let the gas flow over the sensor for 2-3 minutes.

10. If the bars or the meter face do not stop at the 20 mark on the display, adjust the COMB alarm gain pot. (Figure 1) so the bars stop at the 20 mark.

11. Immediately adjust the COMB alarm set pot. (see Figure 1) to bring the unit into alarm. Dial it back slowly, then back into alarm.

12. Turn the gas off and replace the back cover plate. Toxic and combustible calibration procedure is complete.

Oxygen gas calibration is checked in the following manner:

1. Remove the instrument back cover-plate.

2. Adjust the O_2 high adj. pot. (see Figure 1 attached) so the bars on the meter face go to 21.

3. Fill the humidifier bottle half-way with tap water and attach the 17% O_2 calibration gas. Allow the gas to flow over the sensor at a moderate rate (bubbles flowing just faster than can be counted) for 1-2 minutes.

4. Adjust the O_2 low adj. pot. (see Figure 1) so the bars indicate 17.

5. Remove the sensor cover; expose the cell to clean, fresh air for 2 minutes. Re-adjust the O_2 high adj. pot. to 21.

6. Repeat steps 3 through 5.

7. Push in and turn the O_2 CAL knob clockwise completely, then adjust the O_2 high adj. pot. so the bar graph reads 25.

8. Turn the O_2 CAL knob to 19.5. Adjust one O_2 alarm set pot. (see Figure 1) until the unit alarms. Dial it back out of alarm, then slowly back into alarm.

9. Turn the O_2 CAL knob back to 21. Oxygen calibration is complete. Replace the back-cover and the sensor cover.

4.0 MAINTENANCE

1. Place the instrument on charge for 24 hours before each day's use.

2. Purge the instrument before each use and at least once per week when not in use.

3. Replace O_2 toxic, and combustible cells once every 9-12 months.

4. Maintain a log for each tritector. Record all maintenance and calibrations performed on the meter along with the name of the individual or organization performing the task.

Appendix __: Item ____ - PROCEDURE FOR FIELD FILTRATION OF AQUEOUS METALS SAMPLES

Applicability: GENERAL Revision No.: 3 Date: 2/23/98

Prepared By: AJM Date: 02/23/90 Approved By: _____ Date: _____

1.0 INTRODUCTION

This guideline presents a method for filtering aqueous samples in the field for dissolved metals analyses. Filtering of the samples may be performed on-site provided the sample is filtered immediately after sample collection.

2.0 METHODOLOGY

1. Filter aqueous metals samples using a filter flask and funnel made out of polyethylene or boroscillicate glass. Pre-clean both the flask and the funnel by rinsing with a ten (10) percent nitric acid (HNO_3) solution followed by a thorough rinsing of demonstrated analyte-free deionized water. Use this cleaning procedure prior to filtration of all samples.

2. Samples for dissolved metals can also be filtered using an in-line field filter with a 0.45 micron pore size membrane filter. The filter can be attached directly to the discharge tube of a Well Wizard® airlift/bladder pump. If a bladder pump is not used, the sample can be poured into a precleaned, dedicated pre-filter bottle. A peristaltic pump or hand pump can be used to force the sample through the field filter.

3. Use a cellulose based membrane filter with a pore size of 0.45 microns (μm). Since the ultimate effect of the introduction of air to a water sample can be a change in the valence state of some cations which in turn could lead to the loss of analytes through precipitation (e.g., oxidation of ferrous ion to ferric ion after aeration), filter samples immediately after their collection. Pass samples through the filtration apparatus once. Repeated filtration of the sample to accommodate turbidity criteria is not allowed. Preserve samples immediately (if not pre-preserved) with undiluted ultra pure HNO_3 and check the pH to

ensure that a reading of less than 2 is attained. Add only enough HNO_3 to lower the pH to less than 2.

3.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), Division of Hazardous Substance Regulation, August 1989, RCRA Quality Assurance Project Plan Guidance.

Appendix B : Item 13 - WATER LEVEL MONITORING

Applicability: GENERAL Revision No.: _____ Date: _____

Prepared By: MKR Date: 11/20/89 Approved By: GHF Date: 11/22/89

1.0 INTRODUCTION

This guideline presents a method for obtaining water levels from monitoring wells/piezometers. The groundwater levels measured in the monitoring wells can be used to determine groundwater flow directions and when combined with hydraulic conductivity data, flow rates.

Water levels in monitoring wells should be measured using an electronic water level indicator which has been checked to ensure it is operational, prior to mobilizing to the field.

2.0 METHODOLOGY

1. Pre-clean water level probe and lower portion of cable following appropriate decontamination procedures.

2. Lower probe slowly into the monitoring well until the audible alarm, which indicates water, sounds.

3. Read depth from the graduated cable to the nearest 100th (0.01) of a foot using either the v-notched reference point on the well riser or the highest point on the well riser as a reference. Repeat the measurement for confirmation and record the water level in the Project Field Book or on a "Groundwater Levels" form (attached).

4. Remove the probe from the well slowly, drying the cable and probe with a clean tissue.

5. Replace well cap and lock protective cap in place. Repeat decontamination procedures if additional measurements are to be taken.

3.0 EQUIPMENT REQUIREMENTS

- personal protective garment and gear (if applicable)
- water level indicator
- tissues
- Project Field Book

4.0 REFERENCES

USEPA, September 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance Document, 9950.1

GROUNDWATER LEVEL LOG

SITE NAME: _____ PROJECT NO. _____

LOCATION: _____

Date												
Measurement By:												
Well No.	Reference Point (RP)	RP Elev. (ft.AMSL)	Depth BRP (ft.)	Time	Elev. (ft.AMSL)	Depth BRP (ft)	Time	Elev. (ft.AMSL)	Depth BRP (ft)	Time	Elev. (ft.AMSL)

BRP = Below Reference Point *TOC = Top of Casing* *TOR = Top of Riser* *GS = Ground Surface*

Appendix B : Item 11 - SAMPLING EQUIPMENT DECONTAMINATION PROTOCOLS

Applicability: NYSDEC-SPECIFICATION Revision No.: 3 Date: 10/9/90

Prepared By: AJM Date: 10/31/89 Approved By: KLB Date: 12/12/89

1.0 INTRODUCTION

This guideline presents a method for the decontamination of sampling equipment used in the collection of environmental samples.

2.0 HEALTH AND SAFETY

Nitric acid is a strong oxidizing agent as well as being extremely corrosive to the skin and eyes. Solvents such as acetone, methanol, hexane, and isopropanol are flammable liquids. Limited contact with skin can cause irritation, while prolonged contact may result in dermatitis. Eye contact with the solvents may cause irritation or temporary corneal damage. Safety glasses with protective side shields, neoprene or nitrile gloves, and long-sleeve protective clothing must be worn whenever acids and solvents are being used.

3.0 METHODOLOGY

1. All equipment used in sampling must be clean and free from residue of any previous samples. To accomplish this, the following procedures are to be followed:

    a. wash equipment thoroughly with non-phosphate detergent and tap water[1] using a brush to remove any particulate matter or surface film;

b. rinse with tap water[1];

c. rinse with a 10% HNO_3 solution[2];

d. rinse with tap water[1];

e. rinse with deionized water (demonstrated-analyte-free)[3];

f. air dry; and

g. wrap in aluminum foil (shiny side out)

2. Well evacuation equipment, such as submersible pumps and bailers, which are put into the borehole must be decontaminated following the procedures listed above. All evacuation tubing must be dedicated to individual wells, (i.e., tubing cannot be reused).

3. Bailer cord must be cleaned with non-phosphate detergent and demonstrated analyte-free deionized water before use. Cord can be reused; it is not necessary to dedicate it to individual wells. If a ten (10) foot or greater length leader is being used, only the leader need be cleaned (assumes bailer cord is not allowed to contact water).

4. All unused sample bottles and sampling equipment must be maintained in such a manner that there is no possibility of casual contamination.

4.0 EQUIPMENT REQUIREMENTS

- personal protective garment and gear

- brush, buckets, and wash basins
- squirt bottles
- supply of solvents and water
- aluminum foil

5.0 REFERENCES

New York State Department of Environmental Conservation, Division of Hazardous Substances Regulation, August 1989, RCRA Quality Assurance Project Plan Guidance.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, April 1, 1986. USEPA Region IV.

NOTES

(1) Tap water may be used from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute.

(2) Omit this step if metals are not being analyzed. For carbon steel split spoon samplers, a 1% rather than 10% HNO_3 solution should be used.

(3) Deionized water must be demonstrated to be analyte-free water. The criteria for analyte-free water are the Method Detection Limits (MDLs) for the analytes. Specifically for the common laboratory contaminants listed below, the allowable limits are set at three times the respective MDLs determined by the most sensitive analytical method:

1. Methylene Chloride
2. Acetone
3. Toluene
4. 2-Butanone
5. Phthalates

Appendix A: Item 1 - SAMPLE LABELLING

Applicability: GENERAL Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 INTRODUCTION

This guideline presents a method for sample labelling in order to properly identify environmental samples collected during the field investigation.

2.0 METHODOLOGY

1. Assign each sample of each matrix a unique identification alpha-numeric code. An example of this code and a description of its components is presented on the following page.

2. Affix a non-removable (when wet) label to each sample container. The following information should be written on the label with permanent marker:

   - Site name
   - Sample identification
   - Project number
   - Date/time of sample collection (month, day, year)
   - Sampler's initials
   - Sample preservation
   - Analysis required

3. Wrap the label with 2-inch cellophane tape such that the label is completely covered and the tape wraps around the entire perimeter of the bottle.

Appendix A : Item 1 - SAMPLE LABELLING

Applicability: GENERAL Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

Example of Sample ID: BA-MW1D

BA (Site Code) Buffalo Avenue	MW1 (Sample Location)
D (Monitor/Sample Type)	MW = Ground Water Installation (Well Location No. 1)
(S) Shallow	SS = Surficial Soil
(I) Intermediate	SB = Soil Boring (depth designation follows alpha code)
(D) Deep	TB = Trip Blank
	RB = Field (Rinse) Blank

2264-003/OM.055

Appendix A : Item 2 - SAMPLE SHIPPING

Applicability: GENERAL Revision No.: 3 Date: 5/10/90

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 INTRODUCTION

This guideline presents a method for chain-of-custody procedures to track sample shipments, to minimize loss or misidentification of samples, and to ensure that unauthorized persons do not tamper with collected samples.

2.0 METHODOLOGY

1. Fill out the chain-of-custody form completely (see attached example) with all relevant information (the white original goes with the samples and should be placed in a "ziploc" plastic bag and taped inside the sample cooler lid; the yellow copy should be retained by the sampler).

2. Mark liquid volume levels on sample bottles with grease pencil.

3. Place about 3 inches of inert cushioning material such as styrofoam peanuts or bubble pack in bottom of cooler. Place bottles in cooler with VOA vials (in a "ziploc" bag) in the center of the cooler.

4. Cover pack bottles, especially VOA vials, with ice in plastic bags. Pack cooler with blue ice in "ziploc" plastic bags and additional cushioning material.

5. Tape drain shut and wrap cooler completely with strapping tape to secure lid.

6. Place lab address on top of cooler. To protect the shipping coolers against tampering during shipment, the cooler lid will be taped to the cooler body. A chain-of-custody seal will be placed over the tape. A broken seal will indicate that the contents may have been tampered with.

7. For out-of-town laboratory shipments, specify that the contents are "Fragile" and place "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrow head pointing toward the cooler lid. "This Side Up" labels should not be affixed to the cooler lid or the cooler bottom.

Appendix __: Item ____ - WELL PURGING PRIOR TO SAMPLING

Applicability: GENERAL Revision No.: 3 Date: 1/28/94

Prepared By: MKR Date: 11/28/89 Approved By: GHF Date: 12/6/89

1.0 INTRODUCTION

This guideline presents methods for well purging prior to ground water sample collection in order to collect representative ground water samples. Purging involves the removal of at least three to five volumes of water in wells with moderate yields and at least one volume from wells with low yields (slow water level recovery). Sampling should commence as soon as the well has adequately recharged.

2.0 WELL PURGING METHODOLOGY

1. Unlock and carefully remove the well cover to avoid introducing foreign material into the well. Monitor the well for organic vapors using a photoionization detector (HNu), if applicable. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging.

2. Monitor well with an explosiometer. If readings greater than 25% LEL are detected, vent the well before proceeding with purging.

3. Check for floaters and sinkers with cotton attached to water level prior to purging. If floaters or sinkers are detected, notify NYSDEC.

4. Check for floaters and sinkers with cotton attached to water level meter prior to purging. If floaters or sinkers are detected, notify NYSDEC.

5. Calculate the volume of water in the well based on the water level below top of casing and the total depth of well using the following equation:

$V = 5.825\ I^2\ (D-W)$

V = one well volume (gallon)
I = inside diameter of well casing (feet)
D = Well Depth (feet)
W = Depth to Water from Top of Casing (feet)

6. For wells where the water level is 20 feet or less below the top of casing, use a suction-lift pump to purge the well. Measure the purged volume using a calibrated container and record measurements in a field notebook. Use dedicated new low density polyethylene tubing for each well. During this evacuation of shallow wells, the intake opening of the pump tubing should be positioned just below the surface of the water. As the water level drops, lower the tubing as needed to maintain flow. The intake level should not be lowered past the top of the screen. Pumping from the top of the water column will ensure proper flushing of the well. Continue pumping until the required volumes are removed. Adjust the purging rate to maintain the water level above the screen. For wells where the screen straddles the water table, maintain purging at a rate which matches the rate of recovery of the well (well yield). If the well purges to dryness and is slow to recharge (greater than 15 minutes), terminate evacuation.

7. For wells where the water level is initially below about 20 feet, or draw down to this level because of a slow recharge rate, conduct purging using one of three (3) devices:

- Bailer - A bottom-filling bailer with a leader made of teflon stainless steel wire or single-strand polypropylene monofilament of at least

10-feet long which is attached to a dedicated 1/4-inch nylon rope should be used.

- Air-Driven Purge Pump - This is a pneumatic pump that uses compressed air to push water to the surface. Ground water is in contact with the drive air during the pumping process, therefore the pump is not used for sampling. Drive air is fully contained within the pump apparatus.

- Waterra™ pump - This is a manually-operated pump which uses dedicated polyethylene tubing and a check valve, and can be used as an optional method for purging deeper wells or wells with a small inside diameter (viz. 1" piezometers). The pump and tubing can be dedicated to a well, but should be removed prior to sampling.

Prior to use in a well, the bailer, exterior pump bodies, and pump tubing should be cleaned using decontamination protocols specified for the program.

8. Purging methods must create the least possible turbidity in the well and must not lower the water in the well below the top of the sand pack whenever feasible.

9. Purging will continue until a predetermined volume of water has been removed. Measurements for pH, temperature, conductivity and turbidity should be recorded during purging. The stability of these measurements with time can be used to guide the decision to discontinue purging.

9. Well purging data should be recorded in the Project Field Book or on the attached "Well Development/Purging Log" form. 2264-003/OM.034

Appendix __: Item ____ - GROUNDWATER SAMPLING

Applicability: GENERAL Revision No.: __ Date: _____

Prepared By: MKR Date: 11/27/89 Approved By: GHF Date: 12/6/89

1.0 INTRODUCTION

This guideline presents a method for collecting a ground water sample after the monitoring well has been purged and has sufficiently recovered. Sampling should be carried out according to the following protocol:

2.0 METHODOLOGY

1. Perform sampling as soon as practical after purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. Analyses will be prioritized in the order of the parameters volatilization sensitivity. After volatile organics have been collected, field parameters must be measured from the next sample collected. If a well takes longer than 24 hours to recharge, the Project Manager should be consulted.

2. Following purging and recharging the well, collect samples into appropriate containers using a stainless steel or polytetrafluoroethylene (PTFE) bailer. The bailer should be equipped with a leader made of Teflon, stainless steel wires or single strand polypropylene monofilament of at least ten feet long which is attached to a new, dedicated 1/4-inch nylon rope. The bailer should be lowered slowly below the surface of the water so as to allow the water to touch only the "leader" and not the nylon rope. Prior to its use in the field, the stainless steel bailer and "leader" should be cleaned according to decontamination protocols specified for the program.

3. Prelabel all sample bottles in the field using a waterproof permanent marker. The following information should be included on the label:

   - Site name
   - Sample identification code
   - Project number
   - Date/time of sample collection (month, day, year)
   - Sampler's initials
   - Preservation added (if any)
   - Analysis to be performed

4. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added, and the samples placed in coolers for shipment to the designated laboratory. Chain of custody procedures should be adhered to upon sample collection.

5. Collect a separate sample of approximately 200 mls into an appropriate container to measure pH, conductivity, temperature and turbidity in the field.

6. Record well sampling data in the Project Field Book or on the attached "Water Sampling Field Data Sheet."

3.0 REFERENCES

(a) USEPA, September 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance Document.

2264-003/OM.035

Appendix B : Item 16 - SURFACE WATER SAMPLING

Applicability: GENERAL Revision No.: ___ Date: _____

Prepared By: RHO Date: 1/28/94 Approved By: ____ Date: _____

1.0 INTRODUCTION

This guideline presents a method for the collection of surface water samples. Sediment samples will be collected in conjunction with surface water samples if site-specific work plan requires. The most widely used method for collection involves a sampler consisting of an adjustable clamp attached to the end of a two or three piece telescoping aluminum tube that serves as the handle. The clamp is used to secure a precleaned laboratory sample bottle. Using the sample bottle for actual sampling eliminates the need for other equipment. This method also reduces the risk of introducing other variables into a sampling event.

2.0 METHODOLOGY

1. Assemble the sampler. Make sure that the sample bottle and the bolts and nuts that secure the clamp to the pole are tightened properly.

2. With proper protective garment and gear, take a grab sample by slowly submerging the sample bottle with minimal surface disturbance.

3. Collect samples from near shore unless boats are feasible and permitted. If water body is over three feet deep, check for stratification. Check each stratum for contamination using field parameters. Collect samples from each stratum

showing evidence of contamination. If no stratum shows contamination, collect a composite sample having equal parts of water from each stratum.

4. Retrieve the sampler from the surface water with minimal disturbance. (If sample bottles were not used for sample collection, carefully transfer the water samples to appropriate precleaned sample bottles).

5. Cap the sample bottle and remove from the sampler. Follow procedures for preservation, if required, and sample handling.

6. Dismantle the sampler and store in plastic bags for subsequent decontamination.

7. Record available information for the pond, stream or other body of water that was sampled, such as its size, location and depth in the Project Field Book. Approximate sampling points should be identified on a sketch of the water body.

3.0 REFERENCES

New Jersey Department of Environmental Protection, 1988, Field Sampling Procedures Manual: Bureau of Environmental Measurements and Quality Assurance CN 028, 414 p.

New York State Department of Environmental Conservation, October 1993, 6NYCRR Part 360, Solid Waste Management Facilities.

Appendix __: Item ____ - ____CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH METER

Applicability: ____GENERAL____ Revision No.: __1__ Date: __5/10/90__

Prepared By: _MMY_ Date: _12/22/89_ Approved By: KLB Date: __12/22/89__

1.0 INTRODUCTION

This guideline presents a method for calibration of a portable pH meter. The pH meter measures and provides a log scale reading of the hydrogen ion concentration of a water sample. In order to ensure an accurate reading, the pH meter must be calibrated prior to use in the field.

2.0 ACCURACY

The calibrated accuracy of the pH/Eh meter will be 0.1 pH unit, over the temperature range of -2°C to 40°C.

3.0 CALIBRATION

Calibrate all field test equipment at the beginning of each sampling day and check and recalibrate according to the manufacturer's specifications. Calibrate the pH meter by immersing the sensing probe in a container of certified pH buffer solution traceable to the National Bureau of Standards, and compare the meter reading to the known value of the buffer solution, which is stirred. If the reading obtained by the meter does not agree with the known value of the buffer solution, adjust the "standardize" control until the desired reading

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APPENDIX E

HEALTH AND SAFETY PLAN

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APPENDIX E

HEALTH AND SAFETY PLAN FOR OPERATION AND MAINTENANCE OF THE BROCKPORT LANDFILL SITE NO. 8-28-038

VILLAGE OF BROCKPORT TOWN OF SWEDEN, MONROE COUNTY, NEW YORK

DECEMBER 2000

MALCOLM PIRNIE, INC.

P. O. Box 1938
Buffalo, New York 14219

MALCOLM PIRNIE

APPENDIX E

HEALTH AND SAFETY PLAN FOR VILLAGE OF BROCKPORT BROCKPORT LANDFILL REMEDIAL MEASURES FINAL COVER SYSTEM CONSTRUCTION

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MALCOLM PIRNIE

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MALCOLM PIRNIE

We, the undersigned, being employed by the Village of Brockport, have read in full and understand this Health and Safety Plan:

Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date
Signature	Print	Date

MALCOLM PIRNIE

1.0 INTRODUCTION

1.1 GENERAL

This Health and Safety Plan (HASP) was prepared to address the specific health and safety practices and procedures associated with the maintenance of the final cover system and the general operation of the Brockport Landfill located in the Town of Sweden, Monroe County, New York. The HASP presents information and procedures, including the assignment of responsibilities, personnel protection requirements, work practices and emergency response procedures, for personnel who may be required on-site. This document is based on an assessment of potential health hazards at the site, using available historical information and environmental monitoring which was performed during the course of field activities.

All Village of Brockport employees involved with operation and maintenance activities at this site are required to comply with this HASP. Construction contractors and subcontractors involved with site operations will be required to provide a Health and Safety Plan equivalent or more stringent in scope to that presented in this plan. The Village of Brockport accepts no responsibility for the health and safety of personnel other than its employees.

Adherence to this HASP will be required for all personnel who enter the site. The Site Health and Safety Officer (or his designee) is identified below and will determine and enforce compliance.

- SITE HEALTH AND SAFETY OFFICER

  Name: Frederick E. Perrine
  Title: Superintendent of Public Works
  Telephone: (716) 637-1060

This HASP addresses the requirements set forth in the OSHA regulations contained in 29 CFR Parts 1910 and 1926. An emergency response plan has been included as

Attachment 2 to the HASP, and can be readily detached for use in the event of an emergency requiring site evacuation, medical treatment, etc.

1.2 BACKGROUND

The 36-acre Brockport Landfill site is located on East Canal Road in the Village of Brockport, Town of Sweden, Monroe County, New York (Figure 1-1). The site is bordered on the north by East Canal Road and on the south by wetland area and a railroad right-of-way. The New York State Barge Canal (Barge Canal) is less than 800 feet north of the site. An abandoned trolley roadbed bisects the municipal landfill portion of the site. A borrow pit is located southwest of the site. Otis Creek, an intermittent stream, flows northeasterly through the site toward the Barge Canal.

The site was operated by the Village of Brockport from 1950 to 1984 as a municipal waste disposal site. Industrial wastes were also disposed of at the site during some portion of this time period. The industrial waste allegedly disposed included of degreaser still bottoms and paint solvents between 1950 and 1967.

The site cotains two disposal areas. The main landfill, which accepted municipal waste from the Village of Brockport and the Town of Sweden, was closed and covered in 1984. More recently, the Village of Brockport utilized an area of about 2 acres located in the southern portion of the site (i.e., south of Otis Creek) to dispose of leaves, branches, stumps, and other refuse including construction and demolition debris. This area is no longer used and has also been closed.

The United States Environmental Protection Agency (USEPA) conducted studies at the landfill in the early 1980s. These studies were performed by NUS Corporation and consisted of a preliminary assessment in 1983 and a site investigation in 1984. The site investigation consisted of analyses of groundwater, surface water, sediments and leachate. During the site investigation, two residential wells were sampled in the vicinity of the site. Results of the analysis indicated that one well located approximately 700 feet north of the site, contained trichloroethene (TCE) at a concentration of 172 micrograms per liter (μg/L)

(NUS Corporation 1983; 1984). Public water was subsequently extended to both residences by the Village of Brockport.

Ecology and Environment Engineers, P. C. (E&E) performed a Phase II investigation of the site for the New York State Department of Environmental Conservation (NYSDEC) in 1990 and 1991. This investigation included the installation of six groundwater monitoring wells which showed sporadic occurrences of volatile organic compounds in groundwater. Inorganic compounds were also detected. Based on the results of the Phase II Investigation, the NYSDEC redesignated the site as Class 2, pursuant to Article 27, Title 13 of the Environmental Conservation Law (ECL) of the State of New York.

Larsen Engineers and Malcolm Pirnie performed a Remedial Investigation (RI) between October 1993 and November 1996, pursuant to an Administrative Order on Consent (dated May 3, 1995) and Article 52, Title 3 of the ECL. After completing the RI/FS, the NYSDEC issued a Record of Decision for the (ROD) for the site . Briefly, the selected remedial action plan includes the following:

- New landfill cap construction.
- Appropriate measures to limit access to the landfill.
- A long-term, comprehensive groundwater monitoring program to monitor effectiveness of the remedy.
- Landfill cap maintenance.

The Order On Consent and the ROD also require preparation and implementation of a Post-Closure Monitoring and Maintenance Plan.

Larsen Engineers entered into a contract with the Village of Brockport on November 24, 1997 to provide professional remedial design and other general environmental consulting services in connection with the implementation of the remedial program selected by the NYSDEC for the Brockport Landfill site. Malcolm Pirnie was contracted by Larsen Engineers to prepare the remedial design, provide construction administration services, and prepare the Post-Closure Operation and Maintenance (O&M) Plan for the site's remedial program.

1.3 OPERATION AND MAINTENANCE OBJECTIVES

The primary objective of the O&M is to provide information needed to effectively maintain and monitor the Brockport Landfill site (i.e., final cover system, gas vents) for the duration of the post-closure period.

1.4 SCOPE OF ACTIVITIES

Employees of the Village of Brockport or their contractors may be on-site to conduct any of the following activities:

- Inspecting the cap and surroundings.
- Sampling of groundwater.
- Mowing of grass and snow removal.
- Repairing and/or replacing cap material.

2.0 HAZARD EVALUATION

2.1 SUMMARY OF PROJECTED RISKS

Due to the presence of certain contaminants at the site, the possibility exists that workers will be exposed to hazardous substances during post-closure activities. The principal points of exposure would be through direct contact with surface water and/or groundwater. In addition, the possible use of large construction equipment on-site would also present conditions for potential physical injury to workers. Further, since work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing.

Although no work at a landfill site can be considered completely risk-free, logical and reasonable precautions can be implemented to provide an adequate level of protection for workers. The integration of medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, work zones and site control, appropriate decontamination procedures and contingency planning into the project approach minimizes the chances for unnecessary exposures and physical injuries.

2.2 CHEMICAL HAZARDS

As discussed in Section 1.2, waste handling activities conducted during the history of the site included the deposition of municipal and industrial wastes. Previous field investigations have provided information concerning the types of contaminants which may be encountered during inspection and maintenance activities. Table 2-1 identifies contaminants determined present during previous field investigations at the site. Potential contaminants include volatile organic compounds, heavy metals, and one pesticide. Heavy metals are generally not considered a health concern unless there is a potential for prolonged skin contact or ingestion. Since only limited potential exposure to heavy metals is anticipated during the course of post-closure activities at the site, heavy metals are not

TABLE 2-1
BROCKPORT LANDFILL POST-CLOSURE OPERATION AND MAINTENANCE

CONSTITUENTS ENCOUNTERED DURING RI ACTIVITIES[1]

Parameter	Groundwater Conc. Range (µg/L)	Surface Water Conc. Range (µg/L)	Leachate Conc. (µg/L)	Sediment Conc. Range (mg/kg)	Subsurface Soil Conc. Range (mg/kg)
ORGANICS:					
Benzene	7.6 - 9	ND	ND	ND	ND
Chlorobenzene	48 - 58	ND	ND	ND	ND
Chloroethane	5.9 - 28	ND	ND	ND	ND
Tetrachloroethene	1.1 - 6.5	ND	ND	ND	ND
Trichloroethene	1.1 - 170	ND	ND	ND	
Vinyl Chloride	3.8 - 15	ND	ND	ND	ND
PESTICIDES:					
Heptachlor	0.026 - 0.067	ND	ND	ND	ND
INORGANICS:					
Aluminum	165 - 8,460	11 - 193	3,040	5,150 - 12,900	2,380 - 9,430
Antimony	4.1 - 6.3	ND	ND	ND	ND - 1.0
Arsenic	5.4 - 51.5	ND - 8.2	ND	2.6 - 3.6	1.8 - 4.2
Barium	37.1 - 10,700	58.7 - 188	173	64 - 337	20.2 - 580
Copper	8.9 - 90	1.6 - 2.8	50.7	13 - 82.9	5.7 - 124
Lead	2.5 - 93.1	ND - 3.2	30.5	16.4 - 34.5	2.8 - 24.4
Manganese	21.5 - 2,800	2.2 - 21.5	393	183 - 574	118 - 525
Mercury	1.2 - 1.9	ND - 0.76	ND	ND	ND - 0.18
Silver	1.5 - 2.9	ND - 3.5	ND	1.1 - 3.4	ND - 5.1
Zinc	30.2 - 181	ND - 27.1	111	68.5 - 92.2	23.7 - 124

Notes:
(1) Constituents in the Health Risk Assessment of the 1997 Remedial Investigation Report

ND = Not Detected

considered to be target parameters. Table 2-2 lists toxicity and exposure data for the organic parameters or "contaminants of concern" identified in Table 2-1. Brief descriptions of the toxicology of these materials and related health and safety guidance and criteria are provided below.

- **Antimony** is a silver-white metal found in the earth's crust. It is released to the environment from natural sources and from industry. Because antimony is found naturally in the environment, the general population is exposed to low levels of it every day, primarily in food, drinking water, and air. Breathing high levels of antimony for a long time can irritate the eyes and lungs, and can cause heart and lung problems, stomach pains, diarrhea, vomiting, and stomach ulcers.

- **Arsenic** is a naturally occurring element and is usually found combined with one or more elements, such as, oxygen or sulfur. Inhalation is a more important exposure route than ingestion. First phase exposure symptoms include nausea, vomiting, diarrhea, and pain in the stomach. Prolonged contact is corrosive to the skin and mucus membranes.

- **Barium** may be used to make paint, bricks, tiles, glass and rubber. The health effects of the different barium compounds depend on how well the compound dissolves in water. Barium compounds that do not dissolve well in water are not generally harmful. Ingesting high levels of barium compounds that dissolve well in water over the short-term can cause problems with the heart, stomach, liver, kidneys and other organs. The effects of ingesting low levels of barium over the long-term are not known. Animal studies have found increased blood pressure and changes in the heart from ingesting barium over a long time.

- **Benzene** poisoning occurs most commonly through inhalation of the vapor, however, benzene can also penetrate the skin and poison in that way. Locally, benzene has a comparatively strong irritating effect, producing erythema (a diffused redness over the skin) and burning and, in more severe cases, edema (a condition in which the body issues contain an excessive amount of tissue fluid) and blistering. Exposure to high concentrations of the vapor (i.e., 3,000 ppm or higher) may result in acute (severe systems, short course) poisoning characterized by the narcotic (producing stupor or sleep) action of benzene on the central nervous system. In acute poisoning, symptoms include confusion, dizziness, tightening of the leg muscles, and pressure over the forehead. Chronic (long, drawn out) exposure to benzene (i.e., long-term exposure to concentrations of 100 ppm or less) may lead to damage of the blood-forming system. Benzene is very flammable when exposed to heat or flame, and can react vigorously with oxidizing materials.

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TABLE 2-2

BROCKPORT LANDFILL POST-CLOSURE OPERATION AND MAINTENANCE

TOXICITY DATA

Constituents of Interest	Inhalation Hazard		IDLH
	PEL	TLV	
Volatile Organic Compounds (ppm):			
Benzene	1	0.5	500 (Ca)
Chlorobenzene	75	10	1,000
Chloroethane	1,000	100	3,800 (LEL)
Tetrachloroethene	100	25	150 (Ca)
Trichlorethene	100	50	1,000 (Ca)
Vinyl Chloride	1	5	ND (Ca)
Pesticides: (ppm)			
Heptachlor	0.5	--	35 (Ca)
Inorganic Compounds: (mg/m^3)			
Antimony	0.5	0.5	50
Arsenic	0.01	0.01	5 (Ca)
Barium	0.5	0.5	50
Copper (fume)	-	0.2	100
Lead	0.05	0.05	100
Manganese	5	0.2	500
Mercury	(C) 0.1	0.025	10
Silver	0.1	0.1	10
Zinc (fume)	5	5	50

Notes:

PEL = Permissible Exposure Limit, established by OSHA, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week.

TLV = Threshold Limit Value, established by ACGIH, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week.

C = Ceiling Level equals the maximum exposure concentration allowable during the work day.

IDLH = Immediately Dangerous to Life or Health

Ca = NIOSH considers constituent to be a potential occupational carcinogen.

LEL = IDLH was based on 10% of the Lower Explosive Limit for safety considerations.

ND = IDLH has not yet been established.

- **Chlorobenzene** is moderately toxic by ingestion and is a strong narcotic with slight irritant qualities. Chlorobenzene may cause kidney and liver damage at high concentrations. A dangerous fire and explosion hazard exists when exposed to heat or flames. Chlorobenzene reacts vigorously with oxidizers.

- **Chloroethane** is a colorless gas with an ethereal, pungent odor and is flammable at ordinary temperature and pressure. Slight symptoms of toxicity may be exhibited after inhalation of 13,000 ppm. Stomach cramps, stupor and eye irritation may occur at greater concentrations.

- **Copper** dust can cause irritation of the upper respiratory tract, a metallic taste in the mouth, nausea, and in some cases, the discoloration of skin and hair. Ingestion of copper dust can irritate the nose, mouth and eyes, and cause headaches, dizziness, nausea, vomiting, and diarrhea.

- **Heptachlor** is a manufactured chemical and does not occur naturally. Pure heptachlor is a white powder that smells like camphor (mothballs). Exposure to heptachlor may occur through breathing or skin contact with soil. Heptachlor is toxic to humans and can damage the nervous system. Some human data on brief exposures to high levels showed that people who accidentally swallowed pesticide that contained heptachlor or spilled pesticide on their clothes became dizzy, confused, or had convulsions.

- **Lead** has many different uses especially in batteries, ammunition, metal products (solder and pipes), roofing and devices to shield X-rays. Children are especially sensitive to the effects of lead. Lead exposure has been shown to decrease intelligence (IQ) scores, slow growth, and cause hearing problems. In adults, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood.

- **Mercury** is used in thermometers, barometers, batteries, and to produce chlorine gas and caustic soda. Long-term exposure to either organic or inorganic mercury can permanently damage the brain, kidneys and developing fetuses. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing and memory problems.

- **Silver** is a rare and naturally occurring element in the environment. Prolonged exposure to silver compounds via ingestion or inhalation can cause some areas of the skin and other body tissues to turn gray or blue-gray. Exposure to dust containing silver may cause breathing problems, lung and throat irritation, and stomach pain.

ENTRY CHECKLIST	N/A	YES	NO
Entrants, Entry Supervisor, Attendant, Training Current	—		
Direct Reading Gas Monitor Current Calibration	—		
Safety Harness and Lifelines for Entrant and Standby Persons			
Hoisting Equipment with Fall Protection			
Powered Communications			
Escape Bottles - 5 Minute/10 Minute (ESCBA)			
Air Line System (Level B Entry)			
SCBA's for Emergency Response Personnel			
Hardhat, Goggles, Boots, Gloves, Disposable Outerwear	—		
Electric Equipment and Lighting Listed Class I, Division I, Group D			
Ventilation Fan, Hoses and Saddle			
Lockout/Tagout Materials			
Traffic Control Barriers/Cones (devices)			
First Aid and Infection Control Kit	—		

EMERGENCY RESCUE SQUAD:

Name: _____ Phone No. _____

Location: _____ Estimated Response Time: _____

_____

Sketch Confined Space - Ventilation Points - Monitoring Points

A copy of this document shall be referenced by the Confined Space Entry Team Prior to Entry.

Inspector Signature: _____ Date: _____

Project Manager: _____ Date: _____

c: Health and Safety Coordinator
Health and Safety, COR

MALCOLM PIRNIE

CONFINED SPACE ENTRY PERMIT

PERMIT No. 2173

DATE: _____

JOB NO. _____

Please refer to Pre-Entry Inspection Checklist.
Permit valid for duration of entry only. All copies of permit will remain at job site until job is completed.

Client: _____
Site location and description: _____
Purpose of Entry: _____
Supervisor: _____ Emp No _____

SHADED AREAS DENOTE MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY

Check & Initial Appropriate Response	Yes	No	N/A	Supv Init
ENGINEERING CONTROLS				
Lock Out/De-energize/Test				
Line(s) Broken-Capped-Blanked				
Ventilation				
Secure Area (Barriers/Danger Signs/Flags)				
Inert-Purge-Flush and Ventilate				
SAFETY EQUIPMENT				
Air Monitoring Equipment				
Full Body Harness w/"D" Ring				
Emergency Escape Retrieval Equip				
Lifelines				
Fall Protection				
Fire Extinguishers/First Aid Kit				
Lighting (Explosion Proof)				
Spark Resistant Tools				
Powered Communication (Intrinsically Safe)				

Check & Initial Appropriate Response	Yes	No	N/A	Supv Init
PERSONAL PROTECTIVE EQUIPMENT				
Safety Glasses				
Face Shield				
Chemical Goggles				
Hard Hat				
Gloves				
Boots				
Chemical Protective Clothing				
RESPIRATORY PROTECTION				
ESCBA Only				
APR w/ESCBA				
Airline w/ESCBA				
SCBA				
RESCUE SERVICES				
Emergency Response Team Notified				
Standby Rescue Personnel w/SCBA				

RECORD AIR MONITORING RESULTS PRIOR TO ENTRY. CONTINUOUSLY MONITOR THE ATMOSPHERE. RECORD READINGS AT LEAST EVERY TWO HOURS.

Air Monitoring Tests to be Taken	Permissible Entry Level (w/o Respiratory Protect)	Time: _____ Concentration	Time: _____ Concentration	Time: _____ Concentration	Time: _____ Concentration	Time: _____ Concentration
Percent Oxygen	**19.5 to 23.5%**					
Lower Flammable Limit	**Under 10%**					
Carbon Monoxide	**< 35 PPM+**					
Hydrogen Sulfide	**< 10 PPM+ *15 PPM**					
Hydrogen Cyanide	< *4 PPM (Skin)					
Hydrocarbons	< 1 PPM+ * 5 PPM					

* Short-term exposure limit. Employee can work unprotected in the area up to 15 minutes
\+ 8-Hr Time Weighted Avg. Employee can work unprotected in area 8 hours (Longer with appropriate Respiratory Protection.)

Air Monitor Model	Serial No	Calibration Date:
Air Monitor Model	Serial No	Calibration Date:
Air Monitor Model	Serial No	Calibration Date:

Attendants Name/Signature _____ Emp. Number _____ Attendant Training Date _____

Entrants Name/Signature _____ Emp. Number _____ Entrant Training Date _____

ALL OF THE ABOVE CONDITIONS ARE SATISFIED AND ALL PERSONNEL NOTIFIED

SUPERVISOR SIGNATURE _____
DATE: _____ TIME: _____

PERMIT CANCELLED

SUPERVISOR SIGNATURE _____
DATE: _____ **TIME:** _____

MALCOLM PIRNIE

APPENDIX E

HEALTH AND SAFETY PLAN

MALCOLM PIRNIE

1.0 INTRODUCTION

1.1 GENERAL

This Health and Safety Plan (HASP) was prepared to address the specific health and safety practices and procedures associated with the maintenance of the final cover system and the general operation of the Brockport Landfill located in the Town of Sweden, Monroe County, New York. The HASP presents information and procedures, including the assignment of responsibilities, personnel protection requirements, work practices and emergency response procedures, for personnel who may be required on-site. This document is based on an assessment of potential health hazards at the site, using available historical information and environmental monitoring which was performed during the course of field activities.

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Adherence to this HASP will be required for all personnel who enter the site. The Site Health and Safety Officer (or his designee) is identified below and will determine and enforce compliance.

- SITE HEALTH AND SAFETY OFFICER

  Name: Frederick E. Perrine
  Title: Superintendent of Public Works
  Telephone: (716) 637-1060

This HASP addresses the requirements set forth in the OSHA regulations contained in 29 CFR Parts 1910 and 1926. An emergency response plan has been included as

- **Tetrachloroethene** is a colorless liquid having a chloroform-like odor. Tetrachloroethene may be toxic via inhalation routes, prolonged or repeated contact with the skin, or when ingested by mouth. Exposures to concentrations above 200 ppm can cause irritation and burning of the eyes, nose, and throat. There may be vomiting, nausea, drowsiness, an attitude of irresponsibility and even an appearance resembling alcoholic intoxication. This material acts as an anesthetic through the inhalation of excessive amounts within a short time. Tetrachloroethene can cause dermatitis, particularly after repeated or prolonged skin contact.

- **Trichloroethylene (TCE)** is a common industrial solvent used primarily in dry cleaning and metal degreasing. Trichloroethylene exposure at levels of 200 ppm has been associated with mild behavioral and psychomotor effects, including vertigo, fatigue and headache. TCE is a suspected human carcinogen. The principal routes of potential personnel exposure to TCE are through inhalation of volatilized TCE and direct skin contact.

- **Vinyl Chloride** is a synthetic chlorinated organic chemical used in the manufacture of polyvinyl chloride (PVC). Its presence in site-specific circumstances may be attributable to breakdown of the halogenated aliphatic hydrocarbons TCE and 1,2-trans-dichloroethene to vinyl chloride. In high concentrations, vinyl chloride may cause reversible narcosis (an unconscious state) similar to alcohol intoxication. Skin contact with undiluted vinyl chloride results in frostbite by rapid evaporation and subsequent freezing. It is unlikely that these acute effects would be observed at the concentrations and site-specific exposure scenarios expected. Chronic exposure to vinyl chloride through inhalation has been associated with liver toxicity, fatty deposition in particular. Vinyl chloride is considered to be a suspect carcinogen.

- **Zinc** may be corrosive to the skin and mucus membranes. Aqueous solutions are extremely dangerous to the eyes. Zinc may produce sensitization of the skin. Ingestion may be associated with abdominal pain, vomiting, anemia, and pancreatic damage. Target organs may include the eyes, skin, respiratory system, and cardiovascular system. Inhaling large amounts of zinc (as zinc dust or fumes) may cause a specific short-term disease called metal fume fever (a syndrome resembling influenza).

With respect to the anticipated activities identified in Section 1.4, possible routes of exposure to the above-mentioned contaminants are presented in Table 2-3.

The use of proper respiratory equipment, as outlined in Section 7.0, will minimize the potential for exposure to airborne contamination. Further, exposure to contaminants through dermal and other routes will also be minimized through the use of protective

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TABLE 2-3

BROCKPORT LANDFILL POST-CLOSURE OPERATION AND MAINTENANCE

POTENTIAL ROUTES OF EXPOSURE TO CONTAMINANTS-OF-CONCERN

Activity	Direct Contact with Surface Water	Direct Contact with Groundwater or Leachate	Inhalation of Vapors
Clear, grub and regrade existing cover soils	X	X	X
Repair passive gas vents		X	X
Repair cover system			X
Perform finishing operations			X
Inspection of Cap	X	X	X
Groundwater Sampling	X	X	X
Cap Maintenance & Repair	X	X	X

clothing (Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 11.0).

2.3 PHYSICAL HAZARDS

Any repair or maintenance activities at the Brockport Landfill may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as backhoes and bulldozers.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 9.0).
- The potential for slip and fall injuries due to rough, uneven terrain.
- The potential for injury due to fire/explosion if methane gas is released during repair operations (see Section 8.0 for Environmental Monitoring Requirements).

These hazards represent only some of the possible means of injury which may be present during inspection, operation, maintenance, repair, and sampling activities at the Brockport Landfill. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

3.0 RESPONSIBILITIES OF SAFETY PERSONNEL

The following roles have been identified for Safety personnel:

Site Health and Safety Officer - The Site Health and Safety Officer is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include the development and enforcement of the specific provisions of this HASP, including the level of personnel protection to be employed, identification of emergency procedures, and personnel/equipment decontamination procedures. This individual will provide technical assistance on problems relating to industrial hygiene and site worker safety. This individual will monitor the personal exposures of employees to hazardous substances contained in air, soil or water during inspection activities.

Any health and safety briefings required during the post-closure period will be conducted by the Site Health and Safety Officer. Examples of briefings might include accident prevention, respirator refresher courses or current issues. The frequency of safety briefings will be based on the potential hazards specific to the designated work tasks and any new information relative to such hazards which are discovered during the project.

When unsafe work conditions are identified, the Site Health and Safety Officer is authorized to order site personnel to stop work.

4.0 MEDICAL SURVEILLANCE

Medical monitoring, including initial employment, annual and employment termination examinations are required of all employees whose work may result in potential chemical exposure or present unusual physical demands. Medical evaluations are to be performed by an occupational physician and include an evaluation of the workers' ability to use respiratory protective equipment (as per 29CFR 1910). The examination should include:

- Occupational history.
- Medical history.
- Medical review.
- Medical certification of physical requirements (sight, hearing, musculo-skeletal, cardiovascular) for safe job performance.
- Laboratory testing to include a complete blood count, white cell differential count, blood chemistry, and urinalysis.

The purposes of the medical evaluation are to: (1) determine fitness for duty on hazardous waste sites (such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination and an evaluation of the ability to work while wearing protective equipment); and (2) establish baseline medical data.

Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stresses.

In conformance with OSHA regulations, the employer will maintain and preserve medical records for a period of 30 years following termination of employment. Employees have access to the results of medical testing and to full medical records and analyses.

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5.0 EMPLOYEE TRAINING PROGRAM

All employees who may be exposed to hazardous substances, health hazards, or safety hazards must be adequately trained prior to engaging in any on-site work activities. At a minimum, such training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor (i.e., the Site Health and Safety Officer or his/her designee). This training can only be conducted by a qualified instructor and must be specifically designed to meet the requirements of OSHA Standard 29CFR 1910.120(e)(2). At a minimum, the initial 40-hour training course must include the following:

TOPICS

- OSHA/SARA/EPA/RCRA/HCS Requirements
- Decontamination of Personnel & Equipment
- Fire, Explosion & Accident Prevention
- Respiratory Protection Selection & Use
- Preparation of Health & Safety Plans
- Emergency Preparedness & Escape
- Protective Clothing Use & Selection
- Air Monitoring & Surveillance
- Work Practices to Minimize Risk
- Waste Site Safety
- Hazard Recognition
- Medical Surveillance
- Cold & Heat Stress
- Site Entry & Set-Up
- Permissible Exposure Limits
- Site Control & Work Zones
- Chemical & Physical Hazards
- Confined Space Entry

WORKSHOPS/EXERCISES

- Self-Contained Breathing Apparatus
- Air Monitoring Equipment Workshop
- Air Purifying Respirator Workshop
- Decontamination
- Qualitative/Quantitative Fit Test
- Level A/B Field Exercise
- Level B/C Field Exercise
- Air Tank Refilling Workshop

Records and certifications received from the course instructor documenting each employee's successful completion of the training identified above must be maintained on file in the employer's offices. Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not received adequate training and has been so certified is prohibited from engaging in on-site work activities that may involve exposure to hazardous substances, health hazards or safety hazards.

Periodic health and safety briefings may be conducted by the Site Health and Safety Officer for employees on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat/cold stress or the interpretation of newly-available environmental monitoring data are examples of topics which might be covered during these briefings.

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6.0 SAFE WORK PRACTICES

All employees shall conform to the following safe work practices during all on-site work activities conducted within the site fencing:

General:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice which increases the probability of hand-to-mouth transfer of contaminated material is strictly prohibited.

- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above. Each individual must shower as soon as possible after the removal of protective clothing, if any, and equipment after the completion of the daily field activities.

- Any required respiratory protective equipment and clothing **must** be worn by all personnel going on-site. Excessive facial hair (i.e., beards, long mustaches or sideburns), which interferes with the satisfactory respirator-to-face seal is prohibited.

- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross - contamination and need for decontamination.

- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.

- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.

- On-site personnel shall use the "buddy" system. No one may work alone, i.e., out of earshot or visual contact with other workers in the exclusion zone.

- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.

- All employees have the obligation to correct or report unsafe work conditions.

- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for MPI employees, as required.

The recommended specific safety practices for working around the contractor's equipment (e.g., backhoes and bulldozers) are as follows:

- Although the Contractor is responsible for his equipment and the safe operation of the site, all personnel are also responsible for their own safety.
- Drilling and excavation will not be initiated without first clearing underground services such as; hydro, gas, water, telephone, sewer and cable T.V.
- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated.
- Care should be taken to avoid overhead wires when moving heavy equipment from location to location.
- Hard hats and safety boots must be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended. Safety glasses are necessary.
- Slippage is one of the most common causes of accidents around heavy equipment. Drainage should be provided to divert mud and water away from the construction site.
- The Contractor should keep the construction site tidy. This will prevent personnel from tripping and will allow for fast emergency exit from the site.
- Proper lighting must be provided if working at night.
- Construction activities should be discontinued during an electrical storm.
- The presence of combustible gases should be checked before igniting any open flame (e.g., during welding).
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not enter trenches.
- Personnel will not approach the edge of an unsecured trench closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 PROTECTION LEVELS

Personnel must wear protective equipment when work activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Respirators can protect the lungs, the gastro-intestinal tract and the eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and skin-absorbable chemicals. Good personal hygiene and safe work practices, as identified in Section 6.0, are also necessary to limit or prevent the ingestion of potentially harmful substances.

Based upon current information regarding both the contaminants suspected to be present at the Brockport Landfill site and the various tasks that are included in the inspection and maintenance activities, the minimum required Levels of Protection shall be as identified in Table 7-1. The Site Health and Safety Coordinator will monitor the use of personal protective equipment (PPE) during extreme temperature conditions.

Based on the concentrations of contaminants in groundwater listed in Table 2-1, the ACTION LEVEL Model results indicate that trichloroethene and vinyl chloride make up about 85% of any vaporized contaminants with vinyl chloride being 42% of the total. With a C rating and a PEL of 1 ppm, vinyl chloride is the contaminant of concern. The model also predicts that vinyl chloride vapor concentrations produced by evaporation from raw groundwater in a confined space at equilibrium in still air will exceed 1000 ppm.

NIOSH does not recommend APRs for carcinogenic compounds, particularly those with poor warning properties such as vinyl chloride. Therefore, any repairs of the possible gas vents will be conducted in Level B and anyone who approaches closer than 15-feet will also be required to use Level B protection.

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TABLE 7-1

BROCKPORT LANDFILLPOST-CLOSURE MONITORING AND MAINTENANCE

***REQUIRED LEVELS OF PROTECTION*[1]**

Activity	Respiratory *	Clothing[2]	Gloves	Boots	Other Modifications[3]
Clear, grub, regrade existing cover soils	D/C	T	L	L	Goggles, Hard Hat, Dust Mask
Repair passive gas vents	B	S	L	L	Goggles, Hard Hat
Repair cover system	D/C	T	L	L	Goggles, Hard Hat, Dust Mask
Inspection of Cap	D	Work Uniform	—	—	Goggles, Hard Hat
Groundwater Sampling	D/C	T	L	—	Goggles, Hard Hat
Cap Maintenance & Repairs	D	Work Uniform	L	—	Goggles, Hard Hat

Notes:

(1) T = Tyvek; L = Latex; N = Nitrile; S = Saranex

(2) Tyvek uniforms will be worn when Level C respiratory conditions are present (mandatory) or when Level D respiratory conditions are present (optional). In the event that Level B conditions are present, work uniforms shall be upgraded to Saranex (see Attachment 1).

(3) At the discretion of the Site Health and Safety Officer, dust masks will be donned whenever potentially contaminated airborne particulate (i.e., dust) are generated in significant amounts in the breathing zone. Goggles may be substituted for safety glasses with side-shields when contact with liquids is not anticipated.

* Respiratory protection shall correspond to guidelines presented in Section 8.2. The Level C requirement is an air-purifying cartridge respirator equipped with Organic Compound/Acid Gases/Dust cartridges.

8.0 ENVIRONMENTAL MONITORING

8.1 GENERAL APPROACH

The level of protection established for employees will initially be based upon qualitative and quantitative determinations of the contaminants present in the work environment. Concentrations of contaminants known to be present in the groundwater and the leachate at the site have been used to determine the minimum required levels of personal protection described in Section 7.0. Based upon the existing data base, organic vapors are anticipated during intrusive construction activities. Ambient breathing zone concentrations may, at times, exceed the permissible exposure limits (PEL) established by OSHA for the individual compounds (see Table 2-2), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) based upon real-time field monitoring data.

8.1.1 Repair Activities

Real time monitoring will be conducted by the repair contractor on a daily basis during all intrusive construction activities such as excavation and backfilling for cap repair, and gas venting system repairs. The work area will be monitored at regular intervals using a photoionization detector (PID) or similar organic vapor analyzer. Observed values will be recorded and maintained as part of the permanent field record.

A combustible gas meter and photoionization detector may be utilized by the Site Health and Safety Officer to verify field conditions during inspection and repair activities. Monitoring instruments will be protected from surface contamination during use to allow for each decontamination. The monitoring instruments will be placed on plastic sheeting, whenever possible, to avoid direct surface contact. Additional monitoring instruments may be added if the situations or conditions change.

8.1.2 Off-Site Community Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the site perimeter may be conducted. This would provide a real-time method for determination of substantial vapor and/or particulate releases to the surrounding community as a result of intrusive construction work.

The monitoring would be performed at the downwind perimeter location at regular intervals and at a minimum of once per half hour during times when organic vapors, explosive gases or particulates exceed established limits for five minutes or longer until such time as work zone concentrations decrease to below the perimeter monitoring action levels. If sustained concentrations of organic vapors, explosive gas, or particulates are detected in excess of the threshold values identified in Section 8.2.2 at the downwind perimeter location for a period of 5 minutes or longer, the actions identified in Section 8.2.2 shall be taken. Pertinent emergency response information including the telephone number and address of the Fire Department are included in Attachment No. 2 - Emergency Response Plan.

8.2 MONITORING ACTION LEVELS

8.2.1 On-site Levels

The PID or other appropriate instrument(s) will be used by either the Site Health and Safety Officer or the repair contractor to monitor organic vapor concentrations as specified in this plan and in the repair contractor's Health and Safety Plan. Methane gas will be monitored with the "combustible gas" option on the explosimeter/tritector or other appropriate instrument(s) in accordance with the repair contractor's Health and Safety Plan. In addition, fugitive dust/particulate concentrations will be monitored using a real-time particulate monitor as specified in this plan and in the repair contractor's Health and Safety Plan.

Readings obtained in the breathing zone may be interpreted (with regard to other site conditions) as follows for on-site personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to background on the PID - Continue operations under Level D (see Attachment 1).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings above background to 5 ppm on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Attachment 1).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of 5 to 50 ppm above background on the PID - Continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) construction methods to achieve lower vapor concentrations.

- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

The explosimeter may be used to monitor levels of both combustible gases and oxygen during repair activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue engineering operations with caution.

- 10-25% LEL - Continuous monitoring with extreme caution, determine source/cause of elevated reading.

- Greater than 25% LEL - Explosion hazard, evaluate source and leave the Work Zone.

- Less than 19.5% oxygen - Leave Work Zone immediately.

- 19.5-25% oxygen - Continue engineering operations with caution.

- Greater than 25% oxygen - Fire hazard potential, leave Work Zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities. Action levels based on the instrument readings shall be as follows:

- Less than 50 mg/m^3 - Continue field operations.

- 50-150 mg/m^3 - Don dust/particulate mask or equivalent. Initiate engineering controls (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

- Greater than 150 mg/m^3 - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings with the explosimeter, particulate monitor and organic vapor analyzers will be recorded and documented in the Health and Safety Logbook. All instruments will be calibrated before use and the procedure will be documented in the Health and Safety Logbook.

8.2.2 Community Monitoring Levels

In addition to the action levels prescribed in Section 8.2.1 for personnel on-site, the following criteria shall also be adhered to for the protection of the nearby community:

Organic Vapors:

- If the ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background, work activities will be halted and monitoring continued. If the organic vapor decreases below 5 ppm over background, work activities can resume but more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, must be conducted. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm at the perimeter of the exclusion zone, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever is less, is below 5 ppm over background; and more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted. If the organic vapor level is above 25 ppm at the perimeter of the exclusion zone, the Site Health and Safety Officer must be notified and work activities shut down. The Site Health and Safety Officer will determine when re-entry of the exclusion zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan below. All readings will be recorded and will be available for New York State Department of Environmental Conservation (DEC) and Department of Health (DOH) personnel to review.

Major Emergency:

- If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.

  If, following the cessation of the work activities or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).

  If efforts to abate the emission source are unsuccessful and if organic vapor levels approach or exceed 5 ppm above background with the 20-foot zone for more than 30 minutes, then the Major Vapor Emission Response Plan will automatically be placed into effect.

  The Major Vapor Emission Response Plan shall be immediately placed into effect in the event that organic vapor levels become greater than 10 ppm above background.

Major Vapor Emission Response Plan:

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in this Health and Safety Plan and the Emergency Response Plan (Attachment 2) will be advised.

2. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Location/Phone
Site Health and Safety Officer	Police	911 or (716) 637-1011
Site Health and Safety Officer	Joseph Albert (NCDOH) David Napier (NYSDOH)	(716) 274-6904 (716) 423-8071
Site Health and Safety Officer	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Attachment 2.

Explosive Vapors

- Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the site perimeter.
- Sustained atmospheric concentrations of greater than 10% LEL at the downwind site perimeter - Contact local Fire Department.

Airborne Particulates

- Sustained atmospheric concentrations of greater than 150 $\mu g/m^3$ in the work area - Initiate particulate monitoring at the downwind portion of the site perimeter.
- Sustained atmospheric concentrations of 150 $\mu g/m^3$ or greater at the downwind site perimeter - Stop work and evaluate situation.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Attachment 2).

9.0 HEAT/COLD STRESS MONITORING

Since the work activities at the Brockport Landfill will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to employees. The Site Health and Safety Officer or his/her designee will be responsible for monitoring employees for symptoms of heat/cold stress.

9.1 HEAT STRESS MONITORING

Personal protective equipment may place an employee at risk of developing heat stress, probably one of the most common (and potentially serious) illnesses encountered at hazardous waste disposal sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain equilibrium (via evaporation, convection and radiation), and by its bulk and weight increases energy expenditure.

The signs and symptoms of heat stress are as follows:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms
  - pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
  - pale, cool, moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

  - red, hot, usually dry skin
  - lack of or reduced perspiration
  - nausea
  - dizziness and confusion
  - strong, rapid pulse
  - coma

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured in the ear canal with an infrared thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the following work cycle may be further shortened by 33%. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No employee will be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6° Fahrenheit.

9.1.1 Prevention of Heat Stress

Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because

once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illnesses. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slow downs as needed.
- Perform work during cooler hours of the day if possible and at night if adequate lighting can be provided.
- Provide shelter (air conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in perspiration i.e., eight fluid ounces (0.23 liter) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace fluid loss at high ambient temperature. When heavy perspiration occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature at 50° to 60°F.
  - Provide small disposable cups that hold approximately four ounces.
  - Have workers drink 16 ounces of fluid (preferably water or diluted drinks) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

9.2 COLD STRESS MONITORING

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

  1) **Frostnip**- This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102-108°F) and drinking a warm beverage.

  2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish-grey area of tissue which will be firm to the touch but will yield little pain. Treatment is identical to that for Frostnip.

  3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard, and will yield little to no pain. Treatment is identical to that for Frostnip.

- **Hypothermia** occurs when the body loses heat faster than it can produce it. The stages of hypothermia (which may not be clearly defined or visible at first) are the following:

  1) Shivering
  2) Apathy (a change to a disagreeable mood)
  3) Unconsciousness
  4) Bodily freezing
  5) Death (if untreated)

  Treatment of hypothermia is given below:

  - Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

  - Perform active re-warming with hot liquids for drinking (Note: do **not** give the victim any liquid containing alcohol or caffeine in this case) and a warm water bath (102-108°F)

  - Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer. Preferably one of the layers should be wool or silk.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated area, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if frostbite has set in).

9.2.1 Monitoring

Start (oral) temperature recording at the job site:

- At the Site Health and Safety Officer's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a workers request.
- As a screening measures, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20°F, or wind chill less than 30°F with precipitation).
- As a screening measuring whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

10.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established by the repair contractor on a daily basis and communicated to all employees and other site users (i.e., fireman and police) by the repair contractor's Site Health and Safety Officer. It shall be the repair contractor's Site Health and Safety Officer's responsibility to ensure that all site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- **Exclusion Zone ("Hot Zone")** - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 6.2.

- **Contamination Reduction Zone** - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- **Support Zone** - The part of the site which is considered non-contaminated or "clean". Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the repair contractor. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the repair contractor's Site Health and Safety Officer.

A Health and Safety Logbook containing the names of workers and their level of protection will be maintained by the repair contractor(s).

The zone boundaries may be changed by the Site Health and Safety Officer as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

11.0 DECONTAMINATION PROCEDURES

11.1 PERSONAL DECONTAMINATION

The degree of decontamination required is a function of both a particular task and the physical environment within which it takes place. The following decontamination procedure, although somewhat specific to the tasks described herein, will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions which may arise at the site. The procedure shall be followed by all personnel who are on the site, unless the repair contractor's procedure is more stringent.

Station 1:	Equipment Drop	1.	Deposit equipment used on-site (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination.
Station 2:	Boots and Gloves Wash and Rinse	2.	Scrub outer boots and outer gloves with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Tape, Outer Boot and Glove Removal	3.	Remove tape, outer boots and gloves. Deposit tape and gloves in container provided by repair contractor.
Station 4:	Canister or Mask Change	4.	If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and worker returns to duty.
Station 5:	Outer Garment Removal	5.	Protective suit removed and deposited in separate container provided by repair contractor.
Station 6:	Face Piece, Hard Hat, Safety Goggles Removal	6.	Face piece or goggles removed (if used). Avoid touching face with fingers. Face-piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 7:	Inner Glove Removal	7. Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in container provided by repair contractor.
Station 8:	Field Wash	8. Proceed to personnel decontamination facility provided by repair contractor. A shower will be required.

11.2 DECONTAMINATION FOR MEDICAL EMERGENCIES

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (i.e., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a site contaminant would be considered "Immediately Dangerous to Life or Health."

11.3 DECONTAMINATION OF FIELD EQUIPMENT

Decontamination of heavy equipment will be conducted by the repair contractor in accordance with his approved Health and Safety Plan in the Contamination Reduction Zone.

Decontamination of all tools used for sample collection purposes will be required. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal) which will aid in the decontamination effort. Any tool or part of a tool which is made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of all bailers, split-spoons, spatula knives, and other tools used for multi-media environmental sampling and examination shall be as follows:

- Disassemble the equipment.
- Water wash to remove all visible foreign matter.
- Rinse equipment with clean water.
- Pressurized steam clean equipment (inside and outside).

If samples are to be collected for analytical purposes, each tool used for sampling shall be cleaned as follows:

- Disassemble the equipment.
- Water wash to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Rinse all parts with pesticide-grade isopropanol.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene to prevent contamination of clean equipment.

11.4 DISPOSAL OF DECONTAMINATION - DERIVED WASTE

Decontamination solutions and rinses are assumed to contain the same contaminants associated with the site. Refer to the Standard Operating Procedure, "Dispostion of Materials Generated in the Course of Site Investigations", for disposal guidance. This procedure is included in the Monitoring Plan.

12.0 FIRE PREVENTION AND PROTECTION

12.1 GENERAL APPROACH

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory (NYSDEC) authorities, the Site Health and Safety Officer will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

12.2 EQUIPMENT AND REQUIREMENTS

- Fire extinguishers will be provided by the repair contractor.
- Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary.
- Immediately after each use, fire extinguishers will be either recharged or replaced.

12.3 FLAMMABLE AND COMBUSTIBLE SUBSTANCES

- All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons.
- All tanks, containers and pumping equipment, whether portable or stationary, which are used for the storage and handling of flammable and combustible

liquids, will meet the recommendations of the National Fire Protection Association.

- If the LEL exceeds 10% for any compound, fans will be used to dissipate volatile/combustible gases and to minimize the explosion hazard during drilling/excavation activities. In addition, % 0_2/explosive gas monitoring will be conducted throughout any drilling/excavation operations.

13.0 CONFINED SPACE ENTRY

Repair of the passive gas vents at the Brockport Landfill site may require confined space entry into deep excavations. This section is intended to provide guidelines for safe entry into any confined space. The Site Health and Safety Officer is responsible for adapting these guidelines to fit specific employee protection needs.

13.1 CLASSIFICATION

In accordance with OSHA 29 CFR 1910.146, a confined space refers to a space which is large enough and so configured that an employee can bodily enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

In OSHA 29 CFR 1910.146, two classifications of confined spaces have been established; non-permit required and permit-required. A non-permit required confined space is a confined space that, with respect to atmospheric hazards, does not contain or have the potential to contain any hazard that can cause death or serious physical harm. A permit required confined space is a confined space that has any one of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfment of an entrant.
- Has an internal shape such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious safety and health hazard such as moving machinery or the potential for the release of thermal energy.

All confined spaces which may be present during remedial construction at the Brockport Landfill shall be considered as permit-required confined spaces.

13.2 CONFINED SPACE ENTRY TEAM

A confined space entry team consists of properly trained employees performing duties divided among the following three job titles: ENTRANT, ATTENDANT, and ENTRY SUPERVISOR. The specific duties of each member of the confined space entry team are detailed in the following subsections.

13.2.1 Entrant

The ENTRANT is an employee authorized by the company to enter a permit-required confined space. The ENTRANT has received the appropriate level of confined space entry training and shown competence in carrying out an ENTRANT'S responsibilities.

The responsibilities of an authorized ENTRANT are as follows:

- **Hazard Recognition** - The ENTRANT shall:
  - Know the chemical, physical, or electrical or mechanical hazards that may be faced during entry.
  - Recognize the signs and symptoms of exposure to potential chemical or physical hazards.
  - Understand the consequences of exposure to these hazards.
- **Communication** - The ENTRANT shall:
  - Maintain contact with the ATTENDANT.
  - Notify the ATTENDANT when the ENTRANT intends to leave a permitted space.
- **Protective Equipment** - The ENTRANT shall:
  - Be knowledgeable in the use of personal protective equipment such as retrieval lines, respirators or clothing needed for safe entry and exit.
  - Use personal protective equipment properly.
  - Be knowledgeable in the use of external barriers needed to protect entrants from external hazards.

- **Exit**
  - The ATTENDANT or ENTRY SUPERVISOR orders evacuation.
  - An automatic alarm sounds.
  - The authorized ENTRANT perceives that she/he is in danger.

13.2.2 Attendant

The ATTENDANT is an employee authorized by the company to observe the ENTRANT during entry into a permit-required confined space. The ATTENDANT has received the appropriate level of confined space entry training and shown competence in carrying out an ATTENDANT'S responsibilities.

The responsibilities of an authorized ATTENDANT are as follows:

- **Number of Entrants** - The ATTENDANT continuously maintains an accurate count of persons in the confined space.
- **Hazard Recognition** - The ATTENDANT shall:
  - Recognize potential chemical, physical, electrical or mechanical confined space hazards; the signs, symptoms and consequences of exposure to these hazards, and report any unusual circumstance to the ENTRY SUPERVISOR.
  - Monitor activities inside and outside the confined space and judge if it is safe for the ENTRANTS to remain in the space.
- **Communication** - The ATTENDANT shall:
  - Keep in contact with authorized ENTRANTS during entry.
  - Order authorized ENTRANTS to evacuate the permit space immediately when:
    1) The ATTENDANT observes an activity or condition outside the acceptable entry conditions for that confined space.
    2) The ATTENDANT detects a situation outside the confined space that could endanger the ENTRANTS.

3) The ATTENDANT detects an uncontrolled hazard within the confined space.

- **Rescue**
  - Notify 911 or appropriate emergency response team.
  - **Never enter the confined space to attempt a rescue of ENTRANT.**
  - Properly use any remote rescue equipment provided and perform any other assigned rescue and emergency duties without entering the confined space.
  - Warn, advise or stop unauthorized entrants.

13.2.3 Entry Supervision

The ENTRY SUPERVISOR is an employee authorized by the company to be responsible for determining if acceptable entry conditions are present at a permit space, for authorizing entry, overseeing entry operations, and for ending the entry. The ENTRY SUPERVISOR also may serve as the ATTENDANT or the authorized ENTRANT. The ENTRY SUPERVISOR has received the appropriate level of confined space entry training, knows the hazards faced during entry including the mode, signs, symptoms, and consequences, has shown competence in carrying out an ENTRY SUPERVISOR'S responsibilities, and is recognized as competent in managing complex field tasks.

The responsibilities of an ENTRY SUPERVISOR are as follows:

- **Entry Authorization and Supervision** - The ENTRY SUPERVISOR shall:
  - Verify that the information on the Pre-entry Inspection Checklist accurately reflects the conditions and hazards of the confined space.
  - Verify that the completed entry permit reflects the availability and proper working condition of the equipment to be used for atmospheric monitoring, entry and remote emergency retrieval before authorizing or allowing entry.
  - Verify that the necessary procedures, practices and equipment for safe entry are present and in effect before allowing entry.

- Verify that rescue services are available and that the means for summoning them are operable.

- Verify that all ENTRANTS and ATTENDANTS have received appropriate training, medical and respiratory protection clearances before initiating an entry.

- Verify, at appropriate intervals, that the entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are present.

- Cancel the entry authorization and end the entry whenever the ENTRY SUPERVISOR determines that acceptable entry conditions are not present.

- Take the necessary measures for concluding an entry operations, cancel the permit, replace the cover or otherwise restrict access to the confined space.

- **Dealing with Unauthorized Personnel** - The ENTRY SUPERVISOR shall:

  - Take the appropriate measures to prevent individuals who the company has not authorized for entry from lingering in or near an active confined space entry.

- **Equipment** - The ENTRY SUPERVISOR shall:

  - Arrange to use all required field and safety equipment before initiating entry.

  - Inspect all equipment before entry and ensure that the environmental monitors have been properly calibrated, passed a function check, and operate correctly.

13.3 CONFINED SPACE ENTRY PROCEDURES

The following general procedures will be followed on all confined space entries. A sample of the Pre-entry Inspection Checklist, Entry Permit, and Emergency Response forms are provided in Attachment 3. Working copies of these forms may be obtained from the Site Health and Safety Officer.

13.3.1 Notification

The Site Health and Safety Officer will be consulted before initiating any project with confined space entry tasks. Notification may be in writing, or by telephone. This notification will include:

- The project name, location, and project manager.
- The anticipated confined space entry tasks.
- The names of the proposed members of the confined space entry team(s).

The Site Health and Safety Officer, or designate will:

- Review the confined space entry task(s) and provide constructive input on confined space hazard recognition and control.
- Review the proposed staffing lists with the Project Manager to determine that project staff have the required training, medical and respiratory protection clearances.

13.3.2 Pre-entry Inspection

Before conducting a confined space entry task, a Pre-entry Inspection Checklist will be completed by the ENTRY SUPERVISOR or designee to develop first hand knowledge of the potential hazards faced by the confined space entry team in and around the confined space. The Pre-entry Inspection shall consist of a review of the design drawings, if any, and a visit to the site.

The information developed during a pre-entry site inspection will include all the following as applicable to the individual confined space and entry task:

- Entry-way or utility access hole accessibility and condition. All entry-ways and utility access holes will be opened and inspected. Also note size of opening, etc.
- A determination that the available atmospheric testing equipment can remotely test the confined space.
- Any structural modifications or additions required to make a safe entry.
- The possible effect of adverse weather.

- The locations of entry, exit, and ports for mechanical venting.
- The types of safety and environmental monitoring equipment required to make a safe entry.
- The location and path to a secondary means of egress if available.
- Traffic control requirements.
- The number of team members required to complete the assigned tasks and maintain communication with the entrants.

The ENTRY SUPERVISOR should use good professional judgement in the evaluation of hazards posed by a confined space entry task, erring always on the side of safety.

13.3.3 Entry Permit

The Confined Space Entry Permit may be signed out from the Site Health and Safety Officer. The permits are consecutively numbered for tracking purposes. The entry permit is a hazard identification and evaluation checklist used to authorize entry into a permit-required confined space. Information written on the entry permit identifies the confined space, defines the conditions under which the permit space, details the anticipated hazards of the entry, establishes the time that the permit is valid, and lists the names of the eligible ENTRANTS, ATTENDANTS, and the ENTRY SUPERVISOR.

The Confined Space Entry Permit may be completed by any member of the team. After verifying that the information on the permit is correct, the ENTRY SUPERVISOR'S signature means she/he is fully aware of the work to be done, that necessary precautions have been instituted, and the ENTRY SUPERVISOR has inspected the work site.

The ATTENDANT'S signature shows she/he fully understands the job assignment and responsibility for maintaining surveillance and communication with the person(s) working in the confined space. The individual understands that it is the ATTENDANT'S duty to summon help immediately and render assistance during any emergency or as required. The ATTENDANT also understands that she/he **must not enter the space** (even in an emergency) until other assistance is on the scene and she/he is properly equipped.

The ENTRANT'S signature means she/he fully understands the responsibility for preparing the confined space, monitoring environmental conditions, following all instructions, and wearing proper protective equipment.

The ENTRY SUPERVISOR will cancel the entry permit when:

- The entry operations covered by the permit have been completed.
- A condition that is not allowed under the entry permit arises in or near the permit space.

The white top copy of the canceled permit is kept with the project files, and the yellow and pink copies for the canceled permits are returned to the Site Health and Safety Officer.

13.4 ATMOSPHERIC TESTING

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space, and verification that acceptable conditions for entry into that space exist. Employees will be equipped, trained and declared competent to use air monitoring equipment that can measure oxygen concentrations, explosive gas levels, and any other location-specific air contaminants. Measurements will be made before entry into any confined space, and continuously for the duration of the entry.

13.4.1 Evaluation Testing

During the Pre-entry Inspection, the atmosphere of a confined space will be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space.

Evaluation and interpretation of these data, and development of the entry procedure will be done by the ENTRY SUPERVISOR. The ENTRY SUPERVISOR may call upon the Site Health and Safety Officer for assistance with this task.

13.4.2 Verification Testing

The atmosphere of a permit space that may contain a hazardous atmosphere will be tested before entry for the contaminants identified during the Pre-entry Inspection using equipment specified in the permit. The ENTRY SUPERVISOR uses these measurements to decide if the atmospheric contaminant concentrations are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided next to the stipulated acceptable entry condition.

13.4.3 Duration of Testing

Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer. The atmosphere must be retested and the data recorded on the entry permit each time the confined space is entered.

13.4.4 Testing Stratified Atmospheres

When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope (the atmosphere around the ENTRANT) should be tested at a distance of approximately four (4) feet (1.22m) in the direction of travel and to each side. If the ENTRANT uses a sampling probe during a horizontal entry, the ENTRANT'S rate of progress should slow down to fit the probe's sampling speed and detector response.

13.4.5 Ventilation

Purge the atmosphere in the confined space four to eight times before taking initial instrument readings. The ENTRY SUPERVISOR can calculate the time required to purge a space by dividing the interior volume in cubic feet (ft^3) by the volume of air delivered per minute (ft^3 per minute - cfm). The volume of air delivered is equal to the rated delivery rate of the blower minus friction losses. For example, a 1,380 cfm blower with a 25-foot smooth bore flexible delivery hose, one ninety degree bend and a manhole saddle vent will deliver about 800 cfm. Add another 25-foot drop hose below the saddle vent and assume 600 cfm delivered. If a coiled hose is used, the coils of both hoses must twist the same way or severe friction losses will occur.

The drop hose should be positioned no less than 18-inches above the floor and aimed in such a fashion as to create turbulence and to generate good distribution throughout the space.

13.5 ENTRY

A mechanical device shall be available to retrieve staff from vertical entry confined spaces more than five feet deep. Fall protection shall be provided for vertical entries more than five feet deep. Fall protection shall consist of a full body harness, a shock absorbing fall lanyard, or an ANSI certified retractable lifeline/emergency retrieval winch combination, or equivalent.

For vertical openings, entry may be made by a ladder inserted into the confined space or by lowering the ENTRANT into the space using a man-rated winch. Do not use fixed ladder rungs in older installations. They may be difficult to use or they may fail due to corrosion.

If the entrant will be stopping at several different heights for more than a few minutes on the way down, e.g., to do an inspection of the walls, OSHA requires the use of a boatswains's chair when the opening to the space has a diameter larger than 24-inches. See 29 CFR 1926.104, .451 and 29 CFR 1910.28(k) for more information.

13.6 EMERGENCY RESPONSE AND RESCUE

For each confined space entry project, an Emergency Response Form should be completed by the ENTRY SUPERVISOR or designate and posted with the Entry Permit at the project site. Emergency escape routes and directions to the nearest hospital (attach maps) should be developed and attached to the Emergency Response Form.

Arrangements must be completed with emergency and rescue services before listing those services as respondents on the Emergency Response Form. The arrangements should include a determination of interest, response time, equipment, familiarity with the site, and responder training.

All employees entering any confined space will be equipped with, at a minimum, a five-minute escape compressed air cylinder (EEBA). The EEBA will be used to maximize the employee's ability to successfully self-rescue in the event atmospheric conditions within the confined space deteriorate.

13.6.1 Evacuation

A confined space is to be evacuated when:

- The ATTENDANT or the ENTRANT detects a hazardous condition that is outside the acceptable entry conditions or may result in a condition outside the acceptable entry conditions for that confined space.
- The ENTRANT or the ATTENDANT begins to notice signs or symptoms of over exposure to air contaminants or to low levels of oxygen.
- The ENTRANT or the ATTENDANT hears or sees signals from the air monitoring equipment indicating atmospheric conditions that are outside the acceptable entry conditions for that confined space.
- External conditions such as weather, traffic patterns, industrial processes, discharge rates change in such a manner that they may result in an additional hazard to the ENTRANTS.

When the confined space is evacuated due to an on-site emergency, personnel shall not reenter until:

- The conditions resulting in the emergency have been corrected.
- The hazards have been reassessed.
- A new Entry Permit has been completed.
- The entry team has been briefed on proposed changes in work practices, personal protection, and permitted space hazards.

13.6.2 Remote Rescue

If the ENTRANT is injured or unconscious in a confined space the ATTENDANT should take the following steps:

- Make an assessment of the ENTRANT'S injuries. Remote retrieval of an ENTRANT with serious neck, head or spinal injuries is not advised.

- If the injured person is wearing a body harness attached to a retrieval winch and there are no obvious obstructions to raising the individual out of the space. Ladders or ventilation equipment may have to be removed to conduct this type of rescue. When the individual's head and face clear the confined space, summon assistance using emergency response procedures developed for this entry and the list of contacts on the Emergency Response Form.

- If the injured person is wearing a body harness attached to a retrieval winch, and there are not obvious obstructions to raising the individual, attempt to redirect the flow of fresh air from the ventilation system toward the ENTRANT and then summon assistance using the emergency response procedures developed for this entry and the list of contacts on the Emergency Response Form.

- If conditions other than these exist, summon assistance using the emergency response procedures developed for this entry and the list of contacts on the Emergency Response Form.

The ATTENDANT **may not** enter the confined space to perform the rescue unless:

- The ATTENDANT has transferred his/her duties to another individual trained as an ATTENDANT.

- The ATTENDANT has been trained in rescue procedures.

13.7 MULTI-EMPLOYER WORK SITES

OSHA requires the coordination of entry operations when employees of more than one employer are working simultaneously as authorized entrants in a confined space. Representatives of the client or a sub-contractor may be required to enter a confined space with the repair contractors staff. The Village is the "host employee" to the repair contractors.

The repair contractor's staff will independently assess the classification of a confined space using observation, instrumentation, and direct communication with the client. When establishing a reporting structure, the subcontractor should coordinate its operations with that of the "repair contractor." The subcontractor shall:

- Provide a copy of their written confined space entry and lockout/tagout programs to the repair contractor to allow for coordination of efforts.

- Designate an employee as the ENTRY SUPERVISOR.

- Provide documentation of employee confined space entry training.

Each employer is required to provide a designated ENTRY SUPERVISOR who is responsible for the safety of that employer's employees. The subcontractor's ENTRY SUPERVISOR conducts an independent evaluation of the hazards using his/her observations, instrumentation, and judgement, and completes the employer's entry permit controlling their entry operations.

If only one ATTENDANT is necessary to monitor the activities of the ENTRANT(S), and employee from one of the entering companies will be chosen as ATTENDANT. The ATTENDANT must be trained and equipped to the satisfaction of each employer.

Planning the task and making these arrangements in advance would prevent the purchase or rental of redundant equipment and the assignment of extra staff to the project. Circumstances are variable. Contact the Site Health and Safety Officer for assistance in developing working arrangements for multi-employer entry operations.

13.8 EMPLOYEE TRAINING

Training will be provided to each eligible employee before:

- Assigning the employee to confined space entry tasks.
- When the employee is unfamiliar with the hazards presented by confined space operation.
- Whenever the ENTRY SUPERVISOR, or Site Health and Safety Officer believe either that there are significant deviations from the permit space entry procedures on a project or that there are inadequacies in the employee's knowledge or use of these procedures.

All employees required to perform confined space entry tasks shall receive classroom training and hands-on sessions with equipment and the highest level of authorized PPE appropriate to the project. Proficiency will be documented by testing and practical evaluation on the subject matter and the execution of drills.

13.9 RECORDKEEPING

Each Site Health and Safety Officer is issued a folder of consecutively numbered Confined Space Entry Permits and an associated permit log. The ENTRY SUPERVISOR may log out as many permits as required.

The top white copy of each day's entry permits, and the Pre-entry Inspection Form will be maintained by the Village as part of the **permanent** project file. The yellow and pink copies of the canceled permits and any unused entry permits will be returned to the Site Health and Safety Officer.

The Site Health and Safety Officer will note the date the permit was returned and initial the canceled permits, retain the pink copy of the canceled permits in the permit file for one year from the date of cancellation. A permanent record of training shall be made and maintained by the Site Health and Safety Officer.

Training certificates and paper records of classroom and on-the-job training shall be maintained in the employee's Health and Safety file by the Site Health and Safety Officer.

13.10 EQUIPMENT, TOOLS AND WORKING CONDITIONS

Equipment, tools and working conditions to be used or encountered in a confined space shall be carefully inspected and shall meet the following requirements:

- Hand tools shall be kept clean and in good repair.
- Portable electric tools, equipment, and lighting shall be approved in accordance with 29 CFR Part 1910 Sub Part S and be equipped with a ground fault circuit interrupter that meets the requirements of 29 CFR 1910.309. All grounds shall be checked before electrical equipment is used in a confined space.
- All electrical cords, tools, and equipment shall be of heavy duty type with heavy duty insulation and inspected for visually detectable defects before use in a confined space.
- Air driven power tools shall be used when flammable liquids are present. The use of air driven power tools will reduce the risk of explosion, not eliminate it. Explosions can arise by tools overheating (drilling), sparks

produced by striking (percussion), grinding or discharge of accumulated electrostatic charges developed from the flow of compressed air.

- Cylinders of compressed gases shall never be taken into a confined space, and shall be turned off at the cylinder valve when not in use. Exempt from this rule are cylinders that are part of self-contained breathing apparatus or resuscitation equipment.

- Ladders shall be adequately secured, or of a permanent type which provides the same degree of safety as cited in 29 CFR Part 1910 Sub Part D.

- Scaffolding and staging shall be properly designed to carry maximum expected load (safety factor of 4), be equipped with traction type planking, and meet the requirements of 29 CFR 1910.28.

- Electrical lines, junctions and appurtenances will be in accordance with National Electrical Code (NEC) and National Fire Code (NFC) as cited in 29 CFR 1910.309.

- Only hose lines and components designed specially for the compressed gas and working pressure shall be used, and such systems shall have a pressure relief valve outside the confined space.

- All equipment that may be used in a flammable atmosphere shall be approved as explosion proof or intrinsically safe for the atmosphere involved by a recognized testing laboratory such as the U.S. Bureau of Mines, MESA, or MSHA for methane and by the Underwriters Laboratories or by Factory Mutual for all cases.

- All excavations shall conform to 29 CFR 1926.650 through 1926.652.

  - Trench sides shall be sloped or shored to prevent a cave in.

  - Methods of access or egress shall be no more than 25 feet apart.

  - Adequate precautions shall be taken to prevent accumulation of water or leachate and exposure to loose soil that could pose as hazard by falling into the excavation.

In the event that the above conditions are not met (i.e. the Contractor or any other individual(s) within the trench do not maintain the proper procedures/equipment requirements given above), personnel shall not be required to enter the trench. In such a situation, the Site Health and Safety Officer shall be consulted.

13.11 SAFETY EQUIPMENT AND CLOTHING

The entry permit shall include a list of necessary protective equipment which personnel shall use in the confined space as determined by the Site Health and Safety Officer. The contractor shall be responsible for the proper use of the safety equipment, and the inspection and maintenance procedures performed on the safety equipment. The type of protective equipment required will be determined by the Site Health and Safety Officer.

14.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Attachment 2.

MALCOLM PIRNIE

ATTACHMENT 1

PROTECTION ENSEMBLES

MALCOLM PIRNIE

ATTACHMENT 1

PROTECTION ENSEMBLES

Equipment designed to protect the body against contact with known or anticipated chemical hazards have been divided into four categories according to the degree of protection afforded:

- Level A: Should be selected when the highest level of respiratory, skin and eye protection is needed.

- Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required; Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies.

- Level C: Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.

- Level D: Should not be worn on any site with respiratory or skin hazards. This is primarily a work uniform providing minimal protection.

The level of protection selected is based primarily on:

- Types and measured concentrations of the chemical substances in the ambient atmosphere and their associated toxicity; and

- Potential or measured exposure to substances in air, splashes of liquids or other indirect contact with material due to the task being performed.

In situations where the types of chemicals, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgement until the hazards may be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components based on the

widely used United States Environmental Protectin Agency (USEPA) Levels of Protection are detailed below for levels B, C, and D protection.

Level B Protection Ensemble

Recommended

- Pressure-demand, full-facepiece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA);
- Chemical-resistant clothing (overalls and long-sleeved jacket; hooded one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit); disposable chemical-resistant one-piece suit);
- Inner and outer chemical resistant gloves;
- Chemical-resistant safety boots/shoes; and
- Hard hat.

Optional

- Coveralls.
- Disposable boot covers.
- Face shield.
- Long cotton underwear.

Meeting any one of the following criteria warrant the use of Level B protection:

The types and atmospheric concentrations of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:

- with concentrations Immediately Dangerous to Life and Health (IDLH)
- exceeding limits of protection afforded by a full-face air-purifying mask;

- containing substances for which air-purifying canisters do not exist or have low removal efficiency;
- containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard;
- containing less than 19.5% oxygen; or
- with evidence of incompletely identified vapors or gases as indicated by direct reading organic vapor detection instrument, but those vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Level B equipment provides a high level of protection to the respiratory tract, but a somewhat lower level of protection to skin. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail and permeability. These factors all affect the degree of protection afforded. Therefore, a specialist should select the most effective, chemical-resistant clothing based on the known or anticipated hazards and task. Level B skin protection is selected by:

- Comparing the concentrations of identified substances in the air with skin toxicity data;
- Assessing the effect of the substance (at its measured air concentrations or splash potential) on the small area of the head and neck unprotected by chemical-resistant clothing.

Level C Protection Ensemble

Recommended

- Full-facepiece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the Site Health and Safety Officer;
- Chemical-resistant clothing (overalls and long-sleeved jacket, hooded, one- or two-piece chemical splash suit or disposable chemical-resistant one-piece suit);
- Inner and outer chemical-resistant gloves;

- Chemical-resistant safety boots/shoes; and
- Hardhat.

Optional

- Coveralls;
- Disposal boot covers;
- Face shield;
- Escape mask;
- Long cotton underwear.

The use of Level C protection is permissible upon satisfaction of these criteria:

- Measured air concentrations of identified substances will be reduce by the respirator to below the substance's permissible exposure limit (PEL), threshold limit value (TLV), and/or the concentration is within the service limit of the cartridge;
- Atmospheric contaminant concentrations do not exceed IDLH levels; and
- Atmospheric contaminants, liquid splashes or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if:

- Oxygen content of the atmosphere is at least 19.5% in volume;
- Substances are identified and concentrations measured;
- Substances have adequate warning properties;
- Individual passes a qualitative fit-test for the mask; and

- Appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

An air monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

Level D Protection Ensemble

Recommended

- Coveralls;
- Safety boots/shoes;
- Safety glasses or chemical splash goggles;
- Hardhat.

Optional

- Gloves;
- Escape mask;
- Face shield.

The use of Level D protection is permissible upon satisfaction of these criteria:

- No hazardous air pollutants have been measured; and
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of any chemicals; and
- Atmospheric contains at least 19.5% oxygen.

Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, or where there are no inhalable toxic substances.

is likely the result of the historic use of the Site as a dry cleaning facility. It is not currently known when dry cleaning operations started at the Site, only that the dry cleaning operations ended in 1988. Based on the detection of CVOCs in the on-site water supply well, three overburden monitoring wells (MW-1, MW-2, and MW-3) and a replacement water supply well (SW-2) were installed on the Alpine Cleaners Site in 1991 by Todd Giddings and Associates, Inc. of State College, Pennsylvania. Supply well SW-1 was later retrofitted to preclude the movement of groundwater from the overburden to the bedrock via the well. The well construction details are not known.

Because no municipal water supply is currently available in the area, businesses and residents in the area utilize groundwater for drinking water. The amount of water usage for each of the businesses is currently not known. Sampling conducted at the Site and adjacent properties since 1988 indicates that the highest concentrations of CVOCs were present in monitoring well MW-2, and lower concentrations were present in MW-1 and MW-3 and in supply well SW-1. As shown in Table 1-1, the PADEP media-specific concentrations (MSCs) for PCE, trichloroethene, vinyl chloride, cis-1,2-dichloroethene, and methyl tertiary butyl ether (MTBE) were exceeded in groundwater samples collected from on-site wells.

No contaminants were detected in the replacement water supply well SW-2 or in the water supply well located to the west of the site (currently the Comfort Inn). Both of these water supply wells are completed in bedrock. In May 1993, a sample collected from the water supply well on the car wash property located immediately to the east of the site (reportedly also completed in bedrock), was found to contain elevated concentrations of VOCs including cis-1,2-DCE, TCE, benzene, and MTBE. A sample collected in May 1992 from the miniature golf course well contained vinyl chloride at concentrations above the MSCs. This well is reportedly an overburden well.

In 1993, a pumping test planned for the most contaminated overburden well at the site (MW-2) by Converse Consultants East (consultants to the site owners) was aborted due to interference caused by pumping of nearby water supply wells. Apparently, Converse Consultants East documented a five-foot decrease in the water level in MW-3 prior to the start of the pumping test. Water level decreases of approximately two feet were also observed in MW-1 and MW-2. The Agway service station located to the

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ATTACHMENT 2

EMERGENCY RESPONSE PLAN

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ATTACHMENT 2

EMERGENCY RESPONSE PLAN

Personnel Exposure

- Skin contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Lakeside Memorial Hospital.

- Inhalation: Move to fresh air and, if necessary, transport to Lakeside Memorial Hospital.

- Ingestion: Decontaminate and transport to Lakeside Memorial Hospital.

Personal Injury

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Lakeside Memorial Hospital via ambulance. The repair contractor's Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually-sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the Site Health and Safety Coordinator to ensure that the expended items are replaced.

Communications

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of the repair contractor's Site Health and Safety Officer to ensure that an adequate method of internal communication is understood

by all personnel entering the site. Unless all personnel are otherwise informed, the following signals shall be used.

1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.

2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

Evacuation

In the event that an area must be evacuated due to an emergency, such as a chemical spill or a fire, workers shall exit upwind, if possible. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the repair contractor's Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all site workers of any changes.

Adverse Weather Conditions

In the event of adverse weather conditions, the Site Health and Safety Coordinator in conjunction with the repair contractor's Health and Safety Officer will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat/cold stress;
- Inclement weather - related working conditions;
- Limited visibility; and
- Potential for electrical storms.

Emergency Telephone Numbers

LAKESIDE MEMORIAL HOSPITAL	(716) 637-3131
FIRE	(716) 637-1011
AMBULANCE	Dial 911
POLICE	(716) 637-1011
POISON CONTROL CENTER (Strong Memorial Hospital)	(716) 275-3232
STATE EMERGENCY RESPONSE HOTLINE	(800) 457-7362

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NATIONAL RESPONSE HOTLINE	(800) 424-8802
BROCKPORT DEPT. OF PUBLIC WORKS	(716) 637-1060

NEW YORK STATE DEPARTMENT OF HEALTH
(716) 423-8071
Mr. David Napier
NYSDOH
Rochester Field Office
42 South Washington Street
Rochester, New York 14608

MONROE COUNTY DEPARTMENT OF HEALTH
(716) 274-6904
Mr. Joseph Albert
MCDOH
Health & Human Services Building
111 Westfall Road
Rochester, New York 14620

The site location is:

Brockport Landfill
East Canal Road
Brockport, New York 14420

Directions to Hospital

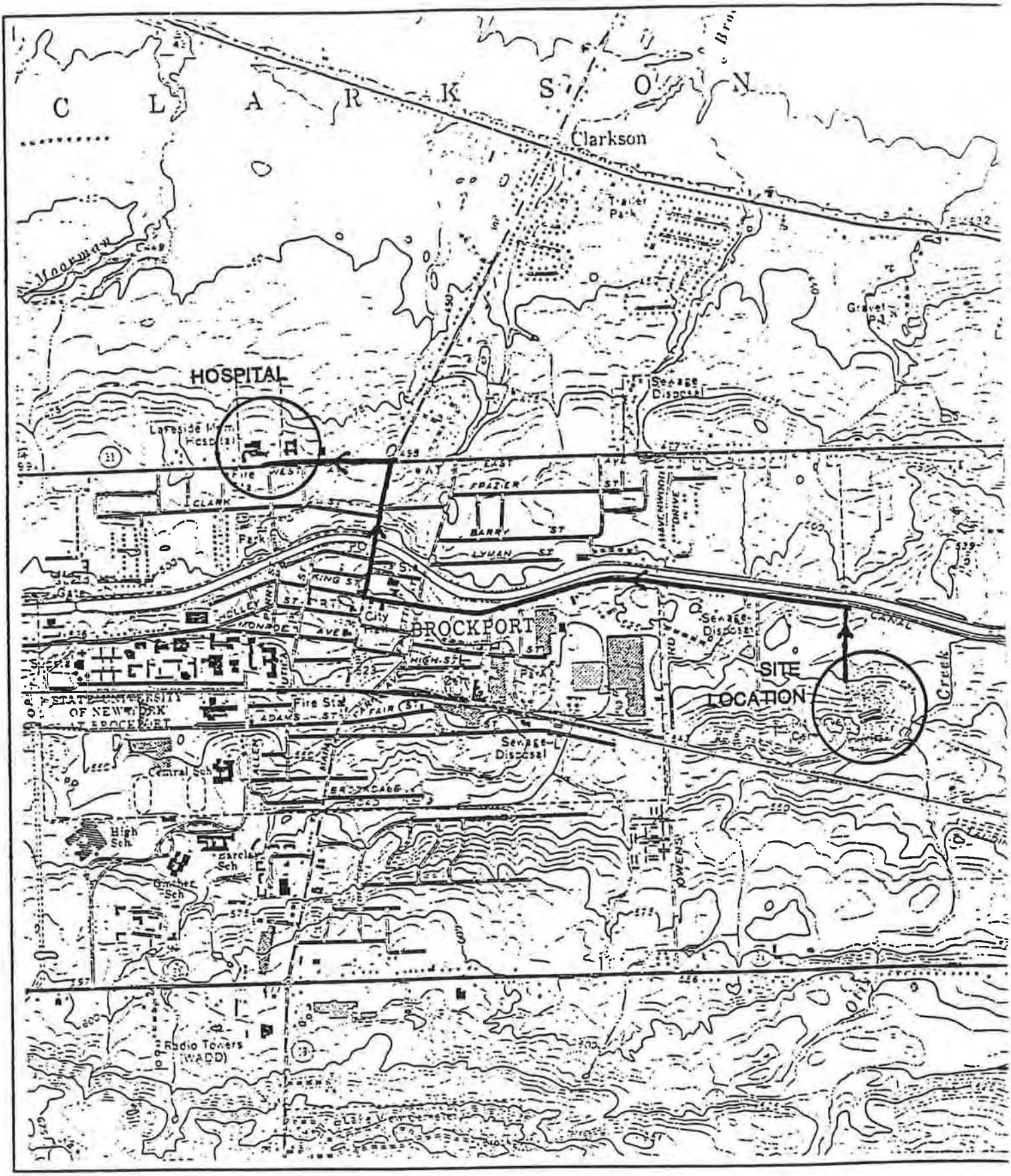
The following directions describe the best route to Lakeside Memorial Hospital:

From Site make left (west) onto East Canal Road. Travel approximately 1.5 miles to U. S. Highway 19. Make right onto U. S. Highway 19 (north). Travel approximately 0.7 miles north to West Avenue. Make left (west) onto West Avenue and travel approximately 0.4 miles. Lakeside Memorial Hospital will be on the right (north) side of the road.

Records and Reporting

It shall be the responsibility of each employer to establish and assure adequate records of all:

- Occupational injuries and illnesses;
- Accident investigations;
- Reports to insurance carrier or State compensation agencies;
- Reports required by client;
- Records and reports required by local, state, federal and/or international agencies;
- Property or equipment damage;
- Third party injury or damage claims;
- Environmental testing logs;
- Explosive and hazardous substances inventories and records;
- Records of inspections and citations;
- Related correspondence; and
- Safety training.



BROCKPORT LANDFILL

HOSPITAL ROUTE

MALCOLM PIRNIE

SCALE: 1"=2000'

MAY 19

MALCOLM PIRNIE

ATTACHMENT 3

SAMPLE FORMS

MALCOLM PIRNIE

PRE-ENTRY INSPECTION CHECKLIST

DATE: _____ JOB NUMBER _____

CLIENT: _____ PURPOSE OF ENTRY: _____

CONFINED SPACE LOCATION/DESCRIPTION _____

CLIENT CLASSIFICATION: ___ NON-PERMIT ___ PERMIT REQUIRED ___ UNKNOWN

If permit required, reasons for classification:

- ☐ Oxygen Level
- ☐ % LEL
- ☐ Engulfment Hazards
- ☐ Air Toxic Hazards
- ☐ Energy/Mechanical/Chemical Hazards
- ☐ Limited Egress
- ☐ Lighting
- ☐ Limited Visual Contact with Entrants

List _____

Technical Notes: _____

AIR MONITORING MEASUREMENTS

TESTS MADE	PERMISSIBLE ENTRY LEVEL	DEPTH	DISTANCE	BEFORE VENTILATION	AFTER VENTILATION
Percent Oxygen	19.5% to 23.5%				
Lower Flammable Limit	Under 10%				
Carbon Monoxide	< 35 ppm				
Hydrocarbons	< 1 ppm				
Hydrogen Sulfide	< 10 ppm				

INSTRUMENTS

MAKE	MODEL	SERIAL NO.	CALIBRATION DATE