



# ARM Group Inc.

Earth Resource Engineers and Consultants

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February 26, 2018

Ms. Barbara Brown  
Project Coordinator  
Maryland Department of the Environment  
1800 Washington Boulevard  
Baltimore, MD 21230

Re: Characterization of Naphthalene and  
Benzo[a]pyrene Impacts  
PORI Lagoon (B22-119-SB)  
Area B: Parcel B22  
Tradepoint Atlantic  
Sparrows Point, Maryland

Dear Ms. Brown:

Following completion of the Parcel B22 Phase II investigation, ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), prepared a Phase II Investigation Preliminary Report (Revision 0) dated July 15, 2017 to describe the findings of the investigation and provide recommendations. This report was submitted to the Maryland Department of the Environment (MDE) and the United States Environmental Protection Agency (USEPA) for review. Following their initial review of the Parcel B22 Phase II Investigation Preliminary Report, the agencies provided a set of comments to EAG on June 27, 2017. Several of the comments pertained to elevated detections of polynuclear aromatic hydrocarbons (PAHs) within the vicinity of the Palm Oil Recovery, Inc. (PORI) Lagoon located in the northern section of Parcel B22.

As identified in the MDE comments, elevated naphthalene and benzo[a]pyrene concentrations were detected in subsurface soil samples collected from soil boring B22-119-SB during the Parcel B22 Phase II investigation. The highest concentrations of these constituents were in samples collected at 9 and 10 feet below ground surface (bgs). At 10 feet bgs, naphthalene had a detection of 2,040 mg/kg and benzo[a]pyrene had a detection of 84.9 mg/kg. In the overlying sample collected at 9 feet bgs, the naphthalene and benzo[a]pyrene concentrations were significantly lower (with reported concentrations of 32.8 mg/kg and 0.26 mg/kg, respectively).

In their comments, the MDE determined that additional characterization would be needed to ensure that these elevated detections are isolated in nature and do not warrant additional evaluation or a remedial response action. Compared to other nearby Phase II sample results, the concentrations of naphthalene and benzo[a]pyrene in soil boring B22-119-SB, which targeted the northwestern edge of the PORI Lagoon, appeared to be uncharacteristically high. Naphthalene

had elevated detections (significantly above the applicable Project Action Limit; PAL) in both the 10-foot and 9-foot bgs samples while benzo[a]pyrene only had one elevated detection in the 10-foot bgs sample. The PORI Lagoon was also targeted by soil borings B22-120-SB, B22-121-SB, and B22-174-SB, which are located to the southeast of the location of interest (B22-119-SB); however, none of these additional soil borings had elevated naphthalene or benzo[a]pyrene detections. It is unclear if the naphthalene and benzo[a]pyrene impacts found in soil boring B22-119-SB are directly associated with the PORI Lagoon due to the fact that the three other borings targeting the PORI Lagoon had only low detections of naphthalene and benzo[a]pyrene. It should be noted that soil boring B22-119-SB was located in the approximate downgradient groundwater flow direction of this sampling target.

Due to the fact that elevated naphthalene and benzo[a]pyrene detections were not found in the nearby boring locations, additional characterization sampling will be performed in the vicinity of boring B22-119-SB to more adequately characterize the extent of the elevated naphthalene and/or benzo[a]pyrene impacts associated with the PORI Lagoon. The detected concentrations of naphthalene identified at location B22-119-SB could cause a potentially unacceptable risk in the future via the vapor intrusion to indoor air risk pathway. To fully evaluate the vapor intrusion risks at the Site, the characterization sampling of the surrounding soil and groundwater will include volatile organic compounds (VOCs) in addition to PAHs. To further assess the potential for future development activities to mobilize non-aqueous phase liquid (NAPL), the soil samples will also be analyzed for total petroleum hydrocarbons (TPH) and Oil & Grease. This document proposes the protocols to be followed during the additional characterization activities in the vicinity of boring B22-119-SB. All field protocols will be conducted in accordance with the Standard Operating Procedures (SOPs) and requirements given in the property-wide Quality Assurance Project Plan (QAPP). The investigation will be conducted under the property-wide Health and Safety Plan (HASP).

The characterization of the area around B22-119-SB will include the collection and analysis of soil samples from the 10 boring locations identified on **Figure 1**. The initial location of interest (B22-119-SB) will also be resampled for relevant soil parameters in accordance with this characterization plan, yielding a total of 11 soil borings. Once soil sampling is completed at each of the three boring locations that are northwest of the PORI Lagoon in the downgradient direction, they will be converted into temporary groundwater sample collection points. To supplement the soil and groundwater investigation to the northwest, two test pits will be completed inside of the PORI Lagoon to characterize this potential source area. The locations of the test pits are also indicated in **Figure 1**.

To date, the preliminary data indicate that naphthalene and/or benzo[a]pyrene contamination may be limited to the sample intervals below approximately 8 feet bgs. Three of the borings will extend vertically below the water table to facilitate the installation of temporary groundwater



sample collection points. The remaining borings will be completed to the depth at which groundwater is encountered in the soil cores. Groundwater is generally expected to be encountered between 10 and 15 feet bgs based on available soil boring logs. At each boring location, soil samples will be collected from intervals of 4 to 5, 9 to 10, and 14 to 15 feet bgs using a Geoprobe<sup>®</sup> direct push rig. The deepest soil sampling interval, specified at 14 to 15 feet bgs, will be adjusted to the unsaturated interval just above the water table. If necessary, the intermediate soil sampling interval from 9 to 10 feet bgs may be adjusted upward if groundwater is encountered prior to reaching 10 feet bgs and may also be adjusted (upward or downward as appropriate) to include the most-contaminated interval of the soil core as determined based on observations including, odors, staining, elevated photoionization detector (PID) readings, etc.

A temporary groundwater sample collection point will be installed at each of the three specified soil boring locations. Each of these borings will be extended to an approximate depth of 7 feet below the water table. The temporary groundwater sample collection point will be properly screened such that the levels at which groundwater is encountered will be below the top of the screen. Immediately after installation, and again prior to sampling, each groundwater sample collection point will be checked for the presence of NAPL using an oil-water interface probe. If measureable NAPL or sheen is present, a groundwater sample will not be collected, but additional delineation activities may be warranted in accordance with standard practices.

The test pits will be completed using an excavator in select areas of the PORI Lagoon to determine whether any significant contamination exists which may represent a continuing source. The environmental professional providing oversight will make a determination of the types of materials in the PORI Lagoon and will document the test pitting with a photograph log. Analytical samples may be collected (as grab samples) from the excavator bucket if the environmental professional observes any potential indicators of significant contamination, including but not limited to odors, elevated PID readings, staining, and/or discoloration. If indications of potential contamination are not observed, characterization sampling will not be required. All spoil piles will be sampled to determine waste disposal requirements.

The MDE will be notified of any initial observation of NAPL bearing soils identified in a soil boring or test pit within 2 hours of the field observation. This notification will be provided in email format to appropriate MDE representatives. For the purposes of this notification, NAPL bearing soil is defined as soil containing free oil (i.e., liquid oil which could potentially be drained or otherwise extracted from the soil). Any subsequent observations of NAPL within the same area will not require additional redundant notifications. The presence of measureable NAPL in a temporary groundwater sample collection point will warrant the same 2-hour MDE notification, if not already reported. If only minor indications of NAPL (globules, sheen, or trace) are identified in the soil or groundwater, the initial 2-hour MDE notification will not be required. Any required delineation activities would be coordinated with the MDE. It should be



noted that NAPL was previously identified in the soil core completed at B22-119-SB but was determined to be immobile since none was ever observed in the piezometer that was installed at this location.

Soil samples from the continuous core soil borings and test pits (as applicable) will be submitted to Pace Analytical Services, Inc. (PACE) to be analyzed for PAHs via USEPA Method 8270 SIM, VOCs via USEPA Method 8260, TPH via USEPA Methods 8015B and 8015D, and Oil & Grease via USEPA Method 9071. Groundwater samples will be submitted to PACE to be analyzed for PAHs via USEPA Method 8270 SIM and VOCs via USEPA Method 8260.

Any soil waste generated during the characterization activities, including spoil piles from the test pits, will be placed in drums or lined/covered stockpiles and sampled for TCLP parameters to determine the appropriate disposal requirements. Any (minimal) aqueous waste generated from decontamination fluids, purged groundwater, etc. will be managed in bulk with waste from other investigations, and will be appropriately characterized prior to disposal.

If elevated concentrations of PAHs, VOCs, or TPH/Oil & Grease are identified in soil or groundwater, further investigation may be required. The findings of this investigation will be provided to the agencies in an interim submittal, and the completion of any additional sampling activities would be coordinated with the agencies if necessary. If a recommendation for no further action is appropriate following agency review of the interim findings, a PORI Lagoon Characterization Report will be prepared to formally present a summary of the findings. In the event that a remedial response action is required, a Work Plan will be provided under separate cover for agency review and approval.

If you have questions regarding any information covered in this document please feel free to contact the undersigned at (410) 290-7775.

Respectfully submitted,  
ARM Group Inc.



Taylor R. Smith  
Project Engineer



Eric S. Magdar  
Vice President



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## **FIGURES**

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-  Phase II Boring (Location of Interest)
-  Phase II Boring
-  Proposed Characterization Boring
-  Proposed Groundwater Sample Point
-  Proposed Test Pit

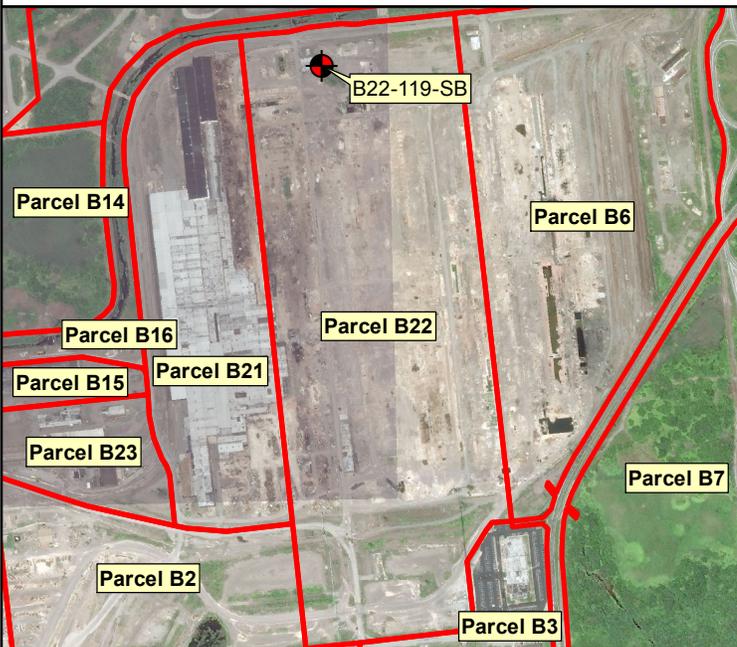
B22-119-SB  
 Benzo[a]pyrene (1ft): 0.16  
 Benzo[a]pyrene (9ft): 0.26  
 Benzo[a]pyrene (10ft): 84.9  
 Naphthalene (9ft): 32.8  
 Naphthalene (10ft): 2,040

B22-174-SB  
 Benzo[a]pyrene (1ft): 0.57  
 Benzo[a]pyrene (4ft): 0.52  
 Naphthalene (1ft): 0.022  
 Naphthalene (4ft): 0.033

B22-121-SB  
 Benzo[a]pyrene (1ft): 0.47  
 Benzo[a]pyrene (9ft): 0.39  
 Benzo[a]pyrene (10ft): 0.9  
 Naphthalene (1ft): 0.092  
 Naphthalene (9ft): 0.11

B22-120-SB  
 Benzo[a]pyrene (1ft): 0.57  
 Benzo[a]pyrene (8ft): 1.3  
 Naphthalene (1ft): 0.2  
 Naphthalene (8ft): 0.031

### Investigation Location



Parcel B22 - PORI Lagoon Characterization  
 Proposed Sample Locations  
 February 26, 2018

Figure  
 1

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	Baltimore County, MD
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