



ARM Group LLC

Engineers and Scientists

January 6, 2021

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

Re: Excavation Completion Report
PORI Lagoon
Area B: Parcel B22
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown,

ARM Group LLC (ARM), on behalf of Tradepoint Atlantic, has prepared this Excavation Completion Report for response activities completed inside the former Palm Oil Recovery, Inc. (PORI) Lagoon, located on Parcel B22 on the Tradepoint Atlantic (TPA) property. The location of the PORI Lagoon is presented on **Figure 1**. The response actions were required to remove sediment accumulated in the PORI Lagoon that contained petroleum hydrocarbons and oil & grease that may serve as an ongoing source of contamination to groundwater downgradient of the lagoon.

Project Background

Several investigation phases have been completed in the vicinity of the PORI Lagoon between 2015 and 2020. Reports detailing the findings of these investigations include:

- Sediment Characterization Report for the Tin Mill Canal (Revision 3 dated January 4, 2018);
- Finishing Mills Groundwater Phase II Investigation Report (Revision 0 dated November 30, 2016);
- Parcel B22 Phase II Investigation Report (Revision 1 dated August 8, 2019);
- NAPL Delineation Completion Report and Permanent Well Installation Work Plan (Revision 0 dated December 4, 2019)

Additional investigations were completed as part of the PORI Lagoon Corrective Measures Study. Investigative work included test pitting of the sediment within the lagoon and additional groundwater sampling.

Test pitting was completed to understand the approximate area and volume of the dark, oily sediment within the lagoon. During the test pitting activities, TPA was able to confirm the sidewalls (including sheet piling in certain areas) and the bottom of the lagoon. Test pitting reached either concrete or hard pack bottom and located the invert of the lagoon's inactive outfall. The "lagoon" actually consists of a fairly narrow conveyance channel and is not in fact a "lagoon." The sediment was found to be located within the channel with a bottom width of approximately 12 to 15 feet that is laid out in a U-shape. Soil forming the banks of this channel did not show visual contamination. The depth of the sediment within the lagoon was also investigated through test pitting. A structural hard bottom or a hard compacted soil bottom was observed between 4 and 6 feet below the surface of the contaminated sediment, which coincided with the approximate water table elevation.

The horizontal and vertical extent of the lagoon channel were confirmed and the test pitting illustrated that sediment removal was feasible and the most effective means of source control. Therefore, TPA proceeded with the process of source control through direct removal. Where feasible, excavation extended at least three feet past the original bottom. The area of sediment removal is presented on **Figure 2**.

Excavated Material Handling and Disposal

Excavation of the PORI Lagoon occurred between December 17 and December 23, 2020. Wet sediment from within the lagoon was stockpiled on the lagoon's sidewalls to allow the material to dry prior to transport to the on-site Greys Landfill. To allow for more efficient drying of the material, sediment with higher moisture content was stockpiled above the lagoon's bank. A bermed drying pad was constructed for this material and covered with polyethylene sheeting. Liquids drained from the wet material flowed into the lagoon.

Prior to transporting the material to Greys Landfill, two composite sediment samples were collected from within the lagoon and submitted to Caliber Analytical Services for laboratory testing for TCLP parameters (VOCs, SVOCs, and metals) and PCBs. Each composite sample from the sediment consisted of 10 randomly selected grab aliquots. The analytical laboratory reports are provided as an electronic attachment. The analytical data is presented on **Table 1**. All results indicated that the PORI Lagoon materials were non-hazardous, and thus appropriate for disposal at Greys Landfill.

A total of approximately 800 cubic yards of sediment was removed from the lagoon and transported to Greys Landfill. A photo log of the excavation is included as **Attachment 1**.



Confirmation Sampling

Near the completion of the excavation, confirmation soil samples were collected at nine perimeter locations within the channel that had formerly contained the excavated sediment. Samples were collected from the material in the bank of the lagoon at the approximate water table elevation. The locations of the samples are presented on **Figure 2** and the results of the sampling are presented on **Table 2**. The maximum concentrations of TPH-DRO and Oil & Grease in the confirmation samples are generally an order of magnitude lower than the average levels observed in the samples of accumulated sediments from the pre-excavation test pits. The results for the PAHs were also compared against the health-based criteria established by MDE for the screening of sediments in the Tin Mill Canal. These criteria were the respective USEPA industrial soil Regional Screening Levels (RSLs) set to a hazard index of 10 and a cancer risk of 1×10^{-4} (i.e., Adjusted RSLs). None of the PAH concentrations in the confirmation samples exceeded these adjusted RSL values. The laboratory report for the confirmation samples is also included as an electronic attachment.

Backfilling and subsequent capping of the PORI Lagoon will be completed during future development at the site.

Groundwater Monitoring

A network of monitoring wells will be installed between the former lagoon and the Tin Mill Canal. The proposed monitoring well configuration is presented on **Figure 3**. These wells will be sampled quarterly for four quarters and analyzed for TPH-DRO, Oil & Grease and PAHs including naphthalene to ensure that groundwater concentrations downgradient of the lagoon remain stable or decrease over time following this source removal activity.

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

Respectfully Submitted,
ARM Group LLC



Ryan Clancy
Staff Engineer



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



ATTACHMENT 1

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



121820-1: Excavated material piled for drying within the lagoon.



121820-2: Dried material being loaded for transport to Greys Landfill.

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



121820-3: Material placed within the lagoon for drying. Historic sheet piling observed in some sections of the PORI Lagoon's sidewalls was left in place.



122120-1: Excavated material combined with calcite to accelerate the drying process.

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



122120-2: Material dry-out pad constructed with polyethylene sheeting and a berm. The dry-out pad allowed liquids drained out of the excavated material to drain into the lagoon.



122220-1: Material excavation in the southeastern end of the lagoon.

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



122220-2: Excavator bucket completing confirmation sampling at the approximate water table elevation.



122220-3: Material collected from the lagoon sidewall for confirmation sampling. Material from the lagoon sidewalls did not have the oily appearance of the material from within the lagoon's channel bottom.

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



122320-1: The western portion of the PORI Lagoon near the completion of material removal.



122320-2: The northern portion of the PORI Lagoon near the completion of material removal.

**Excavation Photograph Log
Area B: Parcel B22 PORI Lagoon
Sparrows Point, Maryland**



010521-1: The eastern portion of the PORI Lagoon following the completion of material removal.



010521-2: The northern portion of the PORI Lagoon following the completion of material removal.

FIGURES




Parcel B6


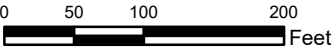
Parcel B16

Parcel B22

Parcel B21



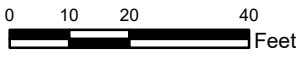
- PORI Lagoon
- Immediate Work Area (~50 feet)
- Sub-Parcel B22-2
- Proposed Building
- Parcel Boundary

B22 PORI Lagoon Excavation Area December 17, 2020		Figure 1
 ARM Group LLC Engineers and Scientists		Tradepoint Atlantic
		Sparrows Point
		Baltimore County, MD
		ARM Project 20010222

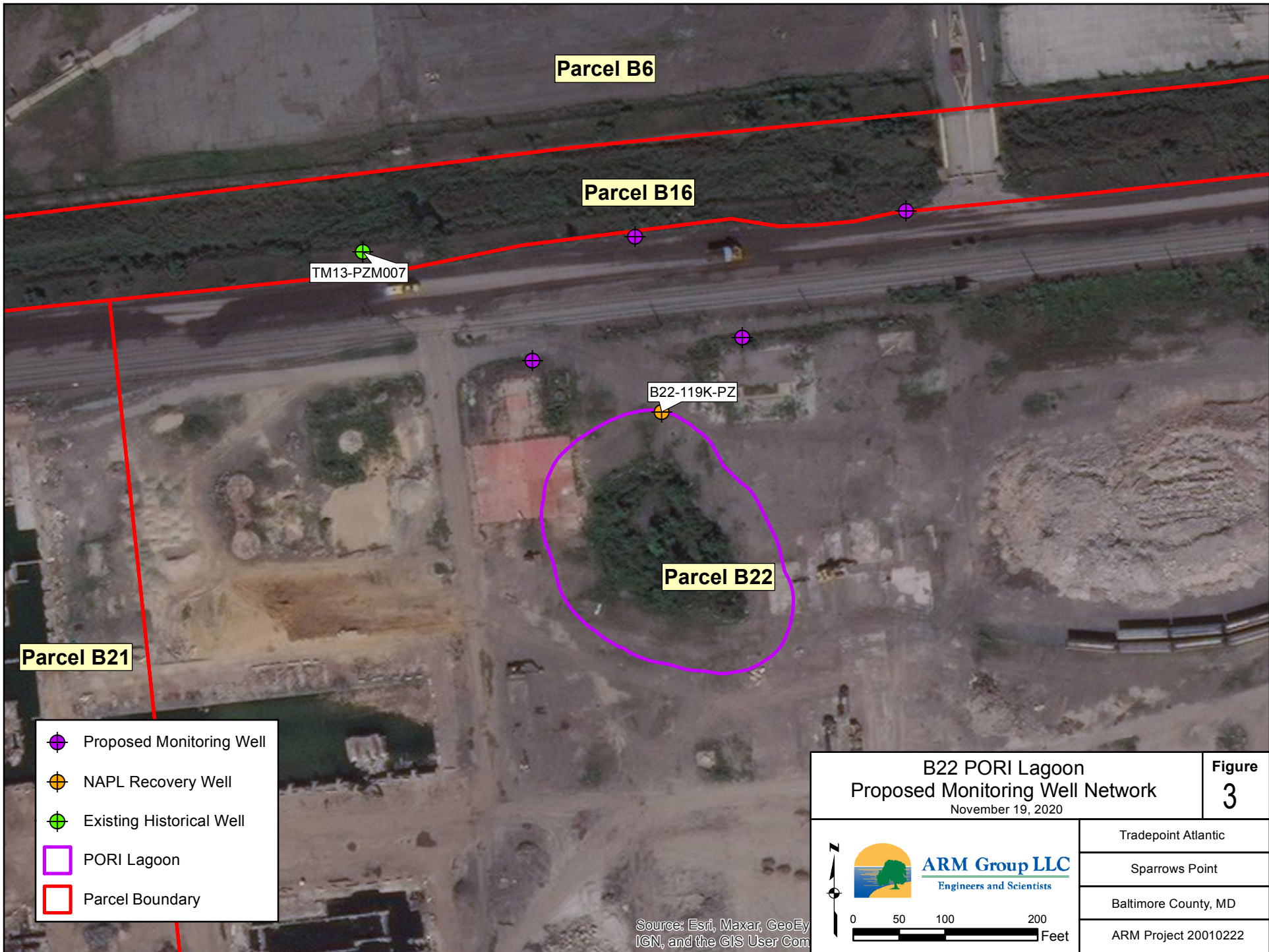





- Confirmation Sample Locations
- PORI Lagoon Centerline
- Approximate Material Removal Area
- Immediate Work Area

B22 PORI Lagoon Material Removal Area January 4, 2021		Figure 2
 ARM Group LLC Engineers and Scientists	Tradepoint Atlantic	
	Sparrows Point	
	Baltimore County, MD	
	ARM Project 20010222	
 		

Source: Esri, Maxar, GeoEye, IGN, and the GIS User Community



Parcel B6






Parcel B16


TM13-PZM007

B22-119K-PZ

Parcel B22

Parcel B21

-  Proposed Monitoring Well
-  NAPL Recovery Well
-  Existing Historical Well
-  PORI Lagoon
-  Parcel Boundary

B22 PORI Lagoon Proposed Monitoring Well Network November 19, 2020		Figure 3
 ARM Group LLC Engineers and Scientists		Tradepoint Atlantic
		Sparrows Point
		Baltimore County, MD
		ARM Project 20010222

Source: Esri, Maxar, GeoEye, IGN, and the GIS User Com

TABLES

**Table 1 - PORI Lagoon
TCLP Soil Characterization**

<u>Sample ID</u>	<u>Parameter</u>	<u>Result</u> (mg/L)	<u>TCLP Limit</u> (mg/L)	<u>TCLP</u> <u>Exceedance</u>	<u>Laboratory</u> <u>Flag</u>	<u>LOQ</u> (mg/L)
PORI 12/10/20 (Lab Report 20121104)	1,1-Dichloroethene	0.025	0.7	no	U	0.025
	1,2-Dichloroethane	0.025	0.5	no	U	0.025
	1,4-Dichlorobenzene	0.025	7.5	no	U	0.025
	2,4,5-Trichlorophenol	0.5	400	no	U	0.5
	2,4,6-Trichlorophenol	0.1	2	no	U	0.1
	2,4-Dinitrotoluene	0.1	0.13	no	U	0.1
	2-Butanone (MEK)	0.05	200	no	U	0.05
	2-Methylphenol	0.1	200	no	U	0.1
	3&4-Methylphenol(m&p Cresol)	0.2	200	no	U	0.2
	Aroclor 1016	0.74	50	no	U	0.74
	Aroclor 1221	0.74	50	no	U	0.74
	Aroclor 1232	0.74	50	no	U	0.74
	Aroclor 1242	0.74	50	no	U	0.74
	Aroclor 1248	0.74	50	no	U	0.74
	Aroclor 1254	0.74	50	no	U	0.74
	Aroclor 1260	2	50	no		0.74
	Arsenic	0.5	5	no	U	0.5
	Barium	10	100	no	U	10
	Benzene	0.025	0.5	no	U	0.025
	Cadmium	0.1	1	no	U	0.1
	Carbon tetrachloride	0.025	0.5	no	U	0.025
	Chlorobenzene	0.025	100	no	U	0.025
	Chloroform	0.025	6	no	U	0.025
	Chromium	0.5	5	no	U	0.5
	Hexachlorobenzene	0.1	0.13	no	U	0.1
	Hexachloroethane	0.1	3	no	U	0.1
	Lead	0.5	5	no	U	0.5
	Mercury	0.02	0.2	no	U	0.02
	Nitrobenzene	0.1	2	no	U	0.1
	Pentachlorophenol	0.5	100	no	U	0.5
	Selenium	0.1	1	no	U	0.1
	Silver	0.5	5	no	U	0.5
	Tetrachloroethene	0.025	0.7	no	U	0.025
Trichloroethene	0.025	0.5	no	U	0.025	
Vinyl chloride	0.025	0.2	no	U	0.025	

**Table 1 - PORI Lagoon
TCLP Soil Characterization**

<u>Sample ID</u>	<u>Parameter</u>	<u>Result</u> (mg/L)	<u>TCLP Limit</u> (mg/L)	<u>TCLP</u> <u>Exceedance</u>	<u>Laboratory</u> <u>Flag</u>	<u>LOQ</u> (mg/L)
PORI 12/7/20 (Lab Report 20120704)	1,1-Dichloroethene	0.037	0.7	no	U	0.037
	1,2-Dichloroethane	0.037	0.5	no	U	0.037
	1,4-Dichlorobenzene	0.037	7.5	no	U	0.037
	2,4,5-Trichlorophenol	0.5	400	no	U	0.5
	2,4,6-Trichlorophenol	0.1	2	no	U	0.1
	2,4-Dinitrotoluene	0.1	0.13	no	U	0.1
	2-Butanone (MEK)	0.074	200	no	U	0.074
	2-Methylphenol	0.1	200	no	U	0.1
	3&4-Methylphenol(m&p Cresol)	0.2	200	no	U	0.2
	Aroclor 1016	0.74	50	no	U	0.74
	Aroclor 1221	0.74	50	no	U	0.74
	Aroclor 1232	0.74	50	no	U	0.74
	Aroclor 1242	0.74	50	no	U	0.74
	Aroclor 1248	0.74	50	no	U	0.74
	Aroclor 1254	0.74	50	no	U	0.74
	Aroclor 1260	0.74	50	no	U	0.74
	Arsenic	0.5	5	no	U	0.5
	Barium	10	100	no	U	10
	Benzene	0.037	0.5	no	U	0.037
	Cadmium	0.1	1	no	U	0.1
	Carbon tetrachloride	0.037	0.5	no	U	0.037
	Chlorobenzene	0.037	100	no	U	0.037
	Chloroform	0.025	6	no	U	0.025
	Chromium	0.5	5	no	U	0.5
	Hexachlorobenzene	0.1	0.13	no	U	0.1
	Hexachloroethane	0.1	3	no	U	0.1
	Lead	0.5	5	no	U	0.5
	Mercury	0.02	0.2	no	U	0.02
	Nitrobenzene	0.1	2	no	U	0.1
	Pentachlorophenol	0.5	100	no	U	0.5
	Selenium	0.1	1	no	U	0.1
	Silver	0.5	5	no	U	0.5
Tetrachloroethene	0.037	0.7	no	U	0.037	
Trichloroethene	0.037	0.5	no	U	0.037	
Vinyl chloride	0.037	0.2	no	U	0.025	

U: The analyte was not detected in the sample. This numeric value represents the sample LOQ.

TCLP: Toxicity Characteristic Leaching Procedure

LOQ: Limit of Quantitation

**Table 2 - PORI Lagoon
Summary of Confirmation Sample Results**

Parameter	Cancer RSL 1E-4	Non-Cancer HI = 10	Pre- Excavation Test Pits Average	Units	PORI Conf 1	PORI Conf 2	PORI Conf 3	PORI Conf 4	PORI Conf 5	PORI Conf 6	PORI Conf 7	PORI Conf 8	PORI Conf 9
					12/22/2020	12/22/2020	12/22/2020	12/22/2020	12/22/2020	12/22/2020	12/22/2020	12/22/2020	12/22/2020
TPH													
TPH-GRO			13.2	mg/kg	21.1 U	13.6 U	14.2 U	14.5 U	16.5 U	13.7 U	12.3 U	12.9 U	12.3 U
TPH-DRO			16,300	mg/kg	1,370	65.7	266	29.3	181	213	196	1,320	1,120
Oil and Grease			88,000	mg/kg	9,760	1,910	1,200	256 J	583	947	137 J	5,660	752
PAHs													
2-Methylnaphthalene		30,100		mg/kg	0.10	0.041	0.028	0.017	0.21	0.045	0.33	0.054	0.22
Acenaphthene		452,000		mg/kg	0.027	0.047	0.017	0.14	0.27	0.014	0.017	0.013	0.47
Acenaphthylene				mg/kg	0.48	0.19	0.052	0.12	0.73	0.57	0.10	0.087	6.3
Anthracene		2,260,000		mg/kg	0.19	0.24	0.10	0.53	1.9	0.37	0.22	0.070	5.5
Benzo(a)anthracene	2,100			mg/kg	0.51	1.0	0.47	1.9	10.0	1.1	0.21	0.16	46.1
Benzo(a)pyrene	210	2,200		mg/kg	0.82	1.5	0.52	1.8	11.8	1.5	0.25	0.27	42.3
Benzo(b)fluoranthene	2,100			mg/kg	1.9	4.2	1.3	4.3	23.9	4.2	0.93	0.73	75.8
Benzo(g,h,i)perylene				mg/kg	0.14	0.25	0.11	0.32	7.6	0.42	0.096	0.11	22.9
Benzo(k)fluoranthene	21,000			mg/kg	1.7	3.8	1.2	3.9	19.2	3.8	0.84	0.66	60.8
Chrysene	210,000			mg/kg	0.56	1.2	0.44	1.6	9.4	1.3	0.25	0.18	30.0
Dibenz(a,h)anthracene	210			mg/kg	0.049	0.10	0.049	0.13	2.8	0.13	0.038	0.021	7.0
Fluoranthene		301,000		mg/kg	1.0	1.8	0.91	4.2	18.1	1.9	0.28	0.21	85.0
Fluorene		301,000		mg/kg	0.047	0.057	0.023	0.16	0.30	0.073	0.035	0.020	1.4
Indeno(1,2,3-cd)pyrene	2,100			mg/kg	0.13	0.27	0.12	0.37	7.1	0.37	0.099	0.057	22.5
Naphthalene	857	5,850		mg/kg	0.21	0.070	0.052	0.046	0.56	0.14	0.22	0.049	1.8
Phenanthrene				mg/kg	0.47	0.76	0.38	2.5	6.9	0.58	0.36	0.13	15.4
Pyrene		226,000		mg/kg	0.87	1.5	0.74	3.2	12.1	1.8	0.25	0.21	66.7

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.

PAH compounds were analyzed via SIM