

Road and Utility Investigation Report (B22)

Developed in Support of Construction Activities for
Area B: Parcel B22, Phase 1

Tradepoint Atlantic Sparrows Point, Maryland

Prepared for:

EnviroAnalytics Group
1650 Des Peres Road, Suite 230
Saint Louis, Missouri 63131

Prepared by:

ARM Group Inc.
9175 Guilford Road
Suite 310
Columbia, MD 21046

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Respectfully Submitted,



Eric S. Magdar
Senior Geologist



T. Neil Peters, P.E.
Vice President

TABLE OF CONTENTS

1.0	Introduction.....	1
	1.1. Introduction.....	1
	1.2. Environmental Investigation.....	1
2.0	Field Activities and Procedures	3
	2.1. Soil Investigation	3
	2.2. Sample Documentation and Analysis	3
	2.3. Management of Investigation Derived Waste.....	4
3.0	Data Validation	5
4.0	Screening Level Risk Assessment	6
	4.1. Analysis Process	6
	4.2. Road and Utility Investigation SLRA Results and Risk Characterization	8
	4.3. Migration Assessment for Elevated TPH/Oil & Grease	9
	4.4. Management of PCB-Contaminated Media.....	10
5.0	Findings and Recommendations.....	11

Attachments

Figure 1 – Proposed Road/Utilities: Final Field Sample Locations	Following Text
Table 1 – Summary of Organics Detected in Soil	Following Text
Table 2 – Summary of Inorganics Detected in Soil.....	Following Text
Table 3 – Exposure Point Concentrations: Pooled Soil.....	Following Text
Table 4 – Risk Ratios Construction Worker: Pooled Soil	Following Text
Appendix A – Soil Boring Logs	Following Text
Soil Laboratory Certificates of Analysis.....	Electronic Attachment
Soil ProUCL Input Tables (formatted soil analytical data)	Electronic Attachment
Soil ProUCL Output Tables.....	Electronic Attachment

1.0 INTRODUCTION

1.1. INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared the following Road and Utility Investigation Report to document existing conditions and provide a Construction Worker risk assessment in support of infrastructure construction activities related to the Development of Parcel B22, Phase 1. The Phase 1 development area consists of approximately 71.6 acres in the southern portion of Parcel B22, but some minor roadway and utility construction is proposed outside of the main development area beyond the parcel boundary. This investigation and assessment was conducted in accordance with the Road and Utility Investigation Plan (B22) Revision 1 dated November 29, 2016 which was submitted to the agencies for their review and approval.

Tradepoint Atlantic is proposing to construct an access road and three primary utility lines (two water lines – one potable and one industrial, and a BGE gas line) to the south of Parcel B22, outside of the areas which have previously been investigated by Phase II Investigations. This Road and Utility Investigation Report presents the analytical results for the areas where utility trenching and roadway installation will be completed. This report also includes a construction worker risk assessment, defines necessary health and safety considerations which are warranted based on the results of the risk assessment (as applicable), and provides guidance for the management of excavated materials.

Site characterization of the proposed areas was performed in compliance with requirements pursuant to the following:

- Administrative Consent Order (ACO) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the Maryland Department of the Environment (effective September 12, 2014); and
- Settlement Agreement and Covenant Not to Sue (SA) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the United States Environmental Protection Agency (effective November 25, 2014).

1.2. ENVIRONMENTAL INVESTIGATION

The purpose of this investigation was to identify existing soil conditions in the vicinity of the proposed road/utility construction work. Across the whole Tradepoint Atlantic property, several buildings and facilities may have been historical sources of environmental contamination.

Ten (10) soil borings were completed along the alignment of the proposed roadway and utilities. The locations of the samples were selected to provide coverage in the vicinity of each primary

utility and the proposed roadway. Locations were adjusted based on a review of available historical steel plant records and drawings to provide coverage of any features which could potentially have resulted in a past release to the environment. The first document to be reviewed was the Recognized Environmental Condition (REC) Location Map provided in the Phase I Environmental Site Assessment (ESA) prepared by Weaver Boos Consultants dated May 19, 2014. Weaver Boos completed site visits of Sparrows Point from February 19 through 21, 2014, for the purpose of characterizing current conditions at the former steel plant. No RECs were identified in the vicinity of the proposed road/utilities. Following the review of the REC Location Map, four (4) sets of historical site drawings were reviewed to identify additional potential sampling targets. These site drawings included the 5000 Set (Plant Arrangement), the 5100 Set (Plant Index), the 5500 Set (Plant Sewer Lines), and a set of drawings indicating coke oven gas distribution drip leg locations. Sampling target locations would be identified if the historical site drawings depicted industrial activities or a specific feature at a location that may have been a source of environmental contamination. One boring was placed directly adjacent to a substation in order to investigate any potential impacts related to this feature. The remaining borings provide general coverage along the alignment of the roadway and utility corridors.

The locations of the proposed utilities and roadway alignment are provided on **Figure 1**, along with the locations of the completed borings and corresponding identification numbers. This figure shows an aerial image of the area toward the south end of Parcel B22 which was investigated.

Information regarding the project organization, field activities and sampling methods, sampling equipment, sample handling and management procedures, the laboratory analytical methods and selected laboratory, quality control and quality assurance procedures, and investigation-derived waste (IDW) management methods is described in detail in the QAPP that has been developed to support the investigation and remediation of the Tradepoint Atlantic Site (Quality Assurance Project Plan, ARM Group Inc., April 5, 2016). All site characterization activities were conducted in accordance with a site-specific Health and Safety Plan (HASP), which was provided as Appendix B of the approved Area B: Parcel B22 Phase II Investigation Work Plan dated June 2, 2016. Boring locations were cleared with the Miss Utility system and utility personnel currently working on the property prior to the completion of any soil borings.

2.0 FIELD ACTIVITIES AND PROCEDURES

2.1. SOIL INVESTIGATION

Soil samples were collected from the locations identified on **Figure 1** in accordance with procedures referenced in the QAPP Worksheet 21 – Field SOPs (Standard Operating Procedures), SOP No. 009 – Sub-Surface Soil Sampling. Regarding soil sampling depth, a shallow sample was collected from the 0 to 1 foot depth interval, and a deeper sample was collected from the 4 to 5 foot depth interval. Each boring provided two analytical soil samples, yielding a total of 20 samples for this investigation. It should be noted that no soil samples were collected from a depth that is below the water table. If asphalt and/or roadway sub-base occupied the 0 to 1 foot below ground surface (bgs) sample, the interval was shifted to the depth of the first observed underlying soil interval. In the event of refusal prior to collecting the 5 foot sample, the deeper sample was collected from the lowest possible interval (at least 4.5 feet bgs in each case). Borings were completed as close as possible to the proposed locations using a hand-held GPS unit as guidance.

After soil sampling was concluded at a location, down-hole soil sampling equipment was decontaminated according to procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 016 Equipment Decontamination. The decontamination procedures used during the course of this investigation include Decontamination Area (Section 3.1 of the SOP), Decontamination of Sampling Equipment (Section 3.5), Decontamination of Measurement Devices & Monitoring Equipment (Section 3.7), Decontamination of Subsurface Drilling Equipment (Section 3.8), and Document and Record Keeping (Section 5).

All soil samples were analyzed for TCL-SVOCs, TAL-Metals, Oil & Grease, TPH-DRO, TPH-GRO, hexavalent chromium, and cyanide. During field screening of the soil cores, any sample interval which exceeded a PID reading of 10 ppm was also analyzed for TCL-VOCs. Additionally, the shallow soil samples from the 0-1 foot bgs interval were also analyzed for PCBs. For shallow samples that were shifted below the 0-1 foot interval, the new interval was still collected as a surface soil sample and analyzed for PCBs. Analytical methods, sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

2.2. SAMPLE DOCUMENTATION AND ANALYSIS

Samples were documented using a project specific identification code for the proposed roadway and utility construction (in this case the format R1-XXX-SB was used). Data from this investigation may also be incorporated into the Phase II Investigation Report for additional parcels in which fieldwork has not yet been completed (currently Parcel B2 and Parcel B3).

Pace Analytical Services, Inc. (PACE) of Greensburg, Pennsylvania performed the laboratory analysis for this project. The specific list of compounds and analytes that the soil samples were analyzed for, as well as the quantitation limits and project action limits, is provided in QAPP Worksheet 15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits.

2.3. MANAGEMENT OF INVESTIGATION DERIVED WASTE

All investigation derived waste (IDW) procedures were carried out in accordance with methods referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 005 – Investigation-Derived Wastes Management.

3.0 DATA VALIDATION

For the road/utility investigation, a representative 50% of the complete analytical dataset was required to undergo data validation in accordance with the Road and Utility Investigation Work Plan dated November 19, 2016. However, since all samples were collected in a single field day and are present on a single laboratory report, the full analytical dataset has been submitted for validation.

All data validation procedures will be carried out in accordance with the QAPP Worksheet 34 – Data Verification and Validation Inputs, QAPP Worksheet 35 – Data Verification Procedures, and QAPP Worksheet 36 – Data Validation Procedures.

If the results of the data validation impact the results or recommendations of the screening level risk assessment provided in the Section 4.0, a revised report will be submitted to the agencies. However, if the data validation process does not impact the results of the risk assessment (i.e., none of the analytical results included in the risk assessment are rejected for any sample) a revision to this report will not be mandatory. The agencies will be notified of any data validation results pertinent to the road/utility risk assessment.

4.0 SCREENING LEVEL RISK ASSESSMENT

The results of the environmental investigation and subsequent risk assessment are presented in this Screening Level Risk Assessment (SLRA) for approval by the agencies prior to the installation of the proposed road/utilities. The SLRA includes an evaluation of any necessary health and safety protocols or response measures which are warranted based on the completed risk assessment. The analytical results for parameters detected in soil are summarized and compared to the PALs specified in the QAPP in the attached **Table 1** (Organics) and **Table 2** (Inorganics). The laboratory Certificates of Analysis (including Chains of Custody) have been included as electronic attachments. The data validation reports have not yet been received following this investigation. Soil boring logs including lithologic information have been included as **Appendix A**. Please note that unless otherwise indicated, all Unified Soil Classification System (USCS) group symbols provided on the attached boring logs are from visual observations, and not from laboratory testing.

4.1. ANALYSIS PROCESS

A human health SLRA was completed for soils to further evaluate the Site conditions in support of the design of necessary response measures or site-specific health and safety protocols. Ten (10) soil borings were completed along the alignment of the proposed roadway and utilities, providing 20 samples to be included in the risk assessment. The data were evaluated to assess risk for the Construction Worker scenario for temporary construction activities associated with utility and road improvements. The SLRA included the following evaluation process:

Identification of Constituents of Potential Concern (COPCs): Compounds that are present at concentrations at or above the EPA Regional Screening Levels (RSLs) set at a target cancer risk of $1E-6$ or target non-cancer Hazard Quotient (HQ) of 0.1 were identified as COPCs to be included in the SLRA.

Identification of Exposure Units (EUs): The development area for the proposed utilities/roads was analyzed as a single exposure unit (approximately 19.3 ac).

Exposure Point Concentrations (EPCs): The COPC soil data for surface (0-1 ft) and subsurface (>1 ft) depths were pooled to accurately assess exposure for Construction Workers grading and/or trenching within the identified roadway and utility corridors. This dataset was used for estimation of potential exposure point concentrations to soil within the exposure unit during construction activities. A statistical analysis was performed for each COPC data set using the ProUCL software (version 5.0) developed by the USEPA to determine representative reasonable maximum exposure (RME) values for the EPC for each constituent. The RME value is typically the 95% Upper Confidence Limit (UCL) of the mean. For lead, the arithmetic mean for the pooled dataset was

calculated for comparison to the Adult Lead Model-based values. If applicable, all PCB results equaling or exceeding 50 mg/kg would be delineated for excavation and removal, and all remaining PCBs would be included in the EPC and risk ratio calculations.

Risk Ratios: The soil EPCs were compared to site-specific Soil Screening Levels (SSLs) for the Construction Worker based on equations derived in the USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (OSWER 9355.4-24, December 2002). For this Construction Worker scenario, site-specific risk-based SSLs were determined based upon a reasonable exposure frequency for the proposed road/utility construction (less than 115 work days). The risk ratios were calculated with a cancer risk of 1E-6 and a non-cancer HQ of 1. The risk ratios for the carcinogens were summed to develop a screening level estimate of the cumulative cancer risk. The risk ratios for the non-carcinogens were segregated and summed by target organ to develop a screening level estimate of the cumulative non-cancer hazard.

Assessment of Lead: For lead, the arithmetic mean concentrations for surface soil and subsurface soils for the EU were pooled and compared to the applicable RSL (800 mg/kg) as an initial screening. If the mean concentration for the EU was below the applicable RSL, the EU was identified as requiring no further action for lead. If the mean concentration exceeded the RSL, the mean value would be compared to calculated Adult Lead Model (ALM Version date 8/2/2016) values with inputs of 1.7 for the geometric standard deviation and a blood baseline lead level of 0.7 ug/dL. The ALM calculation generates a soil lead concentration of 2,737 mg/kg, which is the most conservative (i.e., lowest) concentration which would yield a probability of 5% of a blood lead concentration of 10 ug/dL. If the arithmetic mean concentration for the EU was below 2,737 mg/kg, the EU was identified as requiring no further action for lead. For lead, all results equaling or exceeding 10,000 mg/kg would be delineated for possible excavation and removal (if applicable).

Assessment of TPH-DRO/GRO and Oil & Grease: EPCs were not calculated for TPH-DRO/GRO or Oil & Grease. Instead, the individual results were compared to the PAL set to a HQ of 1 (6,200 mg/kg). Any TPH/Oil & Grease PAL exceedances or non-aqueous phase liquid (NAPL) observations near the proposed subsurface utilities would be delineated. If TPH/Oil & Grease PAL exceedances or free phase NAPL were identified near a proposed subsurface utility, a plan would be required to prevent mobilization of the petroleum and/or Oil & Grease to these features, which may include removal, stabilization, sealing of utilities, etc. An evaluation of the TPH/Oil & Grease exceedances and the potential for product migration which could ultimately lead to exposure risks is presented following the SLRA results in Section 4.3.

Risk Characterization Approach: For the road/utility EU, if the risk ratio for each non-carcinogenic COPC or cumulative target organ did not exceed 1 (with the exception of lead), and the sum of the risk ratios for the carcinogenic COPCs did not exceed a cumulative cancer risk of $1E-5$, then a no further action determination was recommended.

If the estimate of cumulative cancer risk exceeded $1E-5$, but was less than $1E-4$, then site-specific health and safety requirements would be considered to be an acceptable risk mitigation measure for the Construction Worker. The efficacy of health and safety measures for elevated non-cancer hazard would be evaluated in terms of the magnitude of the exceedance and other factors such as bioavailability of the COPC. Similarly, for lead, if the results of the ALM indicated that the mean concentrations would present a 5% to 10% probability of a blood concentration of 10 ug/dL for the EU, then health and safety requirements would be an acceptable risk mitigation measure. The mean soil lead concentrations corresponding to ALM probabilities of 5% and 10% are 2,737 mg/kg, and 3,417 mg/kg, respectively.

If the sum of the risk ratios for carcinogens exceeded a cumulative cancer risk of $1E-4$, further analysis of site conditions would be required including the consideration of toxicity reduction in any proposal for Construction Worker risk mitigation. The magnitude of non-carcinogen hazard exceedances and bioavailability of the COPC would also dictate further analysis of site conditions including consideration of toxicity reduction in any proposal for Construction Worker risk mitigation. In addition, if the ALM indicated that the mean concentrations would present a >10% probability of a blood concentration of 10 ug/dL for the EU, further analysis of site conditions including toxicity reduction would be evaluated such that the probability would be reduced to less than 10% for the Construction Worker after toxicity reduction.

4.2. ROAD AND UTILITY INVESTIGATION SLRA RESULTS AND RISK CHARACTERIZATION

EPCs for each identified COPC were calculated for the single pooled soil dataset. As indicated above, the EPCs for lead are the average (i.e., arithmetic mean) values for each dataset. ProUCL output tables (with computed UCLs) derived from the data for each COPC in soils are provided as electronic attachments, with computations presented and EPCs calculated for COPCs within the single pooled dataset for the exposure unit. The ProUCL input tables are also included as electronic attachments. The calculated EPCs are shown in **Table 3**. Risk ratios for the estimates of potential EPCs for the Construction Worker scenario (115-day exposure frequency) are shown in **Table 4**. The variables entered for calculation of site-specific SSLs (EU area, input assumptions, and exposure frequency) are indicated as notes on the table.

The risk ratio calculation using a site-specific exposure frequency of 115 days is suitable for the Construction Worker assessment based on a reasonable duration for the road and utility construction. The cumulative carcinogenic risk was computed to be $3E-7$ for the pooled soil

dataset using a 115-day exposure frequency, which is less than the regulatory carcinogenic risk level for no further action ($1E-5$). None of the non-carcinogens caused a cumulative HI to exceed 1 for any target organ system for the pooled soil dataset using the 115-day exposure frequency. These results indicate that site-specific health and safety protocols or further action are not required for the current road and utility construction plan.

The average lead value in the pooled soil dataset was 38.4 mg/kg, below the applicable RSL of 800 mg/kg. The screening criterion for lead was set at an EU arithmetic mean of 800 mg/kg based on the RSL, with a secondary limit of 2,737 mg/kg based on the Adult Lead Model developed by the USEPA (corresponding to a 5% probability of a blood lead level of 10 ug/dL).

4.3. MIGRATION ASSESSMENT FOR ELEVATED TPH/OIL & GREASE

Elevated Oil & Grease was identified above the PAL (6,200 mg/kg) at three soil boring locations in the proposed road/utility development area (R1-007-SB, R1-008-SB, and R1-010-SB). TPH was also analyzed at each of the soil boring locations (including locations with elevated Oil & Grease), and this analysis confirmed that petroleum was not present above the action limit of 6,200 mg/kg. The elevated detections of Oil & Grease represent locations which may possibly be impacted by free-phase NAPL that could potentially migrate along utility corridors, although no physical evidence of NAPL was noted in the soil cores.

Based on the relative magnitude of the Oil & Grease exceedances, further investigation and monitoring is recommended to be completed during construction activities. The exceedances were detected in shallow soils only, and the underlying subsurface soil samples did not show elevated detections of Oil & Grease. Therefore, utility corridors are not likely to act as migration pathways. However, soils with elevated Oil & Grease may require special management if excavated during utility trenching. Based on the limited nature of Oil & Grease impacts and the apparent lack of contamination in soils below the surface, screening using a field test kit during construction activities is recommended to facilitate proper management and reuse of excavated soil materials containing Oil & Grease impacts within the utility excavation areas. Key utility trenching and installations should be monitored through daily inspections by an environmental professional (EP). Utility trenches are to be over-excavated to a minimum of one foot on all sides of the proposed utility. All utility trenches are required to be backfilled with bedding and backfill materials meeting the MDE definition of clean fill.

Excavated materials impacted above the Oil & Grease PAL (6,200 mg/kg) are generally suitable as fill under areas to be paved (under the proposed road or within Parcel B22, Phase 1). Elevated Oil & Grease locations with detections in the low percentage range should be segregated for disposal at the on-site nonhazardous landfill (Grey's Landfill). If screening of excavated materials by the EP indicates the presence of conditions of potential concern (i.e., sustained elevated PID readings, visual staining, unsuitable waste materials, etc.), such materials shall be

segregated for additional sampling and special management. If excavated and stockpiled, such materials should be covered with a plastic tarp to minimize potential exposures and erosion.

4.4. MANAGEMENT OF PCB-CONTAMINATED MEDIA

There were no PCB concentrations identified within the proposed road/utility development area above the PALs specified in the QAPP. Soils or contaminated media containing total PCB concentrations less than the PALs specified in the QAPP may be left in place without additional assessment. Only one sample (R1-001-SB-1) had a detection of PCBs during this investigation, with a negligible detection of 0.115 mg/kg of Aroclor 1262 (and total PCBs).

5.0 FINDINGS AND RECOMMENDATIONS

The objective of this Road and Utility Investigation was to fully characterize the nature and extent of contamination within the proposed road/utility development area. During the Investigation, a total of 20 soil samples were collected from 10 boring locations and analyzed to define the nature and extent of existing contamination. The sampling and analysis plan for this investigation provided general coverage of the proposed alignments, and also targeted specific features which represented potential environmental releases (limited to one substation). Soil samples were analyzed for TCL-SVOCs, TAL-Metals, Oil & Grease, TPH-DRO, TPH-GRO, hexavalent chromium, and cyanide. Shallow soil samples (0-1 foot bgs) were analyzed for PCBs. During field screening of the soil cores, any sample interval which exceeded a PID reading of 10 ppm was also analyzed for TCL-VOCs. The samples collected during this study have provided analytical data regarding current conditions within the proposed road and utility development area and facilitated the identification of potential contaminant releases. Soil conditions have been adequately characterized to support the risk assessment provided herein and associated response action planning, if necessary.

The data were evaluated to determine potential risks for a 115 work day Construction Worker scenario to support temporary construction activities. The COPC soil datasets for surface (0-1 ft) and subsurface (>1 ft) depths were pooled to create a more robust single dataset for risk assessment.

Risk ratios for the estimates of potential EPCs for the Construction Worker scenario were calculated for a 115-day exposure frequency. This site-specific exposure frequency is suitable for the Construction Worker assessment based on a reasonable duration of construction for the road and utility construction, with intrusive activities expected to last less than 115 work days. The carcinogenic risk was computed to be $3E-7$ for the pooled soil dataset using a 115-day exposure frequency. Based on this value, the cancer risk is acceptable for the Construction Worker scenario without any further action. None of the non-carcinogens caused a cumulative HI to exceed 1 for any target organ system for the pooled soil dataset using the 115-day exposure frequency. Therefore, no additional actions or special management procedures (including health and safety measures) are required for the proposed road/utility construction activities.

Elevated Oil & Grease was identified above the PAL (6,200 mg/kg) in surface samples at three soil boring locations in the proposed road/utility development area (R1-007-SB, R1-008-SB, and R1-010-SB). No elevated detections of TPH-DRO/GRO or physical evidence of NAPL in the soil cores were noted. Because no Oil & Grease exceedances were detected in subsurface soils, it does not appear that the impacts have migrated to the subsurface where utility corridors could potentially act as migration pathways. Screening using a field test kit is recommended during the proposed construction activities to define and properly manage Oil & Grease impacted soil within the utility excavation areas.

Each boring location was cleared with the Miss Utility system and utility personnel currently working on the property prior to the completion of any soil borings. However, during the Road and Utility Investigation, a gas line was encountered at boring location R1-002-SB at a depth of approximately 3 feet bgs. It was determined that this gas line has been abandoned; however, additional evaluation may be needed prior to the installation of proposed utilities and/or roadways in the area.

FIGURES

TABLES

Table 1
Summary of Organics Detected in Soil
Parcel B22 - Road and Utility Investigation Area
Tradeport Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	R1-001-SB-1	R1-001-SB-5	R1-002-SB-1	R1-002-SB-5	R1-003-SB-1	R1-003-SB-5	R1-004-SB-1.5	R1-004-SB-5	R1-005-SB-1.5	R1-005-SB-5
Volatile Inorganic Compounds												
Acetone	mg/kg	670,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.013 U1c	N/A
Semi-Volatile Organic Compounds*												
1,1-Biphenyl	mg/kg	200	0.025 J	0.08 U	0.084 U	0.079 U	0.073 U	0.076 U	0.077 U	0.081 U	0.08 U	0.081 U
2,4-Dimethylphenol	mg/kg	16,000	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 UL1L3	0.077 U	0.081 U	0.08 U	0.081 U
2,4-Dinitrotoluene	mg/kg	7.4	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 UL1MOL3	0.09	0.081 U	0.10	0.081 U
2,6-Dinitrotoluene	mg/kg	1.5	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 UL1L3	0.077 U	0.081 U	0.13	0.081 U
2-Chloronaphthalene	mg/kg	60,000	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 U	0.77	0.081 U	0.79	0.081 U
2-Methylnaphthalene	mg/kg	3,000	0.09	0.0082 U	0.02	0.0081 U	0.074 U	0.0077 U	0.077 U	0.0034 J	0.078 U	0.0082 U
2-Methylphenol	mg/kg	41,000	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 UL1MOL3	0.077 U	0.081 U	0.08 U	0.081 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.16 U	0.16 UM1	0.17 U	0.16 U	0.15 U	0.15 UL1L3	0.15 U	0.16 U	0.16 U	0.16 U
3,3'-Dichlorobenzidine	mg/kg	5.1	0.081 U1SL1L3	0.08 UL1MOL3	0.084 U1SL1L3	0.079 UL1L3	0.073 UL1L3	0.076 UL1MOL3	0.077 U1SL1L3	0.081 UL1L3	0.024 JISL1	0.081 UL1L3
Acenaphthene	mg/kg	45,000	0.16 J	0.0082 U	0.0028 J	0.0081 U	0.074 U	0.0077 U	0.077 U	0.00068 J	0.078 U	0.0082 U
Acenaphthylene	mg/kg	45,000	0.049 J	0.0082 U	0.0034 J	0.0081 U	0.074 U	0.0077 U	0.077 U	0.00095 J	0.078 U	0.0082 U
Acetophenone	mg/kg	120,000	0.027 J	0.08 U	0.084 U	0.079 U	0.073 U	0.076 U	0.077 U	0.081 U	0.08 U	0.081 U
Anthracene	mg/kg	230,000	0.10	0.0082 U	0.01	0.0081 U	0.0073 J	0.0077 U	0.0089 J	0.0023 J	0.078 U	0.0082 U
Benzaldehyde	mg/kg	120,000	0.18 L2	0.08 UL2	0.084 UL2	0.079 UL2	0.073 UL2	0.076 UL2M0	0.077 UL2	0.081 UL2	0.08 UL2	0.081 UL2
Benzo[a]anthracene	mg/kg	2.9	0.75	0.0014 J	0.06	0.0081 U	0.061 J	0.00094 J	0.043 J	0.0019 J	0.02 J	0.0082 U
Benzo[a]pyrene	mg/kg	0.29	0.93 IS	0.0082 U	0.06	0.0081 U	0.055 JIS	0.0077 U	0.031 JIS	0.0081 U	0.0098 JIS	0.0082 U
Benzo[b]fluoranthene	mg/kg	2.9	2.3 ISip	0.0013 Jip	0.14 ip	0.0081 U	0.096 IS	0.0077 U	0.083 ISip	0.0018 Jip	0.026 JISip	0.0082 U
Benzo[g,h,i]perylene	mg/kg	2.9	0.44 IS	0.0082 U	0.04	0.0081 U	0.025 JIS	0.0077 U	0.013 JIS	0.0081 U	0.078 U1S	0.0082 U
Benzo[k]fluoranthene	mg/kg	29	1.8 ISip	0.0082 Uip	0.11 ip	0.0081 U	0.051 JIS	0.0077 U	0.067 JISip	0.0014 Jip	0.021 JISip	0.0082 U
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.34 IS	0.08 UM1	0.028 JIS	0.079 U	0.073 U	0.076 U	0.077 U1S	0.081 U	0.08 U1S	0.081 U
Carbazole	mg/kg		0.09 L1	0.08 UL1MOL3	0.084 UL1L3	0.079 UL1L3	0.073 UL1L3	0.076 UL1MOL3	0.077 UL1L3	0.081 UL1L3	0.08 UL1L3	0.081 UL1L3
Chrysene	mg/kg	290	1.30	0.00091 J	0.08	0.0081 U	0.073 J	0.0077 U	0.048 J	0.0012 J	0.018 J	0.0082 U
Dibenz[a,h]anthracene	mg/kg	0.29	0.14 IS	0.0082 U	0.02	0.0081 U	0.074 U1S	0.0077 U	0.077 U1S	0.0081 U	0.078 U1S	0.0082 U
Di-n-butylphthalate	mg/kg	82,000	0.081 U	0.08 UM1	0.084 U	0.079 U	0.073 U	0.076 U	0.077 U	0.081 U	0.08 U	0.081 U
Di-n-octylphthalate	mg/kg	8,200	0.081 U1S	0.08 UM1	0.084 U	0.079 U	0.073 U	0.076 UL1MOL3	0.08 IS	0.081 U	0.23 IS	0.081 U
Fluoranthene	mg/kg	30,000	1.40	0.0015 J	0.11	0.0081 U	0.08	0.0077 U	0.064 J	0.005 J	0.032 J	0.0082 U
Fluorene	mg/kg	30,000	0.022 J	0.0082 U	0.0021 J	0.0081 U	0.074 U	0.0077 U	0.077 U	0.0016 J	0.078 U	0.0082 U
Indeno[1,2,3-c,d]pyrene	mg/kg	2.9	0.38 IS	0.0082 U	0.04	0.0081 U	0.025 JIS	0.0077 U	0.012 JIS	0.0081 U	0.078 U1S	0.0082 U
Isophorone	mg/kg	2,400	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 U	0.077 U	0.081 U	0.08 U	0.081 U
Naphthalene	mg/kg	17	0.09	0.0082 U	0.02	0.0081 U	0.074 U	0.0077 U	0.077 U	0.10	0.078 U	0.0082 U
N-Nitroso-di-n-propylamine	mg/kg	0.33	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 U	0.062 J	0.081 U	0.055 J	0.081 U
Pentachlorophenol	mg/kg	4	0.2 UL1L3	0.2 UL1MOL3R1	0.21 UL1L3	0.2 UL1L3	0.18 UL1L3	0.19 UL1MOL3	0.052 JL1	0.2 UL1L3	0.052 JL1	0.2 UL1L3
Phenanthrene	mg/kg		0.85	0.0012 J	0.06	0.0081 U	0.025 J	0.0077 U	0.05 J	0.01	0.033 J	0.0082 U
Phenol	mg/kg	250,000	0.081 U	0.08 U	0.084 U	0.079 U	0.073 U	0.076 UL1MOL3	0.077 U	0.081 U	0.08 U	0.081 U
Pyrene	mg/kg	23,000	1.30	0.0012 J	0.09	0.0081 U	0.064 J	0.0077 U	0.055 J	0.0036 J	0.024 J	0.0082 U
PCBs												
Aroclor 1262	mg/kg		0.12	N/A	0.0627 U	N/A	0.0662 U	N/A	0.0538 U	N/A	0.0557 U	N/A
PCBs (total)	mg/kg	0.97	0.12	N/A	0.0627 U	N/A	0.0662 U	N/A	0.0538 U	N/A	0.0557 U	N/A
TPH/Oil and Grease												
Diesel Range Organics	mg/kg	6,200	80.1	3.2 J	15.6	3.4 J	16.9	7.6 U	109	6.7 J	82.7	9.30
Gasoline Range Organics	mg/kg	6,200	12.6 U	11.4 U	13.4 U	10.5 U	10.4 U	11.2 U	14.1 U	9.8 U	12.9 U	10.2 U
Oil and Grease	mg/kg	6,200	1,740	154 M1R1	657	151	1,330	435	1,800	677	1,130	49 JM1

Detections in bold

N/A indicates that the parameter was not analyzed for this sample

*PAH compounds were analyzed via SIM

A glossary of laboratory flags can be viewed in the attached laboratory reports

Values in red indicate an exceedance of the Project Action Limit (PAL)

Table 1
Summary of Organics Detected in Soil
Parcel B22 - Road and Utility Investigation Area
Tradeport Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	R1-006-SB-1	R1-006-SB-5	R1-007-SB-1	R1-007-SB-5	R1-008-SB-1.5	R1-008-SB-4.5	R1-009-SB-1	R1-009-SB-4.5	R1-010-SB-1	R1-010-SB-5
Volatile Inorganic Compounds												
Acetone	mg/kg	670,000	N/A	N/A	N/A	0.0058 J1c	N/A	N/A	N/A	0.0075 J1c	N/A	N/A
Semi-Volatile Organic Compounds*												
1,1-Biphenyl	mg/kg	200	0.072 U	0.36	0.078 U	0.082 U	0.073 U	0.078 U	0.026 J	0.083 U	0.073 U	0.08 U
2,4-Dimethylphenol	mg/kg	16,000	0.072 U	0.14	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
2,4-Dinitrotoluene	mg/kg	7.4	0.072 U	0.08	0.078 U	0.082 U	0.08	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
2,6-Dinitrotoluene	mg/kg	1.5	0.072 U	0.075 U	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
2-Chloronaphthalene	mg/kg	60,000	0.072 U	0.075 U	0.078 U	0.082 U	0.73	0.078 U	0.32	0.083 U	0.073 U	0.08 U
2-Methylnaphthalene	mg/kg	3,000	0.0028 J	4.90	0.078 U	0.0075 J	0.073 U	0.0078 U	0.03	0.0073 J	0.073 U	0.0083 U
2-Methylphenol	mg/kg	41,000	0.072 U	0.08	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.14 U	0.063 J	0.16 U	0.16 U	0.15 U	0.16 U	0.049 J	0.17 U	0.15 U	0.16 U
3,3'-Dichlorobenzidine	mg/kg	5.1	0.072 UL1L3	0.075 UL1L3	0.078 U1SL1L3	0.082 UL1L3	0.016 J1SL1	0.078 UL1L3	0.077 UL1L3	0.083 UL1L3	0.073 U1SL1L3	0.08 UL1L3
Acenaphthene	mg/kg	45,000	0.0072 U	0.06	0.078 U	0.00079 J	0.0066 J	0.0078 U	0.005 J	0.0047 J	0.073 U	0.0083 U
Acenaphthylene	mg/kg	45,000	0.0072 U	0.04	0.10	0.0015 J	0.073 U	0.0078 U	0.05	0.03	0.073 U	0.0083 U
Acetophenone	mg/kg	120,000	0.072 U	0.38	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
Anthracene	mg/kg	230,000	0.0047 J	0.04	0.047 J	0.0026 J	0.018 J	0.0078 U	0.04	0.06	0.073 U	0.0083 U
Benzaldehyde	mg/kg	120,000	0.072 UL2	1.3 L2	0.078 UL2	0.082 UL2	0.073 UL2	0.078 UL2	0.19 L2	0.083 UL2	0.073 UL2	0.08 UL2
Benzo[a]anthracene	mg/kg	2.9	0.02	0.16	0.48	0.01	0.08	0.0034 J	0.13	0.21	0.02 J	0.0083 U
Benzo[a]pyrene	mg/kg	0.29	0.0048 J	0.10	0.43 IS	0.01	0.076 IS	0.0022 J	0.14	0.19	0.018 JIS	0.0083 U
Benzo[b]fluoranthene	mg/kg	2.9	0.031 ip	0.18 ip	0.9 IS	0.02	0.2 ISip	0.0039 J	0.30	0.26	0.049 JISip	0.0083 U
Benzo[g,h,i]perylene	mg/kg		0.01	0.04	0.2 IS	0.0075 J	0.043 JIS	0.0021 J	0.08	0.08	0.073 UIS	0.0083 U
Benzo[k]fluoranthene	mg/kg	29	0.025 ip	0.15 ip	0.3 IS	0.0063 J	0.16 ISip	0.0029 J	0.09	0.10	0.039 JISip	0.0083 U
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.072 U	0.034 J	0.078 UIS	0.082 U	0.19 IS	0.078 U	0.077 U	0.083 U	0.073 UIS	0.08 U
Carbazole	mg/kg		0.072 UL1L3	0.12 L1	0.078 UL1L3	0.082 UL1L3	0.073 UL1L3	0.078 UL1L3	0.077 UL1L3	0.083 UL1L3	0.073 UL1L3	0.08 UL1L3
Chrysene	mg/kg	290	0.03	0.24	0.52	0.01	0.10	0.0042 J	0.18	0.19	0.036 J	0.0083 U
Dibenz[a,h]anthracene	mg/kg	0.29	0.0023 J	0.02	0.091 IS	0.0021 J	0.073 UIS	0.0011 J	0.03	0.03	0.073 UIS	0.0083 U
Di-n-butylphthalate	mg/kg	82,000	0.017 J	0.043 J	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
Di-n-octylphthalate	mg/kg	8,200	0.072 U	0.075 U	0.078 UIS	0.082 U	0.36 IS	0.078 U	0.077 U	0.083 U	0.073 UIS	0.08 U
Fluoranthene	mg/kg	30,000	0.05	0.15	0.68	0.02	0.12	0.0042 J	0.23	0.44	0.033 J	0.00057 J
Fluorene	mg/kg	30,000	0.0072 U	0.08	0.078 U	0.0012 J	0.073 U	0.0078 U	0.005 J	0.01	0.073 U	0.0083 U
Indeno[1,2,3-c,d]pyrene	mg/kg	2.9	0.0061 J	0.03	0.2 IS	0.0067 J	0.03 JIS	0.0018 J	0.08	0.09	0.073 UIS	0.0083 U
Isophorone	mg/kg	2,400	0.072 U	0.025 J	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
Naphthalene	mg/kg	17	0.004 J	3.80	0.056 J	0.01	0.073 U	0.0078 U	0.07	0.03	0.073 U	0.0083 U
N-Nitroso-di-n-propylamine	mg/kg	0.33	0.072 U	0.075 U	0.078 U	0.082 U	0.073 U	0.078 U	0.077 U	0.083 U	0.073 U	0.08 U
Pentachlorophenol	mg/kg	4	0.18 UL1L3	0.19 UL1L3	0.2 UL1L3	0.21 UL1L3	0.047 JL1	0.2 UL1L3	0.053 JL1	0.21 UL1L3	0.18 UL1L3	0.2 UL1L3
Phenanthrene	mg/kg		0.03	1.40	0.16	0.01	0.069 J	0.0011 J	0.09	0.19	0.019 J	0.0083 U
Phenol	mg/kg	250,000	0.072 U	0.075 U	0.078 U	0.082 U	0.073 U	0.078 U	0.026 J	0.083 U	0.073 U	0.08 U
Pyrene	mg/kg	23,000	0.03	0.20	0.57	0.02	0.11	0.0038 J	0.21	0.33	0.027 J	0.0083 U
PCBs												
Aroclor 1262	mg/kg		0.0538 U	N/A	0.0572 U	N/A	0.0541 U	N/A	0.0643 U	N/A	0.0528 U	N/A
PCBs (total)	mg/kg	0.97	0.0538 U	N/A	0.0572 U	N/A	0.0541 U	N/A	0.0643 U	N/A	0.0528 U	N/A
TPH/Oil and Grease												
Diesel Range Organics	mg/kg	6,200	7.1 J	270	161	107	124	4.6 J	34.6	47.9	91.4	3.3 J
Gasoline Range Organics	mg/kg	6,200	9.4 U	77.4	12.9 U	10 U	13.2 U	22.7 U	10.7 U	10.5 U	12.7 U	11.6 U
Oil and Grease	mg/kg	6,200	375	812	14,600	906	12,300	517	836	680	11,900	296

Detections in bold

N/A indicates that the parameter was not analyzed for this sample

*PAH compounds were analyzed via SIM

A glossary of laboratory flags can be viewed in the attached laboratory reports

Values in red indicate an exceedance of the Project Action Limit (PAL)

Table 2
 Summary of Inorganics Detected in Soil
 Parcel B22 - Road and Utility Investigation Area
 Tradepoint Atlantic
 Sparrows Point, Maryland

Parameter	Units	PAL	R1-001-SB-1	R1-001-SB-5	R1-002-SB-1	R1-002-SB-5	R1-003-SB-1	R1-003-SB-5	R1-004-SB-1.5	R1-004-SB-5	R1-005-SB-1.5	R1-005-SB-5	R1-006-SB-1
Metal													
Aluminum	mg/kg	1,100,000	14,200	29,300 M6	12,400	15,300	41,200	5,420	26,300	15,300	39,700	10,800	11,300
Arsenic	mg/kg	3	6.80	5.80	6.40	5.70	1.8 J	1.9 U	8.00	3.80	2.50	2.6 U	2.2 U
Barium	mg/kg	220,000	205	86.3	99.6	116	432	23.0	311	45.6	462	30.8	86.0
Beryllium	mg/kg	2,300	1.10	0.75 J	0.69 J	0.63 J	7.60	0.41 J	3.00	0.51 J	5.50	0.32 J	0.93
Cadmium	mg/kg	980	1.1 J	1.5 U	1.2 J	1.3 U	0.26 J	1.2 U	0.92 J	1.4 U	0.29 J	1.5 U	0.42 J
Chromium	mg/kg	120,000	120	31.9	41.4	24.6	24.1	6.50	110	25.4	17.6	11.2	1,420
Chromium VI	mg/kg	6.3	0.49 JB	1.2 JBM1	0.56 JB	0.9 JB	0.5 JB	0.75 JB	0.35 JB	0.79 JB	0.42 JB	0.37 JB	8.40
Cobalt	mg/kg	350	7.70	3.5 J	8.60	4.60	0.49 J	0.95 J	18.6	3 J	0.58 J	1.7 J	4.3 U
Copper	mg/kg	47,000	48.3	7.20	32.7	5.90	1.4 J	3.2 J	53.8	8.20	4.4 U	2 J	10.0
Iron	mg/kg	820,000	27,600	16,900 M1	24,600	15,300	13,200	4,310	84,700	22,000	40,200	7,930	169,000
Lead	mg/kg	800	145	18.8	123	12.3	8.00	4.40	57.3	9.70	7.90	8.50	2.2 U
Manganese	mg/kg	26,000	4,380	30.0	847	59.6	2,890	16.3	5,970	72.0	2,470	15.0	28,800
Mercury	mg/kg	350	0.044 J	0.034 J	0.13	0.12 U	0.11 U	0.11 U	0.11 U	0.12 U	0.12 U	0.007 J	0.1 U
Nickel	mg/kg	22,000	26.6	11.0	16.2	14.0	4.1 J	3 J	19.7	10.5	3 J	5.3 J	17.8
Selenium	mg/kg	5,800	3.6 U	4 U	3.8 U	3.4 U	3.1 U	3.1 U	2.9 J	3.6 U	3.60	4.1 U	3.5 U
Thallium	mg/kg	12	4.3 J	10 U	9.5 U	8.5 U	7.9 U	7.7 U	5.5 J	9.1 U	8.8 U	10.3 U	14.7
Vanadium	mg/kg	5,800	257	37.5	69.0	30.1	17.4	8.90	254	34.4	23.8	15.1	629
Zinc	mg/kg	350,000	381	21.8	438	36.5	12.1	10.8	176	25.8	9.60	14.4	15.7
Other													
Cyanide	mg/kg	150	0.92 J	1.2 U	0.25 J	1.2 U	0.55 J	1.2 U	1.00	1.1 U	2.80	1.2 U	0.29 J

Detections in bold

A glossary of laboratory flags can be viewed in the attached laboratory reports

Values in red indicate an exceedance of the Project Action Limit (PAL)

Table 2
Summary of Inorganics Detected in Soil
Parcel B22 - Road and Utility Investigation Area
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	R1-006-SB-5	R1-007-SB-1	R1-007-SB-5	R1-008-SB-1.5	R1-008-SB-4.5	R1-009-SB-1	R1-009-SB-4.5	R1-010-SB-1	R1-010-SB-5
Metal											
Aluminum	mg/kg	1,100,000	1,280	33,900	13,500	36,700	53,300	15,400	15,900	30,100	15,500
Arsenic	mg/kg	3	8.20	2.4 U	5.50	2.10	2.4 U	2.90	9.20	3.10	8.30
Barium	mg/kg	220,000	34.8	345	65.9	504	666	144	180	722	165
Beryllium	mg/kg	2,300	0.59 J	2.40	0.68 J	3.40	3.80	1.90	0.94 J	2.40	1.30
Cadmium	mg/kg	980	0.28 J	1.1 J	0.15 J	0.58 J	0.34 J	0.48 J	2.10	0.5 J	1.5 U
Chromium	mg/kg	120,000	393	604	50.5	35.4	21.2	225	137	592	29.5
Chromium VI	mg/kg	6.3	1.4 B	0.7 JB	0.49 JB	0.5 JB	0.48 JB	0.41 JB	0.68 JB	0.71 JB	0.92 JB
Cobalt	mg/kg	350	13.6	0.9 J	4.2 J	1.2 J	0.48 J	5.10	9.80	4.70	5.30
Copper	mg/kg	47,000	11.1	21.4	13.7	13.0	3.9 J	20.3	42.1	14.0	12.2
Iron	mg/kg	820,000	36,800	83,500	37,600	14,600	16,200	51,800	31,800	56,200	36,000
Lead	mg/kg	800	21.9	143	17.5	29.3	8.30	23.3	98.9	18.6	11.6
Manganese	mg/kg	26,000	852	21,400	1,510	5,980	6,950	5,040	3,610	25,300	85.2
Mercury	mg/kg	350	0.034 J	0.11 U	0.021 J	0.1 U	0.11 UM1	0.014 J	0.043 J	0.11 U	0.12 U
Nickel	mg/kg	22,000	65.0	10.8	12.5	7 J	1.3 J	15.4	24.6	10.6	13.6
Selenium	mg/kg	5,800	3.9 U	3.1 J	3.3 U	2.4 J	2.5 J	3.5 U	3.9 U	3 J	4 U
Thallium	mg/kg	12	9.7 U	22.6	8.4 U	4.1 J	9.6 U	8.7 U	8.7 J	35.2	10 U
Vanadium	mg/kg	5,800	56.0	1,550	116	150	131	156	696	3,110	46.2
Zinc	mg/kg	350,000	47.7	213	49.2	68.9	3.2 J	138	494	57.7	41.9
Other											
Cyanide	mg/kg	150	0.19 J	1.20	1.2 U	0.68 J	0.84 J	0.26 J	0.96 J	0.46 J	1.2 U

Detections in bold

A glossary of laboratory flags can be viewed in the attached laboratory reports

Values in red indicate an exceedance of the Project Action Limit (PAL)

**Table 3 - Parcel B22
Road and Utility Investigation Area EPCs - Pooled Soils**

Parameter	PAL (mg/kg)	EPC Type Site-Wide Exposure Unit	EPC Site-Wide Exposure Unit (mg/kg)
Arsenic	3.00	95% KM (t) UCL	5.51
Chromium VI	6.30	95% Chebyshev (Mean, Sd) UCL	2.76
Cyanide	150	95% KM (t) UCL	0.97
Iron	820,000	95% Adjusted Gamma UCL	57,150
Manganese	26,000	95% Adjusted Gamma UCL	12,844
Thallium	12.0	95% KM (Percentile Bootstrap) UCL	11.3
Vanadium	5,800	95% Chebyshev (Mean, Sd) UCL	1,092
Benzo[a]pyrene	0.29	95% GROS Adjusted Gamma UCL	0.31

Bold indicates UCL higher than PAL

**Table 4 - Parcel B22
Road and Utility Investigation Area Pooled Soils
Construction Worker Risk Ratios**

115 Day		Site-Wide Exposure Unit (19.3 ac.)				
Parameter	Target Organs	EPC mg/kg	Construction Worker			
			SSLs (mg/kg)		Risk Ratios	
			Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	5.51	32.9	208.8	1.7E-07	0.03
Chromium VI	Respiratory	2.76	46.2	1739	6.0E-08	0.002
Cyanide	None Specified	0.97		32		0.03
Iron	None Specified	57,150		522,916		0.1
Manganese	Nervous	12,844		8,700		1
Thallium	None Specified	11.3		29.9		0.4
Vanadium	Dermal	1,092		3,448		0.3
Benzo(a)pyrene		0.31	5.30		5.8E-08	
					3E-07	↓

SSLs calculated using equations in the EPA Supplemental Guidance dated 2002

Guidance Equation Input Assumptions:

- 5 cars/day (2 tons/car)
- 5 trucks/day (20 tons/truck)
- 3 meter source depth thickness

Total HI	Cardiovascular	0
	Dermal	0
	Respiratory	0
	Nervous	1
	None Specified	1

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APPENDIX A

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Client : EnviroAnalytics Group
 ARM Project No. : 160443M-5-6
 Project Description : Sparrows Point - Parcel B22
 : Road and Utility Investigation
 Site Location : Sparrows Point, MD
 ARM Representative : L. Glumac
 Checked by : W. Mader P.G., CPSS
 Drilling Company : Green Services, Inc
 Driller : K.P.
 Drilling Equipment : Geoprobe 7822DT

Date : 12/5/2016
 Weather : 50s, sunny
 Northing (US ft) : 567956.066
 Easting (US ft) : 1460412.127

Boring ID: R1-009-SB

(page 1 of 1)

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample ID/Interval	DESCRIPTION	USCS	REMARKS
0				(0-0.2') SILT with ORGANICS, well graded, soft, brown, dry, no plasticity, no cohesion	ML	Metal pieces (0.2-2.0')
		2.5	R1-009-SB-1	(0.2-2') SLAG and GRAVEL, well graded, coarse grained, loose, dark brown to black, dry, no plasticity, no cohesion		
1		2.1			GW	
2	90	23.8		(2-3.5') SLAG with some GRAVEL, well graded, coarse grained/large chunks, loose, gray to brown, no plasticity, no cohesion	GW	
3		15.7				
4			R1-009-SB-4.5	(3.5-4.5') CLAY, poorly graded, medium consistency, gray to tan, moist, high plasticity, cohesive	CH	
		0.4		(4.5-5') SLAG, well graded, very coarse/ chunks, loose, black, wet, no plasticity, no cohesion	GW	
5						

Total Borehole Depth: 5' bgs.
 Boring terminated at target depth.



Client : EnviroAnalytics Group
 ARM Project No. : 160443M-5-6
 Project Description : Sparrows Point - Parcel B22
 : Road and Utility Investigation
 Site Location : Sparrows Point, MD
 ARM Representative : L. Glumac
 Checked by : W. Mader P.G., CPSS
 Drilling Company : Green Services, Inc
 Driller : K.P.
 Drilling Equipment : Geoprobe 7822DT

Date : 12/5/2016
 Weather : 50s, sunny
 Northing (US ft) : 567578.990
 Easting (US ft) : 1462451.016

Boring ID: R1-010-SB

(page 1 of 1)

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample ID/Interval	DESCRIPTION	USCS	REMARKS
0				(0-0.2') CONCRETE		
		0.1	R1-010-SB-1	(0.2-1') SAND with some GRAVEL, well graded, loose, dark brown, dry, no plasticity, no cohesion	SW	
1		1.1		(1-2') SLAG and GRAVEL, well graded, loose, gray, moist, no plasticity, no cohesion	GW	
2	100	0.8		(2-3.5') CLAY, soft to medium, reddish yellow/ light brown, dry, high plasticity, high cohesion	CH	
		0.0		(3.5-5') CLAY, stiff, reddish yellow/ light brown, dry, high plasticity, low cohesion		
4		0.0	R1-010-SB-5		CH	
5						

Total Borehole Depth: 5' bgs.
 Boring terminated at target depth.