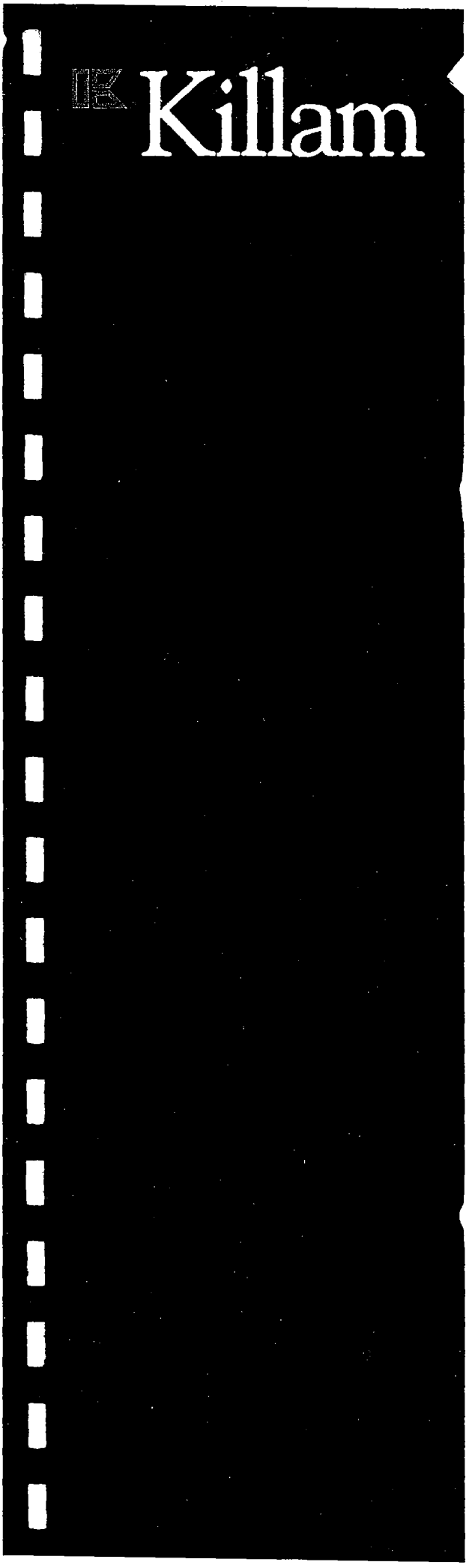
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Report

SITE INVESTIGATION REPORT

of

Port Ivory Site
Staten Island, New York

Block 1309, Lot 10; Block 1338, Lot 1 and Block 1400, Lot 1

Volume I of III

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1.0 EXECUTIVE SUMMARY

In support of the proposed acquisition and redevelopment of the former Procter & Gamble (P&G) facility located at 40 Western Avenue in Staten Island, New York, The Port Authority of New York and New Jersey (Port Authority) retained Killam Associates (Killam) to perform a Site Investigation (SI) of the inactive industrial site. Killam had previously performed a Phase I Environmental Site Assessment (Phase I ESA) for the Port Authority, which had identified potential areas of environmental concern including areas that had been identified and evaluated by P&G. However, in many instances, the information pertaining to those areas, which had been evaluated by P&G was incomplete or outdated. As such, prior to the acquisition of the site, the Port Authority tasked Killam to assist them in obtaining information to better characterize current site conditions and environmental quality of soil, sediment, surface water and groundwater at the site. Overall, the SI revealed the presence of a variety of contaminants, which are typical to industrial sites, particularly those situated in urban areas. These results were not unexpected given the sustained industrial usage of the property for approximately a century and the urban nature of the site area. Further, the results indicated that usage of the site as an intermodal facility and container terminal would be consistent and, in fact, appropriate based on the environmental quality of the site. As the SI revealed the presence of petroleum and non-petroleum impacted areas, the Port Authority has initiated a supplemental subsurface investigation to attempt to determine the type and extent of the petroleum and non-petroleum (i.e., "oil") substances present in soil and groundwater at several site locations.

Importantly, the SI revealed that the presence of contaminants in soil and fill material had not significantly impacted groundwater at the site. Given that the Port Authority's proposed redevelopment includes the placement of materials which will function as an environmental cap, it is anticipated that the proposed redevelopment will have a positive impact on site quality by stabilizing contaminants present in soil and fill material and thereby reducing the potential for contaminants in soil to leach from the unsaturated zone to groundwater. The placement of such materials and re-use of the site for industrial/commercial purposes also will safeguard the pubic by preventing exposure to contaminants present in site soil and/or fill.

2.0 INTRODUCTION

At the request of The Port Authority of New York and New Jersey (Port Authority), Killam performed a Phase I Environmental Site Assessment (ESA) of the now former Procter & Gamble (P&G) Port Ivory Facility located at 40 Western Avenue in Staten Island, Richmond County New York. The ESA was performed in accordance with the Standard Practice for Environmental Site Assessment E1527: Phase I ESA Process, as set forth by the American Society for Testing and Materials (ASTM). Performance of the ESA identified numerous recognized and/or potential environmental conditions, as defined by ASTM E1527, at the above referenced site. It should be noted, following the completion of the Phase I ESA, Killam performed a review of additional documents made available by P&G; the supplemental review was performed on June 28, 2000. The review provided additional information regarding previous environmental efforts and the findings of the supplemental document review were presented to the Port Authority in a letter report dated July 13, 2000. Upon completion of the Phase I ESA and the supplemental file review, the Port Authority requested that Killam prepare an Environmental Site Investigation Workplan (ESIW) to evaluate the Areas Of Concern (AOCs) and subsequently, to implement the proposed Site Investigation (SI) activities. The following report, Environmental Site Investigation Workplan and Report (ESIWR), presents the ESIW as well as a summary of the SI activities performed to assess current environmental conditions at this site.

2.1 Objective

The objective of the SI was to develop a better understanding of current site conditions, including current levels of contaminants present in various environmental media (soil, groundwater, sediment and surface water) at the P&G site. This ESIWR describes the specific investigative actions undertaken as part of this investigation and presents the findings of same. This report also includes a summary of analytical data as well as field observations generated through the performance of sampling and other evaluation efforts. Analytical data is presented in tabular form and pertinent information is provided on maps and described in applicable text sections. Please note, an overview of site history has been included in Section 3 of this report to facilitate review of the investigation described herein.

2.2 Site Location and Description

The subject site is located at 40 Western Avenue, Staten Island, Richmond County, New York. The site is comprised of the three following tax blocks/lots: Block 1309, Lot 10, Block 1338, Lot 1 and Block 1400, Lot 1. The latitude/longitude of the site, as determined from the site center, is 40 degrees 38 minutes 15 seconds (N)/74 degrees 10 minutes 50 seconds (W). At the time of the site investigation as well as during previous assessment activities, the site was owned by P&G; the Port Authority purchased the site from P&G in December 2000 and the site is now known as Port Ivory. This former manufacturing facility encompasses 123.75 acres at the northwestern portion of Staten Island and currently is improved by 68 buildings. The site was formerly utilized for the manufacture of consumer products including soap, detergent and foodstuffs. At the time of the investigation, no manufacturing operations were being performed at the subject site. P&G reportedly initiated manufacturing operations in the early 1900s and ceased operations in approximately 1991. The location of the site is presented in Figure 1 included in Appendix A. A summary of the site buildings is provided as Table 1 included in Appendix B.

Site entrance/exit ways are located along Western Avenue and Richmond Terrace. Western Avenue extends in a north-south direction between Block 1400, Lot 1 and Block 1338, Lot 1 and terminates at Richmond Terrace. One of the three parcels, Block 1309, Lot 10 is situated north of Richmond Terrace and the two remaining parcels, Block 1400, Lot 1 and Block 1338, Lot 1, are situated south of Richmond Terrace. The overall layout of the subject site is presented on Figure 2 included in Appendix A.

The northernmost parcel, Block 1309, Lot 10, encompasses 38.9 acres and is situated between Richmond Terrace and the Arthur Kill/Newark Bay. The parcel is improved by a pier, a gravel parking area and two 420,000-gallon (approximate) above ground storage tanks (ASTs) formerly utilized for fuel oil storage. The northwestern portion of Block 1309, Lot 10 consists of a closed construction and demolition landfill (C&D) Landfill. At the time of the investigation, the majority of this parcel was characterized by vegetation and limited, semi-vegetated pathways. Railroad sidings traverse this portion of the site, extending from the southern side of this area (Richmond Terrace) to the northern terminus of the pier. The railroad extends in a southerly direction, across Richmond Terrace, and onto Block 1400, Lot 1.

Block 1338, Lot 1 encompasses approximately 47.3 acres and is situated east of Western Avenue. This parcel is predominantly characterized by former manufacturing and warehouse buildings, parking areas, loading dock areas, former AST and storage areas, railroad sidings, gravel-surfaced areas and driveway areas.

Block 1400, Lot 1 encompasses approximately 37.55 acres and is situated west of Western Avenue. This parcel is predominantly characterized by manufacturing and warehouse buildings, utility buildings and structures (i.e., boilers houses, fire suppression systems, electrical buildings, etc.), parking areas, railroad sidings, loading docks, former AST and storage areas, gravel surfaced areas and driveway areas.

The site is reported to be and to have been serviced by connections to the potable water and sanitary sewer system of New York City. No septic systems, potable water wells or dry wells are reported to be or to have been located on the subject site. Stormwater generated on the site is directed via sheet flow to on-site catch basins. According to P&G, these catch basins discharge, through the facility's underground stormwater sewer system including permitted outfalls, to the adjacent waterways, roadways and marshland areas. Electrical service is reported to be supplied to the subject site via connection to the Consolidated Edison system servicing this section of Staten Island.

In addition, several utility easements and pipelines traverse the subject site. Specifically, Colonial Pipeline maintains a 10 foot pipeline easement which extends in a north/south direction along the western property boundary of Block 1400, Lot 1 and continues across Richmond Terrace and through the western portion of Block 1309, Lot 1. The easement is located along the eastern portion of the closed C&D Landfill and terminates at the northern end of Block 1309, Lot 1. Texas Eastern and SOHIO maintain pipelines, which extend east/west along the southern portion of Block 1338, Lot 10. Tidewater Pipe Company maintains a 10 foot easement which extends north/south through the center portion of Block 1338, Lot 10 and continues across Richmond Terrace and through the eastern portion of Block 1309, Lot 1. The Tidewater Pipe Company easement terminates at the northern property limit of Block 1309, Lot 1. Drawings provided by P&G reference that the pipelines within this easement (Tidewater Pipe Company easement) are abandoned. Finally, Exxon/Mobil maintains an 18 foot easement which extends in a east/west direction along the southern property boundary of Block 1309, Lot 1.

3.0 BACKGROUND

In the early 1900s P&G developed a portion of the current site for use as a consumer goods manufacturing facility. Over the years, P&G acquired additional acreage and expanded the original facility to include the current site limits, as shown on Figure 2. The site was utilized for consumer goods manufacturing from development until 1991. The specific consumer goods produced at the facility and the operations/activities performed at specific site areas changed based upon corporate requirements. An overview of the site history and a discussion of the current and historical physical setting of the site are provided in the following sections.

3.1 Site/Facility History

According to representatives of P&G and information provided in reports supplied by same, P&G constructed the initial Port Ivory manufacturing facility at this site in 1906-1907. The original 77 acre facility included Block 1400, Lot 1 and Block 1309, Lot 10 and was developed on an open, vegetated, marshy area. Additional acreage is reported to have been gained through the acquisition of the Block 1338, Lot 1 parcel as well as the filling of additional marshlands at all three parcels. The fill used by P&G in conjunction with site development is reported to have included the following: sand, silt, gravel mixed with debris, cinders generated from on-site coal-fired boilers, calcium carbonate and other carbonate salts generated as a by-product from soap manufacturing processes, spent diatomaceous filter earth from vegetable oil refining operations, and carbonaceous filter material from glycerin recovery operations.

Historical information sources indicate some variability in the operations performed at specific site locations throughout the operation of this facility. However, in general, the following activities were conducted on the three parcels comprising this facility: Block 1400, Lot 1 was utilized for soap and glycerin manufacturing and utility functions (i.e., boiler houses, wood processing for the boilers, locomotive maintenance, etc.); Block 1338, Lot 1 was utilized for the manufacturing of cake mixes and vegetable oil and shortening, the processing of orange juice and the warehousing of finished product; Block 1309, Lot 10 was utilized for shipping and receiving via ships, vehicle parking, bulk fuel oil storage and the landfilling of construction and demolition debris. All three parcels are characterized by the presence of an internal railroad system, which connects to the regional system at the southern end of the site.

Historical information sources also identify structures and ASTs that are no longer present at the site. Based on these sources, the following materials were stored in one or more ASTs present at the site: caustics, various vegetable and fish oils, fuel oil, silicate, soap, water, fatty acids, spent acid, lye, grease, and glycerin. A few of the ASTs on the Block 1400, Lot 1 parcel were labeled on historical Sanborn Maps as being "hydrogen holders". Historical maps also identify the use of underground storage tanks (USTs) at the site. The maps identify fuel oil as the contents of several of the USTs, however, the specific contents is not identified for many of the potential USTs at the site. In addition, a variety of materials (resin, silicate, steel drums, glycerin, coal, coke) were noted to be "stored" at certain site locations; storage methods are not identified on the maps. Further, historical sources identify the presence of a sludge pond at the western portion of Block 1309, Lot 10 and a "white-ish" material at the western portion of Block 1309, Lot 10 and the southeastern portion of Block 1338, Lot 1. The locations of the sludge pond and "white-ish" material on Block 1309, Lot 10 generally correspond with the location of the C&D Landfill. In addition, on some historical aerial photographs, debris and disturbed land were also noted in that general area of Block 1309, Lot 10. The location of the "white-ish" material on Block 1338, Lot 1 generally corresponds with the sludge pond reported to have been located near the eastern property boundary at the southern end of that parcel. Further, the historical information sources identify that the following features/structures were formerly present at the site: cooling towers on Block 1338, Lot 1; athletic fields at the northern portion of Block 1338, Lot 1; additional piers and barge slips at Block 1309, Lot 10; additional structures (pump house, locker room, scale house, soap ash silos) related to the active usage of Block 1309, Lot 10 for shipping/receiving; and, additional railroad sidings and tracks on all three parcels

3.2 Hydrogeologic Setting

Hydrogeologic provinces within Staten Island include both the Atlantic Coastal plain and the Triassic lowlands section of the Piedmont physiographic province. The Precambrian-Cretaceous unconformity defines the boundary between these two physiographic provinces extending northeastward from Fresh Kills to north of Stapleton, continuing eastward across Long Island. The low-lying plain in extreme northwest Staten Island consists of glacial outwash deposits and tidal marsh. Outwash deposits consist chiefly of stratified fine to coarse sand and gravel, while

shore and marsh deposits consist of sand, organic clays and silts. These deposits are generally thin and probably no thicker than 15 feet.

With respect to the subject site, the northern portion of Block 1309 is situated along the southern shore of the Kill Van Kull. The subsurface unconsolidated deposits at the site include a complex of stratified drift, glacial till, and tidal marsh deposits consisting of glacial outwash, marsh deposits, and artificial (non-indigenous) fill.

Generally the following six soil and rock strata (listed from ground surface to top of bedrock) have been identified at the subject site area: (1) non-indigenous fill consisting of sand, silt, clay, and gravel in a generally loose condition covering most of the subject site with a maximum thickness of about 19.5 feet; (2) organic clays and peats, consisting of soft and highly compressible tidal marsh deposits, to a maximum thickness of approximately 27 feet; (3) sand deposits consisting of loose to medium dense sand from marine or glacial deltaic deposits extending eastward across the site and ranging in thickness from 5 to 16 feet; (4) glacial clay, silt, sand and gravel, deposits (primarily of clay and silt) ranging in thickness from less than 10 to 60 feet; (5) weathered shale, partially decomposed or weathered shale; and (6) generally unweathered, competent shale, located at depths of 60 to 72 feet below sea level. Soil borings installed by Killam in November and December of 2000 generally confirmed the five upper soil and rock strata; the SI did not include evaluation of competent bedrock.

The Passaic Formation underlies the subject site and consists of reddish-brown to greyish-red siltstone and shale, with a maximum thickness of 3,600 meters. Dense by its nature, the Passaic Formation exhibits very little primary porosity. However, characteristic vertical or near vertical joints and fractures provide for limited transmission and storage of water. These openings decrease with depth, resulting in decreased permeability and specific yield with distance from the surface. The Passaic Formation exhibits a regional bedding strike of north 50 degrees east and a dip of 9 to 15 degrees to the northwest (Drake, et al, 1996).

3.2.1 Soils

The three shallowest units described in the above paragraph constitute the soils of the subject site area (i.e., non-indigenous fill on top of organic clays and peat or sand deposits). Essentially, the SI confirmed that fill material was placed upon tidal salt-marsh or sand deposits to raise the elevation of the land to allow of development and indicated that the soil strata of the site was

consistent with that documented in the site area. The presence of fill material at this site is further described in Sections 6.1.1 and 7.4.

3.2.2 Groundwater

Groundwater at the site area was encountered at depths ranging from 0.5 to 10 feet below surface grade (bsg) with the exception of PAMW-11D located on the northeast corner of Block 1338; where groundwater was encountered at a depth of approximately 22 feet bsg. In the shallow sections of bedrock in the area (+/- 150 feet bsg) bedding-plane separations primarily hold water, gaining porosity in spaces developed by fractures (e.g., joints and faults). Water in the Newark Supergroup of Staten Island occurs under unconfined or confined conditions, depending on the degree of confinement in the overlying deposits and the hydraulic interconnections within the shales and sandstones. Generally, groundwater occurrence in unconsolidated deposits in the site area depends on the sand, silt, and clay compositions of the glacial outwash and non-indigenous fill. Information from the groundwater investigation component of the SI indicates groundwater conditions are generally consistent with that of the area. According to previous environmental investigations as well as limited information from the SI, tidally influenced potentiometric fluctuations were not observed in on-site monitoring stations with the exception of monitoring points directly adjacent to the Kill Van Kill.

Movement of fresh groundwater on Staten Island is seaward. Although the unconsolidated deposits and bedrock are hydraulically connected, most of the flow occurs horizontally within the glacial deposits due to their greater hydraulic conductivity. The horizontal flow is estimated to range from less than 0.1 to approximately 1.5 feet/day in glacial deposits comprised of sand and gravel. Estimates of recharge rates on Staten Island are comparable to Kings and Queens Counties, approximately 0.25 to 0.5 million gallons per day per square mile.

Groundwater is not currently used for public water supply on Staten Island. Before 1970, however, the surface water supply from upstate New York was supplemented by pumping a maximum of 5 million gallons per day of groundwater from aquifers beneath Staten Island. Higher pumping rates induced saline groundwater infiltration. Due to saline intrusion of aquifers in the area caused by increased withdrawal, future development of aquifers for potable purposes in the general area is unlikely.

4.0 ENVIRONMENTAL SITE INVESTIGATION WORKPLAN

As previously stated, Killam performed a Phase I ESA of the subject site. This effort identified AOCs based upon several site inspections, interview of available representatives of P&G, review of historical information sources (site plans, aerial photographs, Sanborn Fire Insurance Maps) and review of an electronic database search. The ESIW presented herein is based upon the information gained through the performance of the Phase I ESA as well as a supplemental review of documents provided by P&G subsequent to the issuance of the Phase I ESA. The SI was designed to provide information on current environmental conditions at the site for the purpose of acquisition.

4.1 Previous Environmental Investigation Efforts

Killam reviewed documents pertaining to site history and previous environmental investigations in conjunction with the performance of the Phase I ESA and a supplemental file review. The documents included in the review were limited to those made available by P&G. Overall, the documents identified a number of AOCs that were evaluated, to varying degrees, by the prior site owner, P&G. The AOCs involved both soil and groundwater as well as underground storage tanks (USTs) and an issue associated with Bridge Creek which runs along the western border of Block 1400, Lot 1. A listing of the documents included in the review and a brief summary of the contents of same is provided in Table 2 included in Appendix B. In addition, an environmental database report was obtained as part of the Phase I ESA. The electronic database search, performed by Environmental Data Resources, Inc. identified that the subject site was included in several American Society of Testing and Materials (ASTM) standard and non-standard environmental record sources. These sources include the following:

The United States Protection Agency (USEPA), Resource Conservation Recovery Information System (RCRIS) Facilities - Large Quantity Generators (LQG) List, December 12, 1999;

The New York State Department of Environmental Conservation(NYSDEC) Inventory of Hazardous Disposal Sites (SHWS) List, February 4, 2000 ;

NYSDEC, Leaking Underground Storage Tank Incident Reports (LTANKS) List, January 2000;

NYSDEC, Petroleum Bulk Storage Database (UST) List, January 2000;

NYSDEC, Chemical Bulk Storage Database (CBS UST) List, January 2000;

NYSDEC, Chemical Bulk Storage Database (CBS AST) List, January 2000;
NYSDEC, Major Oil Storage Facilities Database (MOSF UST) List, January 2000;
NYSDEC, Major Oil Storage Facilities Database (MOSF AST) List, January 2000;
USEPA Facility Index System (FINDS) List, dated October 1999; and,
NYSDEC Spills Information Database (Spills) List dated January 2000.

A summary of the listings as well as commentary regarding the basis for the listings, as feasible and appropriate, is provided in Table 3 included in Appendix B.

4.2 Sampling Plan

The AOCs identified through performance of the Phase I ESA are as follows: USTs, Fill Material, Previously Identified Soil and Groundwater Contamination, the Closed C&D Landfill, Railroad Tracks and Sidings, Surface Staining, Pits and Drains, Former Structures, Listing of the Site (P&G) in Environmental Databases, Area Sites of Concern (i.e., sites of known environmental concern in the vicinity of the subject site), Wetlands, Asbestos-Containing Materials, and Lead-Based Paint. The objective of the investigative/sampling efforts was to develop a better understanding of current site conditions, including current levels of contaminants present in various environmental media (soil, groundwater, sediment and surface water). A description of the individual AOCs and the investigative actions proposed to evaluate each AOC are provided in the following sections. Please note, no investigative efforts were included for three AOCs identified in the Phase I ESA, Area Sites, Wetlands and Asbestos-Containing Materials/Lead-Based Paint as the Port Authority will be addressing these items in conjunction with design and site development. In addition, the Port Authority is addressing issues associated with the site's inclusion in environmental databases as part of the overall acquisition of the property.

It should be noted that, to the greatest extent possible, the sampling plan proposed to bias boring and well locations toward areas exhibiting indications of contamination and to base sample selection upon the results of field screening with a bias toward the interval(s) exhibiting indications of contamination. This includes the collection and analysis of soil samples from beneath the water table due to unique strata identified only below saturated depths.

4.2.1 USTs

According to P&G, no active USTs are present at the site. However, USTs were formerly utilized at the subject site to store toluene and various petroleum products including diesel fuel, No. 2 fuel oil, No. 6 fuel oil and unleaded gasoline. The environmental database report indicates that P&G closed or removed eight USTs containing various fuel products and one tank containing toluene; a summary of tank information included in the database report is provided in Table 3 included in Appendix B. However, reports provided by P&G indicated that 10 site USTs have been closed and, all but one, a toluene tank, were removed from the ground. The tank closures are reported to have been performed in accordance with NYDEC regulations and with NYSDEC oversight, as appropriate. However, reports examined as part of the Phase I ESA as well as the review of Sanborn Maps indicate that additional USTs may have been or may be present at nine locations at the site. Therefore, based on available information, it was proposed to perform a ground penetrating radar (GPR)/electromagnetic (EM) survey at each of the nine potential UST areas (multiple tanks are identified at five of the nine potential tank areas) identified on the Sanborn Maps. In addition, it was also proposed to install and sample soil borings at areas where the GPR/EM survey identified potential tanks. The need to perform laboratory analyses for soil samples was to be based upon the results of field screening and the type of analysis was to be based upon former tank contents, if known. In those instances where the contents of potential tanks could not be established, it was proposed to analyze samples for total petroleum hydrocarbons (TPHC) and the target compounds list (TCL) including volatiles and semi-volatiles, target analyte list (TAL) metals, and polychlorinated biphenyls (PCBs). Although a site-wide groundwater investigation was proposed for this site (Section 4.2.10), it was proposed to perform groundwater investigation activities, as necessary, at potential UST Areas. Specifically, it was proposed to convert one soil boring per potential tank area to a temporary well, as necessary and feasible, to assess groundwater conditions in the vicinity of any identified USTs. Analysis of groundwater samples from temporary wells was to be based on former contents of the tanks. However, in the absence of such information, it was proposed to analyze groundwater samples for TPHC, and TCL. The nine potential tanks areas, UST1 through UST9, are identified on Figure 2 included in Appendix A.

4.2.2 Precipitate At Bridge Creek

Reports provided by P&G identified the presence of one or more types of precipitates along the banks of Bridge Creek and described various efforts (inspection of the creek bed, performance of chemical and physical testing of the noted precipitates) undertaken to evaluate the noted precipitates. Generally the reports summarizing these investigations indicated that the noted material had the potential to be associated with prior filling activities at the site. The reports did not identify a significant environmental issue with regard to the presence of the precipitate. However, it was proposed to evaluate current conditions with regard to the noted precipitate through visual review and the collection and laboratory analysis of sediment/precipitate samples and surface water. The initial phase of the proposed investigation was to include a visual reconnaissance of the creek bed at both low and high tides on two separate occasions (i.e., two low tide and two high tide inspections). In addition, it was proposed to obtain representative samples of precipitate, if any, noted to be present as well as to obtain surface water samples from Bridge Creek to identify current water quality. The number and location of precipitate and surface water samples were to be dependent upon the conditions observed during the proposed visual reconnaissance. All samples, precipitate and surface water, were to be submitted for TAL Metals and pH analysis.

4.2.3 Previously Identified Soil and Groundwater Contamination

Reports provided by P&G identified numerous AOCs. Table 2, Historical Environmental Reports and Information, provides pertinent information associated with the AOCs identified by P&G. Overall, the reports provided by P&G identify that contaminants and/or elevated pH were detected/recorded in one or more soil and/or groundwater samples from the vast majority of these AOCs. In addition, some of the available reports commented upon the presence of black staining in the soil and free-phase floating product on the water surface in monitoring wells. The reports identify and describe remedial efforts undertaken by P&G with regard to the three following areas/issues: the C&D Landfill, USTs and the presence of PCBs in soil at Area F1. As previously stated, eight USTs are reported to have been closed in accordance with NYSDEC requirements. The reports also describe the closure of the C&D Landfill in accordance with NYSDEC requirements and investigative and remedial efforts undertaken to address the presence of PCBs in soil at Area F1. The reports do not identify or describe any

remedial actions undertaken, by P&G, to address contaminants identified in soil at other areas of the site. Rather, P&G asserted, in reports, that the contaminants detected in soil at the site are relatively immobile and that residential (human) exposure would be minimal so long as the soil was undisturbed (i.e., contaminants in soil do not present a risk with regard to contact). The elevated pH levels in groundwater were attributed to certain fill material and free-phase product was attributed to prior usage of vegetable oils and other petroleum products. Overall, P&G indicated that no actions were necessary with regard to site groundwater given that groundwater was not utilized for potable purposes at the site or in the immediately surrounding area. However, a few of the reports included recommendation to address free-phase floating product and elevated pH in groundwater at Block 1400.

Given the identification of contaminants in soil and groundwater at the site as well as the length of time which had elapsed since P&G's investigative efforts (the majority of sampling was performed in the early 1990s), it was proposed to obtain samples from both soil and groundwater at the areas identified as AOCs by P&G. The number of samples proposed for each of P&G's AOCs was based upon the contaminants detected during P&G's investigations, the level of completeness of reports relating to individual AOCs, historical information provided through review of Sanborn Maps and historic aerial photographs and site conditions at the time of the Phase I ESA. Please note, the identification letters/names assigned to the AOCs by P&G have been utilized in this ESIW and the subsequent summary to provide easy reference to investigative efforts described in P&G reports; Table 2 (Appendix B) provides a summary of information contained in previous environmental reports.

It should be noted that P&G often cited the presence of fill material as the rationale for sampling at an AOC. For the purposes of the ESIW as well as the this report, fill material has been regarded as a separate site issue and a discussion of site-wide fill material and investigative efforts proposed to address same are presented in Section 4.2.9. Given the presence of fill throughout the site, the sampling plan was designed to integrate the evaluation of the fill material with P&G AOCs as well as other AOCs. Overall, it was proposed to install and sample a total of 58 soil borings to evaluate the P&G AOCs. Typically, the depth of an investigative soil boring would be based upon the type of issue(s) identified at each AOC. However, for this site specific investigation, it was proposed to utilize all of the soil borings to evaluate and characterize fill material as well as individual AOCs. As such, the sampling plan

proposed to advance all soil borings to a depth of approximately 15 feet below surface grade, regardless of AOC, to evaluate fill material. This approximate depth was deemed sufficient given that no information had been obtained to indicate that contaminants at the P&G AOCs exist at depths greater than 15 feet. Although it was proposed to base the analytical suite for each AOC upon the results of field screening, it was assumed that the samples would be analyzed for TCL volatiles organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TAL metals, pesticides, PCBs, TPHC, oil & grease (O/G), pH and total cyanide and phenolics.

With regard to previously identified contaminants in groundwater, it was proposed to obtain and analyze groundwater sample to establish current groundwater quality. The groundwater investigation program is presented in Section 4.2.10.

4.2.4 Closed C&D Landfill

P&G formerly operated a C&D landfill at Block 1309. Reports provided by P&G documented that the C&D landfill was closed in accordance with NYDEC regulations and described the closure and post-closure requirements for same. Based on the reports provided, post-closure requirements included both groundwater monitoring and maintenance of the landfill cap. As reports provided by P&G documented that the landfill had been closed in accordance with NYSDEC requirements, no investigative activities for this AOC were included in this ESIW.

4.2.5 Railroad Tracks and Sidings

Visual inspection of the site identified the presence of railroad tracks and sidings. In addition, review of historical records revealed that additional tracks and sidings were formerly present at the site. A 1994 summary report stated that some testing was performed to evaluate representative railroad switches, ties and equipment and concluded that testing of the representative railroad equipment did not reveal any "negative impact". Therefore, it was asserted, in the 1994 report, that no negative impact exists with regard to any of the railroad equipment present on the Block 1400 parcel. No information was provided regarding conditions at the Block 1338 and Block 1309 parcels. As such, it was proposed to obtain

samples from locations adjacent to representative portions of the on-site railroad system to confirm the conclusion that the railroad system had not impacted soil at the subject site. As the NYSDEC has not established a program for the evaluation of current or former railroad systems, it was proposed to select sample locations based on current conditions as well as information presented on Sanborn Maps and aerial photographs sets. To maximize the time and cost efficiency of the proposed sampling effort, it was proposed to integrate the sampling proposed for this AOC with that designed for other AOCs and the fill evaluation. The sampling plan included the installation and sampling of approximately 32 soil borings to evaluate this AOC; the sampling program established that 17 of the borings proposed to evaluate this AOC also would be utilized to evaluate other AOCs and all 32 soil borings would be utilized as part of the site-wide fill evaluation. As previously stated, it was proposed to install all soil borings to a depth of approximately 15 feet below surface grade. However, the sampling proposed for this AOC included the collection of samples from a discrete 6-inch interval within the upper four feet of the soil. The sampling program proposed an analytical suite comprised of TPHC, VO+10, base neutral (BN) compounds, PCBs and TAL metals.

4.2.6 Surface Staining

Surface staining was noted at some locations within site buildings as well as at exterior areas. Overall, concrete and/or asphalt surfaces appeared intact in the vicinity of staining. In particular, staining was noted south of Building #60B (Warehouse) at an area corresponding with a former drum storage area (as per Sanborn Maps) and staining was noted on the earthen flooring in two bays of Building #20 (Locomotive House) and on gravel surfaces surrounding Building #20. Reports provided by P&G indicated that investigative efforts were undertaken at Building #20 and that these efforts identified the presence of TPHC, VOCs, BN compounds and PCBs in samples collected from the earthen flooring of this building. Although reports concluded that the sampling results did not contain contaminants above cleanup guidance values or that would pose a threat to human health, the information provided did not include specific analytical results.

Based on the above, it was proposed to install and sample 5 soil borings to evaluate staining at Building #60B and Building #20. Specifically, it was proposed to install and sample soil borings as follows: one soil boring at the area south of Building 60B; two soil borings within

Building #20 and two soil borings at locations along the exterior of Building #20. It was also proposed to utilize the two soil borings at the exterior of Building #20 for the evaluation of railroad systems. As previously stated, the sampling program included utilization of all soil borings as part of the site-wide fill evaluation. Therefore, it was proposed to advance all soil borings at staining locations to a depth of 15 feet below surface grade. With regard to sample selection it was proposed to evaluate soil conditions through field screening and to collect representative samples from discrete 6-inch intervals within the upper four feet of the soil to evaluate surface stained areas. As the source of the surface staining was not determined, it was proposed to analyze the samples for TPHC, TCL, PCBs, TAL Metals, pH and oil and grease.

4.2.7 Pits and Drains

Pits and drains were noted at both interior and exterior site locations. Many of the pits and drains were noted to be sealed or filled with gravel. In addition, reports identified the presence of oil/water separator systems and investigative efforts performed to evaluate conditions at and near oil/water separator systems. These reports identified the presence of contaminants in environmental media in samples from the oil/water separator areas but concluded that the concentrations of contaminants detected did not warrant remedial actions. Given the above, it was proposed to review pits and drains including oil/water separator systems through visual inspection, as possible, as well as through the installation and sampling of soil borings. However, for the purposes of this workplan, sampling was proposed at 28 locations at or adjacent to pits and drains identified in the field and/or through review of reports and historical information sources. It was acknowledged that it would not be possible to accomplish the proposed soil sampling at a portion of the 28 locations due to the presence of structures and utilities. As described in previous sections, it was proposed to integrate the sampling program for pits and drains with the sampling programs designed to address other AOCs and the fill evaluation. Specifically, it was proposed to utilize all soil borings for the fill evaluation and 11 of the 28 soil borings for other AOC investigations. As proposed for other AOC investigations, all soil borings were to be installed to a depth of 15 feet below surface grade as part of the fill evaluation. With regard to soil sampling for pits and drains, it was proposed to obtain representative samples from a discrete 6-inch interval within the upper six feet of the soil and to analyze the samples for TPHC, TCL, pH and oil and grease.

It should be noted that two "fat traps" and/or oil/water separator systems, utilized in process operations were evaluated by P&G and are referenced as Area E and Area N. Additional efforts for these areas were proposed in Section 4.2.3 (Previously Identified Soil and Groundwater Contamination) of this report. No further efforts for these areas are described in this section.

4.2.8 Former Structures

Review of Sanborn Maps and aerial photographs revealed the presence of former structures, ASTs, railroad tracks and sidings, at various locations throughout the subject site. In particular, additional structures (buildings and tanks) were noted at the following locations: a structure identified as a machine shop was located at the southeastern corner of Block 1400 (Former Building 1); small structures and ASTs were located in the central portion of the Rail Yard on Block 1400, west/southwest of Building 20; a number of structures and ASTs were located at the Wood Yard at the western portion of Block 1400; ASTs were located at the area surrounding Buildings 12 and 13; ASTs were located at the P&G AOC areas known as Areas A, B and G; structures (20 Series Buildings) were located west of the 30 Series Buildings; structures were noted extending from or adjacent to Building 17; structures (additional 50 Series Buildings) and ASTs were located east of existing 50 Series Buildings; Building 56 was located north of Building 52; small structures, possibly residential structures were located north of Building 67N and east of Building 80; one structure (S-52) was located at the current location of Building 80; and several structures and ASTs were located at the northern end of Block 1309. In addition, review of historical information sources also revealed the presence of discolored areas, debris piles and possible fill material at various site locations.

Concerns associated with former railroad tracks and sidings are discussed in Section 4.2.5. P&G's records did not include specific information regarding construction, utility systems or uses of the former buildings and included only limited information regarding former activities at many of the former structures and the nature of debris piles.

Given the above, it was proposed to investigate former building areas and discolored or debris piles through the installation and sampling of soil borings. The purpose of the sampling proposed for this AOC was to evaluate areas formerly utilized as part of process operations as

identified through the presence of structures, storage areas, debris, etc. It was not intended to sample every location formerly occupied by an improvement or structure. It should also be noted that some of the P&G AOCs include areas of former structures, in particular, ASTs. Sampling efforts for P&G AOCs are described in Section 4.2.3 of this report. As with other AOCs, the sampling proposed to evaluated former structures was integrated with the proposed for other AOCs and fill material. Please note, the vast majority of the sampling proposed for other AOCs represented investigation of prior activities including some type of structure (ASTs, structures, etc.). However, based on the locations of former structures and debris piles, it was proposed to install and sample 9 additional soil borings to address this AOC. As previously stated, it was proposed to utilize all soil borings for the evaluation of site-wide fill material. Therefore, it was proposed to advance all soil borings installed to evaluate this AOC to a depth of 15 feet below surface grade. With regard to sample selection for former structures, it was proposed to obtain representative samples from a discrete 6-inch interval within the upper four feet of the soil and to analyze the samples for TPHC, TCL, pH and oil and grease.

4.2.9 Fill Material

According to representatives of P&G and information provided in reports provided by same, P&G placed a variety of fill material at the subject site to raise the grade for site development. The fill materials present at the site include soil/sand, construction debris (wood, bricks, glass, concrete), ash from boiler operations, slag, vegetative debris and by-products from production activities (calcium carbonate, spent diatomaceous filter earth, and spent carbonaceous filter material). The specific composition of the fill is reported to vary with location. Information from various site investigations indicated that elevated pH as well as some contaminants detected in samples from the site, both soil and groundwater, may be attributable to the fill material. Also, reports provided by P&G described the presence of black staining in site soil at a few locations.

As no comprehensive report was provided which summarized the locations and concentrations of fill material, contaminants both related and unrelated to fill material, and/or the "black staining", it was proposed to perform a site-wide sampling program to assess current site soil conditions and to identify the limit(s) of fill material. As the NYSDEC guidance documents do

four samples per acre to establish the presence of fill material. However, the NJDEP guidance documents recognize that on larger sites a lower frequency provides sufficient site coverage with regard to the evaluation of fill. In most cases, the NJDEP has accepted a sampling frequency of one sample per acre at larger sites. Given the number of soil borings being installed to evaluate other AOCs and the intent to utilize these for information pertaining to fill material, it was proposed to install and sample soil borings at locations not otherwise evaluated through the overall sampling program. Specifically, it was proposed to install and sample 25 additional soil borings to provide adequate site-wide coverage with regard to fill. In total, the evaluation of other AOCs included the installation and sampling of 102 soil borings. Therefore, the fill evaluation included a total of 127 soil borings; the total did not include those proposed for UST areas since the number and locations of same are to be based upon GPR/EM survey results (See Section 4.2.1) or the five additional borings slated for visual review of the former sludge Pond at Area L (See Table 4). Based on information provided in P&G reports, it was proposed to advance soil borings to a depth of approximately 15 feet below surface grade. To determine the types and extent of fill material at the site, it was proposed to perform a visual assessment of soil conditions at each soil boring location. To determine if contaminants are present in fill material, it was proposed to obtain samples from each type of fill material and submit same for laboratory analysis. The goal of the fill evaluation program was to determine the extent and nature of the various fill material reported to be present at the site. As such, the proposed program included the analysis of a representative number of samples from each type of fill material noted to be present at the site, regardless if the fill was situated within the saturated zone.

Please note, no sampling was proposed within the limits of the closed C&D Landfill to avoid disruption of the installed NYSDEC approved cap. However, the sampling program developed for the fill material proposed to install and sample soil borings at the area adjacent to the closed C&D Landfill.

4.2.10 Groundwater

Previous investigative efforts performed at the site identified the presence of contaminants and elevated pH in site groundwater. In addition, the presence of free-phase floating product and/or a sheen on groundwater was identified at a few site locations. As the majority of the groundwater sampling presented in the P&G reports was collected in the early 1990s, it was proposed to perform a groundwater investigation for the purpose of identifying current groundwater quality.

The initial phase of the groundwater investigation program proposed for this site included the sampling of a representative number of the existing wells and the installation and sampling of additional groundwater wells. To establish the number of useable wells at the site, it was proposed to perform a physical inspection of existing wells as well as to identify the presence of free product and to record, to the extent possible, water levels for all existing wells. The groundwater sampling program assumed that a minimum of 12 monitoring wells would be found to be in adequate condition (i.e., suitable for sampling). Based on information regarding groundwater quality and the presence of fill material provided in P&G reports, it was proposed to install and sample 15 shallow monitoring wells at locations at the interior and around the perimeter of the site. In addition, given that information provided by P&G indicated that a confining layer exists below the noted fill material at some site locations, it was also proposed to install eight deeper monitoring wells to evaluate groundwater quality below the confining layer. The deeper wells were to be situated, to the extent possible, adjacent to eight of the proposed shallow wells to establish well couplets at eight site locations. Upon completion of well installation activities, it was proposed to collect samples from 12 existing and 23 newly installed wells and analyze the samples for TPHC, TCL, oil and grease and pH. Prior to the performance of sampling, it was proposed to redevelop existing monitoring wells included in the proposed sampling program.

As stated in Section 4.2.1, temporary wells were proposed for UST areas based upon the results of GPR/EM and soil investigation activities. The groundwater investigation described above does not include temporary wells installed to evaluate potential UST areas.

4.3 QA/QC and Health and Safety

All field sampling activities were performed in accordance with the Port Authority's QA/QC and Health and Safety protocol's which are presented in the Port Authority *Field Standard Operating Procedures Manual* dated January 1995. As appropriate, field protocols are described and/or referenced in Section 5, Field Investigation.

5.0 FIELD INVESTIGATION

This section describes the activities undertaken to evaluate 10 AOCs identified at the subject site. One of the AOCs evaluated in this investigation, Previously Identified Soil and Groundwater Contamination, is comprised of 19 individual AOCs (Areas A through I including Areas F1 and F2, Area K through R including Areas Q1 and Q2, and the Wood Yard) previously identified by P&G. For the purposes of this investigation, the area identifications utilized for the 19 individual P&G AOCs are as designated in P&G reports. Please note, although identified by P&G, precipitate in Bridge Creek and USTs have been included as individual AOCs within this report and are not discussed as part of the Previously Identified Soil and Groundwater Contamination AOC. Due to the site-wide nature of many of the AOCs, many of the sample locations were utilized to evaluate multiple AOCs. Based on information from historical sources and previous environmental reports, a variety of fill material was placed at the site. As such, all soil borings were utilized as part of the site-wide fill evaluation. Also, the investigation included the laboratory analysis of a number of samples collected from intervals below the water table. As stated in the ESIW (Section 4), the purpose of sampling below the water table was to better characterize fill material present at the site.

This SI included investigation of soil, sediment, surface water and groundwater. Overall, the soil component of the SI/RI included the installation of 128 soil borings and the collection of 265 soil samples for laboratory analysis. A minimum of one sample was collected and submitted for laboratory analysis from all soil borings with the exception of four well locations. The purpose of these four wells was to establish shallow/deep well pairs at certain site locations for use in groundwater evaluation effort. Given their close proximity to other soil borings, no additional soil sampling was deemed warranted. Please note, soils were reviewed during boring/well

installation activities and no unusual soil conditions were noted with regard to these four locations.

The groundwater portion of this investigation included converting 17 of the soil borings into groundwater monitoring wells, installing two temporary monitoring wells, recording water levels from all newly installed wells and 13 existing wells, gauging free phase floating product (free product) in four wells and the collection and laboratory analysis of 34 groundwater samples (17 newly installed wells, 14 existing wells, 2 temporary wells and one re-sample of PG-PA-MW-15D) and four free product samples. In addition, a sheen was noted on the groundwater surface in one of the newly installed monitoring wells, PG-PA-MW-13 and one of the temporary wells, PG-TMW-02. Given that insufficient product was present to collect for analysis, groundwater samples were collected from these wells and submitted for laboratory. The surface water/sediment evaluation included the collection and analysis of three surface water samples and five sediment samples from Bridge Creek.

A summary of the investigative actions and sampling activities performed as part of this SI is presented in Table 4 included in Appendix D. Please note, the table is organized by AOC and includes a brief summary of the types of issues identified through the performance of the Phase I and the supplemental file review, identification of the actions and sampling efforts undertaken to evaluate each AOC, soil boring and sample reference/identification numbers and, as appropriate, analytical parameters. Soil boring and well locations, as feasible, are presented on Figure 2 included in Appendix A.

All sampling and other field investigation activities were performed in accordance with the Port Authority *Field Standard Operating Procedures Manual* dated January 1995 and New York State Department of Environmental Conservation (NYSDEC) protocols. All sample analyses were performed by a New York certified analytical laboratory. Field screening for VO vapors using photo ionization detector (PID) was performed during the sampling activities and was utilized in sample selection as well as in overall site characterization.

It should be reiterated that the site was not in operation at the time of the inspection; therefore the sampling program was based, to a large extent, on information from documents provided by P&G. Killam did not observe operations and therefore could not assess issues associated with daily operating practices including housekeeping, hazardous material and petroleum storage, etc.

Further, during the performance of the SI, the Port Authority provided Killam with information from a report entitled *Phase I ESA Update, Phase II Site Investigation, And Lead/Asbestos/PCB Surveys For Processing And Distribution Center At Proctor [sic] & Gamble Western Avenue Facility* prepared by Roy F. Weston Inc. and dated March 2000. The report provided information on investigative activities performed at a portion of the Block 1338 parcel. Therefore, the SI/RI was based upon information gained through the performance of the Phase I ESA, a supplemental review of P&G documents, a March 2000 Phase II Weston Report, current site conditions and discussions with representatives of P&G.

No investigative efforts were performed for three AOCs (Area Sites (i.e., sites of concern in the vicinity of the subject site), Wetlands and Asbestos-Containing Materials/Lead-Based Paint) identified in the Phase I ESA. Rather, the Port Authority is currently addressing these issues in conjunction with the demolition of existing buildings.

5.1 Pre-Investigation Field Activities

Prior to the initiating sampling efforts, Killam performed a series pre-investigative field tasks consisting of the following:

- Site walk
- Field screening, cataloging and inspection of the existing monitoring wells on site. (Depth to water, Total depth of well, Presence of free phase product, Physical condition of well and protective casing, etc.)
- Mark out of all soil boring and groundwater monitoring well locations in accordance with pre-determined AOCs.
- Meet with site operations personnel as well as former P&G employees to discuss boring and monitoring well locations and possible underground utilities.
- Contact and meet with representatives of the pipeline companies concerning the presence of various pipelines that transect the site.
- Contact and meet with representatives of the local utility companies and authorities regarding the location of public utilities.
- Supervised the geophysical team from Hager-Richter Geoscience, Inc (Hager-Richter) who field screened all proposed soil boring and monitoring well locations for internal underground utilities as well as possible UST locations using geophysical techniques.

5.2 GPR/EM Survey – Potential UST Areas

The June 2000 Phase I ESA identified the potential presence of one or more USTs at nine locations at the subject site. This conclusion was based upon a review of Sanborn Fire Insurance Maps, information in portions of reports provided by P&G and limited information provided by representatives of P&G. Based on the information obtained through the performance of the Phase I ESA, the September 2000 SI/RIW proposed to perform a geophysical and electromagnetic survey of the following site areas:

- UST 1: North of Building 20; Block 1400
- UST 2: South of the feeder house in the Wood Yard; Block 1400
- UST 3: North of the East side of Building 13; Block 1400
- UST 4: West of Buildings 34 and 38; Block 1400
- UST 5: South and West of Building 17; Block 1400
- UST 6: West of Building 17; Block 1400
- UST 7: West of Building 43A and South of Building S-35; Block 1400
- UST 8: Northeast of Building 55; Block 1338
- UST 9: Northwest of Building 53, between building 52; Block 1338

Killam retained Hager-Richter to perform a survey to evaluate the presence of USTs at the above listed locations. Hager-Richter utilized ground penetrating radar (GPR) and electromagnetic (EM) methods to assess the potential UST locations. The findings of the GPR/EM survey are presented in Section 6.2 and a copy of the Hager-Richter Geophysical Report is provided in Appendix C of this report.

5.3 Soil Boring Sampling

In November and December 2000, soil borings were installed to evaluate subsurface soil conditions and to determine the extent of fill material present on the subject site in accordance with ASTM D 1586-84 sampling protocol. Samples were field screened and visually reviewed to establish site lithology and representative samples were submitted for chemical analysis to evaluate AOCs.

The first six feet of the boreholes were advanced using a stainless steel hand augers. Any samples obtained from this interval and slated for chemical analysis were collected via a decontaminated hand auger. Upon reaching six feet bsg, the boreholes were advanced using a truck mounted drill rig with six-inch hollow stem augers (HSA). The boreholes were advanced continuously using HSAs with three-inch diameter split spoons from which the samples were obtained. Split spoons

were taken from approximately six feet bsg to 16 feet bsg or until native material was encountered.

Soil samples were collected from the borings in the following manner. Samples collected for VOC analysis were immediately removed from the two-foot interval of the split spoon and placed in laboratory containers. Samples obtained for analysis other than VOC were homogenized in a stainless steel mixing bowl and transferred using a stainless steel trowel to the appropriate laboratory containers. Upon completion of the soil boring, the abandoned borehole was pressure-grouted with a cement-bentonite mixture to ground surface.

5.4 Monitoring Well Installation

Seventeen wells and two temporary wells were installed as part of this investigation. Prior to installation of the monitoring wells, borings were constructed to identify soils and contamination, if any, at the proposed monitoring well locations. All wells were installed in the overburden. However, to determine conditions both above and below the naturally occurring peat layer, 9 shallow wells were screened in fill or native material above the peat layer (where present) and 8 deep wells were screened in native material below the peat layer. The two temporary wells were both screened in fill material above the peat layer. At some locations, monitoring wells were placed to create shallow/deep well pairs.

The monitoring wells were constructed of two-inch outside diameter (O.D.) Schedule 40 polyvinyl chloride (PVC) pipe in a borehole that was eight inches in diameter. The boreholes were drilled with a truck mounted drill rig utilizing HSAs and mud rotary drilling techniques. As described in the soil boring methodology section, hand augering was performed for the first six feet of each location to avoid contacting utilities. The screens of the shallow wells were set across the uppermost water table using ten-foot sections of 0.02-inch (20 slot) slotted screen. The screens of the deep wells were set in the most permeable layer above bedrock and below the peat layer (as present) using ten-foot sections of 0.01 (10 slot) slotted screen. The screened sections of the wells were packed with well-graded sand pack, 95 percent coarser than the slot size, which extended one foot above the top of the screen. The elevation of the top of the sand was checked by lowering a weighted measuring tape in the annular space of the wells. A two-foot thick granular bentonite seal was placed over the sand pack of the wells. The elevation of the top of the granular bentonite seal of the wells were also checked by lowering a weighted measuring tape in

the annular space of the wells. To avoid bridging, both the sand and granular bentonite seal were installed by carefully placing small quantities of sand and granular bentonite. The remaining annular space was backfilled with a cement/bentonite grout mix.

The wells were completed at the ground surface by either extending a PVC riser to approximately three feet above grade, with a locking compression cap and fitting a steel protective casing over the PVC and embedded into a concrete pad constructed at the ground surface or the PVC was cut to grade and equipped with a locking compression cap and a steel protective flush mount to fit over the PVC and embedded into the ground surface in a pad constructed of concrete. A keyed-alike lock was installed on the steel casing as well as the compression cap to hinder tampering with the wells. The concrete pads were sloped away from the wells to prevent water from collecting around same.

Following completion, the newly installed wells were developed. All existing wells to be sampled were developed as well. Existing wells were redeveloped due to the prolonged time period from previous sampling efforts. A permanent water level measurement mark was etched on top of the PVC casing to allow for accurate, and consistent water level measurements over time. In accordance with Port Authority protocol, the monitoring wells were allowed to equilibrate for a period of two weeks prior to sampling, as feasible given project time constraints.

5.5 Groundwater Sampling

Groundwater sampling was performed in November and December 2000. Prior to sampling activities, the following was performed: condition of each monitoring well was visually inspected for signs of damage or tampering, the lock and well cap was removed so a PID reading could be obtained, depth of water, depth of free phase product (if present), and depth to bottom of each monitoring well was obtained and recorded.

If free phase product was detected in a monitoring well, the depth to product and water were measured to the nearest 0.01 ft using an oil-water interface probe. If the presence of product was detected, samples were collected from the product and submitted for fingerprint analysis. In those instances, the well was neither purged or sampled for groundwater.

All monitoring wells were purged prior to sampling. Purging was accomplished by removing a predetermined volume of standing water using a peristaltic or submersible pump. The purge rate depended on the yield of the well, and did not exceed the well development discharge rate. At the start and end of the purging process, the discharge water was monitored and recorded for the following: pH, temperature, dissolved oxygen, turbidity, and specific conductivity.

Subsequent to the completion of purging, groundwater samples were collected after the well had recovered to a volume sufficient for sampling, or no later than two hours from the end time of purging. Samples were collected using poly-Teflon bailers. Bailers were lowered into the well at the screened interval to the water table. Once the bailer was filled, it was retrieved and the groundwater was poured into the proper laboratory containers while minimizing aeration. The containers were then labeled, placed on ice, and delivered to the laboratory for analysis. As previously stated, 34 groundwater and 4 free product samples were collected as part of this investigation. Specifically, the following wells were sampled: PG-PA-MW-1, PG-PA-MW-1D, PG-PA-MW-4, PG-PA-MW-4D, PG-PA-MW-5, PG-PA-MW-6, PG-PA-MW-6D, PG-PA-MW-7, PG-PA-MW-7D, PG-PA-MW-8, PG-PA-MW-10D, PG-PA-MW-11D, PG-PA-MW-12, PG-PA-MW-13, PG-PA-MW-14D, PG-PA-MW-15, PG-PA-MW-15D (two samples obtained) (new wells); PG-TMW-01 and PG-TMW-02 (new temporary wells); and, PG-BW-13, PG-CS-7, PG-EW-3, PG-EW-6, PG-GW-10, PG-GW-3, PG-GW-5, PG-GW-7, PG-GW-9, PG-MW-03, PG-MW-04, PG-PZ-1, PG-RS-1 and PG-RS-2 (existing wells). During sampling, a sheen was noted on the water surface of wells PA-MW-13 and TMW2. As no measurable free product was present, samples were collected from these wells in accordance with the above outlined procedures and submitted for laboratory analysis.

When sampling product, a Teflon bailer was used to collect the product. The bailer was retrieved from the well and the product was carefully poured into a 40-mL VOC vial. Precaution was taken to minimize the amount of groundwater collected along with the petroleum product in the vial. The free product samples collected from the following four wells were for GC fingerprint analysis: PG-GW-14, PG-OP-01, PG-GW-16 and PG-EW-18.

5.6 Surface Water and Sediment Inspection and Sampling

Killam performed several visual inspections of Bridge Creek during both low and high tide events during the weeks of October 29, 2000, November 5, 2000 and November 13, 2000. The purpose

of the inspections was to determine if the precipitate material identified in environmental reports provided by P&G were present. The visual inspections revealed the presence of a "whit-ish precipitate" material at numerous locations in near shore sediments during low tide. The material was not observed to be present during high tide periods. As such, surface and sediment sampling was performed on during low tide on November 21, 2000. In each case, sediment samples included the "whitish precipitate" material and surface water samples were taken from locations in close proximity to the noted material. The specifics of the sampling for each media are described below.

Killam collected surface water samples from Bridge Creek using laboratory-cleaned glass containers. Samples were obtained from the downstream location first and then progressed upstream, so as to avoid collecting disrupted sediments in the surface water samples. The locations of the three surface water samples (i.e., SW-1, SW-2 and SW-3) are depicted on a Site Plan, Figure 2, included in Appendix A of this report. The surface water samples were analyzed for TAL metals and pH.

Killam obtained five sediment/precipitate samples (Sed-1, Sed-2, Sed-3, Sed-4 and Sed-5) located within the limits of Bridge Creek. A stainless steel trowel was used to obtain the sediment/precipitate samples from the shallow depth. The samples were then placed directly into the appropriate laboratory containers. The sediment/precipitate samples were analyzed for TAL metals.

6.0 RESULTS

As described in Section 5, the SI for this site consisted of a variety of tasks designed to establish current environmental conditions for the purposes of acquisition and potential site redevelopment. The results of the SI efforts are presented in this section.

6.1 Site Hydrogeology

Soil and groundwater sampling efforts have provided information to better characterize site hydrogeology including the types and general extent of fill material present at this site. Soil, groundwater, surface water and sediment conditions are described below.

6.1.1 Soil

Three general types of fill material were identified through the SI program: urban fill including soil fill, vegetative debris, construction debris (wood, bricks, glass, concrete); cinder fill consisting primarily of ash and ash-type materials with some slag; and, by-products from production activities (calcium carbonate, spent diatomaceous earth, and spent carbonaceous filter material). The specific composition of the fill was noted to vary with location and frequently all three types were noted in varying quantities at the same location. Urban fill was observed at locations throughout the site. Although trace cinders were noted to be present in urban fill, more significant cinder fill layers were noted at certain site areas. In particular, cinder fill was noted to be present at the western half of Block 1400 extending to the central portion of Block 1309 and at the southern portion of Block 1338, north of Buildings 74/75 and east of Building 56. Within the above described area, cinder fill was notably absent at the northwestern corner of Block 1400 and the southwestern corner of Block 1309. It should be noted that no investigative efforts were undertaken within the limits of the closed C&D Landfill. As such, it is not know whether the cinder fill is present at that site location. The third type of fill present at this site consist of a combination of process by-products such as calcium carbonate, spent diatomaceous earth, and spent carbonaceous filter material. Although this material was noted to be variable with regard to moisture content and coloration, it was readily distinguishable from other fill materials as well as underlying native materials at the site. The by-product fill can range in color from white to green to blue to gray to black. The by-product fill material was noted to be present at along the western third of Block 1400 and to extend through the central portion of Block 1309. Native material has been defined as peat or very well sorted light brown to orange brown to red brown sands and silts and was generally encountered between 15 and 25 feet bsg. The peat layer was noted to be present at most, but not all, boring locations. Soil boring logs including those logs for borings which were finished as monitoring wells are provided in Appendix E.

6.1.2 Groundwater

Based on the findings of Killam's SI program and considering the data generated by prior site investigation activities, the general hydrogeologic regime in overburden saturated zones consists

of two components; an upper aquifer, comprised of unconsolidated materials described previously in Section 6.1.1 (indigenous granular soils and operational and/or non-indigenous fill materials), and; a deeper water bearing zone comprised of native glacio-fluvial sediments (i.e., gravel, sand, silt and clay). A discontinuous peat layer that occurs at approximately 15 to 20 feet bsg separates these zones of saturation. This peat layer was encountered in the majority of the soil borings installed during Killam's SI program.

Figure 3 depicts the plot of the shallow overburden aquifer potentiometer surface for the November 2000 groundwater sampling event. As depicted on Figure 3, the shallow overburden saturated zone exhibits a hydraulic gradient of variable orientation and magnitude. The flow regime for the shallow, saturated overburden zone reflects the heterogeneity of the upper surface native and fill soils. The groundwater contour plot depicts directional flow components to the north, west, and southwest, with a groundwater flow divide oriented northwest-southeast, across the northern potion of the site. The data set indicates shallow hydraulic gradients in the northeast and southwest portions of the site, on the flanks of the groundwater divide. These are areas where SI borings indicated either granular, reworked native soils along with soil fill, or in-situ, undisturbed soil deposits. Steep hydraulic gradients are mapped for the northwest portion of the site, adjacent to Bridge Creek. Less permeable fill materials (by-product fill) deposited in this portion of the site may contribute to the mounding/hydraulic divide effects observed in this portion of the site.

Indigenous, unconsolidated granular soils consisting of gravel, sand and silt, with little to trace quantities of clay, were encountered in the deep monitoring well borings installed as part of Killam's SI program. As described previously, deep wells were screened in the first encountered permeable formation beneath the observed (or inferred) depth of the peat layer.

Figure 4 depicts the plot of the deep overburden aquifer potentiometer surface for the November 2000 groundwater sampling event. As depicted on Figure 4, the deep overburden saturated zone exhibits a consistent magnitude of hydraulic gradient across the entire site, and indicates flow direction components toward adjacent surface water bodies (Bridge Creek to the west, the Arthur Kill to the west/southwest and the Kill Van Kull to the North. This contrasts with Figure 3 for the shallow overburden aquifer, which reflected the effects on hydraulic magnitude and gradient due to aquifer heterogeneity. This disparity in the magnitude and orientation of hydraulic gradient between the shallow and deep overburden aquifers suggests that the peat layer and/or less

permeable fill materials limit vertical groundwater movement from the shallow, overburden aquifer to the deep overburden aquifer, establishing predominantly horizontal flow conditions in each of these saturated overburden zones.

Killam employed the use of data loggers to assess whether groundwater movement beneath the subject sites was influenced by the tidal fluctuations of the adjacent to the northern end of Block 1309, Lot 1. Data loggers were placed in four shallow groundwater monitoring wells and one deep groundwater-monitoring well to monitor ground water fluctuations in the shallow and deep overburden aquifers. An additional data logger station was established on the Kill Van Kull to monitor fluctuations in the surface water elevation of that water body. Review of the collected elevation data indicated no correlation between tidal fluctuations of the Kill Van Kull and groundwater levels in the shallow and deep aquifers beneath the site.

6.1.3 Surface Water

Bridge Creek is located on the western boundary of Block 1400 Lot 1 and Block 1309 Lot 10. The stream flows to the north and discharges to the Arthur Kill at the northwest corner of Block 1309, Lot 10. No discoloration of the stream was noted at the time of sampling. Bridge Creek is considered a tidal, saline stream due to the influence of the Arthur Kill. The NYSDEC, Division of Water has classified surface water into fresh and saline divisions. Bridge Creek is classified as the following: SD – due to man-made/natural conditions, the stream cannot meet primary or secondary criteria. The stream can support fish survival and limited fishing.

6.2 GPR/EM – Potential UST Areas

Overall, the GPR/EM survey proved inconclusive with regard to identifying USTs at the nine potential locations. However, based on information obtained through the GPR/EM survey, soil borings were installed to further evaluate conditions at the potential UST areas. Soil boring locations were selected through the findings of the Hager-Richter survey as well as available information from soil borings installed at adjacent areas to evaluate other AOCs. In two locations (UST-2 Area and UST-7 Area), temporary wells were installed, in addition to soil borings, to further evaluate the subsurface conditions and attempt to identify impacts to groundwater, if any. The locations of the soil borings installed at each potential UST area are as follows:

At UST1, one soil boring (UST1-2) was installed to the northwest of the suspected tank area. At UST2, seven soil borings (UST2-1, UST2-1A, UST2-1B, UST2-2, UST2-2A, UST2-2B, UST2-3) and one temporary well (PG-TMW-02) were installed to the west of the suspected tank area. At UST3, no additional soil borings were added due to the presence of below grade utilities and overhead obstructions as well as the presence of an existing soil boring (FS-4) down gradient of the suspected tank area. At UST4, two soil borings (UST4-1 and UST4-2) were installed to the northwest and southwest of the suspected tank area. At UST5, one soil boring (UST5-2) was installed to the northwest of the suspected tank area. At UST6, two soil borings (UST6-2 and UST6-3) were installed to the northwest of the suspected tank area. At UST7, five soil borings (UST7-1, UST7-1A, UST7-1B, UST7-1C, UST7-2) and one temporary well (PG-TMW-01) were installed to the west of the suspected tank area. At UST8, no additional soil borings were added due to the presence of below grade utilities and an existing soil borings (M-4 and PG-PA-MW-04) down gradient of the suspected tank area. At UST9, one soil boring (UST9-1) was installed to the west of the suspected tank area.

6.3 Soil Analytical Data

As described in Section 5, 265 soil samples were collected from 128 soil borings at this site. The locations of the soil borings are presented on Figure 2. The samples were submitted for specific laboratory analysis based upon the types of contaminants likely to be present at each AOC. Table 4 provides the analyses for specific samples. The analytical results for Killam's sampling efforts of soil are presented in Tables 5A-5F and are provided in Appendix D of this report. Figures 5 through 12 provide soil boring and well locations as well as pertinent analytical data. For discussion purposes, the results have been compared, as appropriate, to current NYSDEC regulatory criteria. The criteria utilized are the Alternative Guidance Values (AGVs) as set forth August 1992 NYSDEC STARS Memo and the Recommended Soil Cleanup Objectives (RSCOs) as set forth in the January 1994 NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM). Please note, the reference of these standards in this report does not represent any agreement or concurrence that same are appropriate for usage at this site. In addition, reports of previous investigations described the presence of fat, oil, grease or "FOG" in soil at the site. As such, one of the goals of this SI was to identify issues associated with petroleum and non-petroleum substances in soil at the site. In the absence of a regulatory standard for TPHC, O/G or FOG, a threshold value of 10,000 ppm was employed for TPHC and O/G in soil samples for this SI. This threshold value was utilized for comparison purposes only and to identify any areas, which might warrant additional subsurface review prior to site

development. This threshold value is not intended as a site specific standard for petroleum or non-petroleum materials in soil this site. A discussion of the analytical results from the soil component of the investigation is provided below.

6.3.1 Volatile Organic Compounds

VOCs were either not detected or were detected below NYSDEC TAGM RSCOs in all but four of the soil samples. The sample from boring PG-PA-MW-10D exhibited an exceedance of benzene, the sample from boring F1-3 exhibited an exceedance of total xylenes (combined total of o&p-xylenes and m-xylene) and two samples boring PD-8 exhibited exceedances of methylbenzene (toluene). In these instances, the contaminant was detected only marginally above the established RSCO. The total VOCs concentration was below the NYSDEC guidance criteria for all samples. Please refer to Table 5A for VOC results.

6.3.2 Semi-Volatile Organic Compounds

A number of SVOCs were detected in soil samples collected from this site. However, the vast majority of these compounds were detected below NYSDEC TAGM RSCOs. The following SVOCs were detected at concentrations above corresponding RSCOs in one or more soil samples: pyrene, phenanthrene, naphthalene, fluorene, fluoranthene, benzo(g.,h.i)perylene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(a)anthracene, indeno(1,2,3-cd)pyrene, anthracene, 2,4-dimethylphenol , 1-2-benzphenanthracene, and phenol. The total SVO compound concentration was below the NYSDEC guidance criteria for all but one sample. Please refer to Table 5B for a summary of SVOC results.

6.3.3 Polychlorinated Biphenyls

Two specific PCBs, Aroclor 1254 and Aroclor 1260 were detected in a few soil samples. However, the concentrations of total PCBs did not exceed the regulatory criteria established for this class of contaminants in surface or subsurface soil. Please refer Table 5C for a summary of PCB results.

6.3.4 *Pesticides*

A few pesticide compounds were detected in soil samples collected from various locations at the site. Endrin, dieldrin, heptachlor epoxy, and chlordane were detected at concentrations in excess of corresponding NYDEC TAGM RSCOs in only a few soil samples collected at the site. Please refer to Table 5C for a summary of pesticides results.

6.3.5 *Metals*

All TAL metals were detected in at least one soil sample collected as part of this investigation. The NYSDEC TAGM generally regards site background as an appropriate concentration for the 24 TAL metals and only provides RSCOs for only a portion of the metals included in the TAL. RSCOs are provided for the following metals: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, mercury, nickel, selenium, vanadium and zinc. Given the presence of fill material and the urban nature of the site, it is difficult to establish a site background concentration for metals. As such, in the absence of a specified RCSO, the upper limit of the Eastern USA Background Range, as provided in the TAGM was utilized for comparison purposes. It is important to recognize that the presence of a metal above an established background concentration does not constitute an exceedance of a regulatory standard. As the NYSDEC TAGM does not include a regional background concentration nor RSCOs for antimony, silver or thallium, no discussion of exceedances is provided for these metals. Analytical results revealed exceedances of RSCOs in one or more soil samples for all 13 of the metals with established guidance criteria. Also, with the exception of manganese and potassium, the remaining metals were detected in excess of the upper limit of the background standards in one or more samples collected from the site. Please refer to Table 5D for a summary of metals results.

6.3.6 *Cyanide and Total Phenolics*

Cyanide was detected in numerous samples collected from the site. In the majority of instances, cyanide was detected at a concentration of less than 1 part per million (ppm). Twelve samples revealed the presence of cyanide at a concentration greater than 1 ppm; these 12 samples were located throughout the site. The NYSDEC has not established guidance criteria for cyanide in soil. Rather, the NYSDEC establishes guidance criteria for cyanide on a case-by-case basis. Please refer to Table 5E for a summary of cyanide results.

Total phenolics were detected in only 15 of the samples collected from this site. The concentrations ranged from 1.6 ppm to 25 ppm. The NYSDEC has not established guidance criteria for total phenolics in soil. Rather, the NYSDEC establishes guidance criteria for total phenolics on a case-by-case basis. Please refer to Table 5E for a summary of total phenolics results.

6.3.7 Petroleum Hydrocarbons/Oil and Grease

TPHC and O/G were detected in the majority of soil samples collected as part of this investigation. Seven samples exhibited concentrations of TPHC in excess of 10,000 ppm. The exceedances were limited to three site areas: Area A/B, the UST7 Area and the UST2 Area. Five of the seven samples also exhibited concentrations of O/G in excess of 10,000 ppm.

O/G was detected at a concentration in excess of 10,000 ppm in 28 samples collected from locations throughout the site. Only a small percentage (approximately 18% or 5 of 28 samples) of the samples exhibiting concentrations of O/G in excess of 10,000 ppm also exhibited concentrations of TPHC in excess of 10,000 ppm. Please refer to Table 5E for a summary of TPHC and O/G results.

6.3.8 pH

The pH values recorded for soil samples ranged from 3.8 to 13 with the majority, approximately 75%, of the values falling between 6.0 and 8.9. It should be noted that all of the samples exhibiting pH concentrations at or above 11 were collected from by-product fill material present at the site. Please refer to Table 5E for a summary of the pH results.

6.3.9. Dioxin

Information reviewed during the assessment phase of this project did not identify dioxin as a concern with regard to the subject site. During the investigation of conditions at the north-central portion of Block 1400, a fine-grain ash-type material with a black coloration and a "burnt" odor was identified. Given that P&G formerly operated a wood burning furnace at the site and deposited ash at site locations, a sample of the above described material was submitted for

2,3,7,8-TCDD analysis. This contaminant was not detected in the soil sample. Please refer to Table 5F for a summary of the dioxin result.

6.4 Groundwater Analytical Data

Groundwater samples were collected from all 17 of the newly installed groundwater monitoring wells, two temporary wells and 13 existing monitoring wells. Due to high sediment content, a second sample was collected from monitoring well PG-PAMW-15D. Table 4 presents the specific analyses for groundwater samples.. In addition, field pH was recorded for all groundwater samples. The analytical results for Killam's sampling efforts are presented in Tables 6A-6E and are provided in Appendix D of this report. Figure 2 and Figure 13 present monitoring well locations as well as pertinent groundwater analytical data. Figures are provided in Appendix A of this report. For discussion purposes, the results have been compared, as appropriate, to current NYSDEC Ambient Water Quality Standards and Guidance Values (SVGs). The NYSDEC SVGs assume that groundwater is classified as GA, potential drinking water source. Given the location of the site and the potential for water to be saline, the published SVGs are not appropriate for use at this site. However, at this time, these represent the only guidance available for ambient groundwater. Please note, the reference of these standards in this report does not represent any agreement or concurrence that same are appropriate for usage at this site. A discussion of the analytical results from the groundwater component of the investigation is provided below.

6.4.1 Volatile Organic Compounds

VOCs were either not detected or were detected below NYSDEC groundwater SVGs in all but one groundwater sample. The sample from monitoring well PG-CS-7, located at the northwestern portion of Block 1400, exhibited an exceedance of ethylbenzene and m&p xylenes. Please refer to Table 6A for VOC results.

6.4.2 Semi-Volatile Organic Compounds

Only two SVOCs, bis(2ethylhexyl) phthalate and phenol, were detected at concentrations in excess of NYSDEC groundwater SVGs in a few groundwater samples. The first compound, bis(2ethylhexyl) phthalate, is frequently identified as a laboratory contaminant. In fact, this

compound is identified as being a laboratory contaminant in many of the groundwater samples collected with regard to this project. Phenol was detected in excess of the NYSDEC groundwater SVG in seven of the 34 groundwater samples. Please refer to Table 6B for a summary of SVOC results.

6.4.3 Polychlorinated Biphenyls

No PCBs were detected in the groundwater samples. It should be noted that all of the method detection limits for PCBs were above the NYSDEC groundwater SVGs. Please refer to Table 6C for a summary of PCB results.

6.4.4 Pesticides

No pesticides were detected in groundwater samples collected from the subject site. Please refer to Table 6C for a summary of pesticides results.

6.4.5 Metals

Numerous TAL metals were detected in one or more groundwater samples collected as part of this investigation. However, only seven TAL metals were detected at concentrations in excess of corresponding NYSDEC groundwater SVGs. The seven contaminants detected at elevated concentrations in one or more groundwater sample are as follows: aluminum, arsenic, iron, manganese, sodium, barium and cadmium. Aluminum, iron, manganese and sodium were detected in excess of NYSDEC groundwater SVGs in groundwater samples collected from wells located throughout the site. Comparatively, arsenic, barium and cadmium were detected in excess of NYSDEC groundwater SVGs in relatively few samples; arsenic was detected at an elevated concentration in only seven samples and cadmium was detected at an elevated concentration in only one sample. Please refer Table 6D for a summary of metals results.

6.4.6 Cyanide and Total Phenolics

Cyanide was detected in 12 of the groundwater samples collected from the site. However, all concentrations were below the NYSDEC SVG for cyanide. Please refer to Table 6E for a summary of cyanide results.

Total phenolics were detected in only two of the groundwater samples collected from the site. Both concentrations were above the NYSDEC SVG for total phenolics. Please refer to Table 6E for a summary of total phenolic results..

6.4.7 Petroleum Hydrocarbons/Oil and Grease

TPHC was detected in only three groundwater samples (PG-EW-3, PG-PA-MW-1 and PG-TW-02). All three samples were collected from wells located on the western portion of Block 1400. In contrast, O/G was detected in the majority of groundwater samples; O/G was detected in 31 of the 34 groundwater samples. Please refer to Table 6E for a summary of TPHC and O/G results.

6.4.8 Free Product Fingerprint Analysis

Killam identified the presence of free product in four existing site wells (PG-OP-1/EW8, PG-GW-14, PG-GW-16 and PG-GW-5/EW-18) during an initial water level recording effort. As such, samples of the free product were collected and submitted for fingerprint analysis to attempt to determine the type of material present. The fingerprint analysis identified a potential match with mineral oil for the sample from PG-OP-1/EW8 and was inconclusive for free product samples from the other three wells. Please note, during the performance of groundwater sampling, a sheen was noted on groundwater in wells PG—MW-13 and PG-TMW-02. However, it was not possible to obtain a sample of the material for laboratory analysis. As previously stated, groundwater samples were obtained from these wells and submitted for laboratory analysis.

6.4.9 pH

Laboratory analysis for pH was performed and samples from 5 locations (PG-GW-3, PG-GW-6, PG-GW-9, PG-PA-MW-6 and PG-PA-MW-7). The laboratory recorded pH values ranged from 6.8 to 7.7 for samples from PG-GW-3, PG-GW-6, PG-GW-9, and PG-PA-MW-7 and a pH value of 11 was recorded for PG-PA-MW-6. Please refer to Table 6E for laboratory recorded pH values. The pH was recorded for groundwater at all locations as part of field sampling. The field pH values have been included in Table 6E for reference purposes. Please note, the value included

on Table 6E reflects the pH recorded just prior to sampling. The majority of pH values (25 of 34 samples) recorded in conjunction with the groundwater sampling ranged from 6 to 8. The remaining pH values (9 of 34 samples) ranged from 8.2 to 12.9. Eight of the 9 samples exhibiting pH values in excess of 8 were located at the western portion of Block 1400 (PG-EW-3, PG-RS-2, PG-CS-7, PG-PA-MW-6, PG-RS-1, PG-EW-6 and PG-PA-MW-1) and the southwestern portion of Block 1309 (sample from monitoring well PG-PA-MW-12). The locations generally coincide with areas noted to contain fill material. The remaining sample was collected from monitoring well PG-EW-13 (recorded on analytical tables and figures as BW-13 due to an error in labeling) located at the southern portion of Block 1338, just north of Building #74/75. It should be noted that the field pH value recorded for this well ranged from 9.4 to 12.26. Therefore, the actual pH of groundwater at the PG-EW-13 (PG-BW-13) location is unlikely to be as basic as 12.26. The field recorded pH values are included on groundwater sampling logs which are provided in Appendix F.

6.5 Sediment and Surface Water Analytical Data

Five sediment/precipitate and three surface water samples were collected from Bridge Creek and submitted for TAL Metals. In addition, pH values were recorded for surface water samples. The analytical results for Killam's sampling efforts are presented in Tables 7 and 8 and are provided in Appendix D of this report. For discussion purposes, the results have been compared, as appropriate, to current NYSDEC Sediment Screening Criteria and Surface Water Quality Standards. The NYSDEC Sediment Screening establishes two levels of protection for sediments; detections below the first level area considered "not contaminated"; detections above the first level but below the second are considered contaminated but tolerable by most benthic organisms; and, detections above the second level are considered to have a pronounced disturbance of the habitat. Please note, the reference of these standards in this report does not represent any agreement or concurrence that same are appropriate for usage at this site. A discussion of the analytical results from the sediment/precipitate and surface water component of the investigation is provided below.

6.5.1 Metals

Numerous TAL metals were detected in one or more samples of sediment/precipitate and surface water. The following six metals were detected at concentrations above the first level but below

the second level of NYSDEC screening criteria: arsenic (five samples), chromium (five samples), mercury (three samples), copper (one sample), nickel (two samples) and silver (one sample) in sediment/precipitate samples. Copper (four samples), mercury (two samples), nickel (two samples) and silver (three samples) also exceeded the second level screening in criteria in one or more sediment samples. Lead exceeded the second level screening criteria in all five sediment/precipitate samples.

Analytical results revealed the presence of four metals at concentrations in excess of NYSDEC guidance criteria in one or more surface water samples. The four metals in exceedance are copper (three samples), lead (one sample), nickel (one sample) and zinc (three samples). Please refer to Tables 7 and 8 for metals results for sediment and surface water respectively.

6.5.2 pH

The pH recorded for surface water samples ranged from 7.5 to 8.2. Please refer to Table 8 for pH results for surface water.

7.0 DISCUSSION/CONCLUSIONS

The investigative efforts described herein were undertaken to confirm current site conditions as well as to evaluate previously identified AOCs at this site. Overall, the field component of the investigation confirmed the presence of a variety of fill materials and identified several potential "oil" impacted areas including potential UST Areas. Analytical data have revealed the presence of contaminants at concentrations in excess of current NYSDEC regulatory guidance criteria in samples from soil, sediment/precipitate, surface water and groundwater. However, the data generally indicate that site issues are related to petroleum and non-petroleum oils, pH and to some degree, metals. To a far lesser extent, VOCs and SVOCs were noted to be present at concentrations above NYSDEC guidance criteria in soil and groundwater. Generally data have shown that former site usage did not substantially impact groundwater and that groundwater quality is typical to that of urban areas. It should be noted that the investigation described herein did not include a geo-technical evaluation. As such, it does not identify or address any issues associated with the physical elements of the fill material including issues associated with future construction activities.

7.1 Soil

Volatile Organic Compounds

Analytical results identified the presence of only three VOCs, (benzene, total xylenes and methylbenzene (toluene), at concentrations in excess of NYSDEC guidance criteria for soil in only three of 265 soil samples. Benzene and total xylenes each were detected at an elevated concentration in a single soil sample; benzene was detected marginally above the NYSDEC guidance criteria in the 8 to 10 foot sample from soil boring PG-PA-MW-10D and total xylenes were detected marginally above the NYSDEC guidance criteria in the 0 to 2 foot sample from soil boring F1-3. Methylbenzene (toluene) was detected slightly above the NYSDEC guidance criteria in the 8 to 10 foot and 16 to 17 foot samples from soil boring PD-8.

Benzene was not detected in samples collected from shallower depths at the PG-PA-MW-10D boring location. Further, soil boring PG-PA-MW-10D was converted to a well and sampled as part of this investigation. Benzene was not detected in the groundwater sample obtained from PG-PA-MW-10D (a deep well installed as part of this investigation) or from a sample collected from PG-MW-3 (a shallow well installed by another party in January 2000) located approximately 100 feet northwest of PG-PA-MW-10D.

Total xylenes were detected only marginally above NYSDEC guidance criteria in the surficial sample collected from soil boring F1-3. This contaminant was not detected in the deeper sample from this boring and was not detected in other soil samples collected from borings in the vicinity of F1-3. However, as described below, this contaminant was detected at a concentration above NYSDEC guidance criteria in a groundwater sample collected from well PG-CS-7, situated approximately 300 feet west of F1-3. Based on the presence of a groundwater divide at the northwestern portion of Block 1400, it is difficult to determine flow patterns in the overburden aquifer in the F1-3 area. However, it appears that F1-3 is located upgradient of monitoring well PG-CS-7.

Methylbenzene (toluene) was detected slightly above the NYSDEC guidance criteria in the 8 to 10 foot sample and the 16 to 17 foot sample from soil boring PD-8.

Additional actions will be undertaken to further evaluate soil conditions at the F1-3, PG-PA-10D and PD-8 locations. Please refer to the proposed actions in Section 8.

Semi-Volatile Organic Compounds

Analytical results indicate the presence of numerous SVOCs at concentrations in excess of NYSDEC guidance criteria in soil samples. Specifically, these soil results reveal that the SVOCs present in soil at the site consist predominantly of polynuclear aromatic hydrocarbon (PAH) compounds at concentrations only slightly above NYSDEC guidance criteria. The relatively low concentrations of PAH compounds detected in soil samples is not unexpected given that fill material was emplaced at the site in conjunction with development of same and that the site has been utilized in an industrial capacity for approximately 100 years. No PAH compounds were detected above NYSDEC guidance criteria in groundwater samples. In only one instance, one sample (Stain-3, 1.5-2.0 feet) obtained from soil boring Stain-3, were PAH compounds detected well above corresponding NYSDEC guidance criteria. The referenced sample was collected from immediately beneath a rebar-reinforced concrete pit within Building #20 (Locomotive House) which extends to approximately four feet bsg. The sample interval (1.5-2.0 feet) refers to the fact that it was the first sample collected from soil boring Stain-3. The actual sample interval is 5.5 to 6.0 feet bsg. Analytical results reveal decreasing contaminant concentrations with regard to this location. This building is reported to have been utilized for railcar maintenance activities and includes three garage-type bays; the two outer bays are constructed with soil floor and the concrete pit is situated in the central bay. During the Phase I ESA and the investigation described herein, Killam observed the presence of staining on the earthen floor and noted that various lubricants, oil and other petroleum products were stored in Building #20. In addition, a UST containing #6 fuel oil was formerly located east of this building and limited information provided by P&G notes that impacted soil surrounding the tank was left in place due to accessibility issues. Given the prior usage of this building and pit, the presence of staining on the soil flooring surrounding the maintenance pit, and information which indicates fuel oil impacted soil remains east of Building #20, it appears that the elevated concentrations of PAH compounds detected in one of the samples from soil boring Stain-3 may be associated with former site activities rather than fill material. Given the presence of fill material at the site, no action is proposed for the presence of SVOCs in site soil. However, with regard to the presence of PAH compounds in samples from soil boring Stain-3, the Port Authority proposes to review conditions at this area and address impacted soil in conjunction with site development. Please refer to site development discussion presented in Section 8.

Metals

Analytical data revealed the presence of a variety of metals at a wide range of concentrations including exceedances of NYSDEC guidance criteria in soil samples. The presence of metals in soil at this site was not unexpected given that indigenous soils contain concentrations of metals species at levels near or above regulatory criteria. The number and wide range of the concentrations of detected metals similarly was anticipated as a variety of fill materials were placed at the site in conjunction with site development.

A review of the spatial distribution of the analytical results revealed three notable conditions with regard to the metals at the site. First, nickel was detected at concentrations ranging from 80 to 90 ppm in several soil samples collected from the northwestern portion of Block 1400. Although the highest concentration of nickel in soil was actually collected from the surficial interval of a soil boring installed at the southern end of Block 1309, six of the nine soil samples exhibiting a concentration of nickel greater than 80 ppm are situated at the northwestern corner of Block 1400. The other two samples exhibiting nickel at a concentration greater than 80 ppm are located at the southern end of Block 1338. Nickel was not detected in excess of NYSDEC guidance criteria in any groundwater samples collected from the site. Despite the higher levels of nickel which were detected in soil samples from the northwestern portion of Block 1400 and the southern end of Block 1338, groundwater results from these areas do not indicate that the presence of nickel in soil has had a significant impact on groundwater. As such, no further action is proposed with regard to the presence of nickel in soil at the site.

Second, analytical data from the soil component of this SI has revealed the presence of elevated levels of arsenic at locations throughout the site. However, this contaminant seems to occur at higher than "site average" concentrations in soil samples collected from locations adjacent to current and former railroad tracks throughout the site. The presence of this contaminant was also noted, at a reduced frequency and at lower concentrations, in samples from other areas of the site. Given the large portion of the site which is currently occupied or which was historically occupied by railroad tracks and sidings, it is likely that the presence of arsenic at many locations may be attributable, in part, to railroad fill, bedding materials and railroad tie chemical preservatives. Therefore, the presence of this metal is considered ubiquitous to the site based upon the connection of arsenic and railroad materials. Further, the anticipated site usage consists of a container terminal and intermodal facility, which will include a rail system located on Block

1400. Although arsenic was detected in site groundwater, only a small percentage of the detected concentrations, 7 of 34 samples, were in excess of NYDEC guidance criteria. The presence of this contaminant in groundwater may reflect the urban nature of the site area rather than an impact from site activities. Accordingly, no further action is proposed with regard to arsenic in soil.

Third, fewer metals appear to be present in the by-product (diatomaceous earth) fill material present at the site as compared to other fill/soil. Generally, the by-product fill material includes aluminum, barium, calcium, iron, magnesium and sodium and to a lesser extent, manganese and potassium. This assertion does not appear to be sustained at locations where the by-product fill is intermixed or located in close proximity to soil fill or cinder fill or in samples of the by-product fill collected from the surficial interval. Analytical results revealed concentrations of aluminum, iron, sodium, and manganese above NYSDEC guidance criteria in samples from numerous site wells, including wells located at other areas of the site. Further discussion of fill related issues are provided later in this section.

Overall, the presence of metals in soil does not appear to have negatively impacted groundwater at the subject site. Therefore, no further actions are proposed with regard to metals in soil.

pH

Investigative efforts at the site have revealed that pH in soil ranges from 3.8 to 13. The incidence of lower pH values, defined as values of less than 5, did not reveal a spatially tied pattern. However, the higher pH values, defined as values greater than or equal to 11, appear to be most frequently recorded in samples collected from locations situated at the northern portion of Block 1400 and the southwestern portion of Block 1309. Further, the area noted to exhibit higher pH concentrations appears to correspond with the presence of by-product fill material. Likewise, the levels of pH recorded during groundwater sampling indicate higher pH values for groundwater at areas characterized by by-product fill material. However, the pH recorded for surface water samples collected from Bridge Creek, situated downgradient of fill-containing areas, revealed levels of pH within the normal range for saline waters, 7.5 to 8.2. Although pH issues at the site appear to be associated with fill material, the presence of the fill material does not appear to have negatively impacted surrounding surface water. Fill material will be addressed in conjunction with overall site redevelopment. Please refer to Section 8 for a discussion of redevelopment activities.

Potential Oil Impacted Areas (TPHC/Oil & Grease)

Visual observations and the results of laboratory analyses have identified several potential "oil" impacted areas at the site. These areas include: four wells containing free product, two wells exhibiting a sheen, several areas observed to include black staining and a distinct petroleum odor, a few areas exhibiting levels of petroleum related VOCs slightly above NYSDEC criteria, several areas exhibiting concentrations of TPHC in excess of 10,000 ppm, and one area exhibiting O/G in excess of 100,000 ppm. It should be noted that the analytical results for O/G and TPHC suggest that these areas may, in some instances, be impacted by non-petroleum oil materials. The presence of free product on the groundwater surface is discussed in Section 7.2. Black staining was noted at numerous locations. Taken in concert with analytical results, it appears that "oil" impacts may be present at the following locations: Southern Portion of the Wood Yard/UST-2 Area (including PG-TMW-02), Wood-5 Area, FS-1 Area, Area A/B, PD-8 Area, UST-7 Area, FS-6 Area, K-2 Area, M-1/G-6 Area and the D-1 Area. It should be noted that P&G submitted a proposal for "No Further Action" to the NYSDEC based upon the findings of tasks/actions required pursuant to a Memorandum of Understanding (MOU) executed between P&G and the NYSDEC. Based on field observations and analytical results, additional actions to evaluate "oil" issues for soil are proposed for the following areas: Southern Portion of the Wood Yard/UST-2 Area (including PG-TMW-02), Wood-5 Area, FS-1 Area, Area A/B, PD-8 Area, UST-7 Area, FS-6 Area, K-2 Area and M-1/G-6 Area.

Investigative efforts did not identify oil impacted areas in proximity to potential UST Areas 1, 3, 4, 5, 6, 8 and 9, with the exception of some PAH compounds detected in a sample (Stain-3,S-1) near the UST1 Area, However, actions were undertaken at these areas based on information on Sanborn Maps and subsequent data from GPR/EM survey, which, as described in the Hager-Richter report provided in Appendix C, was limited due to various site interference (underground utilities, railroad tracks, rebar-reinforced structural concrete, etc.). In many instances, the presence of black staining was noted at locations, which also were characterized by cinder-type fill material. To the extent possible, the list of potential oil impacted areas provided above reflects "oil" issues, which are not attributable to the presence of trace cinders in fill material. The presence of the cinder fill material at the site is described, along with other fill material, as a separate issue later in this section.

7.2 Groundwater

Volatile Organic Compounds

Analytical results identified the presence of only two VOCs, ethylbenzene and total xylenes at concentrations in excess of NYSDEC guidance criteria in only one of the 34 samples, a single sample from location PG-CS-7. No other VOCs were detected at elevated concentrations in the sample from PG-CS-7 or any other groundwater samples collected as part of this investigation. At this time, no further action is proposed with regard to VOCs in groundwater. However, the Port Authority will re-evaluate this no further action proposal upon completion of the actions proposed to evaluate the presence of free-phase floating product in well PG-OP-1/EW8 and "oil" areas in soil. Please refer to Section 8 for a description of proposed actions.

Semi-Volatile Organic Compounds

Analytical results indicate the presence of only two SVOCs, bis(2-ethylhexyl)phthalate and phenol, at concentrations in excess of NYSDEC guidance criteria in groundwater samples. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and is unlikely to be an issue with regard to this site. Phenol was detected at concentrations in excess of NYSDEC guidance criteria in samples from only seven of the 34 wells sampled as part of this investigation; all the wells exhibiting the exceedances are located within the same general site area. The highest concentrations of phenol were detected in wells PG-PA-MW-1, PG-EW-6 and PG-RS-1, which are located at the northwestern portion of Block 1400 (See Figure 13). While still above NYSDEC standards, lower concentrations of this contaminant were detected in samples from wells PG-PA-BW-13, PG-CS-7 and PG-PA-MW-6. Based on the proximity of the above listed wells to each other, it appears that the presence of phenol is limited to the northwestern portion of Block 1400/southwestern to southcentral portion of Block 1309. Given the documented presence of fill material at this portion of the site, no further action is proposed with regard to phenol at this area. As described in Section 8, the Port Authority will address fill issues, as necessary, in conjunction with site redevelopment.

Metals

Analytical data revealed the presence of only two metals, arsenic and cadmium, at concentrations in excess of NYSDEC guidance criteria in groundwater samples. Elevated concentrations of arsenic were detected in only seven of the 34 samples and cadmium was detected in only one of the 34 samples. The presence of these two metals is not unexpected given the urban nature of the

site as well as the site area. Therefore, no further actions are proposed with regard to metals in groundwater at this site.

pH

Investigative efforts at the site have revealed that pH in groundwater ranges from 6.59 to 12.91. However, the pH recorded for surface water samples collected from Bridge Creek, situated downgradient of fill-containing areas, revealed levels of pH within the normal range for saline waters, 7.5 to 8.2. Given that groundwater is not utilized for potable purposes by the site or surrounding area and that the investigation did not identify any downgradient impacted receptors with regard to pH, no additional actions are proposed with regard to pH in soil or groundwater. However, fill material will be addressed in conjunction with overall site redevelopment. Please refer to Section 8 for a discussion of redevelopment activities.

Potential Oil Impacted Areas (TPHC/Oil & Grease)

Visual observations and the results of laboratory analyses have identified several potential "oil" issues with regard to site groundwater. Specifically, the investigation identified the presence of measurable free product in four wells, PG-OP-1/EW8 (Block 1400), PG-GW-14 (Block 1400), PG-GW-16 (Block 1338) and PG-EW-18/MW-5 (Block 1338), and a sheen on the water surface of two wells, PA-MW-13 and PG-TMW-02. Analytical results from fingerprint analysis of the free product from the four wells with measurable product revealed a potential match with mineral oil for the sample from well OP-1/EW8 and were inconclusive for the samples from the three other wells (PG-GW-14, PG-GW-16 and PG-EW-18/MW-5). Based on the type of processes formerly performed at the P&G site, it appears the product noted to be present in the other three wells may be a vegetable oil-type material. Traditional groundwater samples were collected from PA-MW-13 and PG-TMW-02. Analytical results from that testing revealed the presence of O/G in the samples from PA-MW-13 and both O/G and TPHC in the sample from PA-TMW-02. Based on field observations and analytical results, additional actions are proposed for the six above listed wells. Please refer to Section 8 for a discussion of proposed investigative efforts.

7.3 Bridge Creek - Surface Water/Sediment

Samples from surface water and sediment of Bridge Creek reveal the presence of several metals at concentrations in excess of NYSDEC guidance and screening criteria. The metals present in the surface water and sediment were also noted to be present on-site. The similarity in the contaminant profiles may indicate that site activities have impacted the stream corridor. However, based on information provided in P&G reports, the frequency and extent of precipitates noted to be present in the stream corridor has decreased significantly over the past decade and is expected to continue to do so. It is anticipated that the Port Authority's development of the site will continue to enhance the quality of Bridge Creek. As such, no further action is proposed with regard to Bridge Creek.

7.4 Fill

Initial assessment/investigative efforts revealed that P&G placed a variety of fill material at the subject site to raise the topographic grade to facilitate site development. The investigation noted the presence of three general types of fill: urban fill including soil fill, vegetative debris, construction debris (wood, bricks, glass, concrete), cinder fill consisting primarily of ash and ash-type materials with some slag; and by-products from production activities (calcium carbonate, spent diatomaceous earth, and spent carbonaceous filter material). The specific composition of the fill was noted to vary with location and frequently all three types of fill were noted to be present in varying concentrations at the same location.

As described previously in this report, urban fill is present throughout the site. Further, this type of fill material is considered ubiquitous with regard to waterfront sites throughout Staten Island as well as the larger region. Although trace cinders are likely to be present in urban fill, more significant cinder fill layers were noted at certain site areas. In particular, cinder fill was noted to be present at the western half of Block 1400 extending to the central portion of Block 1309 and at the southern portion of Block 1338, north of Buildings #74/75 and east of Building #56. Within the above described area, cinder fill was notably absent at the northwestern corner of Block 1400 and the southwestern corner of Block 1309. The third type of fill present at this site consist of a combination of process by-products such as calcium carbonate, spent diatomaceous earth, and spent carbonaceous filter material. Although this material was noted to be variable with regard to moisture content and coloration, it was readily distinguishable from other fill materials as well

as underlying native materials at the site. Generally, the by-product fill material was noted to be present along the western third of Block 1400 and to extend through the central portion of Block 1309. It should be noted that no investigative efforts were undertaken within the limits of the closed C&D Landfill.

Analytical results revealed the presence of a variety of contaminants including TPHC, PAH compounds and metals at a wide range of concentrations in samples collected from or including the urban fill and the cinder fill. A review of contaminant profiles of samples from each of these fill materials did not identify contaminants which were more prevalent in either type of material. The contaminants detected in these media are generally regarded as "typical" urban fill (contaminants such as arsenic, beryllium, cadmium, lead and various petroleum hydrocarbons related to fossil fuel by-products including PAH compounds). In general, the potential exists for a wide variety of contaminants to be present in historic fill material and the contaminants present at a specific site are typically linked to the source or sources of the fill materials and the composition of same. For example, arsenic and petroleum related compounds are typically present in historic fill materials taken from old railyard sites and emplaced at sites throughout the New York Metro Region. The types of contaminants detected in the samples from urban and cinder fill present at the site support this assertion. In contrast, the contaminant profile of samples collected from the by-product fill does distinguish this material from other site fill and native material. As previously stated in this report, the by-product fill appears to be characterized by an elevated pH value and the presence of metals such as aluminum, barium, calcium, iron, magnesium and sodium and to a lesser extent, manganese and potassium rather than typical fill metals (lead, arsenic, nickel, etc.). The by-product fill material is not characterized by the presence of VOCs, SVOCs, pesticides, PCBs, TPHC or O/G, although these types of contaminants were detected at locations where the by-product fill is intermixed or located in close proximity to soil fill or cinder fill or in samples of the by-product fill collected from the surficial interval. Based on the investigation, no additional actions are proposed with regard to the presence of fill material at this site. However, the Port Authority will address fill material, as necessary, in conjunction with the redevelopment of this site. Please refer to Section 8 for a discussion on site redevelopment.

7.5 Summary

Overall, given that the subject site is located in a highly urbanized and historically industrial area, it is reasonable to assume that diffuse anthropogenic pollution has also contributed, over many decades, to the contaminants present in site soil, sediment, surface water and groundwater. Diffuse anthropogenic pollution is typically defined as pollution emanating from a variety of sources including automobile exhaust and industrial smokestacks. The primary contaminants of concern associated with these types of sources are lead and PAH compounds, but it is not unusual to encounter other types of contaminants associated with sustained urban activity. Regulatory agencies have indicated that most areas are likely to have been impacted, to some degree, by anthropogenic activity, but recognize that the greatest impacts are to those sites located in urban areas such as the subject site. Given the above, the investigation described herein has revealed the presence of relatively few issues that require additional investigation/delineation and/or remediation. Additional actions proposed for this site are described in Section 8.

8.0 PROPOSED ACTIONS

As described in the preceding sections, investigative activities identified the presence of contaminants typical to urban sites in the New York Metropolitan region. Further, the presence of contaminants in soil does not appear to have adversely impacted groundwater quality at the site. Overall, industrial/commercial usage such as the Port Authority's planned usage of the site as an intermodal facility and container terminal is not inconsistent with the levels of contamination noted to be present in site soil and groundwater. In fact, it is anticipated that the Port Authority's redevelopment of the site will have a positive impact on site environmental quality. In particular, the Port Authority intends to install material such as pavement and other semi-impervious material, which will function as an environmental cap throughout the entire site. This action will tend to stabilize contaminants present in soil and fill material by impeding infiltration, thereby reducing the potential for contaminants in soil to leach from the unsaturated zone to groundwater. In addition, the placement of such materials will safeguard the public by preventing exposure to contaminants in soil and groundwater. Further, the Port Authority will also address surface staining such as that noted at Building #20 in conjunction with site development activities. Any materials excavated from the site will be evaluated and addressed in accordance with NYSDEC regulations.

In addition, the Port Authority proposes to further evaluate potential UST areas as well as many other site areas, which exhibited indications of "oil" issues. As described in Section 6.2, the geophysical survey was inconclusive due to interference with utilities and other site features. As such, the Port Authority proposes to install test pits at UST Areas, UST1-UST9, for the purpose of locating USTs, if present. Additional actions at these areas, such as sample collection and analyses, will be based upon results of the proposed test pit effort.

Visual observations and the results of laboratory analyses have identified several "oil" impacted areas at the site. These areas include: four wells containing measurable free product (PG-OP-1/EW-8, PG-GW-14, PG-GW-16, and PG-EW-18/MW-5), two wells exhibiting a sheen on the groundwater surface (PA-MW-13 and PG-TMW-02), several areas observed to include black staining and a distinct petroleum odor, a few areas with petroleum related VOC exceedances, several areas exhibiting concentrations of TPHC in excess of 10,000 ppm, and one area exhibiting O/G in excess of 100,000 ppm. Based on analytical results, it is proposed to collect additional samples of product and to perform an expanded fingerprint analysis to attempt to conclusively determine the type of substance present on the groundwater surface and to delineate the spatial distribution of free product through a supplemental subsurface investigation. In addition, the Port Authority proposes to delineate the extent of "oil" contamination at the following areas: PG-MW-13, PG-OP-1/EW8, Southern Portion of the Wood Yard/UST-2 Area (including the PG-TMW-02 location), Wood-5 Area, FS-1 Area, Area A/B (including the PG-GW-14), PD-8 Area, UST-7 Area, FS-6 Area, PG-GW-16, PG-EW-18, K-2 Area and M-1/G-6 Area. The additional investigative efforts will include the installation of soil borings, soil sampling and the performance of field screening at each of the above listed locations. Laboratory analysis will be based upon the results of field screening.