



October 29, 2012

Mr. Andrew Fan  
US EPA Region III, 3WC23  
1650 Arch Street  
Philadelphia, PA 19103-2029

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

**Re: Consent Decree, Civil Action Nos. JFM-97-558, JFM-97-559  
*Coke Oven Area Interim Measures Progress Report September 2012***

Dear Mr. Fan and Ms. Brown:

Enclosed with this correspondence is the ***Coke Oven Area Interim Measures Progress Report for September 2012*** completed for the Sparrows Point Facility in accordance with the requirements outlined in the US EPA's September 2, 2010 approval letter for the Coke Oven Area Interim Measures work associated with the referenced Consent Decree. The report summarizes implementation progress for the approved interim measures (IMs) that have been developed to address identified environmental conditions at the Coke Oven Area through September 30, 2012.

Please contact me at 443-610-6503 should questions arise during your review of the enclosed progress report.

Sincerely,

Russell Becker  
Sparrows Point, LLC

Enclosure

# Coke Oven Area Interim Remedial Measures Progress Report

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## Introduction

In accordance with the United States Environmental Protection Agency's (US EPA)'s September 2, 2010 letter, this document is the monthly progress report for September 2012 for the US EPA approved interim measures (IMs) that have been developed to address identified environmental conditions at the Coke Oven Area (COA) Special Study Area at the Sparrows Point LLC facility (formerly owned by RG Steel Sparrows Point LLC) located in Sparrows Point, Maryland. This progress report summarizes IM progress for September 2012.

The following designations are applied in this document to the operating IM "Cells" (**Figure 1**) at the COA:

- Cell 1: Prototype 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, and
- Cell 6: Light Non-Aqueous Phase Liquid (LNAPL) Recovery at the Former Benzol Processing Area.

As of September 2012, Cells 1, 3, 4 and 6 continue to be operational. A preliminary review of activities associated with the current interim measures that have been implemented and those that are planned for the former COA was also completed by Sparrows Point LLC in September and early October 2012. Commentary and a path forward for potential interim measures that incorporate significant change in focus of site development and potential future use of the facility was submitted to the agencies in a letter dated October 23, 2012.

# Coke Oven Area Interim Remedial Measures Progress Report

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

Cell 1 consists of a prototype IM, which includes AS/SVE 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.

### September 2012 Operational Performance

Operational performance of Cell 1 during this reporting period is summarized in **Table 1**. In summary, the CATOX unit operated for 720 hours (100.0 %) during this reporting period. Operations were 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 0.10 pounds per operating hour (estimated monthly total of 72 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 9,439 pounds of recovered hydrocarbons. **Figure 3** presents a graph of the cumulative estimated monthly hydrocarbon recovery in Cell 1 since the startup of the IM system.

Soil gas samples were collected for laboratory and/or field instrument (e.g., photoionization detector [PID]) analysis to monitor CATOX unit performance. One (1) untreated soil gas sample was collected in a Tedlar® bag and submitted to TestAmerica Laboratories, Inc. in Knoxville, Tennessee (TestAmerica) for analysis by US EPA Method TO-15. The influent soil gas hydrocarbon concentration collected on September 27, 2012 was 60.7 parts per million by volume (ppmv) as summarized in **Table 2**.

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 sample collected on September 27, 2012 is representative of hydrocarbon concentrations for the entire month of August. 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.

### September 2012 Groundwater Monitoring Results

Groundwater samples were collected on September 14, 2012 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 Microbac Laboratories, Inc. of Baltimore, Maryland (Microbac) for the analyses shown in **Table 3**. These data indicate benzene is the most prevalent volatile organic compound (VOC) constituent.

**Figure 4** presents a graph of the total measured VOC concentration in Cell 1 groundwater for each well on a monthly basis since the startup of the IM system. Since system startup in August 2010, a decreasing total VOC concentration trend is documented at well CO18-PZM006 while a generally decreasing trend is observed at wells BP-MW-09 and CO02-PZM006. The identified trend for these monitoring wells will continue to be monitored and assessed during system operation in future months.

# Coke Oven Area Interim Remedial Measures Progress Report

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## 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.

### September 2012 Operational Performance

Operational performance of Cell 3 during this reporting period is summarized in **Table 4**. In summary, the CATOX unit operated for 720 hours (100 %) during September. Operations were 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 0.01 pounds per operating hour (estimated monthly total of 7.2 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 594 pounds of recovered hydrocarbons. **Figure 3** presents a graph of the cumulative estimated monthly hydrocarbon recovery in Cell 3 since the startup of the IM system.

Soil gas samples were collected for laboratory and/or field instrument (e.g., PID) analysis to monitor CATOX unit performance. One (1) untreated soil gas sample was collected in a Tedlar® bag and submitted to TestAmerica. The influent soil gas hydrocarbon concentration collected on September 27, 2012 was 10.38 ppmv 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 sample collected on September 27, 2012 is representative of hydrocarbon concentrations for the entire month of September. 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.

### September 2012 Cell 3 Groundwater Monitoring

Groundwater samples were collected on September 14, 2012 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 Microbac for the analyses shown in **Table 6**. These data indicate that benzene is the most prevalent VOC constituent.

**Figure 5** presents a graph of the total measured VOC concentration in Cell 3 groundwater for each well on a monthly basis relative to the baseline concentrations collected in February 2011. Since system startup on June 24, 2011, a decreasing VOC concentration trend is documented for each of the sampled wells. The trends for these monitoring wells will continue to be monitored and assessed during system operation in future months.

# Coke Oven Area Interim Remedial Measures Progress Report

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## 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.

### September 2012 Operations

The seventh amendment dosing event occurred in September.

### September 2012 Groundwater Monitoring Results

Groundwater samples were collected on September 24 and October 1, 2012 (before and after nutrient amendment, respectively) for comparison purposes. Groundwater samples were collected from the following wells (**Figure 7**):

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

The groundwater samples were submitted to Microbac for the analyses shown in **Table 7**. These data indicate naphthalene is the most prevalent VOC constituent.

**Figure 8** presents a graph of the total VOC concentrations in Cell 4 groundwater on a monthly basis, as well as before and after the dosing events. With the exception of MW-CELL4-1, a generally decreasing trend is observed at all monitored Cell 4 wells since system dosing was initiated in July 2011. Trends for these monitoring wells will continue to be monitored and assessed during system operation in future months.

# Coke Oven Area Interim Remedial Measures Progress Report

## Cell 6: LNAPL Extraction at the Former Benzol Processing Area

The Cell 6 LNAPL monitoring and recovery system was monitored twice during September 2012 (two [2] site visits). **Table 8** summarizes LNAPL occurrence and recovery observed during the reporting period, the start date of extraction from recovery wells and cumulative LNAPL recovered since the beginning of the interim measure.

During September, an estimated 308 gallons (2,257 pounds) of LNAPL were recovered, bringing the total recovered LNAPL to 7,752 gallons (56,797 pounds) as of September 27, 2012. The LNAPL was recovered from the following wells:

Well	LNAPL Recovery (gal/lbs)		Notes
	During September 2012	Total thru September 27, 2012	
BP-MW-05	308	46,437	c
RW-04	0	7,255	c
BP-MW-08	0	2,891	c
BP-MW-11	0	57	a
RW-03	0	141	d
RW-01	0	10	b
RW-02	0	5.9	b

(a) Recovery system moved from BP-MW-11 to BP-MW-08 on September 8, 2010

(b) Manual bailing

(c) Cumulative totals included estimated recovery from 12/28/11 to 1/18/12 as well as 5/24 to 6/22/12

(d) Began pumping RW-03 with a skimmer pump on August 6, 2012

The wells are presented in **Table 8** generally in the order of decreasing LNAPL occurrence/recovery. LNAPL thicknesses during the reporting period are summarized below (wells are not listed if LNAPL was not present):

- RW-04 (0.61 to 2.61 ft),
- BP-MW-05 (0.95 to 0.97 ft),
- BP-MW-08 (0.08 to 0.84 ft),
- BP-MW-11 (0.51 to 0.68 ft),
- BP-MW-10 (0.13 to 0.18 ft),
- RW-02 (0.15 to 0.20 ft),
- RW-03 (0.01 to 0.02 ft)
- RW-01 (0.17 to 0.25 ft), and
- BP-MW-07 (0.17 to 0.25 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.

# TABLES

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**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 September 2012 Estimated Hydrocarbon Recovery**

Parameter	Units	Quantity
Total CATOX Operating Time (September 1 - September 30, 2012)	hours	720
Overall CATOX Operational Time	%	100
Estimated Total Hydrocarbons Destroyed	pounds	72
Estimated Hydrocarbon Removal Rate	pounds/hour	0.1

**Cell 1 Cumulative Summary of Estimated Hydrocarbon Recovery**

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - September 30, 2012)	hours	15,120
Overall CATOX Operational Time	%	79.9
Estimated Total Hydrocarbons Destroyed	pounds	9,439
Estimated Hydrocarbon Removal Rate	pounds/hour	0.62

**Table 2**  
**Summary of Soil Gas Analytical Results (September 2012)**  
**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 9/27/2012 13:30 1553.96
<b>TO-15 Volatile Organics</b>		
trans-1,3-Dichloropropene	ppb	< 310 U
Acetone	ppb	< 7800 U
Ethylbenzene	ppb	< 310 U
2-Hexanone	ppb	< 780 U
Methylene Chloride	ppb	< 780 U
<b>Benzene</b>	<b>ppb</b>	<b>44,000</b>
1,1,2,2-Tetrachloroethane	ppb	< 310 U
Tetrachloroethene	ppb	< 310 U
<b>Toluene</b>	<b>ppb</b>	<b>12,000</b>
1,1,1-Trichloroethane	ppb	< 310 U
1,1,2-Trichloroethane	ppb	< 310 U
Trichloroethene	ppb	< 310 U
Vinyl Chloride	ppb	< 310 U
<b>o-Xylene</b>	<b>ppb</b>	<b>1,400</b>
<b>m-Xylene &amp; p-Xylene</b>	<b>ppb</b>	<b>3,300</b>
2-Butanone (MEK)	ppb	< 1600 U
4-Methyl-2-pentanone (MIBK)	ppb	< 780 U
Bromoform	ppb	< 310 U
Carbon Disulfide	ppb	< 780 U
Carbon tetrachloride	ppb	< 59 U
Chlorobenzene	ppb	< 310 U
Chloroethane	ppb	< 310 U
Chloroform	ppb	< 310 U
1,1-Dichloroethane	ppb	< 310 U
1,2-Dichloroethane	ppb	< 310 U
1,1-Dichloroethene	ppb	< 310 U
trans-1,2-Dichloroethene	ppb	< 310 U
1,2-Dichloropropane	ppb	< 310 U
cis-1,3-Dichloropropene	ppb	< 310 U
<b>Total Volatile Organics</b>	<b>ppb</b>	<b>60,700</b>

**Notes:**

**BOLD** = Analyte detected

ppb = parts per billion

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

**Table 3**  
**Summary of Groundwater Analytical Results (September 2012)**  
**Cell 1: Prototype AS/SVE System in Former Benzol Processing Area**  
**Former Coke Oven Area Interim Remedial Measures**  
**Sparrows Point, LLC**

Analyte	Sample ID Date Units	CO02-PZM006	CO18-PZM006	BP-MW-09
		9/14/2012	9/14/2012	9/14/2012
<b>Volatile Organics</b>				
Vinyl Chloride	µg/L	< 1,000 U	< 500 U	< 500 U
Chloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
1,1-Dichloroethene	µg/L	< 1,000 U	< 500 U	< 500 U
Acetone	µg/L	< 25,000 U	< 12,000 U	< 12,000 U
Carbon Disulfide	µg/L	< 1,000 U	< 500 U	< 500 U
Methylene Chloride	µg/L	< 5,000 U	< 2,500 U	< 2,500 U
trans-1,2-Dichloroethene	µg/L	< 1,000 U	< 500 U	< 500 U
1,1-Dichloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
2-Butanone (MEK)	µg/L	< 2,500 U	< 2,500 U	< 2,500 U
Chloroform	µg/L	< 1,000 U	< 500 U	< 500 U
1,1,1-Trichloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
Carbon Tetrachloride	µg/L	< 1,000 U	< 500 U	< 500 U
<b>Benzene</b>	µg/L	<b>300,000</b>	<b>16,000</b>	<b>230,000</b>
1,2-Dichloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
Trichloroethene	µg/L	< 1,000 U	< 500 U	< 500 U
1,2-Dichloropropane	µg/L	< 1,000 U	< 500 U	< 500 U
Methyl Isobutyl Ketone (MIBK)	µg/L	< 5,000 U	< 2,500 U	< 2,500 U
cis-1,3-Dichloropropene	µg/L	< 1,000 U	< 500 U	< 500 U
<b>Toluene</b>	µg/L	< 1,000 U	<b>1,400</b>	<b>51,000</b>
trans-1,3-Dichloropropene	µg/L	< 1,000 U	< 500 U	< 500 U
1,1,2-Trichloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
2-Hexanone (MBK)	µg/L	< 5,000 U	< 2,500 U	< 2,500 U
Tetrachloroethene	µg/L	< 1,000 U	< 500 U	< 500 U
Chlorobenzene	µg/L	< 1,000 U	< 500 U	< 500 U
1,1,1,2-Tetrachloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
Ethylbenzene	µg/L	< 1,000 U	< 500 U	< 500 U
Bromoform	µg/L	< 1,000 U	< 500 U	< 500 U
1,1,2,2-Tetrachloroethane	µg/L	< 1,000 U	< 500 U	< 500 U
<b>Total Xylenes</b>	µg/L	< 3,000 U	< 1,500 U	<b>34,000</b>
<b>Total Volatile Organics</b>	µg/L	<b>300,000</b>	<b>17,400</b>	<b>281,000</b>

**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 September 2012 Estimated Hydrocarbon Recovery**

Parameter	Units	Quantity
Total CATOX Operating Time (September 1 - September 30, 2012)	hours	720
Overall CATOX Operational Time	%	100
Estimated Total Hydrocarbons Destroyed	pounds	7.2
Estimated Hydrocarbon Removal Rate	pounds/hour	0.01

**Cell 3 Cumulative Summary of Estimated Hydrocarbon Recovery**

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - September 30, 2012)	hours	9,770
Overall CATOX Operational Time	%	83.4
Estimated Total Hydrocarbons Destroyed	pounds	593.9
Estimated Hydrocarbon Removal Rate	pounds/hour	0.65

**Table 5**  
**Summary of Soil Gas Analytical Results (September 2012)**  
**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 9/27/2012 13:00 295.62
<b>TO-15 Volatile Organics</b>		
trans-1,3-Dichloropropene	ppb	< 59 U
Acetone	ppb	< 1500 U
Ethylbenzene	ppb	< 59 U
2-Hexanone	ppb	< 150 U
Methylene Chloride	ppb	< 150 U
<b>Benzene</b>	<b>ppb</b>	<b>9,500</b>
1,1,2,2-Tetrachloroethane	ppb	< 59 U
Tetrachloroethene	ppb	< 59 U
<b>Toluene</b>	<b>ppb</b>	<b>810</b>
1,1,1-Trichloroethane	ppb	< 59 U
1,1,2-Trichloroethane	ppb	< 59 U
Trichloroethene	ppb	< 59 U
Vinyl Chloride	ppb	< 59 U
o-Xylene	ppb	< 59 U
<b>m-Xylene &amp; p-Xylene</b>	<b>ppb</b>	<b>68</b>
2-Butanone (MEK)	ppb	< 300 U
4-Methyl-2-pentanone (MIBK)	ppb	< 150 U
Bromoform	ppb	< 59 U
Carbon Disulfide	ppb	< 150 U
Carbon tetrachloride	ppb	< 59 U
Chlorobenzene	ppb	< 59 U
Chloroethane	ppb	< 59 U
Chloroform	ppb	< 59 U
1,1-Dichloroethane	ppb	< 59 U
1,2-Dichloroethane	ppb	< 59 U
1,1-Dichloroethene	ppb	< 59 U
trans-1,2-Dichloroethene	ppb	< 59 U
1,2-Dichloropropane	ppb	< 59 U
cis-1,3-Dichloropropene	ppb	< 59 U
<b>Total Volatile Organics</b>	<b>ppb</b>	<b>10,378</b>

**Notes:**

**BOLD** = Analyte detected

ppb = parts per billion

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

**Table 6**  
**Summary of Groundwater Analytical Results (September 2012)**  
**Cell 3: Prototype AS/SVE System in Former Benzol Processing Area**  
**Former Coke Oven Area Interim Remedial Measures**  
**RG Steel Sparrows Point, LLC**

Analyte	Sample ID	CO30-PZM015	MW-CELL 3-1	MW-CELL 3-2	MW-CELL 3-3
	Date	9/14/2012	9/14/2012	9/14/2012	9/14/2012
	Units				
<b>Volatile Organics</b>					
Vinyl Chloride	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Chloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,1-Dichloroethene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Acetone	µg/L	< 12,000 U	< 12,000 U	< 2,500 U	< 250 U
Carbon Disulfide	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Methylene Chloride	µg/L	< 2,500 U	< 2,500 U	< 500 U	< 50 U
trans-1,2-Dichloroethene	µg/L	< 1,000 U	< 500 U	< 500 U	< 500 U
1,1-Dichloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
2-Butanone (MEK)	µg/L	< 2,500 U	< 2,500 U	< 500 U	< 50 U
Chloroform	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,1,1-Trichloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Carbon Tetrachloride	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
<b>Benzene</b>	µg/L	<b>56,000</b>	<b>3,800</b>	<b>13,000</b>	<b>11,000</b>
1,2-Dichloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Trichloroethene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,2-Dichloropropane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Methyl Isobutyl Ketone (MIBK)	µg/L	< 2,500 U	< 2,500 U	< 500 U	< 50 U
cis-1,3-Dichloropropene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
<b>Toluene</b>	µg/L	<b>4,100</b>	<b>320</b>	<b>700</b>	<b>940</b>
trans-1,3-Dichloropropene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,1,2-Trichloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
2-Hexanone (MBK)	µg/L	< 2,500 U	< 2,500 U	< 500 U	< 50 U
Tetrachloroethene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Chlorobenzene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,1,1,2-Tetrachloroethane	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Ethylbenzene	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
Bromoform	µg/L	< 500 U	< 500 U	< 100 U	< 10 U
1,1,2,2-Tetrachloroethane	µg/L	< 500 U	< 500 U	< 500 U	< 500 U
<b>Total Xylenes</b>	µg/L	<b>&lt; 3,000 U</b>	<b>&lt; 1,500 U</b>	<b>34,000</b>	<b>470</b>
<b>Total Volatile Organics</b>	µg/L	<b>60,100</b>	<b>4,120</b>	<b>13,700</b>	<b>11,940</b>

**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 September 2012 (ft)	Total LNAPL Recovery Period		Cumulative Total LNAPL Recovered		Estimate LNAPL Recovered During September 2012	
		Begin	End	(gal)	(lbs) (a)	(gal)	(lbs) (a)
RW-04	0.61 to 2.61	23-Jul-10	On-going (b)	990	7,255	0	0
BP-MW-05	0.95 to 0.97	28-Jan-10	On-going (b)	6,338	46,437	308	2,257
BP-MW-08	0.08 to 0.84	8-Sep-10	On-going (b)	395	2,891	0	0
BP-MW-11	0.51 to 0.68	23-Jul-10	9/8/2010	7.8	57	0	0
RW-02	0.15 to 0.20	28-Jan-11	On-going (c)	0.8	5.9	0	0
RW-03	0.01 to 0.02	24-Nov-10	On-going (c)	19.3	141	0	0
RW-01	0.17 to 0.25	28-Oct-11	On-going (c)	1.3	10	0	0
BP-MW-10	0.13 to 0.18	na	na	0	0	0	0
BP-MW-07	0.17 to 0.25	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
<b>Total Recovery:</b>				<b>7,752</b>	<b>56,797</b>	<b>308</b>	<b>2,257</b>

**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
9/10/2012	11.29	11.46	0.17	11.59	11.79	0.2	9.36	9.38	0.02
9/27/2012	11.7	11.95	0.25	12.03	12.18	0.15	9.77	9.78	0.01
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
9/10/2012	9.2	11.81	2.61	11.1	12.05	0.95	9.96	9.98	0.02
9/27/2012	9.8	10.41	0.61	11.48	12.45	0.97	11.33	11.35	0.02
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
9/10/2012	12.11	12.19	0.08	8.35	8.48	0.13	10.44	10.95	0.51
9/27/2012	12.46	13.3	0.84	8.95	9.13	0.18	11.03	11.71	0.68

All measurement are presented in feet

# FIGURES

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**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


APPROXIMATE SCALE



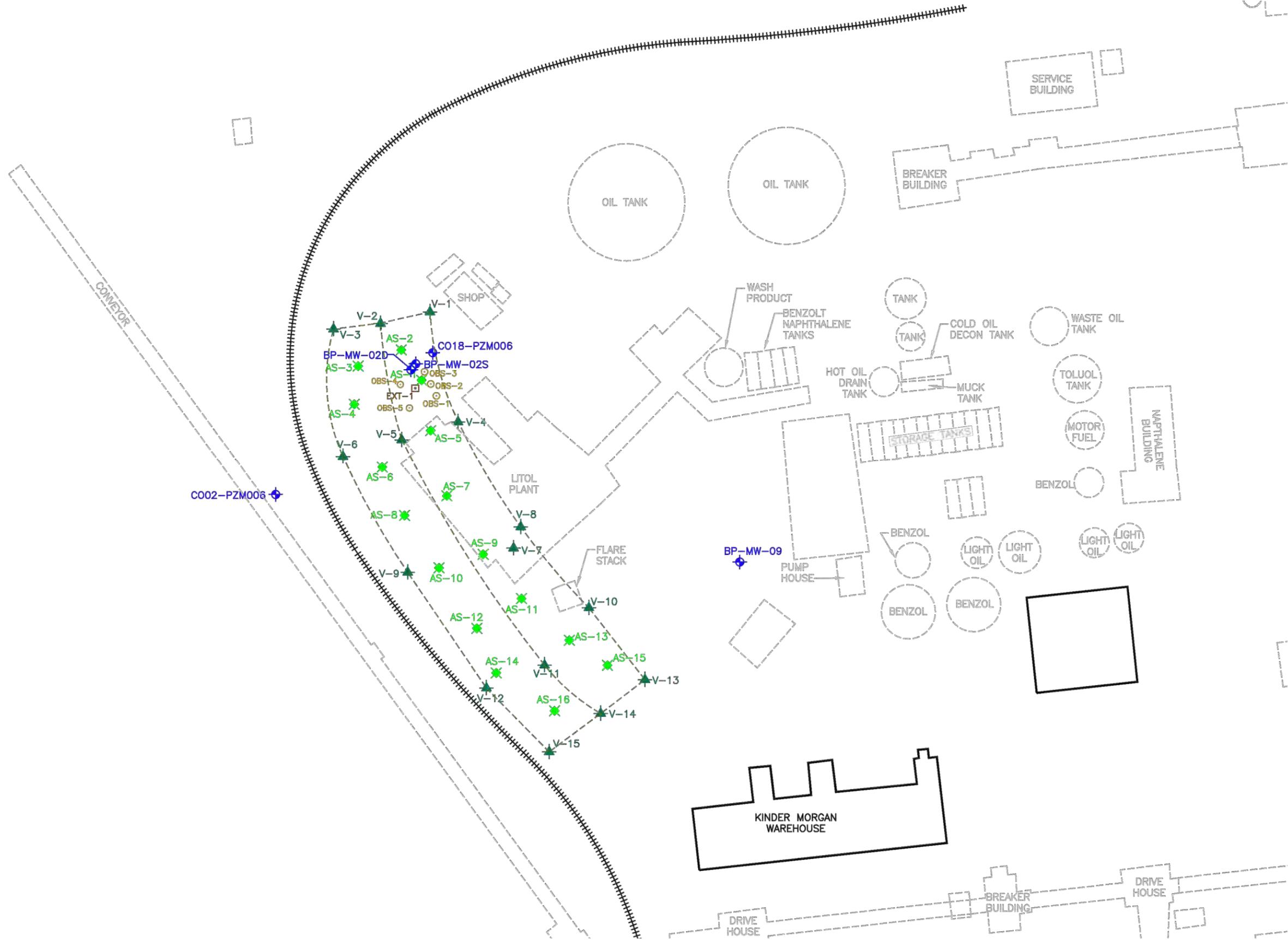
Project  
Sparrows Point, LLC  
Baltimore, Maryland

**INTERIM MEASURES TREATMENT AREAS**

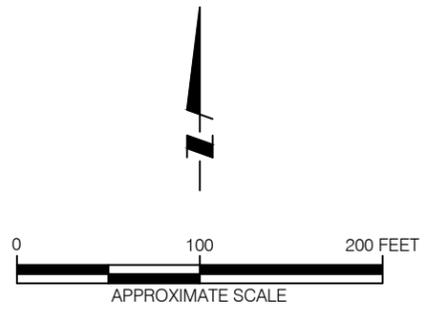
Project Number E-2439.01		File Number E2439-2012-08-01	
Date October 30, 2012			Figure <b>1</b>
PE/PG MZ	PM DB	Drafter SS	

Image source: World Imagery, ESRI, GeoEye, 2009.

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- 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)



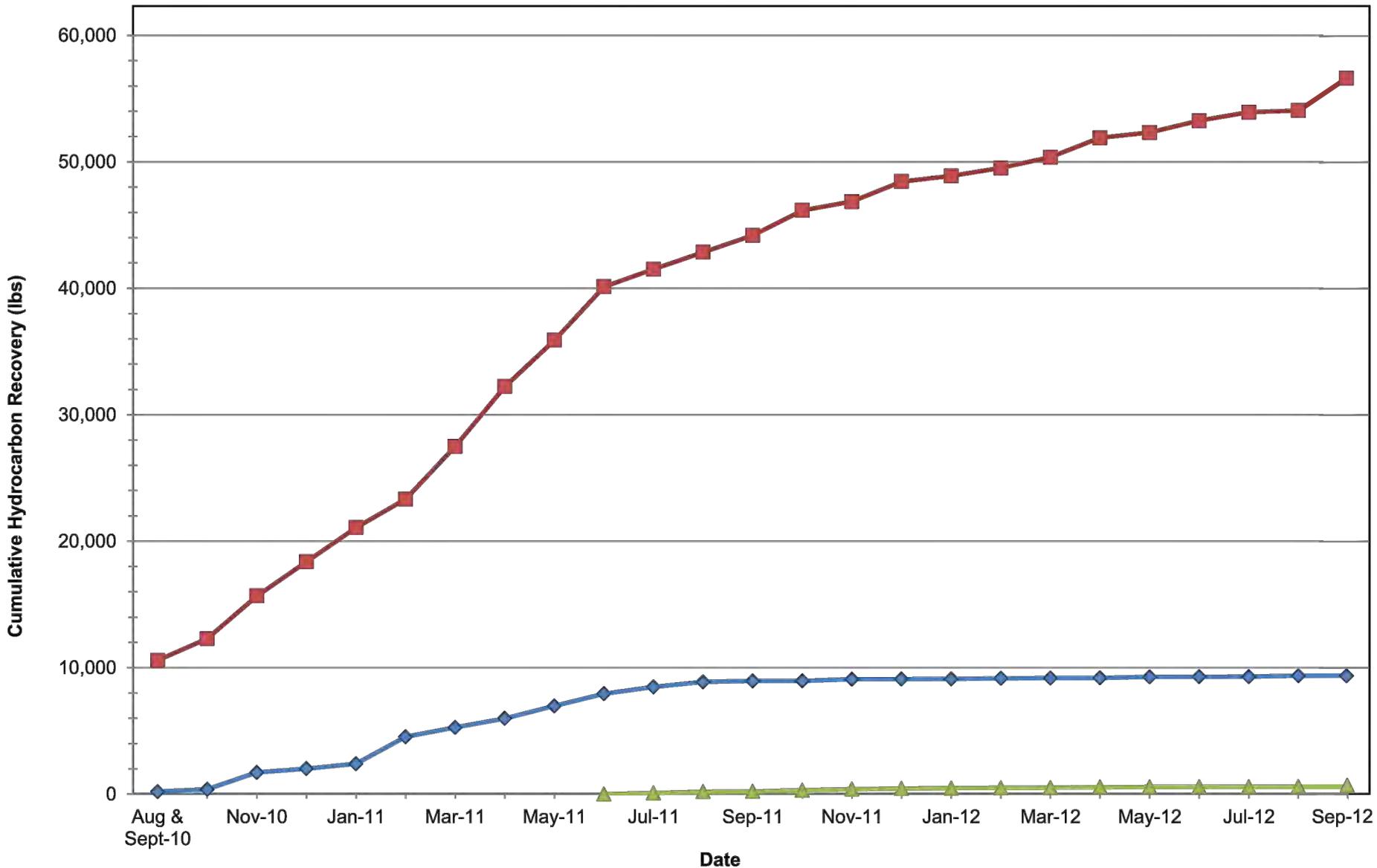
Project  
Sparrows Point, LLC  
Baltimore, Maryland

**AS-BUILT LAYOUT PLAN CELL 1 FORMER BENZOL PROCESSING AREA**

Project Number E-2439.01 File Number E2439-2012-08-02

Date October 30, 2012 Figure 2

PE/PG MZ	PM DB	Drafter SS
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**Cumulative Summary of Estimated Hydrocarbon Recovery  
Former Coke Oven Area Interim Remedial Measures  
Sparrows Point, LLC**

**CUMULATIVE SUMMARY OF  
ESTIMATED HYDROCARBON  
RECOVERY  
Sparrows Point, LLC  
---  
Baltimore, Maryland**

◆ Cell 1    ■ Cell 6    ▲ Cell 3

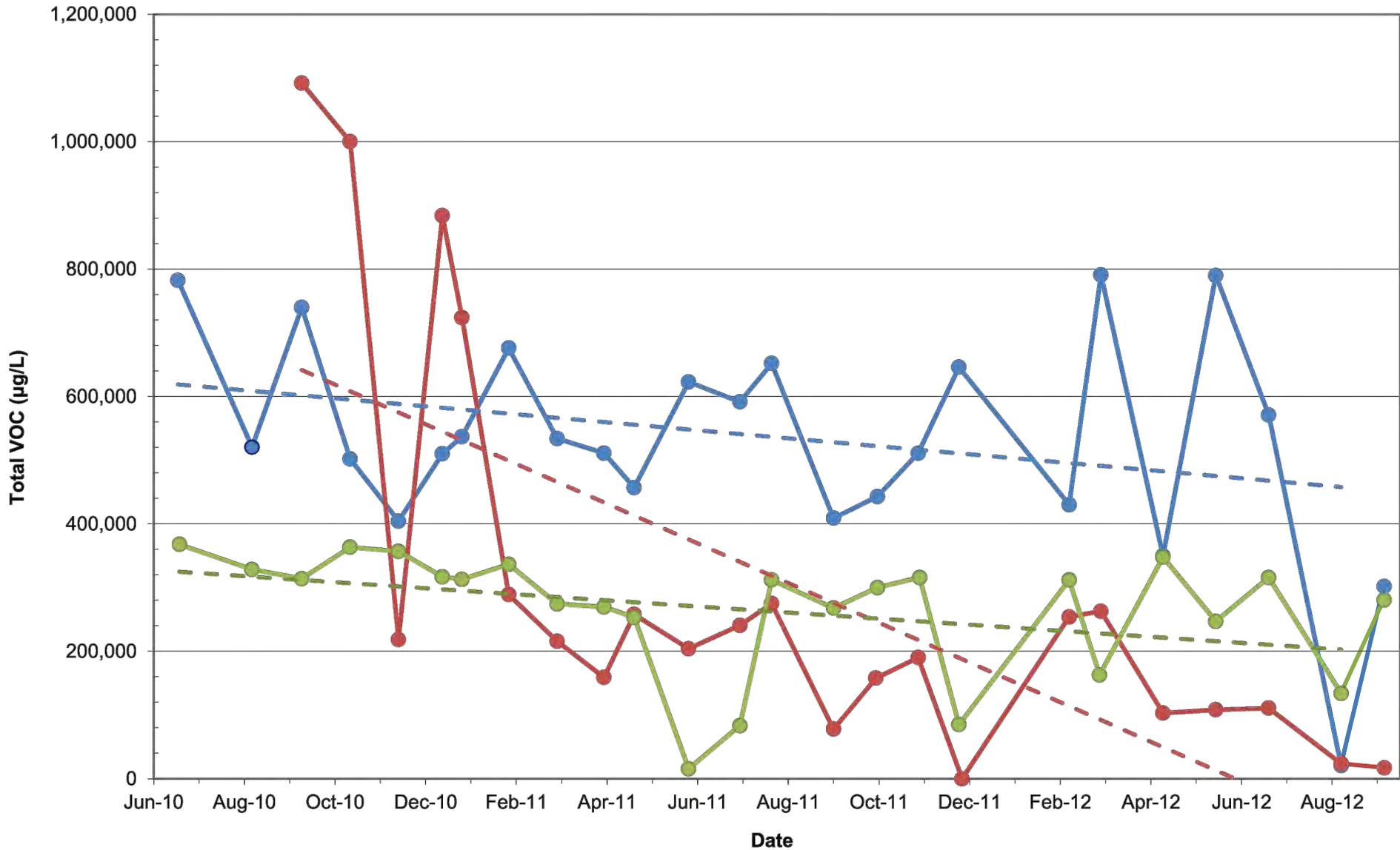
Date  
October 30, 2012

Drafter  
SS

PE/PG  
MZ  
Project Manager  
DB

Project Number  
E-2439.01  
File  
E2439-2012-08-03

Figure  
**3**



**Measured Groundwater VOC Concentration by Month  
Cell 1: Prototype AS/SVE System in the "Cove" Area  
Sparrows Point, LLC**

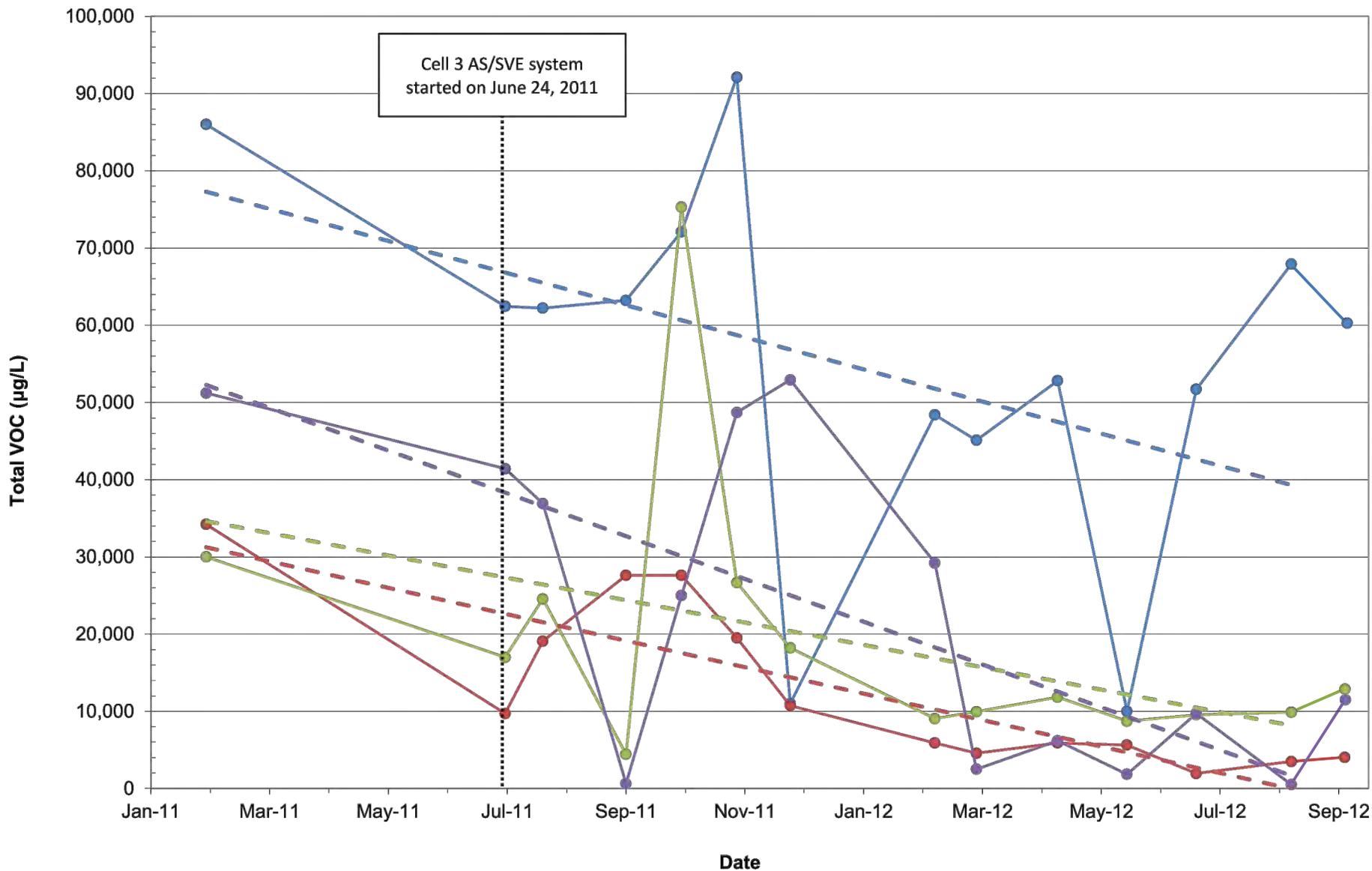
**MEASURED GROUNDWATER  
VOC CONCENTRATION BY  
MONTH  
Sparrows Point, LLC  
---  
Baltimore, Maryland**

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

Date  
October 31, 2012

Drafter  
SS

PE/PG MZ	Project Number E-2439.01	Figure <b>4</b>
Project Manager DB	File E2439-2012-08-04	



**Measured Groundwater VOC Concentration by Month  
Cell 3: Prototype AS/SVE System in the "Cove" Area  
Sparrows Point, LLC**

**MEASURED GROUNDWATER  
VOC CONCENTRATION BY  
MONTH**  
Sparrows Point, LLC  
---  
Baltimore, Maryland

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

Date  
October 31, 2012

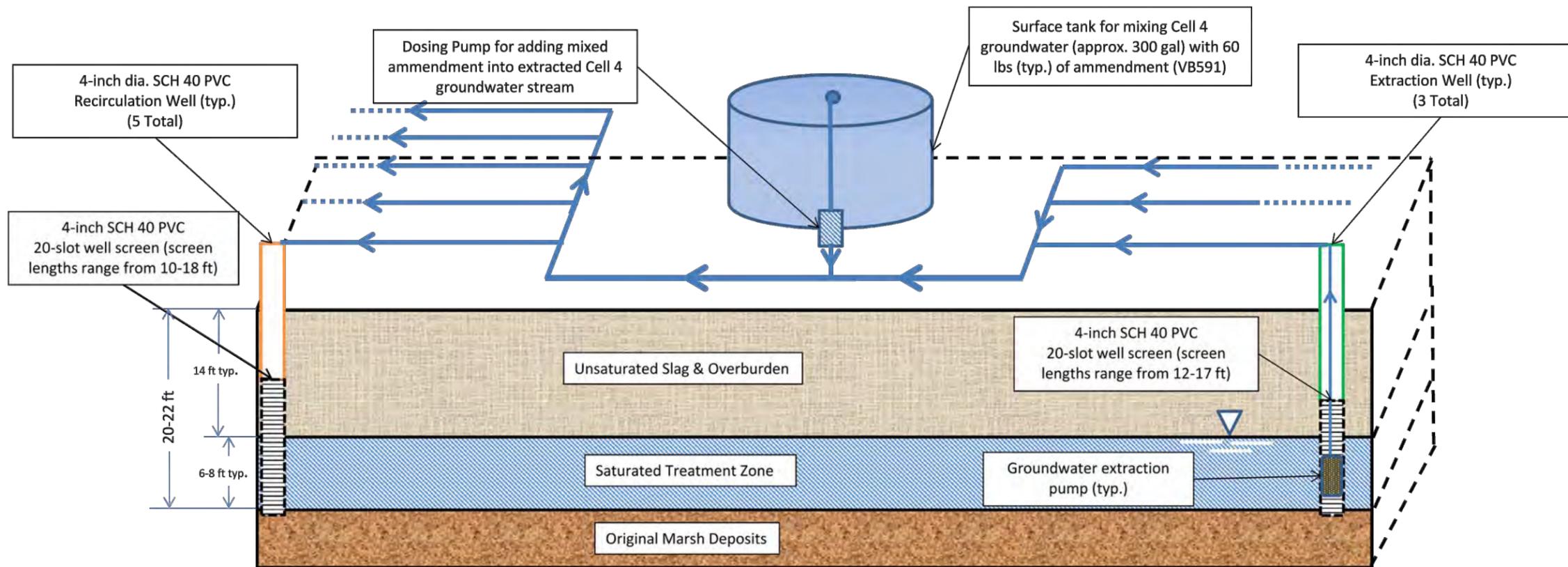
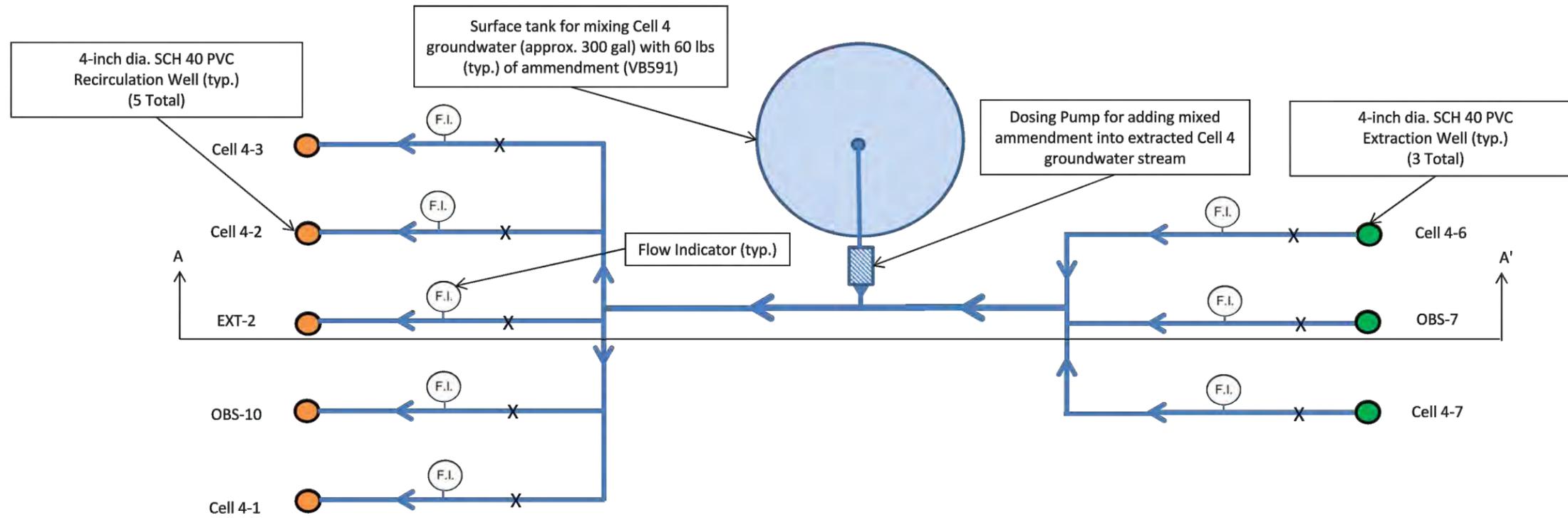
Drafter  
SS

PE/PG  
MZ  
Project Manager  
DB

Project Number  
E-2439.01  
File  
E2439-2012-08-05

Figure  
**5**

**Schematic Layout and Sections  
Cell 4 In-Situ Anaerobic Bio-Treatment System  
Former Coke Oven Area Interim Remedial Measures  
Sparrows Point, LLC**



Section A-A' (not to scale)



Project  
Sparrows Point, LLC  
Baltimore, Maryland

**SCHEMATIC LAYOUT AND SECTIONS**

Project Number E-2439.01	File Number E2439-2012-08-06	
Date October 30, 2012	Figure 6	
PE/PG MZ	PM DB	Drafter SS

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# Cell 4

## In-Situ Anaerobic Bio-System



Image source: World Imagery, ESRI, GeoEye, 2009.

### Legend

- Extraction Well (Existing)
- Extraction Well (New)
- Recirculation Well (Existing)
- Recirculation Well (New)
- ⊕ Monitoring Well (Existing)
- ⊕ Monitoring Well (New)
- ➔ Groundwater Flow Direction



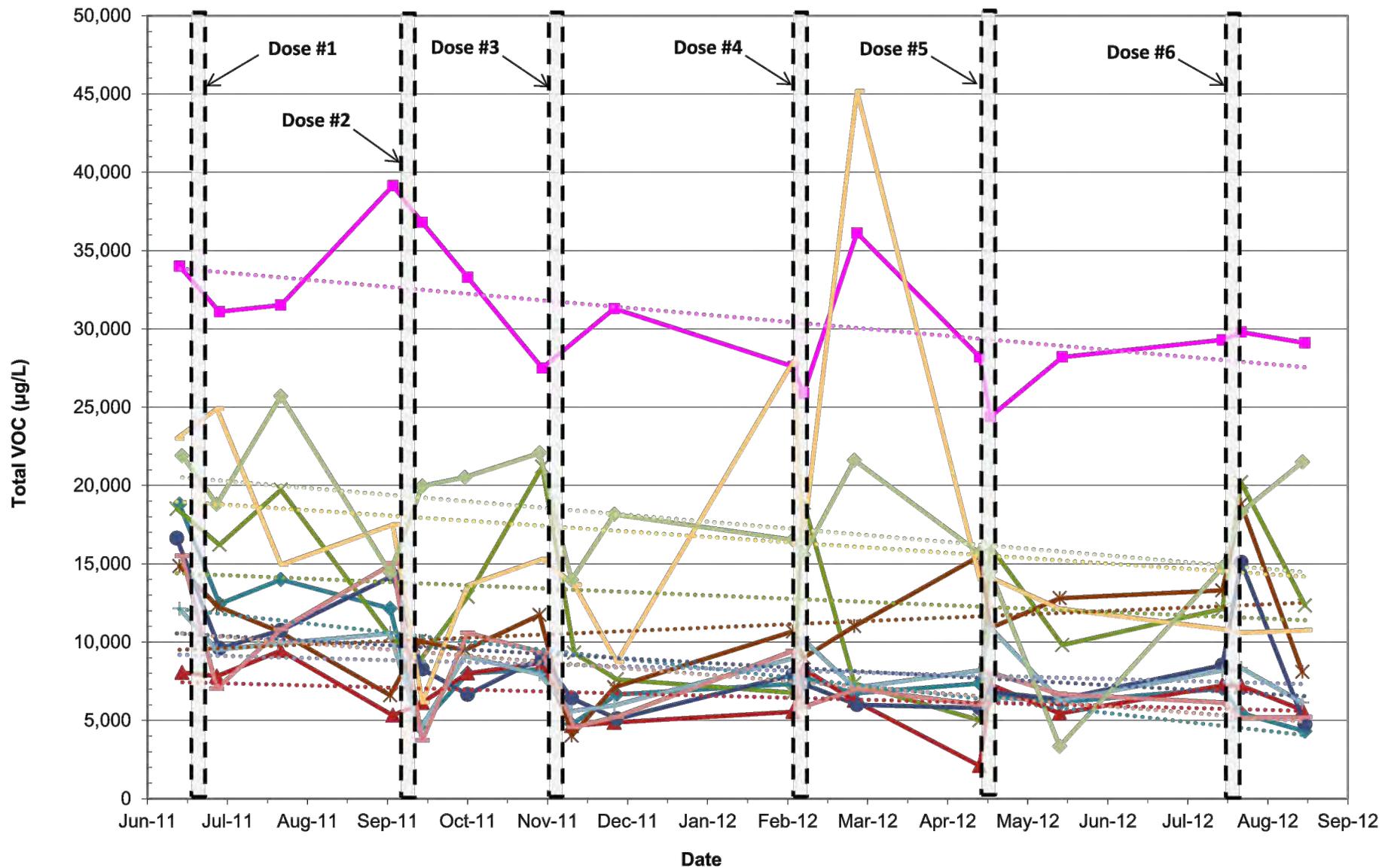
### CELL 4 WELLS

Sparrows Point, LLC  
 ----  
 Baltimore, Maryland



Date	Drafter
October 30, 2012	SS

PE/PG	Project Number	Figure
MZ	E-2439.01	
Project Manager	File	7
DB	E2439-2012-08-07	



**Measured Groundwater VOC Concentration by Month  
Cell 4: In-Situ Anaerobic Bio-Treatment Area  
Sparrows Point, LLC**

- 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

**MEASURED GROUNDWATER  
VOC CONCENTRATION BY  
MONTH  
Sparrows Point, LLC  
---  
Baltimore, Maryland**

Date	Drafter
October 30, 2012	SS

PE/PG	Project Number	Figure
MZ	E-2439.01	
Project Manager	File	8
DB	E2439-2012-08-08	