

February 1, 2016

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Philadelphia, PA 19103-2029

Ms. Barbara Brown  
Project Coordinator  
Maryland Department of the Environment  
1800 Washington Blvd  
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**Subject: Interim Measures 2015 Annual Report  
Former Sludge Bin Storage Area, Rod & Wire Mill**

Dear Mr. Fan and Ms. Brown:

On behalf of Tradepoint Atlantic (formerly Sparrows Point Terminal) and Sparrows Point LLC, enclosed please find the annual progress report that summarizes activities conducted in 2015 for the Interim Corrective Action Measures at the former Rod & Wire Mill Sludge Bin Storage Area at Sparrows Point. Tasks were completed for the Interim Measure including the following:

- Maintaining institutional controls at the former in situ leaching area,
- Groundwater treatment system monitoring, operation and maintenance,
- Semi-annual groundwater elevation monitoring, and
- Semi-annual sampling and analysis of groundwater,
- Evaluation of Interim Measure Effectiveness and chemistry data;

The proposed operating plan for 2016 is to: maintain institutional controls at the former storage area, continue operation, maintenance, and monitoring of the groundwater pump and treat system, and complete semi-annual monitoring of groundwater and effectiveness reviews. In addition to the Interim Measures underway, environmental responses are planned in 2016 pursuant to the following:

- Administrative Consent Order (ACO) between Sparrows Point Terminal, LLC and the Maryland Department of the Environment (effective September 12, 2014);
- Settlement Agreement and Covenant Not to Sue (SA) between Sparrows Point Terminal, LLC and the United States Environmental Protection Agency (effective November 25, 2014).

The Rod and Wire Mill Area has been included in Area A for the Site and has been designated for investigation, remediation, and/or development on a priority basis as defined in the ACO. Investigations are underway to define regulatory obligations and applicable remedial measures will be completed to provide closure in accordance with the terms of the Regulatory Agreements.

Please contact me at (314) 620-3056 should questions arise during your review of the enclosed progress report.

Sincerely,



James Calenda  
Project Manager

Enclosure

**2015 Annual Report  
Interim Measures  
Former Sludge Bin Storage Area  
Rod and Wire Mill Area**

Prepared for:

**Sparrows Point LLC and**

**Tradepoint Atlantic  
1600 Sparrows Point Boulevard  
Sparrows Point Maryland 21219**



January 2016

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## 1.0 EXECUTIVE SUMMARY

Tasks were completed for the groundwater pump and treat Interim Measure at the former Rod & Wire Mill Sludge Bin Storage Area at Sparrows Point during 2015 in accordance with the scope and schedule submitted in the July 2000 Work Plan for Re- Establishment of Interim Measures, Former Sludge Bin Storage Area, Rod & Wire Mill that was approved by U. S. EPA on November 3, 2000. The interim measure tasks included:

- Maintaining institutional controls at the former in situ leaching area,
- Groundwater treatment system monitoring, operation and maintenance,
- Semi-annual groundwater elevation monitoring, and
- Semi-annual sampling and analysis of groundwater;

Specifics of the interim measures tasks completed in 2015 are as follows:

- Institutional controls were maintained at the former sludge bin storage area to minimize and manage activities that could disturb soils at the site. These controls consist of notice sign boundary markers and continuation of an authorization program to conduct work in the area.
- Operation and maintenance of the groundwater recovery wells, transfer pipeline and treatment process equipment located at the Humphreys Creek Wastewater Treatment Plant.
- Evaluation of the Interim Measure, including documentation of groundwater treatment flow, review of semi-annual groundwater elevation data, review of groundwater monitoring data and effectiveness of the Interim Measure.
- Semi-annual sampling, analysis and evaluation of the groundwater impacted by former operations at the sludge bin storage area.

A total of 4,487,659 gallons of water were extracted from the two Former Sludge Bin Storage Area groundwater pumping wells (RW15-PZM020 and RW10-PZM020) during 2015. This compares to 4,954,416 gallons extracted in 2014. The average total pumping rate for 2015 was 12,295 gallons per day (gpd), or 8.53 gallons per minute (gpm). A total of 210 pounds (lbs) of cadmium and 10630 pounds (lbs) of zinc were removed and treated during 2015. This compares to 216 lbs of cadmium and 11,090 lbs of zinc removed in 2014. The decrease in mass removal of cadmium and zinc in 2015 as compared to 2014 is due to the decrease in volume of water pumped from both wells in 2015.

Recovery of intermediate zone groundwater (approximately 20 to 30 feet below the ground surface) at the average annual 2015 pumping rate of 4.69 gallons per minute (gpm) for recovery well RW10-PZM020 and 3.84 gpm for recovery well RW15-PZM020 demonstrated a radius of influence that effectively controlled groundwater movement of the intermediate zone plume.

The groundwater elevation data for the shallow zone (groundwater table surface to 15 feet below this surface), combined with the chemistry data, document a water table situation where contamination migration is effectively controlled in this groundwater zone. Some influence of capture of shallow groundwater from pumping of the intermediate zone may be reflected in the shallow groundwater elevations.

Groundwater elevation data for the deeper groundwater zone (greater than 50 feet in depth) suggest that heads in this zone may not be influenced by the pump and treat system; however, the chemistry data indicate that this zone is minimally impacted.

Cadmium – Cadmium concentrations for 2015 in the two pumping wells (RW10-PZM020 and RW15- PZM020) exhibited slightly lower concentrations as observed in recent prior years. Cadmium concentrations were also similar to prior years at most of the non-pumping wells.

Zinc – Zinc concentrations for 2015 in the two pumping wells (RW10-PZM020 and RW15-PZM020) showed minimal changes in concentrations as observed in recent prior years possibly due to the consistent pumping rate in 2015. RW10-PZM020 showed a decrease in concentration while RW15-PZM020 had a minor increase in concentration. Zinc concentrations were also similar to slightly lower as compared to prior years at most of the non-pumping wells. The increasing trend of zinc concentration in well RW20-PZM020 noted in previous years was not seen in 2015 as results decreased from 72.2 mg/L in 2014 (4<sup>th</sup> qtr) to 10.8 mg/L in 2015 (4<sup>th</sup> qtr). RW20-PZM020 had noted lower concentrations in 2015. Well RW18- PZM047 showed a static concentration in the 4<sup>th</sup> quarter of 2015. These trends will be monitored in 2016 as well.

The Proposed Operating Plan for 2016 is to: maintain institutional controls at the former storage area, continue operation, maintenance, and monitoring of the groundwater pump and treat system, and complete semi-annual monitoring of groundwater consistent with procedures outlined in the approved July 2000 Work Plan and as modified in this report.

In addition to the Interim Measures underway at the former Rod and Wire Mill Area, environmental responses are planned in 2016 pursuant to the following:

- Administrative Consent Order (ACO) between Sparrows Point Terminal, LLC and the Maryland Department of the Environment (effective September 12, 2014);
- Settlement Agreement and Covenant Not to Sue (SA) between Sparrows Point Terminal, LLC and the United States Environmental Protection Agency (effective November 25, 2014).

The Rod and Wire Mill Area has been included in Area A for the Site and has been designated for investigation, remediation, and/or development on a priority basis as defined in the ACO. Investigations are underway to define regulatory obligations and applicable remedial measures will be completed to provide closure in accordance with the terms of the Regulatory Agreements. These terms include obtaining a Certificate of Completion under MDE's Voluntary Cleanup Program and an EPA Certificate of Completeness after the Area proceeds through RCRA's Statement of Basis process upon which a Final Decision and Response to Documents is rendered.

## 2.0 FORMER ROD AND WIRE MILL INTERIM MEASURES

This section summarizes the Interim Measures that are currently underway at the former Rod and Wire Mill Sludge Bin Storage Area:

- Institutional controls for soils have been established to provide a “Restricted Work Area” to control the exposure of on-site workers to soils in the Former Sludge Bin Storage Area.
- A groundwater monitoring network has been installed including the use of 32 wells for monitoring the performance of the groundwater pump and treat system. This monitoring network (excluding well TS04-PZM007 destroyed in 2003) was to be used to collect water level and groundwater quality data.
- A groundwater pump and treat system is operated and maintained consisting of two intermediate depth zone recovery wells (RW10-PZM020 and RW15-PZM020) that are pumped at a rate of between 5.0 and 12.0 gallons per minute (gpm) during operation. The expected normal operating rate for the treatment plant was set at a combined rate of 8.0 to 12.0 gpm with a maximum design flow of 25 gpm. Recovered groundwater is transported via a pipeline to the Humphreys Creek Wastewater Treatment Plant (HCWWTP) for subsequent treatment and discharge in accordance with the NPDES permit requirements for the facility.

### 3.0 MONITORING RESULTS FOR 2015

#### 3.1 Groundwater Pump and Treat System Evaluation

The 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 cadmium and zinc removed from groundwater.

##### 3.1.1 Semi-Annual Water Level Monitoring

Groundwater-level measurements were manually measured semi-annually (May and December 2015) in all existing monitoring wells. A summary of the water level measurements (depth to water and water elevation) are presented in Tables 3-1 and 3-2; the locations of the monitoring wells are shown on Figure 3-1. A review of both sets of semi-annual water level data was conducted and there were no substantive differences in water level elevations between the data sets.

The groundwater elevation data are graphically presented as groundwater elevation contour maps in Figures 3-2 through 3-4. Figures 3-2, 3-3 and 3-4 represent the 2nd quarter (May) 2015 data for the shallow, intermediate and deep 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 20- to 30-foot depths; and the deep water bearing zone is defined as those piezometers screened from approximately 50- to 75-feet below ground surface. The water level results for each of these zones are discussed below.

##### Shallow Water Table Zone

Figure 3-2 presents the groundwater elevation contour map for the shallow water table zone, corresponding to the May 2015 time period when the underlying zone (intermediate pumping zone) was being pumped.

The data for the shallow groundwater zone exhibit lower groundwater elevations at wells located just to the north of the former Rod and Wire Mill structure. This characteristic may be indicative of localized increased infiltration in this area that may be influenced by the withdrawal of groundwater from the intermediate zone. Groundwater flow from this area in the shallow zone is inferred to be moving radially towards the west, northwest and possibly northeast. West of RW09-PZM004 inferred shallow zone groundwater movement is westward. The groundwater chemistry data (see Section 3.2 chemistry discussion) reveal that elevated zinc and cadmium concentrations in shallow groundwater are primarily

associated with the area east of RW09-PZM004 and, thus, are associated with shallow groundwater flow that is away from Bear Creek. At the western edge of the monitored shallow zone (near TS04-PDM004) shallow groundwater is inferred to be flowing toward Bear Creek. However, at this location and in nearby near-shore wells RW19- PZP000 and RW20-PZP000 both the cadmium and zinc concentrations in shallow groundwater are predominantly trace or non-detect (see Section 3.2 chemistry discussion).

### Intermediate Pumping Zone

Figures 3-3 presents groundwater elevations within the intermediate pumping zone during the May 2015 time period. The data indicates significant drawdown surrounding the two pumping wells (RW15-PZM020 and RW10-PZM020) that comprise the groundwater recovery system. This system is maintaining a broad zone of influence extending from the pumping wells for a distance of at least 300 feet. This zone of influence is somewhat elongated and more extensive in an east to west direction, although in 2015 it appears to capture intermediate zone groundwater at the RW16 and RW17 locations. The zone of influence extends beyond the eastern edge of the former Rod and Wire Mill to the east.

### Deep Zone

Figure 3-4 presents the groundwater elevations for the deep water bearing zone, corresponding to the May 2015 time period when the overlying zone (intermediate pumping zone) was being pumped. The data indicates a northwesterly to westerly decrease in water levels, inferring westward groundwater flow within the deep water bearing zone. Pumping the intermediate zone does not appear to affect the deep water bearing zone.

### **3.1.2 Evaluation of Pump and Treat System Effectiveness**

A total of 4,487,659 gallons of water were extracted from the Former Rod and Wire Mill Area pumping wells and treated at the HCWWTP during 2015. The average pumping rate for the pump and treat system was 12,295 gpd, or 8.5 gpm. Average annual pumping rates of approximately 3.84 gpm were achieved in recovery well RW15-PZM020 and 4.69 gpm in RW10-PZM020. These pumping rates appear to effectively capture the most impacted groundwater beneath the Former Sludge Bin Storage Area, as revealed by Figures 3-3 discussed above.

Daily pumping records for the groundwater pump and treat system from January through December 2015 are provided in Appendix A. A summary of isolated operational outages which occurred in 2015 is provided in Appendix B. Overall, the groundwater treatment system operated as intended.

A total of 210 pounds (lbs) of cadmium and 10,630 pounds (lbs) of zinc were removed and treated during 2015. This compares to 216 lbs of cadmium and 11,090 lbs of zinc removed in 2014. The decrease in mass removal of cadmium and zinc in 2015 as compared to 2014 is due to the decrease in the volume of water pumped from both wells in 2015. This minor decrease was due to slightly more down time in 2015 for the pumping system.

- Treated water volume (gal):

	2015	2014	2013
RW10-PZM020	2,467,245	2,354,152	985,416
RW15-PZM020	2,020,414	2,600,264	1,553,208

- Average Cadmium and Zinc Concentrations:

- RW10-PZM020:

	2015	2014	2013	2012
Cadmium (ppm)	9.55	9.83	11.75	12
Zinc (ppm)	487	526	373	470

- RW15-PZM020:

	2015	2014	2013	2012
Cadmium (ppm)	0.78	1.08	1.0	3.3
Zinc (ppm)	35.8	34.9	44	51

- Treated mass (lbs):

- RW10-PZM020:

	2015	2014	2013	2012
Cadmium	197	193	99	142
Zinc	10,027	10,334	3,073	5,805

- RW15-PZM020:

	2015	2014	2013	2012
Cadmium	13	23	12	41
Zinc	603	756	573	637

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

### 3.2 Groundwater Chemistry Data

Groundwater chemistry data were collected on a semi-annual basis during the 2nd and 4th quarters. The sampling occurred during the following months of 2015:

- May 2015 and
- December 2015

Tables 3-2 and 3-3 present the 2015 data collected for the groundwater wells for total cadmium and zinc, respectively. The tables also show semi-annual data from 2008 through 2015. The locations of the wells are shown in Figure 3-1. A comparison of the 2015 data with data from previous years indicates the following:

**Cadmium** – Cadmium concentrations in the two pumping wells (RW10-PZM020 and RW15-PZM020) have declined as compared to concentrations observed in recent prior years. At most of the non-pumping wells the 2015 cadmium concentrations are also similar or have slightly declined as compared to prior years. The exception noted in 2012 at RW06-PZM001 where the 2012 4th quarter cadmium concentration (25 mg/l) was unreasonably higher than historically was not repeated in 2015. Cadmium was measured at 1.75 mg/L and 7.24 mg/L in the 2<sup>nd</sup> and 4<sup>th</sup> quarter of 2015 respectively for this monitoring well. An anomalously high cadmium concentration of 25 mg/L was noted in the 2<sup>nd</sup> quarter sample analyzed for well RW-14-PZM020. This concentration appears to be an artifact possibly from laboratory dilution calculation error as historical ranges and the 4<sup>th</sup> quarter sample were below 1 mg/L. The deeper groundwater continued to show no impacts from overlying cadmium contamination in the shallow and intermediate groundwater zones.

**Zinc** – Zinc concentrations for 2015 in the two pumping wells (RW10-PZM020 and RW15-PZM020) showed minimal changes in concentrations as observed in recent prior years. Zinc concentrations were also similar to slightly lower as compared to prior years at most of the non-pumping wells, RW02-PZM020 and RW20-PZM020 had noted lower concentrations in 2015. The increasing trend of zinc concentration in well RW02-PZM020 noted in previous years was not seen in 2015 as results decreased from 1890 mg/L in 2014 (4<sup>th</sup> qtr) to 649 mg/L in 2015 (4<sup>th</sup> qtr). Well RW18-PZM047

continued to show variable concentrations of zinc (4.71 and 5.54 mg/L for the 2<sup>nd</sup> and 4<sup>th</sup> qtr 2015) that are in the ranges observed historically and will continue to be monitored. Concentrations decreased at RW02-PZM020 most likely due to the decreased pumping rate. These trends and the single well higher concentration result will be monitored going forward.

The analytical results from the most recent sampling event (4th quarter 2015) are depicted in plan view at the well locations in Figures 3-5 through 3-7. A review of both sets of semi-annual groundwater chemistry data was conducted and there were no substantive differences in groundwater chemistry between the data sets. The data recovered in 2015 indicate that the highest cadmium and zinc concentrations are in monitoring wells located near and east-northeast of pumping well RW10-PZM020.

#### 4.0 PROPOSED OPERATING PLAN FOR 2016

The Proposed Operating Plan for 2016 includes the following requirements:

- Operation, maintenance and monitoring of the groundwater pump and treat system on a year round basis;
- Semi-annual monitoring of groundwater quality, including sampling and analysis for total cadmium and zinc from 31 monitoring wells; and
- Semi-annual groundwater level measurements and evaluation of groundwater flow characteristics;

Thirty-one wells in the monitoring network are proposed to be used to collect bi-annual groundwater samples for analysis of cadmium and zinc in 2016. Sampling and analysis will be performed at 14 shallow wells, 13 intermediate wells, and 4 deep wells located in the general area of the former Sludge Bin Storage Area. Water-level measurements will be collected semi-annually in conjunction with the sampling and analysis program. The routine bi-annual water level measurements will be performed manually in all 31 wells in the monitoring network.

In addition to the Interim Measures underway at the former Rod and Wire Mill Area, environmental responses are planned in 2016 pursuant to the following:

- Administrative Consent Order (ACO) between Sparrows Point Terminal, LLC and the Maryland Department of the Environment (effective September 12, 2014);
- Settlement Agreement and Covenant Not to Sue (SA) between Sparrows Point Terminal, LLC and the United States Environmental Protection Agency (effective November 25, 2014).

The Rod and Wire Mill Area has been included in Area A for the Site and has been designated for investigation, remediation, and/or development on a priority basis as defined in the ACO. Investigations are underway to define regulatory obligations and applicable remedial measures will be completed to provide closure in accordance with the terms of the Regulatory Agreements. These terms include obtaining a Certificate of Completion under MDE's Voluntary Cleanup Program and an EPA Certificate of Completeness after the Area proceeds through RCRA's Statement of Basis process upon which a Final Decision and Response to Documents is rendered.

## **FIGURES**



Date: 1/28/2016



### Former Rod and Wire Mill Area Location of Groundwater Monitoring Wells

#### Legend

- ◆ Monitoring Wells Shallow Zone
- ◆ Monitoring Wells Intermediate Zone
- ◆ Monitoring Wells Deep Shallow Zone
- Property Boundary

**Figure**  
**3.1**



Date: 1/28/2016



### Former Rod and Wire Mill Area Shallow Groundwater Elevation Contour Map

Water Levels Recorded 5/5/2015

#### Legend

- Monitoring Well Shallow Zone
- GW Contours Shallow Zone 2015
- Property Boundary



**Figure  
3.2**



Date: 1/28/2016



**Former Rod and Wire Mill Area  
Intermediate Groundwater Elevation Contour Map**

Water Levels Recorded 5/5/2015

**Legend**

- Monitoring Wells Intermediate Zone
- GW Contours Intermediate Zone 2015
- Property Boundary



**Figure  
3.3**



Date: 1/28/2016



**Former Rod and Wire Mill Area  
Intermediate Groundwater Elevation Contour Map**

Water Levels Recorded 5/5/2015

**Legend**

-  Monitoring Wells Deep Zone
-  Property Boundary



**Figure  
3.4**





Date: 1/26/2016



### Former Rod and Wire Mill Area Cadmium and Zinc Results - Intermediate Zone

Wells Sampled 5/4/2015 - 5/7/2015

#### Legend

- Monitoring Wells Intermediate Zone
- Property Boundary
- ND - Not Detected
- NS - Not Sampled



**Figure**  
**3.6**



Date: 1/26/2016



**Former Rod and Wire Mill Area  
Cadmium and Zinc Results - Deep Zone**

Wells Sampled 5/4/2015 - 5/7/2015

**Legend**

- Monitoring Wells Deep Zone
- Property Boundary
- ND - Not Detected
- NS - Not Sampled



**Figure  
3.7**

## **TABLES**

Table 3-1

## 2015 Water Level Elevation Data

Well Number	Top of Casing Elevation (ft)	Date	Depth to Water (ft)	Water Level Elevation (ft)
RW01-PZM020	12.72	05/05/2015	11.62	1.10
RW02-PZM000	12.37	05/05/2015	3.72	8.65
RW02-PZM020	13.00	05/05/2015	12.82	0.18
RW03-PZM003	10.83	05/05/2015	3.15	7.68
RW04-PZM003	11.09	05/05/2015	4.08	7.01
RW05-PZP001	11.04	05/05/2015	5.32	5.72
RW06-PZM001	12.17	05/05/2015	4.32	7.85
RW07-PZM004	15.27	05/05/2015	6.25	9.02
RW07-PZM017	12.95	05/05/2015	13.14	-0.19
RW08-PZM003	11.35	05/05/2015	3.70	7.65
RW09-PZM004	15.22	05/05/2015	5.39	9.83
RW10-PZM004	12.34	05/05/2015	2.32	10.02
RW10-PZM020	12.46	05/05/2015	14.75	-2.29
RW10-PZM065	12.34	05/05/2015	10.01	2.33
RW11-PZM004	15.35	05/05/2015	5.19	10.16
RW12-PZM004	15.37	05/05/2015	6.30	9.07
RW13-PZM020	14.62	05/05/2015	13.01	1.61
RW14-PZM020	15.15	05/05/2015	13.65	1.50
RW15-PZM020	12.70	05/05/2015	13.96	-1.26
RW16-PZM020	13.84	05/05/2015	13.02	0.82
RW17-PZM019	13.67	05/05/2015	12.81	0.86
RW18-PZM047	15.68	05/05/2015	15.70	-0.02
RW19-PZM020	13.49	05/05/2015	12.63	0.86
RW19-PZM050	12.99	05/05/2015	12.90	0.09
RW19-PZP000	13.49	05/05/2015	9.09	4.40
RW20-PZM020	13.47	05/05/2015	12.55	0.92
RW20-PZM050	13.03	05/05/2015	9.95	3.08
RW20-PZP000	12.82	05/05/2015	4.45	8.37
RW21-PZM023	12.91	05/05/2015	11.84	1.07
TS04-PDM004	13.71	05/05/2015	10.6	3.11
TS04-PPM007*	10.22	05/05/2015	NM	NM
TS04-PZM023	10.09	05/05/2015	10.4	-0.31

NM - No Measurement

\*Microbac report indicates well was destroyed in 2003, possibly by a plow

Table 3-2

## 2015 Water Level Elevation Data

Well Number	Top of Casing Elevation (ft)	Date	Depth to Water (ft)	Water Level Elevation (ft)
RW01-PZM020	12.72	12/08/2015	13.15	-0.43
RW02-PZM000	12.37	12/08/2015	3.50	8.87
RW02-PZM020	13.00	12/08/2015	13.55	-0.55
RW03-PZM003	10.83	12/08/2015	3.20	7.63
RW04-PZM003	11.09	12/08/2015	4.07	7.02
RW05-PZP001	11.04	12/08/2015	5.44	5.60
RW06-PZM001	12.17	12/08/2015	4.33	7.84
RW07-PZM004	15.27	12/08/2015	6.19	9.08
RW07-PZM017	12.95	12/08/2015	13.79	-0.84
RW08-PZM003	11.35	12/08/2015	3.83	7.52
RW09-PZM004	15.22	12/08/2015	4.90	10.32
RW10-PZM004	12.34	12/08/2015	1.76	10.58
RW10-PZM020	12.46	12/08/2015	14.22	NM
RW10-PZM065	12.34	12/08/2015	10.9	1.44
RW11-PZM004	15.35	12/08/2015	6.25	9.10
RW12-PZM004	15.37	12/08/2015	6.41	8.96
RW13-PZM020	14.62	12/08/2015	13.51	1.11
RW14-PZM020	15.15	12/08/2015	13.25	1.90
RW15-PZM020	12.70	12/08/2015	13.4	-0.70
RW16-PZM020	13.84	12/08/2015	13.70	0.14
RW17-PZM019	13.67	12/08/2015	14.09	-0.42
RW18-PZM047	15.68	12/08/2015	15.26	0.42
RW19-PZM020	13.49	12/08/2015	14.02	-0.53
RW19-PZM050	12.99	12/08/2015	14.75	-1.76
RW19-PZP000	13.49	12/08/2015	9.05	4.44
RW20-PZM020	13.47	12/08/2015	13.20	0.27
RW20-PZM050	13.03	12/08/2015	10.81	2.22
RW20-PZP000	12.82	12/08/2015	4.10	8.72
RW21-PZM023	12.91	12/08/2015	12.49	0.42
TS04-PDM004	13.71	12/08/2015	10.27	3.44
TS04-PPM007*	10.22	12/08/2015	NM	NM
TS04-PZM023	10.09	12/08/2015	10.07	0.02

NM - No Measurement

\*Microbac report indicates well was destroyed in 2003, possibly by a plow

TABLE 3-3  
Summary of Cadmium Monitoring Data for 2014 and Comparison with Prior Years

Summary of Cadmium Monitoring Data for 2015 and Comparison with Prior Years

New Well Designation	Former Well Designation	2008		2009		2010		2011		2012		2013		2014		2015		UNITS
		2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	
<i>Shallow (Water Table) Monitoring Wells</i>																		
RW02-PZM000	RW-3	0.057	0.30	0.17	0.15	0.11	0.033	0.11	0.11	0.11	0.31	0.141	0.025	0.361	0.128	0.168	0.0616	mg/L
RW03-PZM003	RW-92	0.21	0.30	0.28	0.05	0.50	0.012	3.6	1.6	6.4	3.9	3.160	3.35	4.2	2.52	8.23	8.9	mg/L
RW04-PZM003	RW-91	0.69	0.18	0.38	0.20	0.65	0.72	0.78	0.64	0.61	0.69	1.080	0.906	1.00	0.424	0.895	1.01	mg/L
RW05-PZP001	RW-96	0.11	0.069	0.028	0.013	0.092	0.042	0.032	0.049	NS	NS	0.069	0.032	0.0642	0.058	0.0398	0.0528	mg/L
RW06-PZM001	RW 94	1.5	16	3	1.5	1.4	24 (a)	2.3	1.7	4.9	25 (a)	10.0	6.4	1.92	9.23	1.75	7.24	mg/L
RW07-PZM004	RW-7	0.005	0.018	0.035	0.075	0.0059	0.035	<0.00050	<0.00050	<0.00050	0.00095	0.003	0.001	0.00039	0.0033	0.0044	0.113	mg/L
RW08-PZM003	RW-88	19	20	21	18	18	18	21	16	22	6	20.7	12.3	13.9	11.8	15.2	14.4	mg/L
RW09-PZM004	New Well "X"	0.0003	0.0011	0.00079	0.00099	<0.00050	0.00084	0.00052	<0.00050	0.00068	<0.00050	0.0004	0.0008	0.0003	0.0037	0.003	0.0053	mg/L
RW10-PZM004	RW-26	0.0003	0.0032	0.00098	0.0005	<0.00050	<0.00050	<0.00050	11	0.0013	<0.00050	0.0001	0.0001	0.0014	0.00027	0.00024	0.0096	mg/L
RW11-PZM004	New Well "Y"	19	41	16	35	22	23	20	25	35	NS	28.5	30.2	24.9	34.3	5.5	32.8	mg/L
RW12-PZM004	New Well "Z"	0.069	0.11	0.05	0.044	0.090	0.11	0.38	0.21	1.30	1.60	1.27	2.47	0.0798	1.79	2.02	0.699	mg/L
RW19-PZP000		0.0005	0.00085	0.0033	0.0033	<0.00050	<0.00050	0.001	<0.00050	0.0017	<0.00050	<0.00001	<0.00001	0.00021	ND	0.00008	0.00034	mg/L
RW20-PZP000	RW-8	0.0003	0.025	0.0014	0.0013	<0.00050	<0.00050	<0.00050	<0.00050	0.0010	<0.00050	0.00064	0.0002	ND	ND	0.00008	0.00061	mg/L
TS04-PDM004	TS-04-PD	0.00057	0.0016	0.0028	0.0014	0.00085	0.0013	<0.00050	<0.00050	<0.00050	<0.00050	0.00034	0.00033	0.00047	0.0029	0.0028	0.00039	mg/L
TS04-PPM007	TS-04-PP	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	mg/L
<i>Intermediate (Sand 2) Monitoring Wells</i>																		
RW01-PZM020	RW-1	0.32	0.36	0.37	0.13	0.20	0.061	0.4	0.27	0.22	0.30	0.054	0.064	0.206	0.058	0.0635	0.262	mg/L
RW02-PZM020	RW-2	0.093	0.35	0.30	0.10	0.021	0.068	0.13	0.17	0.12	0.12	0.073	0.059	0.134	0.138	0.113	0.198	mg/L
RW07-PZM017	RW-6	15	14	7.0	6.5	3.6	10	8.9	10	5.1	7	4.30	3.50	4.74	5.09	6	7.19	mg/L
RW10-PZM020	RW-27	10	8.9	10.0	9.8	8.6	10	10	10	13	10	13.0	10.5	10.1	9.56	9.67	9.43	mg/L
RW13-PZM020	RW-4	0.0003	0.0091	0.0110	0.0085	0.0032	0.0027	0.00062	0.0093	<0.00050	<0.00050	0.0047	0.050	ND	0.0267	0.0182	0.0922	mg/L
RW14-PZM020	New Well "A"	1.3	1.0	0.42	0.83	0.90	0.69	0.57	0.54	0.45	0.43	0.438	0.903	0.361	0.405	25	0.664	mg/L
RW15-PZM020	RW-24R	1.6	1.4	1.6	1.3	0.33	1.1	1	0.96	5.5	1.10	1.16	0.96	1.08	1.07	0.798	0.761	mg/L
RW16-PZM020	New Well "B"	0.005	0.027	0.022	0.011	0.0065	0.055	<0.00050	0.0016	1.3	0.11	1.42	1.40	0.0132	0.0757	1.16	1.08	mg/L
RW17-PZM019	New Well "C"	5.8	4.5	5.6	5.7	6.1	6.1	6.2	5.7	6.4	5.0	7.43	8.57	6.7	6.5	6.86	7.61	mg/L
RW19-PZM020	RW-12	0.094	0.11	0.11	0.13	0.061	0.096	<0.00050	0.029	0.011	0.013	0.013	0.024	0.0632	0.0409	0.0276	0.0387	mg/L
RW20-PZM020	RW-9B	0.005	0.046	0.019	0.0011	0.0026	<0.0050	<0.00050	0.0031	0.013	0.0038	0.048	0.011	0.0715	0.028	0.0178	0.0137	mg/L
RW21-PZM023	RW-32	1.9	1.9	1.8	1.7	1.7	1.8	3.9	1.8	1.8	1.9	1.26	1.22	1.57	1.35	1.06	1.24	mg/L
TS04-PZM023	New Well "D"	0.19	0.17	0.13	0.28	0.39	0.31	0.25	0.015	0.0072	0.006	0.0008	0.001	0.0041	0.0018	0.0133	0.0048	mg/L
<i>Deep (Sand 3) Monitoring Wells</i>																		
RW10-PZM065	RW-28	0.0003	0.0031	0.0025	0.0028	<0.00050	<0.00050	<0.00050	10	0.0013	<0.00050	0.0002	0.0004	0.00017	0.00079	0.00018	0.0033	mg/L
RW18-PZM047	RW-22	0.005	0.0051	0.0037	0.0024	0.0037	0.0034	0.0022	0.00079	<0.00050	<0.00050	0.0002	0.0042	0.0016	0.0017	0.0083	0.0047	mg/L
RW19-PZM050	RW-13	0.002	0.0016	0.0061	0.014	0.0044	0.0041	0.0027	0.0034	0.0017	<0.00050	0.00063	0.0037	0.00077	0.00081	0.00078	0.002	mg/L
RW20-PZM050	RW-10	0.0003	0.0019	0.0050	0.022	0.029	<0.00050	0.001	<0.00050	0.0013	0.0012	0.00027	0.014	0.00031	0.00029	0.00025	0.0043	mg/L

Note 1: New wells installed prior to 3rd quarter 2001.

Note 2: Replacement wells installed prior to 3rd quarter 2001. mg/L = milligrams per liter.

The shaded cells are non-detect results. The blank cells represent data not collected.

NS = Well destroyed. Not sampled.

(a) Unreliable outlier.

TABLE 3-4  
Summary of Zinc Monitoring Data for 2014 and Comparison with Prior Years

Summary of Zinc Monitoring Data for 2015 and Comparison with Prior Years

New Well Designation	Former Well Designation	2008		2009		2010		2011		2012		2013		2014		2015		Unit
		2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	2nd Q	4th Q	Unit
<b>Shallow (Water Table) Monitoring Wells</b>																		
RW02-PZM000	RW-3	2.6	14	8	4.5	4.2	1.1	4.3	3.9 (B2)	5	13	6.1	0.76	12.7	5.2	6.47	1.18	mg/L
RW03-PZM003	RW-92	140	130	150	110	140	0.13	140	110 (B2)	180	130	155	131	147	84.9	157	132	mg/L
RW04-PZM003	RW-91	15	4.9	9.5	5.5	16	14	14	12 (B2)	13	12	21.9	17.3	22.7	9.06	17.1	17.3	mg/L
RW05-PZP001	RW-96	6.2	2.3	0.76	0.35	3.7	1.2	1	1.4 (B2)	NS	NS	2.72	0.97	2.11	2.05	1.37	1.75	mg/L
RW06-PZM001	RW-94	23	110	26	36	14	160 (a)	17	14 (B2)	40	160	64.4	47.8	18.7	66.4	13.8	36.6	mg/L
RW07-PZM004	RW-7	9.7	4.5	19.0	33	3.8	23	3.6	0.065 (B1)	0.15	0.17	2.27	0.22	0.0404	1.85	4.29	103	mg/L
RW08-PZM003	RW-88	370	420	410	390	370	390	380	320 (B2)	370	330	396	399	287	323	315	320	mg/L
RW09-PZM004	New Well "X"	0.02	0.0086	0.0063	0.02	0.019	0.011	0.058	0.024 (B1)	0.024	0.0078	0.033	0.060	0.0098	0.271	0.303	0.223	mg/L
RW10-PZM004	RW-26	0.067	0.028	0.018	0.057	<0.0050	0.020	0.018	460 (B2) (a)	0.11	0.03	0.017	0.016	0.081	0.0132	0.0164	0.215	mg/L
RW11-PZM004	New Well "Y"	1600	3700	1400	3500	2400	2100	1900	2200 (B2)	3700	1800	2620	2950	2130	3790	555	3140	mg/L
RW12-PZM004	New Well "Z"	4.3	5.8	2.3	1.7	3.8	5.6	24	14 (B2)	110	110	90	187	4.83	130	151	63.6	mg/L
RW19-PZP000	RW-8	0.01	0.023	0.010	0.054	0.0073	0.014	0.067	0.025 (B1)	0.15	0.044 (B1)	<0.005	0.006	0.0226	0.0052	0.005	0.009	mg/L
RW20-PZP000	RW20-PZP000	0.01	100	0.022	0.02	0.0053	0.0068	0.031	0.0081 (B1)	0.0095	<0.00050	0.019	<0.005	ND	ND	0.0074	0.0301	mg/L
TS04-PDM004	TS04-PDM004	0.15	0.12	0.033	0.02	0.021	0.12	0.039	0.027 (B1)	0.26	0.41	0.227	0.218	0.123	0.442	2.33	0.436	mg/L
TS04-PPM007	TS04-PPM007	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	mg/L
<b>Intermediate (Sand 2) Monitoring Wells</b>																		
RW01-PZM020	RW-1	130	120	140	150	94	150	130	95 (B2)	70	100	131	93.7	74.5	185	108	123	mg/L
RW02-PZM020	RW-2	1500	2200	2300	800	330	3300	3100	2600	3000	2600	996	85.4	2220	1890	708	649	mg/L
RW07-PZM017	RW-6	520	550	310	300	230	420	390	410 (B2)	260	330	263	201	296	295	291	346	mg/L
RW10-PZM020	RW-27	510	530	540	550	500	530	510	450 (B2)	470	470	326	420	531	521	518	456	mg/L
RW13-PZM020	RW-4	0.029	0.017	0.020	0.076	<0.0050	<0.0050	0.028	0.07 (B1)	0.67	0.76	2.95	2.69	2.3	1.49	0.692	3.71	mg/L
RW14-PZM020	New Well "A"	290	310	150	260	260	300	290	280 (B2)	280	260	249	284	229	250	1120	243	mg/L
RW15-PZM020	RW-24R	34	33	47	28	65	29	32	37 (B2)	56	46	47.8	39.5	40.6	29.1	38.1	33.4	mg/L
RW16-PZM020	New Well "B"	69	69	71	66	60	61	61	59	43	53	36	33	44.4	44	33.1	31.9	mg/L
RW17-PZM019	New Well "C"	42	34	42	40	48	46	48	45 (B2)	62	47	95.1`	147	85.1	70.3	80.2	79.2	mg/L
RW19-PZM020	RW-12	17	14	14	17	11	10	0.2	5.6 (B2)	4.6	5	2.97	4.72	5.48	7.66	5.09	7.02	mg/L
RW20-PZM020	RW-9B	52	2.0	120.0	0.16	2.0	56	120	100 (B2) (a)	130	100	99.6	98	95.8	72.2	36.9	10.8	mg/L
RW21-PZM023	RW-32	22	21	20	19	19	20	42	20 (B2)	21	21	14.7	15.6	19.2	15.7	14.4	15.7	mg/L
TS04-PZM023	New Well "D"	140	5.4	4.0	12.0	19	16	9	8.7 (B2)	5.2	2.6	0.136	0.247	2.18	0.592	1.3	1.76	mg/L
<b>Deep (Sand 3) Monitoring Wells</b>																		
RW10-PZM065	RW-28	0.042	0.015	0.053	0.084	<0.0050	<0.0050	0.015	460 (B2) (a)	0.046	0.043 (B1)	0.018	0.033	0.0116	0.0229	0.0115	0.0579	mg/L
RW18-PZM047	RW-22	1.8	6.9	1.2	1.1	3.9	5.7	3.3	0.48 (B2)	0.52	0.4	0.257	8.95	0.454	5.17	4.71	5.54	mg/L
RW19-PZM050	RW-13	0.33	0.22	0.54	0.17	0.092	0.19	0.15	0.16 (B1)	0.076	0.052 (B1)	0.048	0.129	0.0484	0.109	0.0923	0.151	mg/L
RW20-PZM050	RW-10	0.31	0.041	0.14	110*	36	0.22	1	0.011 (B1)	0.12	0.031	0.112	0.116	0.13	0.0272	0.0787	1.62	mg/L

Note 1: New wells installed prior to 3rd quarter 2001.

Note 2: Replacement wells installed prior to 3rd quarter 2001.

Note 3: The 2008 4th Q results for RW20-PZP000 and RW20-PZM020 may relate to a transcription error, to be further evaluated during the next sampling round. mg/L = milligrams per liter.

The blank cells represent data not collected.

The shaded cells are non-detect results.

The italicized values have been qualified by the data validator as qualitatively invalid due to their presence in associated laboratory or field blanks. NS = Well destroyed. Not sampled.

\* The reported concentration doesn't match historic values, which typically are less than 1 mg/L, and is considered to be an error in sampling/reporting convention for this well.

(a) Unreliable outlier value.

(B1) Target analyte detected in the method blank at or above the reporting limit.

(B2) Target analyte detected in the method blank at or above the reporting limit. Concentration found in the samples was 20 times the concentration found in the method blank.

## **APPENDIX A**

Jan-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
7307	6453	
7271	6,457	9.5
7009	6,260	9.2
7323	3,159	7.3
6884	6,452	9.3
6907	6,541	9.3
6927	6,559	9.4
6884	6,098	9.0
7278	6,449	9.5
7006	6,473	9.4
7216	7,299	10.1
6901	7,130	9.7
7068	7,215	9.9
7009	7,247	9.9
6950	7,308	9.9
7061	7,352	10.0
6929	7,290	9.9
7120	7,625	10.2
7015	7,604	10.2
6846	7,414	9.9
6966	7,557	10.1
6932	7,498	10.0
6779	7,343	9.8
6783	7,101	9.6
7456	6,945	10.0
7320	6,890	9.9
7173	6,792	9.7
7010	6,748	9.6
6907	6,712	9.5
7209	7,053	9.9
6223	6,094	8.6
7736	7,607	10.7

Feb-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
7736	7607	
6933	7,007	9.7
6716	6,962	9.5
6548	6,829	9.3
7401	7,649	10.5
5759	5,908	8.1
6332	6,578	9.0
5816	6,615	8.6
5822	6,826	8.8
5963	6,985	9.0
5861	6,929	8.9
5911	7,058	9.0
5950	7,200	9.1
5200	6,872	8.4
5292	7,200	8.7
5208	7,143	8.6
5097	6,853	8.3
5272	7,149	8.6
5567	7,115	8.8
5721	6,405	8.4
6454	7,185	9.5
6180	7,068	9.2
6032	7,042	9.1
6053	7,176	9.2
5842	6,516	8.6
6433	7,272	9.5
6607	7,296	9.7
6056	6,629	8.8
6278	7,005	9.2
6391	7,156	9.4
6328	7,032	9.3

Mar-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
6278	7005	
6391	7,156	9.4
6328	7,032	9.3
6484	6,694	9.2
6406	7,050	9.3
6372	7,085	9.3
6204	6,910	9.1
6590	7,467	9.8
6055	6,970	9.0
6306	7,113	9.3
6757	7,048	9.6
6557	7,049	9.4
6693	6,914	9.4
6439	6,628	9.1
7022	7,459	10.1
6568	8,014	10.1
6457	6,034	8.7
6432	7,055	9.4
6638	7,307	9.7
6376	6,994	9.3
5973	6,825	8.9
6783	8,171	10.4
6335	7,835	9.8
6142	7,740	9.6
6327	7,811	9.8
6330	7,780	9.8
6249	7,762	9.7
5947	7,623	9.4
6086	7,953	9.7
6031	7,420	9.3
6211	7,733	9.7
5730	7,320	9.1

Apr-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
5730	7320	
5787	7,279	9.1
5716	7,179	9.0
6128	8,117	9.9
5775	7,644	9.3
5637	7,494	9.1
5515	7,414	9.0
5600	7,580	9.2
5266	7,403	8.8
5349	7,552	9.0
4963	7,103	8.4
5897	8,448	10.0
5231	7,484	8.8
5829	7,386	9.2
5716	7,427	9.1
5800	7,511	9.2
5724	7,426	9.1
6216	8,074	9.9
5318	6,622	8.3
5938	7,383	9.3
5918	7,263	9.2
6070	7,561	9.5
5846	7,303	9.1
5883	7,325	9.2
5379	6,654	8.4
6472	7,796	9.9
5442	6,906	8.6
5442	6,906	8.6

May-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
0	-	0.0
0	-	0.0
0	-	0.0
0	-	0.0
0	-	0.0
5066	8,830	9.7
4784	8,347	9.1
4721	8,235	9.0
4960	8,708	9.5
4699	8,259	9.0
4735	8,431	9.1
4767	8,485	9.2
4691	8,491	9.2
4711	8,478	9.2
5394	8,332	9.5
5064	7,977	9.1
5581	8,895	10.1
5325	8,465	9.6
5343	8,510	9.6
5330	8,510	9.6
5352	8,903	9.9
4575	7,709	8.5
5080	8,563	9.5
5885	8,000	9.6
5552	7,825	9.3
5515	7,499	9.0
5299	7,405	8.8
5470	7,738	9.2
5665	8,166	9.6
5288	7,757	9.1
5328	7,904	9.2



Nov-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
5563	8538	
6194	9,612	11.0
6032	9,661	10.9
5584	8,920	10.1
5796	9,299	10.5
5688	9,214	10.3
5713	9,055	10.3
6057	9,301	10.7
6022	9,124	10.5
5921	8,676	10.1
6341	6,758	9.1
6174	5,941	8.4
5994	5,771	8.2
1843	1,786	2.5
0	-	0.0
0	-	0.0
0	-	0.0
0	-	0.0
4217	95	3.0
5751	-	4.0
5120	-	3.6
5214	2,308	5.2
4770	3,321	5.6
4780	3,338	5.6
4545	3,218	5.4
5854	4,219	7.0
4839	5,365	7.1
4553	6,084	7.4
5625	5,385	7.6
5628	3,606	6.4
5331	4,678	7.0

Dec-15

Well #24	Well #27	MP 214
gpd	gpd	Total (gpm)
5331	4678	
229	553	0.5
118	4,831	3.4
4874	7,050	8.3
4810	6,065	7.6
1337	3,132	3.1
0	7,362	5.1
0	1,801	1.3
0	1,801	1.3
0	-	0.0
6569	5,516	8.4
6844	5,075	8.3
7391	5,518	9.0
6997	5,085	8.4
7067	4,999	8.4
7209	5,047	8.5
7222	5,047	8.5
7159	4,991	8.4
6585	4,984	8.0
7696	5,099	8.9
7260	5,082	8.6
6954	5,459	8.6
6412	5,328	8.2
7032	5,679	8.8
6921	4,625	8.0
6308	5,325	8.1
7369	5,647	9.0
6128	5,332	8.0
5934	5,153	7.7
7126	6,042	9.1
6473	5,497	8.3
6713	5,681	8.6

## **APPENDIX B**

2015 OPERATIONAL HISTORY OF THE ROD AND WIREMILL INTERM MEASURE  
TREATMENT SYSTEM

2/18 - BOTH CADMIUM WELLS OFF FOR 2 HOURS. DUE TO ELECTRICAL OUTAGE.

3/20 – BOTH CADMIUM WELLS OFF FOR 7 HOURS. DUE TO ELECTRICAL OUTAGE.

4/27-5/15 BOTH CADMIUM WELLS OFF. DUE TO ELECTRICAL OUTAGE AND  
REACTOR TANK CLEANING.

6/18 BOTH CADMIUM WELLS OFF FOR 15 MINUTES. DUE TO ELECTRICAL  
OUTAGE.

7/4-7/6 CADMIUM WELL 24 OFF.REPLACED PUMP DISCHARGE FITTING.

8/19-9/9 BOTH CADMIUM WELLS DOWN. DUE TO ELECTRICAL OUTAGE.

9/21-9/28 BOTH CADMIUM WELLS DOWN. DUE TO ELECTRICAL OUTAGE.

10/4-10/5 CADMIUM WELL 27 OFF. DUE TO ELECTRICAL PROBLEM.REPLACED  
FAULTY OVERLOAD.

11/12 BOTH CADMIUM WELLS OFF. A.R.M. RUNNING TESTS.

11/17 CADMIUM WELL 24 ON.A.R.M. RUNNING TEST.

11/20 CADMIUM WELL 27 ON. A.R.M. RUNNING TEST.

11/30 CADMIUM WELL 24 OFF. A.R.M. RUNNING TEST.

11/30-12/1 CADMIUM WELL 27 OFF.REPLACED PUMP DISCHARGE FITTING.

12/2 CADMIUM WELL 24 ON.

12/4 CADMIUM WELL 24 OFF.A.R.M. RUNNIG TEST.

12/8 BOTH CADMIUM WELLS OFF.A.R.M. TEST.

12/9 BOTH CADMIUM WELLS IN SERVICE. A.R.M. COMPLETED TESTING.