

Lead and TPH/Oil & Grease Delineation and Excavation Work Plan

Area A: Sub-Parcel A3-1 Tradepoint Atlantic Sparrows Point, Maryland

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ARM Project 160443M-1

Respectfully Submitted,



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BACKGROUND

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Work Plan to perform delineation and excavation activities associated with borings with elevated lead and total petroleum hydrocarbons (TPH)/Oil & Grease previously identified on a portion of the Tradepoint Atlantic property that has been designated as Area A, Sub-Parcel A3-1. Parcel A3 is approximately 64 acres of the approximately 3,100-acre former steel mill property located in Sparrows Point, Maryland, and is the location of the former Rod and Wire Mill Area. The Development Area (or Site) covered by this Work Plan consists of 54.7 acres designated as Sub-Parcel A3-1, which includes all of the larger Parcel A3 with the exception of 9.3 acres located to the west of Riverside Drive.

Three of the soil borings completed during the Phase II Investigation of Parcel A3 were identified as containing elevated metals warranting additional delineation. Validated results from location RW-021-SB indicated an arsenic concentration in soil of 492 mg/kg in the shallow (0 to 1 foot bgs) sample. A lead concentration of 44,700 mg/kg was identified in the shallow soil sample from location RW-055-SB, and boring RW-052-SB had a concentration of 16,400 mg/kg in a deeper (4 to 5 foot bgs) sample. Based on direct guidance from the Maryland Department of the Environment (MDE) and United States Environmental Protection Agency (USEPA), these boring locations were investigated for elevated levels of arsenic (RW-021-SB) and lead (RW-052-SB and RW-055-SB).

Each of the soil borings completed during the Phase II Investigation of Parcel A3 was analyzed for Oil & Grease. Based on the specific sampling plan targets, select locations were additionally analyzed for TPH diesel range organics (DRO) and TPH gasoline range organics (GRO). The individual validated results were compared to the project action limits (PALs) of 6,200 mg/kg, which were set to a hazard quotient (HQ) of 1. Four shallow samples (RW-025-SB-1, RW-029-SB-1, RW-033-SB-1, and RW-040-SB-1) exceeded the Oil & Grease PAL, with the highest concentration of 14,700 mg/kg in sample RW-029-SB-1. Eight subsurface samples (RW-004-SB-5, RW-010-SB-7, RW-029-SB-7, RW-041-SB-5, RW-045-SB-5, RW-047-SB-6, RW-052-SB-5, and RW-055-SB-5) exceeded the Oil & Grease PAL, with the highest concentration (39,000 mg/kg) also noted in boring RW-029-SB at a depth of 6 to 7 feet bgs. Also, two additional sample locations had visible sheens or non-aqueous phase liquid (NAPL) noted in the soil cores (RW-003-SB and RW-056-SB).

DELINEATION PROCEDURE

Lead Impacts (Completed)

Additional investigation activities were conducted between June 27 and June 29, 2016 to delineate the extent of elevated arsenic and lead concentrations identified in borings RW-021-SB (arsenic), and RW-052-SB and RW-055-SB (lead). Delineation criteria were established for the supplementary investigations for arsenic and lead as 300 mg/kg and 2,000 mg/kg, respectively. Additionally, composite soil samples were collected and analyzed for TCLP metals to characterize the soil for proper disposal in a hazardous or nonhazardous landfill.

Following the identification of all utilities in the study area, a track-mounted Geoprobe[®] direct push rig was utilized to collect continuous core soil samples based on a grid interval of 25 feet; which was centered on each of the elevated soil locations. At each location, continuous core soil samples were collected to a depth of up to 10 feet bgs and screened with a hand-held X-ray fluorescence (XRF) instrument; which provided real-time results for arsenic and lead in soil. The field operator screened each 1-foot interval of the soil core and recorded the readings for arsenic/lead. Calibration of the XRF is performed in the factory, but calibration checks were completed in the field at the start of each testing period using a calibration clip and NIST Standard 2709a. The sampling grid was adjusted in the field based on the real-time detections reported by the XRF. After soil core screening had been concluded at a location, each hole was backfilled with bentonite chips, and down-hole soil sampling equipment was decontaminated according to procedures specified in the Quality Assurance Project Plan (QAPP) for the Tradepoint Atlantic property dated April 5, 2016.

The first location to be completed for each delineation activity corresponded to the sample location collected during the Phase II Investigation (RW-021-SB, RW-052-SB, or RW-055-SB). Once a level below the delineation criterion for arsenic (300 mg/kg) and/or lead (2,000 mg/kg) was identified surrounding the initial location, the delineation was deemed to be complete. **Table 1** presents the results of the arsenic and lead concentrations recorded with the XRF instrument. The location of each completed soil boring was recorded using a hand-held GPS unit, and each location is provided on **Figure 1** and **Figure 2**. These figures show the lateral extent of the soil concentrations above the delineation levels at any sample depth.

During delineation, composite soil samples were collected from each delineation area and sent to the laboratory for analysis of TCLP metals. **Table 3** presents the results of the TCLP analysis. None of the composite samples exceeded the TCLP regulatory thresholds. Thus it is not anticipated that any material would require management under hazardous waste regulations following excavation.

TPH-DRO/GRO Impacts (Proposed)

The agencies have previously stated that TPH/Oil & Grease detections in excess of 6,200 mg/kg must either be delineated for excavation or assessed in a detailed manner relative to the development plan (plotted in comparison to all utilities and water conveyance systems) as well as evaluated for characteristics and mobility. In addition, the agencies have stated that locations with concentrations in the low percent range are best considered as excavation locations. Based on these objectives, the focus of the investigation of TPH/Oil & Grease impacted soil areas will be on proposed new utilities, or areas with concentrations in the low percent range.

Each boring with TPH/Oil & Grease PAL exceedances in soil, as well as each boring where visible product had been observed in the soil cores, was plotted on the site development plan for Sub-Parcel A3-1. Each location was evaluated for proximity to proposed new utilities, and if these utilities were within 25 feet, further delineation is proposed to determine the extent of any subsequent excavation. In the case of Sub-Parcel A3-1, only RW-025-SB was located within 25 feet of proposed utilities (as shown on **Figure 3**) thus warranting additional delineation. Furthermore, location RW-029-SB is also proposed for additional delineation based on the magnitude of the Oil & Grease exceedances at this location in conjunction with the observation of possible NAPL in the soil core.

Following the identification of all existing utilities in the study area, a track-mounted Geoprobe[®] direct push rig will be utilized to collect continuous core soil samples based on a grid interval of 25 feet; centered on each of the elevated soil locations. Proposed delineation grids for RW-025-SB and RW-029-SB are shown in **Figure 4** and **Figure 5**, respectively. At each location, continuous core soil samples will be collected to a depth of up to 10 feet bgs and visually screened for evidence of NAPL in the soil cores. Since the purpose of the delineation is to assess the presence and potential mobility of product that might migrate along preferential pathways, temporary piezometers would be installed in any borings that indicate NAPL in the soil to assess the potential mobility in groundwater.

The field operator will also collect analytical samples to be analyzed for TPH-DRO/GRO via USEPA Methods 8015B and 8015D and Oil & Grease via USEPA Method 9071 to determine the extent of exceedances above the PAL of 6,200 mg/kg. No samples will be collected from soil core intervals where potential NAPL is noted; locations with NAPL will be investigated by the installation of temporary piezometers. Regarding soil sampling depth, a shallow sample will be collected from the 0 to 1 foot depth interval, and a deeper sample will be collected from the 4 to 5 foot depth interval. One additional set of samples will also be collected and analyzed from the 9 to 10 foot depth interval if groundwater has not been encountered. If a concrete slab or large-diameter slag aggregate layer occupies the 0 to 1 foot bgs sample, the interval may be shifted to the depth of the first observed soil interval. If the PID or other field observations

indicate contamination to exist at a depth greater than 3 feet bgs but less than 9 feet bgs, and is above the water table, the sample from the deeper 4 to 5 foot interval may be shifted to the depth interval indicated by the PID response. It should be noted that no soil samples will be collected from a depth that is below the water table. After soil sampling and screening has been concluded at a location, each hole will be backfilled with bentonite chips, and down-hole soil sampling equipment will be decontaminated according to procedures specified in the QAPP.

This supplemental delineation investigation will be completed once verbal approval is received from the MDE. Additionally, composite soil samples will be collected from each delineation area and analyzed for TCLP VOCs, SVOCs, and metals to characterize the soil for potential disposal at the on-site non-hazardous industrial landfill or off-site at a permitted facility. This investigation will be conducted in accordance with the site-specific HASP for Parcel A3, provided as Appendix A in the approved Work Plan submission (dated September 17, 2015).

EXCAVATION PROCEDURE

Lead Impacts

For lead, the arithmetic mean concentrations for surface soil and subsurface soil for each Exposure Unit (EU; identified as areas inside and outside of the future building footprint) were compared to the applicable RSL (800 mg/kg) as an initial screening of each EU. If a mean concentration exceeded the RSL, the mean values were compared to calculated Adult Lead Model (ALM Version date 8/2/2016) values with inputs of 1.7 for the geometric standard deviation and a blood baseline lead level of 0.7 ug/dL. The ALM calculation generates a soil lead concentration of 2,737 mg/kg, which is the most conservative (i.e., lowest) concentration which would yield a probability of 5% of a blood lead concentration of 10 ug/dL. The arithmetic mean concentration of lead exceeded the RSL of 800 mg/kg in the shallow soils from within the future building footprint (**Table 2**), prior to any additional delineation activities. However, the average lead concentration (1,868 mg/kg) did not exceed the acceptable threshold of 2,737 mg/kg (the lowest concentration calculated by the Adult Lead Model) to identify the EU as no further action. None of the average lead values (pre- or post-delineation) exceeded 2,737 mg/kg.

Since the observed average lead concentrations are all below 2,737 mg/kg, no additional action would be required to mitigate the potential for Composite Worker risk. However, two detections of lead exceeded 10,000 mg/kg, warranting additional assessment and consideration for excavation (RW-055-SB-1 with 44,700 mg/kg and RW-052-SB-5 with 16,400 mg/kg). Results from the ALM analysis indicated that excavation and removal of lead contaminated media from 0 to 2 feet bgs in excess of the action level (10,000 mg/kg) will ensure that environmental capping for Sub-Parcel A3-1, along with the institutional controls, will be protective of future site workers.

Excavation of soil with lead impacts will be overseen by a full-time Environmental Professional. Excavations will be completed within each defined delineation area to remove lead impacts above 10,000 mg/kg down to a depth of 2 feet bgs. The total volume of soil above the lead action level of 10,000 mg/kg in shallow soils was computed to be approximately 710 cubic yards. The proposed excavation areas are indicated on **Figure 6**. Soil from 0 to 2 feet bgs that exceeds the lead cleanup criteria will be removed and disposed of in accordance with relevant regulations. An XRF analysis (SOP No. 23 in the QAPP) will be performed on each 200 square foot area of the excavation sidewalls to confirm the lateral extent of removal to the action level. Since the excavation has a pre-determined depth of 2 feet, an XRF analysis will be required for every 100 linear feet along the perimeter of the excavation. Confirmatory samples will be collected for laboratory analysis from 30% of the XRF screening locations (selected at random). Analytical data will be reviewed to confirm the removal criteria have been achieved prior to backfilling the excavation.

Excavated soil for disposal will be tested at a rate of one sample for every 500 cubic yards for waste characterization analyses (TCLP), for waste determination requirements. The available TCLP data (**Table 3**) may be sufficient if acceptable by the disposal facility. Soil from the excavations will be staged on-site pending TCLP testing to determine if the material must be disposed of in an off-site hazardous landfill or, if non-hazardous, at the on-site landfill (Greys).

TPH-DRO/GRO Impacts

Excavation of soil with TPH/Oil & Grease impacts will be overseen by a full-time Environmental Professional. Excavation will be completed within each defined delineation area to remove TPH/Oil & Grease impacts above 6,200 mg/kg down to the depth of the water table. The total volume of soil above the TPH/Oil & Grease action level of 6,200 mg/kg will be computed and provided to the agencies prior to completion of the proposed excavation activities. The proposed excavation areas will also be indicated on supplemental figures submitted to the agencies for their review. Soil that exceeds the TPH/Oil & Grease action level will be removed and disposed of at the on-site landfill (Greys) if determined to be acceptable with all other requirements. Confirmation soil samples will be collected from each side wall of each excavation (unless limited by concrete), as well as from the bottom of each excavation (unless limited by the water table) at a minimum of one every 2,000 square feet to be analyzed for TPH-DRO/GRO via USEPA Methods 8015B and 8015D and Oil & Grease via USEPA Method 9071. Analytical data will be reviewed to confirm the removal criteria have been achieved prior to backfilling the excavation.

Excavated soil for disposal will be tested at a rate of one sample for every 500 cubic yards for additional waste characterization analyses (TCLP), for waste determination requirements. Soil from the excavations will be staged on-site pending TCLP testing to determine if the material must be disposed of in an off-site hazardous landfill or, if non-hazardous, at the on-site landfill (Greys).

ATTACHMENTS

Figure 1 – RW-021-SB Delineation Arsenic/Lead Results

Figure 2 – RW-052-SB/RW-055-SB Delineation Arsenic/Lead Results

Figure 3 – RW-025-SB Oil & Grease Exceedance

Figure 4 – RW-025-SB Oil & Grease Delineation

Figure 5 – RW-029-SB Oil & Grease Delineation

Figure 6 – RW-052-SB/RW-055-SB Proposed Excavation

Table 1 – Soil Screening XRF Results

Table 2 – Assessment of Lead

Table 3 – Soil Delineation TCLP Results

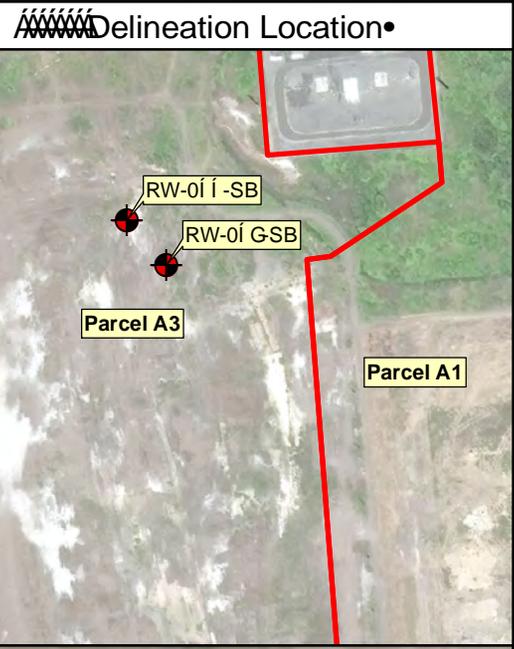
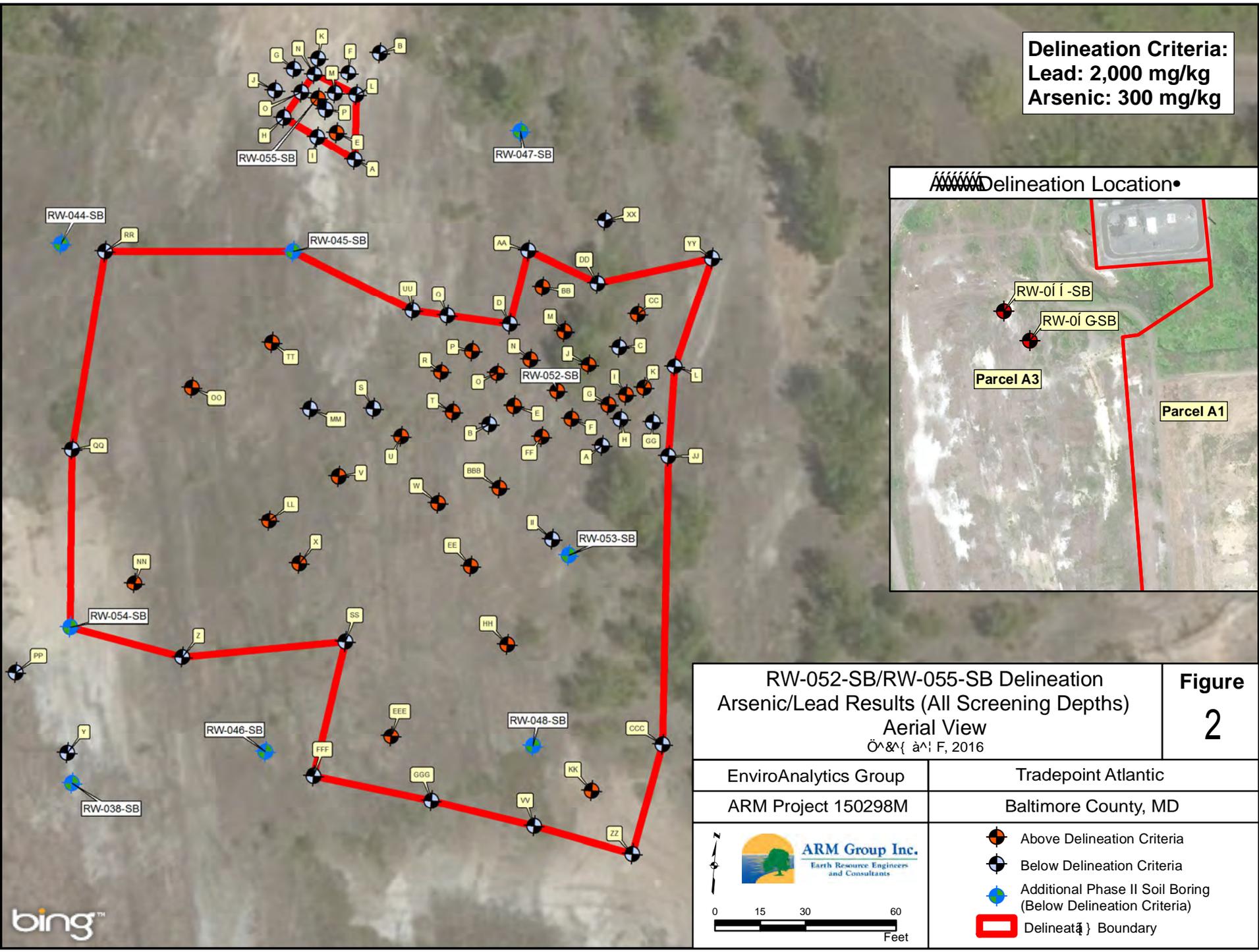
FIGURES

Delineation Criteria:
Lead: 2,000 mg/kg
Arsenic: 300 mg/kg

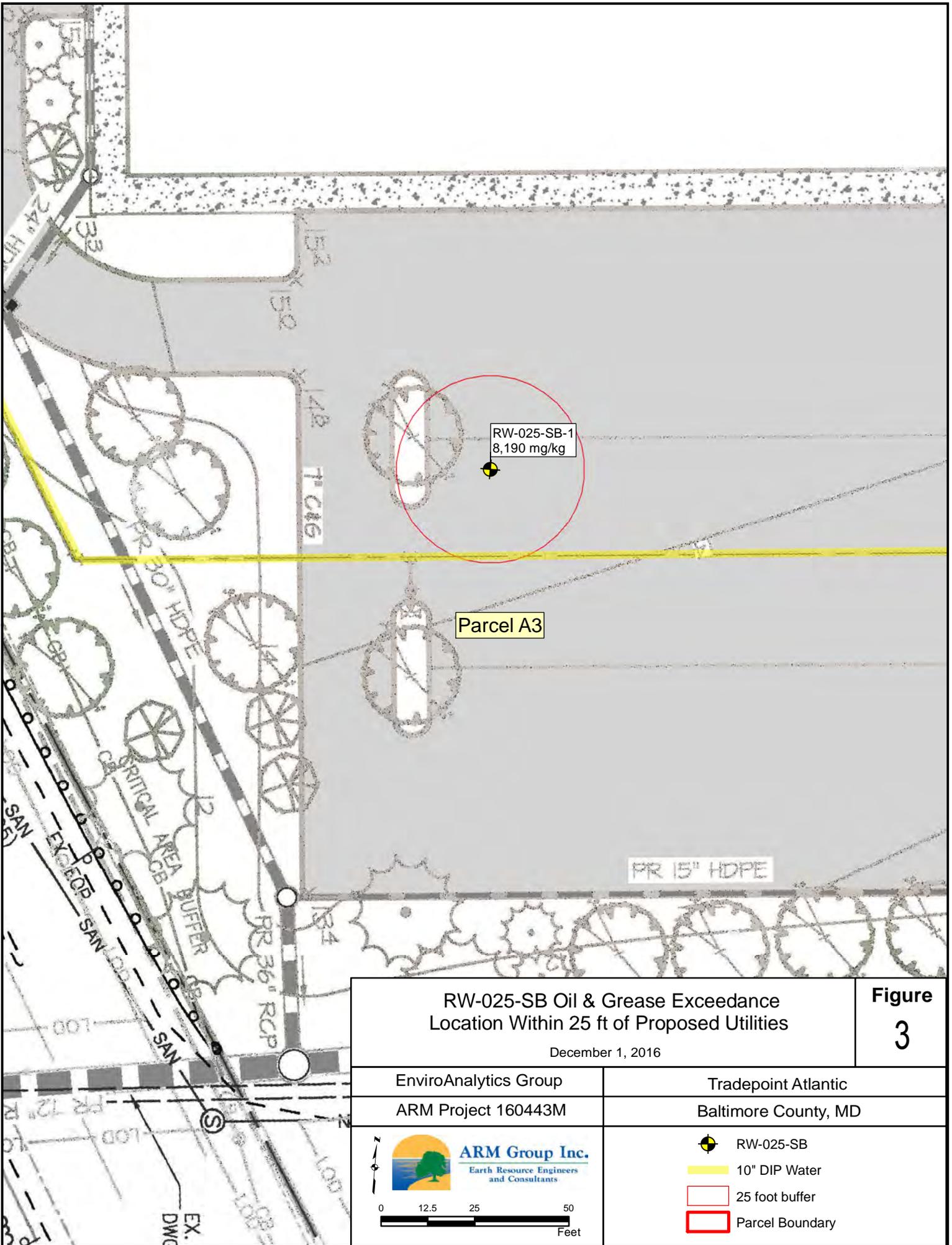


RW-021-SB Delineation Arsenic/Lead Results (All Screening Depths) Aerial View December 4, 2016		Figure 1
EnviroAnalytics Group	Tradepoint Atlantic	
ARM Project 150298M	Baltimore County, MD	
 	<ul style="list-style-type: none">  Above Delineation Criteria  Below Delineation Criteria  Additional Phase II Soil Boring (Below Delineation Criteria)  Delineation Boundary 	

Delineation Criteria:
Lead: 2,000 mg/kg
Arsenic: 300 mg/kg



RW-052-SB/RW-055-SB Delineation Arsenic/Lead Results (All Screening Depths) Aerial View <small>© &copy; F, 2016</small>		Figure 2
EnviroAnalytics Group	Tradepoint Atlantic	
ARM Project 150298M	Baltimore County, MD	
 ARM Group Inc. <small>Earth Resource Engineers and Consultants</small>	<ul style="list-style-type: none"> Above Delineation Criteria Below Delineation Criteria Additional Phase II Soil Boring (Below Delineation Criteria) Delineation Boundary 	



RW-025-SB Oil & Grease Exceedance
Location Within 25 ft of Proposed Utilities

Figure
3

December 1, 2016

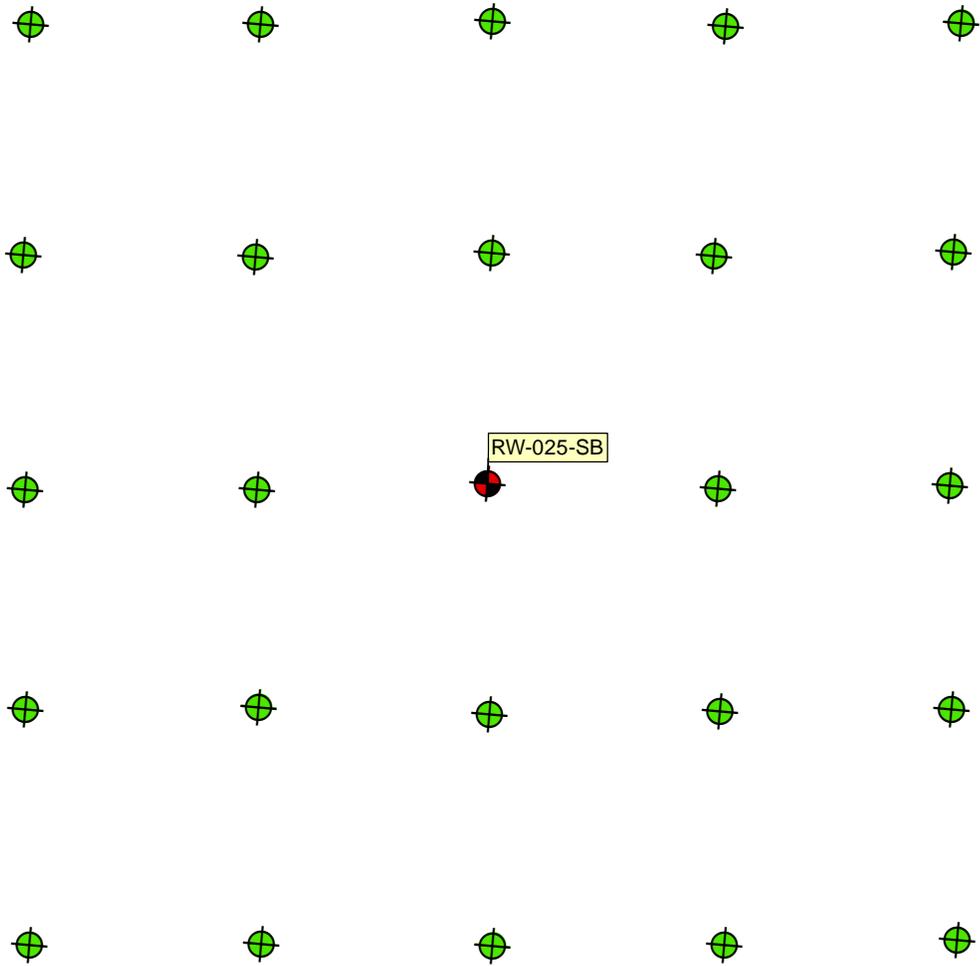
EnviroAnalytics Group
ARM Project 160443M

Tradepoint Atlantic
Baltimore County, MD

ARM Group Inc.
Earth Resource Engineers
and Consultants

0 12.5 25 50
Feet

- RW-025-SB
- 10" DIP Water
- 25 foot buffer
- Parcel Boundary



RW-025-SB Oil & Grease Delineation
Proposed Sample Grid (25-foot Spacing)

December 2, 2016

Figure
4

EnviroAnalytics Group

Tradepoint Atlantic

ARM Project 160443M

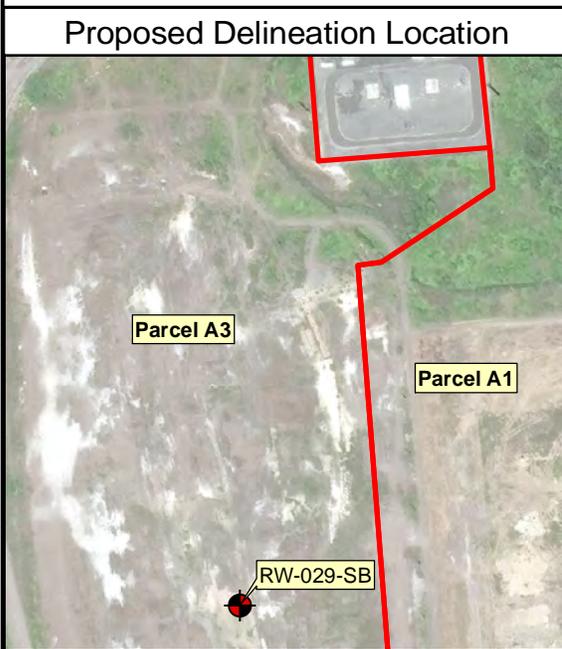
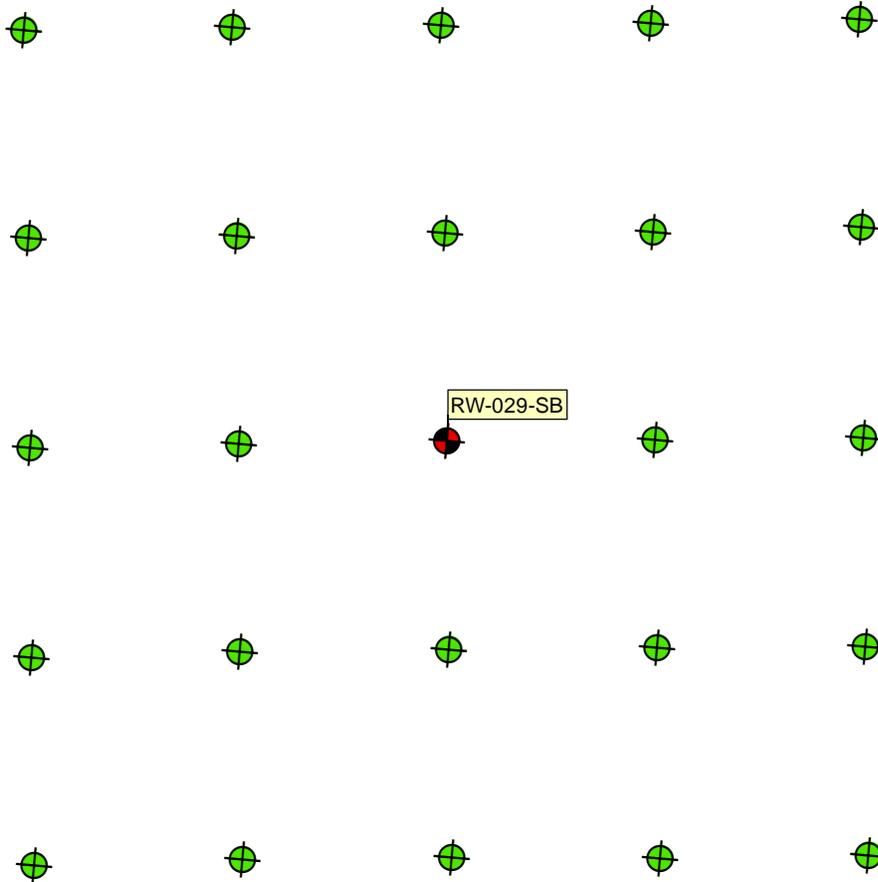
Baltimore County, MD

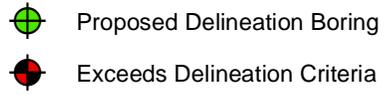
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Earth Resource Engineers
and Consultants

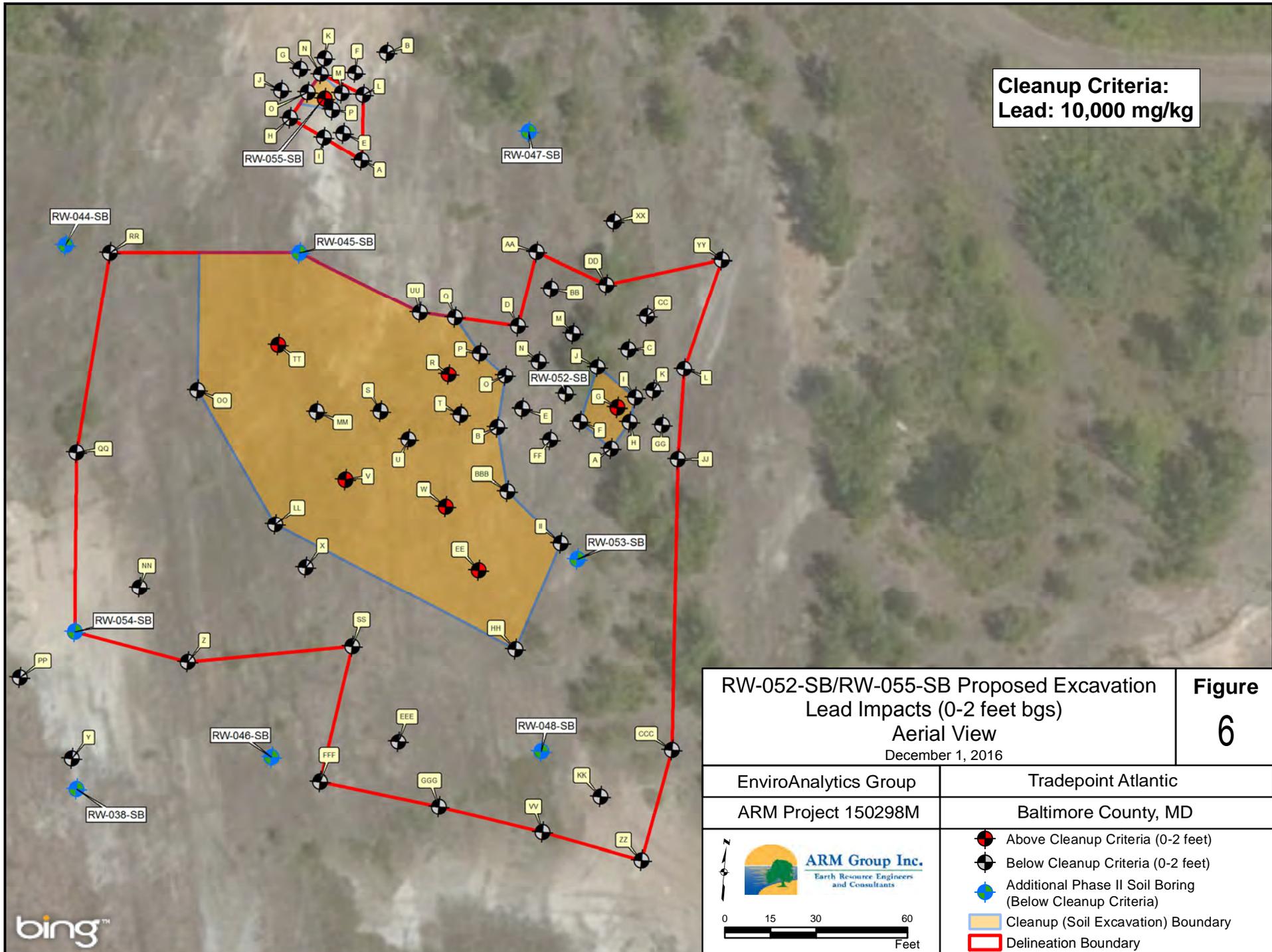
0 5 10 20
Feet

-  Proposed Delineation Boring
-  Exceeds Delineation Criteria

Delineation Criteria Oil & Grease: 6,200 mg/kg



RW-029-SB Oil & Grease Delineation Proposed Sample Grid (25-foot Spacing)		Figure 5
December 2, 2016		
EnviroAnalytics Group	Tradepoint Atlantic	
ARM Project 160443M	Baltimore County, MD	
		
	<small>Delineation Criteria: A <math>A_{1/2}</math> <math>A_{1/4}</math> <math>A_{1/8}</math> <math>A_{1/16}</math> <math>A_{1/32}</math> <math>A_{1/64}</math> <math>A_{1/128}</math> <math>A_{1/256}</math> <math>A_{1/512}</math> <math>A_{1/1024}</math> <math>A_{1/2048}</math> <math>A_{1/4096}</math> <math>A_{1/8192}</math> <math>A_{1/16384}</math> <math>A_{1/32768}</math> <math>A_{1/65536}</math> <math>A_{1/131072}</math> <math>A_{1/262144}</math> <math>A_{1/524288}</math> <math>A_{1/1048576}</math> <math>A_{1/2097152}</math> <math>A_{1/4194304}</math> <math>A_{1/8388608}</math> <math>A_{1/16777216}</math> <math>A_{1/33554432}</math> <math>A_{1/67108864}</math> <math>A_{1/134217728}</math> <math>A_{1/268435456}</math> <math>A_{1/536870912}</math> <math>A_{1/1073741824}</math> <math>A_{1/2147483648}</math> <math>A_{1/4294967296}</math> <math>A_{1/8589934592}</math> <math>A_{1/17179869184}</math> <math>A_{1/34359738368}</math> <math>A_{1/68719476736}</math> 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**Cleanup Criteria:
Lead: 10,000 mg/kg**

**RW-052-SB/RW-055-SB Proposed Excavation
Lead Impacts (0-2 feet bgs)
Aerial View
December 1, 2016**

**Figure
6**

EnviroAnalytics Group
ARM Project 150298M

Tradepoint Atlantic
Baltimore County, MD



ARM Group Inc.
 Earth Resource Engineers
 and Consultants

0 15 30 60
 Feet

-  Above Cleanup Criteria (0-2 feet)
-  Below Cleanup Criteria (0-2 feet)
-  Additional Phase II Soil Boring (Below Cleanup Criteria)
-  Cleanup (Soil Excavation) Boundary
-  Delineation Boundary

TABLES

Table 1A
Soil Screening XRF Results (RW-021-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-021-SB		RW-021A-SB		RW-021B-SB		RW-021C-SB		RW-021D-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	108	45	144	24	78	35	240	86	37	26
2	17	12	76	19	59	154	23	18	99	26
3	39	102	21	10	27	157	19	12	107	54
4	232	41	1,913	71	27	199	15	10	214	186
5	35	28	> 10%	3,890	21	125	16	11	966	177
6			312	28						
7			145	21						
8			231	34						
9			27	11						
10			18	9						

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1A
Soil Screening XRF Results (RW-021-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-021E-SB		RW-021F-SB		RW-021G-SB		RW-021H-SB		RW-021I-SB	
	Lead	Arsenic								
1	58	23	110	25	47	21	1,210	74	1,671	109
2	15	22	154	25	40	62	983	70	31	24
3	66	22	49	18	22	35	780	62	149	25
4	190	23	302	33	49	12	18	13	134	25
5	4,742	133	340	51	55	13	51	14	26	54
6										
7										
8										
9										
10										

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1A
Soil Screening XRF Results (RW-021-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-021J-SB		RW-021K-SB		RW-021L-SB		RW-021M-SB		RW-021N-SB		RW-021O-SB	
	Lead	Arsenic										
1	250	64	17	13	166	71	76	18	130	56	134	25
2	16	55	216	27	17	79	155	70	103	76	734	72
3	80	14	26	14	35	33	202	251	26	21	37	29
4	19	11	16	11	39	30	36	40	1,529	70	4,935	198
5	28	11	261	34	48	18	31	19	76	18	532	98
6												
7												
8												
9												
10												

Highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1A
Soil Screening XRF Results (RW-021-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-021P-SB		RW-021Q-SB		RW-021R-SB		RW-021S-SB		RW-021T-SB		RW-021U-SB	
	Lead	Arsenic										
1	218	32	86	33	65	28	120	33	185	46	110	43
2	199	198	151	34	34	49	447	46	154	36	73	20
3	120	72	44	24	14	11	191	24	350	55	622	47
4	8,903	1,748	119	24	15	11	210	35	168	25	3,907	131
5	35	15	87	17	16	12	33	18	21	12	63	14
6												
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052-SB		RW-052A-SB		RW-052AA-SB		RW-052B-SB		RW-052BB-SB		RW-052BBB-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	41	15	766	42	21	16	216	28	43	24	38	23
2	3,210	105	1,147	46	73	39	131	20	1,038	53	6,792	137
3	Concrete		Concrete		93	16	49	13	21,305	294	47	15
4			660	42	12	10	26	12	49	13	51	16
5	4,413	117	124	47	16	10	Brick/Concrete		17	9	61	18
6							161	36				
7							287	30				
8							227	23				
9							29	13				
10							26	12				

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052C-SB		RW-052CC-SB		RW-052CCC-SB		RW-052D-SB		RW-052DD-SB		RW-052E-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	186	27	27	21	1,996	83	197	26	26	19	67	18
2	1,540	72	79	18	1,169	113	77	15	16	11	223	25
3	540	30	3,347	105	554	41	9	7	621	44	4,670	107
4	1,091	55	500	33	107	23	20	10	11	9	Concrete	
5	1,678	68	488	33	782	42	15	9	15	9	4,444	106
6											21	12
7											16	8
8											16	12
9											23	10
10											45	11

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052EE-SB		RW-052EEE-SB		RW-052F-SB		RW-052FF-SB		RW-052FFF-SB		RW-052G-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	217	39	74	21	28	15	353	31	57	16	1,715	68
2	10,431	197	108	21	63	61	6,647	203	599	37	17,920	254
3	130	19	2,940	118	13,953	197	1,219	70	23	12	5,103	122
4	77	21	11,868	355	6,123	106	3,642	245	24	16	114	22
5	13	9	303	27	7,694	173			10	9	122	22
6					Concrete						66	16
7					107	16						
8					144	29						
9					13	9						
10					12	19						

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052GG-SB		RW-052-GGG		RW-052H-SB		RW-052HH-SB		RW-052I-SB		RW-052II-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	552	111	74	27	1,878	70	30	24	77	21	726	52
2	206	36	1,615	71	130	21	1,330	59	66	16	979	51
3			Concrete		545	47	26,142	317	2,344	88	10	8
4			19	11	749	43	1,321	63	2,658	81	12	9
5			512	51	615	40	596	44	9,271	161	13	9
6									12	9		
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052J-SB		RW-052JJ-SB		RW-052K-SB		RW-052KK-SB		RW-052L-SB		RW-052LL-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	182	37	44	18	223	53	2,890	95	50	24	19	16
2	6,783	37	1,954	99	49	16	82	16	85	17	5,746	130
3	6,366	112			5,013	155	71	15	486	40	4,230	107
4	602	148			2,736	92	25	11	63	18	1,134	49
5					499	37	13	9	65	14	17	10
6												
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
 Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052M-SB		RW-052MM-SB		RW-052N-SB		RW-052NN-SB		RW-052O-SB		RW-052OO-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	271	29	21	13	1,036	52	2,463	81	302	26	23	18
2	3,550	97	1,528	71	375	32	160	26	696	47	2,213	75
3	422	61	229	26	3,372	153	51	13	4,102	95	94	20
4	158	39	970	46	499	35	169	20	1,048	49	39	12
5	27	11	36	14	11	9	133	17	5,277	175	1,513	66
6												
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052P-SB		RW-052PP-SB		RW-052Q-SB		RW-052QQ-SB		RW-052R-SB		RW-052RR-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	157	35	23	17	147	27	1,444	55	33,848	339	129	32
2	107	23	592	35	303	28	173	23	303	33	11	9
3	9,366	193	318	27	Concrete		54	13	440	33	Concrete	
4	151	19	157	20	34	11	66	13	1,966	71	27	11
5	257	26	86	15	25	10	36	11	240	25	36	13
6												
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052S-SB		RW-052SS-SB		RW-052T-SB		RW-052TT-SB		RW-052U-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	22	19	166	25	1,782	72	28	20	168	31
2	51	13	1,365	92	122	22	10,094	193	1,795	68
3	1,474	59	360	35	6,404	126			9,226	161
4	1,979	86	35	14	1,891	70			95	16
5			66	16	895	68			103	16
6										
7										
8										
9										
10										

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052UU-SB		RW-052V-SB		RW-052VV-SB		RW-052W-SB		RW-052X-SB	
Depth (ft)	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	53	24	90	21	117	33	29,761	489	250	33
2	44	15	62,292	606	28	20	276	30	8,153	211
3	21	11	180	24	941	46	207	24	4,842	124
4	15	11	Concrete		577	67	39	10	11,436	255
5	47	14			25	11	11	9	218	23
6										
7										
8										
9										
10										

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1B
Soil Screening XRF Results (RW-052-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-052XX-SB		RW-052Y-SB		RW-052YY-SB		RW-052Z-SB		RW-052ZZ-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	27	18	14	12	257	31	843	48	1,990	212
2	539	54	368	108	150	32	151	20	1,148	57
3	603	151	11	9	57	17	108	17	199	24
4	24	12	18	10	29	17	196	23	204	25
5	17	11	50	13	19	11	93	16	34	14
6										
7										
8										
9										
10										

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1C
Soil Screening XRF Results (RW-055-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-055-SB 6.28.16		RW-055-SB 6.29.16		RW-055A-SB		RW-055B-SB		RW-055E-SB	
	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic	Lead	Arsenic
1	25	19	14	11	250	30	441	47	22	17
2	254	53	881	92	330	39	154	33	414	75
3	3,316	102	2,780	84	26	10	18	10	2,199	88
4	218	22	745	48	10	8	40	14		
5	19	10	335	28	17	9	25	11		
6	44	14			91	27	54	14		
7	45	14			45	13	27	15		
8	30	11			11	10	17	19		
9	61	14			15	10	18	11		
10	660	54			19	9	17	9		

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1C
Soil Screening XRF Results (RW-055-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-055F-SB		RW-055G-SB		RW-055H-SB		RW-055I-SB		RW-055J-SB	
	Lead	Arsenic								
1	18	14	Poor Recovery		226	32	329	45	97	21
2	101	25			13	10	308	41	176	25
3	75	15	27	20	1,181	77	321	31	865	56
4	19	10	1,476	86	111	18	1,693	62	28	10
5	25	11	1,871	69	145	20	24	10	66	15
6			1,136	61						
7			380	32						
8			107	26						
9			44	15						
10			10	8						

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

Table 1C
Soil Screening XRF Results (RW-055-SB)
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

XRF Readings (mg/kg)

Boring ID	RW-055K-SB		RW-055L-SB		RW-055M-SB		RW-055N-SB		RW-055O-SB		RW-055P-SB	
	Lead	Arsenic										
1	191	27	19	16	17	11	20	16	20	16	41	13
2	172	29	52	25	478	36	416	41	311	37	24	11
3	22	11	21	11	1,426	63	1,093	56	113	18	1,446	75
4	12	10	14	9	1,085	77	326	29	57	18	141	157
5	35	12	109	27	21	16	27	12	86	18	23	17
6												
7												
8												
9												
10												

Red highlighted cells indicate lead/arsenic exceedance of delineation criteria
Gray highlighted cells indicate non-detects (reporting XRF detection limit)

**Table 2 - Parcel A3 (RWM)
Development Area
Assessment of Lead**

Exposure Unit	Pre/Post-Delineation	Surface/Sub-Surface	Arithmetic Mean (mg/kg)
Outside Building Footprint (44.74 ac.)	Pre-Delineation	Surface	297
		Sub-Surface	230
	Post-Delineation	Surface	297
		Sub-Surface	230
Inside Building Footprint (19.62 ac.)	Pre-Delineation	Surface	1,868
		Sub-Surface	639
	Post-Delineation	Surface	1,245
		Sub-Surface	395

Adult Lead Model (ALM) Risk Levels	
Soil Concentration (mg/kg)	Probability of Blood Concentration of 10 ug/dL
2,737 mg/kg	5%
3,417 mg/kg	10%

Table 3
Soil Delineation TCLP Results
Parcel A3
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	TCLP Criteria	Sample ID									
			021 Arsenic Waste		021 Lead Waste		052 Waste		055 Waste		RW-055-SB-1	
Arsenic	mg/L	5	0.0038	JB	0.026	JB	0.0092	JB	0.003	JB	0.0093	JB
Barium	mg/L	100	0.8	J	1		0.17	JB	0.2	JB	0.77	J
Cadmium	mg/L	1	0.077		0.31		0.0035	JB	0.05	U	0.00059	JB
Chromium	mg/L	5	0.05	U	0.0012	JB	0.05	U	0.0019	JB	0.011	JB
Lead	mg/L	5	0.92		0.4		0.94		0.014	J	0.25	U
Mercury	mg/L	0.2	0.001	U	0.00008	J	0.001	U	0.001	U	0.001	U
Selenium	mg/L	1	0.011	JB	0.013	JB	0.0047	JB	0.013	JB	0.1	U
Silver	mg/L	5	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U

Detections in bold

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

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.

NA: This parameter was not analyzed for this sample.

There were no exceedances of TCLP criteria in the results above.