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 A7 Phase II Investigation Report
(Revision 1)
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 July 18, 2018 regarding the previous submission of the Phase II Investigation Report (Revision 0 dated June 29, 2018) for Parcel A7 of the Tradepoint Atlantic property located in Sparrows Point, Maryland.

Hard copy replacement pages are provided for incorporation into the Parcel A7 Phase II Investigation Report. The revised report text is included as **Attachment 1**, and additional revised attachments are provided as referenced below. 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 can be discarded as noted below. Responses to specific MDE comments are given below; the original comments are included in italics with responses following.

1. *Table 9 appears to be missing soil exceedances for Oil & Grease and Manganese.*

   Soil exceedances for Oil & Grease and manganese were not included in **Table 9** because the exceedances for these parameters occurred at soil boring locations providing general parcel coverage, rather than specific targets. As indicated in Section 4.1.3 of the report text, **Table 9** indicates which soil impacts (PAL exceedances) are associated with the specific targets listed in the Parcel A7 Work Plan and does not include borings providing general site coverage. Therefore, these data were intentionally excluded from **Table 9**, although they are provided in various other resources with the report.

2. *Figure S-2 appears to be missing soil exceedances for Test Pit locations.*

   Figure S-2 has been revised to include the inorganic soil PAL exceedances at the test pit locations in Parcel A7.

3. *The detection of thallium in test pit location A7-008-TP is elevated at 83.6 ppm. No other soil results identified thallium above the PAL. This test pit area also had the highest detection of lead on the parcel at 6,780 ppm. These elevated constituents appear to be elevated outliers on the site, therefore additional delineation is warranted to determine if there is a source for these metals, particularly since the test pits were done in mounded areas of unknown fill. Upon review of additional delineation data, MDE will make a determination regarding the appropriateness of removing thallium from the risk assessment based on the level of detection. The Department anticipates review of a work plan to delineate metals in the vicinity of A7-008-TP.*

   As shown on **Figure S-2**, elevated thallium was detected at one location (A7-008-TP). Results from other test pits and soil borings completed within the same immediate area, including soils collected from similar berms and mounded soil/slag stockpiles did not exhibit elevated thallium concentrations. A7-007-TP (located 95 feet west of A7-008-TP), A7-009-TP (130 feet east), A7-010-TP (170 feet north), and A7-021-SB (80 feet south), are of particular note because they surround the location of interest. Because no thallium concentrations were detected above the PAL in any of the test pits and soil borings completed in the vicinity of A7-008-TP, the thallium exceedance at location A7-008-TP appears to be an isolated occurrence and it does not appear to be indicative of widespread contamination throughout this area. While the sample from test pit A7-008-TP also returned the highest concentration of lead on the parcel, the detected concentration was well below the action level of 10,000 mg/kg. Lead concentrations detected in other samples indicate that lead is generally elevated in surface soils within the northwestern corner of the parcel. However, none of the levels approach the action level of 10,000 mg/kg, so the lead contamination appears to be adequately defined. Thallium was detected in only 2 samples out of 44 total samples, or <5%, indicating that the materials present at the Site (including samples obtained from berms and mounded soil/slag stockpiles) do not typically contain elevated levels of thallium. Based on the available data, no additional delineation is proposed in the vicinity of A7-008-TP.

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 7.6) has been removed from this revised Parcel A7 Phase II Investigation Report. Some information previously contained in these sections, such as the discussion of locations exhibiting potential exceedances of the established non-aqueous phase liquid (NAPL)/petroleum, lead, or PCB delineation criteria has been relocated within Section 4.1.3. In addition to removing Section 6.0 and Section 7.6, the recommendations (previously Section 7.7 but now Section 6.6) have also been revised to exclude the SLRA findings that are not relevant. The SLRA tables (**Table 20** through **Table 25**) 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 A: PARCEL A7
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

Prepared For:

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Respectfully Submitted,

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Project Geologist

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

Revision 1 – July 8, 2019

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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 A: Parcel A7 (the Site). Parcel A7 is comprised of 22.2 acres of the approximately 3,100-acre former steel making facility (**Figure 1**). The Site is bounded to the south by a former contractor area and spare parts storage yard (within Parcel A11), to the north by the Greys Rail Yard (Parcel A13), to the east by the former Air Products Facility and a small paved driving lot operated by Harley Davidson (within Parcel A8), and to the west by a wooded and vegetated area (within Parcel A5).

The Phase II Investigation was performed in accordance with procedures outlined in the approved Phase II Investigation Work Plan – Area A: Parcel A7. This Work Plan (dated July 12, 2017) was approved by the Maryland Department of the Environment (MDE) and the United States Environmental Protection Agency (USEPA) on July 18, 2017 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 A7 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 A7 is occupied by dense vegetative growth. There are also several slag berms and topographic depressions (pits) that may have been used as disposal locations for wastes, in particular open hearth slurry from wastewater treatment. Parcel A7 is part of the County Lands 1B (CL1B) Parcel, which is one of five areas (1A, 1B, 2, 3A, and 3B) referred to as "County Lands" in the Description of Current Conditions (DCC) Report prepared by Rust Environment and Infrastructure dated January 1998. The DCC Report indicates that the CL1B Parcel is primarily covered by vegetated slag fill, and was previously intended for waste disposal. The DCC Report states that only the southeastern end of the CL1B Parcel was ever used for disposal, suggesting that Parcel A7 may have been used for this purpose.

The Phase I Environmental Site Assessment (ESA) prepared by Weaver Boos Consultants dated May 19, 2014, states generically that fly dumping was known to occur outside of the main steel making facility along roads and mainly in vacant and unmonitored areas. According to interviews conducted as part of the Phase I ESA, no hazardous materials or petroleum products were known to be dumped on the property, but the fly dumping may have included general refuse, household equipment, and boats. Dumping of household refuse was noted during previous site visits conducted by MDE, ARM, and EAG personnel prior to initiation of the Parcel A7 Phase II Investigation.

There are two small ponds within the Site boundary that accumulate and retain surface water. There is no evidence that iron and steel industrial processes were completed within the boundary of Parcel A7.

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 sample 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.

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 has several slag berms, material piles (mounds), and pits throughout the central portion of the parcel. Elevations at the Site range from 2 to 35 feet above mean sea level (amsl) across the entire parcel area. The highest mound within Parcel A7 appears to be located towards the northwestern portion of the Site with peak elevations ranging from approximately 30 to 35 feel amsl. Several pits of varying size and steepness are located throughout Parcel A7. Overland flow appears to collect in the pits as well as the two surface water ponds located near the southern boundary of the Site. According to Figure B-2 of the Stormwater Pollution Prevention Plan (SWPPP) Revision 5 dated June 1, 2017, runoff waters from Parcel A7 appear to be directed along roadside drainage ditches adjacent to Peninsula Expressway toward the National Pollutant Discharge Elimination System (NPDES) permitted Outfall 069. This outfall ultimately discharges to Bear Creek across the western boundary of the Tradepoint Atlantic property.

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/HYDROGEOLOGY

Groundcover at the Site is comprised of 100% natural soils 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 natural soils, which included fine-grained sediments (clays and silts) and coarse-grained sediments (sands). Non-native slag fill materials were encountered throughout the Site at depths of up to 12 feet below the ground surface (bgs). Shallow groundwater was observed in soil cores from 7.5 to 17.2 feet bgs across the Site, however, groundwater was not encountered at every location. 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.

Three existing groundwater wells in the shallow hydrogeologic zone (MW93-001, MW93-002, and W-14) were selected to investigate shallow groundwater conditions at the Site. During vegetation clearing activities, permanent groundwater well MW93-002 was damaged by heavy equipment and was unable to be sampled. A temporary groundwater sample collection point was installed as a replacement sample point at this location (using the same ID). The locations of the groundwater sampling points are indicated on **Figure 3**. Four surface water samples were also collected from the two stormwater ponds in the southeast portion of the parcel (two from each pond). The locations of the surface water samples are also provided on **Figure 3**.

Both of the useable permanent wells (MW93-001 and W-14) were surveyed by a Maryland-licensed surveyor. However, the surveyor failed to locate the replacement temporary sample point (MW93-002) in the field although it remains intact. Supporting documentation from the survey is included in **Appendix C**. Since the replacement groundwater point MW93-002 could not be surveyed, additional groundwater points completed under separate Phase II Investigations were gauged to provide supplemental information to generate a groundwater elevation contour map. A synoptic round of groundwater level measurements was collected on March 30, 2018 from the Parcel A7 groundwater points and the other surrounding groundwater points which were selected to be representative of the localized groundwater flow conditions. Surveyed top of casing (TOC) and ground surface elevations for all applicable locations can be found in **Table 1**, along with the depth to water (DTW) measurements from this date. Note that several of the locations were surveyed under separate Phase II Investigations, and supporting documentation from these additional site surveys is also provided in **Appendix C**.

A groundwater potentiometric surface map was constructed for the shallow hydrogeologic zone based on the field measurements obtained in the vicinity of Parcel A7. The localized potentiometric surface map for shallow groundwater has been included on **Figure 4**. The elevation contours indicate that groundwater flows radially from a mounded location near the eastern end of the parcel (in the vicinity of MW93-001). A predominantly western flow direction is apparent below the majority of the Site; Bear Creek is located across the property to the west.

3.0 SITE INVESTIGATION

A total of 54 soil samples (from 18 boring locations and 10 test pit locations), three groundwater samples, four sediment samples, and four surface water samples were collected for analysis between September 26 and October 31, 2017 as part of the Parcel A7 Phase II Investigation. This Phase II Investigation utilized methods and protocols that followed the procedures included in the Quality Assurance Project Plan (QAPP) dated April 5, 2016 which was 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 A7 Work Plan dated July 12, 2017, and the QAPP.

All site characterization activities were conducted under the property-wide Health and Safety Plan (HASP) provided as Appendix E 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 10.3.1).

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. There were no RECs, SWMUs, or AOCs identified at the Site based on the DCC Report.

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 no drip legs identified inside the boundary of Parcel A7. A summary of the specific drawings covering the Site is presented in **Table 2**. 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), additional non-REC sampling targets were identified at the Site that included the following: Pits, Pond Sediments, and Slag/Soil Berm Test Pits – Spoil Piles. 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 distributed to fill in large 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 3** 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 A7 contains a total of 22.2 acres without engineered barriers. In accordance with the relevant sampling density requirements, a minimum of 15 soil borings were required to cover the area without engineered barriers. A total of 18 soil borings and 10 test pits were completed during the Phase II Investigation to collect analytical soil samples.

3.2. SOIL INVESTIGATION

Continuous core soil borings were advanced at 18 locations across the Site to assess the presence or absence of soil contamination, and to assess the vertical distribution of any encountered contamination (**Figure 5**). The 18 continuous core soil borings were advanced to depths between 2 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 of the 18 completed locations, 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 D**. 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. 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 above the water table, the sample from the deeper 4 to 5 foot interval was shifted to the alternate depth interval. One additional set of samples was also collected from the 9 to 10 foot depth interval if groundwater had not been encountered. The 10-foot bgs samples may have been held by the laboratory prior to analysis in accordance with the requirements given in the Parcel A7 Work Plan. These project-specific requirements for the analysis of 10-foot bgs samples are further described below. It should be noted that soil samples were not collected from a depth that was below the water table.

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.

Each soil sample collected during this investigation was submitted to Pace Analytical Services, Inc. (PACE) for analysis. As stated above, the 10-foot bgs samples may have been held prior to analysis in accordance with the Parcel A7 Work Plan. Excluding these deep samples, the remaining soil samples were analyzed for Target Compound List (TCL) semi-volatile organic compounds (SVOCs) via USEPA Methods 8270D and 8270D SIM, Oil & Grease via USEPA Method 9071, total petroleum hydrocarbon (TPH) diesel range organics (DRO) and gasoline range organics (GRO) via USEPA Method 8015, Target Analyte List (TAL) Metals via USEPA Methods 6010C and 7471C, hexavalent chromium via USEPA Method 7196A, and cyanide via USEPA Method 9012. Samples from any depth interval with a sustained PID reading of greater than 10 ppm were also analyzed for TCL volatile organic compounds (VOCs) via USEPA Method 8260. Additionally, the shallow soil samples collected across the Site from the 0 to 1 foot bgs interval were analyzed for polychlorinated biphenyls (PCBs) via USEPA Method 8082. Sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

If the PID reading from the 9 to 10 foot bgs interval was less than 10 ppm (true for all 10-foot bgs samples in Parcel A7), all parameters were held by the laboratory pending the analysis of the 0 to 1 and 4 to 5 foot bgs (or field adjusted interval) samples. If any 9 to 10 foot bgs interval had exhibited a sustained PID reading of 10 ppm, this sample would be released to be analyzed for VOCs, SVOCs, TPH-DRO, TPH-GRO, and Oil & Grease. However, the samples for metals and cyanide would still be held by the laboratory pending the analysis of the 0 to 1 and 4 to 5 foot bgs interval samples. If the preliminary laboratory results from the 4 to 5 foot bgs interval indicated exceedances of the Project Action Limits (PALs) for any constituents, the held sample from the 9 to 10 foot bgs interval was then released to be analyzed for those constituents that exhibited PAL exceedances in the overlying sample.

3.3. TEST PIT INVESTIGATION

Composite soil samples were collected from 10 test pits completed at the locations shown on **Figure 5**. The objective of the test pit investigation was to determine if the materials within several berms and mounds located on the parcel were indicative of potential contamination. Some of the berms targeted by this investigation surrounded small pits or larger topographic depressions at the Site, which may have been historically used as waste disposal locations (see Section 1.1). Aerial images with topographic hillshade effects (generated in GIS) were used to guide the soil berm and mound test pit locations proposed in the Parcel A7 Work Plan. The test pits were completed in

accordance with **Field SOP Number 015**. A backhoe was used to clear the area and create a pothole at the specified location of each test pit. The types of materials present in each test pit were documented, and the materials excavated from representative locations were screened using visual/olfactory methods and a hand-held PID.

No visible petroleum impacts (or other evidence of potential contamination) were observed in the field during the test pit investigation. No PID readings exceeding 10 ppm were recorded during the test pitting activities. Each test pit appeared to consist of fine to coarse grained soil (silty clay to sandy silt) and/or slag gravel. The agency-approved Work Plan specified that soil samples would only be required if indications of potential contamination were observed; however the sampling procedure was modified in the field, and samples were collected from each test pit location as an additional conservatism. After sampling was complete, the test pit was backfilled with the same material that was in place prior to excavation. A photograph log documenting the completed test pitting activities is provided in **Appendix E**. The photograph log also provides one picture of each excavation area prior to (or immediately following the start of) test pitting activities.

A soil sample was collected from the excavated material generated at each location as a 10-point composite. Each composite sample collected during this investigation was submitted to PACE to be analyzed for TCL-SVOCs via USEPA Methods 8270D and 8270D SIM, Oil & Grease via USEPA Method 9071, TPH-DRO/GRO via USEPA Method 8015, TAL-Metals via USEPA Methods 6010C and 7471C, hexavalent chromium via USEPA Method 7196A, and cyanide via USEPA Method 9012. If any PID readings had exceeded 10 ppm, an additional sample would have been collected to be analyzed for VOCs; however, there were no PID detections greater than 10 ppm recorded at the test pit locations in Parcel A7.

3.4. GROUNDWATER INVESTIGATION

Three historical shallow groundwater monitoring wells (MW93-001, MW93-002, and W-14) were included in the parcel-specific sampling plan to characterize groundwater and to support the definition of the groundwater potentiometric surface. The locations where shallow groundwater samples were collected are provided on **Figure 3**. During field investigation activities, the historical monitoring well MW93-002 was damaged but a replacement temporary groundwater sample collection point (piezometer) was installed at this location in accordance with the procedures and methods referenced in **Field SOP Number 028**. The soil boring log and the piezometer construction log for MW93-002 are included in **Appendix F**.

At the replacement location for MW93-002, the Geoprobe® DT22 Dual Tube sampling system was advanced to a depth approximately 7 feet below where groundwater was identified in the associated soil core, the 1.25-inch inner rod string was removed, and the temporary, 1-inch PVC groundwater sample collection point was installed through the outer casing. Following the installation of the sample collection point, the 0-hour depth to water was documented and the

collection point was checked for the presence of non-aqueous phase liquid (NAPL) using an oil-water interface probe in accordance with the methods referenced in **Field SOP Number 019** provided in Appendix A of the QAPP.

After the installation of the temporary groundwater sample collection point, down-hole equipment was decontaminated according to the procedures and methods referenced in **Field SOP Number 016** provided in Appendix A of the QAPP.

Groundwater samples were collected at each location in accordance with methods referenced in **Field SOP Number 006** provided in Appendix A of the QAPP; which employed the use of laboratory supplied sample containers and preservatives, a peristaltic pump, dedicated polyethylene tubing, and a water quality multiparameter meter with a flow-through cell. Groundwater samples submitted for analysis of dissolved metals were filtered in the field with an in-line 0.45 micron filter. The sampling and purge logs have been included in **Appendix G**. Calibration of the multiparameter meter was performed before the start of each day of the sampling event, and a calibration post-check was completed at the end of the day. Appropriate documentation of the multiparameter meter calibration has also been included in **Appendix G**.

Groundwater samples collected in Parcel A7 were submitted to PACE, and analyzed for TCL-VOCs via USEPA Method 8260, TCL-SVOCs via USEPA Methods 8270D and 8270D SIM, Oil & Grease via USEPA Method 1664A, TPH-DRO/GRO via USEPA Method 8015, TAL-Dissolved Metals via USEPA Methods 6010C and 7470A, dissolved hexavalent chromium via USEPA Method 7196A, total cyanide via USEPA Method 9012A, and available cyanide via USEPA Method OIA1677. In addition, the permanent groundwater wells MW93-001 and W-14 were also analyzed for TAL-Total Metals via USEPA Methods 6010C and 7470A and total hexavalent chromium via USEPA Method 7196A. Sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

3.5. SEDIMENT INVESTIGATION

Sediment samples were collected from the four locations shown on **Figure 5** in order to characterize the sediments in two stormwater ponds located in Parcel A7. Two samples were collected from each pond. Each sample was collected from the top 12 inches of sediment using a dipper which was constructed of a stainless steel rod and a polyethylene cup. A new dedicated polyethylene cup was used for each sample, according to the procedures and methods referenced in **Field SOP Number 016** provided in Appendix A of the QAPP. Sediment samples were collected in accordance with **Field SOP Number 003** provided in Appendix A of the QAPP.

The sediment samples were submitted to PACE and analyzed for TCL-VOCs, TCL-SVOCs, Oil & Grease, TPH-DRO/GRO, PCBs, TAL-Metals, 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.

3.6. SURFACE WATER

A total of four surface water samples were collected at the locations shown on **Figure 3** in order to characterize water quality in two stormwater ponds located in Parcel A7. These samples were approximately co-located with the sediment samples discussed in the preceding section. Two samples were collected from each pond by skimming and collecting the water at the surface in a 1L amber glass jar and then transferring the sample into applicable sample jars with preservatives (where applicable) at each sample location. Surface samples were collected as grab samples near the edge of each pond in accordance with **Field SOP Number 004** provided in Appendix A of the QAPP.

The surface water samples were submitted to PACE and analyzed for TCL-VOCs, TCL-SVOCs, Oil & Grease, TPH-DRO/GRO, TAL-Total Metals, dissolved hexavalent chromium, total cyanide, and available cyanide via the same methods listed above (Groundwater 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.

3.7. 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 temporary groundwater points;
- purged groundwater;
- decontamination fluids; and
- used personal protective equipment

Following the completion of field activities, a composite sample was gathered with aliquots from each of the Parcel A7 Phase II IDW soil drums for waste characterization. Following this analysis, the waste soil was characterized as non-hazardous. A list of all results from the soil waste characterization procedure can be found in **Table 4**. The test pits were backfilled with the material that was in place prior to excavation, and no material was placed in drums. IDW drums containing aqueous materials (including aqueous waste generated during the Parcel A7 Phase II Investigation) were characterized by preparing a composite sample from randomly selected drums. The composite sample included aliquots from several individual drums that were chosen as a subset of

the aqueous drums being staged on-site at the date of collection. Following this analysis, the aqueous waste was characterized as non-hazardous. A list of all results from the aqueous waste characterization procedure can be found in **Table 5**.

The parcel specific IDW drum log from the Phase II investigation is included as **Appendix H**. 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 AND TEST PIT CONDITIONS

Soil analytical results were screened against PALs established in the property-wide QAPP (or other direct guidance from the agencies; i.e., TPH/Oil & Grease) to determine 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 6** (Organics) and **Table 7** (Inorganics). These tables include the data obtained from the soil borings as well as the test pit composite samples. 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 and Test Pit Conditions: Organic Compounds

As provided on **Table 6**, several VOCs were identified above the laboratory's method detection limits (MDLs) in the soil samples collected from across the Site. Only soil samples which exhibited PID readings greater than 10 ppm were analyzed for VOCs. There were no VOCs detected above their respective PALs.

Table 6 provides a summary of SVOCs detected above the laboratory's MDLs in the soil 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, any exceedances for PAHs would be based on the adjusted PALs rather than those presented in the QAPP. There were no SVOCs detected above their respective PALs.

Shallow soil samples collected across the Site from the 0 to 1 foot bgs interval were analyzed for PCBs. The test pit composite samples were not analyzed for PCBs. **Table 6** provides a summary of the PCBs detected above the laboratory's MDLs. There were no PCBs detected above their respective PALs.

Table 6 provides a summary of the TPH/Oil & Grease detections above the laboratory's MDLs in the soil samples collected from across the Site. There were no PAL exceedances of DRO or GRO in any of the soil samples. One soil sample, A7-001-SB-8, had an Oil & Grease PAL exceedance with a detection of 14,400 mg/kg; however, this Oil & Grease concentration does not appear to be associated with TPH-DRO/GRO contamination since DRO was detected at 929 mg/kg (below the

PAL of 6,200 mg/kg) and GRO was not detected in the sample. This intermediate soil sample was shifted to the 7 to 8 foot bgs interval due to observations of a light petroleum odor and staining in the associated soil core at this depth. An underlying soil sample collected in the 9 to 10 foot bgs interval did not have any observations of contamination or significant detections of TPH/Oil & Grease, with an Oil & Grease concentration of 393 mg/kg. In addition, groundwater was not observed to be encountered within this soil core. Based on the field observations and analytical results, the potential mobility of petroleum contaminants is expected to be low and a temporary NAPL screening piezometer is not recommended at this location. The Oil & Grease PAL exceedance at location A7-001-SB is shown on **Figure S-1**; this boring is also highlighted due to the physical evidence of possible petroleum contamination observed in the soil core.

4.1.2. Soil and Test Pit Conditions: Inorganic Constituents

Table 7 provides a summary of inorganic constituents detected above the laboratory's MDLs in the soil samples collected from across the Site. Four inorganic compounds (arsenic, lead, manganese, and thallium) were detected above their respective PALs. Arsenic was by far the most common inorganic exceedance, and was detected above the PAL in 42 soil samples (34 soil boring samples and eight test pit soil samples) analyzed for this compound with a maximum detection of 86.3 mg/kg in soil sample A7-005-SB-1. In comparison, PAL exceedances were noted in seven soil samples for lead (with a maximum detection of 6,780 mg/kg at A7-008-TP). Manganese and thallium exhibited one PAL exceedance each, with detections of 58,300 mg/kg at A7-010-SB-1 and 83.6 mg/kg at A7-008-TP, respectively. A summary of the inorganic PAL exceedance locations and results has been provided on **Figure S-2**.

4.1.3. Soil and Test Pit Conditions: Results Summary

Table 6 and **Table 7** provide a summary of the detected organic compounds and inorganics in the soil samples submitted for laboratory analysis (both from soil borings and test pit composite samples). **Figure S-1** and **Figure S-2** present a summary of the soil sample results that exceeded the PALs. **Table 8** provides a summary of results for all PAL exceedances in soil, including maximum values and detection frequencies. **Table 9** indicates which soil impacts (PAL exceedances) are associated with the specific targets listed in the Parcel A7 Work Plan. Borings providing general site coverage are not included on this particular table. PAL exceedances in soil within Parcel A7 consisted of four inorganics (arsenic, lead, manganese, and thallium) and Oil & Grease. VOCs, SVOCs, PCBs, and TPH-DRO/GRO were not detected above their respective PALs and are not considered to be significant soil contaminants in Parcel A7.

Lead, PCBs, and TPH/Oil & Grease 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/Oil & Grease results above 6,200 mg/kg should be evaluated for the potential presence and mobility of NAPL in any future development planning. Concentrations for lead and PCBs did not exceed

the specified thresholds in any soil samples collected at the Site. Although there were no PAL exceedances of TPH-DRO/GRO, one soil sample (A7-001-SB-8) had a detected concentration of Oil & Grease above the PAL, with a result of 14,400 mg/kg. A light petroleum odor and staining were also noted in the soil core at this location from 7 to 8 feet bgs. However, the underlying soil sample collected in the 9 to 10 foot bgs interval did not have any observations of contamination or significant detections of TPH/Oil & Grease, with an Oil & Grease concentration of 393 mg/kg. Groundwater was not observed to be encountered within this soil core. Based on the field observations and analytical results from the underlying sample interval, and the absence of groundwater in the soil core, the potential mobility of petroleum contaminants is expected to be low at this location.

4.2. GROUNDWATER CONDITIONS

The analytical results for the detected parameters in groundwater are summarized and compared to the PALs in **Table 10** (Organics) and **Table 11** (Inorganics). The laboratory Certificates of Analysis (including Chains of Custody) and the associated DVR have been included as electronic attachments. The DVR contains a glossary of qualifiers for the final flags assigned to individual results in the attached summary tables.

4.2.1. Groundwater Conditions: Organic Compounds

As provided on **Table 10**, several VOCs were identified above the laboratory's MDLs in the groundwater samples collected from across the Site. There were no VOCs detected above their respective PALs.

Table 10 provides a summary of SVOCs identified in the groundwater samples above the laboratory's MDLs. Similar to the evaluation of soil data, the PALs for relevant PAHs have been adjusted upward based on revised toxicity data published in the USEPA RSL Resident Tapwater Table. There were no SVOCs detected above their respective PALs.

Table 10 provides a summary of the TPH/Oil & Grease detections in groundwater at the Site. There were no PAL exceedances of Oil & Grease or GRO in any of the groundwater sampling points. DRO was detected above its PAL in one sample (MW93-002) with a detection of 108 µg/L (flagged with the "J" qualifier indicating that it is an estimated value). Each location 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 groundwater sampling locations. The DRO PAL exceedance at location MW93-002 is shown on **Figure GW-1**.

4.2.2. Groundwater Conditions: Inorganic Constituents

Table 11 provides a summary of inorganic constituents detected above the MDLs in the groundwater samples collected from across the Site. A total of five total/dissolved metals (beryllium, hexavalent chromium, cobalt, iron, and manganese) were detected above their

respective aqueous PALs. The maximum detections of each inorganic constituent in groundwater were 6.2 ug/L at W-14, 10.8 µg/L at MW93-001, 106 ug/L at W-14, 17,700 ug/L at MW93-002, and 1,040 ug/L at W-14, respectively. The inorganic PAL exceedance locations and results have been provided on **Figure GW-2**. For simplicity, **Figure GW-2** does 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.

4.2.3. Groundwater Conditions: Results Summary

Groundwater data were screened to determine whether individual sample results 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 PALs specified in the QAPP are based upon drinking water use, which is not a potential exposure pathway for groundwater at the Site.

None of the aqueous results exceeded the individual VI TCR or THQ criteria as specified by the VISL Calculator. Following the initial screening, a cumulative VI risk assessment was also performed for each individual sample location, with the results separated by cancer versus non-cancer risk. All compounds with detections were included in the computation of the cumulative cancer risk, and all compounds with detections exceeding 10% of the THQ level were included in the evaluation of non-cancer hazard. None of the cumulative VI cancer risks were greater than 1E-5. Methyl tert-butyl ether (MTBE) was the only parameter included in the cumulative evaluation of cancer risk because it was the only detected compound (0.5 ug/L at MW93-002) with a corresponding carcinogenic VI screening level at the specified TCR of 1E-5. There were no compounds that were identified above the 10% THQ level to be included in the cumulative VI evaluation for non-cancer hazard. The results of the cumulative VI comparisons are provided in **Table 12**.

The presence and absence of groundwater impacts within the Site boundaries have been adequately described. There were no concerns related to potential VI risks at the Site. Based on the relatively low-level analytical results identified during this investigation, there do not appear to be significant ongoing sources of groundwater contamination present.

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) Freshwater Sediment Screening Benchmark values. The analytical results for the detected parameters are summarized and compared to the PALs and the BTAG Freshwater Sediment Screening Benchmark values in **Table**

13 (Organics) and **Table 14** (Inorganics). The laboratory Certificate of Analysis (including the Chain of Custody) and the associated DVR have been included as electronic attachments. The DVR contains a glossary of qualifiers for the final flags assigned to individual results in the attached summary tables.

Arsenic and Oil & Grease were the only compounds to exceed the specified PALs (3 mg/kg and 6,200 mg/kg, respectively). Arsenic was detected above the PAL in three of the four samples; whereas, Oil & Grease was detected above the PAL in two of the sediment samples. The maximum detections of arsenic and Oil & Grease in sediment were 8.2 mg/kg in A7-016-SD and 30,000 mg/kg in A7-017-SD, respectively. A summary figure showing the PAL exceedances in the pond sediments (all classes of compounds) has been provided on **Figure SD-1**.

Several organic and inorganic constituents were detected in the sediment samples above their respective BTAG Freshwater Sediment Screening Benchmark values. These included one VOC (carbon disulfide), six SVOCs (2-methylnaphthalene, acenaphthene, acenaphthylene, benzo[b]fluoranthene, bis(2-ethylhexyl)phthalate, and naphthalene), and 11 inorganics (cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, zinc, and cyanide). Most of the listed compounds (all except carbon disulfide, acenaphthene, and bis(2-ethylhexyl)phthalate) were detected above their respective BTAG Benchmark values in more than one sediment sample. It is anticipated that Parcel A7 will be developed for industrial use in the coming years, possibly removing the ponds. While the BTAG Freshwater Sediment Screening Benchmark values are useful for generally characterizing the sediments, the risks associated with these values may not be applicable for future development.

The detections of constituents in the pond sediments are not a significant concern at this time. Since the sediments are below the water surface, there is no direct exposure pathway for a worker to encounter the pond sediments. Furthermore, since arsenic and Oil & Grease were the only compounds to exceed their PALs in the sediments, the potential risks to workers who could in the future be exposed to pond sediments are not expected to be significant. The detections of arsenic in the pond sediments were relatively low, and the elevated Oil & Grease concentrations do not appear to be associated with TPH-DRO/GRO contamination since DRO was detected at low concentrations and GRO was not detected. The Oil & Grease impacts in the pond sediments may be associated with the nearby roadways bordering Parcel A7. There is no indirect exposure risk via the consumption of organisms impacted by the pond sediments because fishing does not occur in this area. Therefore, no additional action or remediation is proposed at this time with regard to the pond sediments. However, the sediments may require additional characterization and management for proper disposal of Oil & Grease contaminated sediments during redevelopment.

4.4. SURFACE WATER CONDITIONS

The surface water samples were screened against the PALs established in the QAPP (for groundwater) to determine potential direct exposure risks. The surface water analytical results

were additionally compared to the National Recommended Water Quality Criteria (NRWQC) Aquatic Life Chronic Criteria for Freshwater. The analytical results for the detected parameters are summarized and compared to the PALs and the Aquatic Life Chronic Criteria for Freshwater in **Table 15** (Organics) and **Table 16** (Inorganics). The laboratory Certificates of Analysis (including Chains of Custody) and the associated DVR have been included as electronic attachments. The DVR contains a glossary of qualifiers for the final flags assigned to individual results in the attached summary tables.

PAL exceedances in the surface water samples consisted of one SVOC (naphthalene), DRO, Oil & Grease, and 11 inorganics (arsenic, cadmium, chromium, hexavalent chromium, iron, lead, manganese, selenium, thallium, vanadium, and zinc). Naphthalene was detected above its PAL in one surface water sample (A7-016-SW) with a detection of 0.5 µg/L compared to the PAL of 0.17 µg/L. DRO was detected above its PAL (47 µg/L) in all four surface water samples with a maximum detection of 358 µg/L (flagged with the "J" qualifier indicating that it is an estimated value) at A7-016-SW. This was also the only surface water sample to exceed the Oil & Grease PAL with a detection of 2,310 µg/L ("J" qualified). The inorganic PAL exceedances were widespread in samples A7-016-SW, A7-017-SW, and A7-019-SW; however, there were no exceedances in sample A7-018-SW. A summary figure showing the aqueous PAL exceedances in the surface water samples (all classes of compounds) has been provided on **Figure SW-1**.

Several inorganic constituents were detected in the surface water samples above their respective Aquatic Life Chronic Criteria for Freshwater. None of the organic compounds detected in the surface water samples had an associated Aquatic Life Chronic Criteria for comparison. The inorganic exceedances included aluminum, cadmium, copper, iron, lead, selenium, zinc, and total cyanide. Each of the listed inorganic constituents was detected above its respective Aquatic Life Chronic Criteria in more than one surface water sample. The exceedances of total cyanide are not valid, because the Aquatic Life Chronic Criteria are expressed as free cyanide; comparable data for available cyanide in the surface water samples indicated that these concentrations are below the Aquatic Life Chronic Criteria of 5.2 µg/L. It is anticipated that Parcel A7 will be developed for industrial use in the coming years, possibly removing the ponds. While the Aquatic Life Chronic Criteria are useful for generally characterizing the surface water in the ponds, the risks associated with these values may not be applicable for future development.

The detections of constituents in the surface water samples are not a significant concern at this time. The PALs specified in the QAPP are based upon drinking water use, which is not a potential exposure pathway for surface water at the Site. There is no indirect exposure risk via the consumption of organisms impacted by the surface water constituents because fishing does not occur in this area. Therefore, no additional action or remediation is proposed at this time with regard to the surface water in the two stormwater ponds.

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, metals, cyanide, or TPH/Oil & Grease) are present in Site media (soil, groundwater, sediment, and surface water) 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 control (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 I**. Please note that the sediment and surface water samples were pooled with a set of soil samples when computing the appropriate number of QA/QC samples for the project. The following QC samples were submitted for analysis to support the data validation:

- Trip Blank – at a rate of one per cooler with VOC samples per day
  - Soil/Sediment – VOCs only
  - Water – VOCs only
- Blind Field Duplicate – at a rate of one per twenty samples
  - Soil/Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, PCBs, hexavalent chromium, and cyanide
  - Water – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, hexavalent chromium, and cyanide
- Matrix Spike/Matrix Spike Duplicate – at a rate of one per twenty samples
  - Soil/Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, PCBs, and hexavalent chromium
  - Water – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, and hexavalent chromium
- Field Blank and Equipment Blank – at a rate of one per twenty samples
  - Soil/Sediment – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, hexavalent chromium, and cyanide
  - Water – VOCs, SVOCs, Metals, TPH-DRO, TPH-GRO, Oil & Grease, hexavalent chromium, and cyanide

The 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 at the beginning of each day and re-checked as needed. The logs have been provided in **Appendix D** (PID calibration log) and **Appendix G** (multiparameter meter calibration logs).

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 Chain of Custody forms 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). The DVRs provided by EDQI have been included as electronic attachments.

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 property-wide QAPP dated 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 PACE-Greensburg (PA) laboratory facility implements quality assurance and reporting requirements through the TNI certification program with the State of Pennsylvania; which is accepted by Maryland. Since late-January 2017, these requirements include the flagging of contaminants with a "B" qualifier when an analyte is detected in an associated laboratory method blank, regardless of the level of the contaminant detected in the sample. A method blank is analyzed at a rate of one blank for each 20 sample analytical batch. The USEPA has previously

specified that results flagged with the "B" qualifier do not represent legitimate detections. They have also specified that results flagged with a "JB" qualifier are invalid, and any such results should be revised to display the "B" qualifier only.

Although elevated sample results may be "B" qualified by the laboratory as non-detects due to low-level blank detections, EDQI corrects any erroneous "B" qualifiers during the data validation procedure to avoid under-reporting analytical detections. EDQI removes the "B" qualifiers for relevant samples according to the guidance given in the table below. Therefore, a result originally flagged with a "B" qualifier in the laboratory certificate may be reported as a legitimate detection without this qualifier. Likewise, a result originally flagged with a "JB" qualifier in the laboratory certificate may be reported as a "J" qualifier if the erroneous "B" qualifier can be eliminated, but would be reported as a "B" qualified non-detect result if the original "B" qualifier is legitimate.

Blank Result	Sample Result	Qualifying Action
Result less than RL	Result less than RL	Result is Qualified "B"
	Result greater than RL	Remove "B"
Result greater than RL	Result less than Blank Result	Result is Qualified "B"
	Result greater than Blank Result	Remove "B"

RL = Reporting Limit

As directed by EDQI, ARM has reviewed all non-validated laboratory reports (those which were not designated to be reviewed by EDQI), and applied the same validation corrections to any relevant "B" or "JB" qualified results. This review of the non-validated data ensures that any elevated detections of parameters, including those which may exceed the PALs, are not mistakenly reported as non-detect values simply because they did not undergo the formal validation procedure by EDQI. 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. The analytical results that were rejected during data validation are provided in **Table 17** (soil; both from borings and test pit composite samples) **Table 18** (groundwater) and **Table 19** (sediment). None of the surface water results were rejected during validation. 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, 004, 006, 008, 009, 010, 011, 015, 017, and 024**. Review of the field notes and laboratory sample receipt records indicated that sample collection 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 significant 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 is provided in **Appendix J**. This evaluation of completeness includes only the representative 50% of sample results which were randomly selected for validation.

All compounds in surface water had an overall completeness ratio of 100%, indicating that none of these results were rejected. All groundwater compounds had an overall completeness ratio of

100%, excluding total cyanide. Both of the total cyanide results which underwent the validation procedure were rejected. However, the rejection of the data for total cyanide does not represent a significant data gap because available cyanide was also sampled in groundwater and had a completeness ratio of 100% (i.e., no rejected results).

The only soil compounds with overall completeness ratios below 90% were 1,4-dioxane (0%) and pentachlorophenol (54%). These two compounds were also rejected in the sediment results, with the full set of validated results rejected in each case (0% completeness). The rejection of the results for these two compounds has not been uncommon for solid matrix data obtained from the Tradepoint Atlantic property. Since 1,4-dioxane is often associated with chlorinated VOCs, any potentially significant concentrations of 1,4-dioxane in the soil and sediments would be expected to be accompanied by a significant presence of chlorinated VOCs, which has not been the case in this parcel. In addition, there was one rejected result for 3,3'-dichlorobenzidine in sediments, resulting in a completeness ratio of 75%. The rejection of this single result in sediment does not represent a significant data gap. Groundwater and surface water data is available (100% completeness for 1,4-dioxane, pentachlorophenol, and 3,3'-dichlorobenzidine) to evaluate the significance of these compounds in Parcel A7.

Overall, the soil, groundwater, sediment, and surface water data can be used as intended, and no significant data gaps were identified. While a limited set of analytes did not meet the completeness goal of 90% for all Site media, 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 54 soil samples (from 18 boring locations and 10 test pit locations), three groundwater samples, four sediments samples, and four surface water samples were collected and analyzed to define the nature and extent of contamination in Parcel A7. 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 and sediment samples were analyzed for TCL-VOCs, TCL-SVOCs, TPH-DRO/GRO, Oil & Grease, TAL-Metals, hexavalent chromium, and cyanide. Shallow soil samples (0 to 1 foot bgs) and sediment samples were additionally analyzed for PCBs. The test pit composite samples were analyzed for TCL-SVOCs, TPH-DRO/GRO, Oil & Grease, TAL-Metals, hexavalent chromium, and cyanide. Groundwater and surface water samples were analyzed for TCL-VOCs, TCL-SVOCs, TPH-DRO/GRO, Oil & Grease, TAL-Metals (total and/or dissolved), hexavalent chromium (total and/or dissolved), total cyanide, and available cyanide.

6.1. SOIL (BORINGS AND TEST PITS)

The concentrations of constituents in the soil (including the data obtained from the soil borings as well as the test pit composite samples) have been characterized by the Phase II Investigation to provide estimates of exposure point concentrations to support risk assessment.

Lead and PCB 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. There were no concentrations of total PCBs identified above the mandatory delineation criterion of 50 mg/kg, indicating that further action is not needed.

There were no soil PAL exceedances identified for VOCs, SVOCs, TPH-DRO/GRO, or PCBs, indicating that these compounds are not significant contaminants in soil at the Site. Exceedances of the PALs in soil within Parcel A7 consisted of four inorganics (arsenic, lead, manganese, and thallium) and Oil & Grease. Arsenic exceeded its PAL in the largest proportion of the samples analyzed for this compound site-wide (42 soil exceedances), with a maximum detection of 86.3 mg/kg in sample A7-005-SB-1. In comparison, lead exceeded its PAL in seven soil samples; whereas, manganese, thallium, and Oil & Grease exceeded their PALs at individual isolated locations with one exceedance each. Petroleum impacts, including a discussion of the soil core observations and the Oil & Grease PAL exceedance (14,400 mg/kg) in sample A7-001-SB-8, are further discussed in Section 6.5.

6.2. GROUNDWATER

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

There were no aqueous PAL exceedances identified in groundwater for VOCs, SVOCs, GRO, or Oil & Grease, indicating that these compounds are not significant contaminants in groundwater at the Site. Exceedances of the PALs in groundwater below Parcel A7 consisted of five total/dissolved metals (beryllium, hexavalent chromium, cobalt, iron, and manganese) and DRO. Beryllium, cobalt, iron, and manganese were all detected at concentrations that exceeded their respective PALs in W-14, and additional exceedances of cobalt, iron, and manganese were observed in MW93-002 (beryllium did not exceed its PAL at this location). The only other inorganic PAL exceedance in groundwater was dissolved hexavalent chromium, which was detected at a concentration of 10.8 µg/L in MW93-001. This was the only groundwater exceedance in MW93-001. DRO was detected above its PAL (47 µg/L) in one location (MW93-002) with a detection of 108 µg/L flagged with the "J" qualifier. Each groundwater point 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 groundwater sampling locations.

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. 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. None of the individual sample results exceeded the VI TCR or THQ criteria. When the aqueous results were summed by sample location, none of the cumulative VI cancer risks were greater than or equal to 1E-5, and none of the cumulative VI non-cancer HI values exceeded 1. There are no concerns related to potential VI risks at the Site.

6.3. SEDIMENT

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 BTAG Freshwater Sediment Screening Benchmark values.

It is anticipated that Parcel A7 will be developed for industrial use in the coming years, possibly removing the ponds. While the BTAG Freshwater Sediment Screening Benchmark values are useful for generally characterizing the sediments, the risks associated with these values may not be applicable for future development. Several constituents were detected in the sediment samples above their respective BTAG Freshwater Sediment Screening Benchmark values, including one VOC (carbon disulfide), six SVOCs (2-methylnaphthalene, acenaphthene, acenaphthylene,

benzo[b]fluoranthene, bis(2-ethylhexyl)phthalate, and naphthalene), and 11 inorganics (cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, zinc, and cyanide).

PAL exceedances in the sediment samples were limited to arsenic and Oil & Grease. Arsenic was detected above the PAL in three of the four samples (maximum detection of 8.2 mg/kg in A7-016-SD); whereas, Oil & Grease was detected above the PAL in two of the sediment samples (maximum detection of 30,000 mg/kg in A7-017-SD).

The detections of constituents in the pond sediments above the PALs are not a significant concern at this time. Since the sediments are below the water surface, there is no direct exposure pathway for a worker to encounter the pond sediments. Furthermore, the potential risks to workers who could in the future be exposed to pond sediments are not expected to be significant because the detections of arsenic in the pond sediments were relatively low. The elevated Oil & Grease concentrations do not appear to be associated with TPH-DRO/GRO contamination, and may be associated with the nearby roadways bordering Parcel A7. There is no indirect exposure risk via the consumption of organisms impacted by the pond sediments because fishing does not occur in this area. Therefore, no additional action or remediation is proposed at this time with regard to the pond sediments. However, the sediments may require additional characterization and management for proper disposal of Oil & Grease contaminated sediments during redevelopment.

6.4. SURFACE WATER

The surface water samples were screened against the PALs established in the QAPP (for groundwater) to determine potential direct exposure risks. The surface water analytical results were additionally compared to the NRWQC Aquatic Life Chronic Criteria for Freshwater.

It is anticipated that Parcel A7 will be developed for industrial use in the coming years, possibly removing the ponds. While the Aquatic Life Chronic Criteria are useful for generally characterizing the surface water in the ponds, the risks associated with these values may not be applicable for future development. Several inorganic constituents were detected in the surface water samples above their respective Aquatic Life Chronic Criteria for Freshwater, including aluminum, cadmium, copper, iron, lead, selenium, zinc, and total cyanide. The exceedances of total cyanide are not valid, because comparable data for available cyanide in the surface water samples indicated that these concentrations are below the applicable criteria.

PAL exceedances in the surface water samples consisted of one SVOC (naphthalene), Oil & Grease, DRO, and 11 inorganics (arsenic, cadmium, chromium, hexavalent chromium, iron, lead, manganese, selenium, thallium, vanadium, and zinc). Naphthalene was detected above its PAL in one surface water sample (A7-016-SW) with a detection of 0.5 µg/L. Oil & Grease was detected above its PAL in the same sample with a detection of 2,310 µg/L ("J" qualified). DRO was detected above its PAL in all four surface water samples with a maximum detection of 358 µg/L

("J" qualified) in A7-016-SW. Several inorganic PAL exceedances were identified in A7-016-SW, A7-017-SW, and A7-019-SW; there were no exceedances in sample A7-018-SW.

The detections of constituents in the surface water samples above the PALs are not a significant concern at this time. The PALs specified in the QAPP are based upon drinking water use, which is not a potential exposure pathway for surface water at the Site. There is no indirect exposure risk via the consumption of organisms impacted by the surface water constituents because fishing does not occur in this area. Therefore, no additional action or remediation is proposed at this time with regard to the surface water in the two stormwater ponds.

6.5. NON-AQUEOUS PHASE LIQUID

Prior to the initiation of the Parcel A7 Work Plan, each of the historical groundwater monitoring wells (MW93-001, MW93-002, and W-14) was inspected and gauged using an oil-water interface probe to evaluate the potential presence of NAPL. In addition, the two intact historical wells (MW93-001 and W-14) and the replacement temporary groundwater sample collection point (MW93-002) were re-gauged to check for NAPL prior to sample collection. None of the groundwater locations exhibited evidence of NAPL during any of the gauging events.

Elevated concentrations of Oil & Grease above the soil PAL (6,200 mg/kg) were detected in the stormwater pond sediments. These concentrations could be indicative of potential NAPL contamination. However, no physical evidence of NAPL contamination was observed during the collection of the sediment samples. Although no additional action or remediation is proposed at this time with regard to the pond sediments, additional characterization may be required during redevelopment to ensure proper management and disposal of excavated sediments which may be impacted by elevated Oil & Grease.

There were no elevated detections of DRO or GRO in soil above the PAL (6,200 mg/kg); however, there was one soil sample with an elevated Oil & Grease detection (14,400 mg/kg in sample A7-001-SB-8). This Oil & Grease concentration does not appear to be associated with TPH-DRO/GRO contamination since DRO was detected at 929 mg/kg in this sample (below the PAL of 6,200 mg/kg) and GRO was not detected. The intermediate soil sample collected from this boring was shifted to the 7 to 8 foot bgs interval due to observations of a light petroleum odor and staining in the associated soil core at this depth. An underlying soil sample collected in the 9 to 10 foot bgs interval did not have any observations of contamination or significant detections of TPH/Oil & Grease. In addition, groundwater was not observed to be encountered within this soil core. Based on the field observations and analytical results from the underlying sample interval, and the absence of groundwater in the soil core, the potential mobility of petroleum contaminants is expected to be low and a temporary NAPL screening piezometer is not recommended at this location.

Although a NAPL screening piezometer is not proposed, the proximity of soil boring A7-001-SB to proposed utilities should be evaluated in any future development planning for Parcel A7 due to the possibility of petroleum impacts at this location. 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.

6.6. RECOMMENDATIONS

Sufficient remedial investigation data has been collected to present this evaluation of the nature and extent of possible constituents of concern in Parcel A7. The presence and absence of soil, groundwater, sediment, and surface water impacts within Parcel A7 have been adequately described and further site-wide investigation is not warranted to characterize overall conditions. Recommendations for the parcel are as follows:

- The soil boring with evidence of petroleum contamination and an elevated concentration of Oil & Grease (A7-001-SB) should be considered for proximity to proposed utilities in any future development plans. If future utilities are proposed in the vicinity of this boring, appropriate protocols for the mitigation of potential product (i.e., NAPL) mobility should be specified in a Response and Development Work Plan.

- At multiple locations in the two stormwater ponds, sediment and surface water sample results exceeded the PALs and other environmental criteria (BTAG and NRWQC). While the environmental criteria are useful for generally characterizing current conditions in the ponds, the risks associated with these values may not be applicable for future development since the ponds may be removed. Based on the lack of exposure pathways for a worker to encounter sediments and surface water in the ponds, no additional action or remediation is proposed at this time. However, future development work may require that some conditions be addressed, in particular elevated concentrations of Oil & Grease in the sediments. Additional characterization may be required during redevelopment to ensure proper management of excavated sediments. If necessary, any response actions will be coordinated in the future with the MDE.

7.0 REFERENCES

ARM Group, Inc. (2017). *Phase II Investigation Work Plan: Parcel A7.* Revision 1. July 12, 2017.

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Rust Environment and 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).

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FIGURES

Phase II Soil Boring

Test Pit Location

Parcel Boundary

Parcel A13

Parcel A5

Parcel A7

Parcel A8

Parcel A11

A7-001-SB-1
Arsenic: 4.7

A7-001-SB-8
Arsenic: 36.0

A7-001-SB-10
Arsenic: 10.2

A7-003-SB-1
Arsenic: 3.6 J

A7-005-SB-1
Arsenic: 86.3 J
Lead: 2,690

A7-007-TP-1
Arsenic: 21.0 J

A7-010-TP-1
Arsenic: 22.1 J
Lead: 1,060

A7-008-TP-1
Arsenic: 67.9 J
Lead: 6,780
Thallium: 83.6

A7-002-SB-1
Arsenic: 9.1 J

A7-002-SB-5

A7-009-TP-1
Arsenic: 21.7 J

A7-006-TP-1
Arsenic: 22.8 J
Lead: 827

A7-001-TP-1
Arsenic: 25.6
Lead: 1,900

A7-011-SB-1
Arsenic: 3.8

A7-011-SB-8

A7-002-TP-1
Arsenic: 14.4

A7-021-SB-1
Arsenic: 34.8 J
Lead: 1,810

A7-021-SB-5
Arsenic: 22.2 J

A7-021-SB-10
Arsenic: 10.7

A7-009-SB-1
Arsenic: 23.9

A7-009-SB-8

A7-003-TP-1
Arsenic: 10.2

A7-007-SB-1
Arsenic: 37.4

A7-007-SB-9
Arsenic: 16.3

A7-007-SB-10
Arsenic: 5.9

A7-008-SB-1
Arsenic: 30.1 J

A7-008-SB-8
Arsenic: 26.4 J

A7-008-SB-10
Arsenic: 27.7

A7-004-TP-1

A7-005-TP-1

A7-004-SB-1

A7-004-SB-5
Arsenic: 10.7

A7-004-SB-10
Arsenic: 8.2

A7-015-SB-1

A7-015-SB-7
Arsenic: 3.3

A7-015-SB-10
Arsenic: 8.3

A7-020-SB-1
Arsenic: 8.9

A7-020-SB-5
Arsenic: 5.0

A7-020-SB-10

A7-006-SB-1
Arsenic: 4.2

A7-006-SB-5
Arsenic: 5.2

A7-006-SB-10
Arsenic: 27.3

A7-022-SB-1

A7-022-SB-5

A7-014-SB-1
Arsenic: 34.9
Lead: 843

A7-014-SB-5
Arsenic: 21.5

A7-014-SB-10
Arsenic: 3.3

A7-013-SB-1
Arsenic: 4.5

A7-013-SB-5
Arsenic: 5.3

A7-013-SB-10
Arsenic: 3.6

A7-012-SB-1
Arsenic: 3.1

A7-012-SB-5
Arsenic: 3.2

A7-010-SB-1
Manganese: 58,300

A7-010-SB-6

Parcels A7 Soil Samples
Phase II Inorganic Exceedances (mg/kg)

June 18, 2019

Figure
S-2

ARM Group Inc.
Earth Resource Engineers and Consultants

0 75 150 300
Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 150298M-15