Pennsylvania Avenue Landfill
Brooklyn, New York
NYSDEC Site No. 224002

Annual Post Closure Operation, Maintenance and Monitoring Report
April 2010 through December 2010

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New York City Department of Environmental Protection
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Section I - Introduction

This Post-Closure Annual Summary Report (Report) has been prepared by the New York City Department of Environmental Protection (NYCDEP) to fulfill the reporting requirements contained in the Pennsylvania Avenue Landfill (PAL) Operation and Maintenance (O&M) Manual, the PAL Monitoring Plan, and 6 NYCRR Part 360. This Report documents the operation, maintenance and monitoring activities performed between April 1, 2010 and December 31, 2010. The O&M and monitoring activities performed during the first quarter of 2010 were documented in the previous Post-Closure Annual Summary Report. Following discussions with the New York State Department of Environmental Conservation (NYSDEC), the reporting period for this Report consists of the last three quarters of 2010 so that future annual reporting periods can be based on the calendar year (i.e., January 1 to December 31), and may be utilized by the NYSDEC as Part 375 Periodic Review Reports, as appropriate.

Section II - Site Background

The PAL inactive hazardous waste disposal site (Site) is located on 110 acres at the southern end of Pennsylvania Avenue in Brooklyn, New York. It is bounded by the Belt Parkway, Jamaica Bay, Hendrix Creek and Fresh Creek. A site location map is provided in Figure 1.

In 1956, the Site was opened to receive residential and commercial wastes, including construction and demolition (C&D) residuals and waste oil. In 1962, land-filling activities shifted to the Fountain Avenue Landfill (FAL). The PAL was reopened for disposal of C&D wastes in 1968. It is reported that, between 1974 and 1980, illegal dumping of hazardous wastes occurred at the Site. Disposal of all wastes stopped by 1980, and the Site was added to the registry of inactive hazardous waste disposal sites requiring surveillance. In 1983, the Site was reclassified to a Class 3, which is a site considered not to pose a significant threat, and for which action can be deferred. After an oil inventory and product recovery feasibility study conducted in 1984, the Site was reclassified to a Class 2, a site which poses a significant threat to public health or the environment.

On December 16, 1985, and again on April 17, 1990, the NYSDEC executed Orders on Consent with the New York City Department of Sanitation (DOS) to close and remediate the Site. On April 7, 1992, the New York City Department of Environmental Protection (NYCDEP) entered into a Consent Order with the NYSDEC to perform a remedial program at the Site.

In response to this, NYCDEP conducted a Remedial Investigation/Feasibility Study (RI/FS) to determine the nature and extent of contamination. The Final RI/FS, dated May 1994, revealed that certain areas and media at the Site required remediation; a summary of these results follows:

- Surface soil and sediment samples exhibited varying levels of contamination by volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides and PCBs.

- It was determined that a floating product plume beneath the Site contaminated the groundwater in the leachate mound and the surface water in Fresh Creek. Tests indicated that the waste oils with the capacity to migrate to the shoreline had already done so, and the remaining oils are stationary. In addition to the VOC and SVOC levels associated with residual petroleum contamination, the waste oil contained PCB levels that classify it as a hazardous waste.
- Groundwater in the leachate mound (U wells – fill aquifer) was somewhat contaminated with VOCs, SVOCs and PCBs, and it was more so in the areas where it was in contact with the floating oil plume. The shallow and deep Upper Glacial Aquifer (S & D wells) did not require remediation because they did not exhibit significant levels of contamination.

By the Order on Consent, Interim Remedial Measures (IRMs) were implemented. An interim cover was placed to prevent casual contact with exposed waste and minimize emissions. Rip-rap was installed for shoreline protection. Construction of a passive waste oil interceptor trench was completed in January 1994. The purpose of the trench is to capture waste oil before it reaches Fresh Creek; however, to date actual oil migration to the trench has been minimal.

The goals for the remediation program were set to eliminate or minimize the threats to the public health and the environment, by addressing the contamination of subsurface soils and waste disposal areas; by protecting surface waters through eradication of run-off and erosion from contaminated substrates and the migration of leachate into surrounding waters; by minimizing the impact of contaminated groundwater; by reducing soil and sediment contamination levels and removing the possibility of human or animal contact; and, by controlling and containing landfill gas emissions.

The Final Feasibility Study Report, dated September 1994, detailed the selection process and the remedial alternative chosen. The option selected included a 6 NYCRR Part 360 cap, leachate collection along Fresh Creek, limited sediment excavation, active gas control, and long-term monitoring of site media.

The Record of Decision (ROD), dated February 1995, presented the remedial action. In accordance with the ROD, the Site was remediated under construction contracts Nos. LF-PAL-G2/E2 and LF-PAL-G3. The main elements of this action included:

- Remediation of approximately 30,000 cubic yards of sediment along the Fresh Creek shoreline.
- Installation of a groundwater/leachate management system consisting of a 750-feet-long interceptor trench, two pumping stations, a force-main and an enclosed leachate pre-treatment system with subsequent disposal to the 26th Ward Wastewater Treatment Plant (WWTP).
- Regrading of the Site to provide proper drainage and minimize erosion.
- Installation of a stormwater collection, conveyance and outfall system.
- Installation of an actively vented impermeable final cover consisting, from top to bottom, of a vegetated top soil layer (6” minimum), a soil barrier protection layer (12”), a Type 2 cover

double-sided geocomposite drainage layer or a Type 1 cover cushion geotextile, an LLPDE geomembrane liner (40 mil thick), and a sub-base grading fill layer.
- Planting of warm season grasses and approximately 13,000 shrubs and trees
- Installation of an active landfill gas (LFG) collection system and flaring station.

The ROD called for a pre-approved Post-Closure Monitoring, Sampling and Analysis Plan (the Monitoring Plan, the Plan) to commence within one month of NYCDEP's receipt of NYSDEC's written approval of the Final Engineering Report (FER) for the Site. The FER acceptance letter was dated March 26, 2009, and the first monitoring round was initiated within a month of its receipt and performed in accordance with the Monitoring Plan requirements. Subsequently, the Monitoring Plan has been revised to allow the low-flow purging and sampling method to be used to collect groundwater samples for the analysis of both the inorganic and organic parameters. The requirements of the revised Monitoring Plan were utilized commencing with the second Post-Closure monitoring event. In accordance with the Monitoring Plan, water elevation and sample collection and analysis is performed for the ten groundwater monitoring wells, and soil gas quality readings are taken from the five gas monitoring wells located beyond the perimeter of the cap, parallel to the Belt Parkway. Monitoring is conducted on a quarterly basis until NYSDEC authorizes a different monitoring frequency.

Prior to approval of the FER, a preliminary groundwater sampling and analysis round was conducted in July 2007. Since their installation in May 2008, the perimeter soil gas wells are monitored as needed and at least quarterly as mandated by the Monitoring Plan.

Section III – Annual Summary

This Report covers the period from April 1, 2010 through December 31, 2010. It summarizes the operation, maintenance and monitoring activities previously described in the Quarterly Post-Closure Operation, Maintenance and Monitoring Reports (Quarterly Reports) for this period.

1. Groundwater/Leachate Management System

The groundwater/leachate management system represents one of the components of the selected remedy in the Site's ROD**.** The ROD stipulated the construction of an active leachate collection trench in the area of the waste oil outbreak along Fresh Creek, and pumping the leachate to an on-site facility for treatment prior to discharge.

The groundwater/leachate collection, pre-treatment and disposal system was designed to prevent migration of groundwater/leachate containing oil and dissolved contaminants to Fresh Creek Basin and to produce a treated effluent acceptable for discharge to the 26th Ward WWTP. The effluent is regulated under NYCDEP's Industrial Wastewater Discharge Permit No. 07-P3145-2, effective from August 27, 2007 to August 26, 2012.

The main components of the groundwater/leachate management system consist of a stone-filled interceptor trench with two pump stations; a 3-inch-diameter HDPE leachate force-main carrier pipe in a 6-inch-diameter HDPE casing pipe; a pre-treatment facility and a 4-inch-diameter HDPE pretreated leachate force-main pipe ultimately discharging to a junction manhole at the 26th Ward WWTP.

The groundwater/leachate pre-treatment facility was designed to treat up to 30 gpm, and treated an average of 18.0 gpm during the period covered by this Annual Report. The maximum permitted flow is 43,000 gpd. Actual daily average and maximum flows were 24,171 gpd and 37,110 gpd, respectively. The pre-treatment facility components include oil-water separation with citric acid conditioning, bag filtration and carbon adsorption. Figure 2 shows the Pre-treatment System Schematic.

During the period covered by this Annual Report, the pre-treatment system treated and discharged 6,212,032 gallons of groundwater and leachate to the WWTP. The table below summarizes the flow data for the nine month period.

Pre-Treatment Flow Data Summary

	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Annual Summary
Total Flow (Gallons)	869,320	786,860	645,870	629,980	487,820	649,390	813,510	691,270	638,012	**6,212,032**
Average Flow (GPM)	21.4	17.9	16.5	17.2	18.4	17.3	20.5	17.0	16.0	**18.0**
Average Daily Flow (GPD)	30,882	25,802	23,696	22,499	23,230	22,393	28,052	23,837	21,267	**24,171**
Maximum Daily Flow (GPD)	35,496	32,000	31,150	28,340	35,291	37,110	34,900	36,840	33,500	**37,110**
Number of Days in Service	30	31	30	28	21	29	29	29	30	**257**
Percent of Time in Service	93.8%	98.4%	90.9%	82.1%	59.3%	86.9%	89.0%	93.9%	89.3%	**87.0%**

Pumping to the pre-treatment plant was temporarily paused for necessary maintenance; oil-water separator (OWS) and coalescer desludging and maintenance, carbon absorber backwashing, high differential pressure during bag filter replacement, and work on the flow meter, discharge suction tank level sensor and pump stations. The system was operating with the spare carbon absorber since February 23rd, while both absorbers were scheduled for replacement. Flow to the pre-treatment facility was halted for 28.2 hours, from April 15th to the 16th, and for 53 hours, from July 4th through the 6th, to change-out the carbon in the standby absorber; this included preparation, soaking and backwash operations. The facility was off-line from August 17th through 27th for replacement of the carbon absorption tanks. Additional down time was encountered each quarter due to high differential pressure at the transfer filters caused by

unusually high levels of solids in the influent. Throughout the period covered by this Annual Report, the leachate pre-treatment facility was off-line for a total of 857 hours or 13 percent of the total operational time. There was no untreated leachate discharge or off-site migration. During the ten-day interval when the carbon absorbers were being replaced, the water level in the interceptor trench was monitored. While the water level did rise, it remained below the top elevation of the geomembrane cutoff wall and was immediately lowered once the pump stations were back on-line. The water level returned to the previous operational drawdown elevation within three days. These results are supported by a review of the available information regarding the size of the interceptor trench and the estimated porosity of the material within the trench, which indicated that there was sufficient storage capacity during this period. Based on these observations, and the documented water quality results of the treatment plant influent (i.e., the interceptor trench water quality) discussed at the end of this section, it is unlikely that there were any impacts to surface water in Fresh Creek Basin adjacent to the interceptor trench from the ground water beneath the site during this period.

The effluent flow meter (FT-301) stopped working on November 4th. After in-house and manufacturer attempts to maintain and repair the meter, a replacement has been ordered. In the interim, the influent flow meter and the City water meter readings are being used to determine the plant discharge flow. The influent flow meter was calibrated and certified on September 1, 2010.

During this nine month period, 12,350 pounds of citric acid were added, at an average dosage of 238.4 mg/L, to adjust the influent pH and enhance treatment. The citric acid feed remained on automatic mode.

The filter bags on the newly installed filter at the influent to the Oil-Water Separator (OWS) Tank were replaced twenty-eight times, three times with 200-mc bags, 20 times with 300-mc bags and five times with 400-mc bags. The optimal filter bag micron rating for the OWS-Inlet filter has not yet been determined; although the 300-mc filters appear to be adequate. The OWS was desludged and washed, and the coalescers were removed and thoroughly cleaned on a monthly basis. This maintenance task is extending the life of the petro-screen coalescers and the downstream process units. No floating product was found on the surface of the OWS during the period covered by this Annual Report. Sludge is removed and transferred to totes, were it is allowed to settle and the water is then decanted to the head of the plant.

The two transfer filters, F-201 and F-202, are run in parallel. The filter bags are normally replaced three times per week, on Mondays and Wednesdays with 50 mc bags, and, on Fridays, with 100 mc bags. During this nine-month reporting period, one-hundred and sixty-two 50-mc and eighty-two 100-mc filter bags were used at the transfer filter station.

While arrangements were being made to replace both carbon absorber tanks, the plant operated with the standby absorber. While in service, this temporary absorber was backwashed thirty-three times. The newly installed absorption tanks were backwashed 14 times. The carbon absorption effluent filter was replaced ten times using 150-mc filter bags. The twin filters that are

used to filter the effluent from the standby tank and during normal operation to filter the backwash effluent were replaced with thirty-nine 25-mc filter bags. The twin filters were removed from service due to leaks and corrosion and replacements are being ordered.

Inspection and monitoring of the groundwater/leachate pre-treatment system was conducted following the O&M Manual and procedures. Daily Operations, bi-weekly (GWL-1), monthly (GWL-2), quarterly (GWL-3), semi-annual (GWL-4) and annual/3 year (GWL-5) inspections were performed. Another form, DP-1, "Description of Deficiencies and Problems," is used to highlight specific problems requiring timely attention. Deficiencies that were encountered and repaired during this reporting period included a malfunctioning discharge tank level sensor, intermittent electrical problems with the pH meter and the replacement of the carbon adsorption tanks. Copies of the inspection reports were provided in Appendix A of the Quarterly Reports for the periods for which they are performed.

The M-1 pre-treatment system effluent is regulated by NYCDEP Industrial Wastewater Discharge (IWD) Permit No. 07-P3145-2. In accordance with the permit, effluent samples were collected on a monthly basis. Appendix B of the Quarterly Reports contains the results of the laboratory analyses.

The Self Monitoring Reports were submitted to the NYCDEP Industrial Pre-treatment & Permit Section. There were no exceedances of any of the permit parameters during the period covered by this Annual Report. A copy of these reports is included in Appendix B of the Quarterly Reports.

While the NYCDEP IWD permit regulations require monthly monitoring of the pre-treatment system effluent, the permit does not require any other monitoring to be performed within the pre-treatment system. However, in December 2009 NYCDEP initiated semi-annual influent sampling for the same parameters as the M-1 sampling event to monitor and document the pre-treatment plant influent (i.e., leachate interceptor trench) water quality and provide an indication of the overall treatment system efficiency. NYCDEP subsequently increased the sampling frequency to a quarterly schedule, and, in November 2010, it was again increased to a monthly collection schedule.

Every month, the influent samples are collected at the same time as the effluent samples. The increase in frequency of influent sample analysis was based on the influent water quality results to date which indicate minimal landfill leachate impacts to the groundwater in the trench. The influent sample analyses have shown that the influent water quality meets the permit discharge limits without pre-treatment. It is anticipated that if the influent water quality continues to meet the IWD Permit discharge requirements there will no longer be a need for pre-treatment and a request will be made during the next reporting period to pump the water from the interceptor trench directly to the 26th Ward WWTP. The influent samples collected on June 9th, September 8th, November 22nd and December 13th, were analyzed for metals, leachate parameters, volatile and semivolatile compounds, and PCBs. The majority of these parameters, including PCBs, were not detected. For comparison purposes, the concentrations of the detected parameters were

evaluated based on the IWD permit limits for the pre-treatment system discharge and NYSDEC saline surface water standards, and summarized in Table 1 of this Report. It should be noted that there are no quality standards for saline groundwater. Examination of the data indicates that the concentration of each detected parameter in the pre-treatment system influent samples is lower than its respective IWD permit discharge limit. This finding indicates that during the period covered by this Annual Report, the facility influent met the pre-treatment system IWD permit discharge limits prior to treatment.

Also during this reporting period, four parameters were detected at concentrations higher than their respective saline surface water standard or guidance value in at least one influent sample as shown in the table below. In addition, although there is no saline surface water standard or guidance value for Total Chromium, one influent Total Chromium result was greater than the saline surface water standard for Hexavalent Chromium. While further analysis would be needed to determine the type of Chromium present, it should be noted that Chromium is more commonly occurring in the trivalent state.

A comparison of the results for the three rounds of influent and effluent samples that were collected contemporaneously shows that the concentrations of these five parameters in the effluent were lower than the surface water protection criteria except for one very slight exceedance for chlorobenzene in the December sample. Moreover, the average effluent concentration of every parameter was lower than the surface water protection criteria, and the criterion for chlorobenzene is a guidance value rather than a standard. Therefore, the pretreatment plant effectively reduced the concentrations of these five parameters to levels that (except for one very slight exceedance for chlorobenzene in the December) would have met the discharge standards for saline surface waters.

Parameter	Units	Class SA Standard	Influent Results				Effluent Results			
			9/8/10	11/22/10	12/13/10	Average	9/9/10	11/22/10	12/13/10	Average
Chromium, Total	mg/L	0.0054 *	<0.025	**0.006**	<0.025	0.0020	<0.005	0.005	<0.005	0.0017
Copper	mg/L	0.0034	**0.47**	**0.06**	<0.05	**0.1767**	<0.01	<0.01	<0.01	<0.01
Nickel	mg/L	0.0082	**0.14**	<0.01	<0.05	**0.0467**	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.066	**0.19**	<0.001	**0.76**	**0.317**	0.05	0.03	0.02	0.033
Chlorobenzene	ug/L	5**	**18**	**29**	**21**	**23**	<5	<5	**6**	2

* - This standard is for Hexavalent Chromium. There is no standard or Guidance Value for Total Chromium
** - Guidance value only.

Based on the above findings, in addition to meeting all permit discharge requirements the facility significantly reduced the concentrations of the five parameters present at concentrations exceeding the saline surface water protection criteria, and the average concentrations of these five parameters were lower than these criteria during this reporting period.

Furthermore, while the groundwater in the interceptor trench is prevented from migrating to the creek due to the trench's vertical geomembrane cutoff wall and the two pumping stations that collect and convey the groundwater to the pretreatment system, it is expected that these parameters would otherwise normally be attenuated by naturally-occurring reducing conditions and biodegradation in the subsurface soils and creek bed sediment.

2. Landfill Gas Management System

The landfill gas management system represents one of the elements of the selected remedy in the Site's ROD. The ROD required the selected remedy "to ensure full collection and control of landfill gas". This system must also meet the requirements of 6 NYCRR Part 360 to limit off-site gas migration to the lower explosive limit at the property line (i.e., 5% gas in air) and 25% of the LEL in structures (i.e., 1.25% gas in air). The landfill gas management system operates in accordance with an Air Facility Registration Certificate # 2-6105-00762/00001 issued by the NYSDEC.

The system features 46 gas extraction wells (EWs), a below-grade polyethylene collection header piping network with isolation valves, two 375-scfm centrifugal blowers (blower 301 and blower 302), a condensate collection system, an enclosed flare system, process instrumentation and controls, a programmable control logic management system, a fire alarm system and an emergency condition alarm autodialer phone system. On August 20th, the facility passed its annual FDNY inspection. A plan of the overall Landfill Gas Management System is shown on Figure 3 illustrating the location of the extraction wells, header pipe and flare facility.

All 46 EWs were inspected and monitored for gas content (percent CH_4, CO_2 and O_2), temperature and vacuum pressure each month. Deficiencies such as missing signage, track cleaning or sampling port repair were corrected at the times of the inspections. Work orders were issued for other work, as required. The LFG-3 reports are included in Appendix C of the Quarterly Reports.

The main header that conveys the landfill gas is connected to a condensate drain line at its low point, located adjacent to the flare station. The condensate drain line and the drain lines from the two blower demisters (knock out pots) empty into the 2,500 gallon condensate tank located at the flare station. At the end of the period covered by this Annual Report , the condensate tank contained 1,545 gallons.

Main piping on the vacuum side of the blowers contains an 8-inch butterfly valve with an electric actuator. This automatically adjusts the valve position according to the vacuum transmitter readings in order to control the landfill vacuum. This is followed by an 8-inch electro-pneumatic butterfly valve which operates with a compressed nitrogen cylinder. This valve automatically closes in the event of a system failure or shutdown.

The gas flare system is designed to operate with one blower in service and one as redundant standby. Although designed to collect up to 375 scfm of landfill gas, the system averaged 77.1 scfm during the period covered by this Annual Report. Blowers are switched periodically and preventive maintenance is performed to ensure both blowers remain in good operating condition. Process gas temperature and pressure readings from the vacuum and discharge side are recorded daily in the LFG-1 inspection log. The monthly summary report of the LFG-1 daily inspections is attached in Appendix C of the Quarterly Reports.

Landfill gas is discharged from the blowers through an 8-inch header and flame arrestor into the enclosed flare. The flare pilot is fired using natural gas from the utility company. The natural gas is also used as auxiliary fuel to supplement the recovered landfill gas and is typically used in the colder months. The supplemental natural gas valve that had been closed off in mid-May had to be cracked open on July 13th because of low methane content of the landfill gas. The valve was again closed on November 5th due to improved landfill gas quality. During the period covered by this Annual Report, 1,432,720 SCF of natural gas was used to supplement the landfill gas supply to the flare. The flare support system includes a purge air blower, two manual and two automatic dampers, temperature control with three thermocouples. The flare operation is normally on automatic control using the middle thermocouple at a target temperature of 1,500 ^{o}F. On March 31, 2010, a power failure produced a surge that damaged the middle thermocouple and control was switched to the bottom unit. The thermocouple manufacturer is no longer in business, so an in-kind substitute was suggested by the flare manufacturer. On November 6, 2010, the replacement unit was installed and flare temperature control was switched back to the middle thermocouple.

During this nine-month reporting period, the landfill gas flaring system processed 29,231,392 SCF of landfill gas. The flare ran for 95.7% of the time. The UV flame detectors tripped numerous times sending out false alarms, most of which resulted in FDNY response. Flame detection equipment malfunction, flare temperature control problems, fire alarm programming, actuator valve maintenance, autodialer repairs and system testing constituted the total gas flare operation down time of 285.1 hours or 4.3% of the nine-month interval. Flow data is summarized in the table that follows.

Month	**Landfill Gas Flow (Standard Cubic Feet)**
April 2010	3,469,393
May 2010	3,815,286
June 2010	3,560,040
July 2010	2,973,922
August 2010	2,756,948
September 2010	2,482,426
October 2010	2,952,828
November 2010	3,384,220
December 2010	3,836,329
Total	**29,231,392**

Bi-weekly (LFG-2) and quarterly (LFG-4) inspections were conducted, and copies are included in Appendix C of the Quarterly Reports. The only deficiencies encountered at the flare and blower station during scheduled inspections were the malfunctioning middle thermocouple, UV flame detectors and flare temperature control louver motor. On November 16th, control was switched back to the middle thermocouple. The UV flame detectors were successfully repaired and reprogrammed, on December 7th. A replacement louver motor has been ordered. The landfill gas flare flow meter was serviced and calibrated on September 1st and the readings continue to remain in range.

The NYCDEP's oversight consultant performed an overall evaluation of the Landfill Gas Management System, at NYCDEP's request, utilizing data collected to date and made recommendations to improve system performance. These recommendations will be implemented during future reporting periods.

3. Final Cover System

The landfill final cover system prevents stormwater infiltration into the landfill and landfill gas migration into the atmosphere. The ROD stipulated the construction of a 6 NYCRR Part 360 landfill cap. According to the O&M Manual, the cover is comprised of a vegetative topsoil layer with a minimum thickness of 6 inches; a 12-inch-thick soil barrier protection layer; a Type 2 cover system double-sided geocomposite drainage layer (areas with less than 5% slope); a Type 1 cover system cushion geotextile layer (areas with more than 5% slope); a 40-mil thick LLDPE (linear low density polyethylene) geomembrane liner; and 6-inch-thick Type II cover soil.

The O&M Manual requires the final cover system be inspected 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 surface of the landfill was divided into 17 inspection zones. All 17 inspection zones are shown in Figure 4, which is utilized to identify the system components. This figure is also utilized to identify the components of the stormwater and ancillary systems. A record of the Final Cover System inspection is summarized on a Monthly Checklist Form FCS-1, with deficiencies noted on the Deficiency and Problems Form (DP-1). The monthly inspection reports can be found in Appendix D. The Final Cover System is inspected for surface cracking, vegetative growth, vector penetration, settlement, erosion, slope stability, seepage, and vandalism. The inspection is performed by walking up and down the side slopes and across each zone several times.

The erosion-related deficiencies associated with nature trail drainage were addressed in August 2010. The effectiveness of these repairs is being monitored. Previous repairs to the erosion in Zone 12 have not proven effective. A permanent-repair plan is being developed by the NYCDEP and their oversight consultant and is scheduled for the next planting period.

4. Stormwater Management System

The stormwater management system is an integral part of the capping and closure system required under the 6 NYCRR Part 360 regulations to protect the landfill final cover system. The system was designed to collect, transport and discharge stormwater to the surface waters surrounding the PAL in order to prevent stormwater ponding and erosion damage to the final cover system.

This system consists of several components which require monitoring, inspection, and periodic maintenance. The system has been divided into three subsystems (SWM-1, SWM-2 and SWM-3) for ease of inspection and reporting. These subsystems include:

- SWM-1: Geocomposite drain pipes and stormwater drainage swales,
- SWM-2: Outlets, culverts, rip-rap inlet and outlet protection and revetment area, and
- SWM-3: HDPE downchute pipes, manholes, pipe trenches and energy dissipation structures.

The O&M Manual requires that Stormwater Management Systems SWM-1, SWM-2 and SWM-3 be inspected on a monthly basis and after a storm event equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). A record of the inspection is summarized on Monthly Checklist Forms SWM-1, SWM-2, SWM-3 and DP-1 (for SWM-1, SWM-2 and SWM-3) for each system in accordance with the requirements of the O&M Manual. A Deficiency and Problems Form DP-1 is completed to summarize the items marked not satisfactory (NS) in the stormwater system checklist forms.

Deficiencies identified during the period covered by this Annual Report do not necessarily affect the efficient performance of this system. Inspection of the system during and after storm events, indicate that it is working properly. The concrete pad around Manhole D1A is cracked and has shifted, but this is monitored and there has been no change to this condition in the past three and a half years. The swales and culverts were mowed, weed-wacked, cleaned out, invasive trees and excessive vegetative growth was removed and repairs performed. The monthly inspection reports can be found in Appendix D of the Quarterly Reports.

5. Ancillary Systems

The Ancillary Systems (ANS) are those support systems at the PAL that are used for site access and security. The ancillary systems include five (5) access roads (A, B, C, D and E) and two (2) nature trails (East & West), along with fences, gates, and locks. The roadways are integral in providing access to perform required inspection, monitoring and maintenance activities. In addition, since the selected remedy resulted in leaving waste on-site, the security fences and gates provide important institutional controls to prevent site access to unauthorized individuals.

The O&M Manual requires that the ANS be inspected on a monthly basis. A record of the inspection is summarized on Monthly Checklist Forms ANS-1 and DP-1 (for ANS-1) in accordance with the requirements of the O&M Manual. The instructions for the checklists further require inspections after storm events equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). These are incorporated into the monthly inspections found in Appendix D.

Damage and wear are inherent in unpaved roads. Potholes on the access roads are recurring and are filled in as part of routine maintenance. Potholes and ruts resulted from plowing roads and parking lots after snow storms. Road repairs and resurfacing was completed in July. Nature trail and associated final cover erosion repairs were completed in August 2010. However, the severe winter and heavier than normal traffic (associated with the NYCDOT's ongoing Belt Parkway improvements) make it necessary to readdress the resurfacing of some of the roads during the next fair weather season.

Holes found in the perimeter fence are repaired after each monthly inspection. Repairs were completed on the gate providing access to the wastewater treatment plant and the perimeter gate located on Department of Transportation property. Trees infringing on the perimeter fence were cut and removed. Installation of "No Trespassing" signs along the perimeter fence is in progress. Locks are inspected and lubricated quarterly, and as needed. Safety inspections are performed monthly. Damaged and missing "Confined Space" and/or "Hazard" signs were also replaced.

6. Post-Closure Environmental Monitoring

The Monitoring Plan for the PAL went into effect when the FER was approved by NYSDEC, at the end of March 2009. The Plan addresses the performance evaluation of the effectiveness of the cap and/or landfill gas collection system in controlling leachate and landfill gas migration. It requires quarterly monitoring of the groundwater elevation and quality at ten wells (HP wells) located around the perimeter, outside the limits of the closure cap, and soil gas quality in five wells (GMW wells) located outside the limits of the cap, parallel to the Belt Parkway. Additionally, monitoring for landfill gas is performed on a monthly basis inside the groundwater/leachate treatment facility building, as per 6 NYCRR Part 360 requirements.

Groundwater Monitoring Results

Modifications to the groundwater portion of the Monitoring Plan were approved by NYSDEC by the third quarter 2009 monitoring event. The changes were to the groundwater sampling procedures and analysis. Specifically, well purging is no longer required, stabilization and low-flow sampling is used for collection of all the samples; and the Part 360 baseline parameters not included in the quarterly schedule are to be analyzed once a year. Additionally, based on a review of hydrologic information contained in the RI Report, it was determined that ground-water monitoring can be performed independently of the tidal cycle. The samples were analyzed by a State-certified environmental laboratory and were validated by an independent data validation company.

There were three groundwater monitoring events during the period covered by this Annual Report. Samples were collected from the ten groundwater monitoring wells in June, September and December. The results for the three groundwater monitoring rounds covered by this Annual Report are summarized in Tables 2 through 5. Note that these tables only list the parameters that have been detected in at least one groundwater sample during the Post-Closure Monitoring Period, many of the parameters analyzed for have not been detected. The groundwater elevation data, the sample collection field logs, the tabulated summary of laboratory results, the laboratory reports, and the Data Usability Summary Report are included in Appendix E of the Quarterly Reports. The complete Data Validation Report can be found in the computer disks located in Appendix G of the Quarterly Reports. Tables 6 through 9 compare the sampling results obtained during this reporting period for the parameters listed in Tables 2 through 5 to previous results for these parameters obtained during the Remedial Investigation, the 2007 monitoring round and the first year of post-closure monitoring. The data is also compared to the NYSDEC ambient water quality standards and guidance values for Class GA (potable) groundwater from TOGS 1.1.1 as there are no NYSDEC quality standards for saline groundwater. Due to the landfill's seaside location, the groundwater underneath it is naturally saline and therefore not potable. Note that five of the groundwater monitoring wells sampled are screened in the saturated fill zone above the tidal marsh deposit (HP-101-U, HP-407-U, HP-104-A, HP-318 and HP-603), two are screened in the upper portion of the Upper Glacial Aquifer (UGA) which lies under the tidal marsh deposit (HP-101-S and HP-407-S), and three wells are screened in the lower portion of the Upper Glacial Aquifer (HP-101-D, HP-407-D and HP-103-D).

Examination of the post-closure groundwater monitoring results reveals that the majority of the volatile and semi-volatile compounds analyzed for were not detected. Similarly, no pesticides or polychlorinated biphenyls have been detected in any of the post-closure groundwater samples collected to date. Most of the leachate indicator parameters were detected, and the majority of the inorganic parameters analyzed for were also detected in at least one of the post-closure monitoring samples collected. However, the majority of these detections are attributed to the naturally saline groundwater conditions beneath the Site.

VOCs – As shown in Tables 2 and 6, a total of nine VOCs have been detected in at least one of the post-closure groundwater samples collected to date; however, three VOCs detected previously (carbon disulfide, MTBE and toluene) were not detected during the period covered by this Annual Report. Sporadic low-concentration VOC detections occurred in several of the wells screened in the saturated fill zone above the tidal marsh deposit (1,4 dichlorobenzene in Wells HP-101-U and HP-318; 1,2,4,5- tetramethylbenzene in Well HP-318; and isopropylbenzene and benzene in Well HP-407-U). Chlorobenzene was the only VOC detected in all the wells screened in the saturated fill zone, with some results above the NYSDEC GA standard for potable groundwater. There were no chlorobenzene detections in the wells screened in the UGA. The only VOC detection in the UGA wells was acetone in the third quarter sample from Well HP-103-D. Analysis of the VOC data shows that the remediation has been successful in reducing the VOC concentrations in groundwater. The PAL is currently not a significant source of VOC releases to groundwater.

SVOCs - Most of the SVOCs analyzed for were also not detected. Tables 3 and 7 list the eight SVOC compounds detected in at least one of the post-closure groundwater samples. These detections were limited to very low concentrations and, during the period covered by this Annual Report, there were no exceedances of the NYSDEC GA standards or guidance values for potable groundwater. Table 7 reveals that these sporadic, low SVOC detections are consistent with the results obtained prior to remediation. Therefore, it can be concluded that the PAL continues to not be a significant source of SVOC releases to groundwater.

Leachate Indicator Parameters – The majority of the leachate indicator parameters analyzed for were detected in most of the ground-water samples collected during this post-closure monitoring period as shown in Tables 4 and 8. Only cyanide and phenols were not detected in any of the samples, and nitrate was only detected in two samples at low concentrations., The return of saline groundwater water conditions, after landfill capping diverted discharge of stormwater directly to receiving waters, is confirmed by the chloride and TDS concentrations detected in the wells screened in lower portion of the UGA. The chloride concentrations exceeded 250 milligrams per Liter (mg/L) at three of the five wells screened in the saturated fill zone above the tidal marsh deposit, and total dissolved solids (TDS) concentrations exceeded 1,000 mg/L in almost every sample of the wells screened in the saturated zone. The detections of bromide, hardness and sulfate are also primarily attributed to the naturally saline ground-water conditions because the highest concentrations of these parameters occured in wells screened in the lower portion of the UGA. Results for chloride in seven wells, for ammonia in nine wells, for sulfate in five wells and for TDS in almost every sample exceed the Class GA standards for potable groundwater. However, the detected concentrations for these parameters, as well as the results obtained for bromide and hardness, are characteristic of the naturally occurring saline groundwater conditions. Review of the data shows a flat or decreasing trend. Significant reductions are not observed for these parameters because of the saline environment.

Inorganic Parameters – The number of inorganic parameters detected has decreased and concentrations are relatively stable or declining. Tables 5 and 9 summarize the data for metals detected in at least one sample collected during post-closure monitoring. Calcium, potassium and sodium were detected in every sample collected, and the results were typical for the saline groundwater conditions. The sodium concentrations were above the Class GA standards for potable groundwater. There are no standards for calcium and potassium. Barium was detected in all the samples collected, at concentrations lower than the Class GA standard. Iron, boron and magnesium were also detected in all the samples. A few of the boron results and all of the iron results were higher than the Class GA standards, and most of the magnesium concentrations higher than the guidance value. Manganese was detected in most samples, and some results were higher than the Class GA standard. Sporadic detections of aluminum (5 samples), chromium (1 sample), nickel (2 samples) and zinc (2 samples) occurred at very low concentration. Chromium, nickel and zinc results were below the Class GA standards or guidance value. There is no Class GA standard for aluminum. Beryllium, cadmium, selenium, silver and thallium have not been detected in any of the post-closure samples collected. Antimony, arsenic, cobalt, copper, lead, mercury and vanadium were previously detected in at least one sample during post-closure

monitoring, but were not detected in any of the samples collected during the period covered by this Annual Report.

Gas Monitoring Results

Perimeter soil gas readings at the five perimeter gas monitoring wells were taken quarterly, on June 14th, September 3rd and December 23rd. Methane readings were consistently 0.0% at GMW-01, GMW-02, GMW-03 and GMW-05. Methane levels at GMW-04 were 0.1%, 0.3% and 1.8%. Table 10 of this Report contains a summary of the perimeter gas monitoring well results during the period covered by this Annual Report. The methane levels at all five gas monitoring wells were less than the lower explosive limit at the property line (i.e., 5% gas in air) which meets the 6 NYCRR Part 360 requirements.

Methane readings within the groundwater/leachate pre-treatment facility building were obtained on a monthly basis and were consistently 0.0% throughout the facility, with one isolated reading of 0.1%, and between 0.0% and 0.3% above the open Oil Water Separator Tank. These readings were taken on April 20th, May 11th, June 3rd, July 19th, August 31st, September 8th and 9th, October 19th, November 22nd and 23rd, and December 13th. The data is summarized in Table 11 of this Report. The methane monitoring results indicate that methane levels within the building were less than 25% of the LEL (i.e., 1.25% gas in air) which meets the 6 NYCRR Part 360 requirements.

On September 24th, landfill surface gas readings were taken, with no detections observed throughout the landfill, except on top of the OWS were a reading of 2 ppm was obtained. Sample locations are shown in Figure 7, and results in Table 7, of the July through September 2010 Quarterly Report.

Based on the results of the post-closure landfill-gas monitoring performed during this reporting period, methane levels measured were less than the 6NYCRR Part 360 requirements indicating that the landfill gas being generated by the PAL is being contained by the collection and treatment system and preventing off-site methane migration. It is expected that landfill gas concentrations will continue to decrease over time as the landfill ages.

Section IV – Conclusions and Recommendations

1. Conclusions

Based on the results of the post-closure activities performed during the period covered by this Annual Report, the PAL was in compliance with the ROD, the OM&M Manual, and the Post-Closure Monitoring Plan requirements, and did not pose a significant risk to public health or the environment during this period. The findings in the previous annual report are corroborated by the monitoring results obtained during the period covered by this Annual Report, further supporting the reclassification of the PAL and the reduction of monitoring frequency.

2. Recommendations

Routine system maintenance and repair of each of the remediation systems should continue in compliance with the requirements of the PAL O&M Manual. Specific recommendations for each of the systems are identified in the following paragraphs.

Groundwater/Leachate Management System

The Groundwater/Leachate Management System is currently operational and meeting it's required discharge limits. In general, it is recommended that individual pieces of equipment continue to be repaired and/or replaced in a timely manner to minimize system down time. Specifically, the recommended corrective actions listed in Form DP-1, Leachate Pre-Treatment System, Descriptions of Deficiencies and Problems, in Appendixes A of the Quarterly Reports should be implemented.

The pre-treatment system influent should continue to be monitored to document the leachate interceptor trench water quality and treatment system efficiency. Based on the influent water quality data obtained to date, the NYCDEP is requesting the NYSDEC's approval to discharge the groundwater/leachate directly to the 26^{tth} Ward WWTP without pre-treatment. The influent water quality data confirms that operating the pre-treatment facility is not necessary because the influent quality and flow rate meet permitted limits prior to pre-treatment. The interceptor trench would continue to be operated, and the pre-treatment facility would be maintained should it be needed in the future. Monthly monitoring for permit-required parameters would also be continued in accordance with the permit requirements.

Landfill Gas Management System

The Landfill Gas Management System is operational and is preventing off-site gas migration. Overall, the methane quality and gas flow in the system have declined since it was first activated. This may be attributable to the age of the landfill, and the condition should continue to be monitored. In general, it is recommended that individual pieces of equipment that are in need of repair continue to be repaired and/or replaced and the current maintenance practices be continued. Specifically, the recommended corrective actions listed in Form DP-1, Landfill Gas System, Descriptions of Deficiencies and Problems, in Appendixes C of the Quarterly Reports should be implemented.

Landfill Final Cover System

Overall the Landfill Final Cover System continues to be protective of the landfill cap beneath it. Conditions found are typical of those encountered during the Landfill Post-Closure period, with only a few deficiencies noted. In general, it is recommended that routine maintenance continue to be performed to control problem areas. This would include filling ruts caused by erosion, reseeding areas where necessary, and maintaining landfill surface slope to promote stormwater

runoff. Specifically, the recommended corrective actions listed in Form DP-1, FCS-1, Descriptions of Deficiencies and Problems, in Appendixes D of the Quarterly Reports should be implemented.

Stormwater Management System

The Stormwater Management System continues to convey stormwater runoff to its outfall locations. Conditions found are typical of those encountered during the Landfill Post-Closure period, with a few deficiencies noted. In general, it is recommended that silt and vegetation in drainage swales continue to be periodically removed and sediment be removed from other portions of the drainage system. Specifically, the recommended corrective actions listed in Form DP-1 (SWM-1, SWM-2 SWM-3), Descriptions of Deficiencies and Problems, in Appendixes D of the Quarterly Reports should be implemented.

Ancillary Systems

The roads and nature trails of the Ancillary Systems continue to provide access throughout the site while the fencing and gates continue to allow for controlled site access. Conditions found are typical of those encountered during the Landfill Post-Closure period, with a few deficiencies noted. In general, it is recommended that routine maintenance continue to be performed to control problem areas from expanding and worsening. This would include filling ruts and depressions in roads and trails and repairing site fencing and gates when necessary. Specifically, the recommended corrective actions listed in Form DP-1, ANS-1, Descriptions of Deficiencies and Problems, in Appendixes D of the Quarterly Reports should be implemented.

Post-Closure Environmental Monitoring

Recommendations this period are to continue to perform the environmental monitoring in accordance with the modified Monitoring Plan until the NYSDEC approves the monitoring frequency reduction requested in NYCDEP's June 16, 2010 letter. [Postscript: NYSDEC approved reducing the frequency of groundwater monitoring to annually, in rotating quarters, and reducing the frequency of monitoring for pesticides and PCBs to once every five years, in a letter to NYCDEP dated March 2, 2011. Future Annual Reporting periods will be on a calendar year basis commencing in January 2011. Therefore, the first quarter 2011 monitoring round shall serve as the annual monitoring round for 2011. The next groundwater monitoring round will be performed during the second quarter of 2012.]

Figures

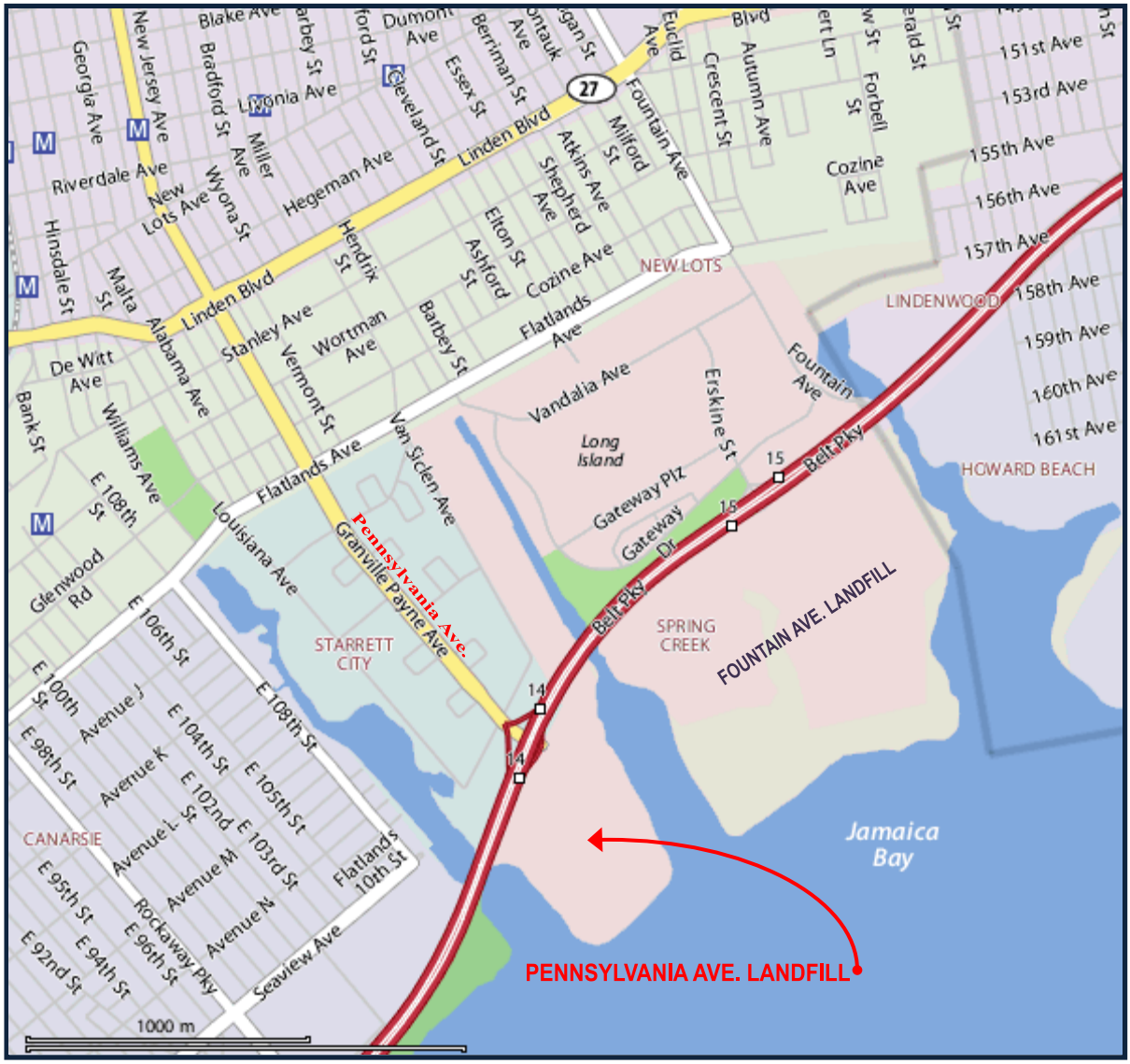

FIGURE 1
SITE LOCATION MAP

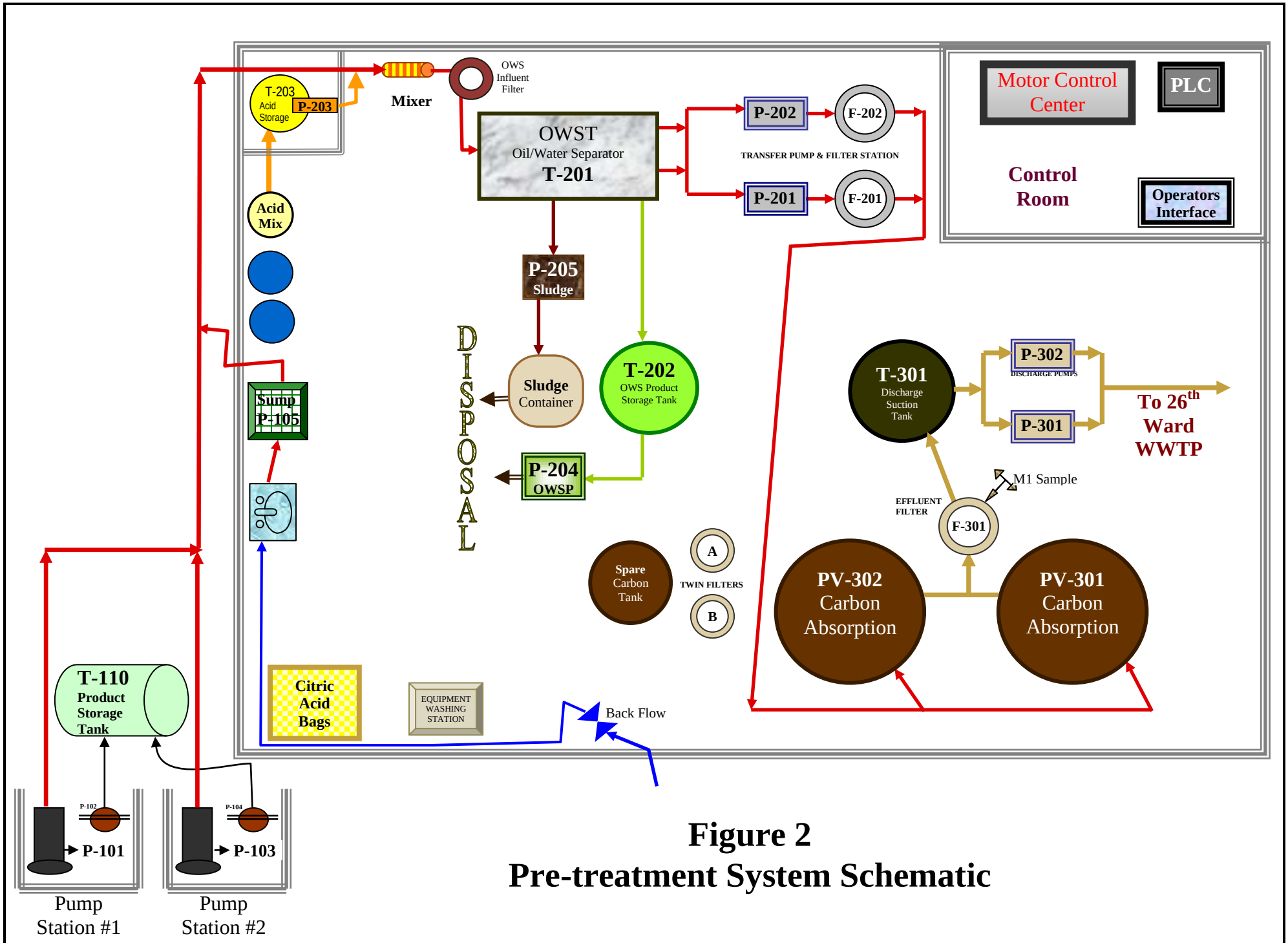

Figure 2
Pre-treatment System Schematic

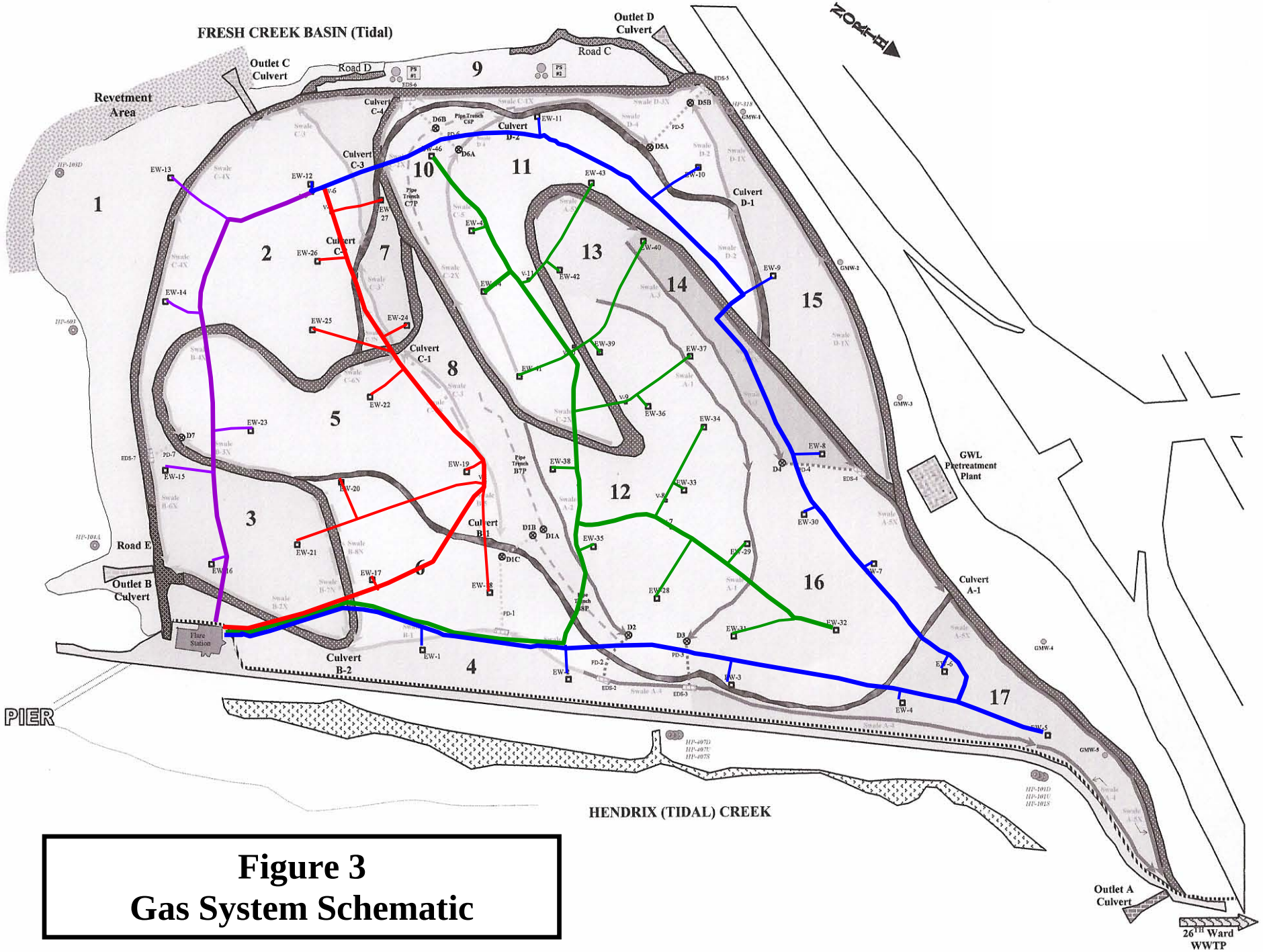

Figure 3
Gas System Schematic

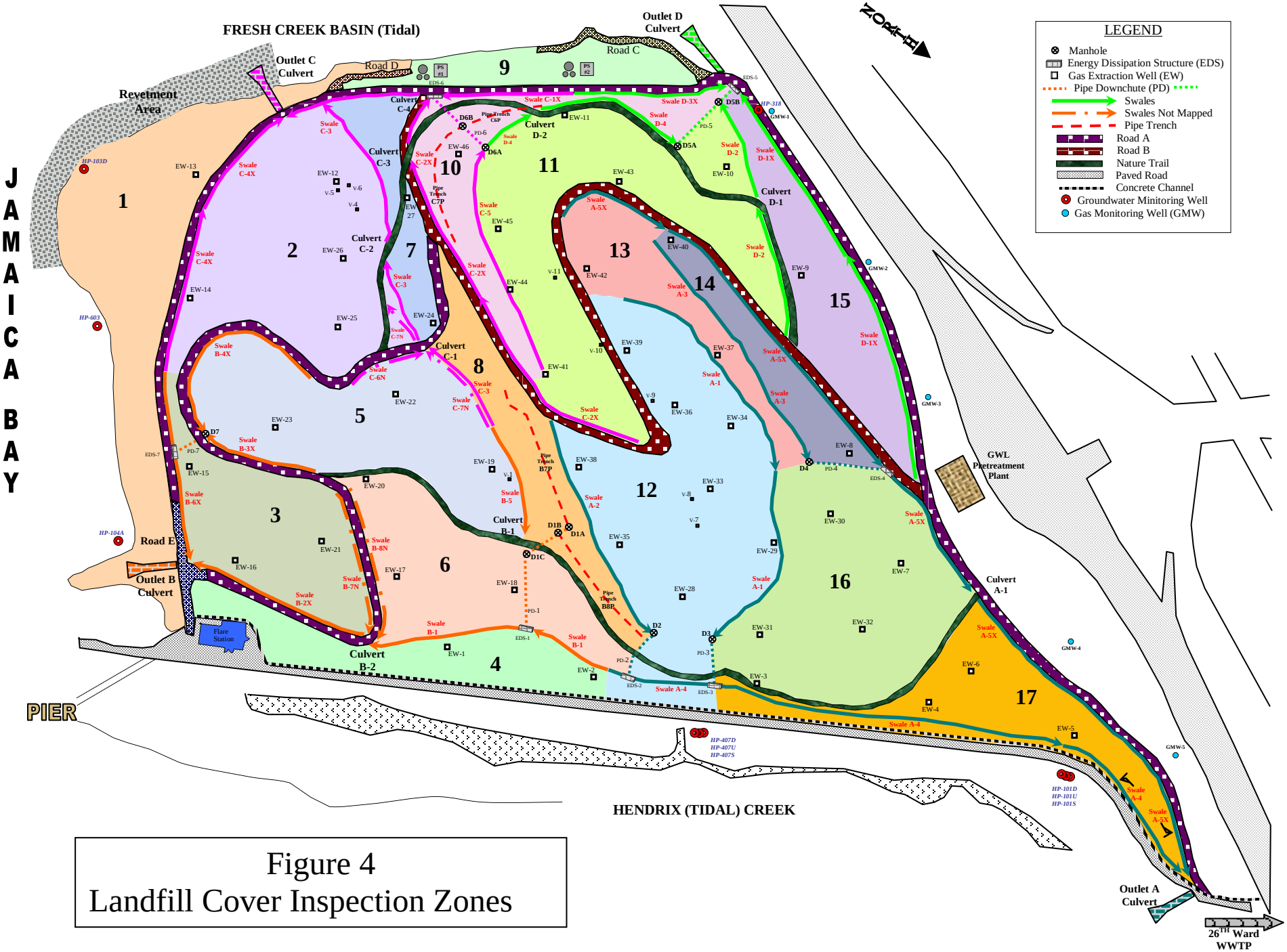

Figure 4
Landfill Cover Inspection Zones

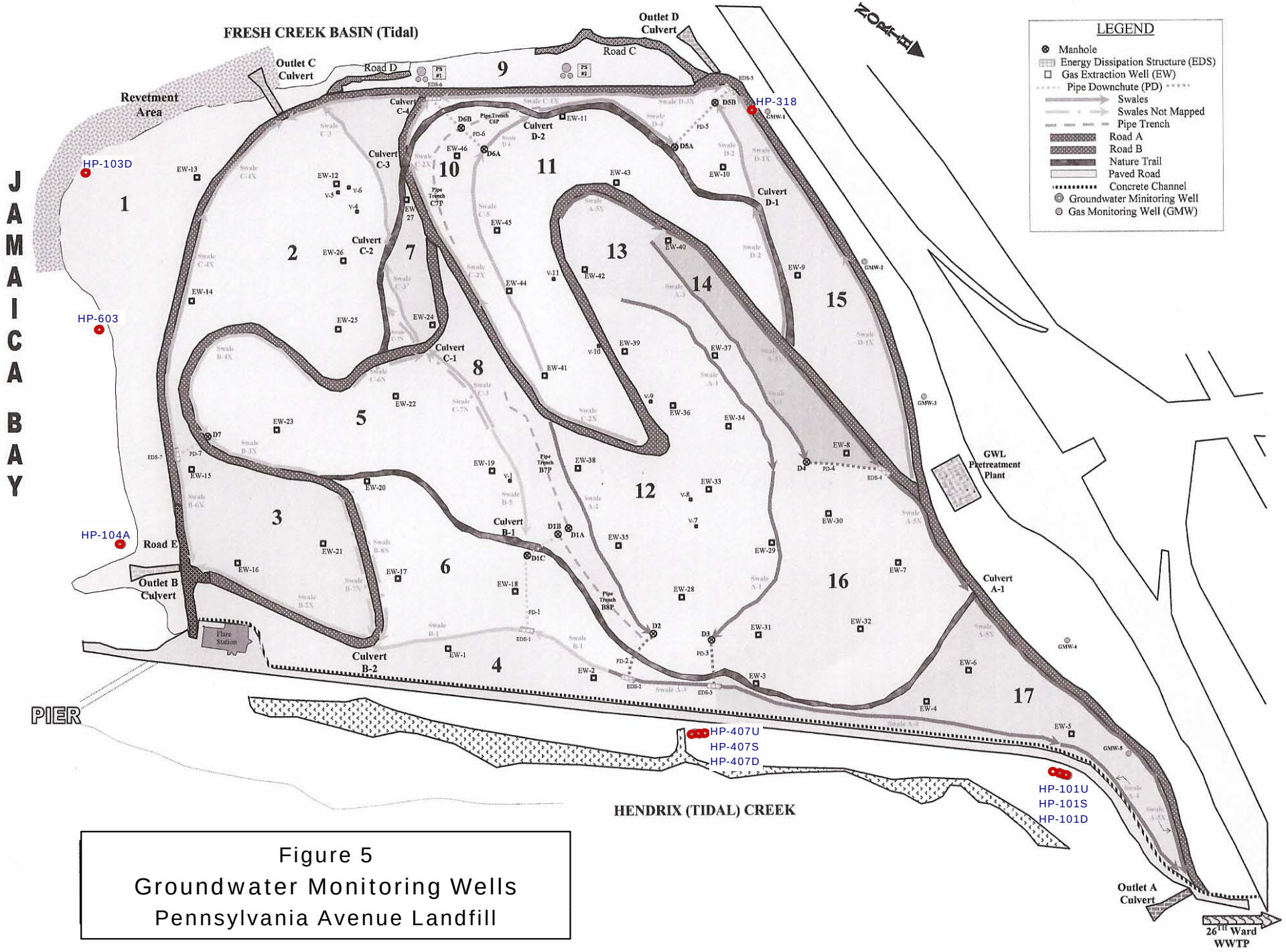

Figure 5
Groundwater Monitoring Wells
Pennsylvania Avenue Landfill

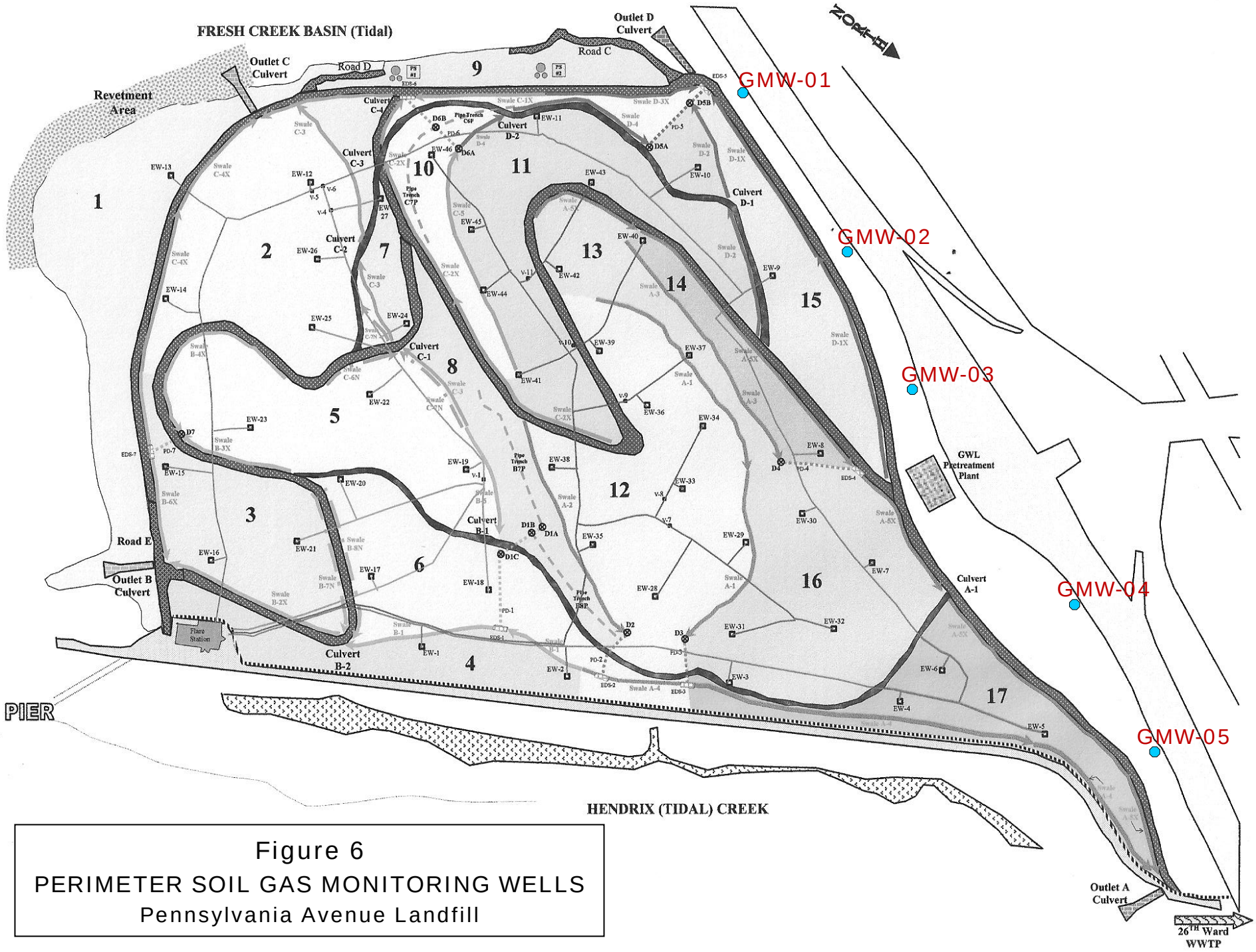

Figure 6

PERIMETER SOIL GAS MONITORING WELLS

Pennsylvania Avenue Landfill

Tables

Table 1
Parameters Detected in the Groundwater Leachate Pretreatment System Influent
Pennsylvania Avenue Landfill, Brooklyn, NY

Analyte	Unit of Measure	IWD Permit Discharge Limit(s)	NYSDEC Saline Surface Water Standard(s)	Standard Type	Influent Sample Results			
					6/9/2010	9/8/2010	11/22/2010	12/13/2010
Chromium, total	mg/L	5.0*	0.0054*	A(C)	0.005	<0.025	**0.006**	<0.025
Copper	mg/L	5	0.0034 or 0.0048	A(C) or A(A)	**0.07**	**0.47**	**0.06**	<0.05
Nickel	mg/L	3	0.0082 or 0.074	A(C) or A(A)	**0.01**	**0.14**	<0.01	<0.05
Zinc	mg/L	5	0.066	A(C)	**0.1**	**0.19**	<0.001	**0.76**
BOD	mg/L	--	--		130	<15	<50	<10
Chloride	mg/L	--	--		3,800	4,700	4,900	3,300
Nitrate	mg/L	--	--		<0.5	1.7	<0.5	0.5
Nitrogen	mg/L	--	--		72	57	68	55
TSS	mg/L	350	--		24	7	50	13
TKN	mg/L	--	--		72	55	68	54
pH	SU	5.0 - 11.0	--		6.65	6.98	6.80	6.88
Benzene	ug/L	134 or 57**	190 or 670	A(C) or A(A)	6	1	<5	<1
Chlorobenzene	ug/L	--	5^{GV}	A(C)	**37**	**18**	**29**	**21**
Ethylbenzene	ug/L	380 or 142**	4.5 or 41	A(C) or A(A)	2	<1	<5	<1
Bis(2-ethylhexyl) Phthalate	ug/L	--	--		6.7	6.5	<1	<1
Di-n-butyl Phthalate	ug/L	--	--		1.2	<1	1.1	<1
N-Nitrosodiphenylamine	ug/L	--	--		<1	<1	7.2	<1

Footnotes:

mg/L = milligrams per Liter.

ug/L = micrograms per Liter.

SU = Standard Units.

-- No standard available.

A(A) = Fish survival.

A(C) = Fish propagation

GV = Guidance Value only, not a standard.

***** Limit/Standard for hexavalent chromium. As per IWD Permit, Section B, Table footnote 2, if the Chromium (Total) level is less than or equal to 5.0 mg/L, then analyzing for Chromium (Hexavalent) at that point is not required. The Chromium (Total) level can be submitted in lieu of analyzing for Chromium (Hexavalent). No standard for Trivalent Chromium, which is the most common form.

****** Daily and monthly limits, respectively.

Bold values exceed saline surface-water standard. No results exceeded permit discharge limits.

Table 2

Summary of Target Volatile Organic Compounds (VOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit														
			HP-101-U			HP-407-U			HP-104-A			HP-318			HP-603		
			2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
1,4 Dichlorobenzene	ug/L	**3**	<1	3	3	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1
1,2,4,5 Tetramethylbenzene	ug/L	**5**	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	1	1	NA	<1	<1
Acetone	ug/L	**50(GV)**	R	<10	<10	R	<10	<10	R	<10	<10	R	<10	<10	R	<10	<10
Benzene	ug/L	**1**	<1	<1	<1	**2**	**2**	**2**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	ug/L	**60**	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J
Chlorobenzene	ug/L	**5**	**7**	**10**	**8**	4	4	4	3	**6**	5	**9**	**14**	**11**	2	2	2
Isopropylbenzene	ug/L	**5**	NA	<1	<1	NA	1	1	NA	<1	<1	NA	1	<1	NA	<1	<1
MTBE	ug/L	**10**	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1
Toluene	ug/L	**5**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer						Wells Screened in the Lower Portion of the Upper Glacial Aquifer								
			HP-101-S			HP-407-S			HP-101-D			HP-103-D			HP-407-D		
			2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
1,4 Dichlorobenzene	ug/L	**3**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4,5 Tetramethylbenzene	ug/L	**5**	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1
Acetone	ug/L	**50(GV)**	R	<10	<10	R	<10	<10	R	<10	<10	R	22	<10	R	<10	<10
Benzene	ug/L	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	ug/L	**60**	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J	<1	<1	<1 J
Chlorobenzene	ug/L	**5**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/L	**5**	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1
MTBE	ug/L	**10**	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1
Toluene	ug/L	**5**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Footnotes:

Only the target VOCs detected in at least one groundwater sample during the entire Post-Closure Period to date are listed. All other target VOCs analyzed for were not detected.

The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturally saline; therefore, non-potable. There are no VOC standards for saline groundwater.

Standards with the (GV) notation are guidance values only.

Results shown in bold font are higher than the potable groundwater standard.

NA = Not analyzed.

R = Data qualified as rejected.

J = Data qualified as estimated.

Table 3

Summary of Target Semi-Volatile Organic Compounds (SVOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit														
			HP-101-U			HP-407-U			HP-104-A			HP-318			HP-603		
ANALYTE	UNITS	NYSDEC Class GA Standard	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
1,4 Dichlorobenzene(sv)	ug/L	**3**	<1	<1	1.5	R	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1 J
Acenaphthene	ug/L	**20(GV)**	<1	<1	<1	R	<1	<1	<1	<1	<1	8.2	4.1	<1	<1	1.7	<1 J
BenzylButylPhthalate	ug/L	**No Std.**	<1	<1	<1	R	1.9	<1 J	<1	3.1	<1	<1	<1	<1	<1	3.1	<1
Bis(2-ethylhexyl)phthalate	ug/L	**5**	<1.5	<5.3	5	R	<11	1.8 J	<2.1	<23	1.5	<1.1	<26	1.3	<1.2	<18	1.0
Di-n-Butyl Phthalate	ug/L	**50**	<1	<1	<1	R	1.2	<1	<1	2.5	<1	<1	2.3	<1	<1	2.1	1.8 J
Di-n-octyl Phthalate	ug/L	**50(GV)**	<1	<1	<1	R	<1	<1 J	<1	<1	<1	<1	1.3	<1	<1	2	<1 J
Dibenzofuran	ug/L	******	<1	<1	<1	R	<1	<1	<1	<1	<1	2.9	1.8	<1	<1	<1	<1 J
Fluorene	ug/L	**50(GV)**	<1	<1	<1	R	<1	<1	<1	<1	<1	1.5	1	<1	<1	<1	<1 J

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer						Wells Screened in the Lower Portion of the Upper Glacial Aquifer								
			HP-101-S			HP-407-S			HP-101-D			HP-103-D			HP-407-D		
ANALYTE	UNITS	NYSDEC Class GA Standard	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
1,4 Dichlorobenzene(sv)	ug/L	**3**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 J	<1	<1	<1
Acenaphthene	ug/L	**20(GV)**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 J	<1	<1	<1
BenzylButylPhthalate	ug/L	**No Std.**	<1	1.2	<1	<1	<1	<1	<1	<1	<1	<1	2.1	<1	<1	<1	<1
Bis(2-ethylhexyl)phthalate	ug/L	**5**	<1.7	<6.3	<1	<2.4	<6.8	1.4	<2.2	<16	4.9	<2.2	<19	2.2	<9.8	<13	1.9
Di-n-Butyl Phthalate	ug/L	**50**	<1	<1	<1	<1	<1	<1	<1	1.6	<1	<1	1.9	1.6 J	<1	<1	<1
Di-n-octyl Phthalate	ug/L	**50(GV)**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.3	<1 J	<1	<1	<1
Dibenzofuran	ug/L	******	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 J	<1	<1	<1
Fluorene	ug/L	**50(GV)**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 J	<1	<1	<1

Footnotes:

Only the target SVOCs detected in at least one groundwater sample during the entire Post-Closure Period to date are listed. All other target SVOCs analyzed for were not detected.

The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturally saline; therefore, non-potable. There are no SVOC standards for saline groundwater.

Standards with the (GV) notation are guidance values only.

** = Limit is 7 x 10^{-7} as 2,3,7,8-TCDD equivalent, but this is a potable water standard that is not applicable to this site.

Results shown in bold font are higher than the potable groundwater standard.

Bis(2-ethylhexyl)phthalate values for 2Q10 and 3Q10 are to be preceded by less than sign, according to validation report.

R = Data qualified as rejected.

J = Data qualified as estimated.

Table 4
Summary of Leachate Indicator Parameters Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit														
			HP-101-U			HP-407-U			HP-104-A			HP-318			HP-603		
			2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
Alkalinity	mg/L	**No Std.**	500	620	460	1,400	1,800	1,800	650	920	710	130	520	380	200	280	270
Ammonia	mg/L	**2**	**7.4**	**8.6**	**10**	**90**	**130**	**120**	**4.0**	**6.6**	**12**	**21**	**26**	**16**	**2.2**	**2.8**	2
BOD_5	mg/L	**No Std.**	NA	6	<2	NA	16	4.3	NA	<2	<2	NA	4.6	2.9	NA	<2	<2
Bromide	mg/L	**$2^{(GV)}$**	NA	1.1	1.2	NA	**3.2**	**3**	NA	1.2	1.5	NA	1.3	1.2	NA	0.8	1
Chloride	mg/L	**250**	**1,100**	**1,000**	**950**	**370**	**420**	**370**	84	110	160	**430**	**930**	**1,000**	76	86	85
COD	mg/L	**No Std.**	NA	80	<40	NA	330	300	NA	40	<40	NA	160	1,000	NA	<40	<40
Color	Color units	**15**	NA	**30**	**60**	NA	**150**	**200**	NA	**20**	**20**	NA	**20**	**15**	NA	10	**20**
Hardness	mg/L	**No Std.**	390	410	450	720	780	760	660	680	660	350	770	570	470	530	540
Nitrate	mg/L	**10**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5
Sulfate	mg/L	**250**	110	75	150	30	<10	<10	63	38	180	20	9	9	**290**	**360**	**300**
Tot. Dissolved Solids	mg/L	**1,000**	**2,200**	**2,200**	**2,100**	**1,800**	**2,200**	**1,900**	930	**1,100**	**1,000**	**1,100**	**2,500**	**2,100**	800	**1,000**	930
Tot Organic Carbon	mg/L	**No Std.**	NA	5.7	11	NA	48	67	NA	10	11	NA	4.1	2.6	NA	5.1	1.9
Tot. Kjeldahl N.	mg/L	**No Std.**	8.4	10	11	94	130	120	5.4	7.8	13	22	28	17	2.8	3.8	3.2

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer						Wells Screened in the Lower Portion of the Upper Glacial Aquifer								
			HP-101-S			HP-407-S			HP-101-D			HP-103-D			HP-407-D		
			2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
Alkalinity	mg/L	**No Std.**	840	1,000	760	800	560	560	730	1,000	760	210	1,100	230	240	260	300
Ammonia	mg/L	**2**	**4.6**	**4.8**	**4**	**10**	**12**	**12**	**15**	**24**	**17**	**5.4**	**67**	**4.4**	2.0	1.6	2
BOD_5	mg/L	**No Std.**	NA	2.1	<2	NA	2.6	2.3	NA	7.3	<2	NA	7.5	2.8	NA	3	<2
Bromide	mg/L	**$2^{(GV)}$**	NA	**2.3**	**2.6**	NA	**22**	**13**	NA	**43**	**99**	NA	**13**	**110**	NA	**19**	**12**
Chloride	mg/L	**250**	**2,800**	**2,400**	**1,900**	**8,100**	**8,000**	**8,800**	**26,000**	**28,000**	**29,000**	**17,000**	**3,200**	**17,000**	**10,000**	**10,000**	**10,000**
COD	mg/L	**No Std.**	NA	220	90	NA	600	450	NA	2,200	1,400	NA	300	80	NA	650	450
Color	Color units	**15**	NA	**50**	**50**	NA	**25**	**100**	NA	**50**	**80**	NA	**80**	10	NA	15	**80**
Hardness	mg/L	**No Std.**	560	590	570	2,500	2,600	2,600	2,300	1,500	2,300	4,700	1,200	4,900	3,000	3,100	3,100
Nitrate	mg/L	**10**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	15	<0.5	<0.5	<0.5	<0.5
Sulfate	mg/L	**250**	13	<10	<5	**750**	**800**	**700**	**1,000**	**680**	**980**	**2,100**	**330**	**1,900**	**1,300**	**1,200**	**1,100**
Tot. Dissolved Solids	mg/L	**1,000**	**4,900**	**4,400**	**3,100**	**14,000**	**15,000**	**13,000**	**40,000**	**46,000**	**37,000**	**29,000**	**6,200**	**28,000**	**18,000**	**18,000**	**17,000**
Tot Organic Carbon	mg/L	**No Std.**	NA	4.8	9.1	NA	1.7	2.1	NA	3.8	4.5	NA	41	<0.5	NA	<0.5	1
Tot. Kjeldahl N.	mg/L	**No Std.**	5.6	5.4	4.8	12	13	13	16	25	18	6.0	71	5.2	2.8	2.4	2.6

Footnotes:

Only the leachate indicator parameters detected in at least one groundwater sample during the entire Post-Closure Period to date are listed. Cyanide and Phenols are not detected.

The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturally saline; therefore, non-potable. There are no saline groundwater standards for these parameters.

Results shown in bold font are higher than the potable groundwater standard.

NA = Not analyzed.

Table 5
Summary of Metals Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit														
		NYSDEC Class GA Standard	HP-101-U			HP-407-U			HP-104-A			HP-318			HP-603		
ANALYTE	UNITS		2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
Aluminum	mg/L	**No Std.**	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05
Antimony	mg/L	**0.003**	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025
Arsenic	mg/L	**0.025**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Barium	mg/L	**1**	0.1	0.11	0.1	0.91	1	0.99	0.22	0.19	0.2	0.032	0.066	0.058	0.037	0.044	0.065
Boron	mg/L	**1**	NA	0.4	0.29	NA	**3.4**	**2.7**	NA	0.41	0.39	NA	0.68	0.34	NA	<0.23	0.29
Calcium	mg/L	**No Std.**	120	130	140	100	97	97	190	200	190	91	230	170	150	170	170
Chromium	mg/L	**0.05**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Cobalt	mg/L	**No Std.**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Copper	mg/L	**0.2**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	mg/L	**0.3**	**24**	**24**	**23**	**1.4**	**1.1**	**1.4**	**2.0**	**14**	**4.0**	**5.6**	**15**	**9.7**	**6.3**	**6.5**	**6.1**
Lead	mg/L	**0.025**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Magnesium	mg/L	**35**$^{(GV)}$	23	22	25	**110**	**130**	**130**	**45**	**45**	**46**	29	**47**	34	24	26	28
Manganese	mg/L	**0.3**	**0.59**	**0.35**	**0.41**	**0.40**	**0.37**	**0.37**	**0.61**	**0.93**	**0.85**	0.18	**0.57**	**0.45**	**0.44**	**0.51**	**0.60**
Mercury	mg/L	**0.0007**	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001
Nickel	mg/L	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L	**No Std.**	20	21	26	61	100	85	16	21	30	29	40	34	9.5	9.3	13
Sodium	mg/L	**20**	**610**	**600**	**560**	**310**	**410**	**400**	**68**	**84**	**110**	**240**	**380**	**430**	**63**	**61**	**83**
Vanadium	mg/L	**No Std.**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Zinc	mg/L	**2**$^{(GV)}$	0.14	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer						Wells Screened in the Lower Portion of the Upper Glacial Aquifer								
		NYSDEC Class GA Standard	HP-101-S			HP-407-S			HP-101-D			HP-103-D			HP-407-D		
ANALYTE	UNITS		2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10	2Q10	3Q10	4Q10
Aluminum	mg/L	**No Std.**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	0.1	<0.05	0.13	<0.05	<0.05	<0.05
Antimony	mg/L	**0.003**	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025	<0.05	<0.025	<0.025
Arsenic	mg/L	**0.025**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Barium	mg/L	**1**	0.049	0.046	0.04	0.16	0.15	0.16	0.13	0.15	0.18	0.1	0.099	0.1	0.058	0.054	0.06
Boron	mg/L	**1**	NA	**1.4**	1	NA	**1.9**	**1.7**	NA	**1.8**	**2.1**	NA	**2.6**	**3.5**	NA	**2.2**	**1.8**
Calcium	mg/L	**No Std.**	52	51	44	220	220	220	240	220	230	330	130	340	260	260	260
Chromium	mg/L	**0.05**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.15	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Cobalt	mg/L	**No Std.**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Copper	mg/L	**0.2**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	mg/L	**0.3**	**0.82**	**0.82**	**0.98**	**12**	**14**	**16**	**9.5**	**1.2**	**12**	**5.5**	**0.7**	**5.0**	**25**	**25**	**24**
Lead	mg/L	**0.025**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Magnesium	mg/L	**35**$^{(GV)}$	**110**	**110**	**110**	**480**	**490**	**500**	**420**	**220**	**420**	**940**	**210**	**990**	**580**	**600**	**610**
Manganese	mg/L	**0.3**	0.05	0.05	<0.05	**0.52**	**0.58**	**0.6**	0.28	0.27	0.27	**1.4**	0.23	**1.4**	**0.87**	<0.05	**0.91**
Mercury	mg/L	**0.0007**	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001	<0.001	<0.00025	<0.001
Nickel	mg/L	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L	**No Std.**	87	110	93	240	220	280	240	290	290	400	180	430	280	270	350
Sodium	mg/L	**20**	**1,600**	**1,300**	**1,100**	**3,800**	**3,800**	**3,900**	**13,000**	**17,000**	**13,000**	**8,200**	**1,800**	**8,100**	**4,800**	**4,900**	**4,900**
Vanadium	mg/L	**No Std.**	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Zinc	mg/L	**2**$^{(GV)}$	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Footnotes:

Only the metals detected in at least one groundwater sample during the entire Post-Closure Period to date are listed. Beryllium, cadmium, selenium, silver and thallium were not detected. Hexavalent Chromium was analyzed for during the second monitoring round (2Q10) but was not detected.

The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturally saline; therefore, non-potable. There are no saline groundwater standards for these parameters. Standards with the (GV) notation are guidance values only.

Results shown in bold font are higher than the potable groundwater standard.

NA = Not analyzed.

Table 6
Comparison of Results for Target Volatile Organic Compounds (VOCs) Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit																						
			HP-101-U					HP-407-U					HP-104-A					HP-318					HP-603				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	7/10/07			8/4/93	12/12/93	7/9/07			8/7/93	12/16/93	NS			8/11/93	12/13/93	7/11/07			8/7/93	NS	NS		
1,4 Dichlorobenzene	ug/L	**3**	**4 J**	ND	<1	0.8	2	**4 J**	3 J	<1	<1	<1	**5 J**	**4 J**		<1	<1	**5 J**	**4 J**	<1	0.3	0.3	**5 J**			0.3	<1
1,2,4,5 Tetramethylbenzene	ug/L	**5**	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1	NA	NA		<1	<1	NA	NA	NA	1	0.7	NA			<1	<1
Acetone	ug/L	**50**$^{(GV)}$	R	R	<10	<10	<10	R	R	<10	<10	<10	6 J	9 J		<10	<10	ND	R	<10	<10	<10	4 J			<10	<10
Benzene	ug/L	**1**	**2 J**	ND	<1	<1	<1	**21**	**11**	<1	**2**	**2**	**2 J**	1 J		<1	<1	ND	**2 J**	<1	<1	<1	**2 J**			<1	<1
Carbon disulfide	ug/L	**60**	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND	ND		<1	<1	ND	ND	<1	0.3	<1	ND			<1	<1
Chlorobenzene	ug/L	**5**	**27**	ND	**11**	**5.5**	**8.3**	**21**	**11**	**6**	5	4	**30**	**18**		3.8	4.7	**85**	**26**	**11**	**10.3**	**11.3**	**48**			3.8	2
Isopropylbenzene	ug/L	**5**	NA	NA	NA	<1	<1	NA	NA	NA	1	1	NA	NA		<1	<1	NA	NA	NA	1	0.5	NA			<1	<1
MTBE	ug/L	**10**	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1	NA	NA		<1	<1	NA	NA	NA	<1	<1	NA			<1	<1
Toluene	ug/L	**5**	ND	ND	<1	<1	<1	ND	2 J	<1	<1	<1	ND	ND		<1	<1	ND	ND	<1	<1	<1	ND			<1	<1

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer										Wells Screened in the Lower Portion of the Upper Glacial Aquifer													
			HP-101-S					HP-407-S					HP-101-D					HP-407-D					HP-103-D				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	8/7/07			8/4/93	12/12/93	7/9/07			8/3/93	NS	9/7/07			8/3/93	12/13/93	9/5/07			8/8/93	12/15/93	9/6/07		
1,4 Dichlorobenzene	ug/L	**3**	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1	ND		<1	<1	<1	ND	NA	<1	<1	<1	3 J	NA	<1	<1	<1
1,2,4,5 Tetramethylbenzene	ug/L	**5**	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1	NA		NA	<1	<1	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1
Acetone	ug/L	**50**$^{(GV)}$	ND	ND	**360***	<10	<10	R	R	<10	<10	<10	ND		<10	<10	<10	ND	ND	30	<10	<10	12 B	R	<10	<10	11
Benzene	ug/L	**1**	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND		<1	<1	<1	ND	ND	<1	<1	<1	**4 J**	1 J	<1	<1	<1
Carbon disulfide	ug/L	**60**	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND		<1	<1	<1	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1
Chlorobenzene	ug/L	**5**	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND		<1	<1	<1	ND	ND	<1	<1	<1	**16**	**12**	<1	<1	<1
Isopropylbenzene	ug/L	**5**	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1	NA		NA	<1	<1	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1
MTBE	ug/L	**10**	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1	NA		NA	1	<1	NA	NA	NA	<1	<1	NA	NA	NA	<1	<1
Toluene	ug/L	**5**	ND	ND	1	<1	<1	ND	ND	**13**	<1	<1	ND		<1	0.8	<1	ND	ND	<1	<1	<1	ND	ND	1	<1	<1

Footnotes: Only the target VOCs detected in at least in one post-closure groundwater sample are listed. All other target VOCs analyzed for were not detected. Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturaly saline; therefore, non-potable. There are no VOC standards for saline groundwater.
Results shown in bold font are higher than the potable groundwater standad.
NA = Not analyzed. NS = Not sampled. ND = Not detected.
R = Compound rejected due to contamination in associated method blank.
J = Indicates the result is < sample quatitation limit but > 0.
B = RI qualifier meaning less than the quatitation limit but ≥ instrument detection limit.
* = Attributed to laboratory contamination.

Table 7
Comparison of Results for Target Semi-Volatile Organic Compounds (SVOCs) Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit																								
			HP-101-U					HP-407-U					HP-104-A					HP-318					HP-603				
		NYSDEC Class GA Standard	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
ANALYTE	UNITS	Standard	8/3/93	12/12/93	7/10/07			8/4/93	12/12/93	7/9/07			8/7/93	12/16/93	NS			8/11/93	12/13/93	7/11/07			8/7/93	NS	NS		
Acenaphthene	ug/L	20$^{(GV)}$	0.6 J	ND	<1	<1	<1	1 J	2 J	1.2	0.6	<1	2 J	ND		<1	<1	ND	14	9.4	4.7	4.1	14			2.0	0.6
BenzylButylPhthalate	ug/L	No Std.	ND	ND	<1	<1	<1	ND	N D	<1	<1	1.0	ND	ND		<1	1.0	ND	ND	<1	<1	<1	ND			<1	1.0
Bis(2-ethylhexyl)phthalate	ug/L	5	R	R	<1	**5.4**	1.7	R	R	1.6	4.8	0.9	R	R		**6.0**	0.5	R	R	<1	4.5	0.4	R			**5.4**	0.3
Di-n-Butyl Phthalate	ug/L	50	R	R	<1	0.7	<1	ND	R	<1	0.7	0.6	R	R		0.8	0.8	R	R	<1	0.4	0.8	R			0.7	1.3
Di-n-octyl Phthalate	ug/L	50$^{(GV)}$	0.1 J	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND	1 J		<1	<1	ND	ND	<1	<1	0.7	ND			<1	1
Dibenzofuran	ug/L	**	ND	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND	ND		<1	<1	ND	5 J	2	2.0	1.6	3 J			<1	<1
Fluorene	ug/L	50$^{(GV)}$	0.3 J	ND	<1	<1	<1	ND	ND	<1	<1	<1	ND	ND		<1	<1	ND	3 J	<1	1.2	0.8	2 J			<1	<1

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer										Wells Screened in the Lower Portion of the Upper Glacial Aquifer														
			HP-101-S					HP-407-S					HP-101-D					HP-407-D					HP-103-D				
		NYSDEC Class GA Standard	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
ANALYTE	UNITS	Standard	8/3/93	12/12/93	8/7/07			8/4/93	12/12/93	7/9/07			8/3/93	NS	9/7/07			8/3/93	12/13/93	9/5/07			8/8/93	12/15/93	9/6/07		
Acenaphthene	ug/L	20$^{(GV)}$	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1	ND		<1	<1	<1	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1
BenzylButylPhthalate	ug/L	No Std.	0.1 J	NA	<1	<1	0.4	0.2 J	NA	<1	<1	<1	0.1 J		<1	<1	<1	ND	NA	<1	<1	<1	ND	NA	<1	<1	0.7
Bis(2-ethylhexyl)phthalate	ug/L	5	R	NA	4.5	**6.0**	<3	R	NA	13	5.0	0.5	R		1.7	5.0	1.6	R	NA	<1	4.9	0.6	R	NA	1.6	**9.2**	0.7
Di-n-Butyl Phthalate	ug/L	50	R	NA	<1	0.3	<1	R	NA	<1	0.3	<1	R		<1	0.7	0.5	ND	NA	<1	<1	<1	ND	NA	<1	0.4	1.2
Di-n-octyl Phthalate	ug/L	50$^{(GV)}$	0.1 J	NA	<1	<1	<1	ND	NA	<1	<1	<1	0.1 J		<1	<1	<1	ND	NA	<1	<1	<1	ND	NA	<1	<1	0.7
Dibenzofuran	ug/L	**	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1	ND		<1	<1	<1	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1
Fluorene	ug/L	50$^{(GV)}$	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1	ND		<1	<1	<1	ND	NA	<1	<1	<1	ND	NA	<1	<1	<1

Footnotes: Only the target SVOCs detected in at least in one post-closure groundwater sample are listed. All other target SVOCs analyzed for were not detected. Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturaly saline; therefore, non-potable. There are no SVOC standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
** = Limit is 7 x 10^{-7} as 2,3,7,8-TCDD equivalent, but this is a potable water standard that is not applicable to this site.
Results shown in bold font are higher than the potable groundwater standad.
NA = Not Analyzed.
NS = Not Sampled.
ND= Not Detected.
J = Data qualified as estimated.
R = Data qualified as rejected.

Table 8
Comparison of Results for Leachate Indicator Parameters Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit																							
			HP-101-U					HP-407-U					HP-104-A					HP-318					HP-603				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	7/10/07			8/4/93	12/12/93	7/9/07			8/7/93	12/16/93	NS			8/11/93	12/13/93	7/11/07			8/7/93	NS	NS		
Alkalinity	mg/L	**No Std.**	715	217	520	515	527	2,640	2,250	2,200	1,675	1,667	1,360	1,540		800	760	R	NA	880	405	343	1,450			388	250
Ammonia	mg/L	**2**	**10.3**	0.26	**8.4**	**6.3**	**8.7**	**244**	**168**	**150**	**105**	**113**	**94**	**116**		**4.1**	**7.5**	**110**	NA	**39**	**25**	**21**	**81**			**8.0**	**2.3**
BOD_5	mg/L	**No Std.**	NA	NA	NA	<2	3	NA	NA	NA	20	10	NA	NA		2.3	<2	NA	NA	NA	26	3.8	NA			<2	<2
Bromide	mg/L	**2[(GV)]**	NA	NA	NA	<0.5	1.2	NA	NA	NA	<0.5	**3.1**	NA	NA		<0.5	1.4	NA	NA	NA	<0.5	1.3	NA			<0.5	0.9
Chloride	mg/L	**250**	**875**	53	**1,700**	**910**	**1,017**	**564**	**518**	**400**	**378**	**387**	152	168		69	118	**574**	NA	**1,300**	**584**	**787**	164			150	82
COD	mg/L	**No Std.**	NA	NA	NA	<400	40	NA	NA	NA	<400	315	NA	NA		50	20	NA	NA	NA	110	580	MA			<40	<40
Color	Color units	**15**	NA	NA	NA	**20**	**45**	NA	NA	NA	**180**	**175**	NA	NA		15	**20**	NA	NA	NA	**30**	**18**	MA			**25**	15
Hardness	mg/L	**No Std.**	542	349	310	433	417	880	860	860	828	753	1,090	965		1,030	667	1,410	NA	900	438	563	652			653	513
Nitrate	mg/L	**10**	ND	0.28	<0.05	0.4	<0.5	ND	0.1	<0.05	<0.5	<0.5	ND	0.21		0.1	<0.5		NA	**12**	3.0	0.2	ND			<0.5	<0.5
Sulfate	mg/L	**250**	ND	98	95	136	112	ND	85	65	24.5	10.0	20	55		58.5	93.7	28	NA	37	79.8	12.7	12			**350**	**317**
Tot Dissolved Solids	mg/L	**1,000**	**1,750**	563	**3,100**	**2,075**	**2,167**	**2,940**	**2,670**	**2,400**	**2,200**	**1,967**	**1,330**	R		**5,000**	**1,010**	**2,750**	NA	**2,600**	**1,505**	**1,900**	**1,230**			**1,030**	910
Tot Organic Carbon	mg/L	**No Std.**	NA	NA	NA	8.3	8.4	NA	NA	NA	12	58	NA	NA		5.9	11	NA	NA	NA	7.8	3.4	NA			4.5	3.5
Tot. Kjeldahl N.	mg/L	**No Std.**	44.3	1.02	11	7.1	10	741	275	160	109	115	240	117		5.0	8.7	128	NA	44	26	22	230			8.8	3.3

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer										Wells Screened in the Lower Portion of the Upper Glacial Aquifer													
			HP-101-S					HP-407-S					HP-101-D					HP-407-D					HP-103-D				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	8/7/07			8/4/93	12/12/93	7/9/07			8/3/93	NS	9/7/07			8/3/93	12/12/93	9/5/07			8/8/93	12/15/93	9/6/07		
Alkalinity	mg/L	**No Std.**	885	225	980	980	867	399	1,050	600	560	640	461		700	810	830	73.6	NA	220	280	267	935	NA	220	328	513
Ammonia	mg/L	**2**	**7.2**	0.2	**6.2**	**3.9**	**4.5**	1.39	**3.85**	**9.0**	**10**	**11**	**12**		**7.4**	**16**	**19**	0.39	NA	1.6	1.9	1.9	**37**	NA	**14**	**6.2**	**26**
BOD_5	mg/L	**No Std.**	NA	NA	NA	2.4	1.1	NA	NA	NA	<2	2.5	NA		NA	<2	3.7	NA	NA	NA	2.8	1.5	NA	NA	NA	<2	5.2
Bromide	mg/L	**2[(GV)]**	NA	NA	NA	1.4	**2.5**	NA	NA	NA	**19**	**18**	NA		NA	<0.05	**71**	NA	NA	NA	**23**	**16**	NA	NA	NA	**35**	**62**
Chloride	mg/L	**250**	**5,400**	116	**350**	**2,450**	**2,367**	**5,120**	**6,700**	**7,500**	**8,125**	**8,300**	**15,900**		**22,000**	**27,500**	**27,667**	**2,090**	NA	**9,800**	**9,925**	**10,000**	148	NA	**17,000**	**19,000**	**12,400**
COD	mg/L	**No Std.**	NA	NA	NA	<400	155	NA	NA	NA	<400	525	NA		NA	<800	1,800	NA	NA	NA	800	550	NA	NA	NA	<800	190
Color	Color units	**15**	NA	NA	NA	**60**	**50**	NA	NA	NA	**25**	**63**	NA		NA	**50**	**65**	NA	NA	NA	10	**48**	NA	NA	NA	15	**45**
Hardness	mg/L	**No Std.**	852	347	690	588	573	1,680	2,200	2,300	2,800	2,567	1,000		4,000	2,675	2,033	602	NA	3,000	3,425	3,067	700	NA	5,000	4,650	3,600
Nitrate	mg/L	**10**	ND	0.21	<0.5	<0.5	<0.5	ND	ND	<0.5	0.4	<0.5	**18.5**		<0.5	<0.5	<0.5	0.19	NA	<0.5	<0.5	<0.5	**14.7**	NA	<0.5	<0.5	5
Sulfate	mg/L	**250**	**375**	104	150	14	4	**478**	**442**	**850**	**803**	**750**	**361**		**1,500**	**1,300**	**887**	208	NA	**1,100**	**1,175**	**1,200**	10.3	NA	**2,000**	**1,900**	**1,443**
Tot Dissolved Solids	mg/L	**1,000**	**10,000**	611	440	**4,200**	**4,133**	**8,510**	**11,900**	**12,000**	**14,250**	**14,000**	**24,600**		**34,000**	**40,000**	**41,000**	**3,060**	NA	**17,000**	**13,515**	**17,667**	**1,140**	NA	**27,000**	**27,250**	**21,067**
Tot Organic Carbon	mg/L	**No Std.**	NA	NA	NA	7.2	7.0	NA	NA	NA	8.3	1.9	NA		NA	6.8	4.2	NA	NA	NA	<0.5	0.5	NA	NA	NA	<0.5	21
Tot. Kjeldahl N.	mg/L	**No Std.**	10.0	0.86	6.6	4.7	5.3	0.8	2.56	9.0	11	13	15.5		8.8	17	20	0.75	NA	2.0	2.3	2.6	93.6	NA	15	6.8	27

Footnotes: Only the leachate indicator parameters detected in at least in one post-closure groundwater sample are listed. Cyanide and Phenols were not detected. Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturaly saline; therefore, non-potable. There are no saline groundwater standards for these parameters.
Results shown in bold font are higher than the potable groundwater standad.
NA = Not analyzed.
NS = Not sampled.
ND= Not detected.
R = Data qualified as rejected.

Table 9
Comparison of Results for Metals Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit																						
			HP-101-U					HP-407-U					HP-104-A					HP-318					HP-603				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	7/10/07			8/4/93	12/12/93	7/9/07			8/7/93	12/16/93	NS			8/11/93	12/13/93	7/11/07			8/7/93	NS	NS		
Aluminum	mg/L	**No Std.**	1.74	1.43	0.34	0.03	<0.05	2.47	0.619	0.01	0.07	0.02	3.55	2.32		0.27	<0.05	0.155 B	1.21	0.096	0.26	0.04	1.74			0.25	<0.05
Antimony	mg/L	**0.003**	ND	ND	**0.007**	<0.025	<0.05	ND	ND	**0.007**	0.0015	<0.05	ND	**0.0369 B**		<0.025	<0.05	ND	ND	<0.02	0.001	<0.05	ND			<0.025	<0.05
Arsenic	mg/L	**0.025**	0.0052 B	0.002 B	0.007	0.004	<0.025	0.0034 B	ND	<0.005	0.004	<0.025	0.0032 B	0.0027 BW		0.004	<0.025	0.0017 B	0.0069 B	**0.03**	0.013	<0.025	0.0043 B			0.009	<0.025
Barium	mg/L	**1**	0.111 B	0.121 B	0.077	0.0885	0.1033	0.634	0.63	0.24	**1.1**	0.97	0.36	0.371 E		0.14	0.20	0.304	0.191 BE	0.11	0.04	0.052	0.227			0.072	0.049
Boron	mg/L	**1**	NA	NA	NA	0.28	0.35	NA	NA	NA	**2.6**	**3.1**	NA	NA		0.52	0.40	NA	NA	NA	0.69	0.51	NA			0.44	0.17
Calcium	mg/L	**No Std.**	156	132	100	138	130	99.7	122	96	110	98	145	155		213	193	209	302 E	240	126	164	159			208	163
Chromium	mg/L	**0.05**	0.005 B*	ND	<0.005	<0.025	<0.025	0.0252 *	0.0164 *	<0.005	0.007	<0.025	0.0246 *	**0.185**		0.002	<0.025	0.0061 B	ND	<0.02	<0.025	<0.025	0.0095 B*			0.008	<0.025
Cobalt	mg/L	**No Std.**	0.0052 B	ND	<0.005	<0.025	<0.025	0.0174 B	0.0144 B	<0.005	0.005	<0.025	0.0088 B	0.009 B		<0.025	<0.025	0.007 B	0.0051 B	<0.02	<0.025	<0.025	0.0086 B			<0.025	<0.025
Copper	mg/L	**0.2**	0.0655	0.168	0.08	0.01	<0.05	0.0165 B	0.0036 B	<0.01	<0.05	<0.05	0.0277	0.0155 B		0.003	<0.05	ND	0.0097 B	<0.04	0.01	<0.05	0.0125 B			<0.05	<0.05
Iron	mg/L	**0.3**	**38.4**	**5.03**	**16**	**20.9**	**23.7**	**15.1**	**17.4**	**0.41**	**1.2**	**1.3**	**38.3**	**29.7 E**		**3.9**	**6.7**	**16.3**	**30.1 E**	**14**	**8**	**10**	**26**			**11**	**6.3**
Lead	mg/L	**0.025**	**0.173 N**	**0.138 N**	**0.028**	0.0015	<0.025	0.0117 N	0.0038 N	<0.005	<0.025	<0.025	**0.0968 N**	**0.0557 NS***		0.004	<0.025	0.0043	0.0059 W	<0.02	<0.025	<0.025	0.0072 N			<0.025	<0.025
Magnesium	mg/L	**35**$^{(GV)}$	20.6	8.87	16	22	23	**143**	**141**	**150**	**135**	**123**	**126**	**131**		**123**	**45**	**192**	**58.8 E**	**75**	**39**	**37**	**55.5**			32	26
Manganese	mg/L	**0.3**	**0.349**	0.0388	**0.65**	**0.53**	**0.45**	0.202	**0.468**	0.08	**0.42**	**0.38**	**0.391**	0.297 E		**0.82**	**0.80**	0.222	**0.478**	**0.38**	0.23	**0.40**	**0.329**			**0.48**	**0.52**
Mercury	mg/L	**0.0007**	ND	ND	<0.00025	<0.00025	<0.001	ND	ND	0.00035	<0.00025	<0.001	ND	ND		<0.00025	<0.001	ND	ND	<0.00025	<0.00025	<0.001	ND			<0.00025	<0.001
Nickel	mg/L	**0.1**	0.0288 B	0.0266 B	0.02	<0.05	<0.05	0.0182 B	ND	<0.01	0.003	<0.05	0.0107 B	0.0175 B		0.003	<0.05	ND	ND	<0.04	0.003	<0.05	0.0095 B			0.01	<0.05
Potassium	mg/L	**No Std.**	16.7	3.47 B	18	12	22	126	124	120	86	82	46.3	57		53	22	100	30.3	66	35	34	59.1			17	11
Sodium	mg/L	**20**	**466**	**85.1**	**1,000**	**548**	**590**	**562**	**600**	**68**	**358**	**373**	**100**	**151**		**704**	**87**	**393**	**77.8**	**700**	**1,295**	**350**	**142**			**74**	**69**
Vanadium	mg/L	**No Std.**	0.0218 B	0.0135 B	<0.005	<0.025	<0.025	0.0454 B	0.0232 B	<0.005	0.008	<0.025	0.0242 B	0.0264 B		<0.025	<0.025	0.0111 B	ND	<0.02	<0.025	<0.025	0.0246 B			<0.025	<0.025
Zinc	mg/L	**2**$^{(GV)}$	0.464 E	0.734	0.17	0.11	0.05	0.0375 E	0.0154 B	<0.01	0.03	0.03	0.106 E	0.097		0.02	<0.05	0.0237 *	0.0396	<0.04	0.04	<0.05	0.0315 E			0.03	<0.05

ANALYTE	UNITS	NYSDEC Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer										Wells Screened in the Lower Portion of the Upper Glacial Aquifer												
			HP-101-S					HP-407-S					HP-101-D					HP-407-D					HP-103-D				
			Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)	Remedial Investigation		2007	Yr 1 Avg. (2Q09-1Q10)	Yr 2 Avg. (2Q10-4Q10)
			8/3/93	12/12/93	8/7/07			8/4/93	12/12/93	7/9/07			8/3/93	NS	9/7/07			8/3/93	12/12/93	9/5/07			8/8/93	12/15/93	9/6/07		
Aluminum	mg/L	**No Std.**	0.0608 B	0.0681 B	<0.2	0.003	<0.05	0.462	0.0523 B	0.19	0.02	<0.05	0.0268 B		0.03	<0.05	0.04	0.72	NA	0.09	0.30	<0.05	0.466	NA	3.1	0.93	0.09
Antimony	mg/L	**0.003**	ND	ND	<0.1	<0.025	<0.05	ND	**0.028 B**	**0.033**	0.0025	<0.05	ND		<0.005	<0.025	<0.05	ND	NA	<0.05	**0.0078**	<0.05	ND	NA	<0.01	**0.0123**	<0.05
Arsenic	mg/L	**0.025**	0.0082 B	0.0123	<0.1	0.003	<0.025	0.0088 B	ND	**0.23**	<0.025	<0.025	0.0014 B		0.012	0.020	<0.025	ND	NA	<0.025	0.019	<0.025	0.0023 B	NA	**0.018**	0.022	<0.025
Barium	mg/L	**1**	0.285	0.408	<0.1	0.038	0.045	0.104 B	0.153 B	0.12	0.17	0.16	0.446		0.11	0.15	0.15	0.0249 B	NA	0.055	0.045	0.057	0.822	NA	0.099	0.12	0.10
Boron	mg/L	**1**	NA	NA	NA	**1.1**	**1.2**	NA	NA	NA	**1.5**	**1.8**	NA		NA	**1.7**	**2.0**	NA	NA	NA	**1.7**	**2.0**	NA	NA	NA	**3.1**	**2**
Calcium	mg/L	**No Std.**	75.6	128	75	50	49	176	193	200	230	220	147		330	275	230	24	NA	260	263	260	201	NA	370	343	267
Chromium	mg/L	**0.05**	0.0073 B*	ND	<0.1	0.002	<0.025	ND	ND	<0.02	<0.025	<0.025	ND		<0.005	0.010	0.050	ND	NA	<0.025	0.002	<0.025	0.0086 B*	NA	0.009	0.008	<0.025
Cobalt	mg/L	**No Std.**	0.0035 B	0.0054 B	<0.1	<0.025	<0.025	ND	ND	<0.02	<0.025	<0.025	ND		<0.005	<0.025	<0.025	ND	NA	<0.025	<0.025	<0.025	0.0069 B	NA	<0.005	<0.025	<0.025
Copper	mg/L	**0.2**	0.013 B	0.0234 B	<0.2	<0.05	<0.05	0.0106 B	0.0036 B	<0.04	<0.05	<0.05	0.0127 B		0.02	0.01	<0.05	0.0104 B	NA	<0.05	<0.05	<0.05	0.0124 B	NA	0.02	<0.05	<0.05
Iron	mg/L	**0.3**	**32.3**	**60.6**	**2.2**	**0.84**	**0.87**	**3.27**	**7.87**	**10**	**14**	**14**	**76.1**		**16**	**10**	**7.6**	**1.39**	NA	**21**	**25**	**25**	**42.1**	NA	**9.2**	**6.6**	**3.7**
Lead	mg/L	**0.025**	0.0235 NS	0.0176 N	<0.1	<0.025	<0.025	ND	0.0016 BNW	<0.02	<0.025	<0.025	**0.0339 N+**		<0.005	<0.025	<0.025	0.0012 BN	NA	<0.025	<0.025	<0.025	**0.0592 N**	NA	0.009	<0.025	<0.025
Magnesium	mg/L	**35**$^{(GV)}$	**140**	9.7	**120**	**115**	**110**	**310**	**394**	**440**	**518**	**490**	**63.2**		**770**	**480**	**353**	31.9	NA	**580**	**613**	**597**	**36**	NA	**1,000**	**908**	**713**
Manganese	mg/L	**0.3**	**1.23**	**2.35**	<0.2	0.04	0.03	0.296	**0.454**	**0.46**	**0.54**	**0.57**	**0.307**		**0.83**	**0.32**	0.27	0.179	NA	**0.98**	**0.92**	**0.59**	**5.21**	NA	**2.5**	**1.7**	**1.01**
Mercury	mg/L	**0.0007**	ND	ND	<0.00025	<0.00025	<0.001	ND	ND	<0.00025	<0.00025	<0.001	ND		**0.00073**	<0.00025	<0.001	ND	NA	<0.00025	<0.00025	<0.001	ND	NA	0.00038	<0.00025	<0.001
Nickel	mg/L	**0.1**	ND	0.0345 B	<0.2	<0.05	<0.05	ND	ND	<0.04	<0.05	0.02	ND		<0.01	<0.05	0.02	ND	NA	<0.05	<0.05	<0.05	0.0098	NA	<0.01	<0.05	<0.05
Potassium	mg/L	**No Std.**	84.2	3.26 B	140	89	97	90.2	126	200	258	247	44.5		380	358	273	11.1	NA	270	255	300	28.3	NA	460	402	337
Sodium	mg/L	**20**	**3,980**	**41.2**	**3,600**	**1,420**	**1,333**	**2,740**	**3,280**	**3,400**	**3,925**	**3,833**	**6,450**		**10,000**	**14,500**	**14,333**	**289**	NA	**4,600**	**4,825**	**4,867**	**104**	NA	**8,000**	**6,565**	**6,033**
Vanadium	mg/L	**No Std.**	0.0491 B	0.0715	<0.1	0.004	<0.025	0.0498 B	0.0278 B	<0.02	<0.025	<0.025	ND		<0.005	<0.025	<0.025	0.0139 B	NA	<0.025	<0.025	<0.025	0.028 B	NA	0.009	<0.025	<0.025
Zinc	mg/L	**2**$^{(GV)}$	0.315 E	1.87	<0.2	0.01	<0.05	ND	ND	0.09	0.01	<0.05	ND		0.03	<0.05	<0.05	ND	NA	0.07	0.02	<0.05	0.0633 E	NA	0.07	0.04	<0.05

Footnotes: Only the metals detected in at least in one post-closure groundwater sample are listed. Beryllium, cadmium, selenium, silver and thallium were not detected. Hexavalent Chromium was analyzed for during the second monitoring round (2Q) but was not detected. Only detected results are reported for the Remedial Investigation events.

The NYSDEC Class GA Standards are for potable groundwater. The groundwater at the site is naturaly saline; therefore, non-potable. There are no saline groundwater standards for these parameters.

Standards with the (GV) notation are guidance values only.

Results shown in bold font are higher than the potable groundwater standad.

NS = Not sampled.

NA = Not analyzed.

ND= Not detected.

E = Reported value is estimated because of the presence of interference.

B = Less than the quatitation limit but ≥ instrument detection limit.

* = Duplicate analysis not within control limits.

N = Spiked sample recovery not within control limits.

S = The reported value was determined by the Method of Standard Additions (MSA).

+ = Correlation coefficient for MSA < 0.995.

W = Post digestion spike for Furnace AA analysis is out of control limits (85-115%) while sample absorbance is <50% of spike absorbance.

Table 10
Summary of Perimeter Gas Monitoring Well Results
Pennsylvania Avenue Landfill, Brooklyn, NY

Quarterly Monitoring Round	Monitoring Location and Result				
	GMW-1	GMW-2	GMW-3	GMW-4	GMW-5
	% Methane				
2Q10	0.0	0.0	0.0	0.1	0.0
3Q10	0.0	0.0	0.0	0.3	0.0
4Q10	0.0	0.0	0.0	1.8	0.0
	% Carbon Dioxide				
2Q10	2.3	3.1	3.3	9.1	2.7
3Q10	2.7	3.4	4.1	8.9	3.2
4Q10	3.9	1.8	1.9	2.8	2.0
	% Oxygen				
2Q10	18.2	17.7	17.6	2.2	18.3
3Q10	19.4	18.0	17.1	2.0	17.9
4Q10	19.9	19.8	20.3	0.1	19.7

Table 11
Summary of Gas Monitoring Results Within the Groundwater Leachate Pre-Treatment Building
Pennsylvania Avenue Landfill, Brooklyn, NY

Quarterly Monitoring Round	Date	Inside Pre-Treatment Building	On Top of Open Oil Water Separator
		% Methane	
2Q10	4/20/2010	0.0	0.0
	5/11/2010	0.0	0.0
	6/3/2010	0.0	0.0
3Q10	7/19/2010	0.0	0.0
	8/31/2010	0.0	0.0
	9/9/2010	0.0	0.1
4Q10	10/19/2010	0.0	0.0
	11/22/2010	0.0	0.1
	11/23/2010	0.0 - 0.1	0.3
	12/13/2010	0.0	0.0