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The Port Authority of New York and New Jersey

Comprehensive Remedial Investigation Report
Site 1 (VCP Site V00615-2)

HHMT - Port Ivory Facility

July 2007

Report 2 of 2

40 Western Avenue, Staten Island, New York

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 historic 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. Additional information pertaining to development actions is provided in Section 13.

12.2 Completed Remedial Actions

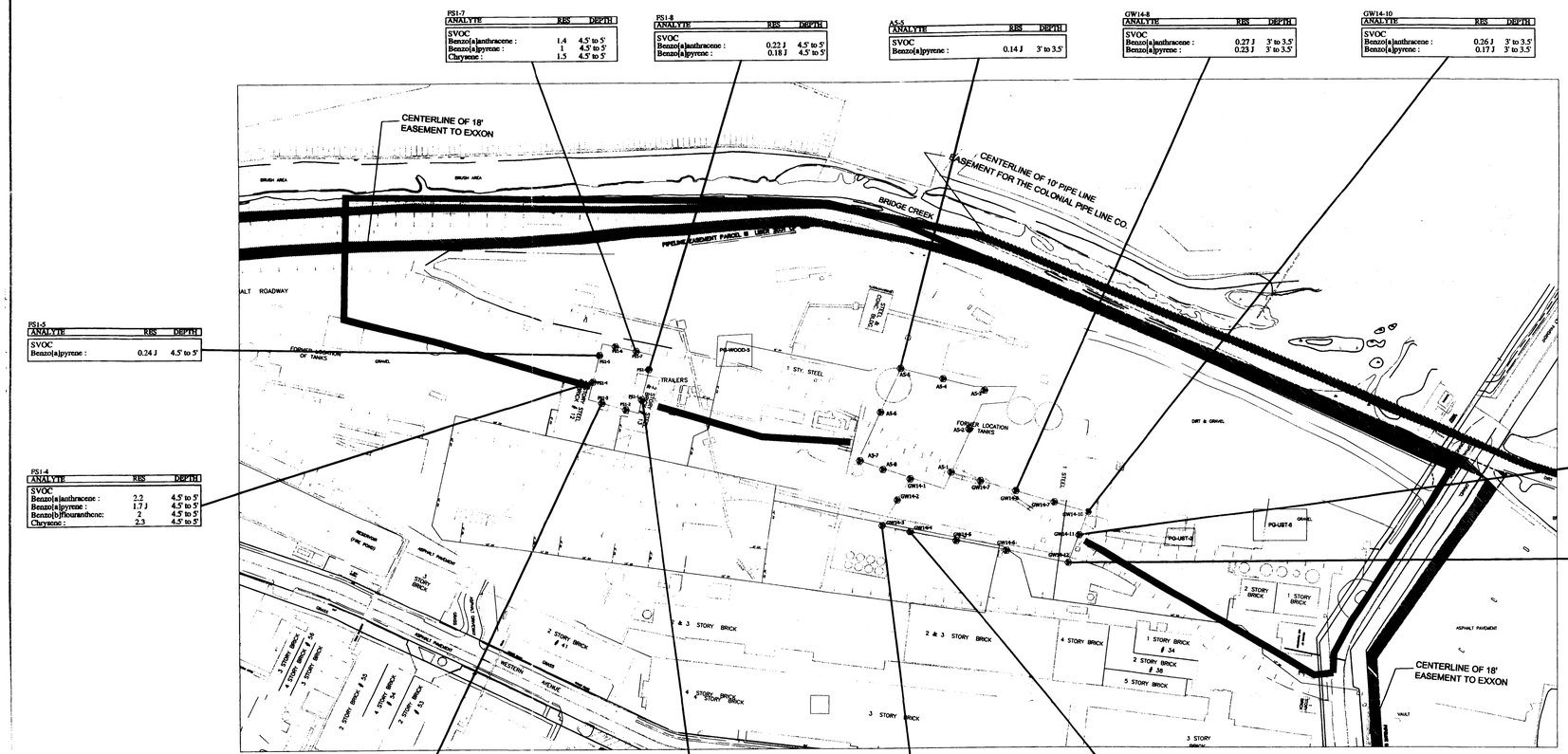
To accommodate site redevelopment efforts, hot spot excavation was performed at locations within Site 1. A summary of the excavation and sampling at 1 is presented by AOC in the following Sections. Excavation and sampling were performed in accordance with NYSDEC protocols. Continuous field screening, utilizing a photoionization detector (PID) was performed through excavation and sampling efforts. The limits of the hot-spot excavation areas and the locations of samples are provided on Figure 21 and a summary of sampling is presented in Table 12.

12.2.1 FS-1 Area

The Area FS-1 measured approximately 100 feet in length (east to west) and 83 feet in width (north to south) and extended approximately 5.0 feet in depth, just above the groundwater table. No readings above background were recorded on the PID. The Area FS-1B excavation is located to the southwest of the Area GW-14 excavation. The majority of the excavation is located on Site 1, with approximately one-quarter of the excavation in Site 2A. Visually impacted soils located from within the limits of the excavation consisted of a mix of cinder, ash, lime sludge/by-product fill material, sand, tree timbers and concrete sections.

During the soil removal effort, a concrete structure was encountered at the southeast corner. No visual indications of contaminants were noted and no readings above background were recorded on the PID. The concrete structure was removed from the excavation for off-site disposal along with other concrete demolition debris.

Eight soil samples were collected from the excavation; two from each sidewall and submitted for PAH compound (8260) and VOC (8270) analyses. VOCs were either not detected or were detected at concentrations below the corresponding RSCO. None of the samples exceeded the guidance threshold of 10 mg/kg for total VOCs. Four PAH compounds were detected at concentrations in excess of corresponding RSCOs in several samples collected from Area FS-1B excavation. Benzo(a)anthracene was detected in excess of its RSCO in three samples with concentrations ranging from 0.27 mg/kg in sample FS1-1 to 2.2 mg/kg in sample FS1-4. Benzo(a)pyrene was detected in excess of its RSCO in six samples ranging in concentrations from 0.18 mg/kg in sample FS1-8 to 1.7



FS1-7		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	1.4	4.5' to 5'
Benzo[a]pyrene :	1	4.5' to 5'
Chrysene :	1.5	4.5' to 5'

FS1-8		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	0.22 J	4.5' to 5'
Benzo[a]pyrene :	0.18 J	4.5' to 5'

AS-5		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.14 J	3' to 3.5'

GW14-8		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	0.27 J	3' to 3.5'
Benzo[a]pyrene :	0.23 J	3' to 3.5'

GW14-10		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	0.26 J	3' to 3.5'
Benzo[a]pyrene :	0.17 J	3' to 3.5'

FS1-5		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.24 J	4.5' to 5'

FS1-4		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	2.2	4.5' to 5'
Benzo[a]pyrene :	1.7 J	4.5' to 5'
Benzo[b]flouranthene:	2	4.5' to 5'
Chrysene :	2.3	4.5' to 5'

GW14-11		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.10 J	3' to 3.5'

GW14-12		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	0.27 J	3' to 3.5'
Benzo[a]pyrene :	0.24 J	3' to 3.5'

FS1-3		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.21 J	4.5' to 5'

FS1-1		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]anthracene :	0.27 J	4.5' to 5'
Benzo[a]pyrene :	0.36 J	4.5' to 5'
Chrysene :	0.41 J	4.5' to 5'

GW14-3		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.062 J	3' to 3.5'

GW14-4		
ANALYTE	RES	DEPTH
SVOC		
Benzo[a]pyrene :	0.11 J	3' to 3.5'

100 0 100 200
SCALE IN FEET

RECOMENDED SOIL CLEANUP OBJECTIVES

COMPOUND	RSCO (mg/kg)
SVOC	
Benzo[a]anthracene :	0.224 or MDL
Benzo[a]pyrene :	0.061 or MDL
Benzo[b]flouranthene:	1.1
Chrysene:	0.4

MDL - METHOD DETECTION LIMIT

NOTES:
1. THIS MAP PRESENTS CONCENTRATIONS OF VOCs AND SVOCs AT LEVELS ABOVE CORRESPONDING TAGM RSCOs.

LEGEND

- UTILITY EASEMENT
- RAILROAD TRACKS
- SITE BOUNDARY
- AS-5 — HMM REMEDIAL ACTION POST EXCAVATION/CONFIRMATION SAMPLE LOCATIONS
- HMM REMEDIAL ACTION EXCAVATION LOCATION

ANALYTE — INDICATES COMPOUND FOR WHICH LABORATORY ANALYSIS WAS CONDUCTED

RES — CONTAMINANT CONCENTRATION IN MG/KG

J — THE REPORTED VALUE WAS OBTAINED FROM A READING THAT WAS LESS THAN THE CONTRACT REQUIRED DETECTION LIMIT (CRDL) BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT (IDL).

DEPTH — DEPTH IN FEET BELOW GROUND SURFACE

Sheet of

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1)
HHMT-PORT IVORY FACILITY

SITE 1
HOT SPOT EXCAVATION LIMITS AND CONFIRMATION SAMPLE ANALYTICAL RESULTS, REMEDIAL ACTION

Designed by Drawn by Checked by

Date

Contract Number

Drawing Number FIGURE 21

Hatch Mott MacDonald

Table 12
Summary of Remedial Actions and Sampling
Site 1: -HHMT Port Ivory Facility

Initial SI AOC	SI Soil Boring Location	Description of Issues	Description of Actions and Sampling	Analytical Parameters
FS-1 Area	**FS-1B**	The RI investigation delineated impacted soil surrounding soil boring FS-1B.	The delineated area surrounding FS-1B was excavated to the groundwater table to address potential petroleum impacted soil. Soil samples were collected from the 0.0-0.5 foot interval above the groundwater table. The excavation measured 100 feet by 83 feet. Eight confirmation soil samples were collected: FS1-1, FS1-2, FS1-3, FS1-4, FS1-5, FS1-6, FS1-7, and FS1-8. Soil samples were taken at the base of the sidewalls at the 0.0-0.5 foot interval above the groundwater table (approximately 4.5-5 feet bgs). Excavated soil was stockpiled onsite pending off-site disposal. The majority of this excavation is located on Site 1, with only a small area at Site 2A	VOC 8270; BN 8260
Area A	**A-2 and A-5**	The RI investigation delineated impacted soil at locations A-2 and A-5 at Area A.	An excavation was conducted at A-5 and A-2; the excavation at these two areas was combined into a single excavation area based upon field observations. The excavation was extended to groundwater to address visual signs of petroleum impacts. Soil samples were collected from 3.0 to 3.5 feet below ground surface. The excavation measured approximately 170 feet by 147 feet wide. Additional excavation, measuring approximately 68 feet by 32 feet, was performed off the northwest corner to address visual signs of potential petroleum impacts. Eight confirmation samples were collected from the A-5 excavation: A5-1, A5-2, A5-3, A5-4, A5-5, A5-6, A5-7, and A5-8. Samples were taken from the base of the sidewalls at the 0.0 - 0.5 foot interval above the groundwater table. Excavated soil was stockpiled on site awaiting off-site disposal. The majority of this excavation is located on Site 1, with only a small area at Site 2A.	VOC 8270; BN 8260

Hatch Mott MacDonald

Table 12
Summary of Remedial Actions and Sampling
Site 1: -HHMT Port Ivory Facility

Initial SI AOC	SI Soil Boring Location	Description of Issues	Description of Actions and Sampling	Analytical Parameters
UST – 2 Area	**UST-2**	The RI investigation delineated impacted soil at UST-2.	Due to on-going demolition activities the remedial actions for this area were not performed in 2002/2003. The appropriate remedial action for this area is being reviewed with respect to proposed development activities.	Not Applicable
Wood Yard	**Wood-5**	The RI investigation delineated impacted soil at Wood-5.	The delineated area surrounding Wood-5 was excavated to the groundwater table. The excavation area measured 30 feet by 30 feet and was extended to the limits defined by the RI. No samples were collected from the resultant excavation based on field observations as well as analytical results from the RI which had revealed few detections of VOCs or PAH Compounds.	Not Applicable

mg/kg in sample FS1-4. Benzo(b)flouranthene was detected in excess of its RSCO in one sample, FS1-4 at 2.0 mg/kg. Chrysene was detected in excess of its RSCO in three samples ranging in concentrations from 0.41 mg/kg in sample FS1-1 to 2.3 mg/kg in sample FS1-4. None of the samples exhibited concentrations in excess of the guidance threshold of 500 mg/kg for total PAH Compounds. Analytical results are presented in Table 13A and 13B.

12.2.2 Area A-2/A-5

The Area A-5 excavation measured approximately 170 feet in length (east to west) and 150 feet in width (north to south) and extended 3.5 feet in depth, including location A-2. No readings above background were recorded on the PID. The northeastern corner of the Area A-5 excavation overlaps the southwestern excavation of the Area GW-14 (Area B-3/B-2) excavation. The majority of the excavation is located on Site 1, with approximately one-quarter of the excavation in Site 2A. Access to the underlying soils was possible after the removal of railroad tracks and concrete slabs. Visually impacted soils located from within the limits of the excavation consisted of a mix of cinder, ash, lime sludge/by-product fill, fine black sand and tan sand. The depth of the excavation was limited by the presence of groundwater (3.5 feet bgs) as well as the presence of lime sludge/by-product fill and numerous tree trunks (4 feet to 15 feet bgs).

Eight soil samples were collected from the interface of the sidewalls/ground water table. All samples were analyzed for PAH compounds (8260) and VOCs (8270). No VOCs were detected at concentrations above corresponding RSCOs and no sample exceeded the total VOC guidance threshold of 10 mg/kg. PAH compounds were either not detected or detected at concentrations below the RSCO in all but one sample. Benzo(a)pyrene was detected at 0.14 mg/kg in Sample A5-5. None of the samples collected exceeded the guidance threshold of 500 mg/kg for total PAH compounds. Please refer to Tables 14A and 14B for a summary of the analytical results.

12.2.3 Area B-3/B-2/Area GW-14

The Area B-3/B-2 excavation was extended to address visual indications of petroleum impacts resulting in the joining of the Area B-3/B-2 excavation and the Area GW-14 excavation. The Area GW-14 excavation extended approximately 305 feet in length (north to south) and 110 feet in width (east to west). The excavation was extended to a depth of approximately 3.5 feet; the excavation activities encountered groundwater at some locations. The majority (approximately three-quarters) of the excavation is located on Site 2A, with the remainder (approximately one-quarter) is located in Site 1. Visually impacted soils located from within the limits of the excavation ranged from cinder and ash fill, red clays, silts and sands. PID readings were continuously recorded

Table 13A
Soil Analytical Results
FS1 Area
Volatile Organic Compounds
Site 1 - HHMT- Port Ivory Facility

Location Sample Date Sample Depth (ft) Units	Recommended Soil Cleanup Objective mg/kg	FS1-1 12/3/2002 4.5-5.0 mg/kg	FS1-2 12/3/2002 4.5-5.0 mg/kg	FS1-3 12/3/2002 4.5-5.0 mg/kg	FS1-4 12/3/2002 4.5-5.0 mg/kg	FS1-5 12/3/2002 4.5-5.0 mg/kg	FS1-6 12/3/2002 4.5-5.0 mg/kg	FS1-7 12/3/2002 4.5-5.0 mg/kg	FS1-8 12/3/2002 4.5-5.0 mg/kg
1,2,4-trimethylbenzene	3.4	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
1,3,5-trimethlybenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
4-isopropyltoluene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0022	0.0020U	0.0016U
Benzene	0.06	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
Ethylbenzene	5.5	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
Isopropylbenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
M&p-Xylenes	1.2*	0.0012U	0.0028U	0.0032U	0.0039U	0.0035U	0.0025U	0.0040U	0.0032U
Methyl-t-butyl ether	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
Naphthalene	13	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
N-butylbenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
N-Propylbenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
O-Xylene	1.2*	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
Sec-butylbenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
T-Butlybenzene	NS	0.0012U	0.0014U	0.0016U	0.0020U	0.0018U	0.0013U	0.0020U	0.0016U
Toluene	1.5	0.0031	0.0037	0.0016U	0.0020U	0.0028	0.0025	0.0023	0.0016U
Total VOCs	10	0.0031	0.0037	ND	ND	0.0028	0.0047	0.0023	ND

U Undetectable Levels
ND Not Detected
NS No Standard
* Total Xylene Recommended Cleanup Standard

Table 13B
Soil Analytical Results
FS1 Area
PAH Compounds
Site 1 - HHMT-Port Ivory Facility

Location	**Recommended Soil Cleanup Objective mg/kg**	**FS1-1**	**FS1-2**	**FS1-3**	**FS1-4**	**FS1-5**	**FS1-6**	**FS1-7**	**FS1-8**
Sample Date		12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002
Sample Depth (ft)		4.5-5.0	4.5-5.0	4.5-5.0	4.5-5.0	4.5-5.0	4.5-5.0	4.5-5.0	4.5-5.0
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Acenaphthene	41	0.045J	0.47U	0.52U	2.0U	0.58U	0.42U	0.27J	0.54U
Anthracene	50	0.12J	0.47U	0.52U	2.0U	0.58U	0.42U	0.67	0.063J
Benzo(a)anthracene	0.224 or MDL	**0.27J**	0.47U	0.1J	**2.2**	0.19J	0.071J	**1.4**	0.22J
Benzo(a)pyrene	0.061 or MDL	**0.36J**	0.47U	**0.21J**	**1.7J**	**0.24J**	0.059J	**1**	**0.18J**
Benzo(b)fluoranthene	1.1	0.6	0.47U	0.36J	**2**	0.29J	0.10J	0.96	0.31J
Benzo(g,h,i)perylene	50	0.13J	0.47U	0.52U	0.69J	0.58U	0.42U	0.2J	0.54U
Benzo(k)fluoranthene	1.1	0.27J	0.47U	0.087J	0.52J	0.069J	0.42U	0.43J	0.54U
Chrysene	0.4	**0.41J**	0.14J	0.15J	**2.3**	0.35J	0.092J	**1.5**	0.32J
Dibenzo(a,h)Anthracene	0.014 or MDL	0.42U	0.47U	0.52U	2.0U	0.58U	0.42U	0.67U	0.54U
Fluoranthene	50	0.66	0.47U	0.17J	0.82J	0.24J	0.11J	1.9	0.28J
Fluorene	50	0.055J	0.47U	0.52U	2.0U	0.58U	0.42U	0.29J	0.54U
Indeno(1,2,3-cd)pyrene	3.2	0.13J	0.47U	0.52U	0.55J	0.58U	0.42U	0.18J	0.54U
Napthalene	13	0.14J	0.16J	0.082J	0.52J	0.58U	0.045J	2.2	0.19J
Phenanthrene	50	0.54	0.19J	0.16J	0.66J	0.20J	0.089J	3.5	0.35J
Pyrene	50	0.81	0.47U	0.17J	2	0.35J	0.11J	3.3	0.41J
Total PAH Coumpounds	500	4.54	0.49	1.489	13.96	1.929	1.516	17.8	2.323

U Undetectable Levels
MDL Method Detection Limit

Table 14A
Soil Analytical Results
A5 Area
Volatile Organic Compounds
Site 1 - HHMT-Port Ivory Facility

Location Sample Date Sample Depth (ft) Units	Recommended Soil Cleanup Objective mg/kg	A5-1 4/9/2003 3-3.5 mg/kg	A5-2 4/9/2003 3-3.5 mg/kg	A5-3 4/9/2003 3-3.5 mg/kg	A5-4 4/9/2003 3-3.5 mg/kg	A5-5 4/9/2003 3-3.5 mg/kg	A5-6 4/9/2003 3-3.5 mg/kg	A5-7 4/9/2003 3-3.5 mg/kg	A5-8 4/9/2003 3-3.5 mg/kg
1,2,4-trimethylbenzene	3.4	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
1,3,5-trimethlybenzene	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
4-isopropyltoluene	NS	0.0039	0.0046	0.0035	0.012	0.0084	0.0013U	0.0014U	0.0012U
Benzene	0.06	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
Ethylbenzene	5.5	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
Isopropylbenzene	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
M&P-Xylenes	1.2*	0.0031U	0.0027U	0.0027U	0.0029U	0.0025U	0.0026U	0.0027U	0.0025U
Methyl-t-butyl ether	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
Naphthalene	13	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
N-butylbenzene	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
N-Propylbenzene	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
O-Xylene	1.2*	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
Sec-butylbenzene	NS	0.0015U	0.0014U	0.0013U	0.0014U	0.0012U	0.0013U	0.0014U	0.0012U
Toluene	1.5	0.033	0.014	0.012	0.0065	0.021	0.031	0.018	0.02
Total VOCs	10	0.0072	0.0186	0.0155	0.0185	0.0294	0.031	0.018	0.02

U Undetectable Levels

NS No Standard

* Total Xylene Recommended Cleanup Standard

Table 14B
Soil Analytical Results
A5 Area
PAH Compounds
Site 1 - HHMT- Port Ivory Facility

Location	Recommended Soil Cleanup Objective mg/kg	A5-1	A5-2	A5-3	A5-4	A5-5	A5-6	A5-7	A5-8
Sample Date		4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003
Sample Depth (ft)		3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Acenaphthene	41	0.77U	0.68U	0.67U	0.71U	0.40U	0.66U	0.68U	0.62U
Anthracene	50	0.77U	0.68U	0.67U	0.71U	0.043J	0.66U	0.68U	0.62U
Benzo(a)anthracene	0.224 or MDL	0.77U	0.68U	0.67U	0.076J	0.15J	0.66U	0.68U	0.62U
Benzo(a)pyrene	0.061 or MDL	0.77U	0.68U	0.67U	0.71U	0.14J	0.66U	0.68U	0.62U
Benzo(b)fluoranthene	1.1	0.77U	0.68U	0.67U	0.71U	0.22J	0.66U	0.68U	0.62U
Benzo(g,h,i)perylene	50	0.77U	0.68U	0.67U	0.71U	0.40U	0.66U	0.68U	0.62U
Benzo(k)fluoranthene	1.1	0.77U	0.68U	0.67U	0.71U	0.083J	0.66U	0.68U	0.62U
Chrysene	0.4	0.77U	0.68U	0.67U	0.087J	0.18J	0.075J	0.68U	0.62U
Dibenzo(a,h)Anthracene	0.014 or MDL	0.77U	0.68U	0.67U	0.71U	0.40U	0.66U	0.68U	0.62U
Fluoranthene	50	0.77U	0.68U	0.67U	0.13J	0.26J	0.19J	0.14J	0.13J
Fluorene	50	0.77U	0.68U	0.67U	0.71U	0.40U	0.66U	0.68U	0.62U
Indeno(1,2,3-cd)pyrene	3.2	0.77U	0.68U	0.67U	0.71U	0.40U	0.66U	0.68U	0.62U
Napthalene	13	0.83	0.68U	0.67U	0.091J	0.070J	0.66U	0.68U	0.62U
Phenanthrene	50	0.77U	0.68U	0.67U	0.12J	0.20J	0.14J	0.68U	0.62U
Pyrene	50	0.77U	0.68U	0.67U	0.12J	0.30J	0.14J	0.10J	0.093J
Total PAH Compounds	500	0.83	ND	ND	0.624	1.646	0.545	0.24	0.223

U Undetectable Levels
ND Not Detected
MDL Method Detection Limit

and ranged from not detected to 1500 parts per million (ppm). No measurable free product was observed to be present or to form on groundwater, where present.

During the removal of soil, piping was noted extending north to south along the eastern portion of the excavation. All piping was removed from the excavation. Based on field observations and historical site maps, it appears that the piping was associated with a former storm sewer line. Additional piping was uncovered in the northern corner of the excavation. The piping was traced and noted to extend to the north. The expansion of the excavation revealed the presence of a UST measuring 4 feet wide by 8 feet long by 6 feet in diameter. Based on historical information, it appeared that the UST was utilized as part of a former oil/water separator system. The UST appeared intact and additional efforts were undertaken to inspect and removed the vessel. Inspection of the tank and the underlying soil did not reveal the presence of residual materials or visually impacted soils. Field screening did not reveal the any readings above background. Due to the presence of the UST, the excavation was expanded in an easterly direction. The extension revealed the presence of three concrete tubs. The tubs were connected with piping and appeared to be part of the oil/water separators system. The system was removed from the excavation for off-site disposal.

Twelve soil samples were collected from the sidewalls of the excavation at the soil/ground water interface (3-3.5 feet bgs). All soil samples were analyzed for PAH compounds (8260) and VOCs (8270). VOCs were either not detected or were detected at concentrations below corresponding RSCOs. No samples exceeded the RSCO of 10 mg/kg for total VOCs. Only two PAH compounds, benzo(a)anthracene and benzo(a)pyrene, were detected above corresponding RSCOs. Benzo(a)anthracene was detected at concentrations in excess of its RSCO in three samples ranging from 0.26 mg/kg in sample GW14-10 to 0.27 mg/kg in samples GW14-8 and GW14-12. Benzo(a)pyrene was detected at concentrations in excess of its RSCO in six samples ranging from 0.062 mg/kg in sample GW14-3 to 0.24 mg/kg in sample GW14-12. None of the samples were noted to exceed 50 mg/kg guidance for individual PAH compounds or the 500 mg/kg guidance criteria for total PAH compounds. Please refer to Tables 15A and 15B for a summary of all analytical results.

12.2.4 Area Wood-5

The Area Wood-5 excavation was extended to the locations of the RI soil borings, which were located approximately 15 feet to the north, east, south and west of location Wood-5. The excavation was advanced to a depth of approximately 3.5 feet bgs. Field screening did not identify the presence of petroleum impacts along sidewalls and limited evidence of such impacts were observed with respect to removed soil. Inspection of excavation sidewalls noted the presence of yellow-tan sands with some fine brown silt/clays with limited

Table 15A
Soil Analytical Results
GW14 Area
Volatile Organic Compounds
Site 1 - HHMT-Port Ivory Facility

Location	**Recommended**	**GW14-1**	**GW14-2**	**GW14-3**	**GW14-4**	**GW14-5**	**GW14-6**
Sample Date	**Soil Cleanup**	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003
Sample Depth (ft)	**Objective**	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5
Units	**mg/kg**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1,2,4-trimethylbenzene	3.4	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
1,3,5-trimethlybenzene	NS	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
4-isopropyltoluene	NS	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0024
Benzene	0.06	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
Ethylbenzene	5.5	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
Isopropylbenzene	NS	0.0014U	0.0013U	0.0048	0.0012U	0.0012U	0.0013U
M&p-Xylenes	1.2*	0.0028U	0.0026U	0.0024U	0.0025U	0.0024U	0.0025U
Methyl-t-butyl ether	NS	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
Naphthalene	13	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
N-butylbenzene	NS	0.0014U	0.0013U	0.0013	0.0012U	0.0012U	0.0013U
N-Propylbenzene	NS	0.0014U	0.0013U	0.0047	0.0012U	0.0012U	0.0013U
O-Xylene	1.2*	0.0014U	0.0013U	0.0012U	0.0012U	0.0012U	0.0013U
Sec-butylbenzene	NS	0.0014U	0.0013U	0.0046	0.0012U	0.0012U	0.0013U
T-butylbenzene	NS	0.0014U	0.0013U	0.0049	0.0012U	0.0012U	0.0013U
Toluene	1.5	0.011	0.0084	0.011	0.0084	0.0076	0.0099
Total VOCs	10	0.011	0.0084	0.0313	0.0084	0.0076	0.0123

U Undetectable Levels
ND Not Detected
NS No Standard
* Total Xylene Recommended Cleanup Standard

Table 15A
Soil Analytical Results
GW14 Area
Volatile Organic Compounds
Site 1 - HHMT-Port Ivory Facility

Location Sample Date Sample Depth (ft) Units	Recommended Soil Cleanup Objective mg/kg	GW14-7 4/9/2003 3-3.5 mg/kg	GW14-8 4/9/2003 3-3.5 mg/kg	GW14-9 4/24/2003 3-3.5 mg/kg	GW14-10 4/24/2003 3-3.5 mg/kg	GW14-11 4/24/2003 3-3.5 mg/kg	GW14-12 4/24/2003 3-3.5 mg/kg
1,2,4-trimethylbenzene	3.4	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
1,3,5-trimethlybenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
4-isopropyltoluene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0088	0.0086
Benzene	0.06	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
Ethylbenzene	5.5	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
Isopropylbenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
M&p-Xylenes	1.2*	0.0029U	0.0025U	0.0028U	0.0022U	0.0022U	0.0022U
Methyl-t-butyl ether	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
Naphthalene	13	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
N-butylbenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
N-Propylbenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
O-Xylene	1.2*	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
Sec-butylbenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
T-butylbenzene	NS	0.0014U	0.0012U	0.0014U	0.0011U	0.0011U	0.0011U
Toluene	1.5	0.015	0.0054	0.0014U	0.0011U	0.0011U	0.0011U
Total VOCs	10	0.015	0.0054	ND	ND	0.0088	0.0086

U Undetectable Levels
ND Not Detected
NS No Standard
* Total Xylene Recommended Cleanup Standard

Table 15B
Soil Analytical Results
GW14 Area
PAH Compounds
Site 1 - HHMT-Port Ivory, Facility

Location	Recommended Soil Cleanup Objective mg/kg	GW14-1	GW14-2	GW14-3	GW14-4	GW14-5	GW14-6	GW14-7	GW14-8	GW14-9	GW14-10	GW14-11	GW14-12
Sample Date		4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/9/2003	4/24/2003	4/24/2003	4/24/2003	4/24/2003
Sample Depth (ft)		3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Acenaphthene	41	0.69U	0.64U	0.61U	0.62U	0.60U	0.63U	0.096J	0.14J	0.69U	0.14J	0.088J	0.079J
Anthracene	50	0.69U	0.64U	0.61U	0.11J	0.60U	0.63U	0.71U	0.62U	0.69U	0.15J	0.062J	0.12J
Benzo(a)anthracene	0.224 or MDL	0.69U	0.64U	0.086J	0.16J	0.60U	0.082J	0.084J	**0.27J**	0.69U	**0.26J**	0.13J	**0.27J**
Benzo(a)pyrene	0.061 or MDL	0.69U	0.64U	**0.062J**	**0.11J**	0.60U	0.63U	0.71U	**0.23J**	0.69U	**0.17J**	**0.10J**	**0.24J**
Benzo(b)fluoranthene	1.1	0.69U	0.64U	0.14J	0.16J	0.60U	0.084J	0.18J	0.53J	0.69U	0.36J	0.18J	0.35J
Benzo(g,h,i)perylene	50	0.69U	0.64U	0.61U	0.62U	0.60U	0.63U	0.71U	0.093J	0.69U	0.56U	0.54J	0.081J
Benzo(k)fluoranthene	1.1	0.69U	0.64U	0.61U	0.070J	0.60U	0.63U	0.71U	0.14J	0.69U	0.12J	0.54J	0.12J
Chrysene	0.4	0.69U	0.64U	0.11J	0.18J	0.60U	0.075J	0.12J	0.37J	0.69U	0.31J	0.14J	0.29J
Dibenzo(a,h)Anthracene	0.014 or MDL	0.69U	0.64U	0.61U	0.62U	0.60U	0.63U	0.71U	0.62U	0.69U	0.56U	0.54U	0.56U
Fluoranthene	50	0.69U	0.64U	0.20J	0.35J	0.60U	0.21J	2.4	8.7	0.15J	0.91	0.37J	0.86
Fluorene	50	0.69U	0.64U	0.61U	0.080J	0.60U	0.63U	0.71U	0.62U	0.69U	0.12J	0.071J	0.098J
Indeno(1,2,3-cd)pyrene	3.2	0.69U	0.64U	0.61U	0.62U	0.60U	0.63U	0.71U	0.099J	0.69U	0.56U	0.54U	0.079J
Napthalene	13	0.074J	0.64U	0.61U	0.62U	0.60U	0.63U	0.16J	0.15J	0.095J	0.20J	0.083J	0.089J
Phenanthrene	50	0.69U	0.64U	0.15J	0.19J	0.60U	0.19J	1.5	0.62U	0.16J	0.79	0.24J	0.76
Pyrene	50	0.69U	0.64U	0.18J	0.30J	0.60U	0.17J	0.22J	0.84	0.10J	0.61	0.33J	0.55J
Total PAH Compounds	500	0.074	ND	0.928	1.71	ND	0.811	4.76	11.562	0.505	4.14	2.874	3.986

U Undetectable Levels
ND Not Detected
MDL Method Detection Limit

observation of cinders. Based on a visual review and analytical results from RI sampling, the issue at this location appears to have been associated with residual cinder material (ubiquitous to the fill material) rather than petroleum. Thus, no confirmation samples were warranted or obtained for Area Wood-5.

12.2.5 Area UST2

No excavation activities have been performed at Area UST2. This area is currently undergoing geotechnical review with respect to proposed redevelopment. As such, the Port Authority will provide additional information pertaining to remedial actions at Area UST2 under separate cover.

13.0 SUMMARY OF PROPOSED SITE DEVELOPMENT ACTIONS

The Port Authority is currently redeveloping Site 1 for use as an intermodal facility, which will function as part of the larger container terminal/intermodal facility including the entire HHMT-Port Ivory Facility. The findings from the assessment/investigation actions have revealed that 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 and that contamination can be addressed through site redevelopment.

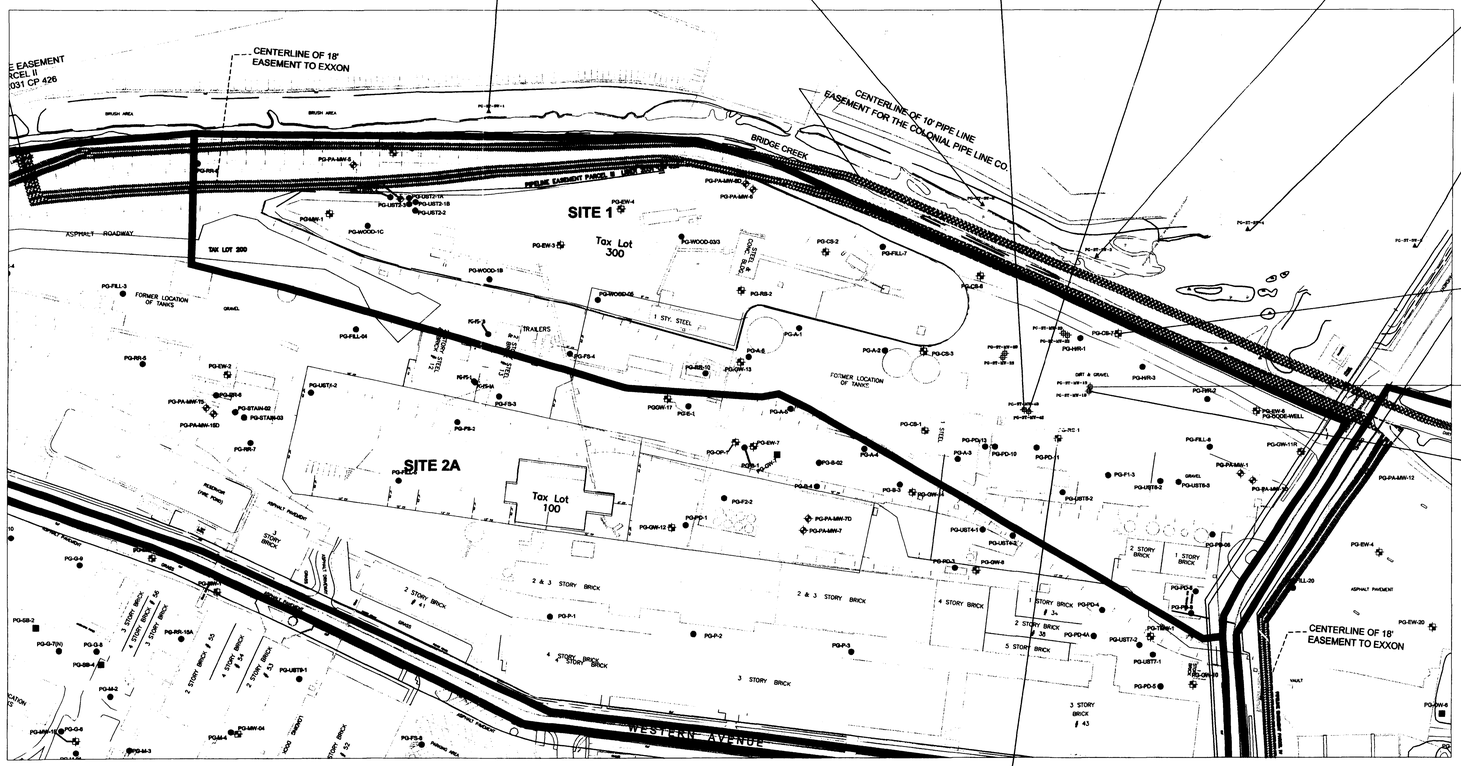
The Port Authority had developed Preliminary Site Plans for the proposed redevelopment of Sites 1 and 2A/2B. Please refer to Appendix E for information related to site development including a Preliminary Site Plan dated January 2003 and a Preliminary Site Plan with Phasing, also dated January 2003. Additional site development information is provided on a schematic drawing designated as SK16 and dated October 13, 2003; drawing SK16 is also provided in Appendix E. At this time, no buildings are located at Site 1 and current development plans do not include the construction of any buildings within the limits of Site 1. To address structural issues presented by the presence of fill material, the Port Authority's development plan includes a process of surcharging portions of Site 1 and Site 2A/2B, with geotechnically suitable clean fill, to achieve a stable base for future construction. Figure SK1, Sequencing of Surcharge Areas along with an associated schedule, is provided in Appendix E.

As part of the geotechnical site preparation work, the Port Authority performed a surcharge pilot study at an area of Site 1 in 2002/2203. The study included the systematic placement of soil/fill over an area measuring approximately 75 feet by 75 feet and the measurement of settlement. As part of the pilot study, the Port Authority reviewed potential environmental impacts to groundwater and Bridge Creek. The environmental review for groundwater included the installation and sampling of nested monitoring well pairs (one shallow and one deep well) at four locations around the pilot study area. The wells were constructed approximately 15 feet

from the edge of the surcharge material pile. Groundwater samples were collected from the eight newly installed wells as well as from two additional existing well locations, PG-CS-7 and PG-RS-1. Three rounds of groundwater sampling were performed on the two existing wells with all rounds including phenols and BTEX (benzene, toluene, ethylbenzene and xylenes) and one round including phenols, BTEX, TAL Metals and pH. One round of groundwater sampling was performed for the eight newly installed wells with analysis for TAL Metals and pH. A summary of analytical results is provided in Tables 16A (BTEX), 16B (phenols), and 16 (TAL Metals and pH). The pilot study area and well locations are presented on Figure 22. In addition, exceedences of applicable groundwater SVGs are also presented, by location, on Figure 22. A summary of analytical results is presented in Tables 16A-16C.

With respect to Bridge Creek, the environmental review included the inspection of the eastern bank of Bridge Creek for the presence of seeps, precipitate, bank failure or other evidence of mass movement of subsurface material or liquids. In addition, two rounds of surface water sampling were performed as part of the surcharge pilot study. Five samples were collected from representative locations during both rounds and samples were analyzed for TAL Metals and pH. The surface water locations and associated analytical results are presented on Figure 22 and Table 16C. Given the purpose of the study, the surface water samples were compared to applicable groundwater SVGs.

Overall, the environmental evaluation performed as part of the pilot study did not reveal any adverse impacts as a result of the compaction process. Inspection of the eastern bank did not reveal the presence of seeps, additional/increased occurrence of precipitate, bank failure or other evidence of mass movement of subsurface material or liquids. Analytical results from surface water and groundwater sampling did not reveal any increased contaminant concentrations over the period of study. It should be noted that m&p xylenes (reported as a combined concentration) was/were detected in the groundwater sample from the third round of sampling of PG-CS-7 but not in the first or second rounds. This is not regarded as increase in contaminant concentration during the pilot study since xylenes were detected at a higher concentration in the SI sampling round performed in November 2000. As shown on the surcharging phasing study and schedule, surcharging has been completed at the two areas labeled Phase 1A has been completed and has been initiated at the area labeled Phase 1B North. Although the pilot study did not reveal the presence of adverse impacts to groundwater or Bridge Creek, additional monitoring efforts are proposed to confirm the findings of the pilot study. The proposed actions will mimic those performed during the pilot study but will utilize five existing monitoring wells situated in both Site 1 and Site 2A at locations adjacent to Bridge Creek; the proposed locations include EW-1 (Site 2A), MW-5 (Site 1) MW-6/MW-6D (Site 2A) and CS-7 (Site 2A). The proposed monitoring program will also include sampling of



PG-ST-SW-1

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON	610***
MAGNESIUM	600,000
SILVER	4,800,000

PG-ST-SW-2

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
MAGNESIUM	630,000
SODIUM	5,100,000

PG-ST-MW-4D

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	22,000***
IRON (filtered)	19,000***
MANGANESE (unfiltered)	5,200***
MANGANESE (filtered)	4,800***
SODIUM (unfiltered)	2,100,000
SODIUM (filtered)	2,000,000

PG-ST-MW-4S

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
ANTIMONY (filtered)	75
ARSENIC (filtered)	69
BERYLLIUM (filtered)	40
IRON (unfiltered)	3,300***
IRON (filtered)	550***
SODIUM (unfiltered)	400,000
SODIUM (filtered)	470,000
THALLIUM (filtered)	42

PG-ST-SW-3

DATE SAMPLED	SURFACE WATER
MATRIX	RESULTS (ug/L)
ANALYTE	
METALS	
IRON	750***
MAGNESIUM	130,000
SODIUM	1,300,000

PG-ST-SW-4

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
MAGNESIUM	610,000
SODIUM	4,900,000

PG-ST-SW-5

DATE SAMPLED	SURFACE WATER
MATRIX	RESULTS (ug/L)
ANALYTE	
METALS	
MAGNESIUM	630,000
SODIUM	5,000,000

PG-CS-7

DATE SAMPLED	10/15/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
SODIUM (unfiltered)	79,000
SODIUM (filtered)	89,000

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
SODIUM (unfiltered)	130,000
SODIUM (filtered)	130,000

DATE SAMPLED	12/2/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
BTEX	
M&P-XYLENES	7

PG-ST-MW-1S

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
ARSENIC (unfiltered)	90
ARSENIC (filtered)	53
IRON (unfiltered)	2,200**
NICKEL (filtered)	110
SODIUM (unfiltered)	1,500,000
SODIUM (filtered)	1,600,000

PG-ST-MW-1D

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	5,200***
IRON (filtered)	3,500***
SODIUM (unfiltered)	660,000
SODIUM (filtered)	720,000

PG-RS-1

DATE SAMPLED	10/15/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	20,000***
IRON (filtered)	180***
SODIUM (unfiltered)	29,000
SODIUM (filtered)	28,000
ACID EXTRACTABLES	
TOTAL PHENOLS	1.1

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	1,400***
IRON (filtered)	950***
SODIUM (unfiltered)	32,000
SODIUM (filtered)	33,000

DATE SAMPLED	12/2/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
ACID EXTRACTABLES	
PHENOL	3
TOTAL PHENOL	6.8

NYSDEC GROUNDWATER CLEANUP STANDARDS AND CLEANUP GUIDANCE VALUES

ANALYTE	RCS (ug/l)	RCG (ug/l)
VOCs		
M&P Xylenes:	5&5	NG
ACID EXTRACTABLES		
Phenol:	1	NG
Total Phenol:	1	NG

NG - NO GUIDANCE VALUE

100 0 100 200
SCALE IN FEET

Notes:
1. Site 1, 2A/2B, and 3 descriptions as per July 2004 VCP Agreements.
2. This map presents concentrations of BTEX, Acid Extractables, and Metals at levels above NYSDEC Groundwater Cleanup Standards and Groundwater Cleanup Guidance Values.

LEGEND

- UTILITY EASEMENT
- SITE BOUNDARY
- PG-RS-1 — PRE-EXISTING P&G MONITORING WELL LOCATION
- PG-SB-2 — PRE-EXISTING P&G SOIL BORING LOCATION
- PG-PA-MW-5 — YEAR 2000 SITE INVESTIGATION MONITORING WELL LOCATION
- PG-WOOD-03/3 — YEAR 2000 SITE INVESTIGATION SOIL BORING LOCATION
- PG-ST-MW-1D — SURCHARGE MONITORING WELL LOCATIONS
- PG-ST-SW-4 — SURCHARGE SURFACE WATER SAMPLE LOCATIONS

Sheet of

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

Rev. Date	Revision	Approved

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1 AND BLOCK 1338, LOT 1) HHMT-PORT IVORY FACILITY

SURCHARGE MONITORING WELL LOCATIONS MAP AND ANALYTICAL DATA

Designed by Drawn by Checked by

Date

Contract Number

Drawing Number FIGURE 22

T:

Surcharge Pilot Study -Groundwater Results

BTEX

Site 1: HHMT - Port Ivory Facility

Location Date LAB ID# Concentration	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	**CS-7** 10/15/2002 AB70453 UG/L	**RS-1** 10/15/2002 AB70455 UG/L	**FB-1** 10/15/2002 AB70457 UG/L	**TB-1** 10/15/2002 AB70459 UG/L	**CS-7** 11/6/2002 AB72292 UG/L	**RS-1** 11/6/2002 AB72294 UG/L	**TB-1** 11/6/2002 AB72304 UG/L	**FB-1** 11/6/2002 AB72305 UG/L	**TB-1** 11/7/2002 AB72397 UG/L	**CS-7** 12/2/2002 AB74079 UG/L	**RS-1** 12/2/2002 AB74081 UG/L
Benzene	1	NG	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U	0.49U
Ethylbenzene	5	NG	0.63U	0.63U	0.63U	0.63U	0.63U	0.63U	0.63U	0.63U	0.63U	2.4	0.63U
m&p-xylenes	5&5	NG	1.1U	1.1U	1.1U	1.1U	1.1U	1.1U	1.1U	1.1U	1.1U	7	1.1U
O-xylenes	5	NG	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U	0.59U
Toluene	5	NG	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U	0.79U

U Undetectable Levels

NG No Guidance

Table

Surcharge Pilot Study - Groundwater Results
Acid Extractables
Site 1: HHMT Port Ivory Facility

Location Date Lab ID Concentration	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	**CS-7** 10/15/2002 AB70453 UG/L	**RS-1** 10/15/2002 AB70455 UG/L	**FB-1** 10/15/2002 AB70457 UG/L	**CS-7** 11/6/2002 AB72292 UG/L
2,4,5-trichlorophenol	NS	NG	0.6U	0.6U	0.6U	0.6U
2,4,6-trichlorophenol	NS	NG	0.65U	0.65U	0.65U	0.65U
2,4-dichlorophenol	5	NG	0.57U	0.57U	0.57U	0.57U
2,4-dimethylphenol	NS	50	0.49U	0.49U	0.49U	0.49U
2,4-dinitrophenol	NS	10	3.1U	3.1U	3.1U	3.1U
2-chlorophenol	NS	NG	0.49U	0.49U	0.49U	0.49U
2-methylphenol	NS	NG	0.61U	0.61U	0.61U	0.61U
2-nitrophenol	NS	NG	0.64U	0.64U	0.64U	0.64U
3&4-methylphenol	NS	NG	5.4U	1.1J	5.4U	5.4U
4,6-dinitro-2-methylphenol	NS	NG	0.36U	0.36U	0.36U	0.36U
4-chloro-3-methylphenol	NS	NG	0.38U	0.38U	0.38U	0.38U
4-nitrophenol	NS	NG	0.27U	0.27U	0.27U	0.27U
pentachlorophenol	1 (total phenols)	NG	0.57U	0.57U	0.57U	0.57U
phenol	1 (total phenols)	NG	0.14U	0.14U	0.14U	0.14U
Total phenols	1	NG	ND	1.1	ND	ND

U Undetectable Levels
NS No Standard
NG No Guidance
ND Not Detected

Table 16B

Surcharge Pilot Study - Groundwater Results

Acid Extractables

Site 1: HHMT Port Ivory Facility

Location Date Lab ID Concentration	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	**RS-1** 11/6/2002 AB72294 UG/L	**FB-1** 11/6/2002 AB72305 UG/L	**CS-7** 12/2/2002 AB74079 UG/L	**RS-1** 12/2/2002 AB74081 UG/L
2,4,5-trichlorophenol	NS	NG	0.6U	0.6U	0.6U	0.6U
2,4,6-trichlorophenol	NS	NG	0.65U	0.65U	0.65U	0.65U
2,4-dichlorophenol	5	NG	0.57U	0.57U	0.57U	0.57U
2,4-dimethylphenol	NS	50	0.49U	0.49U	0.49U	0.49U
2,4-dinitrophenol	NS	10	3.1U	3.1U	3.1U	3.1U
2-chlorophenol	NS	NG	0.49U	0.49U	0.49U	0.49U
2-methylphenol	NS	NG	0.61U	0.61U	0.61U	0.61U
2-nitrophenol	NS	NG	0.64U	0.64U	0.64U	0.64U
3&4-methylphenol	NS	NG	5.4U	5.4U	5.4U	3.8J
4,6-dinitro-2-methylphenol	NS	NG	0.36U	0.36U	0.36U	0.36U
4-chloro-3-methylphenol	NS	NG	0.38U	0.38U	0.38U	0.38U
4-nitrophenol	NS	NG	0.27U	0.27U	0.27U	0.27U
pentachlorophenol	1 (total phenols)	NG	0.57U	0.57U	0.57U	0.57U
phenol	1 (total phenols)	NG	0.14U	0.14U	0.14U	3
Total phenols	1	NG	ND	ND	ND	6.8

U Undetectable Levels

NS No Standard

NG No Guidance

ND Not Detected

Tal

Surcharge Pilot Study - Groundwater and Surface Water Results
Metals and pH
Site 1: HHMT - Port Ivory Facility

Location Date Lab ID Concentration Filtered or Unfiltered	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	ST-SW1 10/21/2002 AB70895 UG/L	ST-SW2 10/21/2002 AB70896 UG/L	ST-SW3 10/21/2002 AB70460 UG/L	ST-SW4 10/21/2002 AB70897 UG/L	ST-SW5 10/21/2002 AB70898 UG/L	CS-7 10/15/2002 AB70453 UG/L unfiltered	CS-7 10/15/2002 AB70454 UG/L filtered	RS-1 10/15/2002 AB70455 UG/L unfiltered
Aluminum	NS	NG	570	400	140	190	330	100U	100U	170
Antimony	3	NG	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U
Arsenic	25	NG	4.0U	5.4	4.0U	10	4.0U	4.0U	4.0U	4.1
Barium	1000	NG	27	25U	45	25U	25U	25U	25U	59
Beryllium	NS	3	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U
Cadmium	5	NG	2.5	2.5	2.0U	2.5	2.5	2.0U	2.0U	2.0U
Calcium	NS	NG	150000	160000	93000	170000	160000	110000	120000	130000
Chromium	50	NG	25U	25U	25U	25U	25U	25U	25U	36
Cobalt	NS	NG	10U	10U	10U	10U	10U	10U	10U	10U
Copper	200	NG	25U	25U	25U	25U	25U	25U	25U	25U
Iron	300***	NG	**610*** **	**280*** **	**790*** **	150U	150U	210	150U	**20000*** **
Lead	25	NG	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Magnesium	NS	35000	**600000**	**630000**	**130000**	**610000**	**630000**	**47000**	**52000**	27000
Manganese	300***	NG	**82*** **	**69*** **	**260*** **	67	61	25U	25U	**180*** **
Nickel	100	NG	25U	25U	25U	25U	25U	25U	25U	46
Potassium	NS	NG	250000	260000	58000	250000	260000	13000	15000	5800
Selenium	10	NG	25U	25U	25U	25U	25U	25U	25U	25U
Silver	50	NG	**4800000**	10U	10U	10U	10U	10U	10U	10U
Sodium	20000	NG	50000U	**5100000**	**1300000**	**4900000**	**5000000**	**79000**	**89000**	**29000**
Thallium	NS	0.5	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Vanadium	NS	NG	25U	25U	25U	25U	25U	25U	25U	25U
Zinc	NS	2000	47	34	25U	32	31	64	67	440
Mercury	0.7	NG	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
pH	NS	NG	7.5	7.6	7.7	7.6	7.6	7	7	7.2

ND No Data
U Undetectable Levels
NS No Standard
NG No Guidance
ST-SW1 through ST-SW5 represents samples collected from surface water
*** Total for Iron and Manganese is > 500
Note-1: pH listed is the pH recorded in the field
Note-2: ST-SW1 through ST-SW5 represents samples collected from surface water

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Surcharge Pilot Study - Groundwater and Surface Water Results
Metals and pH
Site 1: HHMT - Port Ivory Facility

Location	Recommended	Recommended	RS-1	FB-1	FB-1	ST-SW1	ST-SW2	ST-SW3	ST-SW4	ST-SW5
Date	Groundwater	Groundwater	10/15/2002	10/15/2002	10/15/2002	11/7/2002	11/7/2002	11/7/2002	11/7/2002	11/7/2002
Lab ID	Cleanup	Cleanup	AB70456	AB70457	AB70458	AB72569	AB72570	AB72571	AB72572	AB72573
Concentration	Standard	Guidance	UG/L	UG/L	UG/L	ug/l	ug/l	ug/l	ug/l	ug/l
Filtered or Unfiltered	UG/L	UG/L	filtered	unfiltered	filtered					
Aluminum	NS	NG	100U	100U	100U	430	420	340	550	290
Antimony	3	NG	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U
Arsenic	25	NG	4.0U	4.0U	4.0U	4.0U	4.0U	4.1	5.4	4.0U
Barium	1000	NG	52	25U	25U	28	25U	37	25U	25U
Beryllium	NS	3	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U
Cadmium	5	NG	2.0U	2.0U	2.0U	2.6	2.8	2.6	2.8	2.8
Calcium	NS	NG	130000	1000U	1000U	160000	170000	170000	180000	180000
Chromium	50	NG	25U	25U	25U	25U	25U	25U	25U	25U
Cobalt	NS	NG	10U	10U	10U	10U	10U	10U	10U	10U
Copper	200	NG	25U	25U	25U	25U	25U	25U	25U	25U
Iron	300***	NG	**380*** **	150U	150U	**400*** **	290	**360*** **	**460*** **	150U
Lead	25	NG	5.0U	5.0U	5.0U	5U	5U	5U	5U	5U
Magnesium	NS	35000	26000	1000U	1000U	**620000**	**680000**	**610000**	**710000**	**730000**
Manganese	300***	NG	**170*** **	25U	25U	**72*** **	53	**100*** **	**48*** **	36
Nickel	100	NG	25U	25U	25U	25U	25U	25U	25U	25U
Potassium	NS	NG	5500	2500U	2500U	300000	340000	300000	360000	380000
Selenium	10	NG	25U	25U	25U	25U	25U	25U	25U	25U
Silver	50	NG	10U	10U	10U	10U	10U	10U	10U	10U
Sodium	20000	NG	**28000**	25000U	25000U	**5100000**	**5500000**	**5000000**	**5500000**	**5900000**
Thallium	NS	0.5	5.0U	5.0U	5.0U	5U	5U	5U	5U	5U
Vanadium	NS	NG	25U	25U	25U	25U	25U	25U	25U	25U
Zinc	NS	2000	25U	25U	25U	26	25U	28	25U	25U
Mercury	0.7	NG	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
pH	NS	NG	7.2	4.2	4.2	7.7	7.6	7.7	7.8	7.8

ND No Data
U Undetectable Levels
NS No Standard
NG No Guidance
ST-SW1 through ST-SW5 represents samples collected from
*** Total for Iron and Manganese is > 500
Note-1: pH listed is the pH recorded in the field
Note-2: ST-SW1 through ST-SW5 represents samples collected from surface water

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Surcharge Pilot Study - Groundwater and Surface Water Results
Metals and pH
Site 1: HHMT - Port Ivory Facility

Location Date Lab ID Concentration Filtered or Unfiltered	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	CS-7 11/6/2002 AB72292 UG/L unfiltered	CS-7 11/6/2002 AB72293 UG/L filtered	RS-1 11/6/2002 AB72294 UG/L unfiltered	RS-1 11/6/2002 AB722945 UG/L filtered	ST-4S 11/6/2002 AB72296 UG/L unfiltered	ST-4S 11/6/2002 AB72297 UG/L filtered	ST-4D 11/6/2002 AB72298 UG/L unfiltered	ST-4D 11/6/2002 AB72299 UG/L filtered
Aluminum	NS	NG	100U	100U	100U	100U	970	2300	140	100U
Antimony	3	NG	7.5U	7.5U	7.5U	7.5U	7.5U	**75**	7.5U	7.5U
Arsenic	25	NG	7.5	5.9	4.1	4.6	15	**69**	8.1	8.3
Barium	1000	NG	25U	25U	78	76	80	130	780	710
Beryllium	NS	3	4U	4U	4U	4U	4U	**40**	4U	4U
Cadmium	5	NG	2U	2U	2U	2U	2U	3.2	2U	2U
Calcium	NS	NG	83000	81000	130000	120000	200000	90000	290000	230000
Chromium	50	NG	25U	25U	25U	25U	25U	46	25U	25U
Cobalt	NS	NG	10U	10U	10U	10U	10U	220	10U	10U
Copper	200	NG	25U	25U	25U	25U	25U	160	25U	25U
Iron	300***	NG	150U	150U	**1400*** **	**950*** **	**3300*** **	**550*** **	**22000*** **	**19000*** **
Lead	25	NG	5U	5U	5U	5U	5U	5U	5U	5U
Magnesium	NS	35000	34000	34000	18000	19000	2000	**52000**	**97000**	**89000**
Manganese	300***	NG	25U	25U	**170****	**170*** **	**28*** **	**150*** **	**5200*** **	**4800*** **
Nickel	100	NG	25U	25U	25U	25U	25U	49	25U	25U
Potassium	NS	NG	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	10	NG	25U	25U	25U	25U	25U	25U	25U	25U
Silver	50	NG	10U	10U	10U	10U	10U	10U	10U	10U
Sodium	20000	NG	**130000**	**130000**	**32000**	**33000**	**400000**	**470000**	**2100000**	**2000000**
Thallium	NS	0.5	5U	5U	5U	5U	5U	**42**	5U	5U
Vanadium	NS	NG	25U	25U	25U	25U	25U	25U	28	26
Zinc	NS	2000	49	25U	130	34	26	920	25U	25U
Mercury	0.7	NG	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
pH	NS	NG	8	8	8	8	11	11	7	7

ND No Data
U Undetectable Levels
NS No Standard
NG No Guidance
ST-SW1 through ST-SW5 represents samples collected from
*** Total for Iron and Manganese is > 500
Note-1: pH listed is the pH recorded in the field
Note-2: ST-SW1 through ST-SW5 represents samples collected from surface water

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Surcharge Pilot Study - Groundwater and Surface Water Results
Metals and pH
Site 1: HHMT - Port Ivory Facility

Location	Recommended	Recommended	ST-1S	ST-1S	ST-1D	ST-1D	FB-1	FB-1	FB-1	FB-1
Date	Groundwater	Groundwater	11/6/2002	11/6/2002	11/6/2002	11/6/2002	11/6/2002	11/6/2002	11/7/2002	11/7/2002
Lab ID	Cleanup	Cleanup	AB72300	AB72301	AB72302	AB72303	AB72305	AB72306	AB72395	AB72396
Concentration	Standard	Guidance	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Filtered or Unfiltered	UG/L	UG/L	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered
Aluminum	NS	NG	3200	350	910	140	100U	100U	100U	100U
Antimony	3	NG	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U
Arsenic	25	NG	**90**	**53**	8	6.2	4U	4U	4U	4U
Barium	1000	NG	190	150	84	74	25U	25U	25U	25U
Beryllium	NS	3	4U	4U	4U	4U	4U	4U	4U	4U
Cadmium	5	NG	3.2	2.5	2U	2U	2U	2U	2U	2U
Calcium	NS	NG	690000	350000	74000	74000	1000U	1000U	1000U	1000U
Chromium	50	NG	25U	25U	25U	25U	25U	25U	25U	25U
Cobalt	NS	NG	10U	10U	10U	10U	10U	10U	10U	10U
Copper	200	NG	25U	25U	25U	25U	25U	25U	25U	25U
Iron	300***	NG	**2200*** **	150U	**5200*** **	**3500*** **	150U	150U	150U	150U
Lead	25	NG	5U	5U	5U	5U	5U	5U	5U	5U
Magnesium	NS	35000	12000	1000U	**58000**	**59000**	1000U	1000U	1000U	1000U
Manganese	300***	NG	**54*** **	25U	**120*** **	**110*** **	25U	25U	25U	25U
Nickel	100	NG	92	**110**	25U	25U	25U	25U	25U	25U
Potassium	NS	NG	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	10	NG	25U	25U	25U	25U	25U	25U	25U	25U
Silver	50	NG	10U	10U	10U	10U	10U	10U	10U	10U
Sodium	20000	NG	**1500000**	**1600000**	**660000**	**720000**	2500U	2500U	2500U	2500U
Thallium	NS	0.5	5U	5U	5U	5U	5U	5U	5U	5U
Vanadium	NS	NG	32	25U	25U	26	25U	25U	25U	25U
Zinc	NS	2000	44	25U	25U	25U	25U	25U	25U	25U
Mercury	0.7	NG	0.2U	0.21	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
pH	NS	NG	13	13	7.3	7.3	6.5	6.5	6.8	6.8

ND No Data
U Undetectable Levels
NS No Standard
NG No Guidance
ST-SW1 through ST-SW5 represents samples collected from
*** Total for Iron and Manganese is > 500
Note-1: pH listed is the pH recorded in the field
Note-2: ST-SW1 through ST-SW5 represents samples collected from surface water

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Surcharge Pilot Study - Groundwater and Surface Water Results
Metals and pH
Site 1: HHMT - Port Ivory Facility

Location Date Lab ID Concentration Filtered or Unfiltered	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	ST-2S 11/7/2002 AB72398 UG/L unfiltered	ST-2S 11/7/2002 AB72398 UG/L filtered	ST-2D 11/7/2002 AB72400 UG/L unfiltered	ST-2D 11/7/2002 AB72401 UG/L filtered	ST-3D 11/7/2002 AB72402 UG/L unfiltered	ST-3D 11/7/2002 AB72403 UG/L filtered	ST-3S 11/7/2002 AB72404 UG/L unfiltered	ST-3S 11/7/2002 AB72405 UG/L filtered
Aluminum	NS	NG	2400	800	1400	670	680	100U	4400	420
Antimony	3	NG	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U	7.5U
Arsenic	25	NG	**28**	23	8.2	6.2	8.2	4U	61	9.7
Barium	1000	NG	160	180	120	110	91	83	510	430
Beryllium	NS	3	4U	4U	4U	4U	4U	4U	4U	4U
Cadmium	5	NG	2U	2U	2U	2U	2U	2U	2.7	2U
Calcium	NS	NG	420000	420000	120000	110000	220000	220000	880000	430000
Chromium	50	NG	25U	25U	25U	25U	25U	25U	25U	25U
Cobalt	NS	NG	10U	10U	10U	10U	10U	10U	10U	10U
Copper	200	NG	25U	25U	25U	25U	25U	25U	25U	25U
Iron	300***	NG	**1100*** **	150U	**6600*** **	**4900*** **	**8500*** **	**8200*** **	**2100*** **	150U
Lead	25	NG	6.7	5U	5U	5U	5U	5U	5U	5U
Magnesium	NS	35000	2400	1000U	**83000**	**82000**	**130000**	**140000**	13000	1000U
Manganese	300***	NG	25U	25U	**430*** **	**400*** **	**2300*** **	**2500*** **	**58*** **	25U
Nickel	100	NG	39U	37	25U	25U	25U	25U	39	25U
Potassium	NS	NG	52000	57000	23000	32000	72000	74000	250000	2500
Selenium	10	NG	25U	25U	25U	25U	25U	25U	25U	25U
Silver	50	NG	10U	10U	10U	10U	10U	10U	10U	10U
Sodium	20000	NG	**780000**	**850000**	**740000**	**540000**	**2200000**	**2300000**	**2100000**	**25000**
Thallium	NS	0.5	5U	5U	5U	5U	5U	5U	**7.1**	5U
Vanadium	NS	NG	27	25U	25U	25U	55	52	27	25U
Zinc	NS	2000	56	25U	25U	25U	25U	25U	130	25U
Mercury	0.7	NG	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	**1.7**	0.2U
pH	NS	NG	13	13	7.8	7.8	7.2	7.2	13	13

ND No Data
U Undetectable Levels
NS No Standard
NG No Guidance
ST-SW1 through ST-SW5 represents samples collected from
*** Total for Iron and Manganese is > 500
Note-1: pH listed is the pH recorded in the field
Note-2: ST-SW1 through ST-SW5 represents samples collected from surface water

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two sets of wells (MW-15/MW-15D located on Site 2A and MW-1/MW-1D located at Site 1) to provide additional groundwater information. The samples will be analyzed for TCL VOCs, phenols, TAL Metals and pH. Based on current information, four rounds of sampling will be performed over the next 12 months with collection occurring once per quarter.

The monitoring program will include a review of conditions at Bridge Creek and the sampling of both surface water and sediment/precipitate. The proposed sediment/surface water sampling will be performed in conjunction with the proposed groundwater sampling events and will include samples from five locations. Sediment and surface water samples also will be analyzed for TCL VOCs, phenols, TAL Metals and pH. In addition, monthly inspection will be performed to document conditions along the eastern bank of Bridge Creek. The inspections will be performed during low tide and will note the presence of seeps, precipitate, bank failure or other evidence of mass movement of subsurface material or liquids. All sampling will be performed in accordance with NYSDEC protocol and laboratory analysis will be performed by a NYSDEC certified laboratory. Again, information from the pilot study has not identified any adverse impacts to groundwater or Bridge Creek, however, the Port Authority intends to confirm these findings through the above-described program.

14.0 CONCLUSIONS

This report presents a summary of assessment, investigation, delineation and remedial actions which have been undertaken at Site 1 from 2000 through 2003. By and large, assessment and investigation efforts identified relatively few environmental issues with respect to Site 1. Generally, the issues involved the presence of fill material, previously closed USTs and the presence of a few petroleum-impacted areas. As described herein, the environmental conditions at Site 1 as well as Sites 2A/2B and 3 of the HHMT-Port Ivory Facility have been evaluated with respect to the HHMT-Port Ivory Facility's proposed usage. Further, the Port Authority has undertaken actions to address residual petroleum related contamination through source removal. The actions undertaken at these areas also have included the removal of a previously closed UST (closed in place by P&G) and an abandoned oil/water separator system from Site 1. With regard to the presence of fill material, the SI/RI activities identified the presence of contaminants at Site 1, which are typical to urban sites in the New York Metropolitan region. The presence of the fill material and residual levels of fill-related contaminants in soil does not appear to have adversely impacted groundwater quality at Site 1 or Bridge Creek, situated adjacent to the western property boundary of Site 1 and Site 2A/2B.

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 residual levels of contamination noted to be present in site soil and groundwater. The Port Authority has addressed several petroleum-impacted areas through source removal and will address fill material and residual contamination (associated with the fill material and prior industrial usage of the site by P&G) through site redevelopment including the use of engineering and institutional controls, which will minimize potential impacts to human health and the environment. Specifically, the Port Authority intends to install material such as pavement and other semi-impervious material, which will function as an environmental cap at Site 1 and the entire HHMT-Port Ivory Facility. 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. Further, the placement of such materials will safeguard the public by preventing exposure to contaminants in soil and groundwater.

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Hazardous Site Control, 11th Floor
625 Broadway, Albany, New York 12233-7014
Phone: (518) 402-9564 • **FAX:** (518) 402-9557
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

March 25, 2002

Mr. Charles Springer
Killam Associates
27 Bleeker Street
PO Box 1008
Millburn, NJ 07041-1008

Dear Mr. Springer:

Re: Proctor & Gamble Site, Western Ave.
Staten Island, Richmond County, NY

This letter is to confirm our phone conversation of earlier today regarding the Proctor and Gamble Site located on Western Avenue in Staten Island, New York. The site was formerly listed on the *New York State Registry of Inactive Hazardous Waste Disposal Sites* (site # 243002). It was removed from the registry due to the lack of disposal of a consequential amount hazardous waste. In addition, the site is currently not designated a site on the *Inventory of Hazardous Substance Waste Disposal Sites.* The Proctor & Gamble site was considered for, but not included in this inventory.

Please feel free to call me at the above number or e-mail me at emzuk@gw.dec.state.ny.us. if you have any further questions.

Sincerely,

Elaine M. Zuk
Senior Engineering Geologist
Eastern Investigation Section

HAGER-RICHTER
GEOSCIENCE, INC.

GEOPHYSICAL SURVEY
PROCTOR & GAMBLE
PORT IVORY FACILITY
STATEN ISLAND, NEW YORK

Prepared for:

Killam Associates
27 Bleeker Street
PO Box 1008
Millburn, New Jersey 07041-1008

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 00D59
December, 2000

0. EXECUTIVE SUMMARY

Hager-Richter Geoscience, Inc. conducted a geophysical survey at the Proctor & Gamble Port Ivory Facility located on Staten Island, New York for Killam Associates (Killam)in October and November, 2000. The scope of the project and areas of interest were specified by Killam. The geophysical survey is part of a environmental investigation of the site being conducted by Killam on behalf of the Port Authority of New York and New Jersey.

The site is a large inactive industrial facility located in the northwestern portion of Staten Island. The Site consists of several buildings, gravel and paved parking areas, rail spurs, foundations and slabs of demolished buildings, and open areas. Hager-Richter was contracted by Killam to locate utilities in the vicinity of as many as 210 proposed boring locations and to locate possible USTs that may be present at nine locations identified at the Site by Killam. The locations of utilities detected as part of the boring program were marked on site as specified by Killam, and are not discussed further.

According to information provided by Killam, as many as 19 USTs might be present in nine areas of the site, designated by Killam UST Area 1 through UST Area 9. Four of the nine areas may contain multiple USTs, and five areas may contain a single UST.

The objective of the geophysical survey was to detect possible USTs in each of the nine areas of interest specified by Killam, and if any were detected, to determine the locations of each.

The geophysical survey consisted of time domain electromagnetic induction metal detector (EM61) surveys followed by focused GPR surveys in each of the areas of interest. The EM61 data were acquired at approximately 8-inch intervals along profile lines spaced 5 feet apart across the accessible portions of the areas of interest. In order to aid in the identification of the objects, a focused GPR survey was conducted at the locations of anomalies detected with the EM.

The results of the geophysical survey conducted at the Proctor & Gamble Port Ivory Facility can be summarized as follows:

- Several areas of buried metal were detected in the nine areas of interest at the site on the basis of the EM61 data. None of the identified areas of buried metal could be definitively identified as a UST due to the limited GPR signal penetration and/or surface features such as concrete slabs, metal piping, and rail spurs. Whether the buried metal is a UST is present cannot be determined on the basis of the geophysical data alone.

- Several other EM61 anomalies are interpreted as possible utilities.

Geophysical Survey
Proctor & Gamble Port Ivory Facility
Staten Island, New York
File 00D59 December, 2000

TABLE OF CONTENTS

FIGURES

PLATE

APPENDIX

Geophysical Survey
Proctor & Gamble Port Ivory Facility
Staten Island, New York
File 00D59 December, 2000

1. INTRODUCTION

Hager-Richter Geoscience, Inc. conducted a geophysical survey at the Proctor & Gamble Port Ivory Facility located on Staten Island, New York for Killam Associates (Killam) October 25 - November 15, 2000. The scope of the project and areas of interest were specified by Killam. The geophysical survey is part of a environmental investigation of the site being conducted by Killam on behalf of the Port Authority of New York and New Jersey.

The site is a large inactive industrial facility located in the northwestern portion of Staten Island. The general location of the Site is shown in Figure 1, and Plate 1 is a site plan. The Site consists of several buildings, gravel and paved parking areas, rail spurs, foundations and slabs of demolished buildings, and open areas. Hager-Richter was contracted by Killam to locate utilities in the vicinity of as many as 210 proposed boring locations and to locate possible USTs that may be present at nine locations identified at the Site by Killam. The locations of utilities detected as part of the boring program were marked on site as specified by Killam, and are not discussed further.

According to information provided by Killam, as many as 19 USTs might be present in nine areas of the site, designated by Killam as UST Area 1 through UST Area 9. Four of the nine areas may contain multiple USTs, and five areas may contain a single UST. The locations of the nine areas specified by Killam are shown as hatched areas on Plate 1.

The objective of the geophysical survey was to detect possible USTs in each of the nine areas of interest specified by Killam, and if any were detected, to determine the locations of each.

The geophysical survey consisted of time domain electromagnetic induction metal detector (EM61) surveys followed by focused GPR surveys in each of the areas of interest. The EM61 survey detects and outlines areas containing buried metal. However, the EM method cannot provide information on the type of objects causing the EM anomaly. In order to aid in the identification of the objects, a focused GPR survey was conducted at the locations of anomalies detected with the EM61.

James Coffman, Jeffrey Reid, P.G., and Jeffrey Sullivan of Hager-Richter conducted the field operations on October 30, November 8, 9, 14, and 15, 2000. The project was coordinated with Ms. Jennifer Kohlsaat of Killam. Mr. Daniel Davis and Mr. Charles Springer, both of Killam, specified the areas of interest for the survey and were present for portions of the field work.

2. EQUIPMENT AND PROCEDURES

2.1 General

The equipment, limitations, and general procedures of EM61 high sensitivity metal detector and GPR surveys are described below. Details specific to this project are given in the Site Specific section below.

2.2 EM61

Equipment. The EM survey was conducted using a Geonics Model EM61 time domain electromagnetic induction metal detector, the industry standard for this type of geophysical survey. The EM61 produces a pulsed primary magnetic field in the earth that induces eddy currents in the ground and in nearby metal objects. The receiver is timed to measure the secondary magnetic field produced by eddy currents after those in the ground have dissipated, i.e., only the current in the metal objects. The data are recorded on a digital data logger. The EM61 is relatively insensitive to nearby cultural interferences such as buildings.

Limitations of the Method. The data from an EM61 survey are affected by surface metal debris in the survey area, and its depth sensitivity is limited to about 15 feet. The instrument is relatively cumbersome, and works best where the 1-meter square transmit and receive coils can be hand pulled in a small trailer.

Detection and identification should be clearly differentiated. Detection is the recognition of the presence of a metal object, and the electromagnetic method is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?). Although the EM61 data cannot be used to *identify* all buried metal objects, they provide excellent guides to the identification of some objects. For example, buried metal utilities produce anomalies with lengths many times their widths.

2.3 GPR

Equipment. The GPR survey was conducted using a Geophysical Survey Systems SIR-2 digital GPR system equipped with a survey wheel to trigger recording of data at equal horizontal distances. The GPR system was used with a 500 MHz antenna and a 60 nsec time window. The GPR traverses were spaced approximately 5 feet apart, and were conducted at the locations of EM61 anomalies.

Limitations of the Method. There are limitations of the GPR technique as used to detect and/or locate targets such as those of the subject Site: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical conductivities of the targets and the ground, and (4) spacing between lines. Of these limitations, only the fourth, line spacing, is controlled by the operator.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, especially inside of buildings, and a target may not be detectable.

The electrical conductivity of the ground determines the attenuation of the GPR signals, and thereby limits the maximum depth of exploration. The GPR signal does not penetrate clay-rich soils, and targets buried in clay can be missed.

A definite contrast in the electrical conductivities of the ground and the target is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to construction details or extremely corroded conditions of metal targets, then the reflection may be too weak to recognize, and the target can be missed.

The spacing between lines is under control of the GPR operator, and the design of the survey is based on the dimensions of the smallest feature of interest. Targets with dimensions smaller than the spacing between GPR survey lines can be missed.

2.4 Site Specific

As noted in the Introduction, Killam specified nine areas of interest for the geophysical survey. A local survey grid was established in each of the UST survey areas and tied to fixed landmarks.

EM61 data were acquired at approximately 8-inch intervals along lines spaced 5 feet apart in the accessible portions of each area. The EM61 was operated with the 1-meter square transmit/receive coils mounted on a hand-drawn trailer with a survey wheel that measures distance and triggers data collection at equal intervals. The EM61 data were recorded digitally and processed in the field using software provided by the manufacturer. A color contour plot of the data was generated using commercially available software (Geosoft).

A focused GPR survey was conducted at the locations of anomalies detected by the EM61 survey to attempt to identify the causative body(ies). GPR traverses were located along the same

lines as the EM61 survey and spacing was variable based on the size of the EM anomalies and surface conditions. The GPR antenna was pulled by hand for all traverses.

GPR data were acquired with a 300 MHz antenna and a 60 nsec time window. GPR signal penetration varied significantly at the Site. Based on handbook values of time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have varied from about 1 foot to about 5 feet.

3. RESULTS AND DISCUSSION

3.1 General

The geophysical survey consisted of a time domain electromagnetic induction metal detector (EM61) survey followed by a focused GPR survey where the EM61 survey indicated possible buried metal. Plate 1 is a Site Plan provided by Killam showing the locations of the survey areas.

Interpretation of EM61 data is based on the *relative* response (in millivolts) of the top and bottom instrument coils to local conditions. The differential response, the difference between the top and bottom coils, is typically used as the best indication of the location of buried metal objects, and is shown in the figures for this report. The instrument is not calibrated to provide an absolute measure of a particular property, such as the conductivity of the soil or of buried metal objects. Subsurface metal objects produce sharply defined positive anomalies when the EM61 is positioned directly over them. Such anomalies are colored red and pink on the color plots presented herein. Acquiring data at short intervals along closely spaced lines, as was done at the present site, provides high spatial resolution of the location and footprint of the targets. Thus, buried metal is recognized in contour plots of EM61 data by positive anomalies (red or pink zones) roughly corresponding to the dimensions of the buried metal.

Many surface metal objects and objects containing metal are present in the UST survey areas such as manhole covers, railroad tracks, fences, and reinforced concrete. The locations of such objects are shown on the figures for each of the areas. Because these objects contain metal, they can produce significant EM anomalies. The presence or absence of buried metal in these areas cannot be determined due to the anomalies caused by such surface objects.

In general, GPR signal penetration at the site was limited, with reflections received for less than about 30 nsec. The limited signal penetration is likely due to conductive soils, and in many places, concrete at the surface. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been no more than about 2 to 3 feet for most of the areas of interest.

3.2 UST Area 1

UST Area 1 is located on the north side of Building 20, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 2 is a color contour plot of the EM61 data for UST Area 1, and Figure 3 shows the locations of the GPR traverses and the

interpretation of both the EM61 and GPR data. Five areas of possible buried metal were detected within the survey area, and their locations are shown on Figure 3. GPR traverses were conducted in the central portion of the area. GPR signal penetration was limited to less than 2 feet. Therefore, no additional information regarding the causative bodies was determined for this area with the GPR traverse.

Based on the shapes and sizes of the EM anomalies for UST Area 1, we infer that a utility and several other buried objects are present. Whether the objects are USTs cannot be determined on the basis of the geophysical data alone. If any of the buried metal objects is a UST, its capacity is likely 1000 gallons or less.

3.3 UST Area 2

UST Area 2 is located south of a wood shavings stockpile area, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 4 is a color contour plot of the EM61 data for UST Area 2, and Figure 5 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. One area of possible buried metal was detected within the survey area. The area is located about 35 feet south of a concrete pad. GPR traverses were conducted over the location of the EM anomaly. GPR signal penetration is estimated to have been about 4 to 5 feet for this area, but GPR reflections typical of a UST were not detected in the area included in the GPR survey.

Based on the presence of the EM anomaly in UST Area 2, we infer that a buried metal object is present. Whether the object is a UST cannot be determined on the basis of the geophysical data alone. Because no GPR reflections typical of a UST were observed in the records for the effective depth of penetration of the GPR signal (about 5 feet), and the EM anomaly is small in amplitude, we conclude that if a UST is present, it would likely be located at a depth greater than 5 feet.

3.4 UST Area 3

UST Area 3 is located north of the northeast corner of Building 13, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 6 is a color contour plot of the EM61 data for UST Area 3, and Figure 7 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. Two areas of possible buried metal were detected within the survey area as well as a possible utility. One buried metal object is located about 25 feet east of a trailer, the other is located about 60 feet east of the trailer, and the locations of both are shown on Figure 7.

GPR signal penetration is estimated to have been about 2 to 3 feet for this area. GPR reflections typical of a UST were not detected in the area included in the GPR survey. GPR reflections typical of a flat structure, such as a concrete pad, are present at the location of the southern end of the EM anomaly closer to the trailer.

Based on the presence of the EM anomalies in UST Area 2, we infer that two buried metal objects are present. The GPR data indicate that at least part of one of the EM anomalies may be related to a flat concrete-like structure. Whether the concrete object is a UST cannot be determined on the basis of the geophysical data alone.

3.5 UST Area 4

UST Area 4 is located west of Buildings 34 and 38 and north of a former floor slab for a demolished building, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 8 is a color contour plot of the EM61 data for UST Area 4, and Figure 9 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data.

The western portion of the survey area is covered by a concrete pad. Three significant EM anomalies are present in this portion of the survey area and one large EM anomaly is present along the southeast edge of the survey area. The areas of the EM anomalies are shown as areas of buried metal on Figure 9. The large EM anomalies may be caused by structures located under the concrete slab. The GPR signal penetration over the concrete slab is limited to less than about 1 foot and GPR reflections typical of USTs were not detected. Whether USTs are located under the slab cannot be determined on the basis of the geophysical data alone. The remaining portion of UST Area 4 is generally free of buried metal.

3.6 UST Area 5

UST Area 5 is located along a rail spur southwest of Building 17, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 10 is a color contour plot of the EM61 data for UST Area 5, and Figure 11 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. Two rail spurs and a reinforced concrete surface drainage swale are present in the area. High amplitude EM anomalies are present near the concrete drainage swale and low amplitude negative EM anomalies are observed for the rail spurs.

GPR traverses were conducted in the northwest corner of the survey area, but the GPR signal penetration was limited to less than about 1 foot and no GPR reflection typical for a UST were detected.

3.7 UST Area 6

UST Area 6 is located along a rail spur west of Building 17, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 12 is a color contour plot of the EM61 data for UST Area 6, and Figure 13 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. A rail spur and iron rimmed surface drain are present along the east side of the survey area.

Five EM anomalies not related to the surface features were identified, and their locations are shown on Figure 13. The two large circular anomalies located in the northeast portion of the survey area are likely caused by buried concrete. A small portion of a slab was visible on site and its presence was confirmed with the GPR. The remaining three anomalies are low amplitude and small in extent and are likely too small to be caused by USTs.

3.8 UST Area 7

UST Area 7 is located south of Building S-#35, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 14 is a color contour plot of the EM61 data for UST Area 7, and Figure 15 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. Surface objects such as a rail spur, a concrete loading dock, a steel plate, transformers, and a tower are present in the survey area. The EM data were adversely affected at such locations.

Four EM anomalies not related to the surface features were identified, and their locations are shown on Figure 15. A large EM anomaly is present in the central portion of the survey area. The GPR data for the area of the large anomaly indicate the presence of a shallow buried reinforced concrete slab or structure at a depth of about 1 foot in the southern part of the anomaly. GPR records for the traverses conducted in the vicinity of the remaining anomalies contain no reflections characteristic of USTs. Such areas are shown as areas of buried metal. Whether the buried metal objects are USTs cannot be determined on the basis of the geophysical data alone.

3.9 UST Area 8

UST Area 8 is located at the northeast corner of Building 55, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 16 is a color contour plot of the EM61 data for UST Area 8, and Figure 17 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data. Surface objects such as a concrete pad and vertical pipes cut at grade are present in the survey area and such objects are shown on Figure 17.

Three anomalies attributed to buried metal objects were identified by the EM survey and their locations are shown on Figure 17. EM anomalies attributed to subsurface utilities were also identified. GPR signal penetration in the areas of the EM anomalies was limited to a depth of about 1 foot and no GPR reflections typical of a UST were detected. Therefore, no information regarding the causative bodies could be determined. Whether the buried metal objects are USTs cannot be determined on the basis of the geophysical data alone.

3.10 UST Area 9

UST Area 9 is located between Buildings 52 and 53, and its location is shown on Plate 1. EM61 data were acquired along survey lines spaced 5 feet apart, and GPR data were acquired at most locations where the EM data indicated the presence of buried metal. Figure 18 is a color contour plot of the EM61 data for UST Area 9, and Figure 19 shows the locations of the GPR traverses and the interpretation of both the EM61 and GPR data.

Several surface metal objects, such as valve box covers, transformers, and overhead pipes are present in the survey area. Four 4-inch pipes, cut at the surface, are present in the southeast corner of the survey area. Significant EM anomalies are present at the locations of the surface features and may mask the presence of buried metal objects, if any, at such locations.

Three anomalies not associated with surface metal were identified by the EM survey. These anomalies have been attributed to buried metal objects. GPR signal penetration in the areas of the EM anomalies was limited to a depth of about 1 foot and no GPR reflections typical of a UST were detected. Therefore, no information regarding the causative bodies could be determined. Whether the buried metal objects are USTs cannot be determined on the basis of the geophysical data alone.

4. CONCLUSIONS

Based on the geophysical survey conducted at the Proctor & Gamble Port Ivory Facility located on Staten Island, New York, we conclude:

- Several areas of buried metal were detected in the nine areas of interest at the site on the basis of the EM61 data. None of the identified areas of buried metal could be definitively identified as a UST due to the limited GPR signal penetration and/or surface features such as concrete slabs, metal piping, and rail spurs. Whether the buried metal is a UST is present cannot be determined on the basis of the geophysical data alone.

- Several other EM61 anomalies are interpreted as possible utilities.

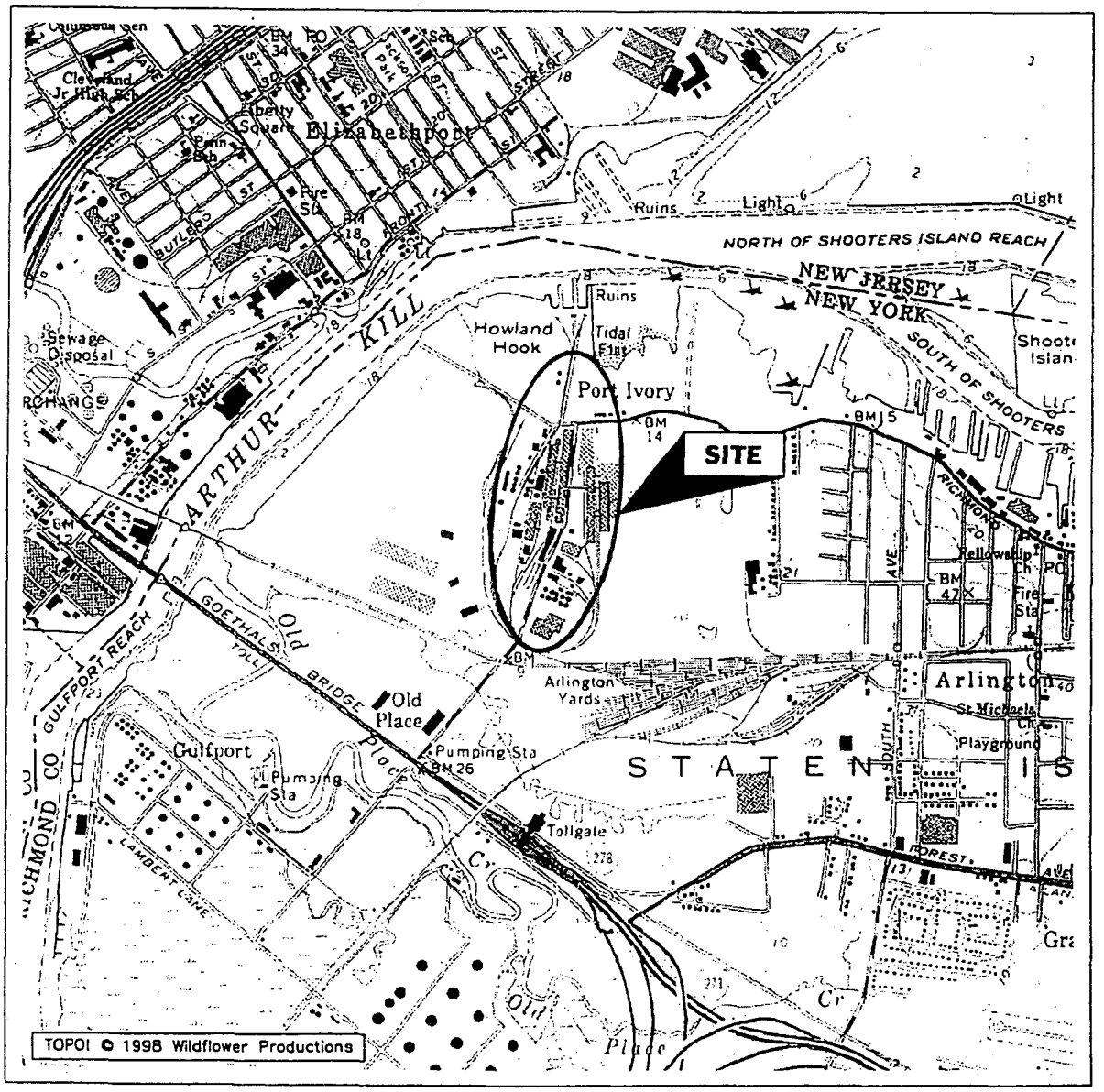
5. LIMITATIONS

This letter report was prepared for the exclusive use of Killam Associates and the Port Authority of New York and New Jersey (Client). No other party shall be entitled to rely on this Report or any information, documents, records, data, interpretations, advice or opinions given to Client by Hager-Richter Geoscience, Inc. (H-R) in the performance of its work. The Report relates solely to the specific project for which H-R has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of H-R. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to H-R.

H-R has used reasonable care, skill, competence and judgment in the performance of its services for this project consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by H-R should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

The detection of subsurface utilities and/or other subsurface objects was not an objective of this portion of the geophysical survey, and the survey was not designed to detect such. However, some utilities and/or other subsurface objects were detected and their locations are provided as a courtesy. Other utilities and/or other subsurface objects may be present and the Client or any third party shall not rely on this report for information on such.

Except as expressly provided in this limitations section, H-R makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.



LOCATION

SCALE (feet)

0 2000 4000

Figure 1
General Site Location
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

BUILDING #20

NOTES:

1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

LEGEND

- EM DATA STATION
- WATER VALVE
- HYDRANT

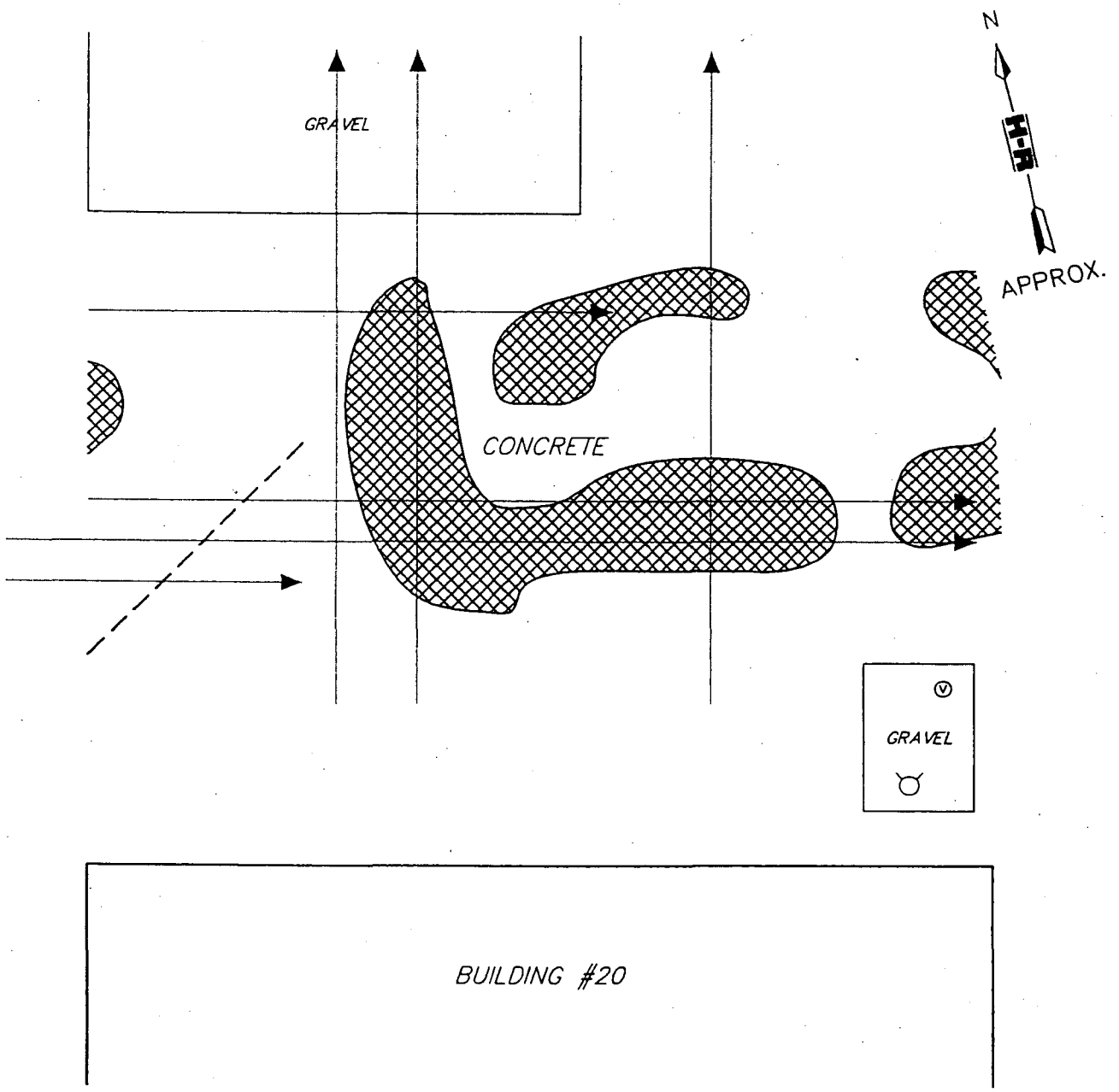
SCALE (feet)

0 10 20

Figure 2
EM61 Survey - UST Area 1
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- POSSIBLE UTILITY
- WATER VALVE
- HYDRANT

SCALE (feet)

0 10 20

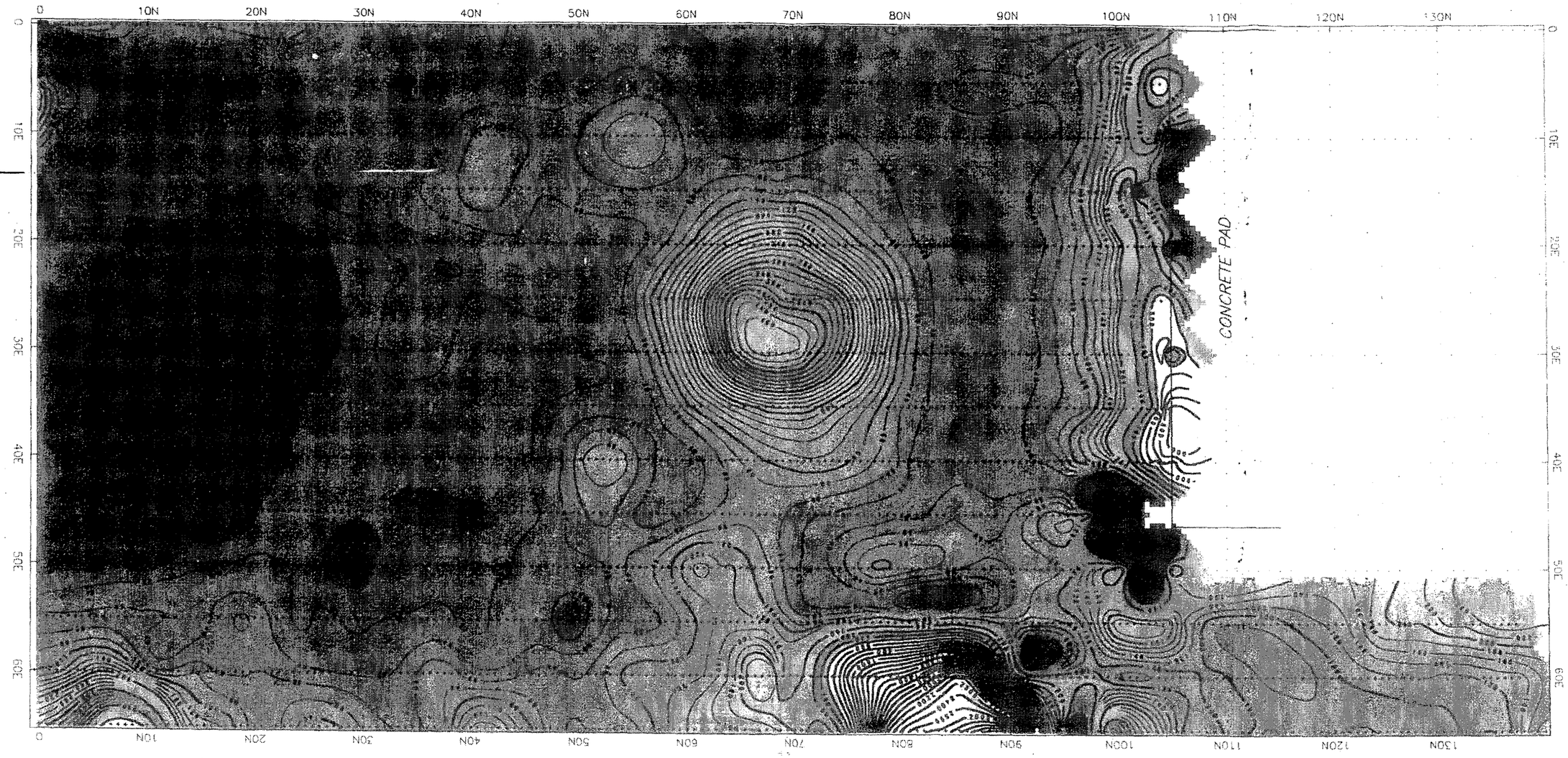
NOTES:

1. Site sketch generated from field notes.
2. Concrete covers survey area except for the areas shown as gravel-covered.

Figure 3
GPR Survey & Integrated Interpretation – UST Area 1
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59	December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



LEGEND

EM DATA STATION

WATER VALVE

MONITORING WELL

SCALE (feet)

0 10 20

APPROX. N

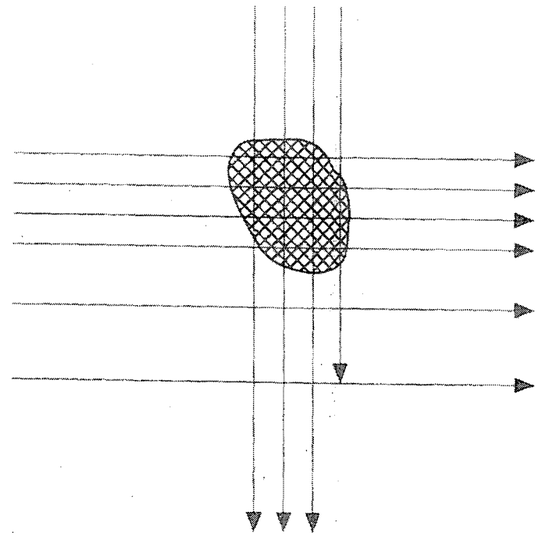
NOTES:

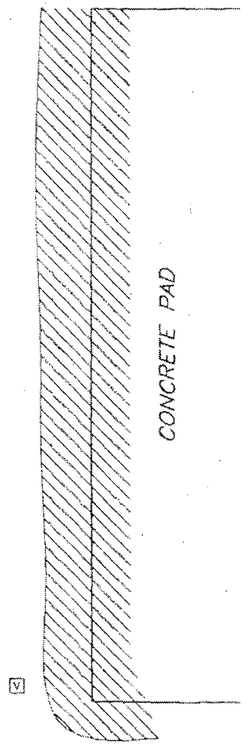
1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

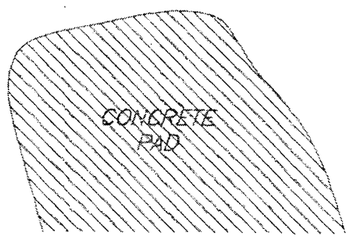
Figure 4
EM61 Survey – UST Area 2
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire







LEGEND

GPR TRAVERSE

AREA OF POSSIBLE BURIED METAL

EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.

WATER VALVE

MONITORING WELL

SCALE (feet)

0 10 20

APPROX. N H-R

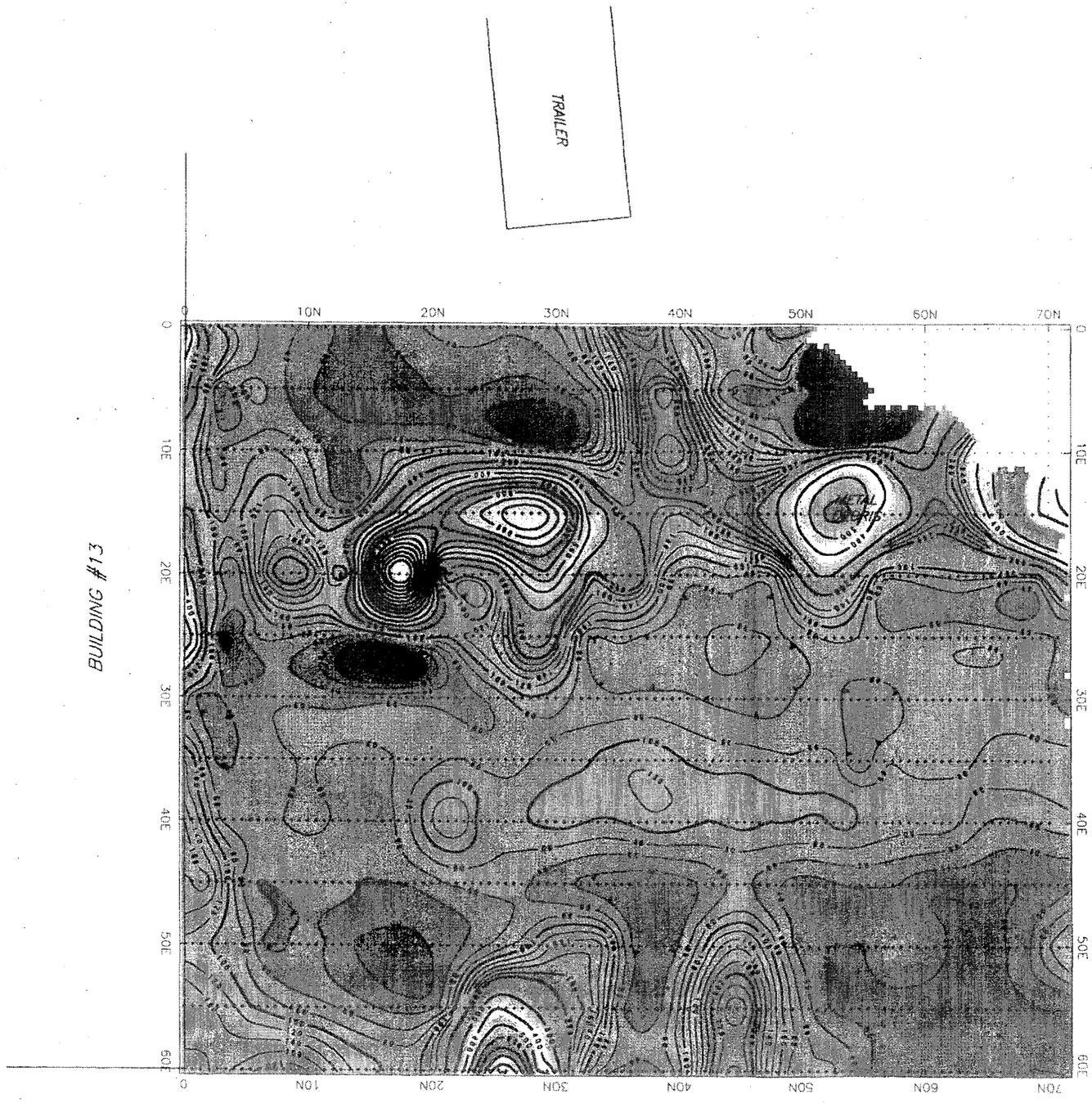
NOTE:

Site sketch generated from field notes.

Figure 5
GPR Survey & Integrated Interpretation – UST Area 2
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX. N

LEGEND

EM DATA STATION

SCALE (feet)

0 10 20

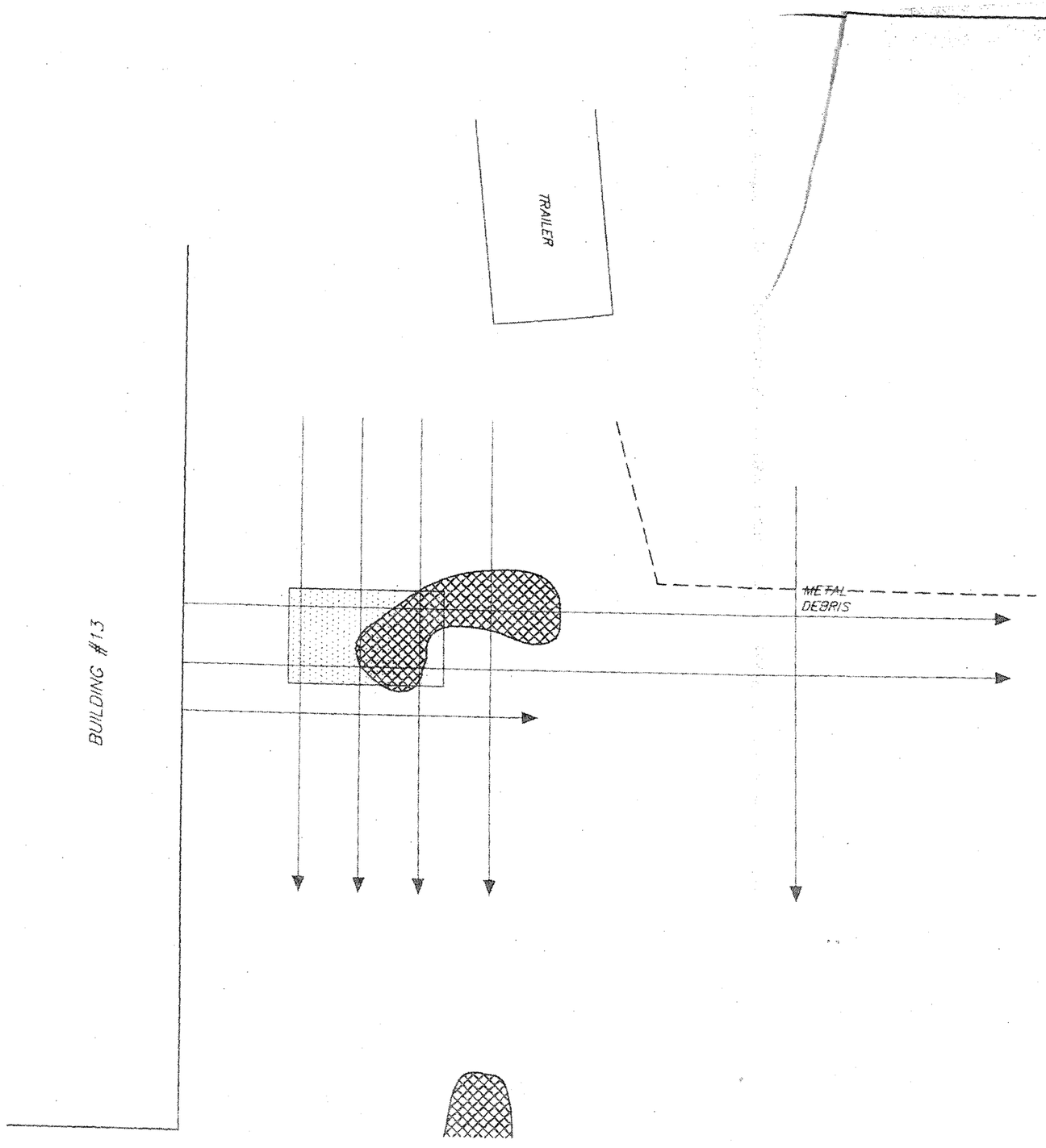
NOTES:

1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

Figure 6
EM61 Survey - UST Area 3
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX. H-R N

LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- POSSIBLE STRUCTURE
- POSSIBLE UTILITY

SCALE (feet)

0 10 20

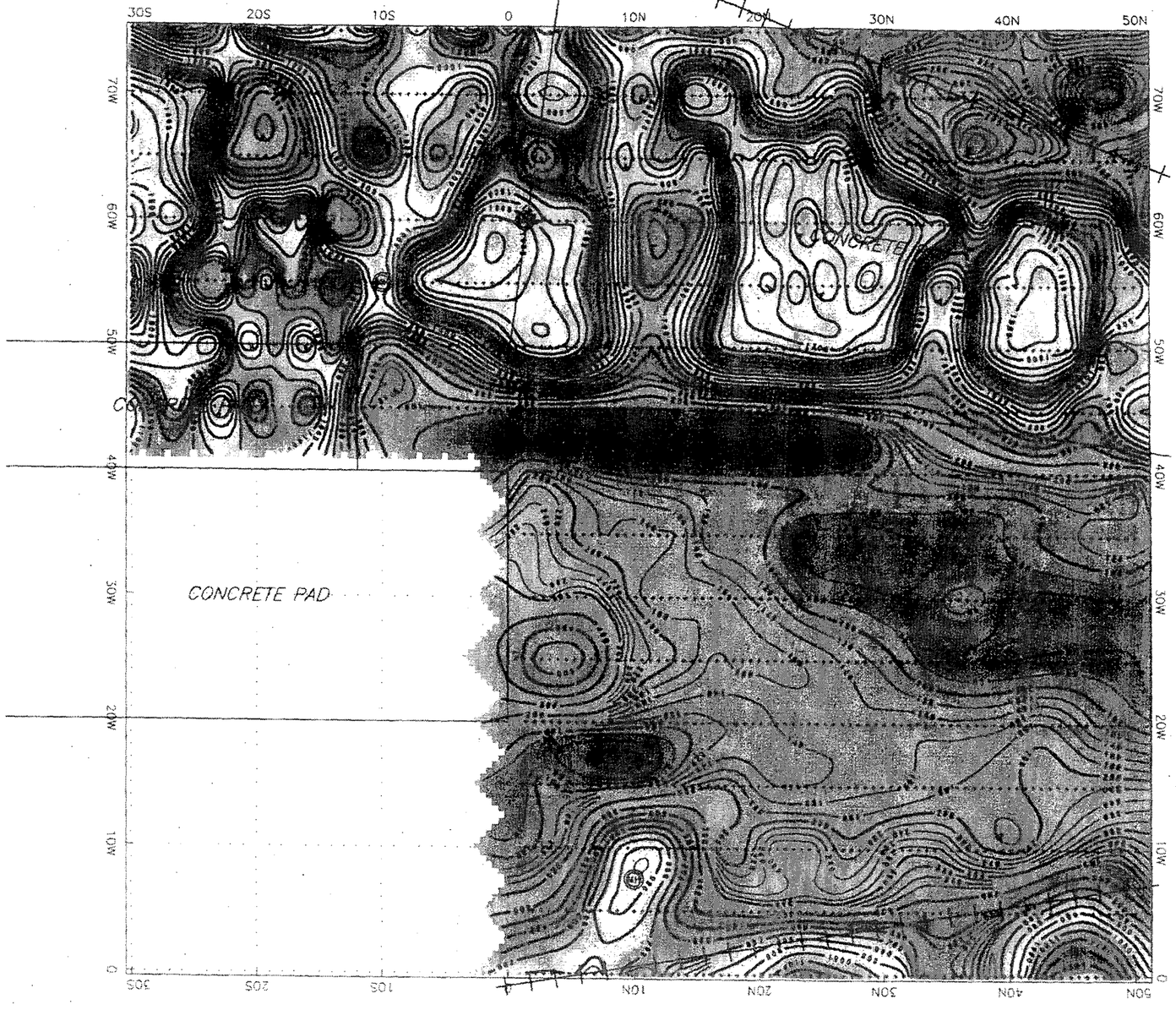
NOTE:

Site sketch generated from field notes.

Figure 7
GPR Survey & Integrated Interpretation – UST Area 3
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX.

H-R

N

LEGEND

- EM DATA STATION
- MANHOLE
- RAILROAD TRACK

SCALE (feet)

0 10 20

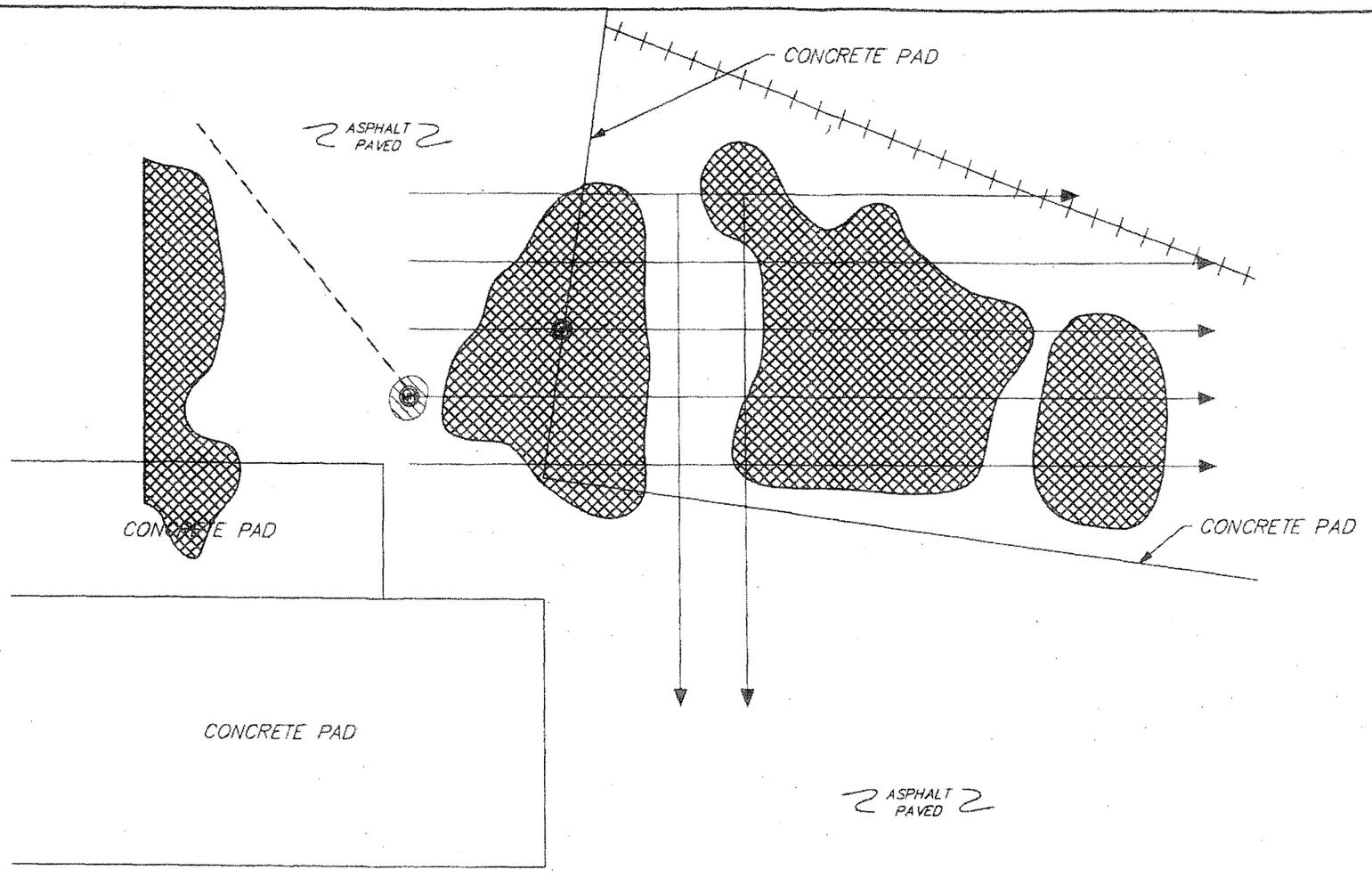
NOTES:

1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

Figure 8
EM61 Survey - UST Area 4
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX. N

LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.
- POSSIBLE UTILITY
- MANHOLE
- RAILROAD TRACK

SCALE (feet)

0 10 20

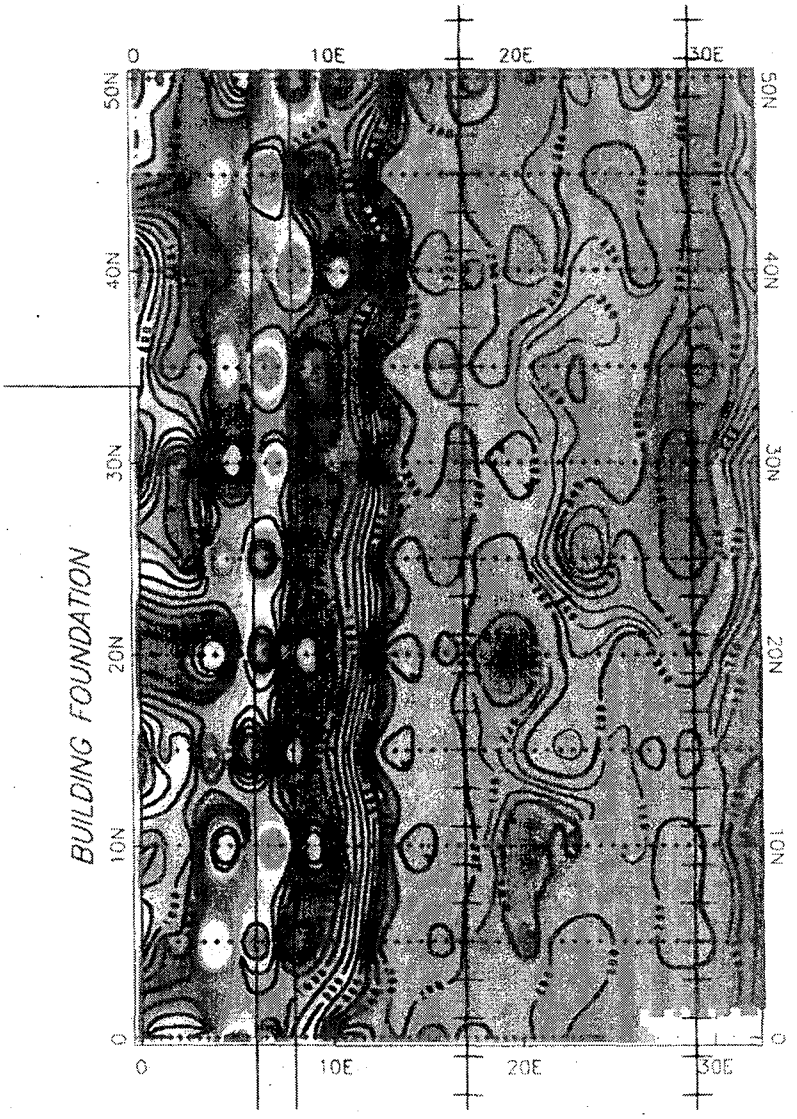
NOTE:

Site sketch generated from field notes.

Figure 9
GPR Survey & Integrated Interpretation – UST Area 4
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



N

APPROX.

NOTES:

1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

LEGEND

EM DATA STATION

RAILROAD TRACK

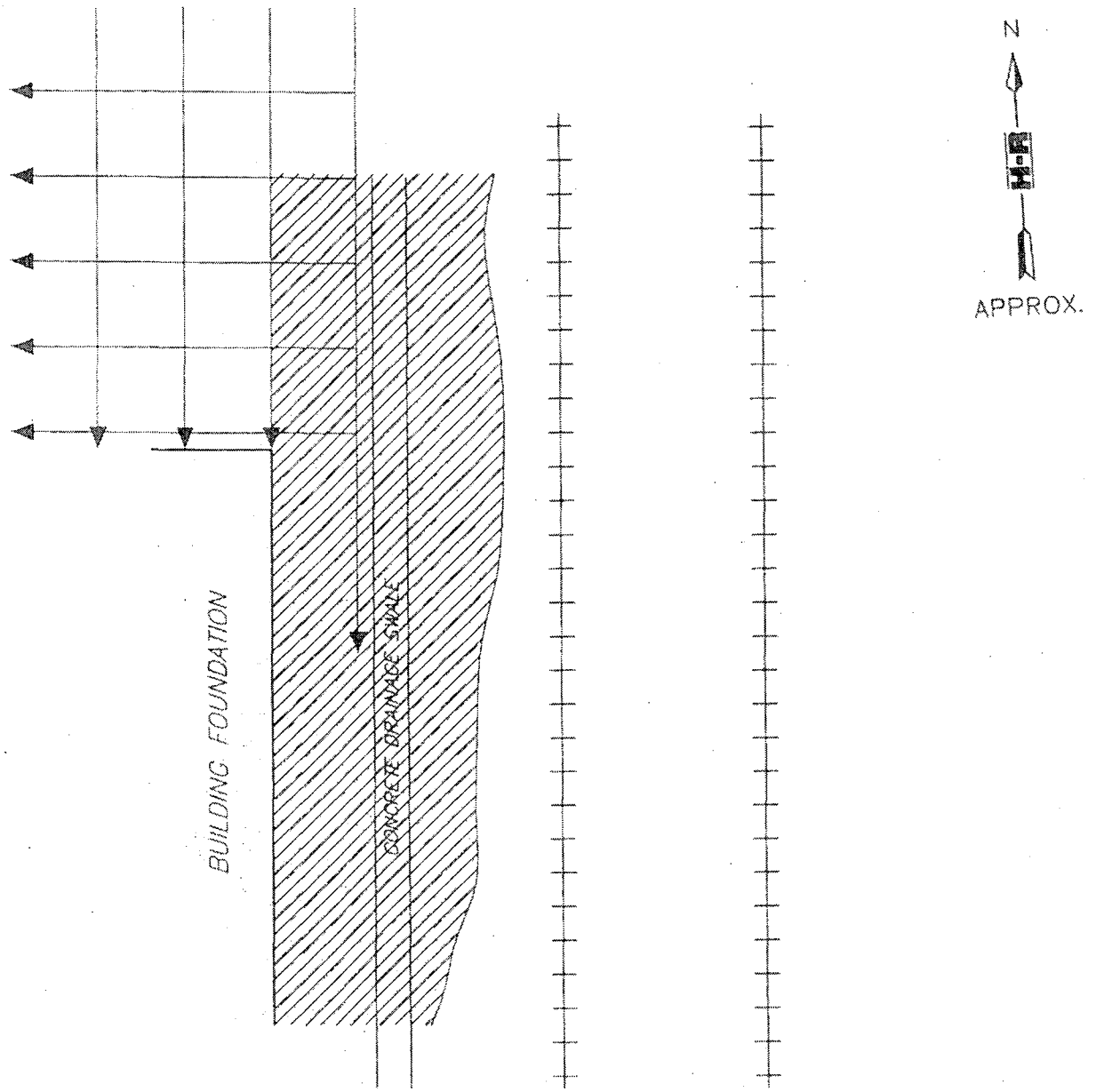
SCALE (feet)

0 10 20

Figure 10
EM61 Survey - UST Area 5
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



LEGEND

GPR TRAVERSE

EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.

RAILROAD TRACK

SCALE (feet)

0 10 20

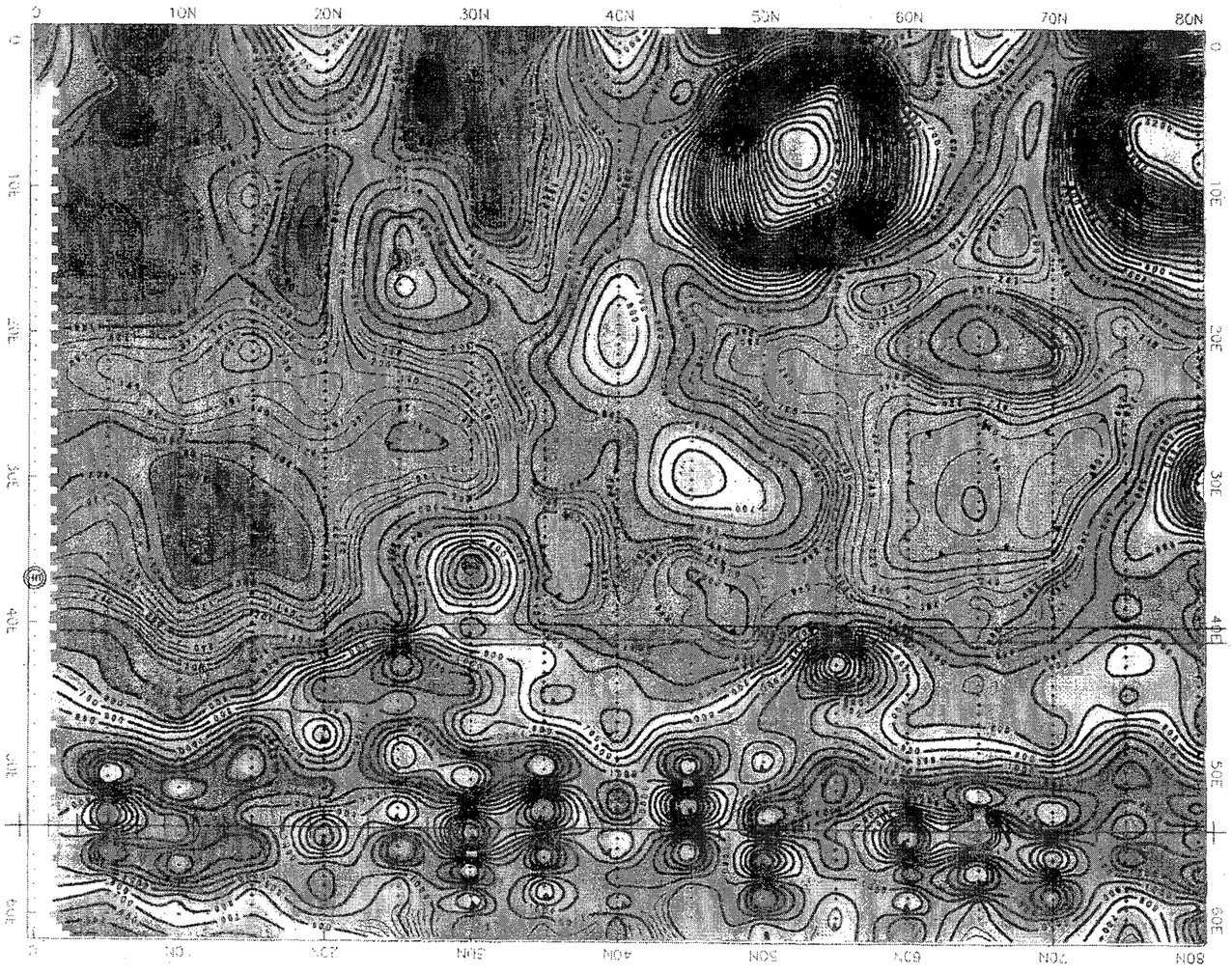
NOTE:

Site sketch generated from field notes.

Figure 11
GPR Survey & Integrated Interpretation – UST Area 5
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX. N

LEGEND

- EM DATA STATION
- MANHOLE
- CATCH BASIN
- RAILROAD TRACK

SCALE (feet)

0 10 20

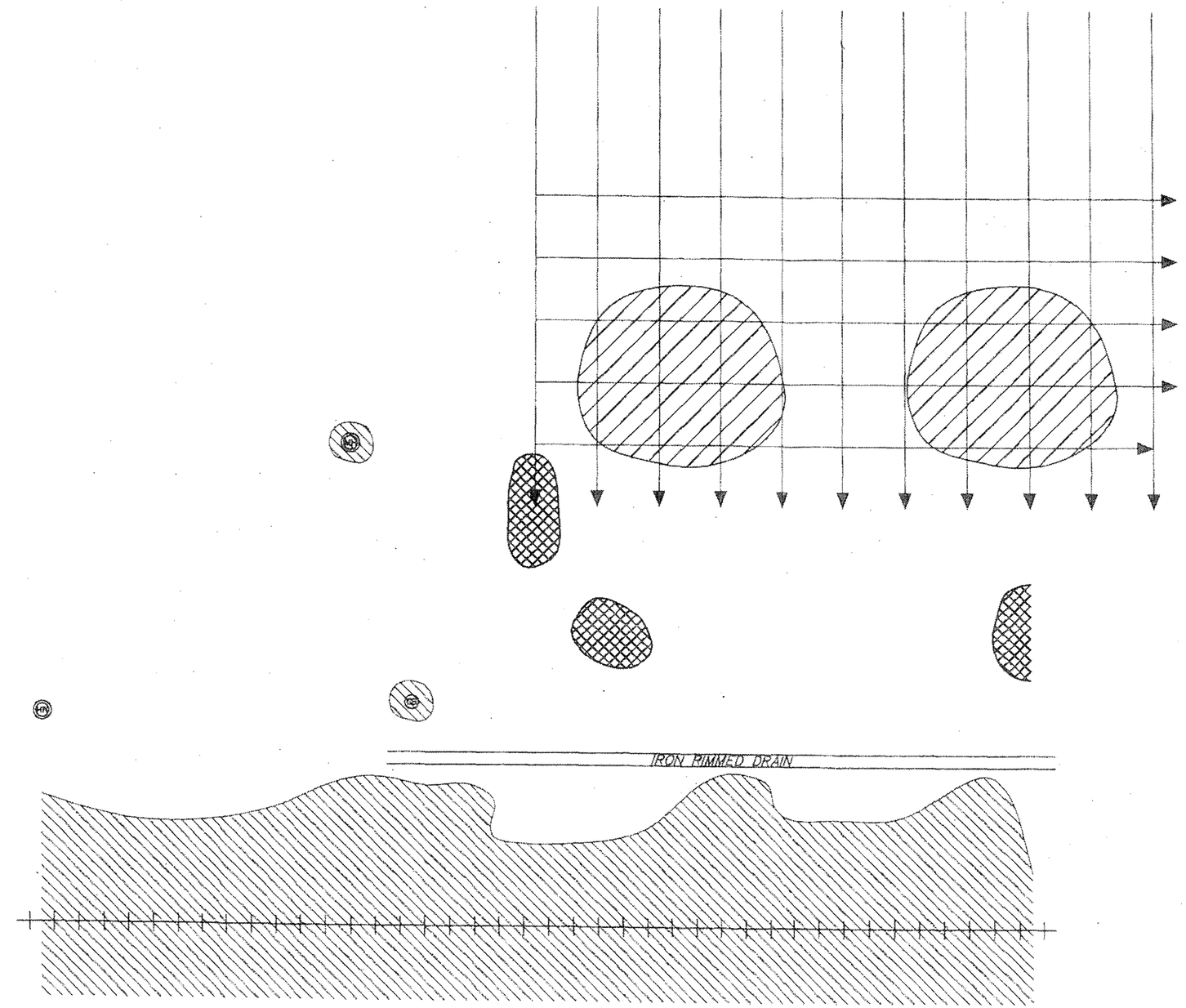
NOTES:

1. Site sketch generated from field notes.
2. Contour interval = 20 mV.

Figure 12
EM61 Survey - UST Area 6
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



APPROX. H-R N

LEGEND

GPR TRAVERSE

AREA OF POSSIBLE BURIED METAL

EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.

POSSIBLE BURIED CONCRETE

MANHOLE

CATCH BASIN

RAILROAD TRACK

SCALE (feet)

0 10 20

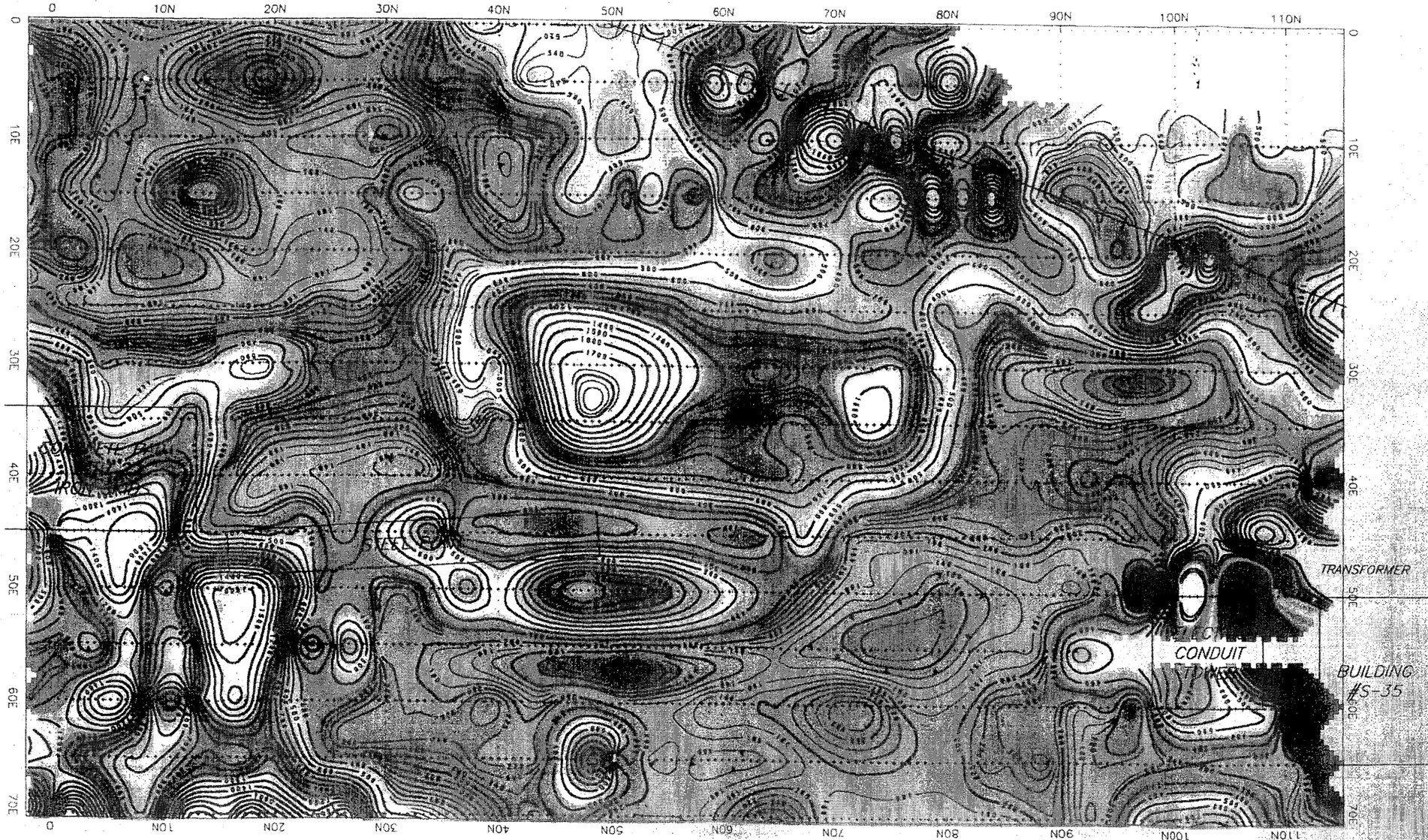
NOTE:

Site sketch generated from field notes.

Figure 13
GPR Survey & Integrated Interpretation – UST Area 6
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



LEGEND

- EM DATA STATION
- MANHOLE
- HYDRANT
- RAILROAD TRACK

NOTES:

1. Site sketch generated from field notes.
2. Contour interval = 20 mV.

SCALE (feet)
0 10 20

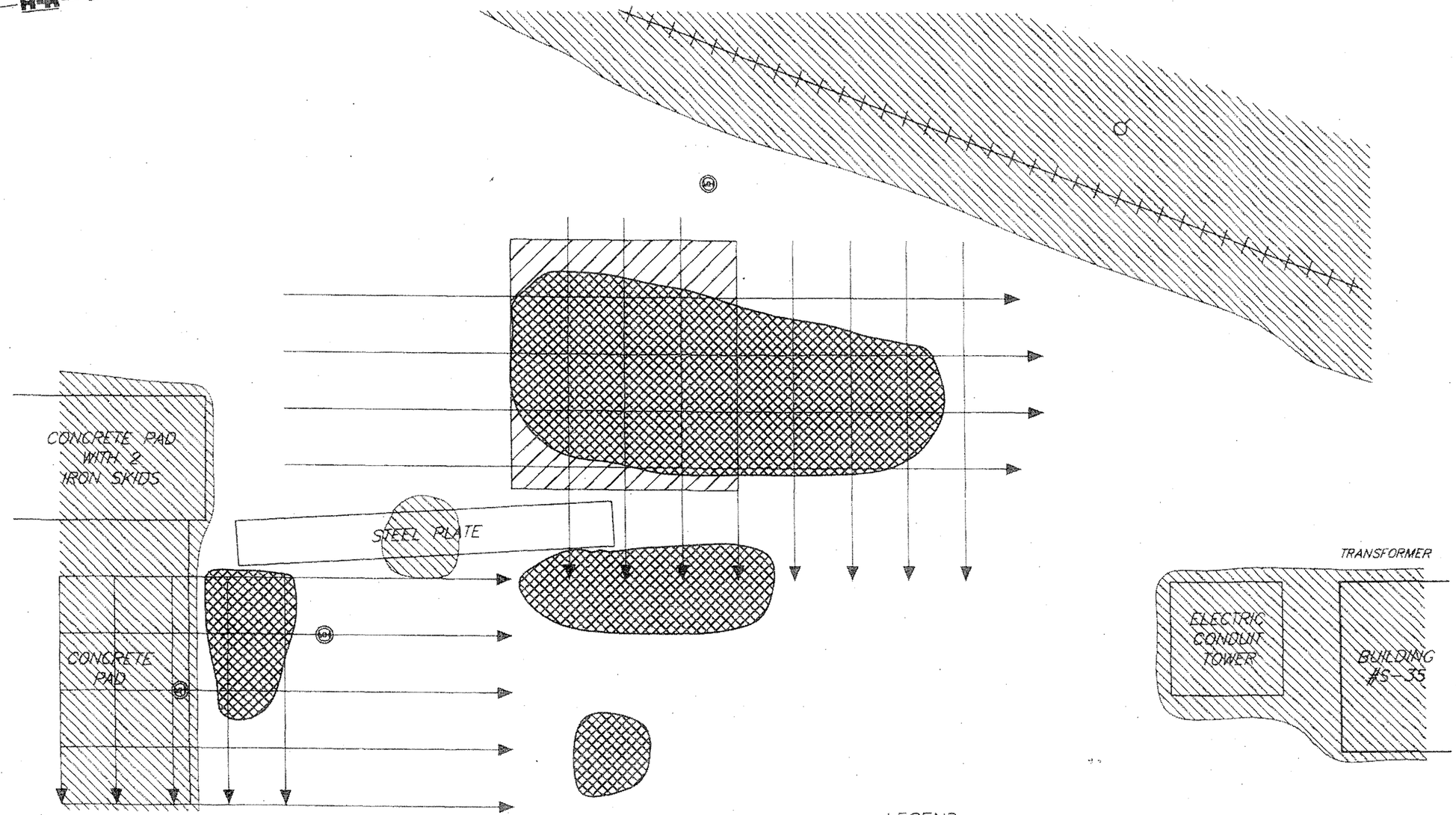
APPROX. H-R Z

Figure 14
EM61 Survey - UST Area 7
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

APPROX. H-R N



LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.
- POSSIBLE BURIED CONCRETE
- MANHOLE
- HYDRANT
- RAILROAD TRACK

SCALE (feet)

0 10 20

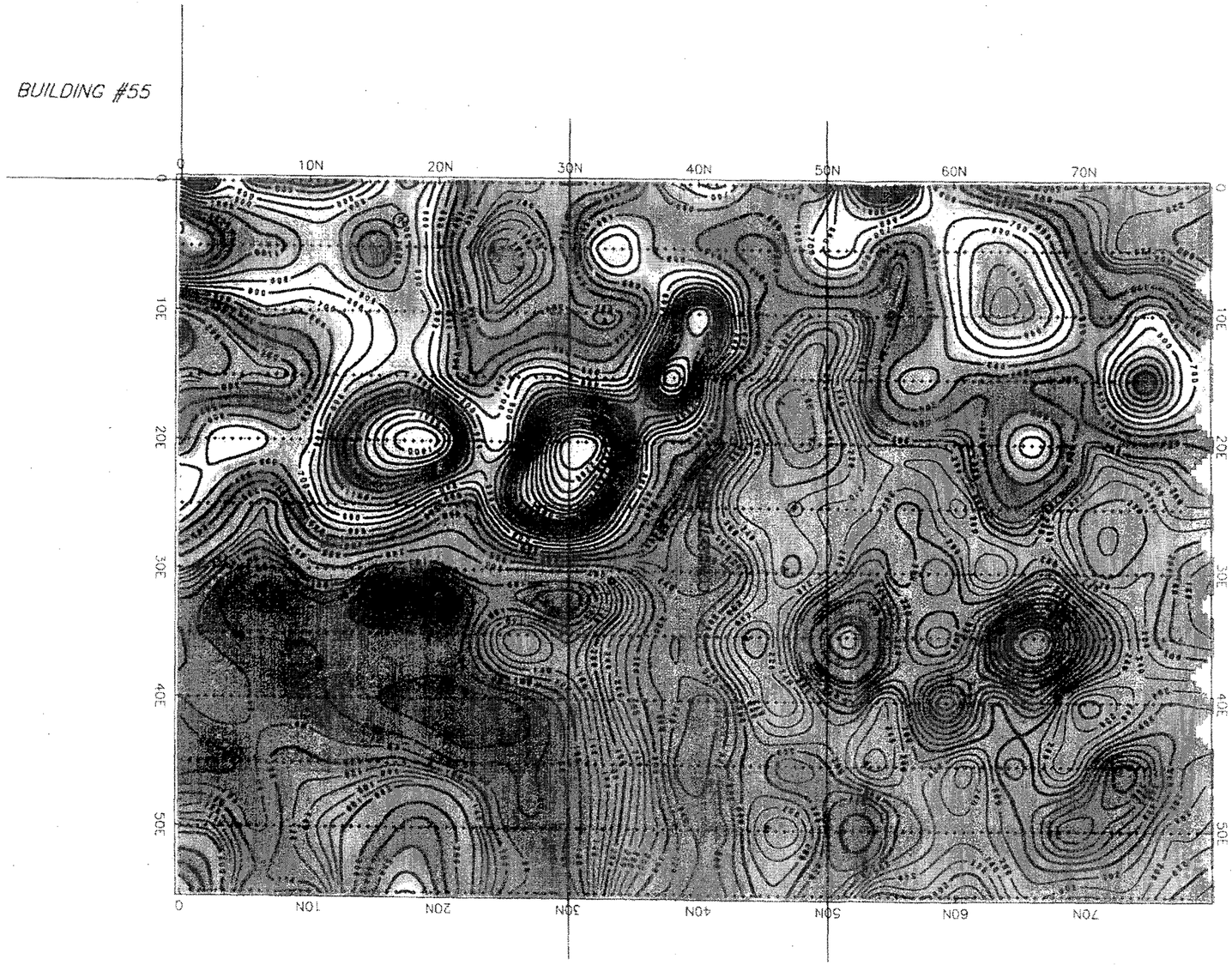
NOTE:

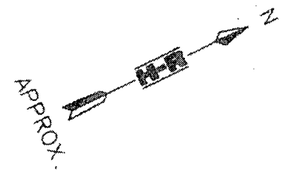
Site sketch generated from field notes.

Figure 15
GPR Survey & Integrated Interpretation – UST Area 7
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire





LEGEND

EM DATA STATION

PIPE

SCALE (feet)

0 10 20

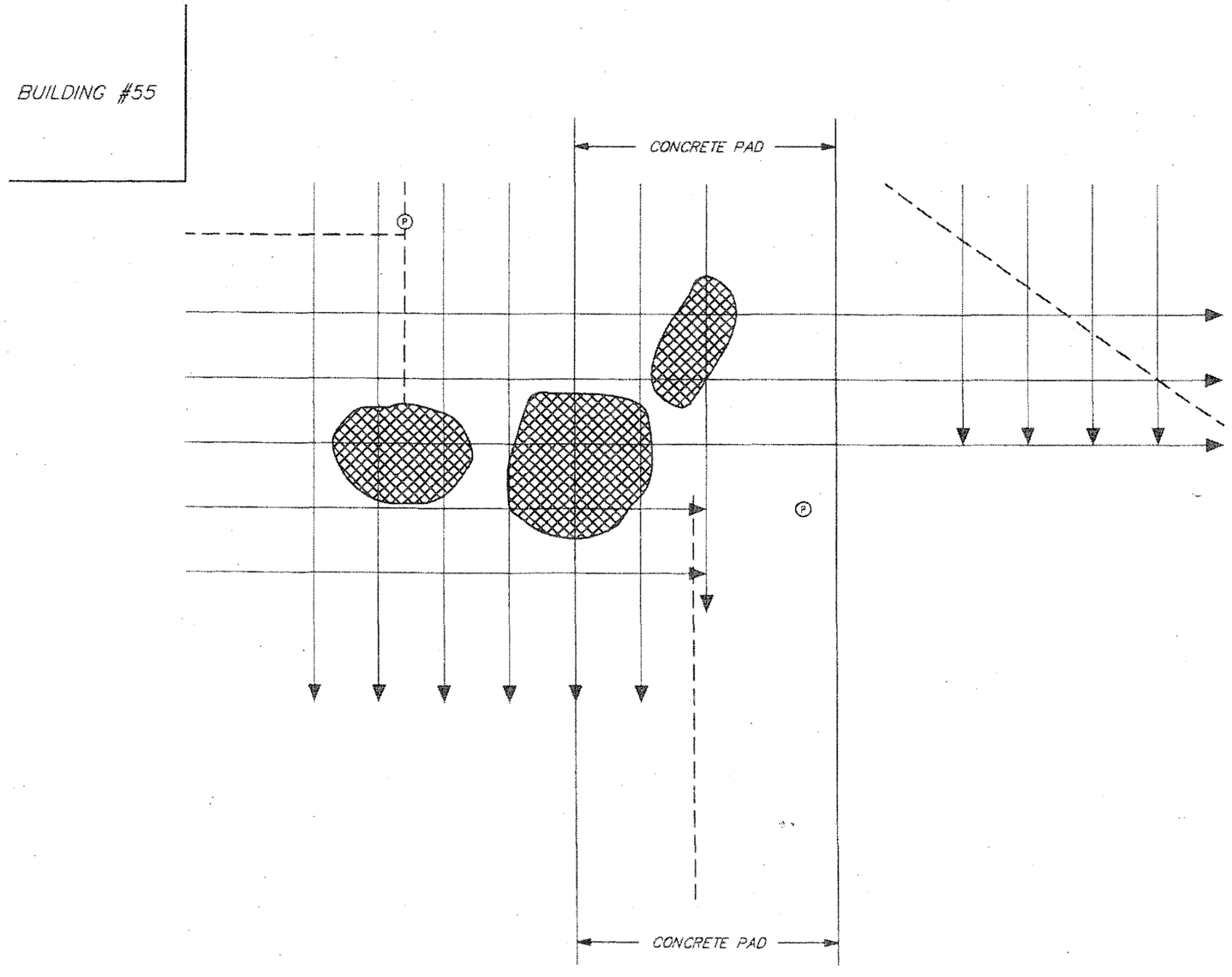
NOTES:

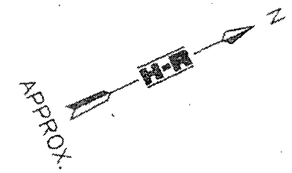
1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

Figure 16
EM61 Survey - UST Area 8
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire





LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- POSSIBLE UTILITY
- Ⓟ VERTICAL PIPE, CUT AT GRADE

SCALE (feet)

0 10 20

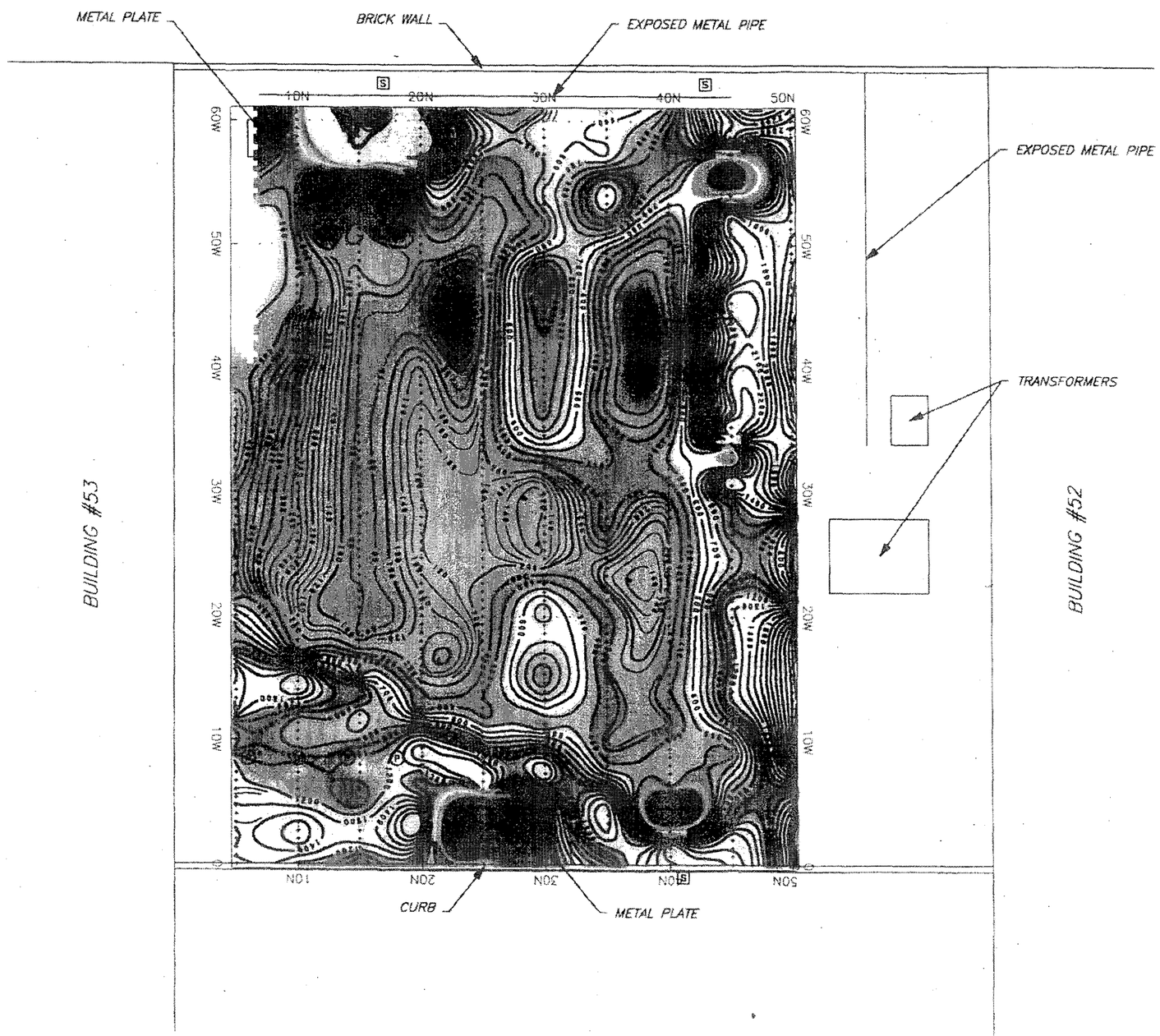
NOTE:

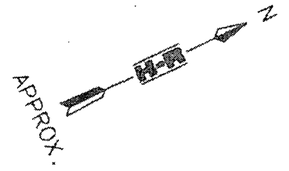
Site sketch generated from field notes.

Figure 17
GPR Survey & Integrated Interpretation – UST Area 8
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire





LEGEND

- EM DATA STATION
- PIPE
- OVERHEAD SUPPORT

SCALE (feet)

0 10 20

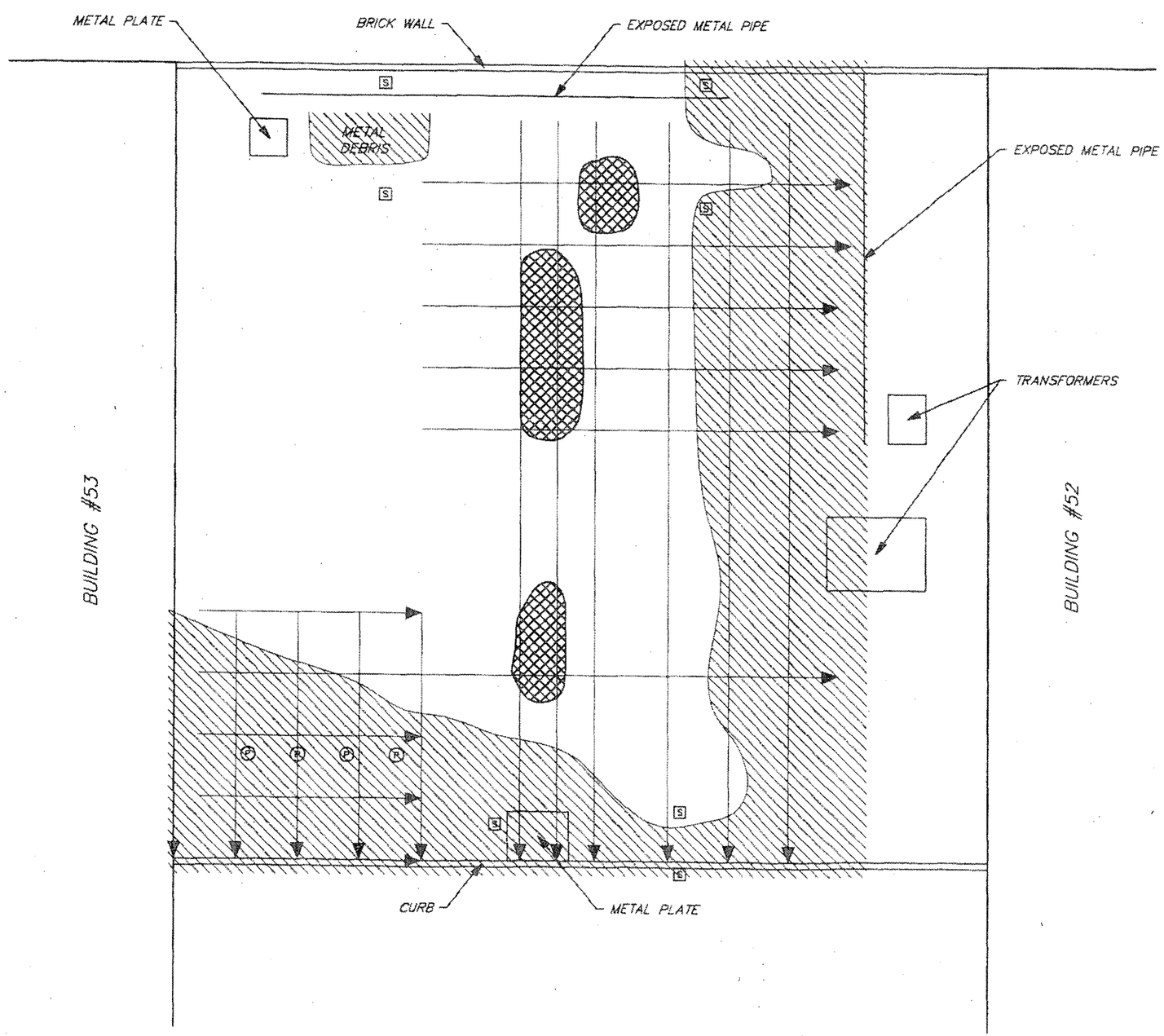
NOTES:

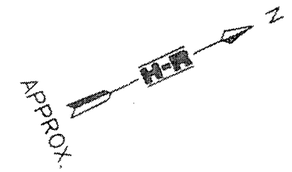
1. Site sketch generated from field notes.
2. Contour Interval = 20 mV.

Figure 18
EM61 Survey – UST Area 9
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire





LEGEND

- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE GEOPHYSICAL DATA ALONE.
- (P) VERTICAL PIPE, CUT AT GRADE
- [S] OVERHEAD SUPPORT

SCALE (feet)

0 10 20

NOTE:

Site sketch generated from field notes.

Figure 19
GPR Survey & Integrated Interpretation – UST Area 9
Procter & Gamble Port Ivory Facility
Staten Island, New York

File 00D59 | December, 2000

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

BLOCK 1400 LOT 1

37.55 ACRES

CONTAINER PORT ENTRANCE

H-R

N

UST AREA 1

UST AREA 2

UST AREA 3

UST AREA 4

UST AREA 5

UST AREA 6

UST AREA 7

UST AREA 8

UST AREA 9

281'

294'

RESERVOIR

200 PARKING SPACES

WESTERN AVENUE

RICHMOND TERRACE

BLOCK 1338 LOT 1

47.3 ACRES

LEGEND

UST SURVEY AREA

NOT TO SCALE

NOTE:

Modified from site plan provided by Killam Associates

PLATE 1
SITE PLAN
PROCTER & GAMBLE
PORT IVORY FACILITY
STATEN ISLAND, NEW YORK

FILE 00D59 | DECEMBER, 2000

HAGER-RICHTER GEOSCIENCE, INC.
SALEM, NEW HAMPSHIRE

APPENDIX
EM61 Metal Detector Surveys

Equipment. The Geonics EM61Metal Detector is a time-domain electromagnetic induction type instrument designed solely for detecting buried metal objects. The manufacturer's specifications are attached. An air-cored 1-meter square transmitter coil generates a pulsed primary magnetic field in the earth, thereby inducing eddy currents in nearby metal objects. The decay of the eddy current produces a secondary magnetic field that is sensed by two receiver coils, one coincident with the transmitter and one positioned 40 cm above the main coil. By measuring the secondary magnetic field after the current in the ground has dissipated but before the current in metal objects has dissipated, the instrument responds only to the secondary magnetic field produced by metal objects. Two channels of secondary response are measured in mV and are recorded on a digital data logger. The system is generally operated by pulling the coils as a trailer with an odometer mounted on the axle to trigger the data logger automatically at 20-cm intervals.

Data Analysis and Interpretation. EM61survey data are most commonly plotted as color contour plots of Channel 2, the lower of the two receiver coils, and the difference between Channel 1 and Channel 2. The differential plot suppresses the effects of surface metal objects.

A buried metal object produces a single, sharply defined, positive peak response when the EM61 is located directly over the object. Thus, the interpretation of the plotted data is relatively straightforward in terms of the presence and location of buried metal objects. The depth of metal objects can be estimated by the width or "footprint" of the peak response.

According to the manufacturer's literature, the EM61 can detect a single 55-gallon drum buried at a depth of 10 feet. The instrument provides excellent lateral location accuracy and discrimination of multiple targets due to the data density (20 cm) possible along each traverse. The EM61 is not as affected by interference from surface metal and electrical objects as other geophysical methods and has the advantage of detecting both ferrous and non-ferrous metal objects.

Limitations of the Method. The EM61 detects metal objects that are present below the 1-meter square coils of the instrument, but it is not very sensitive to the presence of small metal objects located to the sides of the coils. It is possible, then, that metal objects could be missed in an EM61 survey if the survey data are collected at intervals greater than 1 meter.

Detection and identification should be clearly differentiated. Detection in this context is the recognition of the presence of a metal object, and the EM61 is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?), and the EM61 cannot identify the buried metal object.

APPENDIX
GROUND PENETRATING RADAR SURVEYS

Field Work. A Geophysical Survey Systems, Inc. Model SIR-2 ground penetrating radar system was used for this survey. The SIR-2 is a fully digital system and includes a color monitor, grey-scale thermal printer, and 10-Gbyte digital tape backup system. The transmit/receive antenna is housed in a box that is moved across the surface. The antenna transmits electromagnetic signals into the subsurface and then detects, amplifies, and displays reflections of the signals in real-time on the color monitor. The result is a radar record of the subsurface.

The maximum depth of penetration of the GPR signal and the resolution of the reflections are controlled in part by the frequency of the antenna used and in part by the electrical properties of the subsurface. Hager-Richter owns antennas with the following center frequencies: 120 MHz, 300 MHz, 500 MHz, and 1000 MHz. The total time during which radar signals are recorded can be varied from a few to 1,000 nanoseconds (nsec). However, there is a trade-off between total time, corresponding to depth range, and resolution. As the total time of recording is increased, the resolution of the GPR records decreases. For a given site, the total time window is set to detect features located somewhat below the maximum expected target depths.

Interpretation. The horizontal axis of a GPR record represents distance across the surface and the vertical axis represents round-trip travel time of the radar signal. The round-trip travel time can be converted to approximate depth by correlating with reflections from targets of known depth or by using handbook values of velocities for materials in the subsurface. For those sites where the subsurface is electrically heterogeneous, the travel times of the radar signal may be different in the various materials, and the vertical scale for the radar records is not necessarily uniform with depth.

The reflections in a GPR record are produced by spatial changes in the physical properties (e.g., type of material, subsurface fluids, porosity, etc.) and related changes in the electrical properties (dielectric constant) of the subsurface materials in the path of the signals. The greater the difference in electrical properties between two materials in the subsurface, the stronger the reflection observed in the GPR record.

The size, shape, and amplitude of the GPR reflections are the characteristics that are considered in the interpretation of the data from any site. Because the electrical properties of metal USTs, utilities, and conduits different significantly from those of the soils in which they are buried, such objects produce GPR reflections with high amplitude and distinctive shapes that permit identification with a high degree of reliability. Most other objects, although readily detectable, require "ground truth" for identification. Only excavations provide positive identification for most objects identified in GPR surveys.

For GPR profiles oriented perpendicular to the long axis of a tank, the signature is similar to a hyperbola, the shape of which is a function of the diameter and depth of burial of the tank. For GPR profiles oriented parallel to the long axis of a tank, the signature is a set of parallel, high amplitude reflections that terminate sharply at the ends of the tank. GPR, then, is useful for determining the exact location and dimensions of USTs.

Limitations of the Method. The maximum depth to which GPR signals can penetrate depends on the electrical properties of the subsurface materials. The higher the electrical conductivity of the subsurface materials, the lower the radar signal penetration. Clay minerals and/or brackish water in the subsurface, for example, attenuate the GPR signal, so reflections are not received from materials at greater depths.

There are limitations of the GPR technique as used to detect and/or locate particular targets: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical conductivities of the targets and the ground, and (4) spacing between lines. Of these limitations, only the fourth, line spacing, is controlled by the operator.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, and a target may not be detectable.

The electrical conductivity of the ground determines the attenuation of the GPR signals, and thereby limits the maximum depth of exploration. The GPR signal does not penetrate clay-rich soils, and targets buried in clay can be missed.

A contrast in the electrical conductivities of the ground and the target is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to extremely corroded conditions of a metal target, then the reflection may be too weak to recognize, and the target can be missed.

The spacing between lines is under control of the GPR operator, and the design of the survey is based on the dimensions of the smallest target of interest. Targets with dimensions smaller than the spacing between GPR survey lines can be missed.

Accurate determination of the depth to any interface requires calibration of the site specific GPR signal velocity. Where targets of a known depth are not available at a site, the time-to-depth conversion of the GPR signal can be estimated from handbook values, but such depth estimations might contain significant error.

Interpretation of GPR data is subjective. As noted above, "ground truth" through correlation with borings and excavations is required for positive identification of most objects detected on the basis of GPR data.

PA 547
6-90

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P+G	NAME OF CONTRACTOR: Cusig Drilling	BORING NO.: A-1	SURFACE ELEV.
LOCATION: N Bld 1-A Block 1400		CONTRACT NO.: 426-99-006	DATE: 11/2 AND 12/4/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 1/8 "I.D.	auger	1

HAMMER: 140 # FALL 30 (SAFT) — HAMMER # FALL:

DRILLER: SAT

INSPECTOR: Charlie Springer

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/4/00	7:45	8.0	DURING SPLIT-SPOONING

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
NA		NA	Fill	1	Gravel w/ Sand Silt matrix
				2*	~~Gravel w/cinders Sand Silt matrix Block~~ 6.5 ~~3.5~~ ~~diatomaceous Earth white~~ 4.5
	5			3	Cinders + Gravel Block
2		7 8	15"	4	SAME
		12 9			
		9 7	13"	5	SAME
		3 3			
	10	7 6	20"	6	SAME, WITH 4' LAYER DIATOMACEOUS EARTH TOP OF SPOON
		5 3			
		3 1	3"	7	SAME 14'
		2 3			
	15	21	14"	8	BROWN PEAT 16.0
		22			
					BOTTOM OF BORING
	20				- ALL SAMPLES SCREENED WITH PID METER
					- SAMPLE #2 SAVED FOR ENVIRONMENTAL TESTING
					- ALL REMAINING SAMPLES DISCARDED

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

PA 547
6-90

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: A-3	SURFACE ELEV.
LOCATION: As laid out in the field		CONTRACT NO.: 426-99-006	DATE: 11-16-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 Safety # FALL 30	# FALL

DRILLER: G. Mc Aneny

INSPECTOR: J. ZARKS

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-16-00	2:05 PM	2.0'	SAMPLE # 2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D	SAMP. NO.	SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handaugu	0	Cutter Head	Full Re		concrete	0.0' 0.6
				1	Fill grey c-f SAND and Gravel, tr. SILT	
				2*	SAME	2.4'
					Fill greyish-green Silt, tr. m-f SAND	4.0
	5			3	Fill greyish-black SILT & CLAY	
		6-6				
AUGERS		8-10	24"	4*	Fill black - SILT & CLAY	8.0'
		7-8				
	10	9-15	24	5	Fill grey c-f SAND, greenish-White Diatomaceous	
		4-5				
		6-6	24"	6*	Fill white & grey c-f SAND, Gravel, Diatomaceous	12.0
		2-2				
		3-4	20"	7	Fill black Silty Clay, some chunks	
	15	1-2				
		1-2	24"	8	Fill black Clay SILT	
		2-2				
		2-2	24"	9	SAME	
		1-2				19.0'
	20	2-2	24"	10	Brown PEAT	
					Note: 3 samples saved for Testing All other samples screened with PID meter & discarded	Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

PA 547
6-90

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: A-4	SURFACE ELEV.:
LOCATION: As laid out in the field		CONTRACT NO.: 426-99-006	DATE: 11-16-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 Safety # FALL 30 "	# FALL "

DRILLER: G. Mc Aneny
INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-16-00	11:24 AM	3.0'	SAMPLE #2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. [2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Cutter Head	0	Cutter Head	Full Rec			
					DGABC	0.5
					CONCRETE	1.1
HAND AUGER		HAND AUGER		1	Misc Fill greyish-black c-f SAND & Gravel, tr Silt, Coal, Cinders, Brick, wood etc	
				2	SAME	
	5			3	SAME	
		4-4				
SIEH Augers		3-3	18"	4 *	SAME	
		4-3				
	10	3-3	14"	5	SAME	
		4-3				
		3-4	20"	6	SAME	
		4-6				
		6-4	20"	7 *	SAME	
	15	2-2			SAME	14.8
		2-2	18"	8	Brown PEAT	16.0

Note: Samples #4 & #7 saved for testing
All other samples screened with PID meter & discarded

Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

PA 547
6-90

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: A-5	SURFACE ELEV.:
LOCATION: As laid out in the field.		CONTRACT NO.: 426-99-006	DATE: 11-14-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Osuch

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-15-00	7:46	8.0'	Sample #5

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handauger	0	Handauger	Full		Fill DGABC	0.0'
				1	Fill dark brown c-f SAND, Gravel, tr. Silt, cinders	0.8'
					SAME	
				2	Fill greyish-black c-f SAND, Gravel, tr. Silt, cinders, coal	
	5			3	SAME	
		5-8				
Augers		12-17	12"	4	Misc Fill greyish black c-f SAND, Gravel, tr. Silt, cinders, wood, coal.	
		7-8				
	10	7-9	20"	5	SAME	
		12-6				
		6-7	24"	6	SAME	
		10-11				
		11-14	12"	7	SAME	
					SAME	14.8'
	15	4-3				
		3-4	24"	8	Brown PEAT, little Silty CLAY	16.6'
					Note: Sample #2 saved for testing.	
					All samples were screened with PID meter and discarded	
	20					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PDG Site	Craig Drilling	B-6	
LOCATION		**CONTRACT NO.**	**DATE**
East of Bldg 1A Block 1400 Lot 1		426-99-006	11/10/00 - 11/11

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.		1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe / J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/10/00	4 PM	6.0	while Hand Augering
11/11/00	1:05 PM	6.5'	Sample # 4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger	Full		Crushed Stone, Little Misc Fill 0.1 ppm
				1	Misc Fill Cinders, Gravel, Sand, Brick, Etc
				2	
	5			3	Same Same
3 1/4" I.D. Hollow Stem Augers		4 - 3 3 - 6	20"	4	SAME
		4 - 5 6 - 6	20"	5	SAME
	10	6 - 8 6 - 11	24"	6	SAME
		18 - 18 12 - 3	18"	7	Misc Fill Cinders, black c-f SAND, Gravel etc 14.0
	15	W. O H. 1	24"	8	Brown PEAT, some grey Silty CLAY 16.0'
					Bottom of Boring
	20				All Samples checked with PID Meter St 12 Sand for Testing
					Sample #8 saved (On hold) for testing
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 2

PROJECT: Port Ivory PTG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: F1-3	SURFACE ELEV.
LOCATION: West of Bldg 38 Block 140c Lot 1		CONTRACT NO.: 426-99-006	DATE: 11/10/00 - 11/11/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe / J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/10	3 PM	5.3'	open hole
11/11	10:15 AM	1.6'	Open hole

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Hand Auger	0	Hand Auger	Fill		Crushed Stone	1.0
				1	5.2 ppm Misc Fill - Sand, Gravel, Cobbles, Brick, Cinders, ETC	3.0
				2	0.5 ppm Fill Gray Filter Material, Tr Black Filter Material	5.0
	5			3	Fill - Diatomaceous Earth, White	
Hollow STEM Augers		1-1		4		
	10	1-1	24"		SAME (grey & White	
		WOH-1		5		
		1-1	24"		SAME	
		1-1		6		
		1-1	24"		SAME	
	15	1-1		7		
		1-1	24"		SAME	
		1-1		A	SAME	17.0'
		1-4	24"	8B	Brown PEAT, little black organic CLAY	18.0'
	20				All Samples checked with PID Meter	
					Sample #1 & 2 Saved for Testing	Bottom of Boring
					Sample #8 Saved for Testing (On hold)	
	25					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P & G	Craig drilling	UST6-2	
LOCATION		CONTRACT NO.	DATE
± 150' W of center of Bldg 17 Block 1400 Lot 1		426-99-006	11-21-00/11-28-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER J. Craig
INSPECTOR J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-28-00	12:48 PM	1.8'	Open hole.

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS LINE LOCATES CHANGE OF PROFILE	
and auger	0	HAND AUGER	Full		DG ABC & Crushed Rock	0.0' 0.2'
				1	Fill greyish brown c-f SAND & Gravel, tr. SILT.	
					SAME	3.0'
				2	Fill light grey dietomaceous.	
	5			3*	SAME	
Hollow STEM Augers		WOH - 0				
		0 - 1	20"	4	Fill white dietomaceous	
		1 - 0				
	10	1 - 0	24"	5*	Fill white dietomaceous	
		1 - 0				
		1 - 0	20"	6	SAME	
		1 - 0				
		1 - 0	24"	7	SAME	
	15	WOH - 0	24"	8	SAME	
		WOH - 0	24"	9*	Fill brown & white dietomaceous	
					SAME	18.5'
		2 - 2				
	20	3 - 3	24"	10	Brown PEAT	20.0'

Note: 3 samples saved for testing
All other samples checked with PID meter & discarded.

Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: - Portfolio - P&G	NAME OF CONTRACTOR: Craig	BORING NO.: UST6-3	SURFACE ELEV.:
LOCATION: ± 110' West of Bldg 17		CONTRACT NO.: 426-99-006	DATE: 11/29/00

SPOON	CASING SIZE	HOLE TYPE
3" O.D. 2 3/8 I.D.	Augers	I

HAMMER (SAFETY)	HAMMER
140 # FALL 30	# FALL

DRILLER: D. Cooke

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/28/00	10:45A	3.2'	In S-2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand	Full	1 A	Fill - Br M-F Sand & Gravel, little Brick, tr Steel 1.5'
		Auger	Rec	1 B	Fill - Cinders, Sand, Gravel
				2	
	5			3 A	Sand 5.5'
				3 B	Gray & Black Diatomaceous fill
Augers		WOH/24"	24"	4	Same
		WOH/24"	18"	5	Same
	10	WOH/18"-1	19"	6	Same
		WOH/10"-1	20"	7	Same
	15	1/12"			
		1/12"	17"	8	Sand w/ Green Silt
		WOH/24"	16"	9 A	Sand 17.0'
				9 B	Br Peat 18.0'
	20				Bottom of Boring

Note: Sample # 1B & 8 were saved for testing. All other samples were screened w/ PID & then discarded.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory PJG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: UST 5-2	SURFACE ELEV.
LOCATION: South of Building 17		CONTRACT NO.: 426-98-00C	DATE: 11/27/2000

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8" I.D.	Auger	1

HAMMER	HAMMER
140 # FALL 30"	# FALL "

RILLER: David Cooks

NSPECTOR: Madhu Patel

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/27/00	1345	5.0'	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
						0.0
					Concrete	0.7
and Auger		Hand Auger	Fill	1		
				2	Fill - cmf Gravels, Rocks, etc	
	5			3	Wet, White & Gray Diatomaceous Earth material, trace clay	
Au		1 2	24"	4	Wet, White & Gray Diatomaceous earth material.	
		2 1				
		W O	16"	5	SAME	
		H				
	10	1 1	18"	6	SAME	
		1 1				
		2 1	20'	7	SAME	
		1 1				14.0
		2 3	22"	8	Dark Brown Organic SILT, with decomposed wood (Peat)	
	15	1 1				16.0
					Bottom of Hole at 16.0'	
					All samples checked with PID	
					Sample No # 3 saved for Environmental testing. Remaining sample discarded	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: UST 2-1	SURFACE ELEV.
LOCATION: ±10W of BH: UST 2-1 A Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 11-30-00

SPOON	CASING SIZE	HOLE TYPE
3 O.D. 2 3/8 I.D.	Augers	1
HAMMER Safety 140 # FALL 30"	HAMMER # FALL "	

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-30-00	11:15 AM	7.0'	Sample # 4A

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full		
				1	Fill brown decomposed wood
				2	Fill brown decomp. wood & tr. grey diatomaceous 4.0'
	5			3	Orange-brown c-f SAND, tr. Gravel, tr. Silt
		4-4		4A	greyish-black c-f SAND, tr Gravel, tr Silt some Coal.
		5-2	24"	4B*	brown c-f SAND, tr. Gravel, tr. Silt 14.1 ppm
		4-4			
		8-10	24"	5*	Greyish-black c-f SAND, tr. Gravel, tr. Silt Fuel oder.
	10	4-5			
		5-7	20"	6	SAME 14 ppm
		4-4			
		2-2	20"	7	SAME 12.8 ppm 14.0'
	15				Note: 2 SAMples saved for testing. All samples checked w. PID meter. The other samples discarded
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P & G	Craig drilling	UST 2-1 A	
LOCATION		**CONTRACT NO.**	**DATE**
± 100' SW of Bldg 12	Block 1400 Lot 1	426-99-006	11-30-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1
HAMMER Safety 140 # FALL 30 "	HAMMER # FALL "	

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL			
Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full	*	
				1	Fill brown decomposed wood
				2	Fill grey & yellow dietomaceous & brown dec. wood 3.0'
					CONCRETE OBSTRUCTION
	5				NOTE: 1 sample saved for testing. Bottom of Boring
					Obstruction during handauger.
	10				
	15				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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OJECT: ort Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: UST 2-1 B	SURFACE ELEV.
CATION: 2' W. of BH UST2-1 A Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 11-30-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1
HAMMER Safety 140 # FALL 30 "	HAMMER # FALL "	
RILLER D. Cooke		
SPECTOR J. Zarks		

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
AND AUGER	0	Hand AUGER	Full		
				1	Fill brown decomposed wood.
				2 *	Fill brown decomposed wood & greyish white diatomaceous
	5			3 *	Brown c-f SAND, tr. Gravel tr. SILT.
					Greyish black c-f SAND, tr Gravel, tr SILT. Fuel odor. 5.5'
					CONCRETE OBSTRUCTION
					Note: 2 samples saved for testing.
					STOP Handauger because of obstruction.
					Bottom of Boring
	10				
	15				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: UST 2-2	SURFACE ELEV.
LOCATION: 25'S of UST 2-1 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-30-00
SPOON: 2 "O.D. 1 3/8 "I.D.	CASING SIZE: Augers	HOLE TYPE: 1	
HAMMER: 140 # FALL 30 "	HAMMER # FALL "		
DRILLER: D. Cooke			
INSPECTOR: J. Zarks			

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-30-00	2:15 PM	7.0'	Sample #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handauger	0	Handauger	Full		Fill brawn decomposed Wood some grey c-f SAND	0.6'
				1	Fill brown c-f SAND, tr. Gravel, tr. Silt, some Cobbles & bricks	
				2	Misc. Fill greyish-brown c-f SAND & Gravel, tr. Silt, cinders, Coal, bricks	
	5			3*	Misc. Fill greyish-black c-f SAND & Gravel, tr. Silt, cinders, coal, bricks	
No Casing used		7-11				
		7-5	12"	4	Fill yellowish-grey c-f SAND, tr. Gravel, tr Silt, cinders.	
		7-9				
	10	8-4	10"	5	SAME	
		8-2		6*		
		2-2	10"		Misc. Fill grey c-f SAND & Gravel, tr. Silt, wood, cinders, Coal.	12.0'
					Note: 2 samples saved for testing	
					All samples checked with PID meter & discarded	
					Bottom of Boring	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 2

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: UST 2-2 A	SURFACE ELEV.
LOCATION: 4' W of UST 2-2 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-30-00

SPOON	CASING SIZE	HOLE TYPE
"O.D. "I.D.	Handauger	1
HAMMER Handauger # FALL "	HAMMER # FALL "	
DRILLER: D Cooke		
INSPECTOR: J Zarks		

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0.0'	Handauger	Full	1	Fill br decomposed Wood
	0.5'				Fill brown c-f SAND, tr Gravel, tr SILT, cobbles, bricks, cinders
	2.5'				SAME
					CONCRETE OBSTRUCTION
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 2

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: UST 2-2B	SURFACE ELEV.:
LOCATION: 5'S of UST 2-2 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-30-00

SPOON	CASING SIZE	HOLE TYPE
"O.D. "I.D.	Handauger	1
HAMMER Handauger # FALL "	HAMMER # FALL "	

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full		Fill brown decomposed wood some c-f SAND 0.0 / 0.5
				1	Fill grey c-f SAND & Gravel tr. Silt, cinders, coal, brick.
				2	SAME
					Concrete Obstruction
	5				
					Bottom of Boring
	10				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P & G	Craig drilling	UST 2-3	
LOCATION		**CONTRACT NO.**	**DATE**
±150' W of Bldg 12 Center Concrete Roadway - Block 1400 lot 1		426-99-006	12-01-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12-1-00	9:45 AM	6.0'	SAMple # 3

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Cutter Head Handauger	0	Cutter Head Handauger	Full R.		0.0 Concrete 1.0'
				1	Misc Fill dark greyish-black c-f SAND some Gravel, f. Silt, Cinders, Coal, Brick
				2*	SAME
	5			3	SAME
Hollow Stem Auger		5-13			SAME - Fuel.
		10-3	18"	4	Fill greyish white diatomaceous 7.6'
		1-2		5A*	SAME & wood. 9.0'
	10	3-3	20"	5B	Misc Fill greyish-brown Clayey Silt c-f SAND, cinders (Fuel)
		2-1			
		1-1	8"	6	Fill greyish-white diatomaceous (Fuel), some Gravel
		12-14			
		Wo-H	24"	7*	Brown PEAT, (Fuel odor) 14.0'
	15				NOTE: 3 samples saved for testing All samples checked w. PID meter * the other discarded
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 2

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HH - P & G	Craig	Wood - 1	
LOCATION		**CONTRACT NO.**	**DATE**
As laid out, ± 16' East of Conveyor at Wood Site (Block 1400)		426-99-006	11/7/00

SPOON "O.D. "I.D.	CASING SIZE	HOLE TYPE
		1

HAMMER # FALL "	HAMMER # FALL "

DRILLER D. Osuch

INSPECTOR T Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00	10:35 AM		No water encountered.

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand Auger	Full	1 A	Fill - Gravel, some Sand & Cinders 1.0'
			Rec	1 B	Fill - Br F Sand, little Silt
				2	Fill - Br M-F Sand & Cinders, little Gravel
					Concrete 3.5' 4.0'
	5				Hit Concrete - Bottom of Boring
					See Boring - Wood - 1A
	10				
	15				
					Note: No samples were saved. Moved Boring. See BH - Wood 1A

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 2

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HH - P&G	Craig	Wood - 1A	
LOCATION		**CONTRACT NO.**	**DATE**
As laid out ±3' S.E. of Wood-1 (± 18' east of Conveyor at Wood Site) Block 1400		426-99-006	11/7/00

SPOON "O.D. "I.D.	CASING SIZE	HOLE TYPE
		1

HAMMER # FALL "	HAMMER # FALL "

DRILLER: D. Orach

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00			No Water encountered

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
	0	Hand	Full	1 A	Fill - Gravel, some Sand, Cinders, little Clay	1.0'
		Auger	Rec	1 B	Fill - Br F Sand, little Silt	2.0'
		↓	↓	2 A	Fill - Br M-F Sand, & Cinders, little Gravel	2.5'
				2 B	Fill - Gravel, some Cinders, little Sand (R.R Ballast)	3.5'
	5					
					Hit Core - Bottom of Boring	
	10					
	15					
					Note: No samples taken. Moved Boring. See BH - Wood 1-B	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 2

PROJECT: HH - P&G	NAME OF CONTRACTOR: Craig	BORING NO.: Wood 1-B	SURFACE ELEV.
LOCATION: ±10' north of BH Wood-1 (±16' west of Bldg 12 / ±16' east of Conveyor at Wood Site) Block 1400		CONTRACT NO.: 426-99-006	DATE: 11/7/00

SPOON "O.D. "I.D.	CASING SIZE	HOLE TYPE
		1

HAMMER # FALL "	HAMMER # FALL "

DRILLER: D. Douch

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00			No water encountered

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand	Full		
		Auger	Rec	1	Fill - Gravel, some Sand Cinders
		↓			Fill - Br M-F Sand, little Silt.
				2	Sand w/ little Cone Boulders. 3.5'
	5				Hit Concrete - Bottom of Boring
	10				
	15				
					Note: Samples were taken & then discarded as per Kellam Rep. C. Springer. Will return to this area at another time.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: HH - P&G	NAME OF CONTRACTOR: Clays	BORING NO.: Wood - 1C	SURFACE ELEV.
LOCATION: South end of wood pile ± 161' S.W. of Bldg 12 (Block 1400)		CONTRACT NO.: 426-95-006	DATE: 11/9/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger HS	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Osuch

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/9/00	1:10 pm	7.5'	In S #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand Auger	Full Rec.	1	0.3' Fill - Gray Clay cinders 1.5'
				2	Same
	5			3	Same
Adv		4-3		4	Same
		4-4	12"		
		6-5		5	Same
	10	2-3	12"		
		15-6		6	Same w/ sheen & odor
		4-4	14"		12.0'
		7-3		7	Peat 3.5 ppm
		2-2	14"		
	15	3-3	12"	8	Peat 0.9 ppm 15.0'

Bottom of Boring

Note: Samples #4 & 6 were saved for testing. Sample #4 on HOLD! All other samples were screened w/ PID & then discarded.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P+G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: Wood-3	SURFACE ELEV.
LOCATION: South of Bowlding 1A (25)		CONTRACT NO.: YZC-99-006	DATE: 11/29/2005

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
146 # FALL 30" Salty	# FALL "

DRILLER: David Cooks

INSPECTOR: M. Patel

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/29/2005	1600	6.5'	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
			(Fill)		Asphalt
Hand Auger		Hand Auger		1	Fill- light Brown cmf SAND, silt, Rock, wood etc
				2 (X)	light Brown and Dark Gray cmf SAND, little mf Gravel, lt stone, concrete, Rock etc
	5			3	Same lt white diatomaceous earth material
		1, 1	24"	4 (X)	Same
		1, 1			
		6.6	12"	5	Same 9.0'
		5, 4			Dark cmf GRAVEL, little cmf Sand from Sft- weathered Rock.
	10	4, 4	18"	6	SAME
		6, 5			
		2, 2	16"	7	SAME 13.0'
		2, 3			Brown organic silt- w decomposed wood (PEAT)
	15				Bottom of the Hole at 140'
					All soil samples checked with PID meters. Sample No. 2 and 4 are saved for Enviromental testing. Remain samples are discarded
					(X) Sample collected for Analysis

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT: Port. Ivory P+G Site.	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: Wood-3A	SURFACE ELEV.:
LOCATION: South of Building 1A		CONTRACT NO.: 426-95-501	DATE: 11/29/2000

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL 30 Safty	# FALL

DRILLER: David Cooks

INSPECTOR: M. Patel

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/29/00	1100	Dry	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger		Hand Auger	Full		Asphalt
					Fill- light Brown & Dark Gray cmf SAND, Rock, some clay, trace
					Stone
					Bottom of Hole due to obstruction.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Ivory Pt. - P&G	Craig	Wood #3	

LOCATION	CONTRACT NO.	DATE
As laid out ± 88' South of Bldg 1-A (Block 1400)	426-~~99~~-006	11/10/00

SPOON "O.D. "I.D. | CASING SIZE | HOLE TYPE 1

HAMMER # FALL " | HAMMER # FALL "

DRILLER D. Orsuch

INSPECTOR T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/10		Dry	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS LINE LOCATES CHANGE OF PROFILE
Bigger Bar	0				ASPHALT 0.2'
					~~CONC~~ 0.5'
		Hand auger	Full Rec	1	Fill Br m-f Sand, little Gravel. 1.5'
					Gray clay 2.0'
		↓	↓	2	Misc. Fill black c-f SAND, little Clayey Silt, coal, cinders. 4.0'
	5				Bottom of Boring
					Obstruction Concrete Slab
	10				
	15				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: HH - P&G	NAME OF CONTRACTOR: Craig	BORING NO.: Wood 5	SURFACE ELEV.:
LOCATION: As laid out ± 80' South of Bldg 1-B (Wood Site) (Block 1400)		CONTRACT NO.: 426-99-006	DATE: 11/7/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D.O such

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00	2:30 PM	5.8'	In S #3

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand	Full	1	Top Soil 0.3'
		Auger	Rec		Fill - Br M-F Sand, little Silt 2.0'
				2	Fill - Cinders, tr Sand
	5			3	Same
Augers		4-3		4	Same
		3-3	19"		
		4-3		5	Same w/ little wood.
	10	8-10	15"		10.0'
		6-15		6	Wood w/ tr cinders
		12-13	8"		
		13-8		7	Same
		12-12	7"		14.0'
	15	3-3		8	Peat, little org silty Clay
		3-4	18"		2.5 ppm 16.0'
					Bottom of Boring
					Note: Samples # 1-5 and # 8 were saved. Other samples (6 & 7) were screened w/ PID & then discarded.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 4

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P&G Site	Craig Drilling	PA MW-1	
LOCATION		**CONTRACT NO.**	**DATE**
NW Corner of Site, Near Richmond Terr Block 1400 Lot 1		426-99-006	11/22/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	"A" Monitor

HAMMER	HAMMER
140 # FALL 30 Safety	# FALL

DRILLER: T Craig

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/22	10 AM	4.5	While Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand	0	Hand Augr	Full		
Auger					Crushed Stone, Gravel, Sand, Cinders, Etc 3.0
				1	Fill - White Diatomaceous Earth Ph-7
	5			2	Fill White & Gray Diatomaceous Earth Ph-7
Ham		1-1			
Stem		1-1	24"	3	Fill Gray Diatomaceous Earth Ph-7
Augrs		1-1			
		1-1	24"	4	Fill - White & Gray Diatomaceous Earth Ph-7
	10	1-0			
		0-0	16"	5	Same Ph-13
		1-0			
		1-0	20"	6	Same Ph-13
	15	1-0			
		0-0	24"	7	Same Ph-13
		1-1		8A	Fill - Brown, Green, Gray, White Diatomaceous Earth Ph-13 17.0
		3-4	18"	8B	Brown Peat Ph 7 18.0
	20				Bottom of Boring
					All Samples checked with PID Meter, S# 1, 2, 5 & 8B Saved for Enviro Testing, Remaining Samples Discarded
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report

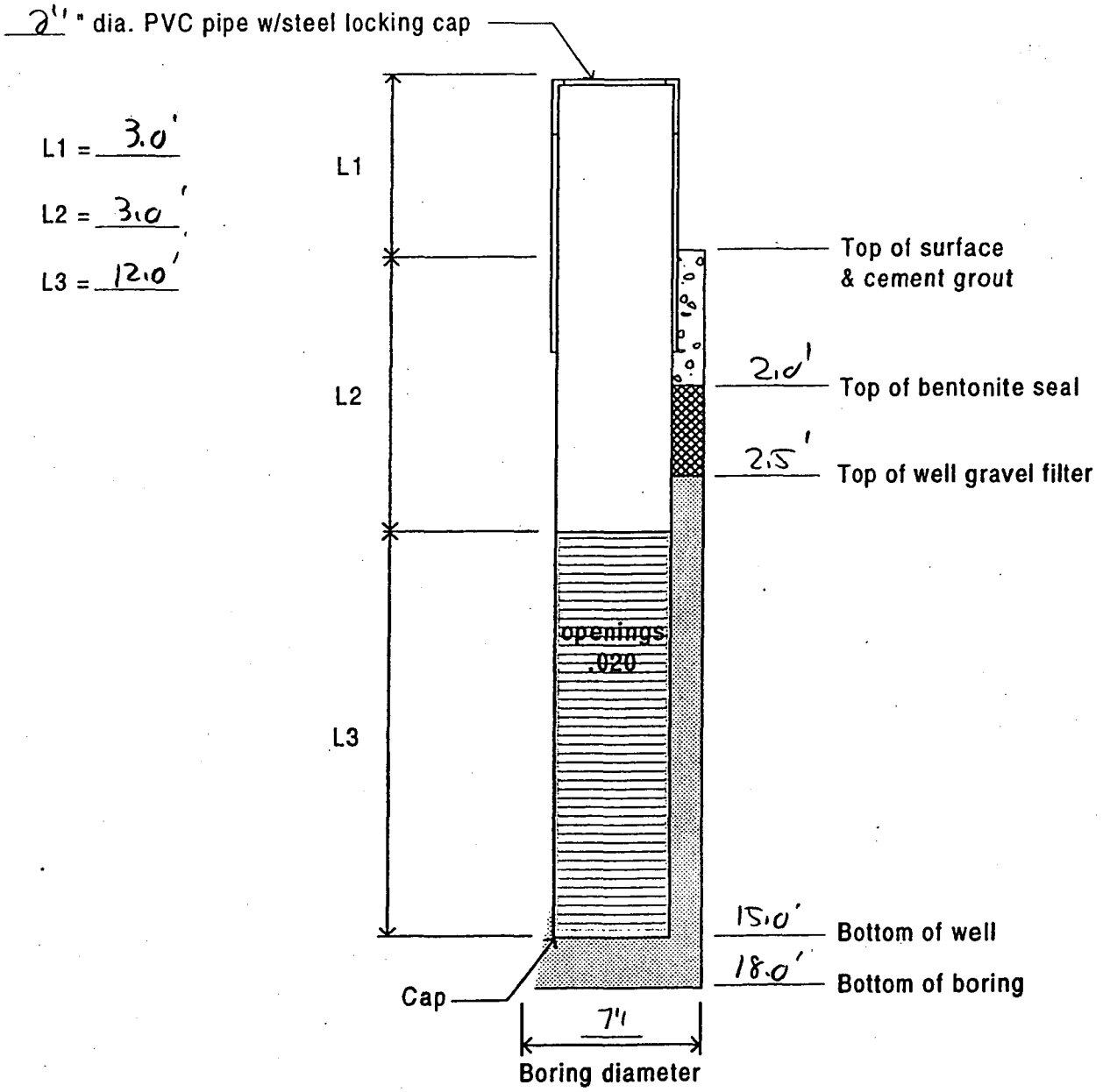
Sheet 2 of 4

PROJECT				CONTRACT NO.
Port Ivory PDG Site Block 1400 Lot 1				426-99-006
LOCATION				CONTRACTOR
NW corner of Site, Near Richmond Ter				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PANW-1	"B" Monitor	D Howe	J Craig	11/22/00

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN
11/24/00	7.5'	10.1'	10 MINUTES AFTER



REMARKS: Hole Backfilled 15-18' with Bentonite

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BORING REPORT

SHEET 1 OF 5

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PDG S,To	Craig Drilling	PAMW-1D	
LOCATION		**CONTRACT NO.**	**DATE**
≠10' North of PAMW-1, NW corner of S,To, Block 140 Lot 1		486-99-006	11/22/00

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	'A' Manton

HAMMER	HAMMER
140 # FALL 30	# FALL

DRILLER: J Craig

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/22	3P	4.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand	0	Hand Auger	Full		0.0
Auger					For STRATA 0-18' See Log for PAMW-1
	5				
H Casing					
	15				18.0'
		WOH	2d'	1	9.8 ppm Brown Peat Ph-7
Drill	20				
Ahead		WOH	20"	2	4.8 ppm Same Ph-7
With					
Rock T		1			2.1 ppm
		2-1-4	21"	3	Same Ph-7
	25				25.0
		2-3		4	Ph-7
		4-3	14"		M-F Brown Sand, Tr Gravel, Tr Silt
	30				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 2 OF 6

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PJG Site	Craig Drilling	PBNW-1D	
LOCATION		**CONTRACT NO.**	**DATE**
±10' North of PBNW-1, NW Corner of site, Block 1400 Lot 1		486-99-006	11/24/00

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	Rovert	"B" Monitor

HAMMER	HAMMER
140 Safety # FALL 30"	# FALL "

DRILLER: J Craig

INSPECTOR: D Houp

GROUND WATER LEVEL			
Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Drill	30	3-4		5	Ph-6
Ahead		4-4	16"		M-F Gray Sand, Tr Gravel, Tr Silt
with					
Rovert					
	35	3-3		6	Ph-7
		4-5	12"		F Gray Sand, Tr Silt, Tr Gravel 32.0
					F Red Brown Sand in Tip of Spoon
	40	4-7		7	Ph-7
		7-8	10"		F Brown Sand, Tr Silt, Tr Gravel
	45	7-4		8	Ph-7
		5-4	14"		M-F Brown Sand, Tr Silt, Tr Gravel
					48.0
					Rods chattering
	60	9-18		9	No Ph Reading
		25-30	8"		Red Brown Clayey Silt, Little F Sand, Tr Gravel
	55				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 3 OF 6

PROJECT: Port Ivory PDGSite	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PA MW-10	SURFACE ELEV.
LOCATION: ±10' North of PA MW-4 NW Corner of Site Block 1400 Lot 1		CONTRACT NO.: 426-95-006	DATE: 11/24/00

SPOON	CASING SIZE	HOLE TYPE
2" O.D. 1 3/8" I.D.	Rovert	"D" Monitor

HAMMER	HAMMER
140 # FALL 30"	# FALL "

DRILLER: J Craig

INSPECTOR: O Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Drill	55	30-100/5" 4/1"		10	No Ph Readings — Little M-F Sand
Dhead		24-26 *	11"		Decomposed Red Shale, Little Red Brown clayey SILT
with					
Rovert					
					60.0
	60	27-31		11	No Ph Readings
		36-40	13"		M-F Red Brown Sand, Little Red Shale, Tr Clayey Silt
					65.0
	65	37-46		12	No Ph Readings — Tr Silt
		36-42	7"		Decomposed Red Shale, Little M-F Red Brown Sand
	70	100/11" 50/6" *	2"	13	Decomposed Red Shale, Tr F Sand — 70.2
					Refusal - Bottom of Boring
	75				
	80				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

* 300lb Hammer used

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Well Installation Report

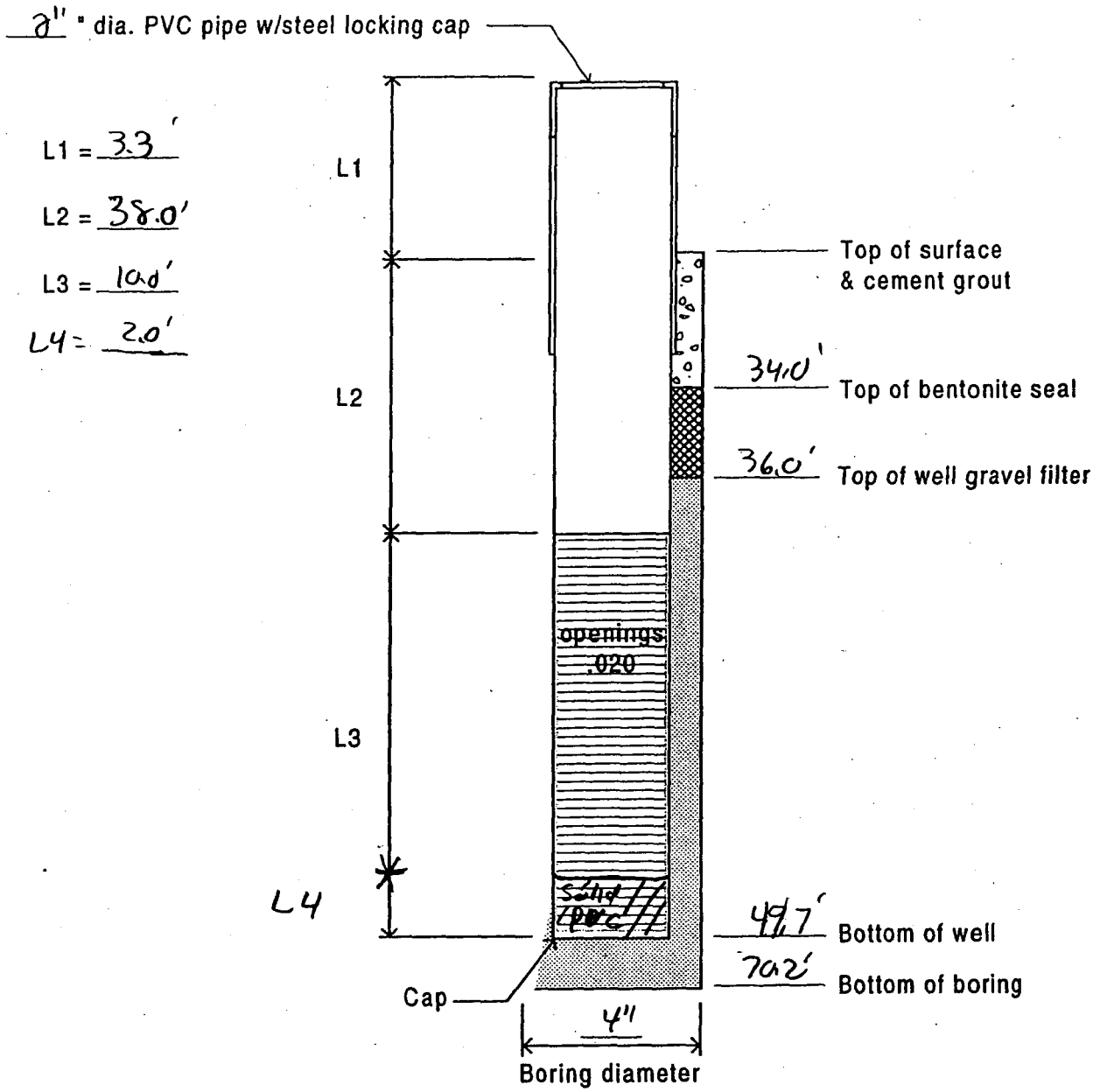
Sheet 4 of 5

PROJECT				CONTRACT NO.
Port Ivory PDG Site				426-98-006
LOCATION				CONTRACTOR
±10' Northof PA MW-1D				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PA MW-1D	"B" Monitor	D Howe	J Crain	11/24/00

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE _____	WATER LEVEL AFTER _____	TAKEN _____ MINUTES AFTER



REMARKS:

Hole Back filled 55.0 - 70.2 with Hole Plug

" " 47.7 - 55.0 with Well Gravel

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BORING REPORT

SHEET 1 OF 4

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PDG Site	Craig Drilling	PDMW-5	
LOCATION		**CONTRACT NO.**	**DATE**
East Side of RR car Scale Block 1400 Lot 1		426-99-006	11/9/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	"A" Mavier

HAMMER	HAMMER
140 # FALL 30 " Safety	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/9/00	3 pm	4.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE		
	0						0.0
Hand		Hand Auger	Full	1	Crushed Stone		0.0
Auger					Misc Fill - Cinders, Ashes, Gravel, ETC	0.1	
				2	Same	0.1	
	5			3	Same	0.3	
Hole		5-3		4A	Same		7.5
Sliam		2-1	7"	B	Fill - Diatomaceous Earth (WHITE)	0.1	8.0
Augers		3-1		A	Misc Fill - Cinders Ashes, ETC	0.1	8.5
		1-2	23"	5 B	Brown Peat	0.1	9.5
	10			C	Fill - Diatomaceous Earth white	0.1	10.0
		WOH-1		6			
		0-1	14"		Brown Peat 4.7ppm		12.0
							9
					Bottom of Boring		
	15						
					All Samples checked with PID Meter		
					5th 1-3 Saved for Testing 5th To Be Tested		
					Remaing Samples Discarded		
	20						
	25						

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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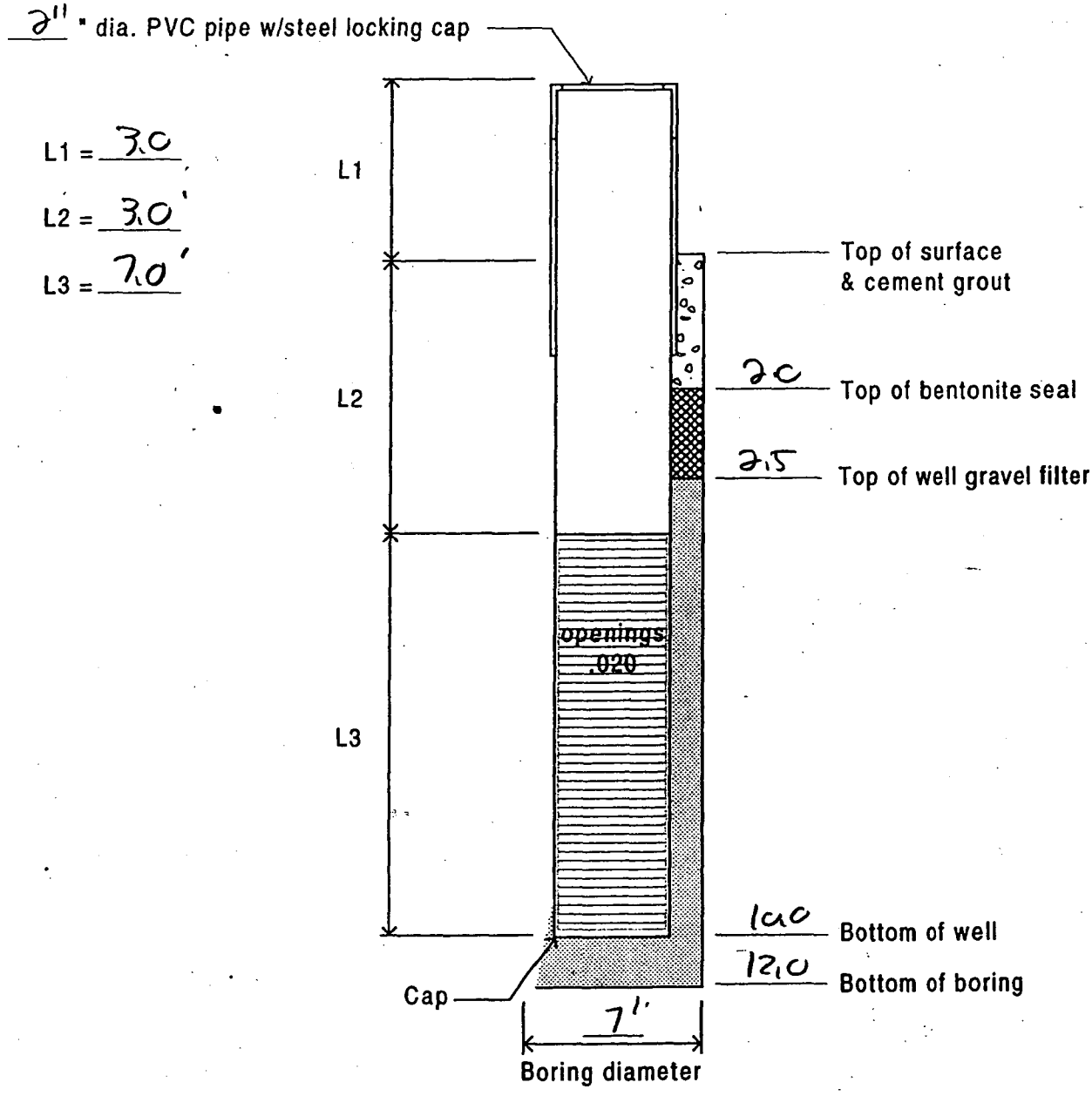
Well Installation Report

PROJECT				CONTRACT NO.
Port Ivory PtG Site				4/26-99-006
LOCATION				CONTRACTOR
East of RR Car Scale				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PP MW-5	"P" Monitor	D Howe	S Burns	11/9/00

Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN
11/9/00	7.1'	7.4	10 MINUTES AFTER



REMARKS:
Hole Back Filled 10-12' with Bentonite

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BORING REPORT

SHEET 1 OF 4

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P&G Site	Craig Drilling	PA-MW-6	
LOCATION		**CONTRACT NO.**	**DATE**
West side of wood dumping Ramp Block 1400 Lot 1		476-99-006	11/7/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 1/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 Safety	# FALL

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00	1250	9.0	S# 5

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger	Full		Asphalt 0.0
					DGABC 0.2
				1	Misc Fill - Cinders, Coal, Brick, Wood, Sand, ETC 1.5
				2	Misc Fill Cinders, Ashes, Gravel, ET
	5			3	Same
Power Storm Augers		8-6		4	
		5-5	18"		Misc Fill Cinders, Ashes, ETC Same 8.5
		2-0		5	
	10	1-2	24"		Fill - Filter Material (white) Diatomaceous Earth
		WOH		6	
		WOH-1	24"		Same
		WOR-WOH		7	
		1-2	24"		Same
	15	1-2		8	Fill - Filter Material (white), Diatomaceous Earth
		2-2	24"		Tr M-F Gray Sand Near Bottom of Sample
		WOH-1		9	
		0-1	24"		Fill - Filter Material (white & Gray) Diatomaceous Earth 18.0
		3-3		10	
	20	4-4	20"		Brown Peat 20.0
					Bottom of Boring
					All Samples checked with PID Meter
					S# 1-5 Saved for Enviro Testing, Geotech
					Samples on all
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report Sheet 2 of 4

PROJECT				CONTRACT NO.
Port Ivory PJG Site				426-97-006
LOCATION				CONTRACTOR
West Side of Wood Dumping Ramp Block 140C Lot 1				Crain
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PA MW-6	"A" Monitor	D Howe	S Burns	11/7/00

Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE					
11/8/00	WATER LEVEL BEFORE 8.0	WATER LEVEL AFTER 8.0	TAKEN 60 MINUTES AFTER
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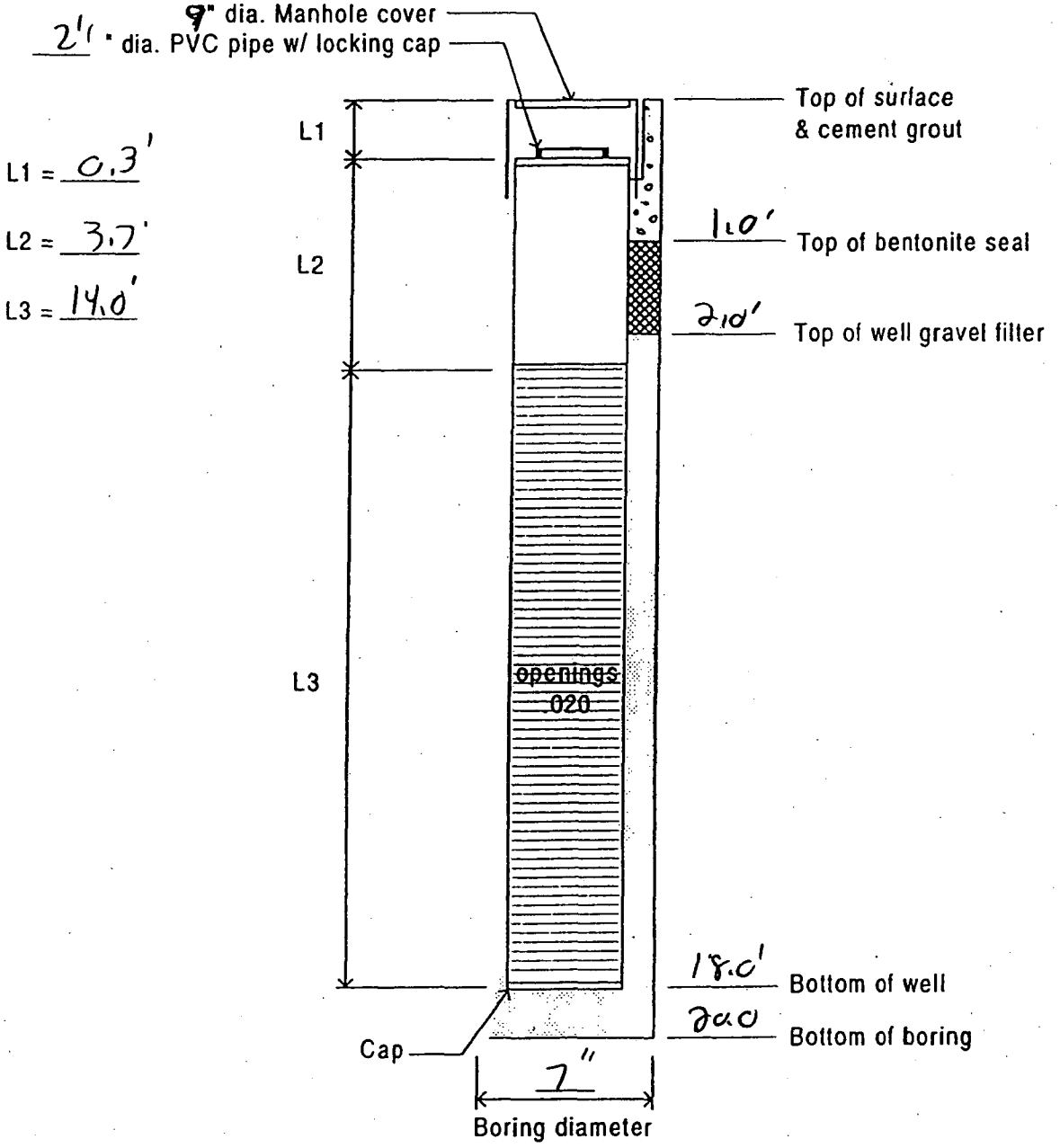

REMARKS: Hole Back filled 18.0-20.0 with Bentonite

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BORING REPORT

SHEET 1 OF 1

PROJECT: Port Ivory P&G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PA-MW-6DA	SURFACE ELEV.
LOCATION: West of Wood Dumpsey Ramp, ±15' North of PA-MW-6 Block 1400 Lot 1		CONTRACT NO.: 426-99-0006	DATE: 11/7/00

SPOON "O.D."	"I.D."	CASING SIZE	HOLE TYPE
			1

HAMMER # FALL "
HAMMER # FALL "

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7		Dry	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0				Asphalt 0.0 / 0.2
					DGABC 0.2
					MISC FIL – Cinders, Orchgl, Sand ER 2.4
					Bo Dom of Boring
	5				Obstruction, Plat Concrete Slab
					No Samples Saved
	10				
	15				
	20				
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PDG Site	Craig Drilling	PAMW-6DB	
LOCATION		**CONTRACT NO.**	**DATE**
West of Wood Dump Ramp, #10 North of PAMW-6 Block 140c Lot 1		426-95-006	11/8/00

SPOON "O.D. "I.D.	CASING SIZE	HOLE TYPE
		1

HAMMER # FALL "	HAMMER # FALL "

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/8		Dry	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0				Asphalt 0.2
					DGABC 1.5
					Misc Fill – Cinders, Bricks, Gravel, ETC
	5				4.6 Bottom of Boring obstruction, concrete, Possible Slab
	10				
	15				
	20				
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 5

PROJECT: Port Ivory PFG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PA-MW-6D	SURFACE ELEV.
LOCATION: West of wood Dumping Ramp ± 15' South of PA MW-6 Block 140C Lot 1		CONTRACT NO.: 426-98-006	DATE: 11/8/00

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	'A' Manitor

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: D House

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger			
				—	No Samples Taken for Strata 0-20'
					See Log for PA MW-6
	5				
Hand Auger Casing					
	19				
Drill	20				20.0
Ahead		WOH-1			
with		1-2	24"	1	Brown Peat
Rotary		WOH-1			
		1-1	20"	2	Same 24.0
		8-8			
	25	8-8	14"	3	F-Gray Sand, Tr Silt
		6-6			
		7-9	16"	4	F Gray Sand, Little Silt
		7-11		5A	F-Gray & Dk Gray Sand, Tr Silt 29.0
		9-6	14"	5B	F Reddish Brown Sand, Little Silt 30.0
	30	6-7			
		8-9	14"	6	F Red Brown Sand, Some Silt
		9-10			
		11-11	17"	7	Same
	35	10-13	18"	8	Same

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 2 OF 5

PROJECT: Port Ivory PTG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PA-MW-6D	SURFACE ELEV.
LOCATION: Westfalwood Pump Ramp ≠15' South of PA MW-6 Block 1400 Lot 1		CONTRACT NO.: 486-99-006	DATE: 11/8/00
SPOON: 2 "O.D. 1 3/8 "I.D.	CASING SIZE: Rewrt	HOLE TYPE: 4" Mountor	
HAMMER: 140 Safety # FALL 30	HAMMER: # FALL		
DRILLER: S Burns			
INSPECTOR: D Howe			

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Drill	35	15-16	18"	8	F Red Brown Sand, Some Silt
Ahead		15-20		9	Note! After S#9 Casing advanced from 19'-34'
with		18-18	17"		Same
Rewrt		16-20		10	Note after S#10 casing advanced from 34'-39'
	40	21-21	18"		Same
		13-13		11	
		17-19	18"		Same
		16-15		12	
		13-13	17"		Same
		9-9		13	
	45	9-12	19"		F Red Brown Sand, Tr clayey Silt 46.0'
		6-6		14	
		8-8	15"		Gray clayey Silt, Little F Sand, Tr Gravel 48.0
		5-13		15	
	50	16-25	13"		M-F Red Brown Sand, Little Gravel, Tr clayey Silt
		11-15		16	
		16-21	13"		F Red Brown Sand, Little Silt, Tr Gravel 52.0
		10-14		17	Red Brown clayey Silt, Little F Sand, Tr Gravel
		13-29	16"		Lens of F Brown Sand in middle of Sample
	55	17-17		18	Sand
		12-12	7"		Red Brown clayey Silt, Little M-F Sand, Little Gravel, Tr F Brown
		7-10		19	
		16-32	15"		Red Brown clayey Silt, Little F Sand, Little Gravel
		20-26		20	Red Brown clayey Silt, Little F Sand, Little Gravel,
↓	60	26-34	21"		Tr Decomposed Red Shale

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 3 OF 4

PROJECT: Port Ivory P&G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PA MW 6D	SURFACE ELEV.
LOCATION: West of wood Dumping Ramp, ±15' South of PA MW-6 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11/9/00

SPOON	CASING SIZE	HOLE TYPE
2" O.D. 1 3/8" I.D.	Rovit	4" Monitor

HAMMER	HAMMER
140 Safety # FALL 30"	# FALL "

DRILLER: S Burns

INSPECTOR: D Hour

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Drill	60	18-14		21	
Ahead		15-21	15"		Red Brown clayey SILT, Little F Sand, Little Gravel
w/Rovit		16-14		22	
		24-19	6"		Same
	65	10-12		23	Red Brown clayey SILT, Little F Sand,
		12-100 for 6"	18"		Little Decomposed Red Shale Tr Gravel 66.0
					Refusal, See Drilling Report
	70				71.0
					Bottom of Boring
	75				
	80				
	85				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

* 300 lb Hammer Used

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DRILLING REPORT

PROJECT	NAME OF CONTRACTOR	BORING NO.	SHEET 4 OF 5
Port Ivory PTC Site	Craig Drilling	PA MW-6D	
LOCATION		**CONTRACT NO.**	**DATE**
West of Wood Dumping Ramp, ± 15' South of PA MW-6 - Block 1466 Lot 1		4/26-99-006	11 / 9 / 00

TYPE OF DRILL RIG.	COE BARREL	CORE DRILL SIZE	CONDITION OF DIAMOND BIT
Mobile B-58	SINGLE TUBE / (DOUBLE TUBE)	3" Wireline I.D.	Good

DEPTH BOTTOM CASING	DEPTH START CORING	DRILLER	INSPECTOR
39.0	66.0	S Burns	D Howe

TIME [1] Start	TIME [1] End	DEPTH	DRILL [2] BEHAVIOR	WASH [3] WATER	[4] ROCK—DESCRIPTION AND REMARKS / LINE LOCATED END OF RUN
		66			66.0
7	Mid/Aft		Steady	Full Rod	
9					Run # 1 Redshale, Seamy, Fractured
10					
6					
6		71			71.0
					Bottom of Boring
		76			
		81			
		86			

	RUN NO.	FROM	TO	LENGTH DRILLED	LENGTH RECOVERED	% RECOVERED	NO. PIECES
NOTES ON DRILL RUNS	1	66.0'	71.0'	5.0'	5.0'	100%	14 Pieces & Frags

NOTES: 1 — Record the time to start and end of each foot of drilling
2 — Log drill behavior (i.e., steady, chatter, grinding, etc.)
3 — Log wash water return (i.e., color, loss, blocking, etc.)
4 — Log type, color and condition of rock (i.e., broken, soft, seamy, hard, etc.), log character of wash return solids

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Well Installation Report

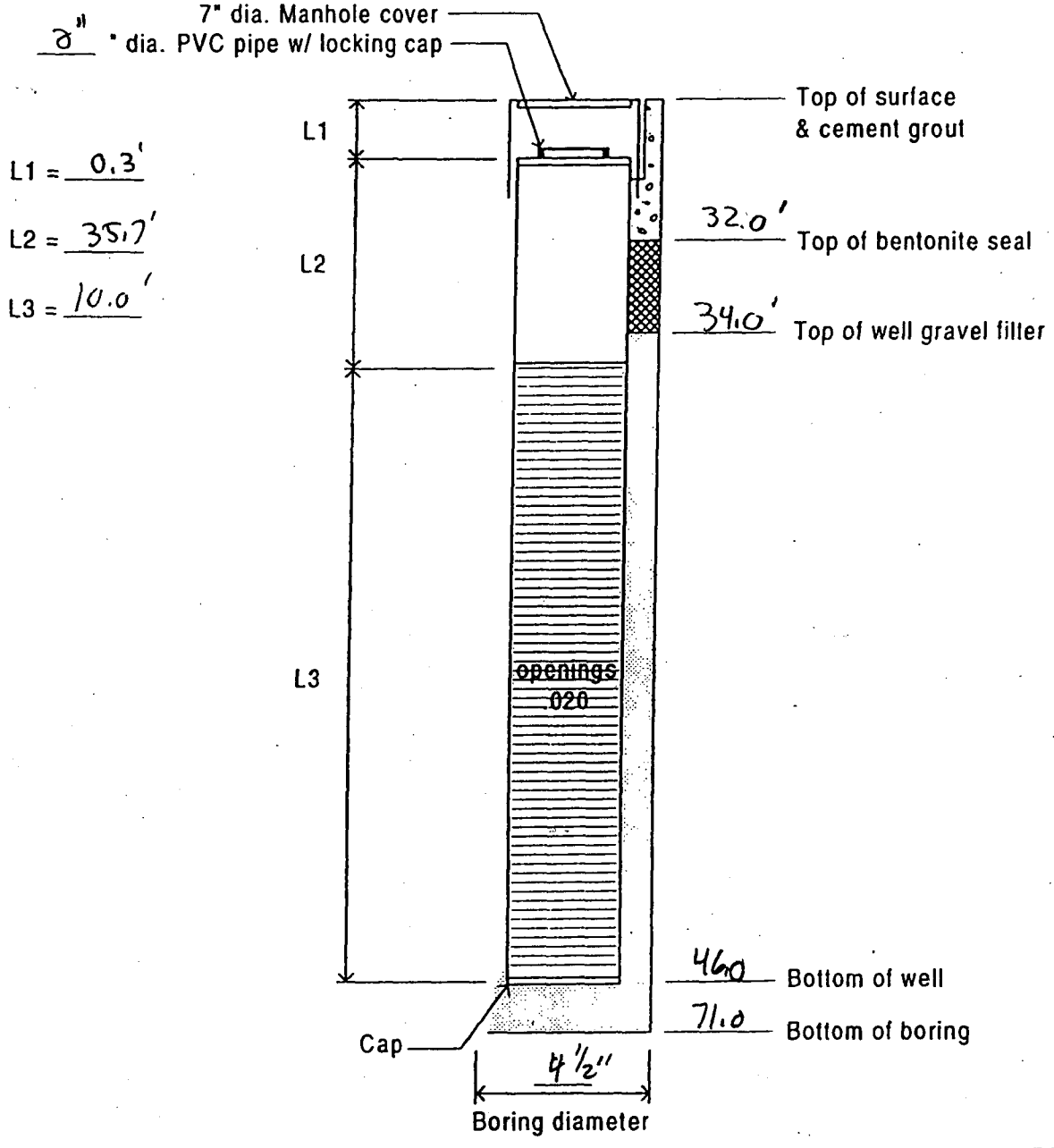
Sheet 5 of 5

PROJ.				CONTRACT NO.
Port Ivory PJG Site				42699-006
LOCATION				CONTRACTOR
West of Wood Dumping Ramp #15' South of PB MW-6 Block 1400 Lot 1				Craig
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PB MW 6D	"B" Monitor	D Howe	S Burns	11/9/00

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE _____	WATER LEVEL AFTER _____	TAKEN _____ MINUTES AFTER



REMARKS:

Hole Back filled 50'–71' with Hole plug

" 46'–50 with Well Gravel

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: PD 8 (FS)	SURFACE ELEV.
LOCATION: 22' E of NE Corner of Bldg 17 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-29-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
Safety 140 # FALL 30 "	# FALL "

DRILLER: A. Kides

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-28-00	11.00 AM	3.0'	Sample #2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handauger	0	Cuttg. Head HAND AUGER	Full Rec		CONCRETE	0.0'
					DGABC	0.6'
				1	Fill greyish black c-f SAND & Gravel, tr. Silt, cinders, coal, brick	1.3'
				2	SAME	
	5				SAME	
				3	Greyish-brown c-f SAND, tr. Gravel, tr. Silt	
Hollow Stem AUGERS		5-5				
		3-2	20"	4	SAME 98.3	
		2-3				
	10	5-5	20"	5	SAME 239.6	
		3-2				
		2-2	12"	6	SAME 150.2	
		3-2				
		8-6	24"	7	SAME 132.6	
	15	3-3				
		4-3	20"	8	SAME 111.4	
		3-1		9A	SAME 102.6	17.0'
		3-4	24"	9B	Brown PEAT	18.0'

NOTE: 3 samples saved for testing
All samples checked with PID meter
the other samples discarded

Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: PD 9	SURFACE ELEV.
LOCATION: 50'E of Bldg 17 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 12-4-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
Safety 140 # FALL 30 "	# FALL "

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12-4-00	12:35 PM	7.0'	SAMPLE #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Cutter Head Handauger	0	Cutter Head HANDAUGER	Full Rec		Concrete	0.0' 1.0'
				1	Fill grey c-f SAND, some Gravel, Cobbles tr. Silt	
				2	Fill greyish black c-f SAND, little Gravel, tr. Silt	
	5			3*	Fill greyish-black c-f SAND, tr. Gravel, tr Silt	
Hollow Stem AUGERS		2-2				
		2-2	10"	4	Misc. Fill greyish-black & Orange c-f SAND, tr Gravel tr Silt cinders, coal	
		1-1		5*		
	10	1-2	12"		SAME	
		2-5		6		
		6-4	2/6"		SAME	
		1-1		7		
		1-1	4"		SAME	
	15	2-2		8	SAME	15.0'
		2-2	18"		Brown PEAT	16.0'

Note: 2 Samples saved for testing
All samples checked w PID meter
Remaining samples discarded

Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory - P & G	NAME OF CONTRACTOR: Craig	BORING NO.: PD-10	SURFACE ELEV.
LOCATION: ± 35 North of Bldg 16 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11/28/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Cooke

INSPECTOR: T. Ryan

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/28/00	2:15 PM	5.0'	In S-2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0				Concrete 0.5'
		Hand Augered	Full Rec	1	Fill - Br M-F Sand, tr Cone, little Gr, tr Cobble.
				2*	Fill - Br M-F Sand, little Gravel
					Sand
	5			3	6.0
Augers		1-1		4*	Fill - White Diatomaceous Soil w/ Green layers.
		1-1	20"		
		1-1		5	Fill - White Diatomaceous Soil
		1/12"	18"		
	10	1-1		6	Sand
		WOH/12"	18"		
		1-WOH/12"		7	Sand
		-1/12"	19"		
	15	WOH/24"	20"	8	Sand
		WOH/18"		9 A	Sand 17.5
		1	16"	D	Ret. Bl Rock w/ org odor
		1, 1			saved 19.0
		1, 1	18"		Dark Brown Organic Silt w Pieces of decomposed Plant
	20				
					Note: Samples #2 & 4 were saved for testing. All other samples were screened w/ PID & then discarded

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory, PTC Site	Craig drilling	PD-11	
LOCATION		CONTRACT NO.	DATE
North of Building S-16		476-99-000	11/27/2000

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8" I.D.	Augers	I
HAMMER Safty 140 # FALL 30 "	HAMMER # FALL "	
DRILLER David Cooks		
INSPECTOR Madhu Patel		

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/27/00	1000	5.5	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
					0.0 Concrete 0.7
Hand Auger		Hand Auger	F/Y	1	Brn. light Gray & Black cmf SAND, some cmf Gravel
				2	C same
	5			3	same Wet 5.0
Auger		W O	24	4	(dk) White Diatomaceous earth
		H			SAME
		W O H	24	5	SAME
	10	1, 1			
		2, 2	24	6	SAME
		2, 2			SAME 12.0
		3, 3	18	7	Wet Black Pieces of Rock, gravel, silt etc 13.0
		4, 4			White & Grey Diatomaceous earth material
		2, 2	16	8	same
	15	2, 2			Wet. white Diatomaceous earth material
		W O	10	9	same.
		H			18.0
		2, 2	12	10	wet park Brown Organic silt, trace f Sand
		3, 4			with pieces of decomposed wood (Peat) 20
	20				Bottom of the Hole at 20.0'
					All soil samples collected and
					check with PID. No 3 sample for
					Environmental testing. Remaining soil
					discarded

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT: Port Ivory PFGS Tp	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PD-11A	SURFACE ELEV.
LOCATION: North of Building S-16		CONTRACT NO.: 476-99-006	DATE: 11/27/2000

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL Safety 30 "	# FALL "

DRILLER: David Cooke

INSPECTOR: Madhu Patel

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/27/00		Dry	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Hand Aug.	0				Concrete	0.0
						0.7
		Hand Augs	Full	1	light Gray & Black cmf SAND, some cmf Gravel	
					w Pieces of Rock etc	
				2	Same	
				3	c/Same	4.5
	5				Bottom of Boring, Obstruction	
					concrete Slab	
	10					
	15					
	20					
	25					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT: HH - Pt Ivory P&G	NAME OF CONTRACTOR: Craig	BORING NO.: PA-12B	SURFACE ELEV.:
LOCATION: As laid out by Killam ±150' S.W. of S.W. corner Bldg 17		CONTRACT NO.: 426-99-006	DATE: 11/28/00
SPOON: "O.D. "I.D.	CASING SIZE:	HOLE TYPE: 1	
HAMMER: # FALL "	HAMMER: # FALL "		
DRILLER: D. Cooke			
INSPECTOR: T. Ryan			

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0				Concrete — 0.6'
					Hit Rebar & The Conduit Pipe under Conc. This was the 3rd attempt.
	5				Bottom of Boring
					Note: Dan from Killam did attempts # PA-12 & PA-12A
	10				
	15				
	20				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: RR8	SURFACE ELEV.
LOCATION: 25' E of wire Fence betw. 1st & 2nd Railroad tracks Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 12-01-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER: Automatic — 140 # FALL 30 " — HAMMER # FALL "

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12-1-00	11:45	2.5'	Sample #2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full Rec		
				1	Misc Fill black c-f SAND & Gravel, Coal, Cinders, Brick
				2 *	SAME
	5			3	SAME
Hollow Stem Augers		1-1			
		1-1	12"	4 *	SAME 8.0'
		3-2			
	10	2-2	14"	5	Brown PEAT 10.0'

Note: 2 samples saved for testing.
All samples checked with PID meter.
The other samples discarded.

Bottom of Boring

	15				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P+G	Craig Driller	RR-10	
LOCATION		**CONTRACT NO.**	**DATE**
N Bld 13		426-99-006	12/2/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL 30 " SAFT	# FALL "

DRILLER: J. M Fuch

INSPECTOR: Charlie Springer

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/2/00	1200	4.5'	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
NA		NA	Full	1	Gravel w/Sand some silt — 0.0 Asphalt — .4 Gravel w/ Sand some silt — 1.2 Cinders/Gravel Black Silt/Sand white some clay white — 2.5
				2*	Cinders + Gravel Some Slag
↓	5	↓	↓	3	Some Sand Silt matrix mixed with discontinuous Earth
		7-10	1.8'	4	
		12-19			Some
		12-11	1'	5*	
	10	7-6			Some
		8-17	2'	6	
		13-9			Some
		14-10	2'	7	
↓		6-4			Some
	15	3-3	1.1'	8	
		3-3			Some 16.0
					End of Boring 15'
					- all Samples Screened w/ PID
	20				- Samples 2+5 Sent For Env Test
					- all Remaining Samples Discarded

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: PD-6	SURFACE ELEV.
LOCATION: ±20' W of NW corner of Bldg 17 Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 11-21-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: J. Craig
INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-21-00	2:30pm	2.7'	Sample #2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Cutter Head	0	Cutter Head	Full		
				1	CONCRETE 1.5
				2	Fill grey c-f SAND & Gravel, tr. SILT
	5			3	Fill grey c-f SAND & Gravel tr dietomaceous 6.0'
Hollow Stem Augers		W.O Hammer	14"	4*	Fill grey Dietomaceous
		W.O Hammer	12"	5	SAME 10.0'
	10	1-1			
		1-1	4"	6	Fill yellowish-grey c-f SAND, tr Gravel, tr. SILT, cinders
		1-0		7*	
		1-0	12"		Greenish-grey SILTY CLAY
	15	1-1			
		0-1	4"	8	SAME
		W.O Hammer	6"	9	SAME 17.5' Brown PEAT w. fibers, some Clay 18.0'
	20				Note: 2 samples saved for testing. All other samples screened with PID meter & discarded
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PJG Site	Craig Drilling	HR-1	
LOCATION		**CONTRACT NO.**	**DATE**
West Side of Site, Near Fence, Northat woodchipper Block 14ce LoT 1		426-99-006	12/2/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
Safety 140 # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/2/00	1700	3.5'	While Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS ____ LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger	Full		Crushed Stone 1.0'
				1	Misc Fill Cinders, Gravel, White Diatomaceous Earth 3.0'
				2	Fill Grey & White Diatomaceous Earth
	5			3	Same
Hollow Stem Augers		WOH		4	
		1-1	24"		Same
		WOH-2		5	
	10	1-1	24"		Fill - White & Grey Diatomaceous Earth
		WOH		6	
		1-1	23"		Fill - White Diatomaceous Earth
		2-1		7	
		2-1	23"		Same
	15	WOH-2		8	
		4-2	24"		Fill - White Diatomaceous Earth, Tr Grey Diatomaceous Earth
		WOH		9A	Same 17.5'
		2-3	23"	9B	Brown Peat 18.0'
					Bottom of Boring
	20				All Samples checked with PID Meter
					S# 1 & 2 Saved for Enviro Testing
					Remaining Samples Discarded
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 3

PROJECT: Port Ivory P&G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: H/R-2	SURFACE ELEV.
LOCATION: NW corner, Near Fence Line Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11/10/00

SPOON	CASING SIZE	HOLE TYPE
2 "O.D." 1 3/8 "I.D."	Augers	1

HAMMER: Safety 140 # FALL 30 — HAMMER # FALL

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/10	3P	5.5	open hole
11/11	9:38 AM	5.2'	Open hole

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. NO. [2]	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger	Full	1	Misc Fill - Cinders, Sand, Gravel, Brick, ETC
				2	Fill - Diatomaceous Earth (White Gray)
	5			3	SAME
Hollow Stem Augers		1 - 1			
	10	1 - 1	24"	4	SAME
		1 - 1			
		1 - 1	24"	5	SAME
		1 - WOR			
		1 - 1	24"	6	SAME
	15	W - 0			
		H - 1	24"	7	SAME
		1 - 1		A	SAME 17.0'
		1 - 2		8B	Brown PEAT, little black organic Clayey Silt 18.0'
	20				All Samples checked w/ PID Meter
					S# 1 thru 2 Saved for Testing
					Bottom of Boring
	25				sample # 8B saved (on hold) for Testing

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 3

PROJECT: Port Ivory PIG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: MW-3	SURFACE ELEV.
LOCATION: NW Corner Lot, Near Fence Line Block 140C Lot 1		CONTRACT NO.: 426-99-006	DATE: 11/10/00 / 11-11-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe / J Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/10/00	11 am	5C	while Hand Augering
11/11	8:10 AM	4.6'	Open hole

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
						C.C
Hand	0	Hand Augur	Fill	1	Crushed Stone	0.3
Augur					Misc Fill - Cinders, Gravel, Sand, ETC	1.0
				2	Fill Diatomaceous Earth, (White)	
				3	SAME	
	5			4	Same	
Hollow STEM Augers		Wash-1				
		1-1	24"	5	SAME	
	10	2-2				
		1-1	24"	6	Fill Diatomaceous Earth (White & light grey)	
		1-1				
		1-1	24"	7	SAME	
	15	2-1				
		1-3	24"	8	SAME	
		1-WOR				
		1-3	24"	9	SAME	
					Yellowish brown c-f SAND some Clayey Silt, little Gravel.	17.7' / 18.6'
	20				All Samples checked with PID Meter	
					S# 1-3 Saved for Testing, S# 1 to 2 Top to Top Tar	
					Remaining Samples Discarded	
					Bottom of Boring	
	25					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS-1	SURFACE ELEV.
LOCATION: ±15'S of Bldg 12 (Front side) Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 11-17-00

SPOON "O.D. "I.D.	CASING SIZE	HOLE TYPE
		1

HAMMER # FALL "	HAMMER # FALL "

DRILLER: S Burns

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
HANDAUGER		HANDAUGER	Full Rec	A	Asphalt 0.2' Fill black & dark brown c-f SAND some Gravel, tr. Silt, coal cinders, brick 1.0'
				1 B	Fill reddish brown Silty CLAY with c-f SAND & Gravel.
				2	SAME 3.5'
	5				Concrete SLAB - obstruction
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 1

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS-1A	SURFACE ELEV.:
LOCATION: ±17'S of Bldg 13 Block: 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-17-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 Safety # FALL 30 "	# FALL "

DRILLER: S Burns

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full Rec		ASPHALT 0.0 to 0.2'
				1	Fill dark brown & black c-f SAND some Gravel, tr. Silt, coal, cinders, brick 1.5'
					Fill reddish brown - Silty CLAY with c-f SAND and Gravel
				2	SAME
	5				5.0'
					Concrete Slab - obstruction
					Bottom of Boring
	10				
	15				
	20				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS1B	SURFACE ELEV.
LOCATION: 40'W of BH-FS1 betw. Bldg 12 & Bldg 13 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-17-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER: Safety # FALL 30 "
HAMMER: # FALL "
DRILLER: S. Burns
INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-17-00	11:20	7.0'	Sample #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handauger	0	Handauger	Full Rec		ASPHALT	0.0'
				* 1	Fill greyish-black c-f SAND, Gravel, tr Silt, Cinders, coal, wood.	0.2'
				* 1	Fill greyish-yellow c-f SAND AND Silty CLAY, cinders, wood, coal.	1.3'
				2	Fill greyish-black Gravel, some c-f SAND, tr Silt, cinders	
	5			3	Fill greyish black Gravel, some c-f SAND, tr Silt, cinders	6.0'
4"		4-7		* 4A	Misc Fill yellowish-white diatomaceous, grey c-f SAND, Gravel, cinders, wood	6.5'
AUGERS		4-3	18"	4B	Fill greyish-black Gravel, some c-f SAND, tr Silt, cinder	
		1-4				
	10	1-0	24"	5	Fill greyish-White Dietomaceous-with grey c-f SAND & Gravel.	
		Weight of		6	(Sample fall into the hole)	
		HAMMER	0"			
		W.O.H.	18"	* A	Fill grey Dietomaceous - with grey c-f SAND & Gravel	13.5'
		18" Bounce	100/0"	7		
	15				Refusal - Bottom of Boring	
					Note: 3 SAMPLES saved for testing.	
					All samples screened with PID meter,	
					the other samples discarded	
	20					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS-2	SURFACE ELEV.
LOCATION: ± 50' NE of Bldg 12 Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-17-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL Safety 30 "	# FALL "

DRILLER: S. Burns

INSPECTOR: J. ZARKS

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-17-00	PM	7.0	Sample #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	HAND AUGER	Full Rec		Crushed Rock DGABC 0.0 – 0.5
				1	BALLAST - Crushed Rock 2.0'
				2 *	Fill red-brown c-f SAND tr. Gravel, tr. SILT
					same.
	5			3	SAME 6.4'
3" EM Augers		3 - 3			
		3 - 4	12"	4	Fill grey c-f SAND, tr. Gravel, tr SILT
		8 - 9			
		9 - 10	24"	5 *	SAME (with wood splinters)
	10	5 - 3			
		8 - 25	20"	6	SAME (with wood)
		40 - 28			
		38 - 25	24"	7	Fill grey c-f SAND & Gravel, tr. SILT wood
		Ro - 12			
	15	18 - 27	20"	8	SAME
		24 - 38		9 A	Fill greyish black c-f SAND & Gravel, tr. SILT & wood.
		68 - 88	24"	* 9 B	Greyish-green c-f SAND
					Note: 3 samples saved for Testing
	20				All other samples screened with PID meter & discarded
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS-2 3	SURFACE ELEV.:
LOCATION: As laid out in the field		CONTRACT NO.: 426-99-006	DATE: 11-15-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Osuch
INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-15-00	11:45	8.5'	Sample # 5

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D[1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full Rec		DGABC 0.0' 0.5'
				1	Misc Fill greyish-black c-f SAND & Gravel, tr. Silt, cinders, wood, coal etc.
				2*	Fill brown c-f SAND, tr. Gravel, tr. Silty CLAY, tr. Coal
	5			3	SAME 6.5'
AUGERS		4 - 4			
		5 - 5	14"	4*	Fill reddish-brown CLAYEY SILT; little c-f SAND, tr. Gravel
		4 - 4			
	10	17 - 14	2"	5	SAME 10.0'
		4 - 5			
		6 - 5	20"	6	Fill brown c-f SAND AND Red-brown Clayey SILT, little Gr
		2 - 2			SAME 12.8'
		3 - 4	24"	7*	Brown PEAT some grey CLAY 14.0'
	15				
					Note: Samples 2; 4 & 7 were saved for testing all samples were screened with PID meters and the other samples were discarded.
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: FS-4	SURFACE ELEV.
LOCATION: As laid out in the field		CONTRACT NO.: 426-99-006	DATE: 11-15-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Osuch

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-15-00	1:40 PM	8.0	Sample #5 (top)

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS LINE LOCATES CHANGE OF PROFILE
HAND AUGER	0	HAND AUGER	Full Rec		DGABC 0.0' 0.5'
				1	Fill grey c-f SAND and Gravel, tr. SILT
				2	Fill greyish-black c-f SAND some Gravel, tr. Silt, cinders, coal, wood
	5			3	SAME
H Auger		4-5			
		5-5	24"	4	SAME
		4-4			
	10	9-9	20"	5	SAME (wood)
		8-12			
		8-6	8"	6	SAME (wood)
		9-9			
		4-4	2"	7	SAME 14.0'
	15	2-2			
		2-2	20"	8	Brown Peat, tr. grey Silty CLAY 16.0'
					Note: Samples 1, 2 & 8 saved for testing
					All samples screened with PID meter and discarded
	20				Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P+G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: FS-7	SURFACE ELEV.:
LOCATION: West of Bld 55		CONTRACT NO.: 426-99.00C	DATE: 12/1/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER: 140 # FALL 30 (Soft Start)
HAMMER: # FALL

DRILLER: Jeff Craig
INSPECTOR: Charlie Spunger

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/1/00	0825	5'	HA

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand auger		Hand auger	Full	1	Concrete .55'
					Grout Fill w/Grout mix +2'
				2*	Fine to med SAND Trace SILT/Some Gravel Dk Brown 4.0
	5			3	Fine SAND Trace SILT Lt Brown
		8-14	2'	4	
		11-10			Sand
		12-14	2'	5*	
		16-18			Same
	10	4-6	2'	6	
		10-7			Same 12.0
					Bottom of Boring
	15				- all Samples Screened w/ PID
					- Samples 2-5 - Saved For Env. Testing
					- all Remaining Samples Discarded
	20				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Howland Hook Port Ivory PDG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: A11-1	SURFACE ELEV.
LOCATION: ±75' South West of Truck Scale, Near South Gate Block 1400 Lot 1		CONTRACT NO.: 486-99-006	DATE: 11/7/00

SPOON	CASING SIZE	HOLE TYPE
2" O.D. 1 3/8" I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30"	# FALL

DRILLER: S Burns

INSPECTOR: D Hove

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/7/00	9 3/5	3.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Hand	0	Hand Augr	Full	1	Crushed Stone	0.5
Auger					Fill M-F Brown Sand, Tr Silt, Tr Crushed Stone	
				2	M-F Brown Sand, Tr Silt	
	5			3	Same	
		4-3		4	Same	7.0
Stem		3-3	19"		M-F Gray Sand, Tr Silt	
Augers		3-3		5	Note S# 4- Taken with 2" Spoon	
	10	6-12	18"		F Brown with Gray Sand, Little Silt	
		7-9		6	F Brown Sand, Tr Silt	
		13-11	18"			
		6-11		7	Same	
		11-14	16"		Same	15.0
	15	4-6		8	M-F Gray Sand, Little Silt	15.5
		7-9	14"		F Brown Sand, Some Silt	16.0
					Bottom of Boring	
	20				All Samples checked with PID Meter, S# 1 & 2 Saved for Enviro Testing. Remaining Samples Discarded	
	26					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Proctor & Gamble	Craig	Fill-2	
LOCATION		**CONTRACT NO.**	**DATE**
As marked out in the field by Killam Assoc.		4/26-99-006	11-3-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	H.S. Augers	
HAMMER (safety) 140 # FALL 30"	**HAMMER** # FALL "	
DRILLER P. Pennell		
INSPECTOR M. Dudek		

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-3	Am	4.1'	Found in S#3

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
H.S.	0				Asphalt Pavement 0.1'
Augers		HAND AUGER	Full		Crushed Rock 0.7'
				1	Fill- dark brown c-f SAND, some Gravel, trace Silt, trace Crushed Rock
	5			2	Fill- brown c-f SAND, trace Gravel, trace Silt
		4-4	20"	3	Fill- SAME
		6-7			
		5-6	20"	4	Fill- SAME
	10	10-12			
		8-11	24"	5	Fill- SAME
		14-17			
		10-10	24"	6	Fill- SAME
		13-15			
	15	9-11	24"	7	Fill- SAME
		18-22			16.0'
					Bottom of boring
	20				All samples were saved in 2 one pt. Jars & 1 4 oz Jar.
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: HH - P&G	NAME OF CONTRACTOR: Craig (Block 1400)	BORING NO.: Fill #3	SURFACE ELEV.
LOCATION: As laid out by Killam Assoc. (±12' east of tank foundations)*		CONTRACT NO.: 426-99-006	DATE: 11/4/00
SPOON: 3 "O.D. 2 3/8 "I.D.	CASING SIZE: HS-Augers	HOLE TYPE: 1	
HAMMER: 140 # FALL 30	HAMMER # FALL		
DRILLER: J. Craig			
INSPECTOR: T. Ryan			

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/6/00	10:05A	7.5'	In S #4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
	0	Hand	Full		Crushed Stone 0.5'
		auger	Rec.	1	Mixed Fill - Sand, Cinders, Brick, Core
				2	Same w/ tr metal
	5			3	[redacted] 5.0'
		7-15			Same
		7-27	17"	4	
		13-31			Same
		54-45	22"	5	
	10	7-11			Same
		18-31	20"	6	
		11-17		7	Same
		22-28	14"		
		4-10	12"	8	Sand 15.0'
	15				Bottom of Boring

Note: Samples #1-4 were saved for testing. All other samples were screened w/ PID & then discarded. Sample #4 was saved & placed on Hold.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

* — Tanks have been removed, foundations only exists.

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BORING REPORT

SHEET 1 OF 3

PROJECT: HH - P&G	NAME OF CONTRACTOR: Craig	BORING NO.: Fill # 4	SURFACE ELEV.
LOCATION: As laid out by Kiddon Assoc (±103' So. of Bldg 12) (BLOCK 1400)	CONTRACT NO.: 426-99-006	DATE: 11/6/00	
SPOON: 3 "O.D. 2 3/8 "I.D.	CASING SIZE: Augers (HS)	HOLE TYPE: 1	
HAMMER: 140 # FALL 30 "	HAMMER: # FALL "		
DRILLER: P Pennell			
INSPECTOR: T. Ryan			

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11/1/00	1:40 pm	5.9'	In S #3

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS (LINE LOCATES CHANGE OF PROFILE) (Gravel Covered)
	0	Hand Auger	Full Rec	1	Fill - Cinders, Sand, little Br, little Glass
				2	Same
	5			3	Same 5.0' Fill - Br M-F Sand little silt, tr Gravel
		2-3		4	Same
		3-6	19"		Br F Sand some Silt, some Plant fibers (org. odor)
		1-1		5	Br M-F Sand, tr Silt, tr Gravel.
	10	2-2	17"		
		1-2		6	Same
		2-2	13"		
		10-15		7	Same
		11-15	24"		
	15	11-14	12"	8	Same 15.0' Bottom of Boring

Note: Samples # 1 - 5 were saved for environ testing. All other samples were screened w/ PID & then discarded. Sample #5 was saved & placed on hold.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: Fill 5	SURFACE ELEV.:
LOCATION: ± 180' E of Bldg 12 - Block 1400 Lot 1		CONTRACT NO.: 426-99-006	DATE: 11-18-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: James Finch

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-18-00	12:30 PM	7.5'	Bottom of Sample # 4

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Handauger	0	HANDAUGER	Full Rec		Crushed Rock & DGABC	0.5'
				1	Fill greyish-brown c-f SAND, little Gravel, tr. Silt, cinder	
				2 *	Fill reddish-brown c-f SAND, tr Gravel, tr Silt, wood	
	5			3	SAME	
3.25" AUGERS		5 - 5				
		6 - 6	20"	4 *	Fill brown c-f SAND, tr. Gravel, tr Silt with bl. organic fibers (± 2")	
		4 - 3				
	10	3 - 5	20"	5	SAME	
		3 - 4				
		7 - 11	18"	6	SAME	
		11 - 13				
		15 - 21	24"	7	Fill grey & brown c-f SAND, tr Gravel, tr. Silt	
	15	7 - 10				
		10 - 13	24"	8	Grey c-f SAND, tr. Gravel, tr. Silt	16.0'
					Note: 2 Samples saved for testing	
					All other samples checked w.	
					PID meter & discarded	
	20					
					Bottom of Boring	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory P&G Site	Craig Drilling	Fill-7	
LOCATION		**CONTRACT NO.**	**DATE**
West of wood chipper, Block 140C Lot 1		426-99-006	12/14/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30	# FALL

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/4	9^{05}	10.0	ST#6

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
	0				Concrete	0.0 / 0.7
Hand		Hand Auger	Full	1	Misc Fill, Sand, Gravel, Cinders, Wood, Silt, Etc	
Auger				2	Same	4.0
	5			3	Misc Fill, Cinders, Gravel, ETC	
		16-11				
Stem		16-18	19"	4	Same	
Augers		17-9				
		4-3	20"	5	Same	10.0
	10	3-2				
		1-1	24"	6	Fill - White Diatomaceous Earth	
		WOH				
		WOH	24"	7	Same	
		WOH-1				
	15	2-2	23"	8	Same	
		2-2				
		2-2	24"	9	Same	
		9-18				
		25-45	15"	10	Fill - White Diatomaceous Earth, Little Cinders, Tr Gravel	
	20	7-3				
		2-2	18"	11	Fill - White & Gray Diatomaceous Earth	
		3-2		12 A	Same	23.0
		1-1	18"	B	Brown Peat	24.0
	25				Bottom of Boring	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

All Samples checked with PID Meter for Ionizable Total Remaining Samples Discarded

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
Port Ivory PDC Site	Craig Drilling	Fill-8	

LOCATION	CONTRACT NO.	DATE
NW Corner of Site, 75' South of PAMW-1 Block 1400 Lot 1	426-99-006	12/2/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
Safety 140 # FALL 30"	# FALL "

DRILLER: S Burns

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/2	11 AM	3.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS ——— LINE LOCATES CHANGE OF PROFILE
	0				0.0
Hand		Hand Auger	Full	1	
Auger		↓	↓		Misc Fill - Sand, Silt, Brick, Gravel, Metal, Etc
↓				2	
					4.0
	5			3	
↓		↓	↓		Fill - Grey Diatomaceous Earth, Little Misc Fill
4" [illegible]o		1-1		4	
[illegible]em		1-1	19"		Fill - Grey Diatomaceous Earth
Augers		WOH		5	
↓	10	WOH	23"		Fill - White & Grey Diatomaceous Earth
		WOH		6	
		WOH	22"		Same
		WOH		7	
		WOH	22"		Same
	15	WOH		8	
↓		WOH	22"		Same
		WOH		9 A	Same 17.5
		WOH-1	24"	9 B	Black Peat 18.0
					Bottom of Boring
	20				
					All Samples checked with PID Meter
					S# 1 & 4 Saved for Enviro Testing
					Remaining Samples Discarded
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P+G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: FVIHO	SURFACE ELEV.:
LOCATION: South of BLD 72		CONTRACT NO.: 426-99-006	DATE: 12/1/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/4 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL SAFETY 30 "	# FALL "

DRILLER: Jeff Craig

INSPECTOR: Charlie Spunger

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/1/00	1025	5.8'	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS LINE LOCATES CHANGE OF PROFILE
H.A.		H.A.	Full	1	Fine Sand some SILT Red Brn 0.2
				2 A D	Fine Sand some SILT w/ Gravel Red Brn 3
	5			3	6.4
		5-8	1.3'	4 A	Sand w/ Gravel, cinders, concrete, wood Black SLight Odor 8.3
		5-23			
		4-4	21	5	Peat 10.0
	10	4-4			
					End of Boring 10'
					- All Samples Screened w/ PID
	15				- Samples 2b + 4 Sent For Analysis
					- All Remaining Samples Discarded
	20				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P+G Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: B1	SURFACE ELEV.
LOCATION: Block 1400, Boring B1 (West of Building #31) Block 1400		CONTRACT NO.: 426-99-006	DATE: 12/4/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL Safety 30 "	# FALL "

DRILLER: Jim Finch

INSPECTOR: Dan Davis

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/4/00	1230	10 to 12	

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP. [2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
					Concrete	0.0
						2.0
Hand Auger		Hand Auger	Full	2*	Cinders and small gravel	
				3A	Same	4.5
	5			3B	Reddish brown clayey silt, little gravel	
		3 4	16"	4*	Same	
		5 6				
		3 5	15"	5A	Same	9.0
		7 8		5B*	Black fine sand, trace silt	
	10	3 4	14"	6	Same	11.0
		4 6			Brown fine to medium sand, trace silt	12.0
		7 8	8"	7	Brown Peat	
		9 11				14.0
	15				T Bottom of Boring	
					- All samples screened with PID meter	
	20				- Samples 2, 4 and 5B saved for environmental testing	
					- All remaining samples discarded	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory PTG Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: B-2	SURFACE ELEV.:
LOCATION: Gravel Area West of Bldg 33		CONTRACT NO.: 476-95-006	DATE: 11/10/00 - 11/16/00
SPOON: 3 "O.D. 2 3/8 "I.D.	CASING SIZE: Augers	HOLE TYPE: 1	
HAMMER: Safety 140 # FALL 30 "	HAMMER: # FALL "		
DRILLER: S Burns			
INSPECTOR: DHowe / J. Zarks			

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-16-00	9:08 AM	9.0'	Sample #5
		5.2'	Open hole

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Cutter Head	0	Cutter Head	Full Rec		0.0' DG ABC - CRUSHED Rock. 0.1
				1	Fill brown c-f SAND, tr. Gravel, tr. Silt 0.8
HAND AUGER		HAND AUGER			Concrete slab w. ribars 2.0'
				2 *	Fill greyish-black c-f SAND & Gravel, tr. Silt, Cinders, coal, brick
	5			3	SAME
		5 - 5			225.8 ppm
AUGERS		6 - 6	24"	4 *	SAME w/oil
		8 - 12			123.9 ppm
	10	13 - 15	18"	5	SAME w/wood
		100/3"	3"	6	Same 10.3'
					Refusal. Bottom of Boring
	15				Note: 2 Samples saved for testing
					All other Samples checked with PID meter & discarded
	20				
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: B-2 A	SURFACE ELEV.:
LOCATION: 10' S of BH. B-2		CONTRACT NO.: 426-99-006	DATE: 11-16-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER: Safety 140 # FALL 30 "
HAMMER: # FALL "
DRILLER: G. Mc. Aneny
INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
11-16-00	10:30	5.1'	Sample #3

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP. [2] NO.	[3] SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Cutter Head	0	Cutter Head	Full	1	
HAND AUGER		HAND AUGER		2	For Soil Strata 0.0' - 8.0' see Boring report BH-2
	5			3	
Auger		—	-	4	
		—	-		
		4 - 5		*	66.8 ppm
	10	7 - 8 (100/3")	2.0"	5	Misc. Fill black c-f SAND some Gravel, tr. Silt, Cinders, Coal, wood
				6	SAME 2.7 ppm

Refusal - Bottom of Boring

Note: 1 sample #5 saved for testing. All other samples screened for PID readings & discarded.

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 1 OF

PROJECT: Port Ivory P & G	NAME OF CONTRACTOR: Craig drilling	BORING NO.: B-3	SURFACE ELEV.:
LOCATION: 40'S of Bldg 16 & 200'W of Bldg 33A Block 1400 lot 1		CONTRACT NO.: 426-99-006	DATE: 12-4-00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Augers	1

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D. Cooke

INSPECTOR: J. Zarks

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12-4-00	9:30	3.5'	sample # 2

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D[1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS LINE LOCATES CHANGE OF PROFILE
Handauger	0	Handauger	Full Rec		Gravel 0.0' / CONCRETE 0.9'
				1	Fill dark grey c-f SAND, tr. Gravel, tr Silt, cinders, coal
				2 *	SAME
	5			3	SAME
4" AUGERS		2-3			
		3-3	20"	4 *	Fill c-f SAND, tr Gravel, tr. Silt, cinders, coal
		12-18			
	10	22-24	24"	5	SAME
		6-6			
		7-7	24"	6	SAME
		8-12			
		12-15	20"	7	SAME
	15	3-5			
		6-7	20"	8	SAME
		4-4			
		4-4	20"	9	SAME 17.5' / Brown Peat 18.0'
					Note: 2 Samples saved for testing
	20				All samples checked w. PID meter
					remaining samples discarded
					Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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THE PORT AUTHORITY OF NY & NJ

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BORING REPORT

SHEET 1 OF 3

PROJECT: Port Ivory Pt 6 Site	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: B4	SURFACE ELEV.
LOCATION: West of Building #33, 3 pier 1400 Block 1400		CONTRACT NO.: 426-99-006	DATE: 12/4/00

SPOON	CASING SIZE	HOLE TYPE
3 "O.D. 2 3/8 "I.D.	Auger	1

HAMMER	HAMMER
140 # FALL 30 (Safety) "	# FALL "

DRILLER: Jim Finch

INSPECTOR: Dan Davis

GROUND WATER LEVEL

Date	Time	Depth	Remarks
12/4/00	2:00	4.5	During Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger		Hand Auger		1 A	Asphalt and stone — 1.5
				B	Fill Cinders and Gravel
				2*	- Petroleum odor 250-400 ppm
	5			3 A	
				B*	Fill Gray Fine Sand Trace Silt - Petroleum odor 250-400 ppm — 5.0 / 6.0
		5 6	15"	4 A*	Fill Reddish Brown Clayey Silt — 7.3
		6 5		B	Fill Brown Fine Sand, Trace Silt
		3 3	2"	5	Same
	10	5 8			— 10.5
		4 4	10"	6	Same / Brown Peat — 10.9
		7 11			Brown Fine Sand, Trace Silt — 12.0
					Bottom of Boring
	15				
					- All samples screened with PID meter
					- Samples #2, 3B and 4A saved for environmental testing
	20				- All remaining samples discarded

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT: MMT - Port Ivory Surcharge Test	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PG-ST-1S	SURFACE ELEV.
LOCATION: As Laid out in field as per Drawings North Side		CONTRACT NO.: 426-99-006	DATE: 10/23/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	Augers	"B" Mobile

HAMMER	HAMMER
140 # FALL 30 Auto	# FALL

DRILLER: D Cooke

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/21/02	12:45 P	3.7	While Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS ____ LINE LOCATES CHANGE OF PROFILE	
Hand Auger	0	Hand Augered	Fill	1		
					Fill - RCA - Recycled Concrete Agg	
				2 A	Same	3.0
				B	Fill - Crushed Stone	
	5			3	Same	6.0
Hollow Stem Auger		1-WOH		4		
		WOH	19"		Fill White & Gray Limestone Slurry	
		WOH	23"	5	Same	
	10	WOH	24"	6	Same	
		WOH	24"	7	Same	
	15	WOH	24"	8	Same	
		WOH	20"	9	Same	
		WOH	16"	10 A	Fill - Green Limestone Slurry	19.0
	20			B	Black Peat	20.0
					Bottom of Boring	
					All Samples checked with PID Meter	
	25				No Samples Saved, All Discarded	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report

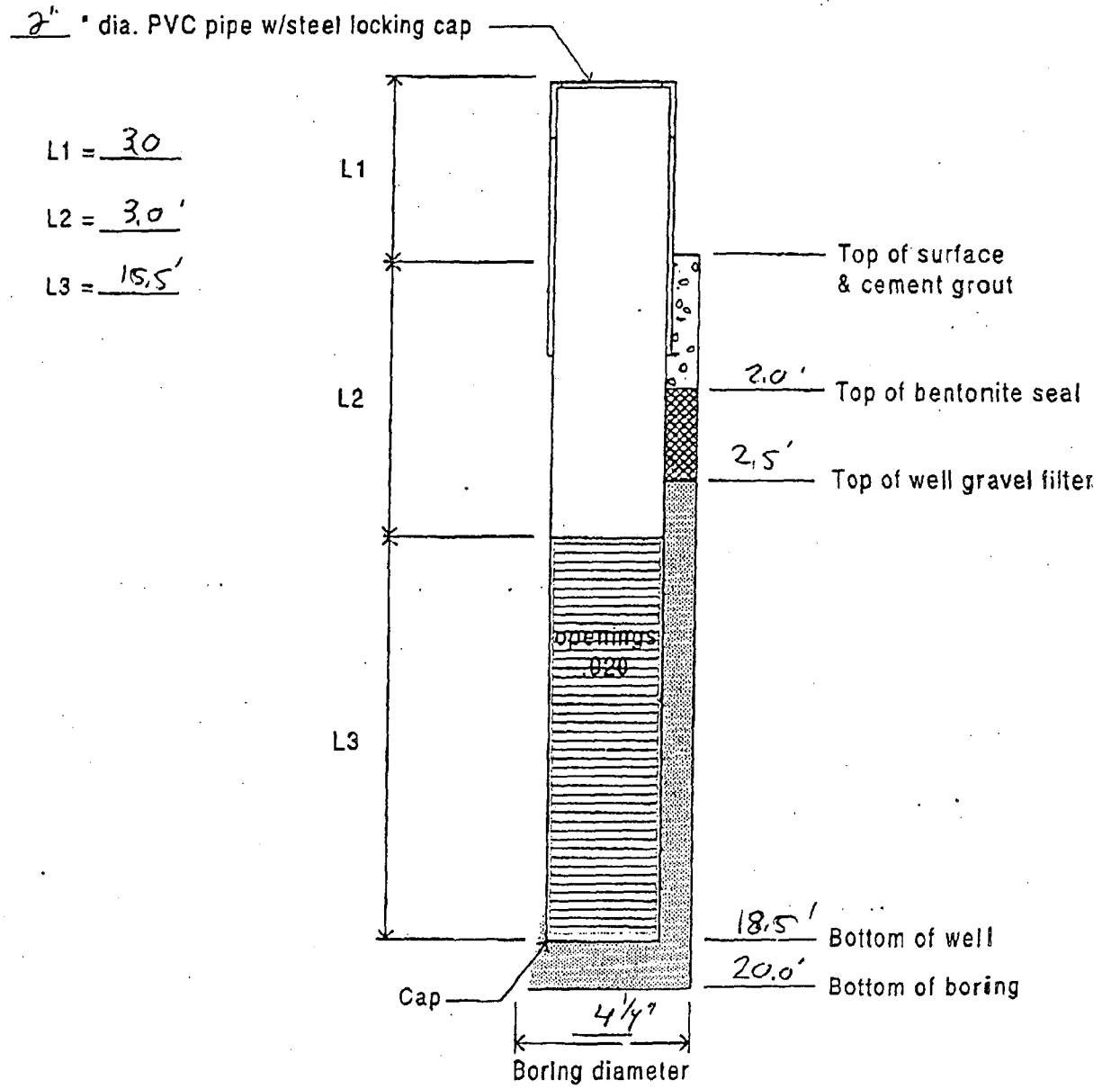
Sheet 2 of 3

PROJECT				CONTRACT NO.
HHMT-Port Ivory Surcharge Test				426-99-006
LOCATION				CONTRACTOR
As Laid out in field as per Drawing North Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG-SI-15	"A" Monitor	D Hoak	D Cooke	10/24/02

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE					
10/28/02	WATER LEVEL BEFORE 6.0	WATER LEVEL AFTER 5.0	TAKEN 20	MINUTES AFTER



REMARKS:

Hole Backfilled 18.5-20.0' with Bentonite

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ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
PID READINGS

Sheet 3 of 3

PROJECT: MM MT- Port Ivory Surcharge Test

BORING No. PG ST 15 DATE: 10/23/02

FIELD READINGS BY: D'Hour PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
AM	1		0.0		
↓	2A		0.0		
↓	2B		0.0		
PM	3		0.0		
↓	4		0.0		
↓	5		0.0		
↓	6		0.0		
↓	7		0.0		
↓	8		0.0		
↓	9		0.0		
↓	10A		0.0		
↓	10B		0.3		Post

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BORING REPORT

SHEET 1 OF

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HMT- Port Ivory Surcharge Test	Craig Drilling	PG-ST-1D	
LOCATION		**CONTRACT NO.**	**DATE**
As Laid out in field as per Drawing North Side		426-99-006	10/24/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	'B' Monitor

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D Cooke

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/24	10 35	5.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS ____ LINE LOCATES CHANGE OF PROFILE
Hand	0	Hand Auger	Full	1	
Auger					Fill - RCA Recycled Concrete Agg
				2	Same 4.0
	5			3	
	6				Fill - Crushed Stone, Silt, Sand, ETC
HW					
Casing					For STA 6+20' See Log for PG-ST-1S
	20				
		1-0		4	
		1-1	8"		Black & Brown Peat
		WOH-1		5	
		2-2	23"		Same
	25	WOH-1		6	
		2-2	11"		Same Hor
		3-3		7	
		4-5	12"		F Gray Sand, Tr Silt
	30				
		3-5		8	
		6-7	10"		Same
	35				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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BORING REPORT

SHEET 2 OF 4

PROJECT: MMT- Port Ivory Surcharge Test	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PG-ST- 1D	SURFACE ELEV.
LOCATION: By Laid out in field as per Drawing North Side		CONTRACT NO.: 426-99-006	DATE: 10/24/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	6" Mud Rotary

HAMMER	HAMMER
140 # FALL 30 "	# FALL "

DRILLER: D Cooke

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
HW	35	4-4		9	
Casing		5-5	10"		M-F Brown Sand, Tr Silt 37.0
					Bottom of Boring
	40				Dh Samples checked with PID Meter
					No Samples Saved, All Discarded
	45				
	50				
	55				
	60				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report

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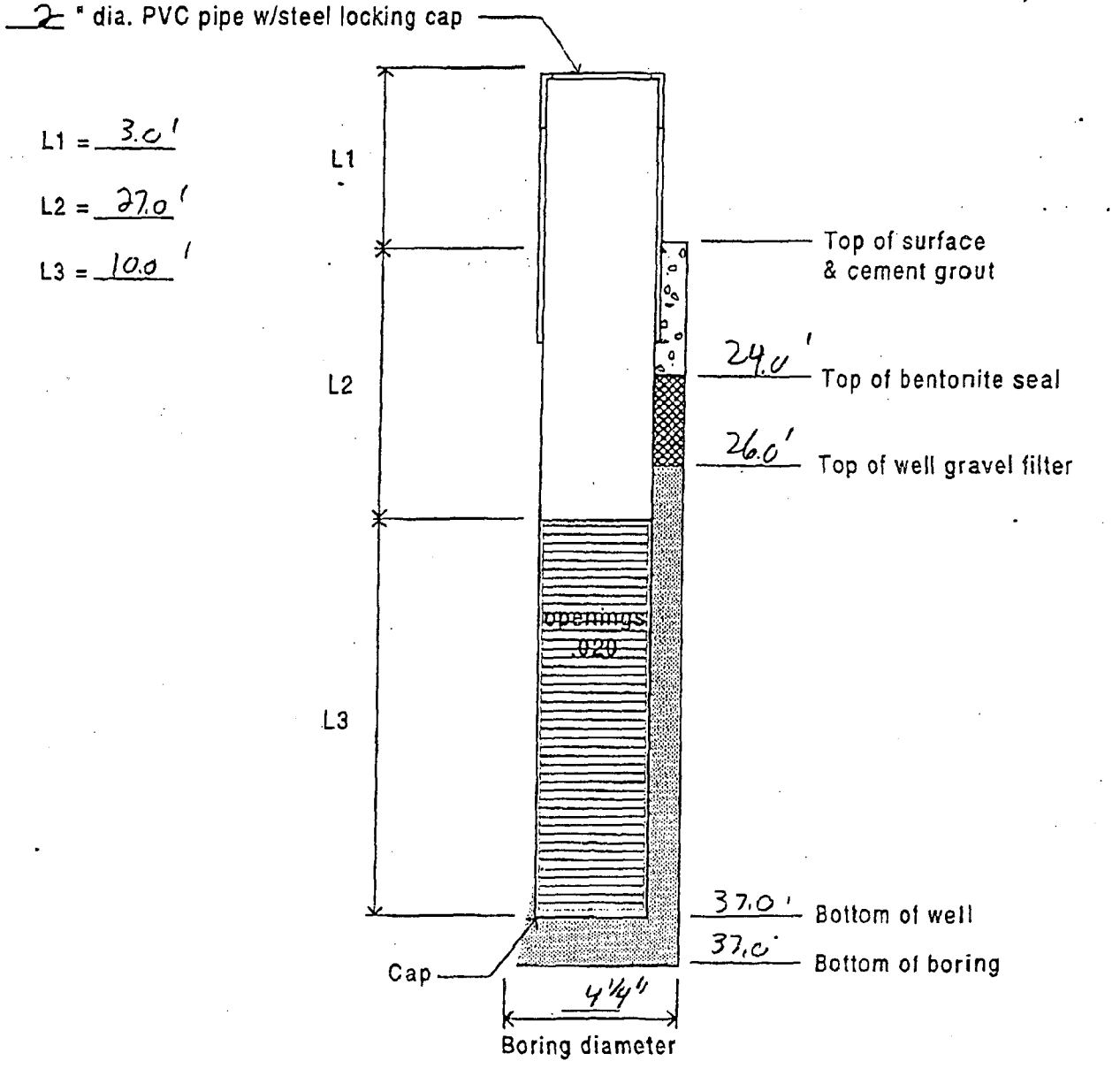
PROJECT				CONTRACT NO.
HHMT- Port Ivory Surcharge Post				426-99-006
LOCATION				CONTRACTOR
As Laid out in field as per Drawings				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG ST-10	"B" Monitor	D Howe	D Howe	10/24/02

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN
10/28/02	15.1	15.1	10 MINUTES AFTER



REMARKS:

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ENGINEERING DEPARTMENT

MATERIALS ENGINEERING DIVISION

PID READINGS

Sheet 4 of 4

PROJECT: HM MT- Port Ivory Surcharge Test

BORING No. PG-ST-10 DATE: 10/24/02

FIELD READINGS BY: D Hows PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
AM	1		0.0		
	2		0.0		
	3		0.0		
	4		0.0		
	5		0.0		
PM	6		0.0		
	7		0.0		
	8		0.0		
	9		0.0		

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
MMT - Port Ivory Surcharge Test	Craig Drilling	PG ST 25	
LOCATION		**CONTRACT NO.**	**DATE**
As Laid out in field as per drawing West Side		426-99-006	10/25/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	Augers	"B" Mobile

HAMMER	HAMMER
Buso 140 # FALL 30 "	# FALL "

DRILLER: D Cooke
INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/25/02	8:45	3.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand	0	Hand Auger	Full	1 A	Fill - Cinders, Gravel, Crushed Stone, Concrete, ETC 1.0
Auger				B	Fill - White & Grey Limestone Slurry
				2	Same
	5			3	Same
Hollow		W O H	24"	4	Same
Stem					
Augers		W O H	24"	5	Same
	10	2-2		6	
		1-1	22"		Same Some Wood
		1-0		7	
		1-1	23"		Same
	15	4-2		8	
		1-2	5"		Same Some Wood
		W O H	12"	9	Same 18.0
		2-1		10	
	20	1-2	22"		Black & Brown Peat 20.0
					Bottom of Boring
					All Samples checked with PID Meter
					No Samples Saved, All Discarded
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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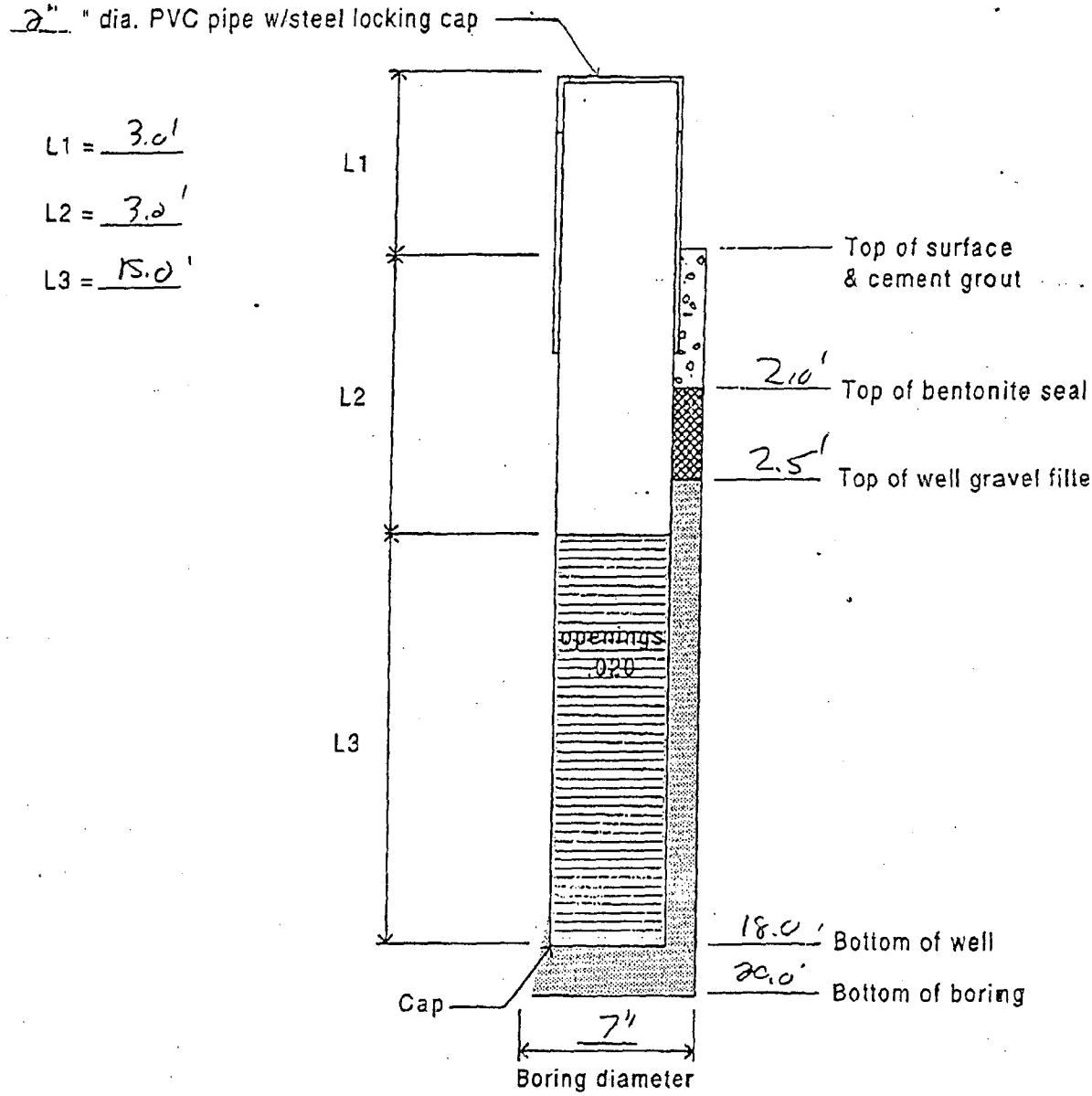
Well Installation Report

Sheet 2 of 3

PROJECT				CONTRACT NO.
HMMT - Port Ivory Surcharge Test				426-95-006
LOCATION				CONTRACTOR
As Laid out in field as per Drawing West Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG ST 25	'A' Monitor	D Howe	D Cooke	10/25/02

Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN	
10/28/02	5.0'	5.0	15	MINUTES AFTER



REMARKS: Hole Back filled 18.0-20.0 with Bentonite

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ENGINEERING DEPARTMENT

MATERIALS ENGINEERING DIVISION

PID READINGS

Sheet 3 of 3

PROJECT: MMMT - Port Ivory Surcharge Test

BORING No. PG ST 25 DATE: 10/25/02

FIELD READINGS BY: P Moon PID Model: Mini Rae

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
AM	1A		0.0		
	1B		0.0		
	2		0.0		
	3		0.0		
	4		0.0		
	5		0.0		
	6		0.0		
	7		0.0		
	8		0.0		
	9		0.0		
	10		0.7		Post

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BORING REPORT

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PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HH MT - Port Ivory Surcharge Test	Craig Drilling	PG-ST-2D	
LOCATION		**CONTRACT NO.**	**DATE**
As Laid Out in field as Per Drawing West Side		426-9T-0CG	10/25/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	'B' Mom Tor

HAMMER	HAMMER
140 # FALL Auto 30 "	# FALL "

DRILLER: D Cook

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/25	1 PM	3.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE- [1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
	0					0.0
Hand		Hand Auger	Fill	1 A	Fill - Cinders, Gravel, Crushed Stone, Sand, ETC	1.0
Auger				1 B	Fill White & Gray Limestone Slurry	
				2	Same	
	5			3	Same	
	6					
HW						
Casing					For Strata 6-20' See Log for PG-ST 2D	
	20					
		Wash		4		
		1-1	14"		Black & Brown Peat	
		1-2		5 A	Same	23.0
		2-2	18"	5 B	MF Black Sand, Tr Silt	
	25					25.0
		2-2		6		
		3-5	7"		F Gray Sand, Tr Silt	
					All Samples checked with PID Motor	
	30				No Samples Saved, All Discarded	
						32.0
		2-3		7		
		5-4	9"		F Brown Sand, Tr Silt	34.0
	35				Bottom of Boring	

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report

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PROJECT				CONTRACT NO.
XM MT - Port Ivory Surcharge Test				426-99-006
LOCATION				CONTRACTOR
As laid out in field as per Drawing West Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG-ST-20	"B" Monitor	D Howe	D Cooke	10/28/01

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

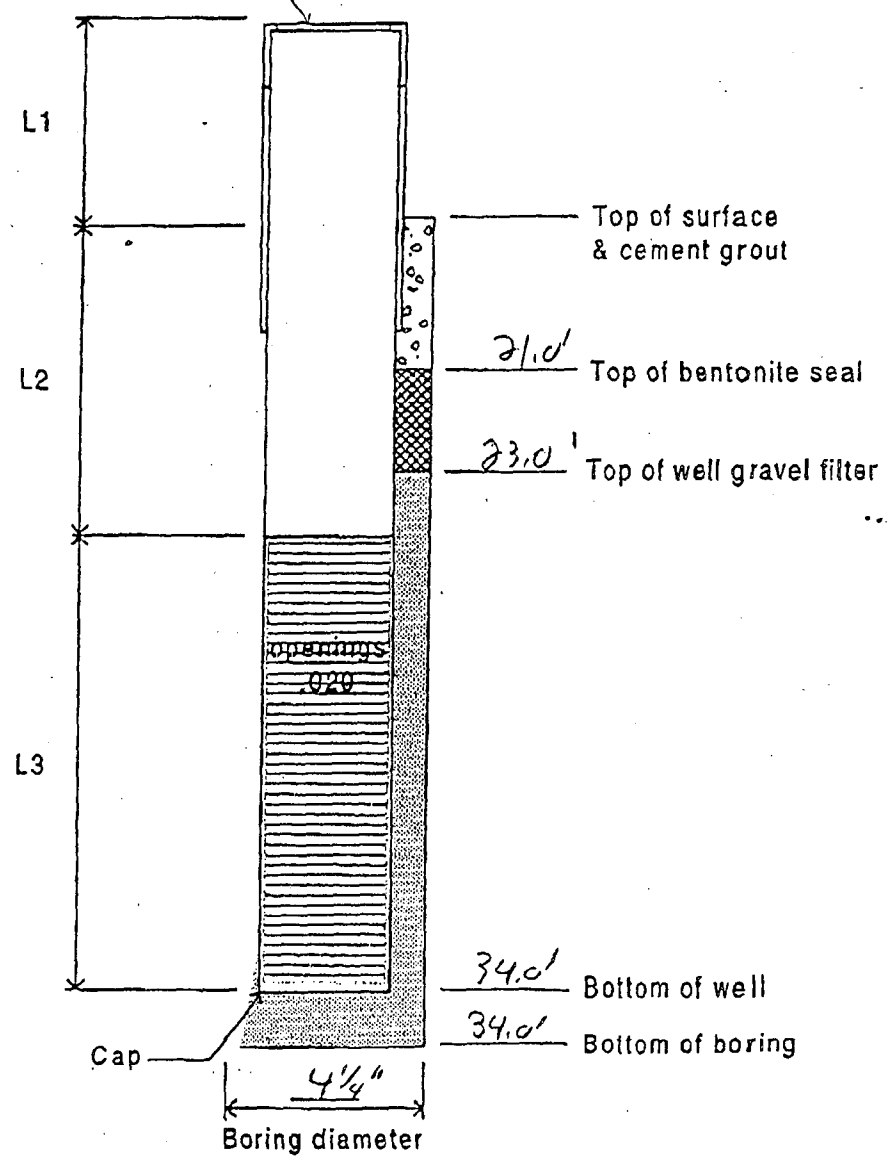
DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN
10/28/01	14.0'	14.0	10 MINUTES AFTER

2" dia. PVC pipe w/steel locking cap

L1 = 3.0'

L2 = 24.0'

L3 = 10.0



REMARKS:

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ENGINEERING DEPARTMENT

MATERIALS ENGINEERING DIVISION

PID READINGS

Sheet 3 of 3

PROJECT: HH MT- Port Ivory Surcharge Test

BORING No. PG ST 20 DATE: 10/25/02

FIELD READINGS BY: DHowe PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
PM	1A		0.0		
	1B		0.0		
	2		0.0		
	3		0.0		
	4		0.2		Post
	5A		0.3		"
	5B		0.0		
	6		0.0		
	7		0.0		

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BORING REPORT

SHEET 1 OF 3

PROJECT: HMMT - PorJ Ilwy Surcharge Test	NAME OF CONTRACTOR: Craig Drilling	BORING NO.: PG-ST-35	SURFACE ELEV.
LOCATION: As Laid out in Field as per Drawing South Side		CONTRACT NO.: 426-99-006	DATE: 10/22/02

SPOON	CASING SIZE	HOLE TYPE
2 O.D. 1 3/8 I.D.	Augers	"B" Mantor

HAMMER	HAMMER
140 # FALL 30	# FALL

DRILLER: D Cooke

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/22/02	8:15	2.5	While Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE
Hand Auger	0	Hand Auger	Fill	1	Fill - Crushed Stone, Silt, Gravel, Cobbles, Etc 2.0
				2	Fill - Grey & White Limestone Slurry
	5			3	Same
Hollow Stem Augers		WOH	24"	4	Same
		WOH	24"	5	Same
	10	WOH	22"	6	Same
		WOH	20"	7	Same
	15	WOH	12"	8	Same
		WOH	18"	9 A	Same
				B	Black Post 15.5 18.0
	20				Bottom of Boring 20
					All Samples checked with PID Meter
					No Samples Saved, All Discarded
	25				

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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Well Installation Report

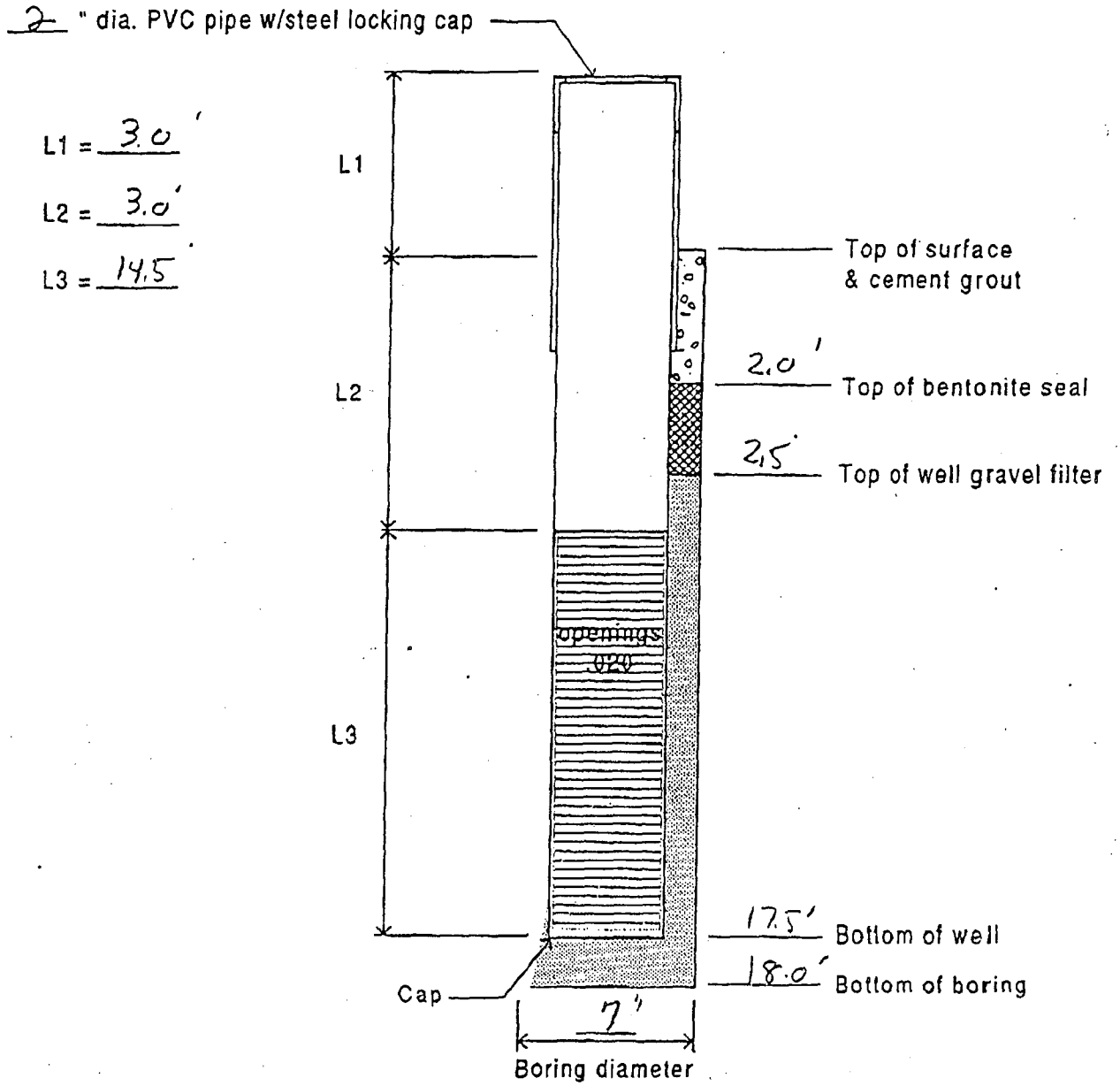
Sheet 2 of 3

PROJECT				CONTRACT NO.
HHMT - Port Ivory				426-99-006
LOCATION				CONTRACTOR
As Laid out in field as per Drawing South Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG-ST 3S	"A" Monitor	D Howe	D Cocks	10/22/02

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN
10/23/02	4.0'	4.7'	15 MINUTES AFTER



REMARKS:

Hole Backfilled 17.5-18.0' with Bentonite

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MATERIALS ENGINEERING DIVISION

PID READINGS

Sheet 3 of 3

PROJECT: MMT- Port Ivory Surcharge Test

BORING No. PG-ST-35 DATE: 10/22/02

FIELD READINGS BY: DHown PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
AM	1		0.0		
	2		0.0		
	3		0.0		
	4		0.0		
	5		0.0		
	6		0.0		
	7		0.0		
	8		0.0		
	9A		0.0		
	9B		0.2		Post

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BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HH MT - Port Ivory	Craig Drilling	PG-ST-30	
LOCATION		CONTRACT NO.	DATE
Bs La. out in field as per Drawing, South Side		426-99-006	10/22/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	'B' Mavita

HAMMER	HAMMER
140 # FALL 30 Auto	# FALL

DRILLER	INSPECTOR
D Coulter	D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/22/02	11am	25	w/16 Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Hand	0	Hand Auger	Fill	1		
Auger					Fill - Crushed Stone, Silt, Gravel, Sand, wood, ETC	2.0
				2	Fill - Gray & White Limestone Slurry	
	5			3		
	6				Same	
					For STrata 6'-18' See Log for PG-ST-35	
Casing	18					
		WO H	12"	4	Black & Brown Peat	
	20					
		WO H	13	5	Same	
		1-1				
		2-3	23	6	Same Trace F Black Sand in Type of spoon	24.0
	25	1-1		7		
		2-2	7"		F Brown Gray Sand, Tr Silt	
					All Samples checked with PID Meter	
					No Samples saved, All Discarded	
	30					
		3-5		8		
		8-8	7"		12 Gray Sand, Tr Silt	
		2-3		9		
	35	6-7	12"		Same	35.0

Bo Bom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

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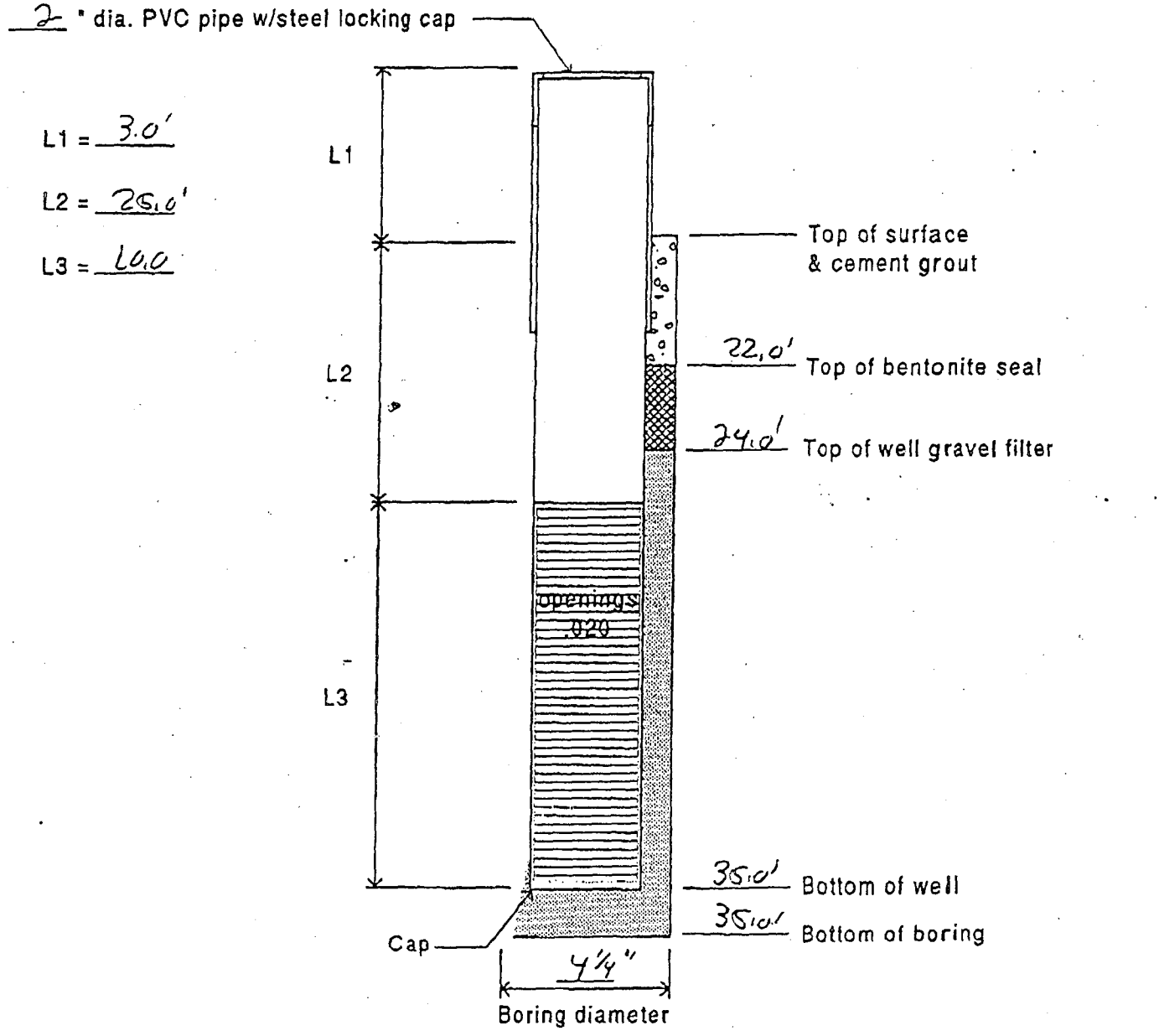
Sheet 2 of 3

PROJECT				CONTRACT NO.
MMT- Port Ivory Surcharge Test				426-99-006
LOCATION				CONTRACTOR
As Laid out in fields per Drawing South Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG-ST-30	'B' Monitor	D Howe	D Cook	10/23/02

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE					
10/23/02	WATER LEVEL BEFORE 13.5	WATER LEVEL AFTER 13.5	TAKEN 15	MINUTES AFTER



REMARKS:

THE PORT AUTHORITY OF N.Y & N.J.

ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
PID READINGS

Sheet 3 of 3

PROJECT: HMT - Port Ivory Surcharge Test

BORING No. PG-SJ-30 DATE: 10/22/02

FIELD READINGS BY: D Howe PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
PM	1		0.0		
	2		0.0		
	3		0.0		
	4		0.0		
	5		0.0		
PM	6		0.0		
	7		0.0		
	8		0.0		
	9		0.0		

PA 547
6-90

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
MMT-Port Ivory Surcharge Test	Craig Drilling	PG-ST-45	
LOCATION		CONTRACT NO.	DATE
As Laid out in field approx Driveway East Side		426-99-006	10/18/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	Augers	"A" Mariner

HAMMER	HAMMER
Auto 140 # FALL 30	# FALL

DRILLER	INSPECTOR
D Cooley	D Moore

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/18	11 AM	3.0	While Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
	0					GL
Hand		Hand Auger	Refusal	1 A	Fill - RCA Recycled concrete Aggr	1.0
Auger				B	Fill - Crushed Stone, Silt, Sand, Concrete, Etc	
				2 A	Same	3.0
				B	Fill White & Gray Limestone Slurry	
	5			3	Same	
Hollow		1-1		4		
Stem		WOH	21"		Same	
Augers		WOH	24"	5	Same	
	10	WOH				
		1-1	11"	6	Same	
		WOH	9"	7	Same	
	15	WOH	17"	8	Same	
		WOH	15"	9	Same	
		WOH		10 A	Same	19.0
	20	1-1	20"	B	Block Peat	20.0
					Bottom of Boring	
					All Samples checked with PID Meter	
					No Samples Saved All Discarded	
	25					

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

PORT AUTHORITY OF NY & NJ
Engineering Department - Materials Division

Well Installation Report

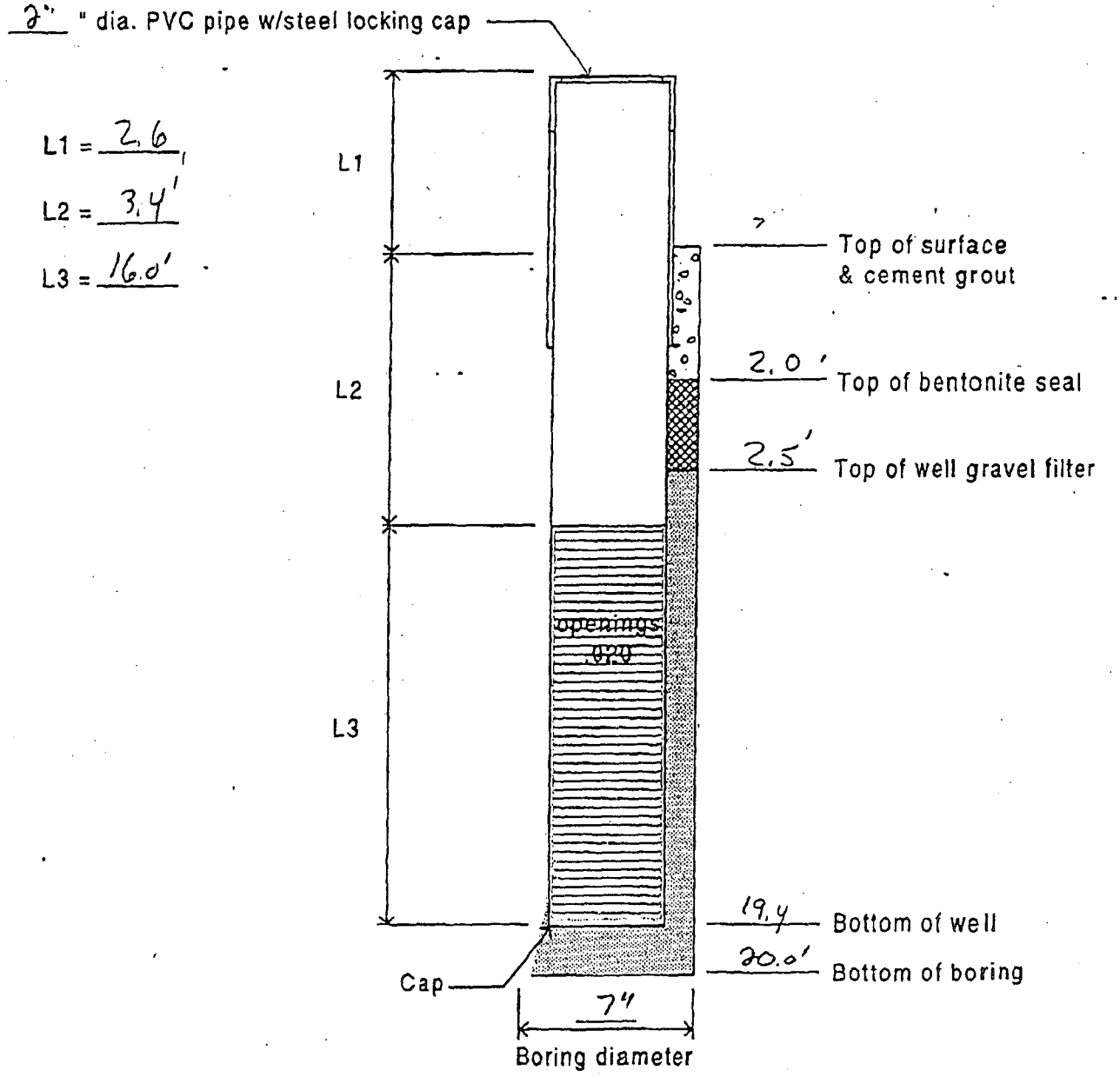
Sheet 2 of 3

PROJECT				CONTRACT NO.
HMT - Port Ivory Surcharge Test				426-95-006
LOCATION				CONTRACTOR
As Laid out in field as per Drawing East Side				Chas Dr. Ll.
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG - ST - 45	"A" Monitor	D Howe	D Cooke	10/18/04

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE					
10/18/04	WATER LEVEL BEFORE 3.7	WATER LEVEL AFTER 3.7	TAKEN 10	MINUTES AFTER



REMARKS: Hole Backfilled 19.4 - 20.0 with Bentonite

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ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
PID READINGS

Sheet 3 of 7

PROJECT: HMMT – Port Ivory Surcharge Test

BORING No. PG-ST-45 DATE: 10/18/04

FIELD READINGS BY: DHouse PID Model: Mini RAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
AM	1A		0.0		
	1B		0.0		
	2A		0.0		
	2B		0.0		
	3		0.0		
	4		0.0		
	5		0.0		
PM	6		0.0		
	7		0.0		
	8		0.0		
	9		0.0		
	10A		0.0		
	10B		0.0		

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Engineering Department
Construction Division
Materials Engineering Section

BORING REPORT

SHEET 1 OF 3

PROJECT	NAME OF CONTRACTOR	BORING NO.	SURFACE ELEV.
HMT-Port Ivory Surcharge Test	Craig Drilling	PG-ST-49	
LOCATION		**CONTRACT NO.**	**DATE**
As Laid out in field as per Drawing East Side		426-99-006	10/21/02

SPOON	CASING SIZE	HOLE TYPE
2 "O.D. 1 3/8 "I.D.	HW	"B" Mayhew

HAMMER	HAMMER
Auto 140 # FALL 30	# FALL

DRILLER: D Cooke

INSPECTOR: D Howe

GROUND WATER LEVEL

Date	Time	Depth	Remarks
10/21/02	9	3.0	while Hand Augering

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-[1] COV'D	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS — LINE LOCATES CHANGE OF PROFILE	
Hand Auger	0	Hand Auger	Full	1 A	Fill- RCA Recycled Concrete Agg.	0.0
				1 B	Fill Crushed Stone	1.0
				2 A	Same	3.0
				2 B	Fill Wh. Tr of Gray Limestone slurry	
	5			3		
	6				Same	
Casing					No Sampling 6-20 See Log for PG-ST-45 for Strata 6-20'	
	20	W.O.H		4		
		1-2	23"		Brown & Black Peat	
		1-2		5		
		2-3	22"		Same Tr F Dk Gray Sand, at Tip of Spoon	24.0
	25	W.O.H		6		
		WOH-2	19"		F Dk Gray Sand, Tr Silt	
					All Samples checked with PID No Tr	
					No Samples Saved, All Discarded	
	30					30.0
		2-3		7		
		4-3	12"		F Brown Sand, Tr Silt	
	33					
		3-3		8		
	35	8-8	13"		F Brown & Gray Sand, Tr Silt	35.0

Bottom of Boring

NOTES: 1 — Length recovered; 0" — Loss of Sample, T — Trap used
2 — U = undisturbed; A = auger; OER = open end rod; V = vane
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

PORT AUTHORITY OF NY & NJ

Engineering Department - Materials Division

Well Installation Report

Sheet 2 of 3

PROJECT				CONTRACT NO.
HHMT - Port Ivory Surcharge Test				426-99-006
LOCATION				CONTRACTOR
As Laid out in Field as Per Drawing East Side				Craig Drilling
WELL NO.	WELL TYPE	INSPECTOR	DRILLER	DATE
PG ST-4D	"B" Monitor	D Howe	D Cooke	10/21/02

Well Development Report

(NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

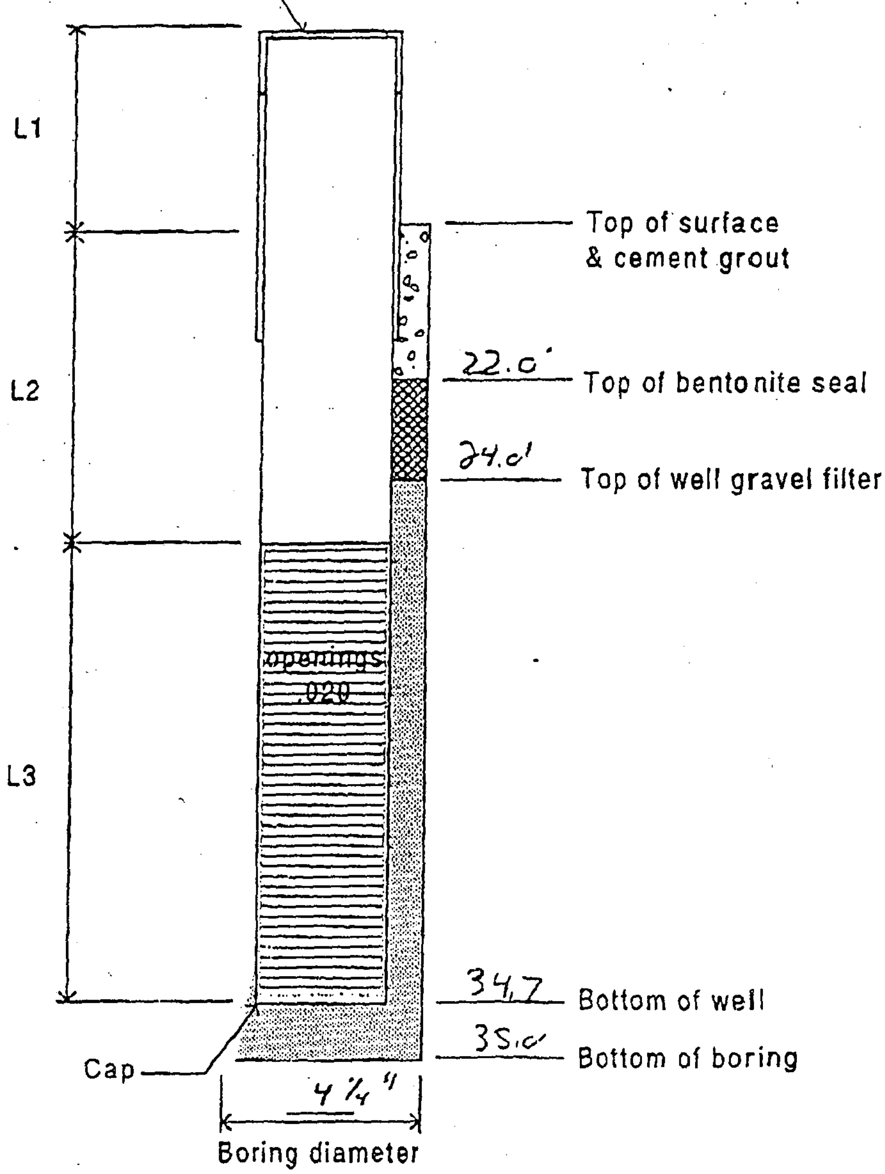
DATE	WATER LEVEL BEFORE	WATER LEVEL AFTER	TAKEN ___ MINUTES AFTER
10/21/02	13.5	13.5	15

2" dia. PVC pipe w/steel locking cap

L1 = 3.3'

L2 = 24.2'

L3 = 10.0'



REM.
Hole Back filled 34.7 To 35.0 with well Gravel

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ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
PID READINGS

Sheet 3 of 3

PROJECT: MMT- Port Ivory Surcharge Test

BORING No. PG ST 4D | DATE: 10/21/04

FIELD READINGS BY: PDA | PID Model: MinRAE

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS
DM	1A		0.0		
	1B		0.0		
	2A		0.0		
	2B		0.0		
	3		0.0		
	4		0.2		PAT
	5		0.3		PAT
	6		0.0		
	7		0.0		
	8		0.0		

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MATERIALS ENGINEERING DIVISION

[redacted] WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: MW RS-2	DATE: 11-24-00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 4 Inch
WEATHER CONDITIONS: Sunny 28°F	STICK-UP DISTANCE: 0.0
STATIC WATER LEVEL	GPS COORD'S : LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	11:24AM	6.02	—
POST PURGE:	12:12PM	6.70	—

WELL PURGE

DEPTH OF WELL		6.02	FEET
DEPTH TO WATER		7.20	FEET
DEPTH OF WATER COLUMN		1.18	FEET
FACTOR *	X	2.471	—
VOLUME TO BE REMOVED		2.92	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
11:30AM	8.56	14.1°	1883	1.0	E-1	—
11:40AM	8.57	16.6°	1844	0.9	270	—
11:47AM	8.54	16.7°	1840	0.9	250	—
					150 *	

SAMPLED BY: R6. / E.M.

COMMENTS: well Sampled @ 12:05PM

* Metals / Filtered

* FACTOR = 0.618 FOR 2 INCH DIAMETER

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MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: TW-1	DATE: 11/29/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 2" Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	11:35	6.10	
POST PURGE:			

WELL PURGE

DEPTH OF WELL	13.90	FEET
DEPTH TO WATER	6.10	FEET
DEPTH OF WATER COLUMN	7.80	FEET
FACTOR * 2"	X 0.618	
VOLUME TO BE REMOVED	4.8	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm) mS	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
11:45	7.62	13.9	1.4	0.7	Error (to high)	
11:55	7.05	14.5	1.7	0.9	F2	
11:05	7.12	15.3	1.8	0.9	F2	

SAMPLED BY:

COMMENTS: 1B Sample for Metals filtered in the field

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

[redacted] WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: RS-1	DATE: 11/24/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 4" Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL GPS COORD'S: LONG.:	LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	14:50	4.64	—
POST PURGE:	16:20	12.75	—

WELL PURGE

DEPTH OF WELL		16.84	FEET
DEPTH TO WATER		4.64	FEET
DEPTH OF WATER COLUMN		12.20	FEET
FACTOR *	X	2.471	
VOLUME TO BE REMOVED		30.14	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
15:23	9.02	13.2	655	0.3	955	—
15:30	10.60	15.0	710	0.3	310	—
15:41	11.22	15.0	448	0.2	200	—
15:52	11.24	15.1	434	0.2	188	—

SAMPLED BY: AZ & DP

COMMENTS: Filtered Metals

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

~~GROUNDWATER~~ WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: PAMW-6D	DATE: 11/30/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 2 Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	11:29	8.26	—
POST PURGE:	12:58	13.63	—

WELL PURGE

DEPTH OF WELL		45.85	FEET
DEPTH TO WATER		8.26	FEET
DEPTH OF WATER COLUMN		37.59	FEET
FACTOR *	X	0.618	
VOLUME TO BE REMOVED		23.23	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
11:46	7.04	16.2	~~11800~~ 19810	11.8	16	—
11:58	7.10	16.6	22100	13.2	140	—
12:16	7.09	16.8	22900	13.4	39	—
12:29	7.08	16.8	22300	13.5	36	—
~~12~~						

SAMPLED BY: A2 & E.M.

COMMENTS: Slow recovery

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: PAHW-6	DATE: 11/27/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD's: LONG.: LAT.:

		DISTANCE FROM TOP OF PIPE TO:	
	TIME	WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	10:30	7.68	
POST PURGE:	11:55	16.05	

WELL PURGE			
	DEPTH OF WELL	17.80	FEET
	DEPTH TO WATER	7.68	FEET
	DEPTH OF WATER COLUMN	10.12	FEET
	FACTOR * 2	X 0.618	
	VOLUME TO BE REMOVED	6.25	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY ~~(umohs/cm)~~ MS	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
10:30	10.59	19.0	4.54	2.5	ER-3	
11:20	10.95	19.7	4.65	2.5	ER-3	
11:35	11.36	19.7	4.78	2.6	ER-3	

SAMPLED BY: DP + EM

COMMENTS: Sample for metals is filtered, turbidity.

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

THE PORT AUTHORITY OF N.Y. & N.J.

MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: PAMW-5	DATE: 11-24-00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 2 Inch
WEATHER CONDITIONS: SUNNY 30°F	STICK-UP DISTANCE: 2.60
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	1:18 PM	7.03	—
POST PURGE:	1:59 PM	7.16	—

WELL PURGE			
DEPTH OF WELL		13.20	FEET
DEPTH TO WATER		7.03	FEET
DEPTH OF WATER COLUMN		6.17	FEET
FACTOR *	X	0.618	—
VOLUME TO BE REMOVED		3.81	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
1:30 PM	6.47	13.6°	869	0.6	Er 3	—
*1:37 PM	6.87	14.7°	1045	0.5	320	—
1:48 PM	6.76	14.8°	1048	0.5	45	—
1:54 PM	—	—	—	—	18 - After another Volume (4th)	

SAMPLED BY: R. L. E.M.

COMMENTS: well evacuated during 2nd Volume → Slowed flow from ~400 mL/min to 200 mL/min
Recovered & 3rd Volume Removed (Flow @ ~200mL/min)
Good Recovery
well sampled @ 1:59 PM

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

* FACTOR =

THE PORT AUTHORITY OF N.Y. & N.J.

MATERIALS ENGINEERING DIVISION

[redacted] WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: PAMW-1	DATE: 11/28/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 2" Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	10:54	5.64	—
POST PURGE:	12:34	13.32	—

WELL PURGE

DEPTH OF WELL		15.93	FEET
DEPTH TO WATER		5.64	FEET
DEPTH OF WATER COLUMN		10.29	FEET
FACTOR *	X	0.618	—
VOLUME TO BE REMOVED		6.36	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
11:04	11.85	15.1	1351	0.7	Er 3	—
11:28	12.25	16.5	2270	1.2	Er 3	—
11:45	12.35	16.4	2700	1.4	Er 3	—
11:55	12.35	16.4	2729	1.4	Er 3	—
					Er 3 = Over Range	

SAMPLED BY: AZ & EM

COMMENTS: Well goes dry Between volume - slow recovery

Filtered metals

Grey silty water

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: PAMW - 1D	DATE: 11/29/00
CHECK BOX FOR LOWFLOW: [ ] RATE(ML):	CASING DIAMETER: 2" Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD's : LONG.: LAT.:

	DISTANCE FROM TOP OF PIPE TO:		
	TIME	WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	1245	12.62	
POST PURGE:	1355	12.67	

WELL PURGE	DEPTH OF WELL	56.75	FEET
	DEPTH TO WATER	12.62	FEET
	DEPTH OF WATER COLUMN	44.13	FEET
	FACTOR * 2"	X 0.618	
	VOLUME TO BE REMOVED	27.3	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm) mS	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
13:20	7.06	15.4	4.2	2.2	11.3	12.65
13:32	7.05	15.6	4.8	2.6	9.09	
13:45	7.07	15.6	4.9	2.6	5.6	

SAMPLED BY: _____

COMMENTS: _____

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

* FACTOR

THE PORT AUTHORITY OF N.Y. & N.J.

MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: MW- EW-6	DATE: 11/24/00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 4 Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD'S : LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	9:20	10.20	—
POST PURGE:	10:55AM	11.96	—

WELL PURGE

DEPTH OF WELL		19.96	FEET
DEPTH TO WATER		10.20	FEET
DEPTH OF WATER COLUMN		9.76	FEET
FACTOR *	X	2.471	
VOLUME TO BE REMOVED		24.12	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
10:55	12.75	15.3	3596	2.4	19	—
10:10	12.83	15.9	7910	5.4	8.1	—
10:20	12.80	17.4	7290	4.8	6.9	—
10:25	12.78	17.3	7530	4.9	7.0	—
10:34	12.81	17.1	8600	5.4	5.4	—
10:45	12.82	17.0	7700	5.4	5.5	—

SAMPLED BY: AZ & BP

COMMENTS:

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

[redacted] WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: MW-EW-3	DATE: 11/24/00
CHECK BOX FOR LOWFLOW: ☐ RATE (ML):	CASING DIAMETER: 2" Inch
WEATHER CONDITIONS:	STICK-UP DISTANCE:
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	13:15	13.41	
POST PURGE:	14:30	15.93	

WELL PURGE

DEPTH OF WELL		17.90	FEET
DEPTH TO WATER		13.41	FEET
DEPTH OF WATER COLUMN		4.49	FEET
FACTOR *	X	0.618	
VOLUME TO BE REMOVED		2.77	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
13:31	8.27	14.9	1461	0.7	330	—
13:45	8.20	15.0	1749	0.8	65	—
13:58	8.23	15.2	1702	0.8	27	—

SAMPLED BY: AZ & DP

COMMENTS: Well went dry after one volume - Very slow recovery

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

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MATERIALS ENGINEERING DIVISION

WELL MONITORING DATA SHEET

PROJECT: HH - PORT IVORY P&G SITE	JOB NO: 501-233-295
WELL DESIGNATION: MW CS 7	DATE: 11-24-00
CHECK BOX FOR LOWFLOW: ☐ RATE(ML):	CASING DIAMETER: 2 Inch
WEATHER CONDITIONS: SUNNY 28°F	STICK-UP DISTANCE: 1.3
STATIC WATER LEVEL	GPS COORD'S: LONG.: LAT.:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER (FEET)	PRODUCT (FEET)
PRE-PURGE:	9:18AM	10.96	—
POST PURGE:	10:57AM	13.43	

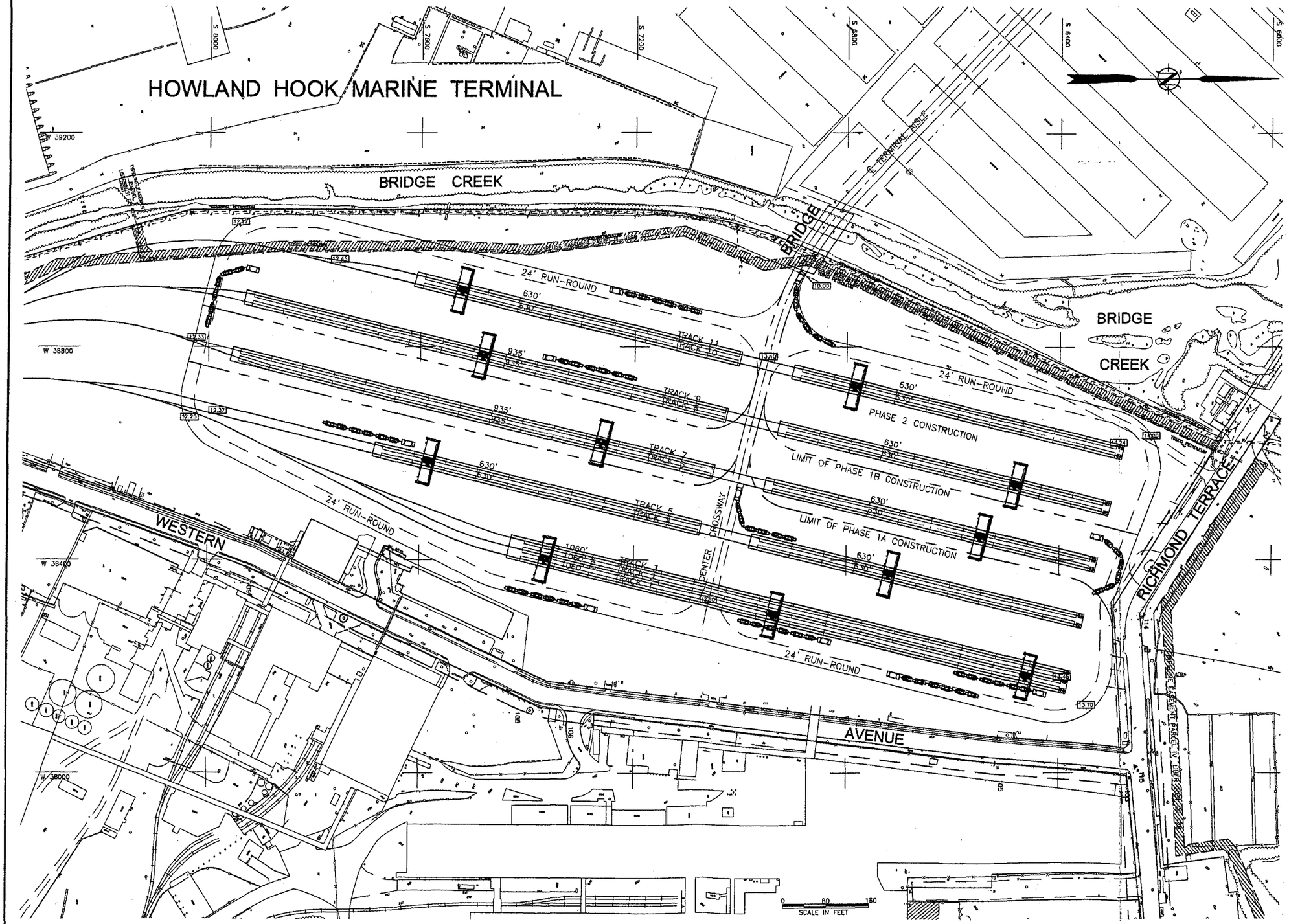
WELL PURGE			
	DEPTH OF WELL	14.32	FEET
	DEPTH TO WATER	10.96	FEET
	DEPTH OF WATER COLUMN	3.36	FEET
	FACTOR *	X 0.618	
	VOLUME TO BE REMOVED	2.08	

TIME	pH (SU)	TEMP (C)	CONDUCTIVITY (umohs/cm)	SALINITY (0/00)	TURBIDITY	DISS. O2 (mg/l)
9:22AM	9.45	13.8°	1540	0.8	30	—
9:33AM	9.41	13.6°	1487	0.8	25	—
9:38AM	9.16	14.1°	1413	0.7	23	—
Well evacuated during 3rd Volume.						

SAMPLED BY: K.G. & E.M.

COMMENTS: Well sampled at 9:55AM

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING



Sheet 1 of 2

THE PORT AUTHORITY OF NY & NJ

DMJM HARRIS
"The People Who Get It Done."
AN AECOM COMPANY

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

HOWLAND HOOK MARINE TERMINAL
PORT IVORY

CIVIL

Title

PORT IVORY
INTERMODAL FACILITY

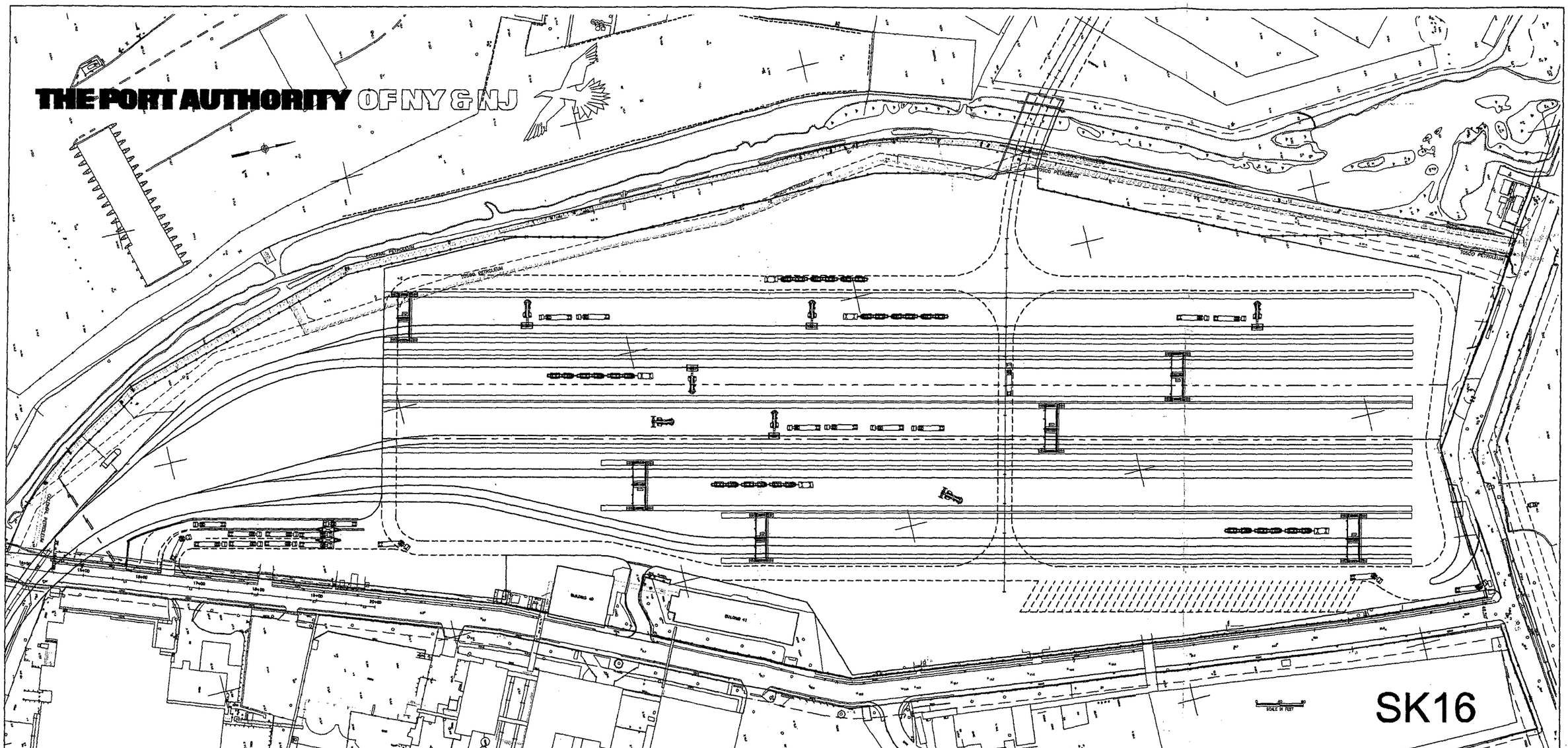
PRELIMINARY SITE PLAN

MJG	ALH	MJG
Designed by	Drawn by	Checked by

Date JANUARY 30, 2003

Contract Number HH-233.827

Drawing Number SK1



REVISED LAYOUT – OCTOBER 13, 2003

PORT IVORY INTERMODAL FACILITY

SK16

DMJM HARRIS
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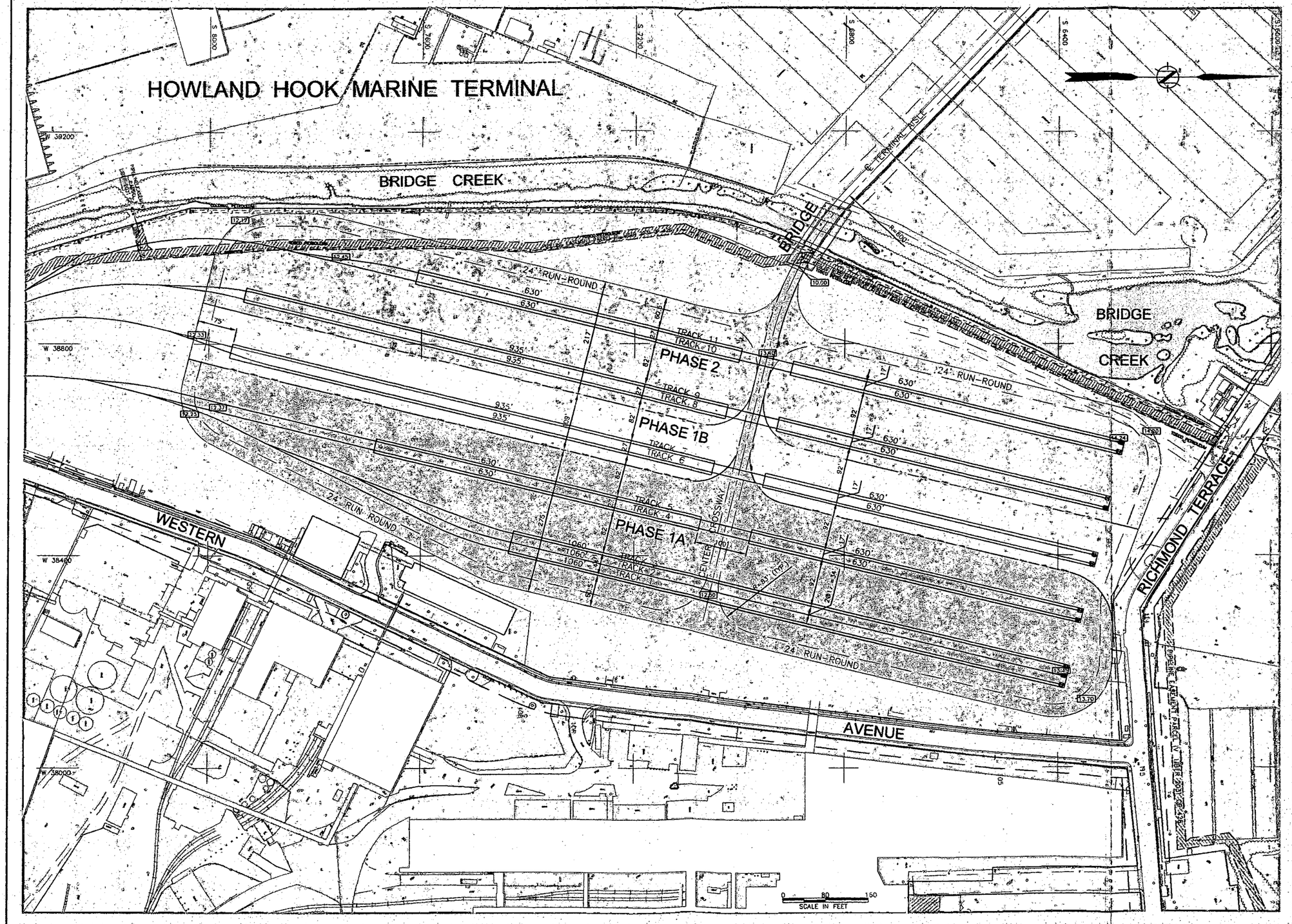

Sheet 3 of 3

THE PORT AUTHORITY OF NY & NJ

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No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

HOWLAND HOOK MARINE TERMINAL
PORT IVORY

CIVIL

Title:

PORT IVORY INTERMODAL FACILITY

PRELIMINARY SITE PLAN WITH PHASING

MJG	ALH	MJG
Designed by	Drawn by	Checked by

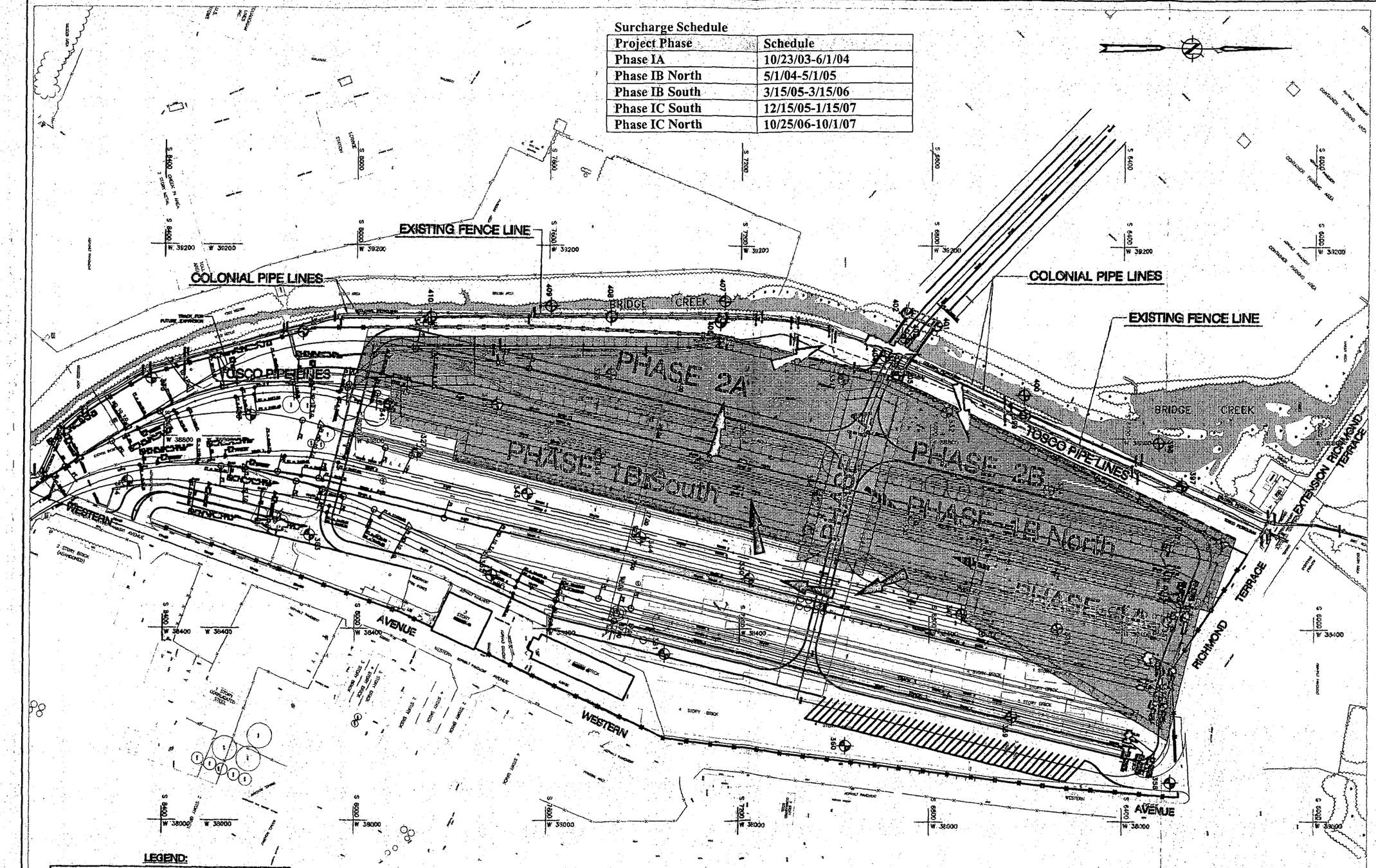
Date: JANUARY 30, 2003

Contract Number: HH-233.827

Drawing Number: SK3

Surcharge Schedule

Project Phase	Schedule
Phase IA	10/23/03-6/1/04
Phase IB North	5/1/04-5/1/05
Phase IB South	3/15/05-3/15/06
Phase IC South	12/15/05-1/15/07
Phase IC North	10/25/06-10/1/07



LEGEND:

397 BORINGS DRILLED IN 2003

327 BORINGS DRILLED IN 2002

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

SURCHARGE AREAS:

PHASE 1A | PHASE 1B | PHASE 2A & 2B

Sheet 1 of

PORT AUTHORITY OF NY & NJ

CHIEF GEOTECHNICAL ENGINEER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

HOWLAND HOOK MARINE TERMINAL

GEOTECHNICAL

Title

PORT IVORY

SEQUENCING OF SURCHARGE AREAS

S. SHETH	C. LAUTENSCHLAGER	S. SHETH
Designed by	Drawn by	Checked by

Date SEPTEMBER 29, 2003

Contract Number

Drawing Number SK1

4.0 SRI REPORT

The Port Authority of New York and New Jersey

Supplemental Remedial Investigation Report

Site 1 (VCP Site 00615-2)

HHMT - Port Ivory Facility

April 2006

40 Western Avenue, Staten Island, New York

Figures

Tables

Appendices

1.0 EXECUTIVE SUMMARY

The Port Authority of New York and New Jersey (Port Authority) is currently redeveloping the former Procter & Gamble (P&G) Port Ivory Facility, now known as the Howland Hook Marine Terminal (HHMT) – Port Ivory Facility. The HHMT-Port Ivory Facility is located at 40 Western Avenue in Staten Island, Richmond County, New York and consists of three parcels: Block 1309, Lot 10; Block 1338, Lot 1; and, Block 1400, Lot 1. This report addresses conditions at only the northwestern portion of Block 1400, Lot 1. This portion of the HHMT-Port Ivory Facility is also known as Site 1.

On behalf of the Port Authority, Hatch Mott MacDonald (HMM) has conducted various phases of environmental investigation at Site 1 between calendar years 2000 and 2005. The overall goal of these investigations was to determine the appropriate remedial actions, if any, for environmental media given the proposed site redevelopment for commercial (intermodal facility) purposes. The following media have been investigated at Site 1: soil; groundwater; surface water in Bridge Creek; and, sediments along the eastern bank/bed of Bridge Creek. Indoor air quality has not been investigated because no occupied buildings exist or are proposed subsequent to the redevelopment of Site 1. For the purposes of this document, an intermodal facility is defined as a commercial site where products are received via one mode of transportation and are ultimately distributed via a different mode of transportation.

HMM's environmental investigation efforts at Site 1 have included the performance of a Phase I Environmental Site Assessment (Phase I ESA) with a supplemental file review, a Site Investigation (SI), a Remedial Investigation (RI), and a Supplemental Remedial Investigation (SRI). The results of the Phase I ESA, SI, and RI are summarized in the report entitled *Site Investigation and Conceptual Remedial Action Workplan, Site 1* and dated September 2004, which has been submitted to the NYSDEC. As such, this report summarizes only the scope of work and findings of the SRI conducted at Site 1 during May 2005. Please note, information from adjacent Sites or previous investigations at Site 1 has been included herein as necessary for clarity and overall site understanding.

In the Phase I ESA, HMM identified Areas of Concern (AOCs) at Site 1. The AOCs were generally grouped into the following categories: Potential Underground Storage Tanks (USTs); Fill Material; Previously Identified Soil and Groundwater Contamination; Railroad Tracks and Siding; Groundwater; Pits and Drains; and, Former Structures. In addition, the HHMT-Port Ivory Facility, which includes Site 1, was listed in several Environmental Databases.

The HHMT-Port Ivory Facility is situated within an industrial section of Staten Island that was reclaimed from marshland by the use of fill and is bordered by railroads, ports, and roadways. Based on the industrial land use, the environmental quality of surface water, sediment, groundwater, and soil have been impacted on a regional scale. Therefore, neither the soil nor the groundwater at the HHMT-Port Ivory Facility are currently or will be used as natural resources and the surface water and sediment in Bridge Creek and the Arthur Kill are also not high quality. Therefore, while media are referred to as "impacted" throughout this report if the concentration of a regulated substance in the medium exceeds NYSDEC standards or guidance values, it is important to realize that the impacts, if any, attributable to P&G's operations only negligibly worsen already degraded environmental quality and that the "impacts" believed to be attributable to former P&G operations may be attributable instead to regional contamination.

Findings of Pre-SRI Environmental Investigations and Soil Removal Actions

Prior to the Port Authority's purchase of the property, P&G implemented a soil removal action at an AOC, identified as F1, which is located at Site 1. Because the P&G investigation efforts and soil removal actions were complete primarily in the 1990s, the Port Authority investigated soil at all AOCs and AOC categories identified during the Phase I ESA, except for Groundwater and the Environmental Databases AOC Categories, during the SI and/or RI. The Groundwater AOC was investigated through the collection of groundwater, surface water, and sediment samples during the SI. The Listing of the Site in Environmental Databases AOC was addressed by the Port Authority as part of its property acquisition activities.

Based on the results of the soil investigation component of the SI and RI, the Port Authority implemented additional soil removal actions at AOCs associated with Potential Underground Storage Tanks, Previously Identified Soil and Groundwater Contamination, and Former Structures. Based on the results of the SI and RI efforts and the post-excavation/confirmatory soil sampling, the remaining soil impacts at Site 1 are generally limited to low levels of polycyclic aromatic hydrocarbon (PAH) compounds and metals that have been detected at similar concentrations throughout the HHMT-Port Ivory Facility and are believed to be attributable to the prior placement of fill at the Facility by P&G.

Groundwater analytical data from the SI and the Surcharge Pilot Study, conducted as a component of the 2003/2004 RI, revealed minimal impacts to groundwater. Some of the organic compounds in

groundwater have decreased in concentration by approximately 60% and 67% between November 2000 and December 2002. In addition, the presence of arsenic, the primary metal of concern, in groundwater at Site 1 is attributable to the presence of treated wood chips in the Wood Yard. These wood chips were removed in 2004. It is not currently anticipated that any remedial actions are warranted with respect to groundwater at Site 1.

The quality of surface water and sediment in Bridge Creek has been adequately characterized with respect to metals and pH. The analytical data collected to date do not confirm that the groundwater impacts at Site 1 are adversely affecting surface water and/or sediment quality in Bridge Creek.

Based on the above discussion, it is believed that the remaining soil impacts (except those detected at AOC-UST2, see Summary of the SRI below) at Site 1 have been adequately characterized and do not require remedial actions other than the capping of much of Site 1 by impervious materials during redevelopment and the recording of a Deed Notice for Site 1. Groundwater impacts at Site 1 appear to be minimal and do not appear to have impacted surface water or sediment quality in Bridge Creek. Any groundwater impacts that may potentially impact surface water and/or sediment quality are anticipated to be less severe following the redevelopment of Site 1. Therefore, remedial actions are not necessary with regard to groundwater, surface water, or sediment quality. Additional surface water and sediment samples will be collected in conjunction with a groundwater monitoring program that will be initiated following the redevelopment of Site 1.

Summary of the SRI

As noted above, it was determined that petroleum-impacted soil encountered at AOC-UST2 warranted removal (i.e., excavation and off-site disposal). The excavation activities were initiated on April 18, 2005. During excavation, light, non-aqueous phase liquid (LNAPL) was observed in a larger area than anticipated based upon prior delineation efforts. As a result, the removal effort was halted so that the Port Authority could determine the extent and mobility of the LNAPL. In addition, efforts were undertaken to identify the effect of the LNAPL on soil quality, to delineate the extent of impacted soil, and to assess the potential for groundwater impacts. The Site 1 SRI effort was conducted at AOC-UST2 between May 13 and 23, 2005.

The Site 1 SRI at AOC-UST2 included an evaluation of both soil and groundwater. Specifically, the SRI consisted of the drilling of 14 soil borings, collection of seventeen soil samples from the soil borings,

conversion of six of the soil borings to temporary wells, and collection of one groundwater sample from each of the temporary wells. The temporary wells were installed in two parallel transects across AOC-UST2 such that each transect included an upgradient well, a well installed immediately downgradient of the area where LNAPL and/or impacted soil was observed (LNAPL area), and a downgradient well between the LNAPL area and Bridge Creek. Soil samples collected during the SRI were analyzed for the following parameters: volatile organic compounds (VOCs) with a 15-compound library search (VOC+15) via method 8260; semivolatile organic compounds (SVOCs) with a 25-compund library search (SVOC+25); and, total petroleum hydrocarbons (TPHC) via method 418.1. Groundwater samples were analyzed for VOC+15 via method 624 and for SVOC+25 via method 625.

Potentially impacted soil was observed at only four of the 14 soil boring locations. Specifically, discolored soil, a sheen, and/or discrete nodules of LNAPL were observed at soil boring locations TWP-1, UST-4, UST2-4A, and UST2-5. As measured using a photoionization detector (PID), the concentration of volatile organic vapors in the soil ranged from 0 (at various depths and locations) to 18 parts per million (at 6-8 feet below ground surface at location UST2-4). Based on field observations, the horizontal extent of the LNAPL and/or impacted soil is approximately 255 feet north-south by 173 feet east-west. Please note, LNAPL and/or impacted soil were present below the western portion of the soil surcharge stockpile that was located along the Site 1-Site 2A boundary.

Analytical results for soil samples collected at AOC-UST2 during the SRI revealed the presence of twelve SVOCs and two VOCs at concentrations in excess of corresponding NYSDEC Recommended Soil Cleanup Objectives (RSCOs). Except for the soil sample collected at location TWP-1A, these concentrations of SVOCs and VOCs are attributable to laboratory contamination of the samples and/or fill materials placed at the Facility by P&G. The concentration of TPHC at location UST2-4 was also elevated (it was more than four times as great at UST2-4 than at any other location), and may indicate the presence of a mobile phase of LNAPL. The elevated concentration of SVOCs at location TWP-1A and of TPHC at UST2-4 require additional investigation.

Groundwater analytical data from the SRI indicate that groundwater impacts are limited to naphthalene and phenol, both SVOCs. These compounds were detected at concentrations slightly greater than their respective NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGV) in the groundwater sample collected from temporary well TWP-1A. In addition, phenol was detected at a concentration slightly greater than its NYSDEC AWQSGV at temporary well TWP-2. No other VOCs or

SVOCs were detected at concentrations greater than their respective AWQSGV in any groundwater sample collected during the SRI. The elevated concentration of naphthalene in groundwater in the vicinity of well TWP-1A is likely due to the presence of creosoted wood at this location. However, regardless of the source, the naphthalene is delineated at TWP-2, located approximately 110 feet downgradient of TWP-1A. The elevated concentrations of phenol at TWP-1A and TWP-2 are potentially attributable to upgradient source areas, including the decay of naturally-occurring marsh deposits that have been observed beneath the fill at portions of Site 1. Regardless of the source, the phenol is delineated at TWP-3, located approximately 65 feet downgradient of TWP-2. Based on the SRI, the groundwater impacted by naphthalene and/or phenol is not anticipated to discharge into Bridge Creek. Groundwater at Site 1 is not currently, and is not anticipated to be, utilized as a source of potable water. Therefore, no investigative or remedial actions are warranted with respect to groundwater at AOC-UST2.

LNAPL did not accumulate within any of the temporary well points, including wells installed immediately downgradient of observed LNAPL. Therefore, except possibly at location UST2-4, the LNAPL appears to be present at a residual saturation (i.e., the LNAPL is immobile) at AOC-UST2.

Overall Conclusions - Additional Remedial Actions

Based upon the results of the SRI and of previous environmental investigations, the Port Authority has determined that further investigative efforts are warranted only for soil at locations UST2-4 and TWP-1A. Soil removal efforts conducted to date by P&G and the Port Authority have resulted in the excavation and disposal of more than 9,400 cubic yards of impacted soil from Site 1 and a layer of wood chips from the Wood Yard. Also, the Port Authority has removed two underground storage tanks, UST-5 and UST-6, which were abandoned in place by P&G.

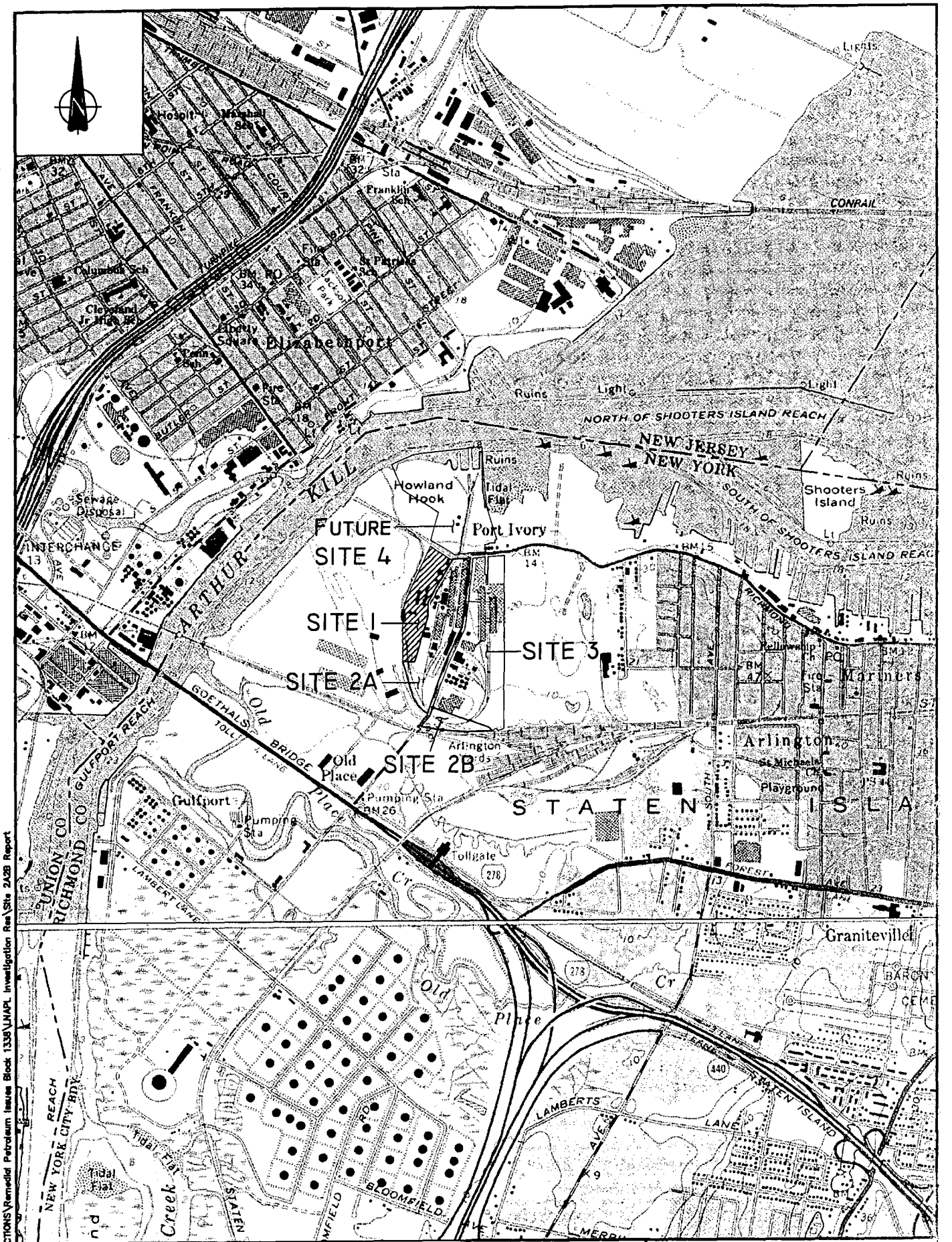
Additional remedial actions, beyond the redevelopment of Site 1 and institution of a Deed Notice at Site 1, are not warranted for any portion of Site 1 except (possibly) at locations UST2-4 and TWP-1A, both located at AOC-UST2. Subsequent groundwater monitoring, in conjunction with surface water and sediment sampling, is warranted to confirm the effectiveness of the removal efforts conducted to date at Site 1, the remedial action that will be conducted at AOC-UST2, and the redevelopment of Site 1. The remedial actions (if any) and groundwater monitoring programs are beyond the scope of this report and will be described in a forthcoming Remedial Action Work Plan.

2.0 INTRODUCTION

The Port Authority Howland Hook Marine Terminal (HHMT)-Port Ivory Facility is located at 40 Western Avenue in Staten Island, Richmond County, New York, as presented on Figure 1. The HHMT-Port Ivory Facility consists of three parcels; Block 1309, Lot 10; Block 1338, Lot 1; and Block 1400, Lot 1, which were purchased from Procter and Gamble (P&G) in 2000. The HHMT-Port Ivory Facility is bordered by Bridge Creek to the west, Arthur Kill to the north, wetlands and undeveloped land to the east, and an unnamed railway to the south. Public roadways separate the three parcels: Western Avenue separates Block 1400, Lot 1 from Block 1338, Lot 1 and Richmond Terrace separates Block 1309, Lot 10 from Block 1338, Lot 1 and Block 1400, Lot 1.

The Port Authority is in the process of redeveloping the HHMT-Port Ivory Facility for a commercial end use; specifically, the Port Authority intends to utilize the Facility as an intermodal facility. With regard to the HHMT-Port Ivory Facility, an intermodal facility is defined as a facility where cargo transported by ship is transferred to intermediate and final destinations via rail or truck. Following redevelopment, approximately 90% of the Facility will be paved or otherwise covered with impermeable or low permeability materials.

As part of the HHMT-Port Ivory Facility redevelopment, the Port Authority entered into the New York State Department of Environmental Conservation (NYSDEC) Voluntary Cleanup Program (VCP) in June 2004. The Port Authority's objective for entering into the VCP program with NYSDEC was to address the presence of contamination attributable to prior operations at the Facility. These operations were unrelated to the Port Authority. The Port Authority has established different redevelopment schedules for different portions of the HHMT-Port Ivory Facility. To accommodate the Port Authority's redevelopment schedule, the NYSDEC agreed to expedite the review of information pertaining to certain portions of the HHMT-Port Ivory Facility. Thus, the Port Authority agreed to address the HHMT-Port Ivory Facility as four "Sites" and to present assessment, investigation, and remedial action information/documentation for each individual Site. Please note, to date, the VCP agreements have been executed for only three of the four Sites; the fourth Site is referred to as a "Future Site" pending inclusion, as necessary, in a NYSDEC regulatory program. The Sites have been defined as follows: Site 1 consists of the northwestern portion of Block 1400, Lot 1; Site 2A/2B consists of the eastern and southern portions of Block 1400, Lot 1 (Site 2A) and the southern portion of Block 1338, Lot 1 (Site 2B); Site 3 consists of the central and northern portions of Block 1338, Lot 1; and, Future Site 4 consists of Block 1309, Lot 10.



SOURCE:
UNITED STATES GEOLOGICAL SURVEY
7.5 MINUTE SERIES TOPOGRAPHIC QUADRANGLES
ELIZABETH AND ARTHUR KILL, NY–NJ,
1967, PHOTOREVISED 1981

NOTES:
HHMT – PORT IVORY FACILITY
CONSISTS OF SITES 1 THROUGH 3
AND FUTURE SITE 4.

2000 0 2000 4000
SCALE IN FEET
1" = 2000'
CONTOUR INTERVAL = 10 FEET

Hatch Mott MacDonald
Certificate No. 24GA28075000

27 Bleeker Street
Millburn, New Jersey 07041

PORT AUTHORITY OF NY AND NJ
40 WESTERN AVENUE, STATEN ISLAND, NY

FIGURE 1
SITE LOCATION MAP
HHMT - PORT IVORY FACILITY

B

Designed	Drawn	Checked	Approved	Date
	EMM	GKC	GKC	2/7/2005

P:\232852\mxd\REMEDIAL ACTIONS\Remedial Petroleum Issues Block 1338\UNAPL Investigation Rev\Site 2A2B Report

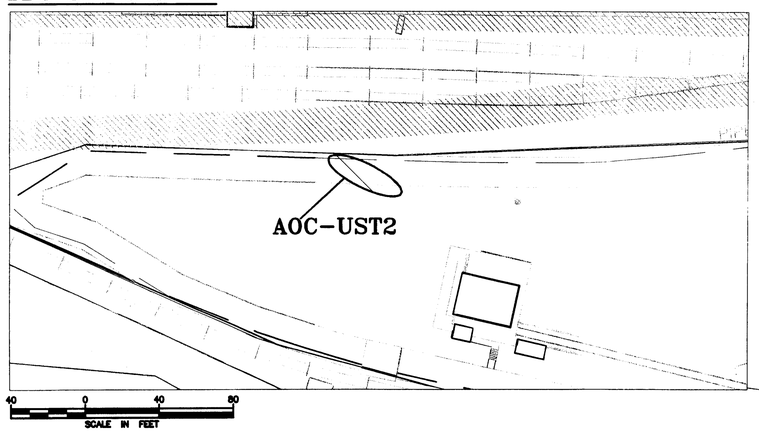
This report has been prepared as part of the ongoing compliance with the NYSDEC VCP agreement for VCP Site V-00615-2 (Site 1) and includes information associated with only Site 1. Information associated with adjacent Sites or previous assessments/investigations at Site 1 has been included as necessary for clarity and overall understanding. Figure 1 depicts the location of Site 1 in relation to the locations of Site 2A/2B, Site 3, and Future Site 4. Figure 2 depicts the easements located at the HHMT-Port Ivory Facility, including those at Site 1. Section 2.1 summarizes the results of previous investigative and soil removal efforts at Site 1. This background information is useful for understanding the scope of the SRI at Site 1. Section 2.2 summarizes the organization of this report.

2.1 Previous Environmental Investigations at Site 1

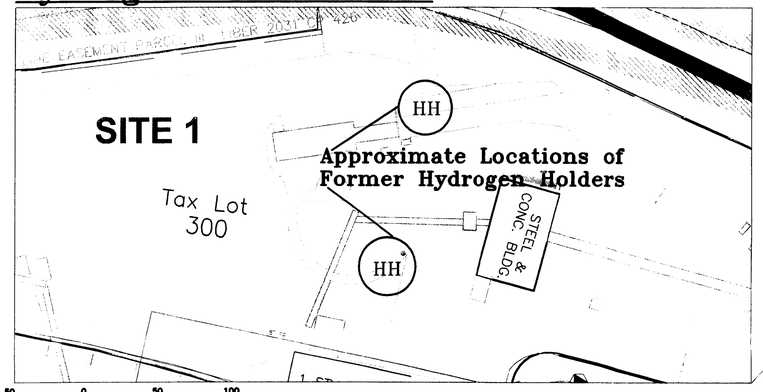
On behalf of the Port Authority, Hatch Mott MacDonald (HMM) has completed several phases of investigation at the site, including a Phase I Environmental Site Assessment with a supplemental file review (Phase I ESA), Site Investigation (SI), Remedial Investigation (RI), and Supplemental Remedial Investigation (SRI). The Phase I ESA and SI were conducted to identify and characterize Areas of Concern (AOCs) at Site 1 prior to the Port Authority's purchase of the Facility in December 2000. The RI and SRI were conducted subsequent to the transfer of the property from P&G to the Port Authority. In general, the RI focused on the investigation of petroleum-impacted soil encountered at various AOCs at Site 1 during the SI. The RI also included a study designed to determine the effect, if any, that surcharging the soil at Site 1 would have on the extent of groundwater impacts at Site 1. The Port Authority planned to surcharge soil at Site 1 in preparation for the redevelopment effort. The SRI, which is the subject of this report, included efforts to further assess the following: the potential petroleum impacts to both soil and groundwater at AOC-UST2 and the impacts, if any, to soil and/or groundwater (determined based on previous soil and groundwater analytical data) that may have resulted from P&G's former use of hydrogen holders at Site 1. The presence of the hydrogen holders was raised as a potential environmental concern by the NYSDEC during a telephone conversation of December 23, 2004 and in subsequent telephone conversations. In addition, previous groundwater and surface water data was re-evaluated subsequent to the removal of wood chips from the Wood Yard AOC.

The remainder of this section summarizes the findings of the previous environmental investigations, including the work conducted by P&G and their consultants. Previous soil and groundwater analytical results were presented in detail in the reports entitled *Site Investigation and Conceptual Remedial Action Workplan, Site 1* (dated April 2003) and *Revised-Site Investigation and Conceptual Remedial Action Workplan, Site 1* and (dated September 2004). The September 2004 document was a revision of the April

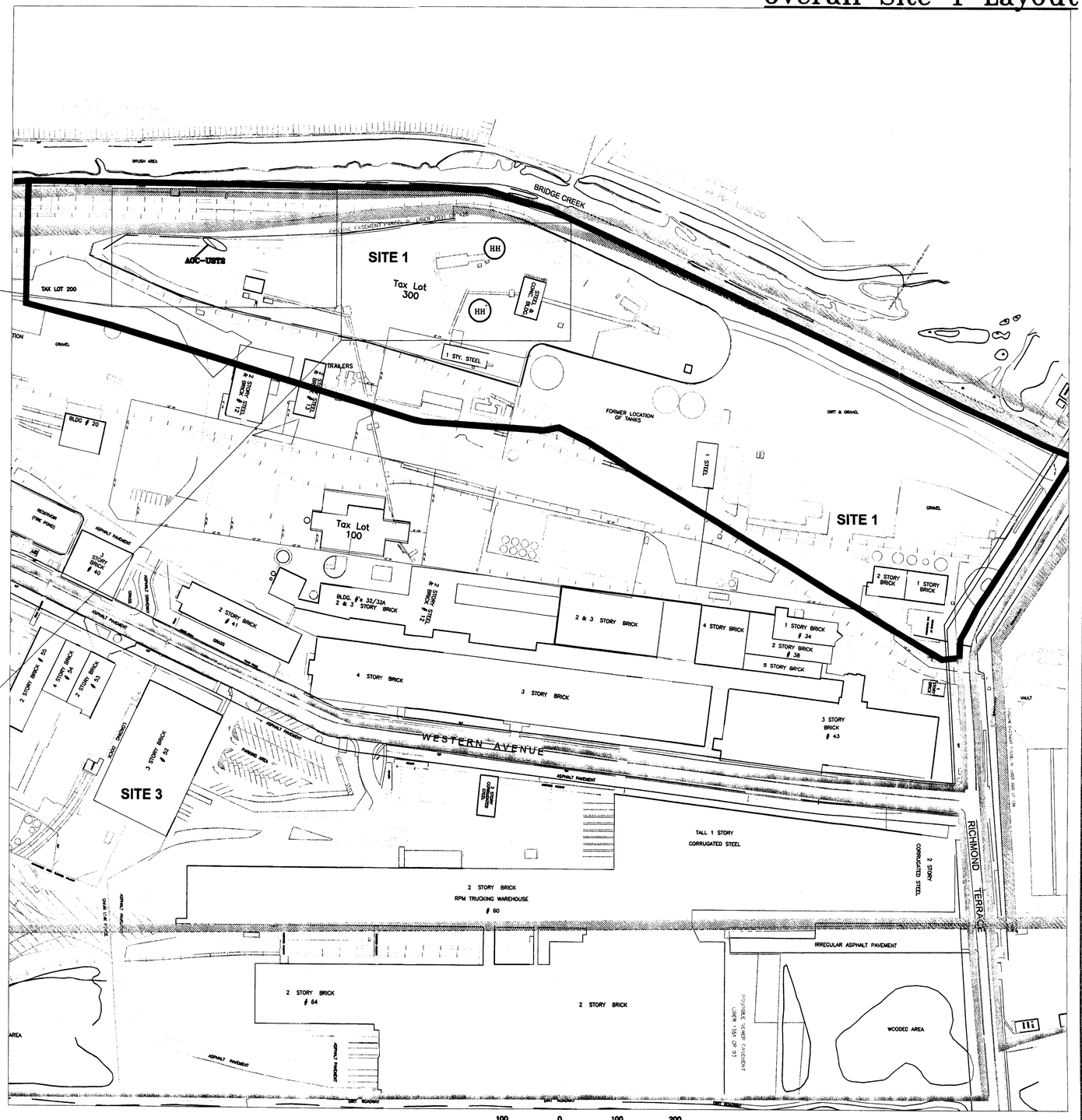
AOC-UST2



Hydrogen Holders AOC



Overall Site 1 Layout



NOTES:
1. Site Designations as per VCP.
2. Buildings and Structures depicted on this Figure were razed prior to the initiation of SRI activities at Site 1.
3. AOCs = Areas of Concern.
4. The locations of the Hydrogen Holders are based on historical (Sanborn) maps.

LEGEND

SITE BOUNDARY

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

Title

HOWLAND HOOK MARINE TERMINAL
PORT IVORY FACILITY

CURRENT SITE 1 LAYOUT AND AOCs MAP
DRAFT

Designed by EMM Drawn by Checked by

Date January 7, 2006

Contract Number

Drawing Number FIGURE 2

Sheet 1 of 1

P:\232952\mxd\REMEDIAL ACTIONS\LNAPL Investigation Res\Site 2A2B Report\Figures\Figure 2. Areas of Concern 6/1/05 09:21 am

2003 version; the revisions were made based on an NYSDEC comment letter dated July 2, 2004. As such, analytical results from the SI and RI that are referenced below are not provided in summary tables and/or maps associated with this report.

During the Phase I ESA, HMM identified several Areas of Concern (AOCs) at Site 1. The AOCs were grouped into the following categories:

- *Potential Underground Storage Tanks (USTs);*
- *Fill Material;*
- *Previously Identified Soil and Groundwater Contamination;*
- *Railroad Tracks and Siding;*
- *Groundwater;*
- *Pits and Drains;*
- *Former Structures; and,*
- *Listing of the HHMT-Port Ivory Site in Environmental Databases*

Soil at all AOCs and AOC categories identified during the Port Authority's Phase I ESA, except for Groundwater and Listing of the Site in Environmental Databases, was investigated during the SI and/or RI. The Groundwater AOC was investigated through the collection of groundwater samples during the SI. The Listing of the Site in Environmental Databases AOC was addressed by the Port Authority as part of its property acquisition activities. Based upon the results of previous environmental investigations, the Port Authority determined that further investigative efforts were not warranted for any medium at any AOC in Site 1, although a removal effort with respect to petroleum-impacted soil was deemed to be warranted at AOC-UST2.

Removal efforts conducted by P&G and the Port Authority prior to the SRI resulted in the excavation and disposal of more than 9,400 cubic yards of impacted soil. In addition, the Port Authority removed a layer of wood chips from the Wood Yard and two AOCs, UST-5 and UST-6, associated with USTs that were abandoned in place by P&G. The scope and effectiveness of each soil removal effort are summarized below in Sections 2.1.1 through 2.1.7, organized according to AOC category.

2.1.1 Potential Underground Storage Tanks (USTs)

Historical mapping identified potential USTs at three areas at Site 1. The AOCs associated with these three potential USTs were designated AOC-UST2, AOC-UST5, and AOC-UST6. As part of the SI,

geophysical surveys, conducted using electromagnetic survey methods, were completed at each of the potential UST AOCs. The geophysical surveys were inconclusive due to interference and thus did not confirm the presence or absence of a UST at any of these three AOCs. USTs that were abandoned in place were subsequently encountered at AOC-UST5 and AOC-UST6; no UST was encountered at AOC-UST2 during the SI or RI. The UST encountered at AOC-UST5 was determined to be part of an oil-water separator system; the system, including both the UST and appurtenant tank components, was decommissioned by P&G. The UST at AOC-UST6 was determined to be a single toluene tank, contained within a concrete vault which was decommissioned by P&G. The Port Authority has removed the previously decommissioned tanks. Based on the above, no known USTs are currently located at Site 1. A summary of information pertaining to each to each potential UST area is provided below.

AOC-UST2

The presence of discolored soil, odors, and elevated concentrations of VOC vapors (as measured using a photoionization detector, or PID) were observed in soil at AOC-UST2 during the SI and RI. In addition, a sheen was observed on the groundwater surface in temporary well TMW-02. Despite these field observations, the concentrations of regulated compounds and metals detected in soil and groundwater samples were generally similar to the concentrations of the same compounds and metals detected in soil throughout the HHMT-Port Ivory Facility. The presence of these compounds/metals is associated with fill placed at the Facility, including Site 1, by P&G. Notwithstanding the above and based on field observations and measurements, the Port Authority determined that a removal effort with respect to petroleum-impacted soil would be appropriate at AOC-UST2.

The removal effort was to consist of the excavation and off-Site disposal of impacted soil, as identified based on the field observations listed above, previously encountered at soil borings. All excavated soil was to be disposed of at an appropriate off-site facility. The removal effort was initiated on April 18, 2005. However, during excavation, LNAPL and/or impacted soil was observed at locations beyond the proposed excavation limits. Therefore, the Port Authority halted the removal effort and implemented horizontal and vertical delineation activities. The delineation of soil and the investigation of groundwater impacts at AOC-UST2 is included in this report, and is detailed in Sections 4.0 et seq.

AOC-UST5

The excavation of soil at Area B and Area GW-14 (the two excavations merged into one as described Section 2.1.3, below) revealed the presence of a former oil/water separator system. The system included

three interconnected concrete structures and a UST within a concrete vault. The UST and the concrete structures were excavated in 2003. Neither visual inspection nor field screening indicated that the soils surrounding the oil-water separator system were impacted. No sampling was performed since the "closed" tank was noted to be situated within a concrete vault and field screening did not reveal any indications of contamination. The SI did not identify the presence of compounds or metals at concentrations above levels that were detected in soil samples throughout the HHMT-Port Ivory Facility. These generally low levels of compounds and metals are considered to be attributable to fill formerly placed at the Facility by P&G. Given the above, no additional investigative and/or remedial actions are/were deemed warranted at AOC-UST5.

AOC-UST6

In conjunction with site demolition in 2002, contractors retained by the Port Authority removed building footings and slabs in the vicinity of Building 17 at the northern portion of Site 1. Those efforts allowed for a review of the subsurface in the vicinity of AOC-UST6. A UST filled with inert materials (brick, stone, and sand) was situated within a concrete vault at this AOC. A review of available records revealed that the UST was used by P&G and formerly contained toluene. Based on information provided by P&G, the NYSDEC had allowed P&G to leave the tank in place and issued a spill case closure letter (August 1990) in response to P&G's decommissioning effort. Although the NYSDEC had not required P&G to remove the tank, the Port Authority elected to implement a removal effort to fully address this AOC.

In 2003, the Port Authority removed the previously decommissioned UST and surrounding concrete vault. Field observations/screenings did not reveal any indications of contamination of soil or groundwater. No soil sampling was performed based on the results of field screening and prior NYSDEC case closure approval. Analytical results from the SI did not reveal the presence of regulated compounds and metals at concentrations above the generally low levels that were detected in soil samples throughout the HHMT-Port Ivory Facility; generally the low levels of contaminants present at the Site are attributable to fill formerly placed at the Facility by P&G. Given the above, no additional investigation and/or remedial actions are/were deemed warranted at AOC-UST6.

2.1.2 Fill Material

Fill material has been encountered throughout the HHMT-Port Ivory Facility, and therefore has been investigated on a Facility-wide basis. The character of the fill is variable, and the fill at any location throughout the HHMT-Port Ivory Facility may be composed of one or more of the following materials:

soil, vegetative debris, wood, brick fragments, glass, concrete fragments, cinders, ash, slag, carbonaceous materials, and diatomaceous earth. Based on field observations, the fill materials were categorized into the following three categories: urban fill, cinder fill, and by-product fill. The cinder fill consists primarily of cinders, ash, and/or slag. The by-product fill includes calcium carbonate, spent diatomaceous earth, and spent carbonaceous filter material generated as by-products of P&G's manufacturing processes. The urban fill is comprised of all other fill materials, generally soil, vegetative debris, and construction debris. Two or all three types of fill were present in several soil borings at Site 1.

The SI and RI included characterization of the physical extent and chemical nature of the fill material. Analytical results for samples collected from fill materials indicate that the urban fill and cinder fill materials contain low concentrations of various metals and organic compounds, primarily Polycyclic Aromatic Hydrocarbons (PAHs). However, the by-product fill appears to be comprised primarily of innocuous metals such as calcium and magnesium. Based on the findings of the SI and RI, it was determined that additional investigation of the fill material was not warranted. In addition, since the low concentrations of metals and PAHs in the urban and cinder fill materials do not appear to have impacted groundwater, it was determined that no remedial actions beyond the proposed Site 1 redevelopment and the institution of a Deed Notice are warranted for the fill material.

2.1.3 Previously Identified Soil and Groundwater Contamination

Since groundwater issues are discussed separately under Section 2.1.7, below, this section will address only soil impacts at portions of Site 1 that P&G had determined to be AOCs. The following five AOCs located at Site 1 were previously identified and evaluated by P&G: Area A, Area C, Area F1, Area H/R, and the Wood Yard. Area A, the West Tank Field, was located southwest of Building 16. Area C, the Former Oleum AST and Acid Wastewater area, was located to the north of the Wood Yard. Area F1, the Spent Nickel Catalyst Drum Storage Area, was located southwest of Building 17. Area H/R indicates an overlapping AOC comprised of (initially distinct AOCs) Area H and Area R. Area H, the Former Rosin Storage Area, and Area R, the Northwest Corner of the Soap Manufacturing Area, were located in the northwestern portion of Site 1. The Wood Yard denotes the area that P&G used to store and chip wood used to fuel a wood-fueled furnace located to the west of Buildings 12 and 13. Based on the results of its environmental investigations, P&G did not perform soil removal at Area A, Area C, Area H/R, and the Wood Yard. Rather, P&G asserted that contaminants detected in soil at these AOCs are relatively immobile (i.e., the compounds and metals are neither highly soluble nor highly volatile) and that human exposure would be minimal. P&G did, however, implement removal efforts at Area F1.

Given the length of time which had elapsed since P&G's investigative and soil removal efforts at these AOCs (the majority of the investigation was completed during the early 1990s), the Port Authority included the P&G AOCs in its SI. The SI was conducted at these AOCs to confirm P&G's conclusions regarding the mobility of the remaining contaminants. Based on the results of soil and groundwater samples analyzed during the Port Authority's SI, no additional investigative or soil removal activities were required at Area C and Area H/R. However, based upon the presence of petroleum-impacted soil at Area A, Area F1, and the Wood Yard, additional investigation was deemed necessary to confirm the success of the P&G removal actions performed at these AOCs. This additional investigation was performed as part of the Port Authority's RI at Site 1.

Based on the RI data, the petroleum-impacted soil at AOCs Area A, Area F1, and the Wood Yard was successfully delineated. Soil in the vicinity of AOC Area F1, previously addressed by P&G's soil removal effort, was deemed to have limited impacts based on field observations and analytical results from the SI and RI. The Port Authority excavated potentially impacted soil at AOCs Area A and the Wood Yard. Based on the relatively low levels of contamination in soil and the general absence of organic compounds other than phenol (commonly encountered as a decay product of naturally-occurring organic matter) in groundwater, it was determined that installing impervious cover (macadam, concrete, etc.) across most of Site 1 and instituting a Deed Notice at Site 1 would constitute an adequate remedial action with regard to soil. The installation of impervious cover is currently proposed as part of the redevelopment of Site 1.

The extents and results of the P&G soil removal effort at AOC Area F1 and the Port Authority's removal efforts at AOCs Area A and the Wood Yard are summarized in the September 2004 *Revised Site Investigation and Conceptual Remedial Action Workplan,* prepared by HMM on behalf of the Port Authority. However, to facilitate review of this document, summaries of these removal efforts are presented below.

Area A (also known as Area A-5)

Approximately 3,300 cubic yards of soil were excavated from Area A-5. Although the majority of the removal effort was conducted at Site 1, a portion of the excavation extended onto Site 2A. Post-excavation soil samples were collected from the sidewalls and bottom of the excavation after completion of soil removal activities. The only compound detected at a concentration greater than its respective

RSCO was benzo(a)pyrene, which exceeded its RSCO in only one post-excavation soil sample. In addition, the concentration reported for benzo(a)pyrene in this sample was similar to concentrations of benzo(a)pyrene detected in soil throughout the HHMT-Port Ivory Facility. The presence of benzo(a)pyrene in the sample is therefore attributable to fill present at the HHMT-Port Ivory Facility.

Area F1

Area F1 is located in the north-central portion of Site 1. According to a March 1993 report, *Area F Soil Remediation Report*, prepared by Recon Systems, Inc., P&G excavated soil and performed confirmatory post-excavation soil sampling to address previously delineated PCB-impacted soil at Area F1. Excavation activities were performed in February 1993. The excavation was extended to a depth of approximately 3 feet bgs. Approximately 150 cubic yards (221 tons) of soil was excavated and nine post-excavation soil samples were collected from the resultant excavation area. PCBs were not detected in five of the post-excavation soil samples. The analytical results for the remaining four soil samples indicated the presence of the PCB Arochlor-1254. The greatest concentration of Arochlor-1254 in these four samples was 0.49 mg/kg, which is well below the RSCO for PCBs in shallow soil (1 mg/kg). Based on the analytical results, P&G did not propose any further action for this area.

Analytical results for soil samples collected at Area F1 during the Port Authority's SI and RI indicate that, although the concentrations of xylenes, dibromochloromethane, the PAH compounds benzo(a)anthracene and benzo(a)pyrene, phenol, and various metals exceed the NYSDEC RSCOs, the soil impacted by PCBs has been successfully remediated. Given the above, no additional investigation and/or remedial actions (beyond the paving of Area F1 as part of the redevelopment of Site 1 and establishment of a Deed Notice at Site 1) are/were deemed warranted at Area F1.

Wood Yard

The Port Authority removed approximately 120 cubic yards of soil from the vicinity of sample location Wood-5. Based on a visual review and analytical results from RI sampling, the soil impacts at this location appear to have been associated with residual cinder material (ubiquitous to the fill material) rather than petroleum. Thus, no confirmation samples were warranted or collected for Area Wood-5. Given the successful completion of the soil removal effort, no additional investigative or remedial activities are/were deemed warranted for soil at Wood-5.

In 2004, the Port Authority removed wood chips that P&G had previously stockpiled in the Wood Yard. Shallow soil was also removed along with the wood chips. This effort was undertaken since treated/creosoted wood sometimes contains elevated concentrations of the metals arsenic, chromium, and copper and arsenic was detected in several soil and groundwater samples collected from within and downgradient of the Wood Yard. Following the removal effort, six confirmatory soil samples were collected from the 0-0.5 foot depth interval below the new ground surface in the area where the wood chips had been stockpiled by P&G see Figure 3. Confirmatory soil sampling analytical results are summarized in Table 1. In general, the concentrations of arsenic and other metals in the confirmatory soil samples were below their respective RSCOs, or exceeded the RSCOs slightly (i.e., were within an order of magnitude of their respective RSCOs). In particular, the concentration of arsenic exceeded its RSCO (7.5 mg/kg or soil background) in only one soil sample, WC-PT1-092104-20-1, in which the arsenic concentration was 25 mg/kg. The concentrations of metals in the confirmatory soil samples were similar to those in soil samples collected at other portions of the facility; therefore, the presence of these metals in soil is considered to be attributable to the former placement of fill materials by P&G. Additional investigation and remedial/removal efforts are not warranted at the Wood Yard beyond the redevelopment of Site 1 and the institution of a Deed Notice at Site 1.

Soil Removal Efforts - Site 2A

In addition to the above-described AOCs, the Port Authority also performed soil removal at Area B, the P&G designation for an AST area at Site 2A. Although the majority (approximately three-quarters) of the excavation is located in Site 2A, the remainder (approximately one-quarter) included an area along the eastern part of Site 1. The Port Authority excavated approximately 4,350 cubic yards of soil in the vicinity of two soil borings, designated B-2 and B-3, based on potential petroleum impacts. All piping encountered during excavation also was removed as part of the removal effort. The excavation area merged with the Area GW-14 excavation; for the purposes of this summary, the two excavations will be referred to as the Area B excavation.

Post-excavation soil samples were collected from the sidewalls of the Area B excavation at the soil-ground water interface (3-3.5 feet below ground surface, or bgs). The analytical results confirmed that the excavation successfully removed the impacted soil. Only two PAH compounds were detected at concentrations greater than their respective RSCOs, and the detected concentrations for these two PAH compounds was similar to those reported for soil samples collected at other portions of the HHMT-Port Ivory Facility. The presence of these compounds is therefore attributable to fill material previously

Sample Location	NYSDEC RSCO (MG/KG)	PT-6
Units		MG/KG
Arsenic	7.5 or SB	ND
Barium	300 or SB	NE
Chromium	10 or SB	NE
Copper	25 or SB	NE
Zinc	20 or SB	ND
Mercury	0.1	ND

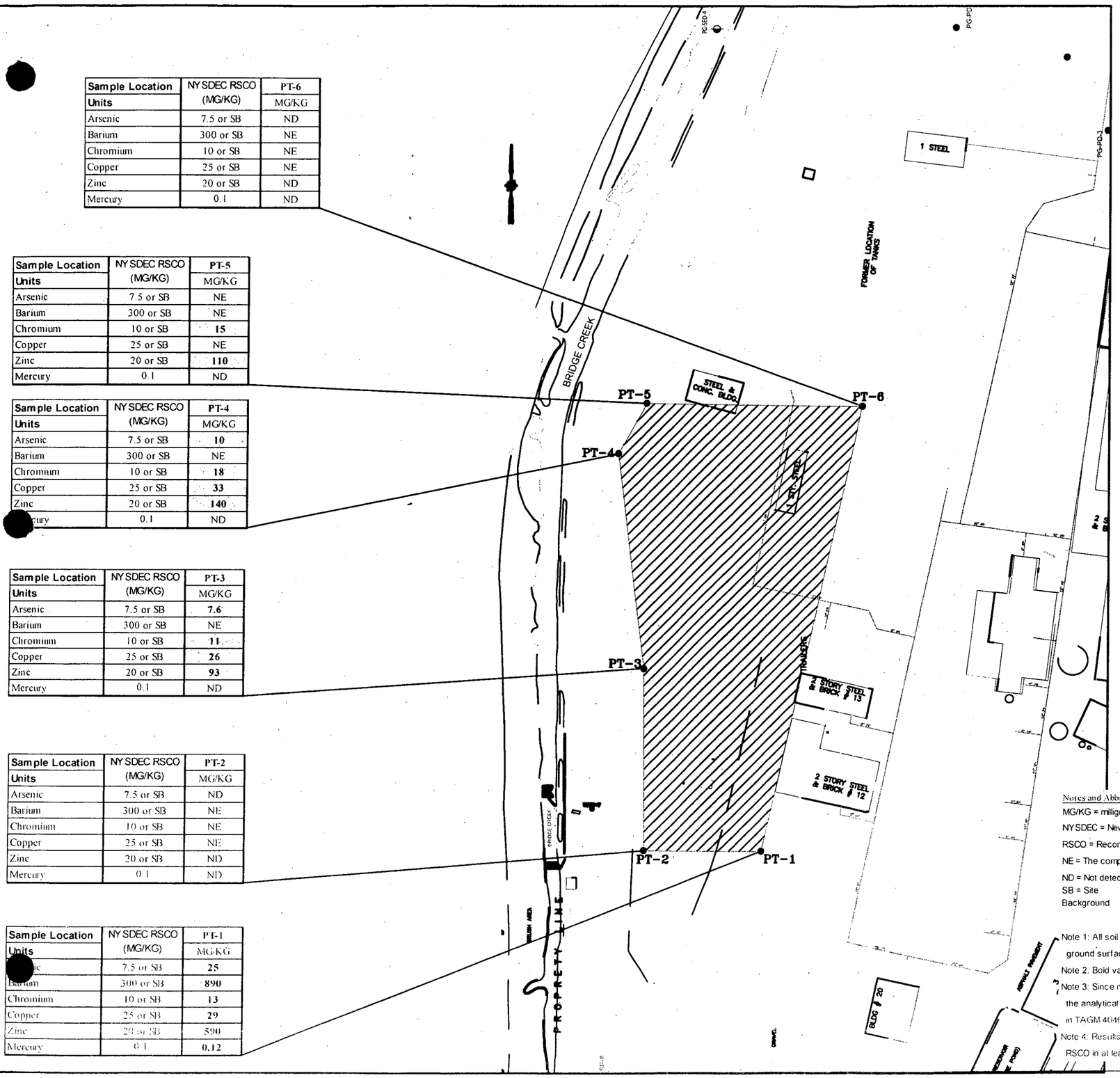
Sample Location	NYSDEC RSCO (MG/KG)	PT-5
Units		MG/KG
Arsenic	7.5 or SB	NE
Barium	300 or SB	NE
Chromium	10 or SB	**15**
Copper	25 or SB	NE
Zinc	20 or SB	**110**
Mercury	0.1	ND

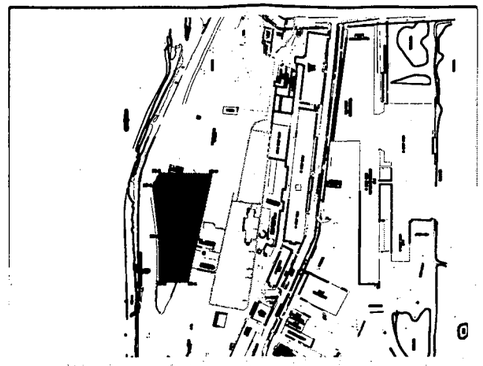
Sample Location	NYSDEC RSCO (MG/KG)	PT-4
Units		MG/KG
Arsenic	7.5 or SB	**10**
Barium	300 or SB	NE
Chromium	10 or SB	**18**
Copper	25 or SB	**33**
Zinc	20 or SB	**140**
Mercury	0.1	ND

Sample Location	NYSDEC RSCO (MG/KG)	PT-3
Units		MG/KG
Arsenic	7.5 or SB	**7.6**
Barium	300 or SB	NE
Chromium	10 or SB	**11**
Copper	25 or SB	**26**
Zinc	20 or SB	**93**
Mercury	0.1	ND

Sample Location	NYSDEC RSCO (MG/KG)	PT-2
Units		MG/KG
Arsenic	7.5 or SB	ND
Barium	300 or SB	NE
Chromium	10 or SB	NE
Copper	25 or SB	NE
Zinc	20 or SB	ND
Mercury	0.1	ND

Sample Location	NYSDEC RSCO (MG/KG)	PT-1
Units		MG/KG
Arsenic	7.5 or SB	**25**
Barium	300 or SB	**890**
Chromium	10 or SB	**13**
Copper	25 or SB	**29**
Zinc	20 or SB	**590**
Mercury	0.1	**0.12**





SCALE: 1" = 500'

LEGEND:

PT-1 ● POST-EXCAVATION SOIL SAMPLING LOCATION

RAILROAD TRACKS

FORMER WOOD CHIP AREA

NOTES:

1) POST-EXCAVATION SAMPLE LOCATIONS AND FORMER WOOD CHIP AREA ARE BASED ON SURVEYING INFORMATION PROVIDED ON A PORT AUTHORITY OF NEW YORK AND NEW JERSEY DRAWING ENTITLED WOOD PILE AREA AND DATED SEPTEMBER 6, 2002.

2) ALL BUILDINGS SHOWN ON THE DRAWING HAVE BEEN RAZED.

SCALE: 1"=125'

125' 0' 125' 250'

SCALE IN FEET

Notes and Abbreviations:

MG/KG = milligrams per kilogram

NYSDEC = New York State Department of Environmental Conservation

RSCO = Recommended Soil Cleanup Objective

NE = The compound was detected, but the concentration is below the RSCO for the metal.

ND = Not detected

SB = Site Background

Note 1: All soil samples were collected from the top half foot (i.e., from 0-0.5 feet below ground surface) of the soil column after removal of the layer of wood chips.

Note 2: Bold values in shaded cells exceed the RSCO for the metal.

Note 3: Since no site background concentrations have been established for these metals, the analytical data have been compared to the Eastern USA Background value provided in TAGM 4046 when these data are available.

Note 4: Results are provided only for metals detected at concentrations above the applicable RSCO in at least one soil sample.

THE PORT AUTHORITY OF NY & NJ

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1)
HHMT-PORT IVORY FACILITY

CONFIRMATORY SOIL SAMPLE LOCATIONS, WOOD CHIPS EXCAVATION (WOOD YARD, SITE 1)

Designed by RMT Drawn by Checked by

Date 1/26/2006

Contract Number

Drawing Number FIGURE 3 B

TABLE 1
SUMMARY OF POST-EXCAVATION SAMPLING ANALYTICAL RESULTS - WOOD CHIP EXCAVATION
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (MG/KG)	PT-1	PT-2	PT-3	PT-4	PT-5	PT-6
Field ID		WC-PT1-092104-20-1	WC-PT2-092104-20-1	WC-PT3-092104-20-1	WC-PT4-092104-20-1	WC-PT5-092104-20-1	WC-PT6-092104-20-1
Sampling Date		9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004
Matrix		Soil	Soil	Soil	Soil	Soil	Soil
Sample Depth		Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Units		MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
METALS		Conc	Conc	Conc	Conc	Conc	Conc
Antimony	SB	ND	ND	ND	ND	ND	ND
Arsenic	7.5 or SB	**25**	ND	**7.6**	**10**	4.9	ND
Barium	300 or SB	**890**	14	80	120	67	42
Beryllium	0.16 (HEAST) or SB	ND	ND	ND	ND	ND	ND
Cadmium	1 or SB	ND	ND	ND	ND	ND	ND
Chromium	10 or SB	**13**	8.3	**11**	**18**	**15**	6.8
Copper	25 or SB	**29**	6.5	**26**	**33**	20	9.3
Lead	500*	87	ND	110	190	76	ND
Nickel	13 or SB	7.9	ND	ND	ND	ND	ND
Selenium	2 or SB	ND	ND	ND	ND	ND	ND
Silver	SB	ND	ND	ND	ND	ND	ND
Thallium	SB	ND	ND	ND	ND	ND	ND
Zinc	20 or SB	**590**	ND	**93**	**140**	**110**	ND
Mercury	0.1	**0.12**	ND	ND	ND	ND	ND

Notes and Abbreviations:

MG/KG = milligrams per kilogram

NYSDEC = New York State Department of Environmental Conservation

RSCO = Recommended Soil Cleanup Objective

Conc = Concentration

ND = Not detected

SB = Site Background

* = No RSCO is available for the metal. The value provided is the Eastern USA Background.

Note 1: All soil samples were collected from the top half foot (i.e., from 0-0.5 feet below ground surface) of the soil column after removal of the layer of wood chips.

Note 2: Bold values in shaded cells exceed the RSCO for the metal.

Note 3: Since no site background concentrations have been established for these metals, the analytical data have been compared to the Eastern USA Background value provided in TAGM 4046 when these data are available.

emplaced at the HHMT-Port Ivory Facility. Based on the IRM, no further investigative or remedial actions were deemed warranted at Area B.

2.1.4 Railroad Tracks and Siding

Site inspections at Site 1 revealed the presence of railroad tracks and sidings, and review of historical records identified additional tracks and sidings that were formerly present at Site 1. As such, it was proposed to obtain samples from locations adjacent to portions of the current and former on-site railroad system to confirm that the railroad system had not impacted soil at Site 1. Based on the analytical results for soil samples collected along railroad sidings at Site 1 during the SI, no further investigative or remedial activities were deemed warranted with respect to the Railroad Tracks and Siding at Site 1.

2.1.5 Groundwater

Environmental investigation activities performed at Site 1 prior to the Port Authority's purchase of the HHMT-Port Ivory Facility identified the presence of contaminants and elevated pH in groundwater. As the majority of the groundwater sampling presented in the P&G reports was performed in the early 1990s, it was proposed to perform a groundwater investigation to confirm current groundwater quality. During the SI, groundwater samples were collected at eight shallow monitoring wells and two deep monitoring wells located at Site 1. Groundwater samples were also collected during a Pilot Study to determine the effects of the surcharge pile on the distribution and mobility of groundwater impacts at Site 1. The Pilot Study was conducted as part of the RI. During the SRI, groundwater samples were collected from temporary wells installed at AOC-UST2.

Both the SI and RI efforts included sampling of surface water and sediment in conjunction with the groundwater samples to characterize the chemistry of these media in close proximity to a "white material" previously observed in Bridge Creek and to confirm whether or not groundwater may potentially impact surface water quality in Bridge Creek. The groundwater samples were analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, Target Analyte List (TAL) metals, TPHC, oil and grease (O&G), total cyanide, and total phenolics. Surface water and sediment samples were analyzed for TAL metals, and the pH of the surface water was measured using a portable pH meter.

For this project, the groundwater analytical results have been compared, as appropriate, to current NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs). The AWQSGVs assume that groundwater is classified as GA, a potential drinking water source. Given the location of the

Site and the high potential for water to be saline, the published AWQSGVs 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 to these standards in this report does not represent any agreement or concurrence that the same are appropriate for use at this Site or the HHMT-Port Ivory Facility.

The analytical results for the groundwater at Site 1 indicate that the only substances detected at concentrations greater than the NYSDEC AWQSGVs were ethylbenzene, xylene, phenol, 2-benzphenanthracene, benzo(a)anthracene, and the metals arsenic and cadmium. As noted above, the surface water and sediment samples were not analyzed for organic compounds. Neither arsenic nor cadmium was detected at a concentration greater than its NYSDEC Recommended Surface Water Cleanup Standard (RSWCS) in any of the three surface water samples. All five sediment samples contained arsenic at concentrations greater than the NYSDEC Lower Effects Level (LEL) but below the Severe Effects Level (SEL). The concentration of arsenic in sediment did not increase either upstream or downstream, and the source of this metal is not known. Cadmium was detected at a concentration slightly greater than the NYSDEC LEL in only one of the five sediment samples. Based on the analytical data for metals, it does not appear that the groundwater impacted by arsenic and cadmium is affecting the quality of surface water in Bridge Creek. The sediment data are less conclusive, and the source of the arsenic and cadmium in sediment appear to be impacted sediment in Bridge Creek upstream of Site 1. The upstream sediment data are presented in Appendix B and are discussed in Section 7.2.1.

Although there are no quantitative analytical results for the concentration of organic compounds in Bridge Creek, it is not anticipated that the surface water or sediment quality is being impacted by the organic compounds detected in groundwater at Site 1. Ethylbenzene and xylene are both VOCs, and are expected to volatilize soon after entering Bridge Creek (if groundwater impacted with these compounds is discharging into the creek). Phenol, as noted above, is a common product of the degradation of organic matter, including naturally-occurring organic matter. Since marsh deposits are present throughout this portion of Staten Island, naturally-occurring organic matter is plentiful. The solubility of 2-benzphenanthracene and benzo(a)anthracene is low at neutral pH (measured to be between 7.5 and 8.2 in Bridge Creek). Although groundwater impacted by organic compounds is not anticipated to affect the quality of surface water in Bridge Creek, there are no data available to corroborate this theory.

Notwithstanding the above, the groundwater chemistry is anticipated to change following the redevelopment of Site 1, which will be implemented in the near future. As a result, the surface water

and/or sediment chemistry may also change. Therefore, a groundwater monitoring program that will include the monitoring of surface water and sediment quality, will be implemented subsequent to completion of Site 1 redevelopment.

2.1.6 Pits and Drains

Pits and drains were observed at two buildings, Building 1A and Building 17, which have since been razed by the Port Authority. Soil samples were collected as part of the SI, to investigate soil quality adjacent to these structures. In addition, a groundwater sample was collected from monitoring well PAMW-5 to investigate the quality of groundwater at this portion of Site 1.

Overall, the analytical results indicate the presence of various PAH compounds and various metals in soil samples collected to evaluate Pits and Drains. The concentrations detected were noted to be similar to those detected in soil at other portions of the HHMT-Port Ivory Facility and are attributable to the former placement of fill materials by P&G. A few non-fill related contaminants (toluene, dieldrin, endrin, and heptachlor epoxide) were detected at concentrations above their respective RSCOs at only one soil sampling location, PD-8. The pesticides may relate to fill material at this portion of the site and/or to typical usage of such materials for pest control. These types of materials were not used or generated as part of process operations by P&G and the presence of residual concentrations of same was not considered a concern at PD-8. As previously stated, P&G performed closure activities for a 10,000 gallon UST formally containing toluene. The NYSDEC issued a spill Case Closure to P&G in August of 1990. Subsequently, the Port Authority removed the decommissioned UST (UST-6); the NYSDEC allowed P&G to decommission the UST in place. The analytical results from the groundwater sample collected at PAMW-5 did not indicate that pits and drains had impacted the groundwater. Therefore, no additional investigation of soil associated with pits and drains formerly located at Site 1 was determined to be warranted.

2.1.7 Former Structures

Review of Sanborn Maps and aerial photographs identified former structures at various locations throughout Site 1. The former structures included buildings and tanks at the Wood Yard and portions of Buildings 12 and 13, as well as ASTs to the west of Buildings 12 and 13 (buildings and structures immediately north, east, and south of Buildings 12 and 13 are located at Site 2A). One building (or several smaller buildings) was located west of Buildings 12 and 13, near the southern portion of Site 1. Historical mapping indicates that this building was utilized as a metal shop. In addition, Building S-16

and a building north of S-16 were located at Site 1, along with ASTs at Area A. Building S-17 and structures extending from or immediately adjacent to Building S-17 were also located at Site 1. Railroad tracks and sidings were visible on the aerial photographs; however, the railroad tracks and sidings are addressed as a separate AOC (see Section 2.1.4). In addition, the status of Area A is discussed above in Section 2.1.3. Please note, all of the structures identified above, with the exception of parts of railroad tracks and sidings, were razed by P&G. However, Buildings 1A and 17 and aboveground conveyor belt systems and supports were removed by the Port Authority.

Soil samples were collected near the former structures during the SI in order to identify if soil had been impacted by P&G's former industrial/commercial activities at the structures. In addition, soil excavation was performed at AOCs FS-1 and the Wood Yard; the removal effort for the FS-1 AOC is summarized below and the removal effort for the Wood Yard is summarized in Section 2.1.3. Analytical results for soil samples collected in the vicinity of former structures other than FS-1 and the Wood Yard identified compounds and metals that were detected at similar concentrations in soil throughout the facility. Based on the their widespread distribution at the Facility, these soil impacts have been attributed to the former placement of historic fill at the facility. As such, no additional investigative and/or remedial activities were deemed warranted with respect to the former structures at Site 1.

Removal Action at FS-1

Soil excavation was completed in the vicinity of former sampling location FS-1 in November-December 2002. Approximately 1,500 cubic yards of soil were removed from the vicinity of FS-1. The excavation area was primarily located at Site 1 but extended onto Site 2A. Post-excavation soil samples were collected following soil excavation. The only compounds detected at concentrations greater than their respective RSCOs in the post-excavation soil samples were four PAHs considered to be attributable to fill material. The PAH compounds were detected at concentrations similar to those detected at other areas of the HHMT-Port Ivory Facility (historic fill discussion). As such, no additional investigative and/or remedial/removal efforts were deemed warranted at FS-1.

2.2 Report Objectives and Organization

This report documents the scope of work completed, methods utilized, and results of the SRI for Site 1. To facilitate review of the report, background information (e.g., Site 1 history, hydrogeology, etc.) is provided in Section 3. The scope of work completed and methods utilized during the SRI are described in Sections 4 and 5, respectively. A summary of the soil sampling and analytical program is presented in

Table 2A and the groundwater sampling and analytical program is summarized in Table 2B. The field observations and analytical data generated during the SRI are summarized in Section 6, tabulated in Tables 3A, 3B, 4A, and 4B, and presented on Figure 4. A discussion of the SRI results is presented in Section 7 and conclusions and recommendations regarding the environmental quality of soil and groundwater at Site 1, as well as the need for additional investigative and/or remedial efforts, are provided in Section 8.

Please note that the need for additional remedial actions proposed in this report is based on a predetermined end-use for Site 1. As previously stated, the Port Authority is redeveloping Site 1 for use as an intermodal facility. As such, most of Site 1 will be finished with impervious cover, precluding direct contact with underlying fill material.

3.0 BACKGROUND

This section includes general information pertaining to the location and operating history of the entire HHMT-Port Ivory Facility, specific information regarding the previous and current land use of Site 1, and a summary of regional and local hydrogeology. These three topics are discussed in Sections 3.1 through 3.3, respectively. Please note, this information was previously submitted to NYSDEC in a report entitled *Revised - Site Investigation and Conceptual Remedial Action Workplan, Site 1* and dated September 2004; however, this information is repeated in this report as a courtesy to the reader.

3.1 HHMT-Port Ivory Facility – Location and Description

The HHMT-Port Ivory Facility is located at 40 Western Avenue, Staten Island, Richmond County, New York and is comprised of the three following tax blocks/lots: Block 1309, Lot 10, Block 1338, Lot 1 and Block 1400, Lot 1. Together, these three parcels encompass 123.75 acres. The latitude/longitude of the HHMT-Port Ivory Facility, as determined from the center of the Facility, is 40 degrees 38 minutes 15 seconds North / 74 degrees 10 minutes 50 seconds West. At the time of the Phase I ESA and SI activities, the HHMT-Port Ivory Facility was owned by P&G; the Port Authority purchased the Facility from P&G in December 2000 and it is now known as the HHMT-Port Ivory Facility. Subsequent to the purchase of the HHMT-Port Ivory Facility, the Port Authority performed RI, SRI, and IRM activities.

The HHMT-Port Ivory Facility can be accessed via driveways located along Western Avenue and Richmond Terrace. Western Avenue extends in a north-south direction between Block 1400, Lot 1 (Sites

1 and 2A) and Block 1338, Lot 1 (Sites 2B and 3) and terminates at Richmond Terrace. One of the three parcels, Block 1309, Lot 10 (Future Site 4) is situated north of Richmond Terrace and the two remaining parcels, Block 1400, Lot 1 (Sites 1 and 2A) and Block 1338, Lot 1 (Sites 2B and 3), are situated south of Richmond Terrace. The overall layout of HHMT-Port Ivory Facility is presented on Figure 1.

The HHMT-Port Ivory Facility is and has 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. These catch basins discharge to pipes that comprise the HHMT-Port Ivory Facility's underground stormwater sewer system. Ultimately, stormwater discharges to permitted outfalls located along the adjacent waterways, roadways, and marshland areas. Electrical service is supplied to the subject site via connection to the Consolidated Edison system servicing this section of Staten Island.

In addition to the utility infrastructure maintained by the HHMT-Port Ivory Facility, several utility easements, both active and inactive, traverse the Facility. Colonial Pipeline and Exxon (now ExxonMobil) maintain easements that traverse Site 1. Colonial Pipeline maintains a 10-foot pipeline easement that extends in a north/south direction along the western property boundary of Site 1. The easement originates south of Site 2A, traverses through that Site entering the southwestern corner of Site 1, continues across Richmond Terrace and through the western portion of Future Site 4 (Block1309, Lot 10), and finally terminates at the northern end of Future Site 4. ExxonMobil maintains an 18-foot easement that is located east of the Colonial Pipeline easement. This easement parallels the Colonial Pipeline easement throughout Site 1; however, this easement extends in an easterly direction along the southern boundary of Future Site 4 beyond Richmond Terrace. The locations of these easements are presented on Figure 2.

3.2 Site 1 Location and History

Site 1 includes the northwestern portion of Block 1400, Lot 1 and constitutes 14.95 acres of the 123.75-acre HHMT-Port Ivory Facility. Site 1 is bordered by Site 2A to the east and south, Richmond Terrace to the north, and Bridge Creek to the west. Vehicular access to the northern portion of Site 1 is provided from Richmond Terrace; access to the remaining portion of Site 1 is provided by a paved access road which extends from Western Avenue through site 2A; of the current layout of Site 1. No structures are currently located on Site 1. Site 1 generally consists of flat, unpaved, and unvegetated land. However, a soil pile, approximately 15-16 feet high in the vicinity of AOC-UST2, is currently located along the

eastern boundary of Site 1; this soil pile was used for surcharging purposes and will be regraded or transported off site during redevelopment of Site 1.

In the early 1900s, P&G developed portions of the current HHMT-Port Ivory Facility for use as a consumer goods manufacturing Facility. The consumer goods manufactured included soap, detergent, and foodstuffs. The specific consumer goods produced at the Facility and the operations/activities performed at specific site areas changed over time based upon corporate requirements. Manufacturing operations ceased in approximately 1991.

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 location in 1906-1907. The original 77-acre Facility included portions of Sites 1, 2A, and Future Site 4, and was developed on an open, vegetated, marshy area. Over the years, P&G acquired additional acreage (Sites 2B and 3) and emplaced fill materials at low-lying areas of Sites 1, 2A/2B, 3 and Future Site 4, expanding the original Facility to include the current site limits, as shown on Figure 1. 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, and manufacturing by-products (i.e. calcium carbonate, carbonate salts from soap productions, diatomaceous filter earth from vegetable oil refining operations, carbonaceous filter material from glycerin recovery operations, etc.). Visual review of subsurface conditions during SI, RI and IRM activities indicates that all of the above-listed types of fill materials may have been emplaced at Site 1.

Review of Sanborn Maps and aerial photographs identified former structures at various locations throughout Site 1. The former structures included buildings and tanks at the Wood Yard, portions of buildings 12 and 13, ASTs to the west of Buildings 12 and 13 (buildings and structures immediately north, east, and south of Buildings 12 and 13 are located at Site 2A), and railroad tracks siding traversing Site 1. One building (or several smaller buildings) was located west of Buildings 12 and 13, near the southern portion of Site 1. Historical maps indicate that this building was utilized as a metal shop. In addition, Building S-16 and a building north of S-16 were located at Site 1, along with ASTs at Area A. Sanborn maps indicate the locations of former hydrogen holders; the nature of these hydrogen holders is discussed below. Building S-17 and structures extending from or immediately adjacent to Building S-17 were also located at Site 1. Please note, all of the structures identified above, with the exception of parts

of railroad tracks and sidings, were razed by P&G. In addition, Buildings 1A and 17 and aboveground conveyor belt systems and supports were removed by the Port Authority.

Based on historical mapping and information provided in reports prepared by P&G, the following materials were stored in ASTs present at Site 1 and/or were maintained at storage areas at Site 1: caustics, various vegetable and fish oils, fuel oil, waste oil, hydrogen, soap, spent acids, spent nickel catalyst, grease, coke and rosin. Storage methods are not identified on the maps. A few of the ASTs on the Block 1400, Lot 1 parcel (Sites 1 and 2A) were labeled on historical Sanborn Maps as being "hydrogen holders". As discussed below, these tanks are believed to have been used for the storage of hydrogen for use in fat and oil hydrogenation.

Historical maps also identify the potential presence of tanks, possibly USTs, at the Facility, including three areas (referenced herein as AOC-UST2, AOC-UST5 and AOC-UST6) on Site 1. Historical information indicates the following tank contents: oil in one or more tanks at Areas UST2 and UST5 and toluene in a tank at Area UST6. No UST was encountered in AOC-UST2, but the Port Authority has removed the previously decommissioned tanks at AOC-UST5 and AOC-UST6.

Historical information sources indicate some variability in the operations performed at specific site locations throughout P&G's operation of the Facility. However, in general, Sites 1 and 2A (Block 1400, Lot 1) were utilized as a single Facility for soap and glycerin manufacturing and utility functions (i.e. boiler houses, wood processing for the boilers, locomotive maintenance, etc.). The activities performed specifically at Site 1 consisted primarily of wood processing and storage. However, some office, machine shop, and soap manufacturing activities may have been performed in Buildings S-16 and 17 and in an additional building formerly located north of Building S-16. The locations of the former structures are indicated on Figure 2.

As noted above, ASTs referred to as "hydrogen holders" were observed on Sanborn Maps. HMM researched the usage and storage methods of hydrogen in industrial settings and determined that hydrogen is often used in the hydrogenation of oils and fats for foodstuffs and other commercial products. This is the most likely use for hydrogen at the former P&G Facility, given the nature of former Facility operations. Hydrogen can be stored as a gas under pressure, as a liquid under near-absolute zero temperature conditions, or bonded to metal and liquid hydrides and carbon compounds. Based on prior operations, it is likely that hydrogen was stored in liquid form at the former P&G Facility. Therefore, it is

unlikely that the presence of the former hydrogen holders impacted soil or groundwater quality at Site 1. Rather, appurtenant equipment that may have been present at Site 1 to pressurize the hydrogen is more likely to have impacted soil or groundwater quality since such equipment was likely powered by fuel oil. Because the location (and even the presence) of specific equipment, if any, is not confirmed on Sanborn or other historical maps, HMM has evaluated previous analytical data for those soil and groundwater samples collected in closest proximity to the hydrogen holders.

Analytical results from soil samples collected approximately 50 to 60 feet from the former tank locations during the SI and RI did not reveal the presence of substances related to the storage/usage of hydrogen (i.e., relatively high concentrations of metals that may be bonded to hydrogen for storage purposes were not present in the vicinity of the tanks). The nearest groundwater sample was collected from well PG-PA-MW-6, which is situated downgradient of the former hydrogen holder area. Analytical results for this sample indicated that only phenol and arsenic were detected at concentrations greater than their respective AWQSGVs. The elevated concentrations of arsenic appear to be related to the wood chips previously stockpiled in the Wood Yard. As indicated in Section 2.1.5, the wood chips have been removed, and the effect of the removal of the wood chips on groundwater quality will be determined during a groundwater monitoring program subsequent to the redevelopment of Site 1. The presence of phenol in the groundwater sample collected at PG-PA-MW-6 is likely related to the decay of naturally-occurring organic material that is present in the marsh deposits observed in the soil column at several locations at the Facility, including at Site 1. As such, it does not appear that the presence of the hydrogen holders has impacted soil or groundwater quality.

3.3 Regional and Local Hydrogeologic Setting

The following sections summarize the geology and hydrogeology of Staten Island and the HHMT-Port Ivory Facility, respectively.

3.3.1 Regional Hydrogeologic Setting

Physiographic 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 and continuing eastward across Long Island. The northwestern portion of Staten Island is underlain by bedrock of the Piedmont physiographic province, while Coastal Plain sediments are present in the southeastern portion of Staten Island.

Coastal Plain sediments include interlayered clay, silt, sand, and gravel deposits of the Raritan formation that thicken downdip (i.e., to the southeast). The bedrock in the Piedmont physiographic province includes shales, mudstones, and siltstones of the Stockton, Lockatong, and Passaic formations and intrusive diabase dikes. Less frequent sandstones and conglomerates occur in the Passaic formation and occasional limestones occur in the Lockatong formation. Basement rock underlying both the Coastal Plain sediment and bedrock of the Stockton, Lockatong, and Passaic formations is metamorphic rock of the Manhattan Prong.

In the extreme northeast portion of Staten Island, bedrock of the Passaic formation is overlain by glacial outwash deposits in turn overlain by finer-grained tidal marsh deposits. The glacial outwash deposits consist chiefly of stratified fine to coarse sand and gravel. The thicknesses of the glacial outwash deposits vary from approximately 20 feet to more than 50 feet. The overlying marsh deposits consist of primarily of organic silts and clays with occasional lenses of sand that represent stream channels and/or storm deposits. The marsh deposits are generally thin (i.e., likely no thicker than 15 feet).

Groundwater flow in the Raritan formation is anticipated to be seaward. In places where silts and clays overlie sands, groundwater may exist under confined conditions; otherwise, groundwater is anticipated to be under water table (i.e., unconfined) conditions. Groundwater flow occurs through the interstices between the individual soil grains. Although silts and clays have relatively high porosities, the mobility of groundwater through the pores is limited because the pore spaces are relatively small. Therefore, groundwater flow velocity is faster through the coarser-grained deposits than through the finer-grained deposits and most groundwater flow occurs through the sand layer.

Groundwater flow through the Lockatong, Stockton, and Passaic formations is expected to be seaward and occurs primarily through secondary porosity (e.g., bedding plane partings, fractures, etc.). In sandstone and conglomerate deposits, however, groundwater flow can occur through porosity in the rock itself, particularly if the cement that holds the individual sand and gravel grains together has been weathered and eroded. Water in these formations occurs under unconfined or confined conditions, depending on the frequency of vertical fractures in the interbedded shales, mudstones, siltstones, and coarser-grained deposits. The fractures become less frequent and narrower with depth so that the likelihood of groundwater being under confined conditions also increases with depth. The diabase dikes

exhibit very low hydraulic conductivity and therefore tend to act as hydraulic barriers to groundwater flow.

Groundwater in the glacial outwash and marsh deposits that overlie bedrock in the northwestern portion of Staten Island is generally anticipated to flow seaward. However, the groundwater may also be tidally influenced, and surface water may flow into confined aquifers or aquifers that have been subjected to pumping. Groundwater flow is similar to that through the Coastal Plain sediments in that it occurs through interstices between soil grains and occurs more rapidly through deposits of coarser-grained sediments that through deposits of finer-grained sediments. Groundwater in the glacial outwash deposits can be under confined or water table conditions, depending in part upon the thickness and vertical hydraulic characteristics of the overlying deposits. 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. Where overlying deposits are thick and have low hydraulic conductivities, groundwater in the glacial outwash deposits is more likely to be under confined conditions. Groundwater in the overlying marsh deposits is under water table conditions.

Groundwater is not currently used for public water supply on Staten Island. Estimates of groundwater 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. Before 1970, 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 former groundwater use, future development of aquifers for potable purposes in the general area is unlikely.

3.3.2 Local Hydrogeologic Setting

As noted above, the Passaic Formation underlies Site 1 and consists of reddish-brown to grayish-red siltstone and shale with a maximum thickness of 3,600 meters. According to available technical literature, the Passaic Formation in the vicinity of Site 1 strikes approximately north 50 degrees east and dips approximately of 9 to 15 degrees to the northwest. The Port Authority installed two deep monitoring wells, PG-PA-MW-1D and PG-PA-MW-6D, at Site 1 in November 2000. Both PG-MW-1D and PG-PA-MW-6D are located adjacent to shallow wells, and each therefore represents half of a well pair. According to the boring logs, bedrock of the Passaic Formation was encountered at approximately 70 feet

below ground surface (bgs) at both deep well locations. The bedrock encountered was described as red shale, confirming that it is bedrock of the Passaic Formation.

The hydrogeologic character of the Passaic Formation is anticipated to be as described in Section 3.3.1. The depth to groundwater in the deep aquifer is approximately eight to ten feet bgs at deep wells PG-MW-1D and PG-PA-MW-6D. According to previous environmental investigations, as well as limited information from the SI, tidal fluctuations were not observed in bedrock of the Passaic Formation. Based on calculated groundwater elevations at deep wells throughout the HHMT-Port Ivory Facility, the direction of the horizontal hydraulic gradient in the deep aquifer is north to northwest. The vertical hydraulic gradient is downward, and appears to be greater in magnitude further away from surface water bodies. Because the groundwater in the bedrock aquifer is anticipated to flow through secondary porosity in the bedrock, the actual direction of groundwater flow may not be parallel to the direction of the hydraulic gradient. However, as noted above, groundwater in the bedrock aquifer is anticipated to be towards Bridge Creek and/or the Arthur Kill.

The overburden materials at Site 1, as well as the remainder of the site, include a complex of stratified drift, glacial till, and tidal marsh deposits consisting of glacial outwash, marsh deposits, and anthropogenic fill. Based on the results of the SRI and previous investigations, the following strata have been encountered at Site 1 (strata are listed from the land surface downwards): (1) fill consisting of sand, silt, clay, and gravel in a generally loose condition mixed with carbonaceous material and/or vegetative, wood, brick, concrete, and glass debris that is present throughout Site 1 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 glacio-fluvial deposits ranging in thickness from 5 to 16 feet; (4) glacial clay and silt deposits with lenses of sand and gravel ranging in thickness from less than 10 to approximately 60 feet; and, (5) weathered shale. Essentially, the SI and the RI confirmed that the soil strata of Site 1 are consistent with documented regional conditions.

The hydrogeologic character of the overburden materials is anticipated to be as described in Section 3.3.1. The depth to groundwater in the overburden aquifer is approximately three to eight feet bgs at Site 1. According to previous environmental investigations as well as limited information from the SI, tidal fluctuations were not observed in the shallow aquifer. Based on calculated groundwater elevations at shallow wells throughout the HHMT-Port Ivory Facility, the direction of the horizontal hydraulic gradient

in the shallow aquifer at Site 1 and Site 2A varies, but is generally towards the north, northwest, or west. The hydraulic gradient indicates that the shallow aquifer is influenced by the presence of Bridge Creek to a greater extent than the deep aquifer. As noted above, the vertical hydraulic gradient is downward, and appears to be greater in magnitude further away from surface water bodies. Although the groundwater flow direction may or may not be parallel to the hydraulic gradient depending on the degree of anisotropy in the overburden aquifer, groundwater in the shallow aquifer is anticipated to be towards Bridge Creek and/or the Arthur Kill.

4.0 SRI SCOPE OF WORK

As noted above, the SRI effort was targeted to the AOC-UST2 area only; however, the SRI also included an evaluation of existing groundwater, surface water, and sediment analytical data with respect to whether groundwater impacts were affecting surface water quality in Bridge Creek and, in response to the NYSDEC concern regarding the former presence of hydrogen holders at Site 1, an evaluation of existing soil and groundwater data for impacts (if any) that may be attributable to the former hydrogen holders. Based on the results of the SI and RI at Site 1, a soil removal effort consisting of soil excavation and off-site disposal or recycling was proposed for AOC-UST2. The soil excavation effort was initiated on April 18, 2005. During excavation, field observations indicated that additional delineation was required to determine the extent of soil potentially impacted by petroleum. As such, the Port Authority discontinued the soil removal efforts and initiated the horizontal and vertical delineation of the observed impacted soil (i.e., initiated the SRI). The six objectives of the SRI were as follows: 1) to determine the impact (if any) the LNAPL has on soil quality; 2) to delineate the extent of the LNAPL and impacted soil; 3) to identify if the soil is acting as a source area for groundwater impacts; 4) to delineate the groundwater impacts (if any); 5) to determine whether LNAPL could discharge into Bridge Creek; and, 6) to determine whether impacted groundwater could discharge into Bridge Creek. The scope of work for the SRI at AOC-UST2 included the sampling of soil and groundwater. Specifically, the SRI consisted of the following: advancement of 14 soil borings, the collection of seventeen soil samples from these soil boring locations, the conversion of six soil borings to temporary wells, and the collection of one groundwater sample from each temporary well. All soil samples were analyzed for VOCs, SVOCs, and TPHC. All groundwater samples were analyzed for VOCs and SVOCs. The analytical laboratory was Veritech Laboratories, Fairfield, New Jersey, a New York State-certified laboratory (New York Laboratory Certification No. 11408).

The scope of work for the Site 1 SRI was designed to collect data sufficient to achieve the objectives listed above. Field observations made during drilling and the soil analytical results were evaluated in order to address the Objective Nos. 1 and 2. The presence/absence of LNAPL within the temporary wells was confirmed in order to address Objective No. 5. The groundwater analytical results were evaluated in order to address Objective Nos. 3, 4, and 6.

The methods and materials utilized during completion of field activities are summarized below in Section 5. Fieldwork was completed in accordance with applicable and relevant NYSDEC regulations and guidance. LNAPL samples were not collected because, during drilling, the LNAPL could not be separated from the soil and because LNAPL did not accumulate in any of the six temporary wells. The fieldwork was performed as proposed in the document entitled *Site Investigation Workplan Addendum – Sites 1 and 2A/2B* (Workplan Addendum) and dated March 24, 2005. Please note, the Workplan Addendum dated March 24, 2005 was a revision to a previous document of the same name dated March 9, 2005. NYSDEC issued comments regarding the March 9, 2005 Workplan Addendum, and conditionally approved the document pending minor edits. The March 9, 2005 Workplan Addendum was edited in accordance with NYSDEC requirements and resubmitted on March 24, 2005. Thus, the March 24 Workplan Addendum is considered the relevant NYSDEC approved document.

5.0 SRI – FIELD INVESTIGATION

This section describes the Site 1 SRI activities conducted between April and May 2005. As noted above, most Site 1 AOCs were investigated during the SI and RI. However, one AOC at Site 1 (AOC-UST2) required additional remedial investigation. Descriptions of the methods used to complete the SRI activities, including the performance of geophysical surveys, the drilling of soil borings, the installation of temporary wells, and the collection of soil and groundwater samples are provided below in Sections 5.1 through 5.4, respectively.

5.1 Drilling Methods – Soil Borings

Fourteen soil borings, including three step-out soil borings and six soil borings that were converted to temporary wells, were drilled at Site 1 between May 13 and 24, 2005. The step-out soil borings were drilled to delineate the presence of LNAPL and as well as to allow collection of subsurface soil samples. Each step-out boring was advanced at an interval of approximately 25 feet from the soil boring where LNAPL and/or petroleum-impacted soil were observed. Two step-out borings (UST2-4A and UST2-4B)

were drilled to the north of soil boring location UST2-4; one step-out soil boring (UST2-5A) was drilled to the east of soil boring location UST2-5; and, one soil boring (TWP-1A) was drilled to the east of soil boring location TWP-1. Figure 4 depicts the locations of soil borings drilled in AOC-UST2 during the SRI.

All soil borings were drilled in accordance with NYSDEC regulations and guidance documents. Manual drilling methods were used at all soil boring locations to a minimum depth of six feet below ground surface (bgs) for utility clearance purposes. Hollow stem auger drilling methods were used at deeper depths at all locations except for soil boring location UST2-6, where manual drilling methods were utilized to the completion depth (six feet bgs). Manual drilling methods included use of post-hole diggers and/or soil augers to advance the borehole and to collect six-inch-long soil cores for inspection.

Hollow stem auger drilling methods included the use of 4 ¼-inch augers, center rods with floating plugs, and a 3-inch inner diameter split spoon sampler. Following manual drilling to six feet bgs, the floating plug was inserted into the bottom auger, and the augers were advanced to approximately six feet bgs in order to remove all soil from the borehole advanced manually. The floating plug was removed, and the split spoon was driven two feet below the bottom of the auger using a 140-pound hammer that was repeatedly dropped approximately 30 inches onto rods connected to the split spoon. The split spoon was retrieved and the soil column was logged. The floating plug was inserted back into the augers, and the augers were advanced an additional two feet. The floating plug was removed, the split spoon was inserted into the augers, and an additional two feet of the soil column were recovered. This process continued until the soil boring was completed. Completion depths varied, but the soil borings were advanced to the shallower of the bottom of the impacted soil or at least one foot below the water table unless auger refusal was encountered. If auger refusal was encountered, the borehole was abandoned and a new soil boring was drilled adjacent to the abandoned boring location.

The soil column was logged continuously at all soil boring locations for (at a minimum) the following conditions: color; texture; moisture content; and, indications of impacted soil, including elevated concentrations of volatile organic vapors as measured using a photoionization detector (PID), discolored soil, sheen, LNAPL, and odor. Boring logs are included in Appendix A. Soil boring locations are shown on Figure 4.

TWP-2 Constituent Sample Depth (ft bgs)	5/19/05 mg/Kg 8'-8.5'	5/19/05 mg/Kg 9'-9.5'	5/19/05 ug/L None [1]
VOCs			
Methylene Chloride	NE	NE	ND
Trans-1,2-Dichloroethene	ND	ND	ND
SVOCs			
Anthracene	ND	ND	ND
Benzo[a]anthracene	**0.1 J**	ND	ND
Benzo[a]pyrene	**0.092 J**	ND	ND
Benzo[b]fluoranthene	NE	ND	ND
Benzo[k]fluoranthene	ND	ND	ND
Chrysene	NE	ND	ND
Dibenzofuran	ND	ND	ND
Dibenzo[a,h]Anthracene	ND	ND	ND
Fluoranthene	NE	ND	ND
Indeno[1,2,3-cd]pyrene	NE	ND	ND
Naphthalene	ND	ND	ND
Phenanthrene	NE	ND	ND
Phenol	ND	ND	**2.2**
Pyrene	NE	ND	ND

UST2-4 Constituent Sample Depth (ft bgs)	5/13/05 mg/Kg 6'-8'	5/13/05 mg/Kg 9'-10'
VOCs		
Methylene Chloride	NE	NE
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	NE	ND
Benzo[a]anthracene	**2.8**	ND
Benzo[a]pyrene	**1.6 J**	ND
Benzo[b]fluoranthene	**1.3 J**	ND
Benzo[k]fluoranthene	NE	ND
Chrysene	**4.6**	ND
Dibenzofuran	ND	ND
Dibenzo[a,h]Anthracene	**0.61 J**	ND
Fluoranthene	NE	ND
Indeno[1,2,3-cd]pyrene	NE	ND
Naphthalene	ND	ND
Phenanthrene	NE	ND
Phenol	ND	ND
Pyrene	NE	ND

UST2-4A Constituent Sample Depth (ft bgs)	5/16/05 mg/Kg 6.5'-7'
VOCs	
Methylene Chloride	NE
Trans-1,2-Dichloroethene	ND
SVOCs	
Anthracene	ND
Benzo[a]anthracene	ND
Benzo[a]pyrene	ND
Benzo[b]fluoranthene	ND
Benzo[k]fluoranthene	ND
Chrysene	ND
Dibenzofuran	ND
Dibenzo[a,h]Anthracene	ND
Fluoranthene	ND
Indeno[1,2,3-cd]pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Phenol	ND
Pyrene	ND

UST2-4B Constituent Sample Depth (bgs)	5/16/05 mg/Kg 6'-6.5'
VOCs	
Methylene Chloride	NE
Trans-1,2-Dichloroethene	ND
SVOCs	
Anthracene	ND
Benzo[a]anthracene	NE
Benzo[a]pyrene	NE
Benzo[b]fluoranthene	NE
Benzo[k]fluoranthene	ND
Chrysene	NE
Dibenzofuran	ND
Dibenzo[a,h]Anthracene	ND
Fluoranthene	NE
Indeno[1,2,3-cd]pyrene	NE
Naphthalene	ND
Phenanthrene	ND
Phenol	ND
Pyrene	NE

TWP-1* Constituent Sample Depth (ft bgs)	5/23/05 mg/Kg 6'-6.5'	5/23/05 mg/Kg 9.5'-10'
VOCs		
Methylene Chloride	NE	NE
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	NE	NE
Benzo[a]anthracene	**0.67**	**0.37 J**
Benzo[a]pyrene	**0.46 J**	**0.36 J**
Benzo[b]fluoranthene	NE	NE
Benzo[k]fluoranthene	NE	NE
Chrysene	**0.69**	**0.45**
Dibenzofuran	NE	ND
Dibenzo[a,h]Anthracene	**0.1 J**	**0.11 J**
Fluoranthene	NE	NE
Indeno[1,2,3-cd]pyrene	NE	NE
Naphthalene	ND	ND
Phenanthrene	NE	NE
Phenol	ND	ND
Pyrene	NE	NE

TWP-1A* Constituent Sample Depth (ft bgs)	5/23/05 mg/Kg 4'-4.5'	5/23/05 ug/L None [1]
VOCs		
Methylene Chloride	NE	ND
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	**81**	ND
Benzo[a]anthracene	**97**	ND
Benzo[a]pyrene	**73**	ND
Benzo[b]fluoranthene	**97**	ND
Benzo[k]fluoranthene	**29**	ND
Chrysene	**78**	ND
Dibenzofuran	**26**	ND
Dibenzo[a,h]Anthracene	**15**	ND
Fluoranthene	**160**	ND
Indeno[1,2,3-cd]pyrene	**43**	ND
Naphthalene	ND	**23**
Phenanthrene	**170**	ND
Phenol	ND	**3.8**
Pyrene	**190**	ND

UST2-7 Constituent Sample Depth (ft bgs)	5/17/05 mg/Kg 4'-4.5'
VOCs	
Methylene Chloride	NE
Trans-1,2-Dichloroethene	ND
SVOCs	
Anthracene	ND
Benzo[a]anthracene	**0.25 J**
Benzo[a]pyrene	NE
Benzo[b]fluoranthene	NE
Benzo[k]fluoranthene	NE
Chrysene	NE
Dibenzofuran	NE
Dibenzo[a,h]Anthracene	ND
Fluoranthene	NE
Indeno[1,2,3-cd]pyrene	NE
Naphthalene	ND
Phenanthrene	NE
Phenol	ND
Pyrene	NE

TWP-3 Constituent Sample Depth (ft bgs)	5/18/05 mg/Kg 5'	5/18/05 ug/L None [1]
VOCs		
Methylene Chloride	NE	ND
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	ND	ND
Benzo[a]anthracene	NE	ND
Benzo[a]pyrene	NE	ND
Benzo[b]fluoranthene	NE	ND
Benzo[k]fluoranthene	ND	ND
Chrysene	NE	ND
Dibenzofuran	ND	ND
Dibenzo[a,h]Anthracene	ND	ND
Fluoranthene	NE	ND
Indeno[1,2,3-cd]pyrene	ND	ND
Naphthalene	ND	ND
Phenanthrene	NE	ND
Phenol	ND	ND
Pyrene	NE	ND

UST2-5A* Constituent Sample Depth (ft bgs)	5/17/05 mg/Kg 1.5'-2'
VOCs	
Methylene Chloride	**0.19 J**
Trans-1,2-Dichloroethene	**0.62**
SVOCs	
Anthracene	NE
Benzo[a]anthracene	**0.81**
Benzo[a]pyrene	NE
Benzo[b]fluoranthene	**1**
Benzo[k]fluoranthene	NE
Chrysene	NE
Dibenzofuran	NE
Dibenzo[a,h]Anthracene	ND
Fluoranthene	NE
Indeno[1,2,3-cd]pyrene	NE
Naphthalene	ND
Phenanthrene	NE
Phenol	ND
Pyrene	NE

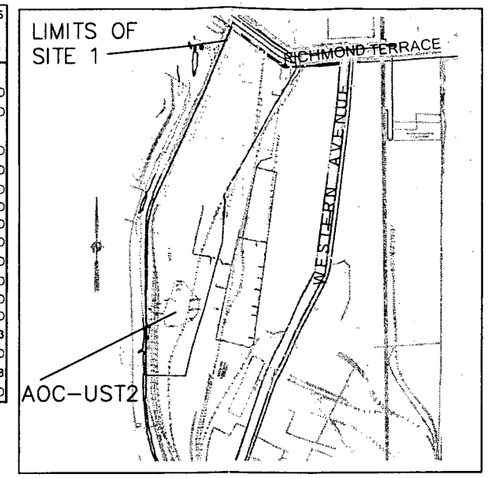
UST2-5* Constituent Sample Depth (ft bgs)	5/16/05 mg/Kg 4.5'-5'
VOCs	
Methylene Chloride	NE
Trans-1,2-Dichloroethene	ND
SVOCs	
Anthracene	NE
Benzo[a]anthracene	**0.97**
Benzo[a]pyrene	**0.75**
Benzo[b]fluoranthene	NE
Benzo[k]fluoranthene	NE
Chrysene	**0.65**
Dibenzofuran	NE
Dibenzo[a,h]Anthracene	**0.19 J**
Fluoranthene	NE
Indeno[1,2,3-cd]pyrene	NE
Naphthalene	ND
Phenanthrene	NE
Phenol	ND
Pyrene	NE

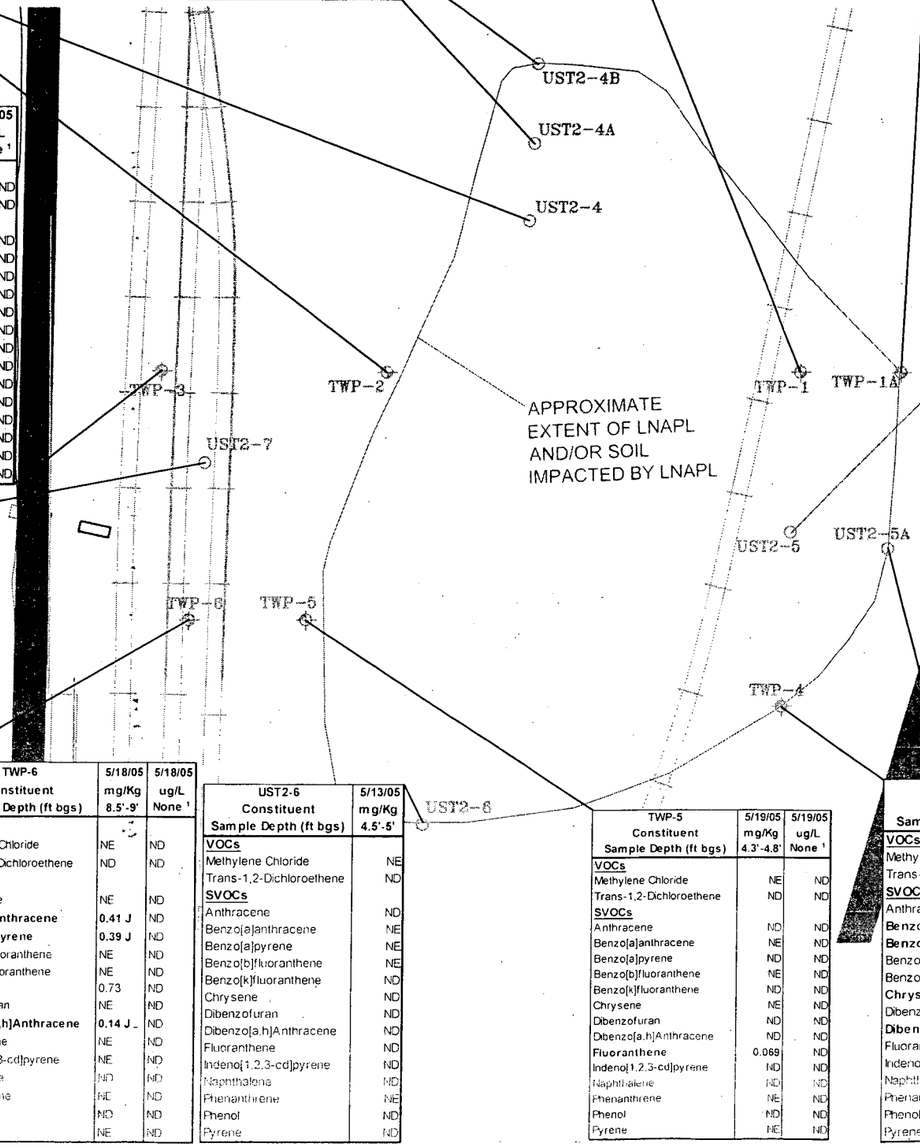
TWP-6 Constituent Sample Depth (ft bgs)	5/18/05 mg/Kg 8.5'-9'	5/18/05 ug/L None [1]
VOCs		
Methylene Chloride	NE	ND
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	NE	ND
Benzo[a]anthracene	**0.41 J**	ND
Benzo[a]pyrene	**0.39 J**	ND
Benzo[b]fluoranthene	NE	ND
Benzo[k]fluoranthene	NE	ND
Chrysene	0.73	ND
Dibenzofuran	NE	ND
Dibenzo[a,h]Anthracene	**0.14 J**	ND
Fluoranthene	NE	ND
Indeno[1,2,3-cd]pyrene	NE	ND
Naphthalene	ND	ND
Phenanthrene	NE	ND
Phenol	ND	ND
Pyrene	NE	ND

UST2-6 Constituent Sample Depth (ft bgs)	5/13/05 mg/Kg 4.5'-5'
VOCs	
Methylene Chloride	NE
Trans-1,2-Dichloroethene	ND
SVOCs	
Anthracene	ND
Benzo[a]anthracene	NE
Benzo[a]pyrene	NE
Benzo[b]fluoranthene	NE
Benzo[k]fluoranthene	ND
Chrysene	NE
Dibenzofuran	ND
Dibenzo[a,h]Anthracene	ND
Fluoranthene	ND
Indeno[1,2,3-cd]pyrene	ND
Naphthalene	ND
Phenanthrene	NE
Phenol	ND
Pyrene	ND

TWP-5 Constituent Sample Depth (ft bgs)	5/19/05 mg/Kg 4.3'-4.8'	5/19/05 ug/L None [1]
VOCs		
Methylene Chloride	NE	ND
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	ND	ND
Benzo[a]anthracene	NE	ND
Benzo[a]pyrene	ND	ND
Benzo[b]fluoranthene	NE	ND
Benzo[k]fluoranthene	ND	ND
Chrysene	NE	ND
Dibenzofuran	ND	ND
Dibenzo[a,h]Anthracene	ND	ND
Fluoranthene	0.069	ND
Indeno[1,2,3-cd]pyrene	ND	ND
Naphthalene	ND	ND
Phenanthrene	NE	ND
Phenol	ND	ND
Pyrene	NE	ND

TWP-4* Constituent Sample Depth (ft bgs)	5/24/05 mg/Kg 5.5'-6'	5/24/05 ug/L None [1]
VOCs		
Methylene Chloride	NE	ND
Trans-1,2-Dichloroethene	ND	ND
SVOCs		
Anthracene	NE	ND
Benzo[a]anthracene	**0.59**	ND
Benzo[a]pyrene	**0.78**	ND
Benzo[b]fluoranthene	NE	ND
Benzo[k]fluoranthene	NE	ND
Chrysene	**0.73**	ND
Dibenzofuran	NE	ND
Dibenzo[a,h]Anthracene	**0.25 J**	ND
Fluoranthene	NE	ND
Indeno[1,2,3-cd]pyrene	NE	ND
Naphthalene	ND	ND
Phenanthrene	NE	ND
Phenol	ND	ND
Pyrene	NE	ND





LEGEND:

- ○ UST2-4 — SUPPLEMENTAL RI SOIL BORING LOCATION
- ⊕ TWP-3 — SUPPLEMENTAL RI TEMPORARY WELL LOCATION
- RAILROAD TRACKS

NOTES:

1) THE SAMPLE IS A GROUNDWATER SAMPLE, AND NO DEPTH INFORMATION IS RELEVENT. DEPTHS ARE PROVIDED FOR ALL SOIL SAMPLES.
2) FOR SOIL BORINGS DRILLED ON TOP OF THE SOIL SURCHARGE PILE (CODED WITH AN * IN THE CHEM BOX), THE DEPTH IS RELATIVE TO APPROXIMATE LAND SURFACE BELOW THE SOIL SUR-CHARGE PILE.
3) LNAPL = LIGHT, NON-AQUEOUS PHASE LIQUID.
4) THE APPROXIMATE EXTENT OF LNAPL AND/OR SOIL IMPACTED BY LNAPL IS BASED UPON FIELD OBSERVATIONS. THE LIMIT OF THIS AREA CONNECTS SOIL BORING LOCATIONS WHERE LNAPL AND/OR SOIL IMPACTED BY LNAPL WERE NOT OBSERVED.

50' 0' 50' 100'

SCALE IN FEET

Notes and Abbreviations

mg/Kg: milligrams per kilogram
ug/L: micrograms per liter
Constituents and values in bold font represent exceedences.
NE: No exceedence
ND: Not detected
VOCs: Volatile Organic Chemicals
TAGM: Technical Administrative Guidance Memo
SVOCs: Semi-Volatile Organic Chemicals
*: Located on top of the soil surcharge pile.
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

Note 1: Groundwater Sample

NYSDEC Recommended Soil Cleanup Objective (RSCO), mg/Kg	Value	NYSDEC TAGM #4046 Groundwater Standards/Criteria, ug/L	Value
VOCs		**VOCs**	
Methylene Chloride	0.1	Methylene Chloride	5
Trans-1,2-Dichloroethene	0.3	Trans-1,2-Dichloroethene	5
SVOCs		**SVOCs**	
Anthracene	50	Anthracene	50
Benzo[a]anthracene	0.224	Benzo[a]anthracene	0.002
Benzo[a]pyrene	0.061	Benzo[a]pyrene	0.002
Benzo[b]fluoranthene	1.1	Benzo[b]fluoranthene	0.002
Benzo[k]fluoranthene	1.1	Benzo[k]fluoranthene	0.002
Chrysene	0.4	Chrysene	0.002
Dibenzofuran	6.2	Dibenzofuran	5
Dibenzo[a,h]Anthracene	0.014	Dibenzo[a,h]Anthracene	50
Fluoranthene	50	Fluoranthene	50
Indeno[1,2,3-cd]pyrene	3.2	Indeno[1,2,3-cd]pyrene	0.002
Naphthalene		Naphthalene	10
Phenanthrene	50	Phenanthrene	50
Phenol		Phenol	1
Pyrene	50	Pyrene	50

THE PORT AUTHORITY OF NY & NJ

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1)
HHMT-PORT IVORY FACILITY

SOIL AND GROUNDWATER SAMPLING LOCATIONS AND ANALYTICAL RESULTS-AOC-UST2

Designed by EMM Drawn by DKC Checked by

Date 11/14/2005

Contract Number

Drawing Number FIGURE 4

B

5.2 Soil Sampling Methods

Seventeen soil samples were collected from 14 soil borings (for rationale, see Tables 2A and 2B), including three step-out soil borings and six soil borings that were subsequently converted to temporary wells, between May 13 and 24, 2005. At soil boring locations where LNAPL impacts were not observed, one soil sample was collected from directly above the water table. At soil boring locations where LNAPL impacts were observed, a sample was collected from the zone exhibiting the greatest indications of contamination, based on field observations, and a second sample was collected from the shallowest depth interval where the soil appeared to be clean (as based on the absence of the indicators listed above).

Soil samples were collected using a stainless steel trowel that was decontaminated between samples; using the trowel, soil was transferred from the sampling device (i.e., the split spoon, hand auger, or post-hole digger) directly into sampling jars. Decontamination efforts included rinsing the trowel and the coring device between uses with laboratory-grade DI water and an Alconox-water solution. The samples were labeled and placed on ice in a cooler. All soil samples were transported to the analytical laboratory under chain-of-custody documentation and analyzed for VOC+10, SVOC+25, and TPHC.

5.3 Installation of Temporary Wells

Six soil borings drilled at Site 1 were converted to temporary wells. Temporary wells TWP-1A and TWP-2 through 6 were constructed of 2-inch diameter PVC screen and riser. The screen for each temporary well consisted of 0.020-inch slot size. In each case, the screened interval extended from approximately two feet above groundwater to the bottom of the borehole. The sand pack for each well consisted of No. 1 sand, and was installed to a depth of approximately one to two feet above the top of the screen. Bentonite pellets were installed above the sand pack in all temporary wells to prevent stormwater or perched water from entering the sand pack. In all cases, the PVC riser was allowed to remain one to three feet above ground surface.

5.4 Groundwater Sampling Methods

As indicated above, one groundwater sample was collected from each of the six temporary wells installed at Site 1. Groundwater sampling was performed in accordance with NYSDEC requirements and guidance documents.

The presence/absence of LNAPL was recorded and the depth to water in the well was measured using an electronic oil-water interface meter. The volume of water within the well was calculated. The well was

TABLE 2A
SOIL SAMPLING ANALYTICAL PROGRAM
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	LNAPL	PID (ppm)	Depth to Water Table (ft bgs)	Sampling Depth (ft bgs)	Laboratory Analyses
UST2-4	NE	18 [1]	6.0	6-8	SVOC + 25; VOC + 10; TPHC
	NE	0		9-10	SVOC + 25; VOC + 10; TPHC
UST2-4A	6-8 ft bgs	0.6 [1]	5.0	6.5-7	SVOC + 25; VOC + 10; TPHC
UST2-4B	NE	0	6.5	6-6.5	SVOC + 25; VOC + 10; TPHC
UST2-5	Note 3	0	5.0	7.5-8	SVOC + 25; VOC + 10; TPHC
UST2-5A	NE	0	5.0	4.5-5	SVOC + 25; VOC + 10; TPHC
UST2-6	NE	0	5.0	4.5-5	SVOC + 25; VOC + 10; TPHC
UST2-7	NE	0	4.5	4-4.5	SVOC + 25; VOC + 10; TPHC
TWP-1	Note 4	0	3.5	6-6.5	SVOC + 25; VOC + 10; TPHC
	NE	0		9.5-10	SVOC + 25; VOC + 10; TPHC
TWP-1A	NE	0	4.5	4-4.5	SVOC + 25; VOC + 10; TPHC
TWP-2	Note 5	0	5.0	8-8.5	SVOC + 25; VOC + 10; TPHC
	NE	0		9-9.5	SVOC + 25; VOC + 10; TPHC
TWP-3	NE	0	5.0	4.5-5	SVOC + 25; VOC + 10; TPHC
TWP-4	NE	0	3.0	5.5-6	SVOC + 25; VOC + 10; TPHC
TWP-5	NE	0	5.0	4.3-4.8	SVOC + 25; VOC + 10; TPHC
TWP-6	NE	0	5.0	8.5-9	SVOC + 25; VOC + 10; TPHC

Notes and Abbreviations:
LNAPL: light, non-aqueous phase liquid
PID: photoionization detector
ppm: parts per million above background
ft bgs: feet below ground surface
SVOC + 25: semivolatile organic compounds with a 25-compound library search
VOC + 10: volatile organic compounds with a 10-compound library search
TPHC: total petroleum hydrocarbons
NE: not encountered
bgs: below ground surface

1: Petroleum odors also noted at approximately 7 feet bgs at these locations.
2: Soil borings UST2-5, UST2-5A, TWP-1, TWP-1A, and TWP-4 were located on top of the surcharge pile. The reference point for the depth at these locations is the land surface adjacent to the surcharge pile, considered to be approximately equivalent to the original (pre-surcharge) land surface that is now covered.
3: Sheen and odor noted at 7-8 ft bgs. Discontinuous LNAPL observed.
4: Sheen observed from 6-8 ft bgs.
5: Sheen, possibly due to decay of naturally-occurring organic matter (the sheen was thick and film-like), noted at 8-9.5 ft bgs.

TABLE 2B
GROUNDWATER SAMPLING ANALYTICAL PROGRAM
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	LNAPL	Depth to Water (ft bgs)	Screen Interval (ft bgs)	Laboratory Analyses
TWP-1A	None observed	4.5	-1.5 to 8.5	SVOC + 25; VOC + 10; TPHC
TWP-2	None observed	5.0	3 to 10.5	SVOC + 25; VOC + 10; TPHC
TWP-3	None observed	6.5	3 to 10	SVOC + 25; VOC + 10; TPHC
TWP-4	None observed	5.0	3 to 10	SVOC + 25; VOC + 10; TPHC
TWP-5	None observed	4.5	2.5 to 11.5	SVOC + 25; VOC + 10; TPHC
TWP-6	None observed	5.0	3 to 9	SVOC + 25; VOC + 10; TPHC

Notes and Abbreviations:
LNAPL: light, non-aqueous phase liquid
ft bgs: feet below ground surface
SVOC + 25: semivolatile organic compounds with a 25-compound library search
VOC + 10: volatile organic compounds with a 10-compound library search
TPHC: total petroleum hydrocarbons
bgs: below ground surface
NE: None encountered

1: Temporary well TWP-1A was installed in a soil boring that was a step-out location from proposed location TWP-1. The step-out soil boring was drilled because LNAPL was observed at soil boring location TWP-1 and the temporary well was intended to be installed upgradient of LNAPL. No temporary well was installed at TWP-1.
2: Temporary wells TWP-1A and TWP-4 were located on top of the surcharge pile (i.e, approximately 15 to 16 feet above surrounding grade). The reference point for the depth at these locations is the land surface adjacent to the surcharge pile, considered to be approximately equivalent to the original (pre-surcharge) land surface that is now covered.

purged of three to five times the calculated volume of water using a centrifugal pump. After the water level recovered, a dedicated Teflon bailer was lowered into the well, allowed to fill with water, and was removed from the well. The groundwater sample was transferred from the bailer into laboratory-prepared sampling jars. The samples were labeled and placed on ice in a cooler. All soil samples were transported to the analytical laboratory (Veritech) under chain-of-custody documentation and analyzed for VOC+10 and SVOC+25.

6.0 SRI – RESULTS AND FIELD OBSERVATIONS

The SRI conducted at Site 1 included the following components: drilling of soil borings, collection of soil samples, installation of temporary wells, collection of groundwater samples, and evaluation of previous soil, groundwater, surface water, and sediment analytical data. The results of the fieldwork implemented during the SRI are provided in Section 6.1. During implementation of each fieldwork component, field observations and measurements were recorded. In addition, soil and groundwater samples were analyzed for the parameters specified in Section 5. The results of the fieldwork portion of the SRI are presented below in Sections 6.1.1 (field observations) and 6.1.2 (analytical results). Section 6.2 is a summary of HMM's evaluation of previous analytical data associated with the effect of impacted groundwater on the quality of surface water and sediment in Bridge Creek (Section 6.2.1) and the presence of the former hydrogen holders (Section 6.2.2).

6.1 Results of the Fieldwork Portion of the SRI

The fieldwork portion of the SRI, including the drilling of 14 soil borings, the collection and analysis of seventeen soil samples from those soil borings, the conversion of six of the soil borings to temporary wells, and the collection and analysis of one groundwater sample from each temporary well, was conducted between May 13 and 24, 2005. Fieldwork was conducted only at AOC-UST2. The results of this portion of the SRI are discussed in the sections below.

6.1.1 SRI Field Observations

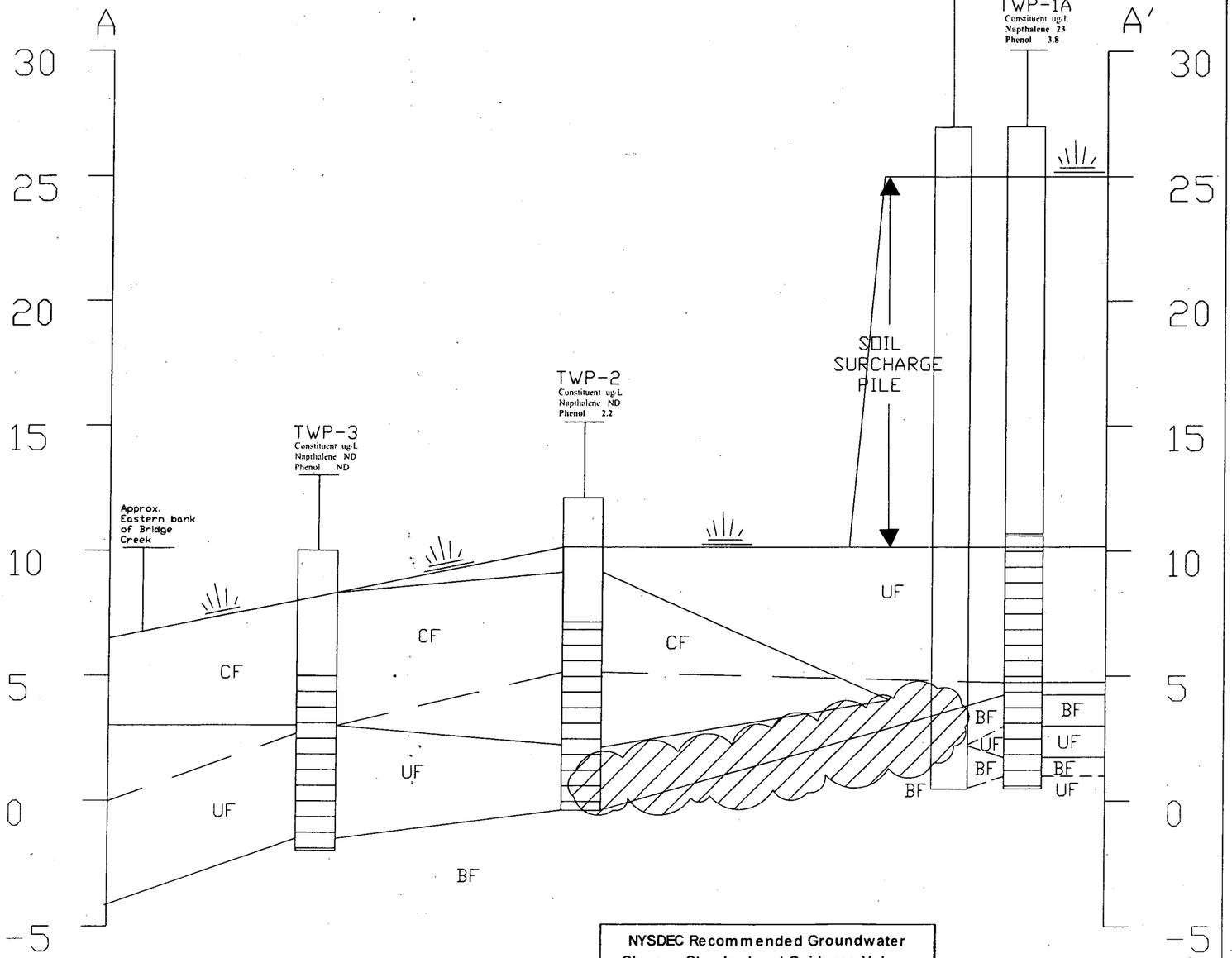
The SRI included a visual examination of soil and groundwater conditions and measurements of the concentrations of volatile organic vapors in soil. Field observations were made to delineate the extent of LNAPL and impacted soil and to identify any indications that groundwater had been impacted by the LNAPL and/or impacted soil. The overburden materials encountered at this AOC during the implementation of the SRI were consistent with those previously observed throughout Site 1. In general,

fill material, including the soil surcharge pile, was encountered overlying organic clays and peat. The soil surcharge pile was present at locations UST2-5, UST2-5A, TWP-1, and TWP-1A. In these four soil boring locations, depths are provided relative to the land surface adjacent to the western side of the surcharge pile. Fill material was encountered at all locations and consisted of one or more of the following types of fill: urban fill; cinder fill; and, byproduct fill. The classification system for the fill is provided in Section 2.1.2, above. Native materials, consisting of organic fine-grained (i.e., primarily silts and clays) soil and peat, were encountered at only locations TWP-5 (at 11.5 feet bgs) and TWP-6 (at nine feet bgs).

Groundwater was encountered in the temporary wells at elevations ranging from approximately sea level to 5 feet above mean sea level (AMSL). The groundwater elevations confirmed that the direction of the horizontal component of the hydraulic gradient is to the west towards Bridge Creek. The groundwater flow direction is anticipated to be approximately perpendicular to the direction of the horizontal hydraulic gradient. To provide a visual presentation of the relationship between the water table, LNAPL/impacted soil, and overburden materials encountered at AOC-UST2, HMM prepared a cross-section through AOC-UST2, which is presented as Figure 5.

Potentially impacted soil was observed at only four of the 14 soil boring locations. Specifically, the presence of sheen, elevated concentrations of volatile organic vapors, petroleum odor, and/or LNAPL were observed at soil boring locations TWP-1, UST-4, UST2-4A, and UST2-5. As measured using a photoionization detector (PID), the concentration of volatile organic vapors in the soil ranged from 0 (at various depths and locations) to 18 parts per million (at 6-8 feet below ground surface at location UST2-4). The LNAPL appeared as sheen on, or as discrete nodules within, the soil and/or groundwater at locations TWP-1, UST2-4A, and UST2-5. Petroleum odor was noted at approximately seven feet bgs at UST2-4 and UST2-4A.

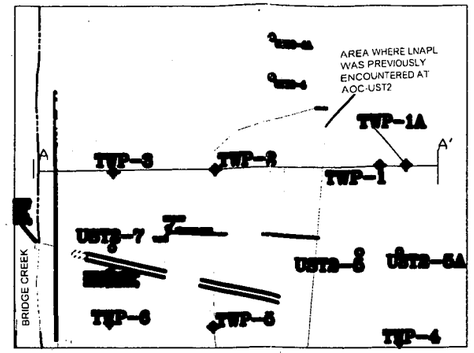
Based on field observations, the horizontal extent of the LNAPL and/or impacted soil is approximately 235 feet north-south by 170 feet east-west. Please note, LNAPL and/or impacted soil were present at locations UST2-5 and TWP-1, drilled at the top of the soil surcharge stockpile and immediately west of the Site 1-Site 2A boundary. Impacted soil is therefore present beneath the western portion of the soil surcharge stockpile.



VERTICAL EXAGGERATION = 8:1
VERTICAL SCALE: 1" = 5'
HORIZOTNAL SCALE: 1" = 40'

NYSDEC Recommended Groundwater Cleanup Standard and Guidance Values

	Standard	Guidance
SVOCs		
Naphthalene	NS	10
Phenol	1	NS



SCALE: 1" = 90'

LEGEND

- PVC RISER/BOREHOLE
- WELL SCREEN
- LAND SURFACE
- --- APPROXIMATE WATER TABLE
- ____ GEOLOGIC CONTACTS (DASHED WHERE INFERRED)
- UF - URBAN FILL (C&D MATERIAL, WOOD, BRICK, GLASS, ETC.)
- BF - BYPRODUCT FILL (LIME SLUDGE)
- CF - CINDER FILL (SLAG AND ASH)
- APPROXIMATE EXTENT OF LNAPL IMPACTS

NOTES

1) TWP-1A, TWP-2, AND TWP-3 ARE TEMPORARY WELLS. TWP-1 WAS A SOIL BORING LOCATION WHERE NO TEMPORARY WELL WAS INSTALLED.
2) LOCATIONS OF TWP-1A, TWP-2, AND TWP-3 AND THE ELEVATION OF LAND SUREFACE ADJACENT TO EACH WELL ARE FROM A SURVEY CONDUCTED BY THE PORT AUTHORITY ON 12-12-05.
3) ug/L = MICROGRAMS PER LITER.
4) ALL ELEVATIONS ARE IN NGVD '29.
5) ANALYTICAL RESULTS ARE SHOWN ONLY FOR THE SVOCs NAPHTHALENE AND PHENOL BECAUSE NO VOC's OR OTHER SVOCs WERE DETECTED AT CONCENTRATIONS GREATER THAN NYSDEC CRITERIA. NO ANALYTICAL RESULTS ARE SHOWN FOR SOIL SAMPLES.
6) THE APPROXIMATE EXTENT OF LNAPL IMPACTS IS BASED UPON FIELD OBSERVATIONS, INCLUDING LNAPL (AT TEST PITS EXCAVATED BETWEEN TWP-1 AND TWP-2) AND SHEEN (AT TWP-1 AND TWP-2).

THE PORT AUTHORITY OF NY & NJ

ENGINEERING DEPARTMENT

(BLOCK 1400, LOT 1)
HHMT-PORT IVORY FACILITY

CROSS SECTION A - A'
THROUGH AOC-UST2

DSH DKC
Designed by Drawn by Checked by

Date 1/4/2006

Contract Number

Drawing Number FIGURE 5 B

6.1.2 SRI Analytical Results and Appropriate NYSDEC Standards and Guidance Values

Seventeen soil and six groundwater samples were collected from AOC-UST2. The analytical results for these samples are tabulated in Tables 3A and 3B (soil sampling results) and Tables 4A and 4B (groundwater sampling results) and are summarized below. The spatial distribution of compounds detected at concentrations greater than the applicable standards are shown on Figure 4.

Summary of Soil Sampling Analytical Results and Appropriate NYSDEC Guidance Values

As noted above, seventeen soil samples were collected from 14 soil borings drilled at AOC-UST2 between May 13 and May 24, 2005. The date of sample collection, depth interval sampled, and the rationale for selecting the depth interval are provided in Table 2A. Soil samples were collected to determine the impact (if any) of the LNAPL on soil quality and to delineate the extent of impacted soil. The sampling locations and a summary of the results are shown on Figure 4. A summary of the analytical results is provided in Tables 3A and 3B.

For discussion purposes, the soil sampling results have been compared to current NYSDEC regulatory criteria. The criteria utilized are the Recommended Soil Cleanup Objective (RSCO) criteria as set forth in the January 1994 NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM 4046). Please note, reference to the RSCOs in this report does not represent any agreement or concurrence that the same are appropriate for usage at this site.

The sampling program for AOC-UST2 included the collection of one soil sample from the zone directly above the water table at soil boring locations with no indications of LNAPL, and the collection of two soil samples (one from the most impacted depth interval and a deeper sample from soil that appeared clean) at soil boring locations with indications of LNAPL. All soil samples were analyzed for VOCs, SVOCs, and TPHC.

Only one of the 17 soil samples collected during the SRI contained one or more VOCs at concentrations greater than their respective RSCOs. The soil sample collected from the 1.5-2 foot bgs depth interval at location UST2-5A contained slightly elevated concentrations of methylene chloride and trans-1,2-dichloroethene. Methylene chloride, a common laboratory solvent, was detected at a concentration of 0.19 mg/kg, slightly greater than its RSCO of 0.1 mg/kg. Trans-1,2-dichloroethene was detected at a concentration of 0.62 mg/kg, slightly greater than its RSCO of 0.3 mg/kg. No other VOC was detected at a concentration greater than its respective RSCO in any soil sample collected during the SRI.

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	UST2-4			UST2-4			UST2-4A			UST2-4B		
Field ID		PI-UST2-4-051305S013			PI-UST2-4-051305S014B			PI-UST2-4A051605SO13			PI-UST2-4B051605SO13		
Lab Sample No.		AC17613-002			AC17613-003			AC17643-001			AC17643-002		
Sampling Date		5/13/2005			5/13/2005			5/16/2005			5/16/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		6'-8' bgs			9'-10' bgs			6.5'-7' bgs			6'-6.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,1,1-Trichloroethane	0.8 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,1,2,2-Tetrachloroethane	0.6 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,1,2-Trichloroethane	6.0 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,1-Dichloroethane	0.2 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,1-Dichloroethene	0.4 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,2-Dichloroethane	0.1 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
1,2-Dichloropropane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
2-Butanone	0.3 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
2-Chloroethylvinylether	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
2-Hexanone	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
4-Methyl-2-Pentanone	1.0 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Acetone	0.2 (Note 1)	0.16			0.064			0.056			0.034		
Acrolein	NS	ND	0.16		ND	0.045		ND	0.049		ND	0.033	
Acrylonitrile	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Benzene	0.06 (Note 1)	ND	0.0064		ND	0.0018		ND	0.002		ND	0.0013	
Bromodichloromethane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Bromoform	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Bromomethane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Carbon disulfide	2.7 (Note 1)	ND	0.032		0.0061		J	ND	0.0098		ND	0.0067	
Carbon tetrachloride	0.6 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Chlorobenzene	1.7 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Chloroethane	1.9 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Chloroform	0.3 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Chloromethane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Cis-1,2-Dichloroethene	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Cis-1,3-Dichloropropene	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Dibromochloromethane	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Ethylbenzene	5.5 (Note 1)	ND	0.0064		ND	0.0018		ND	0.002		ND	0.0013	
M&p-Xylenes	1.2 (Note 1)	ND	0.013		ND	0.0036		ND	0.0039		ND	0.0027	
Methylene chloride	0.1 (Note 1)	0.094			0.04			0.034			0.018		
O-Xylene	1.2 (Note 1)	ND	0.0064		ND	0.0018		ND	0.002		ND	0.0013	
Styrene	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Tetrachloroethene	1.4 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Toluene	1.5 (Note 1)	ND	0.0064		ND	0.0018		ND	0.002		ND	0.0013	
Trans-1,2-Dichloroethene	0.3 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Trans-1,3-Dichloropropene	NS	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Trichloroethene	0.7 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Vinyl chloride	0.2 (Note 1)	ND	0.032		ND	0.0089		ND	0.0098		ND	0.0067	
Total Confident VOCs	10 (Note 2)	0.254			0.104			0.09			0.052		
Total Volatile Organic TICs	NS	11.54		J	0.196		J	11.54		J	0.1206		J
Total Petroleum Hydrocarbons (TPHC)	NS	48000			360			4100			150		

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location		UST2-5			UST2-5A			UST2-6			UST2-7		
Field ID		PI-UST2-5-051605SO04			PI-UST2-5A051705SO03			PI-UST2-6-051305S010			PI-UST2-7-051705SO09		
Lab Sample No.	NYSDEC RSCO	AC17643-003			AC17665-001			AC17613-001			AC17665-002		
Sampling Date	(mg/Kg)	5/16/2005			5/17/2005			5/13/2005			5/17/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		7.5'-8' bgs			4.5'-5' bgs			4.5'-5' bgs			4'-4.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,1,1-Trichloroethane	0.8 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,1,2,2-Tetrachloroethane	0.6 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,1,2-Trichloroethane	6.0 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,1-Dichloroethane	0.2 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,1-Dichloroethene	0.4 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,2-Dichloroethane	0.1 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
1,2-Dichloropropane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
2-Butanone	0.3 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
2-Chloroethylvinylether	NS	ND	0.0077		ND	1.1		ND	0.0064		ND	0.0076	
2-Hexanone	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
4-Methyl-2-Pentanone	1.0 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Acetone	0.2 (Note 1)	0.045			ND	0.43		0.032			ND	0.038	
Acrolein	NS	ND	0.038		ND	0.43		ND	0.032		ND	0.038	
Acrylonitrile	NS	ND	0.0077		0.15		J	ND	0.0064		ND	0.0076	
Benzene	0.06 (Note 1)	ND	0.0015		ND	0.43		ND	0.0013		ND	0.0015	
Bromodichloromethane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Bromoform	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Bromomethane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Carbon disulfide	2.7 (Note 1)	0.01			ND	0.43		0.0022		J	0.0021		J
Carbon tetrachloride	0.6 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Chlorobenzene	1.7 (Note 1)	ND	0.0077		ND	1.1		ND	0.0064		ND	0.0076	
Chloroethane	1.9 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Chloroform	0.3 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Chloromethane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Cis-1,2-Dichloroethene	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Cis-1,3-Dichloropropene	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Dibromochloromethane	NS	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Ethylbenzene	5.5 (Note 1)	ND	0.0015		0.049			ND	0.0013		ND	0.0015	
M&p-Xylenes	1.2 (Note 1)	ND	0.0031		ND	0.43		ND	0.0026		ND	0.003	
Methylene chloride	0.1 (Note 1)	0.027			0.19		J	0.021			0.0096		
O-Xylene	1.2 (Note 1)	ND	0.0015		ND	0.43		ND	0.0013		ND	0.0015	
Styrene	NS	ND	0.0077		0.81	0.43		ND	0.0064		ND	0.0076	
Tetrachloroethene	1.4 (Note 1)	ND	0.0077		0.81	0.43		ND	0.0064		ND	0.0076	
Toluene	1.5 (Note 1)	ND	0.0015		1			ND	0.0013		ND	0.0015	
Trans-1,2-Dichloroethene	0.3 (Note 1)	ND	0.0077		0.62			ND	0.0064		ND	0.0076	
Trans-1,3-Dichloropropene	NS	ND	0.0077		0.41		J	ND	0.0064		ND	0.0076	
Trichloroethene	0.7 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Vinyl chloride	0.2 (Note 1)	ND	0.0077		ND	0.43		ND	0.0064		ND	0.0076	
Total Confident VOCs	10 (Note 2)	0.082			1.669			0.053			0.0096		
Total Volatile Organic TICs	NS	0.1315		J	0.0498		J	0.0354		J	0.0343		J
Total Petroleum Hydrocarbons (TPHC)	NS	4100			860			46			97		

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	TWP-1			TWP-1			TWP-1A			TWP-2		
Field ID		PI-TWP-1-052305SO20			PI-TWP-1-052305SO09			PI-TWP-1-052305SO13			PI-TWP-2-051905SO17		
Lab Sample No.		AC17758-002			AC17758-005			AC17758-001			AC17870-001		
Sampling Date		5/23/2005			5/23/2005			5/23/2005			5/19/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		6'-6.5' bgs			9.5'-10' bgs			4'-4.5' bgs			8'-8.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,1,1-Trichloroethane	0.8 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,1,2,2-Tetrachloroethane	0.6 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,1,2-Trichloroethane	6.0 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,1-Dichloroethane	0.2 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,1-Dichloroethene	0.4 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,2-Dichloroethane	0.1 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
1,2-Dichloropropane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
2-Butanone	0.3 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
2-Chloroethylvinylether	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
2-Hexanone	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
4-Methyl-2-Pentanone	1.0 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Acetone	0.2 (Note 1)	0.037		J	0.018		J	0.033		J	0.045		
Acrolein	NS	ND	0.046		ND	0.03		ND	0.038		ND	0.038	
Acrylonitrile	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Benzene	0.06 (Note 1)	ND	0.0019		ND	0.0012		ND	0.0015		ND	0.0015	
Bromodichloromethane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Bromoform	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Bromomethane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Carbon disulfide	2.7 (Note 1)	0.002		J	ND	0.006		ND	0.0077		0.01		
Carbon tetrachloride	0.6 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Chlorobenzene	1.7 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Chloroethane	1.9 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Chloroform	0.3 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Chloromethane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Cis-1,2-Dichloroethene	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Cis-1,3-Dichloropropene	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Dibromochloromethane	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Ethylbenzene	5.5 (Note 1)	ND	0.0019		ND	0.0012		ND	0.0015		ND	0.0015	
M&p-Xylenes	1.2 (Note 1)	ND	0.0037		ND	0.0024		ND	0.0031		ND	0.0031	
Methylene chloride	0.1 (Note 1)	0.027			0.027			0.024			0.027		
O-Xylene	1.2 (Note 1)	ND	0.0019		ND	0.0012		ND	0.0015		ND	0.0015	
Styrene	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Tetrachloroethene	1.4 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Toluene	1.5 (Note 1)	ND	0.0019		ND	0.0012		ND	0.0015		ND	0.0015	
Trans-1,2-Dichloroethene	0.3 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Trans-1,3-Dichloropropene	NS	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Trichloroethene	0.7 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Vinyl chloride	0.2 (Note 1)	ND	0.0093		ND	0.006		ND	0.0077		ND	0.0077	
Total Confident VOCs	10 (Note 2)	0.027			0.027			0.024			0.082		
Total Volatile Organic TICs	NS	0.103		J	0.068		J	0.111		J	0.249		J
Total Petroleum Hydrocarbons (TPHC)	NS	2700			150			9600			580		

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location		TWP-2			TWP-3			TWP-4			TWP-5		
Field ID		PI-TWP-2-051905SO19			PI-TWP-3-051805SO10			PI-TWP-4-052405S010			PI-TWP-5-051905SO10		
Lab Sample No.	NYSDEC RSCO	AC17870-002			AC17675-001			AC17774-001			AC17870-003		
Sampling Date	(mg/Kg)	5/19/2005			5/18/2005			5/24/2005			5/19/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		9'-9.5' bgs			4.5'-5' bgs			5.5'-6' bgs			4.3'-4.8' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,1,1-Trichloroethane	0.8 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,1,2,2-Tetrachloroethane	0.6 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,1,2-Trichloroethane	6.0 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,1-Dichloroethane	0.2 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,1-Dichloroethene	0.4 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,2-Dichloroethane	0.1 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
1,2-Dichloropropane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
2-Butanone	0.3 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
2-Chloroethylvinylether	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
2-Hexanone	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
4-Methyl-2-Pentanone	1.0 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Acetone	0.2 (Note 1)	0.062			0.024		J	0.035			0.044		
Acrolein	NS	ND	0.03		ND	0.03		ND	0.034		ND	0.03	
Acrylonitrile	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Benzene	0.06 (Note 1)	ND	0.0012		ND	0.0012		ND	0.0014		ND	0.0012	
Bromodichloromethane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Bromoform	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Bromomethane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Carbon disulfide	2.7 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Carbon tetrachloride	0.6 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Chlorobenzene	1.7 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Chloroethane	1.9 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Chloroform	0.3 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Chloromethane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Cis-1,2-Dichloroethene	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Cis-1,3-Dichloropropene	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Dibromochloromethane	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Ethylbenzene	5.5 (Note 1)	ND	0.0012		ND	0.0012		ND	0.0014		ND	0.0012	
M&p-Xylenes	1.2 (Note 1)	ND	0.0024		ND	0.0024		ND	0.0027		ND	0.0024	
Methylene chloride	0.1 (Note 1)	0.022			0.017			0.034			0.026		
O-Xylene	1.2 (Note 1)	ND	0.0012		ND	0.0012		ND	0.0014		ND	0.0012	
Styrene	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Tetrachloroethene	1.4 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Toluene	1.5 (Note 1)	ND	0.0012		ND	0.0012		ND	0.0014		ND	0.0012	
Trans-1,2-Dichloroethene	0.3 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Trans-1,3-Dichloropropene	NS	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Trichloroethene	0.7 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Vinyl chloride	0.2 (Note 1)	ND	0.006		ND	0.006		ND	0.0068		ND	0.0061	
Total Confident VOCs	10 (Note 2)	0.084			0.017			0.069			0.07		
Total Volatile Organic TICs	NS	0.138		J	0.0593		J	0.0392		J	0.1199		J
Total Petroleum Hydrocarbons (TPHC)	NS	ND	40		150			330			ND	41	

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	TWP-6			FB			FB			FB		
Field ID		PI-TWP-6-051805SO10			PI-FB-01-051305WQ01			PI-FB-01-051605WQ01			PI-FB-01-051705WQ01		
Lab Sample No.		AC17675-002			AC17613-004			AC17643-004			AC17665-001		
Sampling Date		5/18/2005			5/13/2005			5/16/2005			5/17/2005		
Matrix		Soil			Aqueous			Aqueous			Aqueous		
Sample Depth		8.5'-9' bgs			none			none			none		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	NS	ND	0.007		ND	5		ND	5		ND	5	
1,1,1-Trichloroethane	0.8 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,1,2,2-Tetrachloroethane	0.6 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,1,2-Trichloroethane	6.0 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,1-Dichloroethane	0.2 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,1-Dichloroethene	0.4 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,2-Dichloroethane	0.1 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
1,2-Dichloropropane	NS	ND	0.007		ND	5		ND	5		ND	5	
2-Butanone	0.3 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
2-Chloroethylvinylether	NS	ND	0.007		ND	5		ND	5		ND	5	
2-Hexanone	NS	ND	0.007		ND	5		ND	5		ND	5	
4-Methyl-2-Pentanone	1.0 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Acetone	0.2 (Note 1)	ND	0.035		ND	25		ND	25		ND	25	
Acrolein	NS	ND	0.035		ND	25		ND	25		ND	25	
Acrylonitrile	NS	ND	0.007		ND	5		ND	5		ND	5	
Benzene	0.06 (Note 1)	ND	0.0014		ND	1		ND	1		ND	1	
Bromodichloromethane	NS	ND	0.007		ND	5		ND	5		ND	5	
Bromoform	NS	ND	0.007		ND	5		ND	5		ND	5	
Bromomethane	NS	ND	0.007		ND	5		ND	5		ND	5	
Carbon disulfide	2.7 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Carbon tetrachloride	0.6 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Chlorobenzene	1.7 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Chloroethane	1.9 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Chloroform	0.3 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Chloromethane	NS	ND	0.007		ND	5		ND	5		ND	5	
Cis-1,2-Dichloroethene	NS	ND	0.007		ND	5		ND	5		ND	5	
Cis-1,3-Dichloropropene	NS	ND	0.007		ND	5		ND	5		ND	5	
Dibromochloromethane	NS	ND	0.007		ND	5		ND	5		ND	5	
Ethylbenzene	5.5 (Note 1)	ND	0.0014		ND	1		ND	1		ND	1	
M&p-Xylenes	1.2 (Note 1)	ND	0.0028		ND	2		ND	2		ND	2	
Methylene chloride	0.1 (Note 1)	0.011			ND	5		ND	5		ND	5	
O-Xylene	1.2 (Note 1)	ND	0.0014		ND	1		ND	1		ND	1	
Styrene	NS	ND	0.007		ND	5		ND	5		ND	5	
Tetrachloroethene	1.4 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Toluene	1.5 (Note 1)	ND	0.0014		ND	1		ND	1		ND	1	
Trans-1,2-Dichloroethene	0.3 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Trans-1,3-Dichloropropene	NS	ND	0.007		ND	5		ND	5		ND	5	
Trichloroethene	0.7 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Vinyl chloride	0.2 (Note 1)	ND	0.007		ND	5		ND	5		ND	5	
Total Confident VOCs	10 (Note 2)	0.011			ND			ND			ND		
Total Volatile Organic TICs	NS	0.0748		J	ND			ND			ND		
Total Petroleum Hydrocarbons (TPHC)	NS	89			NA			NA			NA		

TABLE 3A
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Notes and Abbreviations:

NYSDEC = New York State Department of Environmental Conservation
RSCO = Recommended Soil Cleanup Objective
bgs = feet below ground surface (see Note 3)
Conc = Concentration
mg/Kg = milligrams per kilogram (all units reported in mg/Kg)
MDL = Minimum detection limit
Qual = Laboratory data qualifier
NS = No standard
ND = Not detected
NA = Not analyzed
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration provided is an approximate value.
VOCs = Volatile Organic Compounds
TICs = Tentatively Identified Compounds
Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

Note 1: New York State Cleanup Objective is based on the Soil Cleanup Objective to Protect Groundwater Quality.
Note 2: As per TAGM #4046, the RSCO for Total Volatile Organic Compounds is 10 parts per million (equivalent to 10 mg/Kg).
Note 3: Soil borings UST2-5, UST2-5A, TWP-1, TWP-1A, and TWP-4 were located on top of the soil surcharge pile. The reference point for the depth at these locations is the land surface adjacent to the surcharge pile, considered to be approximately equivalent to the original (pre-surcharge) land surface that is now covered.

TABLE 3B
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	UST2-4			UST2-4			UST2-4A			UST2-4B		
Field ID		PI-UST2-4-051305S013			PI-UST2-4-051305S014B			PI-UST2-4A051605SO13			PI-UST2-4B051605SO13		
Lab Sample No.		AC17613-002			AC17613-003			AC17643-001			AC17643-002		
Sampling Date		5/13/2005			5/13/2005			5/16/2005			5/16/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		6'-8' bgs			9'-10' bgs			6.5'-7' bgs			6'-6.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,2,4-Trichlorobenzene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
1,2-Dichlorobenzene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
1,2-Diphenylhydrazine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
1,3-Dichlorobenzene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
1,4-Dichlorobenzene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,4,5-Trichlorophenol	0.1 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,4,6-Trichlorophenol	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,4-Dichlorophenol	0.4 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,4-Dimethylphenol	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,4-Dinitrophenol	0.200 (Notes 1,3)	ND	5.3		ND	1.5		ND	1.6		ND	1.1	
2,4-Dinitrotoluene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2,6-Dinitrotoluene	1 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2-Chloronaphthalene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2-Chlorophenol	0.8 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2-Methylnaphthalene	36.4 (Note 3)	1.4		J	0.11		J	ND	1.6		ND	1.1	
2-Methylphenol	0.100 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2-Nitroaniline	0.430 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
2-Nitrophenol	0.330 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
3&4-Methylphenol	0.9 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
3,3'-Dichlorobenzidine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
3-Nitroaniline	0.500 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4,6-Dinitro-2-methylphenol	NS	ND	5.3		ND	1.5		ND	1.6		ND	1.1	
4-Bromophenyl-phenylether	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4-Chloro-3-methylphenol	0.240 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4-Chloroaniline	0.220 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4-Chlorophenyl-phenylether	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4-Nitroaniline	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
4-Nitrophenol	0.100 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Acenaphthene	50 (Notes 2, 3)	1.3			ND	0.6		ND	0.65		ND	0.44	
Acenaphthylene	41 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Anthracene	50 (Notes 2, 3)	1.3			ND	0.6		ND	0.65		ND	0.44	
Benzidine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Benzo[a]anthracene	0.224 (Notes 1, 3)	2.8			ND	0.6		ND	0.65		0.049		J
Benzo[a]pyrene	0.061 (Notes 1, 3)	1.6		J	ND	0.6		ND	0.65		0.055		J
Benzo[b]fluoranthene	1.1 (Note 3)	1.3		J	ND	0.6		ND	0.65		0.092		J
Benzo[g,h,i]perylene	50 (Notes 2, 3)	1.7		J	ND	0.6		ND	0.65		0.078		J
Benzo[k]fluoranthene	1.1 (Note 3)	0.32		J	ND	0.6		ND	0.65		ND	0.44	
Benzyl alcohol	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Bis(2-Chloroethoxy)methane	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Bis(2-Chloroethyl)Ether	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Bis(2-Chloroisopropyl)ether	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Bis(2-Ethylhexyl)phthalate	50 (Notes 2, 3)	ND	2.1		0.93			ND	0.65		0.057		J
Butylbenzylphthalate	50 (Notes 2, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Carbazole	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Chrysene	0.4 (Note 3)	4.6			ND	0.6		ND	0.65		0.065		J
Dibenzo[a,h]Anthracene	0.014 (Notes 1, 3)	0.61		J	ND	0.6		ND	0.65		ND	0.44	
Dibenzofuran	6.2 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Diethylphthalate	7.1 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Dimethylphthalate	2.0 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Di-n-butylphthalate	8.1 (Note 3)	ND	2.1		0.06		J	ND	0.65		ND	0.44	
DI-n-octylphthalate	50 (Notes 2, 3)	ND	2.1		0.17		J	ND	0.65		ND	0.44	
Fluoranthene	50 (Notes 2, 3)	1.5			ND	0.6		ND	0.65		0.08		J
Fluorene	50 (Notes 2, 3)	1.6			ND	0.6		ND	0.65		ND	0.44	
Hexachlorobenzene	0.41 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Hexachlorobutadiene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Hexachlorocyclopentadiene	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Hexachloroethane	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Indeno[1,2,3-cd]pyrene	3.2 (Note 3)	0.53			ND	0.6		ND	0.65		0.061		J
Isophorone	4.40 (Note 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Naphthalene	13.0 (Note 3)	0.79			ND	1.5		ND	1.6		ND	1.1	
Nitrobenzene	0.200 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
N-Nitrosodimethylamine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
N-Nitroso-Di-N-Propylamine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
N-Nitrosodiphenylamine	NS	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Pentachlorophenol	1.0 (Notes 1, 3)	ND	5.3		ND	1.5		ND	1.6		ND	1.1	
Phenanthrene	50 (Notes 2, 3)	6.5			0.062		J	ND	0.65		ND	0.44	
Phenol	0.03 (Notes 1, 3)	ND	2.1		ND	0.6		ND	0.65		ND	0.44	
Pyrene	50 (Notes 2, 3)	6.6			ND	0.6		ND	0.65		0.071		J
Total Confident SVOCs	500 (Note 4)	27.52			0.93			0			0		
Total Semi-Volatile TICs	NS	304.80			10.41			33.86			11.75		

TABLE 3B
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	UST2-5			UST2-5A			UST2-6			UST2-7		
Field ID		PI-UST2-5-051605SO04			PI-UST2-5A051705SO03			PI-UST2-6-051305S010			PI-UST2-7-051705SO09		
Lab Sample No.		AC17643-003			AC17665-001			AC17613-001			AC17665-001		
Sampling Date		5/16/2005			5/17/2005			5/13/2005			5/17/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		7.5'-8' bgs			4.5'-5' bgs			4.5'-5' bgs			4'-4.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,2,4-Trichlorobenzene	NS	0.22		J	ND	0.43		ND	0.43		ND	0.51	
1,2-Dichlorobenzene	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
1,2-Diphenylhydrazine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
1,3-Dichlorobenzene	NS	0.29		J	ND	0.43		ND	0.43		ND	0.51	
1,4-Dichlorobenzene	NS	0.33		J	ND	0.43		ND	0.43		ND	0.51	
2,4,5-Trichlorophenol	0.1 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2,4,6-Trichlorophenol	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2,4-Dichlorophenol	0.4 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2,4-Dimethylphenol	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2,4-Dinitrophenol	0.200 (Notes 1,3)	ND	1.3		ND	1.1		ND	1.1		ND	1.3	
2,4-Dinitrotoluene	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2,6-Dinitrotoluene	1 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2-Chloronaphthalene	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2-Chlorophenol	0.8 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2-Methylnaphthalene	36.4 (Note 3)	ND	1.3		0.15		J	0.12		J	0.18		J
2-Methylphenol	0.100 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2-Nitroaniline	0.430 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
2-Nitrophenol	0.330 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
3&4-Methylphenol	0.9 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
3,3'-Dichlorobenzidine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
3-Nitroaniline	0.500 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4,6-Dinitro-2-methylphenol	NS	ND	1.3		ND	1.1		ND	1.1		ND	1.3	
4-Bromophenyl-phenylether	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4-Chloro-3-methylphenol	0.240 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4-Chloroaniline	0.220 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4-Chlorophenyl-phenylether	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4-Nitroaniline	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
4-Nitrophenol	0.100 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Acenaphthene	50 (Notes 2, 3)	0.12		J	0.049		J	ND	0.43		ND	0.51	
Acenaphthylene	41 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Anthracene	50 (Notes 2, 3)	0.24		J	0.19		J	ND	0.43		ND	0.51	
Benzidine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Benzo[a]anthracene	0.224 (Notes 1, 3)	0.97			0.81			0.055		J	0.25		J
Benzo[a]pyrene	0.061 (Notes 1, 3)	0.75			0.81			0.052		J	0.24		J
Benzo[b]fluoranthene	1.1 (Note 3)	0.77			1			0.075		J	0.45		J
Benzo[g,h,i]perylene	50 (Notes 2, 3)	0.59			0.62			0.048		J	0.14		J
Benzo[k]fluoranthene	1.1 (Note 3)	0.36		J	0.41		J	ND	0.43		0.18		J
Benzyl alcohol	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Bis(2-Chloroethoxy)methane	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Bis(2-Chloroethyl)Ether	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Bis(2-Chloroisopropyl)ether	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Bis(2-Ethylhexyl)phthalate	50 (Notes 2, 3)	0.23		J	0.11		J	0.051		J	0.12	0.51	
Butylbenzylphthalate	50 (Notes 2, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Carbazole	NS	ND	0.51		0.051		J	ND	0.43		ND	0.51	
Chrysene	0.4 (Note 3)	0.65			1			ND	0.43		0.39	0.51	
Dibenzo[a,h]Anthracene	0.014 (Notes 1, 3)	0.19		J	ND	0.43		ND	0.43		ND	0.51	
Dibenzofuran	6.2 (Note 3)	0.058		J	0.058		J	ND	0.43		0.053	0.51	
Diethylphthalate	7.1 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Dimethylphthalate	2.0 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Di-n-butylphthalate	8.1 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
DI-n-octylphthalate	50 (Notes 2, 3)	0.082		J	ND	0.43		ND	0.43		ND	0.51	
Fluoranthene	50 (Notes 2, 3)	2.4			1			ND	0.43		0.4		J
Fluorene	50 (Notes 2, 3)	0.065		J	0.068		J	ND	0.43		ND	0.51	
Hexachlorobenzene	0.41 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Hexachlorobutadiene	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Hexachlorocyclopentadiene	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Hexachloroethane	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Indeno[1,2,3-cd]pyrene	3.2 (Note 3)	0.47		J	0.48			ND	0.43		0.12		J
Isophorone	4.40 (Note 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Naphthalene	13.0 (Note 3)	0.32		J	0.14		J	0.058		J	0.11		J
Nitrobenzene	0.200 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
N-Nitrosodimethylamine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
N-Nitroso-Di-N-Propylamine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
N-Nitrosodiphenylamine	NS	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Pentachlorophenol	1.0 (Notes 1, 3)	ND	1.3		ND	1.1		ND	1.1		ND	1.3	
Phenanthrene	50 (Notes 2, 3)	0.32		J	0.86			0.13		J	0.24		J
Phenol	0.03 (Notes 1, 3)	ND	0.51		ND	0.43		ND	0.43		ND	0.51	
Pyrene	50 (Notes 2, 3)	3.3			2			ND	0.43		0.41		J
Total Confident SVOCs	500 (Note 4)	9.43			8			0			0		
Total Semi-Volatile TICs	NS	48.34			24.97			90.68			28.24		

TABLE 3B
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location		TWP-1			TWP-1			TWP-1A			TWP-2		
Field ID		PI-TWP-1-052305SO20			PI-TWP-1-052305SO09			PI-TWP-1-052305SO13			PI-TWP-2-051905SO17		
Lab Sample No.	NYSDEC RSCO	AC17758-002			AC17758-005			AC17758-001			AC17870-001		
Sampling Date	(mg/Kg)	5/23/2005			5/23/2005			5/23/2005			5/19/2005		
Matrix		Soil			Soil			Soil			Soil		
Sample Depth		6'-6.5' bgs			9.5'-10' bgs			4'-4.5' bgs			8'-8.5' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg		
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,2,4-Trichlorobenzene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
1,2-Dichlorobenzene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
1,2-Diphenylhydrazine	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
1,3-Dichlorobenzene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
1,4-Dichlorobenzene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,4,5-Trichlorophenol	0.1 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,4,6-Trichlorophenol	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,4-Dichlorophenol	0.4 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,4-Dimethylphenol	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,4-Dinitrophenol	0.200 (Notes 1,3)	ND	3.1		ND	2		ND	51		ND	1.1	
2,4-Dinitrotoluene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
2,6-Dinitrotoluene	1 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2-Chloronaphthalene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
2-Chlorophenol	0.8 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2-Methylnaphthalene	36.4 (Note 3)	ND	0.62		ND	0.4		1.1		J	ND	2.2	
2-Methylphenol	0.100 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2-Nitroaniline	0.430 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
2-Nitrophenol	0.330 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
3&4-Methylphenol	0.9 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
3,3'-Dichlorobenzidine	NS	ND	1.5		ND	0.4		ND	10		ND	0.43	
3-Nitroaniline	0.500 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
4,6-Dinitro-2-methylphenol	NS	ND	3.1		ND	0.99		ND	26		ND	0.43	
4-Bromophenyl-phenylether	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
4-Chloro-3-methylphenol	0.240 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
4-Chloroaniline	0.220 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
4-Chlorophenyl-phenylether	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
4-Nitroaniline	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
4-Nitrophenol	0.100 (Notes 1, 3)	ND	1.5		ND	0.4		ND	10		ND	0.43	
Acenaphthene	50 (Notes 2, 3)	0.25		J	ND	0.4		24			ND	0.43	
Acenaphthylene	41 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Anthracene	50 (Notes 2, 3)	0.54		J	0.08		J	81			ND	0.43	
Benzidine	NS	ND	1.5		ND	0.4		ND	10		ND	0.43	
Benzo[a]anthracene	0.224 (Notes 1, 3)	0.67			0.37		J	97			0.1		J
Benzo[a]pyrene	0.061 (Notes 1, 3)	0.46		J	0.36		J	73			0.092		J
Benzo[b]fluoranthene	1.1 (Note 3)	0.59		J	0.56			97			0.074		J
Benzo[g,h,i]perylene	50 (Notes 2, 3)	0.3		J	0.31		J	46			0.13		J
Benzo[k]fluoranthene	1.1 (Note 3)	0.18		J	0.16		J	29			ND	0.43	
Benzyl alcohol	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Bis(2-Chloroethoxy)methane	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Bis(2-Chloroethyl)Ether	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Bis(2-Chloroisopropyl)ether	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Bis(2-Ethylhexyl)phthalate	50 (Notes 2, 3)	ND	1.5		0.11	0.4		ND	10		0.087		J
Butylbenzylphthalate	50 (Notes 2, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Carbazole	NS	ND	0.62		ND	0.4		1.5		J	ND	0.43	
Chrysene	0.4 (Note 3)	0.69			0.45			78			0.13		J
Dibenzo[a,h]Anthracene	0.014 (Notes 1, 3)	0.1		J	0.11		J	15			ND	0.43	
Dibenzofuran	6.2 (Note 3)	0.072		J	ND	0.4		28			ND	0.43	
Diethylphthalate	7.1 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Dimethylphthalate	2.0 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Di-n-butylphthalate	8.1 (Note 3)	ND	0.62		ND	0.4		ND	10		0.064		J
DI-n-octylphthalate	50 (Notes 2, 3)	0.066		J	0.071		J	ND	10		0.047		J
Fluoranthene	50 (Notes 2, 3)	1.9			0.54			160			0.058		J
Fluorene	50 (Notes 2, 3)	0.21		J	ND	0.4		45			ND	0.43	
Hexachlorobenzene	0.41 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Hexachlorobutadiene	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Hexachlorocyclopentadiene	NS	ND	0.62		ND	0.99		ND	26		ND	0.43	
Hexachloroethane	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Indeno[1,2,3-cd]pyrene	3.2 (Note 3)	0.25		J	0.24		J	43			0.061		J
Isophorone	4.40 (Note 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Naphthalene	13.0 (Note 3)	0.25		J	ND	0.4		2		J	ND	1.1	
Nitrobenzene	0.200 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
N-Nitrosodimethylamine	NS	ND	1.5		ND	0.4		ND	10		ND	0.43	
N-Nitroso-Di-N-Propylamine	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
N-Nitrosodiphenylamine	NS	ND	0.62		ND	0.4		ND	10		ND	0.43	
Pentachlorophenol	1.0 (Notes 1, 3)	ND	1.5		ND	0.4		ND	10		ND	0.43	
Phenanthrene	50 (Notes 2, 3)	0.83			0.35		J	170			0.065		J
Phenol	0.03 (Notes 1, 3)	ND	0.62		ND	0.4		ND	10		ND	0.43	
Pyrene	50 (Notes 2, 3)	1.4			0.7			190			0.35		J
Total Confident SVOCs	500 (Note 4)	5.49			2.25			1174			0		
Total Semi-Volatile TICs	NS	242.60			638.89			3452.20			10.0		

TABLE 3B
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location		TWP-2			TWP-3			TWP-4			TWP-5			TWP-6		
Field ID		PI-TWP-2-051905SO19			PI-TWP-3-051805SO10			PI-TWP-4-052405S010			PI-TWP-5-051905SO10			PI-TWP-6-051805SO10		
[redacted] Sample No.	NYSDEC RSCO (mg/Kg)	AC17870-002			AC17675-001			AC17774-001			AC17870-003			AC17675-002		
[redacted]mpling Date		5/19/2005			5/18/2005			5/24/2005			5/19/2005			5/18/2005		
Matrix		Soil			Soil			Soil			Soil			Soil		
Sample Depth		9'-9.5' bgs			4.5'-5' bgs			5.5'-6' bgs			4.3'-4.8' bgs			8.5'-9' bgs		
Units		mg/Kg			mg/Kg			mg/Kg			mg/Kg			mg/Kg		
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,2,4-Trichlorobenzene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
1,2-Dichlorobenzene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
1,2-Diphenylhydrazine	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
1,3-Dichlorobenzene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
1,4-Dichlorobenzene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,4,5-Trichlorophenol	0.1 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,4,6-Trichlorophenol	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,4-Dichlorophenol	0.4 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,4-Dimethylphenol	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,4-Dinitrophenol	0.200 (Notes 1,3)	ND	0.99		ND	2		ND	2.3		ND	1		ND	1.2	
2,4-Dinitrotoluene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2,6-Dinitrotoluene	1 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2-Chloronaphthalene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2-Chlorophenol	0.8 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2-Methylnaphthalene	36.4 (Note 3)	ND	2		0.16		J	0.12		J	ND	2		1.2		
2-Methylphenol	0.100 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2-Nitroaniline	0.430 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
2-Nitrophenol	0.330 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
3&4-Methylphenol	0.9 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
3,3'-Dichlorobenzidine	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
3-Nitroaniline	0.500 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4,6-Dinitro-2-methylphenol	NS	ND	0.4		ND	2		ND	1.1		ND	0.41		ND	1.2	
4-Bromophenyl-phenylether	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4-Chloro-3-methylphenol	0.240 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4-Chloroaniline	0.220 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4-Chlorophenyl-phenylether	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4-Nitroaniline	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
4-Nitrophenol	0.100 (Notes 1, 3)	ND	0.4		ND	1		ND	0.45		ND	0.41		ND	0.47	
[redacted]aphthene	50 (Notes 2, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
[redacted]naphthylene	41 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		0.061		J
Anthracene	50 (Notes 2, 3)	ND	0.4		ND	0.4		0.11		J	ND	0.41		0.084		J
Benzidine	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Benzo[a]anthracene	0.224 (Notes 1, 3)	ND	0.4		0.052		J	0.59			0.044		J	0.41		J
Benzo[a]pyrene	0.061 (Notes 1, 3)	ND	0.4		0.051		J	0.78			ND	0.41		0.39		J
Benzo[b]fluoranthene	1.1 (Note 3)	ND	0.4		0.12		J	1			0.05		J	0.86		
Benzo[g,h,i]perylene	50 (Notes 2, 3)	ND	0.4		ND	0.4		1.1			ND	0.41		0.35		J
Benzo[k]fluoranthene	1.1 (Note 3)	ND	0.4		ND	0.4		0.3		J	ND	0.41		0.21		J
Benzyl alcohol	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Bis(2-Chloroethoxy)methane	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Bis(2-Chloroethyl)Ether	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Bis(2-Chloroisopropyl)ether	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Bis(2-Ethylhexyl)phthalate	50 (Notes 2, 3)	ND	0.4		0.13		J	0.17		J	0.12		J	0.25		J
Butylbenzylphthalate	50 (Notes 2, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Carbazole	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		0.064		J
Chrysene	0.4 (Note 3)	ND	0.4		0.11		J	0.73			0.047		J	0.73		
Dibenzo[a,h]Anthracene	0.014 (Notes 1, 3)	ND	0.4		ND	0.4		0.25		J	ND	0.41		0.14		J
Dibenzofuran	6.2 (Note 3)	ND	0.4		ND	0.4		0.06		J	ND	0.41		0.23		J
Diethylphthalate	7.1 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Dimethylphthalate	2.0 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Di-n-butylphthalate	8.1 (Note 3)	ND	0.99		ND	0.4		0.085		J	ND	1		ND	0.47	
DI-n-octylphthalate	50 (Notes 2, 3)	ND	0.4		ND	1		0.06		J	ND	0.41		ND	0.47	
Fluoranthene	50 (Notes 2, 3)	ND	0.4		0.11		J	0.65			0.069		J	0.47		
Fluorene	50 (Notes 2, 3)	ND	0.4		ND	0.4		0.046		J	ND	0.41		ND	0.47	
Hexachlorobenzene	0.41 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Hexachlorobutadiene	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Hexachlorocyclopentadiene	NS	ND	0.4		ND	0.4		ND	1.1		ND	0.41		ND	0.47	
Hexachloroethane	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Indeno[1,2,3-cd]pyrene	3.2 (Note 3)	ND	0.4		ND	0.4		0.71			ND	0.41		0.3	0.47	
Isophorone	4.40 (Note 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Naphthalene	13.0 (Note 3)	ND	0.99		0.1		J	0.23		J	ND	1		0.41		J
Nitrobenzene	0.200 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
N-Nitrosodimethylamine	NS	ND	0.4		ND	2		ND	0.45		ND	0.41		ND	0.47	
N[redacted]so-Di-N-Propylamine	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
[redacted]Sodiphenylamine	NS	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Pentachlorophenol	1.0 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	1.2	
Phenanthrene	50 (Notes 2, 3)	ND	0.4		0.096		J	0.57			0.074		J	0.69		
Phenol	0.03 (Notes 1, 3)	ND	0.4		ND	0.4		ND	0.45		ND	0.41		ND	0.47	
Pyrene	50 (Notes 2, 3)	ND	0.4		0.1		J	0.95			0.089		J	0.95		
Total Confident SVOCs	500 (Note 4)	0			0			7.08			0			4.9		
Total Semi-Volatile TICs	NS	6.04			215.0			23.0			3.81			560.29		

TABLE 3B
SUMMARY OF SOIL ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT - PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Notes and Abbreviations:

mg/Kg = milligrams per kilogram

bgs = feet below ground surface (see Note 5)

NYSDEC = New York State Department of Environmental Conservation

RSCO = Recommended Soil Cleanup Objective

Conc = Concentration

MDL = Minimum detection limit

Qual = Laboratory data qualifier

NA = Not analyzed

NS = No standard

ND = Not detected

TICs = Tentatively Identified Compounds

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

Note 1: Results compared to NYSDEC RSCO or laboratory MDL, whichever value is more stringent.

Note 2: Health-based criterion exceed the 50 mg/Kg maximum for individual semi-volatile contaminants.

Note 3: NYSDEC RSCO is based on the Soil Cleanup Objective to Protect Groundwater Quality.

Note 4: As per TAGM #4046, the RSCO for Total Semi-volatile Organic Compounds is 500 ppm (equivalent to 500 mg/Kg).

Note 5: Soil borings UST2-5, UST2-5A, TWP-1, TWP-1A, and TWP-4 were located on the soil surcharge pile. The reference point for the depth at these locations is the land surface adjacent to the pile, considered to be approximately equivalent to the original (pre-surcharge) land surface that is now covered.

TABLE 4A
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location Field ID Lab Sample No. Sampling Date Matrix Units	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	TWP-1 PI-TWP-1-052305WG01 AC17758-003 5/23/2005 Aqueous ug/L			TWP-2 PI-TWP-2-051905WG01 AC17870-004 5/19/2005 Aqueous ug/L			TWP-3 PI-TWP-3-051805WG01 AC17675-003 5/18/2005 Aqueous ug/L			TWP-4 PI-TWP-4-052405WG01 AC17774-003 5/24/2005 Aqueous ug/L		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	5	ND	0.37		ND	0.44		ND	0.19		ND	0.6	
1,1,1-Trichloroethane	5	ND	0.45		ND	0.53		ND	0.44		ND	0.6	
1,1,2,2-Tetrachloroethane	5	ND	0.18		ND	0.21		ND	0.36		ND	0.6	
1,1,2-Trichloroethane	1	ND	0.39		ND	0.46		ND	0.31		ND	0.6	
1,1-Dichloroethane	5	ND	0.31		ND	0.37		ND	0.19		ND	0.6	
1,1-Dichloroethene	5	ND	1.4		ND	1.6		ND	1.7		ND	0.6	
1,2-Dichloroethane	0.6	ND	1.7		ND	2		ND	0.83		ND	0.6	
1,2-Dichloropropane	1	ND	1.2		ND	1.5		ND	1.5		ND	0.6	
2-Butanone	50	ND	1.2		ND	1.4		ND	0.93		ND	0.6	
2-Chloroethylvinylether	NS/NG	ND	0.98		ND	1.2		ND	2		ND	1.5	
2-Hexanone	NS/NG	ND	0.5		ND	0.6		ND	0.39		ND	0.6	
4-Methyl-2-Pentanone	NS/NG	ND	0.34		ND	0.4		ND	0.5		ND	0.6	
Acetone	50	ND	0.43		ND	0.51		ND	0.12		ND	0.6	
Acrolein	5	ND	0.67		ND	0.8		ND	2		ND	0.6	
Acrylonitrile	5	1	1		ND	1.2		ND	1.9		ND	1.5	
Benzene	1	ND	2.2		ND	2.7		ND	4.1		ND	0.6	
Bromodichloromethane	50	ND	1.5		ND	1.8		ND	1.4		ND	0.6	
Bromoform	50	ND	1.3		ND	1.6		ND	1.4		ND	0.6	
Bromomethane	5	ND	2.7		1.9	3.2		ND	4.1		ND	0.6	
Carbon disulfide	NS/NG	ND	4.2		ND	5		ND	1.9		ND	0.6	
Carbon tetrachloride	5	ND	2.7		ND	3.2		ND	2.8		ND	0.6	
Chlorobenzene	5	ND	1.2		ND	1.5		ND	2.1		ND	1.5	
Chloroethane	5	ND	0.49		ND	0.58		ND	0.45		ND	0.6	
Chloroform	7	ND	2		ND	2.4		ND	2.2		ND	0.6	
Chloromethane	NS/NG	ND	7		ND	8.3		ND	7.5		ND	0.6	
Cis-1,2-Dichloroethene	5	ND	0.39		ND	0.46		ND	0.31		ND	0.6	
Cis-1,3-Dichloropropene	0.4 (Total)	ND	2.4		ND	2.9		ND	1.6		ND	0.6	
Dibromochloromethane	50	ND	1.1		ND	1.4		ND	1.6		ND	0.6	
Ethylbenzene	5	2.5	0.36		ND	0.42		ND	0.18		ND	0.6	
M&p-Xylenes	5	ND	0.2		ND	0.24		ND	0.17		ND	0.6	
Methylene chloride	5	ND	0.25		ND	0.3		ND	0.22		ND	0.6	
O-Xylene	5	ND	0.58		ND	0.69		ND	11		ND	0.6	
Styrene	5	ND	0.42		ND	0.5		ND	0.15		ND	0.6	
Tetrachloroethene	5	ND	0.45		ND	0.53		ND	0.18		ND	0.6	
Toluene	5	ND	0.51		ND	0.61		ND	0.31		ND	0.6	
Trans-1,2-Dichloroethene	5	ND	0.36		ND	0.43		ND	0.16		ND	0.6	
Trans-1,3-Dichloropropene	0.4 (Total)	ND	0.46		ND	0.55		ND	0.38		ND	0.6	
Trichloroethene	5	ND	0.29		ND	0.35		ND	0.26		ND	0.6	
Vinyl chloride	2	ND	0.39		ND	0.46		ND	0.49		ND	0.6	
Total Confident VOCs	10	0			0			0			0		
Total VOC TICs	NS/NG	0			1.7		J	2.2		J	0		
Total Petroleum Hydrocarbons	NS/NG	ND	0.41		ND	0.49		ND	0.3		ND	0.6	

Notes and Abbreviations:

* = RGCS/G values are based on the New York State Title 6 CRR (Codes, Rules and Regulations) Part 703 Surface and Groundwater Quality Standards. A guidance value is used where a standard has not been adopted for a substance.
ug/L = micrograms per liter (all concentrations are given in ug/L).

VOCs = Volatile Organic Compounds

Conc = Concentration

MDL = Minimum detection limit

Qual = Laboratory data qualifier

NS = No standard

NG = No guidance value

ND = Not detected

B = The analyte was found in the laboratory blank as well as the sample, indicating possible laboratory contamination of the sample.

TICs = Tentatively Identified Compounds

J = Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.

TABLE 4A
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location Field ID Lab Sample No. Sampling Date Matrix Units	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	TWP-5 PI-TWP-5-051905WG01 AC17870-005 5/19/2005 Aqueous ug/L			TWP-6 PI-TWP-6-051805WG01 AC17675-004 5/18/2005 Aqueous ug/L			FB PI-FB-01-051805WQ01 AC17675-005 5/18/2005 Aqueous ug/L			FB PI-FB-01-051905WQ01 AC17870-006 5/19/2005 Aqueous ug/L		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	5	ND	0.37		ND	0.19		ND	0.2		ND	0.2	
1,1,1-Trichloroethane	5	ND	0.45		ND	0.44		ND	0.19		ND	0.19	
1,1,2,2-Tetrachloroethane	5	ND	0.18		ND	0.36		ND	0.19		ND	0.19	
1,1,2-Trichloroethane	1	ND	0.39		ND	0.31		ND	0.27		ND	0.27	
1,1-Dichloroethane	5	ND	0.31		ND	0.19		ND	0.31		ND	0.31	
1,1-Dichloroethene	5	ND	1.4		ND	1.7		ND	0.24		ND	0.24	
1,2-Dichloroethane	0.6	ND	1.7		ND	0.83		ND	0.25		ND	0.25	
1,2-Dichloropropane	1	ND	1.2		ND	1.5		ND	0.29		ND	0.29	
2-Butanone	50	ND	1.2		ND	0.93		ND	0.44		ND	0.44	
2-Chloroethylvinylether	NS/NG	ND	0.98		ND	2		ND	0.39		ND	0.39	
2-Hexanone	NS/NG	ND	0.5		ND	0.39		ND	0.45		ND	0.45	
4-Methyl-2-Pentanone	NS/NG	ND	0.34		ND	0.5		ND	0.22		ND	0.22	
Acetone	50	ND	0.43		ND	0.12		ND	3.1		ND	3.1	
Acrolein	5	ND	0.67		ND	2		ND	3.1		ND	3.1	
Acrylonitrile	5	ND	1		ND	1.9		ND	0.63		ND	0.63	
Benzene	1	ND	2.2		ND	4.1		ND	0.23		ND	0.23	
Bromodichloromethane	50	ND	1.5		ND	1.4		ND	0.21		ND	0.21	
Bromoform	50	ND	1.3		ND	1.4		ND	0.33		ND	0.33	
Bromomethane	5	ND	2.7		ND	4.1		ND	0.54		ND	0.54	
Carbon disulfide	NS/NG	ND	4.2		ND	1.9		ND	0.37		ND	0.37	
Carbon tetrachloride	5	ND	2.7		ND	2.8		ND	0.24		ND	0.24	
Chlorobenzene	5	ND	1.2		ND	2.1		ND	0.19		ND	0.19	
Chloroethane	5	ND	0.49		ND	0.45		ND	0.37		ND	0.37	
Chloroform	7	ND	2		ND	2.2		ND	0.22		ND	0.22	
Chloromethane	NS/NG	ND	7		ND	7.5		ND	0.36		ND	0.36	
Cis-1,2-Dichloroethene	5	ND	0.39		ND	0.31		ND	0.18		ND	0.18	
Cis-1,3-Dichloropropene	0.4 (Total)	ND	2.4		ND	1.6		ND	0.17		ND	0.17	
Dibromochloromethane	50	ND	1.1		ND	1.6		ND	0.37		ND	0.37	
Ethylbenzene	5	ND	0.36		ND	0.18		ND	0.45		ND	0.45	
M&p-Xylenes	5	ND	0.2		ND	0.17		ND	0.47		ND	0.47	
Methylene chloride	5	ND	0.25		ND	0.22		ND	0.84		1.7	0.84	B
O-Xylene	5	ND	0.58		ND	11		ND	0.3		ND	0.3	
Styrene	5	ND	0.42		ND	0.15		ND	0.097		ND	0.097	
Tetrachloroethene	5	ND	0.45		ND	0.18		ND	0.28		ND	0.28	
Toluene	5	ND	0.51		ND	0.31		ND	0.15		ND	0.15	
Trans-1,2-Dichloroethene	5	ND	0.36		ND	0.16		ND	0.34		ND	0.34	
Trans-1,3-Dichloropropene	0.4 (Total)	ND	0.46		ND	0.38		ND	0.14		ND	0.14	
Trichloroethene	5	ND	0.29		ND	0.26		ND	0.21		ND	0.21	
Vinyl chloride	2	ND	0.39		ND	0.49		ND	0.51		ND	0.51	
Total Confident VOCs	10	0			0			0			1.7		
Total VOC TICs	NS/NG	1.4		J	2.2		J	0			0		
Total Petroleum Hydrocarb	NS/NG	ND	0.41		ND	0.3		NA			NA		

Notes and Abbreviations:

* = RGCS/G values are based on the New York State Title 6 CRR (Codes, Rules and Regulations) Part 703 Surface and Groundwater Quality Standards. A guidance value is used where a standard has not been adopted for a substance.

ug/L = micrograms per liter (all concentrations are given in ug/L).

VOCs = Volatile Organic Compounds

Conc = Concentration

MDL = Minimum detection limit

Qual = Laboratory data qualifier

NS = No standard

NG = No guidance value

ND = Not detected

B = The analyte was found in the laboratory blank as well as the sample, indicating possible laboratory contamination of the sample.

TICs = Tentatively Identified Compounds

J = Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.

TABLE 4A
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AOC-UST2 - VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	FB			FB		
Field ID		PI-FB-01-052305WQ01			PI-FB-01-052405WQ01		
Lab Sample No.		AC17758-004			AC17774-002		
Sampling Date		5/23/2005			5/24/2005		
Matrix		Aqueous			Aqueous		
Units		ug/L			ug/L		
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	MDL	Qual	Conc	MDL	Qual
1,1,1,2-Tetrachloroethane	5	ND	0.63		ND	0.22	
1,1,1-Trichloroethane	5	ND	0.46		ND	0.18	
1,1,2,2-Tetrachloroethane	5	ND	0.27		ND	0.24	
1,1,2-Trichloroethane	1	ND	0.33		ND	0.23	
1,1-Dichloroethane	5	ND	0.47		ND	0.25	
1,1-Dichloroethene	5	ND	0.31		ND	1	
1,2-Dichloroethane	0.6	ND	0.23		ND	0.18	
1,2-Dichloropropane	1	ND	0.57		ND	0.41	
2-Butanone	50	ND	0.75		ND	0.52	
2-Chloroethylvinylether	NS/NG	ND	0.3		ND	0.31	
2-Hexanone	NS/NG	ND	0.45		ND	0.2	
4-Methyl-2-Pentanone	NS/NG	ND	0.36		ND	0.28	
Acetone	50	ND	3.4		ND	5.6	
Acrolein	5	ND	3.6		ND	2.3	
Acrylonitrile	5	ND	1.1		ND	1.1	
Benzene	1	ND	0.24		ND	0.14	
Bromodichloromethane	50	ND	0.45		ND	0.2	
Bromoform	50	ND	0.52		ND	0.23	
Bromomethane	5	ND	0.46		ND	0.34	
Carbon disulfide	NS/NG	ND	0.51		ND	0.29	
Carbon tetrachloride	5	ND	0.91		ND	0.21	
Chlorobenzene	5	ND	0.2		ND	0.37	
Chloroethane	5	ND	0.73		ND	0.47	
Chloroform	7	ND	0.25		ND	0.36	
Chloromethane	NS/NG	ND	0.82		ND	0.36	
Cis-1,2-Dichloroethene	5	ND	0.36		ND	0.3	
Cis-1,3-Dichloropropene	0.4 (Total)	ND	0.3		ND	0.24	
Dibromochloromethane	50	ND	0.62		ND	0.27	
Ethylbenzene	5	ND	0.67		ND	0.34	
M&p-Xylenes	5	ND	0.81		ND	0.54	
Methylene chloride	5	ND	0.63		1.1	0.49	
O-Xylene	5	ND	0.17		ND	0.14	
Styrene	5	ND	0.15		ND	0.22	
Tetrachloroethene	5	ND	0.41		ND	0.28	
Toluene	5	ND	0.18		ND	0.22	
Trans-1,2-Dichloroethene	5	ND	0.52		ND	0.5	
Trans-1,3-Dichloropropene	0.4 (Total)	ND	0.37		ND	0.13	
Trichloroethene	5	ND	0.47		ND	0.37	
Vinyl chloride	2	ND	0.62		ND	0.42	
Total Confident VOCs	10	0			1.1		
Total VOC TICs	NS/NG	0			0		
Total Petroleum Hydrocarbons	NS/NG	NA			NA		

Notes and Abbreviations:

* = RGCS/G values are based on the New York State Title 6 CRR (Codes, Rules and Regulations) Part 703 Surface and Groundwater Quality Standards. A guidance value is used where a standard has not been adopted for a substance.

ug/L = micrograms per liter (all concentrations are given in ug/L).

VOCs = Volatile Organic Compounds

Conc = Concentration

MDL = Minimum detection limit

Qual = Laboratory data qualifier

NS = No standard

NG = No guidance value

ND = Not detected

B = The analyte was found in the laboratory blank as well as the sample, indicating possible laboratory contamination of the sample.

TICs = Tentatively Identified Compounds

J = Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.

TABLE 4B
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT-PORT I[illegible] FACILITY, SITE 1
STATEN IS[illegible]D, NEW YORK

Sample Location	Recommended Groundwater Cleanup Standard/ Guidance Value (RGCS)*	TWP-1			TWP-2			TWP-3			TWP-4			TWP-5			TWP-6		
Field ID		PI-TWP-1-052305WG01			PI-TWP-2-051905WG01			PI-TWP-3-051805WG01			PI-TWP-4-052405WG01			PI-TWP-5-051905WG01			PI-TWP-6-051805WG01		
Lab Sample No.		AC17758-003			AC17870-004			AC17675-003			AC17774-003			AC17870-005			AC17675-004		
Sampling Date		5/23/2005			5/19/2005			5/18/2005			5/24/2005			5/19/2005			5/18/2005		
Matrix		Aqueous			Aqueous			Aqueous			Aqueous			Aqueous			Aqueous		
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
Semi-Volatile Organic Compound (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
1,2,4-Trichlorobenzene	5	ND	0.37		ND	0.44		ND	0.19		ND	0.6		ND	0.37		ND	0.19	
1,2-Dichlorobenzene	3	ND	0.45		ND	0.53		ND	0.44		ND	0.6		ND	0.45		ND	0.44	
1,2-Diphenylhydrazine	NS/NG	ND	0.18		ND	0.21		ND	0.36		ND	0.6		ND	0.18		ND	0.36	
1,3-Dichlorobenzene	3	ND	0.39		ND	0.46		ND	0.31		ND	0.6		ND	0.39		ND	0.31	
1,4-Dichlorobenzene	3	ND	0.31		ND	0.37		ND	0.19		ND	0.6		ND	0.31		ND	0.19	
2,4,5-Trichlorophenol	NS/NG	ND	1.4		ND	1.6		ND	1.7		ND	0.6		ND	1.4		ND	1.7	
2,4,6-Trichlorophenol	NS/NG	ND	1.7		ND	2		ND	0.83		ND	0.6		ND	1.7		ND	0.83	
2,4-Dichlorophenol	5	ND	1.2		ND	1.5		ND	1.5		ND	0.6		ND	1.2		ND	1.5	
2,4-Dimethylphenol	50	ND	1.2		ND	1.4		ND	0.93		ND	0.6		ND	1.2		ND	0.93	
2,4-Dinitrophenol	10	ND	0.98		ND	1.2		ND	2		ND	1.5		ND	0.98		ND	2	
2,4-Dinitrotoluene	5	ND	0.5		ND	0.6		ND	0.39		ND	0.6		ND	0.5		ND	0.39	
2,6-Dinitrotoluene	5	ND	0.34		ND	0.4		ND	0.5		ND	0.6		ND	0.34		ND	0.5	
2-Chloronaphthalene	10	ND	0.43		ND	0.51		ND	0.12		ND	0.6		ND	0.43		ND	0.12	
2-Chlorophenol	NS/NG	ND	0.67		ND	0.8		ND	2		ND	0.6		ND	0.67		ND	2	
2-Methylnaphthalene	NS/NG	1.0	1.0	J	ND	1.2		ND	1.9		ND	1.5		ND	1		ND	1.9	
2-Methylphenol	NS/NG	ND	2.2		ND	2.7		ND	4.1		ND	0.6		ND	2.2		ND	4.1	
2-Nitroaniline	5	ND	1.5		ND	1.8		ND	1.4		ND	0.6		ND	1.5		ND	1.4	
2-Nitrophenol	NS/NG	ND	1.3		ND	1.6		ND	1.4		ND	0.6		ND	1.3		ND	1.4	
3&4-Methylphenol	NS/NG	ND	2.7		1.9	3.2		ND	4.1		ND	0.6		ND	2.7		ND	4.1	
3,3'-Dichlorobenzidine	5	ND	4.2		ND	5		ND	1.9		ND	0.6		ND	4.2		ND	1.9	
3-Nitroaniline	5	ND	2.7		ND	3.2		ND	2.8		ND	0.6		ND	2.7		ND	2.8	
4,6-Dinitro-2-methylphenol	NS/NG	ND	1.2		ND	1.5		ND	2.1		ND	1.5		ND	1.2		ND	2.1	
4-Bromophenyl-phenylether	NS/NG	ND	0.49		ND	0.58		ND	0.45		ND	0.6		ND	0.49		ND	0.45	
4-Chloro-3-methylphenol	NS/NG	ND	2		ND	2.4		ND	2.2		ND	0.6		ND	2		ND	2.2	
4-Chloroaniline	5	ND	7		ND	8.3		ND	7.5		ND	0.6		ND	7		ND	7.5	
4-Chlorophenyl-phenylether	NS/NG	ND	0.39		ND	0.46		ND	0.31		ND	0.6		ND	0.39		ND	0.31	
4-Nitroaniline	5	ND	2.4		ND	2.9		ND	1.6		ND	0.6		ND	2.4		ND	1.6	
4-Nitrophenol	NS/NG	ND	1.1		ND	1.4		ND	1.6		ND	0.6		ND	1.1		ND	1.6	
Acenaphthene	20	2.5	0.36		ND	0.42		ND	0.18		ND	0.6		ND	0.36		ND	0.18	
Acenaphthylene	NS/NG	ND	0.2		ND	0.24		ND	0.17		ND	0.6		ND	0.2		ND	0.17	
Anthracene	50	ND	0.25		ND	0.3		ND	0.22		ND	0.6		ND	0.25		ND	0.22	
Benzidine	5	ND	0.58		ND	0.69		ND	11		ND	0.6		ND	0.58		ND	11	
Benzo[a]anthracene	0.002	ND	0.42		ND	0.5		ND	0.15		ND	0.6		ND	0.42		ND	0.15	
Benzo[a]pyrene	MDL	ND	0.45		ND	0.53		ND	0.18		ND	0.6		ND	0.45		ND	0.18	
Benzo[b]fluoranthene	0.002	ND	0.51		ND	0.61		ND	0.31		ND	0.6		ND	0.51		ND	0.31	
Benzo[g,h,i]perylene	NS/NG	ND	0.36		ND	0.43		ND	0.16		ND	0.6		ND	0.36		ND	0.16	
Benzo[k]fluoranthene	0.002	ND	0.46		ND	0.55		ND	0.38		ND	0.6		ND	0.46		ND	0.38	
Bis(2-Chloroethoxy)methane	5	ND	0.29		ND	0.35		ND	0.26		ND	0.6		ND	0.29		ND	0.26	
Bis(2-Chloroethyl)Ether	1	ND	0.39		ND	0.46		ND	0.49		ND	0.6		ND	0.39		ND	0.49	
Bis(2-Chloroisopropyl)ether	NS/NG	ND	0.3		ND	0.35		ND	0.23		1.5	0.6		ND	0.3		ND	0.23	
Bis(2-Ethylhexyl)phthalate	5	ND	0.27		1.7	0.32		2.2	0.7		ND	0.6		1.4	0.27		2.2	0.7	

TABLE 4B
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS AOC-UST2 - SVOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location	Recommended Groundwater Cleanup Standard/ Guidance Value (RGCS)*	TWP-1			TWP-2			TWP-3			TWP-4			TWP-5			TWP-6		
Field ID		PI-TWP-1-052305WG01			PI-TWP-2-051905WG01			PI-TWP-3-051805WG01			PI-TWP-4-052405WG01			PI-TWP-5-051905WG01			PI-TWP-6-051805WG01		
Lab Sample No.		AC17758-003			AC17870-004			AC17675-003			AC17774-003			AC17870-005			AC17675-004		
Sampling Date		5/23/2005			5/19/2005			5/18/2005			5/24/2005			5/19/2005			5/18/2005		
Matrix		Aqueous			Aqueous			Aqueous			Aqueous			Aqueous			Aqueous		
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
Semi-Volatile Organic Compound (SVOCs)		Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual	Conc	MDL	Qual
Butylbenzylphthalate	50	ND	0.41		ND	0.49		ND	0.3		ND	0.6		ND	0.41		ND	0.3	
Carbazole	NS/NG	ND	0.35		ND	0.42		ND	0.21		ND	0.6		ND	0.35		ND	0.21	
Chrysene	0.002	ND	0.19		ND	0.22		ND	0.31		ND	0.6		ND	0.19		ND	0.31	
Dibenzo[a,h]Anthracene	NS/NG	ND	0.5		ND	0.6		ND	0.2		ND	0.6		ND	0.5		ND	0.2	
Dibenzofuran	NS/NG	ND	1.7		ND	2.1		ND	1.4		ND	0.6		ND	1.7		ND	1.4	
Diethylphthalate	50	2.3	0.24		ND	0.28		ND	0.26		ND	0.6		ND	0.24		ND	0.26	
Dimethylphthalate	50	ND	0.5		ND	0.6		ND	0.19		ND	0.6		ND	0.5		ND	0.19	
Di-n-butylphthalate	50	ND	0.22		1.5	0.27		ND	0.22		ND	0.6		ND	0.22		ND	0.22	
Di-n-octylphthalate	50	ND	0.24		ND	0.28		ND	0.37		ND	0.6		ND	0.24		ND	0.37	
Fluoranthene	50	ND	0.36		ND	0.43		ND	0.18		ND	0.6		ND	0.36		ND	0.18	
Fluorene	50	ND	0.21		ND	0.25		ND	0.26		ND	0.6		ND	0.21		ND	0.26	
Hexachlorobenzene	0.04	ND	0.56		ND	0.67		ND	0.45		ND	0.6		ND	0.56		ND	0.45	
Hexachlorobutadiene	0.5	ND	0.34		ND	0.41		ND	0.27		ND	0.6		ND	0.34		ND	0.27	
Hexachlorocyclopentadiene	5	ND	6.2		ND	7.4		ND	3		ND	0.6		ND	6.2		ND	3	
Hexachloroethane	5	ND	0.51		ND	0.61		ND	0.38		ND	0.6		ND	0.51		ND	0.38	
Indeno[1,2,3-cd]pyrene	0.002	ND	0.72		ND	0.86		ND	0.19		ND	0.6		ND	0.72		ND	0.19	
Isophorone	50	ND	0.23		ND	0.27		ND	5.9		1.4	0.6		ND	0.23		ND	5.9	
Naphthalene	10	23	0.19		ND	0.23		ND	0.11		ND	1.5		ND	0.19		ND	0.11	
Nitrobenzene	0.4	ND	0.83		ND	0.99		ND	0.31		ND	0.6		ND	0.83		ND	0.31	
N-Nitrosodimethylamine	NS/NG	ND	6.4		ND	7.6		ND	12		ND	0.6		ND	6.4		ND	12	
N-Nitroso-Di-N-Propylamine	NS/NG	ND	0.55		ND	0.66		ND	0.35		ND	0.6		ND	0.55		ND	0.35	
N-Nitrosodiphenylamine	50	ND	0.37		ND	0.44		ND	0.3		ND	0.6		ND	0.37		ND	0.3	
Pentachlorophenol	1.0 (Total Phenols)	ND	0.96		ND	1.1		ND	1.1		ND	1.5		ND	0.96		ND	1.1	
Phenanthrene	50	ND	0.23		1.4	0.27		ND	0.24		27	0.6		ND	0.23		ND	0.24	
Phenol	1.0 (Total Phenols)	3.8	1		2.2	1.2		ND	1.8		ND	0.6		ND	1		ND	1.8	
Pyrene	50	ND	0.17		ND	0.2		ND	0.25		ND	0.6		ND	0.17		ND	0.25	
Total Confident SVOCs	NS/NG	26.8			2.2			0			0			0			0		
Total SVOC TICs	NS/NG	1044.80		J	354.0		J	127.30		J	335.10		J	16.0		J	104.70		

Notes and Abbreviations:

ug/L = micrograms per liter (all concentrations are given in ug/L).

* = RGCS/G values are based on New York State Title 6 CRR (Codes, Rules and Regulations) Part 703. The guidance value is utilized where a standard value has not been adopted for a substance.

SVOCs = Semi-volatile Organic Compounds

Conc = Concentration

MDL = Minimum detection limit

Qual = Laboratory data qualifier

NS = No standard

ND = Not detected

TICs = Tentatively Identified Compounds

NG = No guidance value

J = Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.

One or more PAH compounds, a subset of SVOCs, were detected at concentrations in excess of their respective RSCOs in ten of the 17 soil samples collected at AOC-UST2. No SVOCs other than PAH compounds were detected at concentrations greater than their respective RSCOs. The soil samples collected from the 9-10 foot bgs depth interval at location UST2-4, the 6.5-7 foot bgs depth interval at location UST2-4A, the 6-6.5 ft bgs depth interval at UST2-4B, the 4.5-5 foot bgs depth interval at location UST2-6, the 9-9.5 foot bgs depth interval at location TWP-2, the 5-5.5 foot bgs depth interval at location TWP-3, and the 4.3-4.8 foot bgs depth interval at location TWP-5 did not contain any PAH compounds, or other SVOCs, at concentrations greater than their respective RSCOs. In addition, except for the soil sample collected from the 4-4.5 foot bgs depth interval at location TWP-1A, the soil samples contained concentrations of PAH compounds that are similar to the concentrations of those compounds throughout the Facility.

The concentration of TPHC ranged from non-detect in the soil samples collected at locations TWP-2 and TWP-5 to 48,000 mg/kg in the soil sample collected from the 6-8 foot bgs depth interval at soil boring location UST2-4. No RSCO has been established for TPHC in soil.

Quality Assurance/Quality Control Samples Associated with Soil Samples

To monitor the effectiveness of field decontamination procedures, the Port Authority prepared three field blanks by running laboratory-grade SI water over the stainless steel trowel used in the collection of soil samples. All three field blanks were analyzed for VOCs. No VOCs were detected in any of the three field blanks; therefore, field decontamination procedures were effective.

Summary of Groundwater Sampling Analytical Results and Appropriate NYSDEC Standards

As noted above, six soil borings were converted to temporary wells between May 13 and 24, 2005. The temporary wells were installed to confirm whether LNAPL was mobile, to access an LNAPL sample (if LNAPL migrated into one or more of the temporary wells), and to access a groundwater sample. Based upon measurements made using an oil/water indicator, LNAPL had not migrated into any temporary well as of May 24, 2005. Therefore, LNAPL samples could not be collected because a sufficient volume of LNAPL could not be separated from other matrices and it was concluded that the LNAPL in the vicinity of the temporary wells was immobile.

Groundwater samples were collected to determine whether LNAPL and/or impacted soils, known to be present in several areas in the vicinity of AOC-UST2, was/were acting as a source area for groundwater impacts. In order to confirm whether the LNAPL was acting as a source area, the six temporary wells were installed in two east-west lines. Each line of temporary wells included an upgradient temporary well, a temporary well located immediately downgradient of the LNAPL area, and a downgradient temporary well. The northern transect consisted of upgradient temporary well TWP-1A, LNAPL area temporary well TWP-2, and downgradient temporary well TWP-3. The southern transect consisted of upgradient temporary well TWP-4, LNAPL area temporary well TWP-5, and downgradient temporary well TWP-6. All groundwater samples were analyzed for PP VOCs, PP SVOCs, and TPHC. The analytical results are tabulated in Tables 4A and 4B and summarized below. Temporary well locations are shown on Figure 4.

For discussion purposes, the results have been compared, as appropriate, to current NYSDEC AWQSGVs. The NYSDEC AWQSGVs assume that groundwater is classified as GA, a potential drinking water source. Given the location of the Facility and the potential for water to be saline, the published AWQSGVs are not appropriate. However, at this time, these represent the only standards and guidance values available for ambient groundwater. Please note that the reference of these standards in this report does not represent any agreement or concurrence that the same are appropriate for usage at this site.

No targeted VOCs were detected in the groundwater samples. The concentration of VOC TICs ranged from non-detect at both downgradient temporary wells (TWP-3 and 6) and LNAPL area temporary well TWP-5 to 39.1 ug/L at upgradient temporary well TWP-1A.

Several targeted SVOCs were detected in the groundwater samples; however, the only SVOCs detected at concentrations greater than their respective AWQSGVs were naphthalene and phenol. Naphthalene was detected at a concentration greater than its AWQSGV at upgradient temporary well TWP-1A. Phenol was detected at a concentration greater than its AWQSGV at LNAPL area temporary well TWP-2 and upgradient temporary well TWP-1A. The concentration of total SVOC TICs ranged from 16 ug/L at LNAPL area temporary well TWP-5 to 1044.8 ug/L at upgradient temporary well TWP-1A.

TPHC was not detected in the groundwater samples collected from downgradient temporary wells TWP-3 and TWP-6, LNAPL area temporary well TWP-5, or upgradient well TWP-4. The concentration of

TPHC at upgradient well TWP-1A was 26.8 ug/L, while the concentration of TPHC at LNAPL area well TWP-2 was 2.2 ug/L.

Quality Assurance/Quality Control Associated with Groundwater Samples

To monitor the effectiveness of the field decontamination procedures, the Port Authority prepared and analyzed four field blanks. The field blanks were analyzed for TCL VOCs and were prepared by running laboratory-grade DI water over the sampling equipment.

The targeted VOC methylene chloride was detected in field blanks PI-FB-01-052405WQ01 and PI-FB-01-051905WQ01 (see Table 4A for a summary of the QA/QC results). Methylene chloride is a common laboratory contaminant, and the reported concentration for this compound in one of the field blanks was flagged with a "B," indicating that the compound was detected in an associated method blank. It is likely that the presence of this compound in the field blanks was due to laboratory contamination.

No other VOC was detected in either field blank.

6.2 Data Evaluation Portion of the SRI

Although fieldwork was not performed to evaluate the effect of groundwater impacts at Site 1 on the quality of surface water and sediment in Bridge Creek or to evaluate soil and groundwater quality in the vicinity of the hydrogen holders, HMM reviewed previous analytical data pertaining to these environmental issues. These data have been reported in the September 2004 report entitled *Revised – Site Investigation and Conceptual Remedial Workplan*; however, a summary of the relevant data are summarized in the following sections for the reader's convenience.

6.2.1 Previous Groundwater, Surface Water, and Sediment Analytical Results

Groundwater sampling was conducted at selected Site 1 wells during the SI and the Surcharge Pilot Study, conducted as part of the RI. Groundwater samples collected during both the SI and the RI were analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, TAL metals, TPHC, oil and grease, total cyanide, and total phenolics. One groundwater sample was collected from each of eight monitoring wells during the SI and each of six monitoring wells during the Surcharge Pilot Study. Please note, the wells sampled during the SI were located throughout Site 1, but the wells sampled during the Surcharge Pilot Study were located in exclusively in the northern half of Site 1. The groundwater analytical results are tabulated in Appendix C and are shown on the Figures provided in the same Appendix.

Surface water and sediment sampling was conducted concurrently with the groundwater sampling effort during the SI. Surface water samples, but not sediment samples, were collected concurrently with groundwater samples during the RI as well. The SI surface water and sediment sampling locations were selected based on their proximity to wells where groundwater samples were also collected and to a "white material" previously observed at Bridge Creek. The RI surface water samples were located in Bridge Creek adjacent to the surcharge soil stockpile. All surface water and sediment samples were analyzed for TAL metals. In addition, the surface water samples were analyzed for pH using portable pH meters. The surface water and sediment sampling results are tabulated in Appendix C.

The analytical results for the SI groundwater sampling effort indicates that the only substances detected at concentrations greater than their respective NYSDEC AWQSGVs were ethylbenzene, xylene, phenol, 1,2-benzphenanthracene, benzo(a)anthracene, and the metals arsenic and cadmium. The concentration of ethylbenzene and xylene exceeded their respective AWQSGVs only in the sample from PG-CS-7. The concentrations of 1,2-benzphenanthracene and benzo(a)anthracene were greater than their respective AWQSGVs only in the groundwater samples collected at well PG-EW-3. Cadmium was detected at a concentration greater than its AWQSGV only in the groundwater sample collected from well PG-RS-2. Phenol was the only compound, and arsenic was the only metal, that was detected at a concentration greater than its AWQSGV in more than one groundwater sample. Phenol was detected at a concentration greater than its AWQSGV in the groundwater sample collected at wells PG-PA-MW-6, PG-CS-7, PG-EW-6, and PG-PA-MW-1. With the exception of PG-PA-MW-6, these wells are all located in the northern half of Site 1. Well PG-PA-MW-6 is located on the western side of Site 1, approximately at the north-south midpoint of Site 1. Arsenic was detected at concentrations greater than its AWQSGV in four groundwater samples collected from wells in the southern portion of Site 1.

As previously noted, the surface water and sediment samples were not analyzed for organic compounds. Lead and magnesium were detected at concentrations greater than their respective RSWCS in all three surface water samples. Mercury was detected at a concentration greater than its RSWCS in only the upstream surface water sample. Arsenic, cadmium, chromium, copper, iron, manganese, and nickel were detected at concentrations greater than their respective RSWCS and beryllium and zinc at concentrations greater than their respective Recommended Surface Water Cleanup Guidance Values (an RSWCS is available for neither of these two metals) only in the downstream surface water sample. The pH of Bridge Creek was measured to be between 7.5 and 8.2. Arsenic and cadmium were the only two metals detected at concentrations greater than their respective AWQSGVs in groundwater samples collected

during the SI. Groundwater impacted by arsenic was generally present in the southern portion of Site 1. However, this area is more than 400 feet upstream of the surface water sample (SW-3) that exhibited an elevated concentration of arsenic. Neither of the two surface water samples collected downstream of the area where groundwater was impacted by arsenic and upstream of surface water sample SW-3 contained arsenic at concentrations greater than its RSWCO. The same is true for cadmium: the area where groundwater impacted by cadmium would discharge into Bridge Creek (based on groundwater elevation contour lines generated during the SI) is upstream of surface water samples that didn't contain elevated concentrations of cadmium, but downstream surface water sample SW-3 did contain an elevated level of cadmium. The source of the elevated concentrations of metals, including arsenic and cadmium, in downstream surface water sample SW-3 is therefore unclear.

All five sediment samples contained one or more of the following metals at concentrations greater than their respective NYSDEC Lower Effects Level (LEL) but below the Severe Effects Level (SEL): arsenic, cadmium, chromium, and mercury. Lead and zinc were detected at concentrations greater than their NYSDEC SELs at all sediment sampling locations. Iron, mercury, nickel, and silver were detected at concentrations greater than their respective NYSDEC SELs in at least one of the sediment samples collected during the SI. Please note, the SI sediment sampling analytical results do not exhibit a pattern of increasing or decreasing concentration in a downstream direction in Bridge Creek for any metal analyzed.

The analytical results for the RI groundwater sampling effort indicates that the only substances detected at concentrations greater than their respective NYSDEC AWQSGVs were xylene, phenol, and the metals antimony, arsenic, beryllium, iron, manganese, nickel, sodium, and thallium. The concentration of xylene exceeded its AWQSGVs at PG-CS-7 only. Phenol was detected at a concentration greater than its AWQSGV only in the groundwater sample collected from well PG-RS-1. Arsenic, iron, and sodium were the only metals that were detected at concentrations greater than their respective AWQSGVs in more than one groundwater sample. Arsenic was detected at concentrations greater than its AWQSGV only in the samples collected from wells PG-PA-MW-1S and PG-PA-MW-4S. Iron and sodium were detected at concentrations greater than their respective AWQSGVs at all wells sampled during the RI with the exception of well PG-CS-7, where sodium was the only metal detected at a concentration greater than its AWQSGV. The metals antimony, beryllium, and thallium were detected at concentrations greater than their respective AWQSGVs only in the sample collected from well PG-PA-MW-4S. Manganese was detected at concentrations greater than its AWQSGV only in the sample collected from well PG-PA-

MW-4D. Nickel was detected at a concentration greater than its AWQSGV only in the sample collected from well PG-PA-MW-1S.

As noted above, the surface water samples were not analyzed for organic compounds. The only metals detected at concentrations greater than their respective RSWCS or Guidance Values in any RI surface water sample were iron, magnesium, silver, and sodium. Of these four metals, iron and sodium were the only metals detected at concentrations greater than their respective AWQSGVs in groundwater samples collected during the RI. Magnesium was detected at a concentration greater than its RSWCS in all five surface water samples. Silver was detected at a concentration greater than its RSWCS in the upstream surface water sample. Iron was detected at a concentration greater than its Recommended Surface Water Cleanup Guidance Value (an RSWCS is not available for iron) in two of the five RI surface water samples. Sodium was detected at a concentration greater than its RSWCS in all surface water samples except the upstream surface water sample.

6.2.2 Previous Soil and Groundwater Analytical Results – Former Hydrogen Holders

The soil sampling locations nearest to the former hydrogen holders are PG-Wood-03, PG-Wood-3, PG-Wood-05, PG-PA-MW-6, and PG-PA-MW-6D. All five sampling locations are located within 100 feet of at least one of the two former hydrogen holders. As noted above, the concern regarding the hydrogen holders is not that the holders themselves could have discharged regulated substances, but rather that appurtenant equipment (air compressors, e.g.) could have discharged these substances. HMM's review of available records could not confirm the presence or location of any potential appurtenant equipment.

Seventeen soil samples were collected from the five locations situated nearest the locations of the former hydrogen holders, as based on Sanborn maps. All soil samples were analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, TAL metals, total cyanide, total phenolics, O&G, TPHC, and PCBs. The analytical results are tabulated in Tables 5A through 5D and are depicted on Figure 6.

The soil sampling analytical results indicate that no targeted VOCs, pesticides, PCBs, total cyanide, or total phenolics were detected at concentrations greater than their respective RSCOs. The SVOC benzo(b)fluoranthene was detected at a concentration greater than its RSCO in only two of the 17 soil samples evaluated. The SVOC phenol was also detected at a concentration greater than its RSCO in only two of the soil samples. The following metals were detected at concentrations greater than their

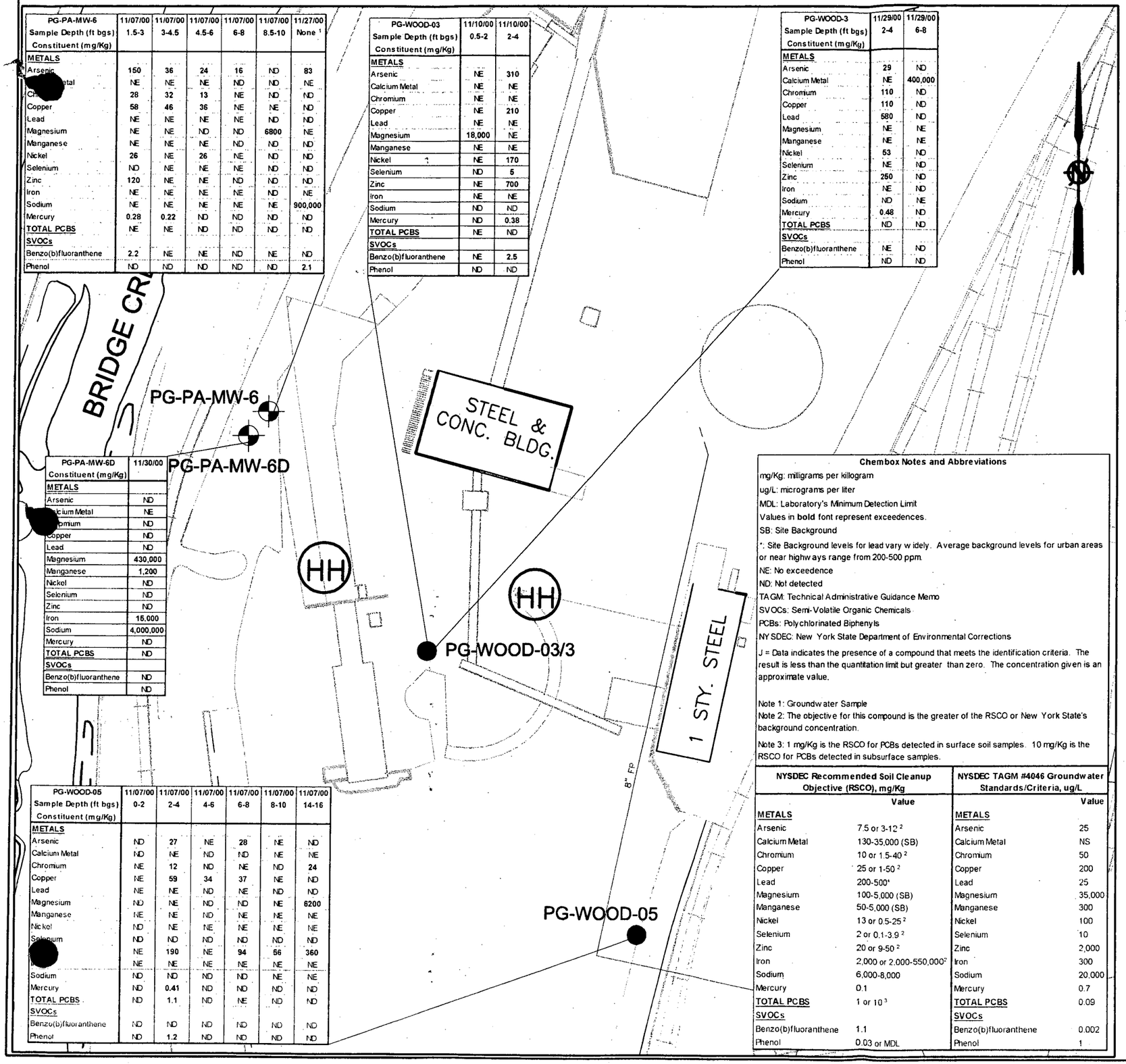
PG-PA-MW-6 Sample Depth (ft bgs) Constituent (mg/Kg)	11/07/00 1.5-3	11/07/00 3-4.5	11/07/00 4.5-6	11/07/00 6-8	11/07/00 8.5-10	11/27/00 None [1]
METALS						
Arsenic	150	36	24	16	ND	83
[illegible]tal	NE	NE	NE	ND	ND	NE
Chromium	28	32	13	NE	ND	ND
Copper	58	46	36	NE	NE	ND
Lead	NE	NE	NE	NE	ND	ND
Magnesium	NE	NE	ND	ND	6800	NE
Manganese	NE	NE	NE	ND	ND	ND
Nickel	26	NE	26	NE	ND	ND
Selenium	ND	NE	NE	NE	ND	ND
Zinc	120	NE	NE	ND	ND	ND
Iron	NE	NE	NE	NE	ND	NE
Sodium	NE	NE	NE	NE	NE	900,000
Mercury	0.28	0.22	ND	ND	ND	ND
TOTAL PCBS	NE	NE	ND	ND	ND	ND
SVOCs						
Benzo(b)fluoranthene	2.2	NE	NE	ND	NE	ND
Phenol	ND	ND	ND	ND	ND	2.1

PG-WOOD-03 Sample Depth (ft bgs) Constituent (mg/Kg)	11/10/00 0.5-2	11/10/00 2-4
METALS		
Arsenic	NE	310
Calcium Metal	NE	NE
Chromium	NE	NE
Copper	NE	210
Lead	NE	NE
Magnesium	18,000	NE
Manganese	NE	NE
Nickel	NE	170
Selenium	ND	5
Zinc	NE	700
Iron	NE	NE
Sodium	ND	ND
Mercury	ND	0.38
TOTAL PCBS	NE	ND
SVOCs		
Benzo(b)fluoranthene	NE	2.5
Phenol	ND	ND

PG-WOOD-3 Sample Depth (ft bgs) Constituent (mg/Kg)	11/29/00 2-4	11/29/00 6-8
METALS		
Arsenic	29	ND
Calcium Metal	NE	400,000
Chromium	110	ND
Copper	110	ND
Lead	580	ND
Magnesium	NE	NE
Manganese	NE	NE
Nickel	53	ND
Selenium	NE	ND
Zinc	250	ND
Iron	NE	ND
Sodium	ND	NE
Mercury	0.48	ND
TOTAL PCBS	ND	ND
SVOCs		
Benzo(b)fluoranthene	NE	ND
Phenol	ND	ND

PG-PA-MW-6D Constituent (mg/Kg)	11/30/00
METALS	
Arsenic	ND
[illegible]cium Metal	NE
[illegible]omium	ND
Copper	ND
Lead	ND
Magnesium	430,000
Manganese	1,200
Nickel	ND
Selenium	ND
Zinc	ND
Iron	15,000
Sodium	4,000,000
Mercury	ND
TOTAL PCBS	ND
SVOCs	
Benzo(b)fluoranthene	ND
Phenol	ND

PG-WOOD-05 Sample Depth (ft bgs) Constituent (mg/Kg)	11/07/00 0-2	11/07/00 2-4	11/07/00 4-6	11/07/00 6-8	11/07/00 8-10	11/07/00 14-16
METALS						
Arsenic	ND	27	NE	28	NE	ND
Calcium Metal	ND	NE	ND	ND	NE	NE
Chromium	NE	12	ND	NE	ND	24
Copper	NE	59	34	37	NE	ND
Lead	NE	NE	ND	NE	ND	ND
Magnesium	ND	NE	ND	ND	NE	6200
Manganese	NE	NE	ND	NE	NE	NE
Nickel	ND	NE	NE	NE	NE	NE
Selenium	ND	ND	ND	ND	ND	ND
[illegible]	NE	190	NE	94	56	360
[illegible]	NE	NE	NE	NE	NE	NE
Sodium	ND	ND	ND	ND	NE	NE
Mercury	ND	0.41	ND	ND	ND	ND
TOTAL PCBS	ND	1.1	ND	NE	ND	ND
SVOCs						
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND
Phenol	ND	1.2	ND	ND	ND	ND



Chembox Notes and Abbreviations

mg/Kg: milligrams per killogram

ug/L: micrograms per liter

MDL: Laboratory's Minimum Detection Limit

Values in **bold** font represent exceedences.

SB: Site Background

*: Site Background levels for lead vary w idely. Average background levels for urban areas or near highw ays range from 200-500 ppm.

NE: No exceedence

ND: Not detected

TAGM: Technical Administrative Guidance Memo

SVOCs: Semi-Volatile Organic Chemicals

PCBs: Polychlorinated Biphenyls

NYSDEC: New York State Department of Environmental Corrections

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

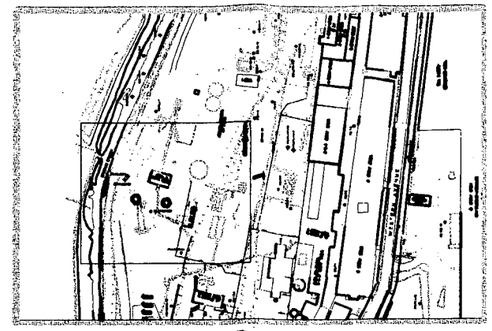
Note 1: Groundw ater Sample

Note 2: The objective for this compound is the greater of the RSCO or New York State's background concentration.

Note 3: 1 mg/Kg is the RSCO for PCBs detected in surface soil samples. 10 mg/Kg is the RSCO for PCBs detected in subsurface samples.

NYSDEC Recommended Soil Cleanup Objective (RSCO), mg/Kg	Value
METALS	
Arsenic	7.5 or 3-12 [2]
Calcium Metal	130-35,000 (SB)
Chromium	10 or 1.5-40 [2]
Copper	25 or 1-50 [2]
Lead	200-500*
Magnesium	100-5,000 (SB)
Manganese	50-5,000 (SB)
Nickel	13 or 0.5-25 [2]
Selenium	2 or 0.1-3.9 [2]
Zinc	20 or 9-50 [2]
Iron	2,000 or 2,000-550,000 [2]
Sodium	6,000-8,000
Mercury	0.1
TOTAL PCBS	1 or 10 [3]
SVOCs	
Benzo(b)fluoranthene	1.1
Phenol	0.03 or MDL

NYSDEC TAGM #4046 Groundwater Standards/Criteria, ug/L	Value
METALS	
Arsenic	25
Calcium Metal	NS
Chromium	50
Copper	200
Lead	25
Magnesium	35,000
Manganese	300
Nickel	100
Selenium	10
Zinc	2,000
Iron	300
Sodium	20,000
Mercury	0.7
TOTAL PCBS	0.09
SVOCs	
Benzo(b)fluoranthene	0.002
Phenol	1



AREA ENLARGED

LEGEND:

PG-PA-MW-6D — SI SOIL SAMPLING LOCATION

PG-WOOD-03/3 — SI MONITORING WELL LOCATION

RAILROAD TRACKS

HH — FORMER HYDROGEN HOLDER TANK LOCATION

NOTES:

1) ADDITIONAL UNDERGROUND UTILITIES MAY OR MAY NOT EXIST IN THIS VICINITY.
2) PORTIONS OF THE RAILROAD TRACKS ARE VISIBLE AT LAND SURFACE AND PORTIONS OF THE RAILROAD TRACKS ARE BELOW GRADE OR HAVE BEEN REMOVED. THE FIGURE SHOWS THE ORIGINAL EXTENT OF THE RAILROAD TRACKS.
3) SOIL SAMPLING RESULTS ARE PROVIDED ONLY FOR SOIL SAMPLES COLLECTED WITHIN 100 FEET OF AT LEAST ONE OF THE TWO FORMER HYDROGEN HOLDERS.
4) GROUNDWATER SAMPLING RESULTS ARE PROVIDED ONLY FOR SAMPLES COLLECTED FROM WELLS LOCATED DOWNGRADIENT OF THE FORMER HYDROGEN HOLDERS.

SCALE: 1"=30'

30' 0' 30' 60'

SCALE IN FEET

Sheet of

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

(BLOCK 1400, LOT 1) HHMT-PORT IVORY FACILITY

SOIL AND GROUNDWATER SAMPLING LOCATIONS AND ANALYTICAL RESULTS-HYDTROGEN HOLDERS AOC

Designed by EMM Drawn by BRC Checked by

Date 12/27/2005

Contract Number

Drawing Number FIGURE 6

B C

TABLE 5A
SUMMARY OF SOIL ANALYTICAL RESULTS-VOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location	NYSDEC RSCO (mg/Kg)	PG-WOOD-03		PG-WOOD-03		PG-WOOD-3		PG-WOOD-3		PG-WOOD-05		PG-WOOD-05	
Field ID		PG-WD-03		PG-WD-03		PG-WD-3		PG-WD-3		PG-WD-05		PG-WD-05	
Sampling Date		11/10/2000		11/10/2000		11/29/2000		11/29/2000		11/7/2005		11/7/2000	
Matrix		Soil		Soil		Soil		Soil		Soil		Soil	
Sample Depth		0.5-2 ft bgs		2-4 ft bgs		2-4 ft bgs		6-8 ft bgs		0-2 ft bgs		2-4 ft bgs	
Units		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
1,1,1-Trichloroethane	0.8	ND		ND		ND		ND		ND		ND	
1,1,2,2-Tetrachloroethane	0.6	ND		ND		ND		ND		ND		ND	
1,2,4-Trichlorobenzene	3.4	ND		ND		ND		ND		ND		ND	
1,1,2-Trichloroethane	0.8 [1]	ND		ND		ND		ND		ND		ND	
1,1-Dichloroethane	0.2	ND		ND		ND		ND		ND		ND	
1,1-Dichloroethene	0.4	ND		ND		ND		ND		ND		ND	
1,2-Dichloroethane	0.1	ND		ND		ND		ND		ND		ND	
1,2-Dichloropropane	0.3 [2]	ND		ND		ND		ND		ND		ND	
2-Chloroethyl vinyl ether	NS	ND		ND		ND		ND		ND		ND	
Acrolein	NS	ND		ND		ND		ND		ND		ND	
Acrylonitrile	NS	ND		ND		ND		ND		ND		ND	
Benzene	0.06	ND		ND		ND		ND		ND		ND	
Bromodichloromethane	NS	ND		ND		ND		ND		ND		ND	
1,2-Dichlorobenzene	7.9	ND		ND		ND		ND		ND		ND	
1,4-Dichlorobenzene	8.5	ND		ND		ND		ND		ND		ND	
Bromoform	NS	ND		ND		ND		ND		ND		ND	
Bromomethane	NS	ND		ND		ND		ND		ND		ND	
Carbon Tetrachloride	0.6	ND		ND		ND		ND		ND		ND	
Chlorobenzene	1.7	ND		ND		ND		ND		ND		ND	
Chloroethane	1.9	ND		ND		ND		ND		ND		ND	
Chloroform	0.3	ND		ND		ND		ND		ND		ND	
Chloromethane	NS	ND		ND		ND		ND		ND		ND	
Cis-1,3-Dichloropropene	NS	ND		ND		ND		ND		ND		ND	
Dibromochloromethane	NS	ND		ND		ND		ND		ND		ND	
Dichloromethane	0.1	0.0028	J,B	0.0025	J,B	0.0058	J,B	0.0089	J,B	ND		ND	
Ethylbenzene	5.5	ND		ND		ND		ND		ND		ND	
M&P-Xylenes	1.2	ND		ND		ND		ND		ND		ND	
Methylbenzene	NS	ND		ND		ND		ND		ND		ND	
O-Xylene	1.2	ND		ND		ND		ND		ND		ND	
Tetrachloroethylene	1.4	ND		ND		ND		ND		ND		ND	
trans-1,2-Dichloroethylene	0.3	ND		ND		ND		ND		ND		ND	
trans-1,3-Dichloropropene	NS	ND		ND		ND		ND		ND		ND	
Trichloroethylene	0.7	ND		ND		ND		ND		ND		ND	
Vinyl chloride	0.2	ND		ND		ND		ND		ND		ND	
Total Confident VOCs		0		0		0		0		0		0	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
RSCO: Recommended Soil Cleanup Objective
VOC: Volatile Organic Compound
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs: Feet below ground surface
NS: No standard
ND: Not detected
B: The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
J: Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.

1: This RSCO is for 1,1,1-Trichloroethane.
2: This RSCO is for 1,3-Dichloropropane.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.

TABLE 5A
SUMMARY OF SOIL ANALYTICAL RESULTS-VOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-WOOD-05 PG-WD-05 11/7/2000 Soil 4-6 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 6-8 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 8-10 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 14-16 ft bgs mg/Kg	
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
1,1,1-Trichloroethane	0.8	ND		ND		ND		ND	
1,1,2,2-Tetrachloroethane	0.6	ND		ND		ND		ND	
1,2,4-Trichlorobenzene	3.4	ND		ND		ND		ND	
1,1,2-Trichloroethane	0.8 [1]	ND		ND		ND		ND	
1,1-Dichloroethane	0.2	ND		ND		ND		ND	
1,1-Dichloroethene	0.4	ND		ND		ND		ND	
1,2-Dichloroethane	0.1	ND		ND		ND		ND	
1,2-Dichloropropane	0.3 [2]	ND		ND		ND		ND	
2-Chloroethyl vinyl ether	NS	ND		ND		ND		ND	
Acrolein	NS	ND		ND		ND		ND	
Acrylonitrile	NS	ND		ND		ND		ND	
Benzene	0.06	ND		ND		ND		ND	
Bromodichloromethane	NS	ND		ND		ND		ND	
1,2-Dichlorobenzene	7.9	ND		ND		ND		ND	
1,4-Dichlorobenzene	8.5	ND		ND		ND		ND	
Bromoform	NS	ND		ND		ND		ND	
Bromomethane	NS	ND		ND		ND		ND	
Carbon Tetrachloride	0.6	ND		ND		ND		ND	
Chlorobenzene	1.7	ND		ND		ND		0.018	
Chloroethane	1.9	ND		ND		ND		ND	
Chloroform	0.3	ND		ND		ND		ND	
Chloromethane	NS	ND		ND		ND		ND	
Cis-1,3-Dichloropropene	NS	ND		ND		ND		ND	
Dibromochloromethane	NS	ND		ND		ND		ND	
Dichloromethane	0.1	0.0043	J	0.0079		ND		0.0086	J,B
Ethylbenzene	5.5	ND		ND		ND		0.0084	
M&P-Xylenes	1.2	ND		ND		ND		0.0047	J
Methylbenzene	NS	ND		ND		ND		0.024	
O-Xylene	1.2	ND		ND		ND		ND	
Tetrachloroethylene	1.4	ND		ND		ND		ND	
trans-1,2-Dichloroethylene	0.3	ND		ND		ND		ND	
trans-1,3-Dichloropropene	NS	ND		ND		ND		ND	
Trichloroethylene	0.7	ND		ND		ND		ND	
Vinyl chloride	0.2	ND		ND		ND		ND	
Total Confident VOCs		0		0.0079		0		0.05	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
RSCO: Recommended Soil Cleanup Objective
VOC: Volatile Organic Compound
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs: Feet below ground surface
NS: No standard
ND: Not detected
B: The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
J: Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.
1: This RSCO is for 1,1,1-Trichloroethane.
2: This RSCO is for 1,3-Dichloropropane.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.

TABLE 5A
SUMMARY OF SOIL ANALYTICAL RESULTS-VOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location		PG-PA-MW-6		PG-PA-MW-6		PG-PA-MW-6		PG-PA-MW-6		PG-PA-MW-6	
Field ID		PG-MWPA-06		PG-MWPA-06		PG-MWPA-06		PG-MWPA-06		PG-MWPA-06	
Sampling Date	NYSDEC RSCO	11/7/2000		11/7/2000		11/7/2000		11/7/2000		11/7/2000	
Matrix	(mg/Kg)	Soil		Soil		Soil		Soil		Soil	
Sample Depth		1.5-3 ft bgs		3-4.5 ft bgs		4.5-6 ft bgs		6-8 ft bgs		8.5-10 ft bgs	
Units		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
1,1,1-Trichloroethane	0.8	ND		ND		ND		ND		ND	
1,1,2,2-Tetrachloroethane	0.6	ND		ND		ND		ND		ND	
1,2,4-Trichlorobenzene	3.4	ND		ND		ND		ND		ND	
1,1,2-Trichloroethane	0.8 [1]	ND		ND		ND		ND		ND	
1,1-Dichloroethane	0.2	ND		ND		ND		ND		ND	
1,1-Dichloroethene	0.4	ND		ND		ND		ND		ND	
1,2-Dichloroethane	0.1	ND		ND		ND		ND		ND	
1,2-Dichloropropane	0.3 [2]	ND		ND		ND		ND		ND	
2-Chloroethyl vinyl ether	NS	ND		ND		ND		ND		ND	
Acrolein	NS	ND		ND		ND		ND		ND	
Acrylonitrile	NS	ND		ND		ND		ND		ND	
Benzene	0.06	ND		ND		ND		ND		ND	
Bromodichloromethane	NS	ND		ND		ND		ND		ND	
1,2-Dichlorobenzene	7.9	ND		ND		ND		ND		ND	
1,4-Dichlorobenzene	8.5	ND		ND		ND		ND		ND	
Bromoform	NS	ND		ND		ND		ND		ND	
Bromomethane	NS	ND		ND		ND		ND		ND	
Carbon Tetrachloride	0.6	ND		ND		ND		ND		ND	
Chlorobenzene	1.7	ND		ND		ND		ND		ND	
Chloroethane	1.9	ND		ND		ND		ND		ND	
Chloroform	0.3	ND		ND		ND		ND		ND	
Chloromethane	NS	ND		ND		ND		ND		ND	
Cis-1,3-Dichloropropene	NS	ND		ND		ND		ND		ND	
Dibromochloromethane	NS	ND		ND		ND		ND		ND	
Dichloromethane	0.1	0.0041	J	0.0036	J	0.004	J,B	0.005	J	0.0059	J
Ethylbenzene	5.5	ND		ND		ND		ND		ND	
M&P-Xylenes	1.2	ND		ND		ND		ND		ND	
Methylbenzene	NS	ND		ND		ND		ND		ND	
O-Xylene	1.2	ND		ND		ND		ND		ND	
Tetrachloroethylene	1.4	ND		ND		ND		ND		ND	
trans-1,2-Dichloroethylene	0.3	ND		ND		ND		ND		ND	
trans-1,3-Dichloropropene	NS	ND		ND		ND		ND		ND	
Trichloroethylene	0.7	ND		ND		ND		ND		ND	
Vinyl chloride	0.2	ND		ND		ND		ND		ND	
Total Confident VOCs		0		0		0		0		0	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
RSCO: Recommended Soil Cleanup Objective
VOC: Volatile Organic Compound
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs: Feet below ground surface
NS: No standard
ND: Not detected
B: The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
J: Compound detected at a concentration lower than the reporting limit and the calibration range for the compound.
1: This RSCO is for 1,1,1-Trichloroethane.
2: This RSCO is for 1,3-Dichloropropane.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.

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TABLE 5B
SUMMARY OF SOIL ANALYTICAL RESULTS-SVOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-WOOD-03 PG-WD-03 11/10/2000 Soil 0.5-2 ft bgs mg/Kg		PG-WOOD-03 PG-WD-03 11/10/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 6-8 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2005 Soil 0-2 ft bgs mg/Kg	
SVOCs		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
1,2-Benzphenanthracene	Note 1	0.06	J	1.1		0.15	J	ND		ND	
1,2-Diphenylhydrazine	Note 1	ND		ND		ND		ND		ND	
2,4,6-Trichlorophenol	0.1[2]	ND		ND		ND		ND		ND	
2,4-Dichlorophenol	0.4	ND		ND		ND		ND		ND	
2,4-Dimethyphenol	Note 1	ND		ND		ND		ND		ND	
2,4-Dinitrophenol	MDL	ND		ND		ND		ND		ND	
2,4-Dinitrotoluene	Note 1	ND		ND		ND		ND		ND	
2,6-Dinitrotoluene	1	ND		ND		ND		ND		ND	
2-Chlornaphthalene	Note 1	ND		ND		ND		ND		ND	
2-Chlorophenol	0.8	ND		ND		ND		ND		ND	
2-Nitrophenol	MDL	ND		ND		ND		ND		ND	
3,3'-Dichlorobenzidine	Note 1	ND		ND		ND		ND		ND	
4,6-Dinitro-o-cresol	Note 1	ND		ND		ND		ND		ND	
4-Bromophenylphenyl ether	Note 1	ND		ND		ND		ND		ND	
4-Chloro-3-methylphenol	0.240 or MDL	ND		ND		ND		ND		ND	
4-Chlorophenylphenyl ether	Note 1	ND		ND		ND		ND		ND	
4-Nitrophenol	MDL	ND		ND		ND		ND		ND	
Acenaphthene	Note 1	ND		0.088	J	ND		ND		ND	
Acenaphthylene	41	ND		0.14	J	ND		ND		ND	
Anthracene	Note 1	ND		0.32		ND		ND		ND	
Benzidine	Note 1	ND		ND		ND		ND		ND	
Benzo(a)anthracene	MDL	0.047	J	0.95		0.10	J	ND		ND	
Benzo(a)pyrene	MDL	0.039	J	0.97		0.11	J	ND		ND	
Benzo(b)fluoranthene	1.1	0.086	J	2.5		0.18	J	ND		ND	
Benzo(g,h,I)perylene	Note 1	ND		0.31		0.11	J	ND		ND	
Benzo(k)fluoranthene	1.1	ND		ND		0.073	J	ND		ND	
Benzyl butyl phthalate	Note 1	ND		ND		ND		ND		ND	
Bis(2-chloroethoxy)methane	Note 1	ND		ND		ND		ND		ND	
Bis(2-chloroethyl)ether	Note 1	ND		ND		ND		ND		ND	
Bis(2-Chloroisopropyl)ether	Note 1	ND		ND		ND		ND		ND	
Bis(2-ethylhexyl)phthalate	Note 1	0.4	B	0.23	B	0.17	J,B	0.34	B	0.21	
Di-n-butyl phthalate	8.1	ND		ND		ND		ND		0.20	
Di-n-octyl phthalate	Note 1	0.052	J	0.089	J	ND		0.067	J	0.097	J,B
Dibenz(a,h)anthracene	MDL	ND		ND		ND		ND		ND	
Diethyl phthalate	7.1	ND		ND		ND		ND		ND	
Dimethyl phthalate	2	ND		ND		ND		ND		ND	
Fluoranthene	MDL	0.09	J	1.6		0.14	J	ND		ND	
Fluorene	MDL	ND		0.11	J	ND		ND		ND	
Hexachloro-1,3-butadiene	NS	ND		ND		ND		ND		ND	
Hexachlorobenzene	0.41	ND		ND		ND		ND		ND	
Hexachlorocyclopentadiene	Note 1	ND		ND		ND		ND		ND	
Hexachloroethane	Note 1	ND		ND		ND		ND		ND	
Indeno(1,2,3-CD)pyrene	3.2	ND		0.33		0.096	J	ND		ND	
Isophorone	4.4	ND		ND		ND		ND		ND	
M-Dichlorobenzene	Note 1	ND		ND		ND		ND		ND	
N-Nitroso-di-n-propylamine	Note 1	ND		ND		ND		ND		ND	
N-Nitrosodimethylamine	Note 1	ND		ND		ND		ND		ND	
N-Nitrosodiphenylamine	Note 1	ND		ND		ND		ND		ND	
Naphthalene	13	ND		0.20		0.07	J	ND		ND	
Nitrobenzene	MDL	ND		ND		ND		ND		ND	
Pentachlorophenol	1.0 or MDL	ND		ND		ND		ND		ND	
Phenanthrene	Note 1	0.07	J	1.1		0.12	J	ND		ND	
Phenol	0.03 or MDL	ND		ND		ND		ND		ND	
Pyrene	Note 1	0.1	J	1.5		0.15	J	ND		ND	
Total Confident SVOCs	500	0		10.88		0		0		0.41	

TABLE 5B
SUMMARY OF SOIL ANALYTICAL RESULTS-SVOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location		PG-WOOD-05		PG-WOOD-05		PG-WOOD-05		PG-WOOD-05		PG-WOOD-05		PG-PA-MW-6	
Field ID		PG-WD-05		PG-WD-05		PG-WD-05		PG-WD-05		PG-WD-05		PG-MWPA-06	
Sampling Date		11/7/2000		11/7/2000		11/7/2000		11/7/2000		11/7/2000		11/7/2000	
Matrix		Soil		Soil		Soil		Soil		Soil		Soil	
Sample Depth		2-4 ft bgs		4-6 ft bgs		6-8 ft bgs		8-10 ft bgs		14-16 ft bgs		1.5-3 ft bgs	
Units	NYSDEC RSCO (mg/Kg)	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
SVOCs		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
1,2-Benzphenanthracene	Note 1	ND		ND		ND		ND		ND		1.3	
1,2-Diphenylhydrazine	Note 1	ND		ND		ND		ND		ND		ND	
2,4,6-Trichlorophenol	0.1 [2]	ND		ND		ND		ND		ND		ND	
2,4-Dichlorophenol	0.4	ND		ND		ND		ND		ND		ND	
2,4-Dimethyphenol	Note 1	ND		ND		ND		ND		ND		ND	
2,4-Dinitrophenol	MDL	ND		ND		ND		ND		ND		ND	
2,4-Dinitrotoluene	Note 1	ND		ND		ND		ND		ND		ND	
2,6-Dinitrotoluene	1	ND		ND		ND		ND		ND		ND	
2-Chlornaphthalene	Note 1	ND		ND		ND		ND		ND		ND	
2-Chlorophenol	0.8	ND		ND		ND		ND		ND		ND	
2-Nitrophenol	MDL	ND		ND		ND		ND		ND		ND	
3,3'-Dichlorobenzidine	Note 1	ND		ND		ND		ND		ND		ND	
4,6-Dinitro-o-cresol	Note 1	ND		ND		ND		ND		ND		ND	
4-Bromophenylphenyl ethe	Note 1	ND		ND		ND		ND		ND		ND	
4-Chloro-3-methylphenol	0.240 or MDL	ND		ND		ND		ND		ND		ND	
4-Chlorophenylphenyl ethe	Note 1	ND		ND		ND		ND		ND		ND	
4-Nitrophenol	MDL	ND		ND		ND		ND		ND		ND	
Acenaphthene	Note 1	ND		ND		ND		ND		ND		0.38	
Acenaphthylene	41	ND		ND		ND		ND		ND		0.16	J
Anthracene	Note 1	ND		ND		ND		ND		ND		2.7	
Benzidine	Note 1	ND		ND		ND		ND		ND		ND	
Benzo(a)anthracene	MDL	ND		ND		ND		ND		ND		1.1	
Benzo(a)pyrene	MDL	ND		ND		ND		ND		ND		1.2	
Benzo(b)fluoranthene	1.1	ND		ND		ND		ND		ND		2.2	
Benzo(g,h,I)perylene	Note 1	ND		ND		ND		ND		ND		0.43	
Benzo(k)fluoranthene	1.1	ND		ND		ND		ND		ND		ND	
Benzyl butyl phthalate	Note 1	ND		ND		ND		ND		ND		ND	
Bis(2-chloroethoxy)methan	Note 1	ND		ND		ND		ND		ND		ND	
Bis(2-chloroethyl)ether	Note 1	ND		ND		ND		ND		ND		ND	
Bis(2-Chloroisopropyl)ether	Note 1	ND		ND		ND		ND		ND		ND	
Bis(2-ethylhexyl)phthalate	Note 1	ND		ND		ND		ND		ND		ND	
Di-n-butyl phthalate	8.1	ND		ND		ND		0.16	J	0.29	J	ND	
Di-n-octyl phthalate	Note 1	ND		0.05	J,B	ND		ND		0.16	J,B	0.038	J
Dibenz(a,h)anthracene	MDL	ND		ND		ND		ND		ND		0.28	
Diethyl phthalate	7.1	ND		ND		ND		ND		ND		ND	
Dimethyl phthalate	2	ND		ND		ND		ND		ND		ND	
Fluoranthene	MDL	ND		ND		ND		ND		ND		2.2	
Fluorene	MDL	ND		ND		ND		ND		ND		0.26	
Hexachloro-1,3-butadiene	NS	ND		ND		ND		ND		ND		ND	
Hexachlorobenzene	0.41	ND		ND		ND		ND		ND		ND	
Hexachlorocyclopentadiene	Note 1	ND		ND		ND		ND		ND		ND	
Hexachloroethane	Note 1	ND		ND		ND		ND		ND		ND	
Indeno(1,2,3-CD)pyrene	3.2	ND		ND		ND		ND		ND		0.47	
Isophorone	4.4	ND		ND		ND		ND		ND		ND	
M-Dichlorobenzene	Note 1	ND		ND		ND		ND		ND		ND	
N-Nitroso-di-n-propylamine	Note 1	ND		ND		ND		ND		ND		ND	
N-Nitrosodimethylamine	Note 1	ND		ND		ND		ND		ND		ND	
N-Nitrosodiphenylamine	Note 1	ND		ND		ND		ND		ND		ND	
Naphthalene	13	ND		ND		ND		0.13	J	ND		0.33	
Nitrobenzene	MDL	ND		ND		ND		ND		ND		ND	
Pentachlorophenol	1.0 or MDL	ND		ND		ND		ND		ND		ND	
Phenanthrene	Note 1	ND		ND		ND		ND		ND		1.6	
Phenol	0.03 or MDL	1.2		ND		ND		ND		ND		ND	
Pyrene	Note 1	ND		ND		ND		ND		ND		2.0	
Total Confident SVOCs	500	1.2		0		0		0		0		16.45	

TABLE 5B
SUMMARY OF SOIL ANALYTICAL RESULTS-SVOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 3-4.5 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 4.5-6 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 6-8 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 8.5-10 ft bgs mg/Kg	
SVOCs		Conc	Qual	Conc	Qual	Conc	Oual	Conc	Qual
1,2-Benzphenanthracene	Note 1	0.22		0.12	J	0.08	J	0.12	J
1,2-Diphenylhydrazine	Note 1	ND		ND		ND		ND	
2,4,6-Trichlorophenol	0.1 [2]	ND		ND		ND		ND	
2,4-Dichlorophenol	0.4	ND		ND		ND		ND	
2,4-Dimethyphenol	Note 1	ND		ND		ND		ND	
2,4-Dinitrophenol	MDL	ND		ND		ND		ND	
2,4-Dinitrotoluene	Note 1	ND		ND		ND		ND	
2,6-Dinitrotoluene	1	ND		ND		ND		ND	
2-Chlornaphthalene	Note 1	ND		ND		ND		ND	
2-Chlorophenol	0.8	ND		ND		ND		ND	
2-Nitrophenol	MDL	ND		ND		ND		ND	
3,3'-Dichlorobenzidine	Note 1	ND		ND		ND		ND	
4,6-Dinitro-o-cresol	Note 1	ND		ND		ND		ND	
4-Bromophenylphenyl ethe	Note 1	ND		ND		ND		ND	
4-Chloro-3-methylphenol	0.240 or MDL	ND		ND		ND		ND	
4-Chlorophenylphenyl ethe	Note 1	ND		ND		ND		ND	
4-Nitrophenol	MDL	ND		ND		ND		ND	
Acenaphthene	Note 1	ND		ND		ND		ND	
Acenaphthylene	41	ND		ND		ND		ND	
Anthracene	Note 1	0.052	J	ND		ND		ND	
Benzidine	Note 1	ND		ND		ND		ND	
Benzo(a)anthracene	MDL	0.14	J	0.072	J	ND		0.061	J
Benzo(a)pyrene	MDL	0.12	J	0.049	J	ND		ND	
Benzo(b)fluoranthene	1.1	0.20		0.059	J	ND		0.063	J
Benzo(g,h,I)perylene	Note 1	0.065	J	ND		ND		ND	
Benzo(k)fluoranthene	1.1	ND		0.049	J	ND		ND	
Benzyl butyl phthalate	Note 1	ND		ND		ND		ND	
Bis(2-chloroethoxy)methan	Note 1	ND		ND		ND		ND	
Bis(2-chloroethyl)ether	Note 1	ND		ND		ND		ND	
Bis(2-Chloroisopropyl)ether	Note 1	ND		ND		ND		ND	
Bis(2-ethylhexyl)phthalate	Note 1	0.055	J	ND		ND		0.076	J
Di-n-butyl phthalate	8.1	0.06	J	0.072	J	0.063	J	0.068	J
Di-n-octyl phthalate	Note 1	0.06	J	0.079	J	ND		ND	
Dibenz(a,h)anthracene	MDL	0.04	J	ND		ND		ND	
Diethyl phthalate	7.1	ND		ND		ND		ND	
Dimethyl phthalate	2	ND		ND		ND		ND	
Fluoranthene	MDL	0.18	J	0.094	J	ND		0.085	J
Fluorene	MDL	ND		ND		ND		ND	
Hexachloro-1,3-butadiene	NS	ND		ND		ND		ND	
Hexachlorobenzene	0.41	ND		ND		ND		ND	
Hexachlorocyclopentadiene	Note 1	ND		ND		ND		ND	
Hexachloroethane	Note 1	ND		ND		ND		ND	
Indeno(1,2,3-CD)pyrene	3.2	0.059	J	ND		ND		ND	
Isophorone	4.4	ND		ND		ND		ND	
M-Dichlorobenzene	Note 1	ND		ND		ND		ND	
N-Nitroso-di-n-propylamine	Note 1	ND		ND		ND		ND	
N-Nitrosodimethylamine	Note 1	ND		ND		ND		ND	
N-Nitrosodiphenylamine	Note 1	ND		ND		ND		ND	
Naphthalene	13	0.22		0.15	J	ND		ND	
Nitrobenzene	MDL	ND		ND		ND		ND	
Pentachlorophenol	1.0 or MDL	ND		ND		ND		ND	
Phenanthrene	Note 1	0.46		0.26		ND		0.093	J
Phenol	0.03 or MDL	ND		ND		ND		ND	
Pyrene	Note 1	0.21		0.10	J	ND		0.11	J
Total Confident SVOCs	500	1.3		0.26		0		0	

TABLE 5B
SUMMARY OF SOIL ANALYTICAL RESULTS-SVOCS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs: Feet below ground surface
ND: Not detected

B: The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
J: Compound detected at a concentration lower than the reporting limit and the calibration range for the compound. Estimated concentration range is provided.
Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

1: As per TAGM #4046, the RSCO for individual SVOCs is 50 ppm.
2: This RSCO is for 2,4,5-Trichlorophenol
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4: Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

TABLE 5C
SUMMARY OF SOIL ANALYTICAL RESULTS-PESTICIDES AND PCBS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-WOOD-03 PG-WD-03 11/10/2000 Soil 0.5-2 ft bgs mg/Kg		PG-WOOD-03 PG-WD-03 11/10/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 6-8 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2005 Soil 0-2 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 2-4 ft bgs mg/Kg	
PESTICIDES		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
4,4'-DDD	2.9	ND		ND		ND		ND		ND		ND	
4,4'-DDE	2.1	ND		ND		ND		ND		ND		ND	
4,4'-DDT	2.1	0.012		ND		ND		ND		ND		0.13	
Aldrin	0.041	ND		ND		ND		ND		ND		ND	
Alpha-BHC	0.11	ND		ND		ND		ND		ND		ND	
Beta-BHC	0.2	ND		ND		ND		ND		ND		ND	
Chlordane	0.54	ND		ND		ND		ND		ND		ND	
Delta-BHC	0.3	ND		ND		ND		ND		ND		ND	
Dieldrin	0.044	ND		ND		ND		ND		ND		0.027	
Endosulfan I	0.9	ND		ND		ND		ND		ND		0.0047	
Endosulfan II	0.9	ND		ND		ND		ND		ND		ND	
Endosulfan Sulfate	1	ND		ND		ND		ND		ND		ND	
Endrin	0.1	ND		ND		ND		ND		ND		0.0089	
Endrin Aldehyde	NS	ND		ND		ND		ND		ND		ND	
Endrin Ketone	NS	ND		ND		ND		ND		ND		0.0099	
Lindane (Gamma-BHC)	0.06	ND		ND		ND		ND		ND		ND	
Heptachlor	0.1	ND		ND		ND		ND		ND		ND	
Heptachlor Epoxide	0.02	ND		ND		ND		ND		ND		0.0065	
Methoxychlor	Note 1	ND		ND		ND		ND		ND		ND	
Toxaphene	NS	ND		ND		ND		ND		ND		ND	
PCBs													
Aroclor 1016	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1221	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1232	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1242	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1248	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1254	NS	ND		ND		ND		ND		ND		1.1	
Aroclor 1260	NS	0.16		ND		ND		ND		ND		ND	
Total PCBs	1 or 10 [2]	0.16		ND		ND		ND		ND		**1.1**	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs.: Feet below ground surface
NS: No standard
ND: Not detected

1: As per TAGM #4046 the RSCO for total VOCs is less than 10 mg/Kg.
2: 1 mg/Kg is the RSCO for PCBs detected in surface soil (0-2 ft. bgs) samples. 10 mg/Kg is the RSCO for PCBs detected in subsurface samples.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4: Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

TABLE 5C
SUMMARY OF SOIL ANALYTICAL RESULTS-PESTICIDES AND PCBS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location		PG-WOOD-05		PG-WOOD-05		PG-WOOD-05		PG-WOOD-05		PG-PA-MW-6		PG-PA-MW-6	
Field ID		PG-WD-05		PG-WD-05		PG-WD-05		PG-WD-05		PG-MWPA-06		PG-MWPA-06	
Sampling Date	NYSDEC	11/7/2000		11/7/2000		11/7/2000		11/7/2000		11/7/2000		11/7/2000	
Matrix	RSCO (mg/Kg)	Soil		Soil		Soil		Soil		Soil		Soil	
Sample Depth		4-6 ft bgs		6-8 ft bgs		8-10 ft bgs		14-16 ft bgs		1.5-3 ft bgs		3-4.5 ft bgs	
Units		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
PESTICIDES		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
4,4'-DDD	2.9	ND		ND		ND		ND		ND		ND	
4,4'-DDE	2.1	ND		ND		ND		ND		ND		0.0058	
4,4'-DDT	2.1	ND		ND		ND		ND		0.019		0.017	
Aldrin	0.041	ND		ND		ND		ND		ND		ND	
Alpha-BHC	0.11	ND		ND		ND		ND		ND		ND	
Beta-BHC	0.2	ND		ND		ND		ND		ND		ND	
Chlordane	0.54	ND		ND		ND		ND		ND		ND	
Delta-BHC	0.3	ND		ND		ND		ND		ND		ND	
Dieldrin	0.044	ND		ND		ND		ND		ND		ND	
Endosulfan I	0.9	ND		ND		ND		ND		ND		ND	
Endosulfan II	0.9	ND		ND		ND		ND		ND		ND	
Endosulfan Sulfate	1	ND		ND		ND		ND		ND		ND	
Endrin	0.1	ND		ND		ND		ND		ND		ND	
Endrin Aldehyde	NS	ND		ND		ND		ND		0.0054		ND	
Endrin Ketone	NS	ND		ND		ND		ND		ND		ND	
Lindane (Gamma-BHC)	0.06	ND		ND		ND		ND		ND		ND	
Heptachlor	0.1	ND		ND		ND		ND		ND		ND	
Heptachlor Epoxide	0.02	ND		ND		ND		ND		ND		ND	
Methoxychlor	Note 1	ND		ND		ND		ND		ND		ND	
Toxaphene	NS	ND		ND		ND		ND		ND		ND	
PCBs													
Aroclor 1016	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1221	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1232	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1242	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1248	NS	ND		ND		ND		ND		ND		ND	
Aroclor 1254	NS	ND		0.049		ND		ND		ND		ND	
Aroclor 1260	NS	ND		ND		ND		ND		0.095		0.077	
Total PCBs	1 or 10 [2]	ND		0.049		ND		ND		0.095		0.077	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
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RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs.: Feet below ground surface
NS: No standard
ND: Not detected

1: As per TAGM #4046 the RSCO for total VOCs is less than 10 mg/Kg.
2: 1 mg/Kg is the RSCO for PCBs detected in surface soil (0-2 ft. bgs) samples.
10 mg/Kg is the RSCO for PCBs detected in subsurface samples.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4: Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

TABLE 5C
SUMMARY OF SOIL ANALYTICAL RESULTS-PESTICIDES AND PCBS
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 4.5-6 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 6-8 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 8.5-10 ft bgs mg/Kg	
PESTICIDES		Conc	Qual	Conc	Qual	Conc	Qual
4,4'-DDD	2.9	ND		ND		ND	
4,4'-DDE	2.1	ND		ND		ND	
4,4'-DDT	2.1	ND		ND		ND	
Aldrin	0.041	ND		ND		ND	
Alpha-BHC	0.11	ND		ND		ND	
Beta-BHC	0.2	ND		ND		ND	
Chlordane	0.54	ND		ND		ND	
Delta-BHC	0.3	ND		ND		ND	
Dieldrin	0.044	ND		ND		ND	
Endosulfan I	0.9	ND		ND		ND	
Endosulfan II	0.9	ND		ND		ND	
Endosulfan Sulfate	1	ND		ND		ND	
Endrin	0.1	ND		ND		ND	
Endrin Aldehyde	NS	ND		ND		ND	
Endrin Ketone	NS	ND		ND		ND	
Lindane (Gamma-BHC	0.06	ND		ND		ND	
Heptachlor	0.1	ND		ND		ND	
Heptachlor Epoxide	0.02	ND		ND		ND	
Methoxychlor	Note 1	ND		ND		ND	
Toxaphene	NS	ND		ND		ND	
PCBs							
Aroclor 1016	NS	ND		ND		ND	
Aroclor 1221	NS	ND		ND		ND	
Aroclor 1232	NS	ND		ND		ND	
Aroclor 1242	NS	ND		ND		ND	
Aroclor 1248	NS	ND		ND		ND	
Aroclor 1254	NS	ND		ND		ND	
Aroclor 1260	NS	ND		ND		ND	
Total PCBs	1 or 10 [2]	ND		ND		ND	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
Ft. bgs.: Feet below ground surface
NS: No standard
ND: Not detected

1: As per TAGM #4046 the RSCO for total VOCs is less than 10 mg/Kg.
2: 1 mg/Kg is the RSCO for PCBs detected in surface soil (0-2 ft. bgs) samples. 10 mg/Kg is the RSCO for PCBs detected in subsurface samples.
3: Results are shown only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4: Shaded values depicted in **bold** font exceed the NYSDEC RSCO.

TABLE 5D
SUMMARY OF SOIL ANALYTICAL RESULTS-METALS, TPH
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Field ID** **Sampling Date** **Matrix** **Sample Depth** **Units**	NYSDEC RSCO (mg/Kg)	PG-WOOD-03 PG-WD-03 11/10/2000 Soil 0.5-2 ft bgs mg/Kg		PG-WOOD-03 PG-WD-03 11/10/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-3 PG-WD-3 11/29/2000 Soil 6-8 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 0-2 ft bgs mg/Kg	
METALS		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
Aluminum (fume or dust)	33,000 or SB	ND		4,500		3,900		ND		1500	
Antimony	NS	ND		2.3		2.6		ND		ND	
Arsenic	7.5 [1]	2.8		**310**		**29**		ND		ND	
Barium	300 [1]	15		260		120		38		21	
Beryllium	0.16 [1]	ND		1.3		1		ND		ND	
Cadmium	1 [1]	ND		0.47		0.37		ND		ND	
Calcium metal	35,000 of SB	31,000		22,000		35,000		**400,000**		ND	
Chromium	10 [1]	6.3		20		**110**		ND		7.4	
Cobalt	30 [1]	ND		15		5.2		ND		ND	
Copper	25 [1]	15		**210**		**110**		ND		8.1	
Iron	2000 or SB	3,800		44,000		31,000		ND		4000	
Lead	200-500*	20		460		**580**		ND		13	
Magnesium	100-5,000 (SB)	**18,000**		4,700		4,200		4,000		ND	
Manganese	50-5,000(SB)	47		200		220		69		28	
Nickel	13 or 0.5-25 [1]	3.2		**170**		**53**		ND		ND	
Potassium	8,500-43,000 (SB)	ND		ND		310		490		ND	
Selenium	2 or 0.1-3.9 [1]	ND		**5**		3.9		ND		ND	
Silver	NS	ND		0.62		ND		ND		ND	
Sodium	6,000-8,000 (SB)	ND		ND		ND		2,300		ND	
Thallium	NS	ND		ND		ND		ND		ND	
Vanadium	150 or 1-300 [1]	20		39		28		ND		24	
Zinc	20 or 9-50 [1]	17		**700**		**250**		ND		21	
Mercury	0.1	ND		**0.38**		**0.48**		ND		ND	
TPHC	NS	710		73		140		ND		ND	
Oil and Grease	NS	2,800		1,200		1,300		130		ND	
Cyanide	NS	ND		ND		16		3.2		ND	
pH	NS	7.4		7.7		8.2		9.0		7.2	
Total Phenolics	500 [2]	ND		ND		1.6		3.7		ND	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
NS: No standard
ND: Not detected
SB: Site Background
*: As per TAGM #4046, background lead levels vary widely. A typical range for metropolitan, suburban, or highway areas is 200-500 ppm. The analytical results are therefore compared to an RSCO of 500 mg/kg.

1) The objective for this compound is the greater of the RSCO or New York State's background concentration.
2) Value based on TAGM #4046, standard for total SVOCs.
3) Results are show only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4) Shaded values depicted in **bold** font exceed the NYSDEC RSCO.
5) Site background concentrations have not been established for any metals. Therefore, for metals without RSCOs, the maximum New York State background concentration is provided.

TABLE 5D
SUMMARY OF SOIL ANALYTICAL RESULTS-METALS, TPH
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location Field ID Sampling Date Matrix Sample Depth Units	NYSDEC RSCO (mg/Kg)	PG-WOOD-05 PG-WD-05 11/7/2000 Soil 2-4 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 4-6 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 6-8 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 8-10 ft bgs mg/Kg		PG-WOOD-05 PG-WD-05 11/7/2000 Soil 14-16 ft bgs mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 1.5-3' mg/Kg	
METALS		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
Aluminum (fume or dus	33,000 or SB	1300		1300		2500		2000		14000		4300	
Antimony	NS	2.8		ND		ND		ND		ND		1.7	
Arsenic	7.5 [1]	**27**		11		**28**		8.7		ND		**150**	
Barium	300 [1]	250		33		54		36		ND		120	
Beryllium	0.16 [1]	ND		ND		ND		ND		ND		ND	
Cadmium	1 [1]	ND		ND		ND		ND		ND		ND	
Calcium metal	35,000 of SB	7400		ND		ND		11000		7700		13000	
Chromium	10 [1]	**12**		ND		6		ND		**24**		**28**	
Cobalt	30 [1]	ND		2.5		6.6		6.7		ND		7	
Copper	25 [1]	**59**		**34**		**37**		20		ND		**58**	
Iron	2000 or SB	8200		3300		7500		6600		19000		24000	
Lead	200-500*	130		ND		32		22		ND		73	
Magnesium	100-5,000 (SB)	2000		ND		ND		ND		**6200**		3800	
Manganese	50-5,000(SB)	55		ND		27		38		110		200	
Nickel	13 or 0.5-25 [1]	12		7.6		15		17		19		**26**	
Potassium	8,500-43,000 (SB)	150		270		320		320		2600		190	
Selenium	2 or 0.1-3.9 [1]	ND		ND		ND		ND		ND		ND	
Silver	NS	ND		ND		ND		ND		ND		.68	
Sodium	6,000-8,000 (SB)	ND		ND		ND		810		6000		370	
Thallium	NS	ND		ND		ND		ND		ND		ND	
Vanadium	150 or 1-300 [1]	16		ND		ND		ND		40		38	
Zinc	20 or 9-50 [1]	**190**		19		**94**		**56**		**360**		**120**	
Mercury	0.1	**0.41**		ND		ND		ND		ND		**0.28**	
TPHC	NS	1000		47		95		ND		110		72	
Oil and Grease	NS	13,000		250		18,000		ND		410		ND	
Cyanide	NS	ND		ND		ND		ND		ND		0.52	
pH	NS	7.1		7.1		6.8		7.5		7.7		6.9	
Total Phenolics	500 [2]	ND		ND		ND		ND		ND		ND	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
NS: No standard
ND: Not detected
SB: Site Background
*: As per TAGM #4046, background lead levels vary widely. A typical range for metropolitan, suburban, or highway areas is 200-500 ppm. The analytical results are therefore compared to an RSCO of 500 mg/kg.

1) The objective for this compound is the greater of the RSCO or New York State's background concentration.
2) Value based on TAGM #4046, standard for total SVOCs.
3) Results are show only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4) Shaded values depicted in **bold** font exceed the NYSDEC RSCO.
5) Site background concentrations have not been established for any metals. Therefore, for metals without RSCOs, the maximum New York State background concentration is provided.

TABLE 5D
SUMMARY OF SOIL ANALYTICAL RESULTS-METALS, TPH
HYDROGEN HOLDERS AOC
HHMT-PORT IVORY FACILITY SITE 1
STATEN ISLAND, NEW YORK

Sample Location Field ID Sampling Date Matrix Sample Depth Units	NYSDEC RSCO (mg/Kg)	PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 3-4.5' mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 4.5-6' mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 6-8' mg/Kg		PG-PA-MW-6 PG-MWPA-06 11/7/2000 Soil 8.5-10' mg/Kg	
METALS		Conc	Qual	Conc	Qual	Conc	Qual	Conc	Qual
Aluminum (fume or dust)	33,000 or SB	7800		6000		ND		ND	
Antimony	NS	ND		ND		ND		ND	
Arsenic	7.5 [1]	**36**		**24**		**16**		ND	
Barium	300 [1]	180		170		50		53	
Beryllium	0.16 [1]	0.49		ND		ND		ND	
Cadmium	1 [1]	ND		ND		ND		ND	
Calcium metal	35,000 of SB	11000		4300		ND		ND	
Chromium	10 [1]	**32**		**13**		5.1		ND	
Cobalt	30 [1]	6.8		10		2.7		ND	
Copper	25 [1]	**46**		**36**		15		7.7	
Iron	2000 or SB	30000		28000		19000		ND	
Lead	200-500*	31		17		6.8		ND	
Magnesium	100-5,000 (SB)	810		ND		ND		**6800**	
Manganese	50-5,000(SB)	92		140		ND		ND	
Nickel	13 or 0.5-25 [1]	17		**26**		8.1		ND	
Potassium	8,500-43,000 (SB)	320		330		460		ND	
Selenium	2 or 0.1-3.9 [1]	3.3		3.9		3.5		ND	
Silver	NS	ND		ND		ND		1.8	
Sodium	6,000-8,000 (SB)	350		290		260		3000	
Thallium	NS	ND		ND		ND		ND	
Vanadium	150 or 1-300 [1]	24		20		ND		ND	
Zinc	20 or 9-50 [1]	34		48		ND		ND	
Mercury	0.1	**0.22**		ND		ND		ND	
TPHC	NS	74		87		ND		ND	
Oil and Grease	NS	ND		190		180		ND	
Cyanide	NS	4.4		3.5		2.9		18	
pH	NS	7.0		5.5		4.5		10	
Total Phenolics	500 [2]	ND		ND		ND		ND	

Notes and Abbreviations
NYSDEC: New York State Department of Environmental Conservation
TAGM: Technical Administrative Guidance Memo #4046
RSCO: Recommended Soil Cleanup Objective
Conc: Concentration
mg/kg: milligrams per kilogram
Qual: Laboratory data qualifier
NS: No standard
ND: Not detected
SB: Site Background
*: As per TAGM #4046, background lead levels vary widely. A typical range for metropolitan, suburban, or highway areas is 200-500 ppm. The analytical results are therefore compared to an RSCO of 500 mg/kg.

1) The objective for this compound is the greater of the RSCO or New York State's background concentration.
2) Value based on TAGM #4046, standard for total SVOCs.
3) Results are show only for those soil samples collected within 100 feet of the former Hydrogen Holders.
4) Shaded values depicted in **bold** font exceed the NYSDEC RSCO.
5) Site background concentrations have not been established for any metals. Therefore, for metals without RSCOs, the maximum New York State background concentration is provided.

respective RSCOs in at least one soil sample: arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, and zinc.

As shown on Figure 6, the SI groundwater sampling location nearest to the former hydrogen holders is well PG-PA-MW-6; please note, a groundwater sample was not collected at deep well PG-PA-MW-6D during the SI. Well PG-PA-MW-6 is located within 100 feet of both hydrogen holders. The well is also approximately downgradient of the eastern hydrogen holder and downgradient/sidegradient of the western hydrogen holder. The groundwater sample collected at well PG-PA-MW-6 during the SI was analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, Target Analyte List (TAL) metals, TPHC, oil and grease (O&G), total cyanide, and total phenolics. The analytical results, summarized in Tables 6A through 6D for the groundwater sample collected at well PG-PA-MW-6 indicate that only one SVOC, phenol, and one metal, arsenic, slightly exceeded their respective AWQSGVs.

7.0 DISCUSSION OF DATA

The following is a discussion of the data gathered and evaluated during the SRI. The SRI was completed with the overall goal of determining whether remediation was warranted at any open AOC or with respect to any open issue at Site 1. As noted above, the open AOC is AOC-UST2, and the open issues are the effect (if any) of impacted groundwater on surface water and sediment quality within Bridge Creek, and the effect (if any) of the former hydrogen holders on soil and groundwater quality. Section 7.1 is a discussion of data associated with AOC-UST2. Section 7.2 is a discussion of data associated with the two open issues identified above. These discussions are the basis for the conclusions and recommendations presented in Section 8.0.

7.1 Discussion of Data – AOC-UST2

As presented in Section 4, the objectives for the investigation of AOC-UST2 were as follows: 1) to determine the impact (if any) the LNAPL has on soil quality; 2) to delineate the extent of the LNAPL and impacted soil; 3) to identify if the soil is acting as a source area for groundwater impacts; 4) to delineate the groundwater impacts (if any); 5) to determine whether LNAPL could discharge into Bridge Creek; and, 6) to determine whether impacted groundwater could discharge into Bridge Creek. The following discussion addresses each of the objectives.

TABLE 6A
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS HYDROGEN HOLDERS AOC-VOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Sampling Date** **Matrix** **Units**	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	**PG-PA-MW-6** 11/27/2000 Aqueous ug/L		**PG-PA-MW-6D** 11/30/2000 Aqueous ug/L	
VOLATILE ORGANIC COMPOUNDS (VOCs)		Conc	Qual	Conc	Qual
1,2,4-TRICHLOROBENZENE	5	ND		ND	
1,2-DICHLOROBENZENE	3	ND		ND	
1,4-DICHLOROBENZENE	3	ND		ND	
1,1,1-TRICHLOROETHANE	5	ND		ND	
1,1,2,2-TETRACHLOROETHANE	5	ND		ND	
1,1,2-TRICHLOROETHANE	1	ND		ND	
1,1-DICHLOROETHANE	5	ND		ND	
1,1-DICHLOROETHYLENE	5	ND		ND	
1,2-DICHLOROETHANE	0.6	ND		ND	
1,2-DICHLORORPROPANE	1	ND		ND	
2-CHLOROETHYL VINYL ETHER	NS/NG	ND		ND	
ACROLEIN	5	ND		ND	
ACRYLONITRILE	5	ND		ND	
BENZENE	1	ND		ND	
BROMODICHLOROMETHANE	50	ND		ND	
BROMOFORM	50	ND		ND	
BROMOMETHANE	5	ND		ND	
CARBON TETRACHLORIDE	5	ND		ND	
CHLOROBENZENE	5	ND		ND	
CHLOROETHANE	5	ND		ND	
CHLOROFORM	7	ND		ND	
CHLOROMETHANE	NS/NG	ND		ND	
CIS-1,3-DICHLOROPROPENE	0.4 (Total)	ND		ND	
DIBROMOCHLOROMETHANE	50	ND		ND	
DICHLOROMETHANE	NS/NG	ND		ND	
ETHYLBENZENE	5	ND		ND	
M&P-XYLENES	5	ND		ND	
METHYLBENZENE	NS/NG	ND		ND	
O-XYLENE	5	ND		ND	
TETRACHLOROETHYLENE	5	ND		ND	
TRANS-1,2-DICHLOROETHYLENE	5	ND		ND	
TRANS-1,3-DICHLOROPROPENE	0.4 (Total)	ND		ND	
TRICHLOROETHYLENE	5	ND		ND	
VINYL CHLORIDE	2	ND		ND	
Total Confident VOCs	NS/NG	0		0	
Total VOC TICs	NS/NG	0		0	

Notes and Abbreviations:
ug/L = micrograms per liter (all concentations are provided in ug/L)
* = RGCS/G values are based on New York State Title 6 CRR (Codes, Rules and Regulations) Part 703. The guidance value is utilized where a standard has not been adopted for a substance.
Conc = Concentration
Qual = Laboratory data qualifier
NS = No standard
ND = Not detected
TICs = Tentatively Identified Compounds
NG = No guidance value
MDL = Minimum detection limit

1) Results are shown only for groundwater samples collected from wells that are downgradient of the location of the former hydrogen holders.

TABLE 6B
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS HYDROGEN HOLDERS AOC-SVOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Sampling Date** **Matrix** **Units**	Recommended Groundwater Cleanup Standards/ Guidance Value (RGCS/G)*	**PG-PA-MW-6** **11/27/2000** **Aqueous** **ug/L**		**PG-PA-MW-6D** **11/30/2000** **Aqueous** **ug/L**	
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)		Conc	Qual	Conc	Qual
Acenaphthene	20	ND		ND	
Acenaphthylene	NS/NG	ND		ND	
Anthracene	50	ND		ND	
1,2-Benzphenanthracene	NS/NG	ND		ND	
Benzidine	5	ND		ND	
Benzo[a]anthracene	0.002	ND		ND	
Benzo[a]pyrene	MDL	ND		ND	
Benzo[b]fluoranthene	0.002	ND		ND	
Benzo[g,h,i]perylene	NS/NG	ND		ND	
Benzo[k]fluoranthene	0.002	ND		ND	
Butylbenzylphthalate	50	ND		ND	
Bis(2-Chloroethoxy)methane	5	ND		ND	
Bis(2-Chloroethyl)Ether	1	ND		ND	
Bis(2-Chloroisopropyl)ether	NS/NG	ND		ND	
Bis(2-Ethylhexyl)phthalate	5	ND		2.3	B
4-Bromophenyl-phenylether	NS	ND		ND	
2-Chloronaphthalene	10	ND		ND	
2-Chlorophenol	NS/NG	ND		ND	
4-Chloro-3-methylphenol	NS/NG	ND		ND	
4-Chlorophenyl-phenylether	NS/NG	ND		ND	
1,2-Diphenylhydrazine	NS/NG	ND		ND	
2,4-Dichlorophenol	5	ND		ND	
2,4-Dimethylphenol	50	ND		ND	
2,4-Dinitrophenol	10	ND		ND	
2,4-Dinitrotoluene	5	ND		ND	
2,6-Dinitrotoluene	5	ND		ND	
3,3'-Dichlorobenzidine	5	ND		ND	
4,6-Dinitro-O-Cresol	NS/NG	ND		ND	
Di-n-butylphthalate	50	ND		1.5	
Di-n-octylphthalate	50	ND		1.3	
Dibenzo[a,h]Anthracene	NS/NG	ND		ND	
Diethylphthalate	50	ND		ND	
Dimethylphthalate	50.0	ND		ND	
m-Dichlorobenzene	3	ND		ND	
Fluoranthene	50	ND		ND	
Fluorene	50	ND		ND	
Hexachloro-1,3-Butadiene	0.5	ND		ND	
Hexachlorobenzene	0.04	ND		ND	
Hexachlorocyclopentadiene	5	ND		ND	
Hexachloroethane	5	ND		ND	
Indeno[1,2,3-cd]pyrene	0.002	ND		ND	
Isophorone	50	ND		ND	
2-Nitrophenol	NS/NG	ND		ND	
4-Nitrophenol	NS/NG	ND		ND	
N-Nitroso-Di-N-Propylamine	NS/NG	ND		ND	
N-Nitrosodimethylamine	NS/NG	ND		ND	
N-Nitrosodiphenylamine	50	ND		ND	
Naphthalene	10	ND		ND	
Nitrobenzene	0.4	ND		ND	
Pentachlorophenol	1.0 (Total Phenols)	ND		ND	
Phenanthrene	50	ND		ND	
Phenol	1.0 (Total Phenols)	2.1		ND	
Pyrene	50	ND		ND	
2,4,6-Trichlorophenol	NS/NG	ND		ND	
Total Confident SVOCs	NS/NG	2.1		2.8	
Total SVOC TICs	NS/NG	0		2.3	

TABLE 6B
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS HYDROGEN HOLDERS AOC-SVOCs
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Notes and Abbreviations:
ug/L = micrograms per liter (all concentrations are provided in ug/L)
* = RGCS/G values are based on New York State Title 6 CRR (Codes, Rules and Regulations) Part 703. The guidance value has been used where a standard has not been adopted for a substance.
Conc = Concentration
Qual = Laboratory data qualifier
MDL = Laboratory's minimum detection limit
Shaded values in **bold** font represent exceedances of the RGCS/G.
B: The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
NS = No standard
ND = Not detected
TICs = Tentatively Identified Compounds
NG = No guidance value

1) Results are shown only for groundwater samples collected from wells that are downgradient of the location of the former hydrogen holders.

TABLE 6C
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS HYDROGEN HOLDERS AOC - PESTICIDES AND PCBS
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Sampling Date** **Matrix** **Units**	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	**PG-PA-MW-6** 11/27/2000 Aqueous ug/L		**PG-PA-MW-6D** 11/30/2000 Aqueous ug/L	
PCBs		Conc	Qual	Conc	Qual
AROCLOR 1016	0.09**	ND		ND	
AROCLOR 1221	0.09**	ND		ND	
AROCLOR 1232	0.09**	ND		ND	
AROCLOR 1242	0.09**	ND		ND	
AROCLOR 1248	0.09**	ND		ND	
AROCLOR 1254	0.09**	ND		ND	
AROCLOR 1260	0.09**	ND		ND	
PESTICIDES					
ALDRIN	0.01	ND		ND	
ALPHA-BHC	0.01	ND		ND	
BETA-BHC	0.01	ND		ND	
CHLORDANE	0.05	ND		ND	
4,4'-DDD	0.3	ND		ND	
4,4'-DDE	0.2	ND		ND	
4,4'-DDT	0.2	ND		ND	
DELTA-BHC	0.01	ND		ND	
DIELDRIN	0.004	ND		ND	
ENDOSULFAN I	NS/NG	ND		ND	
ENDOSULFAN II	NS/NG	ND		ND	
ENDOSULFAN SULFATE	0.1	ND		ND	
ENDRIN	0.01	ND		ND	
ENDRIN ALDEHYDE	5	ND		ND	
ENDRIN KETONE	5	ND		ND	
GAMMA-BHC (LINDANE)	NS/NG	ND		ND	
HEPTACHLOR	0.04	ND		ND	
HEPTACHLOR EPOXIDE	0.01	ND		ND	
METHOXYCHLOR	35	ND		ND	
TOXAPHENE	0.06	ND		ND	

Notes and Abbreviations:
ug/L = micrograms per liter (all concentrations are provided in ug/L)
* = RGCS/G values are based on New York State Title 6 CRR (Codes, Rules and Regulations) Part 703. The guidance value is utilized where a standard has not been adopted for a substance.
** = value provided is for total PCBs (Aroclors)
Conc = Concentration
Qual = Laboratory data qualifier
NS = No standard
ND = Not detected
NG = No guidance value
PCBs = Polychlorinated biphenyls

1) Results are shown only for groundwater samples collected from wells that are

TABLE 6D
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS HYDROGEN HOLDERS AOC-METALS
HHMT-PORT IVORY FACILITY, SITE 1
STATEN ISLAND, NEW YORK

Sample Location **Sampling Date** **Matrix** **Units**	Recommended Groundwater Cleanup Standard/Guidance Value (RGCS/G)*	**PG-PA-MW-6** 11/27/2000 Aqueous ug/L		**PG-PA-MW-6D** 11/30/2000 Aqueous ug/L	
METALS		Conc	Qual	Conc	Qual
ALUMINUM (FUME OR DUST)	NS/NG	430		260	
ANTIMONY	3	ND		ND	
ARSENIC	25	**83**		ND	
BARIUM	1000	ND		68	
BERYLLIUM	3	ND		ND	
CADMIUM	5	ND		ND	
CALCIUM METAL	NS/NG	1,900		180,000	
CHROMIUM	50	ND		ND	
COBALT	NS	ND		ND	
COPPER	200	ND		ND	
IRON	300	120		**15,000**	
LEAD	25	ND		ND	
MAGNESIUM	35000	5,500		**430,000**	
MANGANESE	300	ND		**1200**	
MERCURY	0.7	ND		ND	
NICKEL	100	ND		ND	
POTASSIUM	NS/NG	100,000		81,000	
SELENIUM	10	ND		ND	
SILVER	50	ND		ND	
SODIUM	20000	**900,000**		**4,000,000**	
THALLIUM	1	ND		ND	
VANADIUM	NS	50		ND	
ZINC	2000	ND		ND	
TPHC	100	ND		ND	
OIL & GREASE	100	13		21	
CYANIDE	200	0.013		ND	
***pH**	NS/NG	11.36		7.08	
TOTAL PHENOLICS	1.0	ND		ND	

Notes and Abbreviations:
ug/L = micrograms per liter (all concentrations are provided in ug/L)
* = RGCS/G values are based on New York State Title 6 CRR (Codes, Rules and Regulations) Part 703. The guidance value is utilized where a standard has not been adopted for a substance.
TPHC = Total Petroleum Hydrocarbons
Conc = Concentration
Qual = Laboratory data qualifier
Shaded values in **bold** font represent exceedances of the RGCS/G values.
NS = No standard
ND = Not detected
NG = No guidance value

1)Results are shown only for groundwater samples collected from wells that are downgradient of the location of the former hydrogen holders.

7.1.1 Data Related to Objective 1

Objective 1, to determine the impact (if any) the LNAPL has on soil quality, was evaluated by the collection and analysis of seventeen soil samples from 14 soil borings. All soil samples were analyzed for VOC+15, SVOC+25, and TPHC. The analytical data indicate that soil impacts were limited to two VOCs (methylene chloride and 1,2-dichloroethene) and a few PAH compounds, a subset of SVOCs. Methylene chloride was also detected in an associated method blank; therefore, it is likely that the presence of this compound is attributable to laboratory contamination of the soil sample. The concentration (0.19 mg/kg) of trans-1,2-dichloroethene was detected at a concentration slightly greater than its RSCO (0.1 mg/kg) in only a single soil sample, the sample collected from the 1.5-2 feet bgs depth interval at location UST2-5A. This isolated and relatively low concentration of trans-1,2-dichloroethene is not a concern, particularly given the Port Authority's redevelopment plan that includes the placement of pavement and other impervious cover at the majority of Site 1 and the recording of a Deed Notice for all of Site 1.

At least one PAH compound was detected at a concentration greater than its RSCO in ten of the 17 soil samples collected during the SRI. The concentrations of PAH compounds in all samples, except for the sample collected from the 4-4.5 foot bgs depth interval at location TWP-1A, were similar to or less than those detected throughout the Facility (concentrations of total PAH compounds generally between 0 and 10 mg/kg), and are likely attributable to the former placement of historic fill by P&G. This impacted soil will be addressed through the physical redevelopment of Site 1 and the recording of a Deed Notice. The total concentration of PAH compounds in the soil sample collected at TWP-1A was more than 1,000 mg/kg. The presence of cinders was noted in the 4.25-4.5 foot bgs depth interval at location TWP-1A (i.e., within the depth interval of the sample collected at TWP-1A). The presence of cinders and absence of indications of petroleum-impacted soil suggests that cinders were included in the soil sample and that the elevated concentration of PAHs in the sample is attributable to the presence of these cinder(s). However, additional soil investigation is required to confirm this assertion.

Several VOC and SVOC TICs were detected in the soil samples collected during the SRI. However, none of the TICs were compounds that are included in the definition of Principal Organic Contaminants, as defined in the NYSDEC document entitled *Recommended Groundwater Cleanup Guidance and the Recommended Groundwater Cleanup Standard* and dated June 1998. Therefore, no remedial action is warranted with respect to soil where TICs were detected.

Although TAGM 4046 does not include an RSCO for TPHC, the concentration of TPHC is a relative measure of the LNAPL saturation. The greater the concentration of TPHC in the soil, the greater the saturation of LNAPL. The concentration of LNAPL in the soil sample collected from the 6-8 foot bgs depth interval at location UST2-4 was 48,000 mg/kg. The TPHC concentration in this soil sample is more than five times as great as in the sample with the next greatest concentration. Additional investigation is warranted at UST2-4 to confirm the presence or absence of mobile LNAPL.

7.1.2 Data Related to Objective 2

Objective 2, to delineate the extent of LNAPL and impacted soil based on field observations, was evaluated based on field observations and the SRI soil sampling results. LNAPL and/or impacted soil was encountered at four soil boring locations: UST2-4, UST2-4A, UST2-5, and TWP-1. In addition, LNAPL was observed in the area to the north of location UST2-6, to the east of location TWP-2, to the south of location UST2-4, and to the west of location UST2-5 during initial soil removal efforts at AOC-UST2 in April 2005. LNAPL was not encountered at the following locations: UST2-4B, UST2-5A, UST2-6, TWP-1A, and TWP-2 through TWP-6. Therefore, as shown on Figure 3, the extent of LNAPL and/or impacted soil (as based on field observations) at AOC-UST2 is bounded by location UST2-6 to the south, location TWP-2 to the west, location UST2-4B to the north, and TWP-1A and UST2-5A to the east. This area is approximately 235 feet north-south by 170 feet east-west, with a footprint of 30,750 square feet.

The petroleum impacts observed at locations UST2-4, UST2-4A, UST2-5, and TWP-1 were encountered at depths of between four and eight feet bgs. The petroleum impacts were delineated vertically at depths of between six and nine feet bgs; for locations UST2-5 and TWP-1, these depths are relative to the original land surface prior to the construction of the soil stockpile. Since the water table was measured to be at approximately five to seven feet bgs, the LNAPL is not anticipated to have impacted soil quality much deeper than seven feet bgs, which is consistent with the maximum observed depth for LNAPL and/or soil impacts (i.e., eight feet bgs). In addition, organic marsh deposits and clay-like by-product fill, effective barriers to the vertical migration of the LNAPL, were encountered at various locations during the SRI. Organic marsh deposits were observed at approximately 11.5 feet bgs at location TWP-5 and nine feet bgs at location TWP-6, while clay-like by-product fill was observed at approximately 10.5 and 9.5 feet bgs at locations TWP-2 and TWP-3, respectively.

The analytical results for the soil samples collected during the SRI indicate that soil at AOC-UST2 is impacted by relatively low concentrations of PAH compounds except for the soil sample collected from the 4-4.5 foot bgs depth interval at location TWP-1A. The low concentrations of PAH compounds are similar to those detected in soil samples throughout the Facility, and are attributable to the former placement of historic fill by P&G. The concentration of PAH compounds at location TWP-1A is most likely due to the inclusion of cinders in the soil sample; however, additional soil sampling is required at and in the vicinity of TWP-1A.

Soil at sampling location UST2-4 contains a relatively high concentration (48,000 mg/kg) of TPHC in the 6-8 foot bgs depth interval. While an RSCO has not been established for TPHC, the greater the concentration of TPHC, the greater the saturation of petroleum in the subsurface. Although field observations suggest that the LNAPL at this location is immobile, the relatively high concentration of TPHC in soil at UST2-4 suggests that petroleum may be mobile at this location. Therefore, HMM proposes that additional investigation of soil and groundwater quality be conducted at and in the vicinity of location UST2-4.

7.1.3 Data Related to Objective 3

Objective 3, to identify if the soil is acting as a source area for groundwater impacts, was evaluated using the groundwater analytical data generated during the SRI. One groundwater sample was collected from each of six temporary wells, identified as TWP-1 through TWP-6. The six temporary wells were installed in two transects, each consisting of an upgradient well, a well immediately downgradient of the LNAPL area, and a downgradient well. Both transects were oriented approximately east-west, perpendicular to the eastern bank of Bridge Creek. The northern transect consisted of temporary wells (from upgradient to downgradient) TWP-1A, TWP-2, and TWP-3. The southern transect consisted of temporary wells (from upgradient to downgradient) TWP-4, TWP-5, and TWP-6. All groundwater samples were analyzed for VOC+15, SVOC+25, and TPHC.

The groundwater analytical data indicate that only two groundwater samples contained any of the targeted compounds at concentrations greater than their respective AWQSGVs. These samples were collected at temporary wells TWP-1A and TWP-2. Two SVOCs, naphthalene and phenol, were detected at concentrations greater than their respective AWQSGVs in temporary well TWP-1A, while phenol was the only compound detected at a concentration greater than its AWQSGV in temporary well TWP-2. Since the concentration of naphthalene decreased downgradient of well TWP-1A, it is concluded that the

LNAPL and impacted soil at AOC-UST2 did not impact groundwater with respect to naphthalene. The source of the dissolved naphthalene is unclear. However, creosoted wood observed in the soil boring later converted to temporary well TWP-1A is a potential source. Regardless of the source, the groundwater impact does not extend to the nearest downgradient receptor, Bridge Creek.

The concentrations of phenol were elevated only in groundwater samples collected at temporary wells TWP-1A and TWP-2. The concentration of phenol decreased downgradient of temporary well TWP-1A; thus, the LNAPL and impacted soil at AOC-UST2 are not source areas for phenol. Rather, the elevated concentrations of phenol are likely attributable to the decay of naturally-occurring organic material (from the underlying marsh deposits, e.g.). Regardless of the source, the groundwater impact does not extend to the nearest downgradient receptor, Bridge Creek.

Please note, no remedial actions are warranted with respect to groundwater at AOC-UST2. Groundwater recharge rates are anticipated to decrease following the construction of impervious surfaces as part of the redevelopment of Site 1. Also, as established below, groundwater impacts do not extend to Bridge Creek, the nearest downgradient receptor, having been delineated at temporary well TWP-3.

7.1.4 Data Related to Objective 4

Objective 4, to delineate groundwater impacts (if any), was evaluated using the groundwater analytical data generated primarily during the SRI as well as data for a groundwater sample collected from well PG-EW-3 during the SI. As noted above, one groundwater sample was collected from each of six temporary wells, identified as TWP-1 through TWP-6. All groundwater samples were analyzed for VOC+15, SVOC+25, and TPHC.

Groundwater analytical data indicate that only two samples, the samples collected at temporary wells TWP-1A and TWP-2, contained any of the targeted compounds at concentrations greater than their respective AWQSGVs. The two SVOCs, naphthalene and phenol, were detected at concentrations greater than their respective AWQSGVs in temporary well TWP-1A, while phenol was the only compound detected at a concentration greater than its AWQSGV in temporary well TWP-2. Therefore, the groundwater impacted by naphthalene is delineated to the south (i.e., sidegradient) at temporary well TWP-4 and to the west (i.e., downgradient) at temporary well TWP-2. This groundwater impact has not been delineated to the east (i.e., upgradient) or north (i.e., sidegradient); however, well PG-EW-3, located approximately 100 feet to the north of TWP-1, was sampled during the SI. The analytical results did not

reveal that groundwater has been impacted by naphthalene; therefore, well PG-EW-3 can also be used as a delineation point with respect to groundwater impacted by naphthalene. The groundwater impacted by phenol has been delineated to the south (i.e., sidegradient) at temporary wells TWP-4 and TWP-5 and to the east (i.e., downgradient) by temporary well TWP-3. The SI groundwater sampling results for well PG-EW-3 also can be used as a delineation point with respect to groundwater impacted by phenol.

Please note, no remedial actions are warranted with respect to groundwater at AOC-UST2. Groundwater recharge rates are anticipated to decrease following the construction of impervious surfaces as part of the redevelopment of Site 1. Also, groundwater impacts have been delineated at temporary well TWP-3, located downgradient of the groundwater impacts and upgradient of Bridge Creek.

7.1.5 Data Related to Objective 5

Objective 5, to determine whether LNAPL could discharge into Bridge Creek, was evaluated using field observations and measurements made during the SRI. As noted above, six temporary wells, identified as TWP-1A and TWP-2 through TWP-6, were installed at AOC-UST2 during the SRI. As part of the groundwater investigation, the presence or absence of LNAPL in each temporary well was confirmed using an oil-water indicator. LNAPL was not present in any of the six temporary wells as of May 24, 2005. Therefore, the LNAPL does not appear to be mobile in the vicinity of any of the six temporary wells.

In addition, the boring logs for UST2-4, UST2-4A, UST2-5, and TWP-1, the only soil boring locations where petroleum impacts were observed, describe faint odors, relatively low concentrations of volatile organic vapors (maximum 18 ppm) in soil, and trace quantities of petroleum in soil. However, the relatively high concentration of TPHC at location UST2-4 suggests that LNAPL may potentially be mobile at this location. Therefore, as noted above, additional investigation is proposed in the vicinity of UST2-4.

Because the LNAPL is immobile throughout most, if not all, of AOC-UST2, and because, in the years since its release, the LNAPL has not migrated to wells TWP-3 and TWP-6 (i.e., to within 50 feet of Bridge Creek) since the release occurred, it appears unlikely that the LNAPL can migrate into Bridge Creek.

7.1.6 Data Related to Objective 6

Objective 6, to determine whether impacted groundwater could discharge into Bridge Creek, was evaluated using groundwater analytical data generated during the SRI. Six temporary wells were installed at AOC-UST2 during the SRI; these temporary wells were identified as TWP-1A and TWP-2 through TWP-6. The six temporary wells were installed in two transects, each consisting of an upgradient temporary well, an LNAPL area temporary well, and a downgradient temporary well. Both transects were approximately perpendicular to Bridge Creek. The northern transect consisted of temporary wells (from upgradient to downgradient) TWP-1A, TWP-2, and TWP-3. The southern transect consisted of (from upgradient to downgradient) temporary wells TWP-4, TWP-5, and TWP-6. As noted above, one groundwater sample was collected from each of the six temporary wells. All samples were analyzed for VOC+15, SVOC+25, and TPHC.

The analytical results for temporary wells in the southern transect, identified as TWP-4, TWP-5, and TWP-6, did not indicate any groundwater impacts. However, the analytical results for wells in the northern transect, identified as TWP-1, TWP-2, and TWP-3, indicated that groundwater was impacted by the SVOCs naphthalene and phenol. Based on the analytical results for the groundwater sample collected at temporary wells TWP-3, TWP-4, and TWP-5 and those for the groundwater sample collected at well PG-EW-3 during the SI, the groundwater impacts have been completely delineated. Therefore, groundwater impacts in the vicinity of AOC-UST2 do not discharge into or impact surface water quality in Bridge Creek.

7.2 Discussion of Data – Open Areas/Issues

The following is a discussion of data evaluated during the SRI with respect to the three open AOCs/issues at Site 1. These AOCs/issues include AOC-UST2 (the subject of Section 7.1, above), the effect of impacted groundwater on surface water and sediment quality within Bridge Creek, and the former hydrogen holders. Please note, the use of the term "impacts" in the sections below requires additional explanation. The HHMT-Port Ivory Facility is situated in an industrial section of Staten Island that was reclaimed from marshland by the use of fill and is bordered by railroads, ports, and roadways. Based on the industrial land use, it is reasonable to anticipate impacted surface water, sediment, soil, and groundwater on a regional scale. In fact, the NYSDEC detected sediment impacted by pesticides and metals at several locations along Bridge Creek that are upgradient of the Facility (see Appendix B). The following is an excerpt from the U.S. Fish and Wildlife Service document entitled Significant Habitats and Habitat Complexes of the New York Bight Watershed and dated November 1997:

"This unique and regionally significant wetlands and heronry [Arthur Kill] complex is within one of the most intensively industrialized and urbanized corridors in the northeastern United States, and is subject to both physical and qualitative losses of habitat due to chemical (including heavy metals, [the pesticide] DDT, and petrochemicals) and nutrient pollution stresses, stormwater and sewerage discharges, stream channelization, nonpoint source runoff, illegal filling and dumping activities, fragmentation and loss of connecting corridors, loss of upland buffers, ... This area was the site of several recent oil spills and discharges, resulting in direct wildlife losses and decreased productivity. In 1990, 684 spills dumped a volume of ... (1.5 million gallons) of oil into the waterways and wetlands of New York Harbor; 70% of this volume contaminated the Arthur Kill and Kill van Kull."

Due to the presence of these regional impacts, neither the soil nor the groundwater at the HHMT-Port Ivory Facility are currently or will be utilized as natural resources. In addition, the sediment and surface water quality in adjacent surface water bodies (i.e., Bridge Creek and the Arthur Kill) is also not high quality. Therefore, while media are described as "impacted" if the concentration of a regulated compound or metal is present in the medium exceeds NYSDEC standards/guidance values, it is important to realize that the impacts attributable to P&G's operations, if any, only negligibly worsen already degraded environmental quality and that "impacts" believed to be attributable to former P&G operations at the Facility may actually be attributable to the regional contamination.

Section 7.2.1 is a discussion of data that HMM evaluated to determine whether groundwater impacts have affected surface water and/or sediment quality in Bridge Creek. Section 7.2.2 is a discussion of data associated with the former hydrogen holders. These discussions are the basis for the conclusions and recommendations presented in Section 8.0.

7.2.1 Data Related to the Effect of Groundwater Impacts on Bridge Creek

HMM used groundwater, surface water, and sediment analytical data from the SI as well as groundwater and surface water data from the Surcharge Pilot Test, a component of the RI, to determine whether groundwater has adversely impacted surface water and sediment quality in Bridge Creek. One groundwater sample was collected from each of eight wells located throughout Site 1 during the SI. During the RI, one groundwater sample was collected from each of six wells located in the northern half of Site 1. All groundwater samples collected during the SI and RI were analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, TAL metals, TPHC, O&G, total cyanide, and total phenolics.

Surface water and sediment sampling was conducted concurrently with the groundwater sampling effort during the SI, and surface water sampling, but not sediment sampling, was conducted concurrently with the groundwater sampling during the RI. The surface water and sediment sampling locations were selected based upon their proximity to wells where groundwater samples were also collected and to a "white material" previously observed along the banks of Bridge Creek. All surface water and sediment samples were analyzed for TAL metals. In addition, the surface water samples collected during the SI were analyzed for pH using portable pH meters.

As indicated on the figure and tables in Appendix B, sediment quality is impacted in Bridge Creek upgradient of the Facility. NYSDEC collected 18 sediment/soil samples and combined these soil samples into four composite samples. All samples were analyzed for VOCs, SVOCs, pesticides and PCBs, and the metals arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. For all metals listed above except barium and selenium, the analytical results indicate that the concentration of these metals in sediment exceed the NYSDEC SEL and/or LEL. NYSDEC has not established LELs or SELs for barium or selenium. In addition, storm water runoff eneters Bridge Creek at where it flows under Western Avenue. Due to these potential impacts, for the purposes of the discussion below, HMM attributes surface water and/or sediment impacts in Bridge Creek to groundwater impacts at the Facility only if there is a clear connection (i.e., a groundwater plume and surface water and/or sediment in an adjacent stretch of Bridge Creek are both impacted by the same substance).

Based on the SI analytical data, groundwater was impacted by the following organic compounds: the VOCs ethylbenzene and xylene (at well PG-CS-7 only); the PAH compounds 1,2-benzphenanthracene and benzo(a)pyrene (at well PG-EW-3); and, the SVOC (and non-PAH compound) phenol (at wells PG-PA-MW-6, PG-CS-7, PG-EW-6, and PG-PA-MW-1). Based on the RI analytical data, groundwater was impacted by the following organic compounds: xylene (at well PG-CS-7 only) and phenol (at well PG-RS-1 only). Alkaline pH levels (above 10) have also been detected in groundwater.

The fact that the ethylbenzene and xylene concentrations decreased at well PG-CS-7 by over 60% between November 2000 and November 2002 indicates that these VOCs are attenuating via natural processes. Further, it is anticipated that the relatively low concentration of xylene, if the compound remains in groundwater near well PG-CS-7, would volatilize quickly upon discharging into Bridge Creek.

A groundwater sample was not collected from well PG-EW-3 during the RI. Therefore, concentration trends cannot be established for the PAHs 1,2-benzphenanthracene and benzo(a)pyrene that were detected at concentrations greater than their respective AWQSGVs during the SI. However, the well is located more than 200 feet upgradient of Bridge Creek, and it is unlikely that the low concentrations of these PAH compounds would reach Bridge Creek. It is more likely that these compounds would attenuate naturally prior to reaching Bridge Creek.

The elevated concentrations of phenol that were detected at wells PG-PA-MW-6, PG-CS-7, PG-EW-6, PG-PA-MW-1, and PG-RS-1 during the SI and the RI are likely attributable to the decay of naturally-occurring organic compounds. The fact that similar concentrations of phenol have been detected throughout the northern two-thirds of Site 1 supports this assertion. Therefore, whether or not surface water in Bridge Creek is impacted by phenol, the source of the phenol does not appear to be related to a former release or an onsite industrial source.

Although pH values of almost 10 have been detected in groundwater at Site 1, the pH of surface water in Bridge Creek has ranged from 7.5 to 8.2. Thus, the elevated pH of groundwater at Site 1 does not seem to have affected the pH of the surface water in Bridge Creek. Please note, this result is expected because the hydronium ions in groundwater discharging to surface water will be diluted in Bridge Creek and because compounds (e.g., bicarbonate) that are present at equilibrium conditions in the groundwater at Site 1 will volatilize from the surface water (e.g., as carbon dioxide).

Based on the groundwater analytical data, therefore, groundwater at Site 1 has not been impacted extensively by organic compounds and that those few minor groundwater impacts that exist are attenuating naturally and/or are unlikely to impact the surface water or sediment quality in Bridge Creek. As noted above, the presence of phenol is likely related to the decay of naturally-occurring organic compounds.

Since groundwater, surface water, and sediment samples were collected concurrently and were analyzed for TAL metals, the metals results for samples in these three media can be evaluated to determine if the quality of surface water or sediment in Bridge Creek have been impacted by groundwater. Analytical data for samples collected during the SI indicate that the only metals that were detected in both groundwater and surface water at concentrations greater than their respective standards and/or guidance values were arsenic and cadmium. Arsenic was detected at a concentration greater than its AWQSGV in

groundwater samples collected from four wells (at wells PG-PA-MW-5, PG-TMW-2, PG-EW-3, and PG-PA-MW-6) in the vicinity of the Wood Yard. The elevated concentrations of arsenic appear to be related to the wood chips previously stockpiled in the Wood Yard. As indicated in Section 2.1.5, the wood chips have been removed. Analytical results for confirmatory, post-excavation soil samples indicate that two of the samples contained arsenic at non-detect levels, one sample contained arsenic at a concentration lower than its RSCO, and three samples contained arsenic at concentrations (7.6 to 25 mg/kg) slightly greater than the RSCO for arsenic (7.5 mg/kg). The effect of the removal of the wood chips on groundwater quality will be determined during a groundwater monitoring program initiated subsequent to the redevelopment of Site 1. In addition, arsenic was detected at a concentration greater than its RSWCS at surface water sampling location PG-SW-3, located approximately 400 feet downstream of the Wood Yard. The surface water sample closest to the Wood Yard (i.e., the upstream surface water sample PG-SW-1) did not contain arsenic at a concentration greater than its AWQSGV. Therefore, the groundwater at the Wood Yard that is impacted by arsenic has not affected the quality of surface water in Bridge Creek.

Cadmium was detected at a concentration greater than its AWQSGV in only the SI groundwater sample collected from well PG-RS-2. This metal was detected at a concentration greater than its RSWCS in only one surface water sample, PG-SW-3, the downstream surface water sample. Based upon the groundwater contour map, the groundwater impacted by cadmium should discharge to a location approximately 400 feet upstream of PG-SW-3. However, neither of the surface water samples collected upstream of sample PG-SW-3 contained cadmium at a concentration greater than the RSWCS for cadmium. Therefore, the groundwater at well PG-RS-2 that is impacted by cadmium did not affect the quality of surface water in Bridge Creek.

Analytical data for samples collected during the RI indicate that the only metals detected at concentrations greater than their respective AWQSGVs in groundwater and their respective RSWCOs/Recommended Surface Water Guidance Values in surface water are iron, magnesium, and sodium. Because Bridge Creek is tidally influenced, the elevated concentrations of iron, magnesium, and sodium in the surface water samples collected from Bridge Creek are attributable to the concentration of those dissolved cations in the Arthur Kill. During recent sampling efforts unrelated to the Site 1 SI, RI, and SRI efforts, the concentrations of iron, magnesium, and sodium (323, 615000, and 7,790,000 mg/L, respectively) in the Arthur Kill adjacent to the Facility have been comparable to the analytical results for the SI and RI surface water samples.

As noted above, sediment samples were collected during the SI and were analyzed for metals. Based on the analytical results, arsenic and cadmium were the only metals detected at concentrations greater than their respective AWQSGVs in groundwater and their respective NJDEP LELs/SELs in sediment. Arsenic was detected at a concentration greater than its AWQSGV in groundwater samples collected from four wells (at wells PG-PA-MW-5, PG-TMW-2, PG-EW-3, and PG-PA-MW-6) in the vicinity of the Wood Yard. Arsenic was detected at a concentration greater than its NYSDEC LEL (but less than its SEL) at all five sediment sampling locations (PG-SED-1 through PG-SED-5). Sediment sampling location PG-SED-1, although the furthest upstream sediment sampling location in Bridge Creek, is more than 300 feet downstream of the Wood Yard. Based on these results, the groundwater impacted by arsenic could have impacted sediment quality in Bridge Creek. However, the concentration of arsenic in sediment samples remained relatively constant downstream of PG-SED-1. If sediment quality were impacted by groundwater in the Wood Yard, the concentration of arsenic in sediment would decrease downstream of the Wood Yard. Since this is not the case, there is no indication that groundwater at Site 1 that is impacted by arsenic has affected sediment quality in Bridge Creek.

Cadmium was detected at a concentration greater than its AWQSGV in only the SI groundwater sample collected from well PG-RS-2. This metal was detected at a concentration greater than its NJDEP LEL in only sediment sample PG-SED-2. Based upon the groundwater contour map, the groundwater impacted by cadmium should discharge to a location more than 300 feet upstream of PG-SED-2. However, the analytical results for the sediment sample collected upstream of sample PG-SED-2 did not contain cadmium at a concentration greater than its NJDEP LEL. Therefore, the groundwater at well PG-RS-2 that is impacted by cadmium did not affect the quality of sediment in Bridge Creek.

Based on the above discussion, the minimal groundwater impacts at Site 1 do not appear to have impacted the quality of surface water or sediment in Bridge Creek. The Port Authority previously indicated that additional groundwater, surface water, and/or sediment samples would be collected at Site 1 and Bridge Creek; however, because of the changes that will potentially occur to contaminant migration pathways following the redevelopment of Site 1, it was determined that the additional groundwater, surface water, and sediment sampling efforts would be included in a post-redevelopment monitoring plan. Details of the monitoring plan are beyond the scope of this report, and will be included in a future Remedial Action Work Plan.

7.2.2 Data Related to Former Hydrogen Holders

As part of the SRI, HMM reviewed analytical data for groundwater and soil samples collected in the vicinity of the former hydrogen holders. The soil sampling locations located within 100 feet of at least one of the two former hydrogen holders (as referenced on Sanborn maps) are PG-Wood-03, PG-Wood-3, PG-Wood-05, PG-PA-MW-6, and PG-PA-MW-6D. As noted above, the concern regarding the hydrogen holders is not that the holders themselves could have discharged regulated substances to soil and/or groundwater, but rather that appurtenant equipment (air compressors, e.g.) could have discharged these substances. Seventeen soil samples were collected from these five locations. All soil samples were analyzed for PP VOCs, PP SVOCs, PP pesticides and PCBs, TAL metals, total cyanide, total phenolics, O&G, TPHC, and PCBs.

The soil sampling analytical results indicate that soil impacts in the vicnity of the former hydrogen holders are limited to the PAH compound benzo(b)fluoranthene, the SVOC (and non-PAH) phenol, and the metals arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, and zinc. The elevated concentration of benzo(b)fluoranthene is the only compound or metal that is listed above and that could be related to the presence of the former hydrogen holders and appurtenant equipment (if any). However, the concentrations of benzo(b)fluoranthene were similar to those detected in soil throughout the Facility. As such, the elevated concentrations of benzo(b)fluoranthene appear to be related to the former placement of historic fill at the Facility by P&G. No remedial action is warranted with respect to the soil in the vicinity of the former hydrogen holders.

Groundwater downgradient (i.e., at well PG-PA-MW-6) of the locations of the former Hydrogen Holders is impacted only by phenol and arsenic. The elevated concentrations of arsenic appear to be related to the wood chips previously stockpiled in the Wood Yard. As indicated in Section 2.1.5, the wood chips have been removed. Analytical results for confirmatory, post-excavation soil samples indicate that two of the samples contained arsenic at non-detect levels; one sample contained arsenic at a concentration lower than its RSCO, and three samples contained arsenic at concentrations (7.6 to 25 mg/kg) slightly greater than the RSCO for arsenic (7.5 mg/kg). The effect of the removal of the wood chips on groundwater quality will be determined during a groundwater monitoring program initiated subsequent to the redevelopment of Site 1. The presence of phenol in the groundwater sample collected at PG-PA-MW-6 is likely related to the decay of naturally-occurring organic material that is present in the marsh deposits observed in the soil column at several locations at the Facility, including at Site 1. As such, it does not appear that the presence of the hydrogen holders has impacted groundwater quality.

The elevated concentrations of arsenic appear to be related to the wood chips previously stockpiled in the Wood Yard. As indicated in Section 2.1.5, the wood chips have been removed, and the effect of the removal of the wood chips on groundwater quality will be determined through the proposed groundwater monitoring program. The presence of phenol in the groundwater sample collected at PG-PA-MW-6 is likely related to the decay of naturally-occurring organic material that is present in the marsh deposits observed in the soil column at several locations at the Facility, including at Site 1. As such, it does not appear that the presence of the hydrogen holders has impacted soil or groundwater quality.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The SRI was conducted to close all open AOCs and issues at Site 1 and to determine whether remediation of any medium was warranted. However, based on the findings, limited investigation is required at two locations at Site 1: the vicinity of soil boring location UST2-4 and the vicinity of temporary well point TWP-1A. At this time and pending the outcome of those investigations, no remedial action is warranted at Site 1 beyond the redevelopment of Site 1, including the installation of impervious surfaces, and the recording of a Deed Notice at Site 1. In addition, a groundwater monitoring program will be initiated subsequent to the completion of Site 1 redevelopment.

The HHMT-Port Ivory Facility is situated within an industrial section of Staten Island that was reclaimed from marshland by the use of fill and is bordered by railroads, ports, and roadways. Based on the industrial land use, the environmental quality of surface water, sediment, groundwater, and soil have been impacted on a regional scale. Therefore, neither the soil nor the groundwater at the HHMT-Port Ivory Facility are currently or will be used as natural resources and the surface water and sediment in Bridge Creek and the Arthur Kill are also not high quality. Therefore, while media are referred to as "impacted" throughout this report if the concentration of a regulated substance in the medium exceeds NYSDEC standards or guidance values, it is important to realize that the impacts, if any, attributable to P&G's operations only negligibly worsen already degraded environmental quality and that the "impacts" believed to be attributable to former P&G operations may be attributable instead to regional contamination.

Based on the results and discussion provided in Sections 6 and 7 above, the following conclusions have been drawn for Site 1.

- The soil apparently impacted by PAHs in the vicinity of SRI temporary well location TWP-1A warrants additional investigation. The additional investigation will include the collection of soil samples to confirm that the soil is impacted by PAHs (and that the elevated concentration of PAHs was not due to inclusion of cinders in the soil sample) and soil samples to delineate the impacted soil (if necessary). Depending on the extent of the impacted soil, a groundwater investigation may also be warranted.

- The soil containing elevated concentrations of TPHC (i.e., soil in the vicinity of soil boring location UST2-4) also warrants additional investigation. The goal of the additional investigation will be to determine whether LNAPL in the vicinity of UST2-4 is mobile.

- LNAPL is present at AOC-UST2 within a footprint with an area of 30,750 square feet. However, the presence of the LNAPL, believed to be petroleum-based, has not significantly impacted soil or groundwater with respect to regulated organic compounds. The LNAPL is present within the soil at residual quantities and is immobile throughout most or all of AOC-UST2. Except as described above, neither additional investigation nor any remedial action is required in AOC-UST2.

- With the exception of groundwater impacted by xylene at well PG-CS-7, groundwater impacts at Site 1 have not impacted the quality of surface water and/or sediment in Bridge Creek. The effect of the impacted groundwater at well PG-CS-7 on the quality of surface water and/or sediment in Bridge Creek is not currently known. Moreover, the xylene impacts in groundwater at well PG-CS-7 appear to be attenuating naturally. A groundwater monitoring program that includes the collection of surface water samples in Bridge Creek will be initiated subsequent to the redevelopment of Site 1.

- Neither soil nor groundwater has been impacted by the former hydrogen holders and appurtenant equipment.

- No human receptors have been identified for any contaminated medium at Site 1 following redevelopment. Impacted soil will be capped with impermeable materials, reducing the mobility of impacted soil and the flux of substances to groundwater. Neither groundwater nor surface water in Bridge Creek is currently utilized as a source of potable water; due to the salinity and

generally poor quality of these potential resources, neither is likely to be used as a source of potable water in the near future. Inhabited buildings are not currently located and are not planned at Site 1.

HMM recommends that additional investigation be conducted in the vicinity of soil boring UST2-4 and TWP-1A to confirm that remedial actions are not warranted with respect to LNAPL and impacted soil, respectively. The details of this investigation will be included in a Targeted Supplemental Remedial Investigation Workplan that will be submitted to NYSDEC and NYSDOH for approval. HMM further recommends that, with the exception of the two referenced areas at AOC-UST2, the only remedial actions warranted at Site 1 are the capping of impacted soils and the establishment of a Deed Notice. The effectiveness of these remedial actions will be monitored in a groundwater monitoring program that includes the collection of surface water samples and that will be initiated subsequent to the redevelopment of Site 1. Details related to the proposed remedial actions and groundwater monitoring program will be included in a Remedial Action Work Plan for Site 1, which will be submitted to the NYSDEC and NYSDOH for approval.

APPENDIX A

SOIL BORING LOGS
(SUBMITTED UNDER SEPARATE COVER)

APPENDIX B

SUMMARY OF NYSDEC SAMPLING LOCATIONS AND ANALYTICAL DATA, BRIDGE CREEK

Clark, Geoffrey K

From: Kohlsaat, Jennifer N
Sent: Tuesday, January 17, 2006 9:26 AM
To: Clark, Geoffrey K
Subject: FW:


SedData2.PDF (86 KB)


Bridge ek_sample_sites2.p(


SedData1.PDF (146 KB)


L276PCB.PDF (110 KB)

-----Original Message-----
From: Aldrich, Ed [mailto:ealdrich@panynj.gov]
Sent: Wednesday, September 22, 2004 9:01 AM
To: Kohlsaat, Jennifer
Subject: FW:

Jen,

Here is the data from Steve Zahn for his wetland rehab project.

Ed

-----Original Message-----
From: Steve Zahn [mailto:smzahn@gw.dec.state.ny.us]
Sent: Wednesday, September 22, 2004 8:44 AM
To: Aldrich, Ed
Subject: Re:

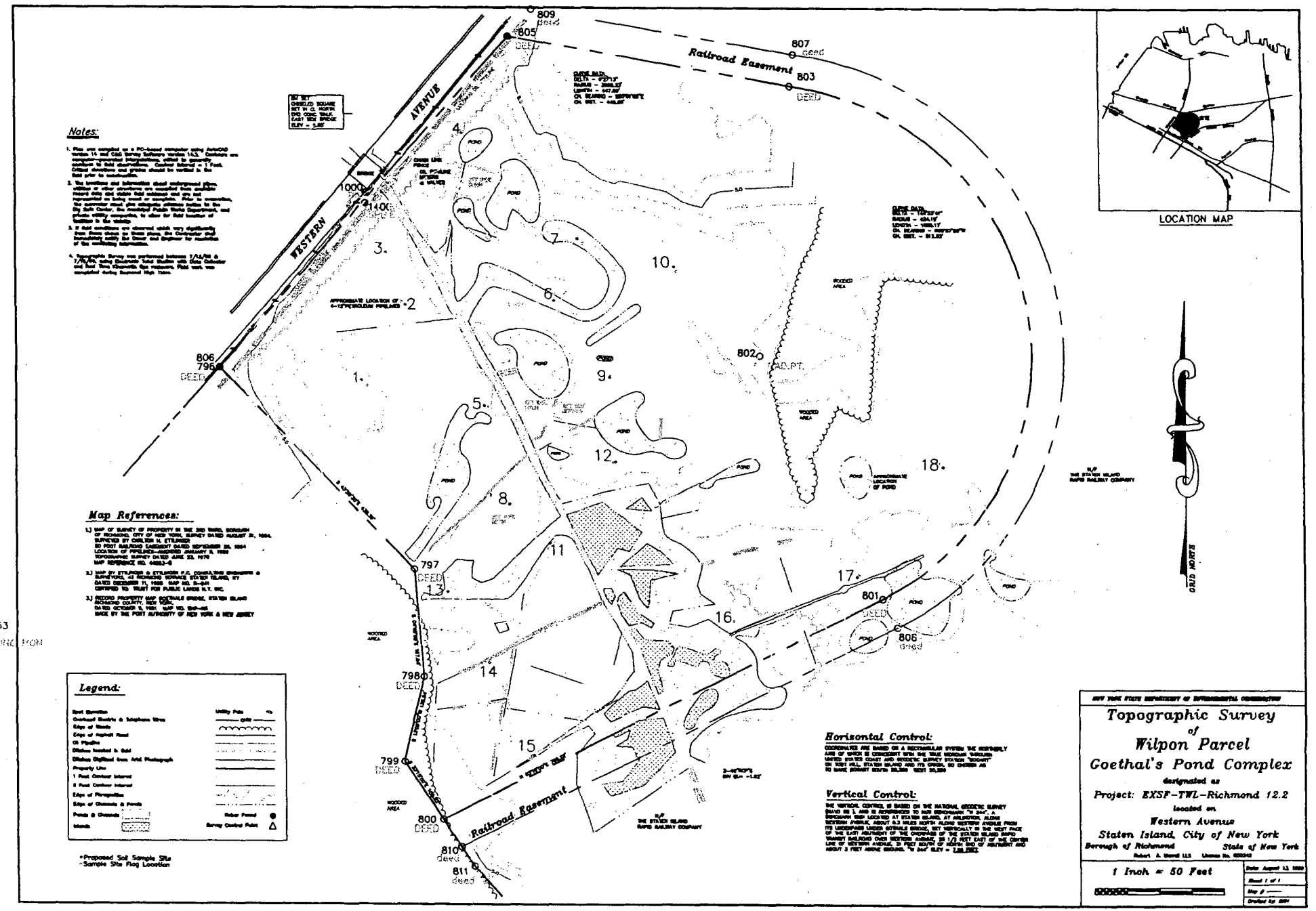
Ed,
Attached are the bulk numbers from our initial survey and a copy of the sample locations. The 4 samples are composites of 4-5 of the locations as follows:
BCW-01: 1,2, 3, 5
BCW-02: 8, 11, 13, 14, 15
BCW-03: 12, 16, 17, 18
BCW-04: 4, 6, 7, 9, 10
The pesticdes, PCBs, VOCs and SVOCs were not a concern here, only metals were a problem. Sample location 1 turned out to be our "hot-spot".
Steve

>>> "Aldrich, Ed" <ealdrich@panynj.gov> 09/21/2004 11:41:38 AM >>>
Steve,

Can I get a copy of the analytical data from your wetland restoration project? Your data may help explain the presence of some metals we found in our sediment sampling. If it's not a problem, please e-mail me the data or fax it to me at 973-565-7649.

Thanks,

Ed Aldrich


Notes:
Map References:
Legend:
Horizontal Control:
Vertical Control:
Topographic Survey
of
Wilpon Parcel
Goethal's Pond Complex
designated as
Project: EXSF-TWL-Richmond 12.2
located on
Western Avenue
Staten Island, City of New York
Borough of Richmond
State of New York
1 Inch = 50 Feet
LOCATION MAP
Railroad Easement
WESTERN AVENUE
809
805
807
803
806
796
802
797
801
806
798
799
800
810
811
1.
2.
3.
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Lionville Laboratory, Inc.

Volatiles by GC/MS, TCLP Leachate

Report Date: 04/21/04 07:19

RFW Batch Number: **0404L276** Client: **NYSDEC** Work Order: 01667601001 Page: 1a

	Cust ID:	BCW-01	BCW-02	BCW-03	BCW-04	BCW-04	BCW-04
Sample	RFW#:	001	002	003	004	004 MS	004 MSD
Information	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.09	1.16	1.00	1.06	1.11	0.926
	Units:	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Surrogate Recovery	Toluene-d8	99 %	101 %	103 %	112 %	100 %	102 %
	Bromofluorobenzene	108 %	110 %	118 %	123 * %	125 * %	122 %
	1,2-Dichloroethane-d4	95 %	87 %	104 %	104 %	92 %	89 %
Vinyl Chloride		52 U	25 J	85 U	44 U	140 %	143 %
1,1-Dichloroethene		26 U	40 U	42 U	22 U	93 %	96 %
Chloroform		26 U	10 J	42 U	22 U	106 %	111 %
1,2-Dichloroethane		26 U	40 U	42 U	22 U	100 %	99 %
2-Butanone		52 U	210	95	170	44 * %	7 * %
Carbon Tetrachloride		26 U	13 J	42 U	22 U	88 %	83 %
Trichloroethene		26 U	14 J	42 U	22 U	93 %	90 %
Benzene		26 U	12 J	42 U	22 U	108 %	108 %
Tetrachloroethene		26 U	17 J	42 U	22 U	93 %	95 %
Chlorobenzene		26 U	12 J	42 U	22 U	101 %	102 %

*= Outside of EPA CLP QC limits.

	Cust ID:	VBLKCS		VBLKCS BS		VBLKCT		VBLKCT BS	
Sample Information	RFW#:	04LVG112-MB1		04LVG112-MB1		04LVG114-MB1		04LVG114-MB1	
	Matrix:	SOIL		SOIL		SOIL		SOIL	
	D.F.:	1.00		1.00		1.00		1.00	
	Units:	ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Surrogate Recovery	Toluene-d8	90	%	89	%	89	%	92	%
	Bromofluorobenzene	93	%	94	%	94	%	100	%
	1,2-Dichloroethane-d4	90	%	90	%	90	%	96	%
Vinyl Chloride		10	U	111	%	10	U	114	%
1,1-Dichloroethene		5	U	84	%	5	U	92	%
Chloroform		5	U	93	%	5	U	99	%
1,2-Dichloroethane		5	U	94	%	5	U	105	%
2-Butanone		10	U	52	%	10	U	82	%
Carbon Tetrachloride		5	U	91	%	5	U	95	%
Trichloroethene		5	U	96	%	5	U	100	%
Benzene		5	U	100	%	5	U	110	%
Tetrachloroethene		5	U	91	%	5	U	97	%
Chlorobenzene		5	U	97	%	5	U	103	%

*= Outside of EPA CLP QC limits.

	Cust ID:	BCW-01		BCW-02		BCW-03		BCW-04		BCW-04		BCW-04	
Sample Information	RFW#:	001		002		003		004		004 MS		004 MSD	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	D.F.:	2.00		2.00		2.00		2.00		2.00		2.00	
	Units:	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
Surrogate Recovery	Nitrobenzene-d5	64	%	62	%	45	%	65	%	62	%	54	%
	2-Fluorobiphenyl	62	%	61	%	47	%	61	%	63	%	54	%
	p-Terphenyl-d14	64	%	80	%	63	%	65	%	71	%	58	%
	Phenol-d5	72	%	79	%	60	%	77	%	75	%	67	%
	2-Fluorophenol	75	%	74	%	56	%	78	%	75	%	66	%
	2,4,6-Tribromophenol	73	%	80	%	66	%	76	%	80	%	69	%
Pyridine		3200	U	4600	U	5600	U	2800	U	24	%	15	%
1,4-Dichlorobenzene		3200	U	4600	U	5600	U	2800	U	53	%	45	%
2-Methylphenol		3200	U	4600	U	5600	U	2800	U	64	%	60	%
3- and/or 4-Methylphenol		3200	U	4600	U	5600	U	2800	U	74	%	69	%
Hexachloroethane		3200	U	4600	U	5600	U	2800	U	29	%	20	%
Nitrobenzene		3200	U	4600	U	5600	U	2800	U	59	%	53	%
Hexachlorobutadiene		3200	U	4600	U	5600	U	2800	U	53	%	46	%
2,4,6-Trichlorophenol		3200	U	4600	U	5600	U	2800	U	71	%	61	%
2,4,5-Trichlorophenol		7900	U	11000	U	14000	U	6900	U	76	%	64	%
2,4-Dinitrotoluene		3200	U	4600	U	5600	U	2800	U	69	%	58	%
Hexachlorobenzene		3200	U	4600	U	5600	U	2800	U	66	%	57	%
Pentachlorophenol		7900	U	11000	U	14000	U	6900	U	80	%	70	%

*= Outside of EPA CLP QC limits.

		Cust ID:	SBLKNT		SBLKNT BS	
Sample Information		RFW#:	04LE0472-MB1		04LE0472-MB1	
		Matrix:	SOIL		SOIL	
		D.F.:	1.00		1.00	
		Units:	UG/KG		UG/KG	
	Nitrobenzene-d5		78	%	74	%
Surrogate	2-Fluorobiphenyl		68	%	66	%
Recovery	p-Terphenyl-d14		89	%	85	%
	Phenol-d5		93	%	88	%
	2-Fluorophenol		89	%	84	%
	2,4,6-Tribromophenol		64	%	73	%
Pyridine			330	U	50	%
1,4-Dichlorobenzene			330	U	66	%
2-Methylphenol			330	U	76	%
3- and/or 4-Methylphenol			330	U	82	%
Hexachloroethane			330	U	72	%
Nitrobenzene			330	U	71	%
Hexachlorobutadiene			330	U	63	%
2,4,6-Trichlorophenol			330	U	68	%
2,4,5-Trichlorophenol			830	U	74	%
2,4-Dinitrotoluene			330	U	77	%
Hexachlorobenzene			330	U	72	%
Pentachlorophenol			830	U	70	%

*= Outside of EPA CLP QC limits.

Lionville Laboratory, Inc.
Herbicides, Special List
Report Date: 04/21/04 21:31

RFW Batch Number: **0404L276** Client: **NYSDEC** Work Order: 01667601001 Page: 1

	Cust ID:	BCW-01	BCW-02	BCW-03	BCW-03	BCW-03	BCW-04
Sample Information	RFW#:	001	002	003	003 MS	003 MSD	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	DCAA	59 %	59 %	49 %	83 %	64 %	56 %
2,4-D		160 U	230 U	280 U	136 %	119 %	140 U
2,4,5-TP (Silvex)		79 U	110 U	140 U	128 %	96 %	69 U

	Cust ID:	PBLKGO	PBLKGO BS	PBLKGO BSD
Sample Information	RFW#:	04LE0471-MB1	04LE0471-MB1	04LE0471-MB1
	Matrix:	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG
Surrogate:	DCAA	73 %	54 %	61 %
2,4-D		33 U	80 %	100 %
2,4,5-TP (Silvex)		17 U	85 %	96 %

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked. %= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Lionville Laboratory, Inc.
PCBs by GC
Report Date: 04/29/04 10:28

RFW Batch Number: **0404L276** Client: **NYSDEC** Work Order: 01667601001 Page: 1

	Cust ID:	BCW-01	BCW-01	BCW-01	BCW-02	BCW-03	BCW-04
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Tetrachloro-m-xylene	80 %	60 %	85 %	70 %	80 %	60 %
	Decachlorobiphenyl	70 %	60 %	90 %	70 %	75 %	55 %
Aroclor-1016		160 U	57 %	87 %	230 U	280 U	140 U
Aroclor-1221		160 U	160 U	160 U	230 U	280 U	140 U
Aroclor-1232		160 U	160 U	160 U	230 U	280 U	140 U
Aroclor-1242		160 U	160 U	160 U	230 U	280 U	140 U
Aroclor-1248		160 U	160 U	160 U	230 U	280 U	140 U
Aroclor-1254		260	I	I	230 U	280 U	140 U
Aroclor-1260		160 U	64 %	114 %	230 U	280 U	140 U

	Cust ID:	PBLKGK	PBLKGK BS
Sample Information	RFW#:	04LE0453-MB1	04LE0453-MB1
	Matrix:	SOIL	SOIL
	D.F.:	1.00	1.00
	Units:	UG/KG	UG/KG
Surrogate:	Tetrachloro-m-xylene	100 %	90 %
	Decachlorobiphenyl	110 %	100 %
Aroclor-1016		33 U	80 %
Aroclor-1221		33 U	33 U
Aroclor-1232		33 U	33 U
Aroclor-1242		33 U	33 U
Aroclor-1248		33 U	33 U
Aroclor-1254		33 U	33 U
Aroclor-1260		33 U	87 %

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Lionville Laboratory, Inc.

Pesticides/PCB by GC, Special List — Report Date: 04/29/04 11:59

RFW Batch Number: **0404L276** Client: **NYSDEC** Work Order: 01667601001 Page: 1

	Cust ID:	BCW-01	BCW-01	BCW-02	BCW-02	BCW-02	BCW-02
Sample Information	RFW#:	001	001 RE	002	002 RE	002 MS	002 MS
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	5.00	1.00	5.00	1.00	5.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Decachlorobiphenyl	110 %	D %	70 %	D %	105 %	D %
	Tetrachloro-m-xylene	70 %	D %	85 %	D %	90 %	D %
		fl	fl	fl	fl	fl	fl
Heptachlor		7.9 U	40 U	11 U	57 U	75 %	D %
alpha-Chlordane		9.5	40 U	11 U	57 U	60 %	D %
gamma-Chlordane		11	19 J	11 U	57 U	90 %	D %
gamma-BHC (Lindane)		7.9 U	40 U	11 U	110 .I	30 * %	D %
Endrin		16 U	79 U	23 U	110 U	25 * %	D %
Methoxychlor		79 U	400 U	110 U	570 U	6 * %	D %
Toxaphene		160 U	790 U	230 U	1100 U	230 U	1100 U
Heptachlor Epoxide		7.9 U	40 U	11 U	57 U	30 * %	D %

	Cust ID:	BCW-02	BCW-02	BCW-03	BCW-03	BCW-04	BCW-04
Sample Information	RFW#:	002 MSD	002 MSD	003	003 RE	004	004 RE
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	5.00	1.00	5.00	1.00	5.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Decachlorobiphenyl	100 %	D %	80 %	D %	75 %	D %
	Tetrachloro-m-xylene	80 %	D %	95 %	D %	50 %	D %
		fl	fl	fl	fl	fl	fl
Heptachlor		65 %	D %	14 U	45 J	6.9 U	35 U
alpha-Chlordane		50 %	D %	14 U	71 U	6.9 U	35 U
gamma-Chlordane		80 %	D %	14 U	71 U	6.9 U	35 U
gamma-BHC (Lindane)		30 * %	D %	14 U	71 U	6.9 U	35 U
Endrin		20 * %	D %	28 U	140 U	6.9 J	69 U
Methoxychlor		2 * %	D %	140 U	710 U	69 U	350 U
Toxaphene		230 U	1100 U	280 U	1400 U	140 U	690 U
Heptachlor Epoxide		20 * %	D %	14 U	71 U	6.9 U	35 U

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

	Cust ID:	PBLKGK	PBLKGK RE	PBLKGK BS	PBLKGK BS
Sample Information	RFW#:	04LE0453-MB1	04LE0453-MB1	04LE0453-MB1	04LE0453-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Decachlorobiphenyl	130 * %	135 * %	120 %	125 * %
	Tetrachloro-m-xylene	105 %	120 * %	100 %	105 %
Heptachlor		1.7 U	1.7 U	70 %	110 %
alpha-Chlordane		1.7 U	1.7 U	50 %	90 %
gamma-Chlordane		1.7 U	1.7 U	50 %	100 %
gamma-BHC (Lindane)		1.7 U	1.7 U	30 * %	90 %
Endrin		3.3 U	3.3 U	10 * %	130 %
Methoxychlor		17 U	17 U	2 * %	122 %
Toxaphene		33 U	33 U	33 U	33 U
Heptachlor Epoxide		1.7 U	1.7 U	20 * %	100 %

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 04/19/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BCW-01	Silver, Total	1.4	MG/KG	0.27	1.0
		Arsenic, Total	23.3	MG/KG	1.5	1.0
		Barium, Total	4640	MG/KG	0.09	1.0
		Cadmium, Total	3.7	MG/KG	0.18	1.0
		Chromium, Total	223	MG/KG	0.22	1.0
		Mercury, Total	3.5	MG/KG	0.07	1.0
		Lead, Total	3570	MG/KG	0.89	1.0
		Selenium, Total	4.3	MG/KG	1.5	1.0
-002	BCW-02	Silver, Total	1.5	MG/KG	0.33	1.0
		Arsenic, Total	34.2	MG/KG	1.9	1.0
		Barium, Total	618	MG/KG	0.11	1.0
		Cadmium, Total	3.8	MG/KG	0.22	1.0
		Chromium, Total	266	MG/KG	0.28	1.0
		Mercury, Total	4.5	MG/KG	0.08	1.0
		Lead, Total	510	MG/KG	1.1	1.0
		Selenium, Total	5.3	MG/KG	1.9	1.0
	BCW-03	Silver, Total	1.8	MG/KG	0.43	1.0
		Arsenic, Total	29.1	MG/KG	2.4	1.0
		Barium, Total	366	MG/KG	0.14	1.0
		Cadmium, Total	2.8	MG/KG	0.28	1.0
		Chromium, Total	99.9	MG/KG	0.36	1.0
		Mercury, Total	1.9	MG/KG	0.12	1.0
		Lead, Total	450	MG/KG	1.4	1.0
		Selenium, Total	7.3	MG/KG	2.4	1.0
-004	BCW-04	Silver, Total	1.1	MG/KG	0.21	1.0
		Arsenic, Total	29.1	MG/KG	1.2	1.0
		Barium, Total	475	MG/KG	0.07	1.0
		Cadmium, Total	2.8	MG/KG	0.14	1.0
		Chromium, Total	166	MG/KG	0.17	1.0
		Mercury, Total	3.7	MG/KG	0.05	1.0
		Lead, Total	406	MG/KG	0.69	1.0
		Selenium, Total	3.4	MG/KG	1.2	1.0

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/19/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	04L0245-MB1	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	0.34 u	MG/KG	0.34	1.0
		Barium, Total	0.04	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	0.05 u	MG/KG	0.05	1.0
		Lead, Total	0.20 u	MG/KG	0.20	1.0
		Selenium, Total	0.34 u	MG/KG	0.34	1.0
BLANK1	04C0085-MB1	Mercury, Total	0.02 u	MG/KG	0.02	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 04/19/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR (SPK)
-001	BCW-01	Silver, Total	24.0	1.4	23.3	97.0	1.0
		Arsenic, Total	904	23.3	934	94.3	1.0
		Barium, Total	5180	4640	934	57.6*	1.0
		Cadmium, Total	26.9	3.7	23.3	99.6	1.0
		Chromium, Total	294	223	93.4	75.8	1.0
		Lead, Total	3720	3570	233	65.7*	1.0
		Selenium, Total	858	4.3	934	91.4	1.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 04/19/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	BCW-01	Silver, Total	1.4	1.6	13.3	1.0
		Arsenic, Total	23.3	23.4	0.43	1.0
		Barium, Total	4640	5450	16.1	1.0
		Cadmium, Total	3.7	3.6	2.7	1.0
		Chromium, Total	223	263	16.6	1.0
		Lead, Total	3570	4950	32.6	1.0
		Selenium, Total	4.3	3.5	20.5	1.0

Lionville Laboratory, Inc.

INORGANICS LABORATORY CONTROL STANDARDS REPORT 04/19/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	04L0245-LC1	Silver, LCS	49.9	50.0	MG/KG	99.8
		Arsenic, LCS	968	1000	MG/KG	96.8
		Barium, LCS	504	500	MG/KG	100.9
		Cadmium, LCS	24.9	25.0	MG/KG	99.6
		Chromium, LCS	50.5	50.0	MG/KG	101.0
		Lead, LCS	248	250	MG/KG	99.4
		Selenium, LCS	939	1000	MG/KG	93.9
LCS1	04C0085-LC1	Mercury, LCS	6.2	6.2	MG/KG	99.5

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 04/22/04

CLIENT: NYSDEC

LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BCW-01	% Solids	21.0	%	0.01	1.0
		Cyanide, Reactive	0.91 u	MG/KG	0.91	1.0
		pH	6.6	SOIL PH	0.01	1.0
		Sulfide, Reactive	133	MG/KG	72.8	1.0
-002	BCW-02	% Solids	14.5	%	0.01	1.0
		Cyanide, Reactive	0.41 u	MG/KG	0.41	1.0
		pH	6.9	SOIL PH	0.01	1.0
		Sulfide, Reactive	47.2	MG/KG	33.1	1.0
-003	BCW-03	% Solids	11.8	%	0.01	1.0
		Cyanide, Reactive	0.37 u	MG/KG	0.37	1.0
		pH	7.3	SOIL PH	0.01	1.0
		Sulfide, Reactive	42.3	MG/KG	29.6	1.0
-004	BCW-04	% Solids	24.0	%	0.01	1.0
		Cyanide, Reactive	0.48 u	MG/KG	0.48	1.0
		pH	6.8	SOIL PH	0.01	1.0
		Sulfide, Reactive	51.1	MG/KG	38.5	1.0

Ignitability — Samples did not ignite.
MJP 4-22-04

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 04/22/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-004REP	BCW-04	Cyanide, Reactive	0.48u	0.51u	NC	1.0
		pH	6.9	6.9	0.0	1.0
		Sulfide, Reactive	51.1	66.9	26.7	1.0

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/22/04

CLIENT: NYSDEC

LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	04LRC16-MB1	Cyanide, Reactive	0.50 u	MG/KG	0.50	1.0
BLANK10	04LRS016-MB1	Sulfide, Reactive	40.0 u	MG/KG	40.0	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 04/22/04

CLIENT: NYSDEC LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE		SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
LCSS1	04LRC16-LCS1	Cyanide, Reactive		2.44	0.14	5.00	45.9	1.0
LCSS2	04LRC16-LCS2	Cyanide, Reactive	MSD	1.49	0.14	5.00	27.0	1.0
BLANK10	04LRS016-MB1	Sulfide, Reactive		89.2	40.0 u	361	24.7	1.0
		Sulfide, Reactive	MSD	161	40.0 u	361	44.7	1.0

Lionville Laboratory, Inc.

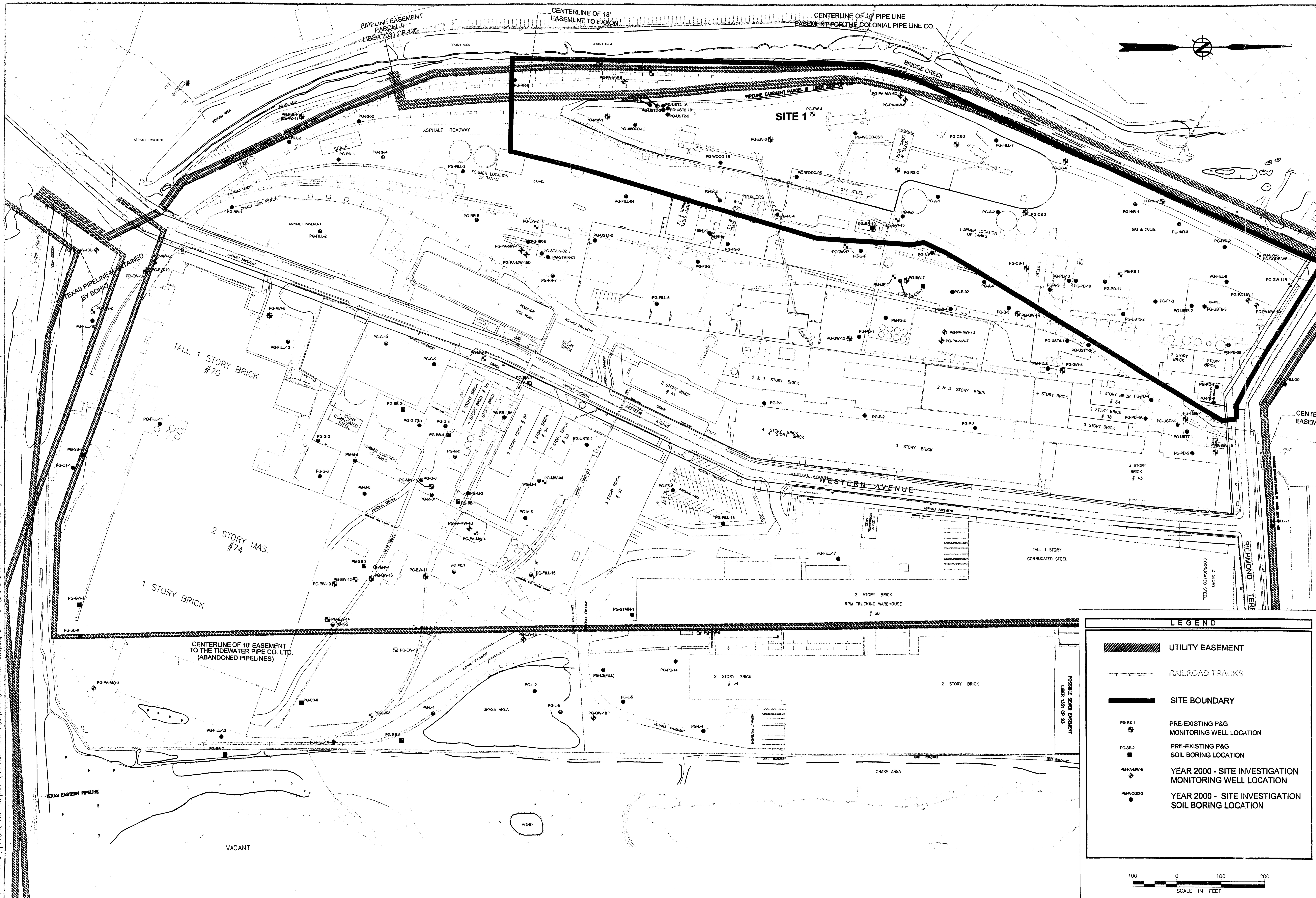
INORGANICS DUPLICATE SPIKE REPORT 04/22/04

CLIENT: NYSDEC

LVL LOT #: 0404L276

WORK ORDER: 01667-601-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
LCSS2	04LRC16-LCS2	Cyanide, Reactive	45.9	27.0	51.7
BLANK10	04LRS016-MB1	Sulfide, Reactive	24.7	44.7	57.6



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THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1)
HHMT-PORT IVORY FACILITY

SITE 1
SITE INVESTIGATION
SAMPLE LOCATION PLAN

Designed by Drawn by Checked by

Date

Contract Number

Drawing Number **FIGURE 7**

APPENDIX C

SUMMARY OF PREVIOUS GROUNDWATER, SURFACE WATER, AND SEDIMENT SAMPLING LOCATIONS AND ANALYTICAL DATA, SITE 1

Groundwater Analytical Results
Volatile Organic Compounds
Site 1 HHMT-Port Ivory Facility

Location Sample Date Concentration in UG/L	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	PG-CS-7 11/24/2000 UG/L	PG-EW-3 11/24/2000 UG/L	PG-EW-6 11/24/2000 UG/L	PG-PA-MW-1D 11/29/2000 UG/L	PG-PA-MW-1 11/28/2000 UG/L	PG-PA-MW-5 11/24/2000 UG/L	PG-PA-MW-6 11/27/2000 UG/L	PG-PA-MW-6D 11/30/2000 UG/L	PG-RS-1 11/24/2000 UG/L	PG-RS-2 11/24/2000 UG/L	PG-TMW-02 12/2/2000 UG/L
1,1,1-TRICHLOROETHANE	5	NG	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.88 U	0.44 U	0.44 U	0.44 U	0.44 U
1,1,2,2-TETRACHLOROETHANE	5	NG	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.84 U	0.42 U	0.42 U	0.42 U	0.42 U
1,1,2-TRICHLOROETHANE	1	NG	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-DICHLOROETHANE	5	NG	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.70 U	0.35 U	0.35 U	0.35 U	0.35 U
1,1-DICHLOROETHYLENE	5	NG	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.82 U	0.41 U	0.41 U	0.41 U	0.41 U
1,2-DICHLOROETHANE	0.6	NG	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.88 U	0.44 U	0.44 U	0.44 U	0.44 U
1,2-DICHLORORPROPANE	1	NG	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.88 U	0.44 U	0.44 U	0.44 U	0.44 U
2-CHLOROETHYL VINYL ETHER	NS	NG	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	2.2 U	1.1 U	1.1 U	1.1 U	1.1 U
ACROLEIN	5	NG	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	6.0 U	3.0 U	3.0 U	3.0 U	3.0 U
ACRYLONITRILE	5	NG	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	13 U	6.6 U	6.6 U	6.6 U	6.6 U
BENZENE	1	NG	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.64 U	0.32 U	0.32 U	0.32 U	0.32 U
BROMODICHLOROMETHANE	NS	50	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.60 U	0.30 U	0.30 U	0.30 U	0.30 U
BROMOFORM	NS	50	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.64 U	0.32 U	0.32 U	0.32 U	0.32 U
BROMOMETHANE	5	NG	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	1.1 U	0.55 U	0.55 U	0.55 U	0.55 U
CARBON TETRACHLORIDE	5	NG	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.46 U	0.23 U	0.23 U	0.23 U	0.23 U
CHLOROBENZENE	5	NG	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.50 U	0.25 U	0.25 U	0.25 U	0.25 U
CHLOROETHANE	5	NG	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	1.0 U	0.52 U	0.52 U	0.52 U	0.52 U
CHLOROFORM	7	NG	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.90 U	0.45 U	0.45 U	0.45 U	0.45 U
CHLOROMETHANE	5	NG	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.64 U	0.32 U	0.32 U	0.32 U	0.32 U
CIS-1,3-DICHLOROPROPENE	5	NG	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.70 U	0.35 U	0.35 U	0.35 U	0.35 U
DIBROMOCHLOROMETHANE	NS	50	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.82 U	0.41 U	0.41 U	0.41 U	0.41 U
DICHLOROMETHANE	5	NG	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	1.7 U	0.85 U	0.85 U	0.85 U	0.85 U
ETHYLBENZENE	5	NG	6.7	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.30 U	0.15 U	0.15 U	0.15 U	0.15 U
M&P-XYLENES	5&5	NG	18(total M&P)	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	1.6 U	0.81 U	0.81 U	0.81 U	0.81 U
METHYLBENZENE	5	NG	4.9	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.48 U	0.24 U	2.4	0.24 U	0.24 U
O-XYLENE	5	NG	3.3	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.72 U	0.36 U	0.36 U	0.36 U	0.36 U
TETRACHLOROETHYLENE	5	NG	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.68 U	0.34 U	0.34 U	0.34 U	0.34 U
TRAMS-1,2-DICHLOROETHYLENE	5	NG	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.92 U	0.46 U	0.46 U	0.46 U	0.46 U
TRANS-1,3-DICHLOROPROPENE	NS	NG	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.48 U	0.24 U	0.24 U	0.24 U	0.24 U
TRICHLOROETHYLENE	5	NG	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.74 U	0.37 U	0.37 U	0.37 U	0.37 U
VINYL CHLORIDE	2	NG	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	1.3 U	0.67 U	0.67 U	0.67 U	0.67 U

U Undetectable Levels
NS No Standard
NG No Guidance

Table 1
Groundwater Analytical Results
Semi-Volatile Organic Compounds
Site 1 HHMT-Port Ivory Facility

Location Sample Date Concentration in UG/L	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	PG-CS-7 11/24/2000 UG/L	PG-EW-3 11/24/2000 UG/L	PG-EW-6 11/24/2000 UG/L	PG-PA-MW-1D 11/29/2000 UG/L	PG-PA-MW-1 11/28/2000 UG/L	PG-PA-MW-5 11/24/2000 UG/L	PG-PA-MW-6 11/27/2000 UG/L	PG-PA-MW-6D 11/30/2000 UG/L	PG-RS-1 11/24/2000 UG/L	PG-RS-2 11/24/2000 UG/L	PG-TMW-02 12/2/2000 UG/L
1,2,4-TRICHLOROBENZENE	5	NG	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
1,2-BENZPHENANTHRACENE	NS	0.002	0.30 U	1.2	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
1,2-DICHLOROBENZENE	3	NG	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,2-DIPHENYLHYDRAZINE	NS	NG	0.24 U	1.2	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
1,4-DICHLOROBENZENE	3	NG	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2,4,6-TRICHLOROPHENOL	NS	NG	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
2,4-DICHLOROPHENOL	5	NG	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2,4-DIMETHYLPHENOL	NS	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
2,4-DINITRPHENOL	NS	10	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
2,4-DINITROTOLUENE	5	NG	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
2,6-DINITROTOLUENE	5	NG	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
2-CHLORONAPHTHALENE	NS	10	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
2-CHLOROPHENOL	NS	NG	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
2-NITROPHENOL	NS	NG	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
3,3'-DICHLOROBENZIDINE	5	NG	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
4,6-DINITRO-O-CRESOL	NS	NG	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
4-BROMOPHENYLPHENYL ETHER	NS	NG	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
4-CHLORO-3-METHYLPHENOL	NS	NG	1.9 U	1.9 J	1.9 J	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
4-CHLORORPHENLYPHENYL ETHER	NS	NG	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
4-NITROPHENOL	NS	NG	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
ACENAPHTHENE	NS	20	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
ACENAPHTHYLENE	NS	NG	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
ANTHRACENE	NS	50	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
BENZIDINE	5	NG	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U
BENZO(A)ANTHRACENE	NS	0.002	0.20 U	1.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
BENZO(A)PYRENE	ND	NG	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
BENZO(B)FLOURANTHENE	NS	0.002	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
BENZO(G,H,I)PERYLENE	NS	NG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
BENZO(K)FLOURANTHENE	NS	0.002	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
BENZYL BUTYL PHTHALATE	NS	50	0.29 U	1.1	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
BIS(2-CHLOROETHOXY)METHANE	5	NG	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
BIS(2-CHLOROETHYL)ETHER	1	NG	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
BIS(2-CHLOROISOPROPYL)ETHER	5	NG	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
BIS(2-ETHYLHEXYL)PHTHALATE	5	NG	2.1	2.6	0.37 U	8.2	5.3 B	1.9	0.37 U	2.3 B	2.1	1.6	4.6 B
DI-N-BUTYL PHTHALATE	50	NG	0.26 U	1.0	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	1.5	0.26 U	0.26 U	0.26 U
DI-N-OCTYL PHTHALATE	NS	50	0.80 U	1.3	0.80 U	0.80 U	2.0 B	0.80 U	0.80 U	1.3	0.80 U	0.80 U	1.1 B
DIBENZ[A,H]ANTHRACENE	NS	NG	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
DIETHYL PHTHALATE	NS	50	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
DIMETHYL PHTHALATE	NS	50	0.24 U	0.24 U	1.6	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
FLUORANTHENE	NS	50	0.29 U	1.4	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
FLUORENE	NS	50	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
HEXACHLORO-1,3-BUTADIENE	0.5	NG	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HEXACHLOROBENZENE	0.04	NG	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
HEXACHLOROCYCLOPENTADIENE	5	NG	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
HEXACHLOROETHANE	5	NG	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U

Table
Groundwater Analytical Results
Semi-Volatile Organic Compounds
Site 1 HHMT-Port Ivory Facility

Location Sample Date Concentration in UG/L	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	PG-CS-7 11/24/2000 UG/L	PG-EW-3 11/24/2000 UG/L	PG-EW-6 11/24/2000 UG/L	PG-PA-MW-1D 11/29/2000 UG/L	PG-PA-MW-1 11/28/2000 UG/L	PG-PA-MW-5 11/24/2000 UG/L	PG-PA-MW-6 11/27/2000 UG/L	PG-PA-MW-6D 11/30/2000 UG/L	PG-RS-1 11/24/2000 UG/L	PG-RS-2 11/24/2000 UG/L	PG-TMW-02 12/2/2000 UG/L
INDENO[1,2,3-CD]PYRENE	NS	0.002	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
ISOPHORONE	NS	50	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
M-DICHLOROBENZENE	3	NG	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
N-NITROSO-DI-N-PROPYLAMINE	NS	NG	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
N-NITROSODIMETHYLAMINE	NS	NG	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
N-NITROSODIPHENYLAMINE	NS	50	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
NAPHTHALENE	NS	10	2.0	0.36 U	0.36 U	0.36 U	1.0	0.36 U	0.36 U	0.36 U	9.6	0.36 U	0.36 U
NITROBENZENE	0.4	NG	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
PENTACHLOROPHENOL	1(Total Phenols)	NG	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
PHENANTHRENE	NS	50	0.27 U	1.6	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
PHENOL	1(Total Phenols)	NG	1.8	1.2 U	29	1.2 U	33	1.2 U	2.1	1.2 U	16	1.2 U	1.2 U
PYRENE	NS	50	0.27 U	1.4	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U

U Undetectable Levels

NS No Standard

NG No Guidance

Table
Groundwater Analytical Results
Pesticides and PCB's
Site 1 HHMT-Port Ivory Facility

Location Sample Date Concentration in UG/L	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	PG-CS-7 11/24/2000 UG/L	PG-EW-3 11/24/2000 UG/L	PG-EW-6 11/24/2000 UG/L	PG-PA-MW-1D 11/29/2000 UG/L	PG-PA-MW-1 11/28/2000 UG/L	PG-PA-MW-5 11/24/2000 UG/L	PG-PA-MW-6 11/27/2000 UG/L	PG-PA-MW-6D 11/30/2000 UG/L	PG-RS-1 11/24/2000 UG/L	PG-RS-2 11/24/2000 UG/L	PG-TMW-02 12/2/2000 UG/L
4,4'-DDD	0.3	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
4,4'-DDE	0.2	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
4,4'-DDT	0.2	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ALDRIN	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ALPHA-BHC	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
AROCLOR 1016	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1221	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1232	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1242	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1248	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1254	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1260	0.09**	NG	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BETA-BHC	0.04	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
CHLORDANE	0.05	NG	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DELTA-BHC	0.04	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
DIELDRIN	0.004	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDOSULFAN I	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDOSULFAN II	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDOSULFAN SULFATE	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDRIN	NS	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDRIN ALDEHYDE	5	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
ENDRIN KETONE	5	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
GAMMA-BHC (LINDANE)	0.05	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
HEPTACHLOR	0.04	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
HEPTACHLOR EPOXIDE	0.03	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
METHOXYCHLOR	35	NG	0.02 U	0.02 U	0.02 U	0.02 U	0.1 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
TOXAPHENE	0.06	NG	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

U Undetectable Levels

NS No Standard

NG No Guidance

** Total PCBs

Groundwa[illegible]D
[illegible]alytical Results
Metals
Site 1 HHMT-Port Ivory Facility

Location Sample Date Concentration in UG/L	Recommended Groundwater Cleanup Standard UG/L	Recommended Groundwater Cleanup Guidance UG/L	PG-CS-7 11/24/2000 UG/L	PG-EW-3 11/24/2000 UG/L	PG-EW-6 11/24/2000 UG/L	PG-PA-MW-1D 11/29/2000 UG/L	PG-PA-MW-1 11/28/2000 UG/L	PG-PA-MW-5 11/24/2000 UG/L	PG-PA-MW-6 11/27/2000 UG/L	PG-PA-MW-6D 11/30/2000 UG/L	PG-RS-1 11/24/2000 UG/L	PG-RS-2 11/24/2000 UG/L	PG-TMW-02 12/2/2000 UG/L
ALUMINUM (FUME OR DUST)	NS	NG	180	170	130	58 U	610	500	430	260	260	2200	58 U
ANTIMONY	3	NG	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ARSENIC	25	NG	3.6 U	26	3.6 U	13	3.6 U	55	83	3.6 U	17	3.7	54
BARIUM	1000	NG	23	160	160	62	75	34	23 U	68	23 U	110	23 U
BERYLLIUM	NS	3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
CADMIUM	5	NG	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	16	1.4 U
CALCIUM METAL	NS	NG	14000	39000	460000	36000	230000	96000	1900	180000	22000	22000	140000
CHROMIUM	50	NG	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U
COBALT	NS	NG	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U
COPPER	200	NG	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
IRON	300***	NG	310	1200***	88 U	5100***	88 U	3200***	120	15000***	88 U	12000***	690***
LEAD	25	NG	3.4 U	3.4 U	4.6	3.4 U	3.4 U	6.2	3.4 U	3.4 U	3.4 U	9.9	3.4 U
MAGNESIUM	NS	35000	13000	99000	400	79000	260 U	14000	5500	430000	13000	10000	58000
MANGANESE	300***	NG	12 U	28***	12 U	90***	12 U	290***	12 U	1200***	12 U	120***	140***
NICKEL	100	NG	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U
POTASSIUM	NS	NG	19000	46000	20000	39000	40000	6100	100000	81000	25000	77000	17000
SELENIUM	10	NG	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
SILVER	50	NG	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
SODIUM	20000	NG	230000	220000	770000	840000	210000	55000	900000	4000000	150000	330000	400000
THALLIUM	NS	0.5	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
VANADIUM	NS	NG	4.8	6.8	4.3 U	12	4.3 U	4.8	50	4.3 U	5.9	21	10
ZINC	NS	2000	20 U	26	20 U	20 U	20 U	55	20 U	20 U	20 U	70	25
MERCURY	0.7	NG	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U

U Undetectable Levels

NS No Standard

NG No Guidance

*** Total for Iron and Maganese is > 500

Tabl
Groundwater A tical Results
TPHC, Oil and Grease, pH, Cyanide and Total Phenolics
Site 1 HHMT-Port Ivory Facility

Location Sample Date		Recommended Groundwater Cleanup Standard	Recommended Groundwater Cleanup Guidance	PG-CS-7 11/24/2000	PG-EW-3 11/24/2000	PG-EW-6 11/24/2000	PG-PA-MW-1D 11/28/2000	PG-PA-MW-1 11/29/2000	PG-PA-MW-5 11/24/2000
PETROLEUM HYDROCARBONS	MG/L	NS	NG	1.0 U	1.2	1.1 U	2.4	1.0 U	1.0 U
OIL & GREASE	ug/L	15,000MAX	NG	22	22	15	0.66	0.15	1.0 U
CYANIDE	MG/L	0.2	NG	0.01 U	0.01 U	0.01 U	0.01 U	0.016	0.01 U
*pH	pH units	NS	NG	9.16	8.23	12.82	12.35	7.07	6.76
TOTAL PHENOLICS	MG/L	0.001	NG	0.05 U	0.05 U	0.05 U	0.22	0.05 U	0.05 U

U Undetectable Levels

NS No Standard

NG No Guidance

Note: pH listed is the pH recorded in the field

Table
Groundwater Analytical Results
TPHC, Oil and Grease, pH, Cyanide and Total Phenolics
Site 1 HHMT-Port Ivory Facility

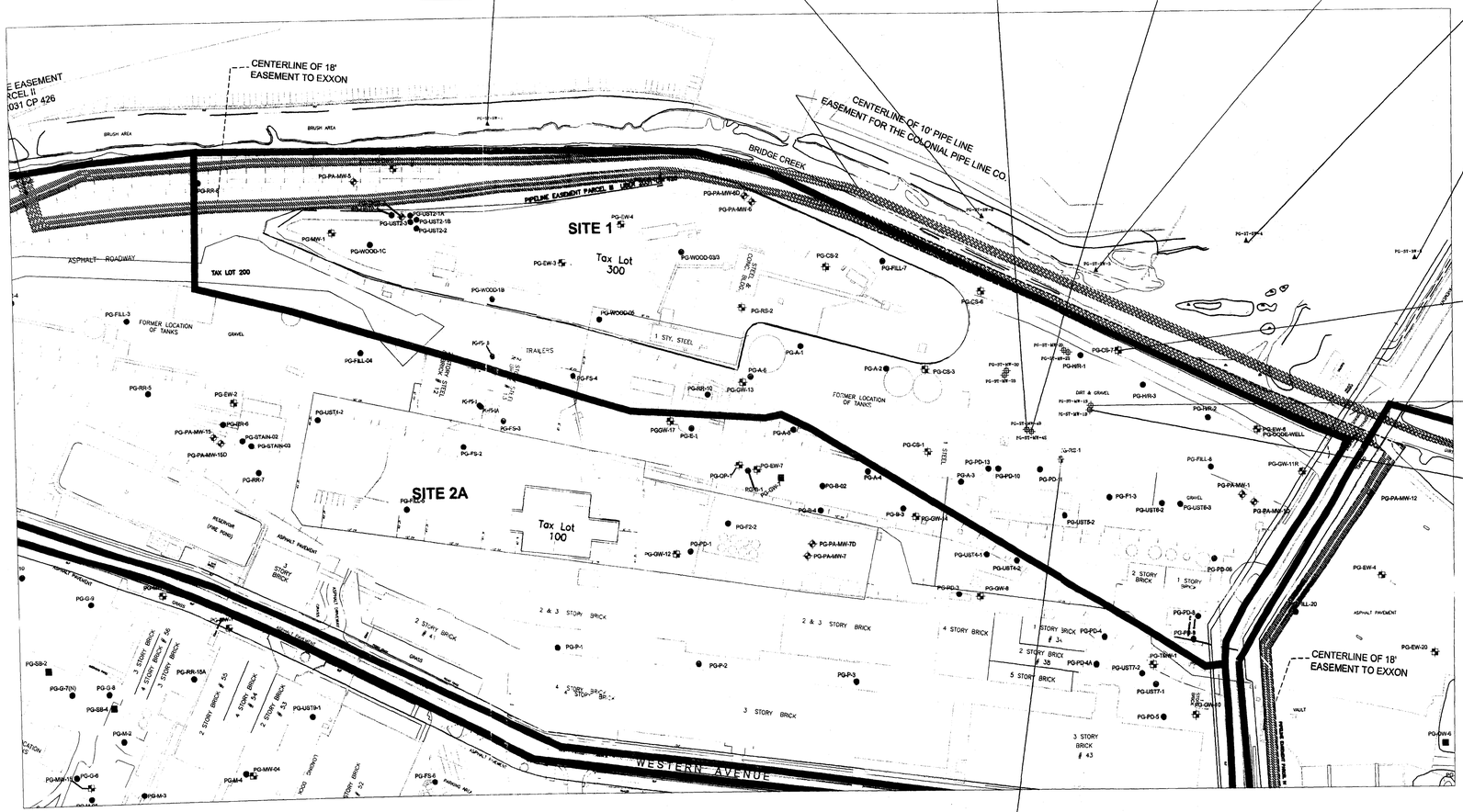
Location Sample Date		Recommended Groundwater Cleanup Standard	Recommended Groundwater Cleanup Guidance	PG-PA-MW-6 11/27/2000	PG-PA-MW-6D 11/30/2000	PG-RS-1 11/24/2000	PG-RS-2 11/24/2000	PG-TMW-02 12/2/2000
PETROLEUM HYDROCARBONS	MG/L	NS	NG	1.0 U	1.0 U	1.0 U	1.0 U	10
OIL & GREASE	ug/L	15,000MAX	NG	13	21	21	14	7.8
CYANIDE	MG/L	0.2	NG	0.013	0.01 U	0.01 U	0.01 U	0.01 U
*pH	pH units	NS	NG	11.36	7.08	11.24	8.54	7.1
TOTAL PHENOLICS	MG/L	0.001	NG	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

U Undetectable Levels

NS No Standard

NG No Guidance

Note: pH listed is the pH recorded in the field



PG-ST-SW-1

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON	610***
MAGNESIUM	600,000
SILVER	4,800,000

PG-ST-SW-2

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
MAGNESIUM	630,000
SODIUM	5,100,000

PG-ST-MW-4D

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	22,000***
IRON (filtered)	19,000***
MANGANESE (unfiltered)	5,200***
MANGANESE (filtered)	4,800***
SODIUM (unfiltered)	2,100,000
SODIUM (filtered)	2,000,000

PG-ST-MW-4S

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
ANTIMONY (filtered)	75
ARSENIC (filtered)	69
BERYLLIUM (filtered)	40
IRON (unfiltered)	3,300***
IRON (filtered)	550***
SODIUM (unfiltered)	400,000
SODIUM (filtered)	470,000
THALLIUM (filtered)	42

PG-ST-SW-3

DATE SAMPLED	SURFACE WATER
MATRIX	RESULTS (ug/L)
ANALYTE	
METALS	
IRON	790***
MAGNESIUM	130,000
SODIUM	1,300,000

PG-ST-SW-4

DATE SAMPLED	10/21/2002
MATRIX	SURFACE WATER
ANALYTE	RESULTS (ug/L)
METALS	
MAGNESIUM	610,000
SODIUM	4,900,000

PG-ST-SW-5

DATE SAMPLED	SURFACE WATER
MATRIX	RESULTS (ug/L)
ANALYTE	
METALS	
MAGNESIUM	630,000
SODIUM	5,000,000

PG-CS-7

DATE SAMPLED	10/15/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
SODIUM (unfiltered)	79,000
SODIUM (filtered)	89,000

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
SODIUM (unfiltered)	130,000
SODIUM (filtered)	130,000

DATE SAMPLED	12/2/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
BTEX	
M&P-XYLENES	7

PG-ST-MW-1S

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
ARSENIC (unfiltered)	90
ARSENIC (filtered)	53
IRON (unfiltered)	2,200***
NICKEL (filtered)	110
SODIUM (unfiltered)	1,500,00
SODIUM (filtered)	1,600,00

PG-ST-MW-1D

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	5,200**
IRON (filtered)	3,500***
SODIUM (unfiltered)	660,000
SODIUM (filtered)	720,000

NYSDEC GROUNDWATER CLEANUP STANDARDS AND CLEANUP GUIDANCE VALUES

ANALYTE	RCS (ug/L	RCG (ug/L)
VOCs		
M&P Xylenes:	5&5	NG
ACID EXTRACTABLES		
Phenol	1	NG
Total Phenol:	1	NG

NG - NO GUIDANCE VALUE

PG-RS-1

DATE SAMPLED	10/15/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	20,000***
IRON (filtered)	380***
SODIUM (unfiltered)	29,000
SODIUM (filtered)	28,000
ACID EXTRACTABLES	
TOTAL PHENOLS	1.1

DATE SAMPLED	11/8/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
METALS	
IRON (unfiltered)	1,400***
IRON (filtered)	950***
SODIUM (unfiltered)	32,000
SODIUM (filtered)	33,000

DATE SAMPLED	12/2/2002
MATRIX	GROUNDWATER
ANALYTE	RESULTS (ug/L)
ACID EXTRACTABLES	
PHENOL	3
TOTAL PHENOL	6.8

100 0 100 200
SCALE IN FEET

Notes:
1. Site 1, 2A/2B, and 3 descriptions as per July 2004 VCP Agreements.
2. This map presents concentrations of BTEX, Acid Extractables, and Metals at levels above NYSDEC Groundwater Cleanup Standards and Groundwater Cleanup Guidance Values.

LEGEND

- UTILITY EASEMENT
- SITE BOUNDARY
- PG-RS-1 — PRE-EXISTING P&G MONITORING WELL LOCATION
- PG-SB-2 — PRE-EXISTING P&G SOIL BORING LOCATION
- PG-PA-MW-5 — YEAR 2000 SITE INVESTIGATION MONITORING WELL LOCATION
- PG-WOOD-03/3 — YEAR 2000 SITE INVESTIGATION SOIL BORING LOCATION
- PG-ST-MW-1D — SURCHARGE MONITORING WELL LOCATIONS
- PG-ST-SW-4 — SURCHARGE SURFACE WATER SAMPLE LOCATIONS

Sheet of

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1 AND BLOCK 1338, LOT 1) HHMT-PORT IVORY FACILITY

SURCHARGE MONITORING WELL LOCATIONS MAP AND ANALYTICAL DATA

Designed by Drawn by Checked by

Date

Contract Number

Drawing Number FIGURE 22

PG-SED-SW-1 (PG-SED-1)	
ANALYTE	RESULTS (MG/KG)
ARSENIC	16
CHROMIUM	52
IRON (%)*	20,000
LEAD*	160
MERCURY	1.1
NICKEL	48
SILVER	1.8
ZINC*	610

(PG-SW-1)	
ANALYTE	RESULTS (ug/L)
LEAD	2,900
MAGNESIUM	360,000
MERCURY	0.93

PG-SED-SW-2 (PG-SED-2)	
ANALYTE	RESULTS (MG/KG)
ARSENIC	19
CADMIUM	0.64
CHROMIUM	69
IRON (%)*	23,000
LEAD*	380
MERCURY	92
NICKEL*	90
SILVER*	4.3
ZINC*	600

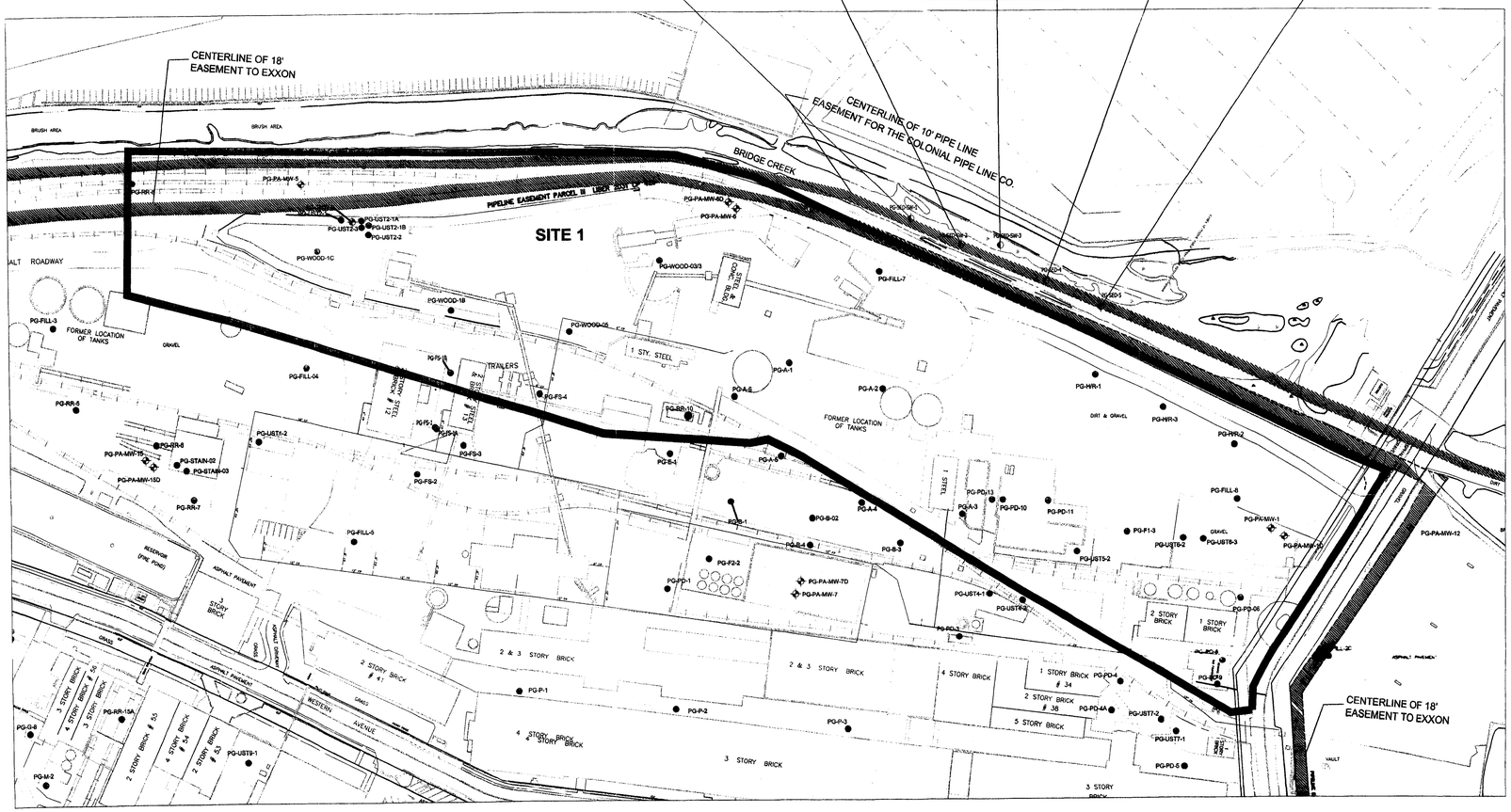
(PG-SW-2)	
ANALYTE	RESULTS (ug/L)
LEAD	3,800
MAGNESIUM	380,000

PG-SED-SW-3 (PG-SED-3)	
ANALYTE	RESULTS (MG/KG)
ARSENIC	14
CHROMIUM	30
LEAD*	310
MERCURY	29
NICKEL	33
ZINC*	510

(PG-SW-3)	
ANALYTE	RESULTS (ug/L)
ARSENIC	57
BERYLLIUM**	4.1
CADMIUM	9.8
CHROMIUM	220
COPPER	790
IRON	63,000
LEAD	650
MAGNESIUM	320,000
MANGANESE	690
NICKEL	140
ZINC**	2,500

PG-SED-4	
ANALYTE	RESULTS (MG/KG)
ARSENIC	11
CHROMIUM	78
IRON (%)*	23,000
LEAD*	200
MERCURY*	2.6
NICKEL*	53
SILVER*	2.5
ZINC*	650

PG-SED-5	
ANALYTE	RESULTS (MG/KG)
ARSENIC	12
CHROMIUM	82
IRON (%)	25,000
LEAD*	190
MERCURY*	2.6
NICKEL	45
SILVER*	2.5
ZINC*	560



NYSDEC SEDIMENT CLEANUP CRITERIA
LOWER EFFECT LEVEL (LEL)
SEVERE EFFECT LEVEL (SEL)

ANALYTE	LEL (ug/g)	SEL (ug/g)
ARSENIC	6.0	33
CADMIUM	0.6	9
CHROMIUM	26	110
IRON (%)*	2% (20,000)	4% (40,000)
LEAD*	31	110
MERCURY	0.2	1.3
NICKEL*	16	50
SILVER*	1.0	2.2
ZINC*	120	270

MG/KG = ug/g

NYSDEC RECOMENDED SURFACE WATER CLEANUP STANDARDS AND CLEANUP GUIDANCE VALUES (RSCS AND RSCG)

ANALYTE	RSCS (ug/L)	RSCG (ug/L)
ARSENIC	50	NG
BERYLLIUM**	NS	3
CADMIUM	5	NG
CHROMIUM	50	NG
COPPER	200	NG
IRON	300	NG
LEAD	50	NG
MAGNESIUM	35,000	NG
MANGANESE	300	NG
NICKEL	100	NG
ZINC**	NS	NG
MERCURY	0.7	2,000

NS - NO STANDARD
NG - NO GUIDANCE VALUE

100 0 100 200
SCALE IN FEET

NOTES:
* - INDICATES VALUES WERE DETECTED ABOVE THE LOWEST EFFECTIVE LEVEL (LEL) AS WELL AS ABOVE THE SEVERE EFFECTIVE LEVEL (SEL). ALL OTHER SEDIMENT RESULTS WERE FOUND ABOVE LEL LEVELS ONLY.
** - INDICATES THAT SURFACE WATER RESULTS ONLY EXCEED THE RECOMENDED SURFACE WATER CLEANUP GUIDANCE (RSCG).
1. SEDIMENT RESULTS ARE RECORDED IN mg/kg. SURFACE WATER RESULTS ARE RECORDED IN ug/L
2. THIS MAP PRESENTS CONCENTRATIONS OF METALS THAT EXCEED NYSDEC RSCS AND RSCG VALUES.
3. pH RESULTS ARE IN STANDARD pH UNITS.
4. NYSDEC DOES NOT HAVE A STANDARD OR GUIDANCE VALUE FOR pH IN SOIL. RESULTS PRESENTED ON THE MAP REFLECT pH READINGS EQUAL TO OR ABOVE 10 AND EQUAL TO OR BELOW NO VALUES OF pH WERE DETECTED AT THESE LEVELS.

LEGEND

- UTILITY EASEMENT
- RAILROAD TRACKS
- SITE BOUNDARY
- PG-PA-MW-5 — YEAR 2000 SITE INVESTIGATION MONITORING WELL LOCATION
- PG-WOOD-3 — YEAR 2000 SITE INVESTIGATION SOIL BORING LOCATION
- PG-SED-SW5 — YEAR 2000 SITE INVESTIGATION SEDIMENT AND SURFACE WATER SAMPLE LOCATION
- ANALYTE — INDICATES COMPOUND FOR WHICH LABORATORY ANALYSIS WAS CONDUCTED

Sheet of

THE PORT AUTHORITY OF NY & NJ

ENGINEERING PROGRAM MANAGER

No.	Date	Revision	Approved

ENGINEERING DEPARTMENT

Title

(BLOCK 1400, LOT 1) HHMT-PORT IVORY FACILITY

SITE 1 ANALYTICAL RESULTS, SEDIMENT AND SURFACE WATER, SITE INVESTIGATION

Designed by Drawn by Checked by

Date

Contract Number

Drawing Number FIGURE 17

P:\23952\wrd\Operable Unit Reports\Operable Unit 1\Mapping\POST VCP Mapping 8-11-04\3rd Drafts, PA Revisions\SITE 1 ANALYTICAL RESULTS FIGURES 8-11-04.dwg 9/21/04 4:29 pm

Sediment Analytical Results
Metals
Site 1 HHMT-Port Ivory Facility

Location	Sediment Criteria	Sediment Criteria	SED-1	SED-2	SED-3	SED-4	SED-5
Sample Date	Lowest Effect Level	Severe Effect Level	11/21/2000	11/21/2000	11/21/2000	11/21/2000	11/21/2000
Concentration	ug/g	ug/g	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
ALUMINUM (FUME OR DUST)	NS	NS	4100	3400	1900	5800	5700
ANTIMONY	2.0	25.0	3.2 U	2.7 U	2.3 U	5 U	5.2 U
ARSENIC	6.0	33.0	16	19	14	11	12
BARIUM	NS	NS	72	70	32	96	98
BERYLLIUM	NS	NS	0.89 U	0.74 U	0.63 U	1.4 U	1.4 U
CADMIUM	0.6	9.0	0.67 U	0.64	0.53	1 U	1.1 U
CALCIUM METAL	NS	NS	2700	3500	2700	4600	5200
CHROMIUM	26.0	110.0	52	49	30	78	82
COBALT	NS	NS	4.9	5.8	3.4	6	5.9 U
COPPER	NS	NS	130	160	61	180	190
IRON (%)	2% (20,000)	4% (40,000)	20000	23000	18000	23000	25000
LEAD	31.0	110.0	160	380	310	200	190
MAGNESIUM	NS	NS	5100	6400	2700	5200	5900
MANGANESE	460.0	1100.0	130	120	100	160	180
MERCURY	0.2	1.3	1.1	.92	.29	2.6	2.6
NICKEL	16.0	50.0	48	90	33	53	45
POTASSIUM	NS	NS	1200	740 U	630 U	1400 U	1900
SELENIUM	NS	NS	5.6 U	4.6 U	4 U	8.6 U	8.9 U
SILVER	1.0	2.2	1.8	4.3	0.79 U	2.5	2.5
SODIUM	NS	NS	8000	2200	1300	5300	13000
THALLIUM	NS	NS	2.7 U	2.2 U	1.9 U	4.1 U	4.3 U
VANADIUM	NS	NS	24	27	18	43	36 U
ZINC	120.0	270.0	610	600	510	650	560

NS No Standard
U Undetectable Levels
Above LEL
Above SEL
ug/g = MG/KG

Table 8
Surface Water Analytical Results
Metals and pH
Site 1 HHMT-Port Ivory Facility

Location **Date** **Concentration**	Recommended Surface Water Cleanup Standard ug/l	Recommended Surface Water Cleanup Guidance ug/l	**SW-1** 11/21/2000 ug/l	**SW-2** 11/21/2000 ug/l	**SW-3** 11/21/2000 ug/l
ALUMINUM	NS	NG	1400	1700	25000
ANTIMONY	3	NG	3.3U	3.3U	3.3U
ARSENIC	50	NG	3.6	5.2	**57**
BARIUM	1000	NG	71	70	440
BERYLLIUM	NS	3	2.5U	2.5U	**4.1**
CADMIUM	5	NG	1.4U	1.4U	**9.8**
CALCIUM	NS	NG	150000	150000	160000
CHROMIUM	50	NG	16U	16U	**220**
COBALT	NS	NG	4.6U	4.6U	16
COPPER	200	NG	43	51	**790**
IRON	300	NG	**2900**	**3800**	**63000**
LEAD	50	NG	21	29	**650**
MAGNESIUM	35000	NG	**360000**	**380000**	**320000**
MANGANESE	300	NG	190	180	**690**
NICKEL	100	NG	15U	15U	**140**
POTASSIUM	NS	NG	130000	140000	110000
SELENIUM	10	NG	20U	20U	20U
SILVER	50	NG	5.2U	5.2U	5.2U
SODIUM	NS	NG	3500000	3600000	2800000
THALLIUM	NS	0.5	3.1U	3.1U	3.1U
VANADIUM	NS	NG	4.3U	4.3U	100
ZINC	NS	2000	130	130	**2500**
pH (150.1)	NS	NS	8.1	8.2	7.5
MERCURY (245.1)	0.7	NG	**0.93**	0.54	0.55

NG No Guidance
NS No Standard
U Undetectable Levels

5.0 FSRI METHODS AND RESULTS

Between June 2006 and February 2007, the Port Authority conducted the FSRI in accordance with the January 26, 2006 *FSRI Work Plan-AOC-UST2* (Work Plan). The NYSDEC approved the Work Plan in a letter dated April 20, 2006 (see Appendix A). The goal of the FSRI was to determine whether remediation was warranted at two areas in AOC-UST2. The objectives of the FSRI were as follows: 1) to confirm the presence or absence of mobile LNAPL at UST2-4; 2) to delineate the horizontal extent of the mobile LNAPL (if present); 3) to confirm the presence or absence of elevated concentrations of PAH compounds at location TWP-1A; and, 4) to delineate the vertical and horizontal extents of the impacted soil (if present) in the vicinity of TWP-1A.

The Scope of Work for, and methods used during, the FSRI are summarized in Section 5.1. Sections 5.2 and 5.3 summarize the FSRI field observations and analytical results, respectively. Section 5.4 discusses the FSRI results relative to the objectives. Section 5.5 presents the FSRI conclusions, and offers recommendations.

5.1 FSRI-Scope of Work

As noted above, the Scope of Work for the FSRI included the investigation of mobile LNAPL at and in the vicinity of location UST2-4 and of elevated concentrations of SVOC compounds in soil at location TWP-1A. The FSRI deviated from the Work Plan in the following respects. Delineation of mobile LNAPL in the vicinity of UST2-4 was accomplished based on field observations at four step-out test pits rather than by expanding the original excavation at UST2-4, as specified in the Work Plan. In addition, the test pits used for delineation remained open for one day rather than one week, as specified in the Work Plan, because the Port Authority could not delay moving the soil surcharge pile. The one-day observation period increases the uncertainty in the delineation of mobile LNAPL in the vicinity of UST2-4. However, the four step-out test pits were used for delineation purposes only. The observation period during the remedial action will be as specified in the RAWP, and the horizontal extent of soil excavated during the remedial action will be based on field observations made during the remedial action rather than FSRI delineation efforts.

The proposed soil samples in the vicinity of TWP-1A were collected from test pits rather than from soil borings, as proposed. In addition, 13 soil samples were collected from these test pits; only 11 soil samples were proposed in the Work Plan. Neither of these deviations is believed to have a negative effect on the investigation of potential soil impacts in the vicinity of TWP-1A.

The Scope of Work for each component of the FSRI is described below in Sections 5.1.1 and 5.1.2.

5.1.1 Scope of Work – Investigation of Potential Mobile LNAPL at UST2-4

Based on the elevated concentration of TPHC detected in soil at location UST2-4 during the SRI, the Port Authority investigated this area for the presence and extent of mobile LNAPL during the FSRI. The investigation was completed between June 6 and 12, 2006. The Port Authority retained Railroad Construction Company Inc. (RCC) to conduct soil excavation and groundwater pumping activities at UST2-4. HMM personnel oversaw the fieldwork on a continual basis.

HMM personnel re-established SRI location UST2-4 in the field using a hand-held global positioning system (GPS) with sub-meter accuracy. The Port Authority arranged for a utility markout and compared the proposed location to HHMT-Port Ivory Facility utility maps. Once the location was cleared, RCC excavated a 10-foot long by 10-foot wide by 14-foot deep test pit at location UST2-4 using a track-mounted excavator. LNAPL-impacted soil was segregated based on field observations and was stockpiled pending off-site disposal at an appropriate recycling/disposal facility. The stockpile of LNAPL-impacted soil was placed on plastic that was elevated approximately one foot above the surrounding grade and was covered with plastic. Soil that appeared to be clean based on field screening results and field observations was stockpiled pending completion of the excavation, when this material was used for backfilling purposes.

Once the excavation was completed, RCC used a centrifugal pump and hose to temporarily lower the static water level in the test pit. A sump was established by excavating the test pit slightly deeper at one end and placing crushed stone around the suction hose intake screen. Groundwater pumped from the excavation was returned to a nearby test pit that was also located within AOC-UST2. During the dewatering effort, LNAPL was observed to flow from the western and southern sidewalls of the test pit. Therefore, the presence of mobile LNAPL was confirmed at location UST2-4, and the focus of the FSRI was changed from confirming the presence or absence of mobile LNAPL to determining its extent.

In an attempt to delineate the extent of the mobile LNAPL, RCC expanded the test pit by five feet to the west and the south. After the water level in the expanded test pit was temporarily lowered, LNAPL was again observed to flow into the test pit through the west and south sidewalls. It became apparent that the extent of the mobile LNAPL was significantly greater than the extent of the test pit. Therefore, rather

than continuing to enlarge the test pit excavated at UST2-4, the Port Authority excavated five small step-out test pits in a second attempt to delineate the area containing mobile (i.e., free) LNAPL to the north, east, south and west of UST2-4. As shown on Figure 2, test pit UST2-4.1E was excavated approximately 15 feet east of UST2-4, test pit UST2-4.2N was excavated approximately 25 feet north of UST2-4, test pit UST2-4.3W was excavated approximately15 feet west of UST2-4, test pit UST2-4.4S was excavated approximately 25 feet south of UST2-4, and test pit UST2-4.5S was excavated approximately 105 feet south of UST2-4. The method and equipment used to excavate each of these additional test pits were the same as that for the initial test pit. In general, the limits of the step-out test pits were approximately 10 feet wide by 10 feet long with depths ranging from 10 to 15 feet bgs. However, test pit UST2-4.1E repeatedly collapsed at a depth of approximately four feet bgs. Once the test pits were excavated, the water level was temporarily lowered. While the water level was lowered, the test pits were closely inspected for the presence of mobile LNAPL. The test pits were also inspected approximately 24 hours later to confirm the presence or absence of LNAPL.

Subsequent to recording the field observations, the Port Authority prepared to backfill the excavations. The Port Authority pumped the LNAPL out of all test pits using a vactor (vac) truck. The LNAPL was transported off site to Lorco Petroleum Services (LPS) for disposal. A total of 2,040 gallons of LNAPL/water mixture was removed and disposed of by LPS. The LPS disposal receipt is included in Appendix B.

5.1.2 Scope of Work – Investigation of Potential Soil Impacts at TWP-1A

The Port Authority investigated soil quality at SRI location TWP-1A to confirm the presence or absence of soil impacted by total SVOC compounds and, if impacts were present, to complete the horizontal and vertical delineation of the impacts. On February 1, 2007, AWT Environmental Services, Inc. (AWT) provided a track-mounted backhoe to excavate test pits in the vicinity of TWP-1A. All soil samples were accessed from the test pits. The excavator was able to access the proposed sampling locations, while a drill rig would not have been able to maneuver around the surcharge pile (a soil pile that is being used to surcharge Site 1 in preparation for redevelopment) and other irregularities in the land surface. HMM provided full-time oversight during the fieldwork summarized below.

HMM personnel re-established SRI location TWP-1A in the field using a hand-held GPS with sub-meter accuracy. Based on this location, HMM personnel marked the locations of five test pits, a test pit at TWP-1A and test pits approximately 10 feet to the north, south, east, and west of TWP-1A. The Port

Authority arranged for a utility markout and compared the proposed test pit locations to HHMT-Port Ivory Facility utility maps. Once the locations were cleared, AWT excavated each test pit. Excavated soil was temporarily stockpiled for use as backfill.

The test pits were no larger than approximately eight feet wide by eight feet long by 12 feet deep. Soil samples were collected at the test pit coincident with location TWP-1A at the following depths: 4-4.5 feet bgs, 8-8.5 bgs, and 10.5-11 feet bgs. For the purposes of this report, the soil sample collected from the 4-4.5 foot bgs depth interval at this test pit will be designated the "confirmation sample." In addition, two soil samples were collected from test pits TWP-1AN, TWP-1AE, and TWP-1AS from the 4-4.5 foot bgs and the 8.5-9 foot bgs depth intervals. Four soil samples were collected at location TWP-1AW. In addition to the depth intervals sampled at TWP-1AN, TWP-1AE, and TWP-1AS, samples were collected at TWP-1AW from the 6-6.5 and 10-10.5 foot bgs depth intervals. The additional samples were collected to better define the vertical extent of impacts, if necessary.

For health and safety purposes, the soil samples were collected from the excavator bucket so that personnel were not required to enter the excavation. The samples were transferred directly from the excavator bucket to the laboratory-prepared sampling jars using a dedicated or decontaminated stainless steel sampling scoop or trowel. Care was taken to ensure that the soil samples did not include cinders. Following the collection of the soil samples at each test pit, the test pit was immediately backfilled and excavation of the next test pit was initiated.

All samples were labeled, placed in a cooler containing ice, and transported to Hampton-Clarke Veritech (New York State Certification No. 11408) under Chain of Custody documentation for analysis of Target Compound List (TCL) SVOC+20. Only the confirmation soil sample was analyzed. The delineation samples were not analyzed because the initial sample contained total SVOCs (including SVOC tentatively identified compounds, or TICs) at a concentration of approximately 36 mg/kg, well below the RSCO for total SVOCs and similar to those concentrations attributable to historic fill.

5.2 FSRI Field Observations

Sections 5.2.1 and 5.2.2 summarize the field observations at locations UST2-4 and TWP-1A, respectively. The field observations include the color, texture, composition, and moisture content of the fill and underlying native soil; the depth to groundwater; and, the presence or absence of mobile (i.e., free) LNAPL. The extent of mobile LNAPL, where delineated, is shown on Figure 2.

5.2.1 *Field Observations at UST2-4*

Unconsolidated materials encountered during the investigation of UST2-4 generally consisted of fill material, including variable amounts of sand and silt, cinders, and slag. LNAPL-impacted soil was encountered at all test pits excavated in this area. Indications of LNAPL impacts included the presence of LNAPL itself, sheen on soil and groundwater, petroleum odors, and stained soil. Where encountered, the thickness of LNAPL-impacted soil varied from 0.5 feet (at the north sidewall of test pit UST2-4.5S) to 2 feet (at the south sidewall of test pit UST2-4). In general, LNAPL-impacted soil was encountered at depths within two feet above and one foot below the water table.

Groundwater was encountered in the excavations between seven and 12 feet bgs. As the land surface was the reference point for these measurements, the majority of the variability in the static water level is due to the uneven topography in the vicinity of UST2-4. The remaining variability in the static water level, if any, is attributable to variability in the hydraulic conductivity of the fill. The depth to water in a test pit will reach equilibrium at the water table more rapidly when the soil surrounding the test pits is more permeable.

Mobile LNAPL was observed to flow into the southern and western sidewalls of test pit UST2-4. LNAPL was not observed to flow into test pits UST2-4.2N and UST2-4.3W during the FSRI. LNAPL was observed to flow into UST2-4.4S but was not observed to re-accumulate following its removal in test pit UST2-4.5S. Therefore, the LNAPL is believed to be mobile at UST2-4.4S, but the mobile LNAPL does not extend as far south as UST2-4.5S .LNAPL and groundwater were not encountered at test pit UST2-4.1E because the test pit could not be completed below 4 feet bgs due to repeated sidewall collapse. Test pit UST2-4.1E was unable to confirm the absence or presence of LNAPL east of UST2-4.

5.2.2 *Field Observations at TWP-1A*

As stated above, one test pit was excavated at TWP-1A and four step out test pits were excavated in the vicinity of TWP-1A during the FSRI. The maximum test pit dimensions were eight feet long by eight feet wide by 12 feet deep. Unconsolidated materials encountered at the test pit excavated at TWP-1A and the step-out test pits were generally consistent with those observed at location TWP-1A during the SRI. Fill material consisted of variable amounts of sand and silt, cinders, slag, and by-product fill. Cinders were encountered in the fill; however, the thickness of the layer containing cinders was approximately four feet, significantly thicker than the 0.25-foot layer of cinders encountered at TWP-1A. A concrete slab and asphalt were encountered at approximately 3.5 feet bgs. Wood debris was encountered between

nine and 10 feet bgs at TWP-1A, TWP-1AN, and TWP-1AW. Native soil was not encountered at any test pit location.

Where encountered, the depth to groundwater at the test pits varied only slightly from approximately 9 to 9.5 feet bgs. Groundwater was not encountered at test pit TWP-1AE, despite that test pit being excavated to 11 feet bgs (i.e., below the static water level in the other test pits).

LNAPL-impacted soil was not encountered at any of the five test pits. As measured using a photoionization detector (PID), the concentration of volatile organic vapors in the soil was the same as background (i.e., in ambient air). However, sheen was observed on the groundwater surface at TWP-1AN, TWP-1A, and TWP-1AW. Given the lack of LNAPL-impacted soil at these locations and the presence of wood debris at the approximate water table depth, the presence of this sheen is likely attributable to treated wood.

5.3 FSRI Analytical Results

The FSRI at UST2-4 was conducted to confirm the presence and, if present, the extent of mobile LNAPL. As the presence and extent of mobile LNAPL was confirmed through field observations, no soil samples were collected in the vicinity of location UST2-4.

The Port Authority investigated soil quality at SRI location TWP-1A during the FSRI to confirm the presence or absence of soil impacted by total SVOC compounds and, if impacts were present, to complete the horizontal and vertical delineation of the impacts. The Port Authority collected 13 soil samples during the investigation of potential soil impacts at location TWP-1A. Three soil samples were collected at the test pit excavated at TWP-1A and ten soil samples were collected from the four step-out test pits. However, except for the confirmation sample, the remaining soil samples, including those collected from step-out test pits, were to be analyzed on a contingent basis, depending on the analytical results of the confirmation sample. The confirmation sample was analyzed for TCL SVOC+20. The concentration of total SVOCs (including SVOC TICs) in the confirmation sample was approximately 36 mg/kg, well below the RSCO for total SVOCs (500 mg/kg) and similar to the concentrations detected in historic fill throughout the HHMT-Port Ivory Facility. As the concentration of total SVOCs at TWP-1A was not elevated, neither horizontal nor vertical delineation was necessary. Therefore, neither the deeper samples collected at TWP-1A nor the soil samples collected from the step-out borings were analyzed. Analytical

results are summarized in Table 2 and on Figure 2. The laboratory analytical deliverable is provided in Appendix C.

5.4 Discussion of FSRI Results

The goal of the FSRI was to determine whether remediation was warranted at two areas in AOC-UST2. The objectives of the FSRI were as follows: 1) to confirm the presence or absence of mobile LNAPL at UST2-4; 2) to delineate the horizontal extent of the mobile LNAPL (if present); 3) to confirm the presence or absence of elevated concentrations of PAH compounds at location TWP-1A; and, 4) to delineate the vertical and horizontal extents of the impacted soil (if present).

As described below, Objectives 1, 2, and 3 were met, and Objective 4 was not applicable.

5.4.1 Objective 1

The presence of mobile LNAPL was confirmed by field observations at location UST2-4.

5.4.2 Objective 2

As indicated in the Site 1 RAWP, the proposed remedial action will address mobile LNAPL and soil containing mobile LNAPL at the start of the remedial action. The presence of mobile LNAPL was confirmed at location UST2-4. The horizontal extent of the mobile LNAPL was delineated to the south, west, and north of location UST2-4 during the FSRI. The horizontal extent of the mobile LNAPL could not be determined to the east of location UST2-4 because the sidewall at FSRI test pit UST2-4.1E repeatedly collapsed. However, based on field observations, LNAPL-impacted soil was delineated to the east by UST 2-5A and TWP-1A during the SRI and at TWP-1AW during the FSRI.

As shown on Figure 2, the footprint for the maximum extent of mobile LNAPL is approximately 15,950 square feet, as defined by a line connecting UST2-4.5S, the eastern edge of where LNAPL was encountered during the SRI, UST2-4.3W, UST2-4.2N, TWP-1AW, and UST2-5A. An oval passing through UST2-4.5S, UST2-4.3W, UST2-4.2N, and UST2-4.1E defines a smaller (minimum) potential extent (2,190 square feet) of mobile LNAPL. Therefore, the mobile LNAPL is within an area of between 2,190 square feet and 15,950 square feet. The actual extent of mobile LNAPL to be removed will be determined during implementation of the remedial action as specified in the Site 1 RAWP.

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS-SVOCS
TWP-1A
HHMT-PORT IVORY FACILITY (SITE 1)

Sample ID	New York	TWP-1A		
Lab Sample No.	Recommended Soil	AC28404-001		
Sampling Date	Cleanup	2/1/2007		
Matrix	Objectives (RSCOs)	Soil		
Units	mg/Kg	mg/Kg		
Semi-Volatile Organic Compounds (SVOCs)		Conc	Qual	MDL
1,2,4-Trichlorobenzene	3.4	ND		0.38
1,2-Dichlorobenzene	7.9	ND		0.38
1,2-Diphenylhydrazine	NS	ND		0.38
1,3-Dichlorobenzene	1.6	ND		0.38
1,4-Dichlorobenzene	8.5	ND		0.38
2,4,5-Trichlorophenol	0.1	ND		0.38
2,4,6-Trichlorophenol	NS	ND		0.38
2,4-Dichlorophenol	0.4	ND		0.38
2,4-Dimethylphenol	NS	ND		0.38
2,4-Dinitrophenol	0.2	ND		0.95
2,4-Dinitrotoluene	NS	ND		0.38
2,6-Dinitrotoluene	1	ND		0.38
2-Chloronaphthalene	NS	ND		0.38
2-Chlorophenol	0.8	ND		0.38
2-Methylnaphthalene	36.4	ND		0.38
2-Methylphenol	0.1	ND		0.38
2-Nitroaniline	0.43	ND		0.38
2-Nitrophenol	0.33	ND		0.38
3&4-Methylphenol	0.33	ND		0.38
3,3'-Dichlorobenzidine	0.33	ND		0.38
3-Nitroaniline	0.33	ND		0.38
4,6-Dinitro-2-methylphenol	0.33	ND		0.95
4-Bromophenyl-phenylether	0.33	ND		0.38
4-Chloro-3-methylphenol	0.33	ND		0.38
4-Chloroaniline	0.33	ND		0.38
4-Chlorophenyl-phenylether	0.33	ND		0.38
4-Nitroaniline	NS	ND		0.38
4-Nitrophenol	0.1	ND		0.38
Acenaphthene	50	0.097	J	0.38
Acenaphthylene	41	0.067	J	0.38
Anthracene	50	0.3	J	0.38
Benzidine	NS	ND		0.38
Benzo[a]anthracene	0.224	**1.3**		0.38
Benzo[a]pyrene	0.061	**1.2**		0.38
Benzo[b]fluoranthene	1.1	**1.5**		0.38
Benzo[g,h,i]perylene	50	0.82		0.38
Benzo[k]fluoranthene	1.1	0.52		0.38
Benzyl alcohol	NS	ND		0.38
Bis(2-Chloroethoxy)methane	NS	ND		0.38
Bis(2-Chloroethyl)Ether	NS	ND		0.38
Bis(2-Chloroisopropyl)ether	NS	ND		0.38
Bis(2-Ethylhexyl)phthalate	50	0.17	JB	0.38
Butylbenzylphthalate	50	ND		0.38
Carbazole	NS	0.097	J	0.38
Chrysene	0.4	**1.2**		0.38
Dibenzo[a,h]Anthracene	0.014	**0.24**	J	0.38
Dibenzofuran	6.2	ND		0.38
Diethylphthalate	7.1	ND		0.38
Dimethylphthalate	2	ND		0.38
Di-n-butylphthalate	8.1	0.093	JB	0.38
Di-n-octylphthalate	50	ND		0.38
Fluoranthene	50	2.2		0.38
Fluorene	50	0.1	J	0.38
Hexachlorobenzene	0.41	ND		0.38
Hexachlorobutadiene	NS	ND		0.38
Hexachlorocyclopentadiene	NS	ND		0.38
Hexachloroethane	NS	ND		0.38
Indeno[1,2,3-cd]pyrene	3.2	0.72		0.38
Isophorone	4.4	ND		0.38
Naphthalene	13	0.064	J	0.38
Nitrobenzene	0.2	ND		0.38
N-Nitrosodimethylamine	NS	ND		0.38
N-Nitroso-Di-N-Propylamine	NS	ND		0.38
N-Nitrosodiphenylamine	NS	ND		0.38
Pentachlorophenol	1	ND		0.95
Phenanthrene	50	1.1		0.38
Phenol	0.03	ND		0.38
Pyrene	50	2.1		0.38
Total SVOCs Conc.	500	13.888	J	
SVOC TICs	NS	22.38	J	

Notes and Abbreviations:
Conc.= concentration
mg/kg= milligrams per kilogram
MDL= method detection limit
B=Analyte was detected in laboratory blank.
ND=Not detected
NS=No standard
Qual=Laboratory qualifier
J= the estimated concentrarion was detected below MDL,
but was detected above the laboratory's reporting limits.
TICs=Tentatively identified compounds
TAGM=Technical and Administrative Guidance
Memorandum #4046, dated January 24, 1994.
RSCOs=Recommended Soil Cleanup Objectives
1. Conc. In bold and highlighted exceed the RSCOs

5.4.3 Objective 3

Based on the analytical results, the concentration of total SVOCs in soil in the vicinity of location TWP-1A is similar to that in soil samples throughout Site 1. The elevated concentration of total SVOCs detected in soil at TWP-1A during the SRI is believed to be attributable to the inclusion of cinders in the soil sample. Therefore, soil in the vicinity of TWP-1A does not contain elevated (above background conditions at Site 1) concentrations of total SVOCs and does not constitute a hot spot.

5.4.4 Objective 4

The FSRI data indicated that the concentration of total SVOCs is not elevated in the vicinity of TWP-1A. Therefore, there is no impact to delineate and this objective is not applicable.

5.5 FSRI Conclusions and Recommendations

Based on the data generated during the FSRI, the following conclusions and recommendations are offered.

Mobile LNAPL in the Vicinity of UST2-4

- Conclusion: Mobile LNAPL is present in a maximum footprint of between approximately 2,190 and 15,950 square feet in the vicinity of UST2-4.
- Recommendation: The mobile LNAPL should be removed to the extent practical as specified in the Site 1 RAWP. The footprint for the removal area is currently estimated to be between 2,190 and 15,590 square feet. The actual extent should include all soil at UST2-4 that contained mobile LNAPL, based on field observations, at the start of the remedial action.

Soil Impacts in the Vicinity of TWP-1A

- Conclusion: Soil in the vicinity of TWP-1A contains concentrations of SVOCs similar to those detected in historic fill throughout the HHMT-Port Ivory Facility.
- Recommendation: No additional remedial or investigative actions are warranted for soil in the vicinity of TWP-1A.

6.0 EXPOSURE ASSESSMENT

The Port Authority completed an exposure assessment to determine if the potential exists for human and ecological receptors to be exposed to known contaminants at the HHMT-Port Ivory Facility. The exposure assessment is documented below.

6.1 Nature of Contaminants at Site 1

The following environmental media have been investigated at Site 1: soil, groundwater, surface water in Bridge Creek, and sediments along the eastern bank/bed of Bridge Creek. The western bank of Bridge Creek is located to the west of the HHMT-Port Ivory Facility. Indoor air quality has not been investigated because no buildings exist or are proposed subsequent to the redevelopment of Site 1. Table 3 documents metals and classes of organic compounds that have been identified at concentrations greater than applicable NYSDEC Standards, Criteria, and Guidance (SCGs) in environmental media investigated at Site 1.

6.1.1 Soil

The analytical results for soil indicate that regulated metals and organic compounds in the following contaminant classes are present in soils at Site 1 at concentrations greater than their respective RSCOs: the VOCs dichloromethane, m&p-xylenes, methylbenzene and o-xylene, various SVOCs, various metals, three pesticides, and total polychlorinated biphenyls (PCBs).

6.1.2 Groundwater

For this project, the groundwater analytical results have been compared to current AWQSGVs for Class GA groundwater. Given the location of the Site and the high potential for water to be saline, the published AWQSGVs are not appropriate for use at Site 1. However, at this time, these represent the only guidance available for ambient groundwater. Please note, reference to these standards in this report does not represent any agreement or concurrence that the same are appropriate for use at Site 1 or the HHMT-Port Ivory Facility. The analytical results for groundwater indicate that the following metals and organic compounds are present in groundwater at Site 1 at concentrations greater than their respective AWQSGVs: the VOCs ethylbenzene and m&p-xylenes; the SVOCs phenol/total phenolics, benzo(a)anthracene, chrysene, and 1,2-diphenylhydrazine; and, the metals antimony, arsenic, beryllium, cadmium, iron, magnesium, manganese, nickel, silver, sodium, thallium, mercury, and sodium.

Table 3

Metals and Compounds Detected at Concentrations Above NYSDEC Standards, Criteria, and Guidance (SCGs)

Howland Hook Marine Terminal-Port Ivory Facility-Site 1

40 Western Avenue

Staten Island, New York

SOIL				
VOCs	**SVOCs**	**Pest &PCBs**	**Metals**	**TPHC; O&G; pH; CN; Tot Ph**
DICHLOROMETHANE	4-CHLORO-3-METHYLPHENOL	DIELDRIN	ARSENIC	PETROLEUM HYDROCARBONS
M&P-XYLENES	4-NITROPHENOL	ENDRIN	BARIUM	(NYSDEC has not established a RSCO
METHYLBENZENE	BENZO[A]ANTHRACENE	HEPTACHLOR EPOXIDE	BERYLLIUM	for TPH; however, TPH concentrations
O-XYLENE	BENZO[A]PYRENE	TOTAL PCBs	CADMIUM	were above 500 mg/kg, the total SVOCs
	BENZO[B]FLOURANTHENE		CALCIUM METAL	allowed by NYSDEC.)
	DIBENZO[A,H]ANTHRACENE		CHROMIUM	Note:RSCO=Recommended soil
	PHENOL		COBALT	cleanup objective
	CHRYSENE		COPPER	
	ANTHRACENE		IRON	
	BENZO[K]FLOURANTHENE		LEAD	
	DIBENZOFURAN		MAGNESIUM	
	FLUORANTHENE		MERCURY	
	INDENO[1,2,3-CD]PYRENE		NICKEL	
	PHENANTHRENE		POTASSIUM	
	PYRENE		SELENIUM	
			SODIUM	
			ZINC	
GROUNDWATER				
VOCs	**SVOCs**	**Pest &PCBs**	**Metals**	**TPHC; O&G; pH; CN; Tot Ph**
ETHYLBENZENE	1,2-BENZPHENANTHRACENE	NONE	ANTIMONY	TOTAL PHENOLS
M&P-XYLENES	BENZO{A}ANTHRACENE		ARSENIC	
	BIS(2-ETHYLHEXYL)PHTHALATE		BERYLLIUM	
	PHENOL		CADMIUM	
	NAPHTHALENE		IRON	
			MAGNESIUM	
			MANGANESE	
			NICKEL	
			SILVER	
			SODIUM	
			THALLIUM	
			MERCURY	
			SODIUM	
SEDIMENT				
VOCs	**SVOCs**	**Pest &PCBs**	**Metals**	**TPHC; O&G; pH; CN; Tot Ph**
N/A	N/A	N/A	ARSENIC	N/A
			CADMIUM	
			CHROMIUM	
			IRON (%)	
			LEAD	
			MERCURY	

Table 3
Metals and Compounds Detected at Concentrations Above NYSDEC Standards, Criteria, and Guidance (SCGs)
Howland Hook Marine Terminal-Port Ivory Facility-Site 1
40 Western Avenue
Staten Island, New York

			NICKEL	
			SILVER	
			ZINC	
SURFACE WATER				
VOCs	**SVOCs**	**Pest &PCBs**	**Metals**	**TPHC; O&G; pH; CN; Tot Ph**
N/A	N/A	N/A	ARSENIC	N/A
			BERYLLIUM	
			CADMIUM	
			CHROMIUM	
			COPPER	
			IRON	
			LEAD	
			MAGNESIUM	
			MANGANESE	
			NICKEL	
			ZINC	
			MERCURY (245.1)	

Notes:
VOCs= Volatile organic compounds
SVOCs= Semi-volatile organic compounds
Pest= Pesticides
PCBs= Poly chlorinated biphenyls
TPHC= Total Petroleum Hydrocarbons
O&G= Oil and Grease
CN= Cyanide
Tot Ph= Total Phenols
N/A= Not analyzed
This list of SCGs is required by the NYSDEC *Draft DER-10 Technical Guidance for Site Investigation and Remediation*, dated 2002.
1: This table lists the metals and organic compounds by medium tested.
2: Samples were collected and analyzed from the following media: soil, groundwater, sediment and surface water.
3: None= None detected above SCGs where applicable

6.1.3 Surface Water

Surface water samples collected from Bridge Creek contained Target Analyte List (TAL) Metals above the NYSDEC Recommended Surface Water Cleanup Standards (RSWCS).

Lead and magnesium were detected at concentrations greater than their respective RSWCS in the three surface water samples collected during the SI. Mercury was detected at a concentration greater than its RSWCS in only the upstream surface water sample. Arsenic, cadmium, chromium, copper, iron, manganese, and nickel were detected at concentrations greater than their respective RSWCS and beryllium and zinc at concentrations greater than their respective Recommended Surface Water Cleanup Guidance Values (no RSWCS is available these two metals) only in the downstream surface water sample. The only metals detected at concentrations greater than their respective RSWCS or Guidance Values in any RI surface water sample were iron, magnesium, silver, and sodium.

As Bridge Creek is tidally influenced and groundwater flows from the Arthur Kill into and up Bridge Creek, it is likely that dissolved metals in the impacted and saline Arthur Kill have impacted Bridge Creek. Based on analytical results for surface water samples collected from the Arthur Kill adjacent to the northernmost portion of the HHMT-Port Ivory Facility as required for a closed landfill at the facility, it appears that the elevated concentrations of TAL Metals in the surface water samples collected from Bridge Creek are attributable to the concentrations of those dissolved cations in the Arthur Kill. The concentrations of iron, magnesium, and sodium (323,000 615,000, and 7,790,000 mg/L, respectively) detected in the most recent surface water samples collected from the Arthur Kill adjacent to the Facility are comparable to the analytical results for the SI and RI surface water samples collected from Bridge Creek.

6.1.4 Sediment

Sediment samples collected from Bridge Creek contained one or more of the following metals at concentrations greater than their respective NYSDEC Lower Effects Level (LEL) but below the Severe Effects Level (SEL): arsenic, cadmium, chromium, and mercury. Only two metals, lead and zinc, were detected at concentrations greater than their NYSDEC SELs at all sediment sampling locations. Iron, mercury, nickel, and silver were detected at concentrations greater than their respective NYSDEC SELs in at least one of the sediment samples collected during the SI. The SI sediment sampling analytical results do not exhibit a pattern of increasing or decreasing concentration in a downstream direction in Bridge Creek for any metal analyzed. Potential sources for the impacted sediments include onsite sources (e.g. historic fill), upstream off-site sources (e.g., the area upstream of Site 1 where the NYSDEC is

performing a wetlands restoration effort) and stormwater runoff and/or discharge from neighboring properties or public roadways. The NYSDEC has detected sediment impacted by pesticides and metals at several locations along Bridge Creek, upgradient of Site 1. These media can migrate downstream during low tide and upstream during high tide. The contaminants would likely be dissolved/suspended in surface water and deposited in sediment.

6.2 Potential Receptors

Two types of potential receptors have been identified at and adjacent to Site 1: human and ecological/environmental receptors. There are no residential properties adjacent to Site 1; in fact, except for one residential property located along Richmond Terrace to the north of Site 3 and located approximately 650 feet northeast of Site 1, no human populations are situated in the immediate vicinity of the HHMT-Port Ivory Facility. Therefore, occupants of the residential property are considered the only potential off-site human receptors in the vicinity of the HHMT- Port Ivory Facility.

Persons present at the site are limited to Port Authority personnel, tenants, or contractors retained by the Port Authority. The Port Authority has implemented health and safety measures to minimize contact with contaminants by all persons currently performing tasks at the facility. However, although the health and safety measures lessen the likelihood of exposure by on-site personnel, the potential for exposure cannot be completely eliminated. Therefore, personnel at the Facility are considered to be potential receptors.

The only ecological/environmental receptor adjacent to Site 1 is Bridge Creek. This surface water body is saline and tidally influenced by the Arthur Kill; the NYSDEC has classified the section of the Arthur Kill adjacent to the HHMT-Port Ivory Facility as an SD surface water body. The SD classification indicates that the stream cannot meet primary or secondary water quality criteria due to man-made/natural conditions. During low tide, surface water in Bridge Creek flows towards and discharges into the Arthur Kill, but during high tide, the direction of surface water flow is from the Arthur Kill and up Bridge Creek. No wetlands, marsh areas, or other potential ecosystems are located immediately adjacent to Site 1. Although metals and compounds could potentially be transported from Bridge Creek to the Arthur Kill during low tide via surface water flow or sediment erosion, these substances would first impact Bridge Creek. Therefore, Bridge Creek is considered to be the only ecological/environmental receptor.

6.3 Migration Pathways

The section identifies potential migration pathways for metals and organic compounds from impacted media at the site to potential receptors. Migration pathways are considered under both pre-redevelopment conditions and post-redevelopment conditions in order to demonstrate that the redevelopment will have a positive impact on the environment. Redevelopment, which will be completed for economic purposes, will improve environmental conditions at the site through the construction of an environmental cap. The cap will reduce the mobility of contaminants to potential receptors. In each of the subsections below, the identification and discussion of the potential migration pathways is organized according to medium and contaminant class.

6.3.1 Migration of Metals and Organic Compounds – Pre-Redevelopment

No likely migration pathways from Site 1 to the residents of the property along Richmond Terrace have been identified. The distance between the northeastern boundary of Site 1 and the residential property is approximately 650 feet, making significant movement of surface soil to the property via wind erosion unlikely. Organic vapors that may be generated at Site 1 are likely to disperse prior to reaching the residential property. Groundwater at Site 1 does not flow towards the residential property. The HHMT-Port Ivory facility and the surrounding area are serviced by connections to the potable water and sanitary system of New York City. Neither groundwater nor surface water is utilized for potable purposes at or in the vicinity of the site. No septic systems and/or potable water wells are reported to be located or have been located on or near the site. Storm water generated on the site is directed via a sheet flow to on-site catch basins. These catch basins discharge, through the facility's underground stormwater sewer system, to the adjacent waterways, roadways, and marshland.

Potential migration pathways for organic compounds and metals to personnel working at the facility have been identified. All buildings at the HHMT-Port Ivory Facility are serviced by public utilities; neither groundwater nor surface water is used for potable purposes. If construction vehicles (e.g., excavators) are operating at Site 1 on a dry day or if facility personnel are conducting subsurface work, personnel may be exposed to metals and less volatile organic compounds through the inhalation or ingestion of airborne particulate matter or through dermal contact with soil. Personnel may be exposed to more volatile organic compounds via the same exposure routes as well as by inhalation of volatile organic vapors. If personnel are involved in subsurface work below the water table, personnel may potentially come into direct contact with impacted groundwater or may inhale volatile organic vapors. The Port Authority, its

tenants, and its subcontractors implement health and safety measures to mitigate these potential chemical hazards.

The Port Authority has identified potential migration pathways for metals or organic compounds to migrate to Bridge Creek. Site 1 is relatively flat, but does slope gently towards Bridge Creek. The Port Authority has not established a prevailing wind direction for Site 1 to date. Surface soil containing VOCs, SVOCs, metals, pesticides, total PCBs, and/or TPHC at concentrations above applicable NYSDEC RSCOs may erode from Site 1 and be transported to Bridge Creek via wind or water (primarily sheet flow during storm events) transport; therefore, the potential exists that the adsorbed metals and organic compounds could migrate into Bridge Creek.

Metals and organic compounds may also be mobilized by desorbing from soil and dissolving in rainwater that ultimately recharges groundwater (i.e., may leach). Alternatively, VOCs and SVOCs may desorb from the soil and dissolve in the soil vapor (i.e., may volatilize), and may subsequently dissolve in rainwater that ultimately recharges groundwater. These migration pathways are considered to be identical to the groundwater pathway discussed below.

Groundwater at Site 1 is impacted by relatively few contaminants at concentrations greater than the NYSDEC AWQSGVs. The metals and all the classes of organic compounds could potentially dissolve in groundwater (albeit to different degrees based on the solubility of the specific metal or organic compound) and migrate via advection, dispersion, and diffusion. Due to the generally coarse-grained nature of the fill (i.e., the fill is generally not clay), the diffusion is anticipated to be negligible. Therefore, groundwater and any metals or organic compounds dissolved in the groundwater are anticipated to flow towards and discharge into Bridge Creek. Of course, the rate of baseflow into Bridge Creek is low relative to the flow of water within the creek. Therefore, any metals or organic compounds that discharge into Bridge Creek are immediately diluted.

6.3.2 Migration of Metals and Organic Compounds – Post-Redevelopment

The redevelopment of Site 1 will include capping approximately 90% of Site 1 with impervious materials and placing clean cover soil, demarcated with a geotextile liner, above the remaining impacted soil. Therefore, surface soil will not be eroded and the metals and organic compounds adsorbed to the surface soil will not migrate into Bridge Creek. The cap and cover will also limit exposure of on-site human receptors to impacted soil and groundwater.

Construction of the impervious cover will decrease the loading of metals and organic compounds from soil. In addition, the depth to water is anticipated to increase following the construction of the impervious cover. Therefore, groundwater quality is anticipated to improve following the redevelopment of Site 1, and lower concentrations of metals and organic compounds will discharge into Bridge Creek.

Notwithstanding the above, personnel working at the facility could still potentially contact impacted soil and/or groundwater during excavation activities. The Port Authority has implemented health and safety protocols to minimize chemical hazards associated with intrusive activities. In addition, remaining groundwater impacts could potentially migrate towards and discharge into Bridge Creek. As noted in Section 6.3.1, the rate of baseflow into Bridge Creek is anticipated to be low relative to the volume of water within the creek. Therefore, any metals or organic compounds that may be transported to Bridge Creek via the groundwater migration pathway will be immediately diluted.

6.4 Exposure Assessment Summary

As the redevelopment of Site 1 is considered to be part of the remedial action for the site, this Exposure Assessment Summary evaluates post-redevelopment conditions. The presence of organic compounds and metals in soil and groundwater at Site 1 is not anticipated to be a hazard for residents of the property located along Richmond Terrace.

As noted above, the impacted soil and groundwater that will remain following implementation of the Site 1 RAWP, including the redevelopment of Site 1, is a hazard to facility personnel only in the event that subsurface activities are being conducted and the humidity is low. However, the hazard to the personnel is not considered to be significant given the low concentrations of organic compounds and metals in the soil. For example, the metal lead has been detected in soil at Site 1 at concentrations as great as 630 mg/kg. The Permissible Exposure Limit (PEL) for lead established by the Occupational Safety and Health Administration is 0.05 milligrams per cubic meter (mg/m^3). Using 630 mg/kg as a worst-case concentration for lead in soil, even though all except one of the soil samples collected to date at Site 1 have exhibited significantly lower concentrations of lead, workers would have to be exposed to dust levels of almost 80 mg/m^3 throughout an 8-hour workday. In other words, the workers would need to work for eight hours within a visible cloud of dust to be exposed to levels of lead above the PEL. The Port Authority's health and safety protocols require moistening soil to reduce the concentration of airborne dust under such extreme circumstances.

Under post-redevelopment conditions, Bridge Creek is most likely to be impacted by metals and/or organic compounds via the discharge of groundwater from Site 1. Based on the concentrations of organic compounds in groundwater at Site 1, the groundwater impacts are primarily present at concentrations similar to or lower than the RSWCS for Class SD surface water bodies. Except for nickel, those metals that were detected in groundwater at Site 1 at concentrations above their respective AWQSGVs were detected at similar concentrations in the Arthur Kill, were detected at concentrations below their respective RSWCS for Class SD water bodies (RSWCS), or have no established RSWCS. The maximum concentration of nickel detected in groundwater at Site 1 was 110 ug/L, while the RSWCS for nickel is 75 ug/L. Since groundwater flowing into Bridge Creek is diluted immediately, nickel dissolved in groundwater at Site 1 is not anticipated to negatively impact surface water in Bridge Creek.

The groundwater impacted by organic compounds at Site 1 is similarly unlikely to impact surface water in Bridge Creek. No RSWCS has been established for phenol, benzo(a)anthracene, chrysene, or 1,2-diphenylhydrazene. The maximum concentrations of ethylbenzene and total xylene detected in groundwater at Site 1 are below their respective RSWCS for a Class SD water bodies. Therefore, groundwater discharging to Bridge Creek is not anticipated to impact surface water in Bridge Creek.

7.0 CONCLUSIONS AND RECOMMENDATIONS

All AOCs identified during and subsequent to the Phase I ESA were investigated during the SI, RI, SRI, and FSRI as necessary. Each subsequent phase of environmental investigation resulted in the additional characterization of soil, groundwater, surface water, and/or sediment at or adjacent to the HHMT-Port Ivory Facility. Currently, further investigative and/or remedial efforts are warranted at only one (AOC-UST2) of the 17 AOCs (i.e., 6%) identified at Site 1.

Based on the investigative and remedial actions completed to date, the Port Authority has determined that no further investigative or remedial efforts are warranted at the following AOCs identified during (all AOCs except the Hydrogen Holders) or after (only the Hydrogen Holders) the Phase I ESA:

- **UST 5**
- **UST 6**
- **Precipitate at Bridge Creek**
- **AOC-Area C Former Oleum AST and Acid Wastewater Area/Block 1400**
- **AOC-Area F1, Spent Nickel Catalyst Drum Storage Area/Block 1400**

- **AOC-Area H, Former Rosin Storage Area/Block 1400**
- **AOC-Area R, Northwest Corner of Soap Manufacturing Area/Block 1400**
- **Railroad Tracks and Siding**
- **Pits and Drains**
- **Groundwater**: LNAPL encountered at TMW-02 will be addressed as part of AOC-UST 2 (see below). Groundwater impacts at GW-14 were addressed by the excavation of soil at Area B (see Area GW-14, below).

The following AOCs were identified during the Phase I ESA and were remediated prior to the FSRI. No further investigative or remedial actions are proposed at these AOCs:

- **AOC-Area A West Tank Field Southwest of Building 16/Block 1400:** Approximately 3,306 cubic yards of LNAPL-impacted soil was removed.
- **AOC-Area B Former Raw Product and By-product AST Areas/Block 1400:** Approximately 4,349 cubic yards of LNAPL-impacted soil was removed.
- **Wood Yard:** Approximately 117 cubic yards of soil was removed.
- **Former Structures:** Approximately 1,537 cubic yards of LNAPL-impacted soil was removed.
- **Area GW-14:** Groundwater impacts were addressed by the removal of approximately 4,349 cubic yards of LNAPL-impacted soil.

The following AOCs warrant additional remedial actions for soil, but not groundwater, quality. Although the environmental quality of groundwater at Site 1 is not believed to warrant remedial action, groundwater quality will be investigated by post-redevelopment monitoring. All remedial actions and post-remedial monitoring will be implemented as per the approved Site 1 RAWP.

- **Historic Fill Material:** An impervious cap will be constructed throughout approximately 90% of Site 1. Geotextile fabric and clean fill will be placed in areas where such a cap was not constructed.
- **AOC-UST2:** Mobile LNAPL will be removed to the extent practical as specified in the site 1 RAWP. The footprint for the removal area is currently estimated to be between 2,190 and 15,590 square feet. The actual extent will include all soil at UST2-4 that contained mobile LNAPL, based on field observations, at the start of the remedial action.

APPENDIX A

NYSDEC LETTER APPROVING FSRI WORK PLAN

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **FAX:** (518) 402-9773
Website: www.dec.state.ny.us

Denise M. Sheehan
Commissioner

April 20, 2006

Mr. Edward Aldrich
Port Authority of New York and New Jersey
Two Gateway Center, 14th Floor
Newark, New Jersey 07102

Re: HHMT - Port Ivory Facility
Site 1, ID # V00615
Focused Supplemental RI Work Plan
AOC-UST2

Dear Mr. Aldrich:

The New York State Department of Environmental Conservation (NYSDEC), in cooperation with the New York State Department of Health (NYSDOH), have reviewed Hatch Mott MacDonald's (HMM) work plan titled "Focused Supplemental RI Work Plan - AOC-UST2 (Site 1), Howland Hook Marine Terminal - Port Ivory Facility (40 Western Avenue), Staten Island" dated March 6, 2006. The NYSDEC is in agreement with the recommendations and scope of work outlined in this work plan and, as such, this work plan is approved.

Please provide the NYSDEC with one week notice prior to the implementation of this scope of work. If you have any questions, don't hesitate to call me at (518) 402-9768.

Sincerely,

Thomas Gibbons
Project Manager
Remedial Bureau B, Section D
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
G. Clark (HMM)

ec: J. Guastella (DOH)
D. Walsh (Reg. 2)

APPENDIX B

LORCO PETROLEUM DISPOSAL CERTIFICATE

Lorco Petroleum Services
450 South Front St.
Elizabeth, NJ 07202
(908) 820-8800
(800) 734-0910
FAX: (908) 820-8412

LORCO PETROLEUM SERVICES

www.lorcopetroleum.com

STANDARD COLLECTION ORDER FORM

592784

GENERATOR/LOCATION

SALES ORDER #

NAME

ATTENTION/ATTENTION LINE

ACCOUNT APPROVAL CODE

DELIVERY ADDRESS

CITY STATE ZIP

PHONE NUMBER

PURCHASE ORDER NUMBER

TIME IN

TIME OUT

BILL TO (IF DIFFERENT FROM LOCATION)

NAME

INFORMATION/ATTENTION LINE

ACCOUNT APPROVAL CODE

DELIVERY ADDRESS

CITY STATE ZIP

PHONE NUMBER

PURCHASE ORDER NUMBER

MANIFEST NUMBER

SHIPPING INFORMATION

The undersigned hereby certifies that the below named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

NO.	TYPE	QTY.	UNIT	US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)

SALES REPRESENTATIVE

SERVICE SECTION

SALES CODE	DESCRIPTION	WASTE CODE	QUANTITY	UNIT PRICE	PRICE	TAX	LINE TOTAL
40600	USED OIL REMOVAL						
40300	ANTI-FREEZE REMOVAL						
40400	OILY WATER DISPOSAL		2,040				
41100	SLUDGE DISPOSAL						
41000	GASOLINE/WATER						
40900	DRUM DISPOSAL						
41507	TANK ENTRY						
[illegible]	OIL FILTER REMOVAL						
40800	PARTS WASHER SERVICE		[illegible]				
40611	NEW 55 GAL DRUM / 17H						
42001	DEXSIL TEST KIT TAX		[illegible]				
41508	TRANSPORTATION						
40700	LED ANTI-FREEZE						
41508	TRUCK AND OPERATOR						
					TOTAL		

PARTS WASHER SERVICE INTERVAL _____ DAYS.
USED OIL CUSTOMER SERVICED EVERY 30 DAYS UNLESS OTHERWISE INDICATED.
USED OIL SERVICE INTERVAL _____ DAYS.

GENERATOR WARRANTS AND REPRESENTS THAT THE MATERIALS PROVIDED LORCO HEREUNDER HAVE NOT BEEN MIXED, COMBINED, OR OTHERWISE BLENDED IN ANY QUANTITY WITH MATERIALS CONTAINING POLYCHLORINATED BIPHENYLS (PCB) OR ANY OTHER MATERIAL DEFINED AS HAZARDOUS WASTE UNDER APPLICABLE LAWS, INCLUDING BUT NOT LIMITED TO 40 CFR PART 261, GENERATOR AGREES TO INDEMNIFY AND HOLD LORCO HARMLESS FOR ANY DAMAGES, COSTS, ATTORNEY'S FEES, ETC. ARISING OUT OF OR IN ANY WAY RELATED TO A BREACH OF THE ABOVE WARRANTY BY THE GENERATOR.

Generator certifies that the waste is ☐ used oil ☐ used antifreeze ☐ oily water ☐ oil filter ☐ parts washer solvent

☐ Other _____ Description

In accordance the N.J.A.C. 7:26-12.1 et seq, LORCO has the required permits to accept the above described waste.

X [illegible]
Print Name Title

X [illegible]
Signature Date

GENERATOR/CUSTOMER

CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR CERTIFICATION

I certify that this generator generates less than 100 kilograms of hazardous waste per month, as defined at 40 C.F.R. 261, and does not accumulate more than 1,000 kilograms of such waste during the month.

X [illegible]
GENERATOR'S SIGNATURE

NON CONDITIONALLY EXEMPT LARGE QUANTITY GENERATOR CERTIFICATION

DEXSIL CDT TEST RESULTS

X _____ PPM

CUSTOMER

CHARGE MY ACCOUNT FOR THIS TRANSACTION UNLESS OTHERWISE INDICATED IN THE PAYMENT SECTION. $ _____ INVOICES REFLECTING CHARGES TO CUSTOMER ARE SUBJECT TO AN INTEREST RATE OF THE LESSER OF 1½% PER MONTH (18% PER ANNUM) OR THE MAXIMUM RATE ALLOWED BY LAW ON ANY INVOICES THAT ARE NOT PAID WITHIN 30 DAYS. IN THE EVENT OF DEFAULT, LORCO SHALL BE ENTITLED TO RECOVER COSTS OF COLLECTION, INCLUDING REASONABLE ATTORNEY'S FEES. INITIAL _____

PAYMENT RECEIVED SECTION

CASH ☐	TOTAL RECEIVED
CHECK NUMBER	

In accordance with NJAC7:26-6.7b + 40CFR PART 279 LORCO has notified the US EPA of its location and used oil management activities.

X [illegible]
Print Name

X [illegible] 6/12
Signature Date

LORCO REPRESENTATIVE

APPENDIX C

LABORATORY ANALYITCAL DATA – FSRI
(SUBMITTED UNDER SEPARATE COVER)

Form1

ORGANICS SEMIVOLATILE REPORT

Sample Number: AC28404-001
Client Id: PI-TWP-1A-020107S01
Data File: 7M24574.D
Analysis Date: 02/08/07 04:36
Date Rec/Extracted: 02/02/07-02/07/07

Matrix: Soil
Initial Vol: 30g
Final Vol: 1ml
Dilution: 1
Solids: 88

Units: mg/Kg

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
120-82-1	1,2,4-Trichlorobenzene	0.38	U	**205-99-2**	**Benzo[b]fluoranthene**	**0.38**	**1.5**
95-50-1	1,2-Dichlorobenzene	0.38	U	**191-24-2**	**Benzo[g,h,i]perylene**	**0.38**	**0.82**
122-66-7	1,2-Diphenylhydrazine	0.38	U	**207-08-9**	**Benzo[k]fluoranthene**	**0.38**	**0.52**
541-73-1	1,3-Dichlorobenzene	0.38	U	100-51-6	Benzyl alcohol	0.38	U
106-46-7	1,4-Dichlorobenzene	0.38	U	111-91-1	bis(2-Chloroethoxy)methan	0.38	U
95-95-4	2,4,5-Trichlorophenol	0.38	U	111-44-4	bis(2-Chloroethyl)ether	0.38	U
88-06-2	2,4,6-Trichlorophenol	0.38	U	108-60-1	bis(2-chloroisopropyl)ether	0.38	U
120-83-2	2,4-Dichlorophenol	0.38	U	**117-81-7**	**bis(2-Ethylhexyl)phthalate**	**0.38**	**0.17 JB**
105-67-9	2,4-Dimethylphenol	0.38	U	85-68-7	Butylbenzylphthalate	0.38	U
51-28-5	2,4-Dinitrophenol	0.95	U	**86-74-8**	**Carbazole**	**0.38**	**0.097 J**
121-14-2	2,4-Dinitrotoluene	0.38	U	**218-01-9**	**Chrysene**	**0.38**	**1.2**
606-20-2	2,6-Dinitrotoluene	0.38	U	**53-70-3**	**Dibenzo[a,h]anthracene**	**0.38**	**0.24 J**
91-58-7	2-Chloronaphthalene	0.38	U	132-64-9	Dibenzofuran	0.38	U
95-57-8	2-Chlorophenol	0.38	U	84-66-2	Diethylphthalate	0.38	U
91-57-6	2-Methylnaphthalene	0.38	U	131-11-3	Dimethylphthalate	0.38	U
95-48-7	2-Methylphenol	0.38	U	**84-74-2**	**Di-n-butylphthalate**	**0.38**	**0.093 JB**
88-74-4	2-Nitroaniline	0.38	U	117-84-0	Di-n-octylphthalate	0.38	U
88-75-5	2-Nitrophenol	0.38	U	**206-44-0**	**Fluoranthene**	**0.38**	**2.2**
106-44-5	3&4-Methylphenol	0.38	U	**86-73-7**	**Fluorene**	**0.38**	**0.10 J**
91-94-1	3,3'-Dichlorobenzidine	0.38	U	118-74-1	Hexachlorobenzene	0.38	U
99-09-2	3-Nitroaniline	0.38	U	87-68-3	Hexachlorobutadiene	0.38	U
534-52-1	4,6-Dinitro-2-methylphenol	0.95	U	77-47-4	Hexachlorocyclopentadiene	0.38	U
101-55-3	4-Bromophenyl-phenylether	0.38	U	67-72-1	Hexachloroethane	0.38	U
59-50-7	4-Chloro-3-methylphenol	0.38	U	**193-39-5**	**Indeno[1,2,3-cd]pyrene**	**0.38**	**0.72**
106-47-8	4-Chloroaniline	0.38	U	78-59-1	Isophorone	0.38	U
7005-72-3	4-Chlorophenyl-phenylether	0.38	U	**91-20-3**	**Naphthalene**	**0.38**	**0.064 J**
100-01-6	4-Nitroaniline	0.38	U	98-95-3	Nitrobenzene	0.38	U
100-02-7	4-Nitrophenol	0.38	U	62-75-9	N-Nitrosodimethylamine	0.38	U
83-32-9	**Acenaphthene**	**0.38**	**0.097 J**	621-64-7	N-Nitroso-di-n-propylamine	0.38	U
208-96-8	**Acenaphthylene**	**0.38**	**0.067 J**	86-30-6	N-Nitrosodiphenylamine	0.38	U
120-12-7	**Anthracene**	**0.38**	**0.30 J**	87-86-5	Pentachlorophenol	0.95	U
92-87-5	Benzidine	0.38	U	**85-01-8**	**Phenanthrene**	**0.38**	**1.1**
56-55-3	**Benzo[a]anthracene**	**0.38**	**1.3**	108-95-2	Phenol	0.38	U
50-32-8	**Benzo[a]pyrene**	**0.38**	**1.2**	**129-00-0**	**Pyrene**	**0.38**	**2.1**

Worksheet #: 40409

Total Target Concentration 13.888

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.

R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>50% between columns due to coelution. Lower concentration used.

Form1e

ORGANICS SEMIVOLATILE REPORT
Tentatively Identified Compounds

Sample Number: AC28404-001 | Matrix: Soil
Client Id: PI-TWP-1A-020107S01 | Initial Vol: 30g
Data File: 7M24574.D | Final Vol: 1ml
Analysis Date: 02/08/07 04:36 | Dilution: 1
Date Rec/Extracted: 02/02/07-02/07/07 | Solids: 88

Units: mg/Kg

	Cas #	Compound	RT	Conc
1	2216-30-0	Heptane, 2,5-dimethyl-	3.90	0.74 JB
2	123-42-2	2-Pentanone, 4-hydroxy-4-methyl-	3.97	13 JAB
3		unknown	5.77	0.47 J
4	2131-18-2	Pentadecylbenzene	8.56	0.25 J
5	1921-70-6	Pentadecane, 2,6,10,14-tetramethyl-	8.83	0.30 J
6	84-69-5	1,2-Benzenedicarboxylic acid, bis(2-met	9.60	0.25 J
7	629-59-4	Tetradecane	9.75	0.23 J
8	779-02-2	Anthracene, 9-methyl-	9.95	0.27 J
9	613-12-7	Anthracene, 2-methyl-	9.97	0.23 J
10		unknown	10.10	0.24 J
11	37052-13-4	1H-Phenanthro[9,10-d]imidazol-2-amine	10.22	0.61 J
12		unknown	10.35	0.26 JB
13		unknown	10.46	0.47 J
14		unknown	10.82	0.46 J
15		unknown	10.86	0.29 J
16	16914-12-8	(E,E)-2,5-Diphenyl-2,4-hexadiene	11.36	1.2 J
17	2381-21-7	Pyrene, 1-methyl-	11.41	0.18 J
18	3353-12-6	Pyrene, 4-methyl-	11.53	0.18 J
19	80249-74-7	Cyclopentylsilane	13.45	0.45 J
20	192-97-2	Benzo[e]pyrene	13.76	0.28 J
21	198-55-0	Perylene	13.94	0.78 J
22	54113-93-8	1,1,3,3-TETRAMETHYL-1,3-DISILAIND	15.02	0.53 J
23		unknown	15.48	0.28 J
24		unknown	15.78	0.43 J

Worksheet #: 40409

Total Tentatively Identified Concentration 22.38

A - Indicates an aldol condensate.
J - Indicates an estimated value.
B - Indicates the analyte was found in the blank as well as in the sample.

Form1

ORGANICS SEMIVOLATILE REPORT

Sample Number: AC28404-015 | Matrix: Aqueous
Client Id: PI-TWP-SFB-020107WQ01 | Initial Vol: 980ml
Data File: 5M27275.D | Final Vol: 1ml
Analysis Date: 02/08/07 17:32 | Dilution: 1
Date Rec/Extracted: 02/02/07-02/08/07 | Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
120-82-1	1,2,4-Trichlorobenzene	10	U	205-99-2	Benzo[b]fluoranthene	10	U
95-50-1	1,2-Dichlorobenzene	10	U	191-24-2	Benzo[g,h,i]perylene	10	U
122-66-7	1,2-Diphenylhydrazine	10	U	207-08-9	Benzo[k]fluoranthene	10	U
541-73-1	1,3-Dichlorobenzene	10	U	100-51-6	Benzyl alcohol	10	U
106-46-7	1,4-Dichlorobenzene	10	U	111-91-1	bis(2-Chloroethoxy)methan	10	U
95-95-4	2,4,5-Trichlorophenol	10	U	111-44-4	bis(2-Chloroethyl)ether	10	U
88-06-2	2,4,6-Trichlorophenol	10	U	108-60-1	bis(2-chloroisopropyl)ether	10	U
120-83-2	2,4-Dichlorophenol	10	U	117-81-7	bis(2-Ethylhexyl)phthalate	10	U
105-67-9	2,4-Dimethylphenol	10	U	85-68-7	Butylbenzylphthalate	10	U
51-28-5	2,4-Dinitrophenol	26	U	86-74-8	Carbazole	10	U
121-14-2	2,4-Dinitrotoluene	10	U	218-01-9	Chrysene	10	U
606-20-2	2,6-Dinitrotoluene	10	U	53-70-3	Dibenzo[a,h]anthracene	10	U
91-58-7	2-Chloronaphthalene	10	U	132-64-9	Dibenzofuran	10	U
95-57-8	2-Chlorophenol	10	U	84-66-2	Diethylphthalate	10	U
91-57-6	2-Methylnaphthalene	10	U	131-11-3	Dimethylphthalate	10	U
95-48-7	2-Methylphenol	10	U	84-74-2	Di-n-butylphthalate	10	U
88-74-4	2-Nitroaniline	10	U	117-84-0	Di-n-octylphthalate	10	U
88-75-5	2-Nitrophenol	10	U	206-44-0	Fluoranthene	10	U
106-44-5	3&4-Methylphenol	10	U	86-73-7	Fluorene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U	118-74-1	Hexachlorobenzene	10	U
99-09-2	3-Nitroaniline	10	U	87-68-3	Hexachlorobutadiene	10	U
534-52-1	4,6-Dinitro-2-methylphenol	26	U	77-47-4	Hexachlorocyclopentadiene	10	U
101-55-3	4-Bromophenyl-phenylether	10	U	67-72-1	Hexachloroethane	10	U
59-50-7	4-Chloro-3-methylphenol	10	U	193-39-5	Indeno[1,2,3-cd]pyrene	10	U
106-47-8	4-Chloroaniline	10	U	78-59-1	Isophorone	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U	91-20-3	Naphthalene	10	U
100-01-6	4-Nitroaniline	10	U	98-95-3	Nitrobenzene	10	U
100-02-7	4-Nitrophenol	10	U	62-75-9	N-Nitrosodimethylamine	10	U
83-32-9	Acenaphthene	10	U	621-64-7	N-Nitroso-di-n-propylamine	10	U
208-96-8	Acenaphthylene	10	U	86-30-6	N-Nitrosodiphenylamine	10	U
120-12-7	Anthracene	10	U	87-86-5	Pentachlorophenol	26	U
92-87-5	Benzidine	10	U	85-01-8	Phenanthrene	10	U
56-55-3	Benzo[a]anthracene	10	U	108-95-2	Phenol	10	U
50-32-8	Benzo[a]pyrene	10	U	129-00-0	Pyrene	10	U

Worksheet #: 40409

Total Target Concentration 0

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>50% between columns due to coelution. Lower concentration used.

Form1e

ORGANICS SEMIVOLATILE REPORT
Tentatively Identified Compounds

Sample Number: AC28404-015
Client Id: PI-TWP-SFB-020107W
Data File: 5M27275.D
Analysis Date: 02/08/07 17:32
Date Rec/Extracted: 02/02/07-02/08/07

Matrix: Aqueous
Initial Vol: 980ml
Final Vol: 1ml
Dilution: 1
Solids: .

Units: ug/L

	Cas #	Compound	RT	Conc
1		No Unknown Compounds Detected	0.00	0 J

Worksheet #: 40409

Total Tentatively Identified Concentration 0

A - Indicates an aldol condensate.
J - Indicates an estimated value.
B - Indicates the analyte was found in the blank as well as in the sample.

VERITECH Wet Chem Form1 Analysis Summary
% Solids

TestGroupName: % Solids SM2540G **Project #:7020230**

TestGroup: %SOLIDS

Lab#	Client SampleID	Matrix	Dilution:	Result	Units:	PQL	Prep Date	Analysis Date	Received Date	Collect Date
AC28404-001	PI-TWP-1A-02010	Soil	1	88	Percent			02/07/07	02/02/07	02/01/07

Chain of Custody Forms

0011

THE PORT AUTHORITY OF NY & NJ

Materials Engineering Division - 241 Erie Street, Room 234
Jersey City, NJ 07310

Chain-of-Custody

PAGE _1_OF_2_ PA PROJECT SDG NO__

7070230

Facility	Port Ivory
Project Info.	Port Ivory
Charge Code #	CP11-233-295

Contact Name	Dorian Bailey / Angelos Zafirelis		
Contact Phone No.	201-216-2963 / 201-216-2960		
Contact Fax No.	201-216-2158		
Contact Email	dbailey@PANYNJ.gov / azafirel@PANYNJ.gov		
Destination Laboratory:		HCV	Lab Case/SDG:

EQuIS Sys_Sample_Code	Sample Depth	Date of Collection Year 2007	Time of Collection	Geotech Cross ID	# of Containers	Preservative Code (MeOH No.)	Grab or Composite		TCL BNA+20		HOLD				EQUIS / PDF
	AC28404														
PI-TWP-1A-020107S01	-001 4.5-5.0	2/1/2007			1	1	GRAB		X						X
PI-TWP-1A-020107S03	-002 8.0-8.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1A-020107S04	-003 10.5-11.0'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AW-020107S01	-004 4.0-4.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AW-020107S02	-005 8.0-8.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AW-020107S03	-006 8.5-9.0'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AW-020107S04	-007 10.0-10.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AN-020107S01	-008 4.0-4.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AN-020107S03	-009 8.5-9.0'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AS-020107S01	-010 4.0-4.5'	2/1/2007			1	1	GRAB				X				

Sampled By: TG/BS

Sampling Method: SS Spoon

Preservatives:
1. Ice 2. HCl 3. HNO3
4. NaOH 5. MeOH 6. H2SO4

TAT: ONE-WEEK
OTHER

3.5

Deliverables: NY ASP B, EXCEL
OTHER

Relinquished By:	Date: 2-2-07	Received By: HCV	Date: 2-02-07 11:45
Relinquished By: HCV	Date: 2-02-07 1340	Received By:	Date: 2/2/07 1340
Relinquished By:	Date:	Received By:	Date:

0012

THE PORT AUTHORITY OF NY & NJ

Materials Engineering Division - 241 Erie Street, Room 234
Jersey City, NJ 07310

Chain-of-Custody

PAGE _2_OF_2_ PA PROJECT S[redacted]NO__

Facility	Port Ivory
Project Info.	Port Ivory
Charge Code #	CP11-233-295

Contact Name	Dorian Bailey / Angelos Zafirelis
Contact Phone No.	201-216-2963 / 201-216-2960
Contact Fax No.	201-216-2158
Contact Email	dbailey@PANYNJ.gov / azafirel@PANYNJ.gov
Destination Laboratory:	HCV
Lab Case/SDG:	

AC28404

EQuIS Sys_Sample_Code	Sample Depth	Date of Collection Year 2007	Time of Collection	Geotech Cross ID	# of Containers	Preservative Code (MeOH No.)	Grab or Composite		TCL BNA+20		HOLD				EQUIS / PDF
PI-TWP-1AS-020107S03	-011 8.0-8.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AE-020107S01	-012 4.0-4.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-1AE-020107S02	-013 6.0-6.5'	2/1/2007			1	1	GRAB				X				
PI-TWP-DUP-020107S01	-014	2/1/2007			1	1	GRAB		Hold Pending Results X						X
PI-TWP-SFB-020107WQ1	-015	2/1/2007			2	1	GRAB		X						X

Sampled By: TG/BS
Sampling Method: SS Spoon

Preservatives:
1. Ice 2. HCl 3. HNO3
4. NaOH 5. MeOH 6. H2SO4

TAT: ONE-WEEK
OTHER

3-5

Deliverables: NY ASP B, EXCEL
OTHER

Relinquished By:	Date: 2-2-07	Received By: HCV	Date: 2-02-07 11:45
Relinquished By: HCV	Date: 2-02-07 1340	Received By:	Date: 2/2/07 1340
Relinquished By:	Date:	Received By:	Date: