EnviroAnalytics Group

January 30, 2015

Mr. Andrew Fan, PE
US EPA Region III, 3LC20
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 4TH QUARTER 2014***

Dear Mr. Fan and Ms. Brown:

On behalf of Sparrows Point Terminal, LLC and Sparrows Point LLC, enclosed please find the Coke Oven Area Interim Measures Progress Report for the fourth quarter of 2014 completed for the Sparrows Point Terminal site. This report was distributed electronically on January 30, 2015 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 December 31, 2014. Please contact me at (314) 686-5611 should questions arise during your review of the enclosed progress report.

Sincerely,

Russell Becker
Vice President, Remediation

Enclosure

FORMER COKE OVEN AREA INTERIM MEASURES PROGRESS REPORT

(Fourth Quarter 2014)

Prepared for

SPARROWS POINT TERMINAL, LLC AND
SPARROWS POINT LLC
1600 SPARROWS POINT BOULEVARND
SPARROWS POINT MD 21219

January 30, 2015

EnviroAnalytics Group

Introduction

This document presents operational data and monitoring information collected in the 4th quarter of 2014 for Interim Measures (IMs) that have been installed to address identified environmental conditions at the former Coke Oven Area (COA) Special Study Area at the Sparrows Point Terminal site located in Sparrows Point, Maryland. This progress report summarizes IM performance including data collected from the fourth quarter of 2014 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 identify 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 2: Air Sparge/Soil Vapor Extraction (AS/SVE) System in the shallow groundwater zone, groundwater pump and treat (GW P&T) system in the intermediate zone, Former Coal Basin Area,
- Cell 3: AS/SVE System in "Cove" Area,
- Cell 5: Dual Phase Extraction (DPE) system for the shallow zone, "Turning Basin" side of former Coke Oven Area,
- Cell 6: Light Non-Aqueous Phase Liquid (LNAPL) Recovery at the Former Benzol Processing Area.

As of the end of the fourth quarter 2014, Cells 1, 2, 3, 5 and 6 are operational. Groundwater and soil gas sampling were conducted during the fourth quarter of 2014 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.

As of September 30, 2014, start-up testing commenced on remediation systems installed at Cells 2 and 5. Full operation was obtained in October 2014. The bio-treatment process at Cell 4 has been discontinued and a combined Cell4/Cell5 dual phase extraction remediation design is operational (Cell 5). Additional detail on the design, operation and groundwater monitoring for these systems is provided in this progress report.

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

Cell 1 consists of an AS/SVE system installed to remove volatile hydrocarbons that is 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, vapor collection trenches and groundwater monitoring wells.

4th Quarter 2014 Operational Performance

Operational performance of Cell 1 during this reporting period is summarized in **Table 1**. In summary, the CATOX unit operated for 384 hours (17.4%) 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 as reflected in the Permit to Operate issued to Sparrows Point LLC on December 8, 2014.

The hydrocarbon removal rate was calculated to be approximately 0.008 pounds per operating hour (estimated quarterly total of 3.14 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 12,445 pounds of recovered hydrocarbons as shown graphically in **Figure 3**.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. One untreated soil gas sample was collected in a Suma Canister 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 third quarter was 18,833 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 third 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. Recovery concentrations in the influent soil gases were lower this quarter and this trend will be monitored in future quarters.

4th Quarter 2014 Groundwater Monitoring Results

Groundwater samples were collected on November 19, 2014 from the following wells; the location of the wells are shown on Figure 2:

- 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 as illustrated in **Figure 4**. The identified trend for these monitoring wells will continue to be monitored and assessed during system operation in future months.

Cell 2: Air Sparge/Soil Vapor Extraction (AS/SVE) System in the Shallow Groundwater Zone, Groundwater Pump and Treat (GW P&T) System in the Intermediate Groundwater Zone, Former Coal Basin Area

Cell 2 consists of an AS/SVE system coupled with vapor destruction via an electric catalytic oxidation (CATOX) unit for volatile hydrocarbon groundwater treatment in the shallow zone and a pump and treat system for recovery of groundwater and volatile hydrocarbon treatment from the intermediate zone. The system design plans were approved by US EPA in correspondence received on September 10, 2013 and began full scale operation in October 2014. **Figure 5** shows the system layout of Cell 2 and locations of the major design components including the air sparging wells, vapor collection trenches, intermediate groundwater recovery wells, groundwater injection wells and groundwater monitoring well locations.

AS/SVE System

The delivery and recovery systems for the shallow AS/SVE system include the use of air sparge points and a horizontal vapor extraction trench. Eight (8) air sparge points along a 500 feet long stretch were installed near the shore line of Cell 2. Details of the air sparge zone and recovery trench include the following:

- Air sparge zone: 8 – 2-inch diameter AS points @ approximately 56 ft spacing, center to center (C-C)
    - Installed to 15 ft -17 ft bgs (bottom of slag fill)
    - Bottom 2 ft of each point to be screened with 20-slot screen

- Recovery trench
    - 500 ft of horizontal, 4-inch diameter perforated pipe (or 20-slot screen) installed to a total depth (TD) of 5 ft
    - 5 vertical 4-inch risers spaced every 100 ft, C-C
    - Top 2 ft is a clay cap
    - Geotextile fabric @ 2 ft bgs (under clay)
    - Granular screened slag backfill from 2 ft -5 ft
    - Horizontal recover piping located approximately 3 ft bgs (above water table)

GW P&T System

The pump and treat groundwater system includes a low profile air stripper that then utilizes an oxidizer to destroy all VOC vapors generated prior to exhausting to the atmosphere. The design groundwater flow is for a maximum of 40 gallons per minute (gpm). The oxidizer is sized to handle up to a 600 cubic feet per minute air flow. The recovery and re-injection systems

include the use of six groundwater recovery wells and six groundwater injection wells. The six recovery wells are installed along a 500 feet long stretch near the shore line of Cell 2.

- 6 – 4-inch diameter GW RWs @ approximately 83 ft spacing, C-C
  - Installed to 40-45 ft bgs (intermediate sand zone)
  - Bottom 15 ft of each RW screened with 20-slot screen
  - An electric pump in each RW, resting approximately 7-10 ft above the bottom of the well

- Recovered GW Treatment
  - Enters low profile air stripper
  - Off-gas sent to Electric Oxidizer for destruction
  - Treated groundwater pumped to six-6 inch diameter re-injection wells screened from 5 to 15 feet in depth for recirculation in shallow GW zone

4th Quarter 2014 Operational Performance

AS/SVE System

Operational performance of the AS/SVE System at Cell 2 during this reporting period is summarized in **Table 4**. In summary, the CATOX unit operated for 1848 hours (83.7%) during this reporting period. The system at Cell 2 is operated on a continuous schedule during this reporting quarter to determine the initial performance of the system. Operations were in conformance with the manufacturer's specifications at all times that soil gases were collected in accordance with the March 24, 2014 permit-to-construct conditions as reflected in the Permit to Operate issued to Sparrows Point LLC on December 8, 2014.

The hydrocarbon removal rate was calculated to be approximately 0.091 pounds per operating hour (estimated quarterly total of 169 pounds). **Table 4** also includes a cumulative summary of operational performance since system startup in October 2014. This is the first operating quarter so in total, the AS/SVE system at Cell 2 has destroyed approximately 169 pounds of recovered hydrocarbons as shown graphically in **Figure 3**.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. One untreated soil gas sample was collected in a Suma Canister 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 was 162,848 micrograms per cubic meter (ug/m^3) as summarized in **Table 5**.

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 fourth quarter are representative of hydrocarbon concentrations for

the entire quarter. This assumption is based on the fact that the same air sparge wells and extraction wells were online when the system was operational.

GW P&T System Evaluation

The Cell 2 groundwater pump and treat system was evaluated with regard to: 1) the water levels measured in the various water bearing zones, and 2) the effectiveness of this system with respect to the mass of volatile hydrocarbons removed from groundwater.

Groundwater Level Monitoring

Groundwater-level measurements were manually measured in December 2014 for fourteen (14) groundwater wells that have been installed to evaluate the Cell 2 system. A summary of the installation specifications of the wells has been included as **Table 6**; water level measurements (depth to water and water elevation) are presented in **Table 7**. The locations of the monitoring wells are shown on **Figure 5**.

The groundwater elevation data are graphically presented as groundwater elevation contour maps in **Figures 6** and **7**. **Figures 6** and **7** represent the fourth quarter 2014 data for the shallow and intermediate water bearing zones. The intermediate water bearing zone is pumped and is therefore also referred to as the intermediate pumping zone. The shallow water bearing zone (water table) includes piezometers screened to depths of approximately 15-feet below ground surface; the intermediate water bearing zone includes piezometers screened from approximately 30- to 50-foot depths. The water level results for each of these zones are discussed below.

Shallow Water Table Zone

Figure 6 presents the groundwater elevation contour map for the shallow water table zone, corresponding to the December 2014 time period when the underlying zone (intermediate pumping zone) was being pumped and groundwater was being re-injected into the shallow zone through the six injection wells. The data for the shallow groundwater zone exhibit the possible influence of the reinjection zone as higher groundwater elevations are noticed in this area. This area is also higher in elevation so data from additional time periods will be required to confirm this feature.

Intermediate Pumping Zone

Figure 7 presents groundwater elevations within the intermediate pumping zone during the December 2014 time period. The data indicates significant drawdown surrounding the six pumping wells (CO43- CO48) that comprise the groundwater recovery system. This system is maintaining a broad zone of influence extending from the pumping wells.

Evaluation of Pump and Treat System Effectiveness

A total of 1,448,763 gallons of water were extracted from the Cell 2 Area pumping wells and treated during the fourth quarter of 2014. The average pumping rate for the pump and treat system was 15,747 gpd, or 11 gpm. Operations were in conformance with the manufacturer's specifications at all times that stripped hydrocarbons were discharged through the CaTOX unit to the atmosphere in accordance with the March 24, 2014 permit-to-construct conditions as reflected in the Permit to Operate issued to Sparrows Point LLC on December 8, 2014. In addition, treated groundwater discharges were in compliance with discharge permit conditions outlined in Discharge Permit 11-DP-3746 issued to Sparrows Point LLC on May 6, 2013. These pumping rates appear to effectively capture the most impacted groundwater beneath Cell 2, as revealed by **Figure 9** discussed in the following section.

A total of 3,424 lbs of benzene, toluene and xylene compounds (btex) and 24 lbs of naphthalene were removed and treated during the fourth quarter of 2014. This total is shown graphically in **Figure 3**. The following table presents data for influent and effluent (treated) groundwater.

Field_ID	Analysis	Units	24-Oct	28-Oct	19-Nov	21-Nov	17-Dec	22-Dec	**Quarter Average**
GWPT Cell 2 INFLUENT	Benzene	ug/L	140000	170000	300000	280000	320000	350000	**260,000**
GWPT Cell 2 INFLUENT	Toluene	ug/L	17000	22000	19000	19000	17000	18000	**18,667**
GWPT Cell 2 INFLUENT	Total Xylenes	ug/L	4700	5400	4600	4600	4400	4200	**4,650**
GWPT Cell 2 INFLUENT	Naphth	ug/L	1500	1900	2800	2200	2100	3000	**2,250**
GWPT Cell 2 EFFLUENT	Benzene	ug/L	320	130	340	360	100	86	**223**
GWPT Cell 2 EFFLUENT	Toluene	ug/L	0	0	0	50	0	0	**8**
GWPT Cell 2 EFFLUENT	Total Xylenes	ug/L	0	0	0	0	0	0	**0**
GWPT Cell 2 EFFLUENT	Naphth	ug/L	180	190	250	260	200	130	**202**

The pump and treat system is removing significant amounts of volatile hydrocarbons from groundwater within the intermediate water bearing zone at the current pumping rates, and it is controlling groundwater flow and associated migration within the intermediate water bearing zone.

4th Quarter 2014 Groundwater Monitoring Results

Groundwater samples were collected in November 2014 from the following wells; the well locations are shown on **Figure 5**. Exceptions to the wells sampled in November are noted for wells CO38-PZM006 and CO38-PZM043. CO38-PZM006 was not sampled due to the presence of free product first identified in November 2014 that is discussed further below and CO38-PZM043 was not sampled in November due to an oversight of the field sampling program. This well will be sampled in future quarterly events.

- CO27- PZM012 – shallow zone -
- CO27-PZM046 - intermediate zone
- CO36-PZM008 – shallow zone
- CO36-PZM043 – intermediate zone
- CO37-PZM003 – shallow zone
- CO37-PZM038 – intermediate zone
- CO38-PZM006 – shallow zone
- CO38-PZM043– intermediate zone
- CO39-PZM007– shallow zone
- CO39-PZM042– intermediate zone
- CO40-PZM008– shallow zone
- CO41-PZM 001– shallow zone
- CO41-PZM 036– intermediate zone
- CO42-PZM004 – shallow zone

The groundwater samples were submitted to Pace Analytical Services, Inc., located in Greensburg, Pennsylvania for the analyses shown in **Table 8**. These data indicate benzene is the most prevalent volatile organic compound (VOC) constituent. The VOC concentrations for the 2014 sampling events are shown for the groundwater wells monitored for system performance in **Figure 8A** and **8B**. These wells will continue to be monitored to assess possible trends associated with operation of the interim measure. **Figure 9** presents a plan view of the concentration of benzene in the intermediate zone from analytical results from the December 2014 monitoring event.

Light non-aqueous product (LNAPL) was encountered in well CO38-PZM006 in the shallow groundwater zone in November 2014. This well was bailed in January 2015 and approximately 1 gallon of product was recovered. The well will be monitored on a weekly basis going forward to determine the extent of continued presence of LNAPL.

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.

4th Quarter 2014 Operational Performance

Operational performance of Cell 3 during this reporting period is summarized in **Table 9**. In summary, the CATOX unit operated for 504 hours (26.4%) during the third quarter of 2014. 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 0.032 pounds per operating hour (estimated quarterly total of 16.1 pounds). **Table 9** also includes a cumulative summary of operational performance since system startup on June 24, 2011. In total, Cell 3 has destroyed approximately 1,448 pounds of recovered hydrocarbons as shown graphically in **Figure 3**.

Soil gas samples were collected for laboratory analysis to monitor CATOX unit performance. One untreated soil gas sample was collected in a Suma Canister and submitted to Pace Analytical Services. The average influent soil gas hydrocarbon concentration of the three samples taken throughout the third quarter was 60,953 ug/m^3 as summarized in **Table 10**.

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 third quarter are representative of hydrocarbon concentrations for the entire third quarter of 2014. 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.

4th Quarter 2014 Groundwater Monitoring

Groundwater samples were collected in November 2014 from the following wells (**Figure 10**):

- 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 11**. These data indicate that benzene is the most prevalent VOC constituent. Since system startup on June 24, 2011, a generally inconclusive VOC concentration trend is documented, as illustrated in **Figure 11**. The VOC concentrations at MW-CELL3-3 decreased significantly from the sampling and analysis conducted in the 3rd quarter of 2014 and more closely reflects the historical concentrations for this well. This result and associated trends for these monitoring wells will continue to be monitored and assessed during system operation in future months.

Cell 5: Dual Phase Extraction (DPE) System for the Shallow Zone, "Turning Basin" side of Former Coke Oven Area

Cell 5 consists of a dual phase (vapor and water) system (DPE) with a low profile air stripper followed by vapor phase granular activated carbon (VGAC) for removal and treatment of vapor and dissolved volatile hydrocarbons in the shallow groundwater zone. The system design plans were approved by US EPA in correspondence received on September 10, 2013 and began full scale operation in October 2014. **Figure 12** shows the system layout of Cell 5 and locations of the major design components including the dual phase recovery points, treatment system, groundwater injection wells and groundwater monitoring well locations.

The recovery and re-injection systems include the use of dual phase (soil vapor and groundwater) recovery wells and six groundwater re-injection wells. Twelve (12) recovery wells were installed along an approximate 500 feet long stretch downgradient of the most recent 10,000 ug/L isocontour line for naphthalene (between the naphthalene source area and the eastern shore line along the Turning Basin).

- 12 – 1.5-inch diameter DPE RWs @ approximately 42 ft spacing, C-C
  - Installed to 15-17 ft bgs (to bottom of shallow slag)
  - Bottom 2 ft of each RW screened with 20-slot screen
  - Vapor recovery perforations located between 10-12 ft bgs

- Recovered GW and vapor Treatment
  - Enters MS knockout tank to separate air and water phases
  - Water sent to low profile air stripper
  - Off-gas sent to VGAC for capture
  - Treated groundwater pumped to six-6 inch diameter re-injection wells screened from 5 to 15 feet in depth for recirculation in shallow GW zone

4th Quarter 2014 Operational Performance

The Cell 5 DPE system was evaluated with regard to: 1) the water levels measured in the various water bearing zones, and 2) the effectiveness of this system with respect to the mass of volatile hydrocarbons removed from groundwater.

Groundwater Level Monitoring

Groundwater-level measurements were manually measured in December 2014 for nine (9) groundwater wells that have been installed in the shallow groundwater zone to evaluate the Cell 5 system. A summary of the installation specifications of the wells has been included as

Table 6; water level measurements (depth to water and water elevation) are presented in **Table 12**. The locations of the monitoring wells are shown on **Figure 12**.

The groundwater elevation data are graphically presented as groundwater elevation contour maps in **Figure 13.** The shallow water bearing zone (water table) includes piezometers screened to depths of approximately 15-feet below ground surface. The data from December 22, 2014 for the shallow groundwater zone are inconclusive as to the influence of the groundwater recovery points on the capture and movement of groundwater. Data from additional time periods will be required to confirm the presence of a capture zone for the shallow groundwater from this system. Some slight mounding may be present in the re-injection zone although additional data and monitoring appears to be required at this location as well.

Evaluation of Pump and Treat System Effectiveness

A total of 876,288 gallons of water were extracted from the Cell 5 Area dual phase extraction wells and treated during the fourth quarter of 2014. The average recovery rate for the DPE system was around 9500 gpd. This system experienced several outage periods in the quarter to work through startup issues associated with the control of scaling and foaming from the recovered groundwater associated with the treatment equipment.

Operations were in conformance with the manufacturer's specifications at all times that stripped hydrocarbons were discharged to the atmosphere in accordance with the March 24, 2014 permit-to-construct conditions as reflected in the Permit to Operate issued to Sparrows Point LLC on December 8, 2014.

An exceedance of the discharge limit for naphthalene defined in Discharge Permit 11-DP-3746 issued to Sparrows Point LLC on May 6, 2013 occurred on November 19th, 2014. Based on a monitoring result, naphthalene was discharged at 0.790 mg/L as compared to a limit of 0.7 mg/L. The cause was identified as foaming in the groundwater which inhibited the application of design air flow without carryover into the vapor treatment system and in turn reduced the removal efficiency of the stripper. The foaming condition has been corrected with use of anti-foam chemical and compliance with the discharge limits has been achieved.

A total of 44 pounds (lbs) of benzene, toluene and xylene compounds (btex) and naphthalene were removed and treated during the fourth quarter of 2014. This total is shown graphically in **Figure 3**. The following table presents data for influent and effluent (treated) groundwater.

Field_ID	Analysis	Units	17-Oct	24-Oct	19-Nov	21-Nov	17-Dec	24-Dec	**Quarter Average**
GWPT Cell 5 INFLUENT	Benzene	ug/L	340	470	500	450	360	370	**415**
GWPT Cell 5 INFLUENT	Toluene	ug/L	200	240	230	220	170	190	**208**
GWPT Cell 5 INFLUENT	Total Xylenes	ug/L	284	332	297	283	230	253	**280**
GWPT Cell 5 INFLUENT	Naphth	ug/L	3900	3500	6700	6400	6400	6600	**5583**
GWPT Cell 5 EFFLUENT	Benzene	ug/L	0	0	0	0	0	0	**0**
GWPT Cell 5 EFFLUENT	Toluene	ug/L	0	0	0	50	0	0	**0**
GWPT Cell 5 EFFLUENT	Total Xylenes	ug/L	0	0	0	0	0	0	**0**
GWPT Cell 5 EFFLUENT	Naphth	ug/L	330	600	790	700	180	360	**493**

The DPE system is removing volatile hydrocarbons from groundwater within the shallow water bearing zone at the current recovery rates. Improved performance is expected in the future as the system improves in operation.

4th Quarter 2014 Groundwater Monitoring Results

Groundwater samples were collected in November 2014 from the following shallow zone monitoring wells; the well locations are shown on **Figure 12**.

- CO23- PZM008
- CO24-PZM007-
- CO26-PZM007
- CO55-PZM000
- CO56-PZP001
- CO57-PZP002
- CO58-PZM001
- CO59-PZP002
- CO60-PZP001

The groundwater samples were submitted to Pace Analytical Services, Inc., located in Greensburg, Pennsylvania for the analyses shown in **Table 13**. These data indicate naphthalene is the most prevalent hydrocarbon constituent. The naphthalene concentrations for the 2014

sampling events are shown for the groundwater wells monitored for system performance as illustrated in **Figure 14A** and **14B. Figure 14A** presents shallow groundwater naphthalene concentration trends for wells presumed to be upgradient of the treatment system, **Figure 14B** presents shallow groundwater naphthalene concentrations for downgradient wells between the treatment system and the shoreline. **Figure 15** presents a plan view of the concentration of naphthalene in the shallow zone from analytical results from the November 2014 monitoring event. These wells will continue to be monitored to assess possible trends associated with operation of the interim measure in future quarters.

Cell 6: LNAPL Extraction at the Former Benzol Processing Area

The Cell 6 LNAPL monitoring and recovery system was monitored weekly during the third quarter of 2014. **Table 14** 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 16** illustrates the well locations. An estimated 886 gallons (6,493 pounds) of LNAPL were recovered during the fourth quarter 2014, bringing the total recovered LNAPL to 12,099 gallons (88,649 pounds) as of December 31, 2014. Additional skimmer pump systems were installed in wells BP-MW-10, BP-MW-11 and RW-3 in October 2014. Well BP-MW-10 did not produce measurable amounts of LNAPL. LNAPL was recovered from wells in the Cell 6 area as shown below.

The LNAPL was recovered from the following wells:

Well	**LNAPL Recovery (gal/lbs)**	
	4th Qtr 2014	**Total thru 4th Qtr 2014**
BP-MW-05	163/1194	8,888/65,124
RW-04	9/66	1,248/9,145
BP-MW-08	80/586	1,300/9,519
BP-MW-11	625/4,580	632.8/4,637
RW-03	9/66	28/207
RW-01	0/0	1/10
RW-02	0/0	0.8/5.9
TOTAL	**886/6,493**	**12,099/88,649**

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

- RW-04 (1.75 ft),
- BP-MW-05 (1.28 ft),
- BP-MW-08 (2.28 ft),
- BP-MW-11 (3.2 ft),
- RW-03 (1.48 ft),
- RW-01 (0.12 ft),
- RW-02 (0.3 ft),
- BP-MW-07 (0.04)

No LNAPL was observed in wells RW-05, BP-MW-06, BP-MW-09, BP-MW-10 or CO19-PZM004. For all wells in which LNAPL accumulated, **Table 15** 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 in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Cell 1 Fourth Quarter 2014 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (October 1 - December 31, 2014)	hours	384
Overall CATOX Operational Time	%	17.4%
Estimated Total Hydrocarbons Destroyed	pounds	3.142
Estimated Hydrocarbon Removal Rate	pounds/hour	0.00818

Cell 1 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - December 31, 2014)	hours	21,480
Overall CATOX Operational Time	%	65.5%
Estimated Total Hydrocarbons Destroyed	pounds	12,445
Estimated Hydrocarbon Removal Rate	pounds/hour	0.6

Table 2
Summary of Soil Gas Analytical Results (Fourth Quarter 2014)
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 Time Dilution Factor Units	CATOX Influent Q4 2014
TO-15 Volatile Organics		
Acetone	ug/m^3	0
Benzene	ug/m^3	17,600
Bromoform	ug/m^3	0
2-Butanone (MEK)	ug/m^3	0
Carbon disulfide	ug/m^3	0
Carbon tetrachloride	ug/m^3	0
Chlorobenzene	ug/m^3	0
Chloroethane	ug/m^3	0
Chloroform	ug/m^3	0
1,1-Dichloroethane	ug/m^3	0
1,2-Dichloroethane	ug/m^3	0
1,1-Dichloroethene	ug/m^3	0
trans-1,2-Dichloroethene	ug/m^3	0
1,2-Dichloropropane	ug/m^3	0
cis-1,3-Dichloropropene	ug/m^3	0
trans-1,3-Dichloropropene	ug/m^3	0
Ethylbenzene	ug/m^3	0
2-Hexanone	ug/m^3	0
Methylene Chloride	ug/m^3	0
4-Methyl-2-pentanone (MIBK)	ug/m^3	0
1,1,2,2-Tetrachloroethane	ug/m^3	0
Tetrachloroethene	ug/m^3	0
Toluene	ug/m^3	608
1,1,1-Trichloroethane	ug/m^3	0
1,1,2-Trichloroethane	ug/m^3	0
Trichloroethene	ug/m^3	0
Vinyl chloride	ug/m^3	0
m&p-Xylene	ug/m^3	411
o-Xylene	ug/m^3	214
Total Volatile Organics	ug/m^3	**18,833**

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

ND = Analyte not detected above laboratory reporting limit

Table 3
Summary of Groundwater Analytical Results (Fourth Quarter 2014)
Cell 1: Prototype AS/SVE System in Former Benzol Processing Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

New Sample ID		CO02-PZM006	CO18-PZM006	CO93-PZMxxx
Former Sample ID		CO02-PZM006	CO18-PZM006	BP-MW-09
Date		11/19/2014	11/19/2014	11/19/2014
Analyte	Units			
Volatile Organics				
1,1,1,2-Tetrachloroethane	µg/L	ND	ND	ND
1,1,1-Trichloroethane	µg/L	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	ND	ND	ND
1,1,2-Trichloroethane	µg/L	ND	ND	ND
1,1-Dichloroethane	µg/L	ND	ND	ND
1,1-Dichloroethene	µg/L	ND	ND	ND
1,2,3-Trichloropropane	µg/L	ND	ND	ND
1,2-Dibromo-3-chloropropane	µg/L	ND	ND	ND
1,2-Dibromoethane (EDB)	µg/L	ND	ND	ND
1,2-Dichlorobenzene	µg/L	ND	ND	ND
1,2-Dichloroethane	µg/L	ND	ND	ND
1,2-Dichloropropane	µg/L	ND	ND	ND
1,4-Dichlorobenzene	µg/L	ND	ND	ND
2-Butanone (MEK)	µg/L	ND	ND	ND
2-Hexanone	µg/L	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	µg/L	ND	ND	ND
Acetone	µg/L	**48.9**	**186**	**111**
Acrylonitrile	µg/L	ND	ND	ND
Benzene	µg/L	**187000**	**82600**	**218000**
Bromochloromethane	µg/L	ND	ND	ND
Bromodichloromethane	µg/L	ND	ND	ND
Bromoform	µg/L	ND	ND	ND
Bromomethane	µg/L	ND	ND	ND
Carbon disulfide	µg/L	ND	ND	**14**
Carbon tetrachloride	µg/L	ND	ND	ND
Chlorobenzene	µg/L	ND	ND	ND
Chloroethane	µg/L	ND	ND	ND
Chloroform	µg/L	ND	**11.5**	**12.4**
Chloromethane	µg/L	ND	ND	ND
Dibromochloromethane	µg/L	ND	ND	ND
Dibromomethane	µg/L	ND	ND	ND
Ethylbenzene	µg/L	**622**	**62.4**	**2670**
Iodomethane	µg/L	ND	ND	ND
Methyl-tert-butyl ether	µg/L	ND	ND	ND
Methylene Chloride	µg/L	ND	**7.2**	**7**
Styrene	µg/L	**32.7**	**20.3**	**1090**
Tetrachloroethene	µg/L	ND	ND	ND
Toluene	µg/L	**7150**	**1080**	**50200**
Trichloroethene	µg/L	ND	ND	ND
Trichlorofluoromethane	µg/L	ND	ND	ND
Vinyl acetate	µg/L	ND	ND	ND
Vinyl chloride	µg/L	ND	ND	ND
Xylene (Total)	µg/L	**3380**	**1960**	**33500**
cis-1,2-Dichloroethene	µg/L	ND	ND	ND
cis-1,3-Dichloropropene	µg/L	ND	ND	ND
trans-1,2-Dichloroethene	µg/L	ND	ND	ND
trans-1,3-Dichloropropene	µg/L	ND	ND	ND
trans-1,4-Dichloro-2-butene	µg/L	ND	ND	ND
Total Volatile Organics	µg/L	**198,234**	**85,927**	**305,604**
Semi-Volatiles				
Naphthalene	µg/L	**968**	**385**	**1990**

Notes:

Bold = Analyte Detected

ND = Analyte not detected above laboratory reporting limit

µg/L = Micrograms per liter

Table 4
Summary of Operation Conditions
Cell 2 AS/SVE System
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Cell 2 Fourth Quarter 2014 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (October 1 - December 31, 2014)	hours	1,848
Overall CATOX Operational Time	%	83.7%
Estimated Total Hydrocarbons Destroyed	pounds	169.069
Estimated Hydrocarbon Removal Rate	pounds/hour	0.091

Cell 2 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (October 1, 2014 - December 31, 2014)	hours	1,848
Overall CATOX Operational Time	%	83.7%
Estimated Total Hydrocarbons Destroyed	pounds	169.069
Estimated Hydrocarbon Removal Rate	pounds/hour	0.091

Table 5
Summary of Soil Gas Analytical Results (Fourth Quarter 2014)
Cell 2 AS/SVE System
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

Analyte	Sample ID Date Time Dilution Factor Units	CATOX Influent Q4 2014
TO-15 Volatile Organics		
Acetone	ug/m^3	23
Benzene	ug/m^3	85,570
Bromoform	ug/m^3	0
2-Butanone (MEK)	ug/m^3	0
Carbon disulfide	ug/m^3	1
Carbon tetrachloride	ug/m^3	0
Chlorobenzene	ug/m^3	0
Chloroethane	ug/m^3	0
Chloroform	ug/m^3	0
1,1-Dichloroethane	ug/m^3	0
1,2-Dichloroethane	ug/m^3	0
1,1-Dichloroethene	ug/m^3	0
trans-1,2-Dichloroethene	ug/m^3	0
1,2-Dichloropropane	ug/m^3	0
cis-1,3-Dichloropropene	ug/m^3	0
trans-1,3-Dichloropropene	ug/m^3	0
Ethylbenzene	ug/m^3	1,933
2-Hexanone	ug/m^3	0
Methylene Chloride	ug/m^3	0
4-Methyl-2-pentanone (MIBK)	ug/m^3	0
1,1,2,2-Tetrachloroethane	ug/m^3	0
Tetrachloroethene	ug/m^3	207
Toluene	ug/m^3	52,533
1,1,1-Trichloroethane	ug/m^3	0
1,1,2-Trichloroethane	ug/m^3	0
Trichloroethene	ug/m^3	0
Vinyl chloride	ug/m^3	0
m&p-Xylene	ug/m^3	18,650
o-Xylene	ug/m^3	3,930
Total Volatile Organics	ug/m^3	**162,848**

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

ND = Analyte not detected above laboratory reporting limit

Table 6
Cell 2 and Cell 5 Monitoring Well Data

Location Designation	Monitoring Well Designation	Monitoring Well Temporary Identification	Installation Method	Date Installed	Well Use	Northing	Easting	Top of Casing Elevation	Protective Cover Type	Well Total Depth	Riser Length	Screen Length	Filter Pack Interval	Seal Interval	Grout Interval
CO36	CO36-PZM008	Cell 2 - MW1 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563212.31	1454571.76	6.94	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
	CO36-PZM043	Cell 2 - MW8 (I)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563214.49	1454578.37	6.92	Steel Riser	50.00	30.00	20.00	28-50	27-28	0-27
CO37	CO37-PZM003	Cell 2 - MW2 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563268.52	1455158.69	12.34	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
	CO37-PZM038	Cell 2 - MW9 (I)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563268.50	1455154.68	12.12	Steel Riser	50.00	30.00	20.00	28-50	27-28	0-27
CO38	CO38-PZM006	Cell 2 - MW3 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563078.80	1454743.79	6.75	Steel Riser	13.00	3.00	10.00	2-13	1-2	0-1
	CO38-PZM043	Cell 2 - MW10 (I)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563078.33	1454737.75	6.65	Steel Riser	50.00	30.00	20.00	28-50	27-28	0-27
CO39	CO39-PZM007	Cell 2 - MW4 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563141.66	1455095.70	7.75	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
	CO39-PZM042	Cell 2 - MW11 (I)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563140.07	1455089.80	7.91	Steel Riser	50.00	30.00	20.00	28-50	27-28	0-27
CO40	CO40-PZM008	Cell 2 - MW5 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563039.41	1455081.70	7.47	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO41	CO41-PZM001	Cell 2 - MW6 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	562873.18	1454953.00	13.57	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
	CO41-PZM036	Cell 2 - MW12 (I)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	562865.34	1454950.75	13.6	Steel Riser	50.00	30.00	20.00	28-50	27-28	0-27
CO42	CO42-PZM004	Cell 2 - MW7 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	563177.72	1455458.51	10.83	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO43	CO43-PZM048	Cell 2 - GW Extraction Well 1	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563202.59	1454621.23	1.96	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO44	CO44-PZM048	Cell 2 - GW Extraction Well 2	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563206.63	1454719.44	1.73	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO45	CO45-PZM047	Cell 2 - GW Extraction Well 3	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563218.62	1454818.73	2.68	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO46	CO46-PZM047	Cell 2 - GW Extraction Well 4	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563226.70	1454918.44	3.08	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO47	CO47-PZM046	Cell 2 - GW Extraction Well 5	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563234.85	1455018.95	3.85	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO48	CO48-PZM044	Cell 2 - GW Extraction Well 6	Hollow Stem Auger	3/2014 - 5/2014	Groundwater Extraction	563243.86	1455117.45	5.55	Steel Riser	50.00	35.00	15.00	33-50	32-33	0-32
CO49	CO49-PZM	Cell 2 - RIW 1	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563045.26	1455174.13	6.52	Steel Riser						
CO50	CO50-PZM	Cell 2 - RIW 2	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563049.45	1455224.48	7.71	Steel Riser						
CO51	CO51-PZM	Cell 2 - RIW 3	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563056.05	1455281.11	7.58	Steel Riser						
CO52	CO52-PZM	Cell 2 - RIW 4	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563066.70	1455325.29	7.92	Steel Riser						
CO53	CO53-PZM	Cell 2 - RIW 5	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563078.31	1455365.17	7.77	Steel Riser						
CO54	CO54-PZM	Cell 2 - RIW 6	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	563103.41	1455423.30	7.84	Steel Riser						
CO55	CO55-PZM000	Cell 5 - MW1 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561434.42	1457585.90	15.1	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO56	CO56-PZP001	Cell 5 - MW2 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561668.41	1457790.05	15.92	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO57	CO57-PZP002	Cell 5 - MW3 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561122.52	1457530.00	16.59	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO58	CO58-PZM001	Cell 5 - MW4 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561331.31	1457989.13	14.31	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO59	CO59-PZP002	Cell 5 - MW5 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561446.98	1457308.79	16.75	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO60	CO60-PZP001	Cell 5 - MW6 (S)	Hollow Stem Auger	3/2014 - 5/2014	Monitoring Well	561872.55	1457913.36	15.83	Steel Riser	15.00	5.00	10.00	3-15	2-3	0-2
CO61	CO61-PZM007	Cell 5 - DPE Well 1	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561330.96	1457592.28	10.26	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO62	CO62-PZM007	Cell 5 - DPE Well 2	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561357.45	1457625.28	9.66	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO63	CO63-PZM007	Cell 5 - DPE Well 3	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561382.08	1457657.57	10.29	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO64	CO64-PZM006	Cell 5 - DPE Well 4	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561407.02	1457691.78	11.16	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO65	CO65-PZM005	Cell 5 - DPE Well 5	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561431.95	1457724.23	11.6	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO66	CO66-PZM005	Cell 5 - DPE Well 6	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561458.25	1457755.59	11.57	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO67	CO67-PZM006	Cell 5 - DPE Well 7	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561503.24	1457809.88	11.2	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO68	CO68-PZM005	Cell 5 - DPE Well 8	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561537.61	1457830.32	12.03	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO69	CO69-PZM005	Cell 5 - DPE Well 9	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561579.10	1457852.16	11.92	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO70	CO70-PZM005	Cell 5 - DPE Well 10	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561618.53	1457867.42	12.28	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO71	CO71-PZM006	Cell 5 - DPE Well 11	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561654.51	1457886.12	11.33	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO72	CO72-PZM005	Cell 5 - DPE Well 12	Hollow Stem Auger	3/2014 - 5/2014	Groundwater and Vapor Extractio	561694.20	1457904.22	11.96	Steel Riser	17.00	15.00	2.00	13-17	12-13	4-12
CO73	CO73-PZM007	Cell 5 - RIW 1	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561813.02	1457253.88	11.03	Steel Riser	18.00	3.00	15.00	2-18	1-2	0-1
CO74	CO74-PZM007	Cell 5 - RIW 2	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561830.95	1457262.00	10.84	Steel Riser	18.00	3.00	15.00	2-18	1-2	0-1
CO75	CO75-PZM006	Cell 5 - RIW 3	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561831.95	1457277.07	10.07	Steel Riser	16.00	6.00	10.00	5-16	4-5	0-4
CO76	CO76-PZM006	Cell 5 - RIW 4	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561838.34	1457290.97	10.09	Steel Riser	16.00	6.00	10.00	5-16	4-5	0-4
CO77	CO77-PZM006	Cell 5 - RIW 5	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561840.78	1457353.41	10.39	Steel Riser	16.00	6.00	10.00	5-16	4-5	0-4
CO78	CO78-PZM006	Cell 5 - RIW 6	Hollow Stem Auger	3/2014 - 5/2014	Reinjection Well	561835.90	1457409.46	9.89	Steel Riser	16.00	6.00	10.00	5-16	4-5	0-4

Table 7
Cell 2
Monitoring Well Groundwater Elevations

Well ID	Temporary Well ID	Top of PVC Elevation (ft)	Aquifer	Well Depth from Ground Surface (ft)	12/22/2014	
					Depth to Groundwater (ft)	Groundwater Elevation (ft)
CO27-PZM012		5.12	S	17	4.83	0.29
CO27-PZM046		5.17	I	51	9.22	-4.05
CO36-PZM008	Cell 2 - MW1 (S)	6.94	S	15	6.79	0.15
CO36-PZM043	Cell 2 - MW8 (I)	6.92	I	50	7.71	-0.79
CO37-PZM003	Cell 2 - MW2 (S)	12.34	S	15	NM	NM
CO37-PZM038	Cell 2 - MW9 (I)	12.12	I	50	13.50	-1.38
CO38-PZM006	Cell 2 - MW3 (S)	6.75	S	13	6.40	0.35
CO38-PZM043	Cell 2 - MW10 (I)	6.65	I	50	7.40	-0.75
CO39-PZM007	Cell 2 - MW4 (S)	7.75	S	15	6.52	1.23
CO39-PZM042	Cell 2 - MW11 (I)	7.91	I	50	8.67	-0.76
CO40-PZM008	Cell 2 - MW5 (S)	7.47	S	15	6.55	0.92
CO41-PZM001	Cell 2 - MW6 (S)	13.57	S	15	12.73	0.84
CO41-PZM036	Cell 2 - MW12 (I)	13.6	I	50	13.93	-0.33
CO42-PZM004	Cell 2 - MW7 (S)	10.83	S	15	7.75	3.08
CO43-PZM048	Cell 2 - GW Extraction Well 1	1.96	I	50	NM	NM
CO44-PZM048	Cell 2 - GW Extraction Well 2	1.73	I	50	NM	NM
CO45-PZM047	Cell 2 - GW Extraction Well 3	2.68	I	50	NM	NM
CO46-PZM047	Cell 2 - GW Extraction Well 4	3.08	I	50	NM	NM
CO47-PZM046	Cell 2 - GW Extraction Well 5	3.85	I	50	NM	NM
CO48-PZM044	Cell 2 - GW Extraction Well 6	5.55	I	50	NM	NM

Notes
I = Intermediate depth wells S = Water table well
NA = No survey available
NM = Not Measured

Table 8
Summary of Groundwater Analytical Results (Fourth Quarter 2014)
Cell 2
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

New Sample ID		CO27-PZM012	CO27-PZM046	CO36-PZM008	CO36-PZM043	CO37-PZM038	CO37-PZM003	CO38-PZM043	CO38-PZM006	CO39-PZM007	CO39-PZM042	CO40-PZM008	CO41-PZM001	CO41-PZM036	CO42-PZM004
Former Sample ID		CO27-PZM012	CO27-PZM046	Cell 2-MW1 (S)	Cell2-MW8 (I)	Cell2-MW9 (I)	Cell2-MW2 (S)	Cell2-MW10 (I)	Cell2-MW3 (S)	Cell2-MW4 (S)	Cell2-MW11 (I)	Cell2-MW5 (S)	Cell2-MW6 (S)	Cell2-MW12 (I)	Cell2-MW7 (S)
Date		11/17/2014	11/17/2014	11/17/2014	11/17/2014	NS	NS	11/17/2014	11/17/2014	11/18/2014	11/18/2014	11/18/2014	11/18/2014	11/20/2014	11/18/2014
Analyte	Units														
Volatile Organics															
1,1,1,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	µg/L	ND	ND	ND	**708**	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	µg/L	ND	**75.4**	ND	ND	NS	NS	ND	ND	**57.8**	ND	ND	**93.7**	**58.9**	**74.6**
Acrylonitrile	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	µg/L	**22600**	**436000**	**26100**	**29000**	NS	NS	**46.4**	**10400**	**14600**	**32700**	**8500**	**111000**	**437000**	**5030**
Bromochloromethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	µg/L	**10.5**	**11.1**	ND	ND	NS	NS	**11.4**	**10.4**	**11.2**	**11.4**	**11.1**	**11.6**	ND	**11.5**
Chloromethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	µg/L	**278**	**1170**	**97.7**	**91.9**	NS	NS	**8.4**	**118**	**63.7**	**409**	**112**	**1380**	**1200**	**412**
Iodomethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-butyl ether	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	**5.1**	**5.7**	ND	**5**	NS	NS	ND	ND	**6**	ND	**5.6**	**7.2**	ND	**7**
Styrene	µg/L	**348**	**403**	**25.3**	**11.7**	NS	NS	ND	**57.1**	**65.4**	**536**	**136**	**144**	**489**	**524**
Tetrachloroethene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	µg/L	**8580**	**68000**	**5980**	**5050**	NS	NS	ND	**1360**	**3290**	**13000**	**2470**	**64900**	**123000**	**8060**
Trichloroethene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl acetate	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	µg/L	**2470**	**14900**	**1780**	**1470**	NS	NS	ND	**606**	**565**	**3260**	**1030**	**35700**	**27400**	**3580**
cis-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	µg/L	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Total Volatile Organics	µg/L	**34292**	**520565**	**33983**	**36337**	**0**	**0**	**66**	**12552**	**18659**	**49916**	**12265**	**213237**	**589148**	**17699**
Semi-Volatiles															
Naphthalene	µg/L	**1650**	**7110**	**772**	**904**	**NS**	NS	**ND**	**611**	**1440**	**2000**	**12400**	**919**	**345**	**1560**

Notes:

Bold = Analyte Detected

ND = Analyte not detected above laboratory reporting limit

µg/L = Micrograms per liter

Table 9
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 Fourth Quarter 2014 Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total CATOX Operating Time (October 1 - December 31, 2014)	hours	504
Overall CATOX Operational Time	%	22.8%
Estimated Total Hydrocarbons Destroyed	pounds	16.108
Estimated Hydrocarbon Removal Rate	pounds/hour	0.031961

Cell 3 Cumulative Summary of Estimated Hydrocarbon Recovery

Parameter	Units	Quantity
Total ICE/CATOX Operating Time (August 3, 2010 - December, 2014)	hours	16,031
Overall CATOX Operational Time	%	75.6%
Estimated Total Hydrocarbons Destroyed	pounds	1,444.7
Estimated Hydrocarbon Removal Rate	pounds/hour	0.09

Table 10
Summary of Soil Gas Analytical Results (Fourth Quarter 2014)
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 Q4 2014
TO-15 Volatile Organics		
Acetone	ug/m^3	0
Benzene	ug/m^3	57,777
Bromoform	ug/m^3	0
2-Butanone (MEK)	ug/m^3	0
Carbon disulfide	ug/m^3	0
Carbon tetrachloride	ug/m^3	0
Chlorobenzene	ug/m^3	30
Chloroethane	ug/m^3	0
Chloroform	ug/m^3	0
1,1-Dichloroethane	ug/m^3	0
1,2-Dichloroethane	ug/m^3	0
1,1-Dichloroethene	ug/m^3	0
trans-1,2-Dichloroethene	ug/m^3	0
1,2-Dichloropropane	ug/m^3	0.00
cis-1,3-Dichloropropene	ug/m^3	0
trans-1,3-Dichloropropene	ug/m^3	0
Ethylbenzene	ug/m^3	0
2-Hexanone	ug/m^3	0
Methylene Chloride	ug/m^3	0
4-Methyl-2-pentanone (MIBK)	ug/m^3	0
1,1,2,2-Tetrachloroethane	ug/m^3	0
Tetrachloroethene	ug/m^3	0
Toluene	ug/m^3	2,611
1,1,1-Trichloroethane	ug/m^3	0
1,1,2-Trichloroethane	ug/m^3	0
Trichloroethene	ug/m^3	0
Vinyl chloride	ug/m^3	0
m&p-Xylene	ug/m^3	375
o-Xylene	ug/m^3	161
Total Volatile Organics	ug/m^3	**60,953**

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

ND = Analyte not detected above laboratory reporting limit

Table 11
Summary of Groundwater Analytical Results (Fourth Quarter 2014)
Cell 3: Prototype AS/SVE System in the "Cove" Area
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

New Sample ID		CO30-PZM015	CO30-PZM060	CO101-PZM	CO102-PZM	CO103-PZM	CO104-PZM
Former Sample ID		CO30-PZM015	CO30-PZM060	MW-CELL 3-1	MW-CELL 3-2	MW-CELL 3-3	MW-CELL 3-4
Date		11/18/2014	11/18/2014	11/19/2014	11/19/2014	11/19/2014	11/19/2014
Analyte	Units						
Volatile Organics							
1,1,1,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	µg/L	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	µg/L	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	µg/L	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	µg/L	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	µg/L	ND	ND	ND	ND	ND	ND
2-Hexanone	µg/L	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	µg/L	ND	ND	ND	ND	ND	ND
Acetone	µg/L	**86.2**	ND	ND	ND	**26.7**	ND
Acrylonitrile	µg/L	ND	ND	ND	ND	ND	ND
Benzene	µg/L	**73700**	**11.8**	**17700**	**25200**	**48900**	**93.7**
Bromochloromethane	µg/L	ND	ND	ND	ND	ND	ND
Bromodichloromethane	µg/L	ND	ND	ND	ND	ND	ND
Bromoform	µg/L	ND	ND	ND	ND	ND	ND
Bromomethane	µg/L	ND	ND	ND	ND	ND	ND
Carbon disulfide	µg/L	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	µg/L	ND	ND	ND	ND	ND	ND
Chlorobenzene	µg/L	ND	ND	ND	ND	ND	ND
Chloroethane	µg/L	ND	**2.6**	ND	ND	ND	ND
Chloroform	µg/L	**11**	ND	ND	ND	ND	ND
Chloromethane	µg/L	ND	ND	ND	ND	ND	ND
Dibromochloromethane	µg/L	ND	ND	ND	ND	ND	ND
Dibromomethane	µg/L	ND	ND	ND	ND	ND	ND
Ethylbenzene	µg/L	**117**	ND	**20.5**	**29.1**	**100**	ND
Iodomethane	µg/L	ND	ND	ND	ND	ND	ND
Methyl-tert-butyl ether	µg/L	ND	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	**7**	ND	ND	ND	ND	ND
Styrene	µg/L	**25.7**	ND	**6.8**	**10.6**	**18.9**	ND
Tetrachloroethene	µg/L	ND	ND	ND	ND	ND	ND
Toluene	µg/L	**6440**	**3.7**	**1130**	**1510**	**3930**	**12.4**
Trichloroethene	µg/L	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	µg/L	ND	ND	ND	ND	ND	ND
Vinyl acetate	µg/L	ND	ND	ND	ND	ND	ND
Vinyl chloride	µg/L	ND	ND	ND	ND	ND	ND
Xylene (Total)	µg/L	**1710**	**1.8**	**261**	**340**	**1630**	**10.7**
cis-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	µg/L	ND	ND	ND	ND	ND	ND
Total Volatile Organics	µg/L	**82,097**	**20**	**19,118**	**27,090**	**54,606**	**117**
Semi-Volatiles							
Naphthalene	µg/L	**12,600**	**3**	**798**	**1,230**	**36,700**	**53**

Notes:

Bold = Analyte Detected

ND = Analyte not detected above laboratory reporting limit

µg/L = Micrograms per liter

Table 12
Cell 5
Monitoring Well Groundwater Elevations

Well ID	Temporary Well ID	Top of PVC Elevation (ft)	Aquifer	Well Depth from Ground Surface (ft)	12/22/2014		1/16/2014	
					Depth to Groundwater (ft)	Groundwater Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
CO23-PZM008		15.76	S	19	15.05	0.71	15.41	0.35
CO24-PZM007		15.95	S	19	15.12	0.83	15.47	0.48
CO26-PZM007		14.89	S	20	15.26	-0.37	15.39	-0.5
CO55-PZM000	Cell 5 - MW1 (S)	15.1	S	15	14.55	0.55	14.95	0.15
CO56-PZP001	Cell 5 - MW2 (S)	15.92	S	15	15.40	0.52	15.75	0.17
CO57-PZP002	Cell 5 - MW3 (S)	16.59	S	15	15.42	1.17	15.33	1.26
CO58-PZM001	Cell 5 - MW4 (S)	14.31	S	15	13.90	0.41	14.20	0.11
CO59-PZP002	Cell 5 - MW5 (S)	16.75	S	15	16.15	0.60	16.54	0.21
CO60-PZP001	Cell 5 - MW6 (S)	15.83	S	15	15.33	0.50	15.68	0.15

Notes
I = Intermediate depth wells S = Water table well
NA = No survey available
NM = Not Measured

Table 13
Summary of Groundwater Analytical Results (Fourth Quarter 2014)
Cell 5 DPE Groundwate Pump and Treat System
Former Coke Oven Area Interim Remedial Measures
Sparrows Point, LLC

New Sample ID		CO23-PZM008	CO24-PZM007	CO26-PZM007	CO55-PZM000	CO56-PZP001	CO57-PZP002	CO58-PZM001	CO59-PZP002	CO60-PZP001
Former Sample ID		CO23-PZM008	CO24-PZM007	CO26-PZM007	Cell5-MW1 (S)	Cell5-MW2 (S)	Cell5-MW3 (S)	Cell5-MW4 (S)	Cell5-MW5 (S)	Cell5-MW6 (S)
Date		11/14/2014	11/17/2014	11/13/2014	11/20/2014	11/14/2014	11/13/2014	11/13/2014	11/14/2014	11/13/2014
Time		16:03	10:52	15:05	12:00	14:25	13:19	13:46	15:06	14:25
Analyte	Units									
Volatile Organics										
1,1,1,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	µg/L	ND	ND	ND	**39.5**	ND	ND	ND	ND	ND
Acrylonitrile	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	µg/L	**947**	**5.3**	ND	**316**	**515**	**3**	**241**	**377**	**361**
Bromochloromethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	µg/L	**9.2**	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	µg/L	**52.3**	**7.4**	ND	ND	**19.4**	ND	11.5	**19.3**	**13.1**
Iodomethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-butyl ether	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	**6**	**5.3**	ND	ND	**6.2**	ND	**8.1**	**6.8**	**6.3**
Styrene	µg/L	**51.5**	ND	ND	ND	**74.2**	ND	**35.9**	**21.2**	**50.2**
Tetrachloroethene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	µg/L	**604**	ND	ND	**95.5**	**211**	**1.3**	**94.7**	**221**	**101**
Trichloroethene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl acetate	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	µg/L	**840**	**16.7**	ND	**46.9**	**399**	ND	**214**	**335**	**280**
cis-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semi-Volatiles										
Naphthalene	µg/L	**3,590**	**3,030**	**6**	**268**	**5,330**	ND	**1,900**	**1,680**	**2,350**
Total Volatile Organics	µg/L	**6,100**	**3,065**	**6**	**766**	**6,555**	**4**	**2,505**	**2,660**	**3,162**

Notes:

Bold = Analyte Detected

ND = Analyte not detected above laboratory reporting limit

µg/L = Micrograms per liter

Table 14
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 ID	Former Well ID	LNAPL Occurrence During Fourth Quarter 2014 (ft)	Total LNAPL Recovery Period		Cumulative Total LNAPL Recovered		Estimate LNAPL Recovered During Fourth Quarter 2014	
			Begin	End	(gal)	(lbs) (a)	(gal)	(lbs) (a)
CO99-PZMxxx	RW-04	1.75	23-Jul-10	On-going (b)	1,248	9,145	9	66
CO89-PZMxxx	BP-MW-05	1.28	28-Jan-10	On-going (b)	8,888	65,124	163	1,194
CO92-PZMxxx	BP-MW-08	2.28	8-Sep-10	On-going (b)	1,300	9,519	80	586
CO95-PZMxxx	BP-MW-11	3.2	23-Jul-10	On-going (b)	632.8	4,637	625	4,580
CO97-PZMxxx	RW-02	0.3	28-Jan-11	On-going (c)	0.8	6	0	0
CO98-PZMxxx	RW-03	1.48	24-Nov-10	On-going (c)	28.3	207	9	66
CO96-PZMxxx	RW-01	0.12	28-Oct-11	On-going (c)	1.3	10	0	0
CO94-PZMxxx	BP-MW-10	0	na	na	0	0	0	0
CO91-PZMxxx	BP-MW-07	0.04	na	na	0	0	0	0
CO90-PZMxxx	BP-MW-06	none	na	na	0	0	0	0
CO100-PZMxxx	RW-05	none	na	na	0	0	0	0
CO93-PZMxxx	BP-MW-09	none	na	na	0	0	0	0
CO19-PZM004	CO19-PZM004	none	na	na	0	0	0	0
				Total Recovery:	**12,099**	**88,649**	**886**	**6,493**

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 15
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
12/11/2014	10.83	10.95	0.12	10.2	10.5	0.3	8.91	10.39	1.48

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
12/11/2014	9.25	11	1.75	10.63	11.91	1.28	10.46	10.5	0.04

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
12/11/2014	11.42	13.7	2.28	7.79	7.79	0	10.1	13.3	3.2

Date	RW-05			BP-MW-09			CO19-PZM004		
	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to LNAPL	Depth to Water	LNAPL Thickness
12/11/2014	9	9	0	10.17	10.17	0	9.75	9.75	0

Date	BP-MW 6		
	Depth to LNAPL	Depth to Water	LNAPL Thickness
12/11/2014	9.85	9.85	0

FIGURES

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Former Coke Oven Area
Interim Measures Cell Locations

0 250 500 1,000 Feet

Figure 1

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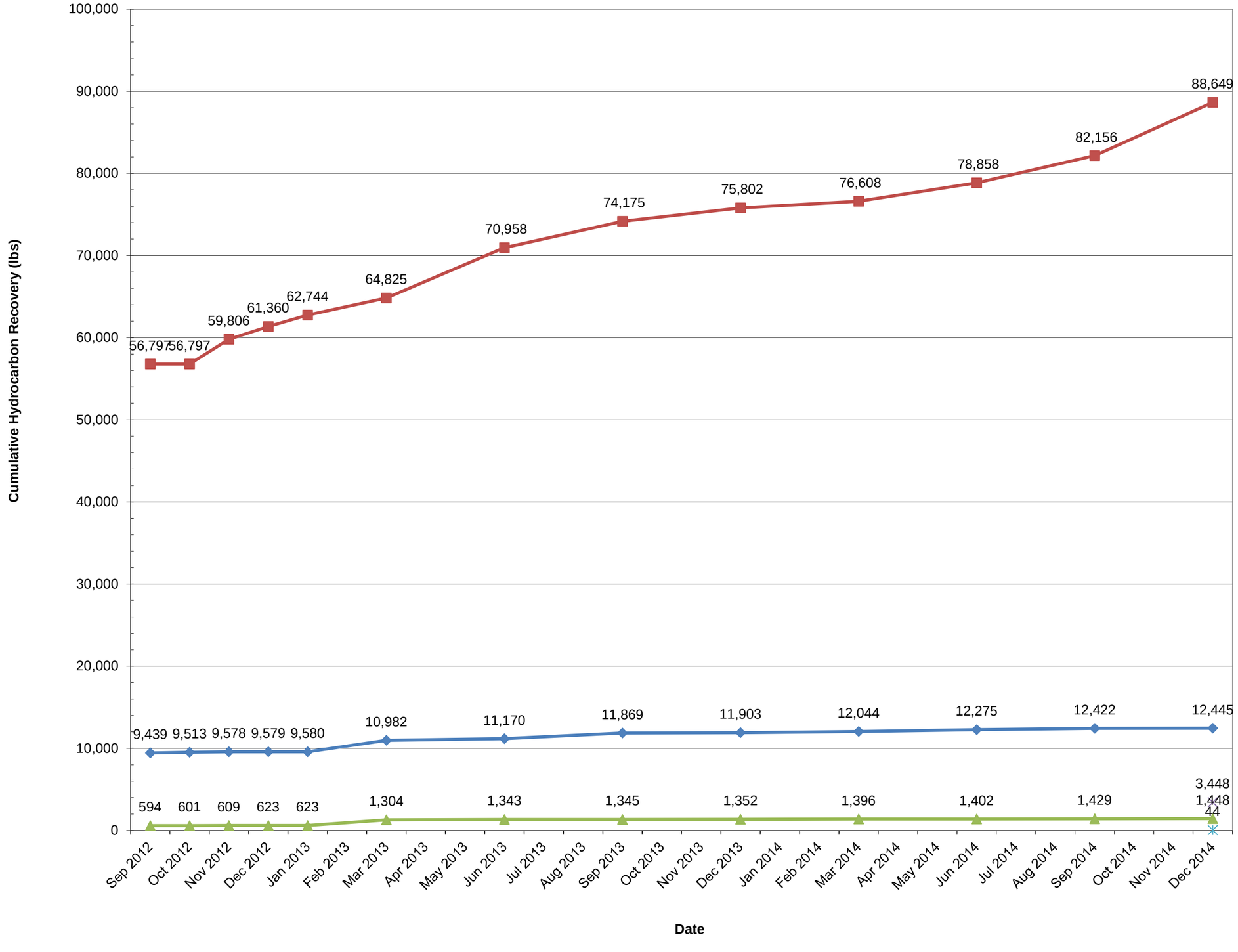
Former Coke Oven Area
Cell 1 System Layout

0 25 50 100 Feet

Figure 2



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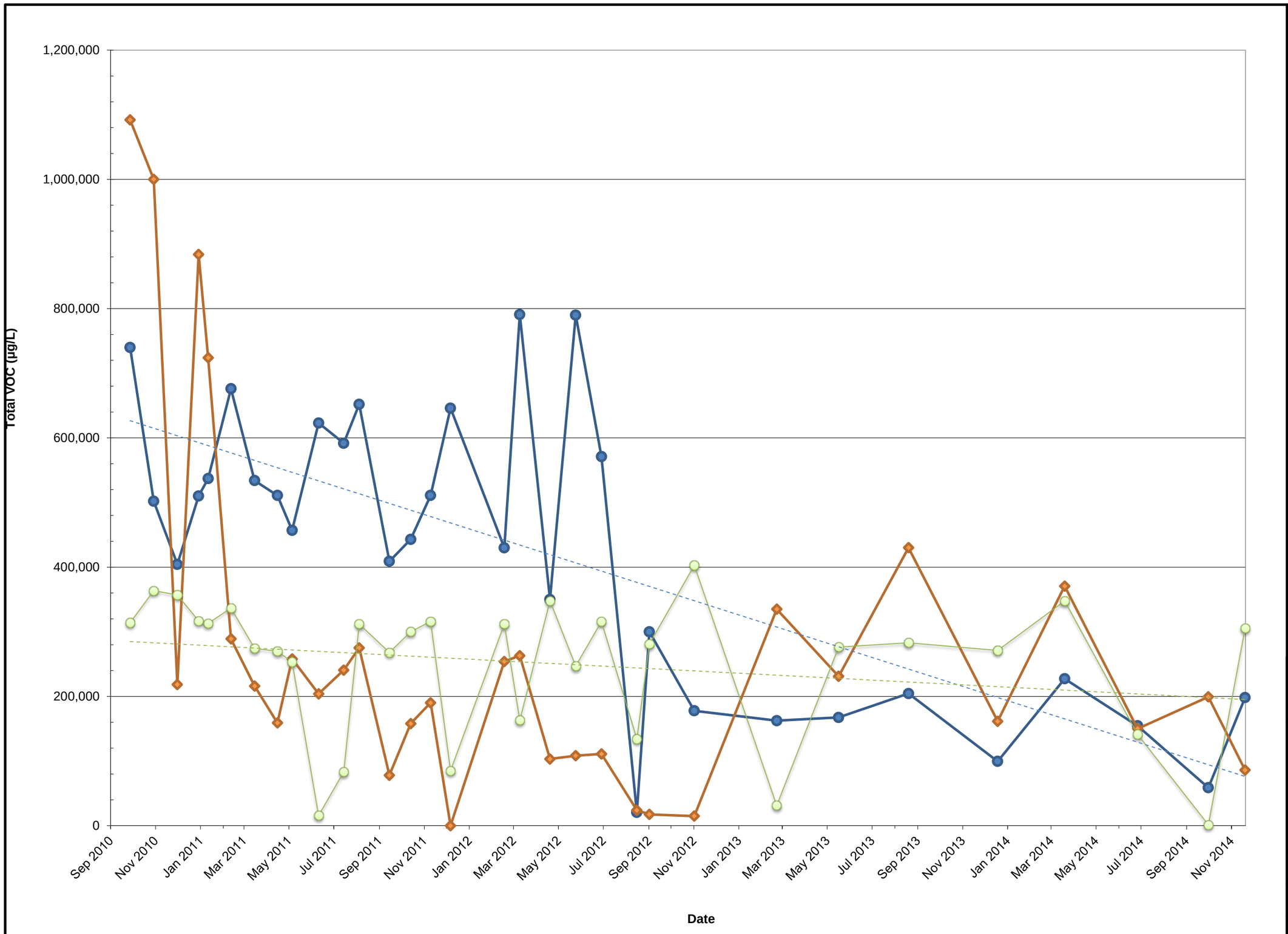
Baltimore, Maryland

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

Project Number	File Number

Date	Figure
Dec. 31, 2014	3

PE/RG	PM	DR



LEGEND

- CO02-PZM006
- CO18-PZM006
- CO93-PZMxxx

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

Date	Figure
Dec. 31, 2014	4

PE/RG	PM	DR

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Former Coke Oven Area
Cell 2 System Layout

0 25 50 100 Feet

Figure 5

EnviroAnalytics Group
Environmental Engineers

Former Coke Oven Area
Cell 2 Groundwater Elevation Contours Shallow Zone

0 30 60 120 Feet

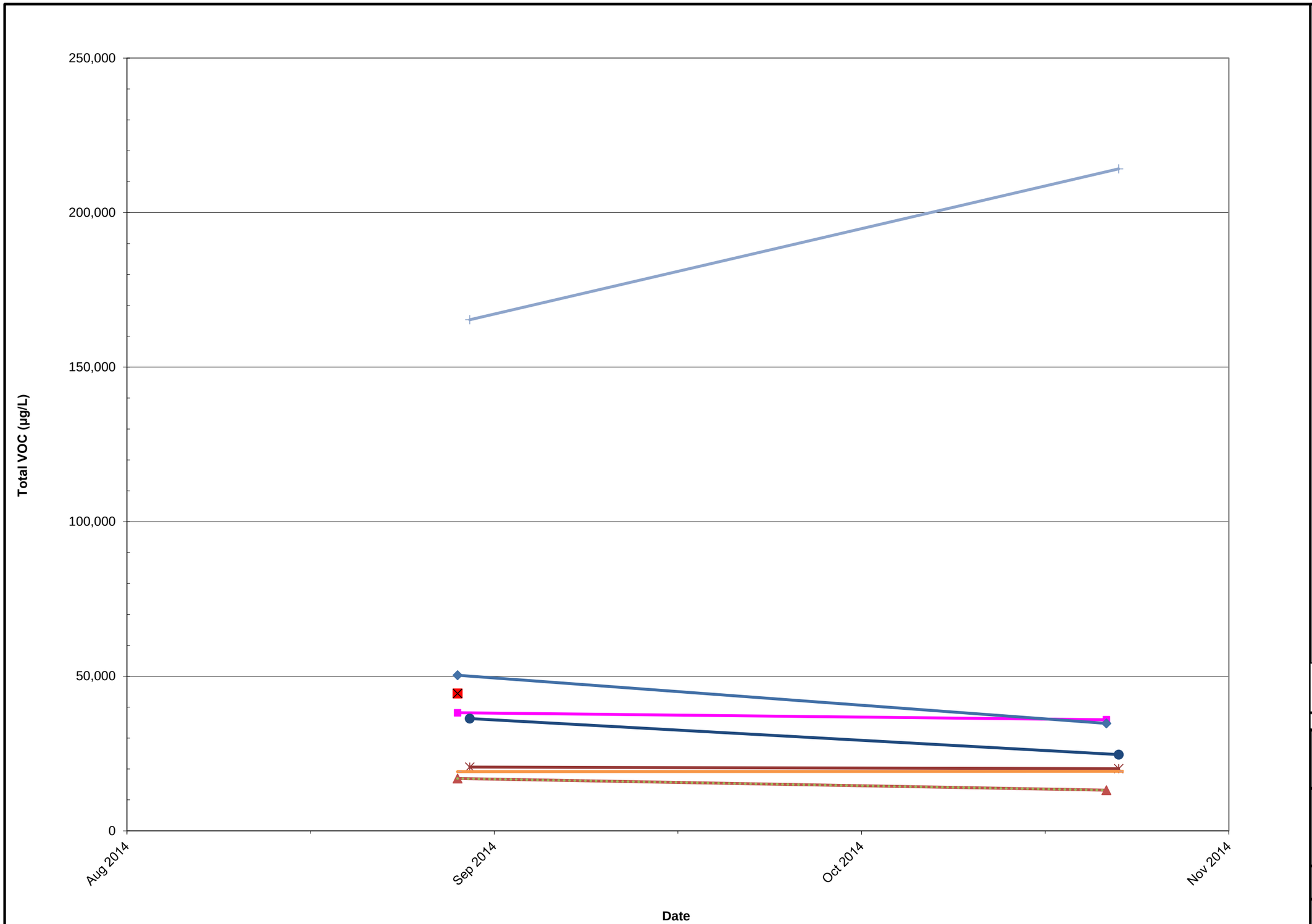
Figure 6

EnviroAnalytics Group
Environmental Engineers

Former Coke Oven Area
Cell 2 Groundwater Elevation Contours Intermediate Zone

0 30 60 120 Feet

Figure 7



LEGEND

- CO27-PZM012
- CO36-PZM008
- CO37-PZM003
- CO38-PZM006
- CO39-PZM007
- CO40-PZM008
- CO41-PZM001
- CO42-PZM004
- Linear (CO38-PZM006)

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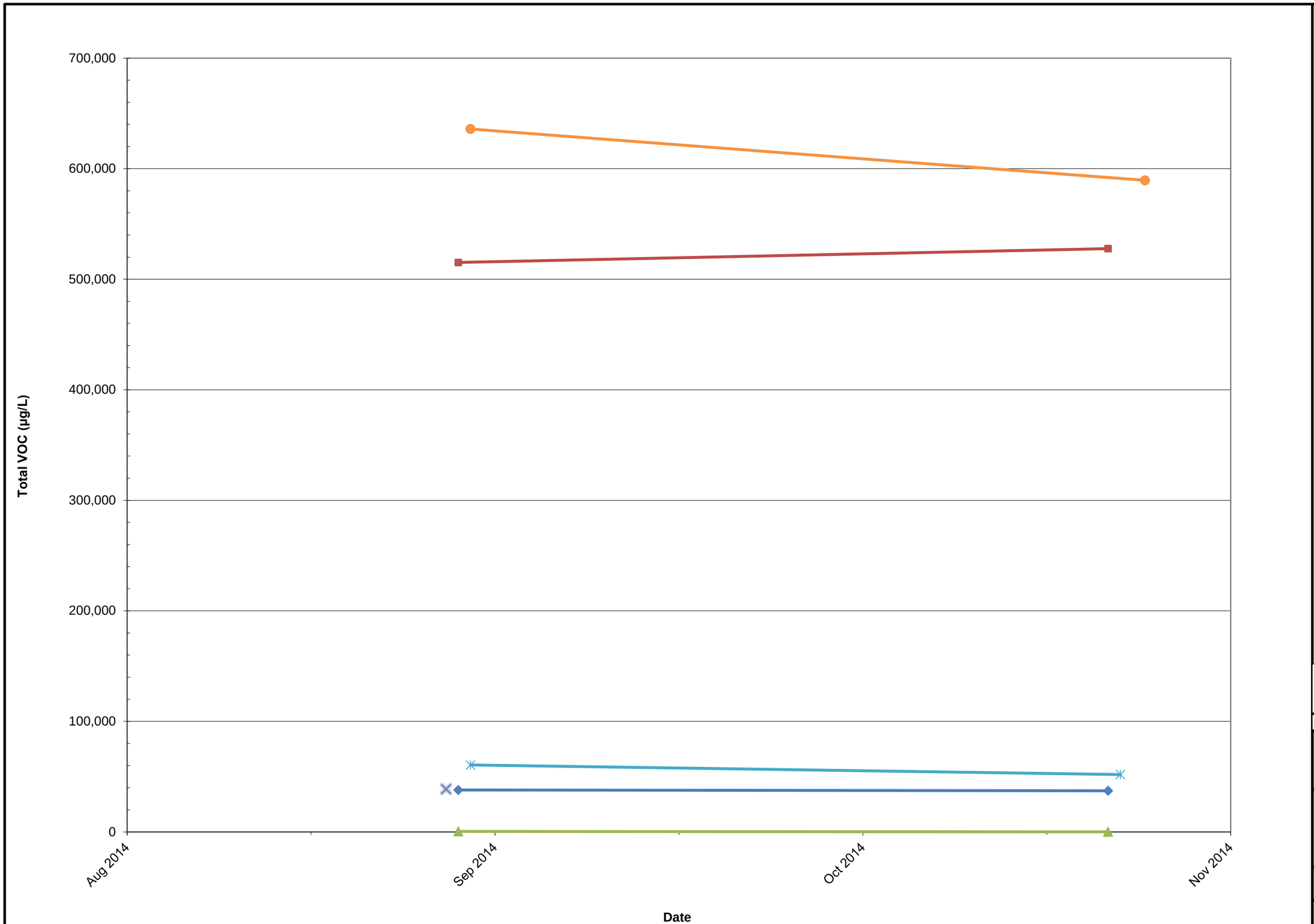
**MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH
CELL 2 GROUNDWATER PUMP AND TREAT SYSTEM
SHALLOW ZONE**

Date	Figure
Dec. 31, 2014	8A

PE/RG	PM	DR



LEGEND

- CO27-PZM046
- CO36-PZM043
- CO37-PZM038
- CO38-PZM043
- CO39-PZM042
- CO41-PZM036
- Linear (CO38-PZM043)

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MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH
CELL 2 GROUNDWATER PUMP AND TREAT SYSTEM
INTERMEDIATE ZONE

Date	Figure
Dec. 31, 2014	8B

PE/RG	PM	DR

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Former Coke Oven Area
Cell 2 Benzene Concentrations Intermediate Zone

0 30 60 120 Feet

Figure 9

EnviroAnalytics Group
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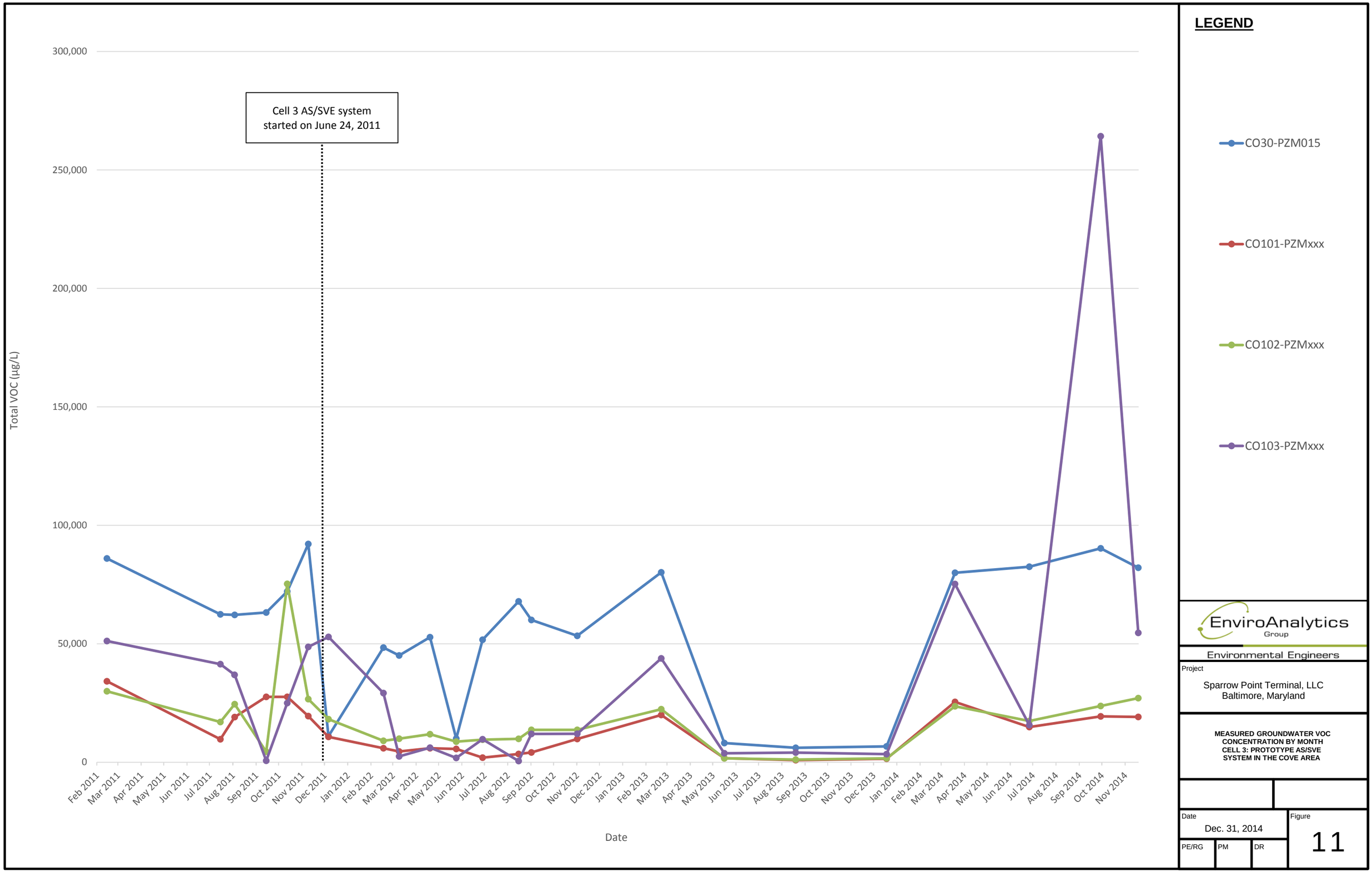
Former Coke Oven Area
Cell 3 System Layout

0 20 40 80 Feet

Figure 10



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

Date	Figure
Dec. 31, 2014	11

PE/RG	PM	DR

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Former Coke Oven Area
Cell 5 System Layout

0 50 100 200 Feet

Figure 12

EnviroAnalytics Group
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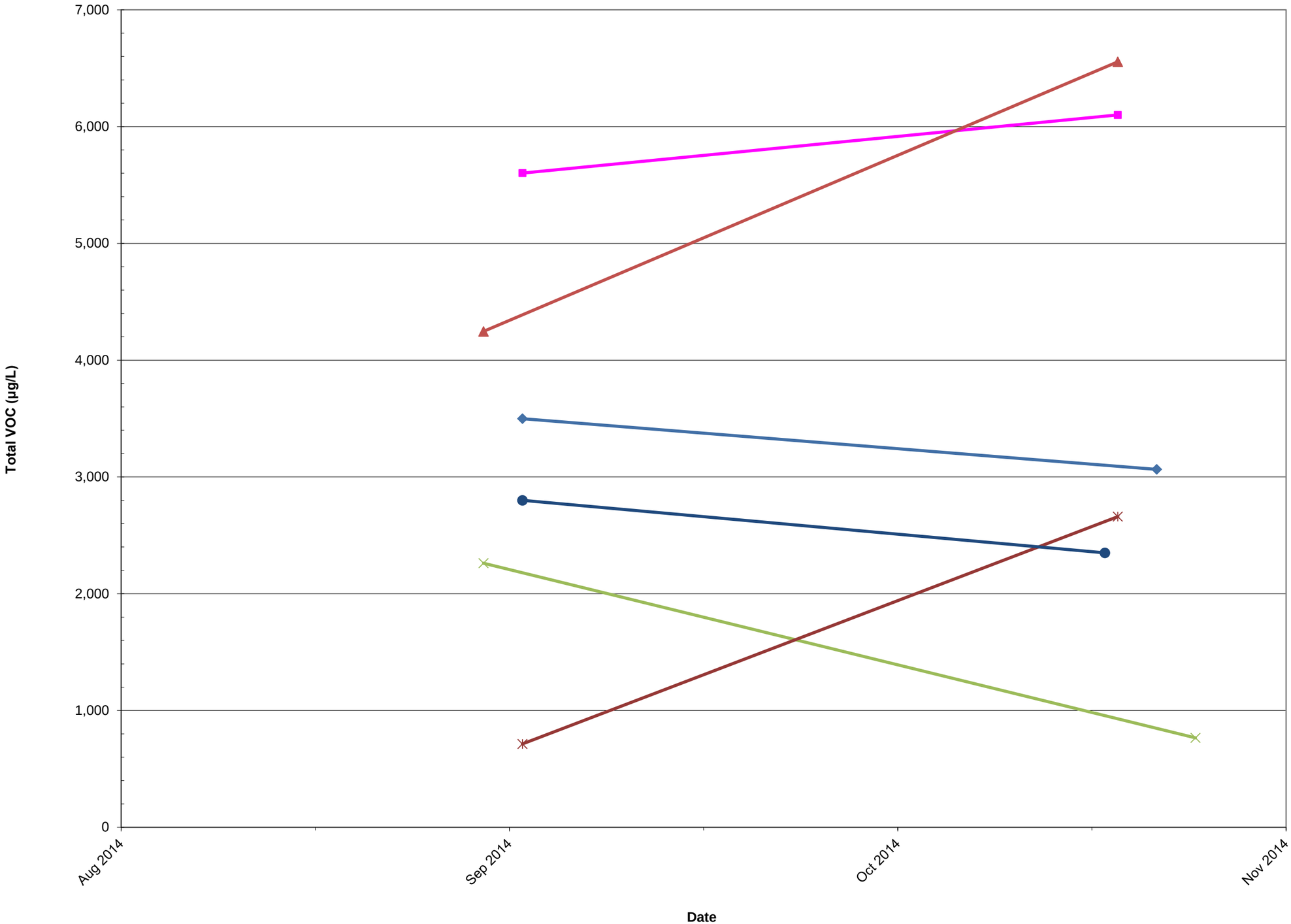
Former Coke Oven Area
Cell 5 Groundwater Elevation Contours Shallow Zone

0 50 100 200 Feet

Figure 13



LEGEND

- CO23-PZM007
- CO24-PZM008
- CO55-PZM000
- CO56-PZP001
- CO59-PZP002
- CO60PZP001

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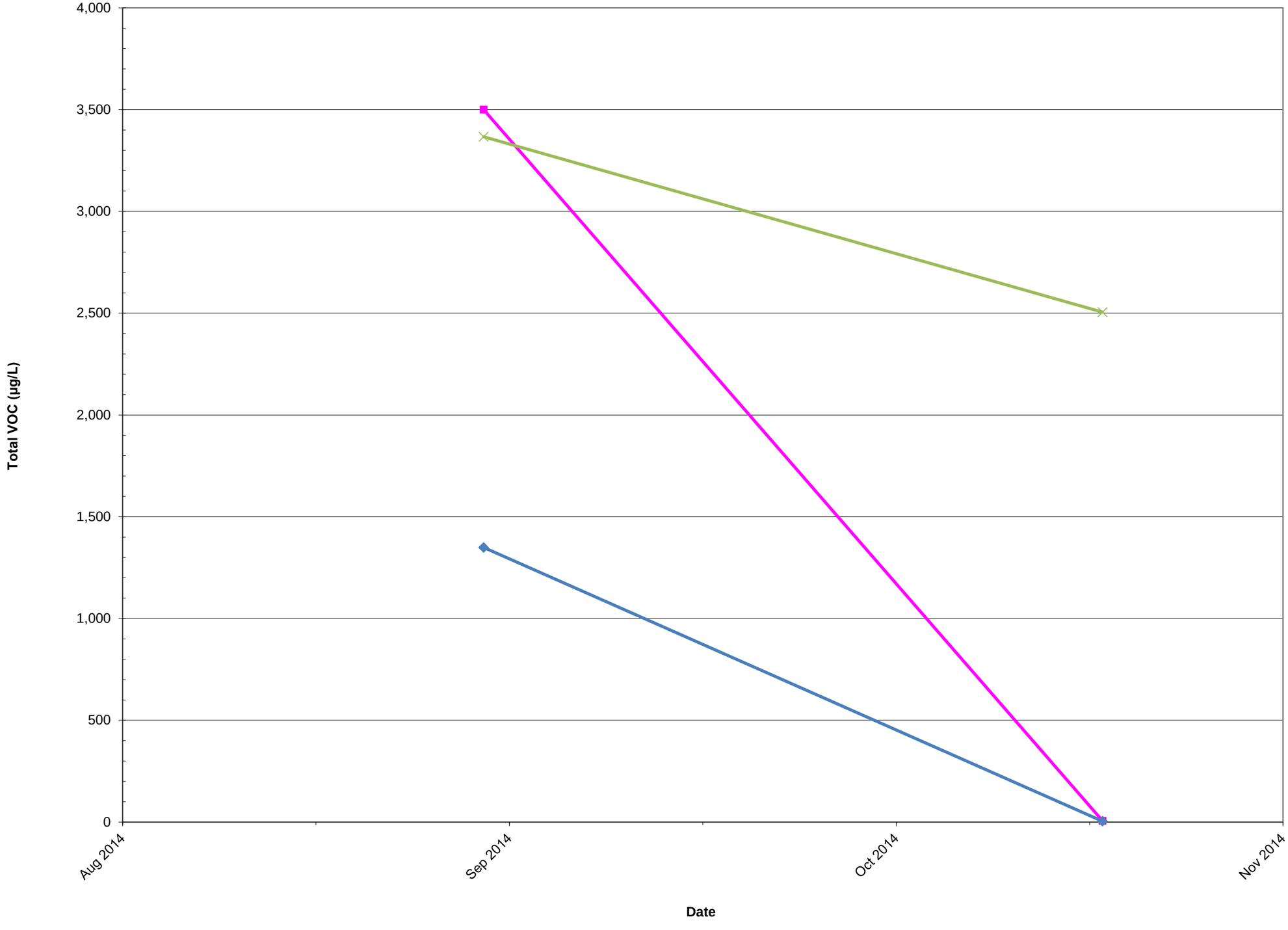
MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH
CELL 5 GROUNDWATER PUMP AND TREAT SYSTEM

Date	Figure
Dec. 31, 2014	14A

PE/RG	PM	DR



LEGEND

- CO26-PZM007
- CO57-PZP002
- CO58-PZM001

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MEASURED GROUNDWATER VOC CONCENTRATION BY MONTH
CELL 5 GROUNDWATER PUMP AND TREAT SYSTEM

Date	Figure
Dec. 31, 2014	14B

PE/RG	PM	DR

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Former Coke Oven Area
Cell 5 Naphthalene Concentrations Shallow Zone

0 50 100 200 Feet

Figure 15

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Former Coke Oven Area
Cell 6 Well Locations

0 25 50 100 Feet

Figure 16