Sparrows Point LLC

August 1, 2013

Mr. Andrew Fan, PE
US EPA Region III, 3LC23
1650 Arch Street
Philadelphia, PA 19103-2029

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

Re: ***COKE OVEN AREA INTERIM MEASURES PROGRESS REPORT 2ND QUARTER 2013***

Dear Mr. Fan and Ms. Brown:

Enclosed with this correspondence is the Coke Oven Area Interim Measures Progress Report for the second quarter of 2013 completed for the Sparrows Point Facility. This report was distributed electronically on August 1, 2013 in accordance with the reporting requirements outlined in the US EPA Interim Measures Progress Report frequency letter dated March 26, 2013. Please advise if paper copies are required for your use and we will distribute accordingly.

The report summarizes implementation progress for the interim measures (IMs) that have been developed to address identified environmental conditions at the Coke Oven Area through June 30, 2013. Please me at (314) 686-5611 should questions arise during your review of the enclosed progress report.

Sincerely,

Russell Becker
Vice President, Remediation
Sparrows Point LLC

Enclosure

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COKE OVEN AREA INTERIM MEASURES PROGRESS REPORT

(Second Quarter 2013)

Prepared for

SPARROWS POINT LLC
1428 SPARROWS POINT BOULEVARND
SPARROWS POINT MD 21219

August 1, 2013

EnviroAnalytics Group
1428 Sparrows Point Blvd
Sparrows Point, MD 21219

Introduction

This document presents operational data and monitoring information collected in the 2nd quarter of 2013 for interim measures (IMs) that have been installed to address identified environmental conditions at the Coke Oven Area (COA) Special Study Area at the Sparrows Point LLC site located in Sparrows Point, Maryland. This progress report also summarizes IM performance including data from the second quarter of 2013 and is submitted in accordance with reporting requirements outlined in correspondence received from US EPA on March 26, 2013. The following designations are applied in this document to the operating IM "Cells" (**Figure 1**) at the COA:

- Cell 1: Air Sparge/Soil Vapor Extraction (AS/SVE) System in the Former Benzol Processing Area,
- Cell 3: AS/SVE System in "Cove" Area,
- Cell 4: In-Situ Anaerobic Bio-treatment Area,
- Cell 6: Light Non-Aqueous Phase Liquid (LNAPL) Recovery at the Former Benzol Processing Area.

As of the end of the second quarter 2013, Cells 1, 3, 4 and 6 continue to be operational. Groundwater and soil gas sampling were conducted during the second quarter of 2013 to assess current conditions and removal efficiencies of the operating IM systems. The results of these sampling events, including trending graphs from IM startup, are detailed in this report. LNAPL removal continued at Cell 6 without interruption.

Design work is underway on the IM remediation systems for Cell 2 and Cell 5 as requested in the US EPA's May 2013 letter. As part of this design work, the current bio-treatment process at Cell 4 is being evaluated for its effectiveness. The preliminary review of historical data and groundwater chemistry for ongoing operations at Cell 4 indicate that a combined Cell 4/Cell 5 remediation design and associated installation may be more effective than the current Cell 4 treatment process. IM designs for Cell 2 and a combined Cell4/5 area will be submitted to the agencies in early August 2013.

Cell 1: Prototype AS/SVE System in the Former Benzol Processing Area

Cell 1 consists of an AS/SVE system coupled with vapor destruction via an electric catalytic oxidation (CATOX) unit. **Figure 2** shows the system layout of Cell 1 and locations of the major design components including the air sparging wells and vapor collection trenches.

2nd Quarter 2013 Operational Performance

Operational performance of Cell 1 during this reporting period is summarized in **Table 1**. In summary, the CATOX unit operated for 576 hours (26.4 %) during this reporting period. The system at Cell 1 continues to operate on a pulsing schedule; where the system is in recovery or on mode for one day and then turned off to let the area rebound for two or three days. This practice was implemented during the first quarter 2013 to improve recovery of hydrocarbons from the subsurface. Operations continue to be in conformance with the manufacturer's specifications at all times that soil gases were collected in accordance with the May 20, 2011 modified permit-to-construct conditions.

The hydrocarbon removal rate was calculated to be approximately 0.33 pounds per operating hour (estimated quarterly total of 187.6 pounds). **Table 1** also includes a cumulative summary of operational performance since system startup on August 3, 2010. In total, Cell 1 has destroyed approximately 11,170 pounds of recovered hydrocarbons.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. Three (3) untreated soil gas sample were collected in Suma Canisters and submitted to Pace Analytical Services, Inc. in Minneapolis, Minnesota. for analysis by US EPA Method TO-15. The average influent soil gas hydrocarbon concentration of the three samples taken throughout the second quarter was 248,430 micrograms per cubic meter (ug/m^3) as summarized in **Table 2**.

Hydrocarbon removal calculations were based on the analytical results and the average daily field-measured influent flow rates. The mass removal calculations assume that the samples collected throughout the second quarter are representative of hydrocarbon concentrations for the entire quarter. This assumption is based on the fact that the same air sparge wells (AS-1 thru AS-8) and extraction wells (V-1 thru V-6) were online when the system was operational. The pulsing operational method continued to show improved recovery concentrations in the influent soil gases and will be maintained in the future.

2nd Quarter 2013 Groundwater Monitoring Results

Groundwater samples were collected on May 16, 2013 from the following wells:

- BP-MW-09 (upgradient of Cell 1),
- CO18-PZM006 (upgradient of Cell 1 at edge of berm), and
- CO02-PZM006 (downgradient of Cell 1).

The groundwater samples were submitted to Pace Analytical Services, Inc., located in Greensburg, Pennsylvania for the analyses shown in **Table 3**. These data indicate benzene is the most prevalent volatile organic compound (VOC) constituent. Since system startup in August 2010, a decreasing total VOC concentration trend is documented at the wells monitored for system performance. The identified trend for these monitoring wells will continue to be monitored and assessed during system operation in future months.

Cell 3: AS/SVE System in the "Cove" Area

Cell 3 consists of an AS/SVE system coupled with vapor destruction via an electric CATOX unit. **Figure 1** shows the location of the Cell 3 AS/SVE treatment area at the COA. The major design components are described in the Cell 3 final design report (*Coke Oven Area Interim Measures Cell 3 "Cove" Area Air Sparge/Soil Vapor Extraction System Design*), submitted to US EPA on March 1, 2011.

2nd Quarter 2013 Operational Performance

Operational performance of Cell 3 during this reporting period is summarized in **Table 4**. In summary, the CATOX unit operated for 576 hours (26.4%) during the second quarter of 2013. The system at Cell 3 continues to operate on a pulsing schedule; where the system is in recovery or on mode for one day and then turned off to let the area rebound for two or three days. This practice was implemented to improve recovery of hydrocarbons from the subsurface. Operations continue to be in conformance with the manufacturer's specifications at all times that soil gases were collected in accordance with the May 20, 2011 modified permit-to-construct conditions.

The hydrocarbon removal rate was calculated to be approximately 0.07 pounds per operating hour (estimated quarterly total of 38.3 pounds). **Table 4** also includes a cumulative summary of operational performance since system startup on June 24, 2011. In total, Cell 3 has destroyed approximately 1,342.5 pounds of recovered hydrocarbons.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. Three (3) untreated soil gas sample was collected in Suma Canisters and submitted to Pace Analytical Services. The average influent soil gas hydrocarbon concentration of the seven samples taken throughout the second quarter was 50,680 ug/m^3 as summarized in **Table 5**.

Hydrocarbon removal calculations were based entirely on the analytical results and the average daily field-measured influent flow rates. The mass removal calculations assume that the samples collected throughout the second quarter are representative of hydrocarbon concentrations for the entire first quarter of 2013. This assumption is based on the fact that the same air sparge wells (AS-2 thru AS-12) and extraction wells (V-2 thru V-4) were online when the system was operational. Operations at this Cell will continue to be evaluated in the future to improve system recovery rates.

2nd Quarter Groundwater Monitoring

Groundwater samples were collected on May 16, 2013 from the following wells (**Figure 1**):

- MW-CELL3-1 (downgradient of Cell 3),
- MW-CELL3-2 (upgradient of Cell 3),
- MW-CELL3-3 (upgradient of Cell 3), and
- CO30-PZM015 (downgradient of Cell 3).

The groundwater samples were submitted to Pace Analytical for the analyses shown in **Table 6**. These data indicate that benzene is the most prevalent VOC constituent. Since system startup on June 24, 2011, a generally decreasing VOC concentration trend is documented for some of the sampled wells. The trends for these monitoring wells will continue to be monitored and assessed during system operation in future months.

Cell 4: In-Situ Anaerobic Bio-treatment Area

Cell 4 consists of an in-situ anaerobic bio-treatment system including extraction and mixing of groundwater in an above ground storage tank containing a nutrient amendment solution and reinjection of groundwater. A schematic layout of the Cell 4 system is shown on **Figure 6**. The major design components are described in the Cell 4 final design report (*Coke Oven Area Interim Measures Cell 4 In-Situ Anaerobic Bio-Treatment System Design*), submitted to US EPA on March 31, 2011.

2nd Quarter 2013 Operations

The dosing schedule for extraction and reinjection of groundwater was suspended at Cell 4 in the 2nd quarter to complete a review of the historical data of the performance of this IM as currently designed and operated. Based on monitoring results, little to no improvement in groundwater quality has been achieved since initiation of the in-situ bio-treatment in 2011. A review of the groundwater chemistry indicates that in-situ bacterial processes may have limited effectiveness not as a result of nutrient availability but as limited by the pH of the groundwater. As such, the current design and operational process will be discontinued and efforts will be made to incorporate interim measures required for this Cell into the Cell 5 design work underway.

2nd Quarter 2013 Groundwater Monitoring Results

Groundwater samples were collected on May 16, 2013. Groundwater samples were collected from the following wells (**Figure 7**):

- OBS-6 MW-CELL 4-3
- EXT-2 MW-CELL 4-5
- AS-2 MW-CELL 4-6
- MW-CELL 4-1
- MW-CELL 4-5
- MW-CELL 4-7

The groundwater samples were submitted to Pace Analytical for the analyses shown in **Table 7**. The data in Table 7 indicate naphthalene is the most prevalent VOC constituent. Figure 8 presents a graph of the total VOC concentrations in Cell 4 groundwater and indicates when each dosing event occurred. VOC trends for these monitoring wells will continue to be monitored and assessed in future months.

Cell 6: LNAPL Extraction at the Former Benzol Processing Area

The Cell 6 LNAPL monitoring and recovery system was monitored weekly during the second quarter of 2013. **Table 8** summarizes; 1) LNAPL occurrence and recovery observed in monitoring wells for this Cell during the reporting period, 2) the start date of extraction from recovery wells and 3) cumulative LNAPL recovered since the beginning of the interim measure. **Figure 9** illustrates the well locations. An estimated 837 gallons (6,134 pounds) of LNAPL were recovered during the second quarter 2013, bringing the total recovered LNAPL to 9,685 gallons (70,958 pounds) as of June 30, 2013. The LNAPL was recovered from the following wells:

Well	LNAPL Recovery (gal/lbs)	
	2nd Qtr 2013	Total thru 2nd Qtr 2013
BP-MW-05	743/5,445	7,724/56,594
RW-04	32/234	1,116/8,178
BP-MW-08	62/454	816/5,972
BP-MW-11	0/0	8/57
RW-03	0/0	19/141
RW-01	0/0	1/10
RW-02	0/0	0.8/5.9

LNAPL thicknesses during the reporting period are summarized below (wells are not listed if LNAPL was not present):

- RW-04 (1.9 ft),
- BP-MW-05 (0.60 ft),
- BP-MW-08 (5.2 ft),
- BP-MW-11 (0.60 ft),
- BP-MW-10 (0.20 ft),
- RW-02 (0.40 ft),
- RW-03 (0.80 ft)
- RW-01 (0.30 ft), and
- BP-MW-07 (0.60 ft).

No LNAPL was observed in wells RW-05, BP-MW-06, BP-MW-09, or CO19-PZM004. For all wells in which LNAPL accumulated, **Table 9** provides well-specific details concerning the measured depths to LNAPL, the water table, and calculated LNAPL thicknesses.

FIGURES

LEGEND

- New Monitoring Well
- Existing Monitoring Well
- AS/SVE Treatment Area
- Special Study Area

INTERIM MEASURES TREATMENT CELLS

"Cell 1": Prototype AS/SVE System in Benzol Area

"Cell 2": AS/SVE and Dual Phase GW Treatment/Injection System in the Former Coal Storage Area

"Cell 3": AS/SVE System in the "Cove" Area

"Cell 4": In-Situ Anaerobic Bio-treatment System in the Coal Tar Area

"Cell 5": Groundwater Extraction/Treatment/ Injection at the Turning Basin Area

"Cell 6": LNAPL Recovery at the Former Benzol Processing Area

N

0 400 800 FEET

APPROXIMATE SCALE

Sparrows Point LLC

Project

Sparrows Point, LLC

Baltimore, Maryland

INTERIM MEASURES TREATMENT AREAS

Project Number	File Number	
Date: April 30, 2013		Figure: 1
PE/PG	PM	Drafter

LEGEND

- V–1 TRENCH VAPOR EXTRACTION RISER
- EXT–1 SVE PILOT TEST EXTRACTION WELL
- OBS–1 SVE PILOT TEST OBSERVATION WELL
- CO18–PZM006 EXISTING MONITORING WELL
- AS–2 AIR SPARGE WELL
- VAPOR COLLECTION TRENCHES
- FORMER STRUCTURES (DEMOLISHED)

N

0 100 200 FEET

APPROXIMATE SCALE

Sparrows Point LLC

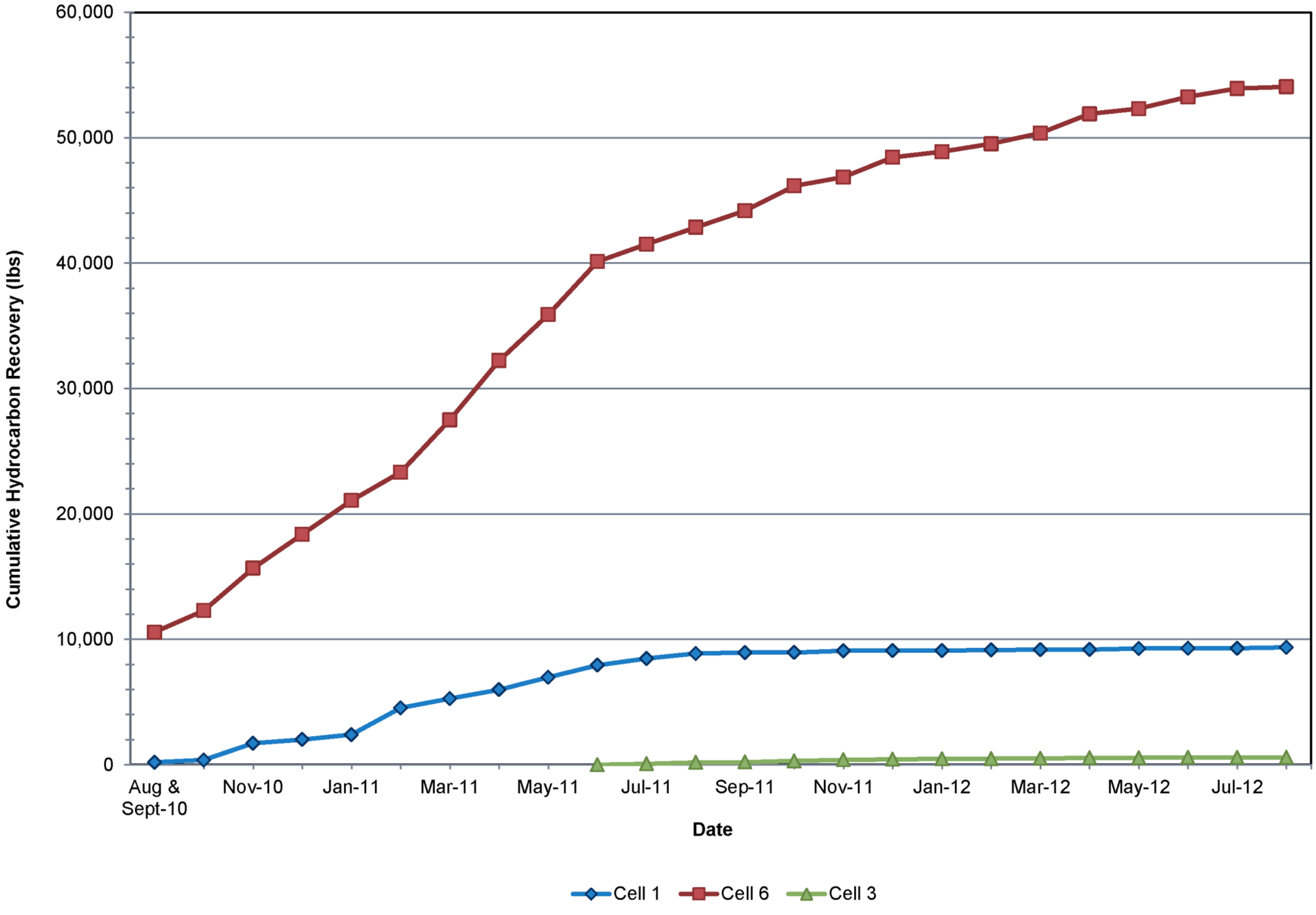
Project

Sparrows Point, LLC

Baltimore, Maryland

AS-BUILT LAYOUT PLAN

Project Number	File Number	Figure
		2
Date: April 30, 2013		
PE/PG	PM	Drafter



Sparrows Point LLC

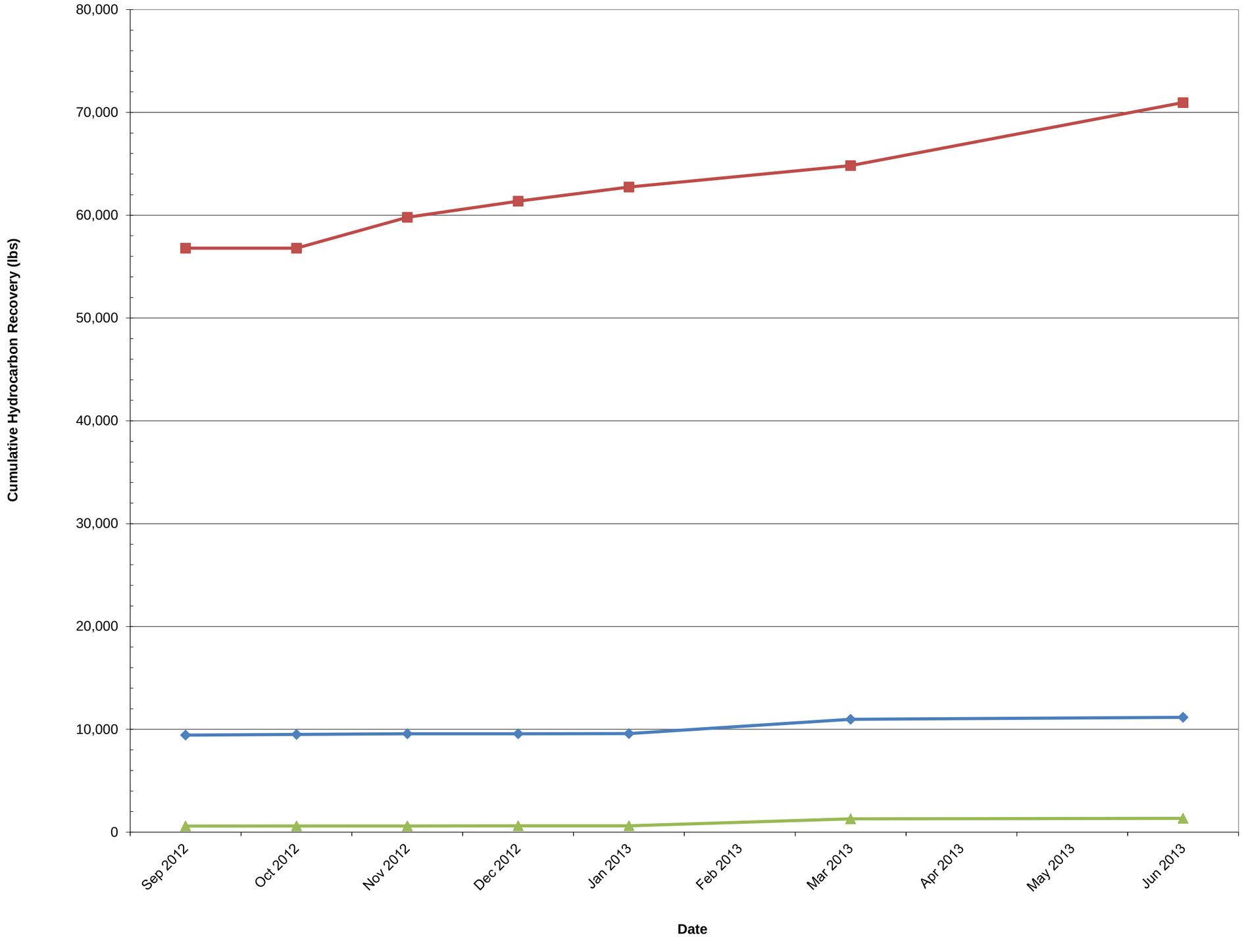
Project
Sparrows Point, LLC
Baltimore, Maryland

CUMULATIVE SUMMARY OF ESTIMATED HYDROCARBON RECOVERY
FORMER COKE OVEN AREA INTERIM REMEDIAL MEASURES
AUGUST 2010 – AUGUST 2012

Project Number	File Number

Date	Figure
April 30, 2013	3

PE/RG	PM	DR



LEGEND

- Cell 1
- Cell 3
- Cell 6

Sparrows Point LLC

Project

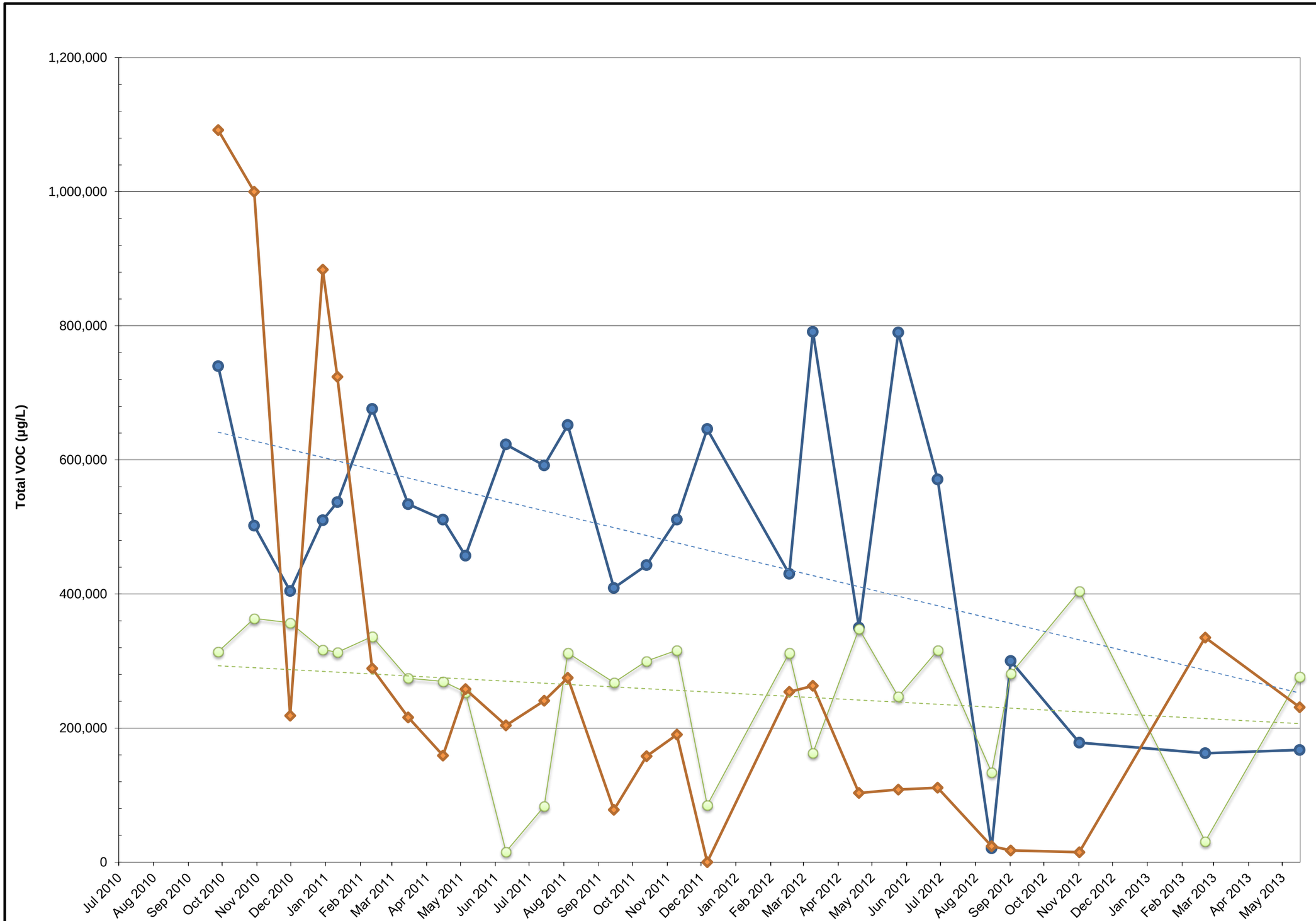
Sparrow Point, LLC
Baltimore, Maryland

CUMULATIVE SUMMARY OF ESTIMATED HYDROCARBON RECOVERY FORMER COKE OVEN AREA INTERIM REMEDIAL MEASURES SEPTEMBER 2012 AND BEYOND

Project Number	File Number

Date	Figure
July 31, 2013	3A

PE/RG	PM	DR



LEGEND

- CO02-PZM006
- BP-MW-09
- CO18-PZM006

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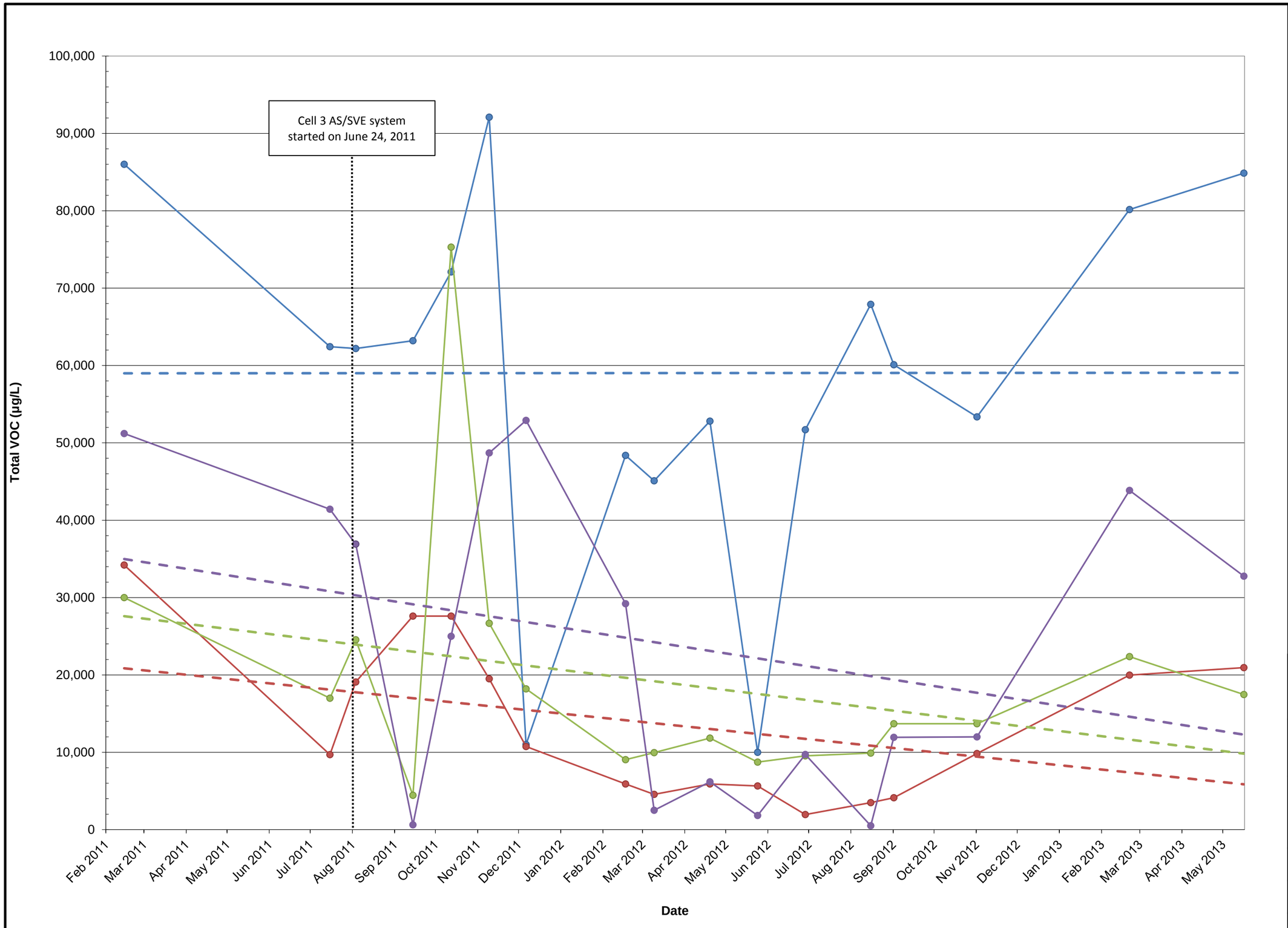
Baltimore, Maryland

MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH CELL 1: PROTOTYPE AS/SVE SYSTEM IN THE "COVE" AREA

Date	Figure
July 31, 2013	4

PE/RG	PM	DR



LEGEND

- CO30-PZM015
- MW-CELL 3-1
- MW-CELL 3-2
- MW-CELL 3-3

Sparrows Point LLC

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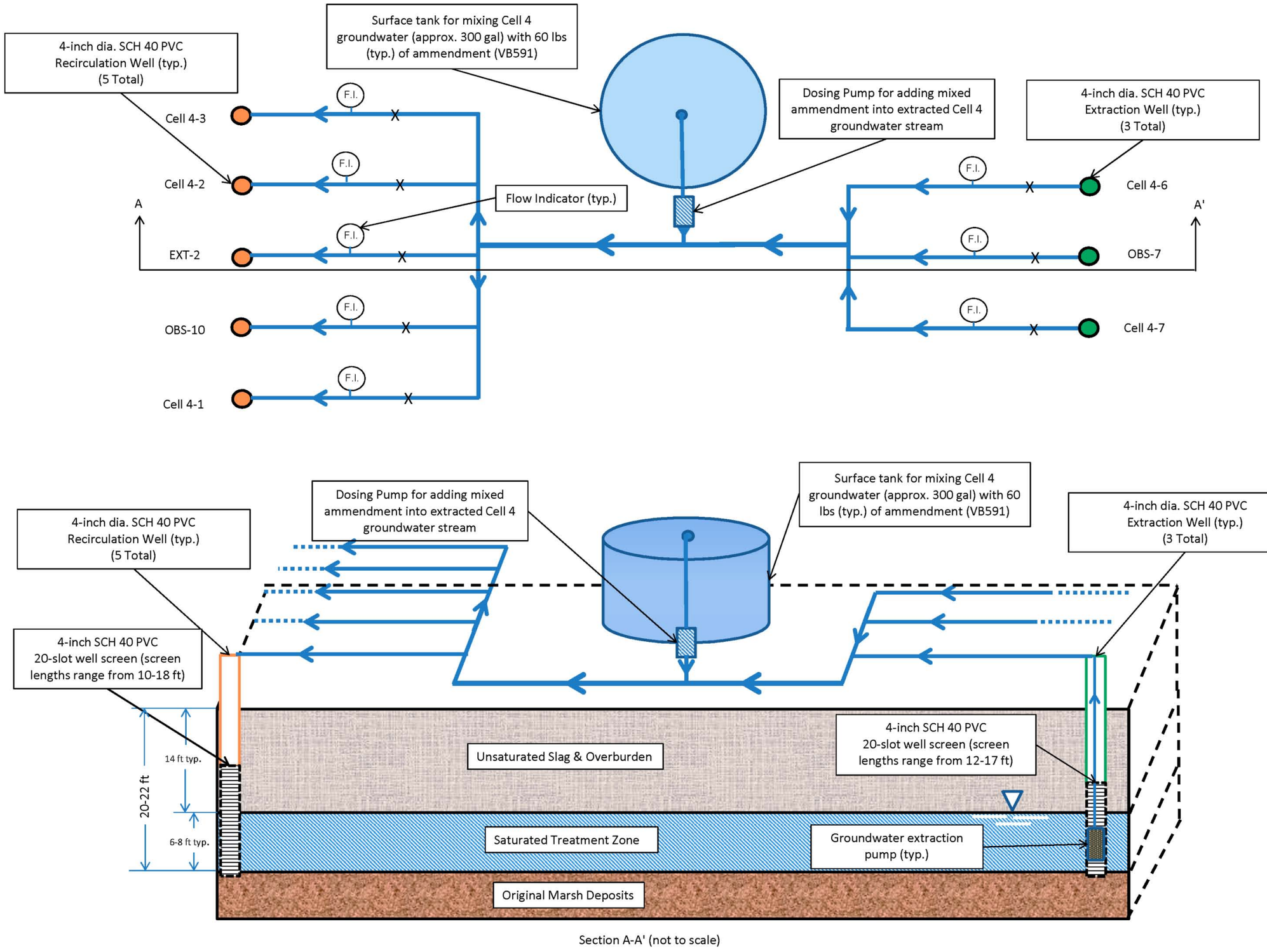
Baltimore, Maryland

MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH CELL 3: PROTOTYPE AS/SVE SYSTEM IN THE COVE AREA

Date	Figure
July 31, 2013	5

PE/RG	PM	DR



Section A-A' (not to scale)

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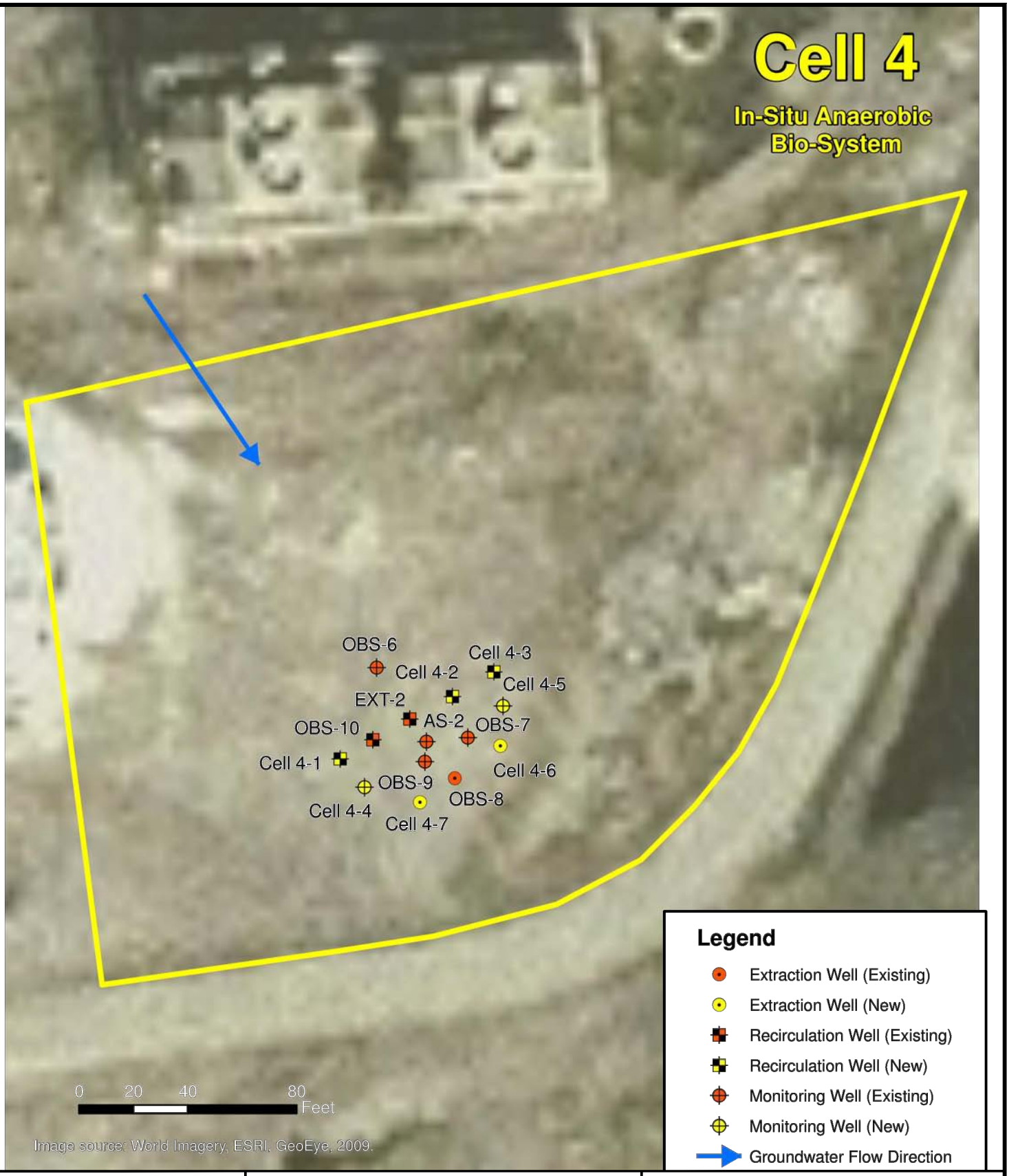
Sparrows Point, LLC
Baltimore, Maryland

SCHEMATIC LAYOUT AND SECTIONS
CELL 4 IN-SITU ANAEROBIC BIO-TREATMENT SYSTEM
FORMER COKE OVEN AREA INTERIM REMEDIAL MEASURES

Project Number	File Number

Date	Figure
April 30, 2013	6

PE/RG	PM	DR



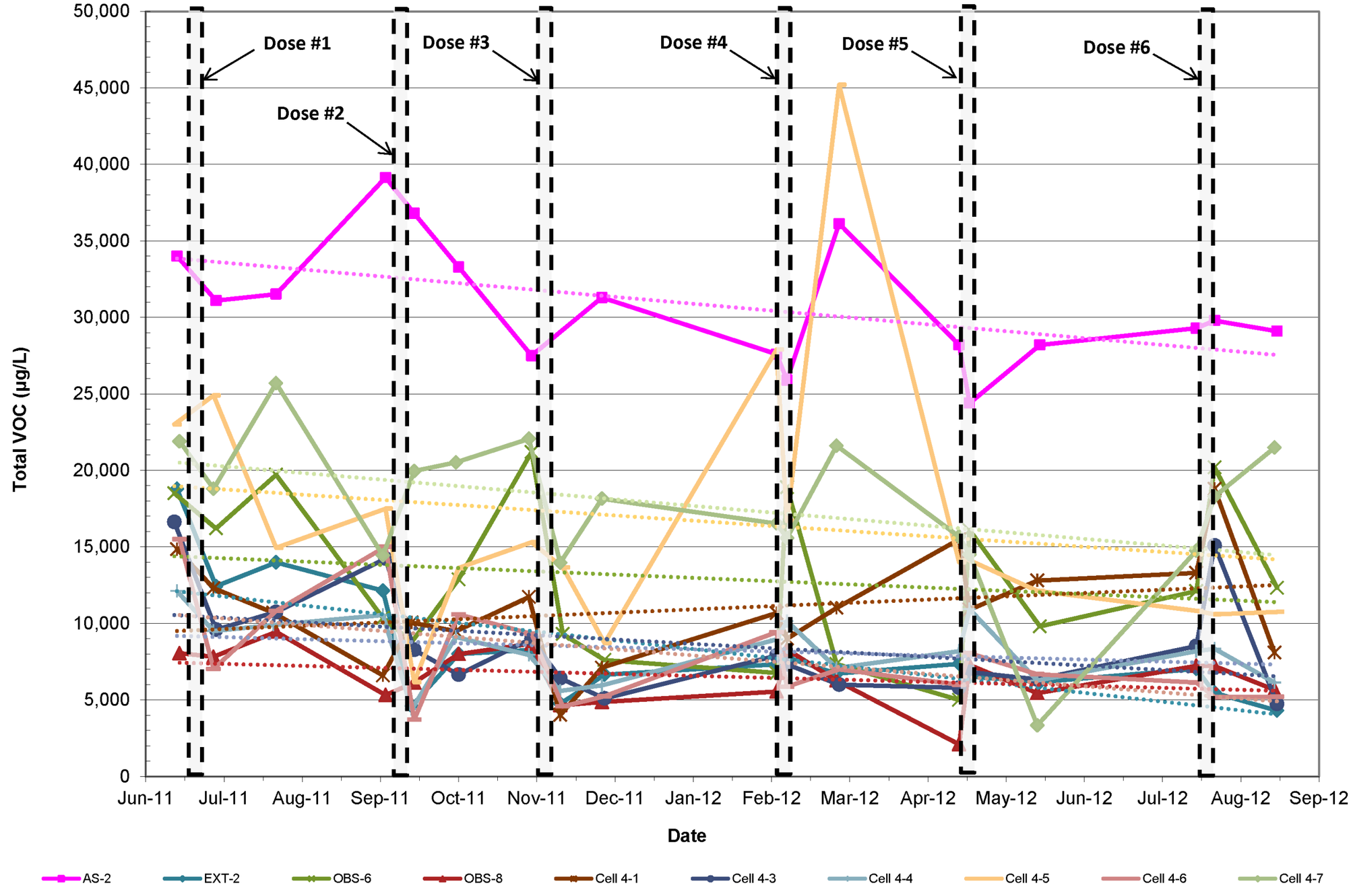
Sparrows Point LLC

CELL 4 WELLS

Sparrows Point, LLC

Baltimore, Maryland

Date	Drafter	PE/PG	Project Number	Figure
April 30, 2013		Project Manager	File	7



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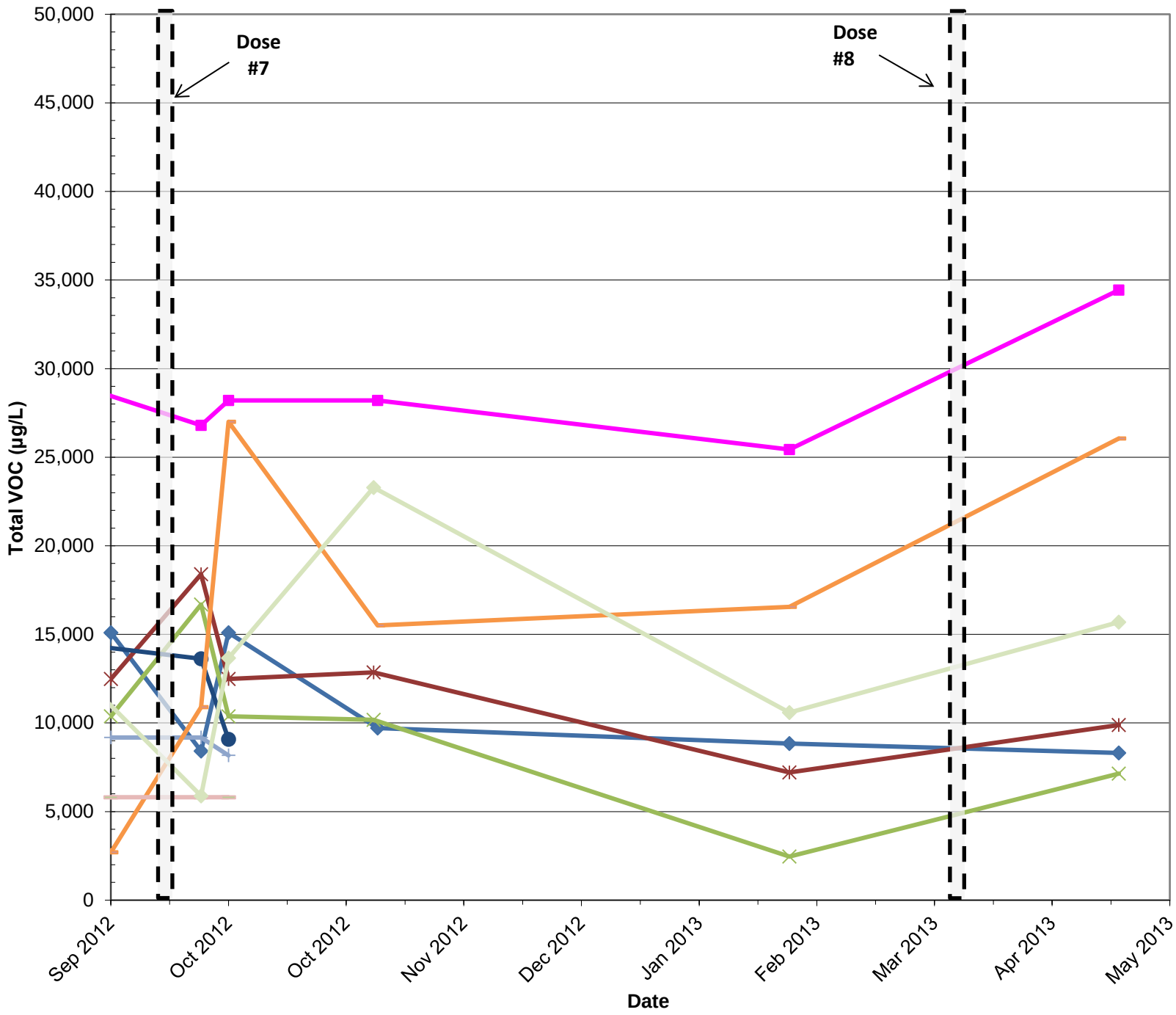
Baltimore, Maryland

MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH
CELL 4: IN-SITU ANAEROBIC BIO-TREATMENT AREA
JUNE 2011 – AUGUST 2012

Project Number	File Number

Date	Figure
April 30, 2013	**8**

PE/RG	PM	DR



LEGEND

- AS-2
- EXT-2
- OBS-6
- OBS-8
- Cell 4-1
- Cell 4-3
- Cell 4-4
- Cell 4-5
- Cell 4-6
- Cell 4-7

Sparrows Point LLC

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Baltimore, Maryland

MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH CELL 4: IN-SITU ANAEROBIC BIO-TREATMENT AREA SEPTEMBER 2012 AND BEYOND

Date
July 31, 2013

Figure
8A

PE/RG PM DR

TABLES

Table 1
Summary of Operation Conditions
Cell 1: Prototype AS/SVE System for Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Cell 1 Second Quarter 2013 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (April 1 - June 30, 2013)	hours	576
Overall CATOX Operational Time	%	26.4%
Estimated Total Hydrocarbons Destroyed	pounds	187.6
Estimated Hydrocarbon Removal Rate	pounds/hour	0.33

Cell 1 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - June 30, 2013)	hours	18,216
Overall CATOX Operational Time	%	75.9%
Estimated Total Hydrocarbons Destroyed	pounds	11,170
Estimated Hydrocarbon Removal Rate	pounds/hour	0.6

Table 2
Summary of Soil Gas Analytical Results (Second Quarter 2013)
Cell 1: Prototype AS/SVE System in the "Cove" Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Analyte	Sample ID Date Time Dilution Factor Units	CATOX Influent Q2 2013
TO-15 Volatile Organics		
trans-1,3-Dichloropropene	ug/m^3	< 310 U
Acetone	ug/m^3	< 7,700 U
Ethylbenzene	ug/m^3	**570**
2-Hexanone	ug/m^3	< 770 U
Methylene Chloride	ug/m^3	**2,740**
Benzene	ug/m^3	**234,500**
1,1,2,2-Tetrachloroethane	ug/m^3	< 310 U
Tetrachloroethene	ug/m^3	< 310 U
Toluene	ug/m^3	**6,700**
1,1,1-Trichloroethane	ug/m^3	< 310 U
1,1,2-Trichloroethane	ug/m^3	< 310 U
Trichloroethene	ug/m^3	< 310 U
Vinyl Chloride	ug/m^3	< 310 U
o-Xylene	ug/m^3	**1,405**
m-Xylene & p-Xylene	ug/m^3	**2,515**
2-Butanone (MEK)	ug/m^3	< 1,500 U
4-Methyl-2-pentanone (MIBK)	ug/m^3	< 770 U
Bromoform	ug/m^3	< 310 U
Carbon Disulfide	ug/m^3	< 770 U
Carbon tetrachloride	ug/m^3	< 310 U
Chlorobenzene	ug/m^3	< 310 U
Chloroethane	ug/m^3	< 310 U
Chloroform	ug/m^3	< 310 U
1,1-Dichloroethane	ug/m^3	< 310 U
1,2-Dichloroethane	ug/m^3	< 310 U
1,1-Dichloroethene	ug/m^3	< 310 U
trans-1,2-Dichloroethene	ug/m^3	< 310 U
1,2-Dichloropropane	ug/m^3	< 310 U
cis-1,3-Dichloropropene	ug/m^3	< 310 U
Total Volatile Organics	ug/m^3	**248,430**

Notes:

VOC concentrations are averages derived from the 3 monthly influent air samples taken during the quarter (one sample taken each month of the quarter)

BOLD = Analyte detected

ug/m^3 = micro grams per cubic meter

</U = Analyte not detected above corresponding laboratory reporting limit

Table 3
Summary of Groundwater Analytical Results (Second Quarter 2013)
Cell 1: Prototype AS/SVE System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

	Sample ID	CO02-PZM006	CO18-PZM006	BP-MW-09
	Date	5/16/2013	5/16/2013	5/16/2013
Analyte	Units			
Volatile Organics				
Vinyl Chloride	µg/L	< 100 U	< 100 U	< 100 U
Chloroethane	µg/L	**4.8**	< 1 U	< 1 U
1,1-Dichloroethene	µg/L	< 100 U	< 100 U	< 100 U
Acetone	µg/L	< 10 U	**35.8**	**14.3**
Carbon Disulfide	µg/L	< 1 U	**4.7**	**17.8**
Methylene Chloride	µg/L	< 500 U	< 500 U	< 500 U
trans-1,2-Dichloroethene	µg/L	< 100 U	< 100 U	< 100 U
1,1-Dichloroethane	µg/L	< 100 U	< 100 U	< 100 U
2-Butanone (MEK)	µg/L	< 500 U	< 500 U	< 500 U
Chloroform	µg/L	< 100 U	< 100 U	< 100 U
1,1,1-Trichloroethane	µg/L	< 100 U	< 100 U	< 100 U
Carbon Tetrachloride	µg/L	< 100 U	< 100 U	< 100 U
Benzene	µg/L	**164,000**	**222,000**	**190,000**
1,2-Dichloroethane	µg/L	< 100 U	< 100 U	< 100 U
Trichloroethene	µg/L	< 100 U	< 100 U	< 100 U
1,2-Dichloropropane	µg/L	< 100 U	< 100 U	< 100 U
Methyl Isobutyl Ketone (MIBK)	µg/L	< 500 U	< 500 U	< 500 U
cis-1,3-Dichloropropene	µg/L	< 100 U	< 100 U	< 100 U
Toluene	µg/L	**626**	**6,330**	**44,800**
trans-1,3-Dichloropropene	µg/L	< 100 U	< 100 U	< 100 U
1,1,2-Trichloroethane	µg/L	< 100 U	< 100 U	< 100 U
2-Hexanone (MBK)	µg/L	< 500 U	< 500 U	< 500 U
Tetrachloroethene	µg/L	< 100 U	< 100 U	< 100 U
Chlorobenzene	µg/L	< 100 U	< 100 U	< 100 U
1,1,1,2-Tetrachloroethane	µg/L	< 100 U	< 100 U	< 100 U
Ethylbenzene	µg/L	**566**	**59.9**	**2,550**
Styrene	µg/L	**32.6**	< 1 U	**2,660**
Bromoform	µg/L	< 100 U	< 100 U	< 100 U
1,1,2,2-Tetrachloroethane	µg/L	< 100 U	< 100 U	< 100 U
1,3,5-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U
1,2,4-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U
Total Xylenes	µg/L	**2,150**	**2,740**	**36,400**
Total Volatile Organics	µg/L	**167,379**	**231,170**	**276,442**

Table 4
Summary of Operation Conditions
Cell 3: AS/SVE System in the "Cove" Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Cell 3 Second Quarter 2013 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (April 1 - June 30, 2013)	hours	576
Overall CATOX Operational Time	%	26.4%
Estimated Total Hydrocarbons Destroyed	pounds	38.3
Estimated Hydrocarbon Removal Rate	pounds/hour	0.07

Cell 3 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - June 30, 2013)	hours	12,935
Overall CATOX Operational Time	%	77.0%
Estimated Total Hydrocarbons Destroyed	pounds	1,342.5
Estimated Hydrocarbon Removal Rate	pounds/hour	0.10

Table 5
Summary of Soil Gas Analytical Results (Second Quarter 2013)
Cell 3: AS/SVE System in the "Cove" Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Analyte	Sample ID Date Time Dilution Factor Units	CATOX Influent Q2 2013
TO-15 Volatile Organics		
trans-1,3-Dichloropropene	ug/m^3	< 30 U
Acetone	ug/m^3	< 740 U
Ethylbenzene	ug/m^3	< 1 U
2-Hexanone	ug/m^3	< 74 U
Methylene Chloride	ug/m^3	< 74 U
Benzene	ug/m^3	**46,700**
1,1,2,2-Tetrachloroethane	ug/m^3	< 30 U
Tetrachloroethene	ug/m^3	**1,685**
Toluene	ug/m^3	< 1 U
1,1,1-Trichloroethane	ug/m^3	< 30 U
1,1,2-Trichloroethane	ug/m^3	< 30 U
Trichloroethene	ug/m^3	< 30 U
Vinyl Chloride	ug/m^3	< 30 U
o-Xylene	ug/m^3	**1,015**
m-Xylene & p-Xylene	ug/m^3	**1,280**
2-Butanone (MEK)	ug/m^3	< 150 U
4-Methyl-2-pentanone (MIBK)	ug/m^3	< 150 U
Bromoform	ug/m^3	< 30 U
Carbon Disulfide	ug/m^3	< 74 U
Carbon tetrachloride	ug/m^3	< 30 U
Chlorobenzene	ug/m^3	< 30 U
Chloroethane	ug/m^3	< 30 U
Chloroform	ug/m^3	< 30 U
1,1-Dichloroethane	ug/m^3	< 30 U
1,2-Dichloroethane	ug/m^3	< 30 U
1,1-Dichloroethene	ug/m^3	< 30 U
trans-1,2-Dichloroethene	ug/m^3	< 30 U
1,2-Dichloropropane	ug/m^3	< 30 U
cis-1,3-Dichloropropene	ug/m^3	< 30 U
Total Volatile Organics	ug/m^3	**50,680**

Notes:

VOC concentrations are averages derived from the 3 monthly influent air samples taken during the quarter (one sample taken each month of the quarter)

BOLD = Analyte detected

ug/m^3 = micro grams per cubic meter

</U = Analyte not detected above corresponding laboratory reporting limit

Table 6
Summary of Groundwater Analytical Results (Second Quarter 2013)
Cell 3: Prototype AS/SVE System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
RG Steel Sparrows Point, LLC

	Sample ID	CO30-PZM015	MW-CELL 3-1	MW-CELL 3-2	MW-CELL 3-3
	Date	5/16/2013	5/16/2013	5/16/2013	5/16/2013
Analyte	Units				
Volatile Organics					
Vinyl Chloride	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Chloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1-Dichloroethene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Acetone	µg/L	< 10 U	< 10 U	< 10 U	**23.7**
Carbon Disulfide	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Methylene Chloride	µg/L	< 500 U	< 250 U	< 2,500 U	< 2,500 U
trans-1,2-Dichloroethene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1-Dichloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
2-Butanone (MEK)	µg/L	< 500 U	< 250 U	< 2,500 U	< 2,500 U
Chloroform	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1,1-Trichloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Carbon Tetrachloride	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Benzene	µg/L	**76,700**	**19,200**	**15,800**	**28,900**
1,2-Dichloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Trichloroethene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,2-Dichloropropane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Methyl Isobutyl Ketone (MIBK)	µg/L	< 500 U	< 250 U	< 2,500 U	< 2,500 U
cis-1,3-Dichloropropene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Toluene	µg/L	**5,510**	**1,470**	**1,350**	**2,640**
trans-1,3-Dichloropropene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1,2-Trichloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
2-Hexanone (MBK)	µg/L	< 500 U	< 250 U	<2,500 U	<2,500 U
Tetrachloroethene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Chlorobenzene	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1,1,2-Tetrachloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
Ethylbenzene	µg/L	< 1 U	**19.9**	**24.6**	**66.7**
Styrene	µg/L	**43.9**	**11.2**	**14.2**	**30.3**
Bromoform	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,1,2,2-Tetrachloroethane	µg/L	< 100 U	< 50 U	< 500 U	< 500 U
1,3,5-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U	< 100 U
1,2,4-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U	< 100 U
Total Xylenes	µg/L	**2,600**	**252**	**287**	**1,100**
Total Volatile Organics	µg/L	**84,854**	**20,953**	**17,476**	**32,737**

Table 7
Summary of Groundwater Analytical Results (Second Quarter 2013)
Cell 4: In-Situ Anaerobic Bio-Treatment Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

	Sample ID	4-1	4-5	4-7	AS-2	EXT-2	OBS-6
	Date	5/16/2013	5/16/2013	5/16/2013	5/16/2013	5/16/2013	5/16/2013
	Time	10:20	11:30	11:30	10:20	9:35	9:20
	Units						
Volatile Organics							
Vinyl Chloride	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Chloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1-Dichloroethene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Acetone	µg/L	**25.6**	**11**	**11.2**	**18.4**	**19.7**	< 10 U
Carbon Disulfide	µg/L	**2.8**	< 1 U	< 1 U	< 1 U	**1.9**	< 1 U
Methylene Chloride	µg/L	< 500 U	< 500 U	< 500 U	< 500 U	< 500 U	< 500 U
trans-1,2-Dichloroethene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1-Dichloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
2-Butanone (MEK)	µg/L	< 500 U	< 2,500 U	< 500 U	< 2,500 U	< 500 U	< 2,500 U
Chloroform	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1,1-Trichloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Carbon Tetrachloride	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Benzene	µg/L	**1,170**	**2,840**	**870**	**4,530**	**301**	**686**
1,2-Dichloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Trichloroethene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,2-Dichloropropane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Methyl Isobutyl Ketone (MIBK)	µg/L	< 500 U	< 2,500 U	< 500 U	< 2,500 U	< 500 U	< 2,500 U
cis-1,3-Dichloropropene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Toluene	µg/L	**712**	**2,560**	**611**	**3,570**	**224**	**466**
trans-1,3-Dichloropropene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1,2-Trichloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
2-Hexanone (MBK)	µg/L	< 10 U	< 10 U	< 10 U	< 10 U	**10.2**	< 10 U
Tetrachloroethene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Chlorobenzene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1,1,2-Tetrachloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
Ethylbenzene	µg/L	**28.4**	**60.5**	**35.5**	**79.8**	**20.4**	**19**
Styrene	µg/L	**213**	**811**	**256**	**1,120**	**37.6**	**88.8**
Bromoform	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,1,2,2-Tetrachloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 U
1,3,5-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
1,2,4-Trimethylbenzene	µg/L	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
Xylenes, Total	µg/L	**622**	**1,570**	**804**	**2,110**	**350**	**410**
Semi-Volatiles							
Naphthalene	µg/L	**7,110**	**18,200**	**13,100**	**23,000**	**7,340**	**5,470**
Total Volatile Organics	µg/L	**9,884**	**26,053**	**15,688**	**34,428**	**8,305**	**7,140**
Wet Chemistry							
Ferric Iron	mg/L	**0.53**	<0.10 U	<0.10 U	**3.3**	**1.5**	<0.10 U
Ferrous Iron	mg/L	**0.8**	**2.61**	**3.3**	**3.3**	**0.12**	**3.3**
Nitrite-N	mg/L	**0.022**	**0.25**	**0.14**	**0.11**	**0.038**	**0.91**
Nitrate-N	mg/L	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U
Nitrate/Nitrite-N	mg/L	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	**0.31**
Orthophosphate as P	mg/L	**0.25**	<0.03	<0.03	<0.03	**16.3**	<0.03
Sulfate as SO4	mg/L	**698**	**1,460**	**888**	**1,440**	**658**	**298**
Total Kjeldahl Nitrogen	mg/L	**102**	**69.6**	**46.7**	**63.3**	**192**	**29.8**
Metals							
Iron, Total	mg/L	**1.33**	**1.03**	**0.528**	**0.528**	**1.62**	**0.18**

Notes:

-- = Not Measured

Bold = Analyte Detected

mg/L =Milligram per liter

</U = Analyte not detected above corresponding laboratory reporting limit

µg/L = Micrograms per liter

Table 8
LNAPL Occurrence and Recovery
Cell 6: LNAPL Recovery System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Well	LNAPL Occurrence During Second Quarter 2013 (ft)	Total LNAPL Recovery Period		Cumulative Total LNAPL Recovered		Estimate LNAPL Recovered During Second Quarter 2013	
		Begin	End	(gal)	(lbs) (a)	(gal)	(lbs) (a)
RW-04	1.9	23-Jul-10	On-going (b)	1,116	8,178	32	234
BP-MW-05	0.6	28-Jan-10	On-going (b)	7,724	56,594	743	5,445
BP-MW-08	5.2	8-Sep-10	On-going (b)	816	5,972	62	454
BP-MW-11	0.6	23-Jul-10	9/8/2010	7.8	57	0	0
RW-02	0.4	28-Jan-11	On-going (c)	0.8	5.9	0	0
RW-03	0.8	24-Nov-10	On-going (c)	19.3	141	0	0
RW-01	0.3	28-Oct-11	On-going (c)	1.3	10	0	0
BP-MW-10	0.2	na	na	0	0	0	0
BP-MW-07	0.6	na	na	0	0	0	0
BP-MW-06	none	na	na	0	0	0	0
RW-05	none	na	na	0	0	0	0
BP-MW-09	none	na	na	0	0	0	0
CO19-PZM004	none	na	na	0	0	0	0
			Total Recovery:	**9,685**	**70,958**	**837**	**6,134**

Notes:

(a) Weight is calculated based on average BP-MW-05 and BP-MW-08 oil density of 0.878 grams per cubic centimeter, measured by EA (2009) by ASTM Method D1481

(b) Skimmer

(c) Bailing

(d) Cumulative recovery volumes are calculated using an estimated recovery from 12/28/11 to 1/18/12 as well as 5/24/12 to 6/22/12.

Table 9
Depths (feet) to Water and LNAPL
Cell 6: LNAPL Recovery System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Date	RW-01			RW-02			RW-03		
	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness
6/29/2013	11.9	12.2	0.3	11.9	12.3	0.4	10	10.8	0.8

Date	RW-04			BP-MW-05			BP-MW-07		
	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness
6/29/2013	11	12.9	1.9	11.8	12.4	0.6	11.6	11.7	0.1

Date	BP-MW-08			BP-MW-10			BP-MW-11		
	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness
6/29/2013	12.6	17.8	5.2	10.6	10.8	0.2	10.9	11.5	0.6

All measurement are presented in feet