RESPONSE AND DEVELOPMENT WORK PLAN

AREA B: SUB-PARCEL B6-6
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

Prepared For:

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TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT.)

FIGURES

TABLES

TABLE OF CONTENTS
(CONT.)

APPENDICES

ELECTRONIC ATTACHMENTS

1.0 INTRODUCTION

ARM Group LLC (ARM), on behalf of Tradepoint Atlantic, has prepared this Response and Development Work Plan (RADWP) for a portion of the Tradepoint Atlantic property that has been designated as Area B: Sub-Parcel B6-6 (the Site). Tradepoint Atlantic submitted a letter (dated December 17, 2021; **Appendix A**) requesting an expedited plan review to achieve construction deadlines for the proposed development on this Site. As shown on **Figure 1**, Sub-Parcel B6-6 consists of approximately 12.7 acres located within Parcel B6 and Parcel A4 of the approximately 3,100-acre former steel plant property.

As shown on **Figure 2**, Sub-Parcel B6-6 is slated for development as a large paved lot of approximately 495,000 square feet. Associated water lines, sanitary sewer lines, storm drains, parking, and an access road are also proposed. The planned development activities will generally include grading, installation of utilities, landscaping and paving of parking areas and roadways. Subsequent site-use may involve workers in a semi-permanent trailer-style office building.

The conduct of any environmental assessment and cleanup activities on the Tradepoint Atlantic property, as well as any associated development, is subject to the requirements outlined in the following agreements:

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

An application to enter the full Tradepoint Atlantic property (3,100 acres) into the MDE Voluntary Cleanup Program (MDE-VCP) was submitted to the MDE 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. Sub-Parcel B6-6 is part of the acreage that remains subject to the requirements of 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.

In consultation with the MDE, Tradepoint Atlantic affirms that it desires to accelerate the assessment, remediation, and redevelopment of certain sub-parcels within the larger site due to current market conditions. To that end, the MDE and Tradepoint Atlantic agree that the Controlled Hazardous Substance (CHS) Act (Section 7-222 of the Environment Article) and the CHS Response Plan (Code of Maryland Regulations (COMAR) 26.14.02) shall serve as the governing statutory and regulatory authority for completing the development activities on Sub-Parcel B6-6

and complement the statutory requirements of the VCP (Section 7-501 of the Environment Article). Upon submission of a RADWP and completion of any remedial activities for the Site, the MDE shall issue a No Further Action Letter (NFA) upon a recordation of an Environmental Covenant describing any necessary land use controls for the specific sub-parcel. At such time that all the sub-parcels within the larger parcel have completed remedial activities, Tradepoint Atlantic shall submit to the MDE a request for issuing a Certificate of Completion (COC) as well as all pertinent information concerning completion of remedial activities conducted on the parcel. Once the VCP has completed its review of the submitted information it shall issue a COC for the entire parcel described in Tradepoint Atlantic's VCP application.

Alternatively, Tradepoint Atlantic or other entity may elect to submit an application for a specific sub-parcel and submit it to the VCP for review and acceptance. If the application is received after the cleanup and redevelopment activities described in this RADWP are implemented and a NFA is issued by the MDE pursuant to the CHS Act, the VCP shall prepare a No Further Requirements Determination for the sub-parcel.

If Tradepoint Atlantic or other entity has not carried out cleanup and redevelopment activities described in the RADWP, the cleanup and redevelopment activities may be conducted under the oversight authority of either the VCP or the CHS Act, so long as those activities comport with this RADWP.

This RADWP provides a Site description and history; summary of environmental conditions identified by the Phase I Environmental Site Assessment (ESA); summary of relevant findings and environmental conditions identified by the relevant Phase II Investigations; a human health Screening Level Risk Assessment (SLRA) conducted for the identified conditions; and any necessary engineering and/or institutional controls to facilitate the planned development and address the impacts and potential human health exposures. These controls include work practices and applicable protocols that are submitted for approval to support the development and use of the Site. Engineering/institutional controls approved and installed for this RADWP shall be described in closure certification documentation submitted to the MDE demonstrating that exposure pathways on the Site are addressed in a manner that protects public health and the environment.

The remainder of Parcel A4 and Parcel B6 have been addressed in separate development plans and/or completion reports in accordance with the requirements of the ACO. Relevant completion reports for sub-parcels in A4 and B6 are listed below:

- Response and Development Completion Report: Area A, Parcel A4 (Revision 1, dated September 13, 2021).
- Response and Development Completion Report: Area B, Parcel Sub-Parcel B6-1 (Revision 0, dated December 11, 2020).
- Interim Response and Development Completion Report: Area B, Parcel Sub-Parcel B6-2 (Revision 0, dated September 22, 2021).

- Response and Development Work Plan: Area B, Sub-Parcel B6-3 (Revision 1, dated June 17, 2020)
- Response and Development Work Plan: Area B, Sub-Parcel B6-4 (Revision 0, dated October 1, 2020)

2.0 SITE DESCRIPTION AND HISTORY

2.1 SITE DESCRIPTION

The Sub-Parcel B6-6 development project consists of approximately 12.7 acres comprising a portion of Parcel B6 as well as a portion of Parcel A4 (**Figure 1**). The development will include a large paved lot of approximately 495,000 square feet (**Figure 2**). The Site is currently zoned Manufacturing Heavy-Industrial Major (MH-IM), and is not occupied. There is no groundwater use on-site or within the surrounding Tradepoint Atlantic property.

Ground surface elevations at the Site range from approximately 10 to 12 feet above mean sea level (amsl) and are generally flat. According to Figure B-2 of the property Stormwater Pollution Prevention Plan (SWPPP) Revision 8 dated April 30, 2020, surface water runoff from the Site flows into the Tin Mill Canal (TMC) and subsequently through National Pollutant Discharge Elimination System (NPDES) permitted Outfall 014 beyond the Humphrey Creek Wastewater Treatment Plant (HCWWTP), which discharges to Bear Creek.

2.2 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 the facility ceased in fall 2012.

The portion of Sub-Parcel B6-6 extending into Parcel A4 did not historically contain any significant operations or processes. A small petroleum recovery facility was previously located outside the eastern side of the Sub-Parcel B6-6 boundary (within Parcel B6). The oil recovery facility was identified within Weaver Boos' Phase I ESA (dated May 19, 2014) based on historical aerial imagery as being located adjacent to the waterway formerly known as Humphrey Creek. The former recovery facility included a small rectangular surface impoundment which was diked to separate it from the Humphrey Creek. The location of the impoundment is within the B6-6 boundary. The former recovery facility was classified as a Recognized Environmental Condition (REC) within Weaver Boos' Phase I ESA. This former REC is further described below in Section 3.1. More information regarding historical activities can also be found in the Phase II Investigation Work Plan for Parcel B6 (Revision 2 dated May 12, 2016; supplemented by a comment response letter dated November 28, 2016), as well as in the Parcel B6 Phase II Investigation Report (Revision 2 dated March 16, 2018).

3.0 ENVIRONMENTAL SITE ASSESSMENT RESULTS

3.1 PHASE I ENVIRONMENTAL SITE ASSESSMENT RESULTS

A Phase I ESA was completed by Weaver Boos Consultants for the entire Sparrows Point property on May 19, 2014. Weaver Boos completed site visits of Sparrows Point from February 19 through 21, 2014, for the purpose of characterizing current conditions at the former steel plant. The Phase I ESA identified particular features across the Tradepoint Atlantic property which presented potential risks to the environment. These RECs included buildings and process areas where releases of hazardous substances and/or petroleum products potentially may have occurred. The Phase I ESA also relied upon findings identified during a previous visual site inspection (VSI) conducted in 1991 as part of the RCRA Facility Assessment (RFA) prepared by A.T. Kearney, Inc. dated August 1993, for the purpose of identifying Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) on the property. This VSI is regularly cited in Description of Current Conditions (DCC) Report (Rust Environment and Infrastructure, 1998).

Weaver Boos' distinction of a REC or Non-REC was based upon the findings of the DCC Report (which was prepared when the features remained on-site in 1998) or on observations of the general area during their site visit. Weaver Boos made the determination to identify a feature as a REC based on historical information, observations during the site visit, and prior knowledge and experience with similar facilities. The following REC was identified at the Site from information presented in the Phase I ESA:

TMC Oil Recovery Plant and Impoundment (REC 26, Finding 278):
According to the Phase I ESA, aerial photography indicated that a small oil recovery plant was located just north of the TMC, with a small rectangular surface impoundment located just to the southwest of the plan. The location of the former plant is outside the eastern side of the Sub-Parcel B6-6 boundary, while the small impoundment was within the B6-6 boundary. The impoundment appeared to be diked to separate it from the adjoining surface waters of the Humphrey Creek (now filled and replaced with the TMC). The area may have contained petroleum products and/or potentially hazardous substances. Both the plant and the surface impoundment have since been removed from the Site.

The DCC Report was also reviewed to identify additional sampling targets. This report included documentation from a previous Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) and a VSI prepared by A.T. Kearney, Inc. (dated August 1993). The purpose of the VSI was to identify SWMUs and AOCs on the property. SWMUs and AOCs, if present, were identified from the DCC Report Figure 3-1. There were no SWMUs or AOCs identified within the Sub-Parcel B6-6 boundary.

3.2 PHASE II INVESTIGATION RESULTS – SUB-PARCEL B6-6

Phase II Investigations specific to soil and groundwater conditions were performed for the property area including Sub-Parcel B6-6 in accordance with the requirements outlined in the ACO as further described in the following agency-approved Phase II Investigation Work Plans:

- Area A: Parcel A4 (Revision 2) dated October 29, 2015
- Area B: Parcel B6 (Revision 2) dated May 12, 2016
- Finishing Mills Groundwater Investigation (Revision 1) dated July 7, 2016

All soil samples and groundwater samples were collected and analyzed in accordance with agency-approved protocols during the Phase II Investigations, the specific details of which can be reviewed in each agency-approved Work Plan. Each Phase II Investigation was developed to target specific features which represented a potential release of hazardous substances and/or petroleum products to the environment, including RECs, SWMUs, and AOCs, as applicable, as well as numerous other targets identified from former operations that would have the potential for environmental contamination. Samples were also collected at site-wide locations to ensure full coverage of each investigation area. The full analytical results and conclusions of each investigation have been presented to the agencies in the following Phase II Investigation Reports:

- Area A: Parcel A4 (Revision 3) dated December 20, 2019
- Area B: Parcel B6 (Revision 2) dated March 16, 2018
- Finishing Mills Groundwater Investigation (Revision 0) dated November 30, 2016

This RADWP summarizes the relevant soil and groundwater findings from these Phase II Investigations with respect to the proposed development of Sub-Parcel B6-6.

3.2.1 Phase II Soil Investigation Findings

Based on the scope of development for Sub-Parcel B6-6, 24 soil samples collected from 12 completed soil borings (including three soil borings from the Parcel A4 Phase II Investigation and nine soil borings from the Parcel B6 Phase II Investigation) were included in this evaluation of Sub-Parcel B6-6. The 12 boring locations are shown on **Figure 3**, and the samples obtained from these borings provided relevant analytical data for discussion of on-site conditions. Note that six of the selected soil borings (B6-003-SB, B6-036-SB, B6-037-SB, B6-038-SB, B6-053-SB, B6-054-SB) are located outside Sub-Parcel B6-6; however, data from these locations have been included in this evaluation because they are very close to the site boundary and/or LOD to characterize soil on the Site.

Soil samples collected during the Phase II Investigation were analyzed for the Target Compound List (TCL) semi-volatile organic compounds (SVOCs) and polynuclear aromatic hydrocarbons (PAHs), total petroleum hydrocarbon (TPH) diesel range organics (DRO) and gasoline range

organics (GRO), Oil & Grease, Target Analyte List (TAL) metals, hexavalent chromium, and cyanide. Shallow soil samples (0 to 1 foot below ground surface (bgs)) were also analyzed for polychlorinated biphenyls (PCBs). Samples from any depth interval with a sustained photoionization detector (PID) reading above 10 ppm were also analyzed for TCL volatile organic compounds (VOCs). The laboratory Certificates of Analysis (including Chains of Custody) and Data Validation Reports (30% to 50% validated soil data) are included as electronic attachments. The Data Validation Reports contain qualifier keys for the flags assigned to individual results in the attached summary tables.

Soil sample results were screened against the Project Action Limits (PALs) established in the property-wide Quality Assurance Project Plan (QAPP) dated April 5, 2016, or based on other direct agency guidance. Several PALs have been adjusted based on revised toxicity data published by the USEPA (May 2021). **Table 1** and **Table 2** provide summaries of the detected organic compounds and inorganics in the soil samples collected from the 12 completed soil borings relevant for this Site evaluation. **Figure 4** presents the soil sample results that exceeded the PALs among these soil borings. PAL exceedances consisted of two SVOCs (benzo[a]pyrene and naphthalene), three inorganics (arsenic, manganese, and vanadium), and DRO.

Evidence of non-aqueous phase liquid (NAPL) was observed at a few of the Phase II soil boring locations being considered for this RADWP. Contingency measures to address the presence of NAPL which could be encountered during construction are addressed in subsequent sections of this RADWP.

3.2.2 Phase II Groundwater Investigation Findings

Groundwater conditions were investigated as reported in the Finishing Mills Groundwater Phase II Investigation Report (Revision 0 dated November 30, 2016), the Parcel A4 Phase II Investigation Report (Revision 3 dated December 20, 2019), and the Parcel A6 Phase II Investigation Report (Revision 0 dated June 23, 2020). The seven relevant monitoring points provide relevant analytical data for the proposed Sub-Parcel B6-6 development project and are shown on **Figure 5**. There is no direct exposure risk for future Composite Workers at the Site because there is no use of groundwater on the Tradepoint Atlantic property; however, groundwater may be encountered in the Site during some construction tasks. If groundwater is encountered, it will be managed to prevent exposures in accordance with the dewatering requirements outlined in Section 5.2. Additionally, vapor intrusion (VI) risks are evaluated in Section 3.2.3.

Each groundwater monitoring well was inspected for evidence of NAPL using an oil-water interface probe prior to sampling. None of the monitoring wells relevant for the proposed development project showed evidence of NAPL during these checks. The groundwater samples were analyzed for TCL-VOCs, TCL-SVOCs and PAHs, TPH-DRO/GRO, Oil & Grease, TAL-dissolved/total metals, hexavalent chromium, and total cyanide. The laboratory Certificates of Analysis (including Chains of Custody) and Data Validation Reports (50% validated groundwater

data) are included as electronic attachments. The Data Validation Reports contain qualifier keys for the flags assigned to individual results in the attached summary tables.

The Finishing Mills Phase II Investigation groundwater results were screened against the PALs established in the property-wide QAPP dated April 5, 2016, or based on other direct agency guidance. Similar to the evaluation of soil data, several PALs have been adjusted based on revised toxicity data published by the USEPA (May 2021). **Table 3** and **Table 4** provide summaries of the detected organic compounds and inorganics in the groundwater samples submitted for laboratory analysis, and **Figure 6** presents the groundwater results that exceeded the PALs. PAL exceedances in the Phase II Investigation groundwater samples collected in the vicinity of the proposed development project consisted of one VOC (chloroform), two SVOCs (benzo[a]pyrene and naphthalene), TPH-DRO, TPH-GRO, and seven total and/or dissolved metals (chromium, cobalt, iron, lead, manganese, thallium, and vanadium).

3.2.3 Locations of Potential Concern

Groundwater data were screened to determine whether any sample results exceeded the USEPA Vapor Intrusion Target Cancer Risk (TCR) (carcinogen) or Target Hazard Quotient (THQ) (non-carcinogen) Screening Levels. None of the individual sample results exceeded the cumulative VI cancer risk screening level of 1E-5 or the non-cancer VI Hazard Index (HI) value of 1. Therefore, based on the dissolved phase groundwater data, there are no identified VI risks associated with Site development. The VI risk evaluation is summarized in **Table 5**.

Other locations of potential concern which are subject to special requirements could include elevated lead, PCBs, or TPH/Oil & Grease in soil. The soil data for Sub-Parcel B6-6 were evaluated to determine the presence of any such locations of potential concern, including: lead concentrations above 10,000 milligrams per kilogram (mg/kg), PCB concentrations above 50 mg/kg, or TPH/Oil & Grease concentrations above 6,200 mg/kg. There were no soil concentrations of lead or PCBs above the specified criteria. However, there were two concentrations of TPH analytes above 6,200 mg/kg: the concentrations of DRO for samples B6-066-SB-5 (11,000 mg/kg) and B6-054-SB-4 (6,840 mg/kg).

Locations with physical evidence of NAPL are also considered to be locations of potential concern with respect to proposed development. Elevated TPH-DRO/GRO concentrations could be indicative of the potential presence of NAPL which could be mobilized during construction associated with utility installations. Soil cores were screened for evidence of possible NAPL contamination during the completion of each soil boring. The field observations were noted on the boring logs (submitted with the Parcel B6 and Parcel A4 Phase II Investigation Reports), and a few sample locations (B6-066-SB and B6-068-SB) had visible sheens or NAPL noted in the soil cores. A NAPL screening piezometer was not warranted at B6-054-SB due to the lack of physical evidence of NAPL in the soil core and lack of subsurface impacts, as reported in the Parcel B6 Phase II Investigation Report.

NAPL screening piezometers were installed at locations B6-066-SB and B6-068-SB. No measurable NAPL was detected in piezometer B6-068-PZ over the 30-day period following its installation, so it was subsequently abandoned. However, measurable NAPL was detected in piezometer B6-066-PZ. This location also exhibited an elevated detection of DRO above the soil PAL as documented above. An oil-water interface probe was used to check the piezometer for the presence of NAPL immediately after installation, 48 hours after installation, and again after at least 30 days. Measurable NAPL was recorded in piezometer B6-066-PZ and the NAPL was subsequently delineated via the installation of additional temporary piezometers and test pits in the surrounding area. Delineation and subsequent monitoring were completed, and response actions to address the NAPL impacts were documented in the B6-066 Test Pit Completion Report dated October 5, 2021. The following paragraph provides a brief summary of the delineation and remediation activities, while the full completion report is included as **Appendix B.**

To delineate the extent of NAPL impacts around B6-066-PZ, a total of 69 NAPL screening piezometers were installed between July 2016 and April 2017. A total of 49 piezometers had trace or measurable NAPL. After a period of routine gauging, all piezometers were abandoned in May 2021. Test pits were completed in July 2021 to further assess the presence of NAPL. Impacted materials from test pits TP-1, TP-2, and TP-4 were stockpiled for offsite disposal. An observation point installed in TP-2—the most NAPL-impacted test pit—did not accumulate NAPL after 30 days, and was subsequently abandoned. Delineation piezometers and test pit locations are shown on **Figure 7.** The B6-066 NAPL delineation area is still considered an area of potential concern with respect to vapor intrusion. However, there are no buildings currently planned for construction near this area or anywhere at the Site.

The proximity of DRO-impacted borings (and NAPL delineation piezometers) to proposed utilities is required to be evaluated for development planning. Appropriate protocols are documented in Section 5.1.1 to prevent the mobilization of any product if future utilities are proposed in the vicinity of these impacts. A close-up view of piezometer B6-066-PZ in relation to the currently proposed utility plan, with all delineation piezometers and test pits, is provided on **Figure 7**. This figure indicates that a proposed storm sewer line runs directly through the NAPL delineation area. Contingency measures to address the potential presence of NAPL which could be encountered during construction are addressed in subsequent sections of this RADWP.

3.3 HUMAN HEALTH SCREENING LEVEL RISK ASSESSMENT

3.3.1 Analysis Process

A human health SLRA has been completed based on the analytical data obtained from the characterization of surface and subsurface soils. The SLRA was conducted to evaluate the existing soil conditions to determine if any response measures are necessary. It should be noted that industrial fill including processed slag aggregate sourced from the Tradepoint Atlantic property will be used at the Site; therefore, regardless of the findings of the Composite Worker baseline

SLRA, Sub-Parcel B6-6 will be subject to surface engineering controls (i.e., capping) unless separate approvals are received from the MDE following appropriate laboratory testing of the industrial fill materials.

The SLRA included the following evaluation process:

Identification of Exposure Units (EUs): The SLRA was evaluated using a single site-wide EU with an area of 12.7 acres. The same EU and associated soil datasets were used for the evaluation of the Composite Worker and Construction Worker scenarios.

Identification of Constituents of Potential Concern (COPCs): For the project-specific SLRA, COPC screening was completed assuming a Target Risk (TR) of 1E-6 and Target Hazard Quotient (THQ) of 0.1. The initial screening also identified parameters detected at a frequency greater than 5%. Based on that data set, parameters were identified as COPCs if:

- The compound was detected in soil at a frequency of greater than 5%;
- The maximum detection exceeded the USEPA's Composite Worker Soil Regional Screening Levels (RSLs).

A COPC screening analysis is provided in **Table 6** to identify all compounds above the relevant screening levels.

All aroclor mixtures (e.g., Aroclor 1248, Aroclor 1260) are taken into account for the reported concentrations of total PCBs. The total PCBs concentrations are used to evaluate the carcinogenic risk associated with PCBs.

Exposure Point Concentrations (EPCs): The COPC soil datasets for the site-wide EU were divided into surface (0 to 2 feet bgs), subsurface (>2 feet bgs), and pooled depths for estimation of potential EPCs. Thus, there are three soil datasets associated with the site-wide EU. If there were less than 10 sample results, the maximum detected value was used as the soil EPC. A statistical analysis was performed only if there were ten or more sample results in the dataset using the ProUCL software (version 5.0) developed by the USEPA to determine representative reasonable maximum exposure (RME) values for the EPC for each constituent. For calculation of UCLs, ProUCL utilizes one half of the detection limit for non-detect results. The RME value is typically the 95% Upper Confidence Limit (UCL) of the mean. For lead, the arithmetic mean for each depth was calculated for comparison to the Adult Lead Model (ALM)-based values (presented in **Table 7**).

Risk Ratios: The surface soil EPCs, subsurface soil EPCs, and pooled soil EPCs were compared to the USEPA RSLs for the Composite Worker and to site-specific Soil Screening Levels (SSLs) for the Construction Worker based on equations derived in the

USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (OSWER 9355.4-24, December 2002). Risk ratios were calculated with a cancer risk of 1E-6 and a non-cancer HQ of 1. The risk ratios for the carcinogens were summed to develop a screening level estimate of the baseline cumulative cancer risk. The risk ratios for the non-carcinogens were segregated and summed by target organ to develop a screening level estimate of the baseline cumulative non-cancer Hazard Index (HI).

For the Construction Worker, site-specific risk-based evaluations were completed for a range of potential exposure frequencies to determine the maximum allowable exposure frequency for the site-wide EU that would result in risk ratios equivalent to a cumulative cancer risk of 1E-5 or HI of 1 for the individual target organs. This analysis indicated that the allowable exposure frequency before additional worker protections or more detailed job safety evaluations might be needed is 30 days.

There is no potential for direct human exposure to groundwater for a Composite Worker since groundwater is not used on the Tradepoint Atlantic property (and is not proposed to be utilized). In the event that construction/excavation leads to a potential Construction Worker exposure to groundwater during development, health and safety plans and management procedures shall be followed to limit exposure risk.

Assessment of Lead: For lead, the arithmetic mean concentrations for surface soils, subsurface soils, and pooled soils for the site-wide EU were compared to the applicable RSL (800 mg/kg) as an initial screening. If the mean concentrations for the EU were below the applicable RSL, the EU was identified as requiring no further action for lead. If a mean concentration exceeded the RSL, the mean values were compared to calculated ALM values (ALM Version dated 6/21/2009 updated with the 5/17/2017 OLEM Directive) with inputs of 1.8 for the geometric standard deviation and a blood baseline lead level of 0.6 ug/dL. The ALM calculation generates a soil lead concentration of 1,050 mg/kg, which is the most conservative (i.e., lowest) concentration which would yield a probability of 5% of a blood lead concentration of 5 ug/dL. If the arithmetic mean concentrations for the EU were below 1,050 mg/kg, the EU was identified as requiring no further action for lead. The lead averages are presented for surface, subsurface, and pooled soils in **Table 7**. Neither surface, subsurface, nor pooled soils exceeded an average lead concentration of 800 mg/kg.

Assessment of TPH/Oil & Grease: EPCs were not calculated for TPH/Oil & Grease. Instead, the individual results were compared to the PAL set to a HQ of 1 (6,200 mg/kg). As described in Section 3.2.3, there were two samples with concentrations of DRO that exceeded the PAL. Contingency measures to address the potential presence of NAPL which could be encountered during construction are addressed in subsequent sections of this RADWP.

Risk Characterization Approach: Generally, if the baseline risk ratio for each non-carcinogenic COPC or cumulative target organ does not exceed 1, and the sum of the risk ratios for the carcinogenic COPCs does not exceed a cumulative cancer risk of 1E-5, then a no further action determination will be recommended. If the baseline estimate of cumulative cancer risk exceeds 1E-5 but is less than or equal to 1E-4, then capping of the EU will be considered to be an acceptable remedy for the Composite Worker. The efficacy of capping for elevated non-cancer hazard will be evaluated in terms of the magnitude of exceedance and other factors such as bioavailability. For the Construction Worker, cumulative cancer risks exceeding 1E-5 (but less than or equal to 1E-4) or HI values exceeding 1 will be mitigated via site-specific health and safety requirements.

It should be noted that industrial fill including processed slag aggregate sourced from the Tradepoint Atlantic property will be used at the Site; therefore, regardless of the findings of the Composite Worker baseline assessment, Sub-Parcel B6-6 will be subject to surface engineering controls (i.e., capping) unless separate approvals are received from the MDE following appropriate laboratory testing of the industrial fill materials. The goal of the SLRA is therefore to determine whether additional response actions beyond capping may be needed due to current conditions at the Site.

The USEPA's acceptable risk range is between 1E-6 and 1E-4. If the sum of the risk ratios for carcinogens exceeds a cumulative cancer risk of 1E-4, further analysis of site conditions will be required including the consideration of toxicity reduction in any proposal for a remedy. The magnitude of any non-carcinogen HI exceedances and bioavailability of the COPC will also dictate further analysis of site conditions including consideration of toxicity reduction in any proposal for a remedy.

3.3.2 SLRA Results and Risk Characterization

Soil data were divided into three datasets (surface, subsurface, and pooled) for Sub-Parcel B6-6 to evaluate potential exposure scenarios. Due to the grading activities including cut and fill which will be implemented during development at the Site, each of these potential exposure scenarios is relevant for the SLRA.

EPCs were calculated for each soil dataset (i.e., surface, subsurface, and pooled soils) in the site-wide EU. ProUCL output tables (with computed UCLs) derived from the data for each COPC in soils are provided as electronic attachments, with computations presented and EPCs calculated for COPCs within each of the datasets. The ProUCL input tables are also included as electronic attachments. If there were fewer than 10 sample results for a particular dataset, the maximum concentration was used. The results were evaluated to identify any samples that may require additional assessment or special management based on the risk characterization approach. The calculated EPCs for the surface, subsurface, and pooled exposure scenarios are provided in **Table 8**.

As indicated above, the EPCs for lead are the average (i.e., arithmetic mean) values for each dataset. A lead evaluation spreadsheet, providing the computations to determine lead averages for each dataset, is also included as an electronic attachment. The screening criterion for lead was set at an arithmetic mean of 800 mg/kg (the RSL), with a secondary limit of 1,050 mg/kg based on the May 2017 updated ALM developed by the USEPA (corresponding to a 5% probability of a blood lead level of 5 ug/dL). The average and maximum lead concentrations are presented for each dataset in **Table 7**, which indicates that neither surface, subsurface, nor pooled soils exceeded an average lead concentration of 800 mg/kg.

Composite Worker Assessment:

Risk ratios for the estimates of potential EPCs for the Composite Worker baseline scenario prior to the placement of industrial fill at the Site are shown in **Table 9** (surface), **Table 10** (subsurface), and **Table 11** (pooled). The results are summarized as follows:

Worker Scenario	Exposure Unit	Medium	Hazard Index (>1)	Total Cancer Risk
Composite Worker	EU (12.7 acres)	Surface Soil	Nervous = 2	3E-6
		Subsurface Soil	Nervous = 2	1E-5
		Pooled Soil	none	9E-6

Based on the risk ratios for Sub-Parcel B6-6, environmental capping (100% of the Site) is an acceptable remedy to be protective of future Composite Workers for the surface, subsurface, and pooled exposure scenarios. The carcinogenic risk estimate for the Composite Worker subsurface scenario was greater than the acceptable risk level of 1E-5 but below the secondary risk level of 1E-4 which would warrant consideration of toxicity reduction. Additionally, the surface and subsurface scenarios non-carcinogenic HI values for the nervous system each exceeded 1, with elevated manganese as the primary driver for both.

Subsurface NAPL within the Site also poses an unquantified risk to the potential future Composite Worker. Since potential exposure to NAPL cannot be quantified, it was not included in the risk assessment and the risks presented above may be biased low. Based on the proposed placement of industrial fill at the Site and the presence of subsurface NAPL, capping and institutional controls (to maintain the integrity of the cap) are suitable measures for the protection of the future Composite Worker for both cancer risks and non-cancer hazards. The capping remedy will additionally be protective of slag aggregate which will be used as the primary fill material and pavement subbase at the Site.

Construction Worker Assessment:

Ground intrusive activities which could result in potential Construction Worker exposures are expected to be limited primarily to utility installation tasks performed by specific work crews. Construction Worker risks were evaluated for several different exposure scenarios to determine the maximum exposure frequency for the site-wide EU that would result in risk ratios equivalent to a cumulative cancer risk of 1E-5 or HI of 1 for any individual target organ. Risk ratios for the Construction Worker scenario using the selected duration (30 days) are shown in **Table 12** (surface), **Table 13** (subsurface), and **Table 14** (pooled). The variables entered for calculation of the site-specific Construction Worker SSLs (EU area, input assumptions, and exposure frequency) are indicated as notes on the tables. The spreadsheet used for computation of the site-specific Construction Worker SSLs is included as **Appendix C**. The results are summarized as follows:

Worker Scenario	Exposure Unit	Medium	Hazard Index (>1)	Total Cancer Risk
Construction Worker	EU (12.7 acres) (30 exposure days)	Surface Soil	none	8E-8
		Subsurface Soil	none	4E-7
		Pooled Soil	none	3E-7

Using the selected exposure duration for the site-wide EU (30 days), the carcinogenic risks were all less than 1E-5, and none of the non-carcinogens caused a cumulative HI to exceed 1 for any target organ system. These findings are below the acceptable limits for no further action established by the agencies. This evaluation indicates that additional site-specific health and safety requirements (beyond standard Level D protection) would be required only if the allowable exposure duration of 30 days were to be exceeded for an individual worker.

Subsurface NAPL within the Site poses an unquantified risk to the potential future Construction Worker. Since potential exposure to NAPL cannot be quantified, it was not included in the risk assessment and the risks presented above may be biased low.

Certain activities at the Site may exceed the allowable duration; if so, then Construction Worker risks must be mitigated to facilitate the proposed construction work. At that point, additional site-specific health and safety requirements are warranted to be protective of workers. Upgraded Personal Protective Equipment (PPE) beyond standard Level D protection will be used for the entire scope of intrusive work covered by this RADWP as a protective measure to ensure that there are no unacceptable exposures for Construction Workers during project implementation. The modified Level D PPE requirements which will be applied immediately and throughout this project, including specific PPE details, planning, tracking/supervision, enforcement, and documentation, are outlined in the PPE Standard Operational Procedure (SOP) provided as **Appendix D**.

Institutional controls will be required to be established for the protection of future Construction Workers in the event of any future long-term construction projects which could include intrusive activities. The anticipated institutional controls, including notification requirements, health and safety requirements, and materials management requirements, are specified in Section 5.4.

3.3.3 Evaluation of RCRA Criteria

Based on the data obtained from the characterization of surface and subsurface soils, results from the SLRA indicate that environmental capping is required within the development area to mitigate potential Composite Worker risks. Additionally, Tradepoint Atlantic will be using industrial fill (including processed slag aggregate) throughout the Site. The entirety of the Site (12.7 acres) will therefore require a remedy of capping with institutional controls to mitigate potential Composite Worker risks.

Site-specific health and safety controls will be implemented to mitigate Construction Worker risks within the Site. This includes using modified Level D PPE. The modified Level D PPE requirements will be implemented throughout the project duration in accordance with the PPE SOP provided as **Appendix D**. Institutional controls will also be required to be established for the protection of future Construction Workers in the event of any future long-term construction projects which could include intrusive activities.

The proposed VCP capping remedy with institutional controls was evaluated for consistency with the RCRA Threshold Criteria and Balancing Criteria. The Threshold Criteria assess the overall protection of human health and the environment, as well as achievement of media cleanup objectives and control of sources of releases at the Site. The Balancing Criteria assess long-term effectiveness and permanence; reduction of toxicity, mobility or volume; short-term effectiveness; implementability; cost effectiveness; and community and State acceptance.

Threshold Criteria:

Protect Human Health and the Environment: The assessment against this criterion evaluates how the remedy, as a whole, protects and maintains protection of human health and the environment. This criterion is satisfied when response actions are complete. The purpose of this remedy is to provide a protective barrier between human site users and impacted materials, and to protect the environment by preventing surface water from contacting potentially impacted materials in place. The capping and institutional control remedy would eliminate risk to current and future industrial workers by preventing exposure to areas of the Site where processed slag aggregate has been placed or where soil concentrations exceed a cancer risk of 1E-5 or a HI of 1. Groundwater does not present a direct human health hazard since there is no groundwater use on the property. Implementation of the proposed use restrictions will address the residual risk and will also

protect future workers by eliminating or controlling potential exposure pathways, thus, reducing potential intake and contact of soil/groundwater COPCs by human receptors.

Achieve Media Cleanup Objective: The assessment against this criterion describes how the remedy meets the cleanup objective, which is risk reduction, appropriate for the expected current and reasonably anticipated future land use. The objective is to protect current/future Composite Workers and Construction Workers from potential exposures to COPCs present in soil or groundwater at levels that may result in risks of adverse health effects. Given the controlled access and use restrictions, the proposed remedy will attain soil and groundwater objectives. The activity use restrictions will eliminate current and future unacceptable exposures to both soil and groundwater.

Control the Source of Releases: In its RCRA Corrective Action proposed remedies, USEPA seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Controlling the sources of contamination relates to the ability of the proposed remedy to reduce or eliminate, to the maximum extent practicable, further releases. Sampling results did not indicate localized, discernible source areas associated with the soil conditions observed at the Site except for the aforementioned NAPL impacts at location B6-066-PZ. As previously mentioned the NAPL impacts at this location were adequately delineated (and a few areas excavated) as described in the B6-066 Test Pit Completion Report (**Appendix B**) Furthermore, it is not anticipated that the NAPL at this location is mobile, based on the multiple years of gauging completed at the NAPL delineation piezometers. The control measures included in the proposed remedy, such as Materials Management Plan requirements and groundwater use restrictions, provide a mechanism to control and reduce potential further releases of COPCs. This is achieved by eliminating the potential for groundwater use and requiring proper planning for intrusive activities.

Balancing Criteria:

Long-Term Reliability and Effectiveness: The assessment against this criterion evaluates the long-term effectiveness of the remedy in maintaining protection of human health and the environment after the response objectives have been met. The primary focus of this criterion is the extent and effectiveness of the controls that may be required to manage the risk posed by slag aggregate, treatment residuals, and/or untreated wastes. The proposed capping remedies have been proven to be effective in the long-term at similar sites with similar conditions. The capping remedy will permanently contain the slag aggregate and other potentially contaminated media in place. In order for the cap to effectively act as a barrier, regular inspections will be performed pursuant to the Operations and Maintenance Plan (O&M Plan).

Institutional controls will be implemented to protect future Composite and Construction Workers against inadvertent contact with potentially impacted media. The anticipated institutional controls are specified in Section 5.4. The Tenant will be required to sign onto the Environmental Covenant with restriction in the NFA. The proposed remedy will maintain protection of human health and the environment over time by controlling exposures to the hazardous constituents potentially remaining in slag aggregate or existing on-site media. The long-term effectiveness is high, as use restrictions are readily implementable and easily maintained. Given the historical, heavily industrial uses of the Site and the surrounding area, including the presence of landfills, land and groundwater use restrictions are expected to continue in the long term.

Reduction of Toxicity, Mobility, or Volume of Waste: The assessment against this criterion evaluates the anticipated performance of specific technologies that a remedial action alternative may employ. The capping remedy will prevent the spread of contaminants in wind-blown dust or stormwater and will prevent infiltration through the unsaturated zone from carrying contaminants to the groundwater. Thus, the mobility of contaminants will be reduced by the capping remedy.

Short-term Effectiveness: The assessment against this criterion examines how well the proposed remedy protects human health and the environment during the construction and implementation until response objectives have been met. This criterion also includes an estimate of the time required to achieve protection for either the entire site or individual elements associated with specific site areas or threats. The risks to the Construction Worker during remedy implementation are mitigated by executing the modified Level D PPE requirements outlined in **Appendix D**. The short-term risk to site workers following these upgraded health and safety measures during implementation of the remedy will be low, leading to a high level of short-term effectiveness for protection of future site users and the environment. Short-term effectiveness in protecting on-site workers and the environment will be achieved through establishing appropriate management, construction, health and safety, and security procedures. Proper water management protocols (for groundwater or surface water) will be implemented to prevent discharges offsite. Security and fences will be used to maintain controlled access during construction.

Implementability: The assessment against this criterion evaluates the technical and administrative feasibility, including the availability of trained and experienced personnel, materials, and equipment. Technical feasibility includes the ability to construct and operate the technology, the reliability of the technology, and the ability to effectively monitor the technology. Administrative feasibility includes the capability of obtaining permits, meeting permit requirements, and coordinating activities of governmental agencies. The proposed capping remedy for the Composite Worker area will use readily available, typically acceptable, and proven technologies.

Cost Effectiveness: The assessment against this criterion evaluates the capital costs, annual O&M costs, and the net present value (NPV) of this remedy relative to alternatives. The capping remedy remedial costs would be incurred as part of the proposed site development, regardless of the findings of the SLRA.

State Support / Agency Acceptance: MDE has been involved throughout the Site investigation process. The proposed use restrictions included in the proposed remedy are generally recognized as commonly employed measures for long-term stewardship.

A capping remedy with institutional controls will satisfy the RCRA Threshold Criteria and Balancing Criteria and will do so in a manner that ensures reliable implementation and effectiveness. The remedy is cost-effective and consistent with the proposed development plan.

4.0 PROPOSED SITE DEVELOPMENT PLAN

Tradepoint Atlantic is proposing to construct a large paved lot totaling approximately 495,000 square feet on Sub-Parcel B6-6. The proposed development will include permanent improvements on approximately 12.7 acres of land. The proposed future use of Sub-Parcel B6-6 is Tier 3 – Industrial. The remainder of Parcel B6 and Parcel A4 have been addressed in separate development plans in accordance with the requirements of the ACO. The Site (12.7 acres encompassing Sub-Parcel B6-6) will be fully capped by surface engineering controls.

Certain compounds are present in the soils located near the surface and in the subsurface at concentrations in excess of the PALs. Therefore, soil is considered a potential media of concern. Potential risks to future adult workers associated with impacts to soil and groundwater exceeding the PALs will be addressed through a remedy consisting of surface engineering controls (capping of the entire area) and institutional controls (deed restrictions). The development plan provides for a containment remedy and institutional controls that will mitigate future adult workers from contacting impacted soil at the Site. In addition, Tradepoint Atlantic has proposed the use of processed slag aggregate as the primary fill material and pavement subbase at the Site. The placement of materials other than approved clean fill, such as slag aggregate, requires the installation of surface engineering controls regardless of the existing soil conditions.

Certain activities at the Site may exceed the allowable duration; if so, then Construction Worker risks must be mitigated to facilitate the proposed construction work. At that point additional site-specific health and safety requirements are warranted to be protective of workers. Upgraded PPE beyond standard Level D protection will be used in conjunction with the property-wide Health and Safety Plan (HASP) for the entire scope of intrusive work covered by this RADWP as a protective measure to ensure that there are no unacceptable exposures for Construction Workers during project implementation. The modified Level D PPE requirements which will be applied throughout this project, including specific PPE details, planning, tracking/supervision, enforcement, and documentation, are outlined in the PPE SOP provided as **Appendix D**.

A restriction prohibiting the use of groundwater for any purpose at the Site will be included as an institutional control in the NFA and COC issued by the MDE, and a deed restriction prohibiting the use of groundwater will be filed. The groundwater use restriction will protect future Composite Workers from potential direct exposures. Proper water management, for groundwater or surface water that may be encountered, is required to prevent unacceptable discharges or risks to Construction Workers during development. Work practices and health and safety plans governing groundwater encountered during excavation activities will provide protection for Construction Workers involved with development at the Site.

The development plan for the Site is shown on **Figure 2** and the detailed development drawings (provided by Bohler Engineering) are included as **Appendix E**. The process of constructing the

proposed paved lot will involve the tasks listed below. Documentation of the outlined tasks and procedures will be provided in a Sub-Parcel B6-6 Development Completion Report.

4.1 RESPONSE PHASE – GROUNDWATER NETWORK ABANDONMENT

Monitoring wells SW-075-MWS and SW075-MWI are the only groundwater monitoring points located inside the development boundary. Both of these wells, shown on **Figure 5**, are still existing but will be abandoned prior to development activities. Former groundwater monitoring well TM10-PZM0007, located just outside the development boundary and also shown on **Figure 5**, has previously been abandoned. Temporary groundwater monitoring piezometers A4-014-PZ, A4-019-PZ, A6-001-PZ, and A6-015-PZ were also located outside of the development boundary. All of these piezometers have been previously abandoned.

4.2 DEVELOPMENT PHASE

4.2.1 Erosion and Sediment Control Installation

Installation of erosion and sediment controls will be completed in accordance with the requirements of the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control prior to any construction at the Site. Any soils which are disturbed during the installation of erosion and sediment controls will be placed on-site below the cap (provided the soil is suitable for reuse in terms of quality and compaction requirements).

4.2.2 Grading and Site Preparation

As indicated on the development plans in **Appendix E**, grading activities including both cut and fill will occur within the Sub-Parcel B6-6 boundary. Any material that is not suitable for compaction will be excavated and replaced with subbase material, although it is not anticipated that poor soils will be encountered. Borrow materials will be obtained from MDE-approved sources and will be documented prior to transport to the Site. Processed slag aggregate sourced from the Tradepoint Atlantic property will be used as fill. Other materials approved by the MDE for industrial use may also be used as fill, but the placement of materials other than approved clean fill will necessitate that the Site will be subject to surface engineering controls (i.e., capping). Fill sources shall be free of organic material, frozen material, or other deleterious material. In the case that there is excess material (not anticipated), the spoils will be stockpiled at a suitable location and dealt with in accordance with the Materials Management Plan (MMP) for the Sparrows Point Facility (Papadopulos & Associates, et al., June 17, 2015). This work will be coordinated with MDE accordingly. No excess material will leave the 3,100-acre property without prior approval from MDE.

4.2.3 Installation of Underground Utilities

The parking lots, roads and other infrastructure associated with the development of Sub-Parcel B6-

6 will be installed as shown on the drawings in **Appendix E**. Soils relocated or removed during construction may be replaced on-site below the cap (provided the soil is suitable for reuse in terms of quality and compaction requirements), but soil removed from utility trenches cannot be used as fill within the utility trenches unless such materials are approved for this use by the VCP. Additional protocols for the installation of utilities at the Site are provided in Section 5.1.2. Any water removed will be sampled (if necessary) as described in Section 5.2 and (if acceptable) sent to the on-site HCWWTP via the TMC.

4.2.4 Paving

The entirety of the Site will be covered with paving as indicated in the development plans provided in **Appendix E** and shown on **Figure 8**. The paved areas will receive a layer of subbase material which will consist of compacted aggregate base, which may include processed slag aggregate sourced from the Tradepoint Atlantic property. The placement of processed slag aggregate or materials other than MDE-approved clean fill will necessitate that the Site will be subject to surface engineering controls (i.e., capping).

The required minimum thicknesses of all site-wide pavement sections which will serve as surface engineering controls are shown in the minimum capping section details provided in **Appendix F**. According to the development plans, all paved areas at the Site will be installed with a minimum of 4 inches of compacted aggregate base and a minimum of 4 inches of overlying pavement surface (asphalt or concrete), which meet these required minimum thicknesses.

4.2.5 Landscaping

There are no areas of the Site that will be covered by landscaped caps. If landscaped caps are required in the future, all landscaped areas at the Site will be installed with a minimum of 24 inches of clean fill, with an underlying geotextile marker fabric between the clean fill and the existing underlying material (as shown in the capping section details provided in **Appendix F**).

4.2.6 Stormwater Management

The proposed stormwater utility layout for the Site is provided on the development plan drawings in **Appendix E**. New stormwater infrastructure will be installed throughout the Site and will tie into existing stormwater drain infrastructure which discharges to the TMC.

Tradepoint Atlantic is working with the MDE Industrial & General Permits Division to renew the property-wide NPDES permit. The stormwater management systems for each parcel are reviewed and approved by Baltimore County for each individual development project.

5.0 DEVELOPMENT IMPLEMENTATION PROTOCOLS

5.1 DEVELOPMENT PHASE

This plan presents protocols for the handling of soils and fill materials in association with the development of Sub-Parcel B6-6. In particular, this plan highlights the minimum standards for construction practices and managing potentially contaminated materials to reduce potential risks to workers and the environment.

Several exceedances of the PALs were identified in soil samples across the Site. The PALs are set based on USEPA's RSLs for industrial soils, or other direct guidance from the MDE. Because PAL exceedances can present potential risks to human health and the environment at certain concentrations, this plan presents material management and other protocols to be followed during the work to adequately mitigate potential risks from such materials remaining on-site during the development phase. There were no locations in the proposed Site boundary with soil exceedances of the special management criteria for PCBs (50 mg/kg) or lead (10,000 mg/kg). There were two samples with concentrations of DRO above 6,200 mg/kg, although only one of these was within the Sub-Parcel B6-6 boundary. NAPL was identified and properly delineated at one soil boring location as documented above.

Following completion of the SLRA, the findings of the Construction Worker evaluation indicated that using the site-specific 30-day exposure frequency for the site-wide EU, the screening level estimates of Construction Worker cancer risk were less than 1E-5 and no HI values above 1 were identified for any target organ system (the acceptable thresholds for no further action). Certain activities at the Site may exceed the allowable duration of 30 days, and if that were the case, Construction Worker risks must be mitigated to facilitate the proposed construction. Upgraded PPE beyond standard Level D protection will be used in conjunction with the HASP for the entire scope of intrusive work covered by this RADWP as a protective measure to ensure that there are no unacceptable exposures for Construction Workers during project implementation. The modified Level D PPE requirements which will be applied throughout this project, including specific PPE details, planning, tracking/supervision, enforcement, and documentation, are outlined in the PPE SOP provided as **Appendix D**.

Based on the characterization of surface and subsurface soils and the associated SLRA findings, surface engineering controls are an acceptable remedy to be protective of future adult Composite Workers who otherwise could potentially contact surface soil (or relocated subsurface soil) at the Site. In addition, Tradepoint Atlantic has proposed the use of processed slag aggregate as the primary fill material and pavement subbase at the Site. The placement of materials other than approved clean fill, such as slag aggregate, requires the installation of surface engineering controls (i.e., capping) regardless of the existing soil conditions. The proposed capping sections will meet

the required minimum thicknesses for surface engineering controls, which are provided in **Appendix F**.

5.1.1 Erosion/Sediment Control

Erosion and sediment controls will be installed prior to commencing work in accordance with the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The erosion and sediment controls will be approved by the MDE. In addition, the following measures will be taken to prevent contaminated soil from exiting the Site:

- Stabilized construction entrance will be placed at site entrance.
- A dry street sweeper will be used as necessary on adjacent roads, and the swept dust will be collected and properly managed.
- Accumulated sediment removed from silt fence, and sediment traps if applicable, shall be periodically removed and returned to the Site.

5.1.2 Soil Excavation and Utility Trenching

A pre-excavation meeting shall be held to address proper operating procedures for working on-site and monitoring excavations and utility trenching in potentially contaminated material. This meeting shall include the construction manager and the Environmental Professional (EP) providing oversight on the project. During the meeting, the construction manager and the EP shall review the proposed excavation/trenching locations and any associated utility invert elevations. The construction manager will be responsible for conveying all relevant information regarding excavation/grading and/or utility work to the workers who will be involved with these activities. The HASP and PPE SOP for the project shall also be reviewed and discussed.

The EP will provide oversight of soil excavation/trenching activities as described in Section 5.6. Soil excavation/trenching will occur during various phases of construction. In general, and based on the existing sampling information, all excavated materials are expected to be suitable for replacement on the Site, except for soil that may be excavated from the within the B6-066-PZ NAPL delineation boundary (as shown on **Figure** 7). However, the EP will monitor the soil excavation activities for signs of significantly contaminated material which may not be suitable for reuse (as described below). The EP will also be responsible for monitoring organic vapor concentrations in the worker breathing zone within utility trenches and excavations to determine whether any increased level of health and safety protection is required.

To the extent practical, all excavation activities should be conducted in a manner to minimize double or extra handling of materials. Any stockpiles shall be kept within the Site footprint, and in a location that is not subjected to concentrated stormwater runoff. Stockpiles shall be managed as necessary to prevent the erosion and off-site migration of stockpiled materials, and in accordance with the applicable provisions of the 2011 Maryland Standards and Specifications for

Soil Erosion and Sediment Control. Soil designated for replacement on-site which does not otherwise exhibit evidence of contamination (as determined by the EP) may be managed in large stockpiles (no size restriction) as long as they remain within the erosion and sediment controls.

All utility trenches will be backfilled with bedding and backfill materials approved by the MDE for industrial use. A general utility cross section is provided as **Appendix G**. Additional preventative measures will be required if evidence of petroleum contamination is encountered, to prevent the discharge to, or migration of, petroleum product along a utility conduit. Contingency measures have been developed to ensure that utilities will be constructed in a manner that will prevent the migration of any encountered NAPL, and that excavated material will be properly managed. The Utility Excavation NAPL Contingency Plan (**Appendix H**) provides protocols to be followed if NAPL is encountered during the construction activities. Preventative measures to inhibit the spread of petroleum product will be conducted in accordance with this plan.

The EP will monitor all soil excavation and utility trenching activities for signs of potential contamination. In particular, soils will be monitored with a hand-held PID for potential VOCs and will also be visually inspected for the presence of staining, petroleum waste materials, or other indications of significant contamination. If screening of excavated materials by the EP indicates the presence of conditions of potential concern (i.e., sustained PID readings greater than 10 ppm, visual staining, unsuitable waste materials, etc.), such materials shall be segregated for additional sampling and special management.

Excavated material exhibiting evidence of significant contamination shall be placed in stockpiles (not to exceed 500 cubic yards) on polyethylene sheeting and covered with polyethylene sheeting to minimize potential exposures and erosion when not in use. Materials stockpiled due to evidence of contamination will be sampled in accordance with waste disposal requirements and transported to an appropriate permitted disposal facility. Plans for analysis of segregated soils for any use other than disposal must be submitted to the MDE for approval.

Excavated material that is visibly impacted by NAPL will be segregated and managed in accordance with the requirements specified in the Utility Excavation NAPL Contingency Plan. Excavated material with indications of possible NAPL contamination will also be containerized or placed in a stockpile (not to exceed 500 cubic yards) on polyethylene sheeting and covered with polyethylene sheeting until the material can be analyzed for TPH/Oil & Grease and PCBs (total) to characterize the material for appropriate disposal. It is anticipated that NAPL-impacted material may be uncovered during excavation from within the B6-066-PZ NAPL delineation boundary (as shown on **Figure 7**). The MDE will be notified if such materials are encountered during excavation or utility trenching activities.

5.1.3 Soil Sampling and Disposal

Excavated materials that are determined by the EP to warrant sampling and analysis because of elevated PID readings or other indications of potential contamination shall be sampled and analyzed to determine how the materials should be managed. If excavated and stockpiled, such materials should be covered with a polyethylene tarp to minimize potential exposures and erosion. All stockpiled soil may be considered for use as fill at this Site or on other areas of the property depending on the analytical results. A sampling Work Plan including a description of the material, estimated volume, and sampling parameters will be submitted to the MDE for approval. The resulting analytical data will be submitted to the MDE to determine the suitability of the material for reuse. If the MDE determines that the materials are unsuitable for reuse, the materials will be sampled to determine alternative disposal options.

Soil material may be taken to an appropriate non-hazardous landfill (including Greys Landfill) for proper disposal if the concentrations of excavated sampled materials indicate that the materials are not hazardous, but still are not suitable for reuse. Soil material that is determined to be a hazardous waste shall be shipped off-site in accordance with applicable regulations to an appropriate and permitted RCRA disposal facility. The quantities of all materials that require disposal, if any, will be recorded and identified in the Development Completion Report.

5.1.4 Fill

Processed slag aggregate sourced from the Tradepoint Atlantic property will be used as the primary fill material for this project. The placement of processed slag aggregate or materials other than approved clean fill will necessitate that the Site will be subject to surface engineering controls (i.e., capping). Soil excavated on the Site has been determined to be suitable for re-use at the Site below the surface engineering controls (capping), unless such materials are determined by the EP/MDE to be unsuitable for use as outlined in Section 5.1.2 and Section 5.1.3.

All over-excavated utility trenches will be backfilled with bedding and backfill approved by the MDE for industrial use. Soil removed from utility trenches cannot be used as fill within the utility trenches unless such materials are approved for this use by the VCP. As with structural fill, processed slag aggregate and other materials approved for industrial use can be used as backfill in utility trenches if the area will be covered by a VCP cap. Any utility backfill which will extend into the cap (i.e., top 2 feet of backfill in landscaped areas) must meet the VCP clean fill requirements, and a geotextile marker fabric will be placed between the VCP clean fill and any underlying material. A general utility detail drawing is provided as **Appendix G**. Material imported to the Site will be screened according to MDE guidance for suitability.

5.1.5 Dust Control

General construction operations, including soil excavation and transport, and trenching for utilities will be performed at the Site. These activities are anticipated to be performed in areas of soil impacted with COPCs. Best management practices should be undertaken at the Sparrows Point property as a whole to prevent the generation of dust which could impact other areas of the property outside of the immediate work zone. To limit worker exposure to contaminants borne on dust and windblown particulates, dust monitoring will be performed in the immediate work zone and at the upwind and downwind perimeter of the Site, and dust control measures will be implemented if warranted based on the monitoring results. The action level proposed for the purpose of determining the need for dust suppression techniques (e.g. watering and/or misting) during the development activities at the Site will be 3.0 milligrams per cubic meter (mg/m^3). The lowest of the site-specific dust action levels, Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) was selected as the proposed action level.

The EP will be responsible for the dust monitoring program. Air monitoring will be performed using Met One Instruments, Inc. E-Sampler dust monitors or equivalent real-time air monitoring devices. The EP will set-up dust monitoring equipment at the outset of ground intrusive work or other dust-generating activities, and continuous dust monitoring will be performed during this work. In addition to work area monitoring, a dust monitor will be placed at selected perimeter locations that will correspond to the upwind and downwind boundaries based on the prevailing wind direction predicted for that day. The prevailing wind direction will be assessed during the day, and the positions of the perimeter monitors will be adjusted if there is a substantial shift in the prevailing wind direction.

Once all dust-generating activities are complete (which may occur at a later stage of the project once ground intrusive work has been completed or after the Site has been capped), the dust monitoring program may be discontinued. If additional dust-generating activities commence, additional dust monitoring activities will be performed.

If sustained dust concentrations exceed the action level ($3.0\ mg/m^3$) at any of the monitoring locations as a result of conditions occurring at the Site, operations will be stopped temporarily until dust suppression can be implemented. Operations may be resumed once monitoring indicates that dust concentrations are below the action level. The background dust concentration will be utilized to evaluate whether Site activities are the source of the action level exceedance. The background dust concentration will be based on measurements over a minimum of a 1-hour period at the upwind Site boundary. The upwind data will be used to calculate a time weighted average background dust concentration. As noted above, the locations of the perimeter dust monitors may be adjusted periodically if there is a substantial shift in the prevailing wind direction.

As applicable, air monitoring will be conducted during development implementation activities to assess levels of exposure to Site workers, establish that the work zone designations are valid, and verify that respiratory protection being worn by personnel, if needed, is adequate. Concurrent with the work zone air monitoring, perimeter air monitoring will also be performed at the upwind and downwind Site boundaries to ensure contaminants are not migrating off-site. The concentration measured at the downwind perimeter shall not exceed the action level of 3.0 mg/m³, unless caused by background dust from upwind of the Site. If exceedances of the action level are identified downwind for more than five minutes, the background dust concentration shall be evaluated to determine whether the action level exceedances are attributable to Site conditions. If on-site activities are the source of the exceedances, dust control measures and additional monitoring will be implemented. The dust suppression measures may include wetting or misting using a hose connected to a water supply or a water truck stationed at the Site.

Dust control measures will be implemented as described above to address dust generated as a result of construction activities conducted at the Site. However, based on the nature of the area and/or ongoing activities surrounding the Site, it is possible that windblown particulates may come from surrounding areas. As discussed above, the dust concentration in the upwind portion of the Site will be considered when monitoring dust levels in the work area. A pre-construction meeting will be held to discuss the potential of windblown particulates from other activities impacting the air monitoring required for this RADWP. Site contact information will be provided to address the possibility of upwind dust impacts. If sustained dust is observed above the action level (3.0 mg/m³) and it is believed to originate from off-site (i.e., upwind) sources, this will immediately be reported to TPA and the MDE-VCP team, as well as the MDE Air and Radiation Administration (ARA).

5.2 WATER MANAGEMENT

This plan presents the protocols for handling any groundwater or surface water that needs to be removed to facilitate construction of the proposed Sub-Parcel B6-6 development.

5.2.1 Groundwater PAL Exceedances

Groundwater samples were collected during the Finishing Mills Groundwater Phase II Investigation, Parcel A4 Phase II Investigation, and Parcel A6 Phase II Investigation from seven temporary piezometers and monitoring wells within and surrounding the Site. Aqueous PAL exceedances in groundwater in the vicinity of the development LOD included both inorganic and organic compounds. The aqueous PAL exceedances are shown on **Figure 6**. There are no concerns related to potential VI risks/hazards at the Site.

While the concentrations of PAL exceedances are not deemed to be a significant human health hazard for future workers since there is no on-site groundwater use which could lead to direct exposures, proper water management is required during construction to prevent unacceptable discharges or risks to Construction Workers.

5.2.2 Dewatering

Dewatering may be necessary to facilitate the placement and compaction of structural fill, installation of underground utilities, and within excavations/trenches. If dewatering is required during construction, it shall be done in accordance with all local, state, and federal regulations. Water that collects in excavations/trenches due to intrusion of groundwater, stormwater, and/or dust control waters will be transported to the HCWWTP via the TMC, following any pretreatment, if necessary. The water will be treated and discharged in accordance with NPDES Permit No. 90-DP-0064A; I. Special Conditions; A.4; Effluent Limitations and Monitoring Requirements.

It is the intent that any water that must be removed will be ultimately sent (via pumping or trucking) to the HCWWTP via the TMC, following any pretreatment, if necessary. Water in the TMC feeds into the HCWWTP where it is treated prior to release into Bear Creek. Dewatering fluids will be evaluated and then tested (if required) pursuant to the HCWWTP Constituent Threshold Limits for Dewatering Activities related to Remediation, Development, and Capping Protocol. If the groundwater does not meet the constituent threshold limits specified in the protocol, the groundwater will be pre-treated. Any water discharged to the TMC will be pumped through a filter bag or equivalent to remove suspended solids prior to discharge.

Note that additional analyses could be required if warranted based on field observations by the EP. The EP will inspect any water that collects in the excavations/trenches. If the water exhibits indications of significant contamination (sheen, odor, discoloration, presence of product), the water may be sampled and analyzed for some or all of the analyses listed below. In such case, the analyses run will be dependent on the suspected source of contamination and local site conditions. The EP will oversee oil/water separation and disposal of NAPL as necessary.

The results of the analyses will be reviewed by the HCWWTP operator to determine if any wastewater treatment system adjustments are necessary. If the results of the analyses are above the threshold levels listed below, the water will be further evaluated to confirm acceptable treatment at the HCWWTP, or will be evaluated to design an appropriate pre-treatment option. Alternatively, the water may be disposed of at an appropriate off-site facility.

Analysis	Threshold Levels
• Total metals by USEPA Method 6020A	1,000 ppm
• PCBs by USEPA Method 8082	>Non-Detect
• SVOCs by USEPA Method 8270C	1 ppm
• VOCs by USEPA Method 8260B	1 ppm
• Oil & Grease by USEPA Method 1664	200 ppm
• TPH-DRO by USEPA Method 8015B	200 ppm
• TPH-GRO by USEPA Method 8015B	200 ppm

Documentation of any water testing, as well as the selected disposal option, will be reported to the MDE in the Development Completion Report. Any permits or permit modifications related to dewatering will be provided to the agencies as addenda to this RADWP.

5.3 HEALTH AND SAFETY

A property-wide HASP has been developed and is provided with this RADWP (as an electronic attachment) to present the minimum requirements for worker health and safety protection for all development projects. All contractors working on the Site must prepare their own HASP that provides a level of protection at least as much as that provided by the attached HASP. Alternately, on-site contractors may elect to adopt the HASP provided.

General health and safety controls (level D protection) are adequate to mitigate potential risk to Construction Workers conducting ground intrusive activities for a duration of up to 30 exposure days. However, certain ground intrusive activities at the Site (utility installations for specific crews) may exceed the allowable duration. Therefore, modified Level D PPE will be used for the entire scope of intrusive work covered by this RADWP as a protective measure to ensure that there are no unacceptable exposures for Construction Workers during project implementation. Health and safety controls outlined in the HASP and PPE SOP will mitigate any potential risk to Construction Workers from contacting impacted soil and groundwater during development. The modified Level D PPE requirements planned for this development project, including specific PPE details, planning, tracking/supervision, enforcement, and documentation, are outlined in the PPE SOP provided as **Appendix D**. The EP will be responsible for monitoring organic vapor concentrations in the worker breathing zone within the utility trenches and excavations to determine whether any increased level of health and safety protection (including engineering controls and/or PPE) is required.

Prior to commencing work, the contractor must conduct an on-site safety meeting for all personnel. All personnel must be made aware of the HASP and the PPE SOP. Detailed safety information shall be provided to personnel who may be exposed to COPCs. Workers will be responsible for following established safety procedures to prevent contact with potentially contaminated material.

5.4 INSTITUTIONAL CONTROLS (FUTURE LAND USE CONTROLS)

Long-term conditions related to future use of the Site will be placed on the RADWP approval, NFA, and COC. These conditions are anticipated to include the following:

- A restriction prohibiting the use of groundwater for any purpose at the Site and a requirement to characterize, containerize, and properly dispose of groundwater in the event of deep excavations encountering groundwater.

- Notice to the MDE at least 30 days prior to any future soil disturbances that are expected to breach the approved capping remedy (i.e., through the pavement cap or marker fabric in landscaped areas).
- Notice to the USEPA at least 30 days prior to any future soil disturbances that are expected to breach the approved capping remedy, only if the proposed duration of ground intrusive activity would exceed the allowable exposure duration determined in the SLRA and the contractor will not use the modified Level D PPE specified in the approved SOP.
- Requirement for a HASP in the event of any future excavations at the Site.
- Complete appropriate characterization and disposal of any material excavated/pumped at the Site in accordance with applicable local, state, and federal requirements.
- Implementation of inspection procedures and maintenance of the containment remedies.

The owner/operator will file the above deed restrictions as defined by the MDE-VCP in the NFA and COC. The Tenant will be required to sign onto the Environmental Covenant with restriction in the NFA. Tradepoint Atlantic will notify the Tenant of this requirement and will provide MDE with contact information for the Tenant prior to issuance of the NFA.

5.5 POST REMEDIATION REQUIREMENTS

Post remediation requirements will include compliance with the conditions specified in the NFA, COC, and the deed restrictions recorded for the Site. Deed restrictions will be recorded within 30 days after receipt of the final NFA. In addition, the MDE and USEPA will be provided with a written notice of any future excavations (as applicable) in accordance with the requirements given in Section 5.5. Written notice of planned excavation activities will include the proposed date(s) for the excavation, location of the excavation, health and safety protocols (as required), clean fill source (as required), and proposed characterization and disposal requirements. Written notice may consist of email correspondence and/or hard copy correspondence.

Additional requirements will include inspection procedures and maintenance of the containment remedies to minimize degradation which could lead to future exposures, as well as continued perimeter groundwater monitoring. An O&M Plan will be submitted for MDE approval and will include long-term inspection and maintenance requirements for the capped areas of the Site. The responsible party will perform cap inspections, perform maintenance of the cap, and retain inspection records, as required by the O&M Plan.

5.6 CONSTRUCTION OVERSIGHT

Construction Oversight by an EP will ensure and document that the project is built as designed and appropriate environmental and safety protocols are followed. Upon completion, the EP will certify that the project is constructed in accordance with this RADWP.

The EP will monitor all soil excavation and utility trenching activities for signs of contamination that may indicate materials that are not suitable for reuse. In particular, soils will be monitored with a hand-held PID for potential VOC impacts, and will also be visually inspected for staining, petroleum waste materials, or other indications of significant contamination. If screening of excavated materials by the EP indicates the presence of conditions of potential concern (i.e., sustained PID readings greater than 10 ppm, visual staining, unsuitable waste materials, etc.), such materials shall be segregated for additional sampling and special management (as described in Section 5.1.2; Soil Excavation and Utility Trenching). The EP will also perform routine periodic breathing zone monitoring and PPE spot checks during ground intrusive activities. The EP will also inspect any water that collects in the excavations/trenches for signs of contamination on an as-needed basis to coordinate appropriate sampling prior to disposal (as described in Section 5.2.2; Dewatering).

Daily inspections, as necessary, will be performed during general site grading and cap construction activities to verify that appropriate fill materials are being used (as described in Section 5.1.4; Fill), dust monitoring and control measures are being implemented as appropriate (as described in Section 5.1.5; Dust Control), the requirements of the HASP and the PPE SOP are being enforced by the designated Site Safety Officer (as described in Section 5.4; Health and Safety), and surface engineering controls are being installed with the appropriate thicknesses (shown on the RADWP attachments). Oversight by an EP will not be required during construction activities which do not have a significant environmental component, such as above-grade construction.

Records will be developed by the EP to document:

- Compliance with soil screening requirements
- Proper water management, including documentation of any testing and water disposal
- Observations of construction activities during site grading and cap construction
- Proper cap thickness and construction

6.0 PERMITS, NOTIFICATIONS AND CONTINGENCIES

The participant and their contractors will comply with all local, state, and federal laws and regulations by obtaining any necessary approvals and permits to conduct the activities contained herein. Any permits or permit modifications from State or local authorities will be provided as addenda to this RADWP.

A grading permit is required if the proposed grading disturbs over 5,000 square feet of surface area or over 100 cubic yards of earth. A grading permit is required for any grading activities in any watercourse, floodplain, wetland area, buffers (stream and within 100 feet of tidal water), habitat protection areas or forest buffer areas (includes forest conservation areas). Wetlands have not been identified within the project area. However, based on the scope of proposed earth disturbance, a grading permit will be required as part of this development project. Erosion and Sediment Control Plans will be submitted to, and approved by, the MDE prior to initiation of land disturbance for development.

Contingency measures will include the following:

1. The MDE will be notified immediately of any previously undiscovered contamination, previously undiscovered storage tanks and other oil-related issues, and citations from regulatory entities related to health and safety practices.

2. Any significant change to the implementation schedule will be noted in the progress reports to MDE.

3. Modified Level D PPE will be used for the entire scope of ground intrusive work covered by this RADWP as a protective measure to ensure that there are no unacceptable exposures for Construction Workers during project implementation. The modified Level D PPE requirements which will be applied during this project are outlined in the PPE SOP provided as **Appendix D**. If it is not possible to implement the PPE SOP as provided, the agencies will be notified and a RADWP Addendum will be submitted to detail any appropriate mitigative measures.

7.0 IMPLEMENTATION SCHEDULE

Progress reports will be submitted to the MDE on a quarterly basis. Each quarterly progress report will include, at a minimum, a discussion of the following information regarding tasks completed during the specified quarter:

- Development Progress
- Soil Management (imported materials, screening, stockpiling)
- Soil Sampling and Disposal
- Water Management
- Dust Monitoring
- Notable Occurrences (if applicable)
- Additional Associated Work (if applicable)

The proposed implementation schedule is shown below:

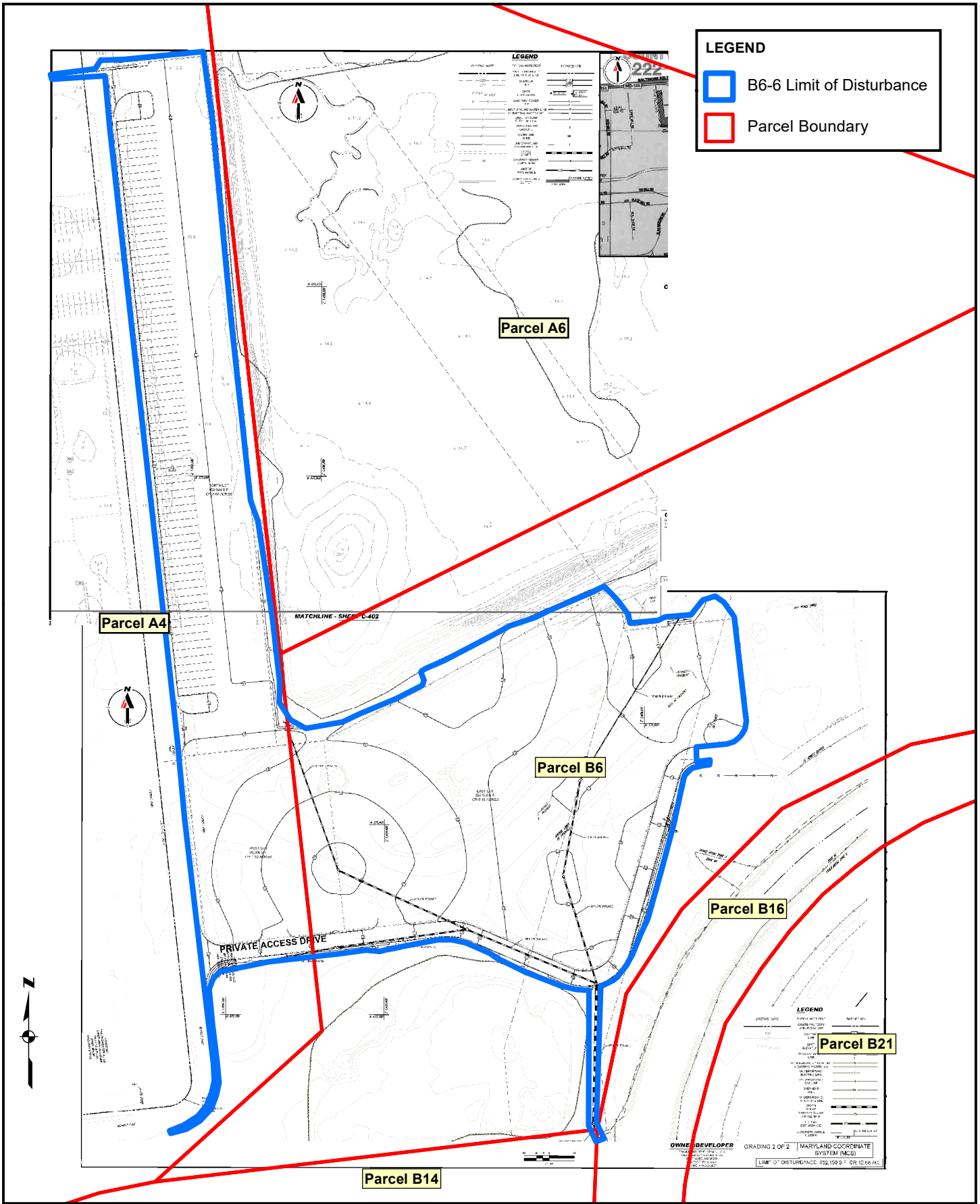
Task	**Proposed Completion Date**
Anticipated RADWP Approval	January 7, 2022
Development:	
Installation of Erosion and Sediment Controls	February 2022
Site Preparation	February 2022
Slag (or Alternative Fill) Delivery and Placement	February 2022
Grading	February 2022
Utility Installations	February 2022
Submittal of Development Completion Report/ Notice of Completion of Remedial Actions*	June 2022
Request for NFA from the MDE	September 2022
Recordation of institutional controls in the land records office of Baltimore	Within 30 days of receiving the

County	approval of NFA from the MDE
Submit proof of recordation with Baltimore County	Upon receipt from Baltimore County

*Notice of Completion of Remedial Actions will be prepared by Professional Engineer registered in Maryland and submitted with the Development Completion Report to certify that the work is consistent with the requirements of this RADWP and the Site is suitable for occupancy and use.

FIGURES


LEGEND
B6-6 Limit of Disturbance
Parcel Boundary
Parcel A9
Parcel A7
Parcel A11
Parcel A12
Parcel A8
Parcel A15
Parcel A2
Parcel A18
Parcel A6
Parcel A3
Parcel A1
Parcel A4
Parcel A10
Parcel B6
Parcel B14
Parcel B22
Parcel B7
Parcel B1
Parcel B2
Parcel B3
Parcel B19
Parcel B4
Parcel B5
Parcel B18
Parcel B10
Parcel B13
Parcel B11
Parcel B20
Parcel B12
Source: Esri, IGN, and the
Tradepoint Atlantic Property
Area A and Area B Parcel Boundaries
December 17, 2021
Figure
1
ARM Group LLC
Engineers and Scientists
0 550 1,100 2,200
Feet
Tradepoint Atlantic
Sparrows Point
Baltimore County, MD
ARM Project 21010206
C:\Users\SKabis\Desktop\B2-2 GIS\Parcel B2-2 - Capping Layout.mxd



Sub-Parcel B6-6
Development Grading Plan
December 8, 2021

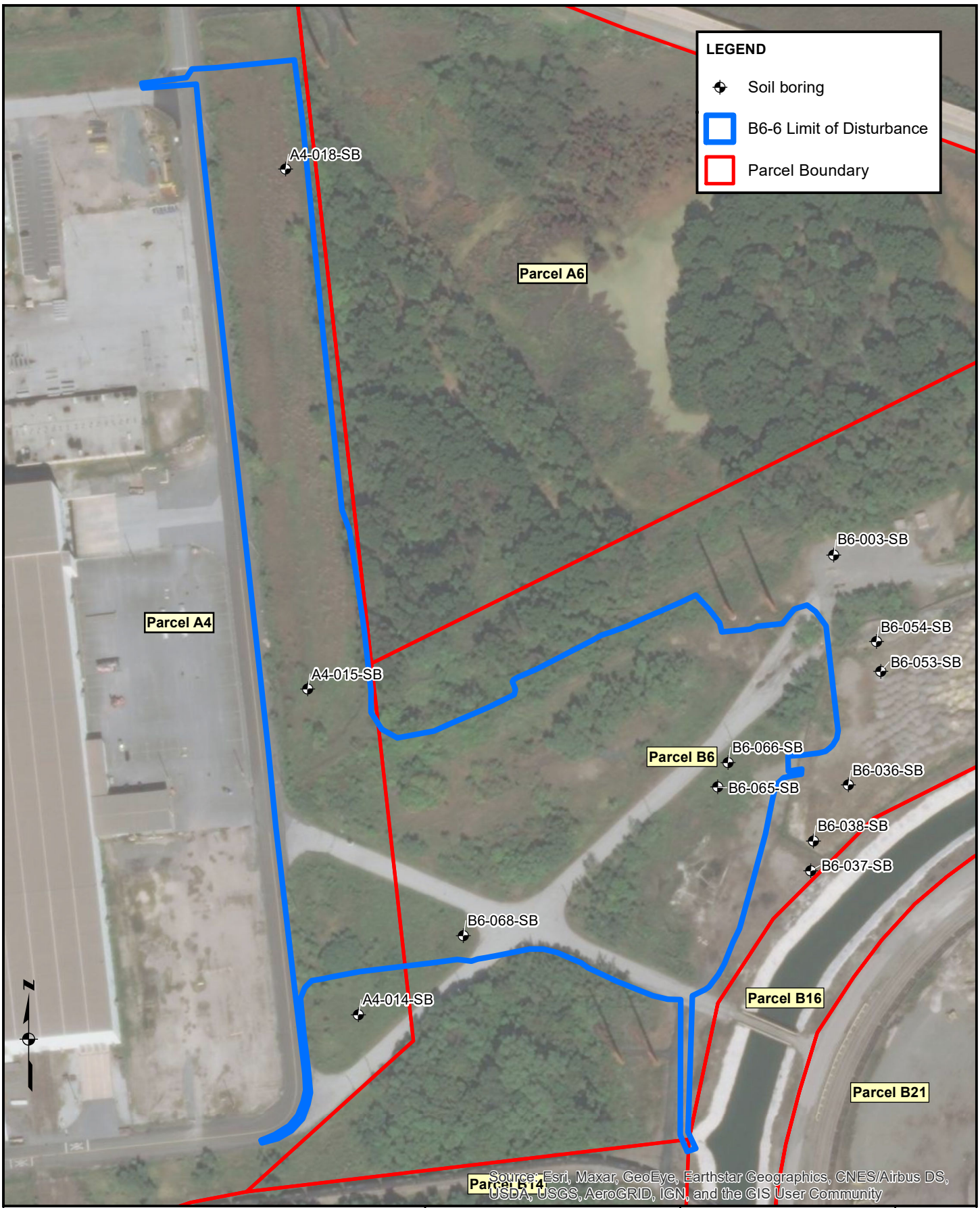
ARM Group LLC
Engineers and Scientists

0 75 150 300 Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
2



Sub-Parcel B6-6
Soil Boring Locations
December 8, 2021

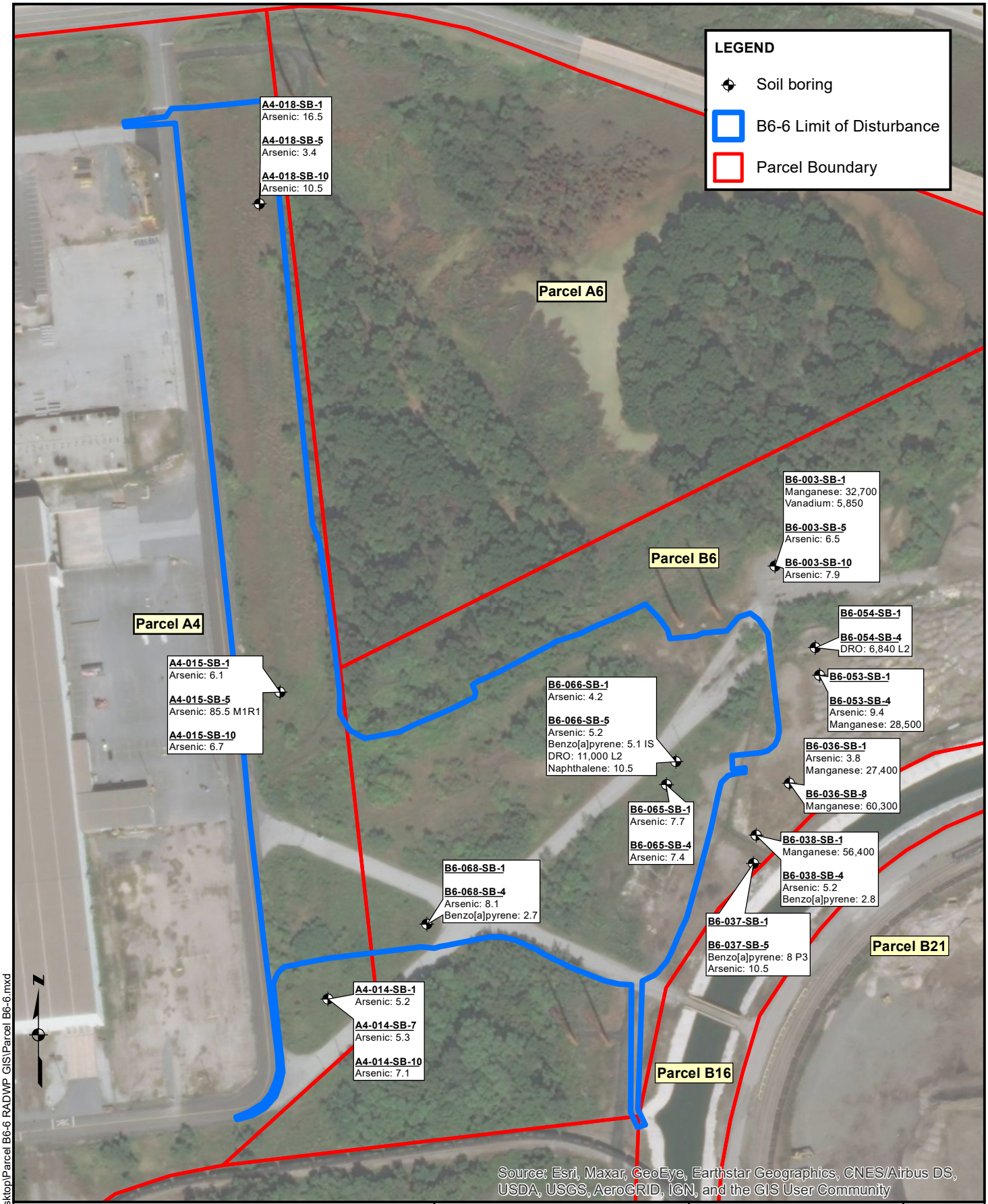
ARM Group LLC
Engineers and Scientists

0 85 170 340 Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
3



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Sub-Parcel B6-6
Soil PAL Exceedances

December 20, 2021

ARM Group LLC
Engineers and Scientists

0 75 150 300 Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
4

Sub-Parcel B6-6
Groundwater Sample Locations
December 17, 2021

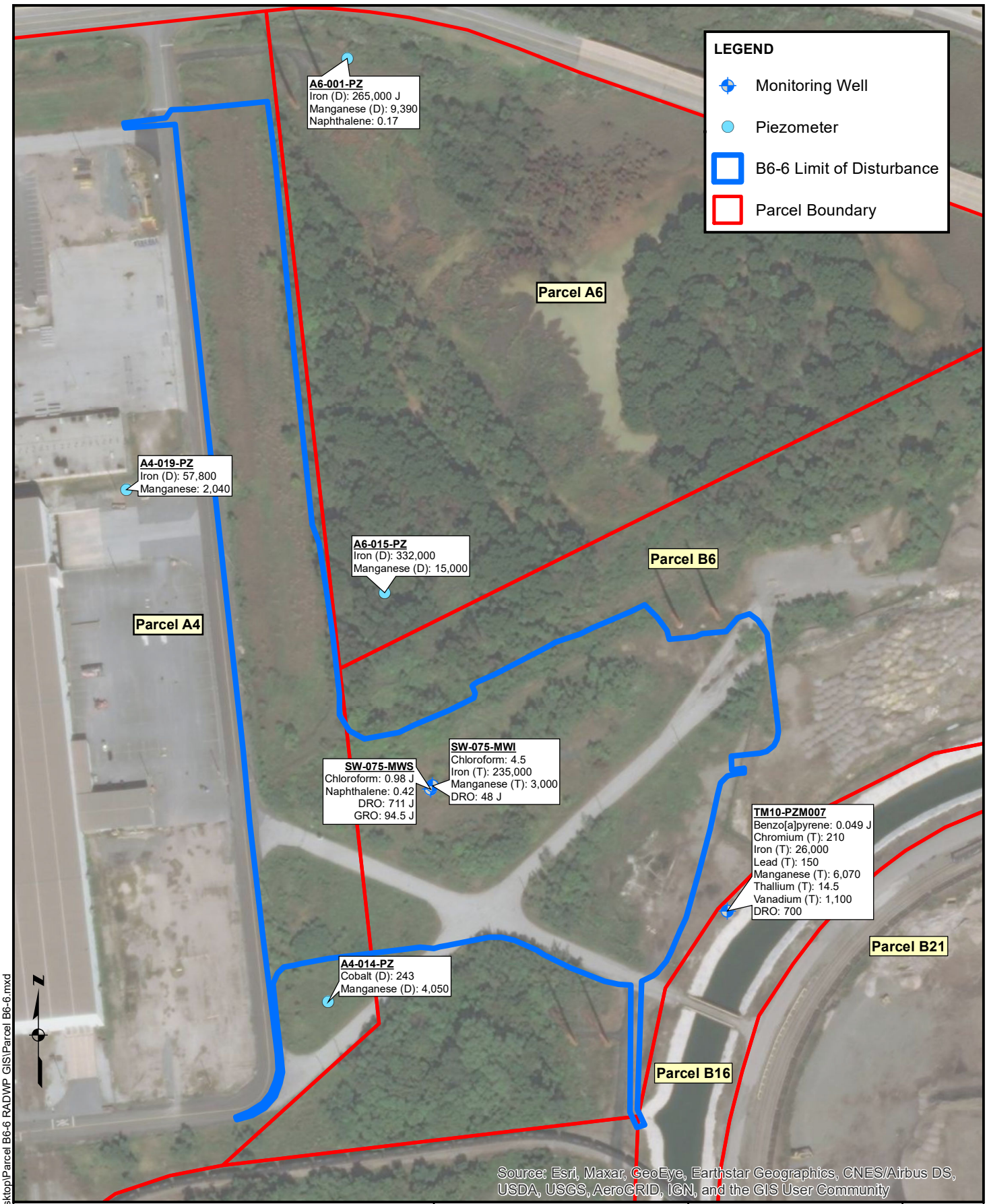
ARM Group LLC
Engineers and Scientists

0 75 150 300
Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
5



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Sub-Parcel B6-6
Groundwater PAL Exceedances

December 20, 2021

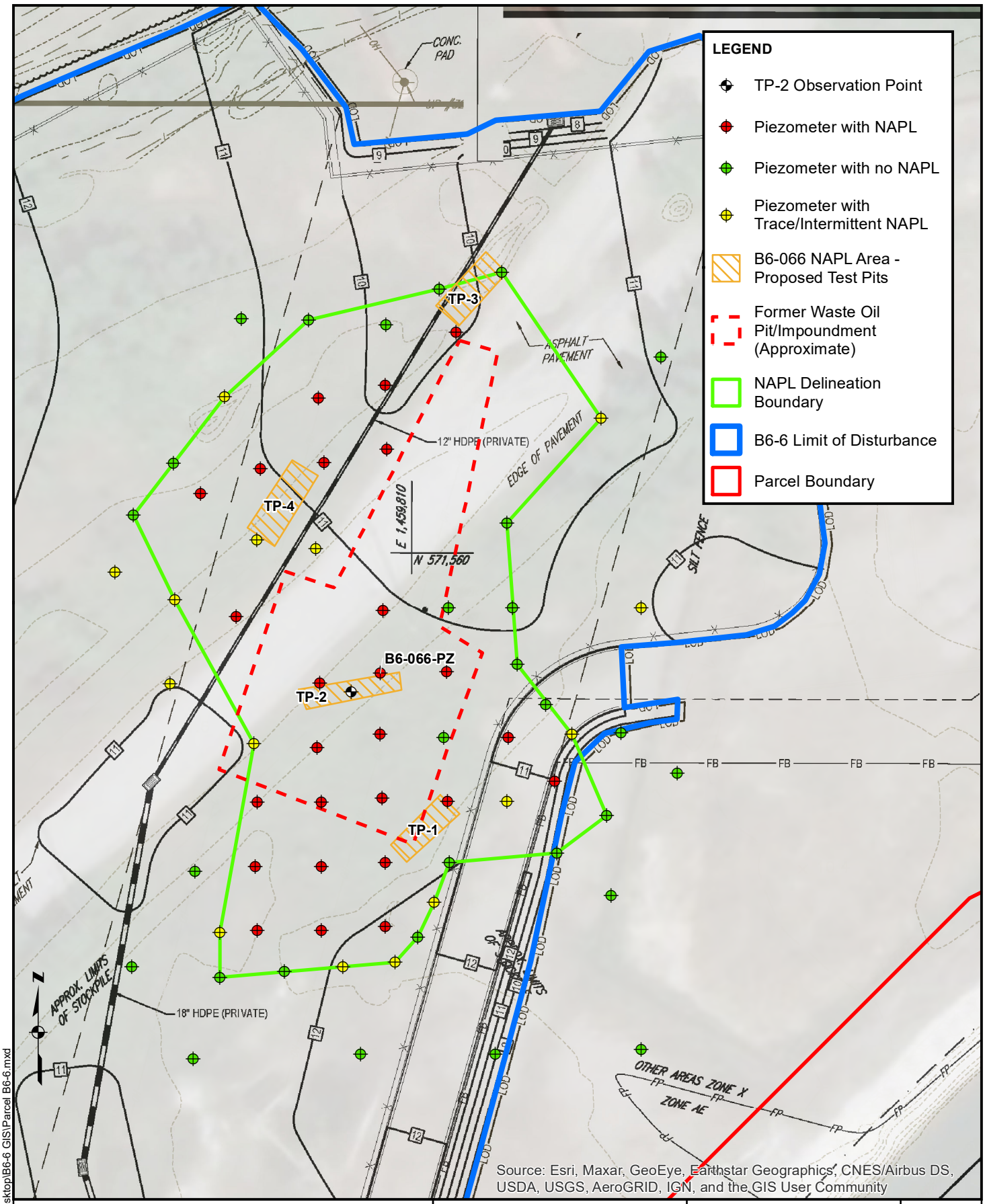
ARM Group LLC
Engineers and Scientists

0 75 150 300 Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
6



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Sub-Parcel B6-6
B6-066 NAPL Delineation Features
December 30, 2021

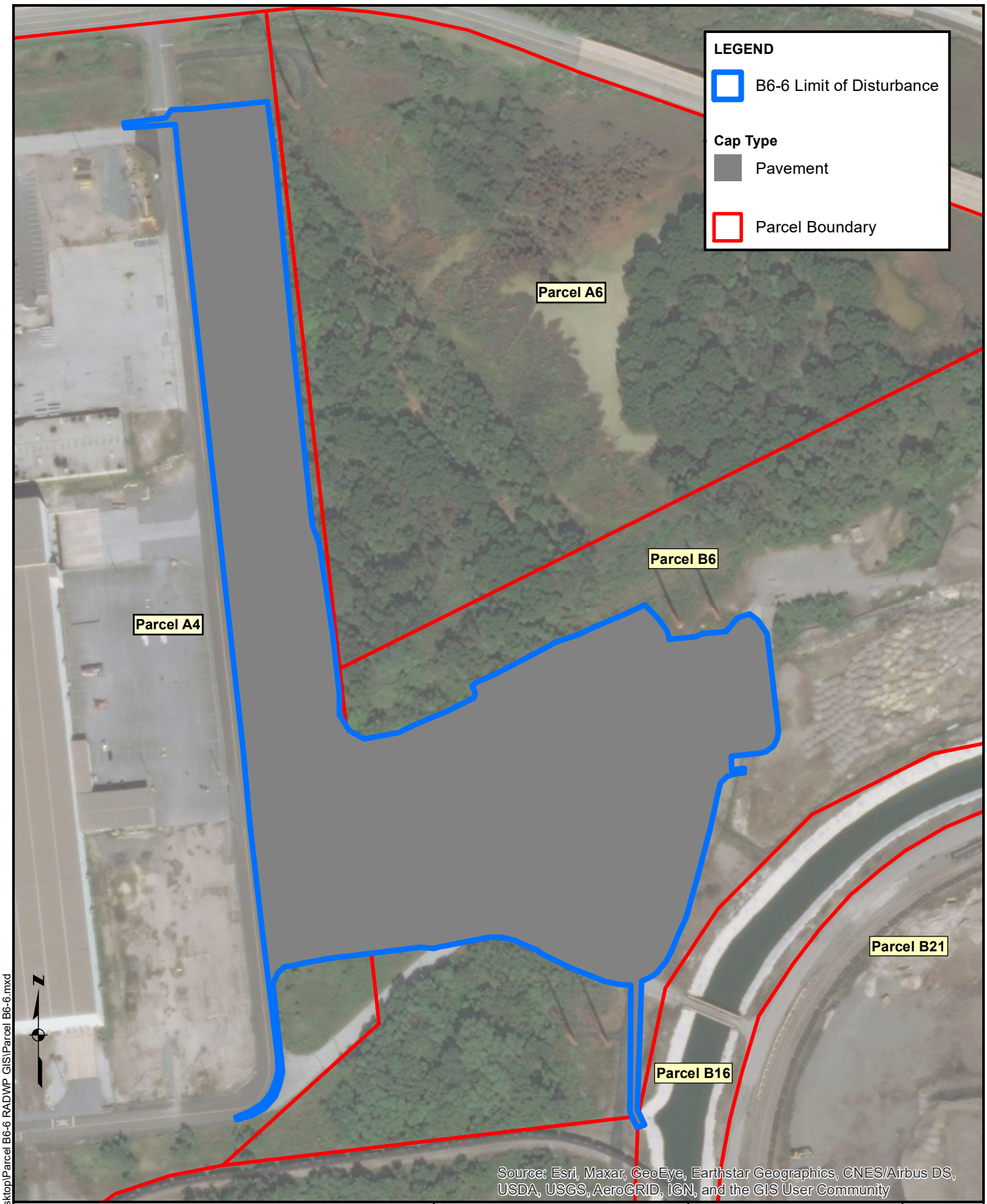
ARM Group LLC
Engineers and Scientists

0 15 30 60 Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
7



C:\Users\SKabis\Desktop\Parcel B6-6 RADWP GIS\Parcel B6-6.mxd

Sub-Parcel B6-6
Cap Types
December 22, 2021

ARM Group LLC
Engineers and Scientists

0 75 150 300
Feet

Tradepoint Atlantic
Sparrows Point

Baltimore County, MD
ARM Project 21010206

Figure
8

TABLES

Table 1 - Sub-Parcel B6-6
Summary of Organics Detected in Soil

Parameter	Units	PAL	A4-014-SB-1	A4-014-SB-7	A4-015-SB-1	A4-015-SB-5	A4-018-SB-1	A4-018-SB-5	B6-003-SB-1*	B6-003-SB-5*	B6-036-SB-1*	B6-036-SB-8*	B6-037-SB-1*	B6-037-SB-5*
			11/5/2015	11/5/2015	11/4/2015	11/2/2015	11/3/2015	11/3/2015	6/30/2016	6/30/2016	6/30/2016	6/30/2016	6/30/2016	6/30/2016
Volatile Organic Compounds														
1,2-Dichlorobenzene	mg/kg	9,300	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.004 J	0.0049 U	0.0055 U	0.0056 U
1,2-Dichloroethene (Total)	mg/kg	2,300	0.0088 U	0.01 U	0.013 U	0.01 U	0.0098 U	0.0099 U	0.011 U	0.012 U	0.011 U	0.0098 U	0.011 U	0.011 U
1,3-Dichlorobenzene	mg/kg		0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
1,4-Dichlorobenzene	mg/kg	11	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
2-Butanone (MEK)	mg/kg	190,000	0.0082 J	0.0092 J	0.0075 J	0.01 U	0.0098 U	0.0099 U	0.011 U	0.012 U	0.0024 J	0.0098 U	0.011 U	0.0043 J
Acetone	mg/kg	670,000	0.085 J	0.059 J	0.051 J	0.01 J	0.044 J	0.0099 R	0.0069 J	0.0096 J	**0.016**	0.007 B	**0.019**	**0.026**
Benzene	mg/kg	5.1	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	**0.0072**
cis-1,2-Dichloroethene	mg/kg	2,300	0.0044 UJ	0.005 UJ	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
Cyclohexane	mg/kg	27,000	0.0088 UJ	0.01 UJ	0.013 U	0.01 U	0.0098 U	0.0099 U	0.011 U	0.012 U	0.011 U	0.0098 U	0.011 U	0.011 U
Ethylbenzene	mg/kg	25	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
Isopropylbenzene	mg/kg	9,900	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
Methyl Acetate	mg/kg	1,200,000	0.044 U	**0.058**	0.063 U	0.052 U	0.049 R	0.05 R	0.057 U	0.061 U	0.055 U	0.049 U	0.055 U	0.056 U
Methylene Chloride	mg/kg	1,000	0.0044 U	0.005 U	0.003 J	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
Tetrachloroethene	mg/kg	100	0.0044 U	0.005 U	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	**0.0058**	0.0041 J	0.0055 U	0.0056 U
Toluene	mg/kg	47,000	0.00075 B	0.0014 B	0.0063 U	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0019 J
Trichloroethene	mg/kg	6	0.0044 U	0.005 U	0.0018 J	0.0052 U	0.0049 U	0.005 U	0.0057 U	0.0061 U	0.0055 U	0.0049 U	0.0055 U	0.0056 U
Xylenes	mg/kg	2,800	0.013 U	0.015 U	0.019 U	0.016 U	0.015 U	0.015 U	0.017 U	0.018 U	0.016 U	0.015 U	0.017 U	0.0063 J
Semi-Volatile Organic Compounds^														
1,1-Biphenyl	mg/kg	200	0.034 J	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.066 J	0.073 U	0.072 U	0.092 J
2,4-Dimethylphenol	mg/kg	16,000	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.076 U	0.073 U	0.072 U	0.37 U
2-Methylnaphthalene	mg/kg	3,000	0.38 U	**0.014**	**0.026**	0.0083 U	**0.042**	0.0082 U	0.027 J	**0.045**	**0.19**	**0.015**	0.071 J	**6.6**
2-Methylphenol	mg/kg	41,000	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.076 U	0.073 U	0.072 U	0.37 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.022 J	0.16 U	0.15 U	0.16 U	0.15 U	0.16 U	0.14 U	0.14 U	0.15 U	0.15 U	0.14 U	0.59 J
Acenaphthene	mg/kg	45,000	0.049 J	0.0032 J	**0.014**	0.0083 U	**0.0086**	0.0082 U	0.063 J	**0.064**	0.022 J	0.0023 J	0.011 J	**0.86**
Acenaphthylene	mg/kg	45,000	0.18 J	0.0062 J	**0.045**	0.0083 U	**0.016**	0.0082 U	0.016 J	0.0036 J	**0.16**	0.0046 J	0.014 J	**2.3**
Acetophenone	mg/kg	120,000	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.076 U	0.073 U	0.072 U	0.37 U
Anthracene	mg/kg	230,000	**0.49**	**0.013**	**0.13**	0.0083 U	**0.021**	0.0082 U	0.042 J	**0.026**	**0.12**	**0.011**	0.048 J	**2.6**
Benz[a]anthracene	mg/kg	21	**2.2**	**0.038**	**0.63**	0.0083 U	**0.1**	0.0082 U	**0.22**	**0.14**	**0.29**	**0.045**	**0.14**	**6.6**
Benzaldehyde	mg/kg	120,000	0.074 R	0.08 R	0.073 R	0.079 R	0.074 R	0.081 R	0.072 U	0.071 U	0.018 J	0.073 U	0.072 U	0.37 U
Benzo[a]pyrene	mg/kg	2.1	**2.1**	**0.041**	**0.52**	0.0083 U	**0.14**	0.0082 U	**0.32**	**0.25**	**0.36**	**0.054**	**0.14**	**8**
Benzo[b]fluoranthene	mg/kg	21	**3.1**	**0.11**	**1.1**	0.0009 J	**0.23**	0.0082 U	**0.44**	**0.34**	**0.58**	**0.086**	**0.27**	**20**
Benzo[g,h,i]perylene	mg/kg		**1.2**	**0.011**	**0.12**	0.0083 UJ	0.12 J	0.0082 UJ	**0.14**	**0.12**	**0.25**	**0.034**	**0.081**	**3.6**
Benzo[k]fluoranthene	mg/kg	210	**1.3**	**0.099**	**0.47**	0.0083 U	**0.083**	0.0082 U	**0.24**	**0.16**	**0.27**	**0.04**	**0.27**	**20.3**
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.041 J	0.073 U	0.015 J	**0.68**
Carbazole	mg/kg		**0.47**	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.041 J	0.073 U	0.072 U	0.37 U
Chrysene	mg/kg	2,100	**2.1**	**0.056**	**0.63**	0.00064 J	**0.15**	0.0082 U	**0.27**	**0.16**	**0.32**	**0.057**	**0.17**	**7**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.46**	0.004 J	**0.065**	0.0083 UJ	**0.041**	0.0082 U	0.053 J	**0.046**	0.077 J	**0.012**	0.022 J	**0.89**
Di-n-butylphthalate	mg/kg	82,000	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	0.076 U	0.073 U	0.072 U	0.37 U
Fluoranthene	mg/kg	30,000	**3.1**	**0.061**	**1**	0.0017 J	**0.16**	0.0082 U	**0.17**	**0.14**	**0.49**	**0.076**	**0.31**	**7.2**
Fluorene	mg/kg	30,000	0.06 J	**0.011**	**0.012**	0.0083 U	0.0071 J	0.0082 U	0.0088 J	**0.0096**	0.019 J	0.0017 J	0.019 J	**1.5**
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**1.3**	**0.011**	**0.16**	0.0083 UJ	**0.1**	0.0082 U	**0.14**	**0.12**	**0.23**	**0.032**	**0.074**	**3.1**
Naphthalene	mg/kg	8.6	0.083 J	**0.017**	**0.04**	0.0083 U	**0.028**	0.0082 U	0.023 J	**0.05**	**0.88**	**0.048**	0.067 J	**3.5**
Phenanthrene	mg/kg		**1.2**	**0.037**	**0.36**	0.0012 J	**0.067**	0.0082 U	**0.095**	**0.075**	**0.43**	**0.054**	**0.19**	**5.2**
Phenol	mg/kg	250,000	0.074 U	0.08 U	0.073 U	0.079 U	0.074 U	0.081 U	0.072 U	0.071 U	**0.14**	0.073 U	0.072 U	0.37 U
Pyrene	mg/kg	23,000	**2.5**	**0.052**	**0.84**	0.0015 J	**0.16**	0.0082 U	**0.17**	**0.14**	**0.42**	**0.062**	**0.31**	**9.8**
Polychlorinated Biphenyls (total)														
Aroclor 1242	mg/kg	0.97	0.093 U	N/A	0.018 U	N/A	0.018 U	N/A	0.0538 U	N/A	0.054 J	N/A	0.0578 U	N/A
Aroclor 1260	mg/kg	0.99	0.093 U	N/A	**0.055**	N/A	**0.036**	N/A	0.0538 U	N/A	**0.0842**	N/A	0.0578 U	N/A
PCBs (total)	mg/kg	0.97	0.65 U	N/A	0.055 J	N/A	0.036 J	N/A	0.0538 U	N/A	**0.1382**	N/A	0.0578 U	N/A
Total Petroleum Hydrocarbons														
Diesel Range Organics	mg/kg	6,200	N/A	N/A	N/A	N/A	N/A	N/A	**84.9**	**53.2**	**200**	**35.4**	**65.3**	**2,790**
Gasoline Range Organics	mg/kg	6,200	N/A	N/A	N/A	N/A	N/A	N/A	15.3 U	9 U	11 U	9 U	9.8 U	10.8 U
Oil and Grease	mg/kg	6,200	**663**	**1,760**	**417**	**252**	**645**	**573**	N/A	N/A	N/A	N/A	N/A	N/A

Non-B-flagged detections above the RL in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
N/A indicates that the parameter was not analyzed for this sample
^PAH compounds were analyzed via SIM
*indicates non-validated data

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
R: The result for this analyte is unreliable. Additional data is needed to confirm or disprove the presence of this analyte in the sample.

Table 1 - Sub-Parcel B6-6
Summary of Organics Detected in Soil

Parameter	Units	PAL	B6-038-SB-1* 6/30/2016	B6-038-SB-4* 6/30/2016	B6-053-SB-1* 6/30/2016	B6-053-SB-4* 6/30/2016	B6-054-SB-1* 6/30/2016	B6-054-SB-4* 6/30/2016	B6-065-SB-1* 7/5/2016	B6-065-SB-4* 75/2016	B6-066-SB-1* 7/5/2016	B6-066-SB-5* 7/5/2016	B6-068-SB-1* 6/30/2016	B6-068-SB-4* 6/30/2016
Volatile Organic Compounds														
1,2-Dichlorobenzene	mg/kg	9,300	**0.013**	0.0029 J	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	**0.53**	*0.0057 U*	*0.0051 U*
1,2-Dichloroethene (Total)	mg/kg	2,300	*0.014 U*	0.005 J	*0.01 U*	*0.011 U*	*0.012 U*	*0.77 U*	*0.013 U*	*0.012 U*	*0.0099 U*	*0.5 U*	*0.011 U*	*0.01 U*
1,3-Dichlorobenzene	mg/kg		*0.0068 U*	*0.0049 U*	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	0.11 J	*0.0057 U*	*0.0051 U*
1,4-Dichlorobenzene	mg/kg	11	*0.0068 U*	*0.0049 U*	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	**0.5**	*0.0057 U*	*0.0051 U*
2-Butanone (MEK)	mg/kg	190,000	*0.014 U*	*0.0099 U*	*0.01 U*	*0.011 U*	*0.012 U*	*0.77 U*	*0.013 U*	*0.012 U*	*0.0099 U*	*0.5 U*	*0.011 U*	*0.01 U*
Acetone	mg/kg	670,000	**0.017**	0.0056 B	*0.01 U*	0.0068 J	0.0066 J	*0.77 U*	*0.013 U*	*0.012 U*	*0.0099 U*	0.35 B	*0.011 U*	0.012 B
Benzene	mg/kg	5.1	*0.0068 U*	*0.0049 U*	*0.0051 U*	**0.0056**	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	*0.25 U*	*0.0057 U*	*0.0051 U*
cis-1,2-Dichloroethene	mg/kg	2,300	*0.0068 U*	0.0045 J	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	*0.25 U*	*0.0057 U*	*0.0051 U*
Cyclohexane	mg/kg	27,000	*0.014 U*	*0.0099 U*	*0.01 U*	*0.011 U*	*0.012 U*	*0.77 U*	*0.013 U*	*0.012 U*	*0.0099 U*	0.38 J	*0.011 U*	*0.01 U*
Ethylbenzene	mg/kg	25	*0.0068 U*	*0.0049 U*	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	0.14 J	*0.0057 U*	*0.0051 U*
Isopropylbenzene	mg/kg	9,900	*0.0068 U*	*0.0049 U*	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	**0.95**	*0.0057 U*	*0.0051 U*
Methyl Acetate	mg/kg	1,200,000	*0.068 U*	*0.049 U*	*0.051 U*	*0.056 U*	*0.062 U*	0.46 J	*0.065 U*	*0.06 U*	*0.049 U*	*2.5 U*	*0.057 U*	*0.051 U*
Methylene Chloride	mg/kg	1,000	*0.0068 U*	*0.0049 U*	*0.0051 U*	*0.0056 U*	*0.0062 U*	0.5 B	*0.0065 U*	*0.006 U*	*0.0049 U*	0.33 B	*0.0057 U*	*0.0051 U*
Tetrachloroethene	mg/kg	100	**0.011**	**0.0074**	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	*0.25 U*	*0.0057 U*	*0.0051 U*
Toluene	mg/kg	47,000	*0.0068 U*	*0.0049 U*	*0.0051 U*	0.0047 J	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	*0.25 U*	*0.0057 U*	*0.0051 U*
Trichloroethene	mg/kg	6	*0.0068 U*	0.0042 J	*0.0051 U*	*0.0056 U*	*0.0062 U*	*0.38 U*	*0.0065 U*	*0.006 U*	*0.0049 U*	*0.25 U*	*0.0057 U*	*0.0051 U*
Xylenes	mg/kg	2,800	0.0047 J	*0.015 U*	*0.015 U*	*0.017 U*	*0.019 U*	*1.1 U*	*0.02 U*	*0.018 U*	*0.015 U*	**1.3**	*0.017 U*	*0.015 U*
Semi-Volatile Organic Compounds^														
1,1-Biphenyl	mg/kg	200	*0.082 U*	**0.18**	0.036 J	**0.095**	*0.076 U*	*0.78 U*	*0.08 U*	0.02 J	0.024 J	**6.4**	*0.073 U*	*0.08 U*
2,4-Dimethylphenol	mg/kg	16,000	0.021 J	*0.079 U*	*0.074 U*	0.015 J	*0.076 U*	*0.78 U*	*0.08 U*	*0.081 U*	*0.074 U*	*0.76 U*	*0.073 U*	*0.08 U*
2-Methylnaphthalene	mg/kg	3,000	0.064 J	**2.2**	**0.14**	**0.29**	0.0023 J	**1.2**	**0.1**	**0.16**	0.063 J	**8.1**	0.0026 J	0.033 J
2-Methylphenol	mg/kg	41,000	*0.082 U*	*0.079 U*	*0.074 U*	0.018 J	*0.076 U*	*0.78 U*	*0.08 U*	*0.081 U*	*0.074 U*	*0.076 U*	*0.073 U*	*0.08 U*
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	*0.16 U*	0.021 J	*0.15 U*	0.054 J	*0.15 U*	*1.6 U*	*0.16 U*	*0.16 U*	*0.15 U*	**0.24**	*0.15 U*	*0.16 U*
Acenaphthene	mg/kg	45,000	*0.084 U*	**0.71**	0.0099 J	0.06 J	*0.0075 U*	**0.44**	0.019 J	0.019 J	*0.15 U*	**8.1**	0.0009 J	**0.093**
Acenaphthylene	mg/kg	45,000	**0.13**	*0.08 U*	**0.24**	**0.62**	*0.0075 U*	**0.14**	0.047 J	0.073 J	0.12 J	**2.4**	0.0012 J	**0.26**
Acetophenone	mg/kg	120,000	*0.082 U*	*0.079 U*	*0.074 U*	0.029 J	*0.076 U*	*0.78 U*	*0.08 U*	*0.081 U*	*0.074 U*	*0.76 U*	*0.073 U*	*0.08 U*
Anthracene	mg/kg	230,000	0.04 J	**2**	**0.18**	**0.87**	0.0015 J	*0.079 U*	**0.094**	**0.14**	0.054 J	**9**	0.0047 J	**0.97**
Benz[a]anthracene	mg/kg	21	0.025 J	**3.1**	**0.57**	**2.1**	*0.0075 U*	0.03 J	**0.35**	**0.49**	**0.22**	**5.8**	**0.02**	**2.7**
Benzaldehyde	mg/kg	120,000	0.035 J	**0.23**	0.026 J	0.037 J	*0.076 U*	*0.78 U*	*0.08 U*	0.03 J	0.024 J	*0.076 U*	*0.073 U*	0.028 J
Benzo[a]pyrene	mg/kg	2.1	0.02 J	**2.8**	**0.67**	**1.7**	*0.0075 U*	0.024 J	**0.34**	**0.49**	**0.35**	**5.1**	**0.02**	**2.7**
Benzo[b]fluoranthene	mg/kg	21	0.028 J	**6.2**	**0.99**	**2.6**	0.0013 J	0.034 J	**0.66**	**0.98**	**0.55**	**9.9**	**0.03**	**4.5**
Benzo[g,h,i]perylene	mg/kg		**0.13**	**1.2**	**0.33**	**0.76**	*0.0075 U*	*0.079 U*	**0.1**	**0.13**	**0.4**	**1.8**	**0.012**	**1.6**
Benzo[k]fluoranthene	mg/kg	210	0.029 J	**6.2**	**0.47**	**1.4**	0.0013 J	0.034 J	**0.6**	**0.9**	**0.48**	**8.6**	**0.014**	**1.8**
bis(2-Ethylhexyl)phthalate	mg/kg	160	**0.18**	**0.32**	0.031 J	0.034 J	*0.076 U*	*0.78 U*	*0.08 U*	*0.081 U*	**0.23**	**4**	*0.073 U*	*0.08 U*
Carbazole	mg/kg		*0.082 U*	**0.13**	**0.091**	**0.26**	*0.076 U*	*0.78 U*	*0.08 U*	0.032 J	*0.074 U*	0.42 J	*0.073 U*	**0.24**
Chrysene	mg/kg	2,100	0.013 J	**3.2**	**0.58**	**1.9**	0.00069 J	**0.087**	**0.28**	**0.42**	**0.21**	**6.2**	**0.02**	**2.9**
Dibenz[a,h]anthracene	mg/kg	2.1	*0.084 U*	**0.48**	**0.12**	**0.32**	*0.0075 U*	*0.079 U*	0.043 J	0.048 J	0.068 J	**0.6**	0.0043 J	**0.68**
Di-n-butylphthalate	mg/kg	82,000	0.024 J	*0.079 U*	*0.074 U*	*0.072 U*	0.022 J	*0.78 U*	*0.08 U*	*0.081 U*	0.02 J	0.36 J	*0.073 U*	*0.08 U*
Fluoranthene	mg/kg	30,000	0.015 J	**8**	**0.74**	**3.7**	0.001 J	0.044 J	**0.5**	**0.68**	**0.18**	**13.2**	**0.031**	**6.2**
Fluorene	mg/kg	30,000	0.011 J	**1.1**	0.027 J	**0.31**	*0.0075 U*	**0.64**	0.028 J	0.021 J	0.017 J	**10.6**	0.0012 J	**0.25**
Indeno[1,2,3-c,d]pyrene	mg/kg	21	0.013 J	**1.3**	**0.33**	**0.82**	*0.0075 U*	*0.079 U*	**0.12**	**0.14**	**0.22**	**1.7**	**0.012**	**1.6**
Naphthalene	mg/kg	8.6	0.082 J	**6.6**	**0.48**	**1.1**	0.0024 J	**0.19**	0.073 J	**0.14**	0.068 J	**10.5**	0.0055 J	0.046 J
Phenanthrene	mg/kg		0.046 J	**8.7**	**0.36**	**2.4**	0.003 J	**1.3**	**0.26**	**0.37**	0.11 J	**30**	**0.015**	**2.5**
Phenol	mg/kg	250,000	0.035 J	0.021 J	0.018 J	0.056 J	*0.076 U*	*0.78 U*	*0.08 U*	*0.081 U*	0.031 J	**0.71**	*0.073 U*	*0.08 U*
Pyrene	mg/kg	23,000	0.029 J	**6.3**	**0.59**	**3**	**0.0091**	**1.7**	**0.41**	**0.64**	**0.24**	**13.4**	**0.026**	**5.3**
Polychlorinated Biphenyls (total)														
Aroclor 1242	mg/kg	0.97	*0.0581 U*	*N/A*	*0.055 U*	*N/A*	*0.054 U*	*N/A*	*0.0592 U*	*N/A*	*0.0575 U*	*N/A*	*0.0526 U*	*N/A*
Aroclor 1260	mg/kg	0.99	**0.163**	*N/A*	*0.055 U*	*N/A*	*0.054 U*	*N/A*	**0.631**	*N/A*	**0.104**	*N/A*	*0.0526 U*	*N/A*
PCBs (total)	mg/kg	0.97	**0.163**	*N/A*	*0.055 U*	*N/A*	*0.054 U*	*N/A*	**0.631**	*N/A*	**0.104**	*N/A*	*0.0526 U*	*N/A*
Total Petroleum Hydrocarbons														
Diesel Range Organics	mg/kg	6,200	**468**	**899**	**146**	**183**	**124**	**6,840**	**35.1**	**117**	**280**	**11,000**	**14.9**	**191**
Gasoline Range Organics	mg/kg	6,200	*11.7 U*	*12.2 U*	*11.9 U*	12.8 J	*12.4 U*	**67.2**	*15.5 U*	*11.3 U*	*11.2 U*	**129**	*10.8 U*	*9.6 U*
Oil and Grease	mg/kg	6,200	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Non-B-flagged detections above the RL in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
N/A indicates that the parameter was not analyzed for this sample
^PAH compounds were analyzed via SIM
*indicates non-validated data

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
R: The result for this analyte is unreliable. Additional data is needed to confirm or disprove the presence of this analyte in the sample.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	A4-014-SB-1	A4-014-SB-7	A4-014-SB-10	A4-015-SB-1	A4-015-SB-5
			11/5/2015	11/5/2015	11/5/2015	11/4/2015	11/4/2015
Metal							
Aluminum	mg/kg	1,100,000	**11,200**	**17,300**	*N/A*	**34,000**	**16,300**
Antimony	mg/kg	470	*3.1 UJ*	*3.5 UJ*	*N/A*	*2.5 UJ*	*3 UJ*
Arsenic	mg/kg	3	**5.2**	**5.3**	**7.1**	**6.1 J**	**85.5 J**
Barium	mg/kg	220,000	**113**	**74.5**	*N/A*	314 J	20.6 J
Beryllium	mg/kg	2,300	0.69 J	0.82 J	*N/A*	**3.1**	**1.2**
Cadmium	mg/kg	980	**2.4**	*1.7 U*	*N/A*	1.2 B	0.23 B
Chromium	mg/kg	120,000	**219**	**35.3**	*N/A*	**303**	**43**
Chromium VI	mg/kg	6.3	*1.1 UJ*	*1.3 UJ*	*N/A*	*1.1 U*	*1.2 UJ*
Cobalt	mg/kg	350	**12.7**	**7.2**	*N/A*	**8.6**	4.1 B
Copper	mg/kg	47,000	50.3 J	18.8 J	*N/A*	**73.5**	**9.1**
Iron	mg/kg	820,000	**43,200**	**19,100**	*N/A*	102,000 J	73,000 J
Lead	mg/kg	800	**214**	**19.3**	*N/A*	101 J	17.1 J
Manganese	mg/kg	26,000	3,470 J	238 J	*N/A*	17,300 J	51.1 J
Mercury	mg/kg	350	0.082 J	0.036 J	*N/A*	0.042 J	0.0079 J
Nickel	mg/kg	22,000	**22.9**	**15.4**	*N/A*	**46.1**	9.6 B
Selenium	mg/kg	5,800	*4.1 U*	*4.6 U*	*N/A*	2.9 B	*4 U*
Silver	mg/kg	5,800	*3.1 U*	*3.5 U*	*N/A*	*2.5 U*	0.39 J
Thallium	mg/kg	12	*10.2 UJ*	*11.6 UJ*	*N/A*	*8.4 U*	2.2 B
Vanadium	mg/kg	5,800	558 J	38 J	*N/A*	430 J	72.8 J
Zinc	mg/kg	350,000	**721**	**80**	*N/A*	**332**	**39.8**
Other							
Cyanide	mg/kg	150	0.2 J	*0.63 U*	*N/A*	**0.86**	*0.71 U*

Bold indicates non-B-flagged detection above reporting limit
Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	A4-015-SB-10	A4-018-SB-1	A4-018-SB-5	A4-018-SB-10	B6-003-SB-1*
			11/4/2015	11/3/2015	11/3/2015	11/3/2015	6/30/2016
Metal							
Aluminum	mg/kg	1,100,000	*N/A*	**11,400**	**17,100**	*N/A*	**8,600**
Antimony	mg/kg	470	*N/A*	0.97 B	*2.3 UJ*	*N/A*	*2.4 U*
Arsenic	mg/kg	3	**6.7**	**16.5**	**3.4**	**10.5**	*2 U*
Barium	mg/kg	220,000	*N/A*	**110**	**53.1**	*N/A*	**70.1**
Beryllium	mg/kg	2,300	*N/A*	**2.5**	**0.8**	*N/A*	0.28 J
Cadmium	mg/kg	980	*N/A*	**1.4**	0.14 B	*N/A*	0.57 B
Chromium	mg/kg	120,000	*N/A*	**117**	**36.1**	*N/A*	**1,150**
Chromium VI	mg/kg	6.3	*N/A*	*1.1 U*	*1.2 U*	*N/A*	0.56 B
Cobalt	mg/kg	350	*N/A*	**17.6**	**5.7**	*N/A*	1.8 J
Copper	mg/kg	47,000	*N/A*	**138**	**13.5**	*N/A*	**21.6**
Iron	mg/kg	820,000	*N/A*	**259,000**	**20,000**	*N/A*	**199,000**
Lead	mg/kg	800	*N/A*	**182**	**17.7**	*N/A*	**35.6**
Manganese	mg/kg	26,000	*N/A*	**3,910**	**37.5**	*N/A*	**32,700**
Mercury	mg/kg	350	*N/A*	**0.12**	0.0045 J	*N/A*	0.0075 J
Nickel	mg/kg	22,000	*N/A*	**94.2**	**14.5**	*N/A*	**14.3**
Selenium	mg/kg	5,800	*N/A*	*2.7 U*	*3 U*	*N/A*	*3.1 U*
Silver	mg/kg	5,800	*N/A*	**3.1**	*2.3 U*	*N/A*	*2.4 U*
Thallium	mg/kg	12	*N/A*	*6.9 U*	*7.6 U*	*N/A*	*7.9 U*
Vanadium	mg/kg	5,800	*N/A*	**178**	**43.6**	*N/A*	**5,850**
Zinc	mg/kg	350,000	*N/A*	**509**	**42.8**	*N/A*	**59.3**
Other							
Cyanide	mg/kg	150	*N/A*	0.29 J	*0.65 U*	*N/A*	0.2 J

Bold indicates non-B-flagged detection above reporting limit
Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	B6-003-SB-5*	B6-003-SB-10	B6-036-SB-1*	B6-036-SB-8*	B6-037-SB-1*
			6/30/2016	6/30/2016	6/30/2016	6/30/2016	6/30/2016
Metal							
Aluminum	mg/kg	1,100,000	**4,050**	*N/A*	**14,300**	**8,430**	**19,700**
Antimony	mg/kg	470	*2.8 U*	*N/A*	*3 U*	*2.6 U*	*3 U*
Arsenic	mg/kg	3	**6.5**	**7.9**	**3.8**	*2.2 U*	*2.5 U*
Barium	mg/kg	220,000	**37**	*N/A*	**204**	**178**	**166**
Beryllium	mg/kg	2,300	*0.95 U*	*N/A*	**1.3**	*0.87 U*	**1.6**
Cadmium	mg/kg	980	0.62 B	*N/A*	**2.8**	**4.1**	0.88 B
Chromium	mg/kg	120,000	**616**	*N/A*	**603**	**1,360**	**787**
Chromium VI	mg/kg	6.3	0.52 B	*N/A*	0.47 B	0.47 B	0.43 B
Cobalt	mg/kg	350	**6.9**	*N/A*	**7.4**	3.6 J	1.3 J
Copper	mg/kg	47,000	**161**	*N/A*	**63.6**	**60.3**	**30.7**
Iron	mg/kg	820,000	**262,000**	*N/A*	**98,400**	**131,000**	**140,000**
Lead	mg/kg	800	**91.9**	*N/A*	**165**	**295**	**31.5**
Manganese	mg/kg	26,000	**19,000**	*N/A*	**27,400**	**60,300**	**18,400**
Mercury	mg/kg	350	0.018 J	*N/A*	0.062 J	0.048 J	0.0099 J
Nickel	mg/kg	22,000	**33.4**	*N/A*	**24.2**	**13.2**	**17.9**
Selenium	mg/kg	5,800	*3.8 U*	*N/A*	*4 U*	*3.5 U*	*4 U*
Silver	mg/kg	5,800	*2.8 U*	*N/A*	*3 U*	*2.6 U*	*3 U*
Thallium	mg/kg	12	*9.5 U*	*N/A*	*10.1 U*	*8.7 U*	*10 U*
Vanadium	mg/kg	5,800	**2,780**	*N/A*	**1,280**	**3,460**	**492**
Zinc	mg/kg	350,000	**179**	*N/A*	**712**	**611**	**150**
Other							
Cyanide	mg/kg	150	0.35 J	*N/A*	**3.1**	0.43 J	0.41 J

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Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	B6-037-SB-5* 6/30/2016	B6-038-SB-1* 6/30/2016	B6-038-SB-4* 6/30/2016	B6-053-SB-1* 6/30/2016	B6-053-SB-4* 6/30/2016
Metal							
Aluminum	mg/kg	1,100,000	**11,400**	**23,400**	**17,800**	**8,400**	**6,350**
Antimony	mg/kg	470	*2.7 U*	*3.2 U*	*2.5 U*	*3.2 U*	*2.5 U*
Arsenic	mg/kg	3	**10.5**	*2.6 U*	**5.2**	**12.9**	**9.4**
Barium	mg/kg	220,000	**130**	**472**	**269**	**72**	**60.2**
Beryllium	mg/kg	2,300	0.83 J	**1.8**	**1.3**	0.24 J	*0.82 U*
Cadmium	mg/kg	980	**2.3**	1.3 B	1.7 B	1.3 B	1 B
Chromium	mg/kg	120,000	**593**	**599**	**189**	**734**	**771**
Chromium VI	mg/kg	6.3	0.26 B	0.81 B	0.43 B	0.45 B	0.39 B
Cobalt	mg/kg	350	**7.6**	4.5 J	**14.5**	**141**	**145**
Copper	mg/kg	47,000	**117**	**40.6**	**81.3**	**369**	**383**
Iron	mg/kg	820,000	**158,000**	**74,100**	**90,500**	**186,000**	**108,000**
Lead	mg/kg	800	**484**	**59.3**	**152**	**99.7**	**82.6**
Manganese	mg/kg	26,000	**20,000**	**56,400**	**9,020**	**37,400**	**28,500**
Mercury	mg/kg	350	0.072 J	0.064 J	**0.41**	**0.29**	**0.2**
Nickel	mg/kg	22,000	**54.7**	**14.4**	**37.8**	**39.6**	**36.4**
Selenium	mg/kg	5,800	*3.6 U*	*4.2 U*	*3.3 U*	**6.4**	*3.3 U*
Silver	mg/kg	5,800	*2.7 U*	*3.2 U*	*2.5 U*	*3.2 U*	*2.5 U*
Thallium	mg/kg	12	*9.1 U*	*10.6 U*	*8.2 U*	*10.7 U*	*8.2 U*
Vanadium	mg/kg	5,800	**315**	**1,660**	**528**	**4,360**	**3,430**
Zinc	mg/kg	350,000	**642**	**168**	**582**	**365**	**278**
Other							
Cyanide	mg/kg	150	**0.7**	**0.78**	**1.4**	**0.61**	**1.3**

Bold indicates non-B-flagged detection above reporting limit
Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	B6-054-SB-1* 6/30/2016	B6-054-SB-4* 6/30/2016	B6-065-SB-1* 7/5/2016	B6-065-SB-4* 7/5/2016	B6-066-SB-1* 7/5/2016
Metal							
Aluminum	mg/kg	1,100,000	**45,700**	**41,800**	**29,300**	**24,100**	**34,600**
Antimony	mg/kg	470	*2.4 U*	*2.5 U*	*2.9 U*	*2.7 U*	*2.5 U*
Arsenic	mg/kg	3	*2 U*	*2.1 U*	**7.7**	**7.4**	**4.2**
Barium	mg/kg	220,000	**386**	**463**	**270**	**226**	**385**
Beryllium	mg/kg	2,300	**7.5**	**7.5**	**1.7**	**1.7**	**4.6**
Cadmium	mg/kg	980	0.21 B	0.25 B	**2.5**	**2.6**	1.1 B
Chromium	mg/kg	120,000	**6.6**	**5.8**	**155**	**192**	**102**
Chromium VI	mg/kg	6.3	0.36 B	0.33 B	0.38 B	0.43 B	0.36 B
Cobalt	mg/kg	350	1.2 J	0.97 J	**9.8**	**10.8**	**4.6**
Copper	mg/kg	47,000	**8.9**	2.1 J	**80.1**	**94.9**	**106**
Iron	mg/kg	820,000	**22,000**	**5,830**	**53,200**	**57,300**	**44,700**
Lead	mg/kg	800	*2 U*	**3.9**	**190**	**203**	**116**
Manganese	mg/kg	26,000	**4,080**	**4,050**	**3,820**	**4,450**	**4,190**
Mercury	mg/kg	350	*0.11 U*	*0.11 U*	**0.16**	0.1 J	0.012 J
Nickel	mg/kg	22,000	1.7 J	*8.2 U*	**42.6**	**47**	**19.3**
Selenium	mg/kg	5,800	**3.3**	*3.3 U*	2.6 B	*3.5 U*	*3.3 U*
Silver	mg/kg	5,800	*2.4 U*	*2.5 U*	*2.9 U*	*2.7 U*	*2.5 U*
Thallium	mg/kg	12	*7.9 U*	*8.2 U*	*9.8 U*	*8.8 U*	*8.3 U*
Vanadium	mg/kg	5,800	**43**	**36.1**	**108**	**162**	**135**
Zinc	mg/kg	350,000	*4 U*	1.9 J	**455**	**454**	**286**
Other							
Cyanide	mg/kg	150	0.27 J	0.28 J	**4.6**	**3.6**	0.65 J

Bold indicates non-B-flagged detection above reporting limit
Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
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J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2 - Sub-Parcel B6-6
Summary of Inorganics Detected in Soil

Parameter	Units	PAL	B6-066-SB-5* 7/5/2016	B6-068-SB-1* 6/30/2016	B6-068-SB-4* 6/30/2016
Metal					
Aluminum	mg/kg	1,100,000	**25,600**	**17,500**	**18,600**
Antimony	mg/kg	470	*2.6 U*	*2.7 U*	*2.8 U*
Arsenic	mg/kg	3	**5.2**	*2.2 U*	**8.1**
Barium	mg/kg	220,000	**378**	**106**	**155**
Beryllium	mg/kg	2,300	**3.3**	**1.2**	**1.6**
Cadmium	mg/kg	980	1.3 B	0.35 B	0.77 B
Chromium	mg/kg	120,000	**104**	**89**	**50.7**
Chromium VI	mg/kg	6.3	0.58 B	0.34 B	0.48 B
Cobalt	mg/kg	350	**5.5**	3.6 J	**7.7**
Copper	mg/kg	47,000	**73.9**	**11.2**	**74.5**
Iron	mg/kg	820,000	**53,400**	**22,100**	**35,000**
Lead	mg/kg	800	**154**	**15.9**	**121**
Manganese	mg/kg	26,000	**4,890**	**2,760**	**1,420**
Mercury	mg/kg	350	0.0059 J	0.019 J	0.11 J
Nickel	mg/kg	22,000	**25.8**	**9.2**	**24.9**
Selenium	mg/kg	5,800	*3.5 U*	*3.6 U*	*3.7 U*
Silver	mg/kg	5,800	*2.6 U*	*2.7 U*	*2.8 U*
Thallium	mg/kg	12	*8.6 U*	*9 U*	*9.3 U*
Vanadium	mg/kg	5,800	**138**	**435**	**83.5**
Zinc	mg/kg	350,000	**225**	**45.5**	**326**
Other					
Cyanide	mg/kg	150	0.42 J	0.098 J	0.52 J

Bold indicates non-B-flagged detection above reporting limit
Values in red indicate a detection exceedance of the Project Action Limit (PAL)
N/A: This parameter was not analyzed for this sample.
* Indicates non-validated data
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 3 - Sub-Parcel B6-6
Summary of Organics Detected in Groundwater

Parameter	Units	PAL	A4-014-PZ	A4-019-PZ	A6-001-PZ	A6-015-PZ*	SW-075-MWI	SW-075-MWS	TM10-PZM007
			11/11/2015	11/11/2015	9/26/2019	9/27/2019	6/28/2016	6/28/2016	6/29/2016
Volatile Organic Compounds									
1,1-Dichloroethane	µg/L	2.7	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	0.7 J
1,2-Dichloroethene (Total)	µg/L	70	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**2.1**
Benzene	µg/L	5	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	0.64 J	*1 U*
Carbon disulfide	µg/L	810	*1 U*	*1 U*	*1 U*	*1 U*	0.77 B	**1.3**	*1 U*
Chloroform	µg/L	0.22	*1 U*	*1 U*	*1 U*	*1 U*	**4.5**	0.98 J	*1 U*
cis-1,2-Dichloroethene	µg/L	70	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**2.1**
Ethylbenzene	µg/L	700	*1 U*	*1 U*	*1 U*	**1.4**	*1 U*	*1 U*	*1 U*
Tetrachloroethene	µg/L	5	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	0.65 J
Toluene	µg/L	1,000	*1 U*	*1 U*	*1 U*	*1 U*	0.2 B	**15.6**	*1 U*
Xylenes	µg/L	10,000	*3 U*	*3 U*	*3 U*	2.2 J	*3 U*	*3 U*	*3 U*
Semi-Volatile Organic Compounds^									
1,4-Dioxane	µg/L	0.46	0.069 B	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	*0.1 U*	**0.25**
2,4-Dimethylphenol	µg/L	360	*1 U*	*1 U*	*0.99 U*	*0.98 U*	*1 U*	**1.1**	*1.1 U*
2-Methylnaphthalene	µg/L	36	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	0.025 J	**0.28**	*0.11 UJ*
3&4-Methylphenol(m&p Cresol)	µg/L	930	*2 U*	*2 U*	*2 U*	*2 U*	*2.1 U*	1.3 J	*2.1 U*
Acenaphthene	µg/L	530	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	0.023 J	**0.17**	**0.11**
Acenaphthylene	µg/L	530	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	0.068 J	0.03 J
Anthracene	µg/L	1,800	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	0.02 J	0.056 J
Benz[a]anthracene	µg/L	0.03	0.024 J	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	*0.1 U*	**0.049 J**
Benzo[a]pyrene	µg/L	0.2	0.0098 J	*0.1 U*	0.013 J	*0.098 U*	*0.1 U*	0.014 J	0.023 J
Benzo[b]fluoranthene	µg/L	0.25	0.016 J	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	*0.1 U*	0.045 J
Benzo[k]fluoranthene	µg/L	2.5	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	0.014 J	0.048 J
bis(2-Ethylhexyl)phthalate	µg/L	6	*1 U*	*1 U*	*0.99 U*	0.43 J	*1 U*	0.21 B	*1.1 UJ*
Chrysene	µg/L	25	0.016 J	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	*0.1 U*	0.029 J
Di-n-butylphthalate	µg/L	900	*1 U*	*1 U*	*0.99 U*	*0.98 U*	*1 U*	0.4 J	*1.1 U*
Fluoranthene	µg/L	800	0.029 J	*0.1 U*	*0.099 U*	*0.098 U*	0.013 J	0.036 J	**0.16**
Fluorene	µg/L	290	*0.1 U*	*0.1 U*	*0.099 U*	*0.098 U*	0.03 J	0.082 J	0.098 J
Naphthalene	µg/L	0.12	0.034 B	0.028 B	**0.17**	*0.098 U*	0.038 B	**0.42**	0.059 B
Phenanthrene	µg/L		0.032 J	*0.1 U*	*0.099 U*	*0.098 U*	0.074 J	**0.19**	**0.21**
Phenol	µg/L	5,800	*1 U*	*1 U*	*0.99 U*	*0.98 U*	*1 U*	0.35 J	*1.1 U*
Pyrene	µg/L	120	0.024 J	*0.1 U*	*0.099 U*	*0.098 U*	*0.1 U*	0.027 J	**0.13**
Total Petroleum Hydrocarbons									
Diesel Range Organics	µg/L	47	*N/A*	*N/A*	*97.1 UJ*	*99 U*	48 J	711 J	**700**
Gasoline Range Organics	µg/L	47	*N/A*	*N/A*	*200 U*	*200 U*	*200 U*	94.5 J	*200 U*

Non B-flagged detections above the RL in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
^PAH compounds were analyzed via SIM
*indicates non-validated data

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method or field blank.

Table 4 - Sub-Parcel B6-6
Summary of Inorganics Detected in Groundwater

Parameter	Units	PAL	A4-014-PZ	A4-019-PZ	A6-001-PZ	A6-015-PZ*	SW-075-MWI	SW-075-MWS	TM10-PZM007
			11/11/2015	11/11/2015	9/26/2019	9/27/2019	6/28/2016	6/28/2016	6/29/2016
Total Metals									
Aluminum	µg/L	20,000	*N/A*	*N/A*	*N/A*	*N/A*	**99.7**	**346**	**5,930**
Antimony	µg/L	6	*N/A*	*N/A*	*N/A*	*N/A*	2.2 J	*6 U*	*6 U*
Arsenic	µg/L	10	*N/A*	*N/A*	*N/A*	*N/A*	3.5 J	**7.1**	*5 U*
Barium	µg/L	2,000	*N/A*	*N/A*	*N/A*	*N/A*	**90**	**49.5**	**98.9**
Cadmium	µg/L	5	*N/A*	*N/A*	*N/A*	*N/A*	0.7 J	*3 U*	2.4 J
Chromium	µg/L	100	*N/A*	*N/A*	*N/A*	*N/A*	0.94 J	**8.9**	**210**
Chromium VI	µg/L	0.035	*10 U*	*10 U*	*10 U*	*10 U*	*10 U*	*10 U*	*10 U*
Cobalt	µg/L	6	*N/A*	*N/A*	*N/A*	*N/A*	4.7 J	*5 U*	1.8 J
Copper	µg/L	1,300	*N/A*	*N/A*	*N/A*	*N/A*	*5 U*	1.6 J	**35.4**
Iron	µg/L	14,000	*N/A*	*N/A*	*N/A*	*N/A*	**23,500**	**931**	**26,000**
Lead	µg/L	15	*N/A*	*N/A*	*N/A*	*N/A*	*5 U*	*5 U*	**150**
Manganese	µg/L	430	*N/A*	*N/A*	*N/A*	*N/A*	**3,000**	**66.5**	**6,070**
Mercury	µg/L	2	*N/A*	*N/A*	*N/A*	*N/A*	*0.2 U*	*0.2 U*	0.05 J
Nickel	µg/L	390	*N/A*	*N/A*	*N/A*	*N/A*	*10 U*	2.8 J	17.4 J
Selenium	µg/L	50	*N/A*	*N/A*	*N/A*	*N/A*	*8 U*	*8 U*	3.2 J
Silver	µg/L	94	*N/A*	*N/A*	*N/A*	*N/A*	0.87 J	*6 U*	*6 U*
Thallium	µg/L	2	*N/A*	*N/A*	*N/A*	*N/A*	*10 U*	*10 U*	**14.5**
Vanadium	µg/L	86	*N/A*	*N/A*	*N/A*	*N/A*	2.1 J	**47.5**	**1,100**
Zinc	µg/L	6,000	*N/A*	*N/A*	*N/A*	*N/A*	3.6 B	**21.1**	412 J
Dissolved Metals									
Aluminum, Dissolved	µg/L	20,000	**178**	*50 U*	**59.2**	**86.8**	27.8 J	**51.8**	**222**
Arsenic, Dissolved	µg/L	10	*5 U*	*5 U*	*5 U*	*5 U*	3.1 J	**7.2**	*5 U*
Barium, Dissolved	µg/L	2,000	**19.4**	**107**	**17.1**	**26.5**	**91.2**	**43.8**	**32.1**
Beryllium, Dissolved	µg/L	4	0.98 J	*1 U*	0.45 J	0.37 J	*1 U*	*1 U*	*1 U*
Cadmium, Dissolved	µg/L	5	2.5 J	*3 U*	*3 U*	*3 U*	0.91 J	0.58 J	*3 U*
Chromium, Dissolved	µg/L	100	1.9 B	*5 U*	*5 U*	*5 U*	*5 U*	1.5 J	2.5 J
Cobalt, Dissolved	µg/L	6	**243**	*5 U*	2.9 J	3.4 J	4.7 J	*5 U*	*5 U*
Copper, Dissolved	µg/L	1,300	*5 U*	*5 U*	2.9 J	*5 U*	*5 U*	*5 U*	1.6 J
Iron, Dissolved	µg/L	14,000	**9,570**	**57,800**	265,000 J	**332,000**	**24,000**	**93.8**	53 J
Lead, Dissolved	µg/L	15	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	2.7 J
Manganese, Dissolved	µg/L	430	**4,050**	**2,040**	**9,390**	**15,000**	**3,130**	**12.2**	**12.7**
Nickel, Dissolved	µg/L	390	**278**	1 B	4 B	8.6 J	3.5 B	3.9 B	*10 U*
Silver, Dissolved	µg/L	94	*6 U*	0.99 J	*6 U*	*6 U*	*6 U*	*6 U*	*6 U*
Thallium, Dissolved	µg/L	2	*10 U*	*10 U*	*10 U*	*10 U*	*10 U*	*10 U*	6.4 J
Vanadium, Dissolved	µg/L	86	1.6 B	0.81 B	*5 U*	*5 U*	1.9 J	**40.6**	**645**
Zinc, Dissolved	µg/L	6,000	**307**	0.96 J	**66.7**	**25**	2.2 J	0.84 J	*10 U*
Other									
Cyanide	µg/L	200	*10 U*	*10 U*	8.1 J-	**14**	*10 U*	9.6 J+	5.2 J

Non-B-flagged detections above the RL in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
N/A indicates that the parameter was not analyzed for this sample
U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
J+: The positive result reported for this analyte is a quantitative estimate, but may be biased high.
B: This analyte was not detected substantially above the level of the associated method or field blank.

Table 5 - Sub-Parcel B6-6
Cumulative Vapor Intrusion Comparison

				A4-014-PZ		A4-019-PZ		A6-001-PZ		A6-015-PZ	
				11/11/2015		11/11/2015		9/26/2019		9/27/2019	
Parameter	Type	Organ Systems	VI Screening Criteria (ug/L)	Conc. (ug/L)	Risk/ Hazard	Conc. (ug/L)	Risk/ Hazard	Conc. (ug/L)	Risk/ Hazard	Conc. (ug/L)	Risk/ Hazard
Cancer Risk											
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	130000	0.069 B	5.3E-12	0.1 U	0	0.099 U	0	0.098 U	0
Naphthalene	SVOC	Nervous; Respiratory	200	0.034 B	1.7E-09	0.028 B	1.4E-09	0.17	8.5E-09	0.098 U	0
1,1-Dichloroethane	VOC	None Specified	330	1 U	0	1 U	0	1 U	0	1 U	0
Benzene	VOC	Immune	69	1 U	0	1 U	0	1 U	0	1 U	0
Chloroform	VOC	Hepatic	36	1 U	0	1 U	0	1 U	0	1 U	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	150	1 U	0	1 U	0	1 U	0	1.4	9.33E-08
Cumulative Vapor Intrusion Cancer Risk					2E-09		1E-09		9E-09		9E-08

				SW-075-MWI		SW-075-MWS		TM10-PZM007	
				6/28/2016		6/28/2016		6/29/2016	
Parameter	Type	Organ Systems	VI Screening Criteria (ug/L)	Conc. (ug/L)	Risk/ Hazard	Conc. (ug/L)	Risk/ Hazard	Conc. (ug/L)	Risk/ Hazard
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	130,000	0.1 U	0	0.1 U	0	0.25	1.9E-11
Naphthalene	SVOC	Nervous; Respiratory	200	0.038 B	1.9E-09	0.42	2.1E-08	0.059 B	3.0E-09
1,1-Dichloroethane	VOC	None Specified	330	1 U	0	1 U	0	0.7 J	2.1E-08
Benzene	VOC	Immune	69	1 U	0	0.64 J	9.28E-08	1 U	0
Chloroform	VOC	Hepatic	36	4.5	1.25E-06	0.98 J	2.7E-07	1 U	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	150	1 U	0	1 U	0	1 U	0
Cumulative Vapor Intrusion Cancer Risk					1E-06		4E-07		2E-08

Conc. = Concentration

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.

B: This analyte was not detected substantially above the level of the associated method or field blank.

J: The positive result reported for this analyte is a quantitative estimate.

Table 6 - Sub-Parcel B6-6
COPC Screening Analysis

Parameter	CAS#	Location of Max Result	Max Detection (mg/kg)	Final Flag	Min Detection (mg/kg)	Average Detection (mg/kg)	Total Samples	Frequency of Detection (%)	Cancer TR=1E-06 (mg/kg)	Non-Cancer HQ=0_1 (mg/kg)	COPC
1,1-Biphenyl	92-52-4	B6-066-SB-5	6.4		0.02	0.77	24	37.50	410	20	no
1,2-Dichlorobenzene	95-50-1	B6-066-SB-5	0.53		0.0029	0.14	24	16.67		930	no
1,3-Dichlorobenzene	541-73-1	B6-066-SB-5	0.11	J	0.11	0.11	24	4.17			no
1,4-Dichlorobenzene	106-46-7	B6-066-SB-5	0.5		0.5	0.5	24	4.17	11	2,500	no
2,4-Dimethylphenol	105-67-9	B6-038-SB-1	0.021	J	0.015	0.018	24	8.33		1,600	no
2-Butanone (MEK)	78-93-3	A4-014-SB-7	0.0092	J	0.0024	0.006	24	20.83		19,000	no
2-Methylnaphthalene	91-57-6	B6-066-SB-5	8.1		0.0023	0.92	24	87.50		300	no
2-Methylphenol	95-48-7	B6-053-SB-4	0.018	J	0.018	0.018	24	4.17		4,100	no
Acenaphthene	83-32-9	B6-066-SB-5	8.1		0.0009	0.56	24	79.17		4,500	no
Acenaphthylene	208-96-8	B6-066-SB-5	2.4		0.0012	0.34	24	83.33			no
Acetone	67-64-1	A4-014-SB-1	0.085	J	0.0066	0.027	23	56.52		67,000	no
Acetophenone	98-86-2	B6-053-SB-4	0.029	J	0.029	0.029	24	4.17		12,000	no
Aluminum	7429-90-5	B6-054-SB-1	45700		4050	19,455	24	100.00		110,000	no
Anthracene	120-12-7	B6-066-SB-5	9		0.0015	0.80	24	87.50		23,000	no
Aroclor 1242	53469-21-9	B6-036-SB-1	0.054	J	0.054	0.054	12	8.33	0.95		no
Aroclor 1260	11096-82-5	B6-065-SB-1	0.631		0.036	0.18	12	50.00	0.99		no
Arsenic	7440-38-2	A4-015-SB-5	85.5	J	3.4	11	28	75.00	3	48	YES (C/NC)
Barium	7440-39-3	B6-038-SB-1	472		20.6	196	24	100.00		22,000	no
Benz[a]anthracene	56-55-3	B6-037-SB-5	6.6		0.02	1.2	24	87.50	21		no
Benzaldehyde	100-52-7	B6-038-SB-4	0.23		0.018	0.054	18	44.44	820	12,000	no
Benzene	71-43-2	B6-037-SB-5	0.0072		0.0056	0.0064	24	8.33	5.1	42	no
Benzo[a]pyrene	50-32-8	B6-037-SB-5	8		0.02	1.2	24	87.50	2.1	22	YES (C)
Benzo[b]fluoranthene	205-99-2	B6-037-SB-5	20		0.0009	2.3	24	95.83	21		no
Benzo[g,h,i]perylene	191-24-2	B6-037-SB-5	3.6		0.011	0.61	24	83.33			no
Benzo[k]fluoranthene	207-08-9	B6-037-SB-5	20.3		0.0013	2.0	24	91.67	210		no
Beryllium	7440-41-7	B6-054-SB-4	7.5		0.24	2.2	24	87.50	6900	230	no
Beryllium	7440-41-7	B6-054-SB-1	7.5		0.24	2.2	24	87.50	6900	230	no
bis(2-Ethylhexyl)phthalate	117-81-7	B6-066-SB-5	4		0.015	0.61	24	37.50	160	1,600	no
Cadmium	7440-43-9	B6-036-SB-8	4.1		1.4	2.6	24	29.17	9300	98	no
Carbazole	86-74-8	A4-014-SB-1	0.47		0.032	0.21	24	33.33			no
Chromium	7440-47-3	B6-036-SB-8	1360		5.8	369	24	100.00		180,000	no
Chrysene	218-01-9	B6-037-SB-5	7		0.00064	1.2	24	95.83	2100		no
cis-1,2-Dichloroethene	156-59-2	B6-038-SB-4	0.0045	J	0.0045	0.0045	24	4.17		230	no
Cobalt	7440-48-4	B6-053-SB-4	145		0.97	19	24	95.83	1900	35	YES (NC)
Copper	7440-50-8	B6-053-SB-4	383		2.1	87	24	100.00		4,700	no
Cyanide	57-12-5	B6-065-SB-1	4.6		0.098	1.0	24	87.50		120	no
Cyclohexane	110-82-7	B6-066-SB-5	0.38	J	0.38	0.38	24	4.17		2,700	no
Dibenz[a,h]anthracene	53-70-3	B6-037-SB-5	0.89		0.004	0.21	24	79.17	2.1		no

Table 6 - Sub-Parcel B6-6
COPC Screening Analysis

Parameter	CAS#	Location of Max Result	Max Detection (mg/kg)	Final Flag	Min Detection (mg/kg)	Average Detection (mg/kg)	Total Samples	Frequency of Detection (%)	Cancer TR=1E-06 (mg/kg)	Non-Cancer HQ=0_1 (mg/kg)	COPC
Di-n-butylphthalate	84-74-2	B6-066-SB-5	0.36	J	0.02	0.11	24	16.67		8,200	no
Ethylbenzene	100-41-4	B6-066-SB-5	0.14	J	0.14	0.14	24	4.17	25	2,000	no
Fluoranthene	206-44-0	B6-066-SB-5	13.2		0.001	2.0	24	95.83		3,000	no
Fluorene	86-73-7	B6-066-SB-5	10.6		0.0012	0.70	24	87.50		3,000	no
Indeno[1,2,3-c,d]pyrene	193-39-5	B6-037-SB-5	3.1		0.011	0.58	24	83.33	21		no
Iron	7439-89-6	B6-003-SB-5	262000		5830	94,035	24	100.00		82,000	YES (NC)
Isopropylbenzene	98-82-8	B6-066-SB-5	0.95		0.95	0.95	24	4.17		990	no
Lead^	7439-92-1	B6-037-SB-5	484		3.9	124	24	95.83		800	no
Manganese	7439-96-5	B6-036-SB-8	60300		37.5	15,158	24	100.00		2,600	YES (NC)
Mercury	7439-97-6	B6-038-SB-4	0.41		0.0045	0.09	24	91.67		35	no
Methyl Acetate	79-20-9	B6-054-SB-4	0.46	J	0.058	0.26	22	9.09		120,000	no
Methylene Chloride	75-09-2	A4-015-SB-1	0.003	J	0.003	0.0030	24	4.17	1000	320	no
Naphthalene	91-20-3	B6-066-SB-5	10.5		0.0024	1.1	24	91.67	8.6	59	YES (C)
Nickel	7440-02-0	A4-018-SB-1	94.2		1.7	30	24	91.67	64000	2,200	no
PCBs (total)*	1336-36-3	B6-065-SB-1	0.631		0.036	0.19	12	50.00	0.94		no
Phenanthrene	85-01-8	B6-066-SB-5	30		0.0012	2.3	24	95.83			no
Phenol	108-95-2	B6-066-SB-5	0.71		0.018	0.14	24	29.17		25,000	no
Pyrene	129-00-0	B6-066-SB-5	13.4		0.0015	2.0	24	95.83		2,300	no
Selenium	7782-49-2	B6-053-SB-1	6.4		3.3	4.9	24	8.33		580	no
Silver	7440-22-4	A4-018-SB-1	3.1		0.39	1.7	24	8.33		580	no
Tetrachloroethene	127-18-4	B6-038-SB-1	0.011		0.0041	0.0071	24	16.67	100	39	no
Toluene	108-88-3	B6-053-SB-4	0.0047	J	0.0019	0.0033	24	8.33		4,700	no
Trichloroethene	79-01-6	B6-038-SB-4	0.0042	J	0.0018	0.0030	24	8.33	6	2	no
Vanadium	7440-62-2	B6-003-SB-1	5850		36.1	1,109	24	100.00		580	YES (NC)
Xylenes	1330-20-7	B6-066-SB-5	1.3		0.0047	0.44	24	12.50		250	no
Zinc	7440-66-6	A4-014-SB-1	721		1.9	316	24	95.83		35000	no

J: The positive result reported for this analyte is a quantitative estimate.

COPC = Constituent of Potential Concern
TR = Target Risk
HQ = Hazard Quotient

C = Compound was identified as a cancer COPC
NC = Compound was identified as a non-cancer COPC

*PCBs (total) include the sum of all detected aroclor mixtures, including those without RSLs (e.g. Aroclor 1262, Aroclor 1268) which are not displayed.
^Lead is assessed separately through the ALM and IEUBK models.

Table 7 - Sub-Parcel B6-6
Assessment of Lead

Exposure Unit	Surface/Sub-Surface	Maximum Concentration (mg/kg)	Arithmetic Mean (mg/kg)
EU1 (12.7 ac.)	Surface	214	101
	Sub-Surface	484	137
	Pooled	484	119

Table 8 - Sub-Parcel B6-6
Soil Exposure Point Concentrations

	EU1 (12.7 ac.)					
	EPCs - Surface Soils		**EPCs - Sub-Surface Soils**		**EPCs - Pooled Soils**	
Parameter	EPC Type	EPC (mg/kg)	EPC Type	EPC (mg/kg)	EPC Type	EPC (mg/kg)
Arsenic	95% KM (t) UCL	8.07	95% KM (Chebyshev) UCL	33.2	95% KM (Chebyshev) UCL	21.7
Cobalt	95% Adjusted Gamma UCL	46.8	95% KM (Chebyshev) UCL	68.8	95% KM (Chebyshev) UCL	52.5
Iron	95% Student's-t UCL	143,562	95% Student's-t UCL	122,258	95% Student's-t UCL	119,930
Manganese	95% Chebyshev (Mean, SD) UCL	39,716	95% Adjusted Gamma UCL	39,645	95% Adjusted Gamma UCL	26,385
Vanadium	95% Adjusted Gamma UCL	3,230	95% Adjusted Gamma UCL	2,737	95% Chebyshev (Mean, SD) UCL	2,558
Naphthalene	95% Adjusted Gamma UCL	0.41	Gamma Adjusted KM-UCL	7.09	97.5% KM (Chebyshev) UCL	4.20
Benzo[a]pyrene	95% KM Bootstrap t UCL	1.13	95% KM (t) UCL	3.09	Gamma Adjusted KM-UCL	2.35

Table 9 - Sub-Parcel B6-6
Surface Soils
Composite Worker Risk Ratios

Parameter	Target Organs	EU1 (12.7 ac.)				
			Composite Worker			
			RSLs (mg/kg)		Risk Ratios	
		EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	8.07	3.00	480	2.7E-06	0.02
Cobalt	**Thyroid**	46.8	1,900	350	2.5E-08	0.1
Iron	**Gastrointestinal**	143,562		820,000		0.2
Manganese	**Nervous**	39,716		26,000		2
Vanadium	**Dermal**	3,230		5,800		0.6
Naphthalene	**Nervous; Respiratory**	0.41	8.6	590	4.8E-08	0.001
Benzo(a)pyrene	**Developmental**	1.13	2.10	220	5.4E-07	0.01
					3E-06	↓

RSLs were obtained from the EPA Regional Screening Levels at
https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
EPC: Exposure Point Concentration
HQ: Hazard Quotient
HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	1
	Thyroid	0
	Gastrointestinal	0
	Nervous	2
	Developmental	0
	Respiratory	0

Table 10 - Sub-Parcel B6-6
Subsurface Soils
Composite Worker Risk Ratios

Parameter	Target Organs	EU1 (12.7 ac.)				
			Composite Worker			
			RSLs (mg/kg)		Risk Ratios	
		EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	33.2	3.00	480	1.1E-05	0.07
Cobalt	**Thyroid**	68.8	1,900	350	3.6E-08	0.2
Iron	**Gastrointestinal**	122,258		820,000		0.1
Manganese	**Nervous**	39,645		26,000		2
Vanadium	**Dermal**	2,737		5,800		0.5
Naphthalene	**Nervous; Respiratory**	7.09	8.6	590	8.2E-07	0.01
Benzo(a)pyrene	**Developmental**	3.09	2.10	220	1.5E-06	0.01
					1E-05	↓

RSLs were obtained from the EPA Regional Screening Levels at
https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
EPC: Exposure Point Concentration
HQ: Hazard Quotient
HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	1
	Thyroid	0
	Gastrointestinal	0
	Nervous	2
	Developmental	0
	Respiratory	0

Table 11 - Sub-Parcel B6-6
Pooled Soils
Composite Worker Risk Ratios

Parameter	Target Organs	EU1 (12.7 ac.)				
			Composite Worker			
			RSLs (mg/kg)		Risk Ratios	
		EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	21.7	3.00	480	7.2E-06	0.05
Cobalt	**Thyroid**	52.5	1,900	350	2.8E-08	0.2
Iron	**Gastrointestinal**	119,930		820,000		0.1
Manganese	**Nervous**	26,385		26,000		1.0
Vanadium	**Dermal**	2,558		5,800		0.4
Naphthalene	**Nervous; Respiratory**	4.20	8.6	590	4.9E-07	0.01
Benzo(a)pyrene	**Developmental**	2.35	2.10	220	1.1E-06	0.01
					9E-06	↓

RSLs were obtained from the EPA Regional Screening Levels at
https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
EPC: Exposure Point Concentration
HQ: Hazard Quotient
HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0
	Respiratory	0

Table 12 - Sub-Parcel B6-6
Surface Soils
Construction Worker Risk Ratios

30 Day		EU1 (12.7 ac.)				
			Construction Worker			
			SSLs (mg/kg)		Risk Ratios	
Parameter	Target Organs	EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	8.07	126.0	798	6.4E-08	0.01
Cobalt	Thyroid	46.8	24,824	7,572	1.9E-09	0.006
Iron	Gastrointestinal	143,562		2,004,511		0.1
Manganese	Nervous	39,716		32,271		1
Vanadium	Dermal	3,230		13,131		0.2
Naphthalene	Nervous; Respiratory	0.41	67.8	104	6.0E-09	0.004
Benzo(a)pyrene	Developmental	1.13	139.0	33.9	8.1E-09	0.03
					8E-08	↓

Bold indicates maximum
SSLs calculated using equations in 2002 EPA Supplemental Guidance
Guidance Equation Input Assumptions:
5 cars/day (2 tons/car)
5 trucks/day (20 tons/truck)
3 meter source depth thickness
EPC: Exposure Point Concentration
HQ: Hazard Quotient
HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0
	Respiratory	0

Table 13 - Sub-Parcel B6-6
Subsurface Soils
Construction Worker Risk Ratios

30 Day		EU1 (12.7 ac.)				
			Construction Worker			
			SSLs (mg/kg)		Risk Ratios	
Parameter	Target Organs	EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	33.2	126	798	2.6E-07	0.04
Cobalt	**Thyroid**	68.8	24,824	7572	2.8E-09	0.009
Iron	**Gastrointestinal**	122,258		2,004,511		0.06
Manganese	**Nervous**	39,645		32,271		1
Vanadium	**Dermal**	2,737		13,131		0.2
Naphthalene	**Nervous; Respiratory**	7.09	67.8	104	1.0E-07	0.07
Benzo(a)pyrene	**Developmental**	3.09	139	33.9	2.2E-08	0.09
					4E-07	↓

Bold indicates maximum
SSLs calculated using equations in 2002 EPA Supplemental Guidance
Guidance Equation Input Assumptions:
5 cars/day (2 tons/car)
5 trucks/day (20 tons/truck)
3 meter source depth thickness
EPC: Exposure Point Concentration
HQ: Hazard Quotient
HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0
	Respiratory	0

Table 14 - Sub-Parcel B6-6
Pooled Soils
Construction Worker Risk Ratios

30 Day		EU1 (12.7 ac.)				
			Construction Worker			
			SSLs (mg/kg)		Risk Ratios	
Parameter	Target Organs	EPC (mg/kg)	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	21.7	126	798	1.7E-07	0.03
Cobalt	Thyroid	52.5	24,824	7572	2.1E-09	0.007
Iron	Gastrointestinal	119,930		2,004,511		0.06
Manganese	Nervous	26,385		32,271		1
Vanadium	Dermal	2,558		13,131		0.2
Naphthalene	Nervous; Respiratory	4.20	67.8	104	6.2E-08	0.04
Benzo(a)pyrene	Developmental	2.35	139	33.9	1.7E-08	0.07
					3E-07	↓

SSLs calculated using equations in 2002 EPA Supplemental Guidance

Guidance Equation Input Assumptions:

5 cars/day (2 tons/car)

5 trucks/day (20 tons/truck)

3 meter source depth thickness

EPC: Exposure Point Concentration

HQ: Hazard Quotient

HI: Hazard Index

Total HI	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0
	Respiratory	0

APPENDICES

APPENDIX A

TRADEPOINT
ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219

December 14, 2021

Maryland Department of Environment
1800 Washington Boulevard
Baltimore MD, 21230

Attention: Ms. Barbara Brown

Subject: Request to Enter Temporary CHS Review
Tradepoint Atlantic Parcel B6-6

Dear Ms. Brown:

The conduct of any environmental assessment and cleanup activities on the Tradepoint Atlantic property, as well as any associated development, is subject to the requirements outlined in the following agreements:

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

On September 11, 2014, Tradepoint Atlantic submitted an application to the Maryland Department of the Environment's (Department) Voluntary Cleanup Program (VCP).

In consultation with the Department, Tradepoint Atlantic affirms that it desires to accelerate the assessment, remediation, and redevelopment of certain sub-parcels within the larger site due to current market conditions. To that end, the Department and Tradepoint Atlantic agree that the Controlled Hazardous Substance (CHS) Act (Section 7-222 of the Environment Article) and the CHS Response Plan (COMAR 26.14.02) shall serve as the governing statutory and regulatory authority for completing the development activities on Parcel B6-6 and complement the statutory requirements of the Voluntary Cleanup Program (Section 7-501 of the Environment Article). Upon submission of a Site Response and Development Work Plan and completion of the remedial activities for the sub-parcel, the Department shall issue a "No Further Action" letter upon a recordation of an environmental covenant describing any necessary land use controls for the specific sub-parcel. At such time that all the sub-parcels within the larger parcel have completed remedial activities, Tradepoint Atlantic shall submit to the Department a request for issuing a Certificate of Completion (COC) as well as all pertinent information concerning completion of remedial activities conducted on the parcel. Once the VCP has completed its review of the

TRADEPOINT
ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219

submitted information it shall issue a COC for the entire parcel described in Tradepoint Atlantic's VCP application.

Alternatively, Tradepoint Atlantic, or another entity may elect to submit an application for a specific sub-parcel and submit it to the VCP for review and acceptance. If the application is received after the cleanup and redevelopment activities described in this work plan are implemented and a No Further Action letter is issued by the Department pursuant to the CHS Act, the VCP shall prepare a No Further Requirements Determination for the sub-parcel.

If Tradepoint Atlantic or other entity has not carried out cleanup and redevelopment activities described in the work plan, the cleanup and redevelopment activities may be conducted under the oversight authority of either the VCP or the CHS Act, so long as those activities comport with this work plan.

Engineering and institutional controls approved as part of this Site Response and Development Work Plan shall be described in documentation submitted to the Department demonstrating that the exposure pathways on the sub-parcel are addressed in a manner that protects public health and the environment. This information shall support Tradepoint Atlantic's request for the issuance of a COC for the larger parcel.

Please do not hesitate to contact Tradepoint Atlantic for further information.

Thank you,

Peter Haid

Vice President Environmental
TRADEPOINT ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219
T 443.649.5055 C 732.841.7935
phaid@tradepointatlantic.com

APPENDIX B

ARM Group LLC
Engineers and Scientists

October 5, 2021

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

Re: Test Pit Completion Report
B6-066 Delineation Area
Area B: Parcel B6
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown:

ARM Group LLC (ARM), on behalf of Tradepoint Atlantic (TPA), has prepared this Completion Report to document the test pitting activities in Parcel B6 (the Site) on the TPA Property located in Sparrows Point, Maryland. This completion report is being provided to the Maryland Department of the Environment (MDE) and United States Environmental Protection Agency (USEPA) to present the observations of the test pitting investigation.

Background

On July 5, 2016, soil boring B6-066-SB was completed during the Parcel B6 Phase II Investigation. The soil boring was completed in the northwestern portion of Parcel B6 and targeted an historical Waste Oil Pit. During the completion of this boring, a strong petroleum odor and non-aqueous phase liquid (NAPL) were observed. Screening piezometer B6-066-PZ was installed at this location (refer to **Figure 1**) in accordance with the NAPL delineation protocols provided in the Parcel B6 Phase II Investigation Work Plan. Non-aqueous phase liquid (NAPL) was observed in this screening piezometer immediately following installation. The MDE was notified of this NAPL detection on July 5, 2016. In accordance with the standard Phase II Investigation procedures across the TPA property, 69 NAPL screening piezometers were subsequently installed between July 6, 2016 and April 26, 2017 in the shallow hydrogeologic zone surrounding B6-066-PZ to delineate the source area. The final configuration of the screening piezometers is presented on **Figure 1**. Of the 69 installed piezometers, 49 had trace or measurable NAPL detections. The

delineation investigation was summarized in the NAPL Delineation Completion Report for B6-066-PZ (Revision 0 dated April 14, 2021).

Following a period of routine gauging and reporting between July 2016 and April 2021, all available piezometers in the B6-066-PZ NAPL delineation area that had not been previously destroyed were properly abandoned on May 3, 2021 in accordance with COMAR 26.04.04.34 through 36. Abandonment of these piezometers was proposed as part of the NAPL Delineation Completion Report Comment Response Letter and Piezometer Abandonment Request (dated March 26, 2021) in order to provide space for material and equipment storage. Piezometer abandonment details were presented in the B6-066 Test Pitting Work Plan and Piezometer Abandonment Completion Report (Revision 0 dated June 4, 2021).

In March 2021, prior to piezometer network abandonment, a NAPL sample was collected from the delineation piezometers for hydrocarbon fingerprinting analysis. The hydrocarbon fingerprinting analysis determined that the NAPL is most likely a lubricating oil. Results of this analysis are included as **Attachment 1**.

Test Pit Investigation

On July 8, 2021, in order to further assess the presence of NAPL on the site, an excavator was used to dig four test pits at the locations shown on **Figure 2**. Test pitting was conducted in accordance with the methods specified in QAPP Worksheet 21 – Field SOPs, SOP No. 015 – Test Pitting. Test pitting procedures were outlined in the B6-066 Test Pitting Work Plan and Piezometer Abandonment Completion Report (Revision 0 dated June 4, 2021).

The test pits were each dug to a depth of approximately 2 feet below the observed water table. Each test pit was approximately 20 feet in length and 5 feet in width (one excavator bucket width). Subsurface material above the water table was relatively uniform between each of the four test pits. The subsurface above the water table in all four test pits was typically comprised of a mixture of silt, sand, and slag fill in varying thicknesses with some clay at depth. All excavated material was screened using a hand-held photoionization detector (PID) as well as visual and olfactory methods to determine if there was evidence of NAPL contamination. Photographs of each test pit are included in **Attachment 2**. Further details on the observations within each test pit are presented below.

TP-1:

Groundwater in TP-1 was observed at approximately 6 feet below ground surface (bgs). TP-1 was excavated to a total depth of approximately 8 feet bgs. Material below the water table was dark, odorous, and appeared to have petroleum impacts. Material removed from below the water table in the test pit had PID readings of up to 80 parts per million (ppm). Dark material excavated from

below the water table was placed in a designated stockpile and covered. The water surface within TP-1 showed a moderate LNAPL sheen.

TP-2:

Groundwater in TP-2 was observed at approximately 6 feet bgs. TP-2 was excavated to a total depth of approximately 10 feet bgs. Material below the water table was dark, odorous, and appeared to have petroleum impacts. Material removed from below the water table in the test pit had PID readings of up to 100 ppm. Dark material excavated from below the water table was placed in a designated covered stockpile at the surface. The water surface within TP-2 showed LNAPL accumulation of less than 1 inch. TP-2 showed the most LNAPL accumulation of the four test pits. Due to the observed NAPL accumulation, an observation point was installed in TP-2 during backfilling. Details of the observation point's construction are further described in the trailing sections.

TP-3:

Groundwater in TP-3 was observed at approximately 4 feet bgs. TP-3 was excavated to a total depth of approximately 6 feet bgs. TP-3 had no elevated PID readings or evidence (visual or olfactory) of petroleum impacts. Material from TP-3 was not separated into segregated stockpiles at the surface and the water surface did not show signs of LNAPL sheen or accumulation.

TP-4:

Groundwater in TP-4 was observed at approximately 5 feet bgs. TP-4 was excavated to a total depth of approximately 7 feet bgs. Material removed from below the water table was dark and appeared to have petroleum impacts, but did not have odors or PID readings above 10 ppm. Dark material excavated from below the water table was placed in a designated stockpile and covered. The water table showed only a light LNAPL sheen.

Excavated Material Handling

Three test pits (TP-1, TP-2, and TP-4) contained material below the water table that showed visible evidence of petroleum impacts when stockpiled at the surface. Material removed from TP-1 and TP-2 also had high (80-100 ppm) PID readings. Impacted material was segregated based on evidence of contamination and placed on and covered with plastic sheeting adjacent to each test pit. The segregated material will be sampled and properly disposed of in accordance with its sample results. Unimpacted material (including all material removed from TP-3) was utilized as backfill. Details on the post-closure monitoring are described in the designated section below.

Backfill Procedure

The four test pit locations were backfilled on August 6, 2021. Prior to backfilling, one temporary observation point was constructed in the most impacted test pit, TP-2, by installing 4-inch diameter PVC screen and riser. This observation point will serve as a temporary monitoring location. The observation point was installed with 5 feet of screen and 10 feet of riser that extends above the surface. The screen was placed at the bottom of the test pit to screen across the groundwater table. Self-compacting recycled aggregate (#57 stone) was used to backfill from the bottom of TP-2 to approximately 1 foot above the water table. The remainder of the test pit was backfilled using the unimpacted excavated and stockpiled material. The material was placed in 1-foot lifts and compacted with an excavator bucket. The PVC was secured at the surface and backfill material was placed around the PVC with extra precaution taken to not damage the screen or riser. The observation point was left in place for future monitoring. The remaining three test pits (TP-1, TP-3, -TP-4) were backfilled with the unimpacted material removed from each test pit.

Post-Closure Monitoring

The 4-inch observation point was installed during backfilling and subsequently monitored for the accumulation of NAPL. The monitoring point did not show evidence of NAPL accumulation after 30 days of equilibration. At this time, TPA is requesting approval to remove the observation point.

The NAPL present in this portion of Parcel B6 will be considered for its proximity to any excavations and/or utility installations that may be proposed for any potential future development plans in this area. If future utilities are proposed in the vicinity, appropriate protocols for the protection of workers and the mitigation of potential NAPL migration via preferential flow paths will be included in a future Response and Development Work Plan. Monitoring wells or extraction wells in the area may also be proposed as part of the forthcoming Site-Wide Groundwater Corrective Measures Study (CMS) and the Sitewide Groundwater Monitoring Plan.

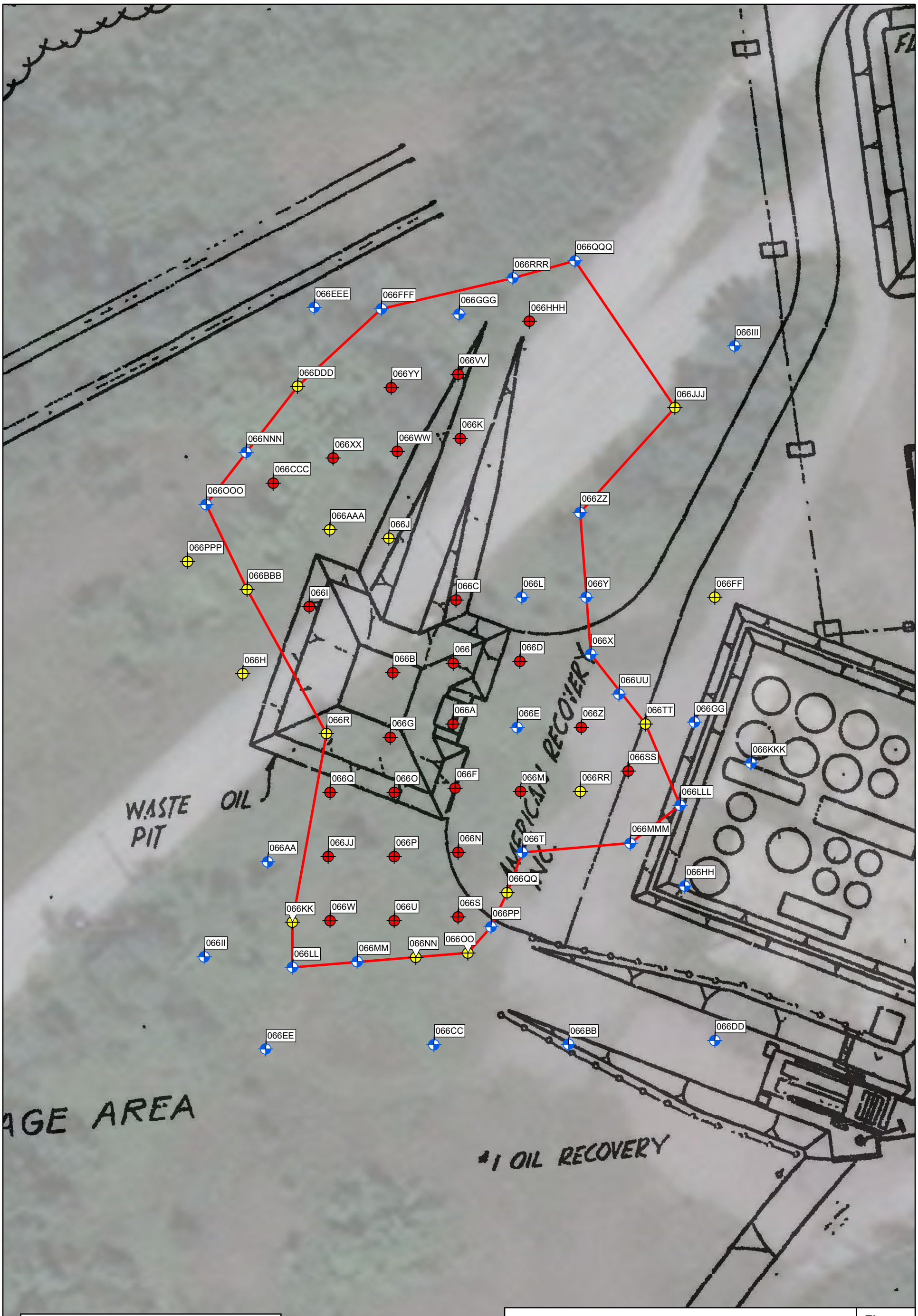
Following your review of this interim report, if you have any questions, or if we can provide any additional information, please do not hesitate to contact ARM Group LLC at 410-290-7775.

Respectfully Submitted,
ARM Group LLC

Joshua M. Barna, G.I.T.
Staff Geologist

Kaye Guille, P.E., PMP
Senior Engineer

FIGURES



Parcel B6: B6-066 NAPL Delineation Piezometer NAPL Status

May 27, 2021

Figure 1

ARM Group LLC
Engineers and Scientists

Tradepoint Atlantic
Sparrows Point
Baltimore County, MD
ARM Project 20010206

TP-3
Unimpacted

TP-4
Light Sheen

TP-2
Accumulated Product

TP-1
Moderate Sheen

TP-2 Observation Point

Historic Piezometer with NAPL Detection

Historic Piezometer with Insignificant NAPL Detection (Trace/Intermittent)

Historic Piezometer without NAPL Detection

Source: E
IGN, and t

Parcel B6: B6-066 NAPL Delineation Test Pits

August 24, 2021

Figure 2

ARM Group LLC
Engineers and Scientists

0 15 30 60 Feet

Tradepoint Atlantic

Sparrows Point

Baltimore County, MD

ARM Project 20010206

ATTACHMENT 1

Torkelson Geochemistry, Inc.
2528 South Columbia Place, Tulsa, Oklahoma 74114-3233
Voice 918-749-8441

April 13, 2021

DRAFT

Bob Tworkowski
Tradepoint Atlantic
1600 Sparrows Point Blvd,
Sparrows Point, MD 21219

Subject: Hydrocarbon fingerprint analysis and evaluation of six product samples from the Sparrows Point IM, Sparrows Point, MD.

Introduction

Six product samples were submitted to Torkelson Geochemistry by Tradepoint Atlantic for hydrocarbon fingerprint (capillary gas chromatography) analysis and interpretation of results, see chain of Custodies, Figures 1 and 2.

The following are my interpretations/opinions of the data. Please keep in mind that these interpretations are made without any hands on knowledge of the site or other analyses done on the samples. In addition, the petroleum in the samples has probably been altered/weathered which can make an accurate interpretation of product type somewhat more difficult since some of the key features of the product may have been altered or removed by the evaporation, water washing and perhaps bacterial processes.

Discussion of Results

The B17 LNAPL sample appears to be a lubricating oil of some sort with a very small amount of unidentifiable light ends. The B17 LNAPL sample chromatogram (Figures 3 and 10) shows a series of peaks that starts at benzene (Bnz) and continues to the end of the chromatogram and an unresolved hump that starts at about nC13, reaches a maximum between nC24 and nC25 and continues to the end of the chromatogram. The large unresolved hump and associated peaks is most likely a lubricating oil of some sort. The identity of the very small amount of light ends in the benzene to nC14 range is not obvious.

The B18 LNAPL sample appears to be a mixture of a heavy material, perhaps a #5 or #6 fuel oil and a smaller amount of coal tar. The B18 LNAPL sample chromatogram (Figures 4 and 11) shows a series of peaks that starts at benzene (Bnz) and continues to about the end of the chromatogram and a broad unresolved hump that starts at about nC10, reaches a maximum at about nC33 and continues to the end of the chromatogram. The broad unresolved hump and smaller peaks may be a heavy fuel oil such as #5 or #6. The naphthalene and larger unlabeled peaks are probably polynuclear aromatic compounds and are typical of a coal tar.

The B6-066 LNAPL sample appears to be a lubricating oil of some sort with a small amount of unidentifiable light ends. The B6-066 LNAPL sample chromatogram (Figures 5 and 12) shows a series of peaks that starts at normal butane (nC4) and continues to the end of the chromatogram and an unresolved hump that starts at about nC13, reaches a maximum at about nC30 and continues to the end of the chromatogram. The large unresolved hump and associated peaks is most likely a lubricating oil of some sort. The identity of the small amount of light ends in the nC4 to nC14 range is not obvious.

The CO124 DNAPL sample appears to be a coal tar. The CO124 DNAPL sample chromatogram (Figures 6 and 13) shows a series of peaks that starts at benzene (Bnz) and continues to about the end of the chromatogram. The larger unlabeled peaks are probably polynuclear aromatic compounds and are typical of a coal tar.

The CO125 DNAPL sample appears to be a coal tar. The CO125 DNAPL sample chromatogram (Figures 7 and 14) shows a series of peaks that starts at benzene (Bnz) and continues to about the end of the chromatogram. The larger unlabeled peaks are probably polynuclear aromatic compounds and are typical of a coal tar.

The identity of the CO173 LNAPL sample is not obvious but may be a mixture of two products. The CO173 LNAPL sample chromatogram (Figures 8 and 15) shows a series of peaks that starts at about normal butane (nC5) and continues to the end of the chromatogram. The early peaks from the beginning of the chromatogram to about nC12 are some sort of highly aromatic mixture. The heavier portion from about nC12 to the end of the chromatogram has some fairly large normal paraffin peaks but the identity of this material is not obvious.

Please let me know if you have any questions regarding this preliminary interpretation.

Bruce Torkelson

Torkelson Geochemistry, Inc.

2528 S. Columbia Place
Tulsa, OK 74114-3233
Phone: 918-749-8441
Fax: 918-749-6005
e-mail: BTorkelson@torkelsongeochemistry.com

CHAIN-OF-CUSTODY RECORD

Sparrows Point IM
Sparrows Point, MD

GLD (443) 610-0211

gp@tradepointatlantic.com
1600 Sparrows Point Blvd
Sparrows Point, MD 21219
(240) 461-0750 (B. Torkowski)
btworkowski@tradepointatlantic.com

Additional Instructions
Please report to
btworkowski@tradepointatlantic.com
mnewman@tradepointatlantic.com
gdavis@armgroup.net
dhamilton@armgroup.net
STD

ITEM NO	SAMPLE DESCRIPTION	DATE	MATRIX	LAB NO	Total # OF Vials	PRESERVATIVES: None	ANALYSES REQUESTED: GC Characterization	Density	Viscosity	Water Surface Tension	NAPL Surface Tension	NAPL/Water Interfac Tens	Lead	Sulfur	REMARKS
1	C0124 DNAPL	3/11/21	DNAPL		2	X									
2	C0125 DNAPL	↓	DNAPL		2	X									
3	C0173 LNAPL	3/11/21	LNAPL		2	X									
4															
5															
6															
7															
8															
9															
10															

RELINQUISHED BY	DATE	TIME	ACCEPTED BY	DATE	TIME
	3/11/21	1410		3/17/21	1:40
				3-26-21	1320

Figure 1, Chain of Custody 1 of 2.

Torkelson Geochemistry, Inc.

2528 S. Columbia Place
Tulsa, OK 74114-3233
Phone 918-749-8441 e-mail BTorkelson@torkelsongeochemistry.com
Fax 918-749-6005

CHAIN-OF-CUSTODY RECORD

Page 2 of 2

Project: Sparrows Point IM
Location: Sparrows Point, MD
Proj. No:
P.O.:
Sampled By: ~~TGT~~ LLP (410) 961 3494

Report/Bill To: ap@tradepointatlantic.com
Address: 1600 Sparrows Point Blvd
Sparrows Point, MD 21219
Phone: 240 461-0750 (B. Tworkowski)
Fax:
e-mail: btworkowski@tradepointAtlantic.com

Additional Instructions
Please report to btworkowski@tradepointatlantic.com
mnewman@tradepointatlantic.com
gdavis@armgroup.net
dhamilton@armgroup.net

Requested Turn-Around Time: STD

ITEM NO.	SAMPLE DESCRIPTION	DATE	MATRIX	LAB NO.	Total # Of Work	PRESERVATIVES: None	ANALYSES REQUESTED: 35 Chlorobenzenes	Density	Viscosity	Water Surface Tension	NAPL Surface Tension	NAPL Water Interfac Tens.	Lead	Sulfur	REMARKS
1	B17 LNAPL	3/17/21	LNAPL		2	X									
2	B6-DBG LNAPL	3/17/21	LNAPL		2	X									
3	B18 LNAPL	3/17/21	LNAPL		2	X									
4															
5															
6															
7															
8															
9															
10															

RELINQUISHED BY	DATE	TIME	ACCEPTED BY	DATE	TIME
	3/17/21	1315		3/17	1:40
				3-26-21	1320

Figure 1, Chain of Custody 2 of 2.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : B17 LNAPL
Acquired : Apr 06, 2021 08:53:38

c:\ezchrom\chrom\21016\b17 -- Channel A

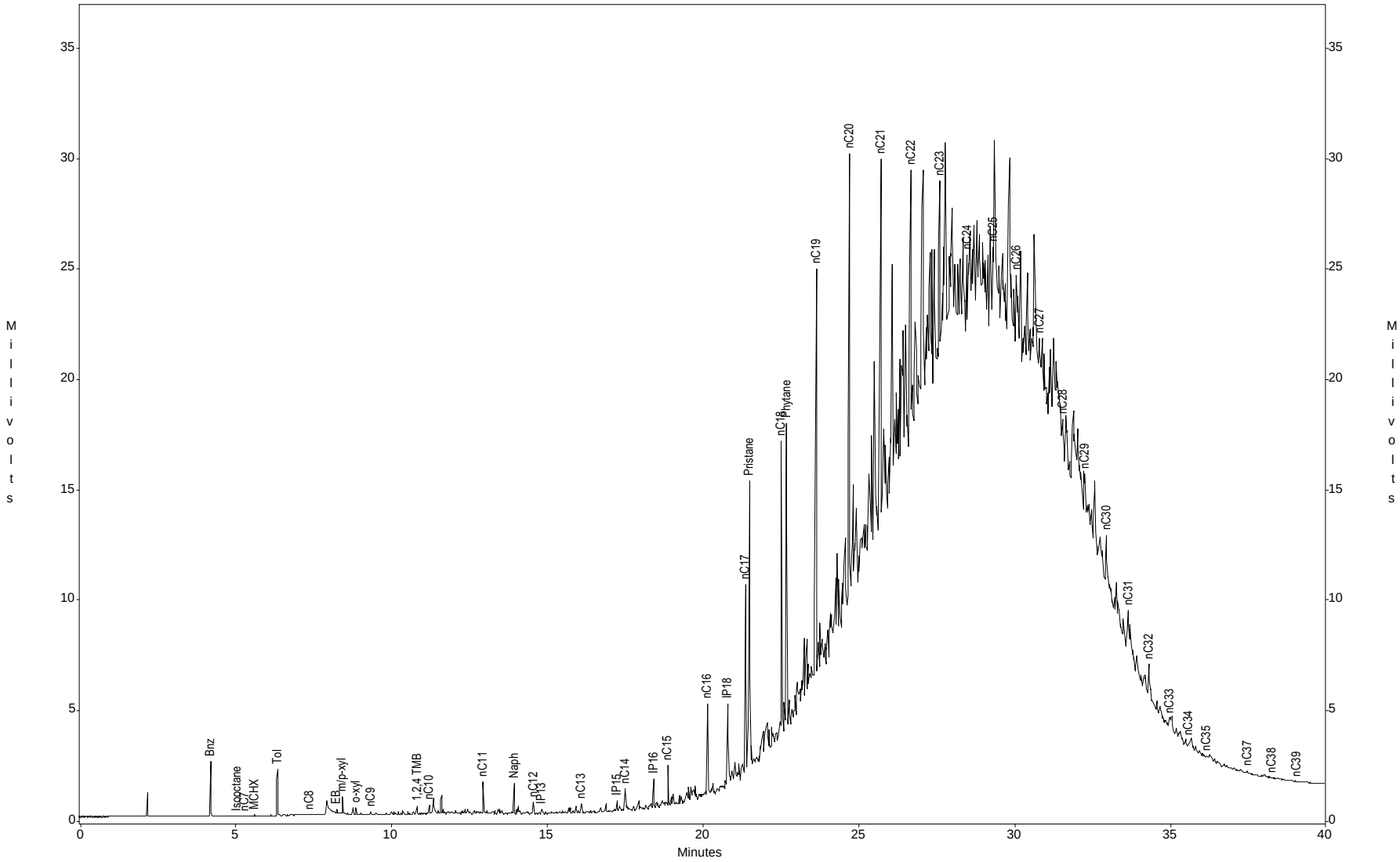


Figure 3, Gas chromatogram of the B17 LNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : B18 LNAPL
Acquired : Apr 06, 2021 15:41:57

c:\ezchrom\chrom\21016\b18.2 -- Channel A

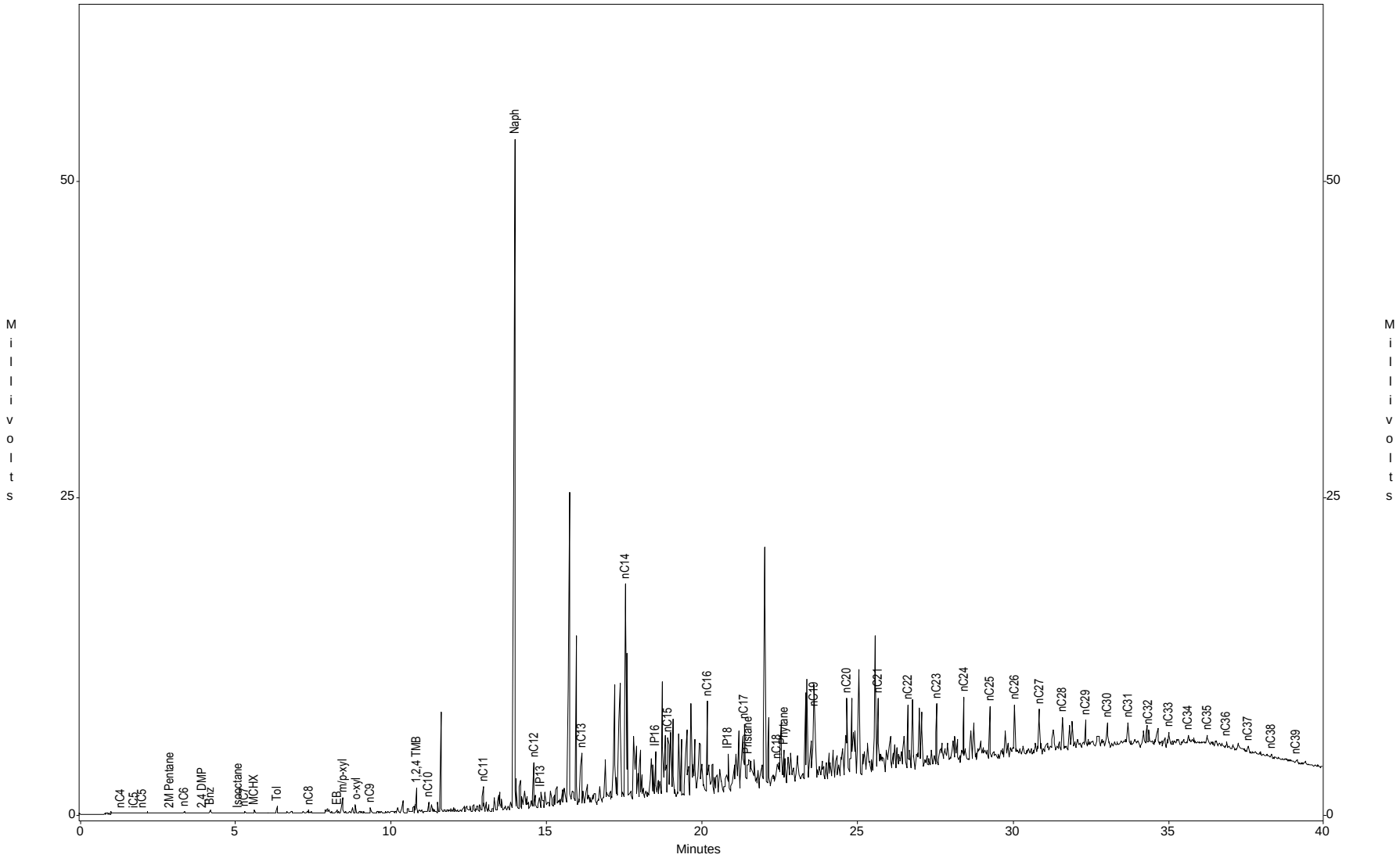


Figure 4, Gas chromatogram of the B18 LNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : B6-066 LNAPL
Acquired : Apr 06, 2021 09:44:19

c:\ezchrom\chrom\21016\b6-066 -- Channel A

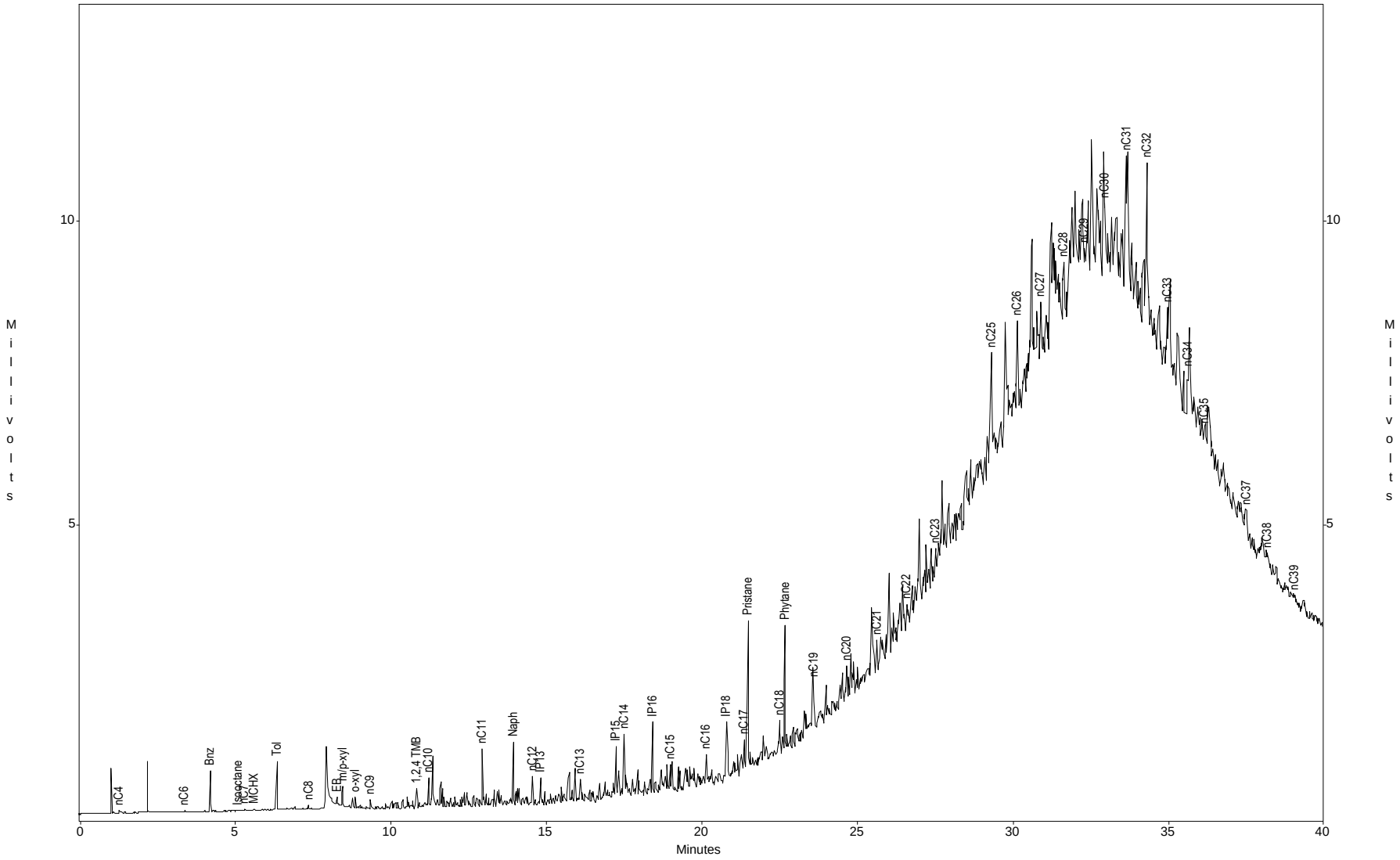


Figure 5, Gas chromatogram of the B6-066 LNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO124 DNAPL
Acquired : Apr 06, 2021 14:00:28

c:\ezchrom\chrom\21016\co124.2 -- Channel A

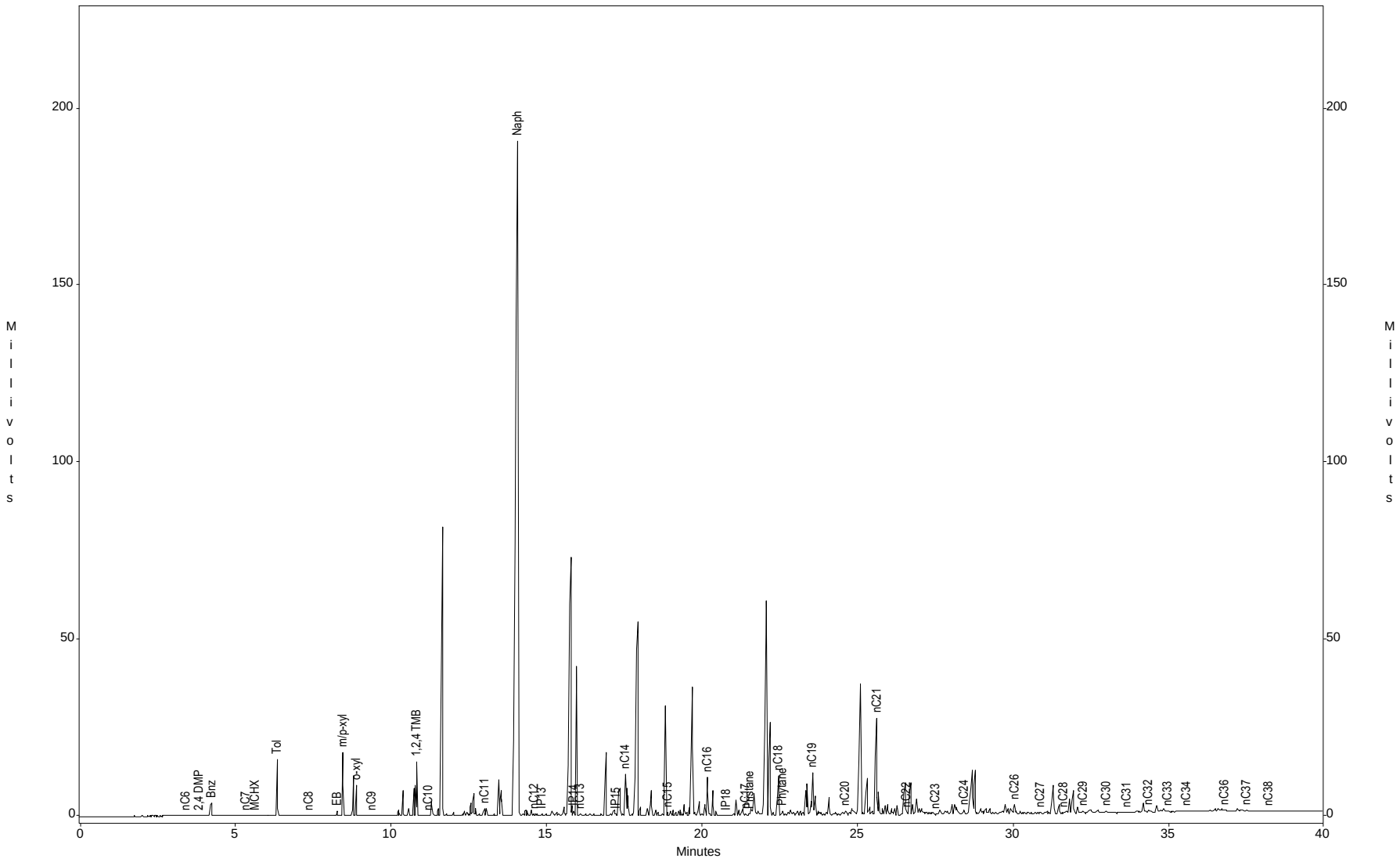


Figure 6, Gas chromatogram of the CO124 DNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO125 DNAPL
Acquired : Apr 06, 2021 12:17:21

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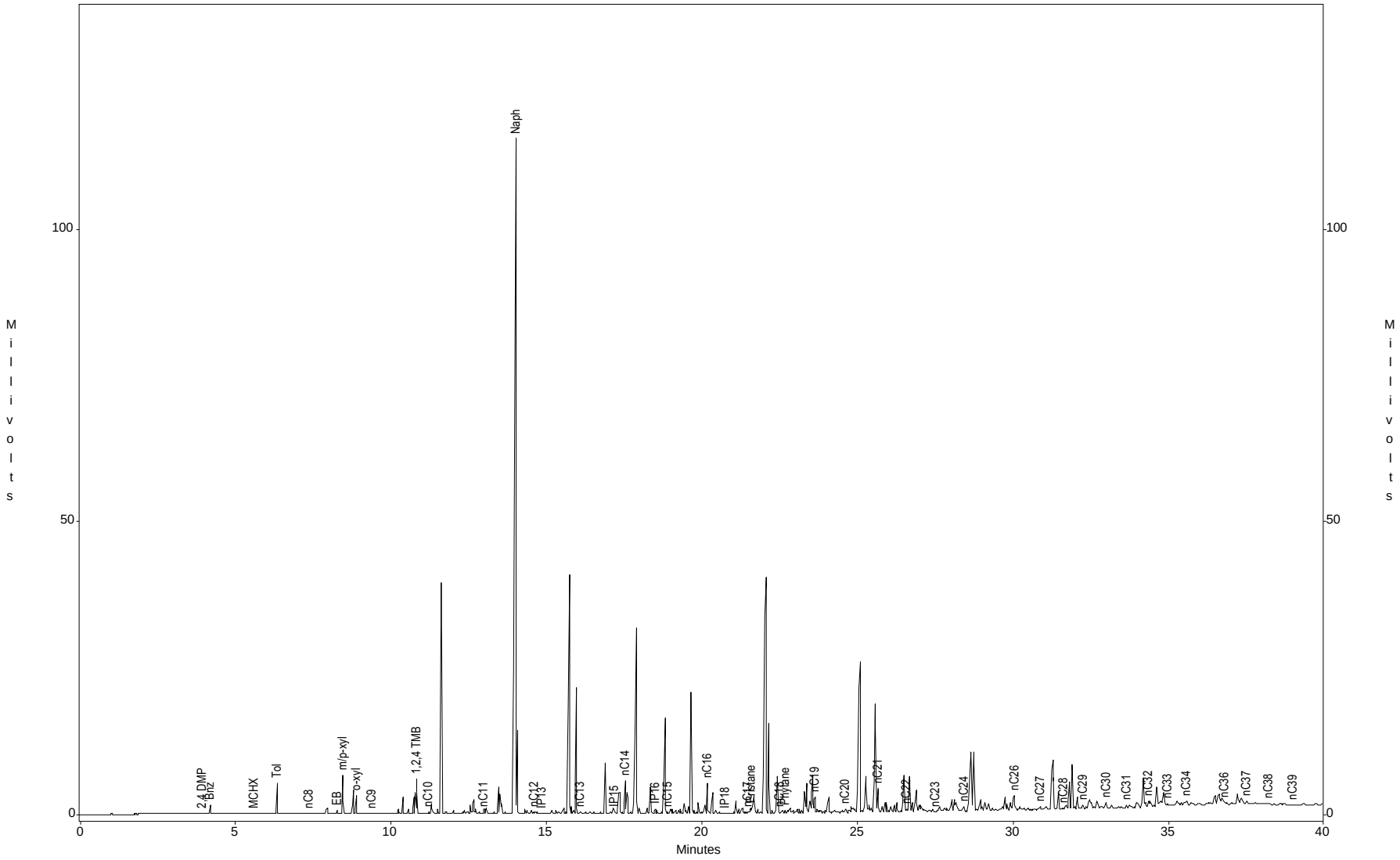


Figure 7, Gas chromatogram of the CO125 DNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO173 LNAPL
Acquired : Apr 06, 2021 08:04:42

c:\ezchrom\chrom\21016\co173 -- Channel A

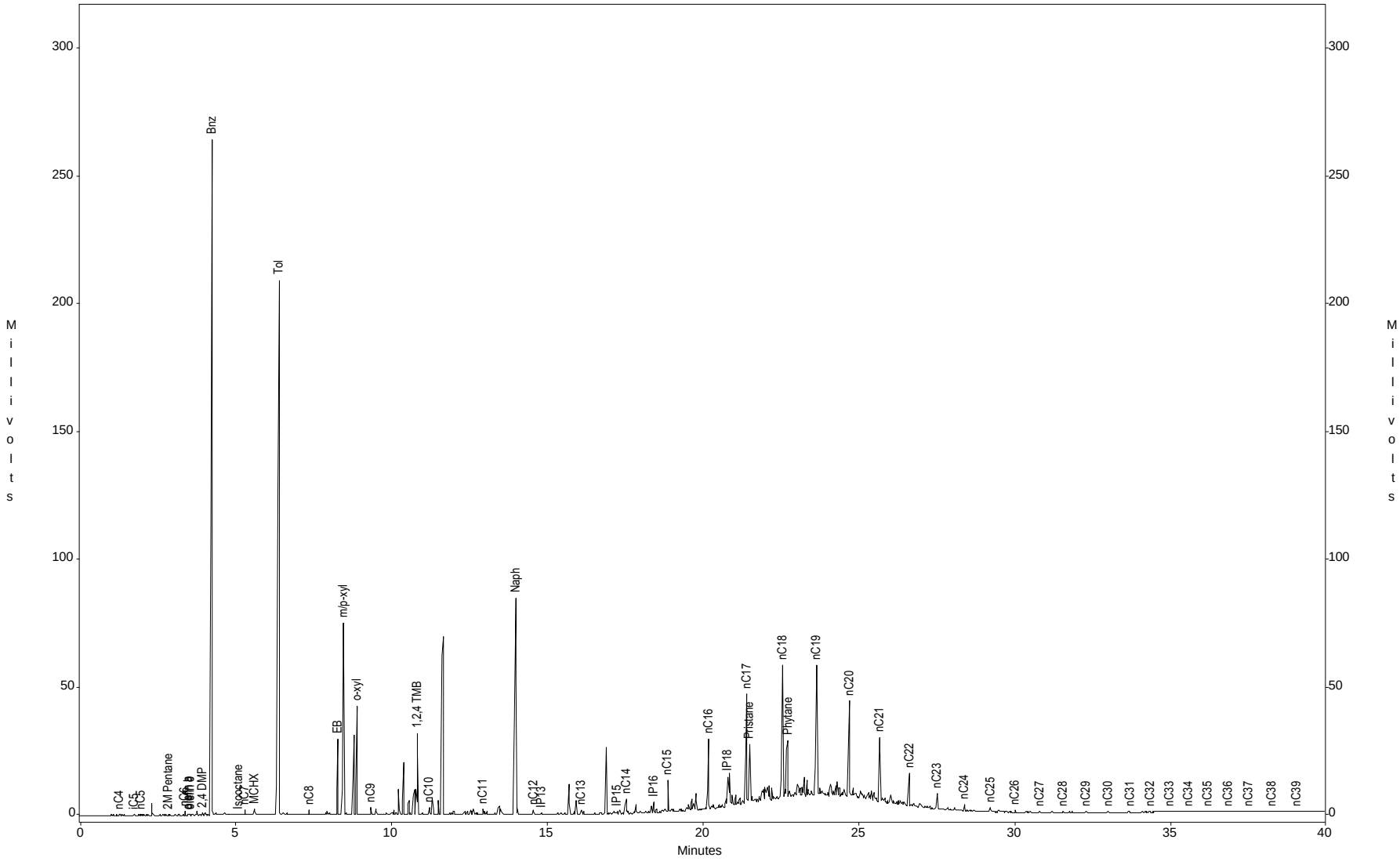


Figure 8, Gas chromatogram of the CO173 LNAPL sample.

Torkelson Geochemistry, Inc.
GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : Gas/Dies/Wax std
Acquired : Apr 06, 2021 10:35:22

c:\ezchrom\chrom\21016\gadiwax2 -- Channel A

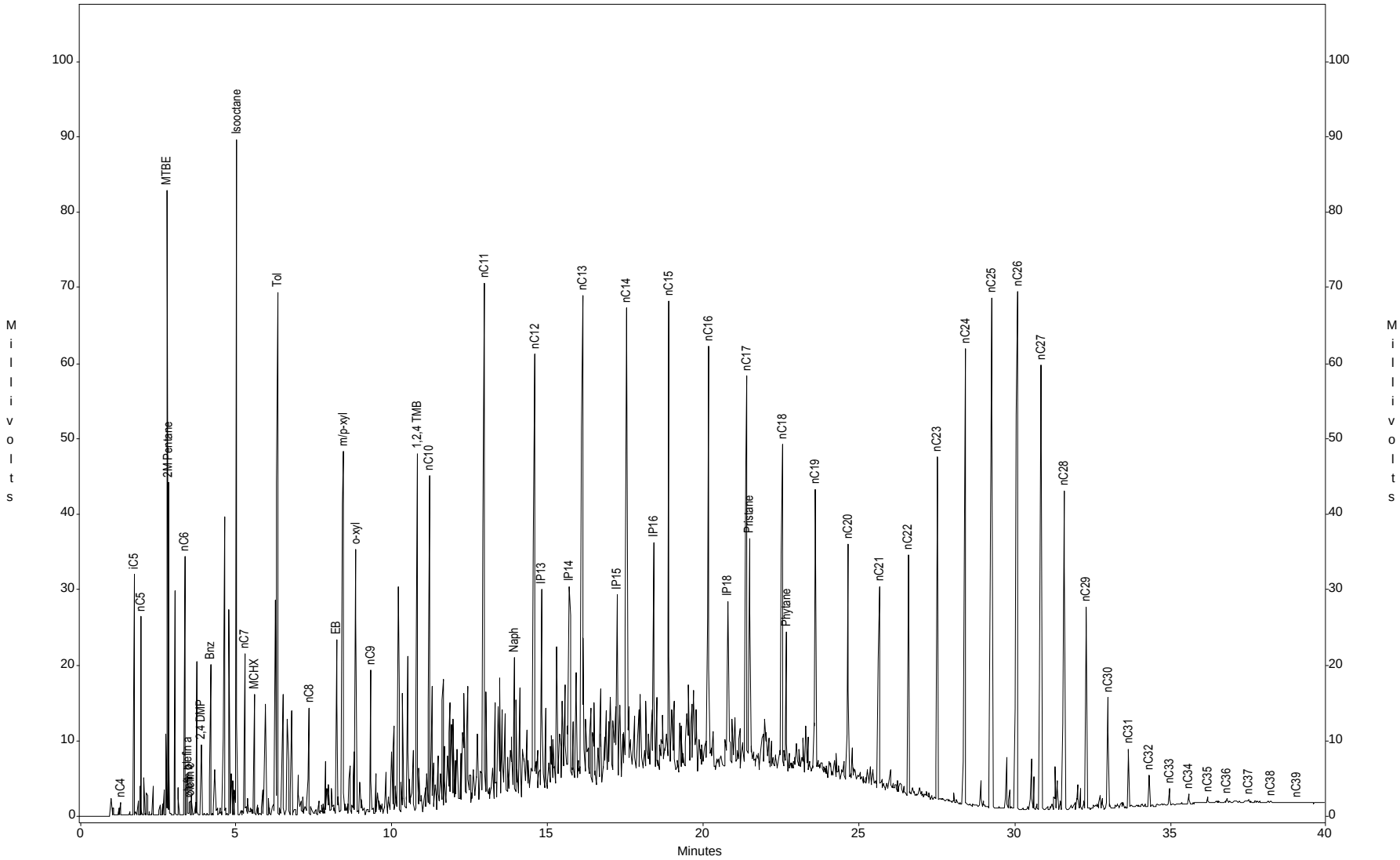
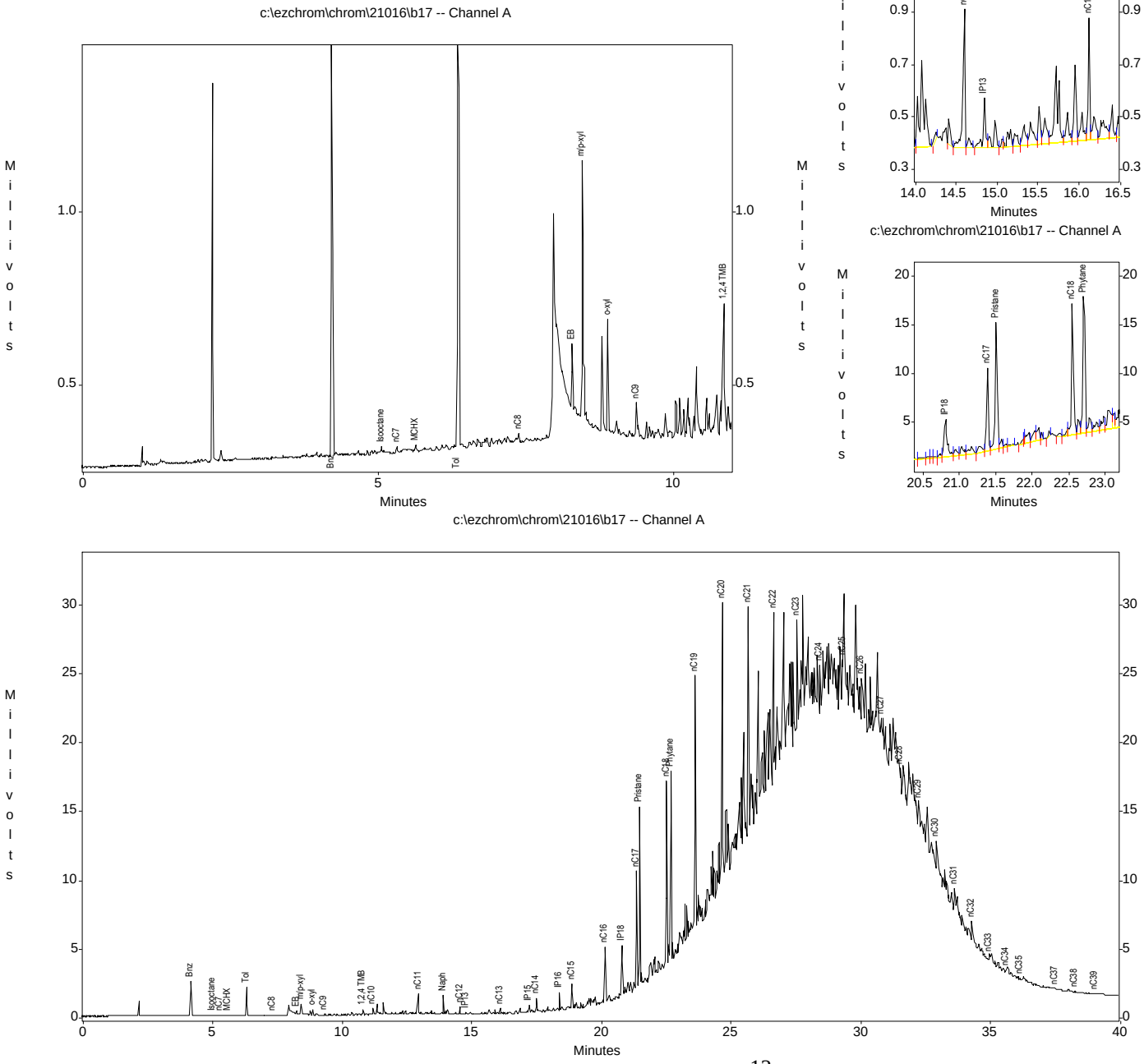


Figure 9, Gas chromatogram of laboratory standard (gasoline/diesel/wax mixture).

Sparrows Point IM, Sparrows Point, MD
Sample ID : B17 LNAPL
Acquired : Apr 06, 2021 08:53:38

Torkelson Geochemistry, Inc.
GC/FID



Channel A Results

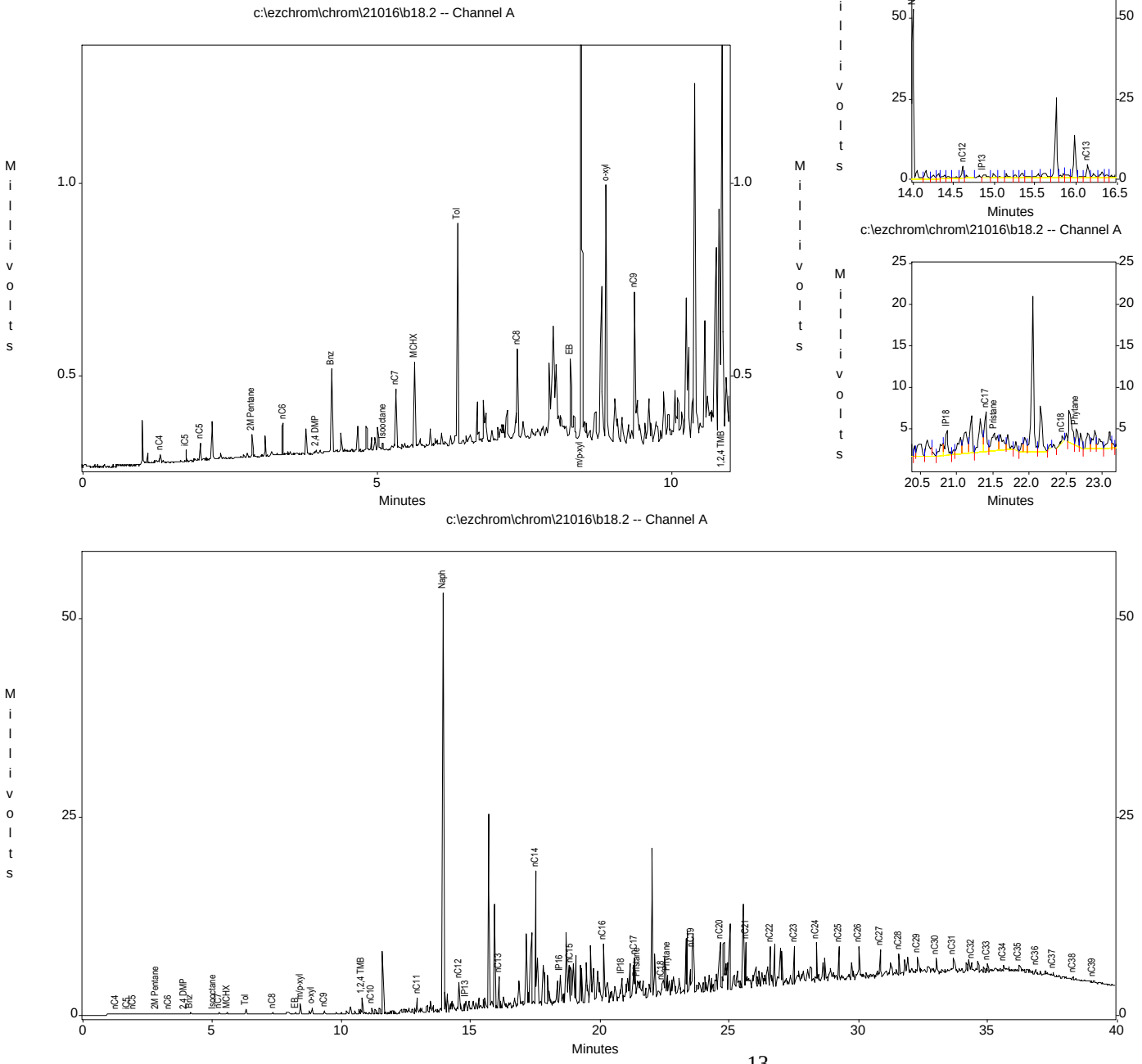
Peak	Area	Height
nC4	0	0
iC5	0	0
nC5	0	0
MTBE	0	0
2M Pentane	0	0
nC6	0	0
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	0	0
Bnz	2594	2489
Isooctane	18	17
nC7	20	16
MCHX	23	19
Tol	2516	2103
nC8	24	19
EB	532	271
m/p-xyl	2051	801
o-xyl	517	344
nC9	247	108
1,2,4 TMB	841	382
nC10	849	427
nC11	2215	1454
Naph	2276	1416
nC12	903	534
IP13	376	192
IP14	0	0
nC13	677	470
IP15	810	497
nC14	2462	998
IP16	2257	1311
nC15	3333	1864
nC16	7157	4152
IP18	10599	3770
nC17	13407	8601
Pristane	26652	13088
nC18	23870	13405
Phytane	28731	14004
nC19	41771	19764
nC20	56274	23637
nC21	65602	22137
nC22	66234	20451
nC23	85880	18800
nC24	40476	14302
nC25	29755	13646
nC26	33507	11382
nC27	24745	7582
nC28	9250	2955
nC29	1606	806
nC30	4738	1871
nC31	3843	1426
nC32	2438	1272
nC33	153	142
nC34	119	95
nC35	176	88
nC36	0	0
nC37	295	72
nC38	55	15
nC39	59	18
nC40	0	0

Figure 10, Multipanel display of gas chromatogram of the B17 LNAPL sample.

Torkelson Geochemistry, Inc.

GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : B18 LNAPL
Acquired : Apr 06, 2021 15:41:57



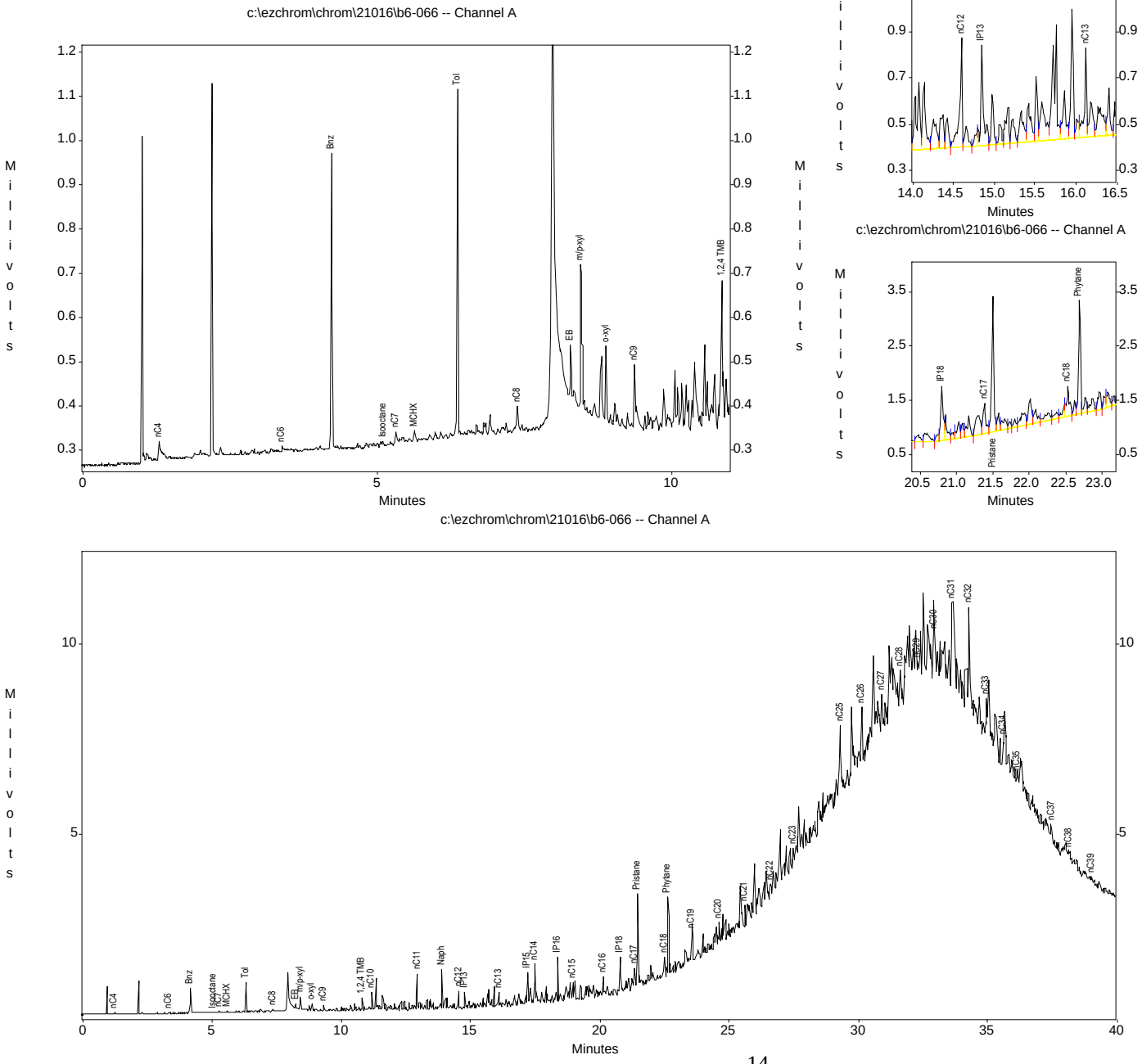
Channel A Results		
Peak	Area	Height
nC4	12	20
iC5	17	27
nC5	31	44
MTBE	0	0
2M Pentane	52	57
nC6	79	83
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	11	8
Bnz	236	214
Isooctane	17	15
nC7	176	154
MCHX	264	222
Tol	739	576
nC8	290	235
EB	326	207
m/p-xyl	2215	1208
o-xyl	954	670
nC9	547	395
1,2,4 TMB	3055	1914
nC10	1107	733
nC11	3551	1869
Naph	113057	52776
nC12	5569	3537
IP13	4156	1163
IP14	0	0
nC13	7055	4102
IP15	0	0
nC14	25848	15397
IP16	10040	3245
nC15	13462	4490
nC16	13363	7111
IP18	7773	2922
nC17	11348	4910
Pristane	10800	2054
nC18	1231	622
Phytane	3478	2156
nC19	10446	5303
nC20	10747	6077
nC21	8563	5273
nC22	9961	5099
nC23	8751	4929
nC24	9421	5200
nC25	7271	4222
nC26	7630	3888
nC27	6411	3494
nC28	4625	2672
nC29	3087	1943
nC30	3273	1602
nC31	4702	1568
nC32	1920	1049
nC33	699	583
nC34	993	572
nC35	908	535
nC36	1076	425
nC37	893	395
nC38	760	289
nC39	408	156
nC40	0	0

Figure 11, Multipanel display of gas chromatogram of the B18 LNAPL sample.

Torkelson Geochemistry, Inc.

GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : B6-066 LNAPL
Acquired : Apr 06, 2021 09:44:19



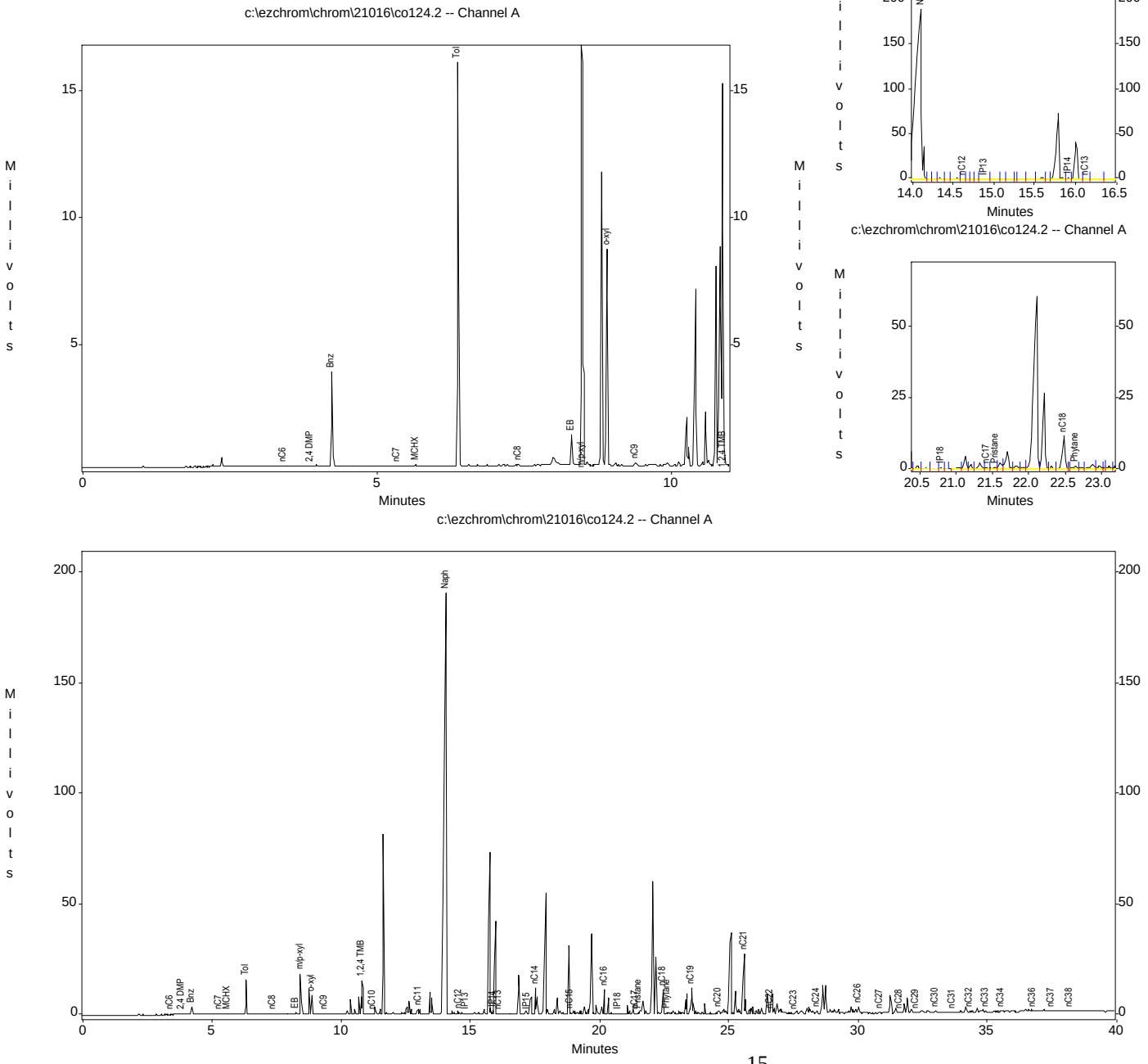
Channel A Results

Peak	Area	Height
nC4	52	38
iC5	0	0
nC5	0	0
MTBE	0	0
2M Pentane	0	0
nC6	12	10
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	0	0
Bnz	702	668
Isooctane	19	10
nC7	39	26
MCHX	26	21
Tol	928	780
nC8	115	56
EB	381	186
m/p-xyl	1118	369
o-xyl	309	187
nC9	380	146
1,2,4 TMB	578	330
nC10	873	467
nC11	1790	947
Naph	1858	1056
nC12	1035	476
IP13	986	440
IP14	0	0
nC13	806	391
IP15	1674	867
nC14	2040	1060
IP16	1958	1196
nC15	692	424
nC16	928	481
IP18	2106	984
nC17	1364	559
Pristane	4887	2482
nC18	1564	553
Phytane	4258	2079
nC19	1352	799
nC20	1396	587
nC21	912	510
nC22	1217	408
nC23	983	478
nC24	0	0
nC25	8287	1924
nC26	4940	1564
nC27	3334	1118
nC28	2074	1048
nC29	265	210
nC30	440	155
nC31	2935	1236
nC32	4281	2187
nC33	1137	621
nC34	540	286
nC35	191	94
nC36	0	0
nC37	447	205
nC38	110	73
nC39	189	89
nC40	0	0

Figure 12, Multipanel display of gas chromatogram of the B6-066 LNAPL sample.

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO124 DNAPL
Acquired : Apr 06, 2021 14:00:28

Torkelson Geochemistry, Inc.
GC/FID



Channel A Results

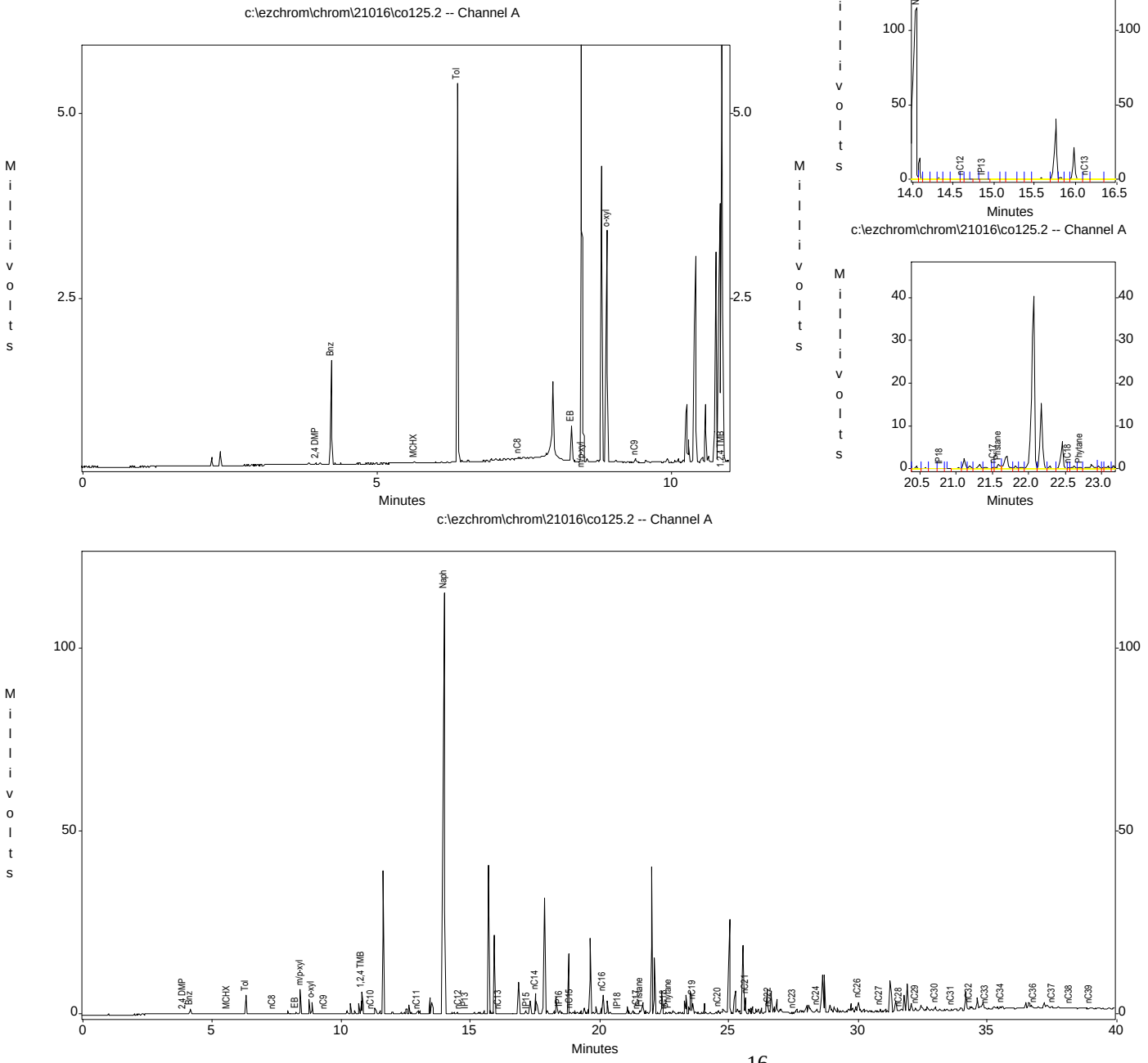
Peak	Area	Height
nC4	0	0
iC5	0	0
nC5	0	0
MTBE	0	0
2M Pentane	0	0
nC6	11	13
olefin a	0	0
olefin b	0	0
olefin c	0	0
2.4 DMP	32	31
Bnz	3909	3723
Isooctane	0	0
nC7	27	24
MCHX	69	54
Tol	18847	15821
nC8	63	46
EB	1579	1185
m/p-xyl	32466	18046
o-xyl	10902	8493
nC9	188	110
1.2.4 TMB	26643	15012
nC10	482	230
nC11	3663	2020
Naph	964319	190527
nC12	1385	615
IP13	1123	375
IP14	2846	1407
nC13	1298	529
IP15	1420	554
nC14	21515	11735
IP16	0	0
nC15	1701	741
nC16	20486	10910
IP18	648	244
nC17	1026	400
Pristane	2157	558
nC18	29134	11362
Phytane	3124	1075
nC19	28497	11895
nC20	3017	1201
nC21	78441	27297
nC22	2258	852
nC23	459	217
nC24	5656	1210
nC25	0	0
nC26	11564	2888
nC27	1354	547
nC28	478	243
nC29	2221	515
nC30	2019	722
nC31	747	301
nC32	926	492
nC33	988	219
nC34	672	149
nC35	0	0
nC36	66	0
nC37	491	168
nC38	30	14
nC39	0	0
nC40	0	0

Figure 13, Multipanel display of gas chromatogram of the CO124 DNAPL sample.

Torkelson Geochemistry, Inc.

GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO125 DNAPL
Acquired : Apr 06, 2021 12:17:21



Channel A Results

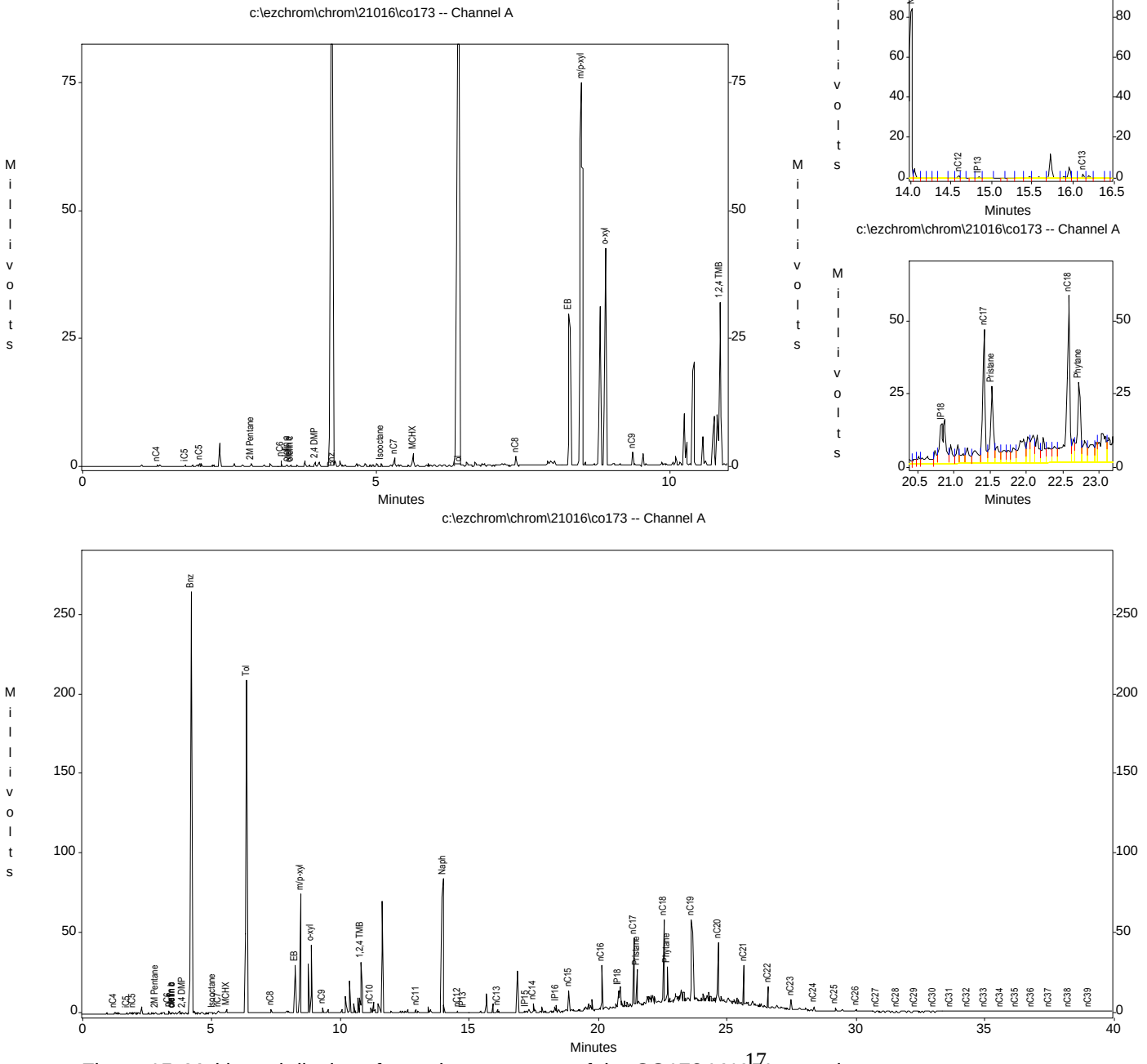
Peak	Area	Height
nC4	0	0
iC5	0	0
nC5	0	0
MTBE	0	0
2M Pentane	0	0
nC6	0	0
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	24	22
Bnz	1460	1392
Isooctane	0	0
nC7	0	0
MCHX	23	20
Tol	6067	5093
nC8	63	39
EB	670	471
m/p-xyl	11243	6667
o-xyl	4032	3120
nC9	78	43
1,2,4 TMB	10263	5966
nC10	601	184
nC11	1642	219
Naph	370883	115171
nC12	494	263
IP13	427	151
IP14	0	0
nC13	562	246
IP15	564	252
nC14	10224	5605
IP16	1475	864
nC15	843	376
nC16	9686	5254
IP18	337	135
nC17	469	259
Pristane	2979	878
nC18	260	125
Phytane	821	340
nC19	6276	2660
nC20	1606	695
nC21	8481	4102
nC22	1504	565
nC23	369	176
nC24	4150	911
nC25	0	0
nC26	9945	2684
nC27	1314	554
nC28	421	230
nC29	2192	610
nC30	2827	1001
nC31	1088	444
nC32	1507	779
nC33	233	147
nC34	1268	352
nC35	0	0
nC36	69	0
nC37	1573	533
nC38	339	67
nC39	104	39
nC40	0	0

Figure 14, Multipanel display of gas chromatogram of the CO125 DNAPL sample.

Torkelson Geochemistry, Inc.

GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : CO173 LNAPL
Acquired : Apr 06, 2021 08:04:42



Channel A Results

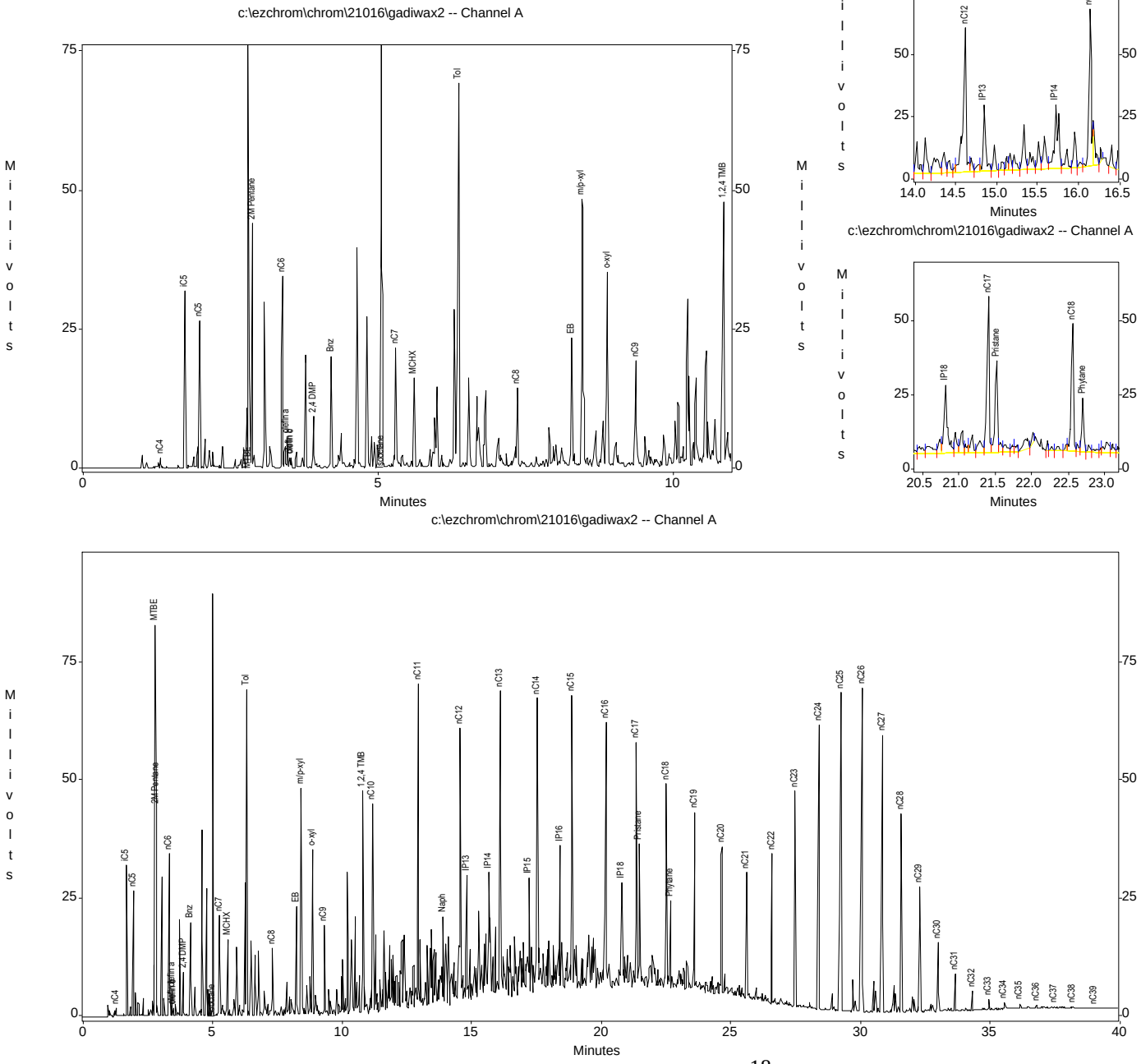
Peak	Area	Height
nC4	88	152
iC5	140	201
nC5	342	453
MTBE	0	0
2M Pentane	386	416
nC6	1124	1135
olefin a	132	89
olefin b	51	50
olefin c	89	72
2,4 DMP	963	866
Bnz	540876	264459
Isooctane	517	457
nC7	1885	1676
MCHX	2875	2368
Tol	536021	209565
nC8	2245	1816
EB	39352	29639
m/p-xyl	203543	75074
o-xyl	62153	42474
nC9	3457	2693
1,2,4 TMB	56528	31915
nC10	4557	2952
nC11	5037	2144
Naph	229103	84620
nC12	2343	1467
IP13	805	457
IP14	0	0
nC13	2527	1808
IP15	2013	931
nC14	10646	5535
IP16	7449	4300
nC15	20392	12717
nC16	56495	28294
IP18	72476	13573
nC17	102146	45389
Pristane	65920	25810
nC18	157667	56701
Phytane	77091	27247
nC19	140606	56147
nC20	105141	41985
nC21	55923	27362
nC22	24677	13184
nC23	11578	6141
nC24	4372	2656
nC25	3114	1756
nC26	1561	895
nC27	1089	580
nC28	938	497
nC29	451	301
nC30	431	277
nC31	596	257
nC32	368	197
nC33	305	160
nC34	121	65
nC35	120	68
nC36	110	54
nC37	101	42
nC38	197	42
nC39	158	30
nC40	0	0

Figure 15, Multipanel display of gas chromatogram of the CO173 LNAPL sample.

Torkelson Geochemistry, Inc.

GC/FID

Sparrows Point IM, Sparrows Point, MD
Sample ID : Gas/Dies/Wax std
Acquired : Apr 06, 2021 10:35:22



Channel A Results

Peak	Area	Height
nC4	936	1737
iC5	21249	31866
nC5	18624	26408
MTBE	79122	82880
2M Pentane	39748	44038
nC6	34618	34368
olefin a	5926	5224
olefin b	1727	1767
olefin c	2098	1789
2,4 DMP	9742	9273
Bnz	22255	19876
Isooctane	132234	89426
nC7	26173	21362
MCHX	19992	16022
Tol	120686	69156
nC8	17675	14139
EB	33040	23208
m/p-xyl	115617	48126
o-xyl	53186	35143
nC9	31442	19107
1,2,4 TMB	83931	47371
nC10	69605	44298
nC11	128658	68455
Naph	31452	18542
nC12	149650	58252
IP13	54331	26756
IP14	92527	25850
nC13	140048	63459
IP15	58577	24866
nC14	198196	62850
IP16	75306	31288
nC15	137246	63109
nC16	145395	56815
IP18	71126	22680
nC17	113647	52253
Pristane	68915	30626
nC18	91190	43114
Phytane	37507	18318
nC19	78094	37796
nC20	60045	31193
nC21	48775	26661
nC22	63730	31872
nC23	102634	45679
nC24	158930	60430
nC25	191653	67503
nC26	197849	68620
nC27	151235	58802
nC28	95146	42212
nC29	51756	26569
nC30	23509	14302
nC31	13473	7760
nC32	7103	4181
nC33	3810	2124
nC34	2412	1313
nC35	1267	739
nC36	827	413
nC37	584	229
nC38	331	110
nC39	249	70
nC40	0	0

Figure 16, Multipanel display of gas chromatogram of laboratory standard (gasoline/diesel/wax mixture).

Table 1. Results of physical property analyses.

Torkelson Geochemistry, Inc.							
Physical Properties Measurements							
Sample	TGI Job	Density of NAPL (gm/ml)	Viscosity of NAPL (centipoise)	Surface Tension Air/Water (dynes/cm)	Interfacial Tension NAPL/Water (dynes/cm)	Surface Tension Air/NAPL (dynes/cm)	Temperature of Measurements
CO173 LNAPL	21016	NR	6.2	NR	NR	NR	60F

NR = Not Requested

ATTACHMENT 2

Test Pit Observations
Area B: Parcel B6 – B6-066 NAPL Area
Sparrows Point, Maryland

070821-1: TP-1 – Test Pit following excavation

070821-2: TP -1 – Excavated Material Stockpiles

Test Pit Observations
Area B: Parcel B6 – B6-066 NAPL Area
Sparrows Point, Maryland

071221-1: TP-2 – Test Pit following extraction

070821-3: TP-2 – Excavated Material Stockpile

Test Pit Observations
Area B: Parcel B6 – B6-066 NAPL Area
Sparrows Point, Maryland

080621-1: TP-2 – Observation Point (While Backfilling)

080621-2: TP-2 – Temporary Monitoring Point (Backfilled)

Test Pit Observations
Area B: Parcel B6 – B6-066 NAPL Area
Sparrows Point, Maryland

070821-4: TP-3 – Test Pit following excavation

070821-5: TP-3 – Excavated Material Stockpile

Test Pit Observations
Area B: Parcel B6 – B6-066 NAPL Area
Sparrows Point, Maryland

070821-6: TP-4 – Test Pit following excavation

070821-7: TP-4 – Excavated Material Stockpile

APPENDIX C

Construction Worker Soil Screening Levels
Maximum Allowable Work Day Exposure
Calculation Spreadsheet - Sub-Parcel B6-6

Area of site (ac)	Ac	12.7
Overall duration of construction (wk/yr)	EW	6
Exposure frequency (day/yr)	EF	**30**
Cars per day	Ca	5
Tons per car	CaT	2
Trucks per day	Tru	5
Tons per truck	TrT	20
Mean vehicle weight (tons)	w	**11**
Derivation of dispersion factor - particulate emission factor (g/m2-s per kg/m3)	Q/Csr	**14.9**
Overall duration of construction (hr)	tc	**1,008**
Overall duration of traffic (s)	Tt	**864,000**
Surface area (m2)	AR	**51,395**
Length (m)	LR	**227**
Distance traveled (km)	ΣVKT	**68**
Particulate emission factor (m3/kg)	PEFsc	**87,443,724**
Derivation of dispersion factor - volatilization (g/m2-s per kg/m3)	Q/Csa	**8.10**
Total time of construction (s)	Tcv	**864,000**

→ Site-Wide EU

Input
Calculation

Chemical	RfD & RfC Sources	^Ingestion SF $(mg/kg\text{-}day)^{-1}$	^Inhalation Unit Risk $(ug/m^3)^{-1}$	^Subchronic RfD (mg/kg-day)	^Subchronic RfC (mg/m^3)	^GIABS	Dermally Adjusted RfD (mg/kg-day)	^ABS	^RBA	*Dia	*Diw	*Henry's Law Constant (unitless)	*Kd	*Koc	DA	Volatilization Factor - Unlimited Reservoir (m^3/kg)	Carcinogenic Ingestion/ Dermal SL (SLing/der)	Carcinogenic Inhalation SL (SLinh)	Carcinogenic SL (mg/kg)	Non-Carcinogenic Ingestion/ Dermal SL (SLing/der)	Non-Carcinogenic Inhalation SL (SLinh)	Non-Carcinogenic SL (mg/kg)
Arsenic, Inorganic	I/C	1.50E+00	4.30E-03	3.00E-04	1.50E-05	1	3.00E-04	0.03	0.6			-	2.90E+01				126	51,958	126	812	47,875	798
Cobalt	P	-	9.00E-03	3.00E-03	2.00E-05	1	3.00E-03	0.01	1			-	4.50E+01					24,824	24,824	8,591	63,834	7,572
Iron	P	-	-	7.00E-01	-	1	7.00E-01	0.01	1			-	2.50E+01							2,004,511		2,004,511
Manganese (Non-diet)	I	-	-	2.40E-02	5.00E-05	0.04	9.60E-04	0.01	1			-	6.50E+01							40,450	159,585	32,271
Vanadium and Compounds	A	-	-	1.00E-02	1.00E-04	0.026	2.60E-04	0.01	1			-	1.00E+03							13,694	319,170	13,131
Benzo[a]pyrene	I	1.00E+00	6.00E-04	3.00E-04	2.00E-06	1	3.00E-04	0.13	1	4.80E-02	5.60E-06	1.87E-05	3.54E+03	5.90E+05	2.37E-11	4.94E+5	149	2,092	139	637	35.9	33.9
Naphthalene	C/I/A	1.20E-01	3.40E-05	2.00E-02	3.00E-03	1	2.00E-02	0.13	1	6.00E-02	8.40E-06	1.80E-02	9.00E+00	1.50E+03	6.35E-06	9.54E+2	1,238	71.7	67.8	42,439	104.4	104.2

*chemical specific parameters found in Chemical Specific Parameters Spreadsheet at https://www.epa.gov/risk/regional-screening-levels-rsls
^chemical specific parameters found in Unpaved Road Traffic calculator at https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
I: chemical specific parameters found in the IRIS at https://www.epa.gov/iris
C: chemical specific parameters found in Cal EPA at https://www.dtsc.ca.gov/AssessingRisk
A: chemical specific parameters found in Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLs) at https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf
P: chemical specific parameters found in the Database of EPA PPRTVs at https://hhpprtv.ornl.gov/quickview/pprtv.php

APPENDIX D

Sparrows Point Development - PPE Standard Operational Procedure, Revision 3

Planning, Tracking/Supervision, Enforcement, and Documentation

Planning

- Response and Development Work Plan (RDWP) for each individual redevelopment sub-parcel identifies and documents site conditions.
- RDWP is reviewed and approved by regulators.
- Contractor HASP to address site-specific conditions and PPE requirements:
    - Contractor H&S professional to sign-off on PPE requirements for site workers;
    - Job Safety Analysis (JSA) to be performed for ground intrusive work.
- Project Environmental Professional (EP) assigned to each construction project – monitors project during environmentally sensitive project phases and is available to construction contractor on an as needed basis. EP responsibilities include the following:
    - Dust monitoring
    - Routine ground intrusive breathing space air monitoring
    - Soil tracking
    - Water handling oversight
    - Ground intrusive work observation
    - Notification for unexpected conditions
- Pre-construction meeting identifies EP roles and responsibilities and reviews site conditions.
- Contractor to perform job-site HazCom. HazCom to be addressed in Contractor HASP and include:
    - PPE requirements,
    - Exposure time limits,
    - Identification of chemicals of concern and potential effects of over-exposure (adverse reactions),
    - Methods and routes of potential exposure.
- All personnel that will be performing ground intrusive work within impacted soils shall sign-off on HazCom.
- If, based on a thorough review of Site conditions, it is expected that construction workers will have the potential to encounter materials considered hazardous waste under RCRA or DOT regulations, HAZWOPER-trained personnel will be utilized.

Tracking/Supervision

- Contractor to record any day that there is ground intrusive work and confirm that proper PPE is being worn.
- EP will note ground intrusive work on daily work sheets and perform at least one spot check per day.
- EP will log on daily work sheets PPE compliance for all intrusive work areas at least once per day.

- EP to take example photos of Exclusion Zones/Contamination Reduction Zones periodically.

Work Zones Delineation

- Exclusion Zone – The Exclusion Zones will include the areas proposed for excavation or with active trenches, excavations, or ground intrusive work, at a minimum. Personnel working within the exclusion zone will be required to wear Modified Level D PPE as described in this SOP. EP to take example photos of Exclusion Zones/Contamination Reduction Zones periodically. The Exclusion Zones will be identified each work day.
- Contamination Reduction Zone – This work zone is located outside of the exclusion zone, but inside of the limits of development (LOD). The Contamination Reduction Zone will be located adjacent to the Exclusion Zone, and all personal decontamination including removal of all disposable PPE/removal of soil from boots will be completed in the Contamination Reduction Zone.

Documentation

- Contractor HASP and HazCom.
- Contractor ground intrusive tracking record.
- HASP and HazCom sign-in sheets.
- EP pre-con memos.
- EP daily work sheets.
- Records documenting intrusive work and proper PPE use to be provided in completion report.

Enforcement

- Non-compliance of PPE requirements will result in disciplinary action up to and including prohibition from working on Sparrows Point.

Unknown and/or Unexpected Conditions

If unknown and/or unexpected conditions are encountered during the project that the EP determines to have a reasonable potential to significantly impact construction worker health and safety, the following will be initiated:

1. Job stoppage,
2. TPA and MDE notification,
3. Re-assessment of conditions.

Work will not continue until EP has cleared the area. If hazardous waste is identified, a HAZWOPER contractor will be brought in to address. The approved contingency plan will be implemented, where appropriate.

Modified Level D PPE

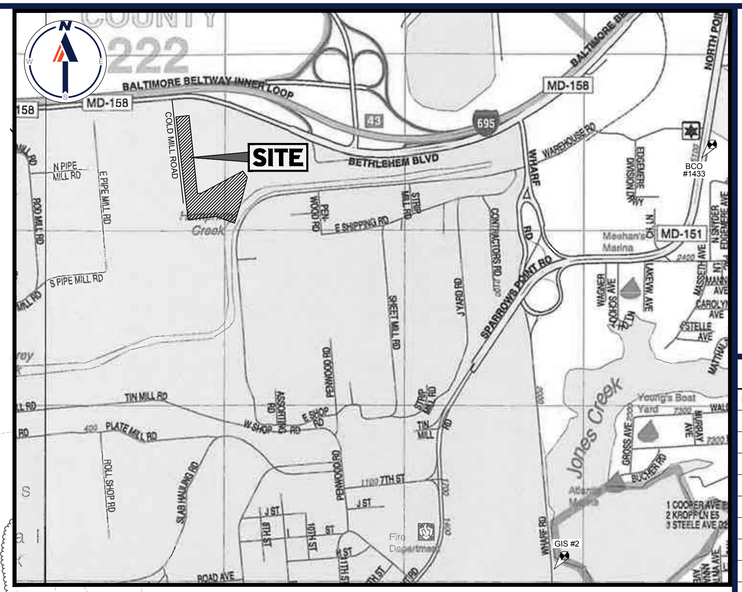
Modified Level D PPE will include, at a minimum, overalls such as polyethylene-coated Tyvek or clean washable cloth overalls, latex (or similar) disposable gloves (when working in wet/chemical surroundings) or work gloves, steel-toe/steel-shank high ankle work boots with taped chemical-protective over-boots (as necessary), dust mask, hard hat, safety glasses with

side shields, and hearing protection (as necessary). If chemical-protective over-boots create increased slip/trip/fall hazardous, then standard leather or rubber work boots could be used, but visible soils from the sides and bottoms of the boots must be removed upon exiting the Exclusion Zone.

APPENDIX E

LEGEND

EXISTING NOTE	TYPICAL NOTE TEXT	PROPOSED NOTE
	ONSITE PROPERTY LINE / R.O.W. LINE	
120 / 121	CONTOUR LINE	120 / 121
TC 516.4 OR 516.4	SPOT ELEVATIONS	TC 516.00 / TC 516.00 BC 515.50
SL	SANITARY SEWER LINE	SL
W	UNDERGROUND WATER LINE	W
I	INDUSTRIAL WATER LINE	I
E	UNDERGROUND ELECTRIC LINE	E
G	UNDERGROUND GAS LINE	G
OH	OVERHEAD WIRE	OH
T	UNDERGROUND TELEPHONE LINE	T
	STORM SEWER	
FM	SANITARY SEWER FORCE MAIN	FM
LOD	LIMIT OF DISTURBANCE	LOD
	CONCRETE CURB & GUTTER	CURB AND GUTTER
	SPILL CURB	



LOCATION MAP

SCALE: 1"=1,000'

OWNER/DEVELOPER

TRADEPOINT DEVELOPMENT, LLC
1600 SPARROWS POINT BLVD
BALTIMORE, MD 21219
CONTACT: TOM CASO
PHONE: 410-382-6667

BENCHMARK INFORMATION

ELEVATIONS ARE BASED ON NAVD 88, COORDINATES AND MERIDIAN ARE BASED ON THE MARYLAND COORDINATE SYSTEM (MCS) PER THE FOLLOWING MONUMENTS:

BCO# 1433 (CAPPED REBAR)
N 571,683.79, E 1,466,230.69, ELEV. 16.59
IN MEDIAN OF NORTH POINT BLVD SOUTH OF NORTH SNYDER AVE.

GIS #2 (BRASS DISK)
N 565,182.39, E. 1,464,480.72, ELEV. 9.95
EAST SIDE OF WHARF ROAD 420'± NORTH OF LIGHT TOWER

BALTIMORE COUNTY STANDARD GRADING PLAN NOTES

1. THE PROPOSED GRADING SHOWN ON THIS PLAN MEETS THE REQUIREMENTS SET FORTH BY BALTIMORE COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SUSTAINABILITY AND COMPLIES WITH ARTICLE 33, TITLE 5 OF THE BALTIMORE COUNTY CODE. HOWEVER, DUE TO BUILDING TYPES AND LAYOUT, SOME FIELD ADJUSTMENTS MAY BE REQUIRED. ALL CHANGES MUST COMPLY WITH THE ABOVE MENTIONED REQUIREMENTS.
2. ALL SWALES HAVE BEEN DESIGNED BY THE ENGINEER TO CONVEY RUNOFF ACCORDING TO BALTIMORE COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN STANDARDS.
3. THERE SHALL BE NO CLEARING, GRADING, CONSTRUCTION OR DISTURBANCE OF VEGETATION IN THE FOREST BUFFER EASEMENT OR OTHER FOREST RETENTION AREAS, EXCEPT AS PERMITTED BY THE BALTIMORE COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SUSTAINABILITY.
4. STORMWATER MANAGEMENT WILL BE PROVIDED VIA A TIMING VARIANCE AND POSTING OF A SURETY IN THE AMOUNT OF $594,000.00 FOR 11.00 ACRES OF IMPERVIOUS AREA.

SITE SPECIFIC GRADING NOTES

1. ALL UTILITIES SHOWN ARE PRIVATE UNLESS OTHERWISE NOTED.
2. THE SUBJECT DEVELOPMENT AREA IS LOCATED IN FLOOD ZONE 'X' (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) PER MAP ENTITLED "NATIONAL FLOOD INSURANCE PROGRAM, FIRM, FLOOD INSURANCE RATE MAP, BALTIMORE COUNTY, MARYLAND (UNINCORPORATED AREAS) PANEL 555 OF 580", MAP NUMBER 2400105555G, MAP REVISED MAY 5, 2014, AND PLAN PREPARED BY PAI, DEV. PLANS REVIEW, DATED SEPTEMBER 21, 2016, PER MAP 0555F, DATED SEPTEMBER 28, 2008
3. ADDITIONAL EXISTING UTILITIES AND SITE FEATURES LOCATED WITHIN THE LIMIT OF DISTURBANCE NOT IDENTIFIED AS "TO BE REMOVED" OR "TO BE RELOCATED" MAY REQUIRE REMOVAL OR RELOCATION AS DIRECTED BY THE GEOTECHNICAL ENGINEER OR TRADEPOINT DEVELOPMENT.
4. EXISTING UTILITIES NOTED AS "TO REMAIN" WITHIN THE LIMIT OF DISTURBANCE MUST BE MAINTAINED TO PROVIDE SERVICE FOR THE PROPOSED DEVELOPMENT.
5. EXISTING GRADES SHOWN ON THIS PLAN ARE BASED ON CAD FILES PROVIDED BY TRADEPOINT ATLANTIC. IF ACTUAL EXISTING GRADES DIFFER FROM WHAT IS SHOWN ON THESE PLANS, CONTRACTOR IS TO NOTIFY BOHLER IN WRITING.
6. EXISTING MANHOLE, CLEANOUT, AND VALVE COVERS WITHIN THE LIMIT OF DISTURBANCE NOT IDENTIFIED AS "TO BE REMOVED" ARE TO BE ADJUSTED TO MEET FINAL GRADES.
7. LOCATION OF ALL UNDERGROUND UTILITIES ARE APPROXIMATE, SOURCE INFORMATION FROM PLANS AND MARKINGS HAVE BEEN COMBINED WITH OBSERVED EVIDENCE OF UTILITIES TO DEVELOP A VIEW OF THOSE UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. WHERE ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, THE CLIENT IS ADVISED THAT EXCAVATION MAY BE REQUIRED.

OWNER'S/DEVELOPER'S CERTIFICATION - GRADING

I/WE CERTIFY THAT ALL GRADING ON THIS SITE WILL BE DONE IN ACCORDANCE WITH THE CURRENT GRADING REQUIREMENTS AS SET FORTH BY THE BALTIMORE COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SUSTAINABILITY AND WITH THE REQUIREMENTS SPECIFIED IN ARTICLE 33, TITLE 5 OF THE BALTIMORE COUNTY CODE.

SIGNATURE OF OWNER/DEVELOPER _____ TITLE _____ DATE _____

PRINT NAME _____

LIMIT OF DISTURBANCE: 552,150 S.F. OR 12.68 AC.

STORMWATER MANAGEMENT PERMIT NOT REQUIRED

BALTIMORE COUNTY
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SUSTAINABILITY

APPROVED FOR GRADING

DATE _____

GRADING 1 OF 2

MARYLAND COORDINATE SYSTEM (MCS)

40 20 10 0 40
1"= 40'

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL SERVICES
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	MD16206658
DRAWN BY:	MJG
CHECKED BY:	MJG
DATE:	12/03/21
CAD I.D.:	MD16206658 - SITE - 0

PROJECT:

ALL-STATE LOT

FOR

TRADEPOINT ATLANTIC

BETHLEHEM BOULEVARD
AT COLD MILL ROAD
BALTIMORE, MD 21219
TM 111, GRID 14, PARCEL 318
ELECTION DISTRICT 15
COUNCILMANIC DISTRICT 7
BALTIMORE COUNTY

BOHLER
901 DULANEY VALLEY ROAD, SUITE 801
TOWSON, MARYLAND 21204
Phone: (410) 821-7900
Fax: (410) 821-7987
MD@BohlerEng.com

M.J. GESELL
PROFESSIONAL ENGINEER
MARYLAND LICENSE No. 44097
PROFESSIONAL CERTIFICATION
I, MICHAEL J. GESELL, HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 44097, EXPIRATION DATE: 6/9/23

SHEET TITLE:

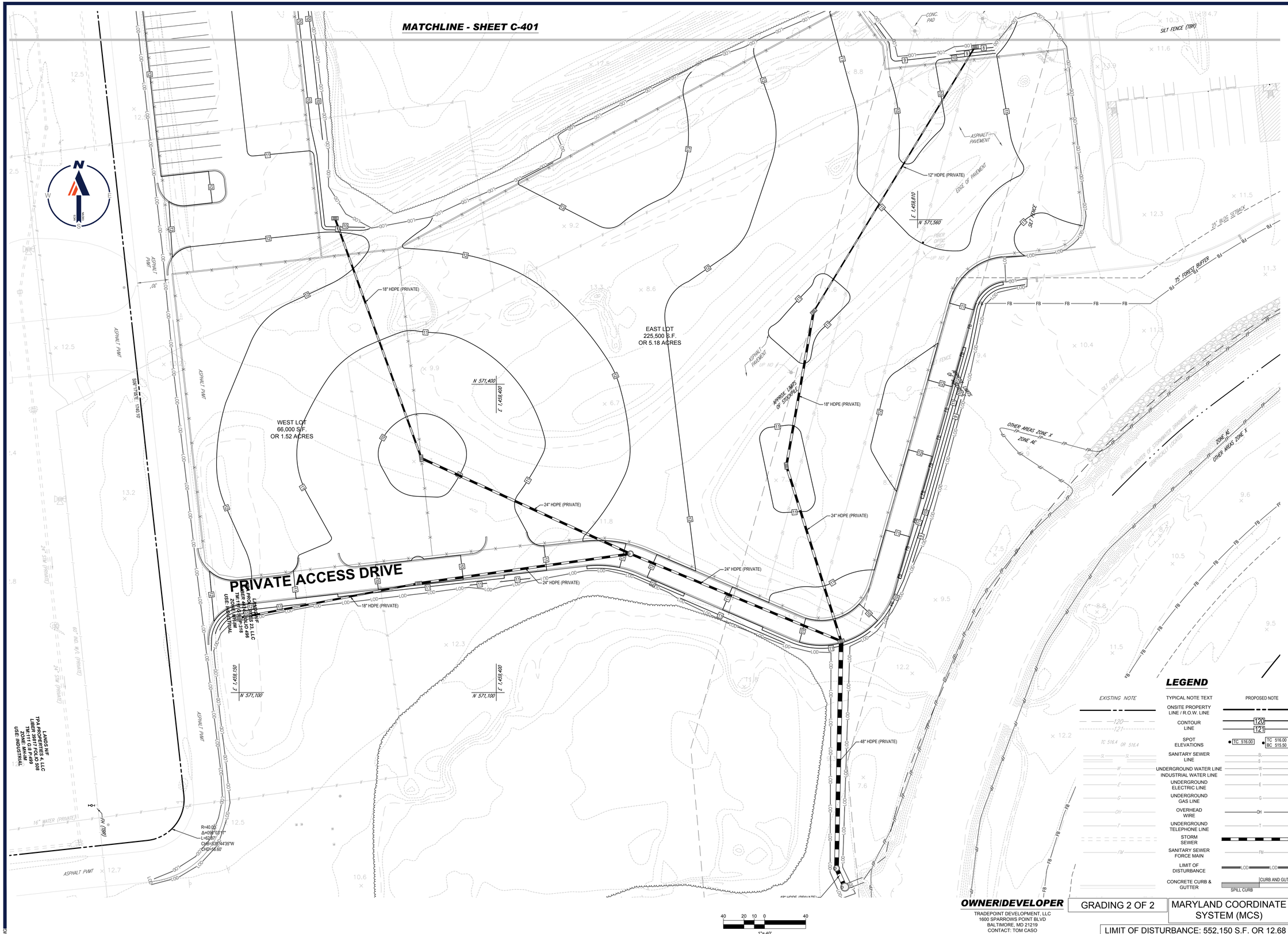
FINAL GRADING PLAN

SHEET NUMBER:

C-401

ORG. DATE - 12/03/21

H:\16\MD\16206658\CAD\DRAWINGS\PLAN SETS\CONSTRUCTION DOCUMENTS\MD16206658 - SITE - 0 - LAYOUT C-401 - FINAL GRADING
MCS



LEGEND

EXISTING NOTE	TYPICAL NOTE TEXT	PROPOSED NOTE
	ONSITE PROPERTY LINE / R.O.W. LINE	
120 / 121	CONTOUR LINE	120 / 121
TC 516.4 OR 516.4	SPOT ELEVATIONS	TC 516.00 BC 515.50
S	SANITARY SEWER LINE	S
W	UNDERGROUND WATER LINE INDUSTRIAL WATER LINE	W / I
E	UNDERGROUND ELECTRIC LINE	E
G	UNDERGROUND GAS LINE	G
OH	OVERHEAD WIRE	OH
T	UNDERGROUND TELEPHONE LINE	T
	STORM SEWER	
FM	SANITARY SEWER FORCE MAIN	FM
LOD	LIMIT OF DISTURBANCE	LOD
	CONCRETE CURB & GUTTER	CURB AND GUTTER / SPILL CURB

OWNER/DEVELOPER
TRADEPOINT DEVELOPMENT, LLC
1600 SPARROWS POINT BLVD
BALTIMORE, MD 21219
CONTACT: TOM CASO
PHONE: 410-382-6667

GRADING 2 OF 2

MARYLAND COORDINATE SYSTEM (MCS)

LIMIT OF DISTURBANCE: 552,150 S.F. OR 12.68 AC.

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
STORMWATER DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	MD16206658
DRAWN BY:	MJG
CHECKED BY:	MJG
DATE:	12/03/21
CAD I.D.:	MD16206658 - SITE - 0

PROJECT:

ALL-STATE LOT

FOR

TRADEPOINT ATLANTIC

BETHLEHEM BOULEVARD
AT COLD MILL ROAD
BALTIMORE, MD 21219
TM 111, GRID 14, PARCEL 318
ELECTION DISTRICT 15
COUNCILMANIC DISTRICT 7
BALTIMORE COUNTY

BOHLER
901 DULANEY VALLEY ROAD, SUITE 801
TOWSON, MARYLAND 21204
Phone: (410) 821-7900
Fax: (410) 821-7987
MD@BohlerEng.com

M.J. GESELL
PROFESSIONAL ENGINEER
MARYLAND LICENSE No. 44097
PROFESSIONAL CERTIFICATION
I, MICHAEL J. GESELL, HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 44097, EXPIRATION DATE: 6/9/23

SHEET TITLE:

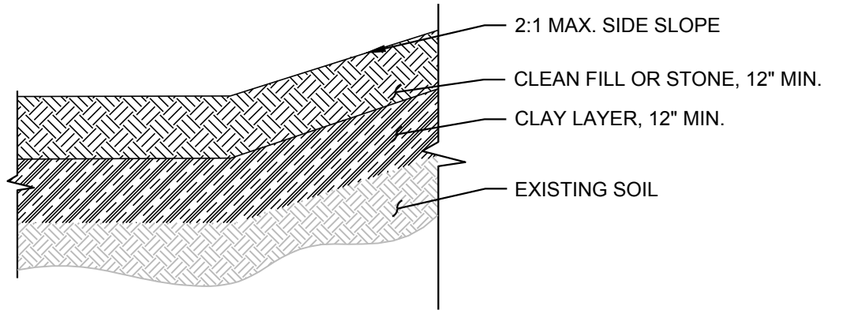
FINAL GRADING PLAN

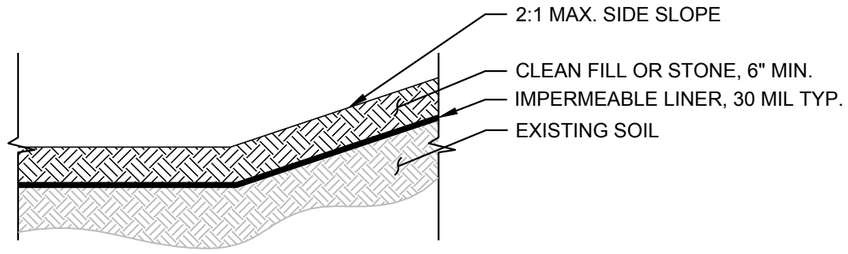
SHEET NUMBER:

C-402

ORG. DATE - 12/03/21

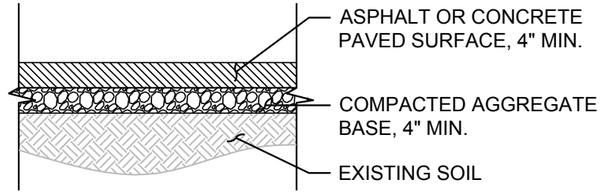
APPENDIX F



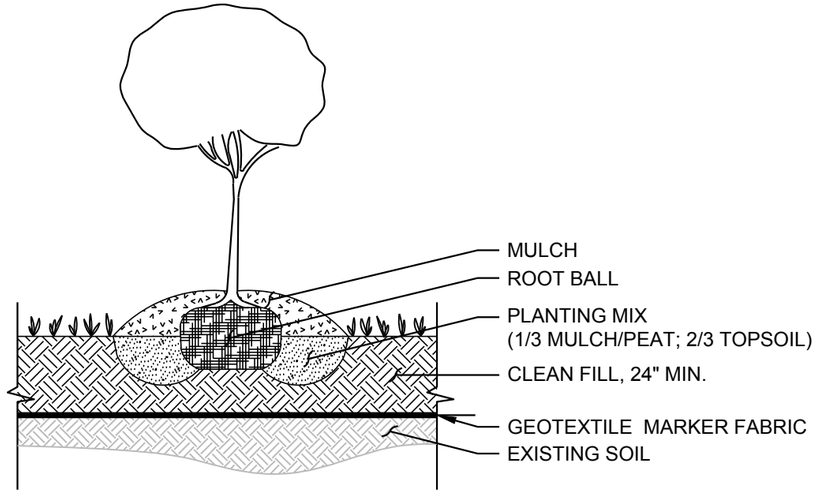


TYPICAL POND SECTIONS
NOT TO SCALE

TYPICAL LANDSCAPE SECTION
NOT TO SCALE



TYPICAL PAVING SECTION
NOT TO SCALE



TYPICAL PLANTING SECTION
NOT TO SCALE

GEOTEXTILE MARKER FABRIC SPECIFICATIONS

THE GEOTEXTILE MARKER FABRIC SHALL BE A NONWOVEN PERVIOUS SHEET OF POLYPROPYLENE MATERIAL. ADD STABILIZERS AND/OR INHIBITORS TO THE BASE MATERIAL, AS NEEDED, TO MAKE THE FILAMENTS RESISTANT TO DETERIORATION BY ULTRAVIOLET LIGHT, OXIDATION AND HEAT EXPOSURE. REGRIND MATERIAL, WHICH CONSISTS OF EDGE TRIMMINGS AND OTHER SCRAPS THAT HAVE NEVER REACHED THE CONSUMER, MAY BE USED TO PRODUCE THE GEOTEXTILE. POST-CONSUMER RECYCLED MATERIAL MAY BE USED. GEOTEXTILE SHALL BE FORMED INTO A NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING THE EDGES. GEOTEXTILES SHALL MEET THE REQUIREMENTS SPECIFIED IN TABLE 1. WHERE APPLICABLE, TABLE 1 PROPERTY VALUES REPRESENT THE MINIMUM AVERAGE ROLL VALUES IN THE WEAKEST PRINCIPAL DIRECTION. VALUES FOR APPARENT OPENING SIZE (AOS) REPRESENT MAXIMUM AVERAGE ROLL VALUES

TABLE 1

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120 (534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
			Maximum Opening Size	
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
			Minimum Roll Value	
Permittivity	ASTM D4491	sec^{-1}	1.7	
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	135 (5500)	
			Minimum Test Value	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

ARM Group LLC
Engineers and Scientists

designed RJC
checked TNP
drawn RJC
scale N/A
date 9/8/2020
project no. 160443M

drawing title: MINIMUM CAPPING SECTION DETAILS

project title: SPARROWS POINT TRADEPOINT ATLANTIC

SPARROWS POINT
BALT. COUNTY, MARYLAND

Sheet 1

APPENDIX G

GENERAL NOTES:

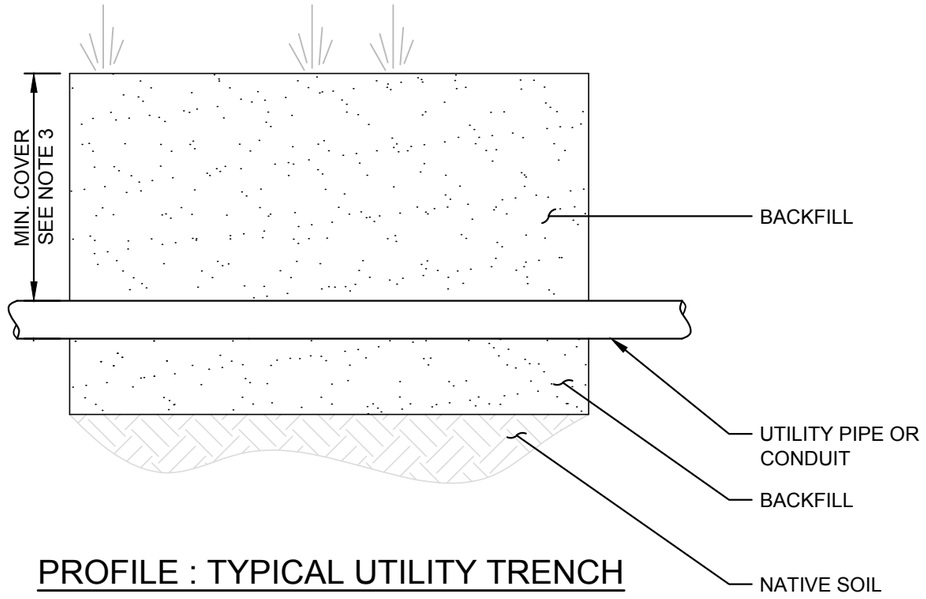
1. ALL PIPES OR CONDUIT SHALL BE LEAK-PROOF AND WATERTIGHT. ALL JOINTS SHALL BE SEALED OR GASKETED.

2. ALL PIPES SHALL BE PROPERLY PLACED AND BEDDED TO PREVENT MISALIGNMENT OR LEAKAGE. PIPE BEDDING SHALL BE INSTALLED IN SUCH A MANNER AS TO MINIMIZE THE POTENTIAL FOR ACCUMULATION OF WATER AND CONCENTRATED INFILTRATION.

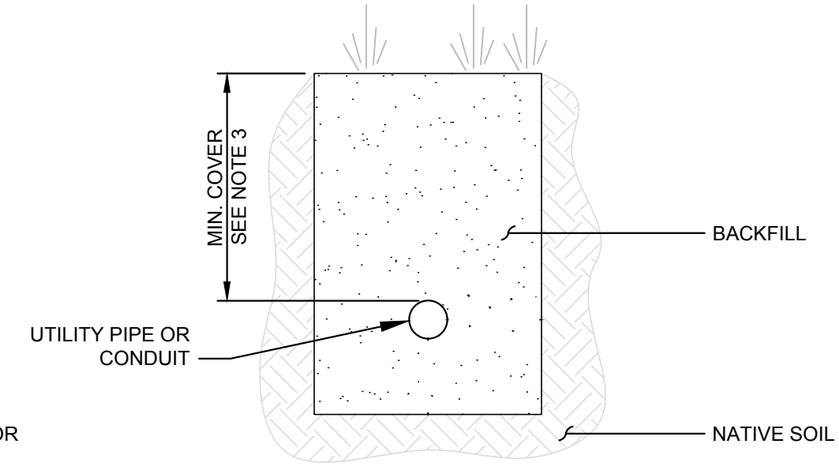
3. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.

4. TRENCHES SHALL BE BACKFILLED WITH BEDDING AND MATERIALS APPROVED BY MDE.

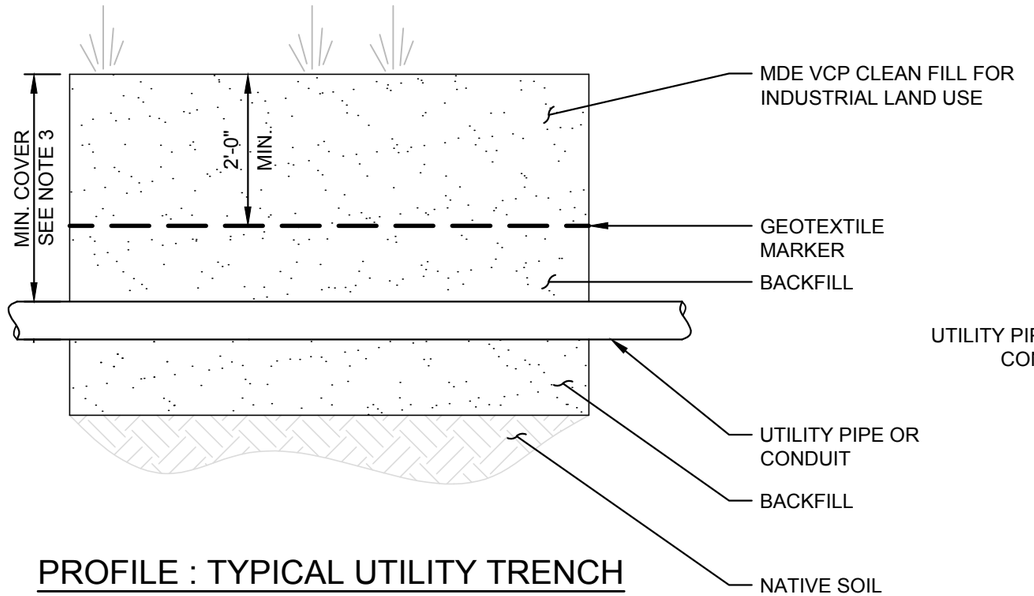
5. FOR ANY UTILITY SEGMENT WHICH GOES THROUGH AN AREA WHICH IS DESIGNATED TO RECEIVE A LANDSCAPED CAP, THE UPPER 2 FEET OF BACKFILL MUST MEET THE REQUIREMENTS OF MDE VCP CLEAN FILL FOR INDUSTRIAL LAND USE. IN THIS CASE THE MDE VCP CLEAN FILL WILL BE UNDERLAIN BY A GEOTEXTILE MARKER FABRIC. UTILITY SEGMENTS WHICH GO THROUGH AREAS WHICH DO NOT REQUIRE CAPPING OR ARE DESIGNATED TO RECEIVED A PAVED CAP WILL BE BACKFILLED WITH MATERIALS APPROVED BY MDE FOR THIS USE.



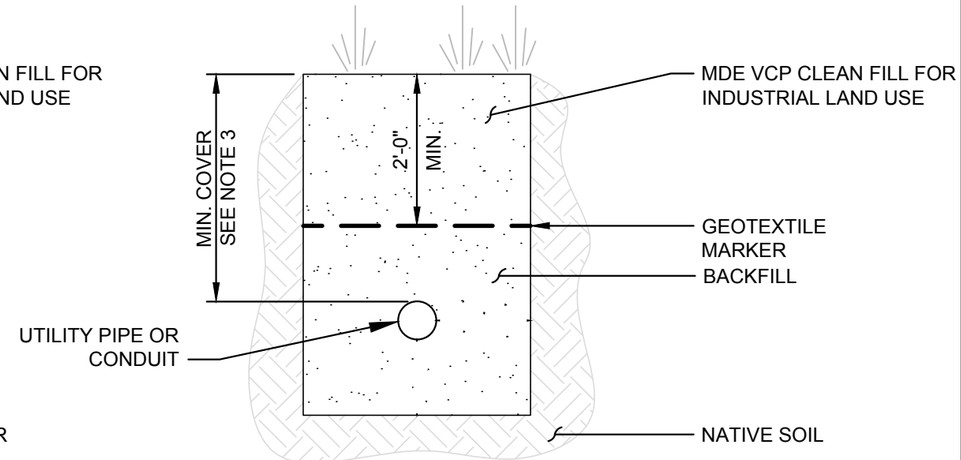
PROFILE : TYPICAL UTILITY TRENCH



SECTION : TYPICAL UTILITY



PROFILE : TYPICAL UTILITY TRENCH
(SEE NOTE 5)



SECTION : TYPICAL UTILITY
(SEE NOTE 5)

ARM Group LLC
Engineers and Scientists

TYPICAL UTILITY
CROSS SECTIONS
Sparrows Point Site
Tradepoint Atlantic

September 2020
1/2" = 1'-0"
160443M

Figure
1

APPENDIX H

Utility Excavation NAPL Contingency Plan

Revision 4 – June 19, 2017

Introduction:

Proposed underground utilities and excavations necessary for the redevelopment of the Tradepoint Atlantic property may encounter areas of petroleum and/or Oil & Grease contamination in soil. The assessment of total petroleum hydrocarbons (TPH) diesel range organics (DRO), gasoline range organics (GRO), Oil & Grease, and/or non-aqueous phase liquid (NAPL) completed as part of each Phase II Investigation includes the following:

- Each soil boring with evidence of NAPL (i.e., containing a sheen or free oil in the soil core), whether located near utilities or not, is investigated via the installation of a piezometer to assess mobility to groundwater. If measureable NAPL is present in the initial piezometer, additional soil borings and shallow temporary piezometers are installed surrounding the initial detection to delineate the impacts. Each piezometer installed to delineate the presence or absence of NAPL is checked with an oil-water interface probe immediately after installation, 48 hours after installation, and at least 30 days after installation.
- TPH-DRO/GRO and Oil & Grease data, once received, are assessed in their magnitude and location respective to subsurface utilities, stormwater conveyances, and surface waters.
- Locations that exhibit elevated detections of TPH/Oil & Grease or evidence of NAPL, that are within reasonable proximity (i.e. 25 feet) to subsurface utilities or stormwater conveyances and/or within reasonable proximity (i.e. 100 feet) to surface waters, are identified for further delineation and selective removal (if warranted).

Any NAPL identified in soil borings or piezometers during the Phase II Investigation would be noted on relevant logs and identified in Response and Development Work Plans for construction planning purposes. Despite these planning efforts, unidentified pockets of contamination (including NAPL) may still be encountered during construction. This contingency plan provides the procedures to be utilized during construction work to properly address response and construction techniques if any materials impacted with NAPL are encountered.

Objectives:

The purpose of this plan is to describe procedures to be followed in the event that NAPL is encountered in utility trenches or other excavations during development of the Tradepoint Atlantic property. The specific objectives of this plan and the procedures outlined herein are:

1. To ensure identification and proper management of Oil & Grease and petroleum-contaminated soils.
2. To ensure proper worker protection for working in areas of Oil & Grease and petroleum contamination.
3. To ensure that the installation of new utilities does not create new preferential flow paths for the migration of free-phase hydrocarbons (Oil & Grease, TPH-DRO/GRO, etc.) or soil vapors.

Identification of Oil & Grease and Petroleum Contaminated Soil:

An Environmental Professional (EP) will be on-site to determine if soils show evidence of the presence of Oil & Grease or TPH present as NAPL during installation of utility trenches or other excavation activities completed during development. Oil & Grease or petroleum-contaminated soils can be identified by the presence of free oil, oil staining, a petroleum odor, or any combination of these conditions. Free oil (NAPL) is liquid oil which could potentially be drained or otherwise extracted from the soil, and is the focus of this contingency plan, although severe staining accompanied by odors should be addressed via the same contingency measures provided herein (based on the judgement of the EP). The appearance of oil staining is not always consistent, but varies depending on the nature of the oil, the soil type, and the age of the release. Staining associated with old petroleum contamination often has a greenish hue, but may also be brown or black. The olfactory sense is the most sensitive instrument for identifying petroleum contamination in the field. Therefore, a petroleum odor may be noted although there is no visible sign of oil or staining. In some instances, decaying organic matter can produce an odor similar to petroleum, but this is rare.

If NAPL is encountered during construction, the extent of impacts shall be delineated by excavating trenches or installing four soil borings (two in each direction) perpendicular to the utility alignment or excavation to examine the soil for physical evidence of NAPL. Perpendicular transects will be investigated every 50 feet along the section of the utility trench or excavation where there is physical evidence of NAPL. Each transect will extend to a distance of 10 feet from the edge of the utility trench or excavation. This represents the maximum distance which would require mandatory excavation to mitigate potential migration risks (see below).

NAPL delineation will be guided primarily by screening observations from the perpendicular borings or trenches, and samples will be collected to test for extractable Oil & Grease or petroleum-contaminated soil using the Oil Sticks™ test kit. This test kit provides a determination of whether hydrocarbons are present in soil and extractable (i.e. could mobilize as a NAPL). Oil Sticks™ change from a pale blue to a deep blue color when they come in contact with free product. This instantaneous change in color occurs even when miniscule amounts of product come in contact with the strip. The sensitivity of Oil Sticks™ to determine the presence/absence of oil is reported by the manufacturer to be about 1,000 to 2,000 mg/kg. The

field test is performed by placing approximately 3 tablespoons of soil in a clean sample cup and adding enough water to cover the sample. After stirring the sample and waiting ~1 minute, the Oil Sticks™ test strip should be swished through the water, making sure to touch the strip to the sides of the cup where product may collect at the interface (meniscus) between the cup, water, and air. If the strip turns deep blue, or deep blue spots appear, oil or hydrocarbon is present. However, the MDE has observed that the Oil Sticks™ method may produce inconsistent results. Therefore, documentation of all screening methods is necessary during boring/trenching work. This documentation shall include an accurate record of visual and olfactory screening, along with a narrative with photographs. Field screening will be aided by photoionization detector (PID) results, and Oil Sticks™ samples should be biased to target elevated PID readings, if any. The agencies have requested that all soil samples prepared for the Oil Sticks™ field test be photographed for evidence of sheen/residue on the cup sides. Detailed records are required to be submitted with the project-specific Completion Report.

If petroleum or Oil & Grease impacts are identified in Site soils based on use of the Oil Sticks™ test kit or other field screening methods, disposal requirements will be determined using the quantitative PetroFLAG™ hydrocarbon analysis system or fixed laboratory analysis (see following section). The PetroFLAG™ hydrocarbon analysis system is a broad spectrum field test kit suitable for TPH contamination regardless of the source or state of degradation (Dexsil Corporation). PetroFLAG™ field test kits do not distinguish between aromatic and aliphatic hydrocarbons, but quantify all fuels, oils, and greases as TPH. Dilutions can be used to determine concentrations of TPH/Oil & Grease above the normal calibration range. Dexsil notes that positive results for TPH may occur if naturally occurring waxes and oils, such as vegetable oils, are present in the sample. Additional detail regarding the procedure for the PetroFLAG™ kit is given in **Attachment 1**.

Soil Excavation, Staging, Sampling and Disposal:

The EP will monitor all utility trenching and excavation activities for signs of potential contamination. In particular, soils will be monitored with a hand-held PID for potential VOCs, and will also be visually inspected for the presence of staining, petroleum waste materials, or other indications of NAPL contamination that may be different than what was already characterized. Excavated material that is visibly stained or that exhibits a sustained PID reading of greater than 10 ppm will be segregated and containerized or placed in a stockpile on polyethylene or impervious surface until the material can be analyzed using the PetroFLAG™ test kit to characterize the material for appropriate disposal. If a PetroFLAG™ test kit is not available to the contractor, or if the contractor prefers to use fixed laboratory analysis, samples may be characterized via submittal to a laboratory for TPH/Oil & Grease analysis. However, any excavated material containing NAPL (i.e., containing free oil) cannot be characterized for waste disposal using the PetroFLAG™ test kit and must instead be characterized via fixed laboratory analysis, as described in the final paragraph of this section. In addition, any hydrocarbon contaminated soil discovered during construction activities that was not previously

characterized must also be analyzed for PCBs prior to removal and transport to an appropriate disposal facility. If excavated and stockpiled, such materials will be covered with a plastic tarp so that the entire stockpile is encapsulated, and anchored to prevent the elements from affecting the integrity of the containment. The MDE will be notified if such materials are encountered during utility work.

Soil exhibiting physical evidence of NAPL contamination or elevated TPH/Oil & Grease with detections in the low percentage range, which is located within 10 feet of a proposed new utility or subsurface structure (i.e., foundation, sump, electrical vault, underground tank, etc.), will be excavated and segregated for disposal at the on-site nonhazardous landfill (Greys Landfill) or an off-site facility pending the completion of any required PCB analytical testing. Impacted soil which is located greater than 10 feet away from the proposed utility or subsurface structure may be left in place and undisturbed. The extent of the excavation will be determined in the field following visual/olfactory screening supplemented by the PID and Oil Sticks™ test kit, but soil disposal requirements will be determined with the PetroFLAG™ test kit (since the Oil Sticks™ method is not quantitative) or via fixed laboratory analysis for TPH/Oil & Grease (if preferred by the contractor or if the PetroFLAG™ test kit is unavailable to the contractor).

Any recovered NAPL will be collected for off-site disposal. As required by the appropriate and MDE approved facility, samples impacted by NAPL (i.e., containing free oil) will be collected for profiling/waste characterization and submitted to a fixed laboratory, as mentioned above, for the following analyses: metals, VOCs, TPH-DRO/GRO, and/or additional analysis required by the selected disposal facility. Upon receipt of any additional characterization analytical results, the MDE will be notified of the proposed disposal facility. Non-impacted material with no evidence of NAPL (i.e. soils that may contain measureable concentrations of TPH/Oil & Grease but below percentage levels) may be placed on the Site in areas to be paved or capped as long as all other requirements specified in the Response and Development Work Plan (or similar governing document) are met.

Initial Reporting:

If evidence of NAPL in soil or groundwater is encountered during excavation, it will be reported to the MDE within two hours. Information regarding the location and characteristics of any NAPL contaminated soil will be documented as follows:

- Location (exact stationing);
- Extent of contamination (horizontally and vertically – prepare a sketch including dimensions);
- Relative degree of contamination (i.e. free oil with strong odor vs. staining); and
- Visual documentation (take photographs and complete a photograph log)

Utility Installations in Impacted Areas:

Underground piping or conduits installed through areas of Oil & Grease or petroleum contamination shall be leak proof and water tight. All joints will be adequately sealed or gasketed, and pipes or conduits will be properly bedded and placed to prevent leakage. All trench backfill will meet the MDE definition of clean fill, or otherwise be approved by the MDE. Pipe bedding will be installed to minimize the potential for accumulation of water and concentrated infiltration. This can be achieved by using a relatively small amount of low-permeability pipe bedding; open-graded stone will be avoided or only used in thicknesses of 6 inches or less. Bedding must be properly placed and compacted below the haunches of the pipe. Clay, flowable fill, or concrete plugs will be placed every 100 feet across any permeable bedding to minimize the preferential flow and concentration of water along the bedding of such utilities.

If required, each trench plug will be constructed with a 2-foot-thick clay plug or 1-foot-thick flowable fill or concrete plug, perpendicular to the pipe, which extends at least 1 foot in all directions beyond the permeable pipe bedding. The plug acts as an anti-seep collar, and will extend above the top of the pipe. Installation of each trench plug will follow the completion of the trench excavation, installation of granular pipe bedding (because dense-graded aggregate or soil or other pipe bedding is difficult to properly compact below the haunches of the pipe), and seating of the pipe. The trench plug will then be installed by digging out a 1-foot trench below and around the pipe corridor, and placing clay, flowable fill, or concrete to construct the plug. A specification drawing for installation of the trench plug has been provided as **Figure 1**.

Attachment 1 - PetroFLAG™ Procedure

PetroFLAG™ field test kits use a proprietary turbidimetric reaction to determine the TPH concentration of solvent extracted samples (USEPA). Calibration standards provided with the unit are used to perform a two-point calibration for the PetroFLAG™. A blank and a 1,000 ppm standard are run by the analyzer unit to create an internal calibration curve.

Analysis of a soil sample is performed using three simple steps: extraction, filtration, and analysis. The PetroFLAG™ analysis is performed as follows:

- Place a 10 gram soil sample in a test tube.
- Add extraction solvent to the tube.
- Shake the tube intermittently for four minutes.
- Filter the extract into a vial that contains development solution
- Allow the solution to react for 10 minutes.

The filtration step is important because the PetroFLAG™ analyzer measures the turbidity or "optical density" of the final solution. Approximately 25 samples can be analyzed per hour. The vial of developed solution is placed in the meter, and the instrument produces a quantitative reading that reveals the concentration of hydrocarbons in the soil sample. The PetroFLAG™ method quantifies all fuels, oils, and greases as TPH between 15 and 2000 ppm (Dexsil Corporation). A 10x dilution of the filtered extraction solvent will be completed to allow for quantification of soil concentrations in excess of 10,000 ppm. The specially designed PetroFLAG™ analyzer allows the user to select, in the field, the response factor that is appropriate for the suspected contaminant at each site. Vegetable-based oils have been shown to exhibit a response factor of 18% (EPA Method 9074). Using the selected response factor, the analyzer compensates for the relative response of each analyte and displays the correct concentration in parts per million (ppm).

References:

U.S. Environmental Protection Agency (EPA). Contaminated Site Clean-up Information (Clu-IN): Test Kits. Office of Superfund Remediation and Technology Innovation. http://www.clu-in.net/characterization/technologies/color.cfm

Dexsil Corporation. 2016. PetroFLAG Analyzer System (PF-MTR-01). http://www.dexsil.com/products/detail.php?product_id=23

EPA SW-846 Method Number 9074 - Turbidimetric Screening Procedure for Total Recoverable Hydrocarbons in Soil

GENERAL NOTES:

1. ALL PIPES OR CONDUIT PASSING THROUGH AREAS OF PETROLEUM CONTAMINATION SHALL BE LEAK-PROOF AND WATERTIGHT. ALL JOINTS SHALL BE SEALED OR GASKETED.

2. ALL PIPES SHALL BE PROPERLY PLACED AND BEDDED TO PREVENT MISALIGNMENT OR LEAKAGE. PIPE BEDDING SHALL BE INSTALLED IN SUCH A MANNER AS TO MINIMIZE THE POTENTIAL FOR ACCUMULATION OF WATER AND CONCENTRATED INFILTRATION.

3. ANTI-SEEP COLLARS FROM THE PIPE MANUFACTURER, THAT ARE PRODUCED SPECIFICALLY FOR THE PURPOSE OF PREVENTING SEEPAGE AROUND THE PIPE, ARE ACCEPTABLE IF INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, AND ONLY WITH PRIOR APPROVAL BY TPA.

4. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.

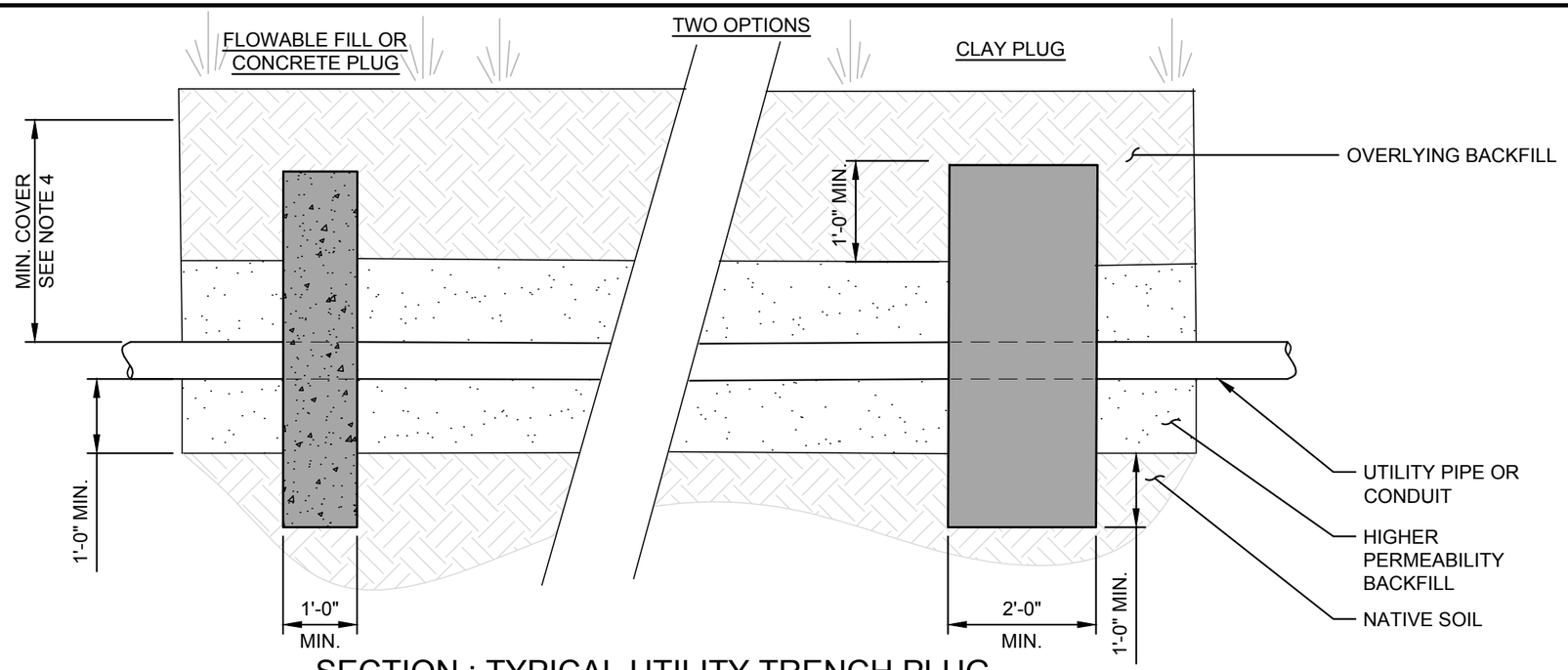
5. TRENCHES SHALL BE BACKFILLED WITH BEDDING AND MATERIALS APPROVED BY MDE.

6. FOR ADDITIONAL REQUIREMENTS, INCLUDING THE USE OF MDE VCP CLEAN FILL FOR INDUSTRIAL LAND USE AND INSTALLATION OF GEOTEXTILE MARKER FABRIC, REFER TO NOTE 5 ON THE TYPICAL UTILITY CROSS SECTIONS.

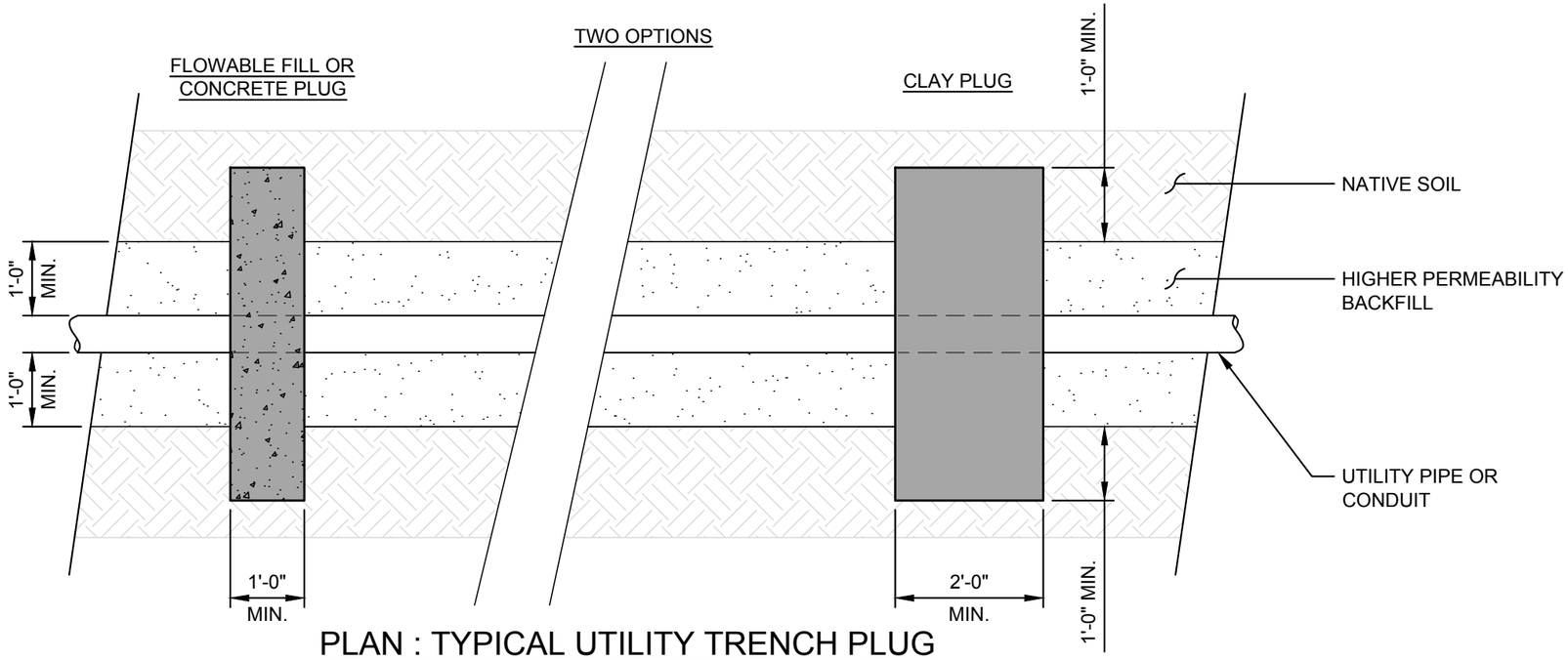
7. ALL UTILITIES INSTALLED THROUGH AREAS CONTAINING NAPL OR ELEVATED CHEMICAL IMPACTS WITH THE POTENTIAL TO TRANSMIT VAPORS ALONG PREFERENTIAL FLOW PATHWAYS SHALL BE EITHER 1) BACKFILLED WITH LOW PERMEABILITY BACKFILL MATERIAL (LESS THAN OR EQUAL TO THE PERMEABILITY OF THE EXISTING SUBGRADE), OR 2) INSTALLED WITH TRENCH PLUGS ALONG THE ALIGNMENT IN ACCORDANCE WITH THE DETAILS SHOWN ON THIS PLAN AND THE FOLLOWING NOTES:

   A.) UTILITY TRENCH PLUGS SHALL BE INSTALLED AT 100-FOOT (MAX.) INTERVALS THROUGH ALL AREAS OF NAPL CONTAMINATION.

   B.) UTILITY TRENCH PLUGS SHALL EXTEND A MINIMUM OF 1-FOOT IN ALL DIRECTIONS BEYOND ANY HIGHER PERMEABILITY BACKFILL MATERIALS (I.E., MATERIALS EXCEEDING THE PERMEABILITY OF THE EXISTING SUBGRADE).



SECTION : TYPICAL UTILITY TRENCH PLUG



PLAN : TYPICAL UTILITY TRENCH PLUG

ARM Group LLC
Engineers and Scientists

UTILITY TRENCH PLUG
Sparrows Point Site
Tradepoint Atlantic

September 2020	Figure
Not to Scale	1
160443M	