



May 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: CONSENT DECREE, CIVIL ACTION NOS. JFM-97-558, JFM-97-559
COKE OVEN AREA INTERIM MEASURES PROGRESS REPORT 1ST QUARTER 2013

Dear Mr. Fan and Ms. Brown:

Enclosed with this correspondence is the Coke Oven Area Interim Measures Progress Report for the first quarter of 2013 completed for the Sparrows Point Facility. This report was distributed electronically on May 1, 2013 in accordance with the outlined reporting requirements; this correspondence provides paper copies for your use.

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 April 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

Coke Oven Area Interim Remedial Measures Progress Report

Introduction

This document presents the 1st quarter 2013 progress report for 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 located in Sparrows Point, Maryland. This progress report summarizes IM progress for the first 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 first quarter 2013, Cells 1, 3, 4 and 6 continue to be operational. During the first quarter of 2013, groundwater and soil gas sampling were conducted 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. In addition, an amendment dosing event was completed for Cell 4 to continue enhancement of bio-treatment in this area.

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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.

First 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 1,127 hours (52.2 %) during this reporting period. Operation of this system during the quarter was modified from a continuous operation to a pulsed operating practice, where the system was 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 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 1.25 pounds per operating hour (estimated quarterly total of 1403.9 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 10,982 pounds of recovered hydrocarbons. Improvements were noted in the operational performance of the system using the pulsed operating practice and this mode will be continued in the future.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. Seven (7) 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 seven samples taken throughout the first quarter was 935,578 micrograms per cubic meter (ug/m^3) 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

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samples collected throughout the first 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.

First Quarter 2013 Groundwater Monitoring Results

Groundwater samples were collected on February 21, 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.

First 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 1,127 hours (52.2%) during the first quarter of 2013. Operation of this system during the quarter was modified from a continuous operation to a

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pulsed operating practice, where the system was 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 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 0.62 pounds per operating hour (estimated quarterly total of 695.7 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 1,304.2 pounds of recovered hydrocarbons. Improvements were noted in the operational performance of the system using the pulsed operating practice and this mode will be continued in the future.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. Seven (7) 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 first quarter was 468,914 ug/m³ 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 first 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.

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November 2012 Cell 3 Groundwater Monitoring

Groundwater samples were collected on February 21, 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 each 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.

First Quarter 2013 Operations

The eighth amendment dosing event occurred from March 25 –March 27, 2013. Sixty (60) pounds of amendment (VB591) was mixed into 300 gallons of Cell 4 groundwater. Extracted groundwater from wells OBS-8, MW-Cell4-6 and MW-Cell4-7 was mixed with amendment and circulated back into the groundwater at wells MW-Cell4-1, OBS-10, EXT-2, MW-Cell4-2 and MW-Cell4-3. Overall, a total of approximately 3,112 gallons of groundwater (including the 300 gallons of amendment mixture) were re-circulated in the Cell 4 bio-treatment area.

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Dosing Event Observations

A double diaphragm dosing pump was used to transfer the groundwater – amendment mixture from the poly tank into the groundwater flow line so that the amendment mixture was evenly and continuously distributed into the groundwater flow from OBS-8, MW-Cell4-6 and MW-Cell4-7 to the five (5) recirculation wells. The pump rates from OBS-8, MW-Cell4-6 and MW-Cell4-7 were maintained around 3-4 gallons per minute (gpm).

First Quarter 2013 Groundwater Monitoring Results

Groundwater samples were collected on February 21, 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 include naphthalene analytical results based on EPA Method 8260 only and appear to not be representative of groundwater conditions based on previous sampling and analytical data. As such, this data has not been included in trending use or evaluation of the performance of this IM cell. Future quarterly sampling events will also analyze for naphthalene using EPA Method 8270.

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Cell 6: LNAPL Extraction at the Former Benzol Processing Area

The Cell 6 LNAPL monitoring and recovery system was monitored weekly during the first quarter of 2013. **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. **Figure 9** illustrates the well locations. An estimated 685 gallons (5,020 pounds) of LNAPL were recovered during the first quarter October and November, bringing the total recovered LNAPL to 8,848 gallons (64,825 pounds) as of March 31, 2013. The LNAPL was recovered from the following wells:

Well	LNAPL Recovery (gal/lbs)		Notes
	1 st Qtr 2013	Total thru 1 st Qtr 2013	
BP-MW-05	503/3,686	6,981/51,149	c
RW-04	68/498	1,084/7,944	c
BP-MW-08	114/835	754/5,518	c
BP-MW-11	0/0	8/57	a
RW-03	0/0	19/141	d
RW-01	0/0	1/10	b
RW-02	0/0	0.8/5.9	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**. LNAPL thicknesses during the reporting period are summarized below (wells are not listed if LNAPL was not present):

- RW-04 (1.86ft),
- BP-MW-05 (0.92ft),
- BP-MW-08 (0.14ft),
- BP-MW-11 (0.68 ft),
- BP-MW-10 (0.18 ft),
- RW-02 (0.16 ft),
- RW-03 (0.46 ft)
- RW-01 (0.06 ft), and

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- BP-MW-07 (0.68 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

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 First Quarter 2013 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (January 1 - March 31, 2013)	hours	1,127
Overall CATOX Operational Time	%	52.2%
Estimated Total Hydrocarbons Destroyed	pounds	1403.9
Estimated Hydrocarbon Removal Rate	pounds/hour	1.25

Cell 1 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 -March 31, 2013)	hours	17,640
Overall CATOX Operational Time	%	72.7%
Estimated Total Hydrocarbons Destroyed	pounds	10,982
Estimated Hydrocarbon Removal Rate	pounds/hour	0.6

Table 2
Summary of Soil Gas Analytical Results (First 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 Q1 2013
TO-15 Volatile Organics		
trans-1,3-Dichloropropene	ug/m ³	< 310 U
Acetone	ug/m ³	< 7,700 U
Ethylbenzene	ug/m³	977
2-Hexanone	ug/m ³	< 770 U
Methylene Chloride	ug/m ³	< 770 U
Benzene	ug/m³	907,987
1,1,2,2-Tetrachloroethane	ug/m ³	< 310 U
Tetrachloroethene	ug/m ³	< 310 U
Toluene	ug/m³	27,591
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/m³	5,436
m-Xylene & p-Xylene	ug/m³	8,000
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/m³	291
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/m³	935,578

Notes:

BOLD = Analyte detected

ug/m³ = micro grams per cubic meter

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

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

Analyte	Sample ID	CO02-PZM006	CO18-PZM006	BP-MW-09
	Date	2/21/2013	2/21/2013	2/21/2013
	Units			
Volatile Organics				
Vinyl Chloride	µg/L	< 100 U	< 100 U	< 100 U
Chloroethane	µg/L	< 100 U	< 100 U	< 100 U
1,1-Dichloroethene	µg/L	< 100 U	< 100 U	< 100 U
Acetone	µg/L	< 10 U	99.4	< 10 U
Carbon Disulfide	µg/L	< 1 U	5.6	< 1 U
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	159,000	318,000	19,600
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	1,260	15,000	4,710
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	457	73.1	1,110
Styrene	µg/L	49.9	4.1	283
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	110	< 100 U	< 100 U
1,2,4-Trimethylbenzene	µg/L	360	< 100 U	< 100 U
Total Xylenes	µg/L	1,740	1820	5,380
Total Volatile Organics	µg/L	162,470	334,820	31,083

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 November 2012 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (January 1 - March 31, 2013)	hours	1,127
Overall CATOX Operational Time	%	52.2%
Estimated Total Hydrocarbons Destroyed	pounds	695.7
Estimated Hydrocarbon Removal Rate	pounds/hour	0.62

Cell 3 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 -March 31, 2013)	hours	12,359
Overall CATOX Operational Time	%	93.8%
Estimated Total Hydrocarbons Destroyed	pounds	1,304.2
Estimated Hydrocarbon Removal Rate	pounds/hour	0.11

Table 5
Summary of Soil Gas Analytical Results (First 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 Q1 2013
TO-15 Volatile Organics		
trans-1,3-Dichloropropene	ug/m ³	< 30 U
Acetone	ug/m ³	< 740 U
Ethylbenzene	ug/m ³	533
2-Hexanone	ug/m ³	< 74 U
Methylene Chloride	ug/m ³	< 74 U
Benzene	ug/m³	443,286
1,1,2,2-Tetrachloroethane	ug/m ³	< 30 U
Tetrachloroethene	ug/m ³	< 30 U
Toluene	ug/m³	19,231
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/m³	1,484
m-Xylene & p-Xylene	ug/m³	6,397
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/m³	468,914

Notes:

BOLD = Analyte detected

ug/m³ = micro grams per cubic meter

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

Table 6
Summary of Groundwater Analytical Results (First 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

Analyte	Sample ID	CO30-PZM015	MW-CELL 3-1	MW-CELL 3-2	MW-CELL 3-3
	Date	2/21/2013	2/21/2013	2/21/2013	2/21/2013
	Units				
Volatiles 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	20.5
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	74,100	18,600	20,700	39,200
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	4,680	1,110	1,350	3,410
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	110	21.7	27.4	89.8
Styrene	µg/L	34.5	9.8	11.2	26.7
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	1,230	239	278	1,110
Total Volatile Organics	µg/L	80,120	19,949	22,050	42,610

Table 7
Summary of Groundwater Analytical Results (First 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	2/21/2013	2/21/2013	2/21/2013	2/21/2013	2/21/2013	2/21/2013	
Time	20:50	8:54	16:10	8:16	10:16	14:00	
Units							
Volatile Organics							
Vinyl Chloride	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 500 U	
Chloroethane	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 500 U	
1,1-Dichloroethene	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 500 U	
Acetone	µg/L	< 10 U	10.5	< 10 U	16.4	14.4	< 10 U
Carbon Disulfide	µg/L	< 100 U	< 500 U	< 100 U	< 500 U	< 100 U	< 500 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	847	2,540	1,010	4,530	1,410	323
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	727	2,110	650	3,340	968	190
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	< 500 U	< 2,500 U	< 500 U	< 2,500 U	< 500 U	< 2,500 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	40.4	57.8	44.7	80.5	39.5	15
Styrene	µg/L	261	681	251	1120	283	43
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	729	1050	781	2,250	711	270
Semi-Volatiles							
Naphthalene	µg/L	<2	<2	<2	<2	<2	<2
Total Volatile Organics	µg/L	2,604	6,449	2,737	11,337	3,426	841
Wet Chemistry							
Ferric Iron	mg/L	0.51	<0.10 U	<0.10 U	<0.10 U	<0.10 U	<0.10 U
Ferrous Iron	mg/L	0.15	3.16	3.3	3.3	3.3	3.2
Nitrite-N	mg/L	0.08	0.13	0.11	0.14	0.160	0.23
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	< 0.10 U
Orthophosphate as P	mg/L	1.9	<0.03	<0.03	<0.03	4.2	<0.03
Sulfate as SO4	mg/L	428	1320	659	1,070	1190	123
Total Kjeldahl Nitrogen	mg/L	51.2	106	75.3	197	144	23.2
Metals							
Iron, Total	mg/L	6.64	12.2	6.36	5.64	6.37	1.41

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 First Quarter 2013 (ft)	Total LNAPL Recovery Period		Cumulative Total LNAPL Recovered		Estimate LNAPL Recovered During First Quarter 2013	
		Begin	End	(gal)	(lbs) (a)	(gal)	(lbs) (a)
RW-04	1.86	23-Jul-10	On-going (b)	1,084	7,944	68	498
BP-MW-05	0.92	28-Jan-10	On-going (b)	6,981	51,149	503	3,686
BP-MW-08	0.14	8-Sep-10	On-going (b)	754	5,518	114	835
BP-MW-11	0.68	23-Jul-10	9/8/2010	7.8	57	0	0
RW-02	0.16	28-Jan-11	On-going (c)	0.8	5.9	0	0
RW-03	0.46	24-Nov-10	On-going (c)	19.3	141	0	0
RW-01	0.06	28-Oct-11	On-going (c)	1.3	10	0	0
BP-MW-10	0.18	na	na	0	0	0	0
BP-MW-07	0.68	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:				8,848	64,825	685	5,020

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.

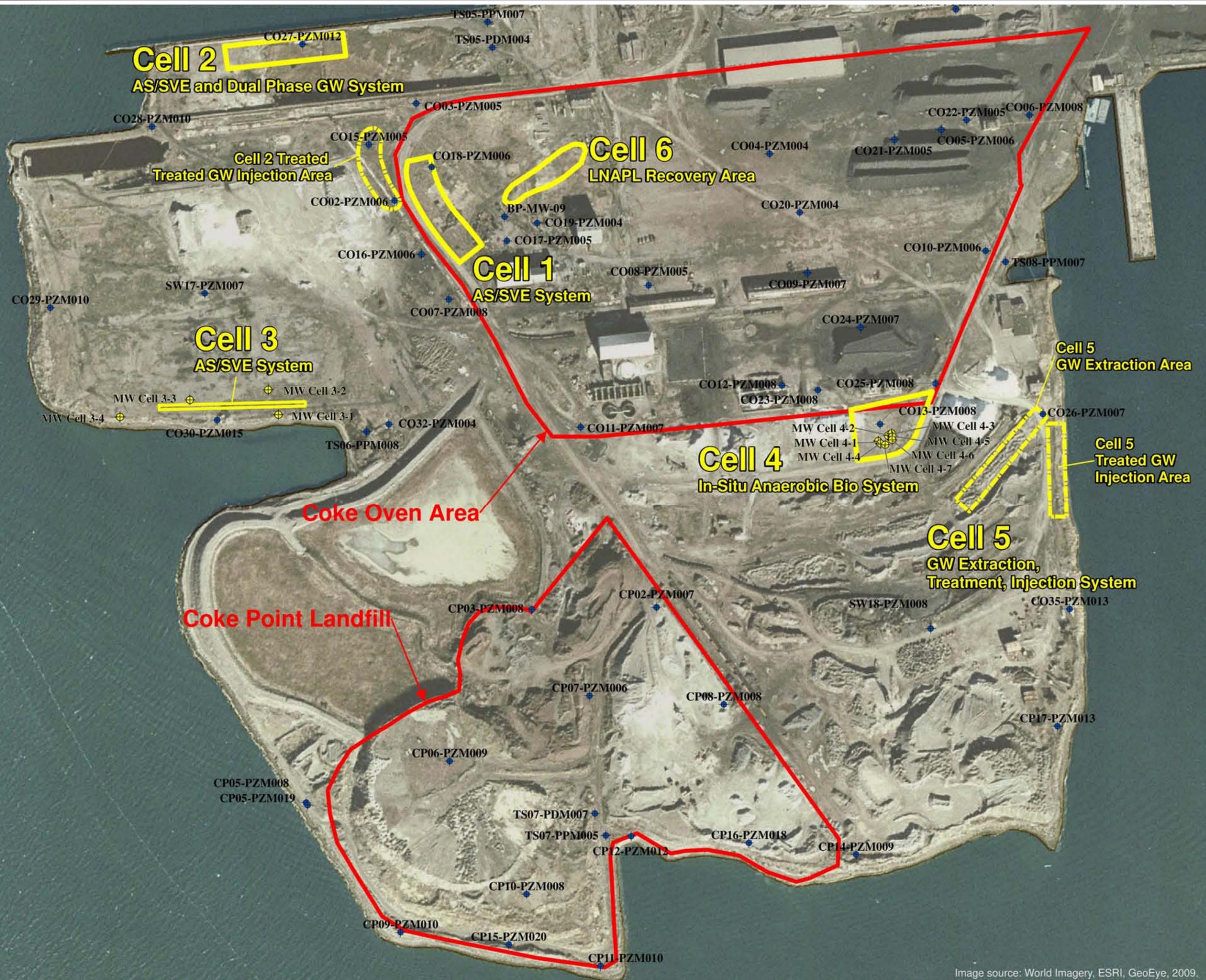
Table 9
Depths (feet) to Water and LNAPL
Cell 6: LNAPL Recovery System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

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
11/30/2012	10.59	10.65	0.06	10.29	10.45	0.16	8.64	9.1	0.46
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
11/30/2012	9.6	11.46	1.86	11.1	12.02	0.92	10.23	10.49	0.26
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
11/30/2012	12.06	12.2	0.14	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



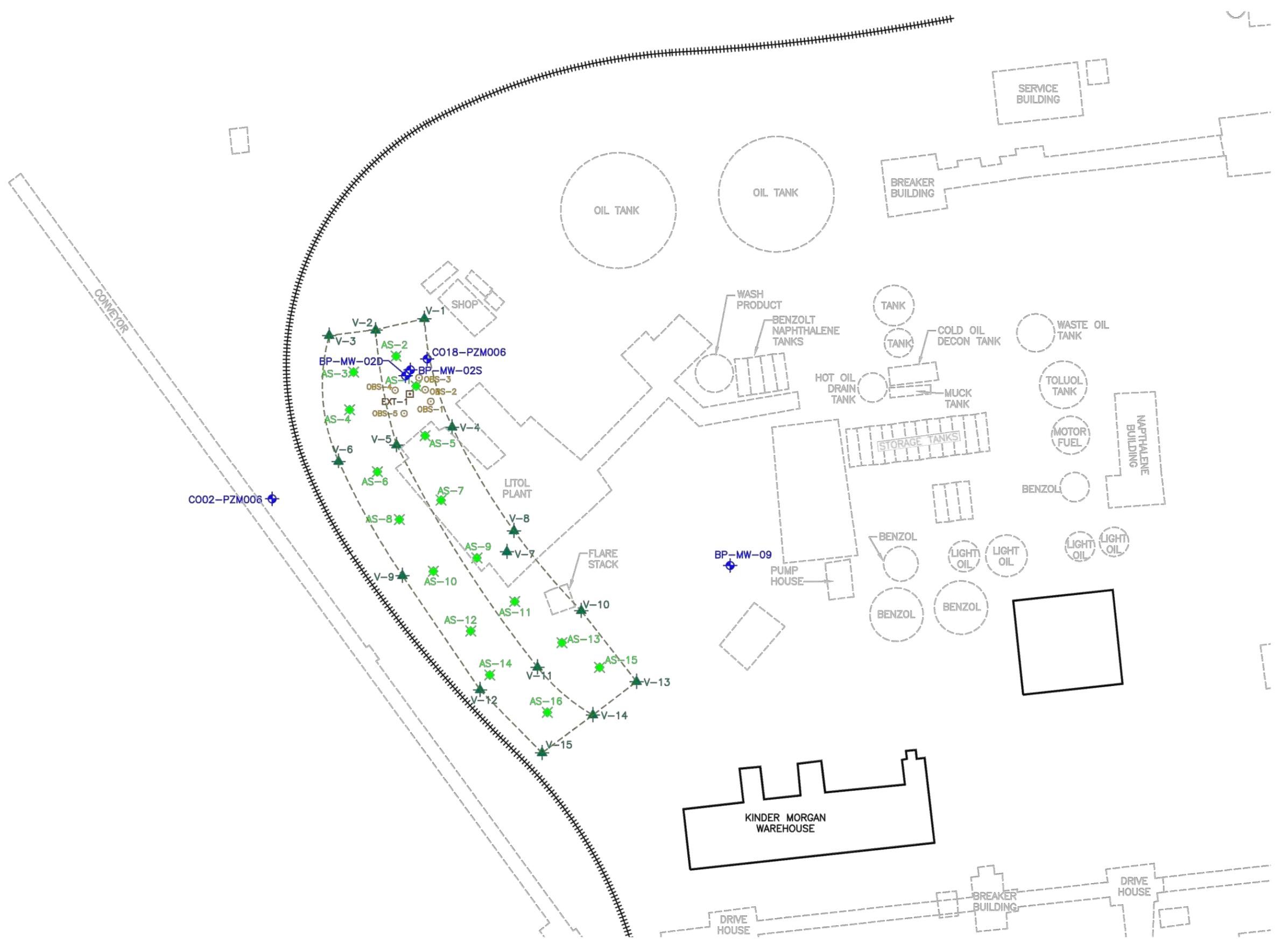
Project
Sparrows Point, LLC
Baltimore, Maryland

INTERIM MEASURES TREATMENT AREAS

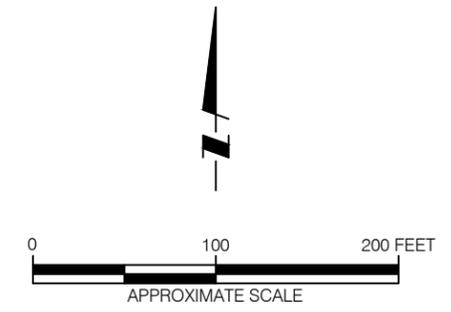
Project Number		File Number	
Date		Figure	
April 30, 2013		1	
PE/PG	PM	Drafter	

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

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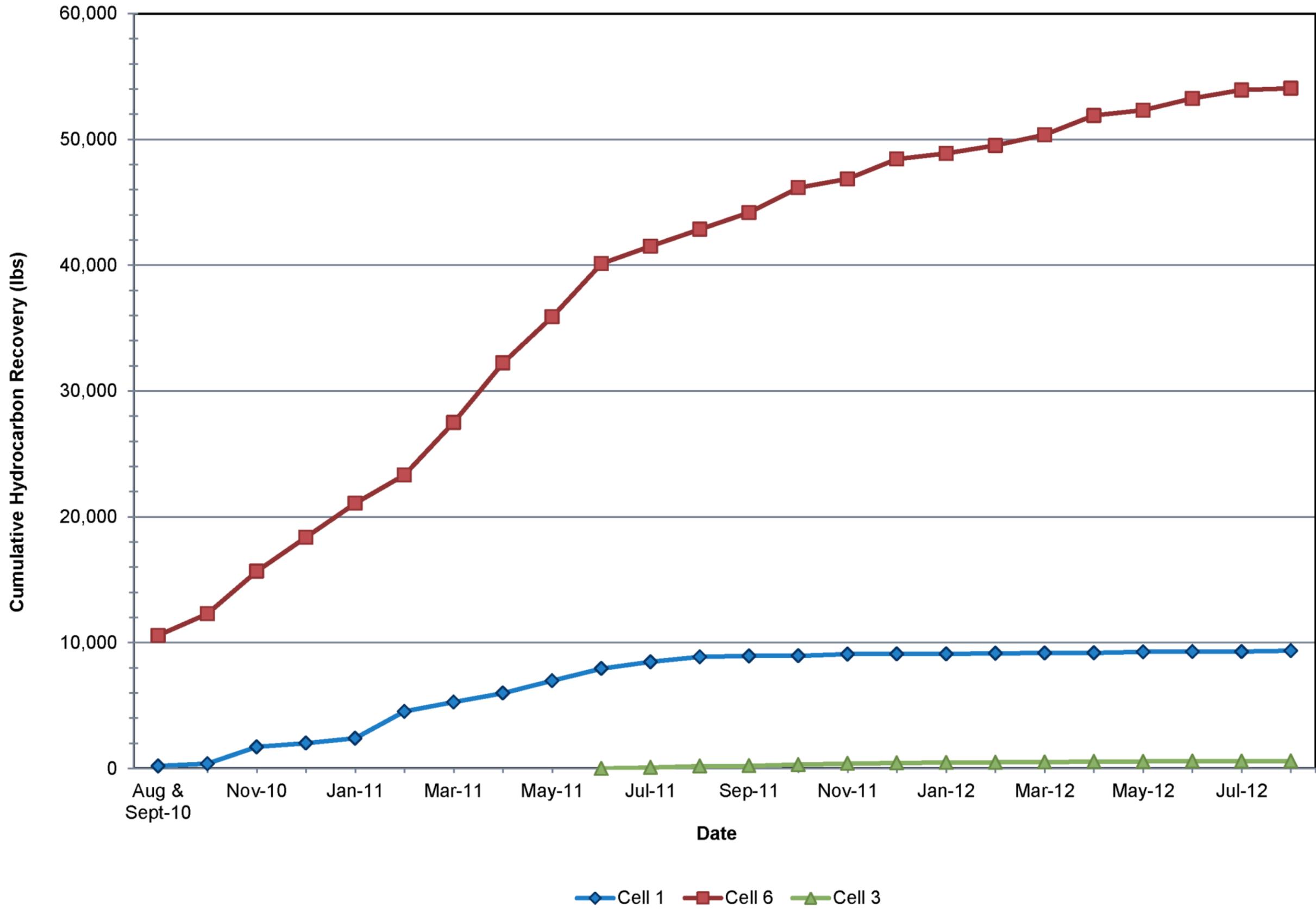
- LEGEND**
- V-1 TRENCH VAPOR EXTRACTION RISER
 - EXT-1 SVE PILOT TEST EXTRACTION WELL
 - OBS-1 SVE PILOT TEST OBSERVATION WELL
 - CO18-PZM006 EXISTING MONITORING WELL
 - AS-2 AIR SPARGE WELL
 - - - - - VAPOR COLLECTION TRENCHES
 - - - - - FORMER STRUCTURES (DEMOLISHED)



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AS-BUILT LAYOUT PLAN

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



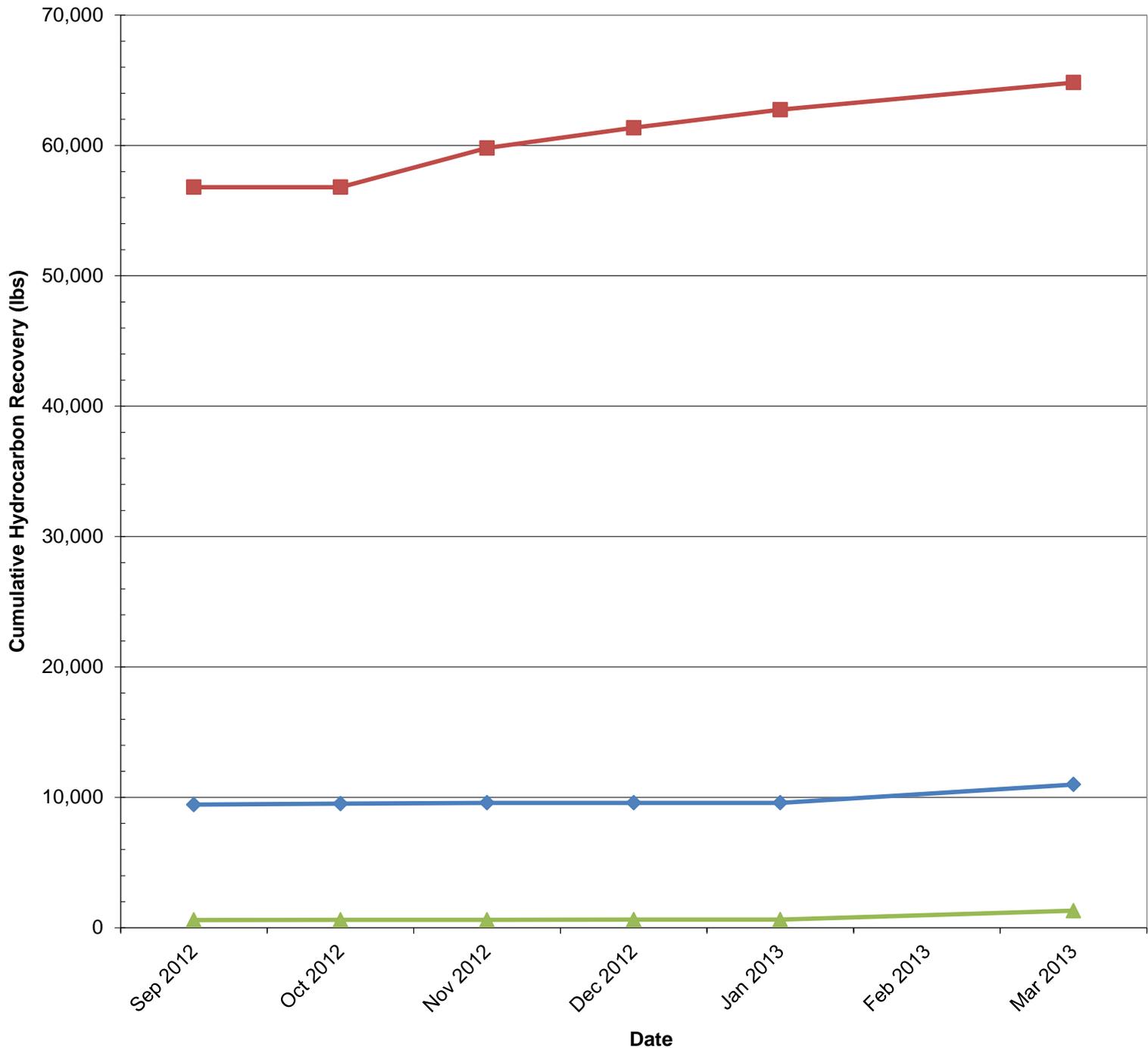
Project
Sparrows Point, LLC
Baltimore, Maryland

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

Project Number _____ File Number _____

Date April 30, 2013 Figure

PE/RG PM DR **3**



LEGEND

- Cell 1
- Cell 3
- Cell 6



Project
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Baltimore, Maryland

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

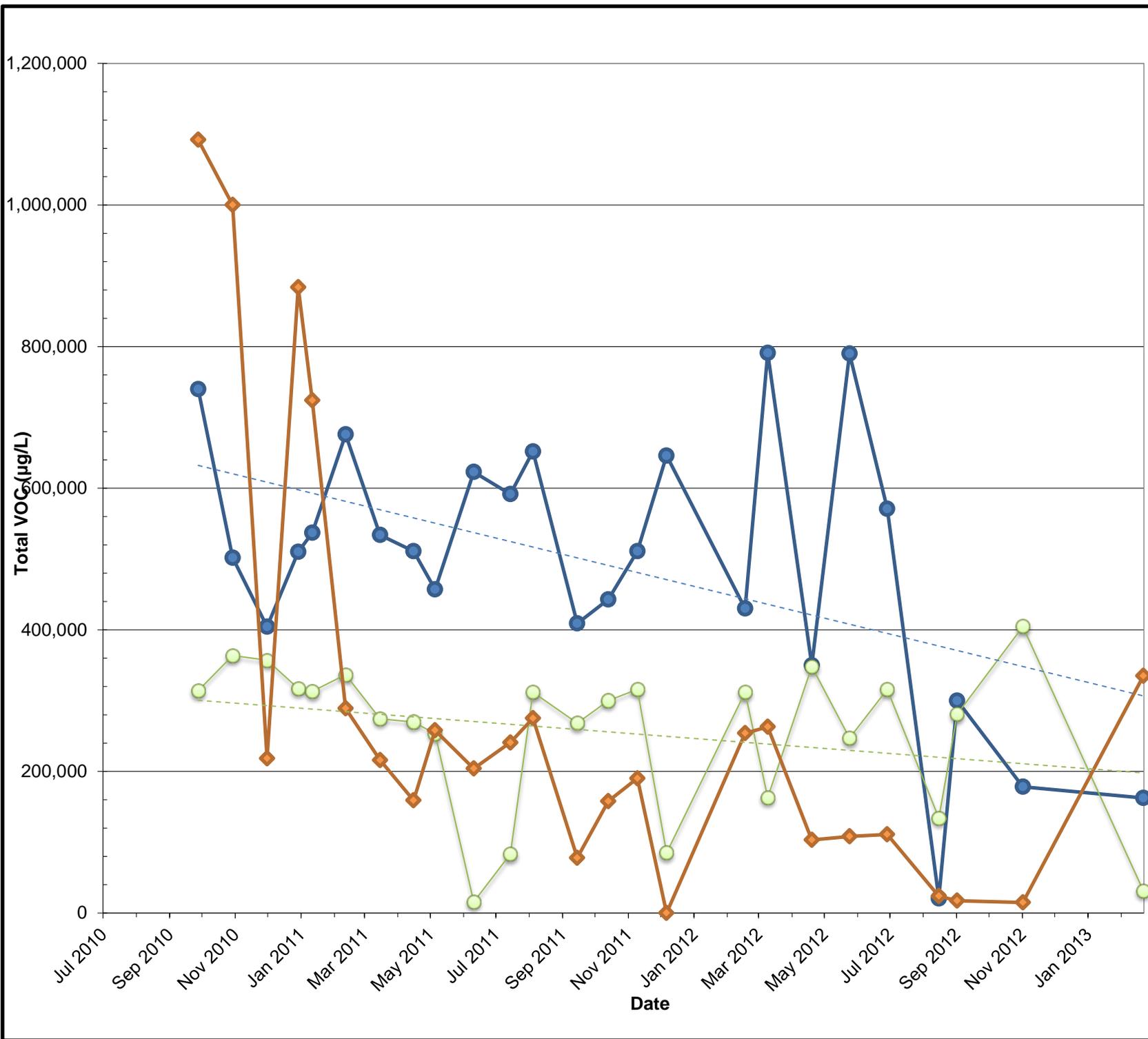
Project Number File Number

Date
April 30, 2013

Figure

E/RG PM DR

3A



LEGEND

- CO2-PZM006
- BP-MW-09
- ◇ CO18-PZM006



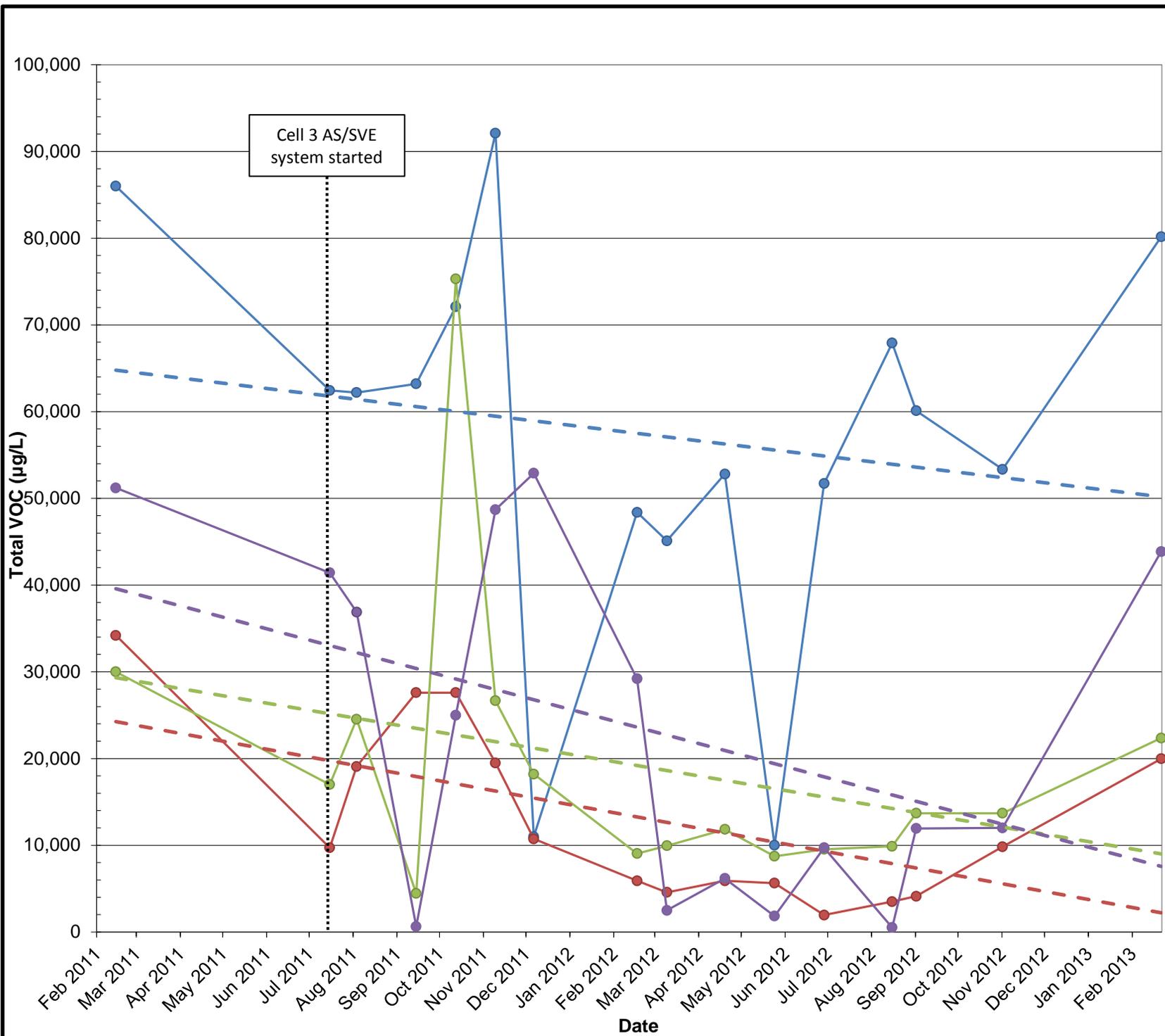
Project
Sparrow Point, LLC
Baltimore, Maryland

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

Date
April 30, 2013

Figure
4

E/RG PM DR



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



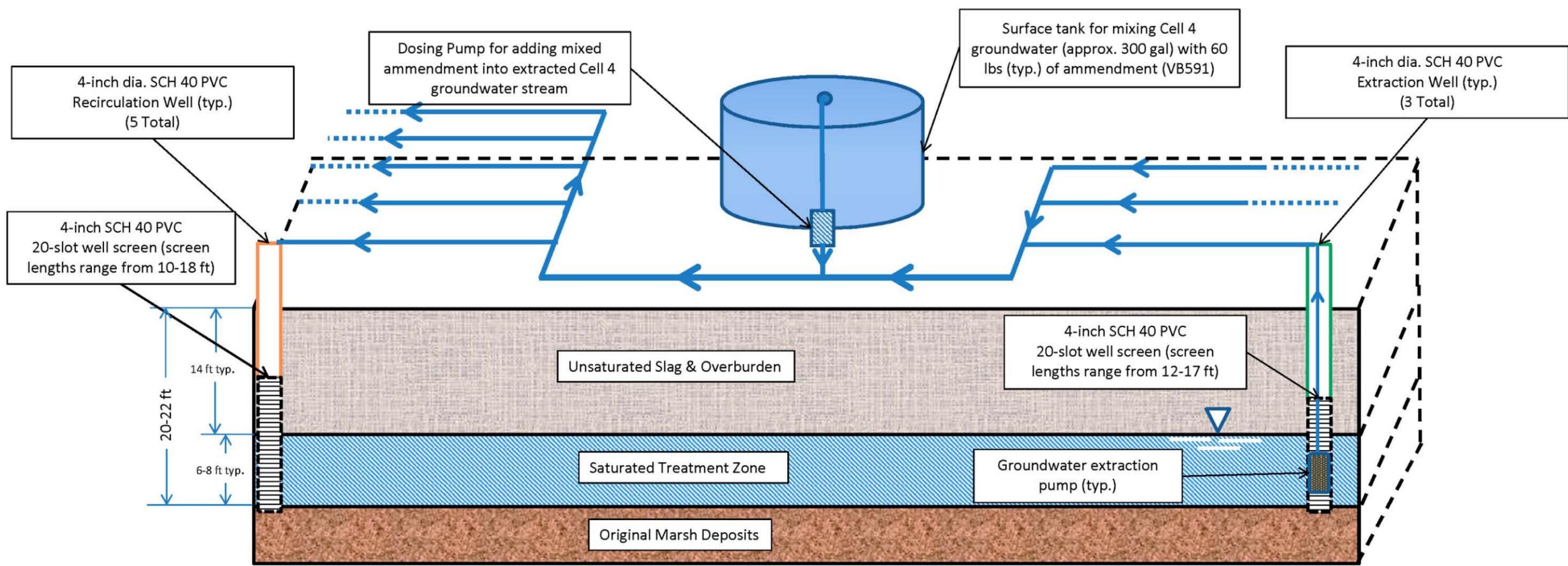
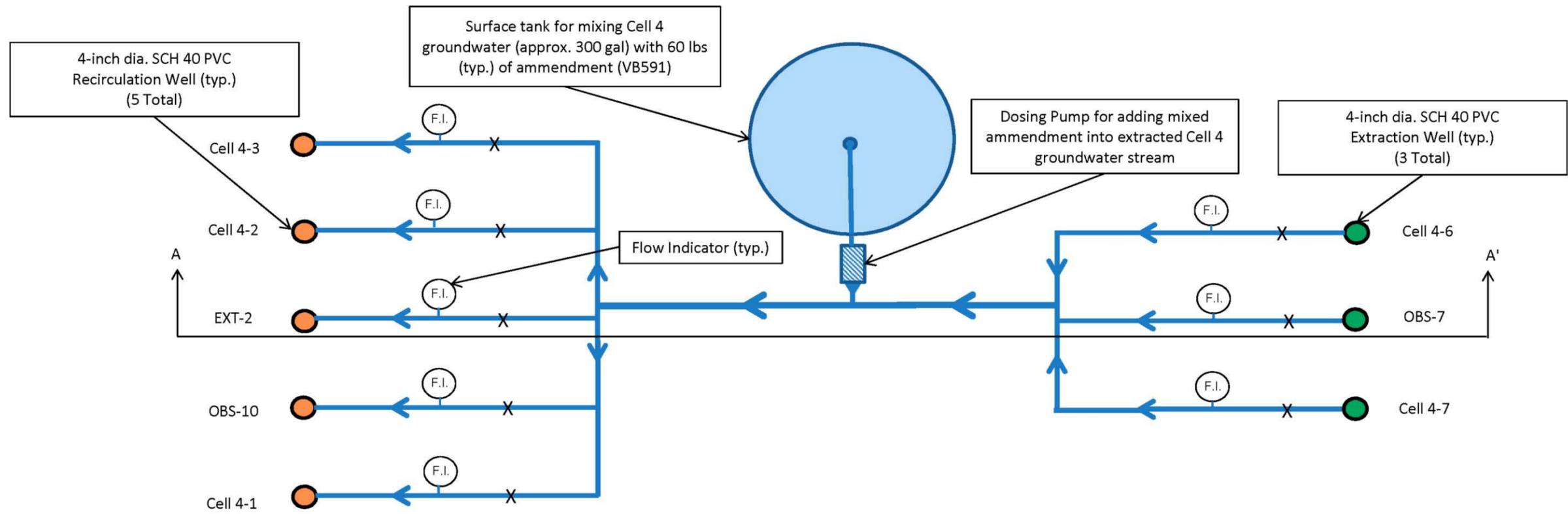
Project
Sparrow Point, LLC
Baltimore, Maryland

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

Date
April 30, 2013

Figure
5

E/RG PM DR



Section A-A' (not to scale)



Project
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
April 30, 2013

PE/RG _____ PM _____ DR _____

Cell 4

In-Situ Anaerobic Bio-System



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



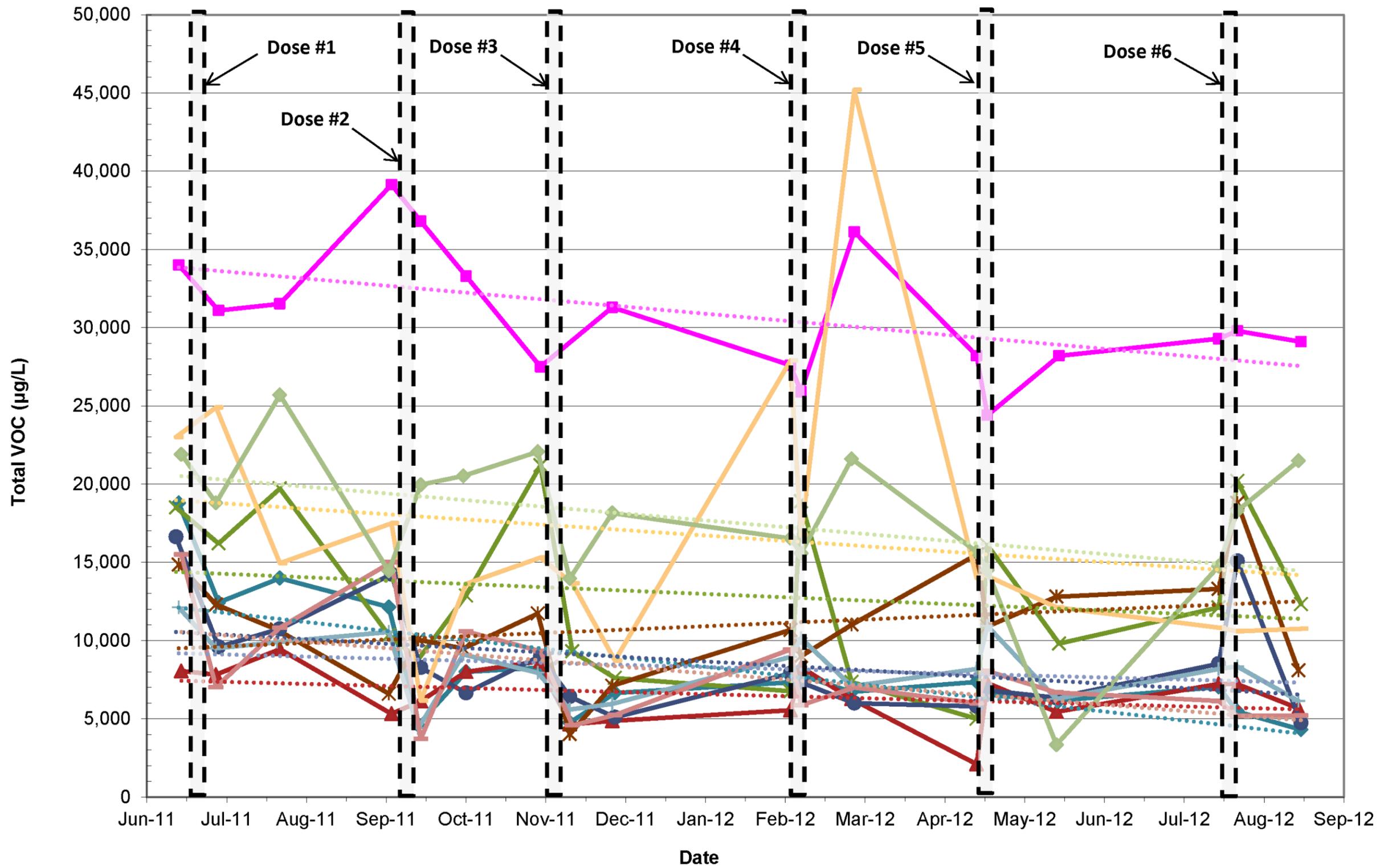
CELL 4 WELLS

Sparrows Point, LLC
Baltimore, Maryland

Date	Drafter
April 30, 2013	

PE/PG	Project Number	Figure 7
Project Manager	File	





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



Project
Sparrows Point, LLC
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
April 30, 2013 Figure

PE/RG PM DR

8