PELHAM BAY LANDFILL
BRONX, NEW YORK

Operations and Maintenance Manual
Volume III

Prepared for:

City of New York
Department of Environmental Protection

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1.0
INTRODUCTION

Volume III of the Operations and Maintenance Manual (O&M Manual) for the Pelham Bay Landfill presents the Standard Operating Procedures (SOP), inspection checklists, regular and preventative maintenance schedules, and performance and environmental monitoring requirements for the closure and remediation systems installed for the Site. This volume provides the basic scope of work for the operation and maintenance contract including:

(i) specific description of the components of each system;
(ii) description of normal and emergency operation procedures;
(iii) monitoring, inspection and maintenance schedules and procedures;
(iv) sampling and analysis procedures;
(v) troubleshooting procedures; and,
(vi) environmental monitoring.

This volume is intended to supplement Volumes I and II of the O&M Manual. It is presented in such a format that the O&M work can be readily performed in relation to the monitoring, inspection, operation, and maintenance of the Site. The components of this volume, by section, are as follows:

Section	Title
2.0	Landfill Cover System
3.0	Stormwater Management System
4.0	Groundwater/Leachate Management System
5.0	Landfill Gas Management System
6.0	Environmental Monitoring and Testing
7.0	Ancillary Systems (Access Roads, Fences, Gates, and Locks)

Each section of Volume III is divided into subsections so that the SOP can be easily followed for each system. Typical subsections include:

- A general paragraph describing the components of the section;

- A description of the subsystems and components, including normal and emergency operating procedures, and control philosophies;
- Monitoring, inspection, and maintenance procedures;
- Sampling and analysis procedures; and,
- Troubleshooting procedures (equipment only).

Appendix A to Volume III includes valuable information about the twice weekly inspection of the gas and groundwater/leachate management systems, monthly inspection routines for the cover, stormwater management, gas system well heads and ancillary systems, monthly monitoring program for the gas collection and flare system and quarterly inspection of the gas extraction system. Instructions for each checklist accompany the individual forms in Appendix A. The instructions include helpful guidance for the O&M Contractor in identifying potential problems with the systems and how to proceed if problems do arise. Not all problems can be addressed in this O&M Manual, hence, at times the O&M Contractor is instructed to contact the NYCDEP for guidance. This Appendix also contains a Liability Release Form when visiting the Pelham Bay Landfill Site and an Event Notification Form for the leachate management system.

Appendix B contains the routine maintenance schedule which is to be followed by the O&M Contractor for normal or expected repair work at the Site.

Appendices C through I provide sampling criteria and protocol for the environmental monitoring program including log sheets for recording the data.

It is the responsibility of the O&M Contractor to become familiar with this volume, as well as the other volumes which outline procedures and provide information that must be incorporated into the operations and maintenance of the Site. The O&M Manual shall be updated by the O&M Contractor, with approval by NYCDEP, to include current contact information, completion of Contract No. HP-877, changes in operation, relevant safety information or other relevant information as the need arises over the course of the O&M Contract.

The other volumes which make up this O&M Manual include:

Volume I - this volume familiarizes the O&M Contractor, his/her personnel and subcontractors working at the Site with general information and requirements for post-closure care. In addition to describing components of the landfill closure systems, it also provides requirements for the O&M Contractor including:

- Management organization, communications structure and required training;
- Safety, emergency response and contingency policies and procedures; and
- Documentation and reporting.

Volume II (a, b, and c) - this volume (which consists of three subvolumes) contains shop drawings, manufacturers manuals and additional submissions provided with the equipment and materials installed under the five construction contracts listed in Volume I, Section 1.2. These volumes provide relevant information for the operation and/or maintenance of the equipment and materials.

Additional materials - Record drawings and specifications for each of the five contracts and Standard Operating Procedure for the Leachate Collection and Handling Systems (both listed in Volume I, Section 1.2) also form a part of this O&M Manual by attachment. These documents are an integral part of the O&M Manual and should be consulted for additional operations and maintenance procedures and for details of materials and methods of construction when repair activities are undertaken. Access to these documents is available through the NYCDEP by contacting David Turney at 718-595-7706..

The O&M Contractor shall supply all the necessary personnel, equipment and materials, and retain necessary subcontractors to perform the work described herein. Care shall be taken to avoid damage caused by the O&M Contractor to the site including, but not limited to, monuments, signs, gas vents, pipes, fencing, vegetation (including trees and shrubs), monitoring wells, flare system, stormwater structures, sedimentation basin, landfill cover system, etc. If these items are damaged, the O&M Contractor shall repair or replace them at no cost to the NYCDEP.

2.0
LANDFILL COVER SYSTEM

2.1 GENERAL

This section is divided into three subsections. Section 2.2 describes the subsystems and components that comprise the landfill cover system. Section 2.3 describes the inspection and maintenance procedures for the landfill cover system.

2.2 MAJOR SUBSYSTEMS AND COMPONENTS

The landfill cover system consists of the following design elements, from top to bottom:

- Vegetated topsoil layer;
- Loamy soil, barrier protection layer;
- Double-sided geocomposite, drainage layer;
- HDPE geomembrane;
- Single-sided geocomposite gas venting layer on the top portion of the landfill; and,
- Subbase layer.

Note: The subbase layer functions as the gas venting layer on the landfill side slopes.

For monitoring, inspection, and maintenance purposes, the landfill cap can be divided into the following:

- Grass cover/topsoil layer; and
- Cover soil and cap components.

The landfill cover system does not have equipment or controls that require maintenance.

2.3 MONITORING, INSPECTION, AND MAINTENANCE

The O&M Contractor shall follow the monitoring, inspection, and maintenance procedures described in detail below, unless otherwise approved by the NYCDEP. These procedures are to be followed in conjunction with the requirements outlined in the cover system record drawings and specifications (reference Contract No. HP-876). Landfill gas may be present in components of the cover system. Precautions must be taken to avoid fire or explosion when performing work in the landfill area.

Repairs to the cover system shall be performed with the materials of construction specified in Contract No. HP-876. The O&M Contractor shall not modify the materials of construction, site grades, or construction methodology without the approval of the NYCDEP, unless otherwise directed in the O&M Manuals.

The O&M Contractor shall supply all necessary equipment, personnel and materials to perform the monitoring, inspection, and maintenance of the landfill cover system. Only equipment relative to the site O&M may be stored on-site. Care shall be taken to avoid damage to the site due to the Contractor's operations including, but not limited to, signs, gas vents, fencing, vegetation (including trees and shrubs), piping, wells, blowers and flare system, stormwater structures, sedimentation ponds, landfill cover systems, etc. If any items are damaged, the O&M Contractor shall repair or replace them at no cost to the NYCDEP.

If damage to the geosynthetic and underlying soil component is suspected, the affected area shall be exposed to allow for inspection and assessment of damage. Any damage to the geomembrane layer or other cover materials **must** be repaired immediately. Specific monitoring, inspection, and maintenance procedures for the landfill cap system components are presented below.

Appendix A contains a checklist and associated instructions for performing inspections of the cover system (Form FCS-1).

2.3.1 Cover Inspection

Appendix A contains a site inspection checklist for the final cover system (Form FCS-1) addressing the various operations and maintenance components for the cover system. Figure 2-1 shows the landfill area divided into 14 inspection zones. The O&M Contractor shall establish a permanent marking system at the site clearly delineating each of the 14 inspection zones, and inspect each of the zones on a monthly basis.

The inspector shall perform the work in an orderly fashion completing all of the items in each zone prior to proceeding to the next zone. The inspector is required to walk up and down the sideslopes at least once in each zone to obtain close inspection of the slope conditions as heavy vegetation may keep some problems from being easily observed. It is anticipated that the inspector will spend a minimum of 20 minutes inspecting each zone for the items listed on Form FCS-1. Additional time may be required if problems/deficiencies are observed.

The O&M Contractor shall follow the inspection procedures described on Form FCS-1 and the reporting procedures discussed in Volume I, Section 5. All significant deficiencies shall be recorded on a 24-inch by 36-inch O&M "record" drawing of the Site. The locations shall be surveyed or accurately measured from known features at the Site and the information shown to scale on the record drawings.

2.3.2 Grass Cover/Topsoil Layer

The O&M Contractor shall visually inspect the grass cover including vegetation islands (the isolated landscaped areas on the landfill surface) on a monthly basis and immediately after each major rainfall event (2.5 inches in 24 hours or larger) using the approved inspection checklists (Appendix A, Form FCS-1). The visual inspection shall include, but not be limited to, erosion, sinkholes, bare spots, dead species, and undesirable species. Bare or dead areas of vegetation shall be further examined for the possibility of landfill gas migration, leachate, erosion, or burrowing animals. The apparent cause of any damage shall be recorded in the inspection report.

The grass cover shall be mowed when directed by the DEP representative. Do not mow when grass is wet. The grass shall be cut to between 6 inches to 8 inches in height. The O&M

Contractor shall use tractors with mower attachments having a maximum total weight of 4000 lbs. It is recommended that the mowing equipment be similar to that used on golf courses. Trimming around existing features such as fences, equipment, drainage ditches, and other areas that cannot be reached with a mower, shall be completed as necessary with smaller (portable) equipment which will not damage the features, (i.e. weed whips or grass trimmers). Additionally, vegetation greater than 2 inches in diameter shall be grubbed during mowing and trimming (except on vegetation islands). Mowers shall mulch grass and clippings shall be left in place. All other materials (i.e., grubbed vegetation) shall be properly disposed of off-site by the O&M Contractor.

Vegetative maintenance shall include the application of fertilizers, as directed by the DEP representative. No fertilizer shall be applied within 10 feet of the stormwater drainage ditches. Application of herbicides and pesticides to control undesirable species shall not be permitted without approval of NYCDEP.

The O&M Contractor shall check that the soil pH is within the range of 6.0 to 7.0 as required in Section 02920 of the specifications for Contract No. HP-876. This shall be done by testing the soil with a pH meter in the Spring of each year. The O&M Contractor shall apply lime in accordance with the requirements specified in Section 02930 of the specifications to adjust pH.

Reseeding of the cover system shall be performed in accordance with specification Sections 02930 and 02940 for lawns and meadows or warm season grass and wildflower seeding, as needed, to replace distressed or dead vegetation. Replanting and trimming shrubs, trees, etc., in the vegetation islands, shall be performed as directed by the NYCDEP.

Sparsely vegetated areas and dying shrubs, etc. (including vegetation islands) shall be revegetated during the current or next planting season, as appropriate (e.g., if sparse vegetation is noted during the winter monitoring period, revegetation shall be initiated in the spring planting season). If seeding is not possible due to seasonal constraints, hay bales shall be installed above the sparsely vegetated areas to help control erosion. Vegetation shall be watered when required by the O&M Contractor to prevent loss due to drought conditions.
Insect infestation shall be addressed by the O&M Contractor by subcontracting with qualified licensed pesticide applicators. Undesirable species discovered during visual inspections shall be exterminated if the NYCDEP determines that their presence negatively impacts the

integrity of the cover system. Insecticides shall not be applied until the insecticide contents have been approved by NYCDEP.

2.3.3 Cover Soil and Cap Components

Similar to the grass cover, the cover soil and cap components shall also be visually inspected on a monthly basis and immediately after each major rainfall event (2.5 inches in 24 hours or larger). If damage to the geosynthetic and underlying soil component is suspected, the affected area shall be exposed to allow for inspection and assessment of damage. The inspection shall cover, but not be limited to, the following elements:

- Surface cracks and irregularities in the cover system;
- Presence and condition of vegetative growth;
- Presence of burrowing animals;
- Evidence of significant settlement, bulging or sinkholes;
- Signs of erosion damage;
- Signs of unstable conditions;
- Signs of leachate or waste breakthrough;
- Presence of ponded water or seepage;
- Evidence of unauthorized access such as vehicular tracks or disturbed cover soil;
- Presence of unauthorized dumping or vandalism; and,
- Damage to the underlying geosynthetic and soil components.

The O&M Contractor shall complete the inspection checklist, form FCS-1 in Appendix A. Based on the inspection reports, the O&M Contractor's recommendations, and the discretion of the NYCDEP, repairs to, or replacement of, the cover soil or cap components may be necessary. All repairs and/or replacements shall be made in accordance with the repair protocol in Section 2.3.4 and the record drawings and specifications for Contract No. HP-876.

2.3.4 Cover Repair Protocol

The O&M Contractor shall exercise care in performing repair work to or over the geosynthetic materials installed in the cover system. Criteria for the materials, and placement procedures including equipment restrictions over the geosynthetics shall be as described in the record drawings and specifications for Contract No. HP-876. The O&M Contractor is responsible for conducting any repair work in compliance with these specifications. The cover repair protocol for listed items is described below

2.3.4.1 Surface Cracks

When surface cracks are observed, investigate cracks for depth and length. Note orientation with respect to the slope. Cracks that are greater than about 20 feet long, 9 inches deep and 2 inches wide that are parallel to the slope should be noted on the checklist and immediately reported to the NYCDEP. Refer to the procedures below for Slope Stability to repair cracks deeper than 12 inches that are on mild slopes (i.e., slopes of 10% or less), and which appear to be the result of localized settlement or dry conditions. ***DO NOT*** fill cracks that are associated with general slope movement. Refer to Volume III, Section 2.3.4.6.

Repair cracks not related to general slope movement by filling with like material, compacting and reseeding area in accordance with the specifications for Contract No. HP-876.

2.3.4.2 Vegetative Growth

When vegetative stress is observed, visually check for cause (i.e. gas odors, leachate seepage, insect infestation, extreme dry periods, etc.). Take sample of topsoil in affected areas and test for organic content, phosphorous, nitrogen, potassium and pH.

If grasses are stressed due to lack of fertilization, apply fertilizer as needed. If stressed due to lack of water, reseed affected area after dry period ends, only if stand has not reestablish itself within 2 months. Refer to specifications for Contract No. HP-876 for topsoil, seed mix, planting criteria and planting seasons.

2.3.4.3 Vector Penetration

When burrow holes are observed, check area for damage to geosynthetics by carefully hand excavating test pit near burrow holes. Note and repair any damage to geosynthetics in accordance with specifications for Contract No. HP-876. Replace original soil materials and hand compact. Reseed if necessary. If significant damage is observed, notify NYCDEP and contract with exterminator to remove burrowing animals subject to NYCDEP approval.

2.3.4.4 Settlement

When settlement which begins to pond water is observed, determine extent of affected area. Record areas of settlement on the O&M record drawings. Categorize as small or large depressions and repair accordingly as described below:

Small Depressions

In general, repair of small depressions (less than 1000 sq. ft., and capable of ponding 3 to 6 inches of water after a rainfall event) shall be as follows:

1. Clear vegetation.
2. Fill to grade with clean topsoil.
3. Compact with hand tools or a backhoe.
4. Reseed.
5. Install hay bales above the remediated area.
6. Remove hay bales after grass has grown 6 inches.

Large Depressions

In general, repair of large depressions created by settlement or general surface sloughing, (greater than 1000 sq. ft. and/or capable of ponding more than 6 inches of water), **not** erosion, shall be as follows:

1. Remove final cover layers with a backhoe and hand tools.

2. Stockpile layers separately.
3. Carefully cut any geocomposite drainage layer with "hook" blades so as not to damage any HDPE liner beneath.
4. Roll back geocomposite drainage layer.
5. Examine the HDPE liner. If HDPE liner is damaged, call HDPE liner contractor and proceed as follows. If HDPE liner is undamaged, proceed to Step 9.
6. Remove damaged HDPE liner and regrade the subsoil layer beneath it to match the grades in the adjacent undamaged areas. Ensure that the prepared surface grades to drain. Place and compact subsoil materials in accordance with specifications for random soil Class II.
7. Repair HDPE liner in accordance with record drawings and specifications for Contract No. HP-876, and as recommended by the vendor.
8. Roll back any geocomposite drainage layer or install new geocomposite drainage layer.
9. Tie geocomposite where cut with cable ties spaced at 5-foot intervals. Overlay geotextiles as required in the specifications.
10. Replace excavated barrier protection soil.
11. Replace excavated topsoil and match surrounding grade.
12. Reseed.
13. Install hay bales above the remediated area when on a side slope.
14. Remove hay bales after grass has grown 6 inches.

2.3.4.5 <u>Erosion</u>

Erosion may indicate that some portion of the stormwater management system is not functioning correctly. Examples of this could be sediment impeding water flow through culverts, debris clogging water inflow through the openings of grates or trashracks, or differential settlement along drainage ditches contributing to stormwater overtopping the drainage systems. When erosion is identified, investigate these or other possible causes. Record areas of erosion on the O&M record drawings.

When erosion rills or gullies are observed at least 3 inches in depth and at least 20 feet in length, repair as described below.

1. Remove any accumulated soils down slope of the area.

2. Add the appropriate soil(s) to the eroded areas in the proper sequence and thickness and compact.
3. Reseed.
4. Install hay bales above the remediated area.
5. Remove hay bales after grass has grown 6 inches.

If general sloughing is associated with the erosion, or it is expected that the geosynthetics may have been damaged, repair in conformance with "Large depressions" as described in Section 2.3.4.4 above.

2.3.4.6 Slope Stability

Any observable slope movement is serious in nature. When signs of slope instability are observed report immediately to the NYCDEP and refer to the Contingency Plan in Volume I, Section 6.0 of this manual. Slope movement may be identified by large displacements or cracks in the soil mass. Early signs of slope movement can also appear as bulging of the soil materials near the base of the potential failure.

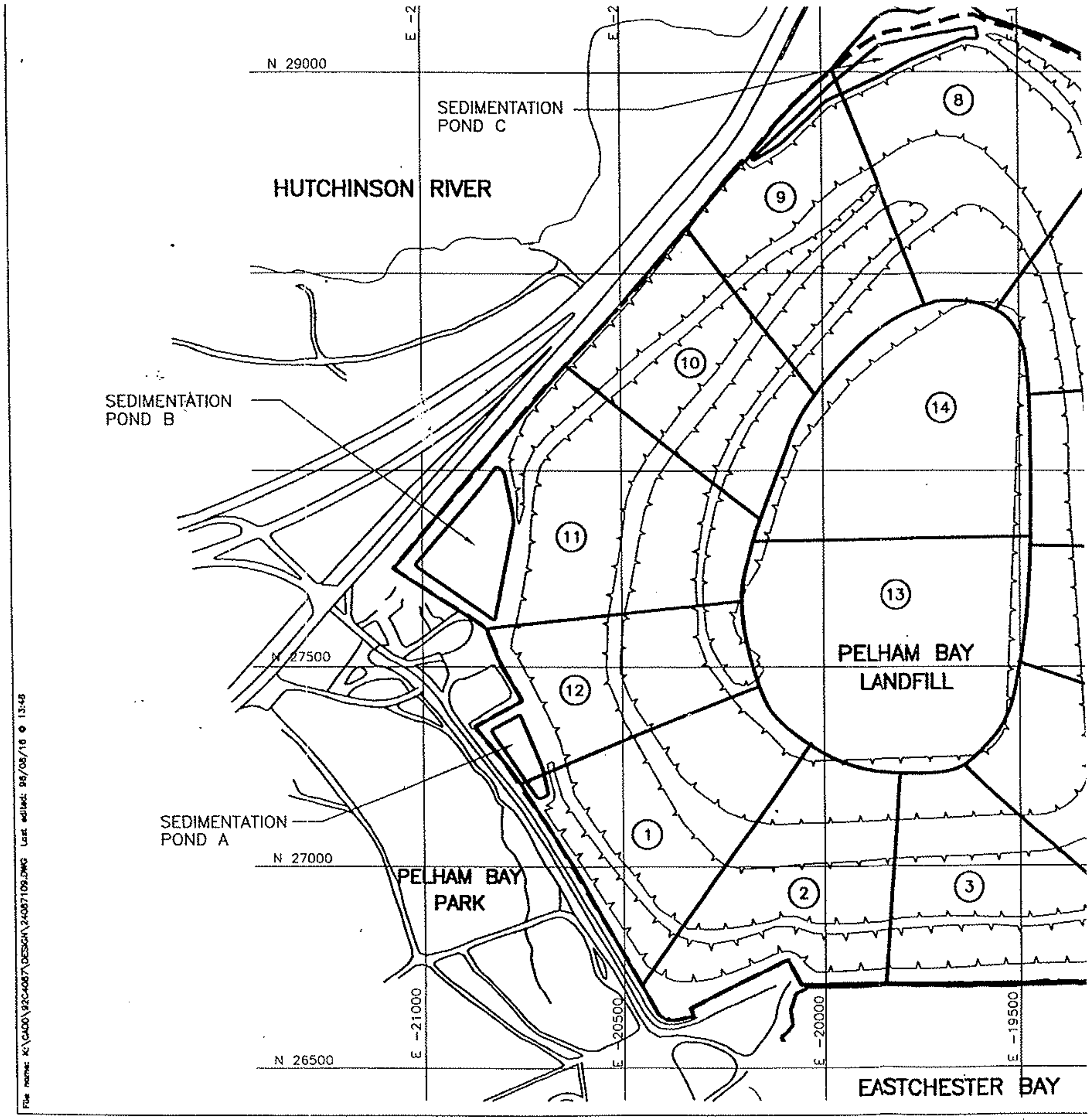
For cracks oriented parallel to the slope with a minimum length of 20 feet, depth of 9 inches and width of 2 inches, install 1 foot long steel bars into soil on either side of cracks for future reference measurements. Check and record distance between steel bars with a tape measure initially and on a frequent basis for the next 2 weeks (i.e., twice per week or even daily depending on the extent of the cracking) or as instructed by NYCDEP.

2.3.4.7 Seepage

When seepage is observed, notify the NYCDEP and refer to the Contingency Plan in Volume I, Section 6.0 for repair of this condition. Hand excavate materials to the level of the geosynthetics following the seepage path and check integrity of the membrane liner at the point of seepage origin. Take care not to damage geosynthetics during uncovering operations.

2.3.4.8 Vandalism

Report any vandalism or illegal dumping to the local police authorities immediately. Concurrently, inform on-site security personnel of each occurrence. Repair damage from vandals to original condition. Refer to specifications for Contract No. HP-876 for materials and methods of construction.



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SEDIMENTATION POND B
SEDIMENTATION POND A
PELHAM BAY PARK
PELHAM BAY LANDFILL
EASTCHESTER BAY
N 29000
N 27500
N 27000
N 26500
E -21000
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3.1 GENERAL

This section is divided into three subsections. Section 3.2 describes the subsystems and components which comprise the stormwater management system. Section 3.3 describes the inspection and maintenance procedures for the stormwater management system.

3.2 MAJOR SUBSYSTEMS AND COMPONENTS

The major stormwater management system components at the Site which require monitoring, inspection, and periodic maintenance include, but are not limited to, the following:

- Stormwater drainage ditches;
- Buried 6-inch diameter corrugated HDPE infiltration pipe and flap gate;
- Riprap;
- Stormwater collection manholes and buried 24-inch diameter corrugated HDPE pipe;
- Concrete baffled outlets;
- Sedimentation ponds;
- Concrete inlet/outlet structures;
- Sedimentation pond connection manholes and 30-inch diameter HDPE sedimentation pond connection pipes;
- 24-inch diameter RCP pipe and flap gate; and,
- Drainage culverts (30-inch diameter).

The stormwater management system operates without automatic or manual controls.

3.3 MONITORING, INSPECTION, AND MAINTENANCE

The O&M Contractor shall follow the monitoring, inspection, and maintenance procedures described in detail below, unless otherwise directed by the NYCDEP. In cases where an O&M procedure could be modified to be more efficient, the O&M Contractor may propose a modification in writing to the NYCDEP. Any modifications to the procedures are subject to approval by the NYCDEP.

3.3.1 General

The O&M Contractor shall visually inspect the elements of the stormwater management system on a monthly basis and after major rainfall events (2.5 inches in 24 hours or larger) using the inspection checklists SMS-1, SMS-2, and SMS-3 attached in Appendix A.

The O&M Contractor shall maintain the original slopes and grades shown in the record drawings and specifications for Contract No. HP-876 unless otherwise directed by the NYCDEP. All sediments removed as part of the maintenance work described herein shall be properly disposed of by the O&M Contractor. The O&M Contractor shall determine if sediments are contaminated prior to disposal or on-site stockpiling. Sediments may be assumed to be uncontaminated if there are no breaches of the HDPE geomembrane liner. The O&M Contractor shall notify the NYCDEP as to the location and disposal of any contaminated sediment. Any debris or refuse removed from the stormwater system shall be properly disposed of off-site.

Small quantities of uncontaminated sediments (less than 20 cubic yards), may be disposed by spreading thinly over a large area of the site. Larger quantities (up to 500 cubic yards) may be stockpiled on-site, allowed to drain, and reused as fill in other cover system repair operations.

Detailed monitoring, inspection, and maintenance procedures for each element of the stormwater management system are presented below.

3.3.2 Stormwater Drainage Ditches

The stormwater drainage ditches consist of crushed stone lined drainageways located primarily adjacent to the access roads on the surface of the landfill. An infiltration trench subdrain system is located directly beneath the flowline of the drainage ditches and consists of a gravel filled trench wrapped in geotextile filter fabric and 6-inch diameter HDPE corrugated slotted pipe. There are also several corrugated metal pipe (CMP) culverts which permit stormwater to flow beneath access roads. Inspection and maintenance of each of these components is described below.

3.3.2.1 Ditches

The location of the Stormwater drainage ditches is shown in Figure 2-3 in Volume I. Ditches shall be inspected for overgrown vegetation, standing water, sediment and debris accumulation, erosion, settlement, blockages, or any other occurrence that may inhibit the efficient flow of stormwater runoff to the corrugated HDPE pipes and sedimentation ponds. Maintenance shall be scheduled to occur within two weeks of the inspection, and shall consist of, but not be limited to, the following:

- Remove excessive vegetation. Mow or trim vegetation greater than 12 inches as close to the landfill surface as practical. Remove grass clippings from drainage ditch. Grub any vegetation greater than 2 inches in diameter.
- Remove sediments and debris to flowline of drainage ditch. Dispose of materials as described in Section 3.3.1.
- Repair erosion rills. Use like materials for each layer and repair erosion or washout to match the surrounding landfill surface elevations and to the relative grades required in the record drawings and specifications for Contract No. HP-876. When erosion is observed, attempt to determine the cause since erosion may indicate that some portion of the stormwater management system is not functioning correctly. Examples of this could be sediment impeding water flow through culverts, debris clogging water inflow through the openings of grates or trashracks, or differential settlement along drainage ditches contributing to stormwater overtopping the drainage systems. Record areas of erosion on the O&M record drawings (see Volume I, Section 5.5).
- Repair depressions using like materials and otherwise as specified in Section 2.3.4;

- Install erosion control matting, if warranted, in accordance with the manufacturer's instructions, in areas of repeated severe erosion.
- Regrade the ditches and fill with crushed stone base or riprap material, as appropriate to compensate for any settlement of the landfill and/or manhole inlets.

3.3.2.2 Infiltration Drainage Trenches

The location of the infiltration drainage trenches is shown in Figure 2-3 in Volume I. The infiltration drainage trenches consist of a 6-inch diameter HDPE corrugated slotted pipe in a gravel filled trench section. The gravel is wrapped in geotextile filter fabric. The infiltration drainage trench collects water which has infiltrated through the cover system down to the level of the 60-mil HDPE geomembrane liner. A site inspection checklist for stormwater drainage ditches (Form SMS-1) is provided in Appendix A.

The connections of the 6-inch diameter infiltration drainage trenches to the stormwater collection manholes (SP-series) shall be inspected as described in Section 3.3.3. Check for water inflow into the manhole at the 8-inch diameter stubout. Water is expected to be flowing through the subdrain system during all but very dry seasons or during long periods of sub-freezing temperatures. Check inlet for ice or other blockages and remove if present.

If inflow is not observed during typical seasonal weather conditions, a blockage of the subdrain system may be indicated. This can result in a serious condition if the slopes become saturated and/or seepage from the side slopes results. If the condition persists for two consecutive inspection periods, check the slopes for saturated conditions and inspect the pipe for blockages using video camera techniques. If a blockage is found, clean the pipe using high pressure jetting or suitable cable tool roto-rooter equipment. If the condition persists, refer to Volume I, Section 6.0 for instructions for Stormwater System Failure.

The alignment of the infiltration drainage trenches should be checked for sinkholes. Sinkholes may indicate a break in the underlying pipe. In such a case, excavate and repair the pipe. Replace same materials of construction and backfill as indicated on the record drawings and specifications for Contract No. HP-876.

3.3.2.3 Culverts

Inspect culverts for rusting, crushing and blockages. The culverts are located at the intersections of Roads A and B and Roads B and C in Zone 8, and south of Pond C in Zone 9 (see Figure 2-3, Volume I). Remove any blockages and repair any damage using same materials of construction as required in the record drawings and specifications for Contract No. HP-876.

3.3.3 Manholes and HDPE Pipes

Manholes and HDPE pipes shall be inspected for debris or other blockages, damage to connections, baffles, access ladders and for any shift in inlet elevations due to landfill settlement. Perform any repair work in accordance with the record drawings and specifications for Contract No. HP-876. Always consult O&M Contractor's Health and Safety Plan and use suitable Health and Safety precautions for confined space entry whenever entering manholes.

Inspect the manholes and HDPE pipe connections using Form SMS-2 and the associated instructions provided in Appendix A. Inspection and maintenance of SP-series and CP-series manholes and 24-inch diameter HDPE stormwater collection pipes and 30-inch diameter Sedimentation Pond connection pipes shall be as follows:

- Clear manhole inlet cover (trashracks or grates) of debris.
- Unfasten and inspect inlet cover, bolts and taps for rusting. Spray taps and bolts with rust inhibitors. Repair damaged inlet covers. Replace inlet covers when inspection is complete.
- Inspect base of manholes for silt accumulation. Remove silt or other debris by hand or by high pressure washing.
- Using a flashlight or other suitable light source, inspect the pipe connections in the manholes for cracking or leakage around the point of connection. Repair any connections in accordance with the record drawings and specifications for Contract No. HP-876. If the connections to the 24-inch diameter stormwater collection pipes are damaged, examine the weepholes in the baffled outlet at the base of the downchute piping. This is to check if water is accumulating in the 24-inch diameter collection pipe trench behind the baffled

outlet. If water is accumulating, refer to Volume I, Section 6.0 for instructions for Stormwater System Failure.

- Check flow of water from the 8-inch diameter HDPE inlets. Refer to Section 3.3.2.2 for further description and instructions.
- Check for blockages in the 24-inch diameter stormwater collection pipes by placing a 12-inch diameter rubber ball (a normal sized basketball can be used) in the 24-inch pipe from above. The ball may be pushed into the pipe using a shovel or broom without entering the manhole. Check that the ball exits the pipe at the manhole on the next lower bench or at the baffled outlet at the end of the pipe run. If the ball does not exit, visibly inspect the pipe run from inside the manholes or from the baffled outlet structures at the base of the landfill. Use suitable Health and Safety precautions for confined space entry whenever entering manholes. A video camera may be used to locate the blockage if it can not be seen from either end of the pipe run. Clear blockage using high pressure jetting or suitable cable tool roto-rooter equipment.
- Check for blockages in the 30-inch diameter sedimentation pond connection pipes by observing, from above, water flow-through the manhole. Stagnant water should only be present if all ponds have similar water levels or water level in the ponds is not above the outlet pipe inverts. If stagnant water is observed and if ponds do not have similar water levels and the water is above the inlet inverts, a blockage of the connection pipe is likely. Clean pipe blockages with high pressure jetting or suitable cable tool roto-rooter equipment for large diameter pipes. If the blockage cannot be removed by these methods, isolate the affected section of pipe with sewer plugs, excavate and remove the blocked section and repair the pipe. Backfill with like materials in accordance with the record drawings and specifications for Contract No. HP-876.
- Check the pipe alignment between the manholes for excessive settlement or blow holes. If observed, this condition likely indicates a breakage in the HDPE piping. Isolate the affected section of pipe with sewer plugs, excavate and remove the damaged section and repair the pipe. Backfill with like materials in accordance with the record drawings and specifications for Contract No. HP-876.
- Regrade stormwater collection ditches at the manhole inlets to compensate for any settlement of the landfill which restricts water from entering the inlets.
- Inspect manhole baffles (SP-series) and access ladders for damage. Gently push on baffles or stairs with a 2x4 wood stud or shovel handle from above and note any deflection or apparent damage near the HDPE weld connections. Repair any damage to its original

condition in accordance with the record drawings and specifications for Contract No. HP-876.

3.3.4 Concrete Baffled Outlets

The concrete baffled outlet structures shall be inspected for sediment accumulation, pipe connections, erosion around structures, flow through weepholes, and any form of blockage that may result in stormwater runoff overtopping the structure. The concrete structure itself shall be monitored for cracks or spalling and the condition of the guardrails. Inspect the baffled outlets using Form SMS-2 and the associated instructions provided in Appendix A.

Maintenance of the concrete baffled outlets shall be as follows:

- Check for accumulated sediments and debris in the baffled outlet silt trap and in front of the structure in the pond or drainage ditch. Remove accumulated sediment from the silt trap when the thickness of sediments reaches two inches. Remove any debris and clear the area in front of the baffled outlets to allow unrestricted drainage.
- Check connections to the 24-inch diameter corrugated HDPE pipe. Inspect for any indications of cracking of the concrete or seepage at the connections. Repair the connection if damaged. If cracks or seepage are noted, check the weepholes at the back of the structure adjacent to the pipe connection for drainage. This is to see if water is accumulating in the 24-inch pipe trench behind the structure. If drainage through the weepholes is observed, refer to Volume I, Section 6.0 for instructions on Stormwater System Failure. Perform all repairs in conformance with the record drawings and specifications for Contract No. HP-876.
- Inspect for erosion rills around the structure. If erosion has occurred, replace with like materials and reseed in accordance with specification for Contract No. HP-876.
- Inspect the structures for cracks and spalling. Repair damage to concrete structure (cracks, spalling, impact damage, etc.) using cement based repair mortar such as Emaco S66-CR by Master Builders, Inc. (216-831-5500) or approved equivalent, to conform with original drawings and specifications.
- Inspect guard rails for damage or rusting. Repair to the original condition in conformance with the record drawings and specifications for Contract No. HP-876.

3.3.5 Riprap

Riprap around structures shall be inspected for plant growth, sediment accumulation, displacement, settlement, or any other occurrence that may inhibit the efficient flow of stormwater runoff to the corrugated HDPE pipes and sedimentation ponds. If required, maintenance shall be scheduled to occur within two weeks of the inspection, and shall consist of, but not be limited to, the following:

- Remove plant growth;
- Remove silt and debris; and,
- Replace displaced or washed out riprap.

There are four classes of riprap used for erosion protection on the landfill surface. These are Class I, II, III and IV. The maximum size of riprap in each class is 9,12,18 and 36 inches, respectively. In areas where riprap is displaced or washed out, replace with riprap one class larger to provide greater protection. Install geotextile filter fabric and/or riprap bedding as required in the record drawings and specifications for Contract No. HP-876.

3.3.6 Sedimentation Ponds

The sedimentation ponds shall be inspected for signs that any stormwater runoff detained during a previous large storm event has been discharged fully. Water remaining in the ponds above the outlet structure invert elevations for an extended period of time may indicate that there is a problem with either the pond outlet structures, connection pipe between the ponds, or the discharge pipe to the Eastchester Bay. The sideslopes of the ponds shall be inspected for settlement and erosion. Inspect ponds using Form SMS-3 and the associated instructions provided in Appendix A.

Inspection and maintenance of the sedimentation ponds shall be as follows:

- Prior to the first pond inspection, place a red colored elevation marker (painted wooden hub or equivalent) at elevation 12 on the sideslope of each pond. **DO NOT** embed the marker more than 6-inches in the sideslope. Embedment more than 6 inches could damage the underlying geomembrane. During each subsequent inspection, note whether the water levels in each pond exceed this elevation. When the water level is at elevation

12, two feet of free board remains and water should be overtopping the spillway crest in Sedimentation Pond C.

- Normally the elevation in the ponds should be at or below the invert elevation of the outlet pipe for Ponds A and B and below the bottom weep holes in the outlet structure for Pond C. Water is likely to be present above this level only after a recent heavy rainfall or during periods of rapid snowmelt.
- If elevation 12 is exceeded in any pond during the inspection, immediately check for flow through the CP-series manholes. If blockage is apparent, drain the ponds using pumps and remove the blockage in the pipes, manholes or inlet/outlet structures.
- Check the bottoms of the ponds for sediment accumulation when the water level is at or below the outlet invert elevations. When sediments are generally 4 to 6 inches above the invert elevation over at least one third the pond area, remove the sediments to the level of the Class I Riprap. Remove sediments with a vacuum truck or light dozer (Caterpillar Model D4 or lighter). Remove sediments a minimum of once per year.
- Regrade basin floor and interior side slopes with Class I Riprap to maintain design grades.
- Place new riprap at the inlet/outlet structures as necessary.
- Inspect the pond side slopes for erosion. Erosion on the sideslopes may indicate overtopping of the stormwater drainage ditch system. Repair in accordance with Section 3.3.2.1.
- Inspect the pond side slopes for stability. Cracks longer than about 20 feet and greater than 2 inches wide running parallel to the pond slopes may indicate a serious stability condition. Notify the NYCDEP immediately and refer to the instructions for Sideslope Failure in Volume I, Section 6.0.
- Remove debris from the ponds.

3.3.7 Inlet/Outlet Structures

The inlet/outlet structures at each sedimentation pond and the outlet structure between Sedimentation Pond C and Eastchester Bay shall be inspected for sediment accumulation, pipe connections, erosion around structures, flow through weepholes, and any form of blockage that may inhibit the free flow of stormwater. The outlet at Pond A consists only of a trash rack covering the 30-inch diameter pond connection pipe. The concrete structures themselves shall be monitored for cracks or spalling and the condition of the guardrails. The outlet structure at Pond C includes the Reinforced Concrete Pipe (RCP) and flap gate at the pipe outfall into Eastchester Bay. Always consult O&M Contractor's Health and Safety Plan and use suitable Health and Safety precautions for confined space entry whenever entering pipes or manholes. Inspect the inlet/outlet structures using Form SMS-3 and the associated instructions provided in Appendix A.

Inspection and maintenance of the inlet/outlet structures shall be as follows:

- Check for accumulated sediments and debris in the inlet/outlet structures. Remove any accumulated sediment or debris from within the structure which might inhibit free water flow.
- Check connections to the 30-inch diameter HDPE pond connection pipe and 24-inch diameter Reinforced Concrete Pipe (RCP). Inspect for any indications of cracking of the concrete or seepage at the connections. Use a flashlight to examine the outside of the pipe at the structure interface and inside for the integrity of the pipe to the visual limits. Look for indications of pipe deflection or gaps between the structure and the pipe. Repair the connection if damaged. Perform all repairs in conformance with the record drawings and specifications for Contract No. HP-876.
- Inspect for erosion around the structure. Check if erosion has displaced riprap. If displacement has occurred, replace with riprap one class larger than originally installed (i.e., place Class II riprap if Class I was originally installed). Refer to Section 3.3.5. If erosion is in vegetated portion of pond sideslope repair in accordance with the instructions for Section 2.3.4.
- Inspect the structures for cracks and spalling. Repair damage to concrete structure (cracks, spalling, impact damage, etc.) using cement based repair mortar such as Emaco S66-CR by Masterbuilders, Inc. (216-831-5500) or approved equivalent, to conform with original drawings and specifications.
- Clear trashracks of debris and blockages.
- Inspect the entire length of the 24-inch diameter RCP using a flashlight or other suitable light source. If cracks, spalling or cracking are observed, report the damage to NYCDEP. Remove any blockages using high pressure jetting or suitable cable tool roto-rooting equipment.
- Exercise flapgate at the Pond C 24-inch diameter RCP outfall by lifting gently away from the pipe and releasing. Check for rusting. If water is flowing through RCP, check that flapgate is permitting flow-through with little resistance. Adjust flapgate hinge and lubricate with good quality, high molybdenum content grease in accordance with

manufacturer's recommendations. If tidewaters are above the water level in Pond C, check that the flapgate remains sealed against pipe outlet. Check that no grit, dirt or other objects prevent firm seal. Wipe gasket seal with clean rag. If gasket seal is damaged, replace with new gasket. Flapgate shop drawings and vender information are provided in Volume II , Section 8.

4.0
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM

4.1 GENERAL

This section is divided into five subsections. Section 4.2 lists major subsystems and components, normal operation, automatic operation procedures, manual operation procedures, alarms and interlocks, and emergency operation procedures for each component of the groundwater/leachate management system. Section 4.3 outlines the monitoring inspection and maintenance procedures for each of the components discussed in Section 4.2. Section 4.4 outlines troubleshooting procedures. Section 4.5 identifies spare parts required for the system. The site inspection checklist for the groundwater/leachate management system and associated instructions are included in Appendix A.

For general description and location of various subsystems the O&M Contractor attention is directed to Volume I.

Table 4-1 is a trouble shooting guide for the leachate management system. Figure 4-1 is a layout of the control panel for sump pumps D-1, D-8, and D-10. Figure 4-2 is a layout of the central control alarm panel for Lift Stations Nos. 1 and 2, duplex air compressor, truck fill station pumps, decon sump pump station, lift station (LS) area sump and storage tank level. Figure 4-3 and 4-4 are layouts of the leachate lift pumps main control panel and pump duplex starter panel, Figure 4-5 is a schematic diagram of the leachate collection system. Photographs No. 4-1 and 4-2 show the main alarm control panel and the control panel for sump pumps D-1, D-8 and D-10. Photographs No. 4-3, 4-4 and 4-5 show Lift Stations Nos. 1 and 2 and the control for Lift Station No. 1. Photograph No. 4-6 shows the leachate tank truck loading arm. Photograph No. 4-7 shows the leachate storage tanks. Photograph No. 4-8 shows the duplex air compressor air system.

4.2 MAJOR SUBSYSTEMS AND COMPONENTS

The O&M Contractor shall follow the operating procedures described in detail below, unless otherwise approved by NYCDEP. The equipment and components, normal operation, automatic operation procedures, manual operation procedures, alarms and interlocks, and emergency operation procedures for the following components of the groundwater/leachate management system are shown on Figures 2-4 through 2-9 in Volume I and presented below:

- Downgradient Collection Drains and Manholes;
- Collection Sumps (D-1, D-8 and D-10);
- Curtain Drain;
- Lift Station Nos. 1 and 2;
- Force Mains Heat Tracing;
- Decon Trailer Sump;
- Gravel Decon Pad/Area Sump;
- Leachate Storage Tanks;
- Leachate Storage Tank Containment Sump;
- Carbon Adsorption System (Storage Tank Off-gas);
- Contract No. HP-877, Force Main Discharge to POTW;
- Storage Tank Off-Loading and Tanker Loading;
- Central Control Alarm Panel;
- Motor Control Center; and,
- Cutoff Wall and Collector Drain

4.2.1 Downgradient Collection Drain and Manholes

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	-	8-inch diameter slotted and solid HDPE piping connected between ten (D-1 through D-10) manholes forming a semi-continuous conduit for leachate extraction along the southwest boundary of the landfill. Total length of drain is 1,223 ft. The ten manholes are constructed from 4 ft diameter precast concrete segments.
PERFORMANCE	-	Average anticipated leachate flow in downgradient drain is 40,000 gpd. This anticipated flow is approximate and will vary.
LOCATION	-	Southwest Boundary of landfill. (Reference Figure 2-6 in Volume I.).

Normal Operation

The collector drain to the north of manhole D-5 drains northward to manhole D-1. This manhole is equipped with two submersible pumps and is called Collection Sump D-1.

The collector drain to the south of D-6 drains southward to manhole D-8. This manhole is equipped with two submersible pumps and is called Collection Sump D-8.

The collector drain to the east of manhole D-9 drains eastward to manhole D-10. This manhole is equipped with two submersible pumps and is called Collection Sump D-10.

Automatic or manual controls are not required for operation of the downgradient collector drain because it is a gravity system. Operation of the collection sumps is discussed in Section 4.2.2.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

Manual operation is not applicable

Alarms and Interlocks

Alarms and interlocks are not applicable.

Emergency Operation

In the event of a serious emergency, the O&M Contractor shall consult the Corrective Action Process in Volume I, Section 6.2.

4.2.2 Collection Sumps (D-1, D-8 and D-10)

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Submersible Pumps and Associated Equipment
PERFORMANCE	- 150 GPM @ 30 ft. TDH, 1800 RPM, 460V, 3 phase, 3 HP, Expl. Proof
LOCATION	- Collection Sumps D-1, D-8, and D-10 (Reference Figure 2-6 in Volume I)
MANUFACTURER	- Flygt
TYPE	- Submersible
MODEL	- CP-3085.091
REPRESENTATIVE	- GA Fleet Associates, Inc., (914) 835-4000

Normal Operation - Prior to Completion of Contract No. HP-877

Collection Sump D-1 discharges to Lift Station No. 1. Collection Sump D-8 discharges to Collection Sump D-10. Collection Sump D-10 discharges to Lift Station No. 2.

If the leachate storage tanks reach maximum capacity, an alarm condition is activated and the operation of all leachate collection pumps (D-1, D-8, D-10, Lift Stations No. 1 and 2, the storage tank containment sump and the decon pad/truck fill area sump) will stop.

Each of the Collection Sumps (D-1, D-8 and D-10) houses a pair of Flygt submersible pumps operating in duty/stand-by configuration. The pumps in all three sumps are identical. Selection of the duty pump can be either automatic or manual as dialed on the three position (AUTO-1-2) panel-front switch on the pump control panel (reference Control No. 7 on Figure 4-1) located near the collection sump. In AUTO mode, the duty pump selection is alternated at 8 hour intervals. (Note: this is 8 hours clock time rather than 8 hours run time). Under normal operating conditions, this switch should be in the AUTO position.

For each pump, there is also a three position switch (AUTO-OFF-HAND) which controls operation of the pump (reference Controls Nos. 5 and 6 on Figure 4-1). With this switch in the AUTO position, the operation of the pump is controlled by the level switches located in the collection sump. In the HAND position, the pump will run without reference to the level switches. Under normal operating conditions, this switch should be in the AUTO position.

Normal Operation - After Completion of Contract No. HP-877 (Connection to Sewer)

Upon completion of the NYCDEP sewer connection (Contract No. HP-877), Collection Sump D-1 will discharge directly to a sewer manhole in Burr Avenue under normal conditions. Operation of Collection Sump D-8 and D-10 is not affected by Contract No. HP-877.

During a storm event, leachate discharge to sewer will stop to prevent overload of the NYCDEP combined sewerage system. A storm event will be detected by a high level in the Burr Avenue sewer manhole. Upon detection of a storm event, discharge from Collection Sump D-1 will be automatically directed (via Lift Station No. 1) to the leachate storage tanks where it will be held until surcharging of the sewer dissipates (i.e., end of storm event). At the end of the storm event, the leachate tanks will automatically drain back to Collection Sump D-1 and the discharge from D-1 will automatically be redirected to the Burr Avenue manhole.

Controls - Automatic Operation

The submersible pumps are operated automatically from a three-way selector switch. The procedure is as follows:

- Set the HAND/OFF/AUTO (reference Controls Nos. 5 and 6 on Figure 4-1) switch to AUTO. With the switch in the AUTO position, the pumps are controlled from the three level switches. In the event of a high-high level in the lift station, both pumps operate in parallel.

In the event that the pump(s) continue to operate due to failure of the level switches, thermal protection will shut-off the pump(s) if the motor(s) start to overheat.

Controls - Manual Operation

The submersible pumps can also be operated manually from the three-way selector switch. The procedure is as follows:

- Set the HAND/OFF/AUTO (reference Controls Nos. 5 and 6 on Figure 4-1) switch to HAND. The selected pump will operate irrespective of the leachate level in the collection sump. Thermal protection will override "hand" selection and shut the pump off if left running.

It should be noted that the operator should manually alternate the status of the pumps unless the AUTO-1-2 (reference Control No. 7 on Figure 4-1) selector is in AUTO mode. The pumps should not be operated in the HAND position unnecessarily as this will allow cavitation of the impeller (when the leachate level is lowered below the normal low level) from which damage to the impeller may result.

Alarms and Interlocks

There is an electrode probe (manufactured by B&W Model No. 6013-W12-20) in each of the collection sumps (D-1, D-8 and D-10). The lower two settings control operation of the pump(s) while the third setting is used to detect an alarm condition (High water level). With the pair of pumps in AUTO mode, the control logic operates the pumps in the following sequence:

Switch	Action
HA	• Alarm condition identified on local panel and on the remote alarm panel
L2	• Start Duty Pump - Pump run indicator on local panel
L1	• Stop Duty Pump

Emergency Operation

Each of the collection sumps is equipped with a pair of pumps which operate in duty/standby configuration. The pumps have been sized so that under normal conditions operation, only one pump is required to meet the leachate inflow rate.

In the event of failure of either of the submersible pumps, the failed pump can be easily removed from the sump for service using the lifting chain and a guide rail system. The sump pump is connected to the discharge piping by means of a quick discharge connector.

In the event of a serious emergency, the O&M Contractor shall consult the Correction Action Process in Volume I, Section 6.2.

Control System After Completion of Contract No. HP-877

Under this design, the pumps from Collection Sump D-1 discharge the leachate collected from the landfill to the New York City Sewer System at Burr Avenue/Pelham Parkway South via an off-site force main. The leachate is combined with the wastewater and storm water flows and flow to an overflow chamber CSO 22.

At time of intense rain, the flow increases and the water level within the chamber raises to a certain elevation where a portion of the flow including leachate overflows into the Westchester Creek. Concerns were voiced to the fact that the overflowing of leachate into the creek constitutes a threat to public health, the environment and the water quality in the creek, and ultimately in the East River. In order to resolve that situation the design has introduced a control system capable of stopping the pumping from Collection Sump D-1 prior to overflowing conditions at CSO 22.

The system conceived to achieve the control is as follows:

An ultrasonic level measurement device installed at CSO 22 is set to transmit a signal when the water level reaches a certain elevation below the chamber weir elevation. That signal is sent to the CSO 22 remote terminal unit (RTU) which in turn transmits the signal, via radio to another remote terminal unit (RTU) located at the landfill site in the vicinity of the Collection Sump D-1 valve chamber. This RTU sends appropriate signals to the valving control system for close and/or open positions and subsequently stops the leachate pumping to the city sewer via the off-site force main and diverts the leachate to the leachate tnak storage area.

When the water level recedes inside CSO 22, the probe control system triggers a signal at a lower elevation. The previous operation is then reversed and pumping to the City Sewer resumes.

A similar scenario is established for Regulator 4.

4.2.3 Curtain Drain

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Curtain Drain - two segments, total length 1150 ft.
LOCATION	- Commences beside southeast corner of Sedimentation Pond B. The shorter first segment extends 200 feet in a northerly direction along the east side of sedimentation Pond B. The second segment branches from the start of the first segment, goes about 300 feet in an east-northeast direction beneath the south portion of Pond B and then heads in a north-northeast direction for about 650 feet along the northwest boundary of the landfill parallel to Shore Road. Discharges to Lift Station No. 1. (Reference Figure 2-6, Volume I).

Normal Operation

A perforated HDPE pipe has been installed in the bottom of the gravel-filled collection trench to form the curtain drain. There are no automatic or manual controls for the operation of the curtain drain. The perforated pipe drains to Lift Station No. 1.

Operation of Lift Station No. 1 is discussed in Section 4.2.4.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

There are no alarm conditions monitored or interlocks activated on the curtain drain.

Emergency Operation

In the event of a serious condition, the O&M Contractor shall consult the process in Volume I, Section 6.0, Emergencies and Contingency Plan.

4.2.4 Lift Stations Nos. 1 and 2

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	Submersible Pumps and Associated Equipment
PERFORMANCE	225 GPM @ 60 ft. TDH, 1,800 RPM, 460V, 3 phase, 7 1/2 HP @ Lift Station No. 1

PERFORMANCE	125 GPM @ 40 ft. TDH, 1,800 RPM, 460V, 3 phase, 3 HP @Lift Station No. 2
LOCATION	Lift Station No. 1 and No. 2 (Reference Figure 2-6 in Volume I)
MANUFACTURER	Ebara
TYPE	Submersible
MODEL	80DLMEII65.5 @ Lift Station No. 1
MODEL	80DLMEII62.2 @ Lift Station No. 2

Normal Operation - Prior to Completion of Contract No. HP-877

Lift Station No. 1 and Lift Station No. 2 both discharge to the leachate storage tanks. If the level in the leachate storage tanks approaches the maximum storage capacity, an alarm is activated and the pumps in all of the leachate collection system sumps (Collection Sumps D-1, D-8 and D-10; Lift Stations 1 and 2; containment area sump; and decon area/truck fill sump) will stop.

Each of the lift stations houses a pair of Ebara submersible pumps operating in duty/standby configuration. The pumps in each lift stations are identical.

The selection of duty pump can be either automatic or manual as dialed on the three position (AUTO-1-2) panel front switch on the sump control panel located beside the lift station. In AUTO mode, the duty pump and the stand-by pump are alternated at 8 hour intervals. (Note: this is 8 hours clock time). Under normal conditions this switch should be in the AUTO position.

For each pump there is also a three position switch (AUTO-OFF-HAND) which controls operation of the pump. With this switch in the AUTO position, the operation of the pump is controlled by the level switches located in the collection sump. In the HAND position, the pump will run without reference to the level switches. Under normal operating conditions this switch should be in the AUTO position.

Normal Operation - After Completion of Contract No. HP-877

Lift Station No. 1 will continue to discharge to the leachate storage tank from which it will flow, under gravity, to Collection Sump D-1. Lift Station No. 2 will discharge (directly to Sump D-1). Storm events will not affect the operation of Lift Stations No. 1 and 2.

Controls - Automatic Operation

The submersible sump pumps are operted automatically from a three-way selector switch. The procedure is as follows:

- Set the alternation selector switch to Auto.
- With the switch in the Auto position, the pumps are controlled from the five level switches. In the event of a high-high level in the lift station, the pumps operate in parallel. It should be noted that the duty pump should run at least 8 hours before it alternate status.

Controls - Manual Operation

The submersible pumps can also be operated manually from the three-way selector switch similar to that for the Collection Sump pumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Alarms and Interlocks

There are five level switches in each of the lift stations. The lower three switches control operation of the pump(s) while the fourth switch is used to detect an alarm condition (High alarm water level). With the pair of pumps in AUTO mode, the control logic operates the pumps in the following sequence:

Switch	Action
HA	• Alarm condition identified on the local panel and on the remote central control alarm panel
H2	• Start Stand-by Pump - Both pumps on
H1	• Start Duty Pump - Pump run indicator on local panel
L2	• Stop Duty Pump - Both pumps off
L1	• Reference Level

In addition, the following alarm conditions are indicated on the Central Control Panel:

The P FAULT visual alarm is activated when the motor of the pump is inoperable.

The P SEAL FAILED visual alarm is activated when the mechanical shaft seal oil level is low.

The P TEMP HIGH visual alarm is activated when the thermistors sense a high temperature in the pump's motor.

Emergency Operation

Each of the lift stations is equipped with a pair of pumps which operate in duty/stand-by configuration. The pumps have been sized so that under normal conditions operation of only one pump is required to meet the leachate inflow rate.

In the event of failure of either of the submersible pumps, the failed pump can be easily removed from the sump for service using the lifting chain and a guide rail system. The sump pump is connected to the discharge piping by means of a quick discharge connector.

For other serious conditions, the O&M Contractor shall consult the Emergencies and Contingency Plan in Volume I, Section 6.0.

4.2.5 Force Main Heat Tracing

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Heat Tracing System
LOCATION	- Above Ground Section of Force Main
MANUFACTURER	- Briskheat, Model SL-CAB-5W
VOLTAGE	- 110V
LENGTH	- 260 ft (approx)

INRUSH CURRENT -			
Start-up Temperature	50°F	0°F	-20°F
(Amps/Ft)	0.09	0.12	0.15
MAX POWER DRAWN	- 1.3 kW		

Normal Operation

The primary heat tracing system is controlled by an ambient temperature sensing thermostat set at 40 degrees Fahrenheit. The secondary heat tracing system is controlled by a pipe temperature sensing thermostat set at 35 degrees Fahrenheit.

The force main installed below ground do not have heat tracing.

Controls - Automatic Operation

The primary and secondary heat tracing systems are controlled by the temperature sensing thermostats.

Controls - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

Alarms and interlocks are not applicable.

Emergency Operation

During colder months (approximately October through April), drain all pipes not used in plant operations to prevent leachate from freezing.

For other serious conditions, the O&M Contractor shall consult the Emergencies and Contingency Plan in Volume I, Section 6.0.

4.2.6 Decontamination Trailer Sump

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Vertical Sump Pump and Associated Equipment
PERFORMANCE	- 15 GPM @ 30 ft.TDH, 1,750 RPM, 460V, 3 phase, 1/2 HP
LOCATION	- Southwest side of Trailer Decontamination Area (reference Figure 2-6 in Volume I)
MANUFACTURER	- Federal Pump Corp., Model VSP-2A

Normal Operation

The Decontamination Trailer Sump discharges to the Decon Pad/Truck Fill Area Sump. The sump pump normally operates in automatic mode by the operation of a two position pedestal mounted float switch.

Controls - Automatic Operation

The pump is operated automatically from a three-way selector switch. The procedure is as follows:

- Set the HAND/OFF/AUTO switch to AUTO.

The pump motor is switched on or off by the two level switches.

- High Level Pump Start
- Low Level Pump Stop

Controls - Manual Operation

The pump can also be operated manually from the three-way selector switch. The procedure is as follows:

- Set the HAND/OFF/AUTO switch to HAND and verify that the appropriate status light of the operating pump is ON.

Alarms and Interlocks

When the liquid in the sump reach a low level setpoint, the float switch stops the pump motor.

When the liquid in the sump reaches a high level setpoint, the float switch starts the pump motor and a visual alarm indicator light is activated at the Central Control Alarm Panel.

Emergency Operation

The submersible pump can be easily removed for service.

For serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.2.7 Gravel Decon Pad Area Sump

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Submersible Pumps and Associated Equipment
PERFORMANCE	- 40 GPM @ 25 ft.TDH, 1,800 RPM, 230V, 2 HP, 6.6 Amps
LOCATION	- Southwest side of Gravel Decon Pad Area Station (reference Figure 2-6 in Volume I)
MANUFACTURER	- Ebara Pump Co.
TYPE	- Submersible
MODEL	- 50DVEV61.52

Normal Operation

The Gravel Decon Pad Area Sump collects rainfall and spills from within the Gravel Decon Pad/Truck Fill Area. The pumps in the Gravel Decon P d Area Sump transfer leachate to the leachate storage tanks. If the storage tanks reach maximum capacity, a visual alarm condition is activated and the sump pumps stop operating.

The Gravel Decon Pad Area Sump houses a pair of Ebara submersible pumps operating in duty/stand-by configuration. The pumps are identical.

Automatic or manual selection of duty pump and AUTO or HAND operation of a pump is similar to that for the Collection sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Controls - Automatic Operation

The automatic operation of these pumps is similar to that described for the Collection Sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Controls - Manual Operation

The manual operation of these pumps is similar to that described for the Collection Sumps (D-1, D-8, and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Alarms and Interlocks

The alarms and interlocks for these sumps is similar to that described for the Collection Sumps (D-1, D-8 and D-10).

There are five level switches in the sump. The lower three switches control operation of the pump(s) while the fourth switch is used to detect an alarm condition (High-High water level). With the pair of pumps in AUTO mode the control logic operates the pumps in similar operating mode as described for Lift Stations Nos. 1 and 2 (reference Section 4.2.4).

Emergency Operation

The Gravel Decon Pad Area Sump is equipped with a pair of pumps which operate in duty/stand-by configuration.

In the event of failure of either of the submersible pumps, the failed pump can be easily removed from the sump for service using the lifting chain and a guide rail system. The sump pump is connected to the discharge piping by means of a quick discharge connector.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 Emergencies and Contingency Plan.

4.2.8 Leachate Storage Tanks

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Reinforced Fiberglass Storage Tanks and Accessories
CAPACITY	- 20,783 Gallons (per tank)
NO. OF TANKS	- 5
DIAMETER	- 11 ft
LENGTH	- 27 ft
LOCATION	- Leachate Storage Tank Area (reference Figure 2-6 in Volume I)
MANUFACTURER	- Justin Tanks

Heating Element

Number	5
Manufacturer	Byline Heating Systems Inc.
Model	RTF
Temperature Range (°F)	220
Voltage (V)	120

Level Indicator

Number	5
Manufacturer	METRON Technology
Model	LG-S
Range (ft)	12.0

The leachate, pumped to the leachate storage tanks, enters each tank through butterfly valves that connect a common feed line to each tank inlet. These are left open in normal operation. An equalization line, equipped with butterfly valves normally open, causes the levels in all of the tanks to be equal. Tank levels are monitored using sight glass level indicators on each tank. These level indicators are removable for maintenance when necessary. Sediment can be removed from the low point of these indicators by opening the drain line at the base of the indicators on the underside of each tank. This is recommended to be done once per week.

Stored leachate in the tanks is drawn through open butterfly valves at the outlets of each tank to a common header which leads to a tanker loading station. Tanker loading is discussed in Section 4.2.12.

Compressed air is used to aerate the leachate stored in the tanks to control anaerobic conditions and odor. The exhausted air from each storage tank is deodorized by passing it through dedicated dual canister carbon filters prior to release to the atmosphere.

Each tank includes a heating system consisting of a thermostatically controlled heating element which maintains the temperature of the leachate between 47°F and 53°F. The heating elements, which are at the bottom of the tanks, are controlled by solid state temperature sensors.

The lower 6 feet of each tank is insulated with 2 inches of polyurethane.

Access into the leachate storage tanks is through 24-inch diameter manways at the top of the tanks. The manways are reached using fiberglass ladders on the tanks.

<u>**Normal Operation - Prior to Contract No. HP-877**</u>

The equalization line between the storage tanks is normally kept open so that the level in the five tanks is uniform. Each of the five tanks can be isolated or emptied by the use of butterfly valves on the inlets and outlets of the storage tanks. Leachate is trucked from site by road tankers to the Sewerage Plant (Hunts Point).

Normal Operation - After Completion of Contract No. HP-877

The leachate storage tanks will not be used to store leachate except in an emergency and or during major storm events. Leachate received by the tanks will be discharged continuously by gravity drainage to Collection Sump D-1 for discharge to the NYCDEP sewer. During major storm events, the discharge line from the storage tanks will close automatically at valve V-3 and the tanks will be used to hold leachate until the end of the storm event. The valves will be automatically controlled as described in Section 4.2.2.

Controls - Automatic Operation

Automatic operation for the leachate storage tanks is not applicable.

Controls - Manual Operation

Manual operation is performed by opening and closing the influent and effluent isolation valves.

Alarms and Interlocks

High level alarms for each of the leachate storage tanks are displayed on the Central Control Alarm Panel.

Emergency Operation

During a leachate storage tank emergency (i.e., leaking tank), one or more leachate storage tanks can be isolated from the leachate storage tank system by closing the butterfly valve before the leachate inlet at the top of the tank, closing the butterfly valve at the leachate tanker loading discharge line, and closing the butterfly valve(s) in the leachate level equalization lines between the tanks (reference Figure 2-8 in Volume I).

Once isolated, a leachate storage tank can be drained by opening the closed butterfly valve in the leachate storage tank drain line leading to the leachate storage tank containment sump. Any leakage from the tank will be drained over a plastic membrane to the storage tank containment sum (see Section 4.2.9).

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.2.9 Leachate Storage Tank Containment Area Sump

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Submersible Pumps and Associated Equipment
PERFORMANCE	- 50 GPM @ 50 ft.TDH, 1,800 RPM, 460V, 3 HP, 4.3 Amps
LOCATION	- Northeast side Leachate Storage Tank Area (reference Figure 2-8, Volume I).
MANUFACTURER	- Ebara Pump Co.
TYPE	- Submersible
MODEL	- 80DLMEU62.2

Normal Operation

The two pumps (duty/stand-by) in the storage tank containment sump transfers leachate that leaked from the tanks, and rainwater as well as leachate that is gravity discharged to the sump through the leachate storage tank drain, back to the storage tanks. The pumps are automatically controlled by an adjustable conductance-actuated level switch which stops the pumps at a low level, starts the lead pump at a high level, and starts the stand-by pump at a high-high level. All aspects of the control of the pumps is similar to that described for the Collection Sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this information.

Controls - Automatic Operation

The automatic operation of these pumps is similar to that described for the Collection Sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Controls - Manual Operation

The manual operation of these pumps is similar to that described for the Collection Sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Alarms and Interlocks

The alarms and interlocks are similar to that described for the Collection Sumps (D-1, D-8 and D-10). The O&M Contractor is directed to Section 4.2.2 for this description.

Emergency Operation

The Storage Tank Containment Area Sump is equipped with a pair of identical pumps which operate in duty/stand-by configuration.

In the event of failure of either of the submersible pumps, the failed pump can be easily removed from the sump for service using the lifting chain and guide rail system. The sump pump is connected to the discharge piping by means of a quick discharge connector.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 Emergencies and Contingency Plan.

4.2.10 Carbon Adsorption System (Storage Tank Off Gas)

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	-	Positive Displacement Air Compressors, Carbon Filters, and Accessories
LOCATION	-	Southeast corner of Leachate Storage Tank Area (reference Figure 2-8, Volume I)
BLOWER MFR.	-	Spence Turbine Company
MODEL	-	RB40C-V
MOTOR MFR/TYPE	-	U.S. Motors/L

POWER	- 460V, 3 phase, 60Hz, 15 HP
ACTIVATED CARBON	- 55 Gallon Drums (10 in total) with Type STI 46 Carbon

The air compressors C-1A and C-1B are located in the southeastt corner of the leachate storage tank area. The air compressors are used to provide air to the leachate storage tanks to assist in the odor control within the leachate storage tanks. Air supplied by the compressors passes to a two-inch diameter perforated aeration pipe header located along the bottom of each leachate storage tank. Off-gas from the storage tanks discharges to activated carbon adsorbers for odor control.

Carbon drums (a pair of canisters, operated in parallel, for each storage tank) are located on the south side of the leachate storage tanks.

Air being supplied by each air compressor passes through a silencer, a check valve, a butterfly valve, and a pressure reducing regulator to the compressed air header of the leachate storage tanks. On the intake of each air compressor, there is a silencer to reduce the noise generated by the compressors and a filter. The air supply piping is equipped with mufflers to further reduce generated noise, check valves to allow each compressor to be serviced and pressure indicators to determine the pressure within the discharge piping.

There is a pressure relief valve on each compressor discharge piping prior to the compressed air header. This helps to maintain a constant pressure within the compressed air header and uniform distribution between the tanks. Each leachate storage tank has a butterfly valve located before the compressed air header enters the tank.

Within the storage tank, there is a 2-inch perforated pipe header located along the bottom of the leachate storage tank. The air can be used to strip VOC's and other odoriferous constituents from the leachate. These compounds are then adsorbed onto the activated carbon canisters. The compressed air piping on the discharge side of each leachate storage tank is equipped with pressure relief valves that is open to the air if the pressure within the leachate storage tank is above 3 psig. There is a vacuum breaker on the compressed air outlet side of each leachate storage tank to prevent damage to the tank if a vacuum develops. The vacuum breaker consists of a check valve that allows air to enter the leachate storage tank when the air blowers are not in operation. The off-gases enter two carbon filters set up in parallel (per tank) with a check valve and butterfly valve. One of the two vessels can be removed for disposal or regeneration while the other remains in service.

The canisters contain 55 gallons (6 cu. ft.) of ST series activated carbon to control hydrogen sulfide, methyl mercaptan and organic emissions emitted from the leachate. The ST series carbon combines the adsorption of organic compounds, and catalytic oxidation of hydrogen sulfide as its main odor control mechanism. ST carbon also removes numerous acidic gases such as hydrogen chloride.

The treated air is vented to the atmosphere through a common U-shaped vent.

Normal Operation - Prior to Completion of Contract No. HP-877

The air compressors are normally operated continuously.

Normal Operation - After Completion of Contract No. HP-877

After completion of Contract No. HP-877, the storage tanks will remain empty under normal dry weather conditions and the compressors will not be in operation.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

The procedure is as follows:

- Verify that the circuit breakers on the Compressors Control Panel are set to ON;
- Verify that all the valves on the discharge piping are open; and
- On the Control Panel, set the ON/OFF switch for the Compressor to be operated to ON.

Alarms and Interlocks

There are no alarm conditions monitored or interlocks activated on the carbon adsorption system.

Emergency Operation

Certain chemicals may undergo fast and extreme polymerization, oxidation, or reduction. Such a reaction could ignite the carbon bed. The carbon adsorption units should be shut off in such an event.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.2.11 Contract No. HP- 877, Force Main Discharge to POTW

(To be modified upon completion of construction for Contract No. HP-877.)

Equipment and Components

Equipment - 3-inch Ductile iron pipe - 2903 linear feet
Location - From Pelham Bay landfill to Burr Avenue manhole No. 8 the alignment is south of Pelham Bay Parkway. (Reference drawings for Contract No. HP-877).

Normal Operation

The force main discharges leachate below ground to the city sewer system. (Reference Section 4.2.2 - Control System after Completion of Contract HP-877).

Controls - Automatic Operation

Automatic operation is not applicable for the forcemain. Automatic operation pertains to the collector sump D-1 and level control at Burr Avenue manholes. (Reference Section 4.2.2 - Control System after Completion of Contract HP-877).

Control - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

Alarms and Interlocks are not applicable.

Emergency Operation

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 Emergencies and Contingency Plan.

4.2.12 Storage Tank Off-Loading and Tanker Loading

The equipment and components are as follows:

Equipment and Components

EQUIPMENT	- Horizontal Transfer Pumps and Related Equipment
PERFORMANCE	- 250 GPM @ 40 ft.TDH, 1,150 RPM, 480V, 3 phase, 10 HP, 16 Amps
LOCATION	- North side of Leachate Storage Tank Area (reference Figure 2-8, Volume I)
MANUFACTURER	- Hayward Gorden
TYPE	- Horizontal shaft, centrifugal
MODEL	- Torus R3-10

The Leachate Tanker Loading Area is located on the north side of the leachate storage tank area.

Prior to completion of Contract No. HP-877, the leachate is pumped to the storage tanks and is subsequently transported to the POTW by road tankers. The leachate is pumped from the storage tanks by the use of two centrifugal horizontal pumps. The quantity of leachate pumped is monitored by the truckfill metering station. The metering station allo -s the truck operator to set the amount of leachate to be removed, in gallons, depending upon the capacity of the tanker available.

Typically, both transfer pumps are used in parallel to minimize the time of transfer. The centrifugal pumps have butterfly valves before and after the pump. These are used to isolate the pump if the pump has to be serviced. A pressure gauge on the discharge side of the centrifugal pumps indicates the pressure within the discharge piping.

During loading, the leachate volume is monitored and controlled by the metering station. The truck operator sets the volume of leachate to be loaded onto the tanker truck. When the Foxboro controller approaches the setpoint, the motor controlled butterfly valve slowly closes, decreasing the flow before total closure is accomplished and then stops the transfer pumps. A sampling port is available immediately downstream of the metering station to allow sampling of the leachate. There are two tanker loading flexible arms with a dry break couplers to enable truck operators to make the necessary connections for loading.

Normal Operation

Under normal operating conditions, the tanker loading pumps operate in the automatic mode. Both pumps are used to load a tanker in order to minimize the transfer time. A butterfly valve (normally closed) on the discharge side of the pumps can be opened to recirculate leachate back to the storage tanks.

Controls - Automatic Operation

The automatic operation is controlled by the Foxboro controller located by the tanker loading platform (reference Figure 2-8 in Volume I). The procedure is as follows:

- Verify that the appropriate valves for the transfer of leachate are in their correct position (open/close);
- Properly connect the tanker loading couplings to the flexible arms;
- Set the dial on the Foxboro controller to the amount of leachate to be loaded in gallons; and
- Using the switch at the tanker loading pump/local control panel, turn the pumps on.

Controls - Manual Operation

The procedure is as follows:

- Verify that the appropriate valves for the transfer of leachate are in their correct position (open/close);
- Properly connect the truck loading couplings to the flexible arms;
- Open the motor controlled butterfly valve; and
- Using the switch at the tanker loading pump/local control panel, turn the pumps on.

Alarms and Interlocks

As the volume of leachate pumped (in gallons) approaches the setpoint volume, the Foxboro controller slowly starts closing the control valve on the fill line to the tanker. This reduces the pump transfer rate. As the valve approaches the fully closed position, the tanker loading pumps are stopped.

When either of the two tanker loading pumps (centrifugal horizontal hydrosolid pumps) are operating, there is a status indicator light on the tanker loading local control panel and the Central Control Alarm Panel.

Emergency Operation

During an emergency with one of the two leachate transfer pumps, the pump is serviced by closing the butterfly valves located on the inlet and outlet sides of the pump. The other pump is large enough to handle the volume of leachate being fed to the tankers.

During an emergency with the magnetic flow transmitter (reference Figure 2-8 in Volume I), the magnetic flow transmitter can be removed. If necessary, close the butterfly valves located on both the inlet side and the outlet side of the transmitter and open the bypass valve to allow the flow of leachate to continue into the tankers.

It should be noted that the amount of leachate removed from the storage tanks is not monitored by the Foxboro controllers; therefore, supervision by the O&M Contractor is necessary.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 Emergencies and Contingency Plan.

4.2.13 Central Control Alarm Panel

The Central Control Alarm Panel is located in the security trailer (reference Figure 2-8, Volume I). It informs the O&M Contractor or security personnel of any high sump level conditions and the status of each pump located in the groundwater/leachate monitoring system except pumps in collection sumps D-1, D-8 and D-10. Figure 4-2 shows the Central Control Alarm Panel.

Equipment and Components

Equipment and components consist solely of the Central Control Alarm Panel.

Normal Operation

The Central Control Alarm Panel informs the O&M Contractor of the status of the leachate removal pumps and any high level condition that may be present.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

There is a HI LEVEL alarm on the Central Control Alarm Panel for Collection Sumps D-1, D-8 and D-10; Lift Stations No. 1 and 2; the decontamination area sump, the containment area sump, and the five leachate storage tanks.

The O&M Contractor shall check local control panels for coordination with the Central Control Alarm Panel. Figure 4-1 shows the local control panel for pumps in collection sumps D-1, D-8 and D-10. Figures 4-2 shows the Central Control Alarm Panel. Figure 4-3 shows the Main Control Panel and the Pump Duplex Starter Panel. Figure 4-4 shows instrument details shown on the Main Control Panel.

Emergency Operation

In the event of an emergency with the Central Control Alarm Panel, a general Site walk-through shall be undertaken to inspect the groundwater/leachate management system and determine the problem.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.2.14 Motor Control Center

Equipment and Components

The Motor Control Center (MCC) consists of a 480V, AC 3 phase, 3 wire 400A bus feed through a Y-connected grounded system with two 250 MCM conductors per phase and one #4 AWG ground conductor. A voltmeter, a kilowatt-hour (kW-hr) meter, a kilowatt meter, and an ampmeter monitor the performance of the MCC. The 120V control voltage is supplied through a 480V - 120V transformer tapped off the MCC bus and situated within the MCC enclosure.

Under all operating conditions the voltmeters reading should be a steady value of 480V (± 5% max) or (±25V). The ampmeter reading will fluctuate with the operation of electrically activated equipment. The more equipment running, the greater the total current drawn.

Normal Operation

Under normal conditions, the draw out disconnect devices are left in the ON position for all active circuits. All spare and de-energized (if any) circuits should have their disconnect devices drawn out to the OFF position with appropriate warning signs and restricted or controlled access.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

When a power overload occurs at one of the pump motors, a relay will trip at the Motor Control Center stopping the electrical power supply to the pump motor.

Emergency Operation

In the event of an emergency with the Motor Control Center, the O&M Contractor shall notify an authorized electrical technician immediately.

For other serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.2.15 Cutoff Wall and Collector Drain

Equipment and Components

The cutoff wall and collector drain system consists of a low-permeability vertical barrier (cutoff wall) and two (2) collector drains, one located on either side of the cutoff wall. This system also includes piezometers and the manholes located along the alignment of the collector drains.

Normal Operation

The purpose of the cutoff wall is to minimize or eliminate groundwater and/or leachate from migrating from the landfill to the Pelham Bay Park and maintain groundwater levels 1 foot higher in Pelham Bay Park than they are on the Landfill side. The collector drains and manholes are a gravity system.

Controls

There are no automatic or manual controls for this system.

Emergency Operation

In the event of serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

4.3 MONITORING, INSPECTION, AND MAINTENANCE

A comprehensive groundwater/leachate management system checklist is included as Appendix A. In cases where a Standard Operating Procedure (SOP) is not discussed for a component of the system which requires frequent maintenance, the O&M Contractor shall develop a procedure that is acceptable to the NYCDEP.

Detailed inspection and maintenance information for the subsystems that comprise the groundwater/leachate management system is included as Appendix B.

4.4 TROUBLESHOOTING PROCEDURES

Table 4-1 provides a troubleshooting guide with possible causes and probable remedies which may be helpful to the O&M Contractor when problems with the groundwater/leachate management system arise. See Table 4-1 for Leachate Collection System Troubleshooting Guide.

4.5 SPARE PARTS AND SUPPLIES

Spare parts and supplies for inspecting and monitoring the groundwater/leachate management system are listed in Table 4-2. The list was provided by the NYCDEP.

TABLE 4-1
LEACHATE COLLECTION SYSTEM
TROUBLESHOOTING GUIDE
PELHAM BAY LANDFILL

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
Pump fails to start, overload unit not tripped (manual or automatic mode)	Power source incompatible with control box.	Correct power source.
	No voltage at line side of overload unit.	Check power source for blown fuse, open overload unit, broken lead, or loose connection.
	Open circuit in motor windings or power cable.	Check continuity.
	Defective motor power cable.	Replace cable
	Motor defective.	Check for and replace defective unit.
	Liquid level device or control circuits improperly connected to main control box.	Check wiring diagrams; correct or tighten connections.
	Level sensing device(s) improperly positioned.	Position device(s) at proper level.
	Level sensing device(s) fouled with mud or foreign material.	Clean sensing device(s)
	Defective liquid level sensing device(s) or control panel.	Repair or replace defective unit(s)

TABLE 4-1 (CONTINUED)
LEACHATE COLLECTION SYSTEM
TROUBLESHOOTING GUIDE
PELHAM BAY LANDFILL

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
Pump overload Unit trips	Low or high voltage, or excessive voltage drop between pump and control box	Measure voltage at control box. Check that wiring is correct type, size, and length.
	Defective insulation in motor windings or power cable; defective windings.	Check insulation resistance; check continuity.
	Impeller jammed due to debris or insufficient clearance.	Disassemble pump and check impeller.
	Bearing(s) frozen.	Disassemble pump and check bearing(s).
	Terminal housing incorrectly wired.	Check terminal housing internal connections against motor wiring plate and schematic wiring diagram.
Pump motor runs, but pump fails to deliver rated discharge	Discharge head too high.	Reduce discharge head, or install staging adapter and additional pump.

TABLE 4-1 (CONTINUED)
LEACHATE COLLECTION SYSTEM
TROUBLESHOOTING GUIDE
PELHAM BAY LANDFILL

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
	Low or incorrect voltage.	Measure control box voltage, when pump is running and when pump is shut off.
	Discharge throttling valve partially closed; check valve installed improperly.	Open discharge valve fully; check piping installation.
	Discharge line clogged or restricted.	Check discharge lines
	Liquid being pumped too thick.	Dilute liquid, if possible.
	Strainer screen or impeller clogged.	Clear clog(s). Stop pump; back flow may flush away debris.
	Insufficient liquid in sump tank.	Stop pump until liquid level rises.
	Worn impeller vanes; excessive impeller clearance.	Check impeller and clearance.
	Pump running backwards.	Check direction of rotation and correct by interchanging any two motor leads at control box.

TABLE 4-1 (CONTINUED)
LEACHATE COLLECTION SYSTEM
TROUBLESHOOTING GUIDE
PELHAM BAY LANDFILL

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
Pump runs with excessive noise or vibration	Pumping entrained air.	Check liquid level in sump; check position of pump and liquid level sensing device(s).
	Damaged or unbalanced impeller.	Replace impeller.
	Discharge piping not properly supported.	Check piping installation.
	Impeller jammed or loose.	Check impeller.
	Motor shaft or bearings defective.	Disassemble pump and check motor and bearings.
	Pump cavitation.	Reduce discharge head, or restrict flow on low head applications.

TABLE 4-2
SPARE PART LIST
LEACHATE/ GROUNDWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL

ITEM	QUANTITY
TYVEK Suit LG White	1.5 Bx.
TYVEK Suit XL White	1.5 Bx.
Yellow Latex Booties	1.5 Bx.
Vapor Cartridges	13 Sets
Fire Extinguisher	2
Heat Trace Sensors	4
Latex Gloves	1 Bx.
V-Belts	6
Strapping And Buckles	1 Rl
Compressor Air Filters	4
Lamp Block With Transformer	2
S39021 Square D Transformer	1
Mektron Electrodes	2
Storage Tank Lid Gaskets (Rubber)	5
4" X 4" S X S Coupling (Rubber)	1
4" X 6" S X S Coupling (Rubber)	1
Hose Clamp 6"	2 Bx.
Gaskets #50	4
Gaskets (Pipe Face)	1 Bx.
USA #48540 1" Pressure Relief Valve	1
Winpower Generator 8500 Watt	2
Hitch Pins	6
K100D1 Square D Transformer	1
5 Gallon Red Plastic Gas Can	1
SS 2" X 1" Bushing	1
1/2 Hose Bib	1
Reset Extensions	8
Terminal Lug Extender	2
G.E. 20 Amp Circuit Breaker	1
Seals (Small)	3
Bearing 7160	1
Bearing 3207 ANT9/C3	2
Bearing 6207JEM BF01	1
Bearing NU307 ECP/C3	1
150 Watt Flood Light Bulb	1
Rust-Oleum Gloss Black	1 Gal
1 1/4" X 3 1/2" Washers	8
Bearing 6414	3
Impeller Truck Fill Pumps	1

TABLE 4-2 (CONTINUED)
SPARE PART LIST
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL

ITEM	QUANTITY
Impeller Small	2
Bearing 501-49-017	2
Bearing 501-49-002	1
Bearing CES-1 6416	1
Bushing 204-73-010-01	1
Plastic Gaskets	4
Impeller Bolt Small	3
Oil Plug Gasket	3
Washer S2R-B291	15
Mechanical Seal Large	1
Oil Seal 503-49-030	1
O-Ring 506-23-159	1
Oil Seal 503-49-020	1
O-Ring 506-50-152	1
Packing 09-41-003-02	5
Lantern Ring 412-15-001-01	1
Lock Ring 520-49-014	2
Lock Washer 521-49-014	2
O-Ring 506-50-384	1
Bushing Large CDL 01-4114	1
Bushing Small CDL 01-4113	2
O-Ring 2170	3
Washer S2R B299	3
O-Ring R2180	1
Bearing DCDC1 7050	3
212-10-245 Face	1
Yellow Rope 1/2"	30 ft
Aluminum Hose Wrenches	2
Chain For Pumps	2
Bucket Assorted Bolts	1
Ebara 80 DVSU 62.2S2 Pump	1
Ebara 80 DLME 65.54 Pump	1
Aluminum Check Valve 4" X 6"	1
Hand Truck For 55 Gallon Drums	1
Weed Whip	2
Ebara Quick Discharge Connector 80LM	2
Ebara 50DVSU 6.75	2
Flygt E18811 Pump 9450 (192, 199, 196)	3
Desk With Side Bar (Black)	1
Extension Cord	1

TABLE 4-2 (CONTINUED)
SPARE PART LIST
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL

ITEM	QUANTITY
Truck Fill Pump	1
Fiberglass Extension Ladder	1
Light Bulbs Florescent	16
Briskheat Trace Cable	1 Rl
Canvas Fire Hose	200 ft
3148801 Wear Ring	6
K150DIS12 Transformer	1
K50D13 Transformer	1
TDL 120 Relay	1
SRPE30A15 Rating Plug	1
53-121000 Relay	1
SEDDA4364T0030 G.E. Circuit Breaker	1
827385 O-Ring Flygt	10
827795 O-Ring Flygt	10
827837 O-Ring Flygt	10
195-BA01 Auxiliary Switch	1
K22-4 Control Relay	1
LY2 Relay	1
LY3 Relay	1
Gould Fuse 20 Amp	1
Gould Fuse 10 Amp	1
Gould Fuse 1 1/2 Amp	1
Gould Fuse 1/2 Amp	1
Pipe Insulation Assorted Sizes	1 Bx.
Shaft 2'	1
3" Keystone Butterfly Valve	3
Furnas 3 HP Starter	1
Furnas 7.5 HP Starter	1
Briskheat Electric Connector Kit	1 Bx.
Flygt Float Switch ENH-10	1
Rubber Boots Size 12	2 Pr
Rubber Boots Size 9	2 Pr
Rubber Boots Size 7	2 Pr
Rubber Boots Size 10	2 Pr
Rubber Boots Size 11	4 Pr
North Safety 7600-8A Full Face Piece M/L	10
North Safety 7700 Respirator Facepiece M	12
05412 Coveralls Yellow XL	12
101 Hard Hats White	12
Industrial Gloves 65% Cotton	24 Pr

TABLE 4-2 (CONTINUED)
SPARE PART LIST
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL

ITEM	QUANTITY
Industrial Gloves 30% Cotton	12 Pr
Rainsuit 500S M	4
Rainsuit 500S L	5
Rainsuit 500S XL	1
Duratouch Vinyl Gloves LG	3 Bx.
6300 RTCHT HDGR	10
Hard Hat Liner	10
Flashlight	6
Interface Relay NY2B21	1
Intra-Automation Level Sensor D-41515	1
Truck Fill Oil Reservoir #20283R	1
Gould Fuse TR100R Time Delay 100 Amp 250 Volt	2
Fusetron TRN-R-100 Amp Time Delay Fuse 250 Volt	1
951-51 Series D13 Bulbs 6 Volt	3

5.1 GENERAL

This section is divided into six subsections. Section 5.2 describes the equipment and components, pre-startup procedures, start-up procedures, normal operations, alarms and interlocks, and emergency operational procedures for each component of the landfill gas management system. Section 5.3 outlines the monitoring, inspection and maintenance procedures for each of the components discussed in Section 5.2 and detailed in Appendices A and B. Section 5.4 presents the sampling and analysis program for the landfill gas. Section 5.5 outlines troubleshooting procedures. Section 5.6 identified spare parts required for the system. The site inspection checklist for the gas management system and associated instructions are included in Appendix A.

For general description and location of various subsystems, the O&M Contractor's attention is directed to Volume I. Figure 5-1 is a schematic flow and instrumentation diagram for the waste gas blowers and the enclosed flare. Figure 5-2 is a layout of the blower control panel. Figure 5-3 is an instruments identification for the blower control panel. Figures 5-4 and 5-5 are a layout of the enclosed flare control panel. Figure 5-6 shows the digital temperature controller for the flare. Figure 5-7 is a complete layout of the gas collection and flaring system. Photograph No 5-1 shows the waste gas blowers and piping. Photograph No. 5-2 shows the enclosed flare. Photographs Nos. 5-3 and 5-4 show the blower control panel, the flare control panel and the purge blower panel. Photograph No. 5-5 shows the blower/flare main breakers.

5.2 EQUIPMENT AND COMPONENTS

The O&M Contractor shall follow the operating procedures described in detail below, unless otherwise approved, in conjunction with the procedures outlined in the John Zink and the Lamson Corporation Operation and Maintenance Manuals (reference Volume II, Section 12). The equipment and components, pre-startup procedures, start-up procedures, normal operation, controls-automatic operation, controls-manual operation, alarms and interlocks, and emergency operation procedures for the following components of landfill gas management system are presented below:

- Gas Collection System and Blower
- Condensate System
- Enclosed Flare System
- Electrical System

It is important to note that the operation and maintenance of the landfill gas management system shall be performed in conjunction with the operation and maintenance of landfill gas blowers and the enclosed flare submitted by vendors of the equipment.

5.2.1 Gas Collection System and Blowers

The gas collection system consists of 22 gas collection wells, PVC well screens and well head polyethylene piping, two centrifugal landfill gas blowers, and related valves and fittings. The wells are spaced over the entire landfill surface and drilled through the refuse to approximately 3/4 of the refuse depth. The wells are constructed with 4-inch PVC well screen and 4-inch PVC solid piping below ground. The above ground portion of each well consist of 3-feet 4-inch diameter PVC connected to a tee, ball valve, and flexible hose. The flexible hose connects the well head to the polyethylene collection piping. Each well head has a tap for temperature and pressure gauges. The pipe tap will be also used for gas sampling. The gas flows from the well heads through a network of polyethylene laterals piping and main header. All pipes are continuously sloped from the most remote well head to the flare. The main header piping contain six isolation valve boxes for the purpose of isolating certain portions of the landfill for gas pressure and flow adjustment and repair of the gas collection system.

The sloped downward main gas conveyance pipe terminates with an expanded pipe section called a gas/condensate separator. Condensate will be collected and gravity drain to the leachate collection manhole through 2-inch double wall piping. Gas piping from the gas/condensate separator runs above ground to the two gas blowers. Each gas blower is capable of handling the total estimated maximum gas generation from the Pelham Bay Landfill (1500 scfm).

Equipment and Components

EQUIPMENT	- Twenty-two Deep Wells, Three Shallow Horizontal Wells, and Associated Equipment, Valves at Well Heads, Monitoring Taps, Isolation Valves, Piping, Landfill Gas Blowers
LOCATION	- Gas Collection System (covers most of landfill foot print) (reference Figure 2-10 in Volume I)
BLOWER PERFORMANCE	- 1300 SCFM @ 6.0 inches of mercury, 30 HP - 1500 SCFM @ 5.6 inches of mercury

Pre-Startup Procedures

The O&M Contractor shall verify that all well heads, piping, valving, and equipment are functional prior to start-up. Check all piping and valves.

- Verify that all piping and valves are installed in accordance with the record drawings for Contract No. HP-876.
- All gas lines should be dry and free of dirt and foreign material.
- Check equipment for any evidence of shipping and/or installation damages, such as cracked metal castings, scrapes, bent tierods.
- Verify proper installation: blower vibration pads, foundation, any grouting, inlet filters, motor and machine hold down bolts.
- Check motor and blower for alignment.
- Check motor and blower bearings lubrication (Volume II, Section 12, Lamson Centrifugal LFG Blowers and Control)
- Check coupling between motor and blower and motor fan guards (Volume II, Section 12, Lamson Centrifugal LFG Blowers and Control).
- Check electrical wiring for loose connection including power and control wiring.
- Check alarm functions.

Start-Up Procedures

This procedure assumes initial startup of the blowers and flare system and the system is running. The initial vendor startup of the blowers and flare use a gas flow of 750 scfm. The O&M Contractor shall perform initial adjustments to the gas collection system in order to provide an even distribution of vacuum pressure to each gas extraction well. The flare inlet gas flow rate shall be adjusted to approximately 1,500 standard cubic feet per minute (scfm) at approximately 50 percent methane by volume. During the first eight week period of operation, the gas collection system should show a trend toward a "steady-state" operation. The gas flow rates and pressures shall be adjusted as discussed below. A sample of standard operating procedures for system balancing is described as follows:

1. Open one or more vent points in the gas collection header to allow the passive venting of landfill gas. (top of the landfill foot print)

2. Fully open all header, and isolation valves. Check that blower isolation valves on suction and discharge sides of each operating blower are fully closed.

3. Insert plugs in the top of the well heads. Open the well valves about 40%. Open the selected blower's isolation valve and discharge valve.

4. Initiate the flare station startup sequence, and allow the flare to come up to operating temperature while operating only one blower.

5. Measure and record the gas quality (methane, carbon dioxide, and oxygen concentrations) at the flare station.

6. Measure the vacuum pressure gas quality and temperature at all well heads, header and flare station.

7. Adjust each of the 22 extraction wells. Starting with each well starting at the well furthest from the flare station and working back towards the flare station, monitor and adjust each extraction well in sequence according to this procedure:

a) initially measure the static pressure flow rate at each well head and use the well head flow control valve to adjust the vacuum to 3 inches water column vacuum;

b) measure the gas quality bi-weekly until the gas flow and quality from the wells has stabilized;

c) if the methane concentration at the well is greater than 50%, increase well flow by 10%. If methane quality is less than 45%, decrease well flow by 10%. Do not fully close the gas well valve. The well should always remain under vacuum (unless a significant amount of oxygen is being pulled into the well)

8. After monitoring and adjusting each well, measure the new flow rate and gas quality at the flare station blower inlet

9. Measure the gas quality at each of the isolation valves and check for air leakage in the header piping outside of the wells.

10. Repeat at least twice per day during the initial 4 to 8 week start-up period. However after the first monitoring event continue to open each well according to Steps 7(b) and 7(c) until each well flow has been maximized.

Normal Operation

The blowers for the gas collection system operate in automatic mode under normal conditions.

- The O&M Contractor shall make periodic adjustments to the gas flow rate in order to decrease system vacuum and allow well heads valves to be opened more.

- Once per month the centrifugal blowers shall be alternated. The duty blower shall be alternated from duty to stand-by. Procedure for alternating blowers is provided in Appendix B, Section B21.

The rate of gas extraction will reduce over time due to the future decline in gas production. A significant decrease in the methane content with an accompanying increase in oxygen of gas drawn from an individual gas source will indicate a need to reduce the extraction flow rate at that source. If subsequent sampling events at the flare indicate an increase in methane content, the

O&M Contractor may increase the flow rate as indicated in Steps 7(b) and 7(c) until a steady-state is reached where the methane concentration is consistently maintained above 45 percent.

Controls - Automatic Operation

The control panels for the blowers are located adjacent to the blower inlets. The control panel informs the landfill operator of the status of various control elements for the blowers. The control panel is equipped with indicators, lights, alarms and associated circuitry necessary to monitor the operation of the blowers. See Figures 5-2 and 5-3 for blower control panel and instrument identification. The blowers are operated automatically from a three-way selector switch. The control procedure is as follows:

Set the AUTO/OFF/HAND switch to AUTO on the blower with the least amount of recorded running hours to select it as the primary blower. It should be noted that the operator should switch between blowers on a monthly basis.

Controls - Manual Operation

Extreme caution should be used when running the blowers in the hand position because raw, unburned LFG can be vented from the flare stack.

The blowers can also be operated manually from the three-way selector switch. The procedure is as follows:

- Set the AUTO/OFF/HAND switch to HAND for the desired blower to operate, typically on a monthly basis.

Alarms and Interlocks

The blowers are controlled by the blower control panel with an interlock with the flare control panel. The blower control panel is shown in Figure 5-2. The blowers receive a permissive run signal via the flare panel interlock.

Emergency Operation

In the event of a blower failure, the failed blower should be set to the OFF position and the other blower returned to AUTO. After disengaging and locking out the power, the failed blower may be serviced.

In the event of a serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergency and Contingency Plan.

5.2.2 Condensate System

Equipment and Components

EQUIPMENT	- Gas/Condensate Separator-HDPE Piping and Fittings
LOCATION	- Buried just outside the flare station (reference Figure 2-10 in Volume I)

Pre-Start-up Procedures

Prime the trap at the condensate manhole with water.

Start-Up Procedures

Start-up is not applicable.

Normal Operation

The condensate system operates or functions on its own. Automatic or manual controls are not required for its operation since condensate generated at the separator will flow by gravity to the leachate manholes.

Controls - Automatic Operation

Automatic operation is not applicable.

Controls - Manual Operation

Manual operation is not applicable.

Alarms and Interlocks

Alarms and interlocks are not applicable.

Emergency Operation

In the event of serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

5.2.3 Enclosed Flare System

Landfill gas (LFG) enters the enclosed flare station through the above ground piping system, and is withdrawn by gas blowers and discharged to the flare. Main piping on the vacuum side of the blowers include a 10-inch manual butterfly valve and 10 inch shut-off valve operated by a compressed nitrogen cylinder. Piping from the nitrogen cylinder to the shut-off valve includes a pressure reducing valve, pressure gauge and a solenoid valve (SV-103). The 10-inch LFG piping branches into two 6-in vacuum lines, each leading to a blower with a 6-inch butterfly isolation valve. At the discharge side of each blower there is a 6-inch check valve and 6-inch butterfly valve prior to connecting with a 10-inch header leading to the enclosed flare through a 10-inch flame arrestor. The 10-inch discharge header includes a pressure gauge and a temperature gauge. The flare has a propane fired pilot. The propane piping includes pressure reducing valve, pressure gauge and solenoid valve. The enclosed flare support system includes a purge air blower, two dampers, one automatic and one manual, and temperature controller to a thermocouple. For complete process diagram and instrumentation see Figure 5-1.

The enclosed flare and its support systems are controlled at control panels 101, 102 and 103. Panels 101 and 102 are mounted on the same rack adjacent to the centrifugal gas blowers control panel. The ignition transformer is in panel 103 which is mounted on the shell of the flare. Electrical panels for the blowers and the flare system are located between the blower panel and the flare panel and are the main circuit breaker panel (Panel G) and the John Zink circuit breaker panel. (Panel G).

Control Panel 101 (see Figures 5-1, 5-4 and 5-5, PNL 101)

The main control has the following displays:

A. Panel power (On/Off)
B. Panel Power On (white indicating light)
C. Start-Up sequence, manual/auto
D. Local unit control Stop/Start
E. Unit Stop
F. Security light Off/On
G. Purge start blower controls
H. Low purge air flow (red indicating light)
I. Purging (blue indicating light)
J. Purge complete (amber indicating light)
K. Ignition start
L. Pilot gas on (green indicating light)
M. Flame proved (green indicating light)
N. Waste inlet valve position, close-open-auto
O. Waste gas blower on (green indicating light)
P. Flare reset
Q. Waste gas blower failure (red indicating light)
R. High flare temperature (red indicating light)
S. Flame failure (red indicating light)
T. Digital readout temperature indicator control (TIC-201)
U. Digital readout temperature recorder (TR201)

Control Panel 102 (see Figure 5-1, PNL 102)

This panel contains fuses, motor starter, and motor overload. There is no display on this panel and the O&M operator will open this panel to replace fuses and check the electrical system.

Control Panel 103 (see Figure 5-1, PNL103)

This panel is mounted on the shell of the flare. This panel contains a transformer which converts 120 volt single phase to 600 volt DC voltage required for pilot ignition. There is no instrument display on this panel.

Main Circuit Breaker Panel (Panel G)

Electrical power feed to the main circuit breaker panel (600V/225 amps). This panel has four circuit breakers:

1. Waste gas blower No.1
2. Waste gas blower No.2
3. John Zink main panel
4. KVA transformer (John Zink)

John Zink Circuit Breaker Panel (Panel G-1)

John Zink 120/208 - 100 amps panel. This panel has the following circuit breakers:

1. Waste gas control panel
2. Security panel
3. Auto damper
4. Temperature element
5. Flame scanner
6. Ignition transformer
7. Purge blower panel
8. Panel outlet

The John Zink and the Lamson Corporation Operation and Maintenance Manuals provide complete instruction on the startup, operation, checking, and trouble shooting of the gas blowers and enclosed flare. The O&M Contractor is directed to these manuals. (reference Volume II, Section 12)

Equipment and Components

EQUIPMENT	- Enclosed Ground Flare, and Associated Equipment
LOCATION	- Gas Flaring System Station (reference Figure 2-10 in Volume I)
MANUFACTURER	- John Zink Company
RATING	- 1300 ˜FM of 50% LFG

Pre-Startup Procedures

All systems components shall be checked, adjusted, and repaired or replaced as necessary. Procedures outlined in the John Zink Operation and Maintenance Manual (reference Volume II, Section 12) shall be followed at startup.

For operator and equipment safety, a qualified John Zink factory representative shall be present for the initial start-up and commissioning of the enclosed flare system.

Prior to attempting the initial flare start-up, the factory representative shall check the following (after initial start-up has been completed, it is the O&M Contractor's responsibility to check):

- Proper Installation - the equipment has been properly installed and all external piping and wiring connections are complete and correct.

- System Checkouts - all piping, wiring and equipment is correctly assembled and no items have been removed or damaged in transport and/or installation.

- Flare Control System - the flare control system is in proper running order and the pre-programmed settings in the controllers and timers are per factory specification. The thermocouple controller and louvre motor are operational.

- Valving - all automated and manual valves are correctly installed and operative.

- Blowers - the blowers are bumped to check rotation and verify the wiring is correctly installed.

- Check that all set points are properly adjusted (flow and temperature).

- Pilot - there is sufficient supply of pilot gas at the correct pressure.

- Extraction System - the O&M Contractor shall verify that the gas extraction system is complete, all valves are in the correct position, and the system is ready to operate and supply landfill gas to the flare station.

- Verify the operation of all valves.

- Flare safeties are functional.

Start-up and Normal Operation

The enclosed flare system shall always be started in manual mode to verify gas flows and mechanical systems prior to the initial automatic start-up. A John Zink factory representative shall be present for initial startup. The following procedures shall be implemented in order to automatically start up the gas flaring system in conjunction with The John Zink Operation and Maintenance Manual:

- Verify that the pre-start checklist has been satisfactorily completed and that all valves are operative and in the proper position.

- Place the Start-up Sequence Switch in the Auto position.

- Place the Local Unit Control Switch in the Start/Run position. (If starting from a remote location, or when using a timer to run the system, the remote circuit must be in the stop position).

- The purge blower will start and run for five minutes. During this time, the blue "Purging" light will illuminate to let the operator know the unit's status. Once the purge cycle is completed, the Purge Complete Light will illuminate.

- The pilot solenoid valve will open.

- The ignition transformer will spark and the pilot will light.

- The flame proved relay will verify that the pilot is lit.

- After the Flame Proved light illuminates, the PLC will open the inlet waste gas valve and activate the blower(s).

- The pilot solenoid valve will close approximately 1 minute after the valve open limit is met.
- As the unit comes up to operating temperature the Controller will send a signal to the Temperature Control Valve and the Controller will make adjustments to achieve the specified continuous combustion temperature (1600°F).
- Once the flare reaches operating temperature, slowly close the manual damper(s) to the same percentage open as the automatic damper(s).

Basic Start Up

A basic start up will typically consist of the following steps:

Stack Purge

Prior to lighting the pilot, the stack must be purged with fresh air to remove potentially explosive gas/air mixtures inside. The flare system comes with a stack purge air blower for this purpose. The purge air blower should be left on for a minimum of 5 minutes to evacuate any gases which may have leaked in through the piping system prior to pilot ignition.

Pilot Ignition

After the stack has been purged, the pilot should be immediately lit. Failure to light the pilot within 30 seconds will require that the flare be purged again.

The pilot ignition sequence can be either an automatic or manual operation. Once the ignition button is depressed in the manual mode or the purge is completed in the automatic mode, the pilot solenoid valve should open and the ignition transformer will be energized.

Initiate Waste Gas Flow

Once the pilot is proven, the inlet valve may be opened and the blower(s) may be activated to initiate flow to the flare.

Heat Up to Operating Temperature

After the landfill gas flow has been started, the temperature controller will begin closing the air damper(s) until the flare is heated to the normal operating temperature (1600 °F - 1800 °F).

Controls - Automatic Operation

Automatic operation is described above and in the John Zink O&M Operation Manual.

Controls - Manual Operation

Manual operation is described above and in the John Zink O&M Manual.

Alarms and Interlocks

The unit is monitored and controlled by a programmable logic controller (PLC) which receives and transmits signals with respect to operating conditions. If an unacceptable operating condition occurs, the control system will stop the flow of landfill gas or change the operating parameters to correct the problem.

The flare control panel provides the control and operation logic for the system. a timed ignition sequence, pre-ignition purge, and fail safe control systems. A self checking flame scanner monitors the pilot and landfill gas flame. A high temperature reading causes the system to shut down in order to prevent damage to the flare. The control panel uses an Allen Bradley SLC-500 PLC.

The burner management system includes a flame safeguard package which monitors key parameters and shuts the unit down if an unsafe condition occurs. The key shutdown interlocks are as follows:

High Flare Temperature
Flame Failure
Low Purge Air Flow (in Purge Cycle)
Low Flare Temperature

Emergency Operation

In the event of serious conditions, the O&M Contractor shall consult Volume I, Section 6 Emergencies and Contingency Plan.

5.2.4 Electrical System

Electrical power to the equipment and components of the landfill gas collection and flaring system is supplied through two (2) explosion-proof, dust-tight, weatherproof electrical control panels, one high voltage power Panel "G" and one low voltage power "Panel G-1".

The primary feeder to "Panel G" is taped from bus trip 1-H of the Motor Control Center (MCC). A 200A transfer switch is provided prior to entering "Panel G" for future connection to stand by power.

The O&M Contractor shall follow the operating procedures described in detail below unless otherwise approved by the NYCDEP. The equipment and components, start-up procedures, normal operation, control and emergency operation procedures, where applicable, are presented below for the following:

- Electrical Power "Panel G"
- Electrical Power "Panel G-1"
- 15KVA Transformer
- Disconnect Switches

5.2.4.1 Power Panel "G"

Power Panel "G" is a 480V, 3Ø, 60HZ, 4-W high voltage panel that houses the main electrically operated circuit breaker, framed at 225A and four other circuit breakers framed at 100A. Circuit, with a 30A trip element, is a spare. Circuits 2 and 3, with 70A trip element, feed the two 30 HP waste flare blower. Circuit 4, with a 40A trip, feed the low voltage "Panel G-1" through a 15KVA transformer.

Equipment and Components

EQUIPMENT	-"Panel G" with interior chassis containing main breaker and internal branch breakers in Nema 7 enclosure.
LOCATION	-Mounted on unistrut support within the fenced flare system enclosure.

Start-Up Procedures

The O&M Contractor shall verify that the equipment is in good operational condition prior to start-up and hook-up.

- Verify proper installation.
- Verify proper wiring connection per color code provided by vendor.
- Check fuses.
- Check integrity of grounding system.

Normal Operation

Once put into service, the control panel does not require outside interference under normal operation conditions.

Control

The electrical power panel is equipped with all necessary indicators, external push buttons, branch breakers and handles for proper automatic and manual control.

Emergency Operations

In the event that a fuse blows out, replacement shall be immediately provided. For serious conditions, the O&M Contractor shall consult Volume I, Section 6 Emergencies and Contingency Plan.

5.2.4.2 "Panel G-1"

"Panel G-1" is a 120/280V, 3Ø, 60HZ, 4W low voltage panel with a main three-pole circuit breaker framed at 100A and eight one-pole branch breakers, that feed the ground fault outlet, the flare area site lighting, and the flare and blower control panels.

Equipment and Components

EQUIPMENT	-"Panel G" with interior chassis containing main breaker and internal branch breakers in Nema 7 enclosure.
LOCATION	-Mounted on unistrut support within the fenced flare system enclosure, next to Panel "G".

Start-Up Procedures

The O&M Contractor shall verify that the equipment is in good operational condition prior to start-up and hook-up.

- Verify proper installation.
- Verify proper wiring connection per color code provided by vendor.
- Check fuses.
- Check integrity of grounding system.

Normal Operation

Once put into service, the control panel does not require outside interference under normal operation conditions.

Control

The electrical panel is equipped with all necessary indicators, external push buttons, branch breakers and handles for proper automatic and manual control.

Emergency Operations

In the event that a fuse blows out, replacement shall be immediately provided.

5.2.4.3 15KVA Transformer

15KVA A/Y transformer 460V primary, 120/208V secondary provides power supply for equipment and components and accessories that require low voltage.

Equipment and Components

EQUIPMENT	Enclosed 15KVA transformer
LOCATION	-Mounted on unistrut support next to "Panel G".

Start-Up Procedures

Verify that the transformer is properly connected.

Normal Operation

No action or handling is required under normal operation conditions.

Emergency Operation

In the event of a shut down of the electrical system, the transformer shall be reset.

5.2.4.4 Disconnect Switches

Disconnect switches are 600V, heavy duty, non-fused. They shall be horsepower rated with provisions for padlocking in the "OFF" position.

Equipment and Components

EQUIPMENT	-100A and 30A unfused knife type disconnect switch.
LOCATION	-Enclosed and mounted with associated flare and blower motors control.

Start-Up Procedures

Verify that the switches are marked with the current, voltage and maximum rating (for horsepower rated) for which they are designed.

Normal Operation

Disconnect switches operate on their own.

Control Operation

Control operation is not applicable.

Emergency Operation

In the event of serious conditions, the O&M Contractor shall consult Volume I, Section 6.0 - Emergencies and Contingency Plan.

5.3 MONITORING, INSPECTION, AND MAINTENANCE

Comprehensive landfill gas management system checklists are included as in Appendix A. Tasks for routine operation and maintenance of various subsystems are included in Appendix B. The O&M Contractor shall follow the monitoring, inspection, and maintenance procedures described in Appendix B, unless otherwise approved by the NYCDEP. In cases where a Standard Operating Procedure (SOP) is not identified, the O&M Contractor shall develop a procedure that is acceptable to the NYCDEP.

5.4 SAMPLING AND ANALYSIS

5.4.1 Gas Collection System

The O&M Contractor shall measure gas concentrations of methane, carbon dioxide, and oxygen at each extraction well head on a monthly basis. These measurements shall be used as an inu.·ator of excessive extraction and richness of methane. In addition to the above constituents, the O&M Contractor shall record flow, vacuum pressure, and temperature readings. All data shall be input into the checklist included in Appendix A. If a LFG fire is suspected, carbon monoxide shall also be measured at the well heads.

Instrumentation and procedures required for total vacuum pressure measurements and methane concentration measurements are outlined below.

5.4.1.1 Instrumentation

The instruments which shall be used for checking the gas management system are listed and described below:

- Landtec GEM-500 Gas Extraction Monitor. This unit shall be used to measure LFG for percentage oxygen, methane, carbon dioxide, nitrogen (balance gas), as well as pressure, temperature, and flow. Spare filaments, desiccant, and batteries shall always be kept on hand. Two cylinders of calibration gas (50 percent methane by volume and 2.5 percent methane in air) shall be used to calibrate the meter. One canister shall contain 50% methane, 45% CO_2, 3% nitrogen and 2% oxygen. The second canister shall be 2.5% methane with the balance gas nitrogen.

- Colormetric tubes (Draeger or similar) shall be used for measuring carbon monoxide.

- Portable combustible gas indicator with two scales, percentage methane by volume, and percentage lower explosive limit (MSA Model 62S), or equivalent. The unit shall have a water separator to protect the filaments.

- Portable sampling pump with rechargeable battery, MSA Model S, with battery charger Cat No. 56059, or equivalent. These items are useful for taking gas samples and for filling sample bags in order to send the samples to an outside laboratory.

- One liter gas sampling bags.

- Assorted sizes of plastic tubing and rubber stoppers.

5.4.1.2 Total Vacuum Pressure Measurement

Total vacuum pressure readings shall be measured at the extraction well head. The instrument utilized in measuring total vacuum pressures shall be the GEM-500.

The following procedure shall be employed for measuring the total vacuum pressures at the well head:

1. Prior to use ensure the GEM-500 meter is zeroed for static and differential pressures follow GEM-500 unit instructions.

2. Connect the hose adapters located on the GEM-500 with plastic tubing.

3. Open the lab cock to be sampled.

4. Record the measurement (the average reading of the unit's readout variable).

5. Close the lab cock and disconnect the tubing.

5.4.1.3 Methane Concentration Measurement

Methane concentration of the landfill gas shall be measured at the connection to the gas transmission piping with a portable combustible gas indicator on the GEM-500, or equivalent. The following methods shall be followed for measuring the percentage of methane by volume at each gas extraction point. The total vacuum pressure at the well heads may exceed the capacity of the portable pump. If this occurs, an auxiliary pump shall be used. The following methods shall be used:

Method A - Direct Reading

1. Calibrate the GEM-500 according to the manufacturer's recommendations.

2. Turn on the GEM-500, setting the range selector to Gas.

3. Briefly open and close the lab cock valve to remove moisture and/or debris build-up on the labcock.

4. Connect the GEM-500 tubing to the orifice plate lab cock, and open the lab cock.

5. Record the average readings for methane, CO_2, O_2 and balance gas.

6. After all readings are taken, close the lab cock and disconnect the tubing.

7. Purge the GEM-500 between well heads by letting the pump run until methane is zeroed and O_2 is around 20%.

8. Adjust value setting.

5.4.2 Condensate System

No sampling and analysis is required for the condensate system. The condensate is combined with the leachate system. Leachate/condensate grab samples will be obtained from sump D-1 for environmental analysis (see Section 6.0).

5.4.3 Gas Flaring System

The landfill gas composition entering the flare shall be determined at the flare station on a monthly basis. The parameters to be determined are:

- Methane
- Carbon Dioxide
- Carbon Monoxide
- Oxygen

In addition to the above parameters, the O&M Contractor shall also determine gas flow rate, pressure, and temperature using indicators permanently located in the flare station (see Figure 5-1). The same procedures described above for methane concentration measurements for the gas collection system (reference Section 5.4.1.3) shall be followed for methane concentration measurement at the flare.

5.4.4 Additional Sampling and Analysis Requirements

The O&M Contractor shall monitor the pressure percent methane, carbon dioxide, and oxygen concentration at each gas monitoring well once per quarter. Gas monitoring well descriptions and locations are provided in Section 2.7 of Volume I. Environmental monitoring for gas migration is described in Section 6.0.

5.5 TROUBLESHOOTING PROCEDURES

This section provides corrective actions which may be helpful to the O&M Contractor when problems with the landfill gas management system arise.

5.5.1 Gas Collection Piping and Extraction Well System

Other than the normal operation and maintenance activities described in previous sections and Appendix B, there should not be many operating problems connected with the gas collection system.

Potential problems which may occur, along with common remedies, are as follows:

Problem: Breakage, collapsing, melting of the gas transmission piping by heavy equipment operations, vandalism, or fire.
Solution: Solution this shall be remedied by replacing the section of piping that has been damaged or by using a repair sleeve (or other suitable method) to seal the pipe against air intrusion.

Problem: Accumulation of silt in the gas transmission piping.
Solution: Silt or sand may enter the gas transmission piping because of pipe breakage problems. Silt or sand blockage or accumulations shall be removed from the piping by one or more of several methods depending on the severity of the problem. These methods include flushing the piping with water, reaming, jet rodding, and vacuuming the pipe.

Problem: Condensate accumulation in the header causing a partial or complete loss in vacuum.

Solution: It will be necessary to add a drain to the low part of the header. Allow header to drain.

Problem: Oxygen infiltration into the collection header.
Solution: Because the site is fully covered with a geomembrane, oxygen in the LFG should be extremely low. If oxygen is discovered, the first thing to do is turn down well flows to see if it can be controlled. If this is unsuccessful, it will be necessary to locate and repair the oxygen leak.

Well system trouble shooting including symptoms, possible causes, determination of causes, temporary fixes and long-term fixes are discussed in Table 5-1.

5.5.2 Condensate System

Debris accumulation in trap separator may occur. Troubleshooting should not be required for the condensate system.

5.5.3 Gas Flaring System

Automatic system shutdown will be initiated by the programmable logic controller in the event of high temperature of the flare shell, and blower surge. Any shutdown of the flaring system will initiate an automatic communication to the O&M Contractor by an automatic telephone dialer. The O&M Contractor shall set the automatic telephone dialer to the proper telephone contact numbers.

Potential operating problems that may occur with the gas flaring system, along with common remedies, are:

- Utility Power Outage - In the event of an extended utility power outage (i.e., no utility power for more than a 24-hour period), an emergency diesel generator set must be connected to the manual transfer switch at the flare site.

- Pilot Failure - In the event that the automatic pilot stops functioning procedures for troubleshooting pilot failure are identified in the John Zink O & M Manual (reference Volume II, Section 12).

- High Flare Stack Temperature - The system automatically shuts down in the event of a high flare stack temperature. Procedures for troubleshooting are identified in the John Zink O & M Manual (reference Volume II, Section 12).

- Low Flare Operating Temperature - In the event of low flare operating temperatures (less than 1200°F), the O&M Contractor should follow the procedures in the John Zink O&M Manual (reference Volume II, Section 12). If the problem is not corrected by following the listed procedures, the O&M Contractor should: a) switch to the low stack thermocouple; b) readjust the gas collection system; c) close off (or throttle) gas sources with low methane concentrations and d) close the manual flare air damper.

- Blower Surge - Blower surge occurs whenever the blower operation is below the limits of the performance curve (i.e., gas flow is too low). Refer to Volume II, Section 12 for the representative blower curve. The source of the problem must be identified (i.e., clogged flame arrestor, closed automatic gas valve, or obstructed gas transmission piping and insufficient LFG generation).

- Problems Requiring Emergency Shutdown - Examples of problems which would require emergency shutdown are fire and gas leakage. In the event of a problem requiring emergency flare shutdown, the Emergencies and Contingency Plan procedures in Volume I, Section 6.3, shall be implemented.

  Gas flow to the flare facility can be stopped inside the fenced area at the blower inlet valves (see record drawings for Contract No. HP-876 and Figure 5-1).

  The flare and blower operation can be stopped by turning the panel power button off on the flare control panel, or by turning the main disconnect switch off. Electric power supply can be completely disconnected from the utility service by contacting utility company personnel.

- Problems of Components in Contact with the Gas Stream - Landfill gas may contain contaminants which could deposit on the flame arrestor, automatic valve and manual valves. These items shall be inspected and cleaned of deposits, as necessary and as recommended in the John Zink O&M Manual (reference Volume II, Section 12). This problem usually occurs when there are fires in the landfill.

- Worn or Old System Components - During the operational life of the flaring system, there will be system components which wear out, fail, or stop functioning correctly. When that happens, the problem must be identified and the components repaired or replaced, as appropriate.

5.5.4 Electrical System

Potential problems that may occur with the electrical system and methods of action are described below:

- Internal power failure - In the event of an internal power failure, check the feeder connections at the Motor Control Center as well as the breakers for proper operating conditions. Check also any problems connected with the gas flaring system.

- Utility Power Outage - In the event of an extended utility power outage (i.e., no utility power for more than a 24-hour period), an emergency diesel generator set with adequate power supply must be connected to the automatic transfer switch at the flare site.

- Problems requiring the emergency shutdown of the Flare System - Electric power supply must be disconnected and deactivated.

5.6 SPARE PARTS

The O&M Contractor shall acquire the following spare parts for the gas blowers and flare for the purpose of repairing minor field work. For extensive repairs, the units should be returned to the factory or repairs shall be performed by a technical representative of the equipment vendors. See Table 5-2 for gas blower spare parts and Table 5-3 for gas flare spare parts.

In addition to the spare parts listed in Tables 5-2 and 5-3, the O&M Contractor shall acquire the GEM-500 landfill gas measurement instrument as manufactured by Landtec.

PELHAM BAY LANDFILL - LANDFILL GAS SYSTEM
WELL SYSTEM TROUBLESHOOTING CHECKLIST

Symptom	Possible Cause	Determination of Cause	Temporary Fix	Long-Term Fix
Well High Oxygen Concentration (>1%)	1. Loose or leaky test port connection.	1. If the pitot tube fits loosely in petcock hole or does not effect a positive seal (hissing heard).	1. Use Teflon® tape liberally to effect a better seal.	1. Plug and redrill test port.
	2. Bad or loose hose connection.	2. Check hose connection.	2. Fix hose connection	2. --
	3. Break in well lateral upstream of test port.	3. Test by monitoring the test port at the wellhead.	3. Use duct tape to patch hole, tear, or small separation in the pipe.	3. Repair lateral with coupler or by cutting out broken pipe and refusing a new piece.
	4. Bad/leaky gasket at wellhead or valve flanges.	4. Test by monitoring the test port at the wellhead.	4. Try to duct tape around the flange.	4. Replace gasket(s).
	5. Broken flange(s).	5. Look to see if the flange is cracked or broken.	5. Try to duct tape around the flange.	5. Replace flange(s).
	6. Break in the wellhead itself.	6. Look for signs of cracks. See if wellhead is loose or turns easily.	6. Shut the valve off.	6. Dig down to top of seal, patch or repair as required.
	7. Bad well seal.	7. None of the above causes were found - historically a good well.	7. Adjust valve setting lower or shut off	7. Repack or replace wellhead seal with bentonite or HDPE skirt.
	8. Overdrawing on the well (i.e., vacuum too high).	8. None of the above causes were found.	8. Adjust valve setting lower or shut off	8. None, well may be maximized out already.
Low Methane Concentration (<50%)	1. Air leak.	1. See "Low Oxygen Concentration" troubleshooting.	--	--
	2. Over pulling on the well (vacuum too high).	2. Check on well's past history, typical flow/vacuums.	2. Adjust valve setting lower. Check well reading the next monitoring event.	

Symptom	Possible Cause	Determination of Cause	Temporary Fix	Long-Term Fix
High Temperatures (>120F)	1. Trash is composting (underground fire).	1. Oxygen or high nitrogen present, carbon monoxide, smoky smell.	1. Shut off well, monitoring well daily until temperature falls to a more typical operating temperature.	1. Check for potential sources where air can enter well from surrounding ground and vapors.
	2. Trash is in thermophyllic stage of decomposition.	2. No composting symptoms.		
Fluctuating Static/Delta Pressure Readings	1. Partial condensate blockage in lateral.	1. Listen to well lateral for surging of gas or gurgling of condensate. Pinpoint actual trouble spot by walking down to the source of surging/gurgling.	1. If significant, shut off well and open labcock valve, pick up lateral and walk condensate back to well or intended drainage low point.	1. Regrade lateral for positive drainage to well or intended drainage low point.
	2. Well filled with leachate.	2. Listen for surging at the well.	2. Turn off well and report to LFG system O&M supervisor.	2. Determined by LFG O&M supervisor (one option is to pump well)
	3. Main header partially blocked with condensate.	3. Listen for surging/gurgling on header side of valve.	3. Check condensate drain line; if nearby, report to LFG O&M supervisor.	3. May need to regrade header, or unplug drain line, or inspect condensate line.
Low Flow	1. Lower flow than normal or no flow.	1. See "Fluctuating Static/Delta Pressure Readings."	1. Contact O&M supervisor.	1. If no condensate is apparent on the lateral, well, or horizontal trench, perforated section may be completely blocked off by condensate leachate. May require pumping.
		2. Check status of blower.		

TABLE 5-2

GAS BLOWER SPARE PARTS

DESCRIPTION	QUANTITY	PART NO.
Bearing, Drive End	1	BC-300807
Bearing, Opposite Drive End	1	BC-300807
Bearing Locknut	2	BC-300507
Bearing Lockwasher	2	BC-300405
Grease Slinger	2	BC-300014
Grease (5.5 oz)	2	BC-301712
Bearing Cap Gasket	2	BC-423201
Head Gasket	2	BC-423101

TABLE 5-3

SPARE PARTS FOR GAS FLARE

COMPONENT	TAG #	PART NO.	QUANTITY
Flame Scanner	BE-103A	026441	1
Flame Scanner Amplifier	BS-103A	001506	1
Thermocouple Assembly	TE-101, TE-201A & B	022963	3
Spark Plug	for B-302-1	003020	1
Ignitor Rod Insulator	for B-302-1	003587	3
Sight Glass	CA-ST-0600	008170	1
Pilot Assembly	B-302-1		1
Panel Lights	for PNL-101	001598	6
Pressure Gauge	PI-612	030373	1
Regulator	PCV-608	016414	1
Solenoid Valve	FV-609	012004	1
Damper Actuator	for TCV-201A & B	001625	1
Pressure Switch	PDSL-203	024372	1

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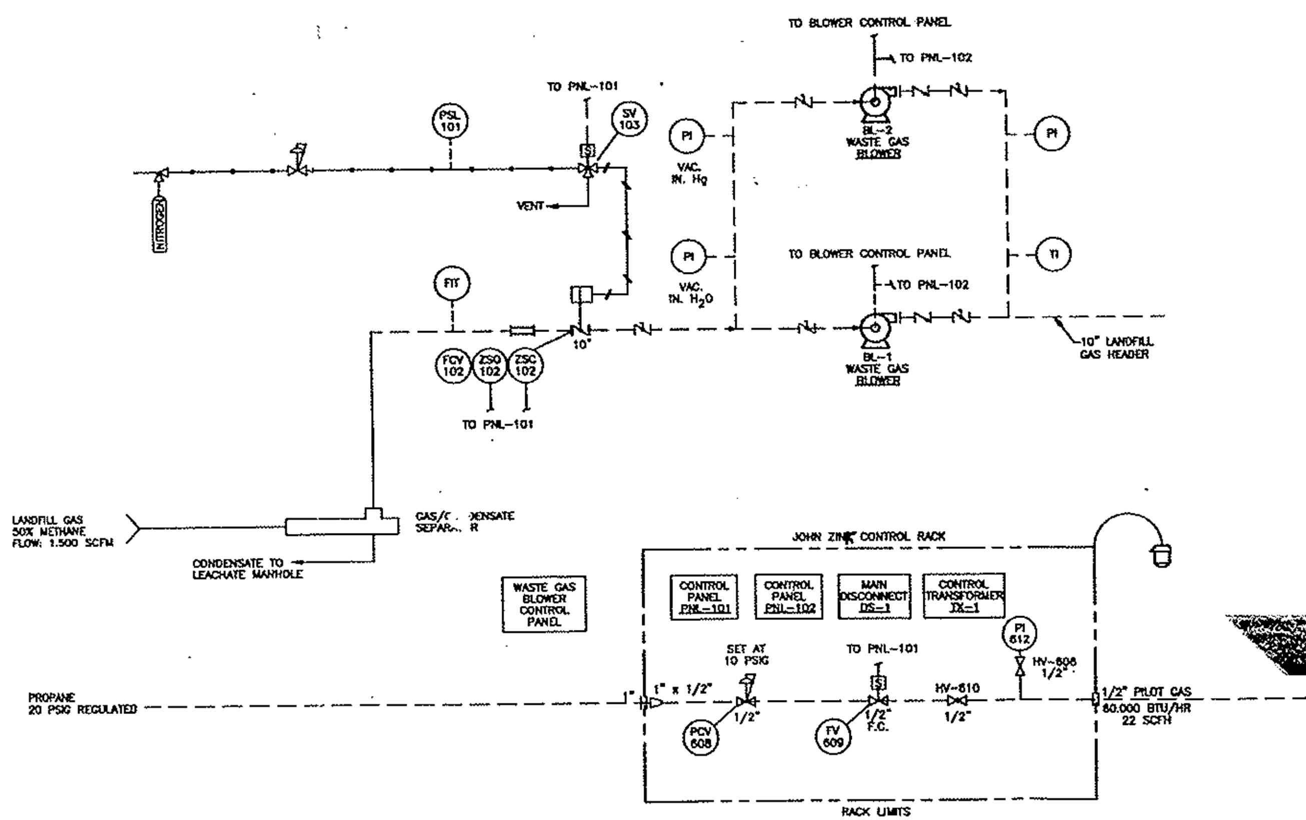
ABBREVIATIONS:

BE	FLAME SCANNER	SV	SOLENOID VA-.E
BL	BLOWER	TAH	TEMPERAT:RE ALARM HIGH
FA	FLAME ARRESTOR	TAL	TEMPERATURE ALARM LOW
FCV	FLOW CONTROL VALVE	TCV(AUTO)	DAMPER AUTO
FIT	FLOW INDICATOR TRANSMITTER	TCV(MAN)	DAMPER MANUAL
HS	HEAT SENSOR	TE	TEMPERATURE ELEMENT
HV	HAND VALVE	TI	TEMPERATURE INDICATOR
PCV	PRESSURE CONTROL VALVE	TIC	TEMPERATURE INDICATOR CONTROLLER
PDSL	PRESSURE DIFFERENTIAL SWITCH LIMIT	TISH	TEMPERATURE INDICATOR SWITCH HIGH
PI	PRESSURE INDICATOR	TR	TEMPERATURE RECORDER
PNL 101	PANEL NO. 101	ZSC	LIMIT SWITCH CLOSE
PSL	PRESSURE SWITCH LOW	ZSO	LIMIT SWITCH OPEN
SL	SECURITY LIGHT		



TEMPERATURE CONTROLLING THERMOCOUPLE LOCATION

50% METHANE FLOW (SCFM)	TE-201 ELEVATION (FT)
250 - 499	17'-0"
500 - 999	22'-0"
1000 - 1300	31'-6"

NOTES:

1. INCORP... ELEVATION...
2. FOR COMPLETE ... MANAGEMENT SYS...

...5-1
...D ENCLOSED FLARE
...RUMENTATION DIAGRAM

LANDFILL REMEDIATION

...CAPPING AND ...LLECTION SYSTEM ...RACT NO. 875-HP

1" = 300'

JULY 29, 1998

C.9 | 10

C.19 | 28

Woodward-C...

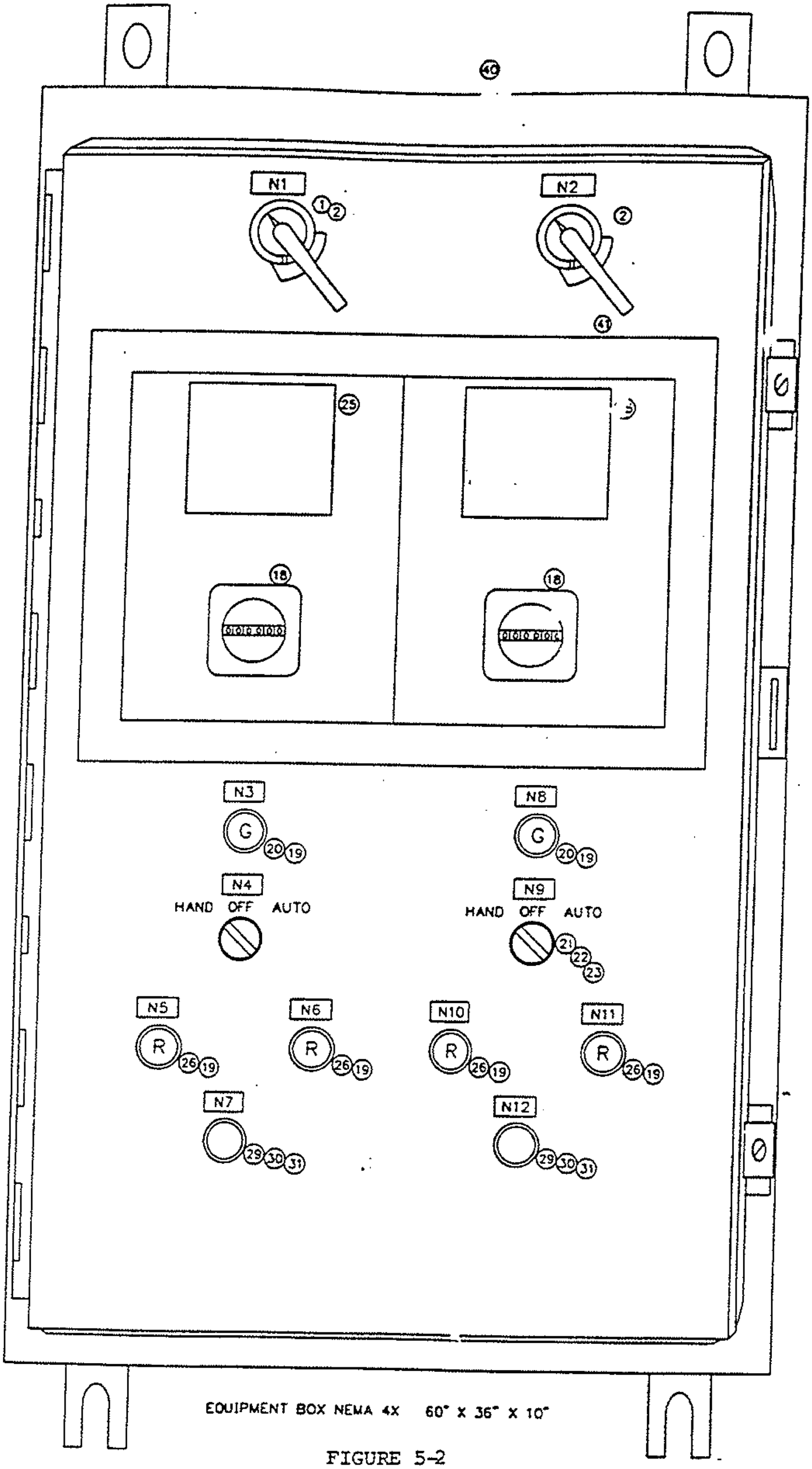


FIGURE 5-2
BLOWER CONTROL PANEL

N	LABEL DISCRIPTION
1	DISCONNECT BLOWER 1
2	DISCONNECT BLOWER 2
3	BLOWER 1 RUNNING
4	BLOWER 1
	HAND OFF AUTO
5	BLOWER 1
	CURRENT ALARM
6	BLOWER 1
	HIGH MOTOR TEMP.
7	RESET ALARMS
8	BLOWER 2 RUNNING
9	BLOWER 2
	HAND OFF AUTO
10	BLOWER 2
	CURRENT ALARM
11	BLOWER 2
	HIGH MOTOR CURRENT
12	RESET ALARMS

ITEM	DESCRIPTION	PART NO	MANUFACTURER	QUAN
1	MOTOR CIRCUIT PROTECTOR	HMCP150T4C	WESTINGHOUSE	2
2	MECHANISM	373D958G22	"	2
	HANDLE	504C323G04	"	2
	SHAFT	47A444G37	"	2
3	FUSE BLOCK	3743	BUSS	6
	END SEC	3742	"	2
4	FUSE	FNM4	"	6
5	PHASE MON.TOR	A258B240	TIME MARK	2
6	SOCKET 8PIN OCT.	SR2P-06	IDEC	2
7	CURRENT TRANSFORMER	5SFT-500	ELECTRIC METERING	2
8				
9				
10	AUTOTRANSFORMER	52911-071-51	SQUARE D	2
11	OVERLOAD HEATER	CC167	"	6
12	FUSE	FNM5	BUSS	2
13	TRANSFORMER	B350MBT713XK	MICRON	2
14	TIME DELAY RELAY	TDU3000A	SSAC	2
15	MAGNETIC STARTER (2R-1R)	85362V02S	SQUARE D	2
16	MAGNETIC STARTER (1S-3S)	8502SE01V02	"	2
17	MAGNETIC STARTER (2S-4S)	8502SE02V02S	"	2
18	ELAP. TIME METER	63510063	"	2
19	PILOT LIGHT	FVLU120	CONTROL CONCEPTS	4
20	LENS CAP (GRN)	PLLGNT	"	2
21	SWITCH	SS03	"	2
22	OPERATOR	SH4-BK	"	2
23	CONTACT	CBNO	"	4
24	TIME DELAY RELAY	9050A012EV02	SQUARE D	2
25	CURRENT/CFM METER	CROMAX-239	AIR-X-DUST	2
26	LENS CAP	PLLRDT	CONTROL CONCEPTS	2
27	RELAY	RH4BUL120	IDEC	4
28	RELAY SOCKET	SH4B-05	"	4
29	PUSH-BUTTON	PB4	CONTROL CONCEPTS	2
30	OPERATOR	FC4-BK	"	2
31	CONTACT	CBNC	"	2
32	TIME DELAY RELAY	TDM120VACL	SSAC	2
33	RELAY SOCKET	SR2P-06	IDEC	2
34	TEMP. CONTROL	M7D	MEARS	1
35	HEATER 150W	OT-715	CROMALOX	1
36	DUPLEX. RECEPT	6598-HDI	LEVITON	1
37	HANDY BOX	#420	RACO	1
38	COVER	864	"	1
39	AUX. CONTACT	9999SX8	SQUARE D	4
40	EQUIPMENT BOX	1418N4T10	HAMMOND	1
41	WINDOW KIT	1481W1711	"	1

FIGURE 5-3
BLOWER CONTROL PANEL
INSTRUMENTS IDENTIFICATION

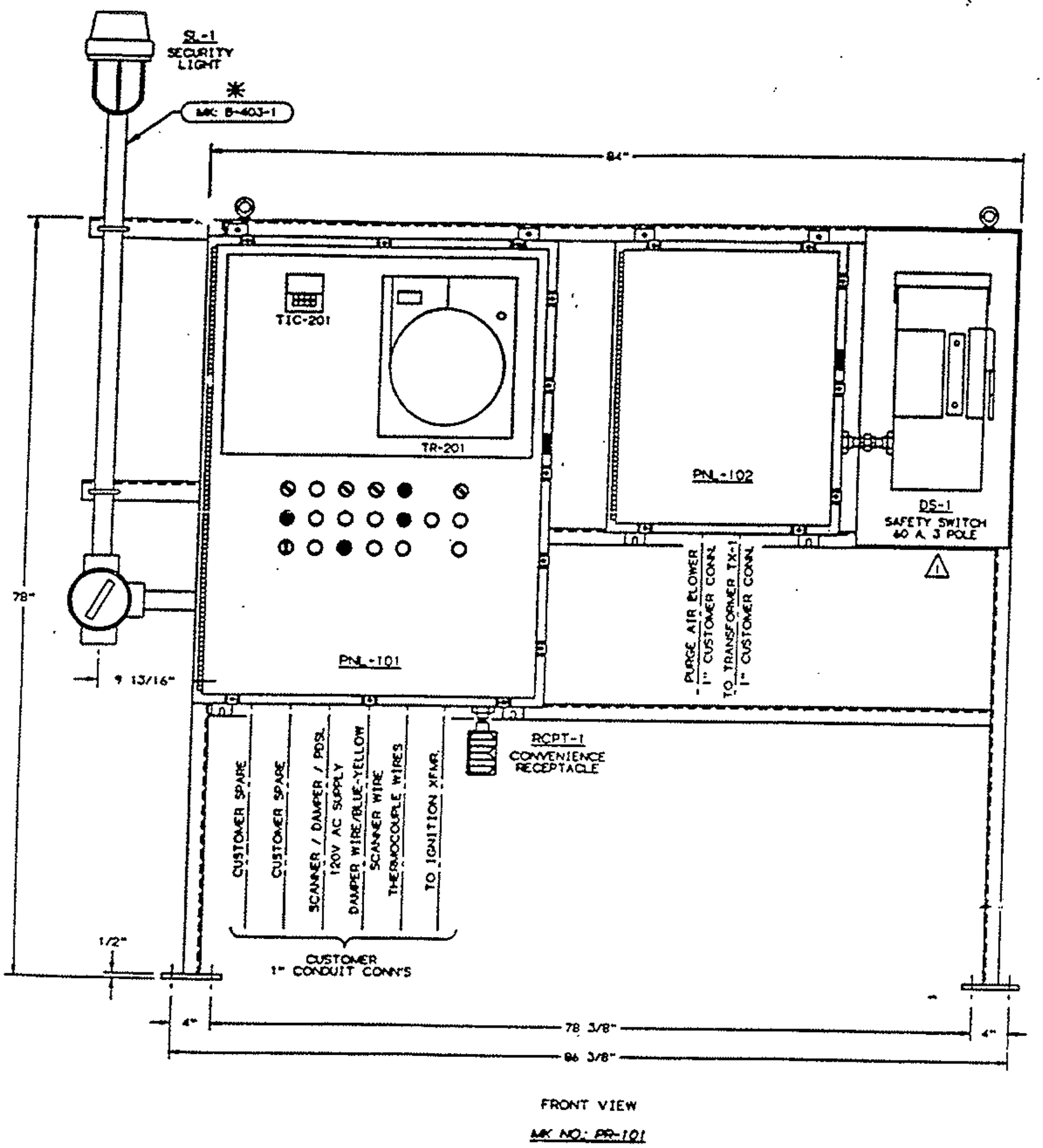


FIGURE 5-4
ENCLOSED FLAR. CONTROL PANEL

Note:
See Figure 5-5 for Control Instrument Detail

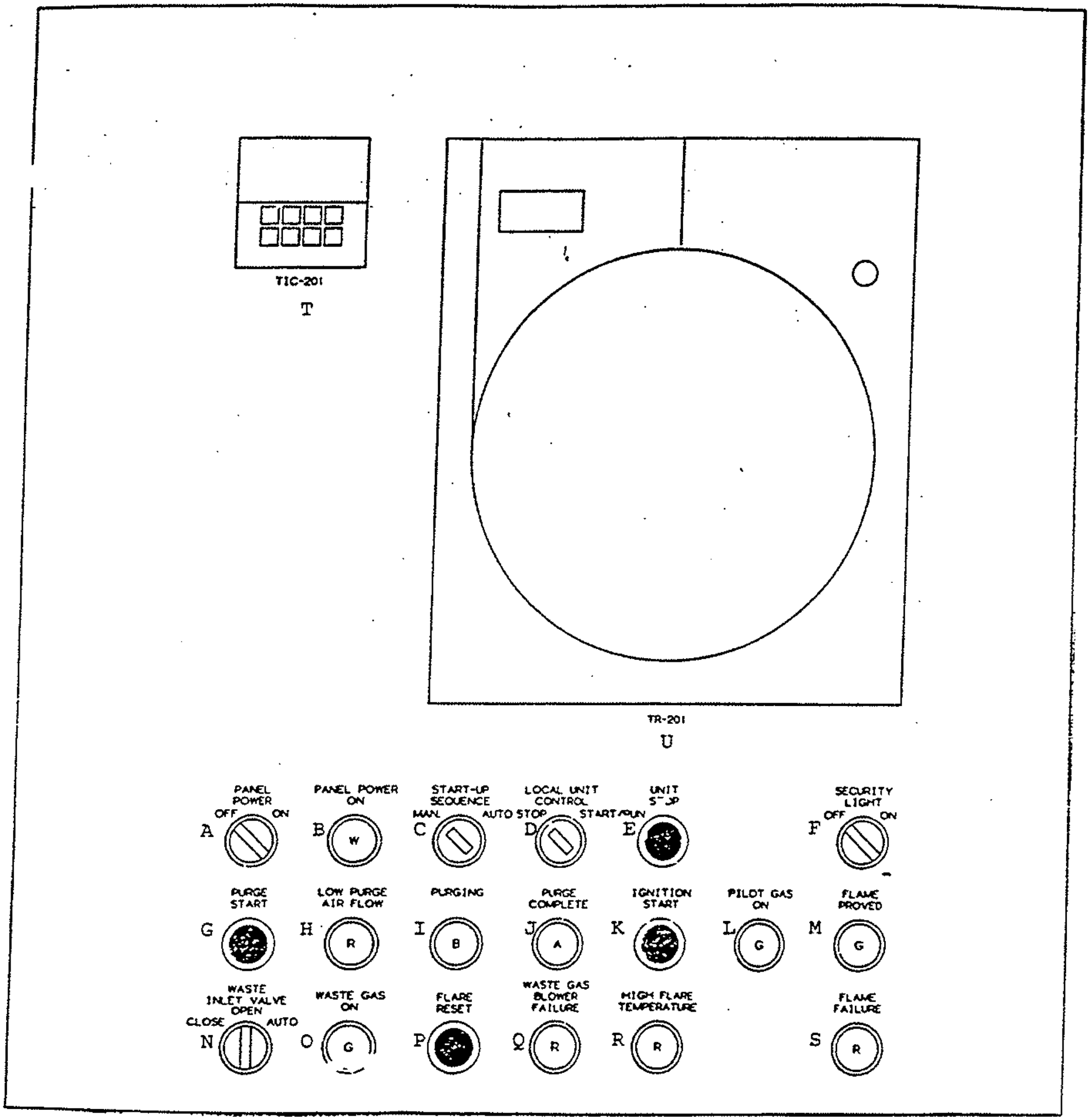
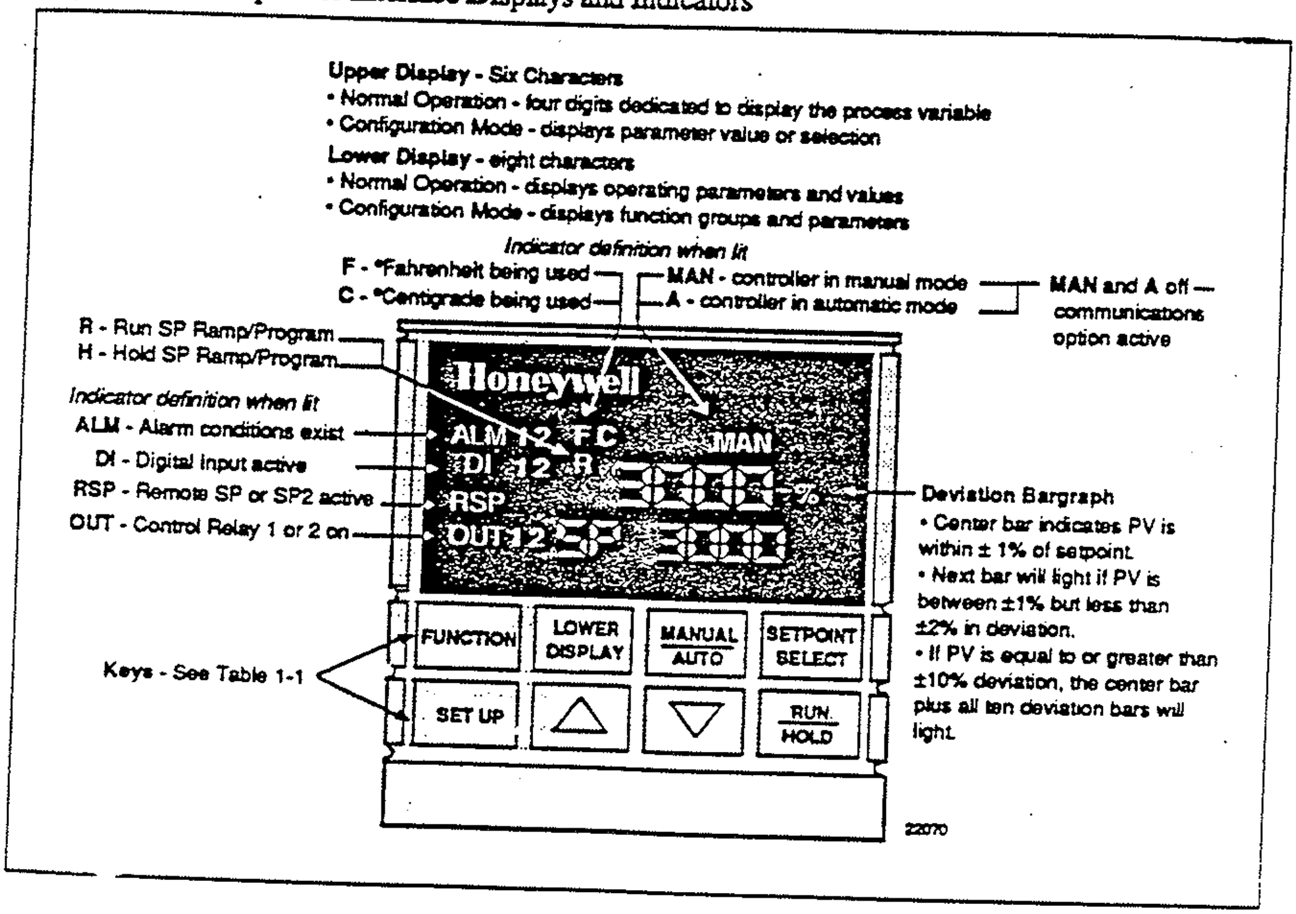


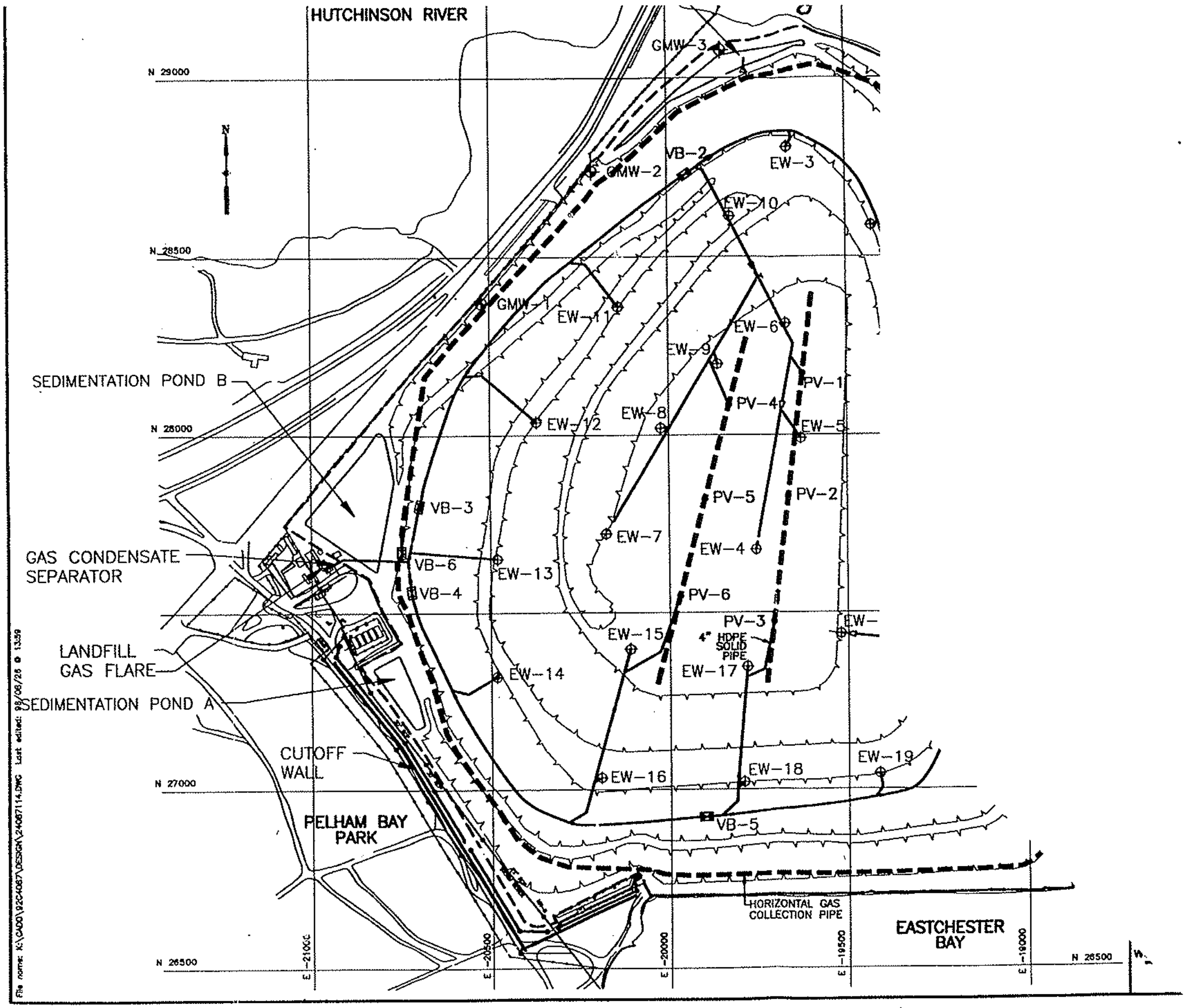
FIGURE 5-5
ENCLOSED FLARE CONTROL PANEL (PNL-101)

Operator Interface Displays and Indicators



Note: For complete description and programming, see John Zinc O&M Manual Section III specification sheets.

FIGURE 5-6
DIGITAL TEMPERATURE CONTROLLER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HUTCHINSON RIVER
SEDIMENTATION POND B
GAS CONDENSATE SEPARATOR
LANDFILL GAS FLARE
SEDIMENTATION POND A
CUTOFF WALL
PELHAM BAY PARK
EASTCHESTER BAY
HORIZONTAL GAS COLLECTION PIPE
4" HDPE SOLID PIPE
N 29000
N 28500
N 28000
N 27000
N 26500
E -21000
E -20500
E -20000
E -19500
E -19000
GMW-1
GMW-2
GMW-3
VB-2
VB-3
VB-4
VB-5
VB-6
EW-3
EW-4
EW-5
EW-6
EW-7
EW-8
EW-9
EW-10
EW-11
EW-12
EW-13
EW-14
EW-15
EW-16
EW-17
EW-18
EW-19
PV-1
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PV-5
PV-6

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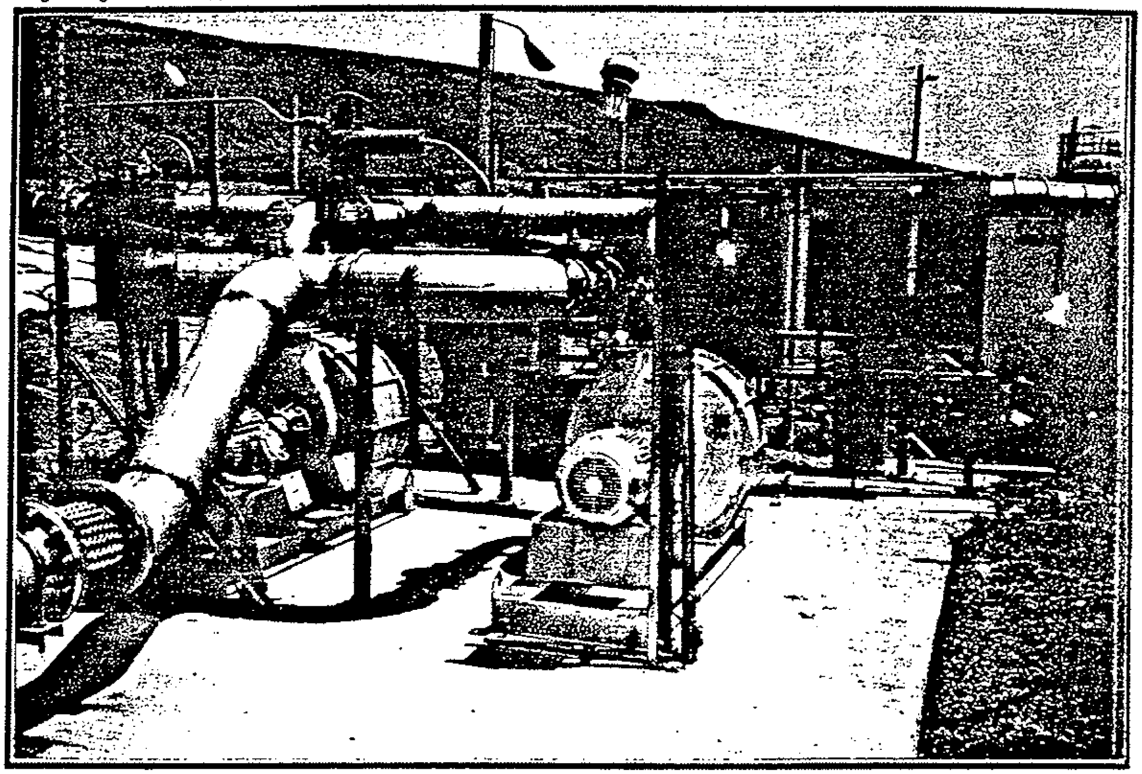
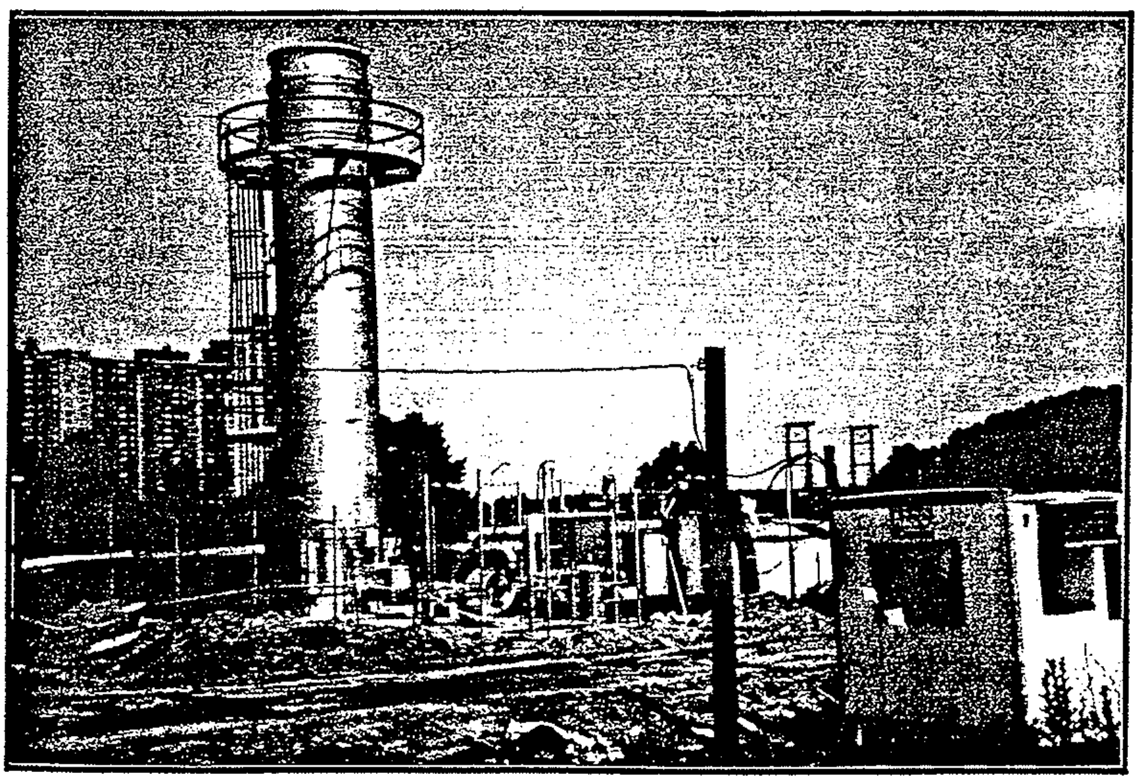


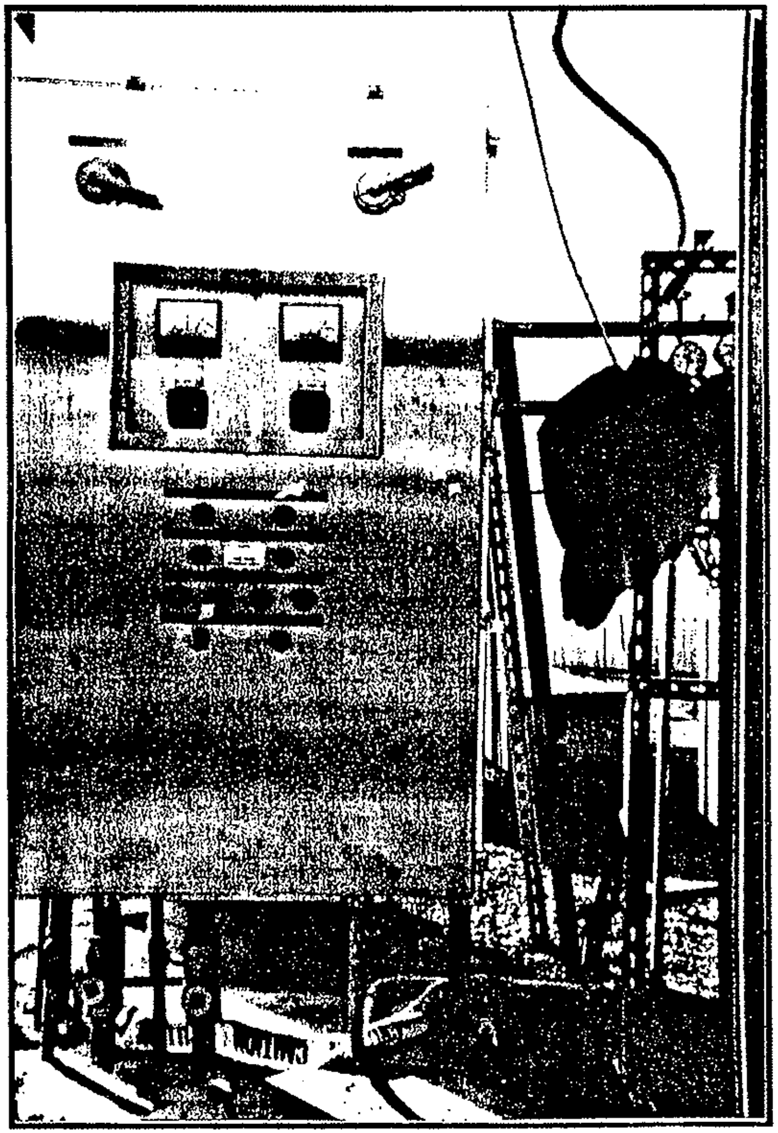
Photograph No. 5-1

Waste Gas Blowers and Piping



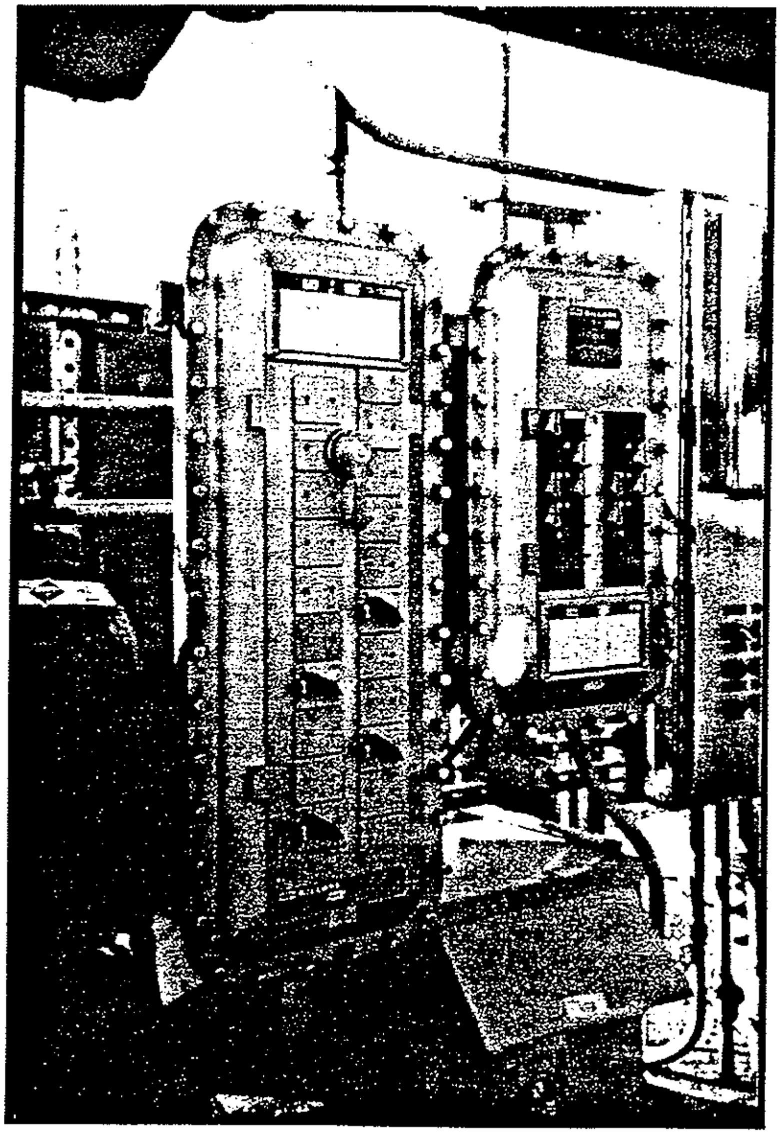
Photograph No. 5-2

Enclosed Flare



Photograph No. 5-3
Blower Control Panel

Photograph No. 5-4
Flare Control Panel and Purge Blower Panel



Photograph No. 5-5
Blower/Flare Main Breakers

6.1 MONITORING PLAN

The monitoring components of the Pelham Bay Landfill include groundwater, leachate, surface water, sediment, and landfill gas in accordance with the Record of Decision (ROD) for this site. This monitoring plan is designed to enable evaluation of the effectiveness of the remedial measures, provide continuing water and air quality information including background (upgradient) and baseline data, and provide early warning of future releases of contaminants to the environment. The environmental monitoring will initially consist of quarterly sampling for a one year period to establish a historical baseline. Monitoring will continue for four more years thereafter, and will include semi-annual monitoring of environmental media. The monitoring program will be reviewed after this 5-year period by the state DEC. Based on this review the parameters list or sampling schedule may be modified and the decision with respect to the installation of additional perimeter extraction wells may be made.

6.1.1 Elements of Monitoring Plan

A total of eleven (11) groundwater monitoring wells within the landfill constitute the long-term monitoring network for groundwater quality and elevation at the site. In addition, four (4) monitoring wells in the Pelham Bay Park and six (6) piexometers located upgradient and dowgradient of the cutoff wall shall be maintained for groundwater elevations. A total of four (4) gas monitoring wells and ten (10) surface gas sampling points constitute the long-term monitoring network for landfill gas migration. One sampling point constitutes the long term monitoring network for the enclosed flare emission. In addition, the plan includes two stormwater sampling points (at Pond C and 6-inch diameter infiltration storm pipe) before discharge to Eastchester Bay and one leachate sampling point (at Sump No. D-1).

Table 6-1 lists groundwater, leachate, stormwater, landfill gas and enclosed flare monitoring wells/probe. Figure 6-1 shows the locations of the monitoring wells/point.

6.1.2 Program Review

The requirements of 40 CFR 264 provide for 30 years of post-closure monitoring. This time may be shortened or extended, depending on the risk to human health and the environment. The long-term monitoring program will be re-evaluated after the initial five year monitoring program. During the monitoring program, data will be evaluated to determine the effectiveness of the remedial measures. The monitoring may be modified and/or corrective actions may be implemented based on analytical and/or elevation results. The schedule for implementation of the monitoring plan is discussed in the following sections.

6.1.3 Well Sampling Equipment

The NYCDEP acquired the following sampling well equipment as manufactured by QED Environmental System, Inc. of Ann Arbor, Michigan:

1. Seventeen (17) Well Wizard Bladder Pumps, Model No. P1201
2. Seven hundred (700) feet of Well Wizard Teflon Lined Tubing, Model No. PT-500.
3. Seventeen (17) Well Wizard Well Cap Assemblies, Model No. 2120-C.
4. Well Wizard Well Controller and Driver, Model No. 3111HR
5. Well Wizard Portable Water Level Meter, Model 6000MSS (300 ft length)

The O&M Contractor shall take possession of this equipment (currently stored at the Site) and provide required sampling and maintenance procedures. These pumps shall be used for sampling the eleven (11) groundwater monitoring wells on site. Each pump shall be marked and dedicated for the same well for the entire scheduled sampling period. These pumps and related equipment shall remain the property of the NYCDEP. Pumping equipment and materials that are not used shall be considered as spare parts.

6.2 ENVIRONMENTAL MONITORING

Appendices C through I present protocols and sampling log sheets. Details of the sampling, analytical, and evaluation elements of the program are as follows:

6.2.1 Sampling Schedule

1) Groundwater

- Quarterly Sampling Events (for the first year) and semi-annual next four years

  Eleven (11) groundwater monitoring wells shall be sampled for Schedule A parameters (see Table 6-2). Appendices C, D and E present the protocols for sampling.

  Each groundwater sampling event shall include one trip blank (Field QC) for TCL only, and one matrix spike and one matrix spike duplicate (Lab QC).

2) Elevation Measurements

- Quarterly Sampling Events (for the first year) and semi-annually next four years

  Fifteen (15) wells within the landfill, four (4) wells within Pelham Bay Park, and six (6) piezometers located upgradient and downgradient of the cut-off wall shall be measured for groundwater elevation (nearest 0.01 ft). Protocols are presented in Appendices C and G.

3) Leachate

- Quarterly Sampling Events (for the first year) and semi-annually next four years

  One grab sample at Collection Sump No. D-1 shall be collected and tested for Schedule B parameters (Table 6-2).

- Semi-annual sampling event (for the first five years)

  One grab sample at Collection Sump No. D-1 shall be collected and tested for Schedule A parameters (Table 6-2)

4) Stormwater

- Spring and Fall Sampling Events (for the first five years)

  Two stormwater samples shall be collected from the effluent of Pond C and the 6-inch infiltration stormwater pipe. Collection, sampling and analysis of stormwater shall be in accordance with federal and state regulations.

  Samples shall be analyzed for Schedule A parameters Table (6-2). Sampling protocols are presented in Appendices C and F.

5) Gas Monitoring Wells

- Sampling Events Quarterly (for the first year) and semi-annually next four years

  Gas monitoring wells GMW-1, 2, 3 and 4 shall be tested on a quarterly basis to measure and record Schedule C LFG constituents. (Refer to Figure 6-1 for gas monitoring well locations).

  The gas monitoring sampling program must be conducted by designated field personnel who are trained in air sampling techniques to ensure proper sample collection. A brief description of the minimum sampling requirements is detailed below:

  Prior to sample collection, each gas sampling probe must be purged with two casing volumes. Once purged a representative air sample from the each well is to be collected using a Landtec portable GEM-500 LFG analyzer. Well air samples are to be collected directly after the two probe casing volumes have been expelled from the well. The measured analyzer reading for each of the schedule C sampling parameters must be recorded on the field sampling form. All sampling equipment must be calibrated and maintained in accordance with the established equipment/manufactures recommendations and/or procedures to ensure proper sample collection. Each gas sampling well must be properly sealed and fitted with a sampling probe and SWAGELOK® or equivalent fitting for attachment of the LFG analyzer. The probe casing volumes must be measured and documented to ensure proper and accurate purge volumes. One sample per well shall be collected and analyzed for Schedule C parameters.

6) Landfill Surface Gas

- <u>Landfill Gas Quarterly Sampling Events (for the first year) and semi-annually next four years</u>

  In order to ensure proper operation of the gas collection system, ten (10) landfill surface areas are to be monitored for the presence of methane gas. The ten monitoring areas are designated on Figure 6-1 as surface gas monitoring (SGM) points 1-10. The selected areas should also be selected based on areas which show visual signs of elevated methane concentrations (e.g., distressed vegetation, cracks or seeps in the cover).

  Methane concentrations are measured within 5 to 10 cm of the landfill surface using a portable organic vapor analyzer (OVA), flame ionization detector (FID), or similar monitoring device which meets the instrument criteria as specified in USEPA Reference Method 21, Section 3.

  Sampling of the selected monitoring areas shall be conducted during "typical" meteorological conditions, and in accordance with the procedures outlined in USEPA Method 21, except that the term "methane" shall be used in place of "volatile organic compounds (VOC), and the calibration gas is 500 ppm methane in air.

Ten samples collected five to ten centimeters above the landfill surface, shall be monitored for methane concentration.

7) Flare Exhaust

Under typical operating conditions, a permitted facility is only required to conduct an initial stack testing program to verify compliance with the established permit limits. The flare exhaust emissions were tested during the initial start-up procedures in accordance with the conditions outlined in the facilities Permit to Construct. This initial compliance stack testing program was conducted by a qualified stack testing firm following the testing procedures outlined in a New York State Department of Environmental Conservation (NYSDEC) approved stack testing protocol.

At the direction of the NYSDEC the initial stack testing program was modified to include the testing of specified speciated Non-methane Organic Compounds (NMOC's). If the NYSDEC requires any future stack testing for the gas flare exhaust, only total Non-methane organic compounds would be required to be tested. The existing sampling protocols would have be modified to delete the testing of speciated NMOC's.

6.2.2 Effectiveness of Remedial Measures

Selected parameters for the environmental monitoring of the landfill shall be used to record the progress of the remedial measures at the site. For reference purposes, Table 6-3 presents the range of concentrations measured in parts per billion (ppb) in monitoring wells during the 1992-1993 Remedial Investigation (RI) for the Pelham Bay Landfill. These were the chemicals of concern (COC) measured during the RI study.

6.2.3 Sampling Procedures

The Pelham Bay long-term monitoring program, sampling and analyses plan (Appendix C) specifies the standard procedures for well purging, sampling, sample preservation, sample shipment, and chain of custody.

6.2.4 Analytical Program

6.2.4.1 Analytical Schedules and Methods

Analytical parameters for analytical testing are identified in Table 6-2. Organic and inorganic analyses shall be performed in accordance with Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, 1986. Appendix H presents the target compound list and contract required quantification limits.

6.2.4.2 Laboratory QC Samples

One matrix spike and one matrix spike duplicate shall be required for each groundwater sampling event. Matrix spikes, matrix spike duplicates and surrogate recoveries shall be in accordance with NYSDEC ASP 1989 recovery limits.

6.2.4.3 Reporting and Deliverables

The reporting and deliverable requirements for each sampling event shall include:

- instrument detection limits
- results summary (for TCL analytes)
- chromatograms (total ion)
- quantitation report for TCL analytes, listing as a minimum the retention time, hits for TCL analytes, and peak areas
- surrogate percent recovery for each sample surrogate
- internal standard areas for each sample
- method blanks and their associated samples
- matrix spike and matrix spike duplicate summary forms listing the percent recovery and relative percent difference for each spiked analyte

6.2.4.4 Special Analytical Protocols

Samples shall not be diluted by the analytical laboratory to remove interferences. Dilution shall only be permitted to bring particular analytes within the linear range of calibration. All analytical cleanups shall be mandatory, not optional, when matrix interferences occur. The type and number of sample cleanups to eliminate these matrix interferences during analysis shall be determined after consultation among the O&M Contractor, its testing laboratory, and the NYCDEP.

6.2.4.5 Laboratory Audit

A one-day laboratory audit shall be performed by the O&M Contractor during each year of the five year program to verify that laboratory meets the technical standards of industry and can provide reliable dependable data. The audit shall include a review of procedures for sample logging, chain-of-custody, sample tracking, container handling, instrument operation, real-time response to QA/QC problems, and other applicable protocol. The audit shall also include review of QC records, calculations, and storage facilities for samples and extracts.

6.2.4.6 Data Audit

A data audit shall be performed by the O&M Contractor to verify that inorganic and organic analyses are performed in accordance with SW-846, 3rd edition methods. The data audit shall include review and evaluation of all analytical deliverables. Data not meeting audit criteria shall be rejected and resampling may be required.

6.2.5 Evaluation of Monitoring Results

Analytical results from each sampling event shall be reported by the O&M Contractor, who shall submit a letter-report transmitting the data to NYCDEP. Any samples violating environmental standards shall be identified. In addition, any trends indicating a potential release from the site shall be reported.

At the conclusion of the second year of sampling and every three years thereafter, the O&M Contractor shall review all analytical data of previous sampling starting with the NYCDEP 1992-1993 RI data and from this O&M procedure to develop recommendations for modifications if necessary, to this Monitoring Plan. The recommendations shall be submitted to NYCDEP in a written report. The report shall also include a summary of the findings of the monitoring program. The O&M Contractor shall then revise the Monitoring Plan per NYCDEP approval of the O&M Contractor recommendations.

6.3 RECORDS

The results of field sampling activities shall be recorded for each day of sampling. Each day sampling reporting shall include, at a minimum, the following:

- Location of work
- Work performed
- Weather information
- Results of any field testing
- Personnel involved
- Problems identified

This information shall be recorded in a bound field notebook that will be kept on file by the O&M Contractor on site and in their regional office. One (1) copy of all deliverables submitted by their analytical and testing laboratory shall also be kept on file, along with a copy forwarded to NYCDEP.

6.4 SUPPORTING DOCUMENT

The O&M Contractor's attention is directed to various appendices C through I included in this volume as supporting documentation for this section. These appendices and their titles are as follows:

Appendix	Title
C	Long-Term Monitoring Program, Sampling and Analysis Plan
D	Groundwater Sample Collection Protocol Using Bailers
E	Groundwater Sample Collection Protocol Using Low Flow Rate Purging

	and Sampling Technique
F	Surface Run-Off Water Sample Collection Protocol
G	Groundwater Table Measurement Protocol
H	Target Compound Lists (TCLs) and Contract Required Quantitation Limits (CRQLs)
I	Sampling Log Sheets
	- Groundwater Elevation Log Sheet, Table I-1
	- Quarterly Groundwater Sampling Event Log Sheet, Table I-3
	- Groundwater Elevation, Calculation Sheet, Table I-2
	- Quarterly Groundwater Sampling Log Sheet, Table I-4
	- Quarterly Environmental Laboratory Analysis, Table I-5

1

TABLE 6-1
MONITORING WELLS AND POINTS
PELHAM BAY LANDFILL

1. Groundwater Monitoring Well Numbers

The following eleven (11) wells within the landfill shall be sampled for analytical analysis:

MW - 104
MW - 106
MW - 109
MW - 110
MW - 113
MW - 114
MW - 119
MW - 120
MW - 120B
MW - 121
MW - 122

2. Elevation Measurement

The following fifteen (15) wells within the landfill shall be used to measure for elevation of groundwater level:

MW - 104
MW - 106
MW - 109
MW - 110
MW - 113
MW - 114
MW - 115
MW - 115 B
MW - 118
MW - 119
MW - 120
MW - 120B
MW - 121
MW - 122
MW - 126 (also referred to as PZ - 5)

The following four (4) wells located in Pelham Bay Park shall be used to measure for elevation of groundwater level:

MW - 117	MW - 124
MW - 117B	MW - 124B

 (Continued)

TABLE 6-1 (Continued)
MONITORING WELLS AND POINTS
PELHAM BAY LANDFILL

The following pairs of piezometers located upgradient and downgradient of the cut-off wall will be monitored for groundwater elevation.

- @ Cut-Off Wall Station 3+50 (2 piezometers, PZ-A and PZ-B)
- @ Cut-Off Station 7+00 (2 piezometers, PZ-C and PZ-D)
- @ Cut-Off Station 11+90 (2 piezometers, PZ-E and PZ-F)

3. **Leachate**

The following location shall be used to sample the leachate prior to discharge to POTW sewer system:

- Collection Sump D-1

4. **Stormwater Points**

The following two (2) locations shall be used to collect stormwater samples for analytical testing:

SW-1 SW-2

5. **Gas Monitoring Wells**

The following four (4) gas wells shall be monitored for gas concentrations:

GMW - 1 GMW - 3
GMW - 2 GMW - 4

6. **Landfill Surface Gas**

The following ten (10) surface locations shall be used to monitor for methane concentrations five (5) to ten (10) cm above the landfill surface:

SGM-1 through SGM-10

7. **Enclosed Flare**

The following location shall be used for long-term monitoring of the enclosed flare emission

- Enclosed Flare Stack EF-1 (see 6.2.1 Sampling Schedule Item 7).

TABLE 6-2
ANALYTICAL SCHEDULES
PELHAM BAY LANDFILL

Schedule A
Target Compound List (TCL) • Field Parameters • Conventionals • TCL Volatile Organics • TCL Semivolatile Organics • TCL Pesticides Target Analyte List (TAL) Inorganics

Schedule B		
BOD	pH	Copper
COD	Petroleum Hydrocarbons	Lead
Chloride	Amenable Cyanide	Mercury
Suspended Solids	Arsenic	Nickel
Ammonia Nitrogen	Cadmium	Zinc
Nitrate Nitrogen	Chromium (total)	Molybdenum
TKN	Chromium (Hexavalent)	Selenium

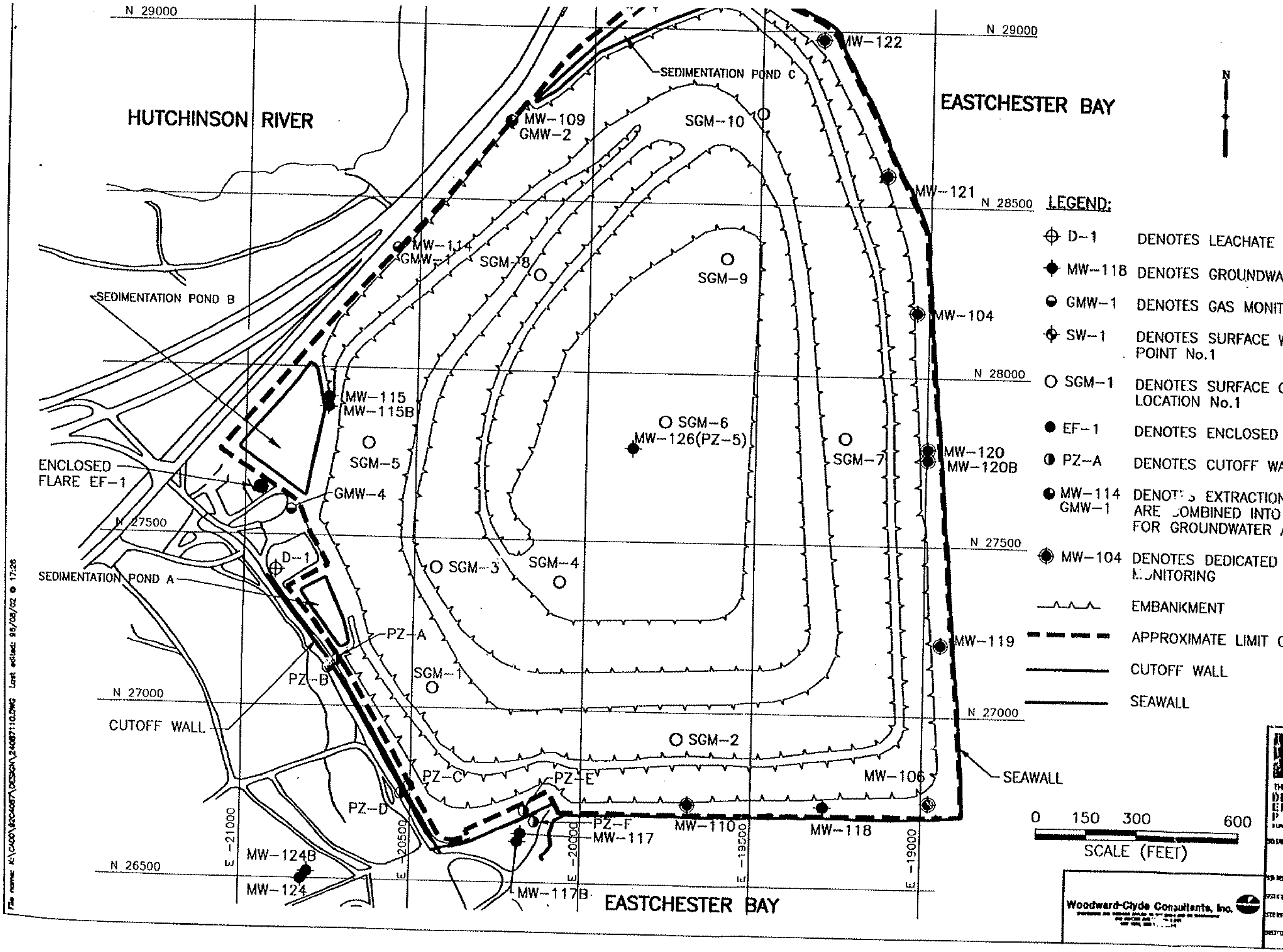
Schedule C
CH_4 % by volume
CO_2 % by volume
O_2 % by volume

TABLE 6-2 (CONTINUED)
ANALYTICAL SCHEDULES
PELHAM BAY LANDFILL

Schedule D
% Destruction for:
• Methane (CH_4)
• Carbon Dioxide (CO_2)
• Carbon Monoxide (CO)
• Non-Methane Organic Compound (NMOC)
Emission Concentration for
• Particulates
• Sulfur Oxide (SO_x)
• Nitorgen Oxides (NO_x)
• Carbon Monoxide (CO)

Table 6-3
REPORTED MONITORING WELL SAMPLES CONCENTRATIONS PELHAM BAY LANDFILL

Target Compound List	Range of Concentration Measured (ppb)
Conventionals	
Ammonia	170 to 1,260,000
Chloride	11,000 to 12,250,000
Nitrate	20 to 23,000
Sulfate	46,000 to 1,690,000
Total Dissolved Solids	304,000 to 27,100,000
Inorganics	
Antimony	51.2 to 56.3
Arsenic	2.3 to 89.1
Barium	60 to 8470
Boron	1570 to 8900
Cadmium	5.4 to 29.1
Chromium	18.6 to 1240
Hexavalent Chromium	20 to 560
Cobalt	8.1 to 77.3
Copper	7.3 to 1130
Cyanide	10.8 to 267
Iron	165 to 860,000
Lead	7.7 to 2780
Magnesium	5290 to 1,936,000
Manganese	75.8 to 29,600
Mercury	0.2 to 5
Selenium	13.6
Sodium	10,700 to 8,000,000
Thallium	2.8 to 16.8
Zinc	6.5 to 7,110
Volatile Organics	
Benzene	1 to 62
Chlorobenzene	1 to 46
Ethylbenzene	3 to 36
Methylene Chloride	1 to 150
Toluene	1 to 230
Xylenes (Total)	4 to 200
Semi Volatile Organics	
Napthalene	2 to 140
1,2-Dichlorobenzene	5
1,3-Dichlorobenzene	5
1,4-Dichlorobenzene	4 to 9
Pesticides	
4,4'-DDD	0.011 to 0.078
4,4'-DDE	0.01 to 0.078
Aldrin	0.058
Dieldrin	0.0063 to 0.64


HUTCHINSON RIVER
EASTCHESTER BAY
SEDIMENTATION POND C
SEDIMENTATION POND B
SEDIMENTATION POND A
ENCLOSED FLARE EF-1
CUTOFF WALL
SEAWALL
N 29000
N 28500
N 28000
N 27500
N 27000
N 26500
E -21000
E -20500
E -20000
E -19500
E -19000
MW-122
MW-121
MW-104
MW-120
MW-120B
MW-119
MW-106
MW-118
MW-110
MW-117
MW-117B
MW-124B
MW-124
MW-109
GMW-2
MW-114
GMW-1
MW-115
MW-115B
GMW-4
MW-126(PZ-5)
D-1
PZ-A
PZ-B
PZ-C
PZ-D
PZ-E
PZ-F
SGM-1
SGM-2
SGM-3
SGM-4
SGM-5
SGM-6
SGM-7
SGM-8
SGM-9
SGM-10
N
LEGEND:
D-1 DENOTES LEACHATE
MW-118 DENOTES GROUNDWA
GMW-1 DENOTES GAS MONIT
SW-1 DENOTES SURFACE W POINT No.1
SGM-1 DENOTES SURFACE C LOCATION No.1
EF-1 DENOTES ENCLOSED
PZ-A DENOTES CUTOFF WA
MW-114 GMW-1 DENOTES EXTRACTION ARE COMBINED INTO FOR GROUNDWATER
MW-104 DENOTES DEDICATED MONITORING
EMBANKMENT
APPROXIMATE LIMIT O
CUTOFF WALL
SEAWALL
0 150 300 600
SCALE (FEET)
Woodward-Clyde Consultants, Inc.

7.1 GENERAL

This section on Ancillary Systems consists of access roads, fences, gates and locks and is divided into four subsections. Section 7.2 describes the subsystems and components which comprise the access roads, fences, gates, and locks. Section 7.3 describes the inspection and maintenance procedures for the access roads, fences, gates, and locks. Section 7.4 describes the expected normal and routine maintenance items.

7.2 MAJOR SUBSYSTEMS AND COMPONENTS

Access roads exist over the cutoff wall and elsewhere throughout the Site. Fences, gates, and locks exist in various areas throughout the Site.

7.3 MONITORING, INSPECTION, AND MAINTENANCE

The O&M Contractor shall follow the monitoring, inspection, and maintenance procedures described in detail below, unless otherwise approved by the NYCDEP. In cases where an SOP is not identified, the O&M Contractor shall develop a procedure that is acceptable to the NYCDEP.

The O&M Contractor shall visually inspect the access roads for the following:

- Overall condition of the road surface, including grading;
- Potholes or burrow holes;
- Erosion gullies;
- Loss of crushed stone cover;
- Evidence of debris and/or obstructions;
- Evidence of uneven settlement; and,
- Ponding of water.

The visual inspection of roads shall be performed on a monthly basis for the first two (2) years and on a quarterly basis thereafter.

The O&M Contractor shall routinely repair any damage to the road surface. Maintenance of the access roads shall include, but not be limited to, the following:

- Repair ruts deeper than 6 inches with like material in accordance with the technical specifications.

- Repair shoulders, slopes and drainage areas.

The O&M Contractor shall visually inspect all fences (including the perimeter fence), gates, and locks on a weekly basis for the following:

- Condition of gates and locks;
- Condition of the fence and signs for forced entry or damage; and,
- Excessive vegetative growth which could damage the fence.

The O&M Contractor shall view or walk all portions of the fenceline.

The O&M Contractor shall repair damage to or replace all fences, gates, and locks with like material and remove excessive vegetative growth as directed by the NYCDEP.

The inspection checklist for access roads, fences, gates and locks is part of the cover system inspection checklist (see Form AS-1 included in Appendix A).

7.4 EXPECTED ROUTINE MAINTENANCE ITEMS

Expected routine maintenance items are those items that will be considered part of the normal operation and maintenance and shall be included as part of the annual costs for the O&M services. The following are examples of Expected Maintenance Items that should have to be performed by the O&M Contractor.

Cover System

- Repair local settlement depressions
- Mow vegetation (4 times per year)
- Repair minor erosion
- Snow removal on access roads (4 times per year)
- Access road grading

Electrical

- Replace fuses
- Replace facility wiring

Stormwater System

- Remove silt and debris from drainage channels
- Remove silt and debris from manholes
- Remove silt and debris from ponds
- Exercise flapgates
- Lubricate flapgate at outlet to 24 inch diameter RCP, replace gasket
- Unplug weepholes in structures
- Repair minor erosion

Ancillary Systems

- Repair minor rutting in access roads
- Replace damaged reflectors
- Replace damaged light bulbs

Gas Extraction System

- Replacement of pipe sections up to 5 feet
- Replacement of valves
- Well head replacement (5 years)
- Recorder chart replacement
- Solvent & cement replacement
- Lubricate blowers, and other equipment requiring lubrication (see Appendix B)

Leachate

- Flush out tank level indicators
- Pull pumps and clean
- Replace check valves
- Cleaning valves
- Lubricate air compressor
- Grease
- Blow out tank off loading pipeline (winter months)

5

APPENDIX A

SITE INSPECTION CHECKLISTS AND INSTRUCTIONS TO THE INSPECTION CHECKLIST FORMS

FORM GWL-1
WEEKLY (TWICE PER WEEK) O&M INSPECTION CHECKLIST
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(REFERENCE VOLUME III SECTION 4)

DATE ________________ INITIALS ________________

Downgradient Collection Sumps	**D-1**		**D-8**		**D-10**	
	Pump 1	Pump 2	Pump 1	Pump 2	Pump 1	Pump 2
Circuit Breakers	☐ On ☐ Off	☐ On ☐ Off	☐ On ☐ Off	☐ On ☐ Off	☐ On ☐ Off	☐ On ☐ Off
Running Light On	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Selector Switch sition Hand-Off ıtomatic (HOA)	☐ H ☐ O ☐ A	☐ H ☐ O ☐ A	☐ H ☐ O ☐ A	☐ H ☐ O ☐ A	☐ H ☐ O ☐ A	☐ H ☐ O ☐ A
Liquid Level in mp Pump	☐ High ☐ Low ☐ Other		☐ High ☐ Low ☐ Other		☐ High ☐ Low ☐ Other	
Leak in Manifold ɔing	☐ Yes ☐ No		☐ Yes ☐ No		☐ Yes ☐ No	
Downgradient and Curtain Drain						

there settlement along alignment of downgradient :tain drain	☐ Yes	☐ No

FORM GWL-1 (continued)

3. LIFT STATION NO. 1

A. Flow from Curtain Drain ☐ Low ☐ Normal ☐ High
B. Are sump pumps operating ☐ Yes ☐ No
C. Alarm indicator lights ☐ Yes ☐ No

Pumps	High Temp	Seal Fail	Fault
P1	☐	☐	☐
P2	☐	☐	☐

D. Check liquid level in sump ☐ Low ☐ High ☐ Other
E. Check for leak in manifold leachate piping ☐ Yes ☐ No

4. LIFT STATION NO. 2

A. Settlement along buried section of forcemain ☐ Yes ☐ No
B. Are sump pumps operating ☐ Yes ☐ No
C. Are the alarms or indicator lights on ☐ Yes ☐ No

Pumps	High Temp	Seal Fail	Fault
P1	☐	☐	☐
P2	☐	☐	☐

D. Check liquid level around stop planks
Is the level, ☐ Low ☐ High ☐ Other

E. Any leaks in the manifold discharge piping ☐ Yes ☐ No
F. Check surface water in the Bay and Rip-Rap
Are there any signs of leachate ☐ Yes ☐ No
G. Check if a pump is out of service ☐ Yes ☐ No
☐ Pump 1 ☐ Pump 2

5. DECONTAMINATION TRAILER

A. Is trailer clean/sanitary ☐ Yes ☐ No
B. Is sump pump operating ☐ Yes ☐ No

FORM GWL-1 (continued)

6. DECONTAMINATION PAD/TRUCK FILL AREA AND SUMP

A. Flow through sump weep holes ☐ Low ☐ Normal ☐ High
B. Are the sump pumps operating ☐ Yes ☐ No
C. Alarm or indicator lights ☐ Yes ☐ No

Pumps	High Seal	Seal Fail	Fault
P1	☐	☐	☐
P2	☐	☐	☐

D. Check Decon-Area for leachate flow out of gravel perimeter ☐
E. Leaks in manifold discharge piping ☐ Yes ☐ No
F. Check if pump is out of service ☐ P1 ☐ P2

7. LEACHATE STORAGE CONTAINMENT AREA AND SUMP

A. Flow through sump weep holes ☐ Low ☐ Normal ☐ High
B. Are the sump pumps operating ☐ Yes ☐ No
C. Alarm or indicator lights ☐ Yes ☐ No

Pumps	High Seal	Seal Fail	Fault
P1	☐	☐	☐
P2	☐	☐	☐

D. Liquid level in sump ☐ Low ☐ High ☐ Other
E. Is there any leak in the storage tanks and manifold discharge piping ☐ Yes ☐ No
F. Check if pump is out of service ☐ P1 ☐ P2

8. CARBON ADSORPTION SYSTEM

A. Air compressors on ☐ Yes ☐ No
B. Activated carbon canisters operating (On-Line) ☐ Yes ☐ No

9. CONTRACT HP-877 FORCE MAIN DISCHARGE TO POTW

A. Leakage from pipework in valve box beside Lift Station No. 1 ☐ Yes ☐ No
B. Settlement along alignment of forcemain to Burr Avenue manhole ☐ Yes ☐ No

FORM GWL-1 (continued)

10. MOTOR CONTROL CENTER (MCC)

A. Are all breakers, for the following equipment, in the ON position:

Lift Station No. 1	☐ Yes	☐ No
Lift Station No. 2	☐ Yes	☐ No
Decontamination Sump	☐ Yes	☐ No
Storage Containment Sump	☐ Yes	☐ No
Site Lighting	☐ Yes	☐ No

11. SECURITY TRAILER AND FENCING

A. Sign In - Review Visitors Log and Check - In with Guards ☐

B. Check cleanliness of trailer
Is trailer clean ☐ Yes ☐ No

C. Check Collection System Alarm Panel

Storage Tank Levels: ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ Full

Alarm Indicators:	Yes	No
Lift Stations	☐	☐
Sumps	☐	☐
Storage Tanks	☐	☐

D. Is the security fencing surrounding the equipment in good condition ☐ Yes ☐ No

Notes: For noted deficiencies and problems provide description on form DP-1. Attach additional sheets if necessary.

FORM NO. DP-1
DESCRIPTION OF DEFICIENCIES AND PROBLEMS
PELHAM BAY LANDFILL, BRONX, NEW YORK

Form No.	Location	Description of Deficiency/Problem	Corrective Action Taken

Date ____________________________ Inspected by ____________________

Weather ____________________________ Signature________________________

FORM LFG-1
WEEKLY (TWICE PER WEEK) INSPECTION CHECKLIST
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(REFERENCE VOLUME III, SECTION 5)

Date								
Time								
Technician								
1. OPERATING BLOWER 1 OR 2	1	2	1	2	1	2	1	2
A. Noise or Vibration	OK	Bad	OK	Bad	OK	Bad	OK	Bad
B. Measurable or Odiferous Gas Leaks	No	Yes	No	Yes	No	Yes	No	Yes
C. Upstream Vacuum-inches wc								
D. Downstream Pressure-inches wc								
E. Inlet Temperature-Degree F								
F. Discharge temperature-Degree F								
2. BLOWER CONTROL PANEL								
A. Disconnect Blower 1 and 2 Switch	On	Off	On	Off	On	Off	On	Off
B. Flow Meter-cfm, Min. & Max								
C. Hour Meter Blower 1 (Zero =)								
Blower 2 (Zero =)								
D. Blower 1 or Blower 2 Running Light (Circle)	1	2	1	2	1	2	1	2
E. The Blower Hand-Off-Auto Switch	HOA/HOA		HOA/HOA		HOA/HOA		HOA/HOA	
F. Blower 1 or 2 Current Alarm	Off	On	Off	On	Off	On	Off	On
G. High Motor Current Alarm	Off	On	Off	On	Off	On	Off	On
H. Reset Alarm								
3. FLARE CONTROL PANEL								
A. Panel Power Switch	Off	On	Off	On	Off	On	Off	On
B. Panel power Light	Off	On	Off	On	Off	On	Off	On
C. Start-Up Sequence Switch								
D. Local Unit Control Switch	Start/Run	Stop	Start/Run	Stop	Start/Run	Stop	Start/Run	Stop
E. Unit Stop								
F. Security Light	Off	On	Off	On	Off	On	Off	On
G. Purge Start								
H. Low Purge Air Flow, Red Indicator Light	Off	On	Off	On	Off	On	Off	On
I. Purging, Blue Indicator Light	Off	On	Off	On	Off	On	Off	On
J. Purge Complete, Amber Indicator Light	Off	On	Off	On	Off	On	Off	On
K. Ignition Start								
L. Pilot Gas On, Green Indicator Light	Off	On	Off	On	Off	On	Off	On
M. Flame Proved, Green Indicator Light	Off	On	Off	On	Off	On	Off	On
N. Waste Inlet Valve	COA		COA		COA		COA	
O. Waste Gas On, Green Indicator Light	Off	On	Off	On	Off	On	Off	On
P. Flare Reset								
Q. Waste Gas Blower Failure, Red Indicator Light	Off	On	Off	On	Off	On	Off	On
R. High Flare Temperature, Red Indicator Light	Off	On	Off	On	Off	On	Off	On
S. Flare Failure, Red Indicator Light	Off	On	Off	On	Off	On	Off	On
4. FLARE								
A. Flame Condition (Color & Stability)	Good	Bad	Good	Bad	Good	Bad	Good	Bad
B. Abnormal Burner Hotspots	No	Yes	No	Yes	No	Yes	No	Yes
C. Unusual Sounds or Odors	No	Yes	No	Yes	No	Yes	No	Yes
D. Damper Motor Running	Yes	No	Yes	No	Yes	No	Yes	No
Manual Damper Position								
5. PIPING								
A. General Condition								
B. Propane Tank Pressure/Level -psig								
C. Inlet Valve Position		% Open				% Open		
D. LFG Flowrate-cfm								
E. Gauges Operational?	Yes	No	Yes	No	Yes	No	Yes	No
F. Nitrogen Pressure-psig								
6. SITE CONDITIONS								
Vandalism, Cleanliness	Good	Bad	Good	Bad	Good	Bad	Good	Bad
Reviewed By								
Date								

Comments ____

MONTHLY INSPECTION COVER SHEET
PELHAM BAY LANDFILL

Forms Required	Description	Check Box	Date
FCS-1	Final Cover System		
SMS-1	Stormwater Drainage Ditches		
SMS-2	Stormwater Manholes and Baffled Outlets		
SMS-3	Stormwater Sedimentation Ponds		
GWL-2	Groundwater/Leachate Management System		
LFG-2	Landfill Gas Management System		
AS-1	Ancillary Systems		

Notes:
Attach and complete all forms listed above. Check and date each form at the time of completion.

Weather: ______________________________

____

Date: ____________ Inspector: ____________

Signature: ____________

FORM GWL-2
MONTHLY INSPECTION CHECKLIST
MANHOLE AND SUMPS
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(REFERENCE VOLUME III SECTION 4)

DATE ________________ INITIALS ________________

Item No.	Inspection Item	Manhole and Sump Number									
		D-1	D-2	D-3	D-4	D-5	D-6	D-7	D-8	D-9	D-10
1	Manhole Cover										
2	Silt Accumulation										
3	Settlement										
4	Pipe Connections										
5	Settlement Along Curtain Drain										
6	Flow into manhole or sump										

Item No.	Inspection Item	Manhole and Sump Number										
		LS-1	LS-2	DS-1	DS-2	TS-1	U-1	U-2	U-3	U-4	U-5	U-6
1	Manhole Cover											
2	Silt Accumulation											
3	Settlement											
4	Pipe Connections											
5	Settlement Along Curtain Drain											
6	Flow into manhole or sump											

Notes:
1. Use a check in the checkbox to indicate that the specific item in the zone has been inspected and no problems were noted.
2. Use "NS" (Not Satisfactory) where problems are noted.
3. For boxes checked NS, provide, on Form DP-1, a description of the deficiency/problem. Attach additional sheets if necessary.

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FORM LFG-2
MONTHLY MONITORING
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
REFERENCE VOLUME III SECTION 5

Inspector ____________________ Date ____________________

Location	Concentration by % Volume			Temp. (°F)	Vac. @ Well Head (In W.C.)	Remarks
	Methane	CO_2	Oxygen			
Flare Inlet						
Well Head No. 1						
Well Head No. 2						
Well Head No. 3						
Well Head No. 4						
Well Head No. 5						
Well Head No. 6						
Well Head No. 7						
Well Head No. 8						
Well Head No. 9						
Well Head No. 10						
Well Head No. 11						
Well Head No. 12						
Well Head No. 13						
Well Head No. 14						
Well Head No. 15						
Well Head No. 16						
Well Head No. 17						
Well Head No. 18						
Well Head No. 19						
Well Head No. 20						
Well Head No. 21						
Well Head No. 22						

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FORM GWL-3
QUARTERLY INSPECTION CHECKLIST
MONITORING WELLS
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(REFERENCE VOLUME III SECTION 4)

DATE ________________ INITIALS __________________

Check For	Sampling Well Designation									
	MW 104	MW 106	MW 109	MW 110	MW 113	MW 114	MW 115	MW 115B	MW 118	MW 119
1. Damage/Vandalism										
2. Settlement										
3. Accessibility										

Check For	Sampling Well Designation								
	MW 120	MW 120B	MW 121	MW 122	MW 126	MW 117	MW 117B	MW 124	MW 124B
1. Damage/Vandalism									
2. Settlement									
3. Accessibility									

Check For	Sampling Well Designation							
	PZ 1F	PZ 3F	PZ 1	PZ 2	PZ 3	PZ 4	PZ 5	PZ 6
1. Damage/Vandalism								
2. Settlement								
3. Accessibility								

Notes:
1. Use a check in the checkbox to indicate that the specific item in the zone has been inspected and no problems were noted.
2. Use "NS" (Not Satisfactory) where problems are noted.
3. For boxes checked NS, provide, on Form DP-1, a description of the deficiency/problem. Attach additional sheets if necessary.

FORM LFG-2
MONTHLY INSPECTION CHECKLIST
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
REFERENCE VOLUME III, SECTION 5

1. Piping and Valve

A. Read Instruments

	Reading	Check Box	Normal Reading
Pressure Gauge, Inches H2O (vac side)			0-100
Pressure Gauge, Inches Hg (vac. side)			3-6
Pressure Gauge, Inches H2O (dis. side)			0-100
Temperature Gauge, °F (dis. side)			0-300°F
Propane Pressure Gauge, psi			10psi
Nitrogen Gauge			100psi

B. Check Condition of Piing & Fittings Related to Operation, Leakage, Heat, Noise, Vandalism

C. Check Condition of Fence

1. Use a check in the checkbox to indicate that the specific item has been inspected and no problems were noted.
2. Use "NS" (not satisfactory) where problems are noted, and provide a description of the deficiency problem on Form DP-1. Attach additional sheets if necessary.

FORM LFG-3
QUARTERLY CHECKLIST
GAS COLLECTION SYSTEM, BELOWGROUND PIPING
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, N.Y.
(REFERENCE VOLUME 1 FIGURE 2-11)

	S	NS
PERFORATED HORIZONTAL GAS COLLECTION		
• TOP OF LANDFILL, HORIZONTAL GAS COLLECTION		
• BOTTOM OF LANDFILL, HORIZONTAL GAS COLLECTION		
LATERALS SOLID PIPING		
• FROM EW-4 TO EW-10 AND MAIN HEADER		
• FROM EW-7 TO EW-10		
• FROM EW-11 TO MAIN HEADER		
• FROM EW-12 TO MAIN HEADER		
• FROM EW-13 TO MAIN HEADER		
• FROM EW-14 TO MAIN HEADER		
• FROM EW-15 TO MAIN HEADER		
• FROM EW-17 TO MAIN HEADER		
• FROM EW-20 TO MAIN HEADER		
MAIN HEADER SOLID PIPING		
• FROM VB-1 TO VB-2		
• FROM VB-2 TO VB-3 AND VB-6		
• FROM VB-1 TO VB-5		
• FROM VB-5 TO VB-4 AND VB-6		
• FROM VB-6 TO FLARE STATION		

Notes:

1. The inspection For the belowground gas collection and conveyance piping from well heads to flare station the operator shall check for pipe settlement, landfill gas leak and any exposed piping.
2. Use an "S" check box to indicate that the specific item has been inspected and no problems were noted.
3. Use "NS" (not satisfactory) where problems are noted, and provide a description of the deficiency problem on Form DP-1. Attach additional sheets if necessary.

FORM FCS-1
MONTHLY INSPECTION CHECKLIST
FINAL COVER SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume III, Figure 2-1)

Item No.	Item Title	Zone Number													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Surface Cracks														
2	Vegetative Growth														
3	Vector Penetration														
4	Settlement														
5	Erosion														
6	Slope Stability														
7	Seepage														
8	Vandalism														
9	Vegetation Islands														

Notes:

1 Use a check in the checkbox to indicate that the specific item number in the zone has been inspected and no problems were noted.

2 Use "NS" (Not Satisfactory) where problems are noted.

3 For boxes checked NS, provide, on Form DP-1, a description of deficiency/problem. Attach additional sheets if necessary.

Date ____________________ Inspected by: ____________________

Weather ____________________ Signature ____________________

FORM MS-1
MONTHLY INSPECTION CHECKLIST
MISCELLANEOUS SYSTEMS
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I, Section 2.8 and Volume III, Section 8)

Description	Check Box	If NS or NI, description and location
IRM Roadway		
Rutting		
Depressions/Settlement		
Washout		
Pavement Condition		
Reflectors		
Road A		
Rutting		
Depressions/Settlement		
Washout		
Pavement Condition		
Reflectors		
Road B		
Rutting		
Depressions/Settlement		
Washout		
Pavement Condition		
Reflectors		
Road C		
Rutting		
Depressions/Settlement		
Washout		
Pavement Condition		
Reflectors		
Fences, Gates, Locks		
Seawall Condition		

Notes:

1 Use a check in the checkbox to indicate that the specific item number in the zone has been inspected and no problems were noted.

2 Use "NS" (Not Satisfactory) where problems are noted.

3 For boxes checked NS, provide, on Form DP-1, a description of deficiency/problem. Attach additional sheets if necessary.

Date ____________________ Inspected by: ____________________

Weather ____________________ Signature ____________________

FORM SMS-2
MONTHLY INSPECTION CHECKLIST
STORMWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I, Figure 2-3)

em No.	Item Title	Manhole Number										
		SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	SP11
1	Manhole Trashracks											
2	Silt Accumulation in Manhole											
3	Pipe Connections to Manhole											
4	Flow From 8" HDPE Inlets											
5	Debris/Silt Blockage in 24" Pipes											
6	Settlement Along 24" Pipe											
7	Settlement Around Manhole											
8	Baffles Inside Manhole											

Inspection Item	Check Box	If NS or NI, description and location
ıffled Outlet BO1		
ilt Accumulation		
ɔnnections to Pipes		
osion Around Structure		
palling, Cracking, etc.		
eep Holes Flowing		
prap		
uard Rails		
ıffled Outlet BO2		
t Accumulation		
onnections to Pipes		
osion Around Structure		
alling, Cracking, etc.		
eep Holes Flowing		
prap		
ıard Rails		

tes:

1 Use a check in the checkbox to indicate that the specific item number in the zone has been inspected and no problems were noted.

2 Use "NS" (Not Satisfactory) where problems are noted.

3 For boxes checked NS, provide, on Form DP-1, a description of deficiency/problem. Attach additional sheets if necessary.

Date ____________________ Inspected by: ____________________

Weather ____________________ Signature ____________________

FORM SMS-3
MONTHLY INSPECTION CHECKLIST
STORMWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I, Figure 2-3)

Item No.	Item Title	Zone Number													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Drainage Ditch, Road A														
	Overgrown Vegetation														
	Standing Water														
	Sediments and Debris														
	Erosion/Washouts														
	Sinkholes														
	Culvert Road A to Road B														
	Flap at 6" Pipe Outlet														
2	Drainage Ditch, Road B														
	Overgrown Vegetation														
	Standing Water														
	Sediments and Debris														
	Erosion/Washouts														
	Sinkholes														
	Culvert Road B to Road C														
3	Drainage Ditch, Road C														
	Overgrown Vegetation														
	Standing Water														
	Sediments and Debris														
	Erosion/Washouts														
	Sinkholes														

Notes:

1 Use a check in the checkbox to indicate that the specific item number in the zone has been inspected and no problems were noted.

2 Use "NS" (Not Satisfactory) where problems are noted.

3 For boxes checked NS, provide, on Form DP-1, a description of deficiency/problem. Attach additional sheets if necessary.

Date ____________________ Inspected by: ____________________

Weather ____________________ Signature ____________________

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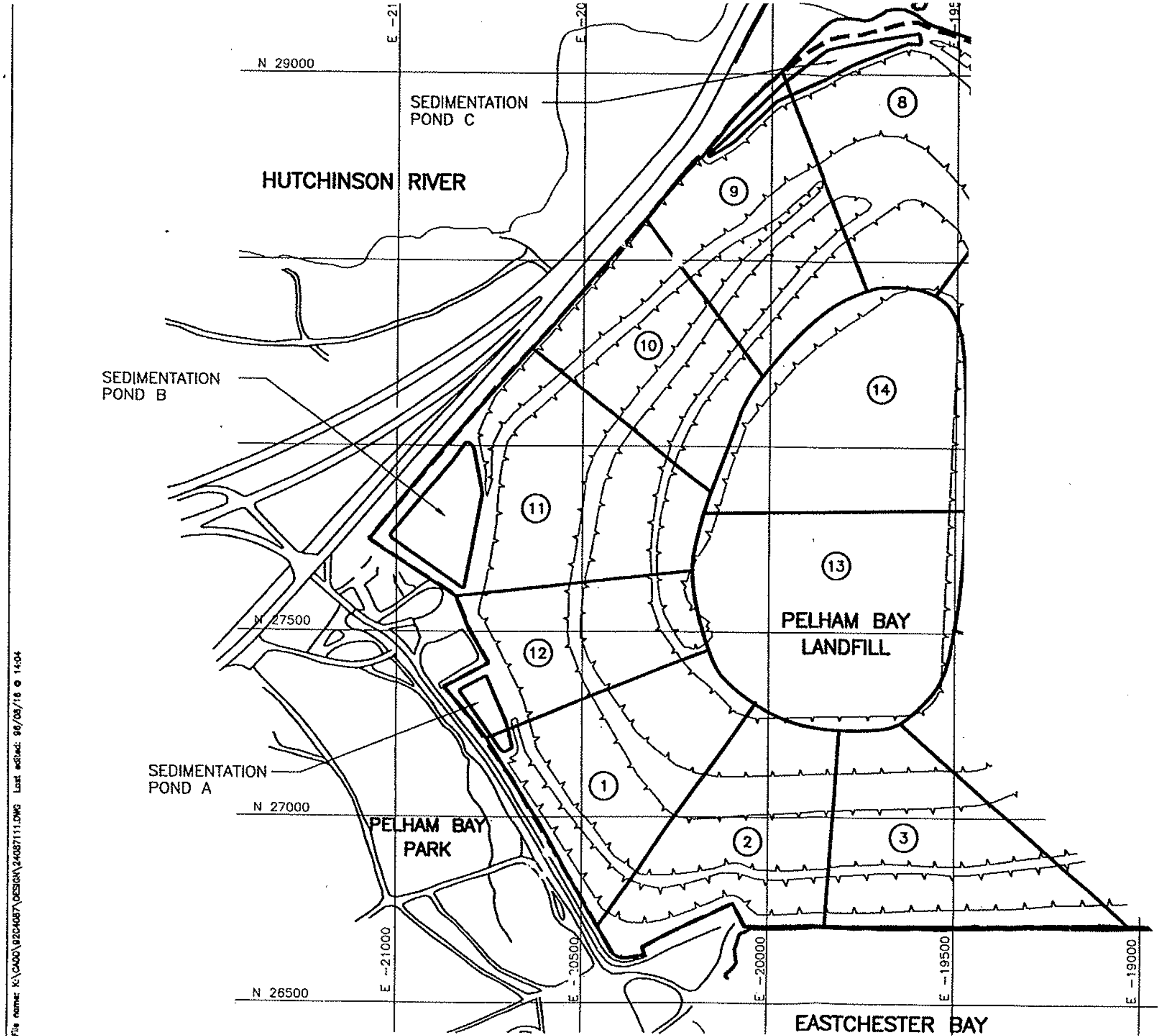

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INSTRUCTIONS FOR INSPECTION CHECKLIST, FORM FCS-1
FINAL COVER SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I - Section 2.2 and Volume III - Section 2.0)

This form is to be used by the inspector on a monthly basis and after storms equal to or exceeding the two year 24-hour precipitation event (3.5 inches in 24 hours). The surface of the landfill shall be divided into zones as shown in Figure 2-1, Volume III. Prior to the first inspection, readily visible markers shall be placed on the landfill surface to delineate the zones (Refer to Section 2, Volume III). The inspector shall perform the work in an orderly fashion completing all of the items in each zone prior to proceeding to the next zone. The inspector is required to walk up and down the sideslopes at least once in each zone to obtain close inspection of the slope conditions. It is anticipated that the inspector will spend a minimum of 20 minutes inspecting each zone for the items listed on Form FCS-1. Additional time may be required if problems/deficiencies are observed.

Observations shall be recorded at the time they are viewed. If no problems or deficiencies are observed in a given zone, the item shall be noted as satisfactory by inserting a ✓ in the appropriate box. If adverse conditions are observed or if others conditions exist which deviate from the normal and could be deleterious to the landfill cover in the opinion of the inspector, the appropriate checkbox should be marked as not satisfactory (NS) and the location and problem noted on the form

Inspection Item	Inspection and Maintenance Requirements/Procedures
1. Surface Cracks	Check carefully for surface cracking while walking up and down the slopes in each zone. Surface cracks may indicate serious problems such as slope movement (see Item 6, Slope Stability below) or less serious conditions such as desiccation cracking due to dry conditions. Investigate observed cracks for depth and length. Note orientation with respect to the slope and record accurately on O&M Drawings (See Volume 5, Section 5.0). Cracks that are greater than about 20 feet long, 9 inches deep and 2 inches wide that are parallel to the slope should be noted on the checklist and immediately reported to the NYCDEP. Repair cracks deeper than 12 inches that are on mild slopes (i.e., slopes of 10% or less), and which appear to be the result of localized settlement or dry conditions. ***DO NOT*** fill cracks that are associated with general slope movement as this may aggravate situation. Refer to Volume III, Section 2. Repair minor cracks by filling with like material, compacting and reseeding area in accordance with the specifications for Contract No. HP-876.
2. Vegetative	Check for areas of vegetative stress on landfill surface and height of

Inspection Item	Inspection and Maintenance Requirements/Procedures
Growth	vegetative stand by zone. Report areas of vegetative stress on checklist and determine possible causes. Grasses should be of consistent quality without shrubs or trees with stem diameter greater than about 2 inches diameter except on vegetation islands (refer to record drawings for Contract No. HP-876 for locations of vegetative islands). Mow vegetation to a height of 6 inches when general height of grasses exceeds 12 to 18 inches. Use tractor with mower attachment weighing less than 4000 lbs. Mow cross-slope rather than up or down slope whenever possible. Mower shall mulch grass and grass clippings shall be left in place. Take care during mowing operations not to damage any wells, well heads, valves, fencing, lighting, culverts, structures, signage, manholes or other permanent features of the cover system. The O&M Contractor shall repair at his own expense, any items which may become damaged during the mowing operations. Trim grasses along fence with suitable grass trimmers which will not damage fencing. Environmentally safe grass inhibitor may be used along fencelines with approval of the NYCDEP. Areas of vegetation stress shall be analyzed for the cause. Note any gas odors and check for insect infestation or other parasites which could be the cause. Take sample of topsoil in affected areas and test for organic content, phosphorous, nitrogen and potassium and pH. If grasses are stressed due to lack of fertilization, apply fertilizer as needed. If stressed due to lack of water, reseed affected area after dry period ends, if stand does not reestablish itself within 2 months. Refer to specifications for Contract No. HP-876 for topsoil, seed mix, planting criteria and planting seasons.
3. *Vector Penetration*	Record indications of burrowing animals in each zone. Check area for damage to geosynthetics by carefully hand excavating test pit near burrow holes. Note and repair any damage to geosynthetics in accordance with specifications for Contract No. HP-876. Replace original soil materials and hand compact. Reseed if necessary. If significant damage is observed, notify NYCDEP and contract with exterminator to remove burrowing animals subject to NYCDEP approval.
4. *Settlement* *Settlement (cont)*	Record, by zone, areas of localized differential settlement. These are areas which begin to pond water on the landfill surface. Mark locations on the O&M record drawings and repair according to the repair protocol in Volume III, Section 2.4.

Inspection Item	Inspection and Maintenance Requirements/Procedures
	Large depressions may require regrading of subsoils beneath the geomembrane and replacement of geosynthetics.
5. Erosion	Record erosion by zone as not satisfactory (NS) whenever rills or gullies exceed 4 inches deep. Inspect closely at top and base of sideslopes, around vegetation islands, around structures and at the outlets of all piping. Repair erosion immediately to match the surrounding grades. Use like materials for each layer of the cover eroded or damaged. For erosion approaching the depth of the top of the geocomposite drainage layer (approximately 30 inches), inspect geosynthetics for damage.
	Erosion may indicate that some portion of the stormwater management system is not functioning correctly. Examples of this could be sediment impeding water flow through culverts, debris clogging water inflow through the openings of grates or trashracks, or differential settlement along drainage ditches contributing to stormwater overtopping the drainage systems. When erosion is identified, investigate these or other possible causes. Repair with like materials and reseed or replace topsoil, crushed base course or rip rap in accordance with the specifications for Contract No. HP-876. Record areas of erosion on the O&M record drawings. (Refer to Volume I, Section 5.0)
6. Slope Stability	Check for indications of slope movement in each zone. Slope movement may be identified by large displacements or cracks in the soil mass. Early signs of slope movement can also appear as bulging of the soil materials near the base of the potential failure. Mark the checkbox NS when any of the conditions described are observed.
	For cracks oriented parallel to the slope with a minimum length of 20 feet, depth of 9 inches and width of 2 inches, install 1 foot long steel bars into soil on either side of cracks for future reference measurements. Check and record distance between steel bars with a tape measure initially and on a frequent basis for the next 2 weeks (i.e., possibly daily, depending on the extent of the cracking) or as instructed by NYCDEP.
Slope Stability (cont)	Any observable slope movement is serious in nature. The area in question should be noted on the checklist as NS and recorded on the O&M record drawings. Notify the NYCDEP immediately. Refer to the Contingency Plan in Volume I, Section 6.0 of the O&M Manual for further instructions.
7. Seepage	Check the sideslopes in each zone carefully for seepage. Mark the

Inspection Item	Inspection and Maintenance Requirements/Procedures
	checkbox (NS) for each zone where seepage is observed. Note the location on the slope. Note if there is odor or other indications that the seepage could be leachate. Provide this information in the description of the deficiency/problem. Clean seepage water may indicate that there is a problem with the cover drainage system. The drainage system may be clogged in an area or is not functioning correctly for some other reason. Seepage near the alignment of the 24-inch diameter corrugated HDPE stormwater piping may indicate a broken collection pipe or subdrain lateral (6-inch diameter HDPE corrugated slotted pipe). Notify NYCDEP of the condition. Check baffled outlet weepholes for clogging and clean if necessary. Seepage of leachate may indicate that the geomembrane liner has ruptured and that liquids may have accumulated beneath the landfill geomembrane. Hand excavate materials to the level of the geosynthetics by following the seepage path and check integrity of the membrane liner at the point of seepage origin. Take care not to damage geosynthetics during uncovering operations. Any accumulation of leachate behind the geomembrane could indicate a serious condition. Notify the NYCDEP and refer to the Contingency Plan in Volume I, Section 6.0 for repair of this condition.
8. *Vandalism*	Check for indications of vandalism, illegal dumping, or other damage to the cover system from sources not related to the elements (i.e., high winds, heavy rainall, etc.). Report any such damage or dumping to the local police authorities immediately. Concurrently, inform on-site security personnel of each occurrence. Repair damage from vandals to original condition. Refer to specifications for Contract No. HP-876 for materials and methods of construction.

INSTRUCTIONS FOR INSPECTION CHECKLIST, FORM SMS-1
STORMWATER DRAINAGE DITCHES
STORMWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I - Section 2.3 and Volume III - Section 3.0)

This form is to be used by the inspector on a monthly basis and after storms events equal to or exceeding the 2 year 24-hour precipitation event (3.5 inches in 24 hours). The inspector shall perform the work in an orderly fashion completing all of the items on the checklist in each zone for a particular drainage ditch prior to proceeding to the next zone.

It is anticipated that the inspector will spend a minimum of 1 hour inspecting all of the drainage ditches. Additional time may be required if problems/deficiencies are observed. Observations shall be recorded at the time they are viewed. If no problems or deficiencies are observed, the item shall be noted as satisfactory by inserting a ✓ in the appropriate box. If adverse conditions are observed or if others conditions exist which deviate from the normal and could be deleterious to the stormwater management system, in the opinion of the inspector, the appropriate checkbox should be marked as not satisfactory (NS) and the location and problem noted on the form.

The Stormwater Drainage Ditches are located along Roads A, B and C of the landfill area (refer to Figures 2-2 and 2-3, Volume I). The ditches should be visually examined along their entire length. It is anticipated that the inspector will observe the condition of the ditches as he/she drives a vehicle slowly along each roadway. The inspector shall exit the vehicle to closely observe any problems or deficiencies detected.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Drainage Ditches	*1. Overgrown Vegetation*	Inspect ditches for overgrown vegetation. Mow or trim vegetation greater than 12 inches as close to the landfill surface as possible. Remove grass clippings from drainage ditch. Grub vegetation greater than 2 inches in diameter.
	2. Standing Water	Standing water may indicate settlement has occurred which impedes flow in the ditch or that there is a blockage in the drainage ditch system. Remove blockage if present. Repair ditches with standing water greater than 6 inches deep or 50 feet in length. Regrade ditch to drain using like materials and in accordance with the record drawings and specifications for Contract No. HP-876. Add Additional crushed rock base or fill, as appropriate.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	3. *Sediments and Debris*	Blockages may cause the ditches to overtop in the event of a storm resulting in slope erosion and potential cover failures. Inspect ditches for sediments and debris which ponds water or impedes potential flow in drainage ditches. Check particularly in front of baffled outlets. Remove any blockages to the level of crushed stone base, riprap or vegetation and grade to drain.
	4. *Erosion/ Washout*	Inspect ditches for erosion or washouts. If located, inspect for cause of erosion such as overtopped manhole or baffled outlet, settlement depressions, roadway not sloped toward landfill, etc. Check local rainfall data for recent rainfall events. Record date of rainfall and significant amounts in inches on form. If riprap is washed out, inspect geotextile and underlying materials for damage and replace if necessary. Use like materials and repair erosion or washout to the relative grades described in the record drawings and specifications for Contract No. HP-876.
	5. *Sink Holes*	Sink holes may indicate damage in the underlying infiltration drainage trench and 6" diameter HDPE corrugated slotted pipe. Investigate sink holes for their origin by excavating to the subdrain pipe system. Take extreme care not to damage geosynthetics during the repair operation. Replace damaged items backfill and grade surface in accordance with the record drawings and specifications for Contract No. HP-876.
	6. *Culverts*	Inspect culverts for rusting, crushing or blockage. The culverts are located near the intersections of Roads A and B and the intersection of Roads B and C in Zone 8 and south of the inlet to Sedimentation Pond C. See Figure 2-3, Volume I. Remove any blockages and repair as necessary.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Flapgate (6") **(see Volume IIA, Section 8)**	*Debris/Silt Blockage*	Inspect flapgate at the outfall of the infiltration drainage trench piping to Eastchester Bay located near the intersection of Roads A and B. Refer to Figure 2-3 Volume 1. Manually lift the gate and check hinges and seating in the closed position. Wipe contact area with cloth. Lubricate hinges with good quality, high grade grease and repair or replace if damaged.

INSTRUCTIONS FOR INSPECTION CHECKLIST FORM SMS-2
MANHOLES AND BAFFLED OUTLETS
STORMWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I - Section 2.3 and Volume III - Section 3.0)

This form is to be used by the inspector on a monthly basis and after storm events equal to or exceeding the 2 year 24-hour precipitation event (3.5 inches in 24 hours). The inspector shall perform the work in an orderly fashion completing all of the items on the checklist. Portions of this form for the CP-Series Manholes and Baffled Outlets B03 and B04 are to be completed in conjunction with the Sedimentation Pond Inspection (Form SMS-3). The inspector is required to open each manhole and use a flashlight, and appropriate hand tools to complete his inspection. DO NOT enter manholes during the inspection. Note any problems on Form DP-1 and perform maintenance separately following appropriate Health and Safety guidelines for Confined Space Entry, when applicable.

It is anticipated that the inspector will spend a minimum of 15 minutes inspecting each manhole and about 5 minutes for each baffled outlet. Additional time may be required if problems/deficiencies are observed. Observations shall be recorded at the time they are viewed. If no problems or deficiencies are observed, the item shall be noted as satisfactory by inserting a ✓ in the appropriate box. If adverse conditions are observed or if others conditions exist which deviate from the normal and could be deleterious to the stormwater management system, in the opinion of the inspector, the appropriate checkbox should be marked as not satisfactory (NS) and the location and problem noted on the form.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Stormwater Collection Manholes (SP Series)	1. *Trashracks*	Unfasten trashrack and remove any debris or blockage. Inspect rack and bolts for rusting. Repaint trash racks if excessive rust is present. Spray taps and bolts with rust inhibitors and replace trash rack when inspection is completed.
	2. *Silt Accumulation*	Inspect base of manhole for silt accumulation or other debris. Remove silt or other debris using suitable Health and Safety precautions. Silt can be removed by hand or by washing through pipe to the baffled outlets
	3. *Pipe Connections to Manhole*	Using a flashlight, inspect pipe connections for 6-inch diameter corrugated infiltration pipe and 24-inch diameter corrugated HDPE pipe. Record any cracking or leakage at connection point. Notify NYCDEP immediately of any breakage or leakage in the 24-inch diameter pipe. Repair connections in accordance with the specifications for Contract No. HP-876. If the pipe connection appears to be damaged, examine

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		weepholes at Baffled Outlet adjacent to 24 inch pipe. This is to check if water has accumulated in pipe trench behind structures.
	4. *Flow from 8" HDPE Inlets*	Check flow of water from 8" HDPE inlets. Flow is expected during all but very dry seasons or during long periods of freezing weather. Check inlet for ice build up and remove if present. Non-flow conditions during typical seasonal conditions may indicate blockage in the subdrainage system. If the condition persists over two consecutive inspection periods, inspect pipes using video camera apparatus. Clean any blockages with high pressure pipe cleaning equipment.
	5. *Debris/Silt Blockage in 24" Pipes*	Inspect 24 inch pipe for blockage by placing a 12 inch diameter rubber ball in pipe and check that it travels through pipe and exits at manhole or baffled outlet below. If ball does not exit, visibly inspect pipe using video camera device. Use appropriate Health and Safety Precautions. If blockage is present, remove using high pressure pipe cleaning equipment. If pipe is compressed or contorted due to settlement or surcharge, notify NYCDEP immediately.
	6. *Settlement along 24" Pipe*	Inspect alignment between SP manholes downslope for settlement, depressions or blow holes. Conditions of this type could indicate a potential pipe failure. Check Baffled Outlet for gravel deposits in silt trap. Gravel could indicate pipe breakage. Notify NYCDEP immediately and repair in accordance with the record drawings and specifications for Contract No. HP-876.
	7. *Settlement Around Manhole*	Inspect for settlement around manhole. Regrade drainage ditch to match top of manhole so that water does not pond around manhole. If persistent settlement continues, inspect 24 inch pipe connection closely following similar instructions for Item 6 above.
	8. *Baffles Inside Manhole*	Inspect baffles for connection to HDPE manhole. Gently push on baffles with a shovel handle or similar item from above and note any deflection near the HDPE weld connections. Note any problems with the baffle and repair.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Pond Collection Manholes (CP Series)	*1. Grates*	Inspect manhole grates and note any debris or blockage and remove if present. Remove grate from manhole and replace after inspection of manhole is completed. Inspect manhole grate for damage and repair if necessary.
	2. Silt Accumulation	Inspect base of manhole for silt accumulation and other debris. Note if any blockages are present. DO NOT enter manhole alone during inspection. Remove silt or other debris using appropriate Health and Safety precautions. A vacuum truck may be used to clean manholes.
	3. Flow through Manhole	Check manholes for water flow-through. Stagnant water should only be present if all ponds have similar water levels. If ponds do not have similar water levels, a blockage of the connection pipe may be indicated. Note the conditions on the form and contact NYCDEP. Refer to Volume III, Sections 3.3.3 and 3.3.6 for instruction on inspection and cleaning the 30-inch connection piping.
	4. Settlement above 30" Pipe	Inspect the alignment between the CP manholes for any settlement. Noticeable settlement could indicate a breakage in the 30-inch connection piping. Report the location of the observed settlement on the form and schedule an inspection of the Pond Collection Manholes during the next significant rainstorm to establish flow-through at the manhole. If settlement continues over the pipe, or a blow hole forms, uncover the affected section of pipe and repair it to its original condition in accordance with the record drawings and specifications for Contract No. HP-876.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Baffled Outlets (BO Series)	*1. Silt Accumulation*	Inspect the Baffled Outlets for silt accumulation in the silt trap. Remove silt from silt trap when the thickness reaches two inches. Gravel present in the silt trap could indicate damage to the 24-inch corrugated HDPE pipe. See description above for Stormwater Collection Manholes - pipe connections to manhole, if gravel is observed.
	2. Connections to 24" Pipe	Using a flashlight, if necessary, inspect connection of Baffled Outlet to 24 inch diameter corrugated HDPE pipe. Record any indications of pipe slippage at the connection, cracking of the concrete or leakage at the connection. Notify NYCDEP immediately of any problems or deficiencies. Check weepholes in the Baffled Outlet below this connection for indications of drainage. This is to check if water has accumulated in the 24 inch pipe trench behind the structure. Repair any damage to the connection. Inspect pipe for visible damage or blockages. If blockage is visible, refer to Item No. 5 for Stormwater Collection Manholes on this form for instructions. If breakage or crushing of pipe is noted, contact NYCDEP immediately.
	3. Erosion Around Structures	Inspect the materials surrounding the Baffled Outlets for erosion rills or gullies. If erosion has occurred in vegetation around structure, replace with like material and reseed. Attempt to determine the cause of the erosion and follow instructions for erosion of the Final Cover System (see Form FCS, Item 5). If erosion has occurred in the rip rap, repair with rip rap one class larger than that originally placed. Refer to Volume III, Section 3.3.3. If erosion has cut through to geomembrane, check integrity of geosynthetics and replace if damaged. Use like materials and repair in accordance with record drawings and specifications for Contract No. HP-876.
	4. Spalling, Cracking	Inspect structures for spalling and cracking. Repair using waterproof sealant cement.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	5. Weepholes	Inspect weepholes in structure for free drainage. The weepholes are located in the structure back wall above and below the 24 inch HDPE pipe inlet. These weepholes are 1/2 inch in diameter spaced at 12 inch centers. Clean with compressed air or water. DO NOT push material back into the weephole using a rod as this will tend to plug the weephole at the back of the wall. There are two 4-inch diameter blockouts on the front lip of the silt trap which allow water to drain from the floor of the structure. Inspect these blockouts for clogging and clean. Check that water can drain freely from the front of the Baffled Outlet to the drainage ditch. Refer to Form SMS-1 for further instructions if ditch does not drain freely.
	6. Guardrails	Inspect guardrails for damage or rusting. If significantly damaged or rusted, repair to the original condition in accordance with the record drawings and specifications for Contract No. HP-876.

INSTRUCTIONS FOR INSPECTION CHECKLIST FORM SMS-3
SEDIMENTATION PONDS
STORMWATER MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I - Section 2.3 and Volume III - Section 3.0)

This form is to be used by the inspector on a monthly basis and after storm events equal to or exceeding the 2 year 24-hour precipitation event (3.5 inches in 24 hours). The inspector shall perform the work in an orderly fashion completing all of the items on the checklist. The Pond connection manholes (CP-1 through CP-5) and baffled outlets (B03 and B04) should be examined during the sedimentation pond inspection. Rference Form SMS-2. The inspector is required to walk from Pond A to Pond C and closely inspect each of the pond, inlet/outlet structure and manholes.

It is anticipated that the inspector will spend a minimum of 1 hour inspecting the ponds and the associated items listed on the forms. Additional time may be required if problems/deficiencies are observed. Observations shall be recorded at the time they are viewed. If no problems or deficiencies are observed, the item shall be noted as satisfactory by inserting a ✓ in the appropriate box. If adverse conditions are observed or if other conditions exist which deviate from the normal and could be deleterious to the stormwater management system in the opinion of the inspector, the appropriate checkbox should be marked as not satisfactory (NS) and the location and problem noted on the form.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Sedimentation Pond	1. *Minimum 2 ft Freeboard*	Initially place a marker at elevation 12 in a convenient location on the sideslope at each pond (See Volume III, Section 3.3). The marker should **NOT** be embedded more than 6 inches in the sideslope. Water levels exceeding this elevation may indicate that there is blockage in the Sedimentation Pond connection pipe. If this is the case, check for flow through the CP manholes (see Form SMS-2). If blockage is apparent, drain the ponds using pumps and remove the blockage from the pipes, manholes or inlet/outlet structures. Refer to Volume III, Sections 3.3.3 and 3.3.7 for instructions on cleaning blockages in the system. Normally the elevation in the ponds should be at or below the invert elevation of the outlet pipe for Ponds A and B and below the bottom weep holes in the outlet structure for Pond C. Water is likely to be present above this level after a recent snowmelt or heavy rainfall.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	2. Silt Accumulation	Check the bottom of the Ponds for silt accumulation when the water level is at or below the outlet invert elevations. When silt is generally 4 to 6 inches above the invert elevation over at least one third the pond area have silt removed. Refer to O&M Manual Volume III Section 3.3.6 for procedures to be used for silt removal.
	3. Slope Erosion/ Stability	Inspect the Pond sideslopes for erosion and stability. The inlets to the Ponds are protected by rip rap. Erosion in these areas should be repaired using the next larger class rip rap (See Volume III, Section 3.3.3 to prevent continued erosion. Repair in accordance with the methods provided in the specifications for Contract No. HP-876. Erosion on the sideslopes indicates overtopping of the stormwater drainage ditch system. Refer to Form SMS-1. Cracks longer than about 20 feet and greater than 2 inches wide parallel to the Pond slopes may indicate a serious stability condition. Notify the NYCDEP immediately. Repair any minor cracks (less than that described above) using like materials placed in accordance with the record drawings and specifications for Contract No. HP-876.
	4. Debris	Remove and properly dispose of debris off-site.
Inlet/Outlet Structures	*1. Debris/Silt Blockage*	Inspect inlet and outlet structures in each Pond for debris and silt accumulation which might inhibit free water flow. Remove and properly dispose of material off-site.
	2. Connection to Pipe	Inspect connections of pipe to structure when water level is at or below invert. Use flashlight to examine the outside of the pipe at the structure interface and inside for the integrity of pipe to visual limits. Check for pipe deflection or gaps between the structure and pipe. Notify the NYCDEP immediately of this condition and repair.
	3. Erosion Around Structure	Inspect the materials surrounding the structures for erosion rills or gullies. Check areas downstream of outlet structures in particular. Observe if erosion has moved or cut through rip rap.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	Erosion Around Structure (cont.)	If erosion has occurred replace with rip rap one class larger than that originally placed (Refer to Volume III, Section 3.3.3). If erosion has cut through to geomembrane check integrity of geosynthetic materials and replace if damaged. Notify NYCDEP. Use like materials and repair in accordance with record drawings and specifications for Contract No. HP-876.
	4. *Spalling, Cracking*	Inspect structures for spalling and cracking. Repair using waterproof sealant cement.
	5. *Weepholes*	Inspect weepholes in the Pond C pipe outlet for blockage. Remove any blockage by hand.
	6. *Trash Rack*	Inspect all trash racks for debris/blockages. Mark the checkbox "NS" when observed and remove debris/blockage by hand.
	7. *RC Pipe*	Inspect entire length of RC pipe from the Pond C pipe outlet using a flashlight or other suitable like source. Look for cracks, spalling, other damage to the pipe or blockages. Remove any blockages using cable tools. Do not enter pipe unless suitable Health and Safety precautions are taken. Report any damage of the pipe to NYCDEP.
	8. *Flapgate*	Exercise flapgate by lifting gently away from the RC pipe and releasing. Lubricate flapgate hinges in accordance with manufacturer's recommendations. Check for rusting. If water is flowing through RC pipe, check that flapgate is permitting flow through with little resistance. If tidewaters are above the water level in Pond C, check that flapgate remains sealed against pipe outlet.
		Repair or replace flapgate when damaged. Flapgate shop drawing and supplier information are provided in Volume II, Section 8.

INSTRUCTIONS FOR THE INSPECTION CHECKLIST, FORM GWL-1
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
BRONX, NEW YORK
(Reference Volume I, Section 2.4 and Volume III, Section 4.0)

The Form for the Groundwater/Leachate Management System should be used in conjunction with Volumes I, II and III of the O&M Manuals and related documents. The O&M Contractor shall inspect the leachate collection and disposal system twice per week. The inspections should be staggered so that they are at least three (3) days apart (e.g. Monday and Thursday, Tuesday and Friday, etc.).

1. DOWNGRADIENT COLLECTOR SUMPS

There are three collector sumps (D-l, D-8 and D-l 0) at the landfill side of the slurry wall (cf Volume I). Each of these three sumps contain two submersible 3 HP pumps and separate local control panel. The local control panel contains circuit breakers, running lights, three-way auto/manual/off switch and indicator running lights for individual pumps. There are five level actuated float switches in each sump for the control of leachate level.

A. Check circuit breakers for each sump pump for ON/OFF position.

B. Check that the pumps are operational. This can be determined several ways:

1. Open the control panel and check for a pump running indicator light.

2. Check the pressure gauge on the pump discharge pipe for an increase in pressure or needle movement.

3. Switch each pump from automatic to manual operation separately, and observe the liquid level height for draw down in the well. Test for about 20 seconds. Next turn switch B to P2 and repeat the observation. When finished place the pumps back in the automatic mode.

4. Under normal operation the pumps should cycle on and off with changing liquid level. This cycle is determined, in part, by the liquid level probes. At low liquid level, the pumps should be off and visible in the lift station well. The flow from the influent piping should also be visible. At high level either one or two pumps will be operating until the low level is reached, when they will shut off for the next cycle.

C. Check selector switch position of each sump pump

D. Check liquid level in sump and note if the level is high, low, or any other level.

E. Check for leak in the manifold discharge piping.

F. If a pump is out of service for any reason (e.g. repair, fault, etc.), it should be noted on the check list and carried as out of service every week until it is returned to service.

2. DOWNGRADIENT AND CURTAIN DRAINS

A. The downgradient drain intercepts water migrating from the landfill to either Lift Station No.1 or Lift Station No.2. Flow intercepted north of manhole D-6 drains to Collection Sump D-1 and the leachate is pumped from Collector Sump D-1 to Lift Station No.1 or after completion of Contract HP-877 to the NYC Sewerage System. Flow intercepted south of manhole D6 drains to Collector Sump D-8, pumped to Collector Sump D-10 and is pumped to Lift Station No.2. The O&M Contractor shall check the alignment of the curtain drainS for settlement.

3. LIFT STATION NO. 1

At certain times of the year flow from the Curtain Drain will vary. During sustained dry periods, flow of leachate into the station may be less than half a pipe or low. During sustained wet periods, flow of leachate into the station may be greater than half a pipe or high. Leachate from slurry wall collector sump D-l is also pumped to the Lift Station. 1.

A. Check flow from Curtain Drain (French drain)

B. With the exception of the Decontamination Trailer, all Lift Stations and Sumps have two (2) pumps and a local control panel. The local control panel contains the automatic/manual controls for the pumps, and indicator lights showing the status of the individual pumps. The indicator lights show power supply, pump running (at that moment), pump off, pump fault, high temperature alarm, seal failure alarm, or high leachate level in the well. If a pump fault, temperature or seal failure alarm indicator is lit, it should be noted on the check list and the appropriate personnel should be notified for action.

Check that the pumps are operational. Similar procedures to sump pumps D-1, D-8, and D-10.

C. Check alarm/indicator lights

D. Check liquid level in sump and note if the level is high, low, or any other level.

E. Check for leak in the manifold discharge piping.

F. If a pump is out of service for any reason (e.g. repair, fault, etc.), it should be noted on the check list and carried as out of service every week until it is returned to service.

4. LIFT STATION NO. 2

A. Lift Station No. 2 receives leachate flow from the three interceptor Wells, the abandoned 72 inch storm water pipe and collector sump D-10. This leachate is then pumped from Lift Station No. 2 through the force main (mainly underground) and into the storage tanks. The local control panel contains the same instruments and functions as described for lift station No. 1 control panel.

B. Check that the pumps are operational.

C. Check alarms or indicator lights

D. Check liquid level in sump and note if the level is high, low, or any other level.

E. Check for leak in the manifold discharge piping.

F. To one side of Lift Station No. 2 is a rectangular pit, over the abandoned storm water outfall pipe, containing a set of stop planks. These stop planks keep leachate from flowing out of the abandoned outfall on one side, and keep sea water from entering Lift Station No. 2 on the other side. Inspect the surface water in the bay and riprap for signs of leachate.

G. If a pump is out of service for any reason (e.g. repair, fault, etc.), it should be noted on the check list and carried as out of service every week until it is returned to service.

5. DECONTAMINATION TRAILER

A. The trailer should be checked for cleanliness. No debris should be lying around, the floors should be clean, garbage pails should be emptied, the showers should be clean, lockers should be free of trash, etc. There is one (1) pump in the trailer sump. Since it works on a float device, it will not be running at all times. This pump does not pump leachate. This pump moves clean up water from the trailer and boot wash to the Decontamination Area Sump. Pump operation can be determined by opening the control panel and checking for a lit pump running indicator light.

B. Check if trailer is clean.

6. DECONTAMINATION PAD/ TRUCK FILL AREA AND SUMP

The decontamination area sump receives flow from the lined and bermed decontamination area. Flow into the sump may originate from captured rainwater, wash water from vehicle decontamination, spillage from truck loading, or inadvertent leakage. During sustained dry periods, leachate or water flow through the weep holes should be low. The weepholes are set at several levels along the sump walls. During normal operations and dry periods the lowest level is visible.

The local control panel contains the same instruments and functions as described for Lift Station No. 1 control panel.

A. Check flow through sump weepholes.

B. Check that the pumps are operational.

C. Check alarms or indicator lights

D. Check Decon area for leachate flow out of gravel perimeter.

The gravel perimeter of the Decontamination Area should be checked for any signs of leachate flow on a weekly basis. If a leachate flow is present this could indicate a possible berm or liner failure.

E. Check for leak in the manifold discharge piping.

F. If a pump is out of service for any reason (e.g., repair, fault, etc.), it should be noted on the check list and carried as out of service every week until it is returned to service.

7. LEACHATE STORAGE CONTAINMENT AREA AND SUMP

The leachate storage area sump receives flow from the lined and bermed storage area. Flow into the sump may originate from captured rainwater, spillage from truck loading, or inadvertent leakage. During sustained dry periods, leachate or water flow through the sump weep holes should be low. During sustained wet periods, leachate or water flow through the weep holes should be high. The weep holes are set at several levels along the sump walls. During normal operations and dry periods the lowest level is visible.

The local control panel contains the same instruments and functions as described for Lift Station No. 1 control panel.

A. Check flow through sump weepholes

B. Check that the pumps are operational.

C. Check alarms or indicator lights

D. Check liquid level in sump and note if the level is high, low, or any other level.

E. Check for leak in the storage tanks and manifold discharge piping

The storage tanks and manifold piping should be checked for leaks on a weekly basis. Any leaks should be commented upon, and the operator should try to isolate the leaking tank and or piping until repairs can be carried out. The gravel perimeter of the Storage area should be checked for any signs of leachate flow on a daily basis. If a leachate flow is present this could indicate a possible berm or liner failure.

F. If a pump is out of service for any reason (e.g. repair, fault, etc.), it should be noted on the check list and carried as out of service every week until it is returned to service.

8. CARBON ADSORPTION SYSTEM

A. The air compressor should be inspected on a weekly basis to determine that the air compressor is operating.

B. The carbon adsorption system should be inspected on a weekly basis to determine that the activated carbon canisters are operating.

9. CONTRACT HP-877 FORCE MAIN DISCHARGE TO POTW

A. The pipework in valve box beside Lift Station No. 1 should be checked for leakage.

B. The O&M Contractor shall walk along the alignment of the forcemain to the Burr Avenue manhole and look for settlement.

10. MOTOR CONTROL CENTER

A. The Motor Control Center consists of main breakers for the supply of electrical power to the various stations throughout the collection system. These breakers, with certain exceptions, should be in the ON position for the system to operate properly. For example, the breaker for Lift Station No. 1 should be in the On position. However, the breaker would not be "ON" for the Pipe Heat Tracing during the summer. The Operator should note if any breakers are TRIPPED or OFF. Before touching any breaker, ascertain the reason for the TRIPPED or OFF breaker. If unsure of the problem <u>DO NOT TOUCH THE EQUIPMENT.</u> A mistake could kill or injure. Contact the appropriate contract operator or personnel from the NYCDEP.

11. SECURITY TRAILER (See Form GWL-1)

A. Everyone working or visiting the site, for whatever reason, should sign the Log Book. The Operator should check in with the guards and review the Log Book to see who may be on site.

B. The trailer should be checked for cleanliness. No debris should be lying around, the floors should be clean, garbage pails should be emptied, the lavatory should be clean, etc.

C. The Collection System Alarm panel should be checked twice weekly. It is analogous to a status board. The storage tank levels should be checked off on the survey sheet. Any alarm lights that are lit should also be marked down on the sheet, investigated, and appropriate action taken.

12. GROUNDWATER MANHOLES AND SUMPS (See Form GWL-2)

A. The groundwater manholes and sumps are located along upgradient and downgradient of the cutoff wall connecting the piping system. The O&M Contractor shall inspect all groundwater manholes and sumps month by removing covers and verifying the condition of each manhole for the following items

- Manhole Cover
- Settlement
- Pipe Connection
- Settlement along connector drain
- Flow into manholes

B. The O&M Contractor shall complete Form GWL-2 and note any deficiencies in the manhole and piping alignment.

13. GROUNDWATER MONITORING WELLS (See Form GWL-3)

A. The groundwater monitoring system consists of fifteen (15) sampling wells located within the Pelham Bay Landfill property, six (6) piezometer wells upgradient and downgradient of the cutoff wall and four (4) sampling wells in Pelham Bay Park (Figure 2-12 Vol. I.). The six piezometers are three sets of two each located just upgradient and downgradient of the cutoff wall. These piezometers stations are used to measure and assure that groundwater level elevation in Pelham Bay Park is higher by 1 foot than the groundwater level in the Pelham Bay Landfill. The O&M Contractor shall inspect all groundwater monitoring wells every three months, two weeks before actual level monitoring and environmental sampling.

B. The O&M Contractor shall inspect each monitoring well for vandalism, settlement, and accessibility and shall complete the inspection form GWL-3.

Notes:

- If any pump is not working properly or is giving an alarm or indicator reading at the local control panel, that pump shall be shut off and Lin Kan (NYCDEP) shall be notified immediately at (718) 595-3635.

- If any leaks are detected in the collection facility system shall be shut off at the motor control center. The "system" includes downgrdient sump pumps, Lift Station No. 1, Lift Station No. 2, the Decontamination Area Sump, and the Storage Area Sump. Following this shut down, Lin Kan (NYCDEP) shall be notified immediately at (718) 595-3635. **If Lin Kan is not available, please call the NYCDEP communication center at (718) 595-6700 (24 hour service).**

INSTRUCTIONS FOR INSPECTION CHECKLIST FORM
LFG-1, LFG-2, AND LFG-3
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL, BRONX, NY
(REFERENCE VOLUME III, SECTION 5)

The following includes a description and instructions for the inspection of the flare stations equipment and operation. These instructions are provided to assist the technician in completing FORM LFG-1 BI-WEEKLY INSPECTION CHECKLIST for the Landfill Gas Management System. In addition, these instructions are to help the technician interpret the readings, switches, and lights at the flare station, It is assumed the technician is familiar with the purpose and function of the flare station equipment. The Operator's attention is directed to Section 5 of this Volume, and to the O&M Manuals provided by John Zin, and Lamson Corporaiton. The O&M Operator shall familiarize himself with contents of these references.

The format of the following description and addresses the blower, flare, control panels, gas, piping, well heads, inspection issues and monitoring plan.

The blower control and flare panel are located behind the blowers. See figures, tables and photographs included in Section 5 of this Manual.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
1. **Blower**		Initially, the technician should check to see which blower, if either, is running. Circle running blower in checklist.
	A. *Noise or Vibration*	The technician should inspect for rattling or any unusual noise or vibration. Possible causes of vibration include bad bearings, debris in the blower, damaged blower impeller, improper motor coupling alignment, failed motor coupling, loose coupling guard or over torqued blower base
	B. *Measurable or Odiferous Gas Leaks*	The technician should be observant for unusual odors at the flare station. LFG leakage may occur at the blower shaft. If odors are detected monitoring can be performed using a combustible gas indicator. Acceptable readings should be less than 1% CH_4 at three inches from the shaft. The blowers are designed to pull in a small amount of air past the shaft seal when they are in operation. This is because the shaft is on the vacuum side of the blower. It is possible for the non-operating blower to expel LFG past the shaft seal if it is under pressure from the operating blower. Opening the suction valve of the non-operating blower should solve this problem by placing the non-operating blower under vacuum. Other potential leak areas include the blower flange connection or the blower housing sections,

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		although these are not likely to occur
	C. Upstream Vacuum	The technician should measure and record the upstream blower vacuum to confirm blower performance. Vacuum changes of more than 2" w.c. between consecutive readings should be checked to determine the cause. Likely causes include changes in gas flow or increase pressure drop in the flare.
	D. Downstream Pressure	The technician should measure and record the blower downstream pressure. The downstream pressure should be reasonable stable between readings.
	E. Inlet Temperature	The technician should measure and record the blower inlet temperature. Inlet temperatures normally tend to follow ambient conditions. Increased gas temperatures caused by fireballs in the landfill cannot normally be seen at the blower inlet because of cooling heat that occurs in the pipe. A high gas temperature may cause damage to plastic piping or components.
	F. Discharge temperature	Under normal operating conditions, the gas increases in temperature by approximately 20-30°F. Conditions that cause high discharge temperature are low gas flow, blower surging, or friction within the blower parts (parts rubbing).
2. Blower Control Panel		The technician should check if the panel is energized and that panel lights and switches are working. The technician should replace those which aren't.
	A. Disconnect Blower 1 and 2 (N1 & N2) Switch	Indicate position of switches on checklist. Note if the switch in position was changed and why (including who you spoke with, how you verified condition, etc.) on the checklist and in the Site Operations Log. The function of the disconnect switches is to remove power from the blower for servicing. Normally, both disconnect switches are closed (Off) allowing the blowers to be energized by using the "Hand-Off-Auto" selector switches N4 or N9. If a disconnect switch is intentionally opened, it should be tagged and/or locked out. (See Lock Out & Tagging Procedure.) If a switch is open and not tagged or locked out, it is presumed that it is acceptable to close the switch (it is possible that the switch may have been automatically tripped.) *Also, if a blower is not working, this switch should be one of the first places you check.* The switch used for each blower is as follows:

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		<table><tr><td></td><td>Blower 1</td><td>Blower 2</td></tr><tr><td>Disconnect Switch</td><td>N1</td><td>N2</td></tr><tr><td>"Hand-Off-Auto" Switch</td><td>N4</td><td>N9</td></tr></table> A second disconnect switch is located adjacent to each blower. These are also used for servicing the blowers. Also check these switches to verify continuity of power to the motors.
	B. Flow Meter	Air-X-Dust Flow Meter is Item 25 on Figure 5-2. This indicates the approximate LFG flow in CFM for the blower in operation based on a calibrated amp meter. That is increased blower amp indicates an increase in gas flow. The technician should record the minimum and maximum flows observed over a 1 minute time period. If there are any irregular fluctuations or spikes in the flow, notify the NYCDEP. This may indicate pipe blockage or blower surge. Blower surge occurs at flows less than 700 cfm.
	C. Hour Meter	This meter monitors the total number of hours the blower has been in service, and can serve as an indictor for routine maintenance. Because the blowers are alternated monthly, the meter hours should be relatively close to being the same. A spot has been included in the chart to indicate when a blower is overhauled so that actual hours between major service can be tracked.
	D. Blower 1 or Blower 2 Running Light (N3 or N8)	The purpose of these lights is to indicate which of the blowers is running. Because of the close proximity of the panel to the blowers, these lights are redundant. The lights do act as a confirmation that the blower is running, and that the panel is operational. If the light is on and the blower is not running, this means that the Blower Circuit Breaker (N1 or N2) has tripped, the motor overloads have tripped, or the local disconnect switches are off. If the light is off and the blower is running, this means the bulb has failed.
	E. The Blower Hand-Off-Auto Switch (N5 or N10)	These switches control operation of the blowers. In the "Hand" position, the blower is energized. In the "Auto" position the PLC controls the status of the blowers Normally, this switch should be in the "Auto" position. *"Hand" operation of the blower should be exercised only by trained and knowledgeable technicians.*

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		Improper operation of the blower may cause gas to be vented to the atmosphere or blower damage.
	F. Blower 1 or 2 Current Alarm (N5 or N10)	The Low Current Alarm light indicates a blower surge has occurred, which caused the gas system to shutdown. Blower surge may occur whenever the flow is less than the minimum design flow. This can be caused by water restrictions in the pipe, failed or collapsed pipe or field valves being closed too much. Blower surge can occasionally manifest itself by causing flare flame failures. If the problem requires temporarily shutting down that blower, make sure to close the blower isolation valves and tag the disconnect switch. Either way, notify the NYCDEP and document what was witnessed in the checklist.
	G. High Motor Current Alarn (N6 or N11)	The red light indicates an overload condition on the blower motor. This results from tripping the overload heater on the motor starters. High current is most often caused by high gas flow through the blowers. A false signal can be caused by the sun shining on this panel on a hot day. Use the reset button to clear the alarm.
	H. Reset Alarms (N7 or N12)	Use this push button to reset the blower alarms. This will not reset the motor starter overloads. To reset these it will be necessary to push the overload reset button on the motor starter control rack located to the right of the blower control panel.
3. Flare Control Panel	*A. Panel Power Switch*	The Panel Power Switch should be in the "On" position. If a panel problem is identified which you cannot easily fix, leave the Panel Switch in the "Off" position and notify the NYCDEP immediately. Indicate what you've found on the checklist and Tag the switch. See Tagging & Lockout Procedure.
	B. Panel power Light	This light indicates whether or not the panel is energized and should always be on. If this light is off, and other lights on the panel are on, replace the bulb. If all of the panel lights are off and the panel is obviously without power, first check the Panel Power Switch. If a problem is identified which you cannot easily fix, leave the Panel Switch in the "Off" position and tag it. Document the problem on the checklist and notify the NYCDEP.
	C. Start-Up Sequence Switch (Manual-	Under normal operating conditions, this switch will be in the "Automatic" position. It is recommended that the technician use the Automatic position only. In the Manual position, it will be necessary to initiate all

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	Auto)	process, i.e. purge starts and ignition starts by using the push buttons on the control panel.
	D. *Local Unit Control Switch (Stop or Start/Run)*	This is the main flare control switch. To stop the flare, turn the switch to "Stop". To start the flare, turn the switch to "Start/Run". Provided the Start-Up Sequence switch is in the "Auto" position, the flare will start automatically. The normal position for this switch is in the "Start/Run" position. When using an external control signal to operate the flare, this switch should be in the "Stop" position. An example of an external signal could be a timer that controls the flare run time.
	E. *Unit Stop Push Button*	Use the Stop button to stop the flare when running the Start-Up Sequence in the "Manual" mode.
	F. *Security Light*	Normally, this switch should be in the "On" position.
	G. *Purge Start Push Button*	The Purge Start Push Button is used only when running in the Start-Up Sequence in the "Manual" mode. Pressing the "Purge Start" button initiates the 5 minute purge cycle. Purging occurs only if the "Purging" light is on.
	H. *Low Purge air Flow Light*	This light is used for troubleshooting the purge cycle. If the purge blower flow is below its normal flow setting, the "Low Purge Air Flow" light will energize and the purge cycle will be aborted. The flow purge air signal is generated by the pressure switch located by the blower pressure differential switch limit (PDSL 203). Verify that the fan is running and that there are no restrictions over the fan suction.
	I. *Purging" Light*	Whenever the flare is purging normally the "Purging" light will be on. The flare needs to purge without interruption for 5 minutes to complete the purge cycle. Purging is performed to vent combustible vapors prior to ignition to avoid a possible explosion during ignition.. This light is an aide to the technician in starting the flare. It is only on when the flare is actually purging.
	J. *"Purge Complete" Light*	Provided the purge cycle is successfully completed, the "Purge Complete" light will illuminate. When operating the flare in the "Auto" position, the pilot ignition sequence will immediately start following the purge cycle. When in the "Manual" operating position, the operator will have a maximum of 30 seconds to press the "Ignition Start" push button to start the operating cycle. Following flare ignition, the purge complete light will turn off.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	K. Ignition Start Push Button	The Ignition Start Push Button is only used when operating the flare in the :Manual" position. Immediately following a purge cycle, the "Ignition Start" sequence should be pushed provided if other systems have been checked out and are functional.
	L. Pilot Gas On Light	This light indicates whether or not the pilot gas is flowing. This light should only be on during the Ignition Sequence and up to one minute following the "Flame Proved Signal". If this light is on and the pilot does not ignite, possible causes can include an empty propane bottle, a closed propane valve, a clogged propane pilot orifice, or a failed solenoid valve.
	M. Flame Proved Light	This light illuminates when the flame safe guard system sees and proves a flame. This light is on whenever the flare is operating. If this flame goes out, the flare shuts down automatically and the light goes off.
	N. Waste inlet Valve Switch	This switch is to control the automatic LFG control valve located upstream of the blowers. Under normal operating conditions, the switch should be in the "Auto" position. The flare cannot operate without landfill gas (if this valve is closed). Therefore, if this valve s closed it was probably closed intentionally and should be tagged. If no reason is apparent for the closed valve, put this switch to the "Auto" position. It is strongly recommended that this valve never be left in the open position. In the open position LFG can freely vent to the flare and potentially cause an explosive condition.
	O. Waste Gas On Light	This light is on when the waste inlet valve is open. Therefore this light should only be on when the flare is operating. If this light is on when the flare is down, the problem should be corrected. Probable causes include to the waste inlet valve switch being in the "open" position, a stuck inlet valve, or improperly adjusted limit switches on the inlet valve.
	P. Flare Reset Push Button	The Flare Reset Push Button is used to clear the flare high temperature and flame failure alarms.
	Q. Waste Gas Blower Failure Light	This indicating light when lit indicates that the duty blower has failed. The Operator should verify that the stand-by blower is in operation and should contact the NYCDEP.
	R. High Flare Temperature Light	This light indicates that the flare temperature has reached the high shut down temperature. This happens when there isn't enough quench air to cool the flame.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		Open the manual air damper to allow more quench air into the flare. High temperature can cause refractory damage, burner damage, and high NO_x emissions. If opening the manual damper doe not correct the problem, check the automatic dampers and damper motor. If the motor is working and the dampers are all the way open, you can control the temperature by decreasing the amount of methane being combusted by either decreasing the flow at the inlet valve to the flare station (short term quick fix) or at the wells (adjusting the control valves for wells with the highest methane concentrations.) If the flare has already shut down, allow it to cool within operating temperatures and initiate the Start Up Sequence. Always alert the of Shutdown and StartUp.
	S. Flame Failure Light	This light is to indicate the status of the flare flame. When this light is on, a flame failure has occurred and the flare will not run. Check to see if it's an electrical problem by checking the flare flame through the flare view port. Likely causes for a flame failure include loss of LFG flow, blower surge or liquid restriction in the pipes, a failed UV scanner tube, or a failed controller. Experience has shown that the UV scanner tube is almost always the cause.
4. Flare	*A. Flame Condition*	Observe the flare flame through view port. The flame should be burning yellow with some blue and should be stable with a consistent pattern. There should be no unusual noises or flame rumble.
	B. Abnormal Burner Hotspots	Observe burner for any irregular hot (red/orange) spots. This would indicate flame impingement on the burner and will lead to early burner failure.
	C. Unusual Sounds or Odors	Observe for any unusual sounds or odors. *If odors are detected immediately take steps to troubleshoot the problem to minimize the risk of gas fires outside the flare.*
	D. Damper Motor	Note if the damper motor seems to be running. Also note the position of the automatic damper. Dampers positioned at the extremes, either all the way open or all the way closed, may indicate or predict problems. If the damper is closed completely, the fuel flow may not be high enough to sustain continuous combustion. A totally open damper may indicate a need for more quench air, and the flare temperature is likely to be

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		rising, possibly to alarm conditions. Set the manual damper so that the automatic damper is about 50% open. If the dampers are fluctuating too much, an adjustment to the temperature controller may be necessary.
5. Piping	*A. General Condition*	The technician should inspect the pipeline for wear, vandalism,, and noticeable leaks. All leaks should be immediately reported to the NYCDEP.
	B. Propane Tank Pressure/Level	The technician should note the level of the propane tanks, and the tank pressure. Normal pressure should be 10-20 lb.
	C. Inlet Valve Position	This valve should be open at all times other than emergency shutdown and during start up procedures. If the valve is intentionally closed, it should be tagged with an explanation.
	D. LFG Flowrate	The technician should note the flowrate to verify it is within the specified range 1300 to 1600 scfm.
	E. Gauges Operational	The technician should quickly check all pipeline gauges in the flare station to verify they are operational (they are indicating reasonable measurements).
	F. Nitrogen	Check the nitrogen gas pressure. This pressure should drop very slowly. If a sudden drop in pressure is observed, troubleshoot the nitrogen system to see if a leak is present. The flare system will not run without nitrogen, hence always make sure there is sufficient quantity available.
6. Site Conditions		The technician should note the general condition of the site, i.e., vandalism, cleanliness, drainage problems.
7. Gas Piping	*Belowground*	Belowground piping may experience settlement in localized areas. Piping may be broken and gas may escape to the atmosphere. For thorough quarterly inspection the belowground landfill gas conveyance piping has been divided into subsystems. Each subsystem will begin at well head and terminate at the main header conveying the landfill gas to the flare station. See Figure 5-7 and Form LFG-3. The O&M operator check each subsystem on quarterly basis for settlement, landfill gas pressure and landfill

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		odor. The operator shall observe if any condensate is generated when pipe is broken. Repair for a broken pipe may be complete in cutting the pipe and installing new piece connected to existing piping with a dresser coupling or similar fitting.
8. Well Heads	*Piping and Valving*	Each of the twenty-two (22) well heads shall be inspected monthly. The general area around each well head shall be inspected for settlement, erosion, visibility and accessibility. The fence around each well head shall be inspected for signs of damage and vandalism and appropriate repairs shall be made if necessary. The piping and valving associated with the extraction wells, the sampling taps and the gauges shall be inspected for leaks, vandalism, and the potential for the obstruction of gas flow. The inspection checklist is given in Form LFG-2. The procedure for repairing an extraction well consists of excavation, replacement of piping and valving, placement of various soil material, and isolation of the damaged well from the rest of the gas extraction system. In certain situations where extensive damage occurs to the well, the O&M contractor may replace the existing well with a new complete well in the vicinity of the existing location. This shall be performed in accordance with the record drawings and specifications for Contract HP-876. The procedure for repair is as follows: 1. Field verify the location of the damaged extraction well. 2. Establish limit of work. 3. Isolate well gas piping by closing associated valves on the gas extraction header piping. 4. Cut and remove damaged materials. 5. Install new materials as shown on the record drawings and specifications for Contract HP-876. 6. Check and verify proper operation.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
		7. Connect to gas system and open associated isolation valves.
	Valve Boxes	There are six valve box on the gas piping VB-1 through VB-6. The O&M operator shall check these valve box on monthly basis and look for damage/vandalism, erosion and settlement and any other deficiencies.
9. Monitoring Plan	*Parameters to be Measured*	Each of the 22 well heads and the flare inlet shall be monitored monthly for methane, carbon dioxide (CO2) and oxygen. The temperature and the vacuum will also be noted at this time. This sampling plan is in addition to the environmental monitoring plan. The purpose of this plan is to assist the O&M Contractor in the proper operation and maintenance of the landfill gas collection and flaring system. The instruments which may be used for checking the gas collection and flaring system is the Landtec GEM-500 Gas Extraction Monitor or other instruments as discussed in Section 8.0 of Volume III of the O&M Manuals. The monitoring plan is shown in Form LFG-2.

INSTRUCTIONS FOR INSPECTION CHECKLIST, FORM AS-1
ANCILLARY SYSTEMS
PELHAM BAY LANDFILL, BRONX, NEW YORK
(Reference Volume I - Section 2.2 and Volume III - Section 6.0)

This form is to be used by the inspector on a monthly basis and after storms equal to or exceeding the 2 year 24-hour precipitation event (3.5 inches in 24 hours). The inspector shall perform the work in an orderly fashion completing all of the items on the checklist. It is anticipated that the inspector will spend a minimum of 1 hour inspecting the items listed on Form AS-1. Additional time may be required if problems/deficiencies are observed.

Observations shall be recorded at the time they are viewed. If no problems or deficiencies are observed, the item shall be noted as satisfactory by inserting a ✓ in the appropriate box. If adverse conditions are observed or if others conditions exist which deviate from the normal and could be deleterious to the landfill cover, in the opinion of the inspector, the appropriate checkbox should be marked as not satisfactory (NS) and the location and problem noted on the form.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
Access Roads	1. *Ruttings*	Inspect roads for rutting. Note any ponding or ruts greater than 2" deep and five feet long on the form. Repair ruts with a motor grader or similar equipment. Provide imported crushed stone base to regrade deeper rutting and blend into adjacent road grades. If rutting persists, excavate road to 12" and place biaxial geogrid (BX 1100 by Tensar or similar material) meeting the specifications for Contract No. HP-876.
	2. *Depressions/ Settlement*	Inspect roadways for depressions caused by settlement. Look for depressions which are greater than 30' long and pond water. Repair during scheduled access road maintenance unless trafficability becomes difficult in affected area. Repair immediately if drainage ditch could overtop the road and cause erosion down sideslope. Repair with like material in accordance with the specifications for Contract No. HP-876.
	3. *Washout*	Inspect for washouts caused by runoff. Repair immediately and look for potential cause of drainage overtopping. Refer to Form SMS-1 for repair instructions.
	4. *Pavement Condition*	Inspect general pavement conditions such as thickness of gravel, trafficability, dust generation, pumping areas, etc. Refer to Volume III, Section 6.0 for Access Road Repair.

System	Inspection Item	Inspection and Maintenance Requirements/Procedures
	5. Reflectors	Inspect roadway edge for reflector condition. Reflectors should be spaced at intervals of 25 feet and should be faced so that reflective sides are perpendicular to the road alignment. Check that reflectors are standing straight and are not bent or otherwise damaged. Repair or replace any damaged or missing reflectors in accordance with record drawings and specifications for Contract No. HP-876.
Perimeter Fence, Gates, Locks		Inspect entire perimeter fence for damage, vandalism, etc. Open all locks and lubricate with WD-40 or similar. Swing gates outward and check alignment and swing action. Check that corner posts are straight and that gates swing properly shut. Relock gates as appropriate. Repair any damaged fence, gates or locks in accordance with the record drawings and specifications for Contract No. HP-876.
Seawall Condition		Inspect seawall conditions from outlook points near the 6" Pond C spillway and near the 72 inch sewer outlet to Eastchester Bay. Also examine the top of the sea wall during the fence inspection. Note any displaced rocks, graffiti, garbage or unusual features and record. Repair as necessary.

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INACTIVE HAZARDOUS WASTE SITE VISIT
LIABILITY RELEASE FORM

Each visitor to the site will be required to execute this release holding the New York City Department of Environmental Protection (NYCDEP) and its contractors harmless for personal or other injuries and/or damages which may occur during the course of the site visit. Visitors will not be granted access to the site unless this release is executed. Each person should complete this form prior to the site visit and bring it with them to the SITE. Any visitor who fails to sign this release form will not be allowed on the site. Submission of this form will serve as a release of liability and as proof of a site visit. The undersigned acknowledges the following:

The NYCDEP advises all site visitors that it is without complete knowledge of the content and nature of the substances on site, or in the soil and air on site; and that is without knowledge of the nature or degree of the hazards which might arise therefrom. The NYCDEP further advises that is has given the site a D hazard rating pursuant to applicable federal standards for the purpose of this inspection. Any person or persons who enter upon the site, examine the site, or conduct any activity on or in the vicinity of the site do so at their own risk. The NYCDEP assumes no liability whatsoever for any damage, loss or injury of any kind arising in anyway from such entry upon, examination of or activity on or in the vicinity of site by any person or persons.

The visitor agrees that, if given permission to enter upon and examine the site, said visitor shall be solely responsible for and shall keep, save, and hold harmless the NYCDEP, its employees and contractors from and against any and all claims, demands, suits, actions, recoveries, judgments, costs and expenses in connection therewith on account of loss of life, property, or injury or damage to the person, body or property of any person, agency or corporation, which shall arise from or result directly or indirectly from said entry upon, inspection of, or activity upon or in the vicinity of the site.

Address of Firm ______________________________

____

____

____

Representative's Name ______________________________

Signature will certify both understanding and acceptance of the liability release.

Signature ______________________________

EVENT NOTIFICATION FORM
CONTINGENCY PLAN
Pelham Bay Leachate Management System

Name of Caller: ____

Location of Caller: ____

Telephone No.: ____

Date of Incident ____

Time of Incident: ____________ AM ____________ PM

Type of Incident: ____

Spill: ____

Explosion ____

Fire ____

Other ____

Location of Incident: ____

Description of Incident: ____

Materials and Quantities Involved:

Personnel Injuries: ____________ YES ____________ NO

Names of Injured Personnel:: ____

Location of Injured Personnel: ____

Extent and Status of Injuries:

Assessment of Actual or Potential Hazards to Human Health or the Environment:

Estimated Quantity and Disposition of solid Waste Liquids, or Material Recovered that Resulted from the Incident:

Steps Taken Subsequent to the Incident to Prevent Recurrence:

Notes:

Signature:
Date:

Emergency Response Team Leader:
Date:

APPENDIX B

TASKS FOR OPERATIONS AND MAINTENANCE

APPENDIX B1

INSPECTION AND PREVENTATIVE MAINTENANCE PLAN
GROUNDWATER/LEACHATE MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(Reference Volume III, Section 4.0)

Inspection and Maintenance

This section provides inspection and preventative maintenance information for the subsystems that comprise the leachate collection and disposal system. The O&M Contractor should use this information as a guideline and should refer to the information provided by the vendors (reference Volume II) for detailed information.

B1.1 DOWNGRADIENT COLLECTOR DRAIN

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Inspect alignment of all drains for settlement	2 hrs.
	• Inspect manholes for sediment accumulation.	
Quarterly	• Examine flow from each drain section into the respective manhole. If the flow is unusually low, flush the drain using a high pressure hose. If the obstruction cannot be removed schedule corrective maintenance to excavate the drain to clean out the blockage.	4 hrs.

B1.2 COLLECTION SUMPS (D-1, D-8 AND D-10)

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Inspect alignment of the buried force main from each Collection Sump for settlement.	1 hr.
	• Check all external wiring for cracks and wearing of the insulation.	4 hrs.
	• Exercise all valves	
	• Open valve box and check pipework, fittings and valves for leaks, repair if necessary	1 hr.

APPENDIX B1 (CONTINUED)

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Check current drawn while pump is operating. Wide variations means something is caught in the impeller and must be removed.	1 hr.
	• Check rate of fall of leachate in the wet well or sump while pump is on. An abnormal decline in the wet well level means that the suction or discharge is blocked.	
	• Check operation of control panel switches and lights. Replace switches as needed. Clean internally and tighten terminal screws.	1 hr.
	• Check remote level alarm high and local indicator and remote operations indicators at the Guard House.	
	• Check indicator lamps and switches in the local control centers and replace as needed.	1 hr.
Quarterly	• Inspect and clean level switches.	8 hrs.
	• Check level control sensors for wear and dirt/grease build up. Clean as needed. Reset and check that all five sensors are working properly.	1 hr.
Every 6 Months	• Pull all pumps, check for obstructions, check pump seal integrity and pump impeller wear. Before a pump is raised disconnect and lock-out power to the pump. If a pump must be raised to be inspected or cleaned, a tripod A-frame and hoist may be set up to lift up the submersible pump. When the pump is resting on the ground and the power is still disconnected and locked out, reach inside suction with a gloved hand and clean out. Clean out check valve and flush down discharge pipe. Reinstall pump and put system back into operation.	2 hrs.
	• Measure the insulation resistance. The value should be more than 1 Mohm. If the resistance is below this value or is rapidly falling to this value, schedule corrective maintenance.	1 hr.
	• Exercise Discharge Butterfly Valves and Check Valves. Examine for wear and adjust lever weight as necessary. Inspect pressure gauge for proper operation. Replace as necessary.	2 hrs.
	• Lubricate and adjust Bilco Doors over the wet well.	
	• Visible inspection of worn or damaged parts.	1 hr.

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Inspect lifting apparatus. Inspect cables and cable entry. • Check controls and motor starter. • Exercise gate and check valves. Examine for wear and adjust lever weights as necessary. Lubricate and adjust cover doors.	
*1 week after oil change	• Lift pump and inspect oil. Insert a tube into the oil fill hole and take up a little oil from the reservoir. Oil should be of uniform consistency. Check for presence of emulsified water (creamy) or free water (bubbles). The presence of water indicates that the oil plug was not sufficiently tight <u>or</u> the o-ring or sealing surface is damaged <u>or</u> the lower mechanical seal is damaged. Contact the manufacturers representative.	
Annually	• With the power off, set up tripod and hoist and lift one pump from wet well or sump. Wash down and clean impeller. Lay the pump on its side and drain oil from the seal casing. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. If a seal needs to be replaced, remove pump from site and schedule corrective maintenance. Otherwise, add fresh oil by pouring new oil into the oil reservoir and then tighten the oil reservoir plug. Inspect the motor enclosure for evidence of corrosion. Check power cable for cracks or wear. If necessary, schedule corrective maintenance. Check lifting chain for wear or damage. Schedule corrective maintenance if needed. Replace pump into wet well and restore to proper operation. Do one pump at a time.	14 hrs.
Every 3 Years	• Remove all pumps from wet well or sump and schedule corrective maintenance overhaul. Do one pump at a time.	4 hrs.

B1.3 CURTAIN DRAIN (FRENCH DRAIN)

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Every 6 Months	• Examine flow from curtain drain to Lift Station No. 1. If the flow is unusually low, back flush the drain line using high pressure hose. If the flow is still blocked or if an obstruction is noted, schedule corrective measures to excavate the curtain drain and clean out the HDPE pipe.	3 hrs.

B1.4 LIFT STATION NOS. 1 AND 2

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Check all external wiring for cracks and wearing of the insulation.	2 hrs.
	• Inspect alignment of the buried forcemain discharge from pump station	1 hr.
	• Check indicator lamps and switches in the local control panels and replace as needed.	2 hrs.
	• Check current drawn while pump is operating. Wide variations means something is caught in the impeller and must be removed.	2 hrs.
	• Check rate of fall in well while pump is on. An abnormal decline in the wet well level means that the suction or discharge is blocked.	
	• Check operation of control panel switches and lights. Replace switches as needed. Clean internally and tighten terminal screws.	2 hrs.
	• Check remote level alarm high and local indicator and remote operations indicators at the Guard House.	
Quarterly	• Check level control sensors for wear and dirt/grease build up. Clean as needed. Reset and check that all five sensors are working properly.	2 hrs.
Every 6 Months	• Exercise and lubricate all valves.	2 hrs.

APPENDIX B1 (CONTINUED)

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Pull all pumps, check for obstructions, check pump seal integrity and pump impeller wear. Before a pump is raised disconnect and lock-out power to the pump. If a pump must be raised to be inspected or cleaned, a tripod A-frame and hoist may be set up to lift up the submersible pump. When the pump is resting on the ground and the power is still disconnected and locked out, reach inside suction with a gloved hand and clean out. Clean out check valve and flush down discharge pipe. Reinstall pump and put system back into operation.	2 hrs.
	• Measure the insulation resistance. The value should be more than 1 Mohm. If the resistance is below this value or is rapidly falling to this value, schedule corrective maintenance.	2 hrs.
	• Exercise discharge butterfly valves and check valves. Examine for wear and adjust lever weight as necessary.	2 hrs.
	• Inspect pressure gauge for proper operation. Replace as necessary.	
	• Lubricate and adjust Bilco Doors over the wet well or sump.	
Annually	• With the power off, set up tripod and hoist and lift each pump from wet well or sump. Wash down and clean impeller. Lay the pump on its side and drain oil from the seal casing. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. If a seal needs to be replaced, remove pump from site and schedule corrective maintenance. Otherwise, add fresh oil by pouring new oil into the oil reservoir and then tighten the oil reservoir plug. Inspect the motor enclosure for evidence of corrosion. Check power cable for cracks or wear. If necessary, schedule corrective maintenance. Check lifting chain for wear or damage. Schedule corrective maintenance if needed. Reinstall pump into wet well or sump and restore to proper operation. Do one pump at a time.	14 hrs.
Every 3 Years	• Remove pump from well and schedule corrective maintenance overhaul. Do one pump at a time.	4 hrs.

B1.5 DECONTAMINATION TRAILER SUMP

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Inspect sump and float device for debris and grease build up. Flush down as necessary to keep clean and in proper operating condition.	1 hr.
	• Check level elements and controls for proper operation. Adjust as necessary.	
	• Confirm operation of run-light on Central Control Alarm Panel.	
	• Grease intermediate bearing using #2 Grease and the grease fitting on the sump cover plate. If the pump is used frequently, lubricate more often.	1 hr.
	• Run water in trailer showers and sinks to ensure everything is functioning properly. Change washers or rings on faucets as necessary. Check drains for free flow. Clean or snake as necessary	1 hr.
Every 6 Months	• Grease thrust ball bearing in the motor pedestal using #2 grease and fitting located on pedestal.	1 hr.
	• Exercise butterfly valve and inspect check valve. Clean and flush as necessary. Schedule corrective maintenance as needed.	1 hr.
Annually	• Clean and inspect motor for proper operation and lubrication. Do current and resistance test.	1 hr.
Every 3 Years	• Remove pump, inspect and overhaul.	1 hr.

B1.6 GRAVEL DECON PAD SUMP

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Check all external wiring for cracks and wearing of the insulation.	1 hr.
	• Check indicator lamps and switches in the local control centers and replace as needed.	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Check current drawn while pump is operating. Wide deflections means something is caught in the impeller and must be removed.	
	• Check rate of fall in well while pump is on. An abnormal decline in the wet well level means that the suction or discharge is blocked.	
	• Check operation of control panel switches and lights. Replace light bulbs as needed. Replace switches as needed. Clean internally and tighten terminal screws.	1 hr.
	• Check remote level alarm high and local indicator and remote operations indicators at the Guard House.	
Quarterly	• Exercise and lubricate all valves.	
	• Check level control sensors for wear and dirt/grease build up. Clean as needed. Reset and check that all five sensors are working properly.	2 hr.
Every 6 Months	• Pull all pumps, check for obstructions, check pump seal integrity and pump impeller wear. Clean pumps as necessary. Before a pump is raised, disconnect and lock-out power to its motor. If a pump must be raised to be inspected or cleaned, a tripod A frame and hoist may be set up to lift up the submersible pump or a truck hoist can be used. When the pump is resting on the ground and the power is still disconnected and locked out, reach inside suction with a gloved hand and clean out. Clean out check valve and flush down discharge pipe. Reinstall pump and put system back into operation.	4 hrs.
Every 6 Months	• Measure the insulation resistance. The value should be more than 1 Mohm. If the resistance is below this value or is rapidly falling to this value, schedule corrective maintenance.	1 hr.
Every 6 Months	• Inspect and Exercise Discharge Valves. Clean when necessary and schedule corrective maintenance if needed.	2 hrs.
	• Inspect pressure gage and repair or replace as necessary.	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Annually	• With the power off, set up tripod and hoist or use hoist truck and lift pump up from wet well. Wash down and clean impeller. Lay the pump on its side and drain oil from the seal casing. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. If a seal needs to be replaced, remove pump from site and schedule corrective maintenance. Otherwise, add fresh oil by pouring new oil into the filler plug and then tighten. Inspect the motor enclosure for evidence of corrosion. Corrosion necessitates replacement of motor enclosure. Check power cable for cracks or wear. If necessary, schedule corrective maintenance. Check lifting chain for wear or damage. Schedule corrective maintenance if needed. Replace pump into wet well and restore to proper operation.	14 hrs.
Every 3 Years	• Remove pump from well and schedule corrective maintenance overhaul. Do one pump at a time.	4 hrs.

B1.7 LEACHATE STORAGE TANKS - PRIOR TO COMPLETION OF CONTRACT HP-877

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Weekly	• Estimate the number of tankers required for leachate disposal and the capacity remaining in the tanks for immediate and future leachate inflow. • Coordinate tankers schedule with the trucking contractor. • Record the total gallons of leachate removed. • Monitor trucking contractor's decontamination procedures of all vehicles.	2 hrs.
Monthly	• Check all external wiring for cracks and wearing of the insulation. Exercise and lubricate all valves. • Check operation of the pressure relief valves and vacuum breakers. • Check operation of all PLCs and check operation of all other electrical controls.	2 hrs.

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Check indicator lamps and switches in the local control panels and replace as needed.	
Annually	• Drain and flush tanks	8 hrs.

B1.8 STORAGE TANK CONTAINMENT AREA AND SUMP

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Check current draw. Wide deflections means something may be caught in the impeller and must be removed.	1 hr.
	• Check rate of fall in well while pump is on. An abnormal decline in the wet well level means that the suction or discharge is likely blocked.	
	• Before a pump is removed, disconnect power to its motor. If a pump must be raised to be inspected or cleaned, a tripod A frame and hoist may be set up to lift up the submersible pump. When the pump is resting on the ground and the power is still disconnected and locked out, reach inside suction with a gloved hand and clean out. Clean out check valve and flush down discharge in pipe. Reinstall pump and put system back into operation.	2 hrs.
	• Measure the insulation resistance. The valve should be more than 1 Mohm. If the resistance is below this value or is rapidly falling to this value, schedule corrective maintenance.	1 hr.
	• Check level control sensors for wear and dirt/grease build up. Clean as needed. Reset and check that all five sensors are working properly.	1 hr.
	• Check operation of control panel switches and lights. Replace light bulbs as needed. Replace switches as needed. Clean internally and tighten terminal screws.	1 hr.
	• Check remote level alarm high and local indicators at the Guard House.	
Every 6 Months	• Exercise Discharge Butterfly Valves and examine Check Valves. Inspect for wear and adjust lever weight as necessary.	2 hrs.
	• Inspect pressure gage for proper operation.	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	Replace as necessary.	
	• Lubricate and adjust Bilco Doors over the wet well.	
Annually	• With the power off, set up tripod and hoist and lift each pump up from wet well. Wash down and clean impeller. Lay the pump on its side and drain oil from the seal casing. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. If a seal needs to be replaced remove pump from site and schedule corrective maintenance. Otherwise, add fresh oil by pouring new oil into the oil reservoir and then tighten the oil reservoir plug. Inspect the motor enclosure for evidence of corrosion. Corrosion necessitates replacement of motor enclosure. Check power cable for cracks or wear. If necessary, schedule corrective maintenance. Check lifting chain for wear or damage. Schedule corrective maintenance if needed. Replace pump into wet well and restore to proper operation.	14 hrs.
Every 3 Years	• Remove pumps from well and schedule corrective maintenance overhaul. Do one pump at a time.	4 hrs.

B1.9 CARBON ADSORPTION SYSTEM

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Twice weekly	• Check oil in air compressors and fill oil reservoir if necessary	
Weekly	• Change oil and filters in air compressors	1 hr.
Quarterly	• Drain condensate from air compressors	1 hr.
Every 6 Months	• Change the activated carbon canisters.	2 hrs.

B1.10 CONTRACT HP-877 FORCE MAIN DISCHARGE TO POTW

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Confirm operation of valve actuators.	2 hrs.
	• Inspect and clean as required level switches in the Burr Avenue manhole. Confirm discharge from force main.	1 hr.
Quarterly	• Grease valve actuators.	2 hrs.
Every 3 Years	• Stop operation of pumps in Collection Sump D-1. Open force main scour valve (V-6) beside Lift Station No. 1 draining the force main to Lift Station No. 1. Close scour valve and return Collection Sump D-1 pumps to AUTO position.	4 hrs.

B1.11 STORAGE TANK OFF-LOADING AND TANKER LOADING

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Fill grease cylinder to the packing gland lantern ring. Adjust packing or add a ring if necessary to seal pump better.	1 hr.
	• Check oil level in bearing housing. Add oil as necessary. Also, check oil temperature while running. Normal running oil temperature is 180°F. Higher temperatures indicate a problem which requires corrective maintenance.	1 hr.
Quarterly	• Change Oil. Use a 20W-20 oil. Exxon Faxam, Gulf Harmony and Shell Tellus-68 are recommended. Check oil lip seals for proper functioning.	2 hrs.
Every 6 Months	• Change Packing. Follow attached procedure.	1 hr.
	• Exercise shut off valves and inspect check valve internals. Schedule corrective maintenance if necessary.	
	• Lubricate and check performance of flexible loading arms and piping. Change flange gaskets when leaking and schedule corrective maintenance for flexible arm s.	2 hrs.
Annually	• Check Controls for proper operation. Replace switches, lamps and buttons as necessary.	3 hrs.
	• Calibrate flow meter and digital readout.	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Exercise valves around flow meter and control system. Test control valve for proper seating when under pump pressure. Schedule correct maintenance if necessary.	
	• Inspect pump impeller, sleeve, lantern ring and other wearing parts. Schedule overhaul if necessary.	3 hrs.
	• Grease Motor bearings. Use #2 Grease and open grease drain plug to make sure old grease is pushed out.	1 hr.
	• Check voltage, current and resistance of insulation.	
Every 3 Years	• Overhaul Pump, replacing such items as bearings, seals, sleeves glands, etc. in a machine shop.	24 hrs.

B1.12 MOTOR CONTROL CENTER

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Initially	• Confirm programming of all PLC's and make modifications as required.	1 hr.
Monthly	• Check operation of all circuit breakers.	1 hr.
	• Check operation of all electrical controls.	
	• Check indicator lamps and switches on the Central Control Alarm Panel and all local control centers and replace as needed.	
	• Check the operation of the following: all motor starters, all overload relays and auxiliary contacts, all motor circuit protectors, all control relays, all other electrical controls.	1 hr.
	• Check and replace fuses, indicator lamps and switches as needed.	

B1.13 GROUNDWATER SYSTEM

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Locate and observe the alignment of the cutoff wall and look for settlement of the ground surface. If	4 hrs.

Schedule	Inspection and Maintenance Task	Estimated Minimum Time

	settlement greater than 6 inches is observed the overburden fill material shall be removed down to the top of the protective concrete slab and the slab shall be inspected for damage and repaired as needed. The area shall be subsequently backfilled in compacted lifts with excavated material.
	• Inspect the collector drain at each outfall and manhole location for
	    • blockage
	    • damage
	    • lower than expected flow rates
	• Use high intensity flood lights to observe the pipes. If damage and/or blockage is suspected inspect the pipes using a remote closed-circuit T.V. technique to locate and determine the extent of the damage and/or blockage	

Table GWL-1
Inspection and Preventative Maintenance
Groundwater/Leachate Management System
Estimated Minimum Annual Labor Hours

Subsystem	Frequency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Yearly Hours
							Month							
Downgradient Collector Drain	M	2	2	2	2	2	2	2	2	2	2	2	2	24
	3M			4			4			4			4	16
	6M													
	Y													
	3Y													
Collection Sumps D-1, D-8, D-10	M	9	9	9	9	9	9	9	9	9	9	9	9	108
	3M			9			9			9			9	36
	6M						4						4	8
	Y						14							14
	3Y						4							
Curtain Drain (French Drain)	M													
	3M													
	6M						3						3	6
	Y													
	3Y													
Lift Station Nos. 1 and 2	M	9	9	9	9	9	9	9	9	9	9	9	9	108
	3M			2			2			2			2	8
	6M						8						8	16
	Y						14							14
	3Y						4							
Decontamination Trailer Sump	M	3	3	3	3	3	3	3	3	3	3	3	3	36
	3M													
	6M						2						2	4
	Y						1							1
	3Y						1							
Gravel Decon Pad Sump	M	2	2	2	2	2	2	2	2	2	2	2	2	24
	3M			2			2			2			2	8
	6M						7						7	14
	Y						14							14
	3Y						4							

Notes:
M indicates monthly activities
3M indicates quarterly activities
6M indicates six month activities
Y indicates annual activities

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Table GWL-1
Inspection and Preventative Maintenance
Groundwater/Leachate Management System
Estimated Minimum Annual Labor Hours

Subsystem	Frequency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Yearly Hours
		Month												
Leachate Storage Tanks - Prior to Completion of Contract No. HP-877	M	6	6	6	6	6	6	6	6	6	6	6	6	72
	3M													
	6M													
	Y						8							8
	3Y													
Storage Tank Containment Area and Sump	M	6	6	6	6	6	6	6	6	6	6	6	6	72
	3M													
	6M						2						2	4
	Y						14							14
	3Y						4							
Carbon Adsorption System	M	4	4	4	4	4	4	4	4	4	4	4	4	48
	3M			1			1			1			1	4
	6M						2						2	4
	Y													
	3Y													
Contract No. HP-877 Force Main Discharge to POTW	M	3	3	3	3	3	3	3	3	3	3	3	3	36
	3M			2			2			2			2	8
	6M													
	Y													
	3Y						4							
Storage Tank Off-Loading and Tanker Loading	M	2	2	2	2	2	2	2	2	2	2	2	2	24
	3M			2			2			2			2	8
	6M						3						3	6
	Y						7							7
	3Y						24							

Notes:
M indicates monthly activities
3M indicates quarterly activities
6M indicates six month activities
Y indicates annual activities

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Table GWL-1
Inspection and Preventative Maintenance
Groundwater/Leachate Management System
Estimated Minimum Annual Labor Hours

Subsystem	Frequency	Month												Total Yearly Hours
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Motor Control Center	M	2	2	2	2	2	2	2	2	2	2	2	2	24
	3M													
	6M													
	Y													
	3Y													
Groundwater System	M	4	4	4	4	4	4	4	4	4	4	4	4	48
	3M													
	6M													
	Y													
	3Y													

Total Monthly Hours	52
Total Quarterly Hours	17
Total Six Month Hours	31
Total Annual Hours	72
Total Three Year Hours	45
Grand Yearly Total Hours	**846**
Grand Total Three Year Hours	**45**

Notes:
M indicates monthly activities
3M indicates quarterly activities
6M indicates six month activities
Y indicates annual activities

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APPENDIX B2
INSPECTION AND PREVENTATIVE MAINTENANCE PLAN
LANDFILL GAS MANAGEMENT SYSTEM
PELHAM BAY LANDFILL
(Reference Volume III, Section 5.0)

Inspection and Maintenance

This section provides inspection and preventative maintenance information for the subsystems that comprise the gas collection and flaring system. The O&M Contractor should use this information as a guideline and should refer to the John Zink and Lamson Corporation O&M Manuals and other vendor O&M Manuals (reference Volume II, Section 12) for detailed information.

B2.1 GAS BLOWERS

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Observe blower and motor alignment	2 hrs.
	• Monitor machine bearings by taking vibration and bearing temperature readings	1 hr.
	• Observe all valves for proper operation	
	• Observe blower foundation and site condition	
	• Lubricate motor bearings. Clean grease inlet area and replace the pipe along with grease fitting. Run motor for two hours	3 hrs.
Monthly	• The flare station blowers shall be alternated on a monthly basis to keep them working properly. The recommended procedure for alternating the blowers is as follows:	3 hrs.
	1. Take flare station readings to verify the existing system operation. Verify that there is propane available for relighting the flare.	
	2. Turn the flare off by using the "stop - start/run" control switch on O.K. panel (Reference Section 5, Figure 5-5).	
	3. Close the inlet and outlet manual valves to the operating blower and open the inlet and outlet manual valves to the stand-by blower or remove drain plugs provided.	
	4. Drain water from the stand-by blower	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	5. Turn the blower selector switch to change the stand-by blower to the operating blower. 6. Restart the flare by turning the control switch to Start/Run (Reference Section 5, Figure 5-5). The flare should be through its normal prepurge cycle, ignite and come up to temperature. 7. Take flare station readings and verify that the system is operating normally. Check the blower operation for unusual noise or vibration.	

B2.2 GAS BLOWER CONTROL PANEL

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Monitor the motor control center and insure that all applicable breakers are in the ON position	1 hr.
Monthly	• Check the operation of the following: • motor starters • overload relays and auxiliary contact • motor circuit protectors • control relays	1 hr.
Monthly	• Check and replace fuses, indicators lamps, and switches as needed	1 hr.

B2.3 PIPING

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Quarterly	• Walk along piping alignment and check for settlement and any LFG detection • Check header valve and valve enclosure	5 hr.

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Check above ground piping for leak and vibration	

B2.4 ENCLOSED FLARE SYSTEM

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Lubricate purge air blower • Stroke inlet landfill gas valves • Check pressure in propane cylinders	2 hrs.
Quarterly	• Observe the pilot assembly for damaged or loose wires, ignition rod, flame detector, spark plug and insulator damage	3 hrs.
Quarterly	• Test and verify all safety shutdown devices	
Quarterly	• Check calibration and operation of all instruments • observe flare tips for blockage or corrosion. Clean if necessary • Observe internal insulation for overall integrity. Repair if necessary • Observe external surface for signs of heat corrosion • Check all flanges and connections for signs of leakage. Remove and replace if necessary • Test control panel logic to insure that all shutdowns, inputs and outputs are operating correctly • Observe all auxiliary flare equipment for signs of deterioration	

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Every 6 months	• Check blower and motor alignment • Bump blower to verify that wiring is correct • Clean flame arrestor • Clean demister pad in knock out • Visually inspect internal surfaces of knock out drum	2 hr.
Annually	• Replace thermocouple assemblies	8 hrs.

B2.5 GAS FLARE CONTROL PANEL

Schedule	Inspection and Maintenance	Time
Initially	• Confirm PLC programming and make modifications as required	1 hr.
Weekly	• Monitor the alarm functions and acknowledge, investigate and record any alarm present	1 hr.
Monthly	• Check operation of all circuit breakers. • Check operation of all electrical controls • Check indicator lamps and switches on panel and replace as needed	1 hr.

B2.6 WELL HEADS

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Monthly	• Monitor, observe and adjust wells	8 hrs.
Quarterly	• Observe each well head and observe alignment and look for settlement • Make sure in-line ball valve and gauges are operating properly • Check for gas leak from well head fitting and flexible hose connection	10 hrs.

B2.7 GAS MONITORING WELLS

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Quarterly	• Inspect each well head and observe alignment and look for settlement	1 hr.
Quarterly	• Inspect probe monitoring and observe alignment and look for settlement	1 hr.

B2.8 ELECTRICAL SYSTEM

B2.8.1 Main Service Equipment

Schedule	Inspection and Maintenance	Estimated Minimum Time
Yearly	• Service Transformer, Current Transformer and Meter (in conjunction with Con Edison).	8 hrs.
Every 6 Months	• Property line manhole, handhole, and grounding system.	6 hrs.

B2.8.2 Main Distribution

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Quarterly	• Manholes and Handholes: Check for debris and water accumulation; check that the splicings are not damaged.	6 hrs.
Every 6 Months	• Main 600A Service Switch: Check that all lugs are tight, fuses are running cool and for indication of phases balance.	8 hrs.
	• Motor Control Center: Check that the amperage meter is indicating a balance load on each phase; check that all fuses are running cool; check grounding.	12 hrs.

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
	• Panels: Check all panels for lug and cable connections; check that the circuit breakers are not overheating because of load imbalance.	8 hrs.
	• Transformers: Check connections; check that transformers are not overloaded or over heating.	6 hrs.
	• Disconnect Switches and Starters: Check that all components are operating correctly; check for contactor failure.	8 hrs.

B2.8.3 Branch Circuits or Feed

Schedule	Inspection and Maintenance Task	Estimated Minimum Time
Yearly	• Inspect all circuit breakers, pull boxes, junction points, site lighting system (luminaries and poles).	8 hrs.

B2.8.4 Control Wiring and Equipment

Schedule	Inspection and Maintenance	Time
Quarterly	• Check all contractors, relays, timers, panel heaters and thermostats for operating conditions.	4 hrs.

Table LFG-1
Inspection and Preventative Maintenance
Landfill Gas Management System
Estimated Minimum Annual Labor Hours

Subsystem	Frequency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Yearly Hours
Gas Blowers	M	9	9	9	9	9	9	9	9	9	9	9	9	108
	3M													
	6M													
	Y													
	3Y													
Gas Blower Control Panel	M	3	3	3	3	3	3	3	3	3	3	3	3	36
	3M													
	6M													
	Y													
	3Y													
Piping	M													
	3M			5			5			5			5	20
	6M													
	Y													
	3Y													
Enclosed Flare System	M	2	2	2	2	2	2	2	2	2	2	2	2	24
	3M			3			3			3			3	12
	6M						2						2	4
	Y						8							8
	3Y													
Gas Flare Control Panel	M	5	5	5	5	5	5	5	5	5	5	5	5	60
	3M													
	6M													
	Y													
	3Y													
Well Heads	M	8	8	8	8	8	8	8	8	8	8	8	8	96
	3M			10			10			10			10	40
	6M													
	Y													
	3Y													

Notes:
W indicates weekly activities
M indicates monthly activities
3M indicates quarterly activities
6M indicates six months activities
Y indicates annual activities

Table LFG-1
Inspection and Preventative Maintenance
<u>Landfill Gas Management System</u>
Estimated Minimum Annual Labor Hours

Subsystem	Frequency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Yearly Hours
Gas Blowers / Gas Monitoring Wells	M	9	9	9	9	9	9	9	9	9	9	9	9	108
	3M			2			2			2			2	8
	6M													
	Y													
	3Y													
Electrical System	M													
	3M			10			10			10			10	40
	6M						48						48	96
	Y						16							16
	3Y													

Total Monthly Hours	27
Total Quarterly Hours	30
Total Six Month Hours	50
Total Annual Hours	24
Total Three Year Hours	0
Grand Yearly Total Hours	**568**
Grand Total Three Year Hours	**0**

Notes:
W indicates weekly activities
M indicates monthly activities
3M indicates quarterly activities
6M indicates six months activities
Y indicates annual activities

APPENDIX B3

ELECTRICAL LOCK-OUT PROCEDURE
PELHAM BAY LANDFILL
(Reference Appendices B1 and B2)

B3.1 INTRODUCTION

WARNING! Lock-out all electrical, rotating or moving equipment before working on it or allowing anyone else to work on it. All people working on equipment should have their own lock and should install it on the lock out clasp.

B3.2 LOCK-OUT PROCEDURE

1. Shut down equipment.
2. Disconnect power to equipment and tag with a "Do Not Operate!" tag, a lock-out device and a lock.
3. Block-in and depressure system if necessary.
4. State reason for the lockout on the space provided, date and sign it.
5. Tag all switches that power the equipment being worked on.
6. Tag all valving to the equipment "Do Not Operate!" (if applicable)
7. Push start button to be sure that power has been interrupted.
8. Before maintenance is performed, the contractor or persons performing maintenance shall place an appropriate maintenance tag on the lock-out device (they may also use their lock, if available). Operating personnel shall not return the equipment to operating state until maintenance personnel have removed their tags. This procedure protects the maintenance personnel.
9. After work has been finished, inspect equipment to be sure all guard covers are in place and that no loose parts or tools are left in or on the equipment.
10. Remove operations tags and test the equipment.
11. Upon job completion, return permits and tags to the operations file.

APPENDIX C

LONG-TERM MONITORING PROGRAM

SAMPLING AND ANALYSIS PLAN

Pages C-1 - C-12

PELHAM BAY LANDFILL SITE
LONG-TERM MONITORING PROGRAM
SAMPLING AND ANALYSIS PLAN

(Developed by NYSDEC, Revised by WCC May 28, 1996)

A. General

This Sampling and Analysis Plan has been prepared to support the groundwater and surface water monitoring programs for the Pelham Bay Landfill site in the Bronx, New York City. Long-term monitoring at Pelham Bay includes the collection and analysis of environmental samples of groundwater and surface water. The plan details procedures for field preparation, well evacuation, sample collection, sample preservation and handling, sample containers, sample custody, sample analysis, quality assurance/quality control, and recordkeeping.

B. Field Preparation

A sampling team of at least two people is established prior to each sampling event. The team holds a pre-sampling meeting in order to:

1. Review the sampling procedures described in this plan;
2. Assemble and inspect all equipment and verify that equipment is clean and in proper working order;
3. Replace or repair any items that are in short supply or improper working condition;
4. Calibrate all equipment to manufacturers's specifications;
5. Examine sample containers to verify that the proper number and type of containers were delivered by the laboratory; and
6. Establish a well evacuation and sample collection schedule for the sampling event.
7. Wells are purged and sampled from "clean" to "dirty", based on previous monitoring results.

C. Groundwater Sample Collection

1. Examination of the Well

a. Verify that the well is not damaged. Note in the fieldbook any signs of tampering. Also, note the condition of the well casing, concrete collar, and lock.

b. Unlock and carefully remove the well cover to avoid having foreign objects enter the well.

c. Sample the well vapors immediately upon opening the well with an organic vapor analyzer (OVA) or other air screening device described in the O&M Contractor's Health and Safety Plan to determine the need for respiratory protection. Record the readings.

2. <u>Water Level Measurements</u>

a. Previous sampling has not indicated the presence of immiscible layers, however, the presence of both light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) should be checked for and thicknessess measured, if present, using an electronic interface probe. The depth to groundwater may be measured using the interface probe. The variety of interface probes on the market precludes the development of a general procedure. The procedure provided with the particular interface probe being used should be carefully followed.

b. The depth to groundwater is measured from the <u>surveyed reference mark</u> on the well casing or riser to an accuracy of 0.01 foot. An electronic interface probe or electronic water level meters shall be used for this measurement.

c. The total depth of the well is then measured to determine the volume of water within the casing. This measurements must be compared to the recorded installed depth to determine how much, if any, sediment has accumulated in the bottom of the well. IF there are six inches or more of sediment in the well, the well must be redeveloped prior to sampling.

d. To avoid cross-contamination, the water level indicator is wiped clean and rinsed with distilled water after each use. The decontamination procedure presented in 3.a.5, below, shall be followed at the end of any sampling event, or whenever significant contamination is encountered.

3. <u>Purging the Well</u>

a. If purging and sampling is being conducted according to the Groundwater Sample Collection Protocol Using Bailers (Appendix D), the following procedure applies:

1) Each well is purged of standing water so that fresh formation water is collected for analysis. The volume of water to be purged from a well is determined by measuring the depth to

water and the total depth of the well, then calculating the number of gallons per foot of water within the well and sandpack. Each well is typically purged of three well/borehole (sandpack) volumes or until dry.

2) For wells which are not evacuated to dryness, a minimum of three well/borehole volumes are removed from the well before collecting samples, as above. If a well evacuates to dryness and is slow to recharge, only one well volume is removed.

3) Any of the following devices are used, as appropriate, for well evacuation:

- bailer
- peristaltic pump
- diaphragm pump
- electric submersible pump
- centrifugal pump
- a dedicated bladder pump is installed on each of the groundwater/leachate wells

4) During well evacuation, the intake opening of the purge devise is positioned just below the surface of the water. If the water level drops during purging, the intake is lowered as needed to maintain flow. Wells which recharge rapidly are purged at a rate matching the recovery rate.

5) Dedicated bailers, nylon bailing line, and polyethylene or polypropylene tubing are used when dedicated pumps are not functioning or in wells that do not have dedicated pumps. If a submersible pump is used, it is cleaned between wells according to the procedure outlined below. Purge water and decontamination water is collected and disposed of in the on-site leachate collection tank.

A. Decontamination Procedure

- Wash with a non-phosphate detergent and water solution;
- Rinse with tap water;
- Rinse with methanol;
- Thoroughly rinse with distilled water.

6) Groundwater samples are collected with Teflon, stainless steel, or disposable bailers. Non-disposable bailers are cleaned

between sampling locations according to the decontamination procedure in 3.a.5.

7) Agitation of the sample is avoided by lowering the bailer slowly into the well and transferring the water gently from the bailers to the sample containers. Care is taken to prevent water from sloshing around in the bailer during the process of filling the sample containers. Pumps, when used, are operated at low output to avoid aeration of the sample.

b. If the Low Flow Rate Purging and Sampling Technique is used (Appendix E), the following general procedure applies:

1) Low Flow rate purging using a dedicated bladder pump negates the need to evacuate multiple well volumes because stagnant water in the well above and below the pump intake is essentially isolated. Representative formation groundwater enters the pump and is brought to the surface almost at the onset of pumping.

2) Stabilization of field measured parameters for the discharge water is used to indicate when enough water has been purged and when sample collection can begin.

3) Appendix E provides the specific procedures for Low Flow Rate Purging and Sampling.

4. <u>Sample Collection</u>

a. Samples are collected and containerized in order of volatilization sensitivity of the parameters to be analyzed. The sample collection priority is listed below.

SAMPLE COLLECTION PRIORITY

Priority	Parameter
1	Volatile organics
2	Acid extractable organics
3	Base/Neutral organics
4	Pesticides/PCBs
5	Metals
6	Cyanide

Note: In wells with high turbidity, metals samples may be taken last in order to collect relatively clear water.

b. Samples are not filtered, but are transferred directly to the containers. Volatile organic sample bottles are filled completely so that no headspace and no air bubbles remain in the vials. Volatile organic samples are collected as soon as a sufficient volume of water has recharged the well, but no later than three hours after purging.

c. If immiscible fluids are present in the well, they are sampled prior to purging. Floating layers are collected with either a vacuum type sampling device or a top-filling bailer. Heavy immiscibles are collected with a double check valve bailer.

D. Surface Water Sample Collection

Surface water and sediment samples are obtained at the same location. Care is taken to minimize agitation of sediments upstream of surface water collection, so the water sample is collected first. Sample bottles are immersed directly in the stream and filled approximately at mid-depth. If the bottles contain preservatives from the laboratory, then the sample bottles are filled from a separate containers that has been immersed in the stream.

E. Field Measurements

Field measurements include temperature, pH and specific conductance, dissolved oxygen, eH, and turbidity. These measurements are recorded directly in the field notebook.

F. Sample Preservation and Handling

Sample containers, preservation techniques, and holding time requirements for specific parameters are as listed in Table 1.

G. Sample Containers

All sample containers are pre-cleaned and contaminant free. The cleanliness of a batch of containers is verified in the laboratory prior to use.

Containers are cleaned based on the analyte of interest. Once cleaned, sample bottles are stored in a clean environment.

1. For Purgeable Organic Analyses

Containers are new 40 ml borosilicate glass vials with Teflon lined septa and screw caps that are:

a. non-phosphate detergent washed with hot water
b. tap water rinsed, 3 times with hot water
c. deionized water rinsed, 3 times with ASTM Type 1
d. oven baked at 110 degrees centigrade for one hour
e. capped while still hot making sure the Teflon side of the septum is facing the interior of the vial.

2. <u>For Metals Analyses</u>

Containers are new plastic or borosilicate glass bottles (1 liter minimum for liquids and 125 ml minimum for solids) that, along with caps, are:

a. non-phosphate detergent washed with hot water
b. tap water rinsed, 3 times with hot water
c. acid washed with 1:1 nitric acid
d. deionized water rinsed, 3 times with ASTM Type 1
e. air dried
f. capped when dry

3. <u>For Extractable Organics (BNAs, PCBs, Pesticides)</u>

Containers are new amber glass bottles (1 liter minimum for liquids and 125 ml minimum for solids) with Teflon lined screw caps, cardboard cap liners removed, that, along with the caps are:

a. non-phosphate detergent washed with hot water
b. tap water rinsed, 3 times with hot water
c. deionized water rinsed, 3 times with ASTM Type 1
d. rinsed with methylene chloride
e. oven dried for 1 hour at 110 degrees centigrade
f. capped when dry

H. <u>Sample Custody</u>

1. Sample labels are affixed to each sample container and include the sample identification number, date, time, location, and analysis. The label is covered with clear plastic tape to ensure that it does not peel off or become damaged or

unreadable. A unique identification number is assigned to each sample. Each sample has a corresponding entry on the chain-of-custody record.

2. Chain-of-custody records include the following:

a. Site name
b. Sample collector's signature
c. Sample identification numbers
d. Date and time of sample collection
e. Number of containers
f. Matrix
g. Analyses requested
h. Signatures and dates of persons involved in chain of possession
i. Condition of sample upon arrival at the laboratory

3. The shipping container (cooler) is sealed for shipment to the lab. Sample containers are checked and logged at the lab. The lab then returns the signed chain-of-custody records to the sampling team.

I. Sample Analysis

Samples are analyzed by one or more of the laboratories contracted by the NYSDEC. Analytical methods to be used are listed in Table C-2. Sample preparation and analysis procedures are detailed in the NYSDEC Analytical Services Protocol.

J. Quality Assurance/Quality Control

1. Field QA/QC Program

a. Field blanks are not required, but taken at the option of the sampling team. These consist of filling two 40 ml vials with reagent (distilled) water in the field in ambient air. These samples are analyzed for volatile organics.

b. Trip blanks are comprised of two 40 ml vials filled with reagent water. They are prepared by the laboratory and are shipped with the empty sample containers. The trip blanks remain unopened until they are returned to the lab with the samples. Trip blanks are required at a 1:20 ratio of blanks to samples, or with each cooler, whichever is greater.

c. If non-dedicated sample collection equipment is decontaminated in the field, one equipment blank per batch of equipment type field-cleaned, is taken.

Equipment blanks are taken by collecting reagent water that has been passed through and over cleaned equipment. A blank is collected for each parameter of interest.

d. At least one duplicate suite of samples is collected and analyzed for each sampling event. The well where this duplicate is taken is changed each time the system is samples.

2. Laboratory QA/QC Program

Requirements for laboratory QA/QC are specified in the NYSDEC Analytical Laboratory Contracts.

K. Recordkeeping

Field logs are maintained by sampling personnel to record all pertinent information about the sampling event. The data recorded is intended to allow for reconstruction of the well evacuation, sample collection, and sample preservation and handling procedures at a later time. the field log for each sample includes, at a minimum:

1. Personnel
2. Date
3. Weather conditions
4. Well identification
5. Static water level and measurement technique
6. Total well depth
7. Well condition
8. Purge volume and pumping rate, if applicable
9. Time of well purge
10. Well evacuation procedure/equipment
11. Physical properties of water purged: color, odor, turbidity, immiscibles present...
12. Sample identification
13. Sample appearance
14. Chemical properties of samples: pH, temperature, conductivity...
15. Preservative(s) used, if any
16. parameters requested for analysis
17. Sample collection procedure/equipment
18. Field measurements, methods, and equipment
19. time of sample collection
20. Decontamination procedures
21. procedures for collection and disposal of purged water

22. Any additional relevant information.

TABLE C-1
PRESERVATIVES AND SAMPLE CONTAINERS

Parameter	Volume Required	Container	Preservative (See Table 1a)	Holding Time
Cyanide	1000 ml	P,G	P-3	14 Days
Pesticides	1000 ml	G	P-1	7 Days
Phenols	500 ml	G	P-5	28 Days
PCBs	1000 ml	G	P-1	7 Days
TOC	10 ml	P,G	P-5	26 Days
Volatile Organics	40 ml	G	P-1/P-7	7 Days
BNA Extractables	2000 ml	G	P-1	7 Days
BOD	1000 ml	P,G	P-1	24 Hours
COD	50 ml	P,G	P-2	28 Days
TSS	500 ml	P,G	P-1	7 Days
TDS	100 ml	P,G	P-1	7 Days
TKN	500 ml	P,G	P-2	28 Days
TP	500 ml	P,G	P-2	28 Days
Metals*				
Aluminum	200 ml	P,G	P-4	6 Months
Antimony	200 ml	P,G	P-4	6 Months
Arsenic	200 ml	P,G	P-4	6 Months
Barium	200 ml	P,G	P-4	6 Months
Beryllium	200 ml	P,G	P-4	6 Months
Cadmium	200 ml	P,G	P-4	6 Months
Calcium	200 ml	P,G	P-4	6 Months
Chromium (Hex)	200 ml	P,G	P-1	24 Hours
Chromium (total)	200 ml	P,G	P-4	6 Months
Copper	200 ml	P,G	P-4	6 Months
Iron	200 ml	P,G	P-4	6 Months
Lead	200 ml	P,G	P-4	6 Months
Magnesium	200 ml	P,G	P-4	6 Months
Mercury	200 ml	P,G	P-4	28 Days
Nickel	200 ml	P,G	P-4	6 Months
Potassium	200 ml	P,G	P-4	6 Months
Selenium	200 ml	P,G	P-4	6 Months
Silver	200 ml	P,G	P-4	6 Months
Sodium	200 ml	P,G	P-4	6 Months
Zinc	200 ml	P,G	P-4	6 Months

*The volumes shown for each metal are those required if that metal was the only one of interest. In the more usual case, where a combination of metals are requested, a total sample volume of 500 ml is required.

P = Plastic Bottles
G = C'ass Bottles

TABLE C-1a
PRESERVATIVES

P-1 Cool to 4°C in an ice chest (cooler).

P-2 Preserve with concentrated sulfuric acid to pH ≤2. Do not add an excess amount of acid. cool 4°C..

P-3 preserve with 10N sodium hydroxide to pH > 12 and cool to 4°C in an ice chest.

P-4 Acidify sample with concentrated nitric acid to pH <2 and cool to 4°C.

P-5 Preserve with concentrated sulfuric acid or concentrated hydrochloric acid to pH ≤2 and cool to 4°C in an ice chest.

P-6 No preservative, determine on site.

Note: When fixing samples with acid or base to a specific pH, the steps below should be followed:

1. add preservative to sample
2. replace cap on sample bottle and mix (shake) sample
3. remove cap and place a drop of sample on a piece of wide range pH paper.
4. if necessary, repeat steps 1 through 3 until desired pH is attained.

P-7 Preserve with concentrated hydrochloric acid to pH <2 and cool to 4°C in an ice chest.

TABLE C-2
REQUIRED ANALYSIS

Parameter	Matrix	Analysis*
Volatile Organics	Water, Water-miscible liquids, Solids, Sludges	SW846,8240
Semivolatile Organics	Water, Solids, Sludges	SW846,8240
Organic Chlorine Pesticides; PCBs	Water, Solids, Sludges	SW846-8080
Total Phenolics	Water	SW846-9066
Cyanide	Water, Solids, Sludges	SW846-9010
total Metals	Water, Solids, Sludges	SW846-6010/7000 series
Hexavalent Chromium	Water, Solids, Sludges	SW846-7195
Biological Oxygen Demand	Water	NYSDEC-ASP
Chemical Oxygen Demand	Water	NYSDEC-ASP
Total Organic Carbon	Water	NYSDEC-ASP
Total Suspended Solids	Water	NYSDEC-ASP
Total Dissolved Solids	Water	NYSDEC-ASP
Total Kjeldahl Nitrogen	Water	NYSDEC-ASP
Total Phosphates	Water	NYSDEC-ASP

* All are methods taken from SW8446, Test Methods for Evaluating Solid Waste, 3rd Edition, 1986, except as noted here:

-600 series is from 40 CFR Part 136, Federal Register, Vol. 49, No. 209
-200, 300, 400 series are from method for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised March 1983
* As per NYSDEC ASP, September, 1989

APPENDIX D

GROUNDWATER SAMPLE COLLECTION PROTOCOL USING BAILERS

Pages D-1 - D-2

GROUNDWATER SAMPLE COLLECTION PROTOCOL
LOW FLOW RATE PURGING AND SAMPLING TECHNIQUE

General

This protocol describes the procedure for monitoring well purging and groundwater sample collection using the low flow rate technique. This technique is based upon the use of dedicated gas-operated stainless steel and teflon badder pumps (equipped with teflon or teflon lined polyethylene tubing) for well purging and stabilization of field-measured parameters for designating the end of the purge and the beginning of sample collection. This protocol follows procedures established in USEPA Region 2 Draft Groundwater Sampling SOP dated March 28, 1995

1. As a first step in the sampling process, the presence and thickness of both light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquids (DNAPL) will be checked for and measured, if present, using an electronic interface probe. The depth depth to groundwater will be also be measured. The variety of interface probes on the market precludes the development of a general procedure. The procedure provided with the particular interface probe being used should be carefully followed.

2. All down-hole purging equipment will be decontaminated before use in each well, in accordance with the procedures.

3. Pumps will be initially lowered into wells at least the day before sampling. Pumps will be slowly lowered into the well to five feet below the top of the screened interval minimizing disturbance to the water column. Pumps and tubing will be dedicated to each well, remaining in the well between sampling events. This eliminates the need for equipment decontamination and field blank preparation. There will be at least one foot of water over the pump intake at all times.

4. The purging rate will be 500 ml/min, or such lower rate as is necessary to (a) maintain a constant water column level in the well, (b) achieve stabilization of each of the stabilization parameters described in paragraphs 8 and 9 below, and (c) allow for pumping without introducing any air bubbles in the sample tubing.

5. Drawdown levels in the pumping well, when incurred, will not exceed 0.3 feet below the static water level. Should it appear that this maximum is being approached, the flow rate must be decreased to further minimize drawdown.

6. Discharge water will be collected for disposal in the on-site leachate collection tank.

7. The pumping rate and water levels will be measured frequently (every five minutes over the first 15 minutes and then every 15 minutes) using a graduated cylinder and a stopwatch.

The purpose of these measurements is to collect monitoring data to be used as a quality control check on pumping rate and maintenance of at most, a less than one-inch drawdown, and, in general, a minimal drawdown. Should the flowrate be different than that specified, the speed of the variable speed pump will be increased or decreased appropriately, but slowly. Should the drawdown be too great, the flowrate will be decreased until an appropriate drawdown can be maintained.

8. Field parameters will be monitored and recorded directly from the discharge line during purging (every three to five minutes, or, as appropriate) to provide an indication of groundwater equilibration and stabilization. Field parameters to be monitored are: pH, temperature, specific conductance, eH, dissolved oxygen (DO), and turbidity. For best results, measurements (particularly DO and eH) should be taken using a flow through cell or other manner in which the sample is not exposed to air prior to the measurement. The well is considered stabilized and ready for sample collection once all the field indicatior parameter values remain within 10% for three consecutive measurements and turbidity is 10 NTUs or less.

9. The total volume of water removed will be recorded and purging will be completed. If the field parameters do not stabilize, purging will continue for up to a total of three hours, followed by sampling.

10. After purging, the sampling discharge rate should be decreased to the maximum of 250 ml/min or such lower rate is necessary to achieve (a), (b), and (c) described in paragraph 4 above.

11. Sample collection will be conducted by filling the sample containers directly from the discharge line. Static water levels in the well are to be maintained with minimal drawdown during sampling. Sampling will follow purging without interruption of the pump operation in order to minimize the disturbance of the overlying stagnant water column in the well.

12. The gas-powered air compressor, if used, will be placed a minimum of 25 feet downwind of the well to limit the potential of cross-contamination.

13. VOC samples will be collected first and directly into pre-preserved sample containers..All sample containers should be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulance.

14. After collection of the samples, the pump's tubing will be dedicated to the well for re-sampling by habging the tubing inside the well

APPENDIX E

GROUNDWATER SAMPLE COLLECTION PROTOCOL USING LOW FLOW RATE PURGING AND SAMPLING TECHNIQUE

Pages E-1 - E-2

GROUNDWATER SAMPLE COLLECTION PROTOCOL USING LOW FLOW RATE PURGING AND SAMPLING TECHNIQUE

General

This protocol describes the procedures for groundwater sample collection using bailers. A bottom-loading stainless steel or teflon bailer will be used for well purging and sampling. During precipitation events, sampling of wells will be discontinued until precipitation ceases.

Procedure

The procedure for the collection of groundwater samples is as follows:

1. In order to reduce the potential for cross-contamination, the monitoring wells should be sampled in order from "cleanest" to "dirtiest" wells.

2. Create a clean surface onto which all sampling equipment can be positioned by cutting a slit in the center of a 3 foot x 6 foot clean plastic sheet, and slipping the sheet over the well standpipe and down to the ground.

3. As a first step in the sampling process, the presence and thickness of both light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquids (DNAPL) will be checked for and measured, if present, using an electronic interface probe. The depth to groundwater will be also be measured. The variety of interface probes on the market precludes the development of a general procedure. The procedure provided with the particular interface probe being used should be carefully followed.

4. Measure the depth to the water table and the bottom of the well using an electric probe. Record this information on the quarterly sampling log sheet (See Table E-1, Appendix-F).

5. Gently lower bailer to avoid impact aeration into well only far enough to fill it one-half full. The purpose of this is to recover any oil film if one is present on the water table. Pull bailer out of well and empty groundwater into a glass container. Observe the appearance of the groundwater and then record the physical appearance on the quarterly sampling log sheet.

6. Purge groundwater from well using the bailer. The groundwater should be poured from the bailer into a graduated pail to measure the quantity of water removed from the well.

7. Peristaltic pumps, diaphragm pumps, electric submersible pumps, or centrifugal pumps may be used to purge groundwater from the wells.

8. Purge until the well has been bailed dry or until 5 well volumes have been evacuated. Once the well is bailed dry, allow sufficient time for the well to recover before proceeding. Record the total volume of groundwater removed from the well and well recovery time on the quarterly sampling log sheet.

9. Prepare the sample bottles for receiving samples and obtain the groundwater samples using the bailer. Gently pour the samples directly into sample bottles from the bailer and cap immediately to minimize aeration. Record sample data (time, I.D. #, etc.) on the chain of custody form and the quarterly sampling log sheet.

10. Collect another groundwater sample and empty it into a glass beaker. Measure the pH, temperature, specific conductance, eH, dissolved oxygen, and turbidity of the water and record this data on the quarterly sampling log sheet.

11. Replace well cap and lock well.

12. Discard gloves in designated location and decontaminate all equipment that has come in contact with sample as discussed below.

13. Complete chain-of-custody form provided by the laboratory.

14. Repeat steps 1 through 13 for next well.

Sample storage and handling will be done in accordance with laboratory QA/QC procedures.

At conclusion of the day, all tools and equipment are to be decontaminated as discussed below.

<u>**Equipment Decontamination Procedures**</u>

All equipment and associated tools that may have come in contact with contaminated materials during measurement activities shall be decontaminated as follows:

1. clean with a soapy water wash; and
2. rinse with tap water.

All liquids generated by the equipment decontamination procedure will be collected and properly disposed of as approved by NYCDEP.

APPENDIX F

SURFACE RUN-OFF WATER SAMPLE COLLECTION PROTOCOL

Pages F-1 - F-2

SURFACE RUNOFF WATER SAMPLE COLLECTION PROTOCOL

General

This protocol presents the procedures to be followed during surface runoff water sampling activities. During precipitation events, sampling of surface runoff water shall be discontinued until precipitation ceases.

Procedure

The procedure for the collection of surface water samples is as follows:

1. Identify sample location and record location number on a copy of the site plan.

2. Place plastic sheeting near sample location to use as a clean work area.

3. Obtain surface runoff water sample by slowly submerging a clean beaker into the water with minimal surface disturbance.

4. Note the appearance of the sample on the quarterly sampling log sheet. Empty the beaker into the sample bottles.

5. Complete the chain-of-custody form provided by the laboratory.

6. Repeat steps 1 through 5 for the next sample.

7. Sample storage and handling shall be done in accordance with laboratory QA/QC procedures.

8. At conclusion of the day, all tools and equipment are to be decontaminated as discussed below.

Equipment Decontamination Procedures

All equipment and associated tools that may have come in contact with contaminated materials during measurement activities shall be decontaminated as follows:

1. clean in a soapy water wash; and
2. rinse with tap water.

All liquids generated by the ecuipment decontamination procedure will be collected and disposed of properly.

Materials

The following materials are required to obtain surface water samples:

- Quarterly sampling event log sheet (Appendix I, Table I-3)
- Safety glasses
- Vinyl surgical gloves
- Soap
- Marker pen
- Disposable wipes
- Spray bottles
- Polyethylene garbage bags
- Plastic wash basins
- Clean glass and plastic sample containers
- Sample labels
- Chain-of-custody forms
- Shipping sheeting
- Plastic sheeting

APPENDIX G

GROUNDWATER TABLE MEASUREMENT PROTOCOL

Pages G-1 - G-2

GROUNDWATER TABLE MEASUREMENT PROTOCOL

General

This protocol presents the procedures for measuring the depth to the groundwater table. The depth of the groundwater table is calculated by measuring the depth of the water from the top of the well standpipe and subtracting this depth from the survey elevation of each well standpipe.

Note: Manholes should not be used for groundwater level measurements. The liquid level should in manholes is affected by pumping operations are generally not indicative of the overall groundwater surface elevations. Groundwater levels should only be taken at the designated monitoring wells and piezometers.

Procedure

The procedure for the groundwater table measurement is as follows:

1. Unlock and open well standpipe.

2. The presence and thickness of both light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquids (DNAPL) should be checked for and measured, if present, using an electronic interface probe. The depth to groundwater can be also be measured using the interface probe. The variety of interface probes on the market precludes the development of a general procedure. The procedure provided with the particular interface probe being used should be carefully followed.

3. For an electronic water level indicator, lower the probe into the well until the indicator light, or buzzer, indicates contact with the water.

4. Record the depth, as indicated on the graduated scale on the probe line, on the groundwater elevation log sheet (See Appendix I, Table I-1).

5. Repeat the measurement by raising the probe and lowering again until the indicator light goes on. The two measurements should agree within 0.1 foot. If not, check the measurement using a standard weighted tape measure. Note measurement on the groundwater elevation log sheet.

6. Decontaminate the probe and/or tape measure.

7. Close and lock the standpipe.

8. Calculate the elevation of the groundwater table by subtracting the depth from the elevation of the top of the standpipe. Note the results on groundwater elevation calculation sheet (See Appendix I, Table I-2).

9. If the well standpipe height is adjusted for any reason, obtain new survey information for the top of well standpipe prior to performing groundwater elevation calculations.

Equipment Decontamination Procedures

All equipment and associated tools that may have come in contact with contaminated materials during measurement activities will be decontaminated as follows:

1. a soapy water wash; and
2. a rinse with tap water.

All liquids generated by the equipment decontamination procedure should be collected and properly disposed of as approved by NYCDEP.

The Following Materials are Recommended for Groundwater Elevation Measurements:

- Groundwater elevation log sheet (See Table I-1, Appendix I)
- Groundwater elevation calculation sheet (See Table I-2, Appendix I)
- Safety glasses
- Vinyl surgical gloves
- Soap and water
- Marker pen
- Disposable wipes
- Spray bottles
- Polyethylene garbage bags
- Plastic wash basins
- Water Marker

EXHIBIT H

TARGET COMPOUND LISTS (TCLS)

AND

CONTRACT REQUIRED QUANTIFICATION LIMITS

Pages H-1 - H-5

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TABLE H-1
TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

	Volatiles	CAS Number	Quantitation Limits[a] Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
1.	Chloromethane	74-87-3	10	10	1200	(50)
2.	Bromomethane	74-83-9	10	10	1200	(50)
3.	Vinyl Chloride	75-01-4	10	10	1200	(50)
4.	Chloroethane	75-00-3	10	10	1200	(50)
5.	Methylene Chloride	75-09-2	10	10	1200	(50)
6.	Acetone	67-64-1	10	10	1200	(50)
7.	Carbon Disulfide	75-15-0	10	10	1200	(50)
8.	1,l-Dichloroethene	75-35-4	10	10	1200	(50)
9.	l,l-Dichloroethane	75-34-3	10	10	1200	(50)
10.	1,2-Dichloroethene (total)	540-59-0	10	10	1200	(50)
11.	Chloroform	67-66-3	10	10	1200	(50)
12.	1,2-Dichloroethane	107-06-2	10	10	1200	(50)
13.	2-Butanone	78-93-3	10	10	1200	(50)
14.	l,l,l-Trichloroethane	71-55-6	10	10	1200	(50)
15.	Carbon Tetrachlorlde	56-23-5	10	10	1200	(50)
16.	Bromodichloromethane	75-27-4	10	10	1200	(50)
17.	1,2-Dichloropropane	78-87-S	10	10	1200	(50)
18.	cis-1,3-Dichloropropene	10061-01-5	10	10	1200	(50)
19.	Trichloroethene	79-01-6	10	10	1200	(50)
20.	Dibromochloromethane	124-48-1	10	10	1200	(50)
21.	1,1,2-Trichloroethane	79-00-5	10	10	1200	(50)
22.	Benzene	71-43-2	10	10	1200	(50)
23.	trans-1,3 -Dichloropropene	10061-02-6	10	10	1200	(50)
24.	Bromoform	75-25-2	10	10	1200	(50)
25.	4-Methyl-2-pentanone	108-10-1	10	10	1200	(50)
26.	2-Hexnone	591-78-6	10	10	1200	(50)
27.	Tetrachloroethene	127-18-4	10	10	1200	(50)
28.	Toluene	108-88-3	10	10	1200	(50)
29.	1,1,2,2-Tetrachloroethane	79-34-5	10	10	1200	(50)
30	Chlorobenzene	108-90-7	10	10	1200	(50)
31.	Ethyl Benzene	100-41-4	10	10	1200	(50)
32.	Styrene	100-42-5	10	10	1200	(50)
33.	Xylenes (Total)	1330-20-7	10	10	1200	(50)
34.	Phenol	108-95-2	10	330	10000	(20)
35.	Bis(2-Chloroethyl) ether	111-44-4	10	330	10000	(20)
36.	2-Chlorophenol	95-57-8	10	330	10000	(20)
37.	1,3-Dichlorobenzene	541-73-1	10	330	10000	(20)
38.	1,4-Dichlorobenzene	106-46-7	10	330	10000	(20)
39.	1,2-Dichlorobenzene	95-50-1	10	330	10000	(20)
40.	2-Methylphenol	95-48-7	10	330	10000	(20)

TABLE H-1 (continued)
TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Quantitation Limits[a]

	SemiVolatiles	CAS Number	Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
41.	2,2'-Oxybis(l-Chloropropane)[b]	108-60-1	10	330	10000	(20)
42	4-Methylphenol .	106-44-5	10	330	10000	(20)
43	N-Nitroso-di-n-propylamine	621-64-7	10	330	10000	(20)
44.	Hexachloroethane	67-72-1	10	330	10000	(20)
45.	Nitrobenzene	98-95-3	10	330	10000	(20)
46.	Isophorone	78-59-1	10	330	10000	(20)
47.	2-Nitrophenol	88-75-5	10	330	10000	(20)
48.	2,4-Dimethylphenol	105-67-9	10	330	10000	(20)
49.	Bis(2-Chloroethoxy)methane	111-91-1	10	330	10000	(20)
50.	2,4-Dichlorophenol	120-83-2	10	330	10000	(20)
5l.	1,2,4-Trichlorobenzene	120-82-1	10	330	10000	(20)
52.	Naphthalene	91-20-3	10	330	10000	(20)
53.	4-Chloroaniline	106-47-8	10	330	10000	(20)
54.	Hexsahlorobutadiene	87-68-3	10	330	10000	(20)
55.	4-Chloro-3-methylphenol	59-50-7	10	330	10000	(20)
56.	2-Methylnaphthalene	91-57-6	10	330	10000	(20)
57	Hexachlorocyclopentadiene	77-47-4	10	330	10000	(20)
58.	2,4,6-Trichlorophenol	88-06-2	10	330	10000	(20)
59.	2,4,5-Trichlorophenol	95-95-4	25	800	25000	(50)
60.	2-Chloronaphthalene	91-58-7	10	330	10000	(20)
61.	2-Nitroaniline	88-74-4	25	800	25000	(50)
62.	Dimethylphthalate	131-11-3	10	330	10000	(20)
63.	Acenaphthylene	208-96-8	10	330	10000	(20)
64.	2,6-Dinitrotoluene	606-20-2	10	330	10000	(20)
65.	3-Nitroaniline	99-09-2	25	800	25000	(50)
66.	Acenaphthene	83-32-9	10	330	10000	(20)
67.	2,4-Dinitrophenol	51-28-5	25	800	25000	(50)
68.	4-Nitrophenol	100-02-7	25	800	25000	(50)
69.	Dibenzofuran	132-64-9	10	330	10000	(20)
70.	2,4-Dinitrotoluene	121-14-2	10	330	lO000	(20)
71.	Diethylphthalate	84-66-2	10	330	10000	(20)
72.	4-Chlorophenyl-phenyl ether	7005-72-3	10	330	10000	(20)
73.	Fluorene	86-73-7	l0	330	10000	(20)
74.	4-Nitroaniline	100-01-6	25	800	25000	(50)
75.	4,6-Dinitro-2-methylphenol	534-S2-1	25	800	25000	(50)
76.	N-nitrosodiphenylamine	86-30-6	10	330	10000	(20)
77.	4-Bromophenyl-phenylether	101-55-3	10	330	10000	(20)
78.	Hexachlorobenzene	118-74-1	10	330	10000	(20)
79.	Pentachlorophenol	87-86-5	25	800	25000	(50)
80.	Phenanthrene	85-01-8	10	330	10000	(20)

TABLE H-1 (continued)
TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

		Quantitation Limits[a]				
81.	Anthracene	120-12-7	10	330	10000	(20)
82.	Carbazole	86-74-8	10	330	10000	(20)
83.	Di-n-butylphthalate	84-74-2	10	330	10000	(20)
84.	Fluoranthene	206-44-0	10	330	10000	(20)
85.	Pyrene	129-00-0	10	330	10000	(20)
86.	Butylbenzylphthalate	85-68-7	10	330	10000	(20)
87.	3,3'Dichlorobenzidine	91-94-1	10	330	10000	(20)
88.	Benzo(a)anthracene	56-55-3	10	330	10000	(20)
89.	Chrysene	218-01-9	10	330	10000	(20)
90.	Bis(2-Ethylhexyl)phthalate	117-81-7	10	330	10000	(20)
91.	Di-n-octylphthalate	117-84-0	10	330	10000	(20)
92.	Benzo(b)fluoranthene	205-99-2	10	330	10000	(20)
93.	Benzo(k)fluoranthene	207-08-9	10	330	10000	(20)
94.	Benzota)pyrene	50-32-8	10	330	10000	(20)
95.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330	IO000	(20)
96.	Dibenz(a,h)anthracene	53-70-3	10	330	10000	(20)
97	Benzo(g,h,i)perylene	191-24-2	10	330	10000	(20)

TABLE H-1 (continued)
TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

			Quantitation Limits[a]		
_	Pesticide/Aroclors	CAS Number	Water ug/L	Soil ug/Kg	Column (pg)
98.	alpha-BHC	319-84-6	0.05	1.7	5
99.	beta-EHC	319-85-7	0.05	1.7	5
100.	delta-BHC	319-86-8	0.05	1.7	5
101.	gamma-BHC (Lindane)	58-89-9	0.05	1.7	5
102.	Heptachlor	76-44-8	0.05	1.7	5
103.	- Aldrin	309-00-2	0.05	1.7	5
104.	Heptachlor Epoxide	1024-57-3	0.05	1.7	5
10S.	Endosulfan I	959-98-8	0.05	1.7	5
106.	Dieldrin	60-57-1	0.10	3.3	10
107.	4,4'-DDE .	72-55-9	0.10	3.3	10
108.	Endrin	72-20-8	0.10	3.3	10
109.	Endosulfan II	33213-65-9	0.10	3.3	10
110.	4,4'-DDD	72-54-8	0.10	3.3	10
111.	Endosulfan Sulfate	1031-07-8	0.10	3.3	10
112.	4,4'-DDT	50-29-3	0.10	3.3	10
113.	Methoxychlor	72-43-5	0.50	17.0	50
114.	Endrin Ketone	S3494-70-5	0.10	3.3	10
115.	Endrin Aldehyde	7421-36-3.	0.10	3.3	10
116.	alpha-Chlordane	5103-71-9	0.05	1.7	5
117.	gamma-Chlordane	5103-74-2	0.05	1.7	5
118.	Toxaphene	8001-35-2	5.0	1~0.0	500
119.	Aroclor-1016	12674-11:2	1.0	33.0	100
120.	Aroclor-1221	11104-28-2	2.0	67.0	200
121.	Aroclor-1232	11141-16-5	1.0	33.0	100
122.	Aroclor-1242	53469-21-9	1.0	33.0	100
123.	Aroclor-1248	12672-29-6	1.0	33.0	100
124.	Aroclor-1254	11097-69-1	1.0	33.0	100
125.	Aroclor-1260	11096-82-5	1.0	33.0	100

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TABLE H-2
INORGANIC TARGET ANALYTE LIST (TAL)
CONTRACT REQUIRED DETECTION LIMIT

Analyte	(ug/L)	mg/Kg)
Aluminum	200	40
Antimony	60	12
Arsenic	10	2
Barium	200	40
Beryllium	5	1
Cadmium	5	1
Calcium	5000	1000
Chromium	10	2
Cobalt	50	10
Copper	25	5
Iron	100	20
Lead	3	.6
Magnesium	5000	1000
Manganese	15	3
Mercury	0.2	0.1
Nickel	40	8
Potassium	5000	1000
Selenium	5	1
Silver	10	2
Sodium	5000	1000
Thallium	10	2
Vanadium	50	10
Zinc	20	4
Cyanide	10	2

APPENDIX I

SAMPLING LOG SHEETS

TABLE I-1
GROUNDWATER ELEVATION LOG SHEET
PELHAM BAY LANDFILL, BRONX, NEW YORK

ARRIVAL
DATE: _________ **TIME:** _________

DEPARTURE
DATE: _________ **TIME:** _________

Personnel Onsite: ____________________________
Site Conditions on Arrival: ____________________
____
Weather: Date: ____________________

POST-SAMPLING CHECKLIST:
____ Wells Locked
____ Site Cleanup
____ Site Secured

GROUNDWATER ELEVATION			
Well Number	**Date**	**Elevation**	**Remarks**
MW-104			
MW-106			
MW-109			
MW-110			
MW-113			
MW-114			
MW-115			
MW-115B			
MW-118			
MW-119			
MW-120			
MW-120B			
MW-121			
MW-122			
MW-126			
MW-117			
MW-117B			
MW-124			
MW-124B			
Piezometer*	**Date**	**Elevation**	**Remarks**
PZ-1			
PZ-2			
PZ-3			
PZ-4			
PZ-5			
PZ-6			

NOTES: ____
____

By: ______________________________
Firm: ______________________________ Telephone #: ______________________

* PZ-1, PZ03 and PZ-5 are groundwater wells upstream of slurry wall
PZ-2, PZ-4 and PZ-6 are groundwater wells downstream of slurry wall

TABLE I-2
GROUNDWATER ELEVATION CALCULATION SHEET
PELHAM BAY LANDFILL, BRONX, NEW YORK

MEASURER (print): ______________________________

MEASURER (signature): ______________________________

MEASUREMENT DATE AND WEATHER: ______________________________
____

Well Number	Top of Well Elevation (ft)	Depth to Groundwater (ft)	Groundwater Table Elev. (ft)
MW - 104			
MW - 106			
MW - 109			
MW - 110			
MW - 113			
MW - 114			
MW - 115			
MW - 115B			
MW - 117			
MW - 117B			
MW - 118			
MW - 119			
MW - 120			
MW - 120 B			
MW - 121			
MW - 122			
MW - 124			
MW - 124B			
MW - 126 (PZ-5)			
PZ-1			
PZ-2			
PZ-3			
PZ-4			
PZ-5			
PZ-6			

Comments:____
____
____

TABLE I-3
QUARTRLY SAMPLING EVENT LOG SHEET
PELHAM BAY LANDFILL, BRONX, NEW YORK

ARRIVAL
DATE: ________ **TIME:** ________

DEPARTURE
DATE: ________ **TIME:** ________

Personnel Onsite: ______________________
____

Site Conditions on Arrival: ______________________
____

Weather: Date: ______________________

POST-SAMPLING CHECKLIST:

____ Wells Locked
____ Site Cleanup
____ Site Secured

GROUNDWATER SAMPLES			
Well Number	**Sampling**	**Sample Time**	**Remarks**
MW-104			
MW-106			
MW-109			
MW-110			
MW-113			
MW-114			
MW-119			
MW-120			
MW-120A			
MW-121			
MW-122			
SURFACE WATER SAMPLES			
SW-1			
SW-2			
LEACHATE SAMPLE			
Sump D-1			

NOTES: ____
____
____

By: ______________________

Firm: ______________________ Telephone # : ______________________

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TABLE I-4
QUARTERLY GROUNDWATER SAMPLING LOG SHEET
PELHAM BAY LANDFILL, BRONX, NEW YORK

SAMPLER (print): : ______________________
SAMPLER (signature): : ______________________
SAMPLE DATE: ______________________
WEATHER: ______________________

Location	Depth to Water Table (ft)	Water Volume in Well (gal)	Recovery Time (hours)	Sample Time	pH	Temp.
MW - 104						
MW - 106						
MW - 109						
MW - 110						
MW - 113						
MW - 114						
MW - 119						
MW - 120						
MW - 120B						
MW - 121						
MW - 122						

Physical Observation: ______________________

TABLE I-5
QUARTERLY ENVIRONMENTAL LABORATORY ANALYSIS
PELHAM BAY LANDFILL, BRONX, NY

Well Number	MW-104	MW-106	MW-109	MW-110	MW-113	MW-114	MW-119	MW-120	MW-120A	MW-121	MW-122
Date											
Volatile Compounds											
Acetone											
Benzene											
Bromodichloromethane											
Bromoform											
Bromomethane											
2-Butanone											
Chloromethane											
Chloroethane											
Chlorobenzene											
Carbon Disulfide											
Carbon Tetrachloride											
Chloroform											
Dibromochloromethane											
1,1-Dichloroethane											
1,2-Dichloroethane											
1,1-Dichloroethylene											
1,2-Dichloroethylene (total0											
1,2-Dichloropropane											
cis-1,2-Dichloropropene											
trans-1,2-Dichloropropene											
Ethylbenzene											
2-Hexanone											
4-Methyl-2-Pentanone											
Methylene Chloride											
Styrene											
1,1,2,2-Tetrachloroethane											
Tetrachloroethylene											
Toluene											
1,1,1-Trichloroethane											
1,1,2-Trichloroethane											
Trichloroethylene											
Vinyl Acetate											
Vinyl Chloride											
Xylenes (total)											

TABLE I-5
QUARTERLY ENVIRONMENTAL LABORATORY ANALYSIS
PELHAM BAY LANDFILL, BRONX, NY

Well Number	MW-104	MW-106	MW-109	MW-110	MW-113	MW-114	MW-119	MW-120	MW-12	MW-121	MW-122
Date											
Metals/Inorganics											
Aluminun											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
thallium											
Vanadium											
Zinc											
Cyanide											

TABLE I-5
QUARTERLY ENVIRONMENTAL LABORATORY ANALYSIS
PELHAM BAY LANDFILL, BRONX, NY

Well Number	**MW-104**	**MW-106**	**MW-109**	**MW-110**	**MW-113**	**MW-114**	**MW-119**	**MW-120**	**MW-12**	**MW-121**	**MW-122**
Date											
Pesticides and PCBs											
Alpha-BHC											
Beta-BHC											
Delta-BHC											
Gamma-BHC											
Heptachlor											
Aldrin											
Heptachlor epoxide											
Endosulfan I											
Dieldrin											
4,4'-DDe											
Endrin											
Endosulfan II											
4,4'-DDD											
Endosulfan Sulfate											
4,4'-DDT											
Methoxychlor											
Endrin Ketone											
Alpha-Chlordane											
Gamma-Chlordane											
Toxaphene											
Aroclor-1016											
Aroclor-1221											
Aroclor-1232											
Aroclor-1242											
Aroclor-1248											
Aroclor-1254											
Aroclor-1260											