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

Post-Closure Operation, Maintenance and Monitoring Program

2023 Annual Summary Report

and

Third Five-Year Review Report, Fourth Periodic Review Report

March 2024

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Section 1 - Introduction

The Pennsylvania Avenue Landfill (PAL) completed its fifteenth annual post-closure reporting period on December 31, 2023. This Report has been prepared by the New York City Department of Environmental Protection (DEP) to fulfill the reporting requirements contained in the PAL Operation and Maintenance (O&M) Manual, the PAL Monitoring Plan (as modified), and 6NYCRR Parts 363 and 375.

The remainder of this Report is organized into the following Sections:

- Section 2: Site Background – This Section provides a description of the site, a summary of the pertinent PAL site history, and significant site remediation events from the initial Remedial Investigation Report in 1994 through the 2018 Agreement between DEP and the New York State Office of Parks, Recreation, and Historic Preservation (NYS Parks) for development of the site into a State Park.

- Section 3: 2023 Annual Summary Report – This Section summarizes the operation, maintenance and monitoring (OM&M) activities conducted during the 2023 annual post-closure reporting period from January 1 through December 31, 2023.

- Section 4: Third Five-Year Review and Fourth Periodic Review Report – This Section provides an overall summary and review of the post-closure OM&M activities during the third five-year post-closure period as required by 6NYCRR Part 363, including a summary of the status and condition of the PAL Institutional Controls (ICs) and Engineering Controls (ECs) during the fourth periodic review period (January 1, 2019 through December 31, 2023) as required by 6NYCRR Part 375. The executed Institutional and Engineering Controls Certification Form for the fourth periodic review period accompanies this Report.

- Section 5: Conclusions and Recommendations – This Section provides the conclusions and recommendations related to the Site remedial systems and post-closure OM&M activities based on the third five year period of post-closure work.

The combined purpose of this Report has been accepted by the New York State Department of Environmental Conservation (NYSDEC) and the DEP in order to provide an efficient reporting and review process that meets the requirements of 6NYCRR Parts 363 and 375. Unless otherwise directed by the NYSDEC, the current schedule calls for the fifth Periodic Review Report to be submitted at the end of the fourth five-year post-closure review period which will cover the period from January 1, 2024 through December 31, 2028. That Report will follow the format of this Report and include the 2028 Annual Summary Report.

Section 2 - 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 adjacent 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. As a result of 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.

In 1974, ownership of the lands on which the PAL is situated transferred with other parcels from the City of New York to the United States Department of the Interior, National Park Service (NPS), for the creation of the Gateway National Recreation Area with the understanding that landfill operations at PAL could continue at the Site until the end of 1985.

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 DEP entered into a Consent Order with the NYSDEC to perform a remedial program at the Site.

In response to this, DEP 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 volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides and polychlorinated biphenyls (PCBs) contamination.
- It was determined that a floating product (i.e., separate-phase petroleum) 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; protecting surface waters through eradication of run-off and erosion from contaminated substrates and the migration of leachate into surrounding waters; minimizing the impact of contaminated groundwater; reducing soil and sediment contamination levels and removing the possibility of human or animal contact; and 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 6NYCRR 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 (GW/L) 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).
- Re-grading 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 DEP'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 ground-water portion of the Monitoring Plan was 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. These revised Monitoring Plan requirements were utilized commencing with the second Post-Closure monitoring event. Based on the results of one year of quarterly post-closure monitoring, the frequency of ground water monitoring was reduced from quarterly to annually in rotating calendar quarters (i.e., once every five quarters), and the list of parameters required to be monitored was reduced. This monitoring schedule ensures that monitoring is performed once in each calendar quarter during each five-year review period.

Prior to approval of the FER, a preliminary groundwater sampling and analysis round was conducted in July 2007. In May 2008, the perimeter soil gas wells were installed between the Site and the Belt Parkway. As per the Monitoring Plan, these wells are monitored as needed, and at least quarterly as mandated by the Monitoring Plan.

In July 2012, the NYSDEC changed the classification of the PAL site from a Class 2 to a Class 4 site on the Registry of Inactive Hazardous Waste Disposal Sites since it was properly remediated and requires site management.

The Gateway National Recreation Area in which the former PAL and FAL are situated was established by the NPS, Site Owner, in order to "preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features". In 2017, NPS proposed, and NYCDEP and the New York State Office of Parks, Recreation and Historic Preservation (NYS Parks) agreed, that it would be to the mutual advantage of the Federal, State and City governments, and to the benefit of the public, to develop the concept of a park and restoration plan for this area.

Pursuant to said proposal, NYS Parks entered into a General Agreement with NPS, allowing the State to invest State funds for the design, construction, operation and maintenance of a New York State Park at the former PAL and FAL. NPS, NYS Parks, and NYCDEP subsequently entered into a Cooperative Management Agreement to effectuate the development of Phase 1 of this State Park (Park), to be named in honor of Shirley Chisholm. In accordance with the requirements of the sites' Environmental Notice, in December 2017, NYS Parks received approval from NYSDEC and the New York State Department of Health to change the Site's land use from a closed landfill to a closed landfill with Department-approved passive recreational uses.

On August 24, 2018, an agreement between the DEP and the NYS Parks was executed in order to delineate the responsibilities of the two agencies in relation to NYS Parks' efforts for the development of the PAL and FAL into the Shirley Chisholm State Park (Park). NYS Parks has made capital improvements to the sites to create the Park and is responsible for the maintenance of those improvements as well as the maintenance of portions of the capping and closure systems. All work performed by NYS Parks must be done in accordance with the sites' RODs, Consent Orders, Environmental Notices and O&M Manuals. The Park was opened to the public in 2019.

Section 3 – 2023 Annual Summary Report

This Section of the Report covers the fifteenth annual post-closure period from January 1, 2023 through December 31, 2023.

3.1 Groundwater/Leachate Management System

The groundwater/leachate (GW/L) 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 pre-treatment prior to discharge to the 26th Ward WWTP.

The GW/L collection, pre-treatment and disposal system was designed to prevent migration of groundwater/leachate containing oil and dissolved contaminants to Fresh Creek, and to produce a treated effluent acceptable for discharge. 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 force main pipe for pretreated leachate that is ultimately discharged to a junction manhole at the 26th Ward WWTP. The GW/L Pre-Treatment Facility was designed to treat up to 30 gpm of groundwater/leachate. The facility's treatment process includes oil-water separation with citric acid conditioning, bag filtration and carbon adsorption.

The effluent was originally regulated under DEP's Industrial Wastewater Discharge (IWD) Permit No. 07-P3145-2, effective from August 27, 2007 to August 26, 2012. Based on the historical sampling data, indicating that the groundwater/leachate quality in the interceptor trench met the plant's Industrial Pre-Treatment Permit discharge limits prior to treatment, the DEP received approval in 2011 to install diversion piping within the PAL GW/L Pre-Treatment Plant to divert the influent directly to the plant effluent piping. The plant flow diversion began on November 1, 2011 and the new Industrial Wastewater Discharge Permit # 11-P3145-1 was issued effective November 11, 2011 - November 10, 2016. Since that time, the GW/L Pre-Treatment System has operated in Pre-Treatment Plant Diversion Mode. Discharge Permit # 16-P3145-1 was issued effective October 19, 2016 - October 18, 2021 and Discharge Permit # 21-P3145-1 was issued effective October 19, 2021 - October 18, 2026. A new Industrial Wastewater Discharge Permit #23-P3145-1 was issued effective February 27, 2023, through February 26, 2028, superseding the previous permits, respectively. The current permit requires submittal of the Self-Monitoring Report to the NYCDEP Industrial Inspection and Permitting Section (IIPS) two times a year. Each self-monitoring 6-month interval will entail the collection and analysis of four (4) sample sets taken within a two-week period.

Prior to commencing the plant diversion mode, the programmable logic control (PLC) management system was reprogrammed to accommodate this second mode of operation. Figure 2 shows the current Pre-Treatment System Schematic, which includes the diversion-related modifications.

The Pre-Treatment Plant equipment within the building has been and shall continue to be properly maintained so that if the GW/L water quality degrades, the Pre-Treatment Plant can be put back into operation in accordance with the PAL O&M Manual.

During this annual reporting period, the system discharged 6,934,564 gallons of groundwater and leachate to the WWTP. The table below summarizes the monthly flow data:

Pennsylvania Avenue Landfill						
Groundwater Management System Operation - 2023						
	Total Flow (GAL)	**Average Flow (GPM)**	**Average Daily Flow (GPD)**	**Maximum Daily Flow (GPD)**	**Number of Days in Service**	**Percent of Time in Service**
January	604,735	13.5	19,508	31,740	31	100%
February	443,220	11.0	15,829	20,520	28	100%
March	609,973	13.7	19,677	21,680	31	100%
April	444,297	10.3	14,810	17,173	30	100%
May	506,980	11.4	16,354	18,610	31	100%
June	354,820	9.1	11,827	15,860	27	89.9%
July	636,020	21.3	20,517	74,083	21	66.8%
August	398,427	10.2	12,852	36,860	27	87.1%
September	463,523	21.1	15,451	42,680	15	51.0%
October	972,367	21.8	31,367	44,910	31	100%
November	846,920	22.6	28,231	59,740	26	86.7%
December	653,283	14.6	21,074	34,000	31	100%
Average	**577,880**	**15.1**	**18,958**	N/A	N/A	**90%**
Maximum	**972,367**	**22.6**	N/A	**74,083**	N/A	N/A
Total	**6,934,564**	N/A	N/A	NA	**329**	N/A

Inspection and monitoring of the GW/L Pre-Treatment System was conducted following the O&M Manual procedures. Daily operations, bi-weekly (GWL-1), monthly (GWL-2), quarterly (GWL-3), semi-annual (GWL-4), and annual (GWL-5) inspections were performed. Another form, DP-1, "Description of Deficiencies and Problems," is used to highlight specific problems requiring timely attention. Equipment components exposed to the Hurricane Sandy surge that are currently operational but not designated for replacement will continue to be monitored and assessed over time and may be replaced in the future, if necessary.

Although the system is operating in diversion mode, the interceptor trench and the leachate pump stations continue to be inspected daily for the presence of product and to verify water levels. There was no indication of product in the trench or off-site leachate migration during this annual reporting period. While there has never been any measurable product detected at the leachate pump stations, as a precautionary measure, replacement of the scavenger pumps was considered but

determined not to be necessary at this time. Should product be observed, mitigation measures will be taken at that time according to the actual conditions encountered. The replacement of the OWS influent filter casing and the petroscreen coalescer baskets has been placed on hold since the pre-treatment system can be placed back on-line temporarily without these items, thereby, allowing for future replacement when and if the pre-treatment system is placed back on-line. At the commencement of the diversion mode operation, the pre-treatment plant equipment and piping was power-washed and prepared in accordance with the manufacturer's recommendations to remain in a standby condition. The equipment continues to be inspected as required to ensure that it remains in good operating condition and is ready to return to service if needed.

Deficiencies encountered during this annual reporting period include, and still pending, include the inoperative operator's interface computer, PLC communication and programming issues, Pump Station No. 1 Variable Frequency Drive (VFD) malfunction and the broken plant heater. Work orders have been issued for replacement of the VFD, the plant heater and the operator's interface computer, and to address programming and communication issues. However, replacement of the VFD has been put on hold until the PLC issues are resolved. The pump stations are currently being operated in manual mode. The work to repair the columns in the Pre-Treatment Plant building was completed in October 2023. The flow meter malfunctioned on November 24 and was repaired on December 18, and Pump Station No. 2 discharge pipe was damaged and replaced on December 19, 2023. Copies of the inspection reports for this reporting period are provided in Appendix A of the Quarterly Reports.

The M-1 Pre-Treatment system effluent was regulated by DEP IWD Permit No. 21-P3145-1 from January 1 through February 27, 2023, and by DEP IWD Permit No. 21-P3145-1 from February 28 through December 31, 2023. In agreement with Permit No. 21-P3145-1, effluent samples were collected on January 18 and February 14, 2023. In accordance with Permit No. 23-P3145-1 semi-annual sampling schedule, samples were collected on April 10, 12, 17 and 19, and on October 9, 11, 16 and 18, 2023. Appendix B of the First, Second and Fourth Quarter Reports contains the results of the laboratory analyses.

The Self-Monitoring Reports (SMR's) were submitted to the DEP Industrial Pre-Treatment & Permit Section prior to the end of the first quarter, and each semi-annual period. Examination of the M-1 sampling data in Table 1 indicates that there were no exceedances of permit parameters during this annual reporting period. Copies of these reports are included in Appendix B of the First, Second and Fourth Quarter Reports.

To verify that operation of the interceptor trench collection system is still warranted, the M-1 sample results were compared to the NYSDEC 6 NYCRR Part 703.5 standards and TOGS 1.1.1 guidance values for Class SA (saline) surface waters, which are also provided in Table 1. As shown in Table 1, during 2023, the chlorobenzene and n-nitrosodiphenylamine concentrations in at least one of the semiannual samples of the interceptor trench water exceeded the Class SA standard or guidance value for protection of fish propagation. Due to the exceedances, operation of the interceptor trench system is still warranted.

3.2 Landfill Gas Management System

The landfill gas management system (LFGMS) 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 363 to limit off-site gas migration to 25% of the lower explosive limit (LEL) in structures and at the property line (i.e., 1.25% CH_4 gas in air). The LFGMS operates in accordance with an Air Facility Registration Certificate # 2-6105-00762/00001 issued by the NYSDEC and a Methane Recovery Operations Permit issued by the Fire Department of the City of New York (FDNY) Bureau of Fire Prevention. The system passed the annual FDNY Alarm System inspection on June 16, 2023.

The LFGMS features 46 gas extraction wells (EWs), a below-grade polyethylene collection header piping network with isolation valves, two 375-scfm centrifugal blowers (Blowers 301 and 302), a condensate collection system, an enclosed flare system, a process instrumentation and control loop, a programmable logic control (PLC) management system, a fire alarm system, and an emergency condition alarm autodialer phone system. A plan of the overall LFGMS is shown on Figure 3, illustrating the location of the extraction wells, header pipes and flare facility.

During 2018, low methane concentrations routinely caused the flare to automatically shut down, resulting in increased use of natural gas to ignite the flare pilot and supplement methane recovery. In order to reduce natural gas consumption, the NYSDEC granted approval to operate the flare on a modified "pulse-operations" schedule. The flare is generally operated during the work-week and shut-down for the weekend (i.e., run during the week, shut-down Friday morning, remain off-line during the weekend, restart Monday morning). LFG quality at the flare and the flare's operation schedule are being closely monitored to determine the most appropriate run-time to ensure optimum methane concentrations. To date this schedule has been effective for efficient flare operation. In August 2023, the fire alarm system telephone lines failed. Verizon could not resolve the issue involving the outdated copper telephone wires. The system has since been required to run under fire watch schedule, i.e., during normal work hours, until a solution can be implemented.

The four main headers that convey the landfill gas are connected to a condensate drain line at their low points 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 reporting period, the condensate tank inventory was 1,269 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 is operated with compressed nitrogen. 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 150.4 scfm during the 2023 annual reporting period. Process gas temperature and pressure readings from the vacuum and discharge side of the blower are recorded daily in the LFG-1 inspection log. The

monthly summary reports of the LFG-1 daily inspections are included in an Appendix of the Quarterly Reports.

All 46 gas 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, entry hatch frame cleaning/adjustment or sampling port repair are corrected, when possible, at the time of the inspection. Work Orders are issued for other corrective work. The LFG-3 inspection reports for monthly extraction well monitoring are included in an Appendix 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 recovery of landfill gas.

During the 2023 annual reporting period, 125,826 SCF of natural gas was used during flare start-ups and to supplement the recovery of landfill gas. While on the fire watch operating schedule, supplemental gas was not used. The flare support system includes a purge air blower, two manual and two automatic dampers, and temperature control with three thermocouples. The flare operation is currently on automatic control using the middle thermocouple at a target temperature of 1,500 ^oF.

During this annual reporting period, the landfill gas flaring system processed 23,387,182 SCF of landfill gas at an average methane content of 20.0%. The system had 6,191.8 hours of down time due to pulse-operations, flame failure and low temperature faults attributed to poor gas quality, blower bearing replacement, purge blower repair, equipment inspection, maintenance and calibration, and fire watch operation due to fire alarm system telephone line failure. The flare was in service for 29.7 percent of the total time during this reporting period. Flow and process gas content data is summarized in the table below:

Pennsylvania Avenue Landfill			
Flare Operation – 2023			
	CH_4 (% by Volume)	**Time in Service (Hours)**	**Flow (SCF)**
January	20.6%	361.2	3,213,660
February	20.0%	336.6	3,005,338
March	17.9%	300.2	2,756,035
April	17.8%	282.6	2,478,236
May	17.5%	254.4	2,189,468
June	17.6%	243.5	2,192,796
July	17.2%	261.3	2,379,315
August	19.3%	185.2	1,737,731
September	20.6%	92.8	861,216
October	24.0%	86.0	801,931
November	24.3%	88.0	806,883
December	25.1%	100.4	964,573
Average	**20.0%**		**1,948,932**
Total		**2,592.2**	**23,387,182**

Bi-weekly (LFG-2) and quarterly (LFG-4) inspections were conducted, and copies are included in an Appendix of the Quarterly Reports. Maintenance was performed on the electro-pneumatic valve nitrogen system, the pilot system, the purge blower, and the LEL and oxygen sensors. The flare stack louvers, blower bearings and belts, and the station valves were adjusted and lubricated. Sampling ports on the headers were replaced as needed. The bottom fare stack thermocouple was replaced on March 16, and it failed on August 28, 2023. The bearings on both blowers were replaced during the third quarter of 2023. Equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement will continue to be monitored and assessed over time and may be replaced in the future, if necessary.

3.3 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 greater than 5% slope); a Type 1 cover system cushion geotextile layer (areas with slopes less than 5%); 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 immediately after each major rainfall event 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 each final cover system inspection is summarized on Monthly Checklist Form FCS-1, with deficiencies noted on the Deficiency and Problems Form (DP-1). The monthly inspection reports can be found in an Appendix of the Quarterly Reports. 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 remaining drainage repair work in Zone 16, included under the Zones 5 and 16 work order, was completed during the third quarter of 2023. Other deficiencies encountered include erosion in Zones 3, 8, 10 and 11 which is a result of Park patrons. NYS Parks has been made aware of the issue.

Under the Agreement executed on August 24, 2018 with the DEP, NYS Parks is responsible for the maintenance/repair of the following elements of the Final Cover System:

- Surface restoration and replanting of the grass cover and topsoil layer of the final cover system; and
- Landscaping, both existing and any landscaping installed by NYS Parks. At a minimum, NYS Parks shall perform all landscaping work, including maintenance and repair of existing vegetation/landscaping including those in the existing planting islands, required in the O&M Manual.

3.4 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.

The stormwater management system consists of several components (as shown in Figure 4) 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 down chute pipes, manholes, pipe trenches and energy dissipation structures.

The O&M Manual requires that the stormwater management systems SWM-1, SWM-2 and SWM-3 be inspected on a monthly basis and immediately after each major rainfall event equal to or exceeding a 2-year 24-hour precipitation event (3.5 inches in 24 hours). A record of each inspection is summarized on Monthly Checklist Forms SWM-1, SWM-2, and SWM-3 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. The monthly inspection reports and DP-1 Forms can be found in an Appendix of the Quarterly Reports.

Deficiencies identified during the 2023 post-closure period do not necessarily affect the overall performance of this system. The DP-1 Forms identify some locations where overgrown vegetation, sediment, erosion, and standing water have been observed and provides corrective actions for each location. Where necessary, investigations are being performed, repair details are being developed and repairs will be addressed. Monthly inspections showed the system is working adequately.

Under the Agreement executed on August 24, 2018 with the DEP, NYS Parks is responsible for the maintenance/repair of the following elements of the Stormwater Management System:

- Clearing of overgrown vegetation, sediment and debris, including trash, from stormwater swales;
- Clearing of visible sediment, debris, including trash, and vegetative growth from outlets and culverts, culvert inlet/outlet rip-rap protection and energy dissipaters; and
- Removal of trash and debris from rip-rap in revetment areas.

3.5 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) as shown in Figure 4, 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. In anticipation of the Site being developed into a state park, DEP installed security cameras at the site entrance, GW/L pre-treatment plant, and flare station to maintain security of these facilities during off hours. The security system is monitored by DEP Central Communications personnel.

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. Work orders are issued when necessary to perform repair work as identified on the DP-1 Forms. The instructions for the checklists require further inspections immediately after each major rainfall event equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). These are incorporated into the monthly inspection reports found in an Appendix of the Quarterly Reports.

Safety inspections are performed monthly. Damaged and missing "Confined Space" and/or "Hazard" signs are also replaced when necessary.

Under the Agreement executed on August 24, 2018 with the DEP, NYS Parks is responsible for the maintenance/repair of the following elements of the Ancillary Systems:

- Maintain the surface condition of all gravel paths and the perimeter stone and paved roads necessary for operation of the Park. Such maintenance shall not include repairs required because of subsurface settlement or other subsurface conditions;
- Maintain and, when necessary, repair or replace the perimeter fencing including gates and locks to prevent unauthorized access to the Site when the Park is closed; and
- Install, maintain and, when necessary, repair or replace signage, except that DEP shall maintain signage relating to Landfill Infrastructure and City Property security and/or safety.

3.6 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, and now incorporates modifications approved by the NYSDEC in 2011. 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 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 as shown in Figure 5. Groundwater monitoring is

performed once every five quarters and perimeter soil gas quality monitoring is performed at least quarterly. Monitoring for landfill gas is also performed during the M-1 sampling events inside the GW/L Pre-Treatment Facility building. Additionally, the landfill surface is monitored semi-annually for potential landfill gas emissions, although this is not a regulatory requirement at this site.

3.6.1 Gas Monitoring Program

Perimeter soil gas readings were taken at the five perimeter gas monitoring wells during quarterly monitoring rounds on March 27, June 9, September 27 and December 20, 2023, to confirm the absence of off-site gas migration. Figure 5 shows the locations of the perimeter gas wells, and the gas monitoring results are summarized in Table 2. Monitoring at these perimeter gas monitoring wells is performed in accordance with 6 NYCRR Part 363 (effective July 22, 2023) to ensure that subsurface methane gas is less than 25% of the lower explosive limit (LEL) at the property line (i.e., 1.25% CH_4 gas in air). No methane was detected in GMW-1, GMW-2, or GMW-3. In GMW-5, methane was only detected in the June 9 round at a concentration of 0.1% by volume. In GWM-4, methane concentrations were between 0.0% and 1.1% by volume. All monitoring results were less than 25% of the LEL (i.e., 1.25% CH_4 gas in air), and are therefore acceptable per the 6 NYCRR Part 363 landfill regulations. Monitoring data are included in an Appendix of the Quarterly Reports.

On May 16, and October 24, 2023, two rounds of landfill surface gas readings were taken, and no CH_4 gas was detected. Although the O&M Manual does not require surface emission monitoring because the PAL does not meet the applicability requirements of 6 NYCRR Part 208, the DEP has included this task in the OM&M Contract. The results of monitoring events indicate that surface methane levels are well below 500-ppm limit in 6 NYCRR Part 208.1. Figure 6 shows the sampling locations, and monitoring results are included in an Appendix of the Quarterly Reports.

Methane readings were taken inside the GW/L Pre-Treatment Facility building during the M-1 sampling events and/or the GWL-2 monthly inspections. The results were consistently 0.0% throughout the facility. These results are less than 25% of the LEL and therefore acceptable per the 6 NYCRR Part 363 landfill regulations. The data are summarized in Table 3 of this Report.

Based on the results of the post-closure landfill-gas monitoring performed during this reporting period, methane levels measured at the property line were less than the 6 NYCRR Part 363 requirements, indicating that the landfill gas being generated by the PAL is being contained by the collection and treatment system, and off-site methane migration is being prevented. It is expected that landfill gas concentrations will continue to decrease over time as the landfill ages.

3.6.2 Groundwater Monitoring Program

In a March 2, 2011 letter to the DEP, the NYSDEC approved the DEP's request to reduce the frequency of groundwater monitoring from quarterly to annually in rotating quarters (i.e., once every five quarters), and to reduce the frequency of monitoring for pesticides and polychlorinated biphenyls (PCBs) to once every five years. This groundwater monitoring schedule allows results to be obtained once in each of the four calendar quarters during each five-year review period. In

addition, beginning in 2011, annual PAL reporting periods were aligned to the calendar year. Groundwater monitoring was not required in 2015 and 2020 due to the five-quarter schedule. Monitoring for pesticides and PCBs was last conducted during the second quarter of 2022. The next round of monitoring for pesticides and PCBs, for the next (fourth) five-year review period (2024-2028), will be performed during the 2027 monitoring round. The 2023 annual monitoring round was performed during the third quarter. The next annual monitoring round will be conducted during the fourth quarter of 2024.

This Section of the Report includes a discussion of the 2023 groundwater-monitoring results. A comparison to previous years' results and trend analyses will be provided in the Section 4 of this Report for this Five-Year Review and Periodic Review Period.

The PAL groundwater monitoring wells are designated by aquifer zone as follows:

- U for fill aquifer (saturated zone above the tidal marsh deposit (TMD)).
- S for the shallow upper glacial aquifer (UGA), 10-20 feet below the bottom of the TMD.
- D for deep upper glacial aquifer, 45-55 feet below the bottom of the TMD

The work order for repair of Wells HP-101-S, HP-103-D and HP-407-D was completed in January 2023.

The 2023 groundwater monitoring round was performed on September 21 and 22. Synoptic water levels and groundwater samples were collected from all ten monitoring wells shown in Figure 5. The required QA/QC-related samples were also collected, some at the FAL site. The wells were purged and sampled using a portable peristaltic pump and dedicated tubing. Review of the field sampling logs indicates that, apart from slightly more than 0.3 feet of drawdown in Wells HP-101-S, HP-103-D and HP-318, the samples were collected in accordance with low-flow protocols and purged from the screen zone. The results for one well, HP-318, were independently validated.

The results of the 2023 groundwater monitoring round are summarized in Tables 4 through 7 for VOCs, SVOCs, leachate indicator parameters, and inorganic parameters, respectively. Note that Tables 4 and 5 only list VOCs and SVOCs detected in at least one well. Nearly all the VOCs and SVOCs analyzed for were not detected.

Overall, the 2023 results are consistent with previous results, and continue to indicate that the PAL is not a significant source of releases of hazardous or toxic substances to groundwater. The results also indicate that site-related impacts are primarily limited to the fill aquifer, which is hydraulically separated from the underlying UGA by a layer of naturally-occurring organic tidal marsh deposits with low permeability. The results for wells screened in the UGA continue to indicate that the groundwater beneath the PAL is naturally saline, which is consistent with its shoreline location.

As shown in Table 4, only three of the 46 VOCs analyzed for were detected in at least one well, and detections were limited to sporadic, low concentrations of acetone in two wells (HP-407-U and HP-407-D), chlorobenzene in two wells (HP-104-A and HP-603), and 1,4-dichlorobenzene in one well (HP-104-A). None of the VOC detections exceeded Class GA standards or guidance

values. Moreover, it should be noted that the acetone detections may be due to laboratory contamination, as explained in the footnotes in Table 4.

Table 5 shows that, of the 70 SVOCs analyzed for, only seven were detected, and detections were limited to sporadic, low concentrations of acenaphthene in HP-603, acetophenone in HP-407-U, bis (2-ethylhexyl) phthalate in HP-101-S (duplicate only) and HP-407-S, caprolactam in HP-407-D, cresol (m&p) in HP-101-U, N-nitrosodiphenylamine in HP-318, and phenol in HP-103-D and HP-407-U. Except for phenol, the SVOC detections did not exceed the Class GA standards or guidance values. Note that additional, method-specific, results for phenols are provided in Table 6, and that the Class GA standard for phenols is aesthetics-based rather than health-based.

The 2023 leachate indicator parameter and inorganic parameter results (shown in Tables 6 and 7, respectively) are consistent with an old, closed and capped landfill and the fact that the groundwater beneath the PAL is naturally saline. The concentrations of a number of leachate indicator parameters exceeded the Class GA standards and guidance values. However, it should be noted that most of the exceedances are for parameters that are related to the naturally-saline groundwater beneath the site. The exceedances for site-related parameters, such as ammonia, are not a significant concern because the groundwater is non-potable. Heavy metals (i.e., the eight RCRA metals) were typically either not detected, or only detected sporadically and/or at low concentrations. Only two RCRA metals exceedances occurred, for cadmium and lead, both in HP-101-U, which is screened in the fill aquifer.

Appendix E of the Third Quarter Report contains the synoptic water-level data, the sample collection field logs, a full copy of the Laboratory Final Report, and the data validator's Data Usability Summary Report (DUSR). Following the five-quarter schedule, the next groundwater monitoring round will be performed during the fourth quarter of 2024 and samples will be analyzed for VOCs, SVOCs, leachate indicator parameters and inorganic parameters unless further reductions in monitoring are requested by the DEP and approved by the NYSDEC.

Section 4 – Third Five-Year Review and Fourth Periodic Review Report

As previously discussed, this Section serves two purposes. First, this section represents the third five-year review of PAL post-closure OM&M activities required by 6NYCRR Part 363 for the period from January 1, 2019 through December 31, 2023. Secondly, this Section also represents the fourth Periodic Review Report (PRR) discussing the status and condition of the PAL Institutional Controls (ICs) and Engineering Controls (ECs) required by 6NYCRR Part 375. The executed Institutional and Engineering Controls Certification Form for the fourth periodic review period accompanies this Report. This fourth PRR and Certification covers the period from January 1, 2019 through December 31, 2023. The first through third PRRs and Certifications covered the periods from April 1, 2009 through December 31, 2018.

The following subsections discuss the status and conditions of the PAL site remedial systems, the results of the post-closure monitoring and the pertinent activities that occurred during the third five-year review period.

4.1 Groundwater/Leachate Management System

The effluent from the groundwater/leachate pre-treatment facility was originally regulated under NYCDEP's Industrial Wastewater Discharge (IWD) Permit No. 07-P3145-2, effective from August 27, 2007 through August 26, 2012. Based on monitoring data indicating that the influent entering the facility continuously met permit discharge limits without pre-treatment, the DEP received approval in 2011 to install diversion piping within the PAL Groundwater/Leachate Pre-Treatment Plant to divert the influent directly to the plant effluent piping. The plant flow was diverted on November 1, 2011, and the new IWD Permit No. 11-P3145-1 was issued effective from November 11, 2011 to November 10, 2016. Since that time, the Groundwater/Leachate Pre-Treatment System has been operated in Pre-Treatment Plant Diversion Mode. The current Discharge Permit # 23-P3145-1 (see Appendix A) was issued effective from February 27, 2023 to February 26, 2028.

Prior to commencing plant diversion mode, the PLC was reprogrammed to accommodate this second mode of operation. Monthly M-1 sampling was performed under the previous permits and currently is performed on a semi-annual basis under the current permit. M-1 sample results are reported in the Self-Monitoring Reports submitted to the IIPS. This information is contained in Appendix B of each Quarterly Report in which sampling occurred. To date, the results have continued to show that all discharge requirements are being met. The results also indicate that the concentrations of certain parameters (e.g., chlorobenzene) in the influent continue to typically exceed the NYSDEC saline surface water standard for protection of fish propagation on a regular basis, and sporadic exceedances of other parameters. Therefore, operation of the interceptor trench is still warranted.

The Pre-Treatment Plant equipment within the building has been, and shall continue to be properly maintained so that if the groundwater/leachate quality degrades, the Pre-Treatment Plant can be put back into operation in accordance with the PAL O&M Manual. The interceptor trench is

monitored daily to inspect for the presence of product and to verify water levels. There was no indication of product or off-site leachate migration noted during this reporting period.

During this five-year review period, the system discharged a total of 31,389,860 gallons of groundwater and leachate to the WWTP. The table below summarizes the flow data by year.

Pennsylvania Avenue Landfill						
GW/L System Operation – Five-Year Review Period						
Post-Closure Year	**Total Flow (Gallons)**	**Average Flow (GPM)**	**Average Daily Flow (GPD)**	**Maximum Daily Flow (GPD)**	**Number of Days in Service**	**Percent of Time in Service**
11	6,862,635	13.7	19,771	35,847	347.1	95.10%
12	6,332,040	12.1	17,440	30,690	363	99.20%
13	6,078,980	11.6	16,655	29,700	365	100.00%
14	5,181,640	9.9	14,197	24,490	365	100.00%
15	6,934,565	15.1	18,958	74,083	329	90.14%
Average	NA	**12.5**	**17,404**	**38,962**	NA	**96.88%**
Total	**31,389,860**	NA	NA	NA	**1,769.10**	NA

Throughout this five-year reporting period, the groundwater/leachate management system was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. During this period, the system was periodically taken off-line for the following reasons: damage to the leachate discharge line on June 10, 2019 which was repaired on June 11, 2019; and electrical system testing by BEDC from October 5 – October 7, 2020. Equipment components exposed to the Hurricane Sandy surge that are currently operational but not designated for replacement will continue to be monitored and assessed over time and may be replaced in the future, if necessary.

4.2 Landfill Gas Management System

Towards the end of the previous five-year post-closure period, recurrent flame failures attributed to poor gas quality resulted in increased use of natural gas to ignite the flare pilot and supplement methane recovery. To reduce natural gas consumption, the NYSDEC granted approval to operate the flare on a modified "pulse-operations" schedule. Beginning in the 1st Quarter and continuing into the 2nd Quarter of 2018, the flare was operated during work hours (i.e., run during the work day, shut-down at the end of the work day, and restart the next morning). In the 3rd and 4th Quarters of 2018, the flare was operated during the work-week and shut-down for the weekend (i.e., run during the week, shut-down Friday morning, remain off-line during the weekend, restart Monday morning). The flare continues to be operated only during the work-week. LFG quality at the flare and the flare's operational schedule continue to be closely monitored to determine the most appropriate run-time to ensure optimum methane concentrations for flare operation. Further

adjustments to the flare's operational schedule may be warranted in the future as LFG quality continues to decline as the landfill ages.

The landfill 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 160.6 scfm during the five-year review period.

System flow and process gas content data are summarized in the following table for each of the third five-year post-closure reporting periods. During this reporting period, the LFGMS processed 149,292,626 SCF of landfill gas, was in service for 15,509.5 hours representing an average of 35.4% time in service and the average methane quality at the flare was 19.8%. The lowest average monthly methane concentration at the flare during this reporting period was 15.9% in June 2019 with a high of 25.1% for December 2023. Overall, the average monthly methane concentration at the flare during this reporting period was between 20% and 25% for 40% of the reporting period.

Pennsylvania Avenue Landfill					
Flare Operation – Third Five-Year Review Period					
Post-Closure Year	**Avg. CH_4 (% by Volume)**	**Time in Service (Hours)**	**Percent Time in Service**	**Avg. Blower Flow (SCFM)**	**Flow (SCF)**
11	21.0%	3,014.7	34.4%	178.0	32,200,976
12	20.4%	3,135.6	35.7%	172.2	32,391,500
13	19.2%	3,246.0	37.1%	154.8	30,157,473
14	18.3%	3,521.0	40.2%	147.5	31,155,495
15	20.0%	2,592.2	29.7%	150.4	23,387,182
Average	**19.8%**	NA	**35.4%**	**160.6**	NA
Total	NA	**15,509.5**	NA	NA	**149,292,626**

During this five-year reporting period, the system was out of service for various reasons including pulse-operations, shut-downs for routine inspection, calibration, maintenance, repair and/or replacement of equipment; flame failures caused by poor LFG quality; temperature monitoring and control problems; system evaluations by the manufacturer's representative; FDNY inspections; occasional power failures associated with poor weather, etc.

The flare pilot is fired using natural gas from the utility company. The natural gas is also used as auxiliary fuel to supplement the recovery of landfill gas. During this five-year reporting period 1,061,761 SCF was used for the pilot, to help bring system to temperature during start-ups and to improve landfill gas quality to the flare.

Throughout this five-year reporting period, the LFGMS was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. Deficiencies encountered at the flare and blower station addressed during this five-year reporting period include the following:

the flare and blower station addressed during this five-year reporting period include the following: replacement of the top, middle, and bottom thermocouples (on separate occasions); installation of black mesh to cover poly screens; replacement of the igniter and damaged cable; replacement of flare stack louver arms; replacement of the flare stack UV flame detector; repair of the flame sensor precast base; and servicing of the main header isolation valves.

Additionally, the operational equipment components impacted by the Hurricane Sandy surge that were designated for replacement were replaced under DEP Contract No. 1400-FLP in 2018 during the previous five-year reporting period. This included installation of new dry transformers, current monitors, circuit breakers, VFD motor starters, power supplies, strip heaters, thermostats and miscellaneous fuses. Other equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP will continue to be monitored and assessed over time and may be replaced in the future, if necessary.

4.3 Final Cover System

During the five-year reporting period, the final cover system was inspected, maintained and repaired in accordance with the requirements of the O&M Manual, as summarized in the Quarterly and Annual Reports. Overall, the final cover system is in good condition. Erosion in noted in Zone 5 and settlement noted in Zones 1, 16, and 17 were repaired during this reporting period. The remaining deficiencies encountered, including overgrown vegetation throughout the cover and erosion due to Park patrons in inspection Zones 3, 8, 10, and 11, are being coordinated with NYS Parks.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the final cover system identified in Section 3.3 of this Report. DEP will continue to be responsible for inspection and reporting for all final cover system components, as well as maintenance of the remaining components of the final cover system not under NYS Parks' responsibility.

4.4 Stormwater Management System

During the five-year reporting period, the stormwater management system was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. The system remained operational throughout the reporting period. Minor deficiencies were repaired on an ongoing basis and did not necessarily affect the overall performance of this system. Routine maintenance generally included removal of excessive vegetative growth, sediment, and debris from swales and culverts.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the stormwater management system identified in Section 3.4 of this Report. DEP will continue to be responsible for inspection and reporting for all stormwater management system components, as well as maintenance of the remaining components of the stormwater management system not under NYS Parks' responsibility.

4.5 Ancillary Systems

During the five-year reporting period, the ancillary systems were inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. Overall, the majority of the systems remained in good condition throughout the reporting period. The majority of deficiencies noted throughout this reporting period generally consisted of rutting and potholes in roadways and damage to the perimeter fence/gates which were repaired on an ongoing basis.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the ancillary systems identified in Section 3.5 of this Report. DEP will continue to be responsible for inspection and reporting for all ancillary system components, as well as maintenance of the remaining components of the ancillary systems not under NYS Parks' responsibility.

4.6 Post-Closure Environmental Monitoring

The Post-Closure Monitoring Plan for PAL went into effect when the FER was approved by NYSDEC at the end of March 2009, and now incorporates modifications approved by the NYSDEC in 2011. Monitoring currently entails monitoring of groundwater levels and quality once every five quarters in ten wells located around the perimeter of the Site, outside the limits of the landfill cap; and quarterly monitoring for the presence of methane in five gas monitoring wells located along the north boundary of the Site, adjacent to the Belt Parkway. Additionally, monitoring for the presence of methane is performed during M-1 sampling events inside the groundwater/leachate Pre-Treatment Facility building to ensure compliance with the NYSDEC Solid Waste Management Facility regulations.

During the PAL post-closure monitoring period, the PAL Post-Closure Monitoring Plan requirements have been modified as approved by the NYSDEC and the NYSDEC Solid Waste Management Facility regulations have been revised. The following sections address these modifications.

4.6.1 Gas Monitoring Program

During this five-year reporting period, quarterly perimeter gas monitoring events at the site were performed in accordance with the 6NYCRR Part 363 requirements. Figure 5 shows the locations of the five perimeter Gas Monitoring Wells GMW-01 to GMW-05.

During this five-year reporting period, methane monitoring was performed during twenty quarters, sometimes multiple times per quarter during intermittent flare shutdown periods. The monitoring results during this five-year reporting period are summarized in Table 8. Methane concentrations were 0% during all quarters at wells GMW-01 and GMW-02, in all but one quarter for GMW-03 (0.3% during 3Q19) and during thirteen quarters at well GMW-05. The results from the remaining seven monitoring quarters at well GMW-05 ranged from 0.1% to 1.0%. Monitoring at well GMW-04 ranged between 0.1% to 12.0%, with methane concentrations exceeding 1.25% in well GMW-04 in only three of twenty quarters (3Q19, 4Q19 and 1Q20). During these three quarters, bar hole surveys were performed around the well which all resulted in 0% methane readings as documented

in the Quarterly Reports. Overall the results from the perimeter gas monitoring events during this five-year reporting period met the requirements of 6NYCRR Part 363.

Methane readings within the groundwater/leachate Pre-Treatment Facility building were obtained on a during the M-1 sampling events and were consistently 0.0% throughout the facility during the five-year reporting period. 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) and met the 6NYCRR Part 363 requirements. The Pre-Treatment Facility building methane monitoring results are summarized in tables in the Quarterly Reports.

Landfill surface gas readings were taken semi-annually during the five-year reporting period (although this is not a regulatory requirement at this site), with no detections observed throughout the landfill. Sample locations are shown in Figure 6, and results are provided in the Appendices of the Quarterly Reports.

4.6.2 Groundwater Monitoring Program

The first round of post-closure groundwater monitoring was performed during the second quarter of 2009. During the first two years of post-closure monitoring, groundwater was monitored on a quarterly basis for all required Monitoring Plan parameters. After the first monitoring round, the field procedures in the Monitoring Plan were updated to allow the use of the low-flow purging and sampling procedure to collect samples for all parameters (instead of switching to bailers for VOCs). Analyses are performed by a State-certified environmental laboratory, and ten percent of the results are independently verified. The groundwater beneath the PAL is influenced by the tide cycle. However, hydraulic analysis determined that while tide cycle causes pressure fluctuations in the wells, it does not significantly influence groundwater flow beneath the site. Accordingly, monitoring rounds are conducted independently of the tide cycle, and water-level data are used for informational purposes only, not to determine groundwater flow directions or gradients.

Based on the results from the first year of monitoring, which indicated that the remediated PAL is not a significant source of contaminant releases to groundwater, DEP requested justifiable reductions in the frequency and scope of groundwater monitoring. NYSDEC approved that request in a letter dated March 2, 2011, and reduced 1) the frequency of groundwater monitoring from quarterly to annually, in rotating quarters (i.e., once every five quarters), and 2) the frequency of monitoring for pesticides and PCBs to once during each five-year review period. In addition, the post-closure reporting periods were revised to coincide with the calendar year. Accordingly, during the third five-year review period, the annual monitoring round for 2019 was performed during the fourth quarter; monitoring was not required in 2020, and the annual monitoring rounds for 2021, 2022 and 2023 were performed during the first, second and third quarters, respectively. Monitoring for pesticides and PCBs was performed during the 2022 monitoring round and will continue to be performed once during each subsequent five-year review period unless DEP receives approval from NYSDEC to discontinue monitoring for these parameters in the future.

Overall, the results for this review period continue to indicate that the PAL is not a significant source of releases of hazardous or toxic substances to groundwater, and that concentrations of the few site-related parameters detected are stable or decreasing over time. The results for the detected

VOCs and SVOCs, and leachate indicator parameters and metals, during the third five-year review period are summarized and compared to the NYSDEC Class GA standards and guidance values in Tables 9 through 12, respectively. These tables are also used to compare the results from this five-year review period to the 1993 remedial investigation (RI) results and the average concentrations from the first five-year review period (2009-2013) and second five-year review period (2014-2018). Pesticides and PCBs were not detected during the 2022 monitoring round, so summary tables for these analyte groups are not included.

As previously noted, the groundwater beneath the PAL is naturally saline and therefore non-potable. The results were compared to the Class GA potable water standards and guidance values because there are no standards or guidance values for saline ground water. However, exceedances of these standards and guidance values do not necessarily indicate a significant concern. The specific results for each analyte group are summarized on the following pages.

VOCs – Only eleven VOCs have been detected at least once during the past fifteen years of post-closure groundwater monitoring, and only five were detected at least once during this reporting period. Moreover, nearly all of these detections have been sporadic and limited to low concentrations in one to a few wells. During the most recent 2023 monitoring round, only three VOCs were detected – acetone, chlorobenzene and 1,4-dichlorobenzene. The results for the five VOCs detected during this five-year review period are summarized in Table 9.

As shown in Table 9, only two of the VOCs (acetone and chlorobenzene) have been detected in groundwater more than sporadically, and other than at low, estimated concentrations. The acetone may be due to laboratory contamination as the concentrations are typically <10X the acetone concentration detected in associated field blanks. During the post-closure period. chlorobenzene has only been detected in well screened in the fill aquifer, above the tidal marsh deposit. Moreover, chlorobenzene concentrations in groundwater have been decreasing over time, particularly when compared to the pre-remediation RI results. No exceedances of the Class GA standards or guidance values for VOCs occurred during this reporting period.

VOCs have not been detected at significant frequencies and concentrations in the five wells screened in the Upper Glacial Aquifer. This finding indicates that the tidal marsh deposit is continuing to serve as a hydraulic barrier to vertical migration of groundwater from the fill aquifer into the underlying Upper Glacial Formation.

SVOCs – Twenty-three of the SVOCs analyzed for have been detected at least once during the past fifteen years of post-closure groundwater monitoring, and 15 SVOCs were detected during this reporting period. Nearly all of these detections have also been limited to sporadic, low concentrations in wells screened in the fill aquifer, above the tidal marsh deposit. Moreover, as shown in Table 10, over time, the number and concentrations of SVOC detections has generally been decreasing. For example, in 2023, most of the SVOC detections occurred in just one well (HP-407-U), and most were limited to low, estimated concentrations. One exceedance for bis (2-ethylhexyl) phthalate occurred in well HP-104-A during this reporting period, in 2019. This SVOC is a plasticizing agent used in the production of PVC. As such, its detection is most likely attributable to leaching from the wells' PVC screens and casings. The only other exceedance during this reporting period were for ideno (1,2,3-cd) pyrene in Well

HP-101-S in 2019, and for phenols in Well HP-103-D in 2023, both of which were low in magnitude. Accordingly, the SVOC results for this reporting period still indicate that the PAL is not a significant source of SVOC releases to groundwater, and that the tidal marsh deposit is continuing to serve as a hydraulic barrier to vertical migration of groundwater.

Pesticides – Pesticides were not detected during the 2022 monitoring round, or in any of the groundwater samples collected during the first ten years of post-closure monitoring. Pesticides were also generally not detected during the RI. This finding indicates that the PAL continues to not be a source of pesticide impacts to groundwater.

PCBs – PCBs were also not detected during the 2022 monitoring round or in any of the groundwater samples collected during the first ten years of post-closure monitoring, and were only detected sporadically during the RI. This finding also indicates that the PAL continues to not be a source of PCB impacts to groundwater.

Leachate Indicators – The leachate indicator parameter results for this reporting period continue to be consistent with the PAL being an old, closed and capped municipal landfill that is underlain by saline groundwater. Specifically, as shown in Table 11, most of these parameters were detected in nearly every well; except for BOD and cyanide, which typically do not occur at elevated concentrations in uncontaminated saline ground water; and nitrate, which is metabolized by the naturally-occurring bacteria in the ground water. However, the concentrations of the parameters known to occur naturally in seawater, such as bromide, chloride, hardness, sulfate and total dissolved solids, are highest in the wells screened in the Upper Glacial Aquifer where the groundwater is most saline. Other parameters, such as alkalinity, ammonia and phenols, appear to be site-related because they are often detected at higher concentrations in wells screened in the fill aquifer, above the tidal marsh deposit.

The concentrations of a number of parameters exceed the Class GA standards and guidance values. However, it should be noted that most of the exceedances are for parameters that are related to the saline groundwater beneath the PAL. The exceedances for the site-related parameters, such as ammonia, are not a significant concern because the groundwater is non-potable, as noted above. Moreover, ammonia occurs naturally in seawater and is not persistent in the environment, and the standard for phenols is aesthetics-based rather than health-based. Overall, the concentrations of leachate indicator parameters in groundwater have remained stable or have decreased during the post-closure monitoring period. Sporadic higher concentrations have occurred, but these results are attributed to sample turbidity and/or below average recharge from precipitation.

Metals – The metals results for this reporting period continue to indicate that the PAL is not a significant source of metals-related impacts to groundwater. Specifically, as shown in Table 12, most of the target analytes, including the more toxic heavy metals, were either not detected or were only detected sporadically and/or at low concentrations. Moreover, the concentrations of the frequently-detected parameters, such as boron, magnesium, potassium and sodium, are generally much higher in the wells screened in the Upper Glacial Aquifer than in the wells screened in the fill aquifer above the tidal marsh deposits. This pattern indicates that they are primarily attributable to the saline groundwater.

The concentrations of certain metals exceed the Class GA standards and guidance values. However, it should be noted nearly all of the exceedances, and the highest-magnitude exceedances, are for parameters attributable to the saline groundwater. During this reporting period, no significant exceedances for heavy metals occurred, and overall, metal concentrations in the groundwater are similar to, or lower than, previous results. Overall, the concentrations of metals in groundwater have remained stable or have decreased during the post-closure monitoring period. Sporadic higher concentrations have occurred, but these results are attributed to sample turbidity and/or below average recharge from precipitation.

In summary, taken as a whole, the results for this reporting period indicate that the PAL continues to not be a significant source of toxic or hazardous substance releases to groundwater, and that groundwater quality conditions beneath the PAL are stable or improving over time in response to the remediation. The results also confirm that the reductions in the scope and frequency of post-closure groundwater monitoring were justified, and that further reductions may be warranted.

4.7 Record of Decision (ROD) Land Use Restriction Requirement

The ROD for the PAL required that a deed restriction be in place for the Site to prevent the extraction of ground water for consumptive use, and to ensure that any future Site use or other invasive activity is approved by NYSDEC and NYSDOH. In a letter dated March 29, 2009, NYSDEC indicated that it would accept either a deed restriction, per 6 NYCRR Part 360, or an environmental easement, per 6 NYCRR Part 375, in satisfaction of this requirement. The land upon which the PAL is located is owned by the National Parks Service (NPS) and DEP was informed by the NPS that it does not allow deed restrictions or environmental easements to be placed on its lands. Therefore, NYSDEC utilized an Environmental Notice, dated May 16, 2012, to satisfy this regulatory requirement. The Environmental Notice was recorded in New York City's ACRIS database on July 16, 2012. Therefore, the land use restriction requirement of the ROD has been fulfilled.

4.8 Periodic Review Report (PRR) Requirement

6NYCRR Part 375 requires that PRRs contain a certification that the Institutional and Engineering Controls are in effect and the certification be submitted on an appropriate Site-specific schedule. The information in Subsections 4.1 through 4.7 above satisfies the requirements of the fourth PRR for the PAL, covering the period from January 1, 2019 through December 31, 2023. The executed Institutional and Engineering Controls Certification Form for the third periodic review period accompanies this Report.

Section 5 – Conclusions and Recommendations

Based on the results of the post-closure activities performed during this five-year review period, the PAL engineering controls and associated institutional controls are in place, performing properly and remain effective. The PAL remedy continues to be protective of public health and the environment and is compliant with the PAL ROD. The activities associated with the O&M Manual and the modified Post-Closure Monitoring Plan (as approved by the NYSDEC) continue to be implemented. Routine system maintenance and repair of each of the remediation systems should continue in compliance with the requirements of the PAL O&M Manual.

Per the Agreement executed on August 24, 2018 between DEP and NYS Parks, NYS Parks has made capital improvements to the sites to create the Shirley Chisholm State Park and is responsible for the maintenance of those improvements, as well as the maintenance of portions of the Final Cover System, Stormwater Management System and Ancillary Systems identified under Section 3 of this Report. All work performed by NYS Parks will be done in accordance with the sites' RODs, Consent Orders, Environmental Notices and O&M Manuals. DEP will continue to be responsible for inspection and reporting of the condition of all components of these systems. DEP and NYS Parks will work together to coordinate these efforts.

Specific conclusions and recommendations for each of the remediation systems are identified in the following paragraphs.

5.1 Groundwater/Leachate Management System

The groundwater/leachate management system continued to be operational and prevent off-site leachate migration during the Site's third five-year review period. Since November 1, 2011, the groundwater/leachate management system has been operating in plant diversion mode. In this mode, the treatment system processes are being circumvented since the quality of the interceptor trench water being collected meets the permit discharge limits without pre-treatment. During this reporting period, the untreated discharge continued to meet the required permit limits. The interceptor trench discharge monitoring for permit-required parameters will be continued in accordance with the permit requirements. Should it be necessary in the future for the treatment processes to be brought back online, it would be recommended that influent/effluent water quality sampling be reinstated.

Based on a review of the M-1 sample results, the concentrations of certain parameters in the influent continue to exceed the NYSDEC limits for saline surface water. Therefore, operation of the interceptor trench is still warranted.

As previously recommended in prior Post-Closure Reports, since no product has ever been detected at the leachate pump stations, the replacement of the scavenger pumps was examined and determined not to be necessary. The pump stations should continue to be inspected on a daily basis and the water quality should continue to be sampled in accordance with the discharge permit requirements. Should product be observed, mitigation measures should be taken at that time to ensure they are appropriate to the actual conditions encountered. Based on the

results of the monitoring and inspection activities performed during this five-year reporting period, this recommendation remains in effect.

Operational equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP should continue to be monitored and assessed over time and may be replaced in the future, if necessary.

In general, it is recommended that individual pieces of equipment that are not in use be maintained in good working condition and ready to be placed back on-line, if necessary. The interceptor trench pump stations and related equipment will continue to be operated and maintained. If deficiencies are noted they will be repaired and/or replaced in a timely manner to minimize system downtime. Specifically, the recommended corrective actions listed in Form DP-1, Leachate Pre-Treatment System, Descriptions of Deficiencies and Problems, in the Quarterly Reports should be implemented.

5.2 Landfill Gas Management System

The LFGMS continued to be operational and prevent off-site gas migration during the Site's second five-year review period. As the landfill ages, the methane quality and quantity of gas generated by the landfill will continue to decline. The LFGMS should continue to be operated under pulse operations to maximize methane quality at the flare in order to minimize the use of supplemental gas. The recommendations made by the DEP oversight consultant to improve system performance should continue to be implemented. The LFGMS performance should continue to be monitored to determine if additional adjustments and/or modifications to the system are necessary as the landfill gas quality and quantity diminishes further in the future.

Operational equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP should continue to be monitored and assessed over time and may be replaced in the future, if necessary. In addition, the recommended corrective actions listed in Form DP-1, Landfill Gas System, Descriptions of Deficiencies and Problems, in the Quarterly Reports should be implemented.

5.3 Final Cover System

Overall, the landfill final cover system continued to be protective of the landfill cap beneath it during the Site's second five-year review period. Conditions found were 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 prevent problem areas from expanding and worsening. In addition, the recommended corrective actions listed in Form DP-1, FCS-1, Descriptions of Deficiencies and Problems, in the Quarterly Reports should be implemented.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the final cover system identified in Section 3.3 of this Report. DEP will continue to be responsible for inspection and reporting for all final cover system components, as well as maintenance of the remaining

components of the final cover system not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.4 Stormwater Management System

The stormwater management system continued to convey stormwater runoff to its outfall locations during the Site's second five-year review period. Conditions found were 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. The recommended corrective actions listed in Form DP-1 (SWM-1, SWM-2 SWM-3), Descriptions of Deficiencies and Problems, in the Quarterly Reports should be implemented as deemed appropriate.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the stormwater management system identified in Section 3.4 of this Report. DEP will continue to be responsible for inspection and reporting for all stormwater management system components, as well as maintenance of the remaining components of the stormwater management system not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.5 Ancillary Systems

The roads and nature trails of the ancillary systems continued to provide access throughout the Site while the fencing and gates continued to allow for controlled site access during the Site's second five-year review period. Conditions found were 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 prevent problem areas from expanding and worsening. . In addition, the recommended corrective actions listed in Form DP-1, ANS-1, Descriptions of Deficiencies and Problems, in the Quarterly Reports should be implemented.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the ancillary systems identified in Section 3.5 of this Report. DEP will continue to be responsible for inspection and reporting for all ancillary system components, as well as maintenance of the remaining components of the ancillary systems not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.6 Post-Closure Environmental Monitoring

Based on the results of the post-closure environmental monitoring performed to date, the PAL remedy continues to be protective of public health and the environment and is compliant with the PAL ROD.

The results of the post-closure landfill-gas monitoring performed during this five-year reporting period document that methane levels measured met the 6NYCRR Part 363 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.

In summary, the groundwater monitoring results from this reporting period continue to indicate that the PAL is not a significant source of toxic or hazardous substance releases to groundwater, and that groundwater-quality conditions beneath the Site are stable or improving over time in response to the remediation. The results also confirm that the reductions in the scope and frequency of post-closure groundwater monitoring were justified, and that further reductions may be warranted.

Recommendations for post-closure groundwater monitoring are to continue to perform the environmental monitoring in accordance with the modified Monitoring Plan (approved by the NYSDEC in March 2011) reflecting the reduction in the frequency of groundwater monitoring to annually, in rotating quarters (i.e., once every five quarters) and the reduction in the frequency of monitoring for pesticides and PCBs to once during each five-year review periods. It is also recommended that further reductions in the scope and/or frequency of monitoring be evaluated, and if warranted that a request be submitted to the NYSDEC. In the meantime, the next groundwater monitoring round will be performed during the fourth quarter of 2024.

FIGURES

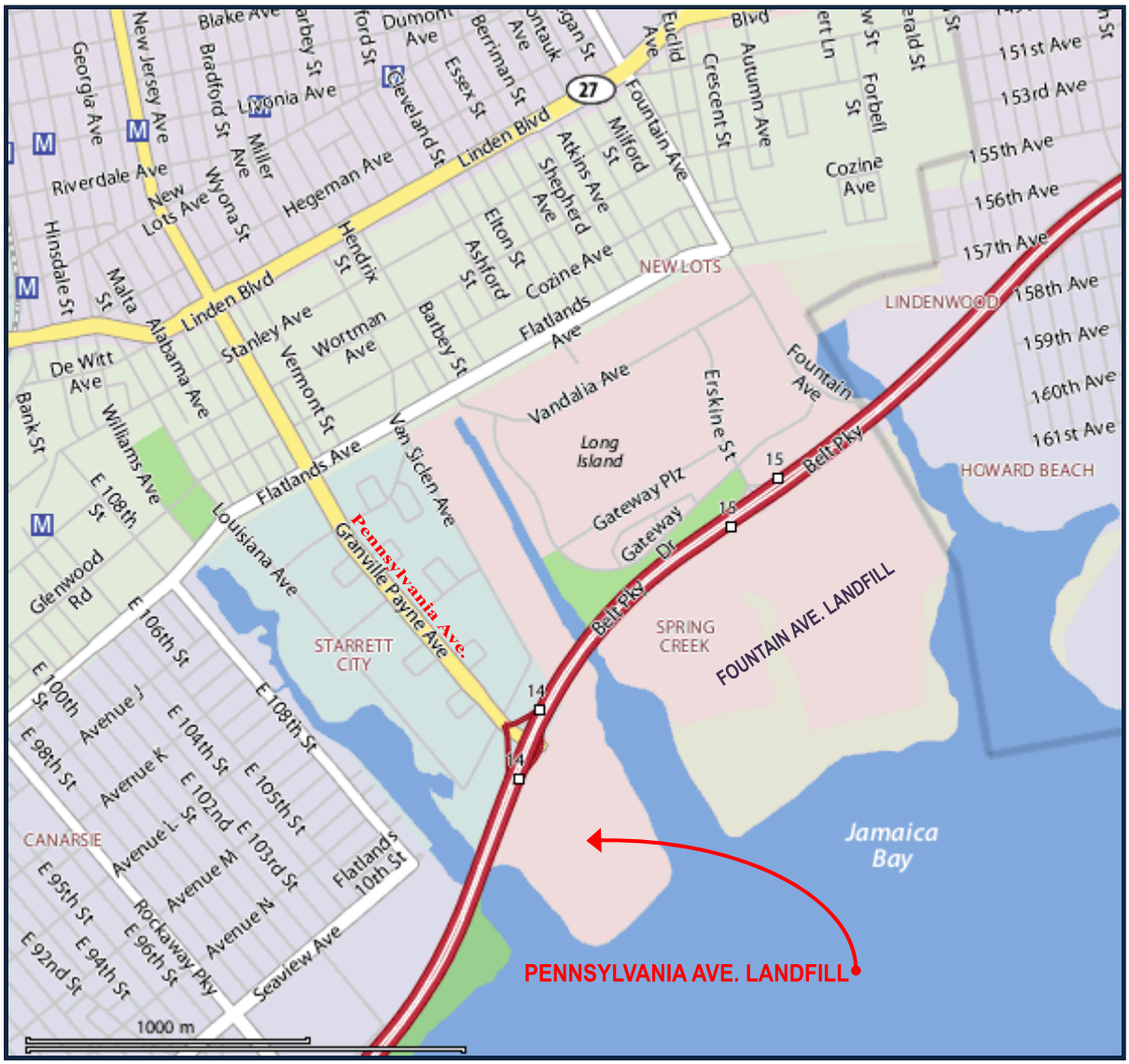

FIGURE 1
SITE LOCATION MAP

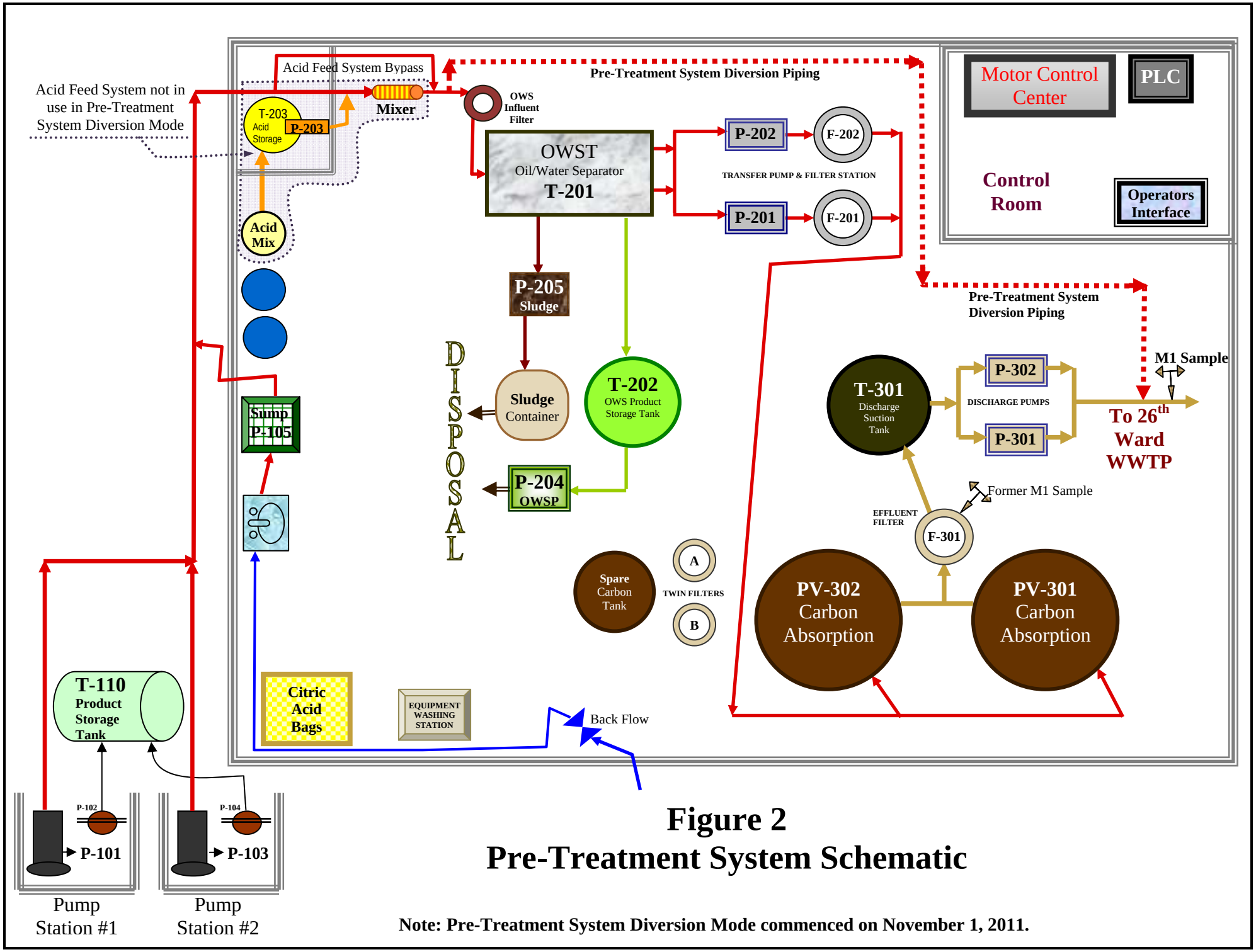

Figure 2
Pre-Treatment System Schematic

Note: Pre-Treatment System Diversion Mode commenced on November 1, 2011.

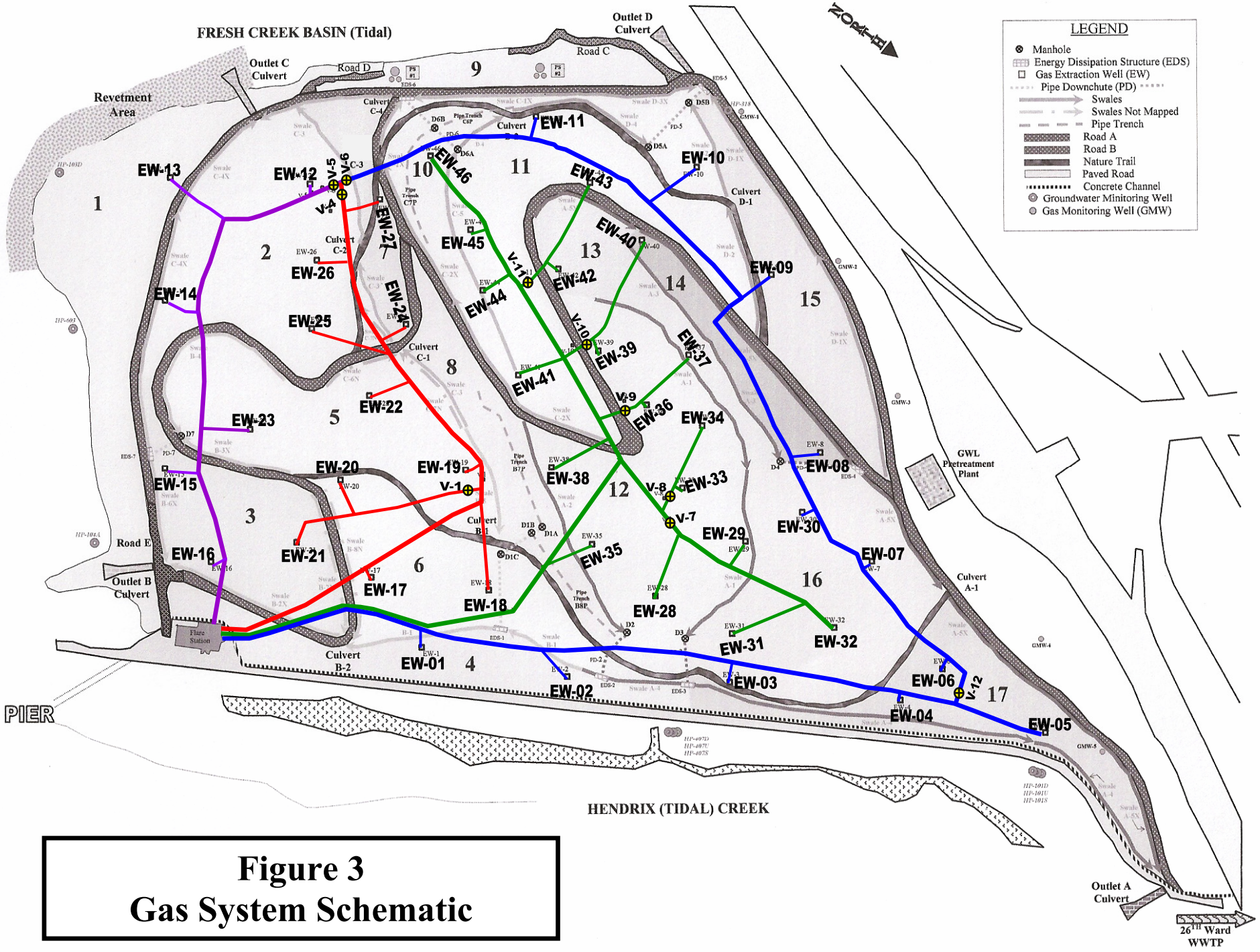

Figure 3
Gas System Schematic

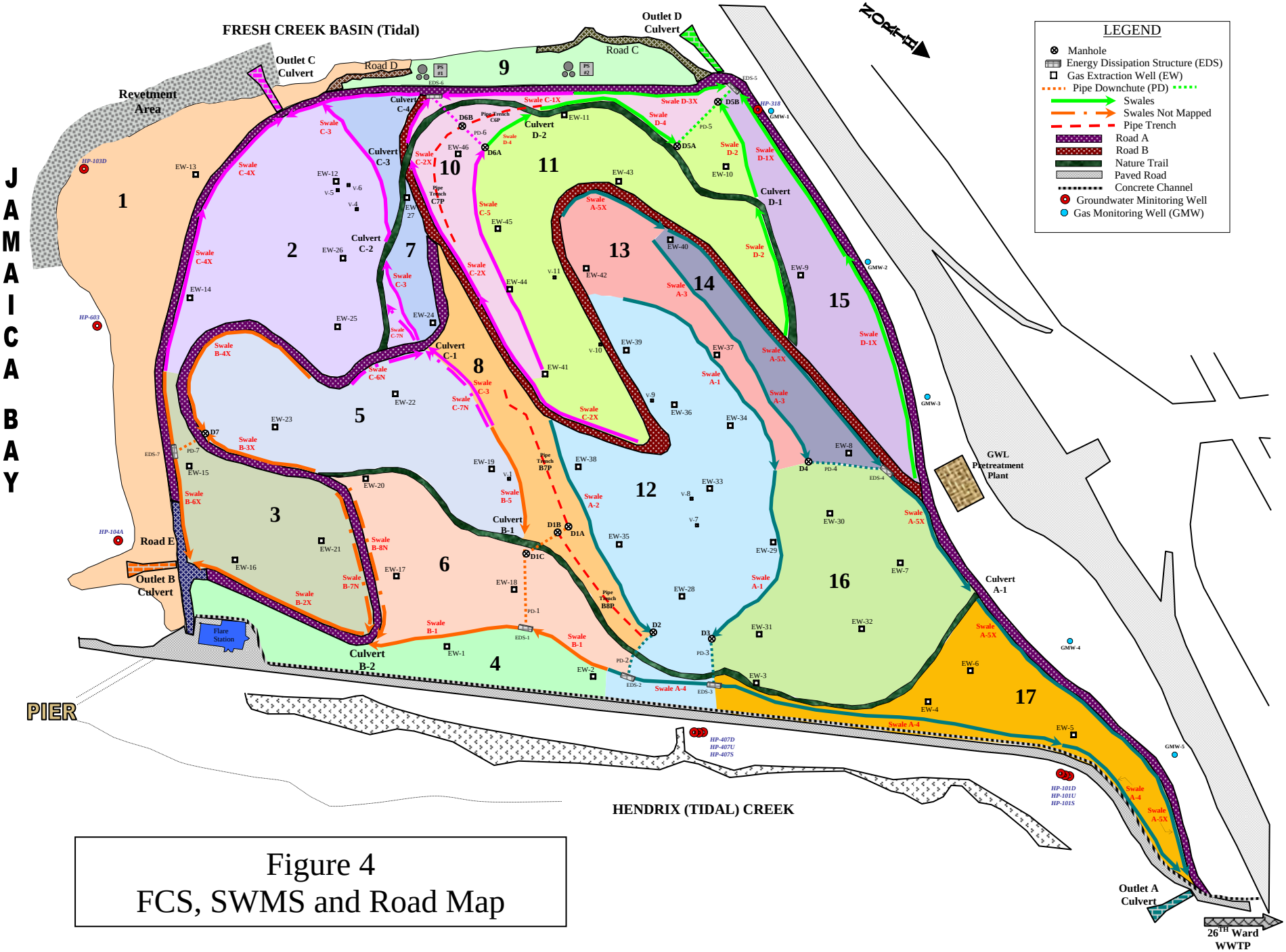

Figure 4
FCS, SWMS and Road Map

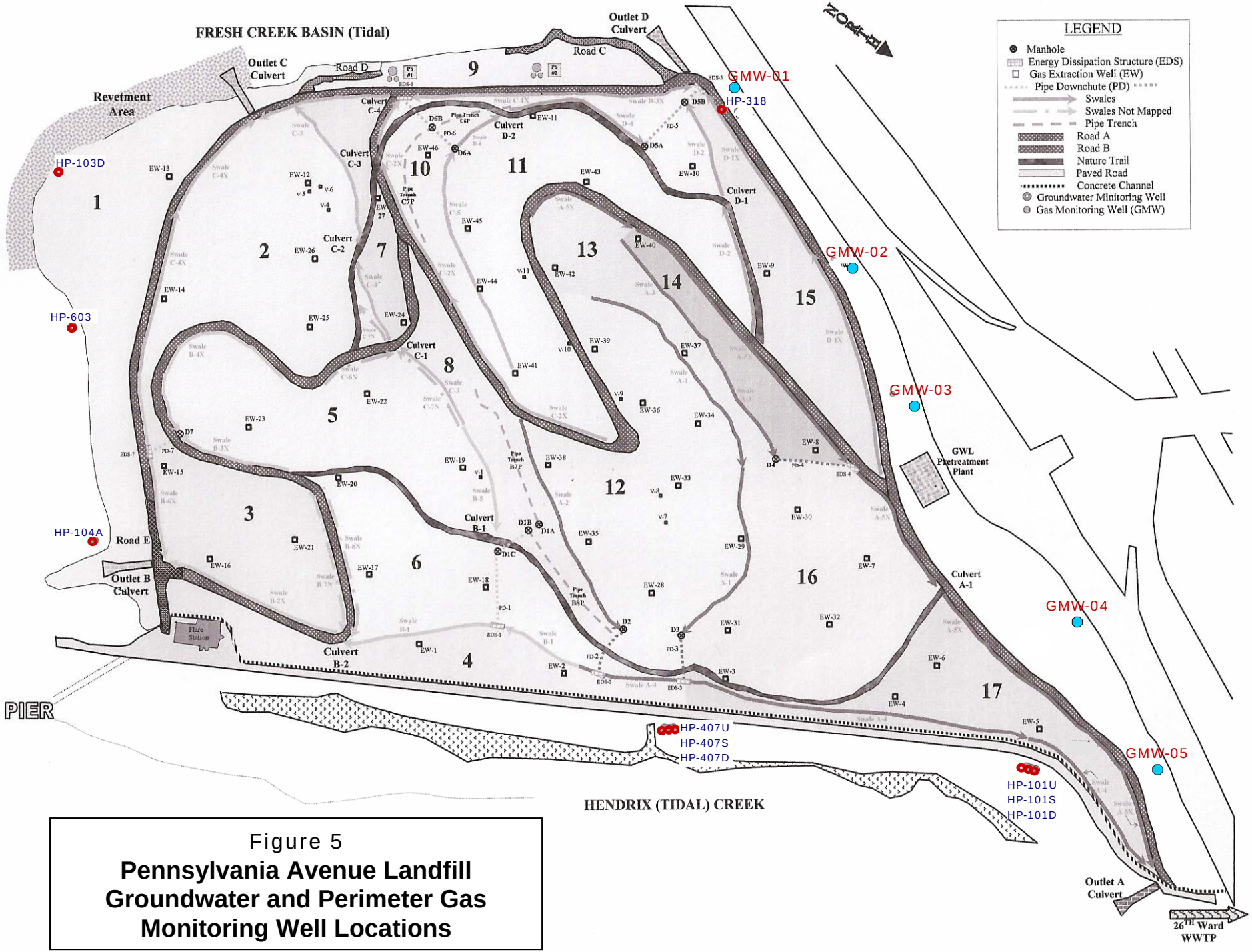

Figure 5

Pennsylvania Avenue Landfill Groundwater and Perimeter Gas Monitoring Well Locations

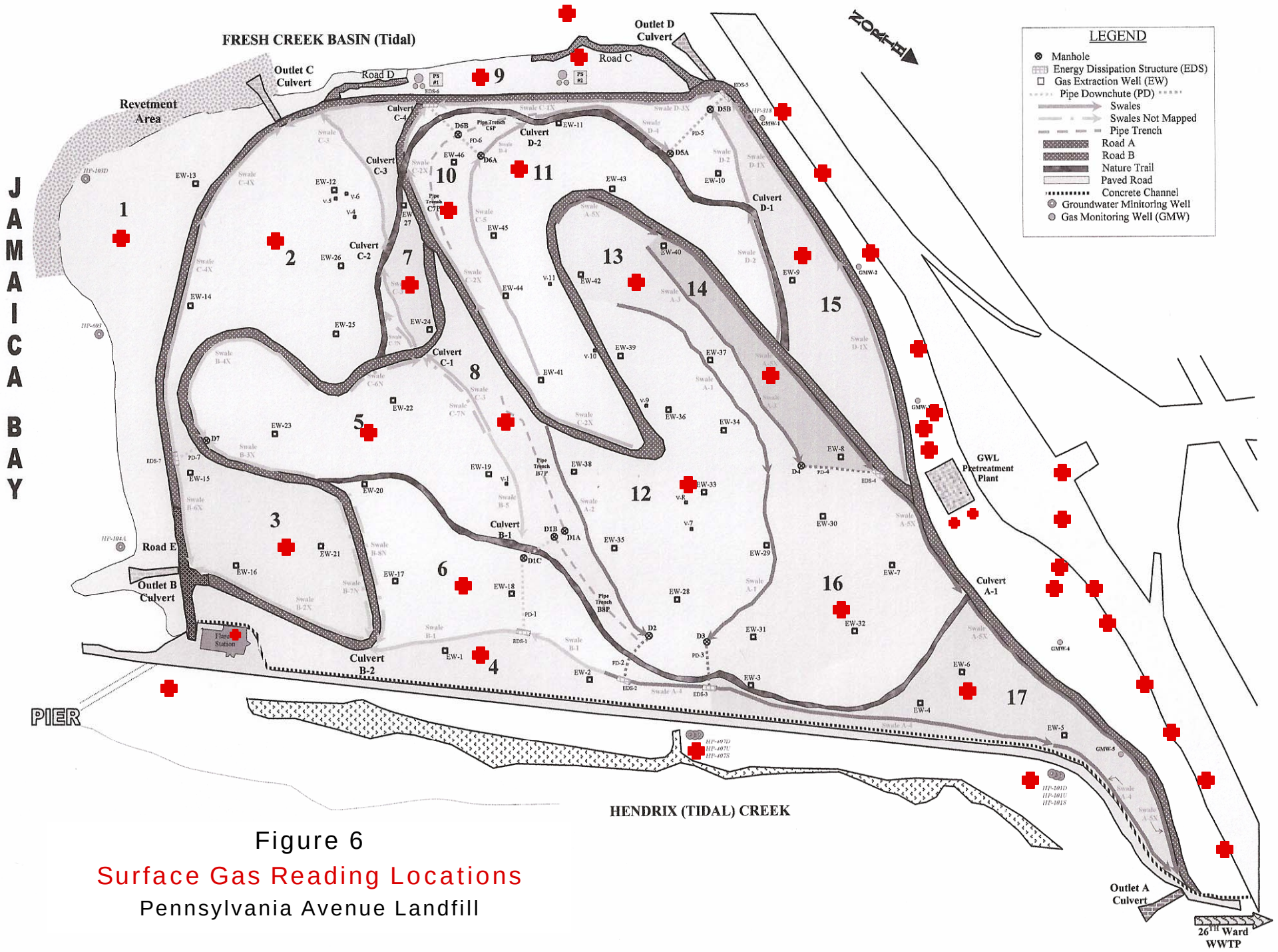

Figure 6

Surface Gas Reading Locations

Pennsylvania Avenue Landfill

TABLES

Table 1

Pararameters Detected in the Groundwater Leachate Pre-Treatment System Discharge

Pennsylvania Avenue Landfill, Brooklyn, N.Y.

Analyte	Units	Permit			TOGS - SA Fish Propagation Standards	2023 M1 Discharge Sample Results									
		Max. Conc.	Daily Limit	Monthly Limit		18-Jan	14-Feb	10-Apr	12-Apr	17-Apr	19-Apr	9-Oct	11-Oct	16-Oct	18-Oct
Chloride	mg/L					1,050	891	786	742	779	822	523	2,040	660	2,260
Nitrate as N	mg/L					0.35	0.16	0.18	0.2	0.1	0.16	0.34	0.13	0.41	<0.050
Nitrite as N	mg/L					0.14	0.16	0.16	0.23	<0.050	0.12	0.14	0.17	0.076	<0.050
Nitrogen, Kjeldahl, Total	mg/L					24.2	22.8	29.8	37.4	27.8	38.6	9.9	29.8	9.9	34.4
Nitrogen, Total	mg/L					24.5	23.0	30	37.6	27.9	38.8	10.3	29.9	10.4	34.5
Suspended Solids (Residue, Non-Filterable)															
TSS Grab #1	mg/L	350				8.0	21.3	34	34	30	40	42.0	12.0	46.0	18.7
TSS Grab #2	mg/L	↓				7.3	17.3	30	32	34	32	8.0	16.7	8.7	18.0
TSS Grab #3	mg/L					9.3	16.0	38	30	30	30	13.2	14.0	9.3	20.7
TSS Grab #4	mg/L					7.3	14.0	34	32	28	32	6.0	12.7	6.7	21.3
pH															
pH Grab #1 (Field/Lab)	SU	5.0 - 12.0 Standard Units				7.21 / 7.0	6.64 / 7.2	6.99 / 6.9	6.98 / 7.0	7.32 / 7.2	7.08 / 7.2	7.20 / 7.1	6.92 / 7.2	6.90 / 7.1	6.84 / 7.1
pH Grab #2 (Field/Lab)	SU					7.10 / 7.0	7.11 / 7.0	6.90 / 6.8	7.07 / 7.0	7.49 / 7.0	7.01 / 7.0	6.91 / 7.2	6.94 / 7.2	6.97 / 7.3	6.91 / 7.1
pH Grab #3 (Field/Lab)	SU					6.89 / 7.1	6.98 / 7.2	7.02 / 6.9	6.93 / 7.1	6.96 / 7.0	7.02 / 6.9	6.92 / 7.4	6.87 / 7.2	6.96 / 7.5	6.82 / 7.1
pH Grab #4 (Field/Lab)	SU					6.84 / 7.0	7.04 / 7.0	7.04 / 6.9	6.94 / 7.1	7.05 / 7.4	7.12 / 7.1	6.87 / 7.5	6.97 / 7.1	6.92 / 7.3	6.90 / 7.0
Volatile Organic Carbons (VOCs)															
1,2-Dichlorobenzene	ug/L					1.1	1.3	1.6	1.4	1.9	1.9	<1.0	1.6	<1.0	1.5
1,3-Dichlorobenzene	ug/L					<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	ug/L					2.7	2.8	4.1	3.2	3.9	4.4	<1.0	3.0	1.4	3.0
Sum of Dichlorobenzenes	ug/L				5 (GV)	3.8	4.1	**5.7**	4.6	**5.8**	**7.4**	<1.0	4.6	1.4	4.5
Acetone	ug/L					<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	10.7	8.5	<5.0
Carbon disulfide	ug/L					<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L				5 (GV)	**15.5**	**15.3**	**21.6**	**19.8**	**19.9**	**21.6**	1.7	**9.5**	1.5	**12.2**
Dimethylphthalate	ug/L					<0.97	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.1
Semi-Volatile Organic Carbons (SVOCs)															
N-Nitrosodiphenylamine	ug/L				5 (GV)	2.8	3.0	<1.0	4.4	**5.0**	4.2	1.7	**5.0**	2.2	**5.1**

Table 2

Summary of Perimeter Gas Monitoring Well Results

Pennsylvania Avenue Landfill, Brooklyn, NY

Quarterly Monitoring Round:		1Q2023	2Q2023	3Q2023	4Q2023
Monitoring Date:		27-Mar	9-Jun	27-Sep	20-Dec
METHANE (% BY Volume)	GMW-1	0.0	0.0	0.0	0.0
	GMW-2	0.0	0.0	0.0	0.0
	GMW-3	0.0	0.0	0.0	0.0
	GMW-4	1.0	0.6	0.7	0.5
	GMW-5	0.0	0.1	0.0	0.0
CARBON DIOXIDE (% BY Volume)	GMW-1	5.9	4.3	3.4	3.3
	GMW-2	6.7	3.8	3.1	4.2
	GMW-3	5.5	3.5	3.3	3.0
	GMW-4	12.4	11.2	10.9	11.6
	GMW-5	7.1	10.6	3.2	3.4
OXYGEN (% BY Volume)	GMW-1	15.8	16.1	17.1	17.5
	GMW-2	13.3	14.5	13.4	12.4
	GMW-3	15.2	15.9	15.2	16.2
	GMW-4	12.9	8.8	8.4	9.1
	GMW-5	16.5	17.2	16.7	17.8

Table 3
Summary of Gas Monitoring Results within the Groundwater Leachate Pre-Treatment Building

Pennsylvania Avenue Landfill
Brooklyn, NY

	Date	Groundwater Leachate Pre-Treatment Building Methane (% by Volume)
1Q2023	1/18/2023	0.0
	2/14/2023	0.0
	3/17/2023	0.0
2Q2023	4/10/2023	0.0
	5/11/2023	0.0
	6/8/2023	0.0
3Q2023	7/12/2023	0.0
	8/10/2023	0.0
	9/18/2023	0.0
4Q2023	10/9/2023	0.0
	10/11/2023	0.0
	10/16/2023	0.0
	10/18/2023	0.0
	11/22/2023	0.0
	12/22/2023	0.0

Table 4

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

Pennsylvania Avenue Landfill, Brooklyn, NY

VOCs Detected In Groundwater Samples	Class GA Standard	Well Number and Result, in ug/L										
		HP-101-U	**HP-101-S**	**101-S Dup.**	**HP-101-D**	**HP-103-D**	**HP-104-A**	**HP-318**	**HP-407-U**	**HP-407-S**	**HP-407-D**	**HP-603**
Acetone	50[GV]	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.8	17.3	<5.0	8.6	<5.0
Chlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<1.0	1.8	<1.0	<5	<5.0	<5.0	4.3
1,4-Dichlorobenzene	3	<5.0	<5.0	<5.0	<5.0	<1.0	1.0	<1.0	<5	<5.0	<5.0	<1.0

Notes: ug/L = Micrograms per Liter.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA standard for this parameter).
There are no exceedances of Class GA standards or TOGS 1.1.1 guidance values for VOCs.
Acetone was detected in the field blank at an estimated concentration of 3.1 J.
Acetone detection in Well 318 flagged as non-detected by data validator.
The other actetone detections would also have flagged as non-detected because they are <10X the field blank result.

Table 5

Summary of Target Semivolatile Organic Compounds (SVOCs) Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

SVOCs Detected In Groundwater Samples	Class GA Standard	Well Number and Result, in ug/L										
		HP-101-U	**HP-101-S**	**101-S Dup.**	**HP-101-D**	**HP-103-D**	**HP-104-A**	**HP-318**	**HP-407-U**	**HP-407-S**	**HP-407-D**	**HP-603**
Acenaphthene	20[GV]	<5.1	<5.0	<5.0	<5.0	<4.9	<5.0	<4.9	<5.0	<5.0	<5.0	1.2 J
Acetophenone	NA	<5.1	<5.0	<5.0	<5.0	<4.9	<5.0	<4.9	0.83 J	<5.0	<5.0	<4.8
bis(2-Ethylhexyl)phthalate	5	<5.1	<5.0	1.9 J	<5.0	<4.9	<5.0	<4.9	1.8 J	<5.0	<5.0	<4.8
Caprolactam	NA	<5.1	<5.0	<5.0	<5.0	<4.9	<5.0	<4.9	<5	<5.0	1.5 J	<4.8
Cresol (m+p)	NA	1.1 J	<5.0	<5.0	<5.0	<4.9	<5.0	<4.9	<5	<5.0	<5.0	<4.8
N-Nitrosodiphenylamine	50[GV]	<5.1	<5.0	<5.0	<5.0	<4.9	<5.0	0.58 J	<5	<5.0	<5.0	<4.8
Phenol	1[(a)]	<5.1	<5.0	<5.0	<5.0	**1.2 J**	<5.0	<4.9	**13.0**	<5.0	<5.0	<4.8

Footnotes: ug/L = Micrograms per Liter.
J = Estimated concentration.
Class GA Standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or guidance value.
[(a)] Applies to the sum of phenolic compounds
Additional, method-specific, results for phenol are provided in Table 5.

Table 6

Summary of Leachate Indicator Parameters Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Leachate Indicator Parameter	Class GA Standard	Well Number and Result, in mg/L*									
		HP-101-D	**HP-101-S**	**HP-101-U**	**HP-103-D**	**HP-104-A**	**HP-318**	**HP-407-D**	**HP-407-S**	**HP-407-U**	**HP-603**
Apparent Color	15	**40**	**45**	**40**	**20**	**100**	**50**	**50**	**70**	**70**	**35**
Alkalinity,Bicarbonate (CaCO3)	NA				93.5	288	324	126			564
Total Hardness as CaCO3	NA	455,000	595,000	418,000	1,520,000	1,780,000	252,000	3,020,000	2,210,000	492,000	474,000
Total Dissolved Solids	500**	**1,480**	**5,500**	**1,440**	**6,500**	**7,150**	478	**16,300**	**10,500**	**1,940**	**620**
Chemical Oxygen Demand	NA	42	46.4	87.4	245	165	18.3	659	455	225	37.7
BOD, 5 day	NA	<4.0	<4.0	<4.0	<2.0	<4.0	<4.0	<4.0	<4.0	14.4	<4.0
Bromide	2^{GV}	0.58	**2.6**	0.45 J	**12.5**	**12.2**	0.24 J	**31.5**	**25.5**	1.1	0.42 J
Chloride	250	**346**	**3,320**	**432**	**4,980**	**3,370**	76.4	**9,790**	**6,510**	165	56.2
Sulfate	250	<5.0	<10.0	11.1	**706**	**497**	17.6	**1,240**	**399**	<5	54.2
Nitrogen, Kjeldahl, Total	NA	5.6	12.2	13.7	0.32	8.8	2.0	0.88	35.1	144	13.2
Nitrate-Nitrite (as N)	10	<0.050	<0.050	<0.050	0.35	<0.050	0.4	<0.050	<0.050	<0.05	0.16
Nitrite as N	1	<0.050	<0.050	<0.050	<0.050	0.035 J	<0.050	<0.050	<0.050	<0.05	<0.050
Nitrogen, Ammonia	2	**4.4**	**12.8**	**10.6**	0.78	**9.1**	1.4	0.47	**43.1**		**14.9**
Phenolics, Total Recoverable	0.001	**0.586**	**0.0409**	**0.0835**	**0.0127**	**.0076 J**	<0.010	**0.192**	**0.0613**	**0.0876**	<0.010
Cyanide	0.2	<10.0	**7.9 J**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	**8.3 J**	<10.0
Total Organic Carbon	NA	10.7	12.7	13.9	2.7	9.8	7.6	36.3	4.4	73.8	13.8

Notes: BOD = Biological Oxygen Demand.
mg/L = Milligrams per Liter.
J = Estimated concentration.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or TOGS 1.1.1 guidance value.
* = Except for Color, which is in Color Units.
** = Standard is the more stringent Federal SMCL (The Class GA TDS standard is <1,000 mg/L).
Phenolics Lab data in ug/L, converted to mg/L

Table 7

Summary of Inorganic Parameters Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

Inorganic Parameter	Class GA Standard	Well Number and Result, in ug/L									
		HP-101-D	**HP-101-S**	**HP-101-U**	**HP-103-D**	**HP-104-A**	**HP-318**	**HP-407-D**	**HP-407-S**	**HP-407-U**	**HP-603**
Aluminum	NA	50.6 J	290	1,970	376	271	<200	601	479	198 J	<200
Arsenic*	10	<10.0	<10.0	6.6 J	<10.0	<10.0	7.2 J	<10.0	<10.0	<10.0	<10.0
Barium*	1,000	223	82.6 J	93.5 J	79.8 J	248	14.2 J	64.1 J	233	503	91.9 J
Beryllium	3[GV]	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0.36 J	<5.0	<5.0	<5.0
Boron	1,000	230	**1,060**	325	**1,020**	198	223	**1,580**	**1,660**	**1,740**	303
Cadmium*	5	<2.5	<2.5	**9.5**	1.2 J	<2.5	<2.5	0.34 J	<2.5	<2.5	<2.5
Calcium	NA	132,000	85,200	124,000	110,000	382,000	72,900	244,000	176,000	82,400	123,000
Chromium*	50	<10.0	2.1 J	18	<10.0	<10.0	<10.0	<10.0	<10.0	8.2 J	<10.0
Cobalt	NA	<50.0	<50.0	4.6 J	<50.0	<50.0	<50.0	<50.0	10.7 J	4.8 J	<50.0
Copper	200	<25.0	<25.0	**274**	<25.0	<25.0	<25.0	4.0 J	<25.0	4 J	<25.0
Iron	300	**12,700**	**1,230**	**30,400**	59.2 J	**52,700**	**7,590**	**13,700**	**12,300**	**4,710**	**9,100**
Lead*	25	<5.0	6.9	121	<5.0	<5.0	<5.0	13.7	13	2.5 J	<5.0
Magnesium	35,000[GV]	30,500	**92,800**	26,200	**303,000**	**201,000**	17,100	**586,000**	**429,000**	**69,500**	**40,500**
Manganese	300	**448**	88	193	142	**1,840**	168	**824**	167	257	**530**
Nickel	100	19.8 J	30.5 J	52.5	10.8 J	14.9 J	20.0 J	27.8 J	34.3 J	26.5 J	15.3 J
Potassium	NA	15,700	92,900	19,700	137,000	38,600	11,000	250,000	231,000	54,100	12,400
Silver*	50	<10.0	<10.0	2.5 J	<10.0	1.8 J	<10.0	1.7 J	1.4 J	<10	<10.0
Sodium	20,000	**199,000**	**1,840,000**	**278,000**	**2,280,000**	**687,000**	**69,000**	**4,400,000**	**3,160,000**	**206,000**	**38,500**
Vanadium	NA	<50.0	13.6 J	14.8 J	9.0 J	8.4 J	3.2 J	13.1 J	15.9 J	11.7 J	3.4 J
Zinc	2,000[GV]	<20.0	<20.0	526	28.4	<20.0	<20.0	<20.0	<20.0	9.8 J	<20.0

Notes: ug/L = Micrograms per Liter.
J = Estimated concentration.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or TOGS 1.1.1 guidance value.
* = RCRA metal.

Table 8

Summary of Perimeter Gas Monitoring Well Methane Results During the Third Five-Year Review Period

Pennsylvania Avenue Landfill, Brooklyn, NY

Post- Closure Year	Quarterly Monitoring Round	Methane (% by Volume)				
		GMW-01	GMW-02	GMW-03	GMW-04	GMW-05
11	1Q19	0.0	0.0	0.0	0.2-0.6	0.5-0.8
	2Q19	0.0	0.0	0.0	0-0.3	0.0
	3Q19	0.0	0.0	0.3	0-10.3	0-0.8
	4Q19	0.0	0.0	0.0	0.1-12.0	0.0
12	1Q20	0.0	0.0	0.0	0.9-4.1	0.0
	2Q20	0.0	0.0	0.0	0.8-1.2	0.0
	3Q20	0.0	0.0	0.0	0.9-1.2	0.0
	4Q20	0.0	0.0	0.0	0.7-0.9	0.0
13	1Q21	0.0	0.0	0.0	0.5-0.6	0.0
	2Q21	0.0	0.0	0.0	0.4-1.2	0.0
	3Q21	0.0	0.0	0.0	0.3-0.6	0.2-0.8
	4Q21	0.0	0.0	0.0	0.3-1.0	0-0.3
14	1Q22	0.0	0.0	0.0	0.3-0.9	0.0
	2Q22	0.0	0.0	0.0	0-1.0	0-1.0
	3Q22	0.0	0.0	0.0	0.2-0.5	0-0.1
	4Q22	0.0	0.0	0.0	0.8-1.0	0.0
15	1Q23	0.0	0.0	0.0	1.0	0.0
	2Q23	0.0	0.0	0.0	0.6	0.1
	3Q23	0.0	0.0	0.0	0.7	0.0
	4Q23	0.0	0.0	0.0	0.5	0.0

Table 9

Comparison of Results for Target Volatile Organic Compounds (VOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit									
			HP-101U									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/3/93	12/12/93							
Acetone	ug/L	50^{GV}	R	R	ND	2.1 J	<5.0	<5.0	4.6 J	<5.0	1.15 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	**27**	ND	**6.1 J**	0.53 J	<1.0	1.5	1.5	<5.0	0.75
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	**4 J**	ND	1.1 J	ND	1.2	ND	ND	<5.0	0.30

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit									
			HP-407U									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/4/93	12/12/93							
Acetone	ug/L	50^{GV}	R	R	ND	12 J	4.4 J	6.4	26.5	17.3	13.7 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	**21**	**11**	4.0 J	1.7 J	<1.0	1.9	3	<5	1.2
Toluene	ug/L	5	ND	2 J	ND	ND	ND	ND	3.2	ND	0.8
1,4-Dichlorobenzene	ug/L	3	**4 J**	**3 J**	0.1 J	ND	<1.0	ND	ND	<5	0

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit									
			HP-104A									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/7/93	12/16/93							
Acetone	ug/L	50^{GV}	6 J	9 J	ND	1.2 J	<5.0	<5.0	<5.0	<5.0	ND
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	**30**	**18**	3.9 J	3.1 J	1.0	<1.0	<1.0	1.8	0.70
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	**5 J**	**4 J**	ND	0.30 J	<1.0	ND	ND	1.0	0.25

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit									
			HP-318									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/11/93	12/13/93							
Acetone	ug/L	50^{GV}	ND	R	ND	1.7 J	<5.0	<5.0	<5.0	<5.8	ND
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	**85**	**45**	**9.2**	2.5 J	<1.0	<1.0	<1.0	<1.0	ND
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	<1	**4 J**	0.3 J	ND	<1.0	ND	ND	<1.0	ND

			Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit									
			HP-603									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/7/93	12/12/93							
Acetone	ug/L	50^{GV}	4 J	NS	ND	1.1 J	<5.0	<5.0	<5.0	<5.0	ND
2-Butanone (MEK)	ug/L	50^{GV}	ND	NS	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	**48**	NS	3.3	2.3 J	<5.0	2.3	3.6	4.3	2.6
Toluene	ug/L	5	ND	NS	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	<5	NS	0.1 J	ND	<5.0	ND	ND	<1.0	ND

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer									
			HP-101S									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/3/93	12/12/93							
Acetone	ug/L	50^{GV}	ND	ND	ND	1.4 J	<5.0	<5.0	4.4 J	<5.0	1.1 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	ND	ND	ND	ND	<1.0	<1.0	<1.0	<5.0	ND
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	2.8	ND	0.70
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	ND	<1.0	ND	ND	<5.0	ND

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer									
			HP-407S									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/4/93	12/12/93							
Acetone	ug/L	50^{GV}	R	R	ND	2.5 J	4.1 J	<5.0	9	<5.0	3.2 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	ND	ND	ND	ND	<1.0	<1.0	<1.0	<5.0	ND
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	ND	<1.0	ND	ND	<5.0	ND

			Wells Screened in the Upper Portion of the Upper Glacial Aquifer									
			HP-101D									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/3/93	12/93							
Acetone	ug/L	50^{GV}	ND	NS	ND	0.63 J	<5.0	<5.0	4.7 J	<5.0	1.18 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	NS	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	ND	NS	ND	ND	<1.0	<1.0	<1.0	<5.0	ND
Toluene	ug/L	5	ND	NS	0.2	ND	ND	ND	2.1	ND	0.53
1,4-Dichlorobenzene	ug/L	3	ND	NS	ND	ND	<1.0	ND	ND	<5.0	ND

			Wells Screened in the Lower Portion of the Upper Glacial Aquifer									
			HP-103D									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/8/93	12/15/93							
Acetone	ug/L	50^{GV}	12 B	R	ND	0.63 J	9	9	26	<5.0	11
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	4.4 J	ND	ND	1.1 J
Chlorobenzene	ug/L	5	**16**	**12**	ND	ND	<5.0	<1.0	<1.0	<1.0	ND
Toluene	ug/L	5	ND	ND	ND	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	3 J	ND	ND	ND	<5.0	ND	ND	<1.0	ND

			Wells Screened in the Lower Portion of the Upper Glacial Aquifer									
			HP-407D									
VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation		1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
			8/3/93	12/13/93							
Acetone	ug/L	50^{GV}	ND	ND	ND	1	<5.0	<5.0	4.1 J	8.6	3.18 J
2-Butanone (MEK)	ug/L	50^{GV}	ND	ND	ND	ND	ND	<5.0	ND	ND	ND
Chlorobenzene	ug/L	5	ND	ND	ND	ND	<1.0	<1.0	<1.0	<5.0	ND
Toluene	ug/L	5	ND	ND	1	ND	ND	ND	<1.0	ND	ND
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	ND	<1.0	ND	ND	<5.0	ND

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 naturally saline; therefore, non-potable.
There are no VOC standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled.
Bold results are higher than the standard or guidance value.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Table 10

Comparison of Results for Target Semivolatile Organic Compounds (SVOCs) Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

HP-101U

SVOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ug/L	20 GV	0.6 J	ND	ND	ND	ND	ND	ND	<5.1	ND
Acetophenone	ug/L	No Std.	ND	ND	ND	ND	ND	ND	ND	<5.1	ND
Benzo (b) fluoranthene	ug/L	No Std.	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ug/L	No Std.	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ug/L	No Std.	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	ug/L	5	R	R	2.67	0.17 J	2	ND	ND	<5.1	0.45
Caprolactam	ug/L	No Std.	ND	ND	ND	ND	ND	ND	ND	<5.1	ND
Chrysene	ug/L	No Std.	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ug/L	No Std.	ND	ND	ND	ND	ND	ND	ND	1.1 J	0.28 J
Dibenz (a,h) anthracene	ug/L	5	NA	NA	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ug/L	50 GV	0.1 J	ND	ND	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ug/L	0.002 GV	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ug/L	5	ND	ND	ND	ND	ND	<1.0	ND	ND	ND
N-Nitrosodiphenylamine	ug/L	50 GV	ND	ND	ND	ND	ND	ND	ND	<5.1	ND
Phenol	ug/L	1 (a)	ND	ND	ND	ND	ND	ND	ND	<5.1	ND

HP-407U

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	1 J	2 J	0.23	ND	ND	ND	ND	<5	ND
Acetophenone	N	N	ND	ND	ND	ND	ND	0.83 J	0.21 J
Benzo (b) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NA	ND	0.23 J	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	R	2.20	1.53	<1.0	ND	ND	1.8 J	0.45 J
Caprolactam	ND	ND	ND	ND	ND	ND	ND	<5	ND
Chrysene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	ND	ND	ND	ND	ND	ND	<5	ND
Dibenz (a,h) anthracene	NA	NA	ND	0.11 J	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	ND	ND	0.18 J	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NA	ND	**0.24 J**	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND	<1.1	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	<5	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	**13.0**	**3.25**

HP-104A

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/7/93	Remedial Investigation 12/16/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	2 J	ND	0.16 J	ND	ND	ND	ND	<5.0	ND
Acetophenone	ND	ND	ND	ND	ND	ND	ND	<5.0	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	R	2.55	0.50	**14.3**	ND	ND	<5.0	3.58
Caprolactam	ND	ND	ND	ND	ND	ND	ND	<5.0	ND
Chrysene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	ND	ND	ND	ND	ND	ND	<5.0	ND
Dibenz (a,h) anthracene	NA	NA	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	1 J	ND	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND	<1.1	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	<5.0	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	<5.0	ND

HP-318

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/11/93	Remedial Investigation 12/13/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ND	14	4.52	0.68 J	ND	ND	ND	<4.9	ND
Acetophenone	ND	ND	ND	ND	ND	ND	ND	<4.9	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	R	2.13	0.35	<1.0	ND	ND	<4.9	ND
Caprolactam	ND	ND	ND	ND	ND	ND	ND	<4.9	ND
Chrysene	ND	ND	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	ND	ND	ND	ND	ND	ND	<4.9	ND
Dibenz (a,h) anthracene	NA	NA	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	ND	0.20	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NA	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND	<1.0	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	0.58 J	0.15 J
Phenol	ND	ND	ND	ND	ND	ND	ND	<4.9	ND

HP-603

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/7/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	14	NS	1.61	ND	ND	ND	ND	1.2 J	0.3 J
Acetophenone	ND	NS	ND	ND	ND	ND	ND	<4.8	ND
Benzo (b) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	NS	2.26	0.15 J	3	ND	ND	<4.8	0.65
Caprolactam	ND	NS	ND	ND	ND	ND	ND	<4.8	ND
Chrysene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	NS	ND	ND	ND	ND	ND	<4.8	ND
Dibenz (a,h) anthracene	NA	NS	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	NS	0.30	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND	<0.94	ND	ND	ND
N-Nitrosodiphenylamine	ND	NS	ND	ND	ND	ND	ND	<4.8	ND
Phenol	ND	NS	ND	ND	ND	ND	ND	<4.8	ND

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

HP-101S

SVOCs Detected In Ground-Water Samples	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ug/L	20 GV	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Acetophenone	ug/L	No Std.	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Benzo (b) fluoranthene	ug/L	No Std.	ND	NS	ND	ND	0.58 J	ND	ND	ND	0.15 J
Benzo (k) fluoranthene	ug/L	No Std.	ND	NS	ND	ND	0.72 J	ND	ND	ND	0.18 J
Benzo (g,h,I) perylene	ug/L	No Std.	ND	NS	ND	ND	0.79 J	ND	ND	ND	0.2 J
Bis (2-ethylhexyl) phthalate	ug/L	5	R	NS	2.50	**30.75**	0.69 J	ND	ND	<5.0	0.17 J
Caprolactam	ug/L	No Std.	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Chrysene	ug/L	No Std.	ND	NS	ND	ND	0.55 J	ND	ND	ND	0.14 J
Cresol (m&p)	ug/L	No Std.	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Dibenz (a,h) anthracene	ug/L	5	NA	NS	ND	ND	0.89 J	ND	ND	ND	0.22 J
Di-n-Octyl Phthalate	ug/L	50 GV	0.1 J	NS	ND	ND	0.58 J	ND	ND	ND	0.15 J
Ideno (1,2,3-cd) pyrene	ug/L	0.002 GV	ND	NS	ND	ND	**0.74 J**	ND	ND	ND	**0.19 J**
4-Nitroaniline	ug/L	5	ND	NS	ND	ND	ND	<1.0	ND	ND	ND
N-Nitrosodiphenylamine	ug/L	50 GV	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Phenol	ug/L	1 (a)	ND	NS	ND	ND	ND	ND	ND	<5.0	ND

HP-407S

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Acetophenone	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Benzo (b) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	NS	2.12	0.23 J	<1.0	ND	ND	<5.0	ND
Caprolactam	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Chrysene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Dibenz (a,h) anthracene	NA	NS	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	NS	0.01 J	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND	<1.0	ND	ND	ND
N-Nitrosodiphenylamine	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Phenol	ND	NS	ND	ND	ND	ND	ND	<5.0	ND

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

HP-101D

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/3/93	Remedial Investigation 12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Acetophenone	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Benzo (b) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	NS	2.70	0.63	0.63 J	ND	ND	<5.0	0.16 J
Caprolactam	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Chrysene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Dibenz (a,h) anthracene	NA	NS	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	<1	NS	ND	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND	<1.1	ND	ND	ND
N-Nitrosodiphenylamine	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Phenol	ND	NS	ND	ND	ND	ND	ND	<5.0	ND

HP-103D

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/8/93	Remedial Investigation 12/15/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ND	NS	ND	ND	ND	ND	ND	<4.9	ND
Acetophenone	ND	NS	ND	ND	ND	ND	ND	<4.9	ND
Benzo (b) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	NS	4.06	**11.78**	<1.0	ND	ND	<4.9	ND
Caprolactam	ND	NS	ND	ND	ND	ND	ND	<4.9	0.0
Chrysene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	NS	ND	ND	ND	ND	ND	<4.9	ND
Dibenz (a,h) anthracene	NA	NS	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	1	NS	ND	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND	<0.94	ND	ND	ND
N-Nitrosodiphenylamine	ND	NS	ND	ND	ND	ND	ND	<4.9	ND
Phenol	ND	NS	ND	ND	ND	ND	ND	**1.2 J**	0.3 J

HP-407D

SVOCs Detected In Ground-Water Samples	Remedial Investigation 8/3/93	Remedial Investigation 12/13/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Acenaphthene	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Acetophenone	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Benzo (b) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Benzo (g,h,I) perylene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	R	NS	2.26	0.82 J	0.53 J	ND	ND	<5.0	0.13 J
Caprolactam	ND	NS	ND	ND	ND	ND	ND	1.5 J	0.38 J
Chrysene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
Cresol (m&p)	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Dibenz (a,h) anthracene	NA	NS	ND	ND	<1.0	ND	ND	ND	ND
Di-n-Octyl Phthalate	<1	NS	ND	ND	<1.0	ND	ND	ND	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	ND	<1.0	ND	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND	1.6	ND	ND	0.4
N-Nitrosodiphenylamine	ND	NS	ND	ND	ND	ND	ND	<5.0	ND
Phenol	ND	NS	ND	ND	ND	ND	ND	<5.0	ND

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 naturally saline; therefore, non-potable.
There are no SVOC standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
Bold results are higher than the standard or guidance value.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.
(a) Applies to the sum of phenolic compounds

Table 11

Comparison of Results for Leachate Indicator Parameters Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

HP-101U

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	715	217	500	489	494	497	346	573	478
Ammonia	mg/L	2	**10.3**	0.26	**7.3**	**5.8**	**9.5**	**4.2**	**2.3**	**10.6**	**6.7**
BOD_5	mg/L	No Std.	NA	NA	1.3	ND	<28.6	<2.0	<2.0	<4.0	ND
Bromide	mg/L	2^{GV}	NA	NA	0.38	0.14 J	0.6	0.45 J	0.19 J	0.45 J	0.41 J
Chloride	mg/L	250	**875**	53.4	**894**	**559**	**465**	**1,070**	**265**	**432**	**558**
COD	mg/L	No Std.	NA	NA	18.4	41.7	56.5	44.1	39.0	87.4	56.8
Color	Color Units	15	NA	NA	**54**	**111**	**150**	**40**	**65**	**40**	**73.8**
Cyanide	mg/L	0.2	ND	ND	NA	ND	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	542	349	457	488	400	340	424	418	396
Nitrate	mg/L	10	ND	0.28	0.47	0.29	0.24	2.50	1.10	<0.050	0.96
Sulfate	mg/L	250	ND	98.0	126	103 J	20.2	62.5	75.6	11.1	42.4
Phenols	mg/L	0.001	**0.035**	**0.013 N**	NA	**0.0052 J**	<0.005	<0.005	**0.01**	**0.0835**	**0.03**
Tot Dissolved Solids	mg/L	500	**1,750**	**563**	**1,957**	**3,365**	**1,310**	**1,500**	**866**	**1,440**	**1,279**
Tot Organic Carbon	mg/L	No Std.	NA	NA	8.6	46.6 J	8	7.6	6.8	13.9	9.1
Tot. Kjeldahl Nitrogen	mg/L	No Std.	44.3	1.02	8.19	6.58	9.20	4.50	4.4	14	8.0

HP-407U

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	2,640	2,250	1,561	1,248	582	1,380	841	1,170	993
Ammonia	mg/L	2	**244**	**168**	**99.6**	**83.6**	**28.1**	**87.9**	**47.7**	ND	**40.9**
BOD_5	mg/L	No Std.	NA	NA	14.3	11.7	1.9 J	8.1	9.8	14.4	8.55 J
Bromide	mg/L	2^{GV}	NA	NA	1.56	**2.03**	0.060 J	**2.2**	1.5	1.1	1.22 J
Chloride	mg/L	250	**564**	**518**	**416**	219	87.2	**272**	169	165	173
COD	mg/L	No Std.	NA	NA	145	206	65.3	213	196	225	175
Color	Color Units	15	NA	NA	**174**	**95**	**60**	**300**	**120**	**70**	**138**
Cyanide	mg/L	0.2	0.0457	ND	NA	ND	0.004 J	<0.010	<0.010	0.0083 J	0.0031 J
Hardness	mg/L	No Std.	880	860	774	865	300	460	519	492	443
Nitrate	mg/L	10	ND	0.1	ND	ND	0.049 J	<0.050	<0.050	<0.050	0.012 J
Sulfate	mg/L	250	ND	85.2	21.4	9.6	<5.0	10.90	1.2 J	<5.0	3.03 J
Phenols	mg/L	0.001	**0.022**	**0.031**	NA	**0.011**	**0.026**	<0.005	**0.042**	**0.0876**	**0.0391**
Tot Dissolved Solids	mg/L	500	**2,940**	**2,670**	**1,999**	**1,363**	**616**	**1,480**	**1,060**	**1,940**	**1,274**
Tot Organic Carbon	mg/L	No Std.	NA	NA	29.3	130	18.7	67.2	60.2	73.8	55.0
Tot. Kjeldahl Nitrogen	mg/L	No Std.	741	275	103	78.7	27.9	107	40.2	144	79.8

HP-104A

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/7/93	Remedial Investigation 12/16/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	1,360	1,540	745	472	410	293	297	288	322
Ammonia	mg/L	2	**94.2**	**116**	**5.7**	**4.9**	**2.1**	1.1	0.6	**9.1**	**3.2**
BOD_5	mg/L	No Std.	NA	NA	3.0	ND	<28.6	<4.0	<4.0	<4.0	ND
Bromide	mg/L	2^{GV}	NA	NA	0.45	0.06 J	0.19 J	0.030 J	<0.50	**12.2**	**3.11 J**
Chloride	mg/L	250	152	168	97.1	58.7	22.4	46.4	14.4	**3,370**	**863**
COD	mg/L	No Std.	NA	NA	33.3	36.4	38.9	31.3	32.4	165	66.9
Color	Color Units	15	NA	NA	**22**	**239**	**300**	**1,000**	**700**	**100**	**525**
Cyanide	mg/L	0.2	ND	ND	NA	ND	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	1,090	965	820	690	500	220	367	1,780	717
Nitrate	mg/L	10	ND	0.21	0.05	0.01 J	<0.050	<0.050	<0.050	<0.050	ND
Sulfate	mg/L	250	19.8	54.7	65.4	136	79	88	74	**497**	184
Phenols	mg/L	0.001	**0.033**	ND	NA	**0.0052 J**	<0.005	<0.005	<0.005	**0.0076 J**	**0.002 J**
Tot Dissolved Solids	mg/L	500	**1,330**	R	**2,611**	**2,486**	**620**	**600**	**2,810**	**7,150**	**2,795**
Tot Organic Carbon	mg/L	No Std.	NA	NA	7.7	10.3	9.0	8.5	7.6	9.8	8.7
Tot. Kjeldahl Nitrogen	mg/L	No Std.	240	117	6.67	5.20	3.4	2.00	1.4	8.8	3.9

HP-318

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/11/93	Remedial Investigation 12/13/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	R	NS	365	268	342	243	205	324	279
Ammonia	mg/L	2	**110**	NS	**19.7**	**6.1**	1.90	**2.9**	<0.10	1.4	1.6
BOD_5	mg/L	No Std.	NA	NS	14.8	1.53 J	2.2 J	<2.0	<2.0	<4.0	0.55 J
Bromide	mg/L	2^{GV}	NA	NS	0.52	0.27 J	0.25 J	0.23 J	<0.50	0.24 J	0.18 J
Chloride	mg/L	250	**574**	NS	**596**	**300**	57.4	96.9	17.4	76.4	62.0
COD	mg/L	No Std.	NA	NS	254	31.4	30.0	18.5	8.1 J	18.3	18.73 J
Color	Color Units	15	NA	NS	**36**	**36**	**150**	**30**	**24**	**50**	**64**
Cyanide	mg/L	0.2	ND	0.0126	NA	ND	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	1,410	NS	512	495	260	240	334	252	272
Nitrate	mg/L	10	NA	NS	1.56	2.20	0.19	1.30	2.0	0.40	1.0
Sulfate	mg/L	250	28.0	NS	92.5	219	28.8	138	120	17.6	76.1
Phenols	mg/L	0.001	**0.024**	NS	NA	**0.006 J**	**0.0452**	<0.005	**0.007**	<0.010	**0.013**
Tot Dissolved Solids	mg/L	500	**2,750**	NS	**1,491**	**899**	**492**	**734**	**395**	**478**	**525**
Tot Organic Carbon	mg/L	No Std.	NA	NS	6.9	21.4 J	6.9	3.4	2.1	7.6	5.0
Tot. Kjeldahl Nitrogen	mg/L	No Std.	128	NS	21.27	6.61	2.30	0.6	0.4	2.0	1.3

HP-603

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/7/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	1,450	NS	395	450	613	246	233	564	414
Ammonia	mg/L	2	**80.8**	NS	**11.0**	**6.9**	**13.1**	**18.6**	**26.8**	**14.9**	**18.4**
BOD_5	mg/L	No Std.	NA	NS	ND	2.00 J	1.0 J	<2.0	<4.0	<4.0	0.25 J
Bromide	mg/L	2^{GV}	NA	NS	0.36	0.533 J	0.68	0.014 J	<0.50	0.42 J	0.28 J
Chloride	mg/L	250	164	NS	191	144	59.8	20.1	16.7	56.2	38.2
COD	mg/L	No Std.	NA	NS	8.3	43.6	52.1	16.3	23.6	37.7	32.4
Color	Color Units	15	NA	NS	**24**	**70**	**125**	10	**80**	**35**	**63**
Cyanide	mg/L	0.2	0.060	NS	NA	0.007	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	652	NS	681	660	600	140	224	474	360
Nitrate	mg/L	10	ND	NS	0.017	1.65	<0.050	1.20	<0.050	0.16	0.34
Sulfate	mg/L	250	11.5	NS	**339**	131	95.6	73.5	80.4	54.2	75.9
Phenols	mg/L	0.001	**0.026**	NS	NA	**0.0049 J**	<0.005	<0.005	**0.007**	<0.010	**0.002**
Tot Dissolved Solids	mg/L	500	**1,230**	NS	**1,156**	**1,142**	**782**	358	306	**620**	**517**
Tot Organic Carbon	mg/L	No Std.	NA	NS	7.7	70.5	13.7	6.2	8.3	13.8	10.5
Tot. Kjeldahl Nitrogen	mg/L	No Std.	230	NS	12.13	7.89	12.9	17.1	24.2	13.2	16.9

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

HP-101S

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	885	225	906	596	968	984	783	1,040	944
Ammonia	mg/L	2	**7.2**	0.2	**4.4**	**6.0**	**12.6**	**12.0**	**8.8**	**12.8**	**11.6**
BOD_5	mg/L	No Std.	NA	NA	6.0	ND	3.9 J	<2.0	4.0	11.0	1.73 J
Bromide	mg/L	2^{GV}	NA	NA	**2.42**	0.95 J	**4.2 J**	**3.50**	**2.4**	**2.6**	**3.18 J**
Chloride	mg/L	250	**5,400**	116	**2,514**	**1,913 J**	<20.0	**8,450**	**3,320**	**3,320**	**3,773**
COD	mg/L	No Std.	NA	NA	67.7	117	241	148	218	46	163
Color	Color Units	15	NA	NA	**66**	**31**	**100**	**50**	**60**	**45**	**64**
Cyanide	mg/L	0.2	ND	ND	NA	ND	<0.010	<0.010	<0.010	0.0079 J	0.002 J
Hardness	mg/L	No Std.	852	347	603	583 J	500	480	509	595	521
Nitrate	mg/L	10	ND	0.21	ND	1.21	0.038 J	0.1	<0.050	<0.050	0.0255 J
Sulfate	mg/L	250	**375**	104	8.8	69.4 J	<5.0	6.6	14.1	<10.0	5.2
Phenols	mg/L	0.001	**0.011**	ND	NA	**0.003 J**	<0.005	<0.005	**0.005**	**0.041**	**0.012**
Tot Dissolved Solids	mg/L	500	**10,000**	**611**	**4,169**	**3,230**	**6,140**	**5,670**	**5,350**	**5,500**	**5,665**
Tot Organic Carbon	mg/L	No Std.	NA	NA	8.1	35.9	12.1	10.8	7.7	12.7	10.8
Tot. Kjeldahl Nitrogen	mg/L	No Std.	10	0.86	5.11	9.94	11.9	11.8	11.8	12.2	11.9

HP-407S

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	399	1,050	578	746	890	1,210	1,350	1,300	1,188
Ammonia	mg/L	2	1.4	**3.9**	**12.5**	**33.2**	**35**	**40.3**	**33.0**	**43.1**	**37.9**
BOD_5	mg/L	No Std.	NA	NA	ND	1.3	<13.3	<2.0	<2.0	<4.0	ND
Bromide	mg/L	2^{GV}	NA	NA	**27.5**	**25.2**	**37.5**	**29.0**	**28.3**	**25.5**	**30.1**
Chloride	mg/L	250	**5,120**	**6,700**	**7,475**	**8,273**	**8,110**	**6,810**	**6,980**	**6,510**	**7,103**
COD	mg/L	No Std.	NA	NA	250	317	718	481	512	455	542
Color	Color Units	15	NA	NA	**65**	**124**	**200**	**250**	**120**	**70**	**160**
Cyanide	mg/L	0.2	ND	ND	NA	ND	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	1,680	2,200	2,496	3,263	2,700	1,900	2,240	2,210	2,263
Nitrate	mg/L	10	ND	ND	0.14	0.003 J	<0.050	1.3	0.5	<0.050	0.5
Sulfate	mg/L	250	**478**	**442**	**754**	**683**	**422**	**444**	**436**	**399**	**425**
Phenols	mg/L	0.001	**0.009**	ND	NA	**0.0047 J**	<0.005	<0.005	<0.005	**0.061**	**0.015**
Tot Dissolved Solids	mg/L	500	**8,510**	**11,900**	**14,080**	**12,600**	**11,100**	**12,200**	**11,900**	**10,500**	**11,425**
Tot Organic Carbon	mg/L	No Std.	NA	NA	5.5	22.0	20.6	28.6	24.3	4.4	19.5
Tot. Kjeldahl Nitrogen	mg/L	No Std.	0.8	2.56	13.5	30.8	30.2	121	32.5	35.1	54.7

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

HP-101D

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	461	NS	806	478	564	535	538	618	564
Ammonia	mg/L	2	**7.4**	NS	**13.5**	**5.7**	**4.0**	**6.2**	**3.5**	**4.4**	**4.5**
BOD_5	mg/L	No Std.	NA	NS	ND	1.1	1.0 J	<4.0	<2.0	<4.0	0.25 J
Bromide	mg/L	2^{GV}	NA	NS	**36.8**	**35.4 J**	**73.7**	**43.4**	0.8	0.6	**29.6**
Chloride	mg/L	250	**15,900**	NS	**24,000**	**14,625**	**19,700**	**13,700**	**380**	**346**	**8,532**
COD	mg/L	No Std.	NA	NS	740	389 J	874	689	44	42	412.1
Color	Color Units	15	NA	NS	**62**	**58**	**125**	**300**	**180**	**40**	**161**
Cyanide	mg/L	0.2	ND	NS	NA	ND	<0.010	<0.010	<0.010	<0.010	ND
Hardness	mg/L	No Std.	1,000	NS	2,670	4,725	4,100	2,900	477	455	1,983
Nitrate	mg/L	10	**18.5**	NS	ND	0.005 J	<0.050	<0.050	<0.050	<0.050	ND
Sulfate	mg/L	250	**361**	NS	**1,105**	**1,465**	**1,300**	**1,400**	1.6 J	<5.0	**675.4 J**
Phenols	mg/L	0.001	**0.009**	NS	NA	**0.0016**	<0.005	<0.005	**0.0111**	**0.586**	**0.149**
Tot Dissolved Solids	mg/L	500	**24,600**	NS	**38,270**	**24,100**	**21,500**	**23,600**	**1,030**	**1,480**	**11,903**
Tot Organic Carbon	mg/L	No Std.	NA	NS	6.7	39.7	5.1	5.1	8.2	10.7	7.3
Tot. Kjeldahl Nitrogen	mg/L	No Std.	15.5	NS	16.6	6.0	<0.10	6.2	7.9	5.6	4.9

HP-103D

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/8/93	Remedial Investigation 12/15/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	935	NS	355	230	1,010	1,190	913	93.5	802
Ammonia	mg/L	2	**37**	NS	**11.7**	**6.3**	**43.8**	**42.5**	**33.1**	0.78	**30.0**
BOD_5	mg/L	No Std.	NA	NS	2.5	ND	45.1	<2.0	<4.0	<2.0	11.3
Bromide	mg/L	2^{GV}	NA	NS	**52.60**	**33.8 J**	**23.6**	**12.3**	**13.1**	**12.5**	**15.4**
Chloride	mg/L	250	148	NS	**14,986**	**16,475**	**5,190**	**2,670**	**2,520**	**4,980**	**3,840**
COD	mg/L	No Std.	NA	NS	154.1	629.8	488	293	349	245	344
Color	Color Units	15	NA	NS	**30**	**68**	**100**	**15**	**180**	**20**	**79**
Cyanide	mg/L	0.2	0.0338	NS	NA	0.027	0.022	0.0047 J	0.016	<0.010	0.011
Hardness	mg/L	No Std.	700	NS	4,310	4,825	1,900	1,020	1,140	1,520	1,395
Nitrate	mg/L	10	**14.7**	NS	1.60	0.001 J	<0.050	6.1	**12.5**	0.4	4.7
Sulfate	mg/L	250	10.3	NS	**1,467**	**1,815**	**297**	204	202	**706**	**352**
Phenols	mg/L	0.001	**0.014**	NS	NA	**0.0035 J**	**0.0039 J**	<0.005	**0.010**	**0.013**	**2.257 J**
Tot Dissolved Solids	mg/L	500	**1,140**	NS	**24,610**	**28,000**	**8,150**	**3,990**	**4,980**	**6,500**	**5,905**
Tot Organic Carbon	mg/L	No Std.	NA	NS	7.3	27.6	28.5	61.5	52.3	2.7	36.3
Tot. Kjeldahl Nitrogen	mg/L	No Std.	93.6	NS	12.33	5.98	41.60	40.10	29.5	0.3	28

HP-407D

Leachate Indicator Parameter	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Alkalinity	mg/L	No Std.	73.6	NS	259	173	214	300	149	126	197
Ammonia	mg/L	2	1.9	NS	**16.3**	**2.2**	**2.1**	1.3	0.1	0.5	1.0
BOD_5	mg/L	No Std.	NA	NS	ND	ND	2.2 J	<2.0	<2.0	<4.0	0.55 J
Bromide	mg/L	2^{GV}	NA	NS	**31.0**	**28.1 J**	**69.3**	**32.3**	**28.7**	**31.5**	**40.5**
Chloride	mg/L	250	**2,090**	NS	**9,685**	**9,580**	**9,840**	**9,130**	**9,820**	**9,790**	**9,645**
COD	mg/L	No Std.	NA	NS	622	345	766	580	749	659	689
Color	Color Units	15	NA	NS	**37**	**75**	**100**	**25**	**28**	**50**	**51**
Cyanide	mg/L	0.2	ND	NS	NA	ND	0.0020 J	<0.010	<0.010	<0.010	0.0005 J
Hardness	mg/L	No Std.	602	NS	3,485	3,203	3,200	3,000	3,100	3,020	3,080
Nitrate	mg/L	10	0.2	NS	ND	0.004 J	0.1	0.042 J	0.1	<0.050	0.054 J
Sulfate	mg/L	250	208	NS	**1,269**	**1,210**	**1,130**	**1,080**	**1,190**	**1,240**	**1,160**
Phenols	mg/L	0.001	ND	NS	NA	**0.0043 J**	**0.032**	<0.005	**0.019**	**0.192**	**0.061**
Tot Dissolved Solids	mg/L	500	**3,060**	NS	**16,986**	**15,950**	**14,600**	**16,800**	**15,900**	**16,300**	**15,900**
Tot Organic Carbon	mg/L	No Std.	NA	NS	0.4	14.3	3.0	3.3	1.1	36.3	10.9
Tot. Kjeldahl Nitrogen	mg/L	No Std.	0.75	NS	2.82	2.10	0.35	<0.10	1.6	0.9	0.7

Footnotes: Only the leachate indicator parameters detected in at least in one post-closure groundwater sample are listed.
All other leachate indicator parameters 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 naturally saline; therefore, non-potable.
There are no leachate indicator parameter standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
Bold results are higher than the standard or guidance value.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Table 12

Comparison of Results of Inorganic Parameters Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

HP-101U

Metals	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	ug/L	No Std.	1,740	1,430	13	4.1 J	<200	95.9 J	<200	1,970	516 J
Antimony	ug/L	3	ND	ND	ND	1.1 J	<60.0	<60.0	<60.0	<60.0	ND
Arsenic	ug/L	10	ND	ND	ND	ND	<10.0	<10.0	<10.0	6.6 J	1.65 J
Barium	ug/L	1,000	111 B	121 B	90 J	77.5 J	81.0 J	61.2 J	73.2 J	93.5 J	77.2 J
Beryllium	ug/L	3.0^{GV}	ND	ND	NA	ND	<5.0	<5.0	<5.0	<5.0	ND
Boron	ug/L	1,000	NA	NA	294 J	313	268	257	220	325	268
Cadmium	ug/L	5	**7.8**	**11.2 ***	NA	0.63 J	<2.5	0.89 J	0.37 J	**9.5**	2.69 J
Calcium	ug/L	No Std.	156,000	132,000	137,500	144,000 J	123,000	147,000	133,000	124,000	131,750
Chromium, Total	ug/L	50	5 B*	ND	ND	2.18 J	<10.0	<10.0	<10.0	18	5
Cobalt	ug/L	No Std.	5.2 B	ND	0.10 J	0.78 J	<50.0	<50.0	<50.0	4.6 J	1.15 J
Copper	ug/L	200	65.5	168	40.0	1.3 J	15.2 J	15.2 J	11.4 J	**274**	78.95 J
Iron	ug/L	300	**38,400**	**5,030**	**19,650 J**	**9,208 J**	**20,200**	**2,060**	**5,370**	**30,400**	**14,508**
Iron and Manganese	ug/L	500	**38,749**	**5,069**	**20,109 J**	**9,382 J**	**20,451**	**2,265**	**5,474**	**30,593**	**14,696**
Lead	ug/L	25	**173 N**	**138 N**	1.3	6.9 J	<5.0	<5.0	<5.0	**121**	**30**
Magnesium	ug/L	$35,000^{GV}$	20,600	887	23,350	26,500	23,900	29,300	22,400	26,200	25,450
Manganese	ug/L	300	**349**	38.8	**459**	173	251.0	205	104	193	188
Mercury	ug/L	0.7	ND	ND	ND	0.27 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ug/L	100	28.8 B	26.6 B	0.6 J	7.6 J	17.8 J	17.7 J	18.8 J	52.5	26.7 J
Potassium	ug/L	No Std.	16,700	3,470 B	15,700 J	11,845 J	14,800	14,700	9,120	19,700	14,580
Selenium	ug/L	10	NA	ND	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ug/L	50	ND	ND	NA	0.8 J	<10.0	3.4 J	<10.0	2.5 J	1.5 J
Sodium	ug/L	20,000	**466,000**	**85,100**	**510,800**	**423,500 J**	**311,000**	**421,000**	**148,000**	**278,000**	**289,500**
Thallium	ug/L	0.5	ND	NA	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	ug/L	No Std.	21.8 B	13.5 B	0.13 J	0.63 J	<50.0	<50.0	<50.0	14.8 J	3.7 J
Zinc	ug/L	$2,000^{GV}$	464 E	734	107	5.8 J	16.4 J	70.3	39.4	526	163 J

HP-407U

Metals	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	2,470	619	34	4.2 J	<200	209	79.4 J	198 J	122 J
Antimony	ND	ND	0.6	ND	<60.0	<60.0	<60.0	<60.0	ND
Arsenic	ND	ND	ND	ND	<10.0	<10.0	<10.0	<10.0	ND
Barium	364	630	917	590	287	767	480	503	509
Beryllium	ND	ND	NA	ND	<5.0	<5.0	<5.0	<5.0	ND
Boron	NA	NA	**2,568 J**	**1,838**	906	**1,960**	**1,280**	**1,740**	**1,472**
Cadmium	2.1 B	ND	NA	ND	<2.5	<2.5	0.32 J	<2.5	0.08 J
Calcium	99,700	122,000	107,600	97,600 J	77,300	120,000	100,000	82,400	94,925
Chromium, Total	25.2 *	16.4 *	4.3 J	11.6 J	3.0 J	10	9.6 J	8.2 J	7.7 J
Cobalt	17.4 B	14.4 B	2.92	5.93 J	3.4 J	10.3 J	7.3 J	4.8 J	6.5 J
Copper	16.5 B	3.6 B	31.0	ND	<25.0	<25.0	5.6 J	4 J	2.4 J
Iron	**15,100**	**17,400**	**1,297**	**1,438**	**1,540**	**3,410**	**2,950**	**4,710**	**3,153**
Iron and Manganese	**15,302**	**17,868**	**1,700**	**1,736**	**1,852**	**3,815**	**3,319**	**4,967**	**3,488**
Lead	11.7 N	3.8 N	0.7 J	9.1 J	<5.0	<5.0	<5.0	2.5 J	0.6 J
Magnesium	**143,000**	14,100	**122,600**	**85,025**	**46,000**	**90,900**	**65,500**	**69,500**	**67,975**
Manganese	202	**468**	**403**	**316**	**312**	**405**	**369**	257	**336**
Mercury	ND	ND	ND	0.063 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	18.2 B	ND	1.0 J	5.4 J	16.2 J	24.9 J	22.3 J	26.5 J	22.5 J
Potassium	126,000	124,000	77,160	51,725 J	28,800	61,100	41,500	54,100	46,375
Selenium	NA	ND	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ND	ND	NA	ND	<10.0	<10.0	<10.0	<10	ND
Sodium	**562,000**	**600,000**	**357,300**	**324,500 J**	**129,000**	**293,000**	**177,000**	**206,000**	**201,250**
Thallium	ND	NA	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	45.4 B	23.2 B	4.42 J	9.8 J	<50.0	9.9 J	10.4 J	11.7 J	8 J
Zinc	37.5 E	15.4 B	29.0	3.7 J	<20.0	<20.0	11 J	9.8 J	5.2 J

HP-104A

Metals	Remedial Investigation 8/7/93	Remedial Investigation 12/16/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	3,550	2,320	106	ND	<200	339	<200	271	153
Antimony	ND	**36.9 B**	0.2 J	1.4 J	<60.0	<60.0	<60.0	<60.0	ND
Arsenic	ND	ND	ND	ND	<10.0	<10.0	<10.0	<10.0	ND
Barium	360	371 E	211	208 J	564	244	206	248	316
Beryllium	ND	ND	NA	ND	<5.0	<5.0	<5.0	<5.0	ND
Boron	NA	NA	438 J	257	228	132	121	198	170
Cadmium	ND	2.8 B	NA	0.59 J	<2.5	<2.5	<2.5	<2.5	ND
Calcium	145,000	155,000	200,400	179,000 J	145,000	113,000	102,000	382,000	185,500
Chromium, Total	24.6 *	18.5	0.8	5.9 J	<10.0	1.1 J	<10.0	<10.0	0.3 J
Cobalt	8.8 B	9 B	0.04 J	ND	<50.0	<50.0	<50.0	<50.0	ND
Copper	27.7	15.5 B	1.0	ND	19.5 J	6.6 J	5.6 J	<25.0	7.9 J
Iron	**38,300**	**29,700 E**	**5,870**	**28,175 J**	**47,400**	**33,200**	**37,300**	**52,700**	**42,650**
Iron and Manganese	**38,691**	**29,997 EJ**	**6,663**	**28,701 J**	**47,772**	**33,535**	**37,606**	**54,540**	**43,363**
Lead	**96.8 N**	**55.7 NS***	2.1 J	1.18 J	<5.0	<5.0	4.8 J	<5.0	1.2 J
Magnesium	**126,000**	**131,000**	**75,860**	**38,275**	**35,800**	27,700	27,200	201,000	**72,925**
Manganese	**391**	297 E	**793**	**547**	**372**	**335**	**306**	**1,840**	**713**
Mercury	ND	ND	ND	0.13 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	10.7 B	17.5 B	1.0 J	2. J	14.2 J	15.8 J	16.9 J	14.9 J	15.5 J
Potassium	46,300	57,000	32,660	11,190 J	7,780	4,790 J	4,410 J	38,600	13895 J
Selenium	NA	1.5 BNW	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ND	ND	NA	1.2 J	<10.0	<10.0	<10.0	1.8 J	0.45 J
Sodium	**100,000**	**151,000**	**329,030**	**32,925**	**24,000**	**20,400**	19,000	**687,000**	**187,600**
Thallium	ND	NA	NA	**0.53 J**	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	24.2 B	26.4 B	0.09 J	ND	<50.0	<50.0	<50.0	8.4 J	2.1 J
Zinc	106 E	97	18	ND	<20.0	24.6	<20.0	<20.0	6

HP-318

Metals	Remedial Investigation 8/11/93	Remedial Investigation 12/13/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	155 B	1,210	151	ND	205	<200	<200	<200	51
Antimony	ND	ND	0.5	ND	<60.0	<60.0	<60.0	<60.0	ND
Arsenic	ND	ND	ND	ND	<10.0	<10.0	<10.0	7.2 J	1.8 J
Barium	304	191 BE	47 J	33.3 J	23.4 J	16.3 J	17.8 J	14.2 J	17.9 J
Beryllium	ND	ND	NA	ND	<5.0	<5.0	<5.0	<5.0	ND
Boron	NA	NA	553 J	180	153	78	72	223	131
Cadmium	ND	ND	NA	ND	<2.5	<2.5	<2.5	<2.5	ND
Calcium	209,000	302000 E	142,500	139,500 J	97,200	102,000	91,800	72,900	90,975
Chromium, Total	6.1 B	ND	2.3	0.60 J	<10.0	<10.0	<10.0	<10.0	ND
Cobalt	7 B	5.1 B	0.11 J	0.50 J	<50.0	<50.0	<50.0	<50.0	ND
Copper	ND	9.7 B	4.6 J	ND	9.8 J	<25.0	6 J	<25.0	4 J
Iron	**16,300**	**30,100 E**	**7,907**	**1,590 J**	**9,460**	123	**647**	**7,590**	**4,455**
Iron and Manganese	**16,522**	**30,578 E**	**8,208**	**1,744 J**	**9,607**	152	**658**	**7,758**	**4,544**
Lead	4.3	5.9 W	1.1 J	6.8	<5.0	<5.0	<5.0	<5.0	ND
Magnesium	**192,000**	**58,800 E**	**36,970**	**38,325**	23,400	30,900	25,500	17,100	24,225
Manganese	222	**478**	**301**	160	147	29	11	168	89
Mercury	ND	ND	ND	0.035 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ND	ND	2.1 J	1.53 J	19.5 J	15.3 J	15.6 J	20.0 J	17.6 J
Potassium	100,000	30,300	29,370 J	12,115 J	7,890	4,270 J	4,530 J	11,000	9,445
Selenium	NA	ND	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ND	ND	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Sodium	**393,000**	**77,800**	**685,300**	**174,550 J**	**59,700**	**14,200**	12,500	**69,000**	**38,850**
Thallium	ND	NA	NA	**0.60 J**	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	11.1 B	ND	0.38 J	1.8 J	<50.0	<50.0	<50.0	3.2 J	0.8 J
Zinc	23.7*	40	23	1.63 J	11.2 J	10.5 J	<20.0	<20.0	5.4 J

HP-603

Metals	Remedial Investigation 8/7/93	Remedial Investigation 12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	1,740	NS	103	40.3 J	<200	<200	<200	<200	ND
Antimony	ND	NS	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Arsenic	ND	NS	ND	ND	<10.0	<10.0	<10.0	<10.0	ND
Barium	227	NS	89	53.1 J	83.2 J	28.9 J	46.5 J	91.9 J	62.6 J
Beryllium	ND	NS	NA	ND	<5.0	<5.0	<5.0	<5.0	ND
Boron	NA	NS	417 J	575	567	175	209	303	314
Cadmium	ND	NS	NA	0.53 J	<2.5	2.0 J	<2.5	<2.5	0.5 J
Calcium	159,000	NS	205,600	158,750 J	191,000	62,100	60,100	123,000	109,050
Chromium, Total	9.5 B*	NS	3.1	3.3 J	<10.0	<10.0	<10.0	<10.0	ND
Cobalt	8.6 B	NS	0.27 J	0.73 J	2.3 J	<50.0	<50.0	<50.0	0.6 J
Copper	12.5 B	NS	ND	ND	7.5 J	<25.0	<25.0	<25.0	1.9 J
Iron	**26,000**	NS	**9,053**	**5,378 J**	**8,410**	**1,040**	**2,580**	**9,100**	**5,283**
Iron and Manganese	**26,329**	NS	**9,653**	**5,989 J**	**9,043**	**1,311**	**3,138**	**9,630**	**5,781**
Lead	7.2 N	NS	0.6 J	6.6 J	<5.0	<5.0	<5.0	<5.0	ND
Magnesium	**55,500**	NS	**37,640**	**45,900**	**53,300**	21,500	18,000	**40,500**	33,325
Manganese	**329**	NS	**600**	**738**	**633**	271	**558**	**530**	**498**
Mercury	ND	NS	ND	0.07 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	9.5 B	NS	2.8 J	5.3 J	10.6 J	15.2 J	19.2 J	15.3 J	15.1 J
Potassium	59,100	NS	17,540 J	10,800 J	11,200	10,500	13,200	12,400	11,825
Selenium	NA	NS	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ND	NS	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Sodium	**142,000**	NS	**106,000**	**83,375 J**	**62,800**	15,900	17,300	**38,500**	**33,625**
Thallium	ND	NS	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	24.6 B	NS	0.26 J	0.88 J	<50.0	<50.0	<50.0	3.4 J	0.9 J
Zinc	31.5 E	NS	10	1.5 J	5.0 J	14.3 J	<20.0	<20.0	4.8 J

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

HP-101S

Metals	Units	Class GA Standard	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	ug/L	No Std.	60.8 B	68.1 B	1	5.23 J	<200	110 J	<200	290	100 J
Arsenic	ug/L	10	ND	ND	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Antimony	ug/L	3	ND	ND	ND	ND	<10.0	<10.0	<10.0	<10.0	ND
Barium	ug/L	1,000	285	408	51 J	72.8 J	142 J	62.3 J	106 J	82.6 J	98.2 J
Beryllium	ug/L	3.0^{GV}	ND	ND	NA	ND	0.24 J	<5.0	<5.0	<5.0	0.06 J
Boron	ug/L	1,000	NA	NA	**1,128 J**	882	**1,200**	**1,060**	725	**1,060**	**1,011**
Cadmium	ug/L	5	2.3 B	4.2 B*	NA	0.40 J	<2.5	<2.5	<2.5	<2.5	ND
Calcium	ug/L	No Std.	75,600	128,000	49,850	70,900 J	80,700	83,200	116,000	85,200	91,275
Chromium, Total	ug/L	50	7.3 B*	ND	1.5 J	4.6 J	2.5 J	5.3 J	<10.0	2.1 J	2.5 J
Cobalt	ug/L	No Std.	3.5 B	5.4 B	ND	0.95 J	<50.0	<50.0	<50.0	<50.0	ND
Copper	ug/L	200	13 B	23.4 B	40.1 J	ND	13.6 J	5.3 J	11.5 J	<25.0	7.6 J
Iron	ug/L	300	**32,300**	**60,600**	**906**	**813 J**	**860**	**1,560**	**1,150**	**1,230**	**1,200**
Iron and Manganese	ug/L	500	**33,530**	**62,950**	**947**	**870**	**952**	**1,656**	**1,233**	**1,318**	**1,290**
Lead	ug/L	25	24 NS	18 N	0.9 J	7.6 J	<5.0	<5.0	<5.0	6.9	1.7
Magnesium	ug/L	$35,000^{GV}$	**140,000**	9,700	**116,400**	**100,500**	**107,000**	**105,000**	**53,300**	**92,800**	**89,525**
Manganese	ug/L	300	**1,230**	**2,350**	41.5	53.8	92.1	95.9	82.6	88.0	89.7
Mercury	ug/L	0.7	ND	ND	ND	0.063 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ug/L	100	ND	34.5 B	ND	5.25 J	9.1 J	25.1 J	22.6 J	30.5 J	21.8 J
Potassium	ug/L	No Std.	84,200	3,260	89,010 J	58,890 J	95,200	91,600	60,200	92,900	84,975
Selenium	ug/L	10	NA	1 BN	NA	ND	<10.0	<10.0	7.1 J	<10.0	1.8 J
Silver	ug/L	50	ND	ND	NA	ND	3.9 J	8.4 J	3 J	<10.0	3.8 J
Sodium	ug/L	20,000	**3,980,000**	**41,200**	**1,259,000**	**1,101,250 J**	**2,640,000**	**1,910,000**	**1,680,000**	**1,840,000**	**2,017,500**
Thallium	ug/L	0.5	ND	NA	NA	**0.55 J**	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	ug/L	No Std.	49.1 B	71.5	2.89 J	8.4 J	11.1 J	10.9 J	7 J	13.6 J	10.7 J
Zinc	ug/L	$2,000^{GV}$	315 E	1,870	9	52.5 J	5.3 J	<20.0	25	<20.0	7.6 J

HP-407S

Metals	Remedial Investigation 8/4/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum		52.3 B	37	34.5 J	<200	94.6 J	<200	479	143.4 J
Arsenic	ND	ND	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Antimony	ND	**28 B**	1.0	1.5 J	<10.0	<10.0	<10.0	<10.0	ND
Barium	104 B	153 B	241	193 J	195 J	171 J	190 J	233	197 J
Beryllium	ND	1.4 B	NA	ND	0.14 J	<5.0	<5.0	<5.0	0.04 J
Boron	NA	NA	**2,160 J**	**1,635**	**1,840**	**1,820**	**1,710**	**1,660**	**1,758**
Cadmium	ND	ND	NA	2	<2.5	<2.5	<2.5	<2.5	ND
Calcium	176,000	193,000	210,900	211,000 J	230,000	192,000	186,000	176,000	196,000
Chromium, Total	ND	ND	19.0	8.6 J	<10.0	3.1 J	2.4 J	<10.0	1.4 J
Cobalt	ND	ND	4.17 J	3.2 J	5.5 J	8.1 J	9.9 J	10.7 J	8.6 J
Copper	10.6 B	3.6 B	ND	ND	14.5 J	19.7 J	17 J	<25.0	12.8 J
Iron	**3,270**	**7,870**	**13,380**	**12,475 J**	**13,300**	**783**	**732**	**12,300**	**6,779**
Iron and Manganese	**3,566**	**8,324**	**13,890**	**12,910 J**	**13,798**	**852**	**807**	**12,467**	**6,981**
Lead	ND	1.6 BNW	0.9 J	12 J	<5.0	<50.0	<50.0	13.0	3.3
Magnesium	**310,000**	**394,000**	**463,000**	**485,750**	**542,000**	**461,000**	**431,000**	**429,000**	**465,750**
Manganese	296	**454**	**510**	**427**	**498**	69.1	74.8	167	202
Mercury	ND	ND	ND	0.063 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ND	ND	20.0	36.8 J	17.2 J	25.6 J	28.4 J	34.3 J	26.4 J
Potassium	90,200	126,000	255,700 J	187,500 J	224,000	237,000	258,000	231,000	237,500
Selenium	NA	ND	NA	2	<10.0	<10.0	8.7 J	<10.0	2.2 J
Silver	ND	ND	NA	0.78 J	<10.0	16	5.2 J	1.4 J	5.7 J
Sodium	**2,740,000**	**3,280,000**	**3,649,000**	**3,244,250 J**	**4,040,000**	**3,730,000**	**3,400,000**	**3,160,000**	**3,582,500**
Thallium	ND	NA	NA	0.48 J	<10.0	**7.5 J**	<10.0	<10.0	**1.9 J**
Vanadium	49.8 B	27.8 B	0.48 J	2.4 J	<50.0	6.7 J	7.5 J	15.9 J	7.8 J
Zinc	ND	ND	13	ND	<20.0	<20.0	<20.0	<20.0	ND

HP-101D

Metals	Remedial Investigation 8/3/93	Remedial Investigation 12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	26.8 B	NS	22	ND	<200	<200	<200	50.6 J	12.7 J
Arsenic	ND	NS	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Antimony	ND	NS	0.2 J	1.8 J	<10.0	<10.0	<10.0	<10.0	ND
Barium	446	NS	153 J	112 J	143 J	136 J	227	223	182 J
Beryllium	ND	NS	NA	ND	0.20 J	<5.0	<5.0	<5.0	0.05 J
Boron	NA	NS	**2,007 J**	**2,720**	**2,890**	**2,720**	252	230	**1,523**
Cadmium	4.1 B	NS	NA	2.4 J	<2.5	<2.5	<2.5	<2.5	ND
Calcium	147,000	NS	249,000	298,000 J	280,000	269,000	140,000	132,000	205,250
Chromium, Total	ND	NS	19.4 J	11.7 J	<10.0	1.3 J	<10.0	<10.0	0.3 J
Cobalt	ND	NS	ND	4.6 J	`<50.0	<50.0	<50.0	<50.0	ND
Copper	12.7 B	NS	58.0	ND	15.3 J	5.5 J	8.7 J	<25.0	7.4 J
Iron	**76,100**	NS	**8,830**	**15,590 J**	**9,410**	**11,100**	**10,900**	**12,700**	**11,028**
Iron and Manganese	**76,407**	NS	**9,128**	**16,151 J**	**9,984**	**11,543**	**11,385**	**13,148**	**11,515**
Lead	**33.9 N+**	NS	0.8 J	7.7 J	<5.0	<5.0	<5.0	<5.0	ND
Magnesium	**63,200**	NS	**452,600**	**879,250**	**805,000**	**796,000**	31,000	30,500	**415,625**
Manganese	**307**	NS	298	**561**	**574**	**443**	**485**	**448**	**488**
Mercury	ND	NS	ND	0.04 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ND	NS	8.5 J	21.7 J	8.8 J	21.7 J	18.9 J	19.8 J	17.3 J
Potassium	44,500	NS	281,200 J	274,750 J	272,000	357,000	15,700	15,700	165,100
Selenium	NA	NS	NA	3	<10.0	<10.0	<10.0	<10.0	ND
Silver	3 B	NS	NA	0.65 J	3.4 J	4.8 J	<10.0	<10.0	2.1 J
Sodium	**6,450,000**	NS	**13,437,000**	**5,795,500 J**	**7,680,000**	**7,560,000**	**206,000**	**199,000**	**3,911,250**
Thallium	ND	NS	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	ND	NS	0.17 J	1.18 J	<50.0	<50.0	<50.0	<50.0	ND
Zinc	ND	NS	18	10.4 J	<20.0	<20.0	<20.0	<20.0	ND

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

HP-103D

Metals	Remedial Investigation 8/3/93	Remedial Investigation 12/12/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	466	NS	151	112 J	<200	<200	<200	376	94
Arsenic	ND	NS	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Antimony	ND	NS	**3.3 J**	1.1 J	<10.0	<10.0	<10.0	<10.0	ND
Barium	822	NS	63 J	91.6 J	149 J	93.2 J	92.4 J	79.8 J	103.6 J
Beryllium	ND	NS	NA	ND	0.30 J	<5.0	<5.0	<5.0	0.08 J
Boron	NA	NS	**2,190 J**	**3,205**	**2,110**	**2,750**	**2,700**	**1,020**	**2,145**
Cadmium	2.3 B	NS	NA	0.45 J	<2.5	<2.5	<2.5	1.2 J	0.3 J
Calcium	201,000	NS	275,800	358,250 J	179,000	132,000	129,000	110,000	137,500
Chromium, Total	ND	NS	0.6	5.8 J	7.0 J	7.1 J	6.4 J	<10.0	5.1 J
Cobalt	6.9 B	NS	ND	2.1 J	4.4 J	8.2 J	8.2 J	<50.0	5.2 J
Copper	12.4 B	NS	29.1 J	ND	17.1 J	6.4 J	13.6 J	<25.0	9.3 J
Iron	**42,100**	NS	**21,130**	**5,938 J**	**613**	**362**	151	59.2 J	296.3 J
Iron and Manganese	**47,310**	NS	**22,643**	**7,090 J**	**926**	**570**	284	201.2 J	495.3 J
Lead	**59.2 N**	NS	0.4 J	1.1 J	<5.0	<5.0	<5.0	<5.0	ND
Magnesium	**36,000**	NS	**683,500**	**1,033,000**	**378,000**	**217,000**	**199,000**	**303,000**	**274,250**
Manganese	**5,210**	NS	**1,513**	**1,153**	**313**	208	133	142	199
Mercury	ND	NS	ND	0.1 J	<0.20	<0.20	0.12 J	<0.20	0.03 J
Nickel	10	NS	0.7 J	17.3 J	<40.0	43	48	10.8 J	25.5 J
Potassium	28,300	NS	301,500 J	327,000 J	216,000	183,000	192,000	137,000	182,000
Selenium	NA	NS	NA	ND	<10.0	<10.0	<10.0	<10.0	ND
Silver	ND	NS	NA	ND	5.2 J	<10.0	2.3 J	<10.0	1.9 J
Sodium	**104,000**	NS	**5,592,000**	**6,173,500 J**	**2,760,000**	**1,620,000**	**1,310,000**	**2,280,000**	**1,992,500**
Thallium	ND	NS	NA	**1.83 J**	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	28 B	NS	0.20 J	1.4 J	10 J	7.2 J	6.8 J	9.0 J	8.3 J
Zinc	63.3 E	NS	28	ND	6.1 J	<20.0	9.3 J	28.4	12.6 J

HP-407D

Metals	Remedial Investigation 8/8/93	Remedial Investigation 12/15/93	1st 5 Yr. Review Period Average	2nd 5 Yr. Review Period Average	2019	2021	2022	2023	3rd 5 Yr. Review Period Average
Aluminum	720	NS	423	4.8 J	<200	<200	<200	601	150
Arsenic	ND	NS	ND	ND	<60.0	<60.0	<60.0	<60.0	ND
Antimony	ND	NS	**5.1 J**	ND	<10.0	<10.0	<10.0	<10.0	ND
Barium	24.9 B	NS	99 J	57.8 J	67.8 J	70.7 J	63.6 J	64.1 J	66.6 J
Beryllium	ND	NS	NA	0.17 J	0.17 J	<5.0	<5.0	0.36 J	0.1 J
Boron	NA	NS	**2,442 J**	**1,745**	**1,830**	**1,700**	**1,640**	**1,580**	**1,688**
Cadmium	3.1 B	NS	NA	2.4 J	<2.5	<2.5	<2.5	0.34 J	0.1 J
Calcium	24	NS	302,700	275,750 J	275,000	260,000	263,000	244,000	260,500
Chromium, Total	ND	NS	3.6 J	7.7 J	<10.0	1.3 J	<10.0	<10.0	0.3 J
Cobalt	ND	NS	ND	1.8 J	<50.0	<50.0	<50.0	<50.0	ND
Copper	10.4 B	NS	24.0	ND	15.7 J	3.8 J	21.4 J	4.0 J	11.2 J
Iron	**1,390**	NS	**8,880**	**19,350 J**	**15,700**	**1,530**	**938**	**13,700**	**7,967**
Iron and Manganese	**1,569**	NS	**10,176**	**20,049**	**16,330**	**2,270**	**1,063**	**14,524**	**8,547**
Lead	1.2 BN	NS	0.8 J	8.8 J	<5.0	<5.0	<50.0	14	3.4
Magnesium	31,900	NS	**806,700**	**698,500**	**661,000**	**606,000**	**593,000**	**586,000**	**611,500**
Manganese	179	NS	**1,296**	**721**	**630**	**740**	125	**824**	**580**
Mercury	ND	NS	ND	0.06 J	<0.20	<0.20	<0.20	<0.20	ND
Nickel	ND	NS	ND	10.3 J	14.4 J	26.1 J	26.5 J	27.8 J	23.7 J
Potassium	11,100	NS	318,300 J	213,750 J	242,000	238,000	273,000	250,000	250,750
Selenium	NA	NS	NA	2.6 J	<10.0	<10.0	9 J	<10.0	2.3 J
Silver	ND	NS	NA	0.53 J	2.6 J	<10.0	6.7 J	1.7 J	2.8 J
Sodium	**289,000**	NS	**5,774,000 J**	**3,283,500 J**	**4,960,000**	**4,960,000**	**4,600,000**	**4,400,000**	**4,730,000**
Thallium	ND	NS	NA	**1.0 J**	<10.0	<10.0	<10.0	<10.0	ND
Vanadium	13.9 B	NS	0.10 J	0.4 J	<50.0	<50.0	5.6 J	13.1 J	4.7 J
Zinc	ND	NS	34	1.8 J	5.8 J	<20.0	<20.0	<20.0	1.5 J

Footnotes: Only the metals detected in at least in one post-closure groundwater sample are listed.
All other metals 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 naturally saline; therefore, non-potable.
There are no metal standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Bold values are higher than the standard or guidance value.
B = Less than the quantitation 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.

Appendix A

Industrial Wastewater Discharge
Permit No. 23-P3145-1

Environmental Protection

Rohit Aggarwala
Commissioner

Angela M. De Lillo, P.E.
Acting Deputy Commissioner

Bureau of Wastewater Treatment

96-05 Horace Harding Expressway – 2nd Floor
Corona, NY 11368

February 27, 2023

NEW YORK CITY DEPARTMENT OF
ENVIRONMENTAL PROTECTION,
BUREAU OF WASTEWATER TREATMENT,
PENNSYLVANIA AVENUE LANDFILL,
96-05 HORACE HARDING EXPRESSWAY,
2ND FLOOR,
CORONA, NY 11368

Re: Issuance of Industrial Wastewater Discharge Permit No. 23-P3145-1

Attention: Ms. Theresa Tam

Enclosed is your Industrial Wastewater Discharge Permit No. 23-P3145-1, authorizing the discharge of industrial wastewater from your facility located at 1750 PENNSYLVANIA AVENUE, BROOKLYN, NY 11239, into the New York City sewerage system. This control mechanism is effective as of February 27, 2023 and expires at midnight on February 26, 2028. In order to continue discharging after the expiration date of this Permit, an application must be filed for a new Permit at least 120 days prior to the expiration date. **This Permit shall supersede Permit No. 21-P3145-1 issued to you on October 8, 2021. Please note that you are now required to submit a self-monitoring report two times a year. Your first self-monitoring report pursuant to this Permit is due on July 31, 2023.**

Your Permit contains applicable Federal Categorical Standards and New York City Sewer Use Limits, as well as self-monitoring, reporting and record keeping requirements. Failure to comply with all terms and conditions contained in the Permit and the New York City Sewer Use Regulations (available upon request) may result in issuance of Notices of Summonses (returnable to the New York City Office of Administrative Trials and Hearings) currently carrying civil penalties of up to $10,000 per violation per day and/or other enforcement proceedings.

Substantial changes have been made to the New York City Industrial Wastewater Discharge Permits. It is therefore vital that you read through your Permit carefully and become aware of the new requirements. Please make special note of the extensive changes in discharge limitations and monitoring requirements.

In order to facilitate your periodic self-monitoring and reporting, a standardized four-page Industrial Self-Monitoring Report Form and an Analytical Report Form are enclosed. Additional forms are always available upon request. When completing the forms, your Permit should be referred to for specific monitoring and reporting requirements.

The SMR must be submitted to:

Sean Hulbert, P.E., Acting Chief
Industrial Resource Management and Permitting Section
Bureau of Wastewater Treatment
New York City Department of Environmental Protection
96-05 Horace Harding Expressway
Corona, New York 11368

Please contact Ms. Kene Umeasor at kumeasor@dep.nyc.gov, if you have any questions regarding this Permit.

Sincerely,

DocuSigned by:
F0FA5DB140EA4BB...
Sean Hulbert, P.E., Acting Chief
Industrial Resource Management
and Permitting Section

enc: Industrial Wastewater Discharge Permit
Industrial User Self-Monitoring Report Form
Analytical Report Form

NEW YORK CITY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Permit No.: **23-P3145-1**
Effective Date: **February 27, 2023**
Expiration Date: **February 26, 2028**

In accordance with the provision of Title 24, Chapter 5, Section 24-523 (c) (1) of the New York City Administrative Code (NYCAC)

Industrial User Name:	**New York City Department of Environmental Protection**
Facility Address:	**Bureau of Wastewater Treatment**
	Pennsylvania Avenue Landfill
	1750 Pennsylvania Avenue
	Brooklyn, NY 11239
Mailing Address:	**96-05 Horace Harding Expressway, 2nd Floor**
	Corona, NY 11368

is hereby authorized to discharge industrial wastewater from the above identified facility into the New York City sewerage system in accordance with the discharge limitations, monitoring requirements, and other conditions set forth in this Permit.

All discharges authorized herein shall be consistent with the terms and conditions of this Permit. The discharge of any pollutant not identified in this Permit, or any pollutant identified in this Permit more frequently than or at levels in excess of that authorized, shall constitute a violation of the Permit.

The Industrial User shall not discharge any process or regulated wastewater after the date of expiration. If the Industrial User wishes to continue to discharge after this expiration date, an application for reissuance of this Permit must be filed a minimum of 120 days prior to its expiration date.

By: DocuSigned by: Frances Leung 4A1BEC2E952A40B...

Frances Leung, P.E., Chief
Division of Pollution Prevention and Monitoring
Bureau of Wastewater Treatment

Issued this 27th day of February, 2023

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PART I - SPECIFIC CONDITIONS

SECTION A. DISCHARGE LIMITATIONS

1. Discharge Points

The Industrial User is authorized to discharge leachate from the Pennsylvania Avenue Landfill, subject to the conditions in this Permit, through the discharge point(s) listed below to the New York City sewerage system.

DISCHARGE POINT	DESCRIPTION
M1	A 0.25"diameter PVC pipe located 25.25" above the concrete floor of the prefabricated building housing the facility's pre-treatment system and 90" from the face of a steel beam facing Pennsylvania Avenue, situated 98" from the building's exterior shell facing Pennsylvania Avenue and 69" from the interior cinder block wall of the office area facing Belt Parkway.

2. Sewer Use Limits

The discharge from point **M1** shall not exceed the following New York City sewer use limits, including but not limited to:

SEWER USE LIMITS
(15 R.C.N.Y. ch. 19)

POLLUTANT	PERMISSIBLE MAXIMUM CONCENTRATION FOR ANY GIVEN TIME (MG/L)	DAILY MAXIMUM CONCENTRATION (MG/L)
pH	5.0–12.0 Standard Units	—
Cadmium	2.0	0.69
Chromium (Hexavalent)	5.0	—
Copper	5.0	—
Lead	2.0	—
Mercury	0.05	—
Nickel	3.0	—
Zinc	5.0	—
Cyanide (Amenable to Chlorination)	0.2	—
Non-Polar Material	50.0	—

The discharge of leachate with temperature above 150 degrees Fahrenheit and/or closed-cup flash point below 140 degrees Fahrenheit (using the test methods specified in 40 C. F. R. 261.21) at any time is prohibited.

The following limits shall also apply:

Pollutant	Permissible Maximum Concentration for any Given Time
Total Suspended Solids (TSS)	350 ppm
Methyl-Tert-Butyl-Ether (MTBE)	50 ppb
Tetrachloroethylene (Perc)	20 ppb
Total PCB*	1 ppb

Pollutant	Daily Limit (ppb)	Monthly Limit (ppb)
Benzene	134	57
Ethylbenzene	380	142
Naphthalene	47	19
Toluene	74	28
Xylenes (Total)	74	28

* Total PCBs shall equal the sum of all concentrations of the 7 PCB compounds listed on pages I-4 and I-5 of this Permit.

SECTION B. MONITORING REQUIREMENTS

1. Sampling

The Industrial User shall monitor the specified discharge points for the pollutants listed below. All sampling shall take place on days representative of normal operations. All samples shall be taken **within a two-week period**, unless this is not feasible. Sampling shall be conducted in accordance with 40 C.F.R. § 403.12(g)(3) which states, in pertinent part, that grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organic compounds. For all other pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques, unless time-proportional composite sampling or grab sampling is authorized by the [Department]. Where time-proportional composite sampling or grab sampling is authorized by the [Department], the samples must be representative of the discharge. Where the Industrial

User batch discharges, the company must state how it will take representative samples.

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
VOLATILE ORGANICS (VOC)			
Benzene	**M1**	Once every six-month monitoring period.	4 grab samples per day, taken at least 1 hour apart for 4 days. Each sample must be individually preserved and sent to a certified laboratory. The laboratory may then composite each day's 4 grabs to make a daily composite for each of the 4 days.
Ethylbenzene	**M1**	" "	" "
Methyl-Tert-Butyl-Ether (MTBE)	**M1**	" "	" "
Tetrachloroethylene (Perc)	**M1**	" "	" "
Toluene	**M1**	" "	" "
Xylenes	**M1**	" "	" "
Carbon tetrachloride	**M1**	" "	" "
Chloroform	**M1**	" "	" "
1,1,1-trichloroethane	**M1**	" "	" "
SEMI-VOLATILE ORGANICS			
Naphthalene	**M1**	Once every six-month monitoring period.	4 one-day composite samples.
1,4-dichlorobenzene	**M1**	" "	" "
Phenol	**M1**	" "	" "
1,2,4-trichlorobenzene	**M1**	" "	" "
PCB-1016[3] (Arochlor 1016)	**M1**	" "	" "
PCB-1242[3] (Arochlor 1242)	**M1**	" "	" "

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
PCB-1254[3] (Arochlor 1254)	**M1**	Once every six-month monitoring period.	4 one-day composite samples.
PCB-1221[3] (Arochlor 1221)	**M1**	" "	" "
PCB-1232[3] (Arochlor 1232)	**M1**	" "	" "
PCB-1248[3] (Arochlor 1248)	**M1**	" "	" "
PCB-1260[3] (Arochlor 1260)	**M1**	" "	" "
OTHER TOXIC ORGANICS OF CONCERN[1]			
1) Volatile Organics (VOC)	**M1**	Once every six-month monitoring period.	4 grab samples per day, taken at least 1 hour apart for 4 days. Each sample must be individually preserved and sent to a certified laboratory. The laboratory may then composite each day's 4 grabs to make a daily composite for each of the 4 days. See Part II, Sect. C(1).
2) Semi-Volatile Organics	**M1**	" "	4 one-day composite samples. See Part II, Sect. C(1).
OTHER POLLUTANTS, PH, AND FLOW			
Cadmium	**M1**	Once every six-month monitoring period.	4 one-day composite samples.
Chromium (Total)	**M1**	" "	" "
Chromium (Hexavalent)[2]	**M1**	" "	" "
Copper	**M1**	" "	" "
Lead	**M1**	" "	" "
Mercury	**M1**	" "	" "

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
Molybdenum	**M1**	Once every six-month monitoring period.	4 one-day composite samples.
Nickel	**M1**	" "	" "
Silver	**M1**	" "	" "
Zinc	**M1**	" "	" "
Carbonaceous Biochemical Oxygen Demand (CBOD)	**M1**	" "	" "
Total Nitrogen	**M1**	" "	" "
Chloride	**M1**	" "	" "
Cyanide (Total)	**M1**	Once every six-month monitoring period.	4 grab samples per day, taken at least 1 hour apart for 4 days. Each sample must be individually preserved and sent to a certified laboratory. The laboratory should then composite each day's 4 grabs to make a daily composite for each of the 4 days.
Cyanide (Amenable)[4]	**M1**	" "	" "
Total Suspended Solids (TSS)	**M1**	" "	4 grab samples, taken at least 1 hour apart for 4 days. Each grab sample must be individually preserved and sent to a certified laboratory.
Non- Polar Material	**M1**	" "	" "
pH	**M1**	" "	Either by 4 in situ measurements or by 4 grab samples, each taken at least 1 hour apart.

FOOTNOTES TO MONITORING REQUIREMENTS

1. Monitoring for Toxic Organics of Concern (TOC) may not be required. See Part II, Sect. C(1). TOC are comprised of two subcategories, volatile organic compounds (VOCs) and semi-volatile organic compounds. There are different sampling methods for each subcategory (See Part 1, Sect. B. Monitoring Requirements). These compounds include:

	(1)	acenaphtene
VOC	(2)	acrolein
VOC	(3)	acrylonitrile
	(4)	benzidine
VOC	(5)	chlorobenzene
	(6)	hexachlorobenzene
VOC	(7)	1,2-dichloroethane
	(8)	hexachloroethane
VOC	(9)	1,1-dichloroethane
VOC	(10)	1,1,2-trichloroethane
VOC	(11)	1,1,2,2-tetrachloroethane
VOC	(12)	chloroethane
	(13)	bis (2-chloroethyl) ether
VOC	(14)	2-chloroethylvinyl ether (mixed)
	(15)	2-chloronaphthalene
	(16)	2,4,6-trichlorophenol
	(17)	parachlorometa cresol
	(18)	2-chlorophenol
	(19)	1,2-dichlorobenzene
	(20)	1,3-dichlorobenzene
	(21)	3,3-dichlorobenzidine
VOC	(22)	1,1-dichloroethylene
VOC	(23)	1,2-trans-dichloroethylene
	(24)	2,4-dichlorophenol
VOC	(25)	1,2-dichloropropane
VOC	(26)	1,3-dichloropropylene (1,3-dichloropropene)
	(27)	2,4-dimethylphenol
	(28)	2,4-dinitrotoluene
	(29)	2,6-dinitrotoluene
	(30)	1,2-diphenylhydrazine
	(31)	fluoranthene
	(32)	4-chlorophenyl phenyl ether
	(33)	4-bromophenyl phenyl ether
	(34)	bis (2-chloroisopropyl) ether
	(35)	bis (2-chloroethoxy) methane
VOC	(36)	methylene chloride (dichloromethane)
VOC	(37)	methyl chloride (chloromethane)
VOC	(38)	methyl bromide (bromomethane)
VOC	(39)	bromoform (tribromomethane)
VOC	(40)	dichlorobromomethane
VOC	(41)	chlorodibromomethane
	(42)	hexachlorobutadiene
	(43)	hexachlorocyclopentadiene
	(44)	isophorone
	(45)	nitrobenzene
	(46)	2-nitrophenol
	(47)	4-nitrophenol
	(48)	2,4-dinitrophenol
	(49)	4,6-dinitro-o-cresol
	(50)	n-nitrosodimethylamine
	(51)	n-nitrosodiphenylamine
	(52)	n-nitrosodi-n-propylamine
	(53)	pentachlorophenol
	(54)	bis (2-ethylhexyl) phthalate
	(55)	butyl benzyl phthalate
	(56)	di-n-butyl phthalate
	(57)	di-n-octyl phthalate
	(58)	diethyl phthalate
	(59)	dimethyl phthalate
	(60)	1,2-benzanthracene (benzo(a)anthracene)
	(61)	benzo(a)pyrene (3,4-benzopyrene)
	(62)	3,4-benzofluoranthene (benzo(b)fluoranthene)
	(63)	11,12-benzofluoranthene (benzo(k)fluoranthene)
	(64)	chrysene
	(65)	acenaphthylene
	(66)	anthracene

	(67)	1,12-benzoperylene (benzo(ghi)perylene)
	(68)	fluorene
	(69)	phenanthrene
	(70)	1,2,5,6-dibenzanthracene (dibenzo(a,h)anthracene)
	(71)	indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
	(72)	pyrene
VOC	(73)	trichloroethylene
VOC	(74)	vinyl chloride (chloroethylene)
	(75)	aldrin
	(76)	dieldrin
	(77)	chlordane (technical mixture and metabolites)
	(78)	4,4-DDT
	(79)	4,4-DDE (p,p-DDX)
	(80)	4,4-DDD (p,p-TDE)
	(81)	alpha-endosulfan
	(82)	beta-endosulfan
	(83)	endosulfan sulfate
	(84)	endrin
	(85)	endrin aldehyde
	(86)	heptachlor
	(87)	heptachlor epoxide (BHC-hexachlorocyclohexane)
	(88)	alpha-BHC
	(89)	beta-BHC
	(90)	gamma-BHC
	(91)	delta-BHC
	(92)	toxaphene
	(93)	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)
	(94)	azinophos-methyl
	(95)	chlorpyrifos
	(96)	demeton
	(97)	halomethanes
	(98)	manganese (inorganic element)
	(99)	methoxychlor
	(100)	pentachlorinated ethane
	(101)	2,3,4,6-tetrachlorophenol

2. If the Chromium (Total) level at discharge point **M1**, 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).

3. The analysis of PCB compounds must be done by EPA Method 608, with a method detection level less than or equal to 65 ppt.

4. If the Cyanide (Total) level at discharge point **M1**, is less than or equal to 0.2 mg/L, then analyzing for Cyanide (Amenable) at that point is not required. The Cyanide (Total) level can be submitted in lieu of analyzing for Cyanide (Amenable).

2. Additional Monitoring Requirements

See Part II, Sect. C for additional monitoring requirements

SECTION C. REPORTING REQUIREMENTS

1. Periodic Reports Concerning Continued Compliance

The Industrial User shall implement a self-monitoring program, as required in Part I, Sect. B of this Permit. Reports are due on a semi-annual basis as follows:

Monitoring Period	Report Due Date
January 1 to June 30	**July 31**
July 1 to December 31	**January 31**

Reports must be received by the Department on or before the due dates specified above.

2. Additional Reporting Requirements

See Part II, Sect. D for additional reporting requirements.

3. Submission of Reports and Notices

The self-monitoring report and all other reports and notices required by this Permit shall be submitted to the Department at the following address, unless otherwise indicated:

Sean Hulbert, P.E., Acting Chief
Industrial Resource management and Permitting Section
Bureau of Wastewater Treatment
New York City Department of Environmental Protection
96-05 Horace Harding Expressway
Corona, New York 11368

It is recommended that you send all reports and notices by certified mail in the event that you are required to prove that such reports or notices were submitted in a timely manner.

4. Reporting Format

a. Periodic reports shall be submitted on the Department's Industrial User **Self-Monitoring Report Form**.

b. Analytical results submitted to the Department for any reason, including but not limited to self-monitoring reports, split sampling, and pursuant to Commissioner's Orders, shall be reported by the certified laboratory performing the analysis in a format consistent with the Department's **Analytical Report Form**. The sampling points referenced on the Analytical Report Form must be identified exactly as they are in the Industrial User's Permit.

c. Copies of the Self-Monitoring Report Form and the Analytical Report Form are enclosed with this Permit. Additional copies are also available from the Department upon request.

SECTION D. SPECIAL CONDITIONS

1. The Industrial User must maintain a logbook on daily volume of discharge (in gallons per day). **A copy of the logbook entries for the monitoring period must be submitted in each self-monitoring report.**

PART II - GENERAL CONDITIONS

SECTION A. DEFINITIONS AND STANDARD CONDITIONS

1) Definitions

a. Allowable Runoff - Non-stormwater discharges associated with firefighting activities or as otherwise authorized by the Commissioner pursuant to this chapter.

b. Biochemical Oxygen Demand - The laboratory determination of the quantity of oxygen utilized in the biochemical oxidation of organic matter in a given time and at a specified temperature. It is expressed in parts per million (ppm) or (mg/L) of oxygen used in a period of five days at 20 degrees Celsius.

c. Bypass - The intentional diversion of wastes from any portion of a treatment system.

d. Commissioner - The Commissioner of the New York City Department of Environmental Protection.

e. Composite Sample - A sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

f. Cooling water - The water discharged from any system of condensation, air conditioning, cooling, refrigeration, or other similar temperature reducing sources. It shall contain no polluting substances which would produce BOD or SS in excess of 10 mg/L or toxic substances in concentrations or amounts greater than those specified herein.

g. Daily Maximum - The maximum allowable discharge of a pollutant during a 24-hour period. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass of the pollutant discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.

h. Department - The New York City Department of Environmental Protection.

i. Grab Sample - A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes.

j. Indirect discharge - A discharge from a private sewer to a public sewer, or a discharge to any street, gutter, pipe, channel, pumping station, catch basin, drain, waterway, or other conveyance leading to or connecting with a public sewer, including but not limited

to the placement or abandonment of any substance which could reasonably enter a public sewer under the force of stormwater or other influence.

k. Industrial User - A source of Indirect Discharge.

l. Instantaneous Maximum Concentration - The maximum concentration allowed in any single grab sample.

m. Interference - A discharge that alone or in conjunction with a discharge or discharges from other sources both:

i) Inhibits or disrupts the POTW, its treatment processes or operations or its sludge processes, use or disposal; and

ii) Causes a violation of any requirement of the POTW's SPDES Permit (including an increase in the magnitude or duration of a violation) or prevents the use or disposal of sewage sludge in compliance with the following statutory provisions and regulations or Permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA) and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act and the Marine Protection, Research and Sanctuaries Act.

n. Maximum Monthly Average - The maximum allowable value for the monthly average.

o. Monthly Average - The average of all samples taken during one calendar month. Thus, if only one sample is taken during a calendar month, the monthly average for that month will be based on only that one sample.

p. Pass Through - A discharge that exits the POTW into waters of the United States in quantities or concentrations that, alone or in conjunction with a discharge or discharges from other sources, cause a violation of any requirement of the POTW's SPDES Permit (including an increase in the magnitude or duration of a violation).

q. Publicly Owned Treatment Works (POTW) - A treatment works as defined by Section 212 of the Clean Water Act that is owned by the State or municipality. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW treatment plant.

r. Resource Conservation and Recovery Act (RCRA) - A Federal statute regulating the management of hazardous waste from its generation through ultimate disposal. The Act

contains requirements for waste generators, transporters and owners and operators of treatment, storage and disposal facilities.

s. Sewer Use Regulations - Rules of the City of New York relating to the "Use of the Public Sewers." 15 R.C.N.Y. ch. 19.

t. Shall - mandatory.

u. Slug Discharge - Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge, which has a reasonable potential to cause interference or pass through, or in any other way violate the POTW's regulations, local limits or permit conditions.

v. Stormwate**r** - Runoff that is generated when precipitation from rain events or snowmelt flows overland and does not percolate into the ground.

w. Toxic Organics - Either the organic compounds listed in the definition of Total Toxic Organics (TTO) in Part I, Sect. A (2), and the Other Toxic Organics of Concern (OTOC) listed in Part I, Sect. B (1); or the Toxic Organics of Concern listed in Part I, Sect. B (1).

x. Upset - An exceptional incident in which there is unintentional and temporary noncompliance with technology based Permit effluent limitations because of factors beyond the reasonable control of the Industrial User, excluding such factors as operational error, improperly designed or inadequate treatment facilities or improper operation and maintenance or lack thereof.

2) Severability

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit, shall not be affected thereby.

3) Duty to Comply

The Industrial User must comply with the provisions of the New York City Administrative Code (NYCAC) and the Sewer Use Regulations promulgated pursuant thereto, and all conditions of this Permit. Failure to comply with these requirements may be grounds for administrative action, or enforcement proceedings including civil and/or criminal penalties, injunctive relief and summary abatements.

4) Duty to Mitigate

The Industrial User shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Permit, including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5) Permit Action

This Permit may be modified, revoked and reissued, or terminated for good cause, including, but not limited to, the following:

a) Incorporation of any new or revised Federal, State, or local pretreatment standards or requirements;

b) Material or substantial alterations or additions to the discharger's operations that were not covered in the effective Permit;

c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;

d) Information indicating that the Permitted discharge poses a threat to the New York City collection and treatment systems, POTW personnel or the receiving waters;

e) Violation of any terms or conditions of this Permit;

f) Obtaining this Permit by misrepresentation or failure to disclose fully all relevant facts;

g) Upon request of the Industrial User, provided such request does not create a violation of any existing applicable requirements, standards, laws, or rules and regulations; or

h) Correction of typographical or other errors in the Permit.

The filing of a request by the Industrial User for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any Permit condition.

6) Property Rights

The issuance of this Permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private or public property or any invasion of personal rights, nor any violation of Federal, State or local laws or regulations.

7) Limitation on Permit Transfer

This wastewater discharge Permit is issued to the named Industrial User for the specific operation(s) described herein. It is not assignable to any other named individual or entity or transferable to any other location without the prior written approval of the Department. Any change in the name of the Industrial User shall be considered to be such an assignment. The sale of 50% or more of the stock of the Industrial User, if the Industrial User is a corporation, or the change of any partners, general or limited, if the Industrial User is a partnership, or the change in ownership, if the Industrial User is a sole proprietorship, shall also be considered an assignment. In the event

of such a sale, the Industrial User must inform the purchaser of all responsibilities and obligations under this Permit.

8) Duty to Reapply

If the Industrial User wishes to continue an activity regulated by this Permit after the expiration date of this Permit the Industrial User must apply for and obtain a new Permit. The application must be submitted at least 120 days before the expiration date of this Permit.

9) Dilution

The Industrial User shall not increase the use of process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this Permit.

The Industrial User shall post a Dilution Notice in a conspicuous manner. The Dilution Notice shall state that the New York City Department of Environmental Protection is to be notified of the illegal dilution of any wastewater discharges or any illegal discharges by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements. The Dilution Notice shall include the following definition of illegal dilution: Illegal dilution is an increase in the use of process water, or any other attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a Pretreatment Standard or Requirement.

10) General Prohibitive Standards

The Industrial User shall comply with all of the general prohibitive discharge standards in the General Pretreatment Regulations, 40 C.F.R. pt. 403 and the Department's Sewer Use Regulations.

The Industrial User shall not discharge or cause to be discharged, directly or indirectly, into any storm sewer, catch basin, or manhole any substance other than stormwater or allowable runoff.

Except as expressly allowed by this Permit, if the Industrial User discharges or causes to be discharged, including any placement, run, leak, or escape into any combined or sanitary sewer, pipe, channel, pumping station, catch basins, drain connecting with any combined or sanitary sewer or any other sewer appurtenances, or green infrastructure, or waterway connecting with any combined or sanitary sewer, or into any private sewer connected with a combined or sanitary sewer any of the following described materials, substances or wastes, except as authorized in writing by the Commissioner or such small quantities through a building drainage system as may be present in normal household wastes, shall be strictly liable, without regard to fault:

a) Construction materials, concrete or concrete contaminated water, ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastic, wood, paunch manure, coffee grounds, fur, wax, power wash waste, building wash waste, fats, oils, grease, or any solids or viscous substances capable of causing obstruction to the flow in sewers or other

interference with the proper operation of the sewerage system. No amount of the following shall be considered normal household wastes for purposes of this section: wipes that are not flushable, diapers, paper towels, floss, condoms, razors, hypodermic needles, contact lenses, bandages, sanitary pads, tampons, tampon applicators, gauze, cotton balls, swabs, any other personal hygiene products, drinking straws, any other items that are not toilet paper, sanitary waste, or items that have otherwise been authorized in writing by the Commissioner;

b) Snow and ice at locations not authorized in writing by the Commissioner;

c) Steam or wastewater above 150°F;

d) Flammable or explosive liquids, solids or gases, including but not limited to gasoline, benzene and naphtha (notwithstanding anything to the contrary contained in these Regulations, under no circumstances may any such substances be discharged into the sewerage system, even if diluted prior to or after discharge);

e) Oil sludges, waste oil, motor oil, heating oil, diesel and other fuels, dielectric fluid, brake fluid, transmission fluid, hydraulic fluid, or other similar substances;

f) Non-polar material, as defined in 15 RCNY § 19-01, in concentrations greater than 50 mg/L for any given time;

g) Coal tar, its derivatives and waste;

h) Paints and related paint waste products from any source that tend to clog or otherwise interfere with the operation of the sewerage system;

i) Corrosive wastewater having a pH lower than 5.0 or higher than 12.0 or having any other corrosive property likely to cause damage to structures or equipment of the sewerage system or create a hazard to personnel;

j) Toxic substances in such quantities, which may when discharged from a single source or in combination with other sources:

(i) interfere with any sewage treatment process, including sludge digestion;

(ii) limit the City's options for operating its sewerage system or disposing of the sewage sludge, grit or scum generated at wastewater resource recovery facilities;

(iii) be detrimental to the health of human beings, animals, or aquatic life;

(iv) have any negative impact on the receiving waters; or

(v) violate federal or state laws or regulations or the requirements of a discharge permit of a sewage treatment plant issued pursuant to § 402 of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, as amended, or any other permit issued

pursuant to federal or state law.

k) Toxic substances in such quantities which may, when discharged from a single source or in combination with other sources:

(i) violate any federal or state laws, regulations, rules or standards governing such discharge; or

(ii) violate the toxic discharge limits to be set by the Commissioner, contained in a list to be maintained by the Commissioner and which may be published from time to time in the City Record, or

(iii) violate any discharge limit contained in 15 RCNY § 19-04(a) or ordered pursuant to 15 RCNY § 19-04(b).

l) Any liquids or wastes containing pollutants of such quality and/or quantity that become burdensome in the operation and maintenance of a sewage treatment plant;

m) Any noxious or malodorous gas or substance capable of creating a public nuisance;

n) Any wastewater or substance, that in the opinion of the Commissioner, will result in a violation of any applicable Federal, State or local water quality standard concerning discoloration or other undesirable physical changes in the appearance of the receiving waters;

o) Radioactive material either directly or indirectly into the sewerage system, unless all restrictions, prohibitions, and requirements of 24 RCNY Health Code Article 175 are fully complied with

p) Any still bottom or sludge residues resulting from dry cleaning processes including, but not limited to, dirt, lint, soil and any other deposits or residues extracted as a result of any dry cleaning processes. The discharge of filters or filter media used in dry cleaning processes is also prohibited;

q. Antifreeze;

r. Hazardous waste pharmaceuticals, as defined in the Code of Federal Regulations, in 40 C.F.R. Part 266.500.

11) Compliance with Applicable Pretreatment Standards and Requirements

The Industrial User shall comply at all times with any and all applicable local, State and Federal pretreatment standards and requirements, including any such standards or requirements that may become effective during the term of this Permit.

12) Confidentiality

As provided in Section 19-09 of the Sewer Use Regulations, any information submitted to the Department, except for discharge and effluent data, may be claimed by the discharger to be confidential. Any such claim must be asserted at the time of submission of the information and should contain a stamped legend or any other suitable form of notice on each page containing such information, employing language such as trade secret, proprietary or confidential business information. If no claim is asserted at the time of submission, the information may be made available to the public without further notice. If a claim is asserted, it will be treated in accordance with Section 19-09.

Effluent data shall be available to the public without restriction.

13) Duty to Provide Information

The Industrial User shall furnish to the Department within a reasonable time, any information that the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Industrial User shall also furnish to the Department, upon request, copies of records required to be kept by this Permit.

14) Annual Publication by the Department

A list of all Industrial Users who, at any time during the previous twelve (12) months, were in significant noncompliance with applicable pretreatment requirements shall be annually published by the Department in a newspaper of general circulation that provides meaningful public notice within the city of New York, as required by 40 C.F.R. Part 403.8(f)(2)(viii) and Section 19-10(g) of the Sewer Use Regulations.

15) Civil and Criminal Liability

Nothing in this Permit shall be construed to relieve the Industrial User from civil and/or criminal penalties for noncompliance under Section 24-524 (f) of the NYCAC.

16) Penalties for Violations of Permit Conditions

Section 24-524 (f) of NYCAC provides that any person who fails to comply with any of the provisions of Sections 24-504 through 24-522 and 24-523 of the Code, the Sewer Use Regulations, Order of the Commissioner or Environmental Control Board or a Permit condition shall be liable for a civil penalty of up to $10,000.00 for each violation. In the case of a continuing violation, each day's continuance shall be a separate and distinct offense. In addition to civil penalties, any person who knowingly violates or fails to comply with any of the above-cited provisions shall be guilty of a misdemeanor and subject to a fine of up to $10,000.00 and/or to imprisonment not exceeding thirty days. The Industrial User may also be subject to sanctions under State and/or Federal law.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROL SYSTEMS

1) Proper Operation and Maintenance

The Industrial User shall at all times properly operate and maintain all facilities and systems for treatment, monitoring and control (and related appurtenances) that are installed or used by the Industrial User to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes, but is not limited to, effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the Permit.

2) Duty to Halt or Reduce Activity

Upon reduction of efficiency of operation or loss or failure of all or part of the pretreatment facility, the Industrial User shall, to the extent necessary to maintain compliance with its Permit, control production or all discharges or both until operation of the pretreatment facility is restored or an alternative method of pretreatment is provided. This requirement applies, for example, when the primary source of power of the pretreatment facility fails or is reduced. It shall not be a defense for an Industrial User in an enforcement action to state that it would have been necessary to halt or reduce the Permitted activity in order to maintain compliance with the conditions of this Permit.

3) Bypass of Pretreatment Facilities

a) Bypass is prohibited unless

i) it is unavoidable to prevent loss of life, personal injury, or severe property damage, no feasible alternatives exist, and the Industrial User submits notification as required by subparagraph (b) of this paragraph; or

ii) it is for essential maintenance to assure efficient operation, it does not cause pretreatment standards or requirements to be violated, and the Industrial User submits notification as required by subparagraph (b) of this paragraph.

b) Notification of bypass:

i) Anticipated bypass - If the Industrial User knows in advance of the need for a bypass, it shall submit prior written notice, at least ten days before the date of the bypass, to the Department.

ii) Unanticipated bypass - The Industrial User shall immediately notify the Department by calling 311, New York City's General Information Number, and shall submit a written notice to the Department within 5 days after the bypass. This report shall specify:

(1) a description of the bypass, its cause and duration;
(2) whether the bypass has been corrected; and
(3) the steps being taken or to be taken to reduce, eliminate and prevent a recurrence of the bypass.

When calling 311, you must ask for and record your complaint number for proof of compliance with your notification requirements.

4) Disposal of Hazardous Wastes

All solids, sludges, resins or residues, filter backwash or other pollutants removed in the course of pretreatment or control of wastewater shall be handled and disposed of in accordance with all New York State hazardous wastes requirements and RCRA requirements including, but not limited to, subtitles C and D thereof.

SECTION C. MONITORING AND RECORDS

1) Toxic Organics

The Industrial User may not use the certifications provided below for any organic pollutants for which sampling is required under the Industrial User's applicable Federal Categorical Standards. The Industrial User must sample and analyze its wastewater for all such organic pollutants.

The Industrial User shall satisfy the following Toxic Organics requirements:

a) Indicate in each periodic report concerning continued compliance as required by Part I, Sect. C of this Permit which Toxic Organics, if any, were used or stored during the reporting period, and their amounts.

b) Sample and analyze its wastewater for those Toxic Organics that would reasonably be expected to be present.

c) In lieu of monitoring for Toxic Organics and upon scribed request, the Department may allow the Industrial User to make one of the following certifications in its periodic self-monitoring reports:

i) "Based upon my inquiry of the person or persons directly responsible for managing environmental affairs at my facility, I certify that, to the best of my knowledge and belief, no toxic organics were used or stored at my facility during the reporting period covered by this report. I certify that I am duly authorized by the establishment to make this statement on its behalf and am fully aware that there are significant civil and criminal sanctions for submitting false information, including the possibility of a fine and/or imprisonment."

OR

ii) "Based upon my inquiry of the person or persons directly responsible for managing environmental affairs at my facility, I certify that, to the best of my knowledge and belief, there was no discharge to a public sewer of toxic organics during the reporting period covered by this report. I also certify that the explanations provided concerning the disposal of toxic organics from the facility are true, accurate and complete. I further certify that this facility is implementing a toxic organics management plan to protect against the release of such compounds to a public sewer. I certify that I am duly authorized by the establishment to make this statement on its behalf and am fully aware that there are significant civil and criminal sanctions for submitting false information, including the possibility of a fine and/or imprisonment."

If certification **(ii)** is made, the facility must also submit a Toxic Organics Management Plan (TOMP) for approval by the Department. An acceptable TOMP must contain:

i) a list of all toxic organic compounds used or stored at your facility; and

ii) a description of the storage, handling and disposal practices for control of toxic compounds at your facility, including procedures for ensuring that toxic organics do not spill or leak into your wastewater.

2) Sampling and Analysis

a) Samples and measurements taken as required in this Permit shall be representative of the volume and nature of the monitored discharge. Samples shall be taken at the monitoring points specified in this Permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water or substance. Monitoring points shall not be changed without prior written approval of the Department.

b) All handling and preservation of collected samples and laboratory analyses of samples shall be performed in accordance with 40 C.F.R. pt. 136. If 40 C.F.R. pt. 136 does not cover the pollutant in question, the handling, preservation, and analysis must be performed in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater." All analyses shall be performed using a detection limit less than the lowest applicable regulatory discharge limit.

c) All laboratory analyses must be conducted by a New York State Health Department certified wastewater laboratory. The results must be certified by the laboratory and submitted on the laboratory's letterhead. For each sample, the laboratory report must indicate the date of sampling, time sample was taken, sample location, chain of custody, sampling preservation procedures, analytical techniques used, date of analysis, units of measurement, and the laboratory's sample identification; where the analytical result

reported is below the method detection level, the laboratory report must also indicate the method detection level.

3) Flow Measurements

If flow measurements are required by this Permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharge. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

4) Inspection and Entry

The Industrial User shall allow duly authorized representatives of the Department to:

a) Enter upon the Industrial User's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

b) Have access to and copy, at reasonable times, any records that must be kept by law or regulation and/or under the conditions of this Permit;

c) Inspect, videotape, photograph or otherwise record at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit;

d) Sample or monitor, for the purposes of assuring Permit compliance, any substance or parameters at any location; and

e) Inspect, videotape, photograph or otherwise record any production, manufacturing, fabricating or storage area where pollutants, regulated or required under this Permit could originate, be stored or be discharged to the public sewer.

The applicant, by accepting any Permit issued, does hereby consent and agree to entry upon the premises as described herein.

5) Retention of Records

a) The Industrial User shall retain records of all monitoring information, including all calibration and maintenance records and original strip chart recordings for all continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period of

at least three years from the date of the sample, measurement, report or application. This period may be extended by order of the Commissioner at any time, and shall also be extended during the course of any unresolved litigation regarding the IU or POTW or when requested by the Director (as defined in 40 C.F.R. § 403.3(g)) or the United States Environmental Protection Agency Regional Administrator.

b) All records that pertain to matters that are the subject of or related to special orders or any other enforcement or litigation activities brought by the Department regarding the IU or POTW or when requested by the Director (as defined in 40 C.F.R. § 403.3(g)) or the United States Environmental Protection Agency Regional Administrator shall be retained and preserved by the Industrial User until all enforcement activities have concluded and all periods of limitations with respect to any and all appeals have expired.

6) Record Contents

Records of sampling information shall include:

a) The date, exact place, time and methods of sampling or measurement, and sample preservation techniques or procedures;

b) Who performed the sampling or measurements;

c) The date(s) analyses were performed;

d) Laboratory that performed the analyses;

e) The analytical techniques or methods used;

f) The results of each analysis;

g) The chain of custody of each sample;

h) Method detection level where analytical result reported is non-detect;

i) Units of measurement for each analytical result; and

j) Laboratory's sample identification for each sample.

7) Falsifying Information

It is unlawful to make any false statement representation or certification in any application, report, plan or other document required by this Permit or to falsify, tamper with or knowingly render any monitoring device or method inaccurate.

SECTION D. ADDITIONAL REPORTING REQUIREMENTS

1) Additional Monitoring

If the Industrial User monitors any pollutant more frequently than required by this Permit, using test procedures prescribed in 40 C.F.R. pt. 136 or otherwise approved by EPA or specified in this Permit, the results of such monitoring shall be submitted to the Department in its next self-monitoring report.

2) Automatic Resampling

If the results of the Industrial User's wastewater discharge sampling indicates a violation, the Industrial User shall:

a) notify the Department within 24 hours of becoming aware of the violation; and

b) repeat the sampling and analysis and submit the results of the second analysis to the Department within 30 days after becoming aware of the violation.

3) Split Sampling Results

If the Industrial User requests and analyzes a split sample(s) during a Department sampling event, the results of such analysis shall not be considered as valid samples for determining compliance unless all handling and preservation of collected samples and laboratory analyses of samples have been performed in accordance with 40 C.F.R. pt. 136, as per Part II, Section (C)(2)(b) of this Permit, and such sample results have been submitted to the Department within 45 days of the date that the Industrial User received the sample(s) from the Department.

4) Accidental Discharge Notification

In the event of an accidental discharge in violation of any provision of the Sewer Use Regulations, the Industrial User shall immediately notify the Department, at any hour, by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements.

Within five days following an accidental discharge, the Industrial User shall submit to the Department a detailed written report. The report shall specify:

a) the description of the accidental discharge, the cause thereof, and the impact on the Industrial User's compliance status, including the location of discharge, type, concentration

and volume of waste;

b) the duration of noncompliance, including exact dates and time of noncompliance, and if the noncompliance continues, the time by which compliance is reasonably expected to occur; and

c) all steps taken to reduce, eliminate and prevent recurrence of such an upset, slug, accidental discharge, or other conditions of noncompliance.

5) Operating Upsets

Any Industrial User that experiences an upset in operations that places the Industrial User in a temporary state of noncompliance with the provisions of either this Permit or the Sewer Use Regulations, shall inform the Department immediately after becoming aware of the upset by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements.

A written follow-up report thereof shall be filed by the Industrial User with the Department within five (5) days. The report shall specify:

a) the description of the upset or slug discharge, the cause(s) thereof and the upset's or slug discharge's impact on the Industrial User's compliance status;

b) the duration of noncompliance, including exact dates and times of noncompliance, and if the noncompliance continues, the time by which compliance is reasonably expected to occur; and

c) all steps taken or to be taken to reduce, eliminate and prevent recurrence of such an upset, slug discharge or other conditions of noncompliance.

6) Planned Changes

The Industrial User shall give written notice to the Department 90 days prior to any change in the Industrial User's name or address, or any facility expansion, production increase, or process modification that results in new or substantially increased discharges or a change in the nature of the discharge. The Industrial User shall also provide written notice 90 days prior to discontinuing any regulated process. The Industrial User shall notify the Department immediately of any changes at its facility affecting its potential for a slug discharge.

7) Anticipated Noncompliance

The Industrial User shall give a minimum of ten days advance notice to the Department of any

planned changes in the Permitted facility or activity that may result in noncompliance with this Permit.

8) Signatory Requirements

All applications, reports or information submitted to the Department shall contain the following certification:

> "I certify under penalty of law that I have personally examined and am familiar with the information contained in this document and all attachments therein. Furthermore, based on my inquiry of those persons immediately responsible for obtaining the information contained in this document, I believe that this information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment."

This certification shall be signed by:

a) a responsible corporate officer if the Industrial User submitting the reports is a corporation. For the purpose of this paragraph, a responsible corporate officer means:

   i) president, secretary, treasurer or vice-president of the corporation in charge of a principal business function or any other person who performs similar policy or decision-making functions for the corporation, or

   ii) the manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for control mechanism requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

b) a general partner or proprietor if the Industrial User submitting the report is a partnership or sole proprietorship, respectively.

c) a duly authorized representative of the individual designated in paragraph (a) or (b) of this section if:

   i) The authorization is made in writing by the individual described in paragraph (a) or (b);

ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the industrial discharge originates, such as the position of plant manager, or a position of equivalent responsibility, or a position having overall responsibility for environmental matters for the company; and

iii) The written authorization is submitted to the Department.

If an authorization under this paragraph is no longer accurate because a different individual or position has responsibility for the overall operation of the facility or overall responsibility for the environmental matters of the company, a new authorization satisfying the requirement of this paragraph must be submitted to the Department prior to or together with any reports to be signed by an authorized representative.