ARM Group Inc.
Engineers and Scientists

July 8, 2019

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

Re: Parcel B5 Phase II Investigation Report
(Revision 3)
Comment Response Letter
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown:

On behalf of EnviroAnalytics Group, LLC (EAG), ARM Group Inc. (ARM) is pleased to provide the following responses to comments provided by the Maryland Department of the Environment (MDE) via email on October 10, 2018 regarding the Phase II Investigation Report for Parcel B5 of the Tradepoint Atlantic property located in Sparrows Point, Maryland. The MDE comments referenced a previous version of the Phase II Investigation Report (Revision 1 dated March 16, 2018) although an additional revision of the report (Revision 2 dated August 13, 2018) was submitted prior to receipt of the comments.

Hard copy replacement pages are provided for incorporation into the Parcel B5 Phase II Investigation Report. The revised report text is included as **Attachment 1**. The enclosed CD provides a compiled PDF of the entire report with the inserted replacement pages. Revised cover and spine cardstock sheets are also provided for insertion into the binders. Select attachments previously included in the Phase II Investigation Report (Revision 2) can be discarded as noted below. Responses to specific MDE comments are given below; the original comments are included in italics with responses following. The MDE comments reference some of the items discussed in ARM's previous Comment Response Letter dated March 16, 2018.

1. *MDE Initial Comment [discussed in Comment Response Letter dated March 16, 2018]: Boring ID No. B5-097-SB: The soil boring log for this boring location noted a 1-2 inch thick tarry/sticky substance at 4.5'bgs. The soil sample was collected from a depth of 4' bgs. Efforts should be made to collect samples from the most impacted depths observed, particularly if a piezometer will not be installed to investigate the potential for NAPL.*

The response to comments noted that groundwater was encountered in this soil boring at 4' bgs, therefore, the soil sampling interval was shifted to just above the groundwater. MDE accepts this response. However, it must be noted that the piezometer installed in this location was constructed with a screen interval of 5' - 15' bgs, which is below the stated detection depth of groundwater. Also, groundwater depths provided in Appendix F of the report confirm that the well screen was submerged at this boring location. It has since been destroyed. Based on available data, confirmation of the presence or absence of NAPL cannot be determined in this area and future development plans in this portion of the site may dictate the need for further delineation and/or investigation.

It is notable that on the date that the NAPL screening piezometer was installed (April 27, 2017), water was observed in the soil core at approximately 8.5 feet bgs leading to the selection of the screen interval from 5 to 15 feet bgs. However, as stated in the comment the static groundwater level was detected above the top of the screen.

This area of the property is being developed as part of Sub-Parcel B1-2 (also designated as Logistics Centers XI & XII). As discussed in the Sub-Parcel B1-2 Response and Development Work Plan (RADWP; Revision 2 dated June 4, 2019), B5-097-SB is located in a proposed parking lot outside of the Logistics Center XII warehouse. The RADWP was approved by MDE on June 18, 2019. Based on the proposed development plan, no additional action is proposed in this area.

2. *MDE Initial Comment [discussed in Comment Response Letter dated March 16, 2018]: MDE understands that an additional piezometer was installed in B5-161-SB to investigate potential NAPL. This is a location where excavation is proposed due to elevated PAH's and TPH-DRO. Provide an update on the status of work being done/planned in the vicinity of this boring. At a minimum, the area requires additional delineation. Also, will there be a NAPL investigation report for this parcel?*

   The response to comments noted that the gauging data from B5-161-SB has not shown mobile NAPL. MDE notes that the wells screen is submerged in this temporary piezometer and therefore, no conclusion can be made regarding the presence or absence of NAPL in this area. Based on the submerged well screen, MDE approves this point for abandonment. However, prior to abandonment, conduct a final gauging event and, if NAPL is not detected, collect and analyze a groundwater sample from this temporary piezometer and submit the results to the MDE. The sample must be collected in accordance with the QAPP and analyzed for TPH-DRO/GRO, SVOCs, and PPL Metals.

   Additional delineation work in the vicinity of B5-161-SB was coordinated with the MDE under the Test Pitting Work Plan for B5-161-SB (Revision 1) dated May 8, 2019. EAG proposed to complete test pits surrounding B5-161-SB to attempt to identify any grossly contaminated material (i.e., NAPL). This area will ultimately be capped by surface engineering controls installed during the development of Sub-Parcel B1-1.

During implementation of the Test Pitting Work Plan, grossly contaminated material was not identified using field screening methods. As specified in the Work Plan, a series of analytical confirmation samples were collected from the test pit sidewalls. In addition, the NAPL screening piezometer was abandoned after gauging to confirm that NAPL had not accumulated in the casing. Analytical samples were also collected from the piezometer prior to its abandonment as requested in the MDE comment. The detailed findings and analytical results from the supplemental field activities at B5-161-SB will be reported to the MDE outside of the scope of this Phase II Investigation Report to avoid the need for future updates.

There are no specific plans to submit an additional comprehensive NAPL report for the parcel. The NAPL screening findings are discussed in the Phase II Investigation Report, and the detailed findings from B5-098-PZ/B5-099-PZ and B5-161-PZ (the locations with supplemental data) are discussed in separate designated reports. Specifically, the Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB (dated February 27, 2019) and the Test Pitting Work Plan for B5-161-SB (Revision 1 dated May 8, 2019) were submitted to the MDE and discussed supplemental work in each of these respective areas. Both of these Work Plan documents have been implemented, and Completion Reports for these areas are anticipated to be submitted to the MDE.

3. *MDE anticipates a NAPL Delineation Completion Report will be submitted for B5-098-SB. This report must also include all other NAPL investigation details for Parcel B5 that occurred after the most recent reporting date, November 7, 2017. Confirm that delineation of NAPL on the parcel is complete and provide a timeline for submitting this report.*

   A Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB (dated February 27, 2019) was submitted to the MDE and provided the requested NAPL gauging information at locations B5-098-PZ/B5-099-PZ.

   The only other location on Parcel B5 with NAPL gauging information obtained after November 7, 2017 was B5-161-PZ. The supplemental gauging activities and additional actions at this location will be discussed in a separate designated Completion Report.

4. *MDE understands that there is a plan to address elevated concentrations of PAH's and TPH-DRO in the future, as development plans are finalized for this parcel. This plan must include delineation of PAH concentrations in soil, and potentially groundwater, in the vicinity of B5-161-SB, as required in comments to the initial Phase II Report, Rev. 0.*

   Additional actions were conducted in the vicinity of B5-161-SB in accordance with the Test Pitting Work Plan (Revision 1) dated May 8, 2019. More detail is provided in the response to Comment #2.

Additional Revisions:

The report has been updated in accordance with the Phase II Investigation Report Approach Letter: Screening Level Risk Assessments (SLRAs) for Parcel-Specific Statement of Basis (dated April 22, 2019). The United States Environmental Protection Agency (USEPA) and MDE have recommended that the SLRAs based upon hypothetical EUs be removed from future Phase II Investigation Reports. As outlined in the referenced letter, the SLRA for Construction and Composite Workers should not be included in the Phase II Investigation Reports (with a few noted exceptions) since each development boundary will include its own site-specific SLRA. Therefore, the SLRA (previously Section 6.0 and Section 7.4) has been removed from this revised Parcel B5 Phase II Investigation Report. Some information previously contained in these deleted sections has been relocated, such as the discussion of borings exhibiting potential exceedances of the established NAPL/petroleum, lead, or PCB delineation criteria (retained within Section 4.1.3); and the groundwater results and vapor intrusion (VI) evaluation from the separate Area B Groundwater Investigation (retained within a new "Groundwater" Section 6.2). In addition to removing Section 6.0 and Section 7.4, the recommendations (previously Section 7.5 but now Section 6.5) have been revised to exclude the SLRA findings that are not relevant. The SLRA attachments (**Table 12** through **Table 22**, **Figure 4**, and **Appendix I**) have been removed from this revised submission, and can be discarded from the report copies currently held by the agencies. The attached CD delivers the revised electronic attachments which do not include the ProUCL Input/Output files or the lead evaluation spreadsheet.

If you have any questions, or if we can provide any additional information at this time, please do not hesitate to contact ARM Group Inc. at 410-290-7775.

Respectfully submitted,
ARM Group Inc.

Taylor R. Smith, P.E.
Project Engineer

T. Neil Peters, P.E.
Senior Vice President

Attachment 1

PHASE II
INVESTIGATION REPORT

AREA B: PARCEL B5
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

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Respectfully Submitted,

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Revision 3 – July 8, 2019

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT.)

FIGURES

TABLES

TABLE OF CONTENTS
(CONT.)

APPENDICES

ELECTRONIC ATTACHMENTS

1.0 INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has completed a Phase II Investigation of a portion of the Tradepoint Atlantic property (formerly Sparrows Point Terminal, LLC) that has been designated as Area B: Parcel B5 (the Site). Parcel B5 is comprised of 305 acres of the approximately 3,100-acre former steel making facility (**Figure 1**). The Site is bounded to the west by the former Basic Oxygen Furnace (BOF), Mould Yard, and Continuous Caster (currently designated as Parcel B4), as well as a former Coke Oven Laboratory and the Kinder Morgan Warehouse (currently designated as Parcel B18); to the north by the former Primary Rolling Mill (currently designated Parcel B1) and the former Mason's Garage (currently designated as Parcel B2); to the south by the former Ore Yard Material Handling and former Bedding Plant Material Handling areas (currently designated as Parcels B13 and B20) and the Ore Dock; and to the east by former Oil Tanks (currently designated as Parcel B19), Jones Creek, and Old Road Bay.

The Phase II Investigation was performed in accordance with procedures outlined in the approved Phase II Investigation Work Plan – Parcel B5. This Work Plan (dated December 3, 2015) was approved by the Maryland Department of the Environment (MDE) and the United States Environmental Protection Agency (USEPA) on December 16, 2015. A Dioxin and Furan Work Plan Addendum dated November 28, 2016 was approved for fieldwork on December 20, 2016, with an associated comment response letter submitted to the agencies shortly thereafter (dated December 21, 2016). The investigation was implemented in compliance with requirements pursuant to the following:

- Administrative Consent Order (ACO) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the MDE, effective September 12, 2014; and
- Settlement Agreement and Covenant Not to Sue (SA) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the USEPA, effective November 25, 2014.

Parcel B5 is part of the acreage that was removed (Carveout Area) from inclusion in the Multimedia Consent Decree between Bethlehem Steel Corporation, the USEPA, and the MDE (effective October 8, 1997) as documented in correspondence received from the USEPA on September 12, 2014. Based on this agreement, the USEPA determined that no further investigation or corrective measures will be required under the terms of the Consent Decree for the Carveout Area. However, the SA reflects that the property within the Carveout Area will remain subject to the USEPA's Resource Conservation and Recovery Act (RCRA) Corrective Action authorities.

An application to enter the full Tradepoint Atlantic property (3,100 acres) into the Maryland Department of the Environment Voluntary Cleanup Program (MDE-VCP) was submitted to the

MDE and delivered on June 27, 2014. The property's current and anticipated future use is Tier 3 (Industrial), and plans for the property include demolition and redevelopment over the next several years.

1.1. SITE HISTORY

From the late 1800s until 2012, the production and manufacturing of steel was conducted at Sparrows Point. Iron and steel production operations and processes at Sparrows Point included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, Sparrows Point was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steel making operations at Sparrows Point ceased in fall 2012.

Parcel B5 was formerly occupied by the Blast Furnace Area and part of the former Steel Making Area. A small portion of the former residential town was also present within Parcel B5. Several iron and steel work processes were completed within the boundary of the Site. Descriptions of the facilities and processes are provided below:

Sinter Plant:

The Sinter Plant produced sinter from iron-bearing fine materials. Burnt lime and the fine materials were combined and passed through an ignition furnace, which fused the materials into cohesive lumps. The finished sinter was cooled and stored before being transferred to be included as a raw material in the blast furnaces.

Blast Furnaces:

Several high temperature blast furnaces were used for extracting iron from ore and other iron-rich recyclable materials. The furnaces received ore, sinter, coke, limestone and/or dolomite, and heated air, and produced a molten iron product and slag as a by-product. This slag was stored in piles outside of the furnaces, before being transported out of the Parcel B5 area to be crushed and screened for sale as a product. At the time the Description of Current Conditions (DCC) Report (prepared by Rust Environment and Infrastructure, dated January 1998) was developed, blast furnaces A through G and K had been previously demolished and removed from the site. Blast furnaces H, J, and L remained on site, with only blast furnace L remaining operational.

Recirculating Industrial Water (RIW) System:

The RIW systems acted as gas-cleaning water treatment systems for the blast furnaces. A variety of features were included in the system, including a pipeline, sumps, holding tanks, clarifying tanks, and RIW wastewater treatment plant.

Mould Yard:

When the BOF facilities were unable to receive the hot metals produced from the blast furnaces, the iron could be temporarily stored in the Mould Yard. The hot metal was poured on the ground and allowed to cool. Once it was cooled it could be broken into smaller pieces and then transferred to the BOF.

Iron and Brass Foundry:

The iron and brass foundry was used in casting operations. The metals were melted, poured and cast, and according to the Phase I Environmental Site Assessment (ESA) prepared by Weaver Boos dated May 19, 2014, lead-containing dust may have been produced from saws, shot blasters, and grinders within the foundry.

1.2. OBJECTIVES

The objective of this Phase II Investigation was to fully characterize the nature and extent of contamination at the Site. A summary table of the site investigation locations, including the boring identification numbers and the analyses performed, is provided as **Appendix A**. This report includes a summary of the work performed, including the environmental setting, site investigation methods, analytical results and data usability assessment, and findings and recommendations.

As specified in the approved Work Plan for Parcel B5, groundwater at the Site was investigated as described in the separate Area B Groundwater Investigation Work Plan (dated October 6, 2015), the final version of which was approved by the agencies via email on October 5, 2015. A separate Area B Groundwater Phase II Investigation Report has been submitted (Revision 0 dated September 30, 2016) to discuss the findings of the groundwater investigation.

2.0 ENVIRONMENTAL SETTING

2.1. LAND USE AND SURFACE FEATURES

The Tradepoint Atlantic property consists of the former Sparrows Point steel mill. According to the Phase I ESA prepared by Weaver Boos dated May 19, 2014, the property is zoned Manufacturing Heavy-Industrial Major (MH-IM). Surrounding property zoning classifications (beyond Tradepoint Atlantic) include the following: Manufacturing Light (ML); Resource Conservation (RC); Density Residential (DR); Business Roadside (BR); Business Major (BM); Business Local (BL); and Residential Office (RO). Light industrial and commercial properties are located northeast of the property and northwest of the property across Bear Creek. Residential areas of Edgemere and Fort Howard are located northeast of the property across Jones Creek and to the southeast across Old Road Bay, respectively. Residential and commercial areas of Dundalk are located northwest of the property across Bear Creek.

According to topographic maps provided by EAG, the Site is at an approximate mean elevation of 19 feet above mean sea level (amsl). Elevations in the parcel range between 0 and 64 feet (stockpiled mounds) over the entire parcel area. The central portion of the Site appears to be relatively consistent, and ranges from 10 feet amsl to 16 feet amsl. Along the eastern edge, the parcel slopes sharply downward to the adjacent Jones Creek and Old Road Bay at sea level. Surface elevations also slope sharply downward from approximately 14 feet amsl to sea level from the north, west, and south sides of the Pennwood Canal (identified in **Figure 1**). According to Figure B-2 of the Stormwater Pollution Prevention Plan (SWPPP) Revision 5 dated June 1, 2017, stormwater from the majority of the parcel is discharged through the Pennwood Canal and National Pollution Discharge Elimination System (NPDES) Outfall 001. However, runoff from the southeastern corner of the parcel is directed towards the Ore Dock (ultimately discharging through either Outfall 055 or Outfall 056 into the Patapsco River), and runoff from the northeastern parcel appears to drain into Parcel B19.

2.2. REGIONAL GEOLOGY

The Site is located within the Atlantic Coastal Plain Physiographic Province (Coastal Plain). The western boundary of the Coastal Plain is the "Fall Line", which separates the Coastal Plain from the Piedmont Plateau Province. The Fall Line runs from northeast to southwest along the western boundary of the Chesapeake Bay, passing through Elkton (MD), Havre de Grace (MD), Baltimore City (MD), and Laurel (MD). The eastern boundary of the Coastal Plain is the off-shore Continental Shelf.

The unconsolidated sediments beneath the Site belong to the Talbot Formation (Pleistocene), which is then underlain by the Cretaceous formations which comprise the Potomac Group (Patapsco Formation, Arundel Formation and the Patuxent Formation). The Potomac Group

formations are comprised of unconsolidated sediments of varying thicknesses and types, which may be several hundred feet to several thousand feet thick. These unconsolidated formations may overlie deeper Mesozoic and/or Precambrian bedrock. Depth to bedrock is approximately 700 feet within the Site.

2.3. SITE GEOLOGY

Groundcover at the Site is comprised of approximately 64% natural soils and 36% slag fill based on the approximate shoreline of the Sparrows Point Peninsula in 1916, as shown on **Figure 2** (adapted from Figure 2-20 in the DCC Report prepared by Rust Environment and Infrastructure, dated January 1998).

In general, the encountered subsurface geology included slag fill materials overlying natural soils, which included fine-grained sediments (clays and silts) and coarse-grained sediments (sands). Slag fill materials were encountered at depths ranging from 0 to 16.5 feet below the ground surface (bgs). Groundwater was observed in the soil borings at depths ranging from 2 to 19 feet below the ground surface (bgs) across the Site. Soil boring observation logs are provided in **Appendix B**. 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.

3.0 SITE INVESTIGATION

A total of 325 soil samples (from 172 boring locations) and six sediment samples were collected for analysis between December 21, 2015 and April 13, 2016 as part of the Parcel B5 Phase II Investigation. In addition, eight surface soil samples (0 to 1 foot bgs) were collected in the vicinity of the former Sinter Plant on January 9, 2017 as part of the Dioxin and Furan Work Plan Addendum. This Phase II Investigation utilized methods and protocols that followed the procedures included in the Quality Assurance Project Plan (QAPP) dated October 2, 2015 (updated April 5, 2016) approved by the agencies to support the investigation and remediation of the Tradepoint Atlantic property. Information regarding the project organization, field activities and sampling methods, sampling equipment, sample handling and management procedures, the selected laboratory and analytical methods, quality control and quality assurance procedures, investigation-derived waste (IDW) management methods, and reporting requirements are described in detail in the approved Parcel B5 Work Plan dated December 3, 2015, the Dioxin and Furan Work Plan Addendum dated November 28, 2016 (and associated comment response letter dated December 21, 2016), and the QAPP.

All site characterization activities were conducted under the site-specific health and safety plan (HASP) provided as Appendix C of the approved Work Plan.

3.1. SAMPLE TARGET IDENTIFICATION

Previous activities within and around the buildings and facilities located on the Tradepoint Atlantic property may have been historical sources of environmental contamination. If present, source areas were identified as targets for sampling through a careful review of historical documents. When a sampling target was identified, a boring was placed at or next to its location using Geographic Information Systems (GIS) software (ArcMap Version 10.2.2).

Sampling targets included, as applicable, 1) Recognized Environmental Conditions (RECs) shown on the REC Location Map provided in Weaver Boos' Phase I ESA, 2) additional findings (non-RECs) from the Phase I ESA which were identified as potential environmental concerns, and 3) Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified from the DCC Report prepared by Rust Environment and Infrastructure. The following RECs were identified in the Parcel B5 Work Plan: the Former Electrical Repair Shop (ERS) Oily Wastewater Tank (REC 8A, Finding 199, also listed as SWMU 195) and Residential Town Tanks (REC 21, Finding 271). The following additional SWMUs or AOCs were identified in the Parcel B5 Work Plan: PCB-Contaminated Oil Spill (AOC C) and Slag Pit/Piles (SWMU 165). Additional information regarding these features is presented in the approved Work Plan.

Four sets of historical drawings were also reviewed to identify potential sampling targets for the Site. These 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. Drip legs are points throughout the distribution system where coke oven gas condensate was removed from the gas pipelines. The condensate from the drip legs was typically discharged to drums, although it is possible some spilled out of the drums and on to the ground. There were 20 drip legs identified inside the boundary of Parcel B5. A summary of the specific drawings covering the Site is presented in **Table 1**. Sampling target locations were identified if the historical drawings depicted industrial activities or a specific feature at a location that may have been a source of environmental contamination that potentially impacted the Site.

Based on the review of plant drawings and Phase I ESA documents (or based on direct agency guidance for additional features), sampling targets were identified at the Site that included the following: Dispersant Tank/Acid Storage Tank, Fuel/Oil Tanks, Fuel/Oil Loading and Unloading Stations, Fuel Shop, Fuel Storage Area, Iron and Brass Foundry, Iron Beaching Pit, Oil Houses, Paint Shops, "Trans" Pits, Settling Tank, (Unknown Contents) Tanks, Tar Storage Area, Thickener Tanks, Wastewater Treatment Building, Open Hearth Furnace Area, Old H Furnace Area, Nos. 3 and 4 Mould Yard (and Stripper), Storage Area, Electric Substation, Sinter Area, Railroad Tracks, Tar/Underground Conduit/Transformer, Industrial Buildings, and Ladle Repair Shop. A summary of the areas that were investigated, along with the applicable boring identification numbers and the analyses performed, has been provided as **Appendix A**. Additional sample locations were then added to fill in spatial gaps between proposed borings to provide complete coverage of the Site. During the completion of fieldwork, it was necessary to shift some borings from the approved locations given in the Work Plan, primarily due to access restrictions and/or refusal. **Table 2** provides the identification numbers of the field adjusted borings, the coordinates of the proposed and final locations, and the distance/direction of the field shifts.

The density of soil borings met the requirements set forth in QAPP Worksheet 17 – Sampling Design and Rationale. Parcel B5 contained a total of 191.0 acres without engineered barriers and 114.2 acres with engineered barriers. Of the 114.2 acres with engineered barriers, 48.7 acres contained former building slabs and 65.6 acres consists of parking/roads. In accordance with the relevant sampling density requirements, a minimum of 64 soil borings were required to cover the area without engineered barriers, and a minimum of 20 soil borings were required to cover areas with barriers. A total of 84 borings were required to meet the density specification; 172 soil borings were completed during the Phase II Investigation. Eight additional surface samples were collected in the vicinity and downwind of the former Sinter Plant, not included in the original Parcel B5 Phase II Investigation but covered by the Dioxin and Furan Work Plan Addendum.

In an e-mail to EAG from the MDE dated November 30, 2015, the agency requested that samples from the borings in the vicinity of the former Sinter Plant be analyzed for dioxins and furans. Based on this request, the Dioxin and Furan Work Plan Addendum was developed to provide characterization data in the vicinity and downwind of the former Sinter Plant. An

additional eight surface soil sample locations (B5-181-SB through B5-188-SB) were completed for the Phase II Investigation of Parcel B5.

In addition, the Pennwood Powerhouse Staining and Sediments (Finding 267 not identified as a REC, SWMU, or AOC) were selected as a target for sediment sampling. During a former site visit discussed in the Phase I ESA, the Pennwood Powerhouse contained large out-of-service equipment, with observed surface staining on and below the equipment. Past flooding (at least one previous incident) caused water to pool on the equipment room floor and drain to the adjacent Pennwood Canal. The Phase I ESA concluded that it was unlikely that the flooding of the Pennwood Powerhouse resulted in a significant release, and the canal sediments were classified as a non-REC. However, the Pennwood Canal was selected as a target for sediment sampling (six samples) to characterize current conditions.

3.2. SOIL INVESTIGATION

Continuous core soil borings were successfully advanced at 172 locations across the Site to assess the presence or absence of soil contamination, and to assess the vertical distribution of any encountered contamination (**Figure 3a**). The continuous core soil borings were advanced to depths between 1 and 20 feet bgs using the Geoprobe® MC-7 Macrocore soil sampler (surface to 10 feet bgs) and the Geoprobe® D-22 Dual-Tube Sampler (depths >10 feet bgs). At each location, each soil core was visually inspected and screened with a hand-held photoionization detector (PID) prior to logging soil types. Soil boring logs have been included as **Appendix B**, and the PID calibration log has been included as **Appendix C**. Unless otherwise indicated, all USCS group symbols provided on the attached boring logs are from visual observations.

One 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 from each continuous core soil boring. One additional set of samples was also collected from the 9 to 10 foot depth interval if groundwater had not been encountered; however, these samples were held by the laboratory pending the analysis of the 0 to 1 and 4 to 5 foot depth interval samples, and were only analyzed for parameters that were detected in the 5 foot depth samples at concentrations above the Project Action Limits (PALs). If the PID or other field observations indicated contamination to exist at a depth greater than 3 feet bgs but less than 9 feet bgs, and was above the water table, the sample from the deeper 4 to 5 foot interval was shifted to the alternate depth interval. It should be noted that soil samples were not collected from depths that were below the water table.

An additional eight locations in the vicinity and downwind of the Sinter Plant were successfully completed to assess the presence or absence of dioxin and furan soil contamination in the shallow (0 to 1 foot) sample interval (**Figure 3b**).

Soil sampling activities were conducted in accordance with the procedures and methods referenced in **Field Standard Operating Procedure (SOP) Numbers 008, 009, 012, and 013**

provided in Appendix A of the QAPP. Down-hole soil sampling equipment was decontaminated after soil sampling had been concluded at a location, according to the procedures and methods referenced in **Field SOP Number 016** provided in Appendix A of the QAPP.

Soil samples were submitted to Pace Analytical Services, Inc. (PACE), and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) via USEPA Method 8260B, TCL semi-volatile organic compounds (SVOCs) via USEPA Methods 8270D and 8270D SIM, Target Analyte List (TAL) Metals via 6010C and 7471C, hexavalent chromium via USEPA Method 7196A, cyanide via USEPA Method 9012, and total petroleum hydrocarbon (TPH) diesel range organics (DRO) and gasoline range organics (GRO) via USEPA Methods 8015B and 8015D. The Work Plan requirements for analysis of TPH-DRO/GRO and/or Oil & Grease have evolved throughout the investigation process and changed several times since late-2015 under agency guidance. During the implementation of the Parcel B5 Work Plan, TPH-DRO/GRO analysis was required at every location, but Oil & Grease analysis was not required or completed. Additionally, the shallow soil samples collected across the Site from the 0 to 1 foot bgs interval were also analyzed for polychlorinated biphenyls (PCBs) via USEPA Method 8082. Select shallow soil samples (listed in **Appendix A**) were also analyzed for asbestos via USEPA Method 600/R-93/116 based on their proximity to a former overhead gas line. Soil samples collected for dioxin and furan characterization adjacent to the Sinter Plant were analyzed via USEPA Method 8290. Sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

3.3. SEDIMENT INVESTIGATION

Sediment samples were collected from six locations across three transects of the Pennwood Canal in order to characterize sediment quality in the inflow and outflow canals. Each transect consisted of two sampling locations; one sediment sample from the middle of the inflow canal and one sediment sample from the middle of the outflow canal. Sediment samples were collected from the top 12 inches of sediment using a Petite Ponar Sampler (scoop sample). An aluminum flat boat was piloted to the center of each inflow/outflow canal transect to facilitate the collection of the sediment samples. Sediment samples were collected in accordance with **Field SOP Number 003** provided in Appendix A of the QAPP.

Sediment sampling equipment was decontaminated after sampling had been concluded at each location, according to the procedures and methods referenced in **Field SOP Number 016** provided in Appendix A of the QAPP.

The Phase II Investigation sediment samples were submitted to PACE and analyzed for TCL-VOCs, TCL-SVOCs, TAL-Metals, TPH-DRO, TPH-GRO, PCBs, hexavalent chromium, and cyanide via the same methods listed above (Soil Investigation). Sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

3.4. DEVIATIONS FROM SAMPLING PLAN

During the course of fieldwork, one deviation from the original sampling plan presented in the approved Parcel B5 Work Plan was necessary based on encountered field conditions. Shallow refusal (0 to 1 foot bgs) was encountered at sample locations B5-035-SB and B5-036-SB due to densely compacted slag. Several attempts to collect samples were made; however, recovery was minimal and consisted of very coarse slag fragments which were not suitable for collection. These borings targeted one drip leg, but the 19 additional drip legs which were characterized should provide adequate analytical data such that the loss of these samples is not significant.

3.5. MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

In accordance with **Field SOP Number 005** provided in Appendix A of the QAPP, potentially impacted materials, or IDW, generated during this Phase II Investigation was containerized in 55-gallon (DOT-UN1A2) drums. The types of IDW that were generated during this Phase II Investigation included the following:

- soil cuttings generated from soil borings or the installation of the temporary screening piezometers;
- decontamination fluids; and
- used personal protective equipment

Following the completion of field activities, two composite samples were gathered from the Parcel B5 Phase II IDW soil drums for TCLP analysis. Following this analysis, the waste soil was characterized as non-hazardous. A list of all results from the soil TCLP procedure can be found in **Table 3**, which indicates no exceedances of TCLP criteria.

IDW drums containing aqueous materials were characterized by preparing composite samples from randomly selected drums. The first set of composite samples was collected on March 22, 2016, after the majority of fieldwork on Parcel B5 was completed. Each composite sample included aliquots from three individual drums that were chosen from a set of 30 drums being staged on-site at the date of collection. A second aqueous composite sampling event was performed on July 22, 2016, to characterize additional waste (primarily from other parcels). This composite sample included aqueous waste from four individual drums that were chosen from a set of 30 drums being stored on-site at the date of collection. A total of nine aqueous composite samples were collected for TCLP analysis. Following this analysis, the aqueous waste was characterized as non-hazardous. A list of all results from the aqueous TCLP procedure can be found in **Table 4**, which indicates no exceedances of TCLP criteria.

The parcel specific IDW drum log from the Phase II investigation is included as **Appendix D**. All IDW procedures were carried out in accordance with methods referenced in the QAPP Worksheet 21 – Field SOPs and Appendix A of the QAPP.

4.0 ANALYTICAL RESULTS

4.1. SOIL CONDITIONS

Soil analytical results were screened against PALs established in the property-wide QAPP (or other direct guidance from the agencies; i.e. TPH-DRO/GRO) to determine PAL exceedances. PALs are generally based on the USEPA's Regional Screening Levels (RSLs) for the Composite Worker exposure to soil. The Composite Worker is defined by the USEPA as a long-term receptor exposed during the work day who is a full time employee that spends most of the workday conducting maintenance activities (which typically involve on-site exposures to surface soils) outdoors.

The analytical results for the detected parameters are summarized and compared to the PALs in **Table 5a** (Organics) and **Table 6** (Inorganics). Measured concentrations for individual dioxin and furan isomers were converted to total 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) toxic equivalents using the 2005 World Health Organization (WHO) toxicity equivalency factors, and the total toxic equivalents values (as 2,3,7,8-TCDD) were screened against the PAL of 2.2E-5 mg/kg to characterize potential contamination in the vicinity of the former Sinter Plant (**Table 5b**). There were no detections of asbestos in the samples collected from Parcel B5, so a table is not warranted. The laboratory Certificates of Analysis (including Chains of Custody) and Data Validation Reports (DVRs) have been included as electronic attachments. The DVRs contain a glossary of qualifiers for the final flags assigned to individual results in the attached summary tables.

4.1.1. Soil Conditions: Organic Compounds

As provided on **Table 5a** several VOCs were identified above the laboratory's method detection limits (MDLs) in the soil boring samples collected from across the Site. There were no VOCs detected above their respective PALs.

Table 5a provides a summary of SVOCs detected above the laboratory's MDLs in soil boring samples collected from across the Site. The PALs for relevant polynuclear aromatic hydrocarbons (PAHs) have been adjusted upward based on revised toxicity data published in the USEPA RSL Composite Worker Soil Table. Therefore, exceedances for PAHs are based on the adjusted PALs rather than those presented in the QAPP. Seven SVOCs, all PAHs, were detected above their respective PALs. These SVOCs were benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, and naphthalene. Benzo[k]fluoranthene was the least common exceedance, with only one detection above the PAL (270 mg/kg in sample B5-161-SB-1). Benzo[a]pyrene exceeded the PAL in the largest number of samples of any SVOC (21), with a maximum detection of 215 mg/kg in sample B5-161-SB-4. Exceedances were noted at approximately 10% of the boring

locations distributed throughout the parcel. A summary of the PAL exceedance locations and results has been provided as **Figure SB-1**.

Shallow soil samples collected across the Site from the 0 to 1 foot bgs interval were also analyzed for PCBs. **Table 5a** provides a summary of the PCBs detected above the laboratory's MDLs. Aroclor 1254, Aroclor 1260, and total PCBs exceeded their respective PALs in multiple locations (11 total) collected across the Site. These PAL exceedance locations have been provided on **Figure SB-2**. One sample (B5-101-SB-1 associated with a storage tank with unknown contents) had a detection which exceeded 50 mg/kg of Aroclor 1254 (and total PCBs).

Table 5a provides a summary of the TPH-DRO and TPH-GRO detections in the parcel. GRO was detected above the laboratory's MDL at multiple locations; however, no detections exceeded the PAL. DRO was detected above its PAL in three samples (B5-099-SB-4.5, B5-144-SB-4, and B5-161-SB-4), with the highest detection of 17,900 mg/kg identified in sample B5-161-SB-4. A summary of the PAL exceedance locations has been provided on **Figure SB-3**.

Table 5b provides the individual dioxin and furan results from samples collected in the vicinity of the former Sinter Plant, with calculations presented for equivalent concentrations of total 2,3,7,8-TCDD using the 2005 WHO toxicity equivalency factors. While none of the individual samples exceeded the PAL for 2,3,7,8-TCDD (2.2E-5 mg/kg), the blind field duplicate for sample B5-088-SB-1 had higher concentrations than the associated field sample (and exceeded the PAL). This sample had total 2,3,7,8-TCDD equivalents detected at 6.5E-5 mg/kg.

4.1.2. Soil Conditions: Inorganic Constituents

Table 6 provides a summary of inorganic constituents detected above the laboratory's MDLs in the soil samples collected from across the Site. Eight inorganic compounds (antimony, arsenic, lead, manganese, thallium, vanadium, hexavalent chromium, and cyanide) were detected above their respective PALs. Antimony and cyanide were only detected above their respective PALs at single isolated locations (B5-068-SB-1 and B5-038-SB-5, respectively). Arsenic was by far the most common inorganic exceedance (detected above the PAL in 232 soil samples), followed by manganese (detected above the PAL in 32 soil samples). The remaining four inorganic PAL exceedances (lead, thallium, vanadium, and hexavalent chromium) accounted for a total of 22 total exceedances. A summary of the inorganic PAL exceedance locations has been provided on **Figure SB-4**.

4.1.3. Soil Conditions: Results Summary

Table 5a and **Table 6** provide a summary of the detected organic and inorganic compounds in the soil samples submitted for laboratory analysis, and **Figure SB-1** through **Figure SB-4** present summaries of the soil sample results that exceeded the PALs. **Table 7** provides a summary of results for all PAL exceedances in soil, including detection frequencies and

maximum results. **Table 8** indicates which soil impacts (PAL exceedances) are associated with the specific targets listed in the Parcel B5 Work Plan. There were no detections of VOCs above the applicable PALs. PAL exceedances in soil within Parcel B5 consisted of eight inorganics (antimony, arsenic, lead, manganese, thallium, vanadium, hexavalent chromium, and cyanide), seven SVOCs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, and naphthalene), three PCB groups (Aroclor 1254, Aroclor 1260, and total PCBs), and DRO. In addition, one sample (the field duplicate of B5-088-SB-1) had cumulative detections of dioxins/furans which resulted in a total concentration of 2,3,7,8-TCDD equivalents above the applicable PAL. The detected concentrations of dioxins and furans and the computations for 2,3,7,8-TCDD equivalents are given in **Table 5b**.

Arsenic was detected above the PAL in most soil samples, and the highest arsenic detection was 33.8 mg/kg at sample location B5-133-SB-1. Manganese was detected above its PAL in 32 soil samples across the Site with the maximum detection at sample location B5-123-SB-8 (91,800 mg/kg). Lead was detected above its PAL in 14 samples with the highest detection of 4,910 mg/kg at sample location B5-015-SB-1. Hexavalent chromium and thallium were detected above their PALs in only three soil samples each, vanadium was detected above the PALs in only two soil samples, and cyanide and antimony were detected above their respective PALs in only one sample location each. Of these less common inorganics (antimony, thallium, vanadium, hexavalent chromium, and cyanide), only antimony had any detections exceeding two times the PAL (with a maximum detection less than four times the PAL). It should be noted that the maximum detection of antimony of 1,680 mg/kg in sample B5-068-SB-1 (targeting a former paint shop) is notably higher than any other detections throughout the parcel, and additional investigation and/or remedial action may ultimately be necessary at this location depending on future development planning.

The maximum detections of all SVOC/PAH compounds, with the exception of naphthalene, were associated with a single location (B5-161-SB). The maximum detections of benz[a]anthracene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene were associated with the 4-foot bgs sample, while the maximum detections of benzo[b]fluoranthene and benzo[k]fluoranthene were associated with the 1-foot bgs sample. PCBs (total) were detected above the PAL in 11 samples. Aroclor 1260 was far more common than Aroclor 1254, with these PCB groups responsible (independently) for eight and two PAL exceedances, respectively. The only location where total PCBs were detected above the PAL with contributions from multiple PCB groups was at B5-162-SB-1.

Lead, PCBs, and TPH-DRO/GRO are subject to special requirements as designated by the agencies: lead results above 10,000 mg/kg are subject to additional delineation (and possible excavation), PCB results above 50 mg/kg are subject to delineation and excavation, and TPH-DRO/GRO results above 6,200 mg/kg should be evaluated for the potential presence and mobility of non-aqueous phase liquid (NAPL) in any future development planning:

- Concentrations of lead did not exceed the delineation criterion of 10,000 mg/kg in any soil samples collected at the Site.

- Concentrations of total PCBs (and Aroclor 1254) exceeded the mandatory excavation criterion of 50 mg/kg at sample location B5-101-SB-1 (54.2 mg/kg), which targeted a storage tank with unknown contents. Therefore, delineation of PCBs was required to define the extent of elevated PCBs this location for evaluation for excavation and disposal. As documented in other reports submitted to, and approved by, the agencies, the elevated PCB detection at B5-101-SB has been fully delineated and the impacts appear to be extremely limited. These delineation activities were completed outside of the scope of the original Phase II Investigation. Following their review of the Delineation and Excavation of PCB Impacted Soil Notification Letter dated May 11, 2017, the agencies have approved the recommendation that excavation is not warranted, and no further action is required. This agency approval was received on May 16, 2017.

- Concentrations of DRO exceeded the PAL in three soil samples (B5-099-SB-4.5, B5-144-SB-4, and B5-161-SB-4) with a maximum detection of 17,900 mg/kg in sample B5-161-SB-4. Two of the DRO PAL exceedances exhibited evidence of possible NAPL contamination in the corresponding soil cores (B5-099-SB and B5-144-SB). A total of five soil boring locations exhibited physical evidence of product (visible sheens or NAPL) in the soil cores (B5-097-SB, B5-098-SB, B5-099-SB, B5-103-SB, and B5-144-SB). These locations are discussed in greater detail in Section 4.1.4 (Summary of NAPL Observations in Soil Cores) and Section 4.2.2 (Summary of NAPL Observations in Piezometers). Each location should be considered for proximity to proposed utilities in any future development plans.

4.1.4. Summary of NAPL Observations in Soil Cores

Soil cores were screened for evidence of possible NAPL contamination during the completion of the Phase II soil borings in Parcel B5. During soil core screenings, five sample locations had physical evidence of possible product which was noted on the soil boring logs. The locations with physical evidence of possible product (visible sheens or NAPL) included B5-097-SB, B5-098-SB, B5-099-SB, B5-103-SB, and B5-144-SB. These boring locations with physical evidence of NAPL are highlighted on **Figure SB-3**. The physical observations of NAPL (as indicated on the boring logs) were as follows:

- B5-097-SB: A sticky black substance (possible product) was observed in the soil core in a 1 to 2 inch interval at approximately 4.5 feet bgs. A soil sample was collected from the shallow interval (0 to 1 feet) and an intermediate interval (3 to 4 feet). Due to encountered groundwater a deep sample was not collected. The intermediate sample interval had detected DRO at 1,540 mg/kg.

- B5-098-SB: A small amount of visible product was noted in the soil core sleeve from 7.5 to 10 feet bgs. A soil sample was collected from the shallow interval (0 to 1 feet) and an intermediate interval (3 to 4 feet). Due to encountered groundwater a deep sample was not collected. The intermediate sample interval had detected DRO at 4,760 mg/kg.
- B5-099-SB: Visible product was noted in the soil core sleeve from 7 to 10 feet bgs. A soil sample was collected from the shallow interval (0 to 1 feet) and an intermediate interval (3.5 to 4.5 feet). Due to encountered groundwater a deep sample was not collected. The intermediate sample interval had detected DRO at 7,780 mg/kg (above the PAL of 6,200 mg/kg).
- B5-103-SB: An oily sheen was noted in the soil core from 3 to 4.5 feet bgs, but not free phase product. A soil sample was collected from the shallow interval (0 to 1 feet) and an intermediate interval (3.5 to 4.5 feet). Due to encountered groundwater a deep sample was not collected. The intermediate sample interval had detected DRO at 251 mg/kg.
- B5-144-SB: Product and a strong odor were noted in soil sample B5-144-SB from 4 to 5 feet bgs. A soil sample was collected from the shallow interval (0 to 1 feet) and an intermediate interval (3 to 4 feet). Due to encountered groundwater a deep sample was not collected. The intermediate sample interval had detected DRO at 8,430 mg/kg (above the PAL of 6,200 mg/kg).

Based on these observations, temporary screening piezometers were installed at each of these five locations to delineate and assess the potential mobility of free-phase product (NAPL) to groundwater. A sixth piezometer was installed at location B5-161-SB, even though there was no evidence of NAPL in the soil cores from this boring. Soil from this boring (3 to 4 feet bgs) exhibited an elevated detection of DRO in the low percentage range. Based on this elevated DRO detection (17,900 mg/kg), a piezometer was installed at this location to determine the potential presence of any NAPL. Descriptions of the piezometer installation and gauging events at these six locations, as well as any subsequent delineation activities in these areas, are provided in Section 4.2.2 (Summary of NAPL Observations in Piezometers).

4.2. GROUNDWATER CONDITIONS

4.2.1. Area B Groundwater Investigation

As specified in the approved Parcel B5 Work Plan, groundwater at the Site was investigated as described in the separate Area B Groundwater Investigation Work Plan (dated October 6, 2015). The Area B Groundwater Phase II Investigation Report (Revision 0 dated September 30, 2016) has been submitted to discuss the detailed finding of this groundwater investigation. Groundwater results obtained during the separate investigation were screened against the PALs established in the property-wide QAPP (or other direct guidance from the agencies) to determine exceedances. The complete findings of the groundwater investigation, including detection

summary tables and exceedance figures, were provided in the respective Phase II Investigation Report. A figure summarizing the shallow aqueous PAL exceedances (for all classes of compounds) in the vicinity of Parcel B5 is provided in **Appendix E**. The groundwater analytical results obtained from the intermediate and lower hydrogeologic zones are not relevant for this Parcel B5 Phase II Investigation, but can be reviewed in the separate groundwater report.

Regarding the shallow groundwater exceedances, some of the PALs have been updated since the submission of the Area B Groundwater Phase II Investigation Report. In particular, the aqueous screening levels for some PAH constituents have been adjusted upward. Similar to the evaluation of soil data, the PALs for relevant PAHs have been modified based on revised toxicity data published in the USEPA RSL Resident Tapwater Table. Aqueous PAL exceedances in the shallow groundwater in the vicinity of Parcel B5 consisted of three VOCs (chloroform, methyl tertiary-butyl ether (MTBE), and benzene), three SVOCs (naphthalene, benz[a]anthracene, and pentachlorophenol), nine inorganics including total/dissolved metals (cobalt, manganese, thallium, vanadium, beryllium, lead, iron, hexavalent chromium, and cyanide), DRO, and GRO. For simplicity, the inorganic PAL exceedances shown on the figure do not include duplicate exceedances of total and dissolved metals at relevant sample locations. If both total and dissolved concentrations exceeded the PAL for a specific compound, the value for total metals is displayed on the figure for each sample.

Each permanent well sampled during the Area B Groundwater Investigation was checked for the potential presence of NAPL using an oil-water interface probe prior to sampling. During these checks, NAPL was not detected in any of the permanent monitoring wells.

Groundwater data were also screened to determine whether any individual sample results, or cumulative results summed by sample location, may exceed the USEPA Vapor Intrusion (VI) Screening Levels (Target Cancer Risk (TCR) of 1E-5 and Target Hazard Quotient (THQ) of 1) as determined by the Vapor Intrusion Screening Level (VISL) Calculator version 3.5 (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls). The aqueous PALs specified in the QAPP are based upon drinking water use, which is not a potential exposure pathway for groundwater at the Site. There were no potential VI risks identified from the shallow groundwater sampling points located in the vicinity of Parcel B5. Total cyanide had previously been identified as a potential VI hazard in the Area B Groundwater Phase II Investigation Report at several locations, but the screening level for cyanide has since been adjusted upward by the USEPA, eliminating this concern.

4.2.2. Summary of NAPL Observations in Piezometers

Based on the field observations of potential NAPL in the associated soil cores and/or elevated detections of DRO, temporary screening piezometers were installed at six locations in Parcel B5 (B5-097-PZ, B5-098-PZ, B5-099-PZ, B5-103-PZ, B5-144-PZ, and B5-161-PZ) to assess the potential mobility of NAPL from the soil to groundwater. Piezometer B5-144-PZ (screened

from 2 to 10 feet bgs) was installed on January 6, 2016. Piezometers B5-098-PZ and B5-099-PZ (both screened from 2 to 12 feet bgs) were installed on January 7, 2016. More recently, piezometers B5-103-PZ (screened from 4 to 21 feet bgs), B5-161-PZ (screened from 7 to 17 feet bgs), and B5-097-PZ (screened from 5 to 15 feet bgs) were installed on April 24, April 26, and April 27, 2017, respectively.

Immediately after installation, each piezometer was gauged using an oil-water interface probe to determine the presence or absence of NAPL. The piezometers were gauged again after approximately 48 hours and again after at least 30 days had passed to allow for equilibration. NAPL was not detected in any temporary screening piezometer during these checks.

The six NAPL screening piezometers were revisited and evaluated for abandonment on November 7, 2017. At that time, three of the locations with clean 30-day gauging measurements (B5-097-PZ, B5-103-PZ, and B5-144-PZ) were observed to have been destroyed by vehicle traffic or other causes. The remaining three piezometers were gauged on November 7, 2017, and NAPL was detected in one location. Piezometer B5-098-PZ contained approximately 1.8 feet of NAPL during this gauging event, prompting extended delineation according to standard procedures (i.e., additional piezometers installed at surrounding locations). Location B5-099-PZ did not contain any accumulated NAPL at that time, but was also proposed to be retained because it was located in the immediate vicinity of B5-098-PZ (approximately 10 feet to the west). Location B5-161-PZ did not contain any accumulated NAPL, and abandonment of this location was proposed. Supplemental test pitting work was later completed in the vicinity of B5-161-PZ due to the presence of elevated PAHs and DRO contamination in soil (and to investigate for the possible presence of NAPL).

The exact dates of gauging activities completed through November 7, 2017, as well as NAPL thickness measurements and water level measurements for that time period, have been included in **Appendix F**. This attachment also includes the installation date of each NAPL screening piezometer, as well as relevant construction details (screen intervals, etc.). In order to avoid the need for continued updates to this Phase II Investigation Report, NAPL gauging and delineation/response activities completed after November 7, 2017 are addressed in separate reports for the NAPL investigations in Parcel B5. Specifically, the Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB (dated February 27, 2019) and the Test Pitting Work Plan for B5-161-SB (Revision 1 dated May 8, 2019) were submitted to the MDE and discussed supplemental work in each of these respective areas. Both of these Work Plan documents have since been implemented, and final Completion Reports for these areas are anticipated to be submitted to the MDE outside of the scope of this Phase II Investigation Report.

4.3. SEDIMENT CONDITIONS

The sediment samples were screened against the PALs established in the QAPP (for soil) to determine potential direct exposure risks. The sediment analytical results were additionally compared to the Biological Technical Assistance Group (BTAG) Marine Sediment Screening Benchmark values. The analytical results for the detected parameters are summarized and compared to the PALs and BTAG Marine Sediment Screening Benchmark values in attached **Table 9** (Organics) and **Table 10** (Inorganics). The laboratory Certificates of Analysis (including Chains of Custody) have been included as electronic attachments. The laboratory Certificates of Analysis contain a glossary of qualifiers for the flags assigned to individual results in the attached summary tables.

Arsenic was the only compound to exceed the specified PAL (3 mg/kg), and was detected above this threshold in each sample. The maximum detection of arsenic in sediment was 21.2 mg/kg in B5-127-SD. Several organics and inorganics (SVOCs, PCBs, and metals) were detected in the sediment samples above their respective BTAG Marine Sediment Screening Benchmark values. These included 15 SVOCs (2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorine, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, and pyrene), two PCB groups (Aroclor 1254 and total PCBs), and nine inorganics (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc).

Each compound identified as an exceedance of the BTAG values was detected above its applicable criterion in at least two samples. However, the majority of the BTAG exceedances (100 results out of 108 total exceedances) were less than 10 times the BTAG values, so potential risks to aquatic life are expected to be low. The only compounds to exceed 10 times the BTAG criteria were benzo[b]fluoranthene, naphthalene, copper, zinc, and total PCBs, and each of these exceedances was by less than a factor of 15. Summary figures indicating the BTAG exceedances in the Pennwood Canal sediment samples have been provided as **Figure SD-1** (organics) and **Figure SD-2** (inorganics).

PCBs in the canal sediments were identified above the BTAG criteria in four of the six sediment samples (B5-126-SD through B5-129-SD). The maximum detection of total PCBs was 0.53 mg/kg, which is below the soil PAL (0.97 mg/kg) but exceeds the BTAG value (0.04 mg/kg). The four exceedances of the total PCB BTAG criterion were identified in the four samples positioned closest to the Pennwood Powerhouse at the western end of the canal. The two samples located closest to the shoreline (B5-130-SD and B5-131-SD) did not exceed any of the BTAG values for PCBs. Thus, it does not appear that PCBs have migrated to surface waters via sediment transport.

Based on the relatively low magnitude of the PAL and BTAG exceedances relative to the screening criteria as described above, the detections of constituents in the Pennwood Canal sediment are not a significant concern at this time. Since the sediments are below the water

surface, there is no direct exposure pathway for a current worker to encounter the canal sediments. Furthermore, since arsenic was the only compound to exceed its PAL in the sediments, the potential risks to workers who could in the future be exposed to canal sediments are expected to be low. No additional action or remediation is proposed at this time with regard to the canal sediments. As specified in correspondence received via email on September 5, 2017, the MDE and USEPA have agreed that no additional action or remediation is required at this time; however, future site work in the canal may require additional sampling or response actions. If necessary, such actions would be coordinated with the MDE.

5.0 DATA USABILITY ASSESSMENT

The approved property-wide QAPP specified a process for evaluating data usability in the context of meeting project goals. Specifically, the goal of the Phase II Investigation is to determine if potentially hazardous substances or petroleum products (VOCs, SVOCs, PCBs, TAL-Metals, cyanide, TPH-DRO/GRO, dioxins/furans, or asbestos) are present in Site media (soil and sediment) at concentrations that could pose an unacceptable risk to Site receptors. Individual results are compared to the PALs established in the QAPP (i.e., the most current USEPA RSLs) or based on other direct guidance from the agencies, to identify the presence of exceedances in each environmental medium.

Quality assurance and quality control (QA/QC) samples were collected during field studies to evaluate field/laboratory variability. A summary of QA/QC samples associated with this investigation has been included as **Appendix G**. The following QA/QC samples were submitted for analysis to support the data validation:

- Trip Blank – at a rate of one per day
  - Soil – VOCs only
  - Sediment – VOCs only
- Blind Field Duplicate – at a rate of one per twenty samples
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, PCBs, Hexavalent Chromium, Cyanide, and Dioxins/Furans
  - Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, PCBs, Hexavalent Chromium, and Cyanide
- Matrix Spike/Matrix Spike Duplicate – at a rate of one per twenty samples
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, PCBs, Hexavalent Chromium, and Dioxins/Furans
  - Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, PCBs, and Hexavalent Chromium
- Field Blank and Equipment Blank – at a rate of one per twenty samples
  - Soil – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Hexavalent Chromium, Cyanide, and Dioxins/Furans
  - Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Hexavalent Chromium, and Cyanide

The QA/QC samples were collected and analyzed in accordance with the QAPP Worksheet 12 – Measurement Performance Criteria, QAPP Worksheet 20 – Field Quality Control, and QAPP Worksheet 28 – Analytical Quality Control and Corrective Action.

5.1. DATA VERIFICATION

A verification review was performed on documentation generated during sample collection and analysis. The verification included a review of field log books, field data sheets, and Chain of

Custody forms to ensure that all planned samples were collected, and to ensure consistency with the field methods and decontamination procedures specified in the QAPP Worksheet 21 – Field SOPs and Appendix A of the QAPP. In addition, calibration logs were reviewed to ensure that field equipment was calibrated and/or checked once per day. The logs have been provided in **Appendix C** (PID calibration log).

The laboratory deliverables were reviewed to ensure that all records specified in the QAPP as well as necessary signatures and dates are present. Sample receipt records were reviewed to ensure that the sample condition upon receipt was noted, and any missing/broken sample containers (if any) were noted and reported according to plan. The data packages were compared to the Chains of Custody to verify that results were provided for all collected samples. The data package case narratives were reviewed to ensure that all exceptions (if any) are described.

5.2. DATA VALIDATION

USEPA Stage 2B data validation was completed for a representative 50% of the environmental sample analyses performed by PACE and supporting Level IV Data Package information by Environmental Data Quality Inc. (EDQI).

Sample analyses have undergone an analytical quality assurance review to ensure adherence to the required protocols. The Stage 2B review was performed as outlined in "Guide for Labeling Externally Validated Laboratory Analytical Data for Superfund Use", EPA-540-R-08-005. Results have been validated or qualified according to general guidance provided in "USEPA National Functional Guidelines for Inorganic Superfund Data Review (ISM02.1)", USEPA October 2013. Region III references this guidance for validation requirements. This document specifies procedures for validating data generated for Contract Laboratory Program (CLP) analyses. The approved QAPP dated October 2, 2015 (updated April 5, 2016) and the quality control requirements specified in the methods and associated acceptance criteria were also used to evaluate the non-CLP data. The validation of 100% of the dioxin/furan data collected in the vicinity of the former Sinter Plant was conducted using the USEPA Region III Dioxin/Furan Data Validation Guidance, DRAFT, dated March 1999.

Data validation has been completed for a representative 50% of all sample results, and the DVRs provided by EDQI have been included as electronic attachments. The USEPA has previously specified that results flagged with a "JB" qualifier are erroneous, and any such results should be revised to display the "B" qualifier only. EDQI reviews and corrects any "JB" qualified results during the data validation procedure. Therefore, any result originally flagged with a "JB" qualifier in the laboratory certificate is reported as a "B" qualified non-detect result in this Phase II Investigation Report. ARM has reviewed all non-validated laboratory reports (those which were not designated to be reviewed by EDQI), and applied the same validation correction to any relevant "JB" qualified results. ARM has also revised the non-validated results to eliminate any

laboratory-specific, non-standardized qualifiers (L2, 6c, ip, 4c, etc.), which are customarily removed by EDQI during the validation procedure.

5.3. DATA USABILITY

The data were evaluated with respect to the quality control elements of precision, bias, representativeness, comparability, completeness, and sensitivity relative to data quality indicators and performance measurement criteria outlined in QAPP Worksheet 12 – Measurement Performance Criteria. The following discussion details deviation from the performance measurement criteria, and the impact on data quality and usability.

The measurement performance criteria of precision and bias were evaluated in the data validation process as described in the DVRs provided as electronic attachments. Where appropriate, potential limitations in the results have been indicated through final data flags. These flags indicate whether particular data points were quantitative estimates, biased high/low, associated with blank contamination, etc. Individual data flags are provided with the results in the detection summary tables. A qualifier code glossary is included with each DVR provided by EDQI. Particular results may have been marked with the "R" flag if the result was deemed to be unreliable and was not included in any further data evaluation. A list of the soil results that were rejected during data validation has been provided in **Table 11**. A discussion of data completeness (the proportion of valid data) is included below.

Representativeness is a measure of how accurately and precisely the data describe the Site conditions. Representativeness of the samples submitted for analysis was ensured by adherence to standard sampling techniques and protocols, as well as appropriate sample preservation prior to analysis. Sampling was conducted in accordance with the QAPP Worksheet 21 – Field SOPs and Appendix A of the QAPP. Specific Field SOPs applicable to the assessment of representativeness include **Field SOP Numbers 003, 008, 009, 010, 011, 017, and 024**. Review of the field notes and laboratory sample receipt records indicated that collection of samples at the Site was representative, with no significant deviations from the SOPs.

Comparability describes the degree of confidence in comparing two sets of data. Comparability is maintained across multiple datasets by the use of consistent sampling and analytical methods across multiple project phases. Comparability of sample results was ensured through the use of approved standard sampling and analysis methods outlined in the QAPP. QA/QC protocols help to maintain the comparability of datasets, and in this case were assessed via blind duplicates, blank samples, and spiked samples, where applicable. No deviations from the QAPP were noted in the dataset.

Sensitivity is a determination of whether the analytical methods and quantitation limits will satisfy the requirements of the project. The laboratory reports were reviewed to verify that reporting limits met the quantitation limits for specific analytes provided in QAPP Worksheet

#15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits. In general the laboratory reporting limits met the detection and quantitation limits specified in the QAPP.

Completeness is expressed as a ratio of the number of valid data points to the total number of analytical data results. Non-usable ("R" flagged) data results were determined through the data validation process. The approved QAPP specifies that the completeness of data is assessed by professional judgement, but should be greater than or equal to 90%. Data completeness for each compound (with the exception of dioxins/furans which were validated but had no rejected analytical results) is provided in **Appendix H**. This evaluation of completeness includes only the representative 50% of sample results which were randomly selected for validation.

The only soil compounds with an overall completeness value below 90% were 1,4-dioxane, methyl acetate, bromomethane, 3,3'-dichlorobenzidine, n-nitroso-di-n-propylamine, and pentachlorophenol. Only 1,4-dioxane and methyl acetate had completeness values below 80% (23.3% and 68.3%, respectively). A substantial amount of the 1,4-dioxane and methyl acetate soil datasets were rejected (138 and 57 results, respectively), but the valid results did not indicate that these appear to be significant contaminants at the Site. There were no detections of 1,4-dioxane in soil throughout the parcel. Methyl acetate had only two detections out of 180 total validated samples (both flagged with the "J" qualifier indicating that they are quantitative estimates). Furthermore, the maximum detection of methyl acetate was 0.31 mg/kg, which is insignificant in comparison to the PAL of 1,200,000 mg/kg. Bromomethane had a completeness ratio of 80.0%, and pentachlorophenol, n-nitroso-di-n-propylamine, and 3,3'-dichlorobenzidine all had completeness ratios of 85.6%. However, there were no detections of any of these parameters among the validated results. (Pentachlorophenol had two non-validated detections with a maximum result of 0.07 mg/kg flagged with the "J" qualifier, in comparison to the PAL of 4 mg/kg.)

Overall, the soil (and sediment) data can be used as intended, and no significant data gaps were identified. While a limited set of compounds did not meet the completeness goal of 90%, these compounds do not appear to be significant contaminants at the Site.

6.0 FINDINGS AND RECOMMENDATIONS

The objective of this Phase II Investigation was to fully characterize the nature and extent of contamination at the Site. During the Phase II Investigation, a total of 333 soil samples (all locations/depths including the eight supplemental locations sampled for dioxins/furans) and six sediment samples were collected and analyzed to define the nature and extent of contamination in Parcel B5. The sampling and analysis plan for the parcel was developed to target specific features which represented a potential release of hazardous substances and/or petroleum products to the environment. Soil boring samples were analyzed for TCL-VOCs, TCL-SVOCs, TPH-DRO, TPH-GRO, TAL-Metals, hexavalent chromium, and cyanide. Shallow soil samples from across the site (0 to 1 foot bgs) were analyzed for PCBs. Select shallow soil samples were also analyzed for asbestos or dioxins/furans. Sediment samples collected from the Pennwood Canal were analyzed for TCL-VOCs, TCL-SVOCs, TPH-DRO, TPH-GRO, TAL-Metals, PCBs, hexavalent chromium, and cyanide.

6.1. SOIL

The concentrations of constituents in the soil have been characterized by the Phase II Investigation to provide estimates of exposure point concentrations to support risk assessment.

Lead concentrations are well below the levels that would warrant evaluation of a removal remedy. There were no locations where detections of lead exceeded 10,000 mg/kg, the designated threshold at which delineation would be required.

Aroclor 1254, Aroclor 1260, and total PCBs exceeded their respective PALs in multiple locations (11 total) collected across the Site. However, only one detection of Aroclor 1254 (and total PCBs) exceeded the mandatory excavation criterion of 50 mg/kg. This detection (54.2 mg/kg) was identified at sample location B5-101-SB-1, which targeted a storage tank with unknown contents. Therefore, delineation of PCBs was required to define the extent of elevated PCBs this location for evaluation for excavation and disposal. As reported in the Delineation and Excavation of PCB Impacted Soil Notification Letter dated May 11, 2017, the elevated PCB detection at B5-101-SB has been fully delineated and the impacts appear to be extremely limited. Therefore, on May 16, 2017 the agencies approved the recommendation at excavation is not warranted and no further action is required.

There were three soil PAL exceedances of DRO in the parcel (B5-099-SB-4.5, B5-144-SB-4, and B5-161-SB-4). The highest detection of DRO was 17,900 mg/kg in sample B5-161-SB-4, which targeted the No. 3 Mould Yard. The remaining two samples where DRO was detected above 6,200 mg/kg were B5-144-SB-4 at 8,430 mg/kg (providing general site coverage) and B5-099-SB-4.5 at 7,780 mg/kg (targeting a tank with unknown contents). Locations impacted by elevated TPH represent areas where free product (NAPL) could potentially mobilize, particularly

along utility corridors. These elevated TPH results above the PAL of 6,200 mg/kg are discussed in greater detail in Section 6.3 (Non-Aqueous Phase Liquid).

There were no soil PAL exceedances or concerns related to VOCs or asbestos at the Site. Additional PAL exceedances in the soil included eight inorganics (antimony, arsenic, lead, manganese, thallium, vanadium, hexavalent chromium, and cyanide) and seven SVOCs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, and naphthalene). Arsenic was the most common inorganic exceedance, and was detected above the PAL in the majority of soil samples analyzed at the Site (232 total). The maximum detections for all SVOC compounds, with the exception of naphthalene, were associated with a single location (B5-161-SB). The maximum detections of benz[a]anthracene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene were associated with the 4-foot sample, while the maximum detections of benzo[b]fluoranthene and benzo[k]fluoranthene were associated with the 1-foot sample. The most common SVOC exceedance was benzo[a]pyrene, with 21 detections above the PAL. One supplemental sample collected for the characterization of dioxins/furans (field duplicate of B5-088-SB-1) had cumulative detections which resulted in a total concentration of 2,3,7,8-TCDD equivalents above the applicable PAL.

6.2. GROUNDWATER

Groundwater is not used on the Tradepoint Atlantic property (and is not proposed to be utilized); therefore, there is no potential for direct human exposure for a Composite Worker. In the event that future construction/excavation leads to a potential Construction Worker exposure to groundwater, health and safety plans should be implemented to limit exposure risk. Findings from the Area B Groundwater Phase II Investigation which include the groundwater data obtained within Parcel B5 are presented in the Area B Groundwater Phase II Investigation Report (Revision 0) dated September 30, 2016, which was submitted to the agencies for review. An aqueous PAL exceedance figure is provided in **Appendix E** to indicate the locations of any shallow groundwater exceedances from the Area B Groundwater Investigation.

The groundwater data were screened to determine whether any cumulative (or individual) sample results exceeded the USEPA VI TCR (carcinogen) or THQ (non-carcinogen) Screening Levels. Among the samples obtained during the separate Area B Groundwater Investigation, there were no potential VI risks identified from the permanent monitoring wells located in the vicinity of Parcel B5. Total cyanide had previously been identified as a potential VI risk in the Area B Groundwater Phase II Investigation Report, but the screening level for cyanide has since been adjusted upward by the USEPA, eliminating this concern.

6.3. NON-AQUEOUS PHASE LIQUID

There were three samples (from three individual borings) where TPH-DRO was detected above the screening level of 6,200 mg/kg. These samples include the following: B5-099-SB-4.5 at 7,780 mg/kg, B5-144-SB-4 at 8,430 mg/kg, and B5-161-SB-4 at 17,900 mg/kg. Soil cores were screened for evidence of possible NAPL contamination during the completion of the Phase II soil borings in Parcel B5. The field observations were noted on the boring logs, and several sample locations had visible sheens or NAPL noted in the soil cores. Five boring locations had physical evidence of possible product in the cores: B5-097-SB, B5-098-SB, B5-099-SB, B5-103-SB, and B5-144-SB.

To assess the potential presence and mobility of NAPL in groundwater, temporary piezometers were installed at six soil boring locations (B5-097-SB, B5-098-SB, B5-099-SB, B5-103-SB, B5-144-SB and B5-161-SB) following the visual observation of evidence of NAPL in these soil cores during the field investigation and/or elevated analytical detections of DRO. An oil-water interface probe was used to check each piezometer for the presence of NAPL immediately after installation, 48 hours after installation, and again after approximately 30 days. NAPL was not detected in any temporary screening piezometer during these checks.

The piezometers were evaluated for their suitability for abandonment on November 7, 2017. At that time, three locations (B5-097-PZ, B5-103-PZ, and B5-144-PZ) had apparently been destroyed by vehicle traffic or other causes. The remaining three piezometers were gauged on November 7, 2017, and NAPL was detected in one location (B5-098-PZ) with an accumulated thickness of 1.8 feet. The detection of NAPL during this gauging event prompted extended delineation surrounding B5-098-PZ according to standard procedures. Location B5-099-PZ (which did not contain any accumulated NAPL) was also proposed to be retained because it was located in the immediate vicinity of B5-098-PZ (approximately 10 feet to the west). Location B5-161-PZ did not contain any accumulated NAPL, but supplemental test pitting work was later completed in the vicinity of B5-161-PZ to investigate for the possible presence of NAPL due to the elevated analytical detections of PAHs and DRO in soil.

In order to avoid the need for continued updates to this Phase II Investigation Report, NAPL gauging and delineation/response activities completed after November 7, 2017 are addressed in separate reports for the NAPL investigations in Parcel B5. Specifically, the Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB (dated February 27, 2019) and the Test Pitting Work Plan for B5-161-SB (Revision 1 dated May 8, 2019) were submitted to the MDE and discussed supplemental work in each of these respective areas. Both of these Work Plan documents have since been implemented, and final Completion Reports for these areas are anticipated to be submitted to the MDE.

Each of the soil boring locations at which a piezometer was installed due to the presence of NAPL and/or elevated TPH detections should be considered for proximity to proposed utilities in any future development plans. Appropriate protocols should be documented in a Response and Development Work Plan (as necessary) to prevent the mobilization of any product if future utilities are proposed in the vicinity of these impacts.

6.4. SEDIMENT

Sediment analytical results were screened against the soil PALs and BTAG Marine Sediment Screening Benchmark values to identify potential human health or ecological risks presented by sediments in the Pennwood Canal. Evaluation against the soil PALs established in the QAPP indicated that arsenic was the only compound that exceeded its PAL (3 mg/kg), with a maximum detection of 21.1 mg/kg. The sediment samples were primarily screened against the BTAG criteria (rather than human health screening criteria) since no direct exposures to sediments in the Pennwood Canal are anticipated.

Several organic and inorganic compounds (SVOCs, PCBs, and metals) were detected in the sediment samples above their respective BTAG Marine Sediment Screening Benchmark values. These included 15 SVOCs (2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorine, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, and pyrene), two PCB groups (Aroclor 1254 and total PCBs), and nine inorganics (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc). The majority of the BTAG criteria exceedances appear to be fairly low and would not pose a significant hazard to aquatic life.

Only eight total exceedances (limited to detections of benzo[b]fluoranthene, naphthalene, copper, zinc, and total PCBs) exceeded their applicable BTAG screening levels by more than a factor of 10. Benzo[b]fluoranthene was responsible for the most significant exceedance, and was detected above the BTAG value by an approximate factor of 14. PCBs in the canal sediments were detected above the BTAG criteria in the four samples positioned closest to the Pennwood Powerhouse (B5-126-SD through B5-129-SD). The two samples located closest to the shoreline did not exceed the PCB BTAG criteria. Thus, it does not appear that PCBs are directly discharging to surface waters via sediment transport.

Based on the relatively low magnitude of the PAL and BTAG exceedances relative to the screening criteria, the detections of constituents in the Pennwood Canal sediment are not a significant concern at this time. Since the sediments are below the water surface, there is no direct exposure pathway for a current worker to encounter the canal sediments. Furthermore, since arsenic was the only compound to exceed its PAL in the sediments, the potential risks to workers who could in the future be exposed to canal sediments are expected to be low. No additional action or remediation is proposed at this time with regard to the canal sediments. As specified in correspondence received via email on September 5, 2017, the MDE and USEPA

have agreed that no additional action or remediation is required at this time; however, future site work in the canal may require additional sampling or response actions. If necessary, such actions would be coordinated with the MDE.

6.5. RECOMMENDATIONS

Sufficient investigation data has been collected to evaluate the nature and extent of possible constituents of concern in Parcel B5. The presence and absence of soil and sediment impacts within Parcel B5 have been adequately described and further site-wide investigation is not warranted to characterize overall conditions. Recommendations for the Site are as follows:

- Soil impacted by elevated PCBs (>50 mg/kg) in the vicinity of the former storage tank with unknown contents targeted by B5-101-SB have been delineated and were evaluated for excavation as reported in the Delineation and Excavation of PCB Impacted Soil Notification Letter dated May 11, 2017. Following a review of the delineation data, the agencies approved the recommendation at excavation is not warranted and no further action is required.

- Soil boring locations with physical evidence of possible NAPL and/or elevated TPH detections (B5-097-SB, B5-098-SB, B5-099-SB, B5-103-SB, B5-144-SB, and B5-161-SB) should be considered for proximity to proposed utilities in any future development plans. If future utilities are proposed in the vicinity of these borings, appropriate protocols for the mitigation of potential product mobility should be specified in a Response and Development Work Plan.

- Site-wide NAPL gauging and delineation/response activities completed after November 7, 2017 are addressed in separate reports for the NAPL investigations in Parcel B5. Specifically, the Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB (dated February 27, 2019) and the Test Pitting Work Plan for B5-161-SB (Revision 1 dated May 8, 2019) were submitted to the MDE and discussed supplemental work in each of these respective areas. Both of these Work Plan documents have since been implemented, and final Completion Reports for these areas are anticipated to be submitted to the MDE.

- At multiple locations in the Pennwood Canal, sediment samples exceeded PALs (arsenic only) and BTAG criteria (SVOCs, PCBs, and metals). Based on the relatively low magnitude of the exceedances relative to the specified criteria, and lack of a direct exposure pathway for a current worker to encounter canal sediments, no additional action or remediation is proposed at this time with regard to the Pennwood Canal. As specified in correspondence received via email on September 5, 2017, the MDE and USEPA have agreed that no additional action or remediation is required at this time; however, future site work in the canal may require additional sampling or response actions. If necessary, such actions would be coordinated in the future with the MDE.

7.0 REFERENCES

ARM Group Inc. (2016). *Area B Groundwater Phase II Investigation Report*. Revision 0. September 30, 2016.

ARM Group Inc. (2017). *Delineation and Excavation of PCB Impacted Soil Notification Letter*. Final Draft. May 11, 2017.

ARM Group Inc. (2016). *Dioxin and Furan Work Plan Addendum: Parcel B5*. Revision 1. November 28, 2016.

ARM Group Inc. (2015). *Phase II Investigation Work Plan: Area B Groundwater Investigation.* Revision 3. October 6, 2015.

ARM Group Inc. (2015). *Phase II Investigation Work Plan: Parcel B5.* Final Draft. December 3, 2015.

ARM Group Inc. (2015). *Quality Assurance Project Plan: Sparrows Point Terminal Site*. Revision 2. October 2, 2015.

ARM Group Inc. (2019). *Response Action Work Plan: Delineation Completion Report and Proposed Excavation of NAPL at B5-098-SB*. February 27, 2019.

ARM Group Inc. (2017). *Stormwater Pollution Prevention Plan (SWPPP)*. Revision 5. June 1, 2017.

ARM Group Inc. (2019). *Test Pitting Work Plan: Area B: Parcel B5 (B5-161-SB).* Revision 1. May 8, 2019.

Rust Environment & Infrastructure (1998). *Description of Current Conditions: Bethlehem Steel Corporation*. Final Draft. January 1998.

USEPA (2017). Vapor Intrusion Screening Level (VISL) Calculator version 3.5. (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls).

Weaver Boos Consultants (2014). *Phase I Environmental Site Assessment: Former RG Steel Facility*. Final Draft. May 19, 2014.