East Mission Flats Repository 2014 Annual Water Quality Report

State of Idaho
Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

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Acronyms and Abbreviations

bgs	below ground surface
BPRP	Basin Property Remediation Program
BHSS	Bunker Hill Mining and Metallurgical Complex Superfund Site
CDA River	Coeur d'Alene River
cfs	cubic feet per second
CLP	Contract Laboratory Program
COC	contaminant of concern
CRQL	contract required quantitation limit
DEQ	Idaho Department of Environmental Quality
DI	deionized
DO	dissolved oxygen
EMFR	East Mission Flats Repository
I-90	Interstate-90
ICP	Institutional Controls Program
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	matrix spike
mV	millivolts
MW	monitoring well
North Wind	North Wind Construction Services
OIG	Office of the Inspector General
ORP	oxidation reduction potential
OU	operable unit
PZ	piezometers
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
Ralston	Ralston Hydrologic Services, Inc.
RL	reporting limit
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCM	site conceptual model
SVL	SVL Analytical, Inc.
TerraGraphics	TerraGraphics Environmental Engineering, Inc.
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

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1 Introduction and Purpose

During implementation of the 2014 remedial actions, approximately 20,310 compact cubic yards of metals contaminated soils were placed at the East Mission Flats Repository (EMFR) (North Wind 2015). Consolidation of contaminated soils, sediments, and source materials into controlled repositories is a critical component of the human health remedy for the Bunker Hill Mining and Metallurgical Complex Superfund Site (BHSS), as described in the Records of Decision (RODs; USEPA 1991, 1992, 2002). As part of ongoing repository operations, routine monitoring and evaluation of surrounding environmental conditions are conducted to evaluate repository performance. The purpose of this annual report is to provide a summary and interpretation of monitoring data collected at the EMFR through 2014.

Water monitoring activities have been conducted at EMFR since the fall of 2007. The contaminants of concern (COCs) include the metals antimony, arsenic, cadmium, lead, and zinc. Groundwater, floodwater, and repository pore water are monitored for COCs to evaluate the EMFR's potential impacts on the surrounding water quality. Ongoing water monitoring is conducted to meet the following goals: 1) evaluate water levels and water quality parameters of pore water within the repository waste; 2) evaluate the influence of surface water elevation on groundwater levels at the site; 3) evaluate the quality of floodwater entering and leaving the site; 4) evaluate hydraulic gradients and groundwater flow direction over time, both vertically and horizontally at the EMFR site; and 5) evaluate the potential effects of the repository on groundwater.

1.1 Location

The EMFR is located on a 23-acre parcel in Kootenai County approximately three-quarters of a mile west of Cataldo. The site is bounded to the northeast by Canyon Road, to the southwest by Interstate 90 (I-90) and exit 39, and to the north and northwest by private property. The site is located in the 100 year floodplain of the Coeur d'Alene (CDA) River. The river flows in an approximate arc around the site approximately three-quarters of a mile to the east, south, and west. The EMFR site is north of I-90, across the freeway from the Old Mission State Park and the Cataldo Mission (Figure 1).

1.2 Report Organization

This annual water quality report for the EMFR is structured as follows:

> **Section 1.0 – Introduction and Purpose** provides a brief description of the EMFR, its location, and the purpose of the report.
>
> **Section 2.0 – Background and Site Conceptual Model** describes the EMFR history, regional and site-specific conditions, and existing water quality conditions in the area.

Section 3.0 – Methods briefly summarizes the field sampling and monitoring activities, quality assurance/quality control (QA/QC) procedures, and data analysis conducted for this report.

Section 4.0 – Results and Discussion presents dissolved metals data through 2014, summarizes data analyses, and discusses the data and results as they relate to the sampling and monitoring objectives.

Section 5.0 – Conclusions and Recommendations summarizes the conclusions drawn from the data and analyses and recommends future actions for the project.

Section 6.0 – **References** lists those used to develop the information presented in this annual report.

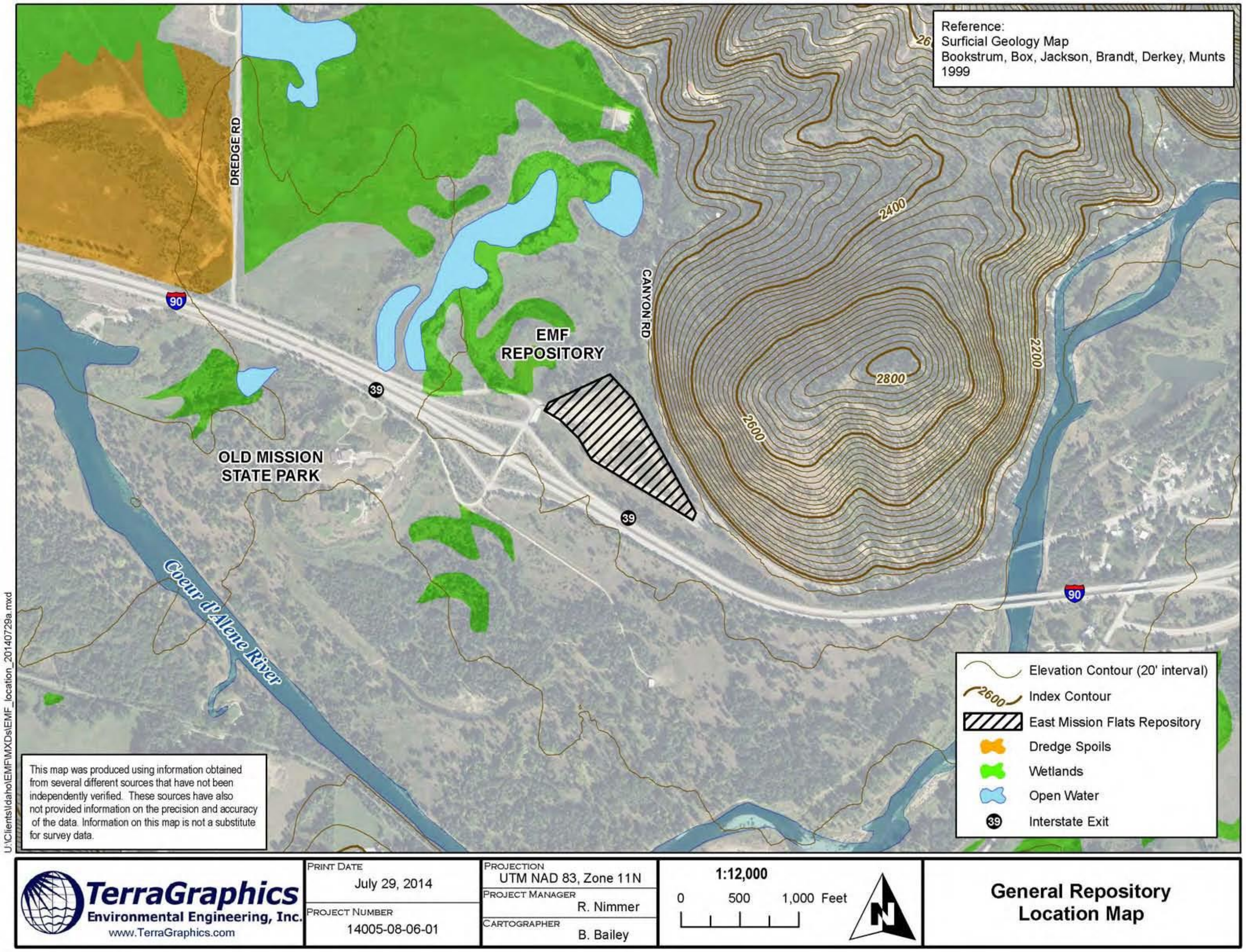

Figure 1. East Mission Flats Repository Location - Cataldo Idaho.

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2 Background and Site Conceptual Model

This section summarizes past information and data in terms of a site conceptual model (SCM) to describe: the site background (Section 2.1), regional conditions (Section 2.2), site specific conditions (Section 2.3), and groundwater quality surrounding the EMFR Repository (Section 2.4).

This SCM is considered a living document and will be updated as additional site characterization information and data are gathered. In future annual reports, the purpose of updating the SCM will be to capture new information that improves our current understanding of site knowledge.

2.1 Site Background

Prior to EMFR construction activities, there is no history of development in the EMFR footprint, with the exception of utilities construction. From the 1930's through the 1960's dredging operations removed mining contaminated sediments from the CDA River. The dredge spoils were deposited on property the Mine Owners Association purchased on nearby Cataldo Mission Flats for the purpose of impounding the waste. The dredge spoils are located west of the EMFR site and are not thought to occur below the repository site (Bookstrom et al. 1999).

Since August, 2009, the EMFR has been used as a disposal site in support of the BHSS Operable Unit (OU) 3 ROD (USEPA 2002). Waste materials from a variety of sources in OU3 including the Basin Property Remediation Program (BPRP), Institutional Controls Program (ICP), and commercial and infrastructure development projects are placed at the EMFR (TerraGraphics 2009). Waste is added to the repository primarily during the construction season from approximately May to November.

Waste placement occurs in thin lifts that are compacted to 90 to 95% maximum density. Successive thin lifts of waste are placed until the desired interim or final elevation is achieved. Repository construction began by filling the western third of the final repository footprint to an interim elevation through the 2010 season. During the 2011 and 2012 construction season the footprint was extended east at the interim elevation to encompass approximately two-thirds of the final footprint. During 2013, waste placement was expanded to the east at the interim elevation to encompass the entire final footprint. Waste will continue to be placed in the repository until the final design elevation is achieved.

2.2 Regional Conditions

The BHSS facility includes mining contaminated areas in the CDA River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas, as well as the 21-square mile Bunker Hill "Box" located in the area surrounding the historic smelting operations. As much as 100 million tons of contaminated sediment is dispersed over thousands of acres throughout the area. The contaminants are primarily metals, including arsenic, cadmium, lead, and zinc.

Regional deposition of contaminated sediments surrounding the repository is related to historical dredging operations and the historical and ongoing deposition of contaminated floodwater sediments on the floodplain. Lead concentrations as high as 8,000 milligrams per kilogram (mg/kg) have been measured in dredge spoils (Brookstrom et al. 2001). The dredge spoils were deposited just over half a mile northwest of the repository site covering more than 130 acres at depths of up to 36 feet thick. The wetlands to the east of the dredge spoils and north of the repository site and the surrounding floodplain contain contaminated floodwater deposits greater than two feet thick. Lead concentrations greater than 10,000 mg/kg were found in these floodplain deposits (Box et al. 2001).

2.3 Site-Specific Conditions

The EMFR is set within the low relief, wide floodplain valley of the CDA River within the Middle Proterozoic depositional basin of the Belt Supergroup. The repository site lies about 2,135 feet above sea level, and slopes gently from north to south. The local vegetation is a mix of Ponderosa pine, cottonwood, alder and Rocky Mountain maple trees interspersed with open meadows. Wetlands are located nearby to the east, northeast, and northwest of the EMFR footprint.

The EMFR location was previously impacted by metals-contaminated sediments from historical mining and milling activities occurring upstream (Bookstrom et al. 2001). Contaminated sediments are deposited at the site by frequent flooding during spring runoff events. Soil samples collected from 23 borings at the site show concentrations that exceed 8,700 mg/kg lead, 2,800 mg/kg zinc, 114 mg/kg arsenic, and 20 mg/kg cadmium from the top two to four feet of soil. The soil metals concentrations decrease sharply at two to four feet below ground surface (bgs), interpreted as the native soil horizon (TerraGraphics 2009).

2.3.1 Geology

The footprint of the EMFR is on unconsolidated alluvial sediments that overlie metamorphic rocks of the Belt Supergroup, most likely the Prichard Formation (Browne 2006). The underlying Quaternary alluvial sediments comprise gravel, sand, and silt from the ancestral flood channel of the CDA River (CH2M Hill 2009).

Extensive ancient faulting occurred in the vicinity of the EMFR, predominantly in the northwest to southeast orientation associated with the Lewis and Clark Shear Zone (Browne 2006). However, the U.S. Geological Survey (USGS) indicates no earthquakes of Richter Scale magnitude 6.0 or greater occurred in the local area during the current Quaternary period (USGS 2005).

2.3.2 Hydrology

Frequent flooding of the area surrounding the repository occurs during spring runoff events. The area surrounding EMFR is inundated by CDA River floodwater when discharge exceeds approximately 20,000 cubic feet per second (cfs). Floods of this magnitude have approximately a 50% chance of occurring during any given year (CH2M Hill 2010). When discharge remains between approximately 20,000 and 30,000 cfs, floodwater enters the area surrounding EMFR through culverts under I-90 to the south and west of the repository. When discharge exceeds approximately 30,000 cfs, floodwater may enter the area through the culverts and from the southeast through the channel along the north embankment of I-90. Contributions of likely uncontaminated tributary water to the wetlands north of the site also occur but these flows are thought to be minimal in comparison to contributions from flooding of the CDA River. Local groundwater levels rise in response to high river stages and may also contribute to the presence of surface water surrounding the repository during flood events.

Sediment contaminated with metals is carried by the CDA River floodwater and deposited on the floodplain surrounding EMFR (TerraGraphics 2009). Evidence of the ongoing depositional process is suggested through the results of floodwater sampling. Historical sampling results show that in general, floodwater draining from the site has lower total metals concentrations when compared to the incoming floodwater.

2.3.3 Hydrogeology

The hydrogeology underlying the EMFR consists of a four-layered sequence from top to bottom as follows (Figure 2):

1) Low-permeability silt and clay from the ground surface to approximately 15 feet bgs.
2) An upper aquifer of alluvial sand and gravel from approximately 15 to 105 feet bgs.
3) A silt layer from 105 to 116 feet bgs that likely forms a confining layer.
4) A lower aquifer composed of fine sand and clay lenses below 116 feet bgs.

Groundwater in the upper alluvial sand and gravel aquifer is confined by the low permeability silt and clay above and the underlying silt layer. The low permeability layer above the upper aquifer was found to be ubiquitous throughout the site during pre-design investigations and is thought to prevent groundwater from migrating into the repository contaminants (TerraGraphics 2009). The properties of the lower confining layer have not been well characterized but it likely isolates the lower aquifer from the contaminants found within the upper aquifer. The characteristics of the lower aquifer are also not well characterized but not considered to influence conditions in the upper aquifer.

The repository site is located in an apparent transitional area forming two distinct hydrologic units moving from east to west through the area as noted by well logs (Ralston 2008):

1) The upper sand and gravel aquifer is encountered below and to the east of the repository site.
2) Sand and clay zones are encountered approximately 1,750 feet northwest of the repository site.

This may be explained by the transitional zone which is apparent locally at the surface in the current river channel as the transition from a higher gradient gravel and cobble floored channel to a low-gradient sand floored channel (Ralston 2008). The historical location of the gradient transition is controlled by the elevation of Lake Coeur d'Alene which is regulated by the elevation of the bedrock outfall in Post Falls and the Post Falls Dam. The gravels present in the upper aquifer below the repository site were likely deposited by former channels that migrated through the area. These gravels are absent and transitions into sand and clay bands to the west. The implications of this transition on groundwater flow are not fully understood but should be considered during evaluation of monitoring results.

In general, during low flow periods, the groundwater in the upper aquifer has a downward vertical gradient and a horizontal gradient toward the south-southwest. This suggests that the upper aquifer is recharged locally through the wetlands located to the north of the site. During flood events, changes in river stage cause a rapid response in groundwater elevations. This suggests that the sand and gravel aquifer may extend to the CDA River which in turn likely contributes to aquifer recharge. Monitoring data indicates the horizontal gradient shifts to the west-northwest during flood events. In addition an upward vertical gradient occurs during flooding and water was observed discharging from a monitoring well completed in the lower portion of the upper aquifer.

After passing below the repository site groundwater in the upper aquifer is thought to travel toward the south or southwest around the east side of the bedrock outcrop that forms the topographic high at the Old Mission State Park and toward the CDA River. Gain/loss studies may not be possible in the low gradient section of the river to the west and have not been conducted to date so the amount of groundwater that discharges to the river is unknown. Under high flow conditions, discharge to the river west of the bedrock outcrop may occur.

2.4 Groundwater Quality

Historical analytical results from groundwater sampling for the COCs in the Mission Flats area are summarized in Ralston (2008). Additional impacts to the CDA River originating from groundwater in the Mission Flats area and the dredge spoils have not been detected in previous assessments. Average zinc concentrations measured from piezometers throughout the Cataldo Mission Flats prior to the start of repository construction range from less than 0.1 milligrams per liter (mg/L) to more than 140 mg/L (Gill 2003). The historical results indicate widespread contamination unrelated to the repository and the potential for high spatial variability in groundwater metals concentration in the vicinity.

The potential for high spatial variability in field parameters within the local repository monitoring network is suggested by the transitional fluvial setting, multiple sources of recharge to the upper aquifer, and the results of monitoring. The sand and clay zone west of the repository site shows elevated pH, specific conductance, and groundwater elevations compared to the upper sand and gravel aquifer located below the repository site. This suggests that the monitoring well completed in the sand and clay zone to the west is not appropriate for evaluating potential repository impacts. The potential influence of groundwater in the sand and clay zone on conditions found in the sand and gravel aquifer below the repository is not well understood because groundwater flow within the sand and clay zone has not been fully characterized.

The COC concentrations (Appendix A) also differ between the two hydrologic units. The sand and clay zone to the west shows the greatest arsenic concentrations with frequent exceedances of the regulatory threshold of 0.01 mg/L. Although all COC concentrations in the upper sand and gravel aquifer have remained below the regulatory threshold, elevated concentrations of cadmium and zinc occur when compared to the sand and clay zone to the west.

Despite the spatial variability, both hydrologic units share a few similarities. Field parameters indicate conditions approaching a reduced environment with dissolved oxygen (DO) concentrations less than 0.5 mg/L and oxidation reduction potential (ORP) values less than

200 millivolts (mV). While the upper sand and gravel aquifer shows ORP values greater than zero, the sand and clay zone to the west has occasional values that are slightly negative.

Although the influence of the sand and clay zone to the west is not fully understood, monitoring conducted within the sand and gravel aquifer provides the best assessment of potential repository impacts. The historical metal concentrations measured within the sand and gravel aquifer are below water quality standards. In general, zinc is the COC with the greatest frequency of detection within the upper sand and gravel aquifer, followed by cadmium, arsenic, and lead.

Spatial variability in COC concentrations is most evident in dissolved zinc and dissolved cadmium concentrations, as other constituents are only detected infrequently. Downgradient wells located within the sand and gravel aquifer furthest south and west of the repository have historically had the greatest concentrations of cadmium and zinc with average concentrations less than 0.002 mg/L and 2 mg/L, respectively. The elevated constituent concentrations occurring in these wells are likely related to the larger area of historical contamination that is located upgradient of this location compared to other wells monitoring the site.

Cadmium and zinc concentrations up/cross gradient and east of the repository also show evidence of the ubiquitous contamination in the area. Although concentrations are below those observed in the downgradient wells, elevated concentrations are measured when compared to upgradient concentrations entering the site from the north. During previous evaluations of EMFR data, statistically significant increases in zinc concentration were detected in monitoring wells east of the repository. It is unlikely that the increase in zinc concentration is related to repository operations because this is an up/cross gradient location. These results indicate that sources unrelated to the repository are contributing to increased contaminant concentrations in groundwater. Results of repository monitoring must be carefully interpreted and fully vetted prior to committing resources to any potential corrective action.

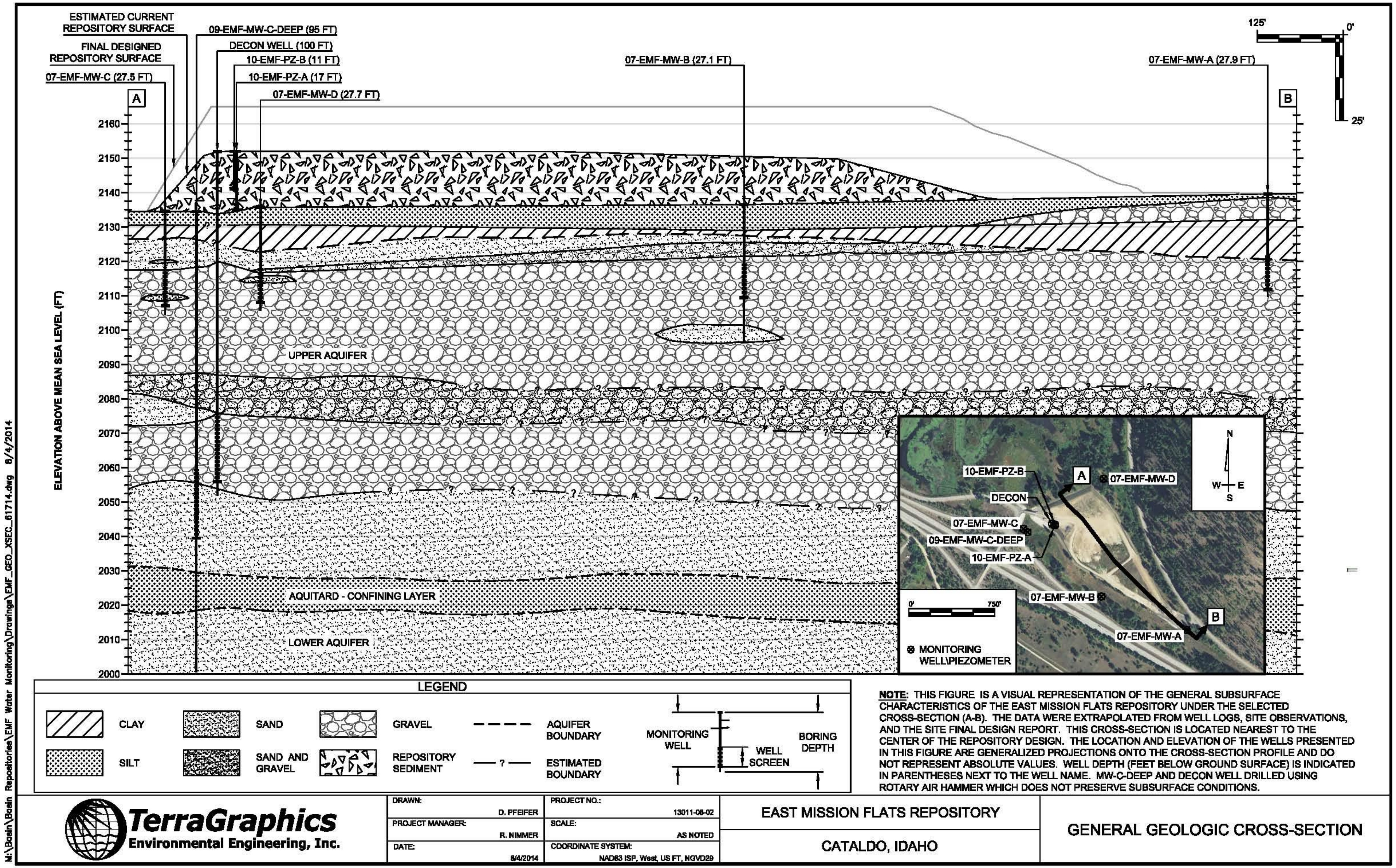


Figure 2. East Mission Flats Repository geologic cross section.

3 Methods

This section summarizes the monitoring network; monitoring methods for groundwater, floodwater, and repository pore water; and data analysis and statistical methods. The EMFR Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) provides further detail on the monitoring, sampling, documentation, analytical, and data-review procedures for the groundwater monitoring (TerraGraphics 2014g).

3.1 Monitoring Network

The current monitoring network is displayed in Figure 3 and consists of the following:

- Seven groundwater monitoring wells (MW):
    - MW-A, MW-B, MW-C, MW-D and MW-F are screened in the upper alluvial aquifer.
    - MW-C-Deep is screened deeper in the upper alluvial aquifer.
    - MW-E is screened in a different hydrologic unit from the other monitoring wells based on a comparison of water levels and groundwater chemistry and drill logs.
    - Sampling of the Decon well was discontinued after April 2014 because variability in well operations prevented collection of reproducible samples (DEQ 2014).
- Two surface water (i.e., floodwater) level sites: LL-1 and LL-2 monitor floodwater levels adjacent to the EMFR.
- Four floodwater sampling sites: SW-A, SW-B, SW-C, and SW-D are sampled opportunistically during floodplain inundation.
- Two piezometers (PZ): PZ-A and PZ-B are screened in the repository waste mass to monitor for the presence of water in the waste (and in the event of sufficient water, water chemistry) and are set approximately 0.5 feet and 6.5 feet, respectively, above the native topographic surface.

Additional details about these monitoring sites, their position with respect to the EMFR, and monitoring frequency are included in Table 1.

3.2 Groundwater Monitoring and Sampling

Quarterly groundwater monitoring and sampling occurred in January, April, July, and October 2014. The field crew collected groundwater samples using dedicated low-flow pumps at the seven monitoring wells. Groundwater samples were shipped to:

- The U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) designated laboratory and analyzed for dissolved metals (antimony, arsenic, cadmium, lead, and zinc), hardness, total phosphorus, and dissolved cations (calcium, magnesium, potassium, and sodium), and
- Idaho Department of Environmental Quality's (DEQ's) contracted local laboratory (SVL Analytical, Inc. [SVL]) and analyzed for dissolved anions (chloride, nitrate and nitrogen, and sulfate) and alkalinity.

Dataloggers are deployed in select wells and record water level measurements every half hour or hour. Dataloggers in the monitoring wells were downloaded quarterly during the sampling events and the water-level data were compensated for barometric pressure. Water levels were measured by hand at the seven monitoring wells.

Groundwater field parameters were measured prior to sample collection. Field parameters include temperature, pH, specific conductance, DO, and ORP.

3.3 Floodwater Monitoring and Sampling

Floodwater sample locations and the locations of water level loggers installed to monitor the elevation of floodwater surrounding the repository are shown on Figure 3. Dataloggers deployed at LL-1 and LL-2 record water-level measurements every half hour and were downloaded quarterly during the sampling events.

Floodwater sampling is conducted opportunistically in coordination with DEQ and EPA. Flooding of the Coeur d'Alene River occurred in early March 2014. Floodwater sampling was conducted on March 10, 2014 as floodwater entered the area surrounding the repository. A second sample was collected on March 12, 2014 as floodwater receded from the area surrounding the repository. The objective of the sampling was to measure the quality of floodwater entering and receding from the area surrounding the EMFR to determine if there are any changes in metals concentrations. This sampling effort was not part of a regular monitoring program but was conducted opportunistically as flooding occurred at the site.

3.4 Piezometer Monitoring and Sampling

Piezometers are installed within the repository waste mass to monitor for the presence of saturated conditions within the waste material. The piezometers are sounded quarterly to manually check for the presence of water or obtain water level measurements when possible. In addition, a water quality probe that records water level, temperature, pH, DO, conductivity, and ORP is installed in PZ-A and a data logger that records water levels is deployed in PZ-B. Both devices provide hourly measurements when water is present. If sufficient water is present, sampling will be attempted to evaluate water quality conditions within the waste mass.

3.5 Data Analysis and Statistical Methods

The following subsections describe how data were reviewed and/or analyzed for this annual report.

3.5.1 Water Levels and Hydraulic Gradient

Water levels were used to evaluate the hydrogeologic conceptual model of the EMFR area, horizontal and vertical hydraulic gradients, and groundwater flow direction. Groundwater fluctuations were compared to the CDA River stage elevation at the USGS gage station at Cataldo (Site #12413500, *http://waterdata.usgs.gov/usa/nwis/uv?site_no=12413500*).

3.5.2 Regulatory Thresholds

Dissolved metals data collected in 2014 were compared to regulatory thresholds (Table 2). Regulatory thresholds for antimony, arsenic, cadmium, and lead in groundwater are the National Primary Drinking Water Standards (i.e., maximum contaminant levels) and the regulatory threshold for zinc is the National Secondary Drinking Water Standard. These standards are based on total concentrations; however, the dissolved metals concentrations in the groundwater are compared to the regulatory thresholds because it is assumed that dissolved concentrations are indicators of contamination in groundwater under all conditions (CH2M Hill 2006).

3.5.3 Statistics

During 2014, the monitoring approach and statistical evaluation of the EMFR groundwater data was evaluated. It was determined that changing to semi-annual sampling and using a prediction limit test with a 1-of-3 retesting strategy would be logistically possible and result in a good trade-off between controlling the false positive rate while maximizing power. Semi-annual sampling will be implemented during 2015. The April and October sampling events will be retained to cover the high and low water level conditions. The details for evaluation of data collected during 2015 and beyond are presented in a White Paper (TerraGraphics 2015a).

Table 3 shows the non-parametric prediction limits calculated using results of monitoring from 2007 through 2013. Arsenic data from July 2011 and January 2012 were qualified as estimates because similar concentrations were measured in the field blank sample. The results from these two sample events represent the two highest arsenic concentrations measured at several wells. To be conservative, these data were not included during development of the prediction limits shown in Table 3.

For evaluation of the 2014 monitoring results a slightly altered prediction limit procedure must be used for comparison to the prediction limits because retesting is no longer relevant. The wells/COC's are still compared to the prediction limits listed in Table 3 but a statistically significant increase can be concluded if, and only if, all four quarterly samples exceeded the prediction limit. For the well/COC combination with no detections through 2013 the double quantification rule applies. This rule states that, "A confirmed exceedance is registered if any well-constituent pair in the 100% non-detect group exhibits quantified measurements (i.e., at or above the reporting limit [RL]) in two consecutive sample and resample events."

3.5.4 Data Quality Review

A data quality review was conducted to ensure compliance with the SAP/QAPP (TerraGraphics 2014g). Information was reviewed for holding times, appropriate preservation, field quality control (QC) sample frequency and results, laboratory verification and validation, and data completeness. The data quality review included Stage 2A validation review of the SVL data (USEPA 2009, 2010). The USEPA chemist conducted Stage 4 data verification and validation on 100% of the CLP-analyzed data (USEPA 2009, 2010). The USEPA data validation reports are included and summarized as part of the data-quality review.

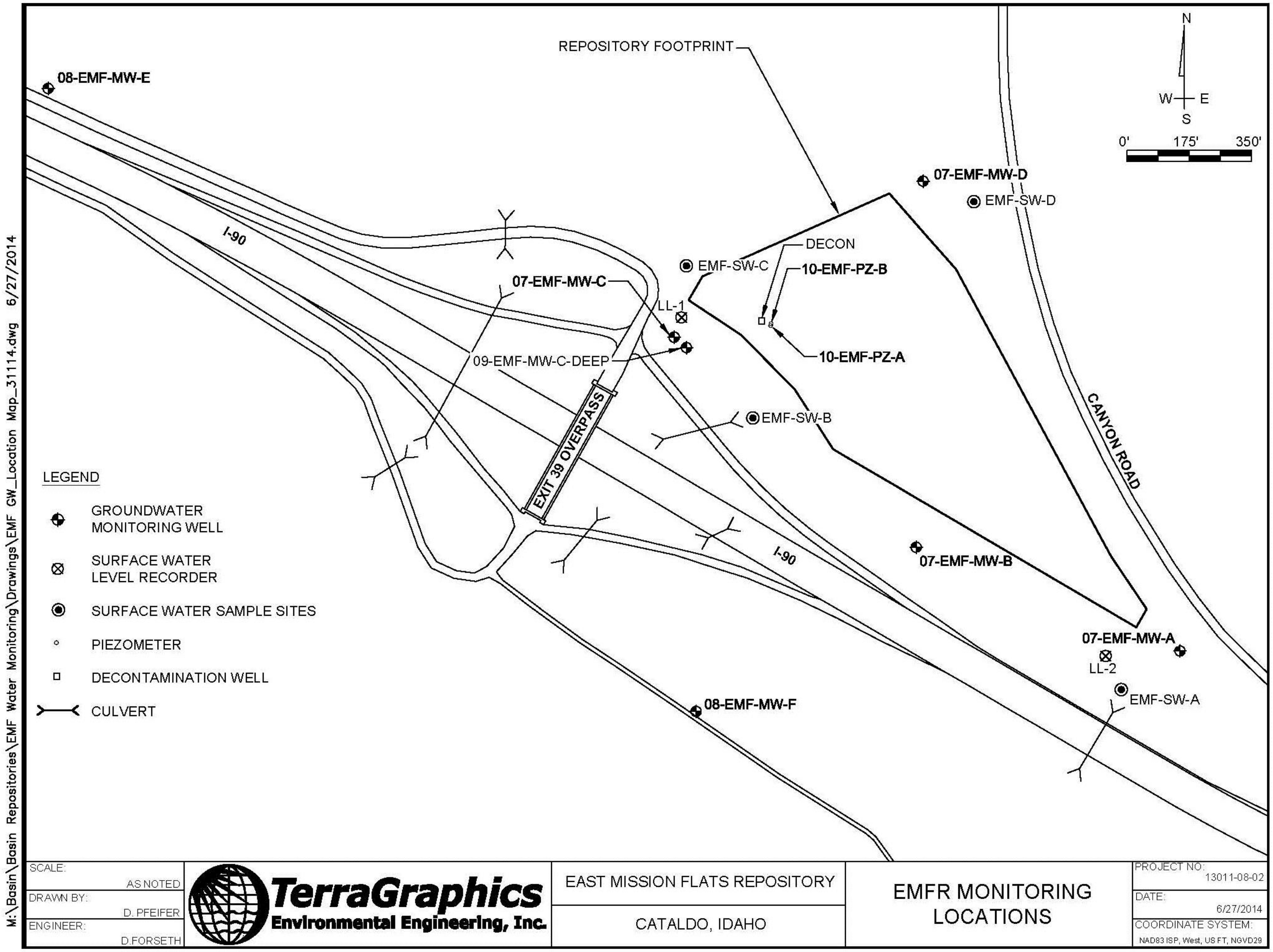


Figure 3. East Mission Flats Repository groundwater and surface water monitoring location.

Table 1. Summary of East Mission Flats Repository water quality monitoring program.

Site	Media	Monitoring		Position with Respect to Groundwater at the EMFR				Period of Record	Purpose
		Frequency	Datalogger[a]	Upgradient	Downgradient	Cross-gradient	Other		
07-EMF-MW-A 07-EMF-MW-B 07-EMF-MW-C 07-EMF-MW-D	Groundwater Groundwater Groundwater Groundwater	Q Q Q Q	Y Y Y Y	X X	 X X 	 X 		Oct 2007 – present Oct 2007 – present Oct 2007 – present Oct 2007 – present	Horizontal groundwater gradients and groundwater quality in the uppermost portion of the upper aquifer
09-DMF-MW-C-DEEP	Deep groundwater	Q	Y		X			Dec 2009 – present	Evaluate the vertical hydraulic gradient and groundwater quality in lower portion of the upper aquifer
08-EMF-MW-E	Groundwater	Q					X	Oct 2008 – present	Hydraulic gradients, flow directions, and water quality in uppermost portion of the upper aquifer
08-EMF-MW-F	Groundwater	Q			X			Oct 2008 – present	
Decon Well	Deep groundwater	O			X			June 2010 – April 2014	Decontamination well water quality
10-EMF-PZ-A	Waste mass pore water	O	Y				X	Oct 2010 – present	Waste mass pore water quality and saturation
10-EMF-PZ-B	Waste mass pore water	O	Y				X	Oct 2010 – present	
LL-1 LL-2	Surface water – floodwater Surface water – floodwater	O O	Y Y					Aug 2009 – present Jan 2009 – present	Monitor floodwater timing and depth
EMF-SW-A EMF-SW-B EMF-SW-C EMF-SW-D	Surface water – floodwater Surface water – floodwater Surface water – floodwater Surface water – floodwater	O O O O						May 2008 – present May 2011 – present May 2008 – present May 2011 – present	Evaluate the quality of floodwater entering and leaving the site

Notes:
a = Dataloggers monitor groundwater level. The datalogger in 10-EMF-PZ-A also monitors water quality field parameters.
O = opportunistic sampling
Q = quarterly sampling
D = Discontinued
Blank cells are not applicable

Table 2. East Mission Flats Repository Regulatory thresholds for groundwater metals.

Analyte	Regulatory Threshold[a] (mg/L)
Antimony	0.006
Arsenic	0.01
Cadmium	0.005
Lead	0.015[b]
Zinc	5.0[c]

Notes:

a. National Primary Drinking Water Regulations (IDAPA 58.01.08.050 and 40 CFR Part 141.62)

b. Lead is regulated by a treatment technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps (IDAPA 58.01.08.350 and 40 CFR Part 141.80).

c. National Secondary Drinking Water Regulations (IDAPA 58.01.08.400 and 40 CFR Part 143.3)

mg/L – milligrams per liter

Table 3. Non-parametric Prediction Limits (mg/L) for comparison with 2014 data.

COC	MW-A	MW-B	MW-C	MW-D	MW-F
Arsenic	0.0014	0.0014	0.0027	0.00291	0.0014
Cadmium	0.000777	0.0002[A]	0.00364	0.0002[A]	0.001
Lead	0.001[A]	0.001[A]	0.001[A]	0.001[A]	0.001[A]
Zinc	1.71	0.0259	2.03	0.132	3.82

Notes:

A = Use the Double Quantification Rule, value shown is the contract required quantitation limit.

4 Results and Discussion

The objectives of water quality monitoring are outlined in the SAP/QAPP and summarized in Section 1.0 of this annual report. The methods used to evaluate applicable data to these objectives are presented in Section 3.0. This section summarizes the evaluation of the 2014 piezometer monitoring data, floodwater sampling data, hydraulic gradients, and groundwater analyte results, and field parameter information. Quarterly monitoring memoranda and QA/QC memoranda were prepared after each sampling and monitoring event (TerraGraphics 2014a-f, TerraGraphics 2015b-c).

Appendix A contains the groundwater field parameter and analytical data, as well as the hand measured water levels collected from the seven monitoring wells.

4.1 Piezometer Monitoring Data

Only insignificant quantities (less than half an inch) of water were detected in PZ-A and no water was detected in PZ-B during 2014. Insufficient water was available to collect water quality data from the repository waste mass. These results indicate that saturation of the waste material did not occur during the 2014 monitoring period.

4.2 Floodwater Data

The results of floodwater sampling conducted in early March 2014 were evaluated and documented in detail in a memorandum to EPA (DEQ 2014). A summary of these results includes the following:

- Flood water level loggers LL-1 and LL-2 show floodwater surrounding the repository for 3 three to five days beginning on March 10, 2014.
- Total and dissolved lead concentrations decreased as floodwater receded from the area surrounding the EMFR.
- The results for cadmium and zinc were inconclusive and not sufficient to conclude that a difference in concentration was present based on the single sample collected.
- Based on the difficultly determining if changes in metals concentrations are related to the repository or the historical contamination in the area, the monitoring of floodwater metals concentrations will be discontinued.
- Visual inspection to identify surface erosion or deficiencies in sediment controls and groundwater and repository pore water monitoring will be continued to evaluate the potential migration of dissolved contaminants away from the repository.

4.3 Water Levels and Groundwater Hydraulic Gradients

Hydrographs of the CDA River at the Cataldo Gaging Station and groundwater elevations for 2014 show the water-level fluctuations at the site (Figure 4). Groundwater levels were highest in the spring, lowest in the fall, and are closely related to fluctuations in river stage. In general, the lowest horizontal gradients occurred during periods of low water levels in the fall, and on the rising limb of individual water-level peaks. Well MW-E is located in a different hydrologic unit and shows the highest water surface elevations and a weaker correlation with fluctuations in river stage.

Relative to the hydrographs, groundwater contour maps provide finer detail of groundwater flow and direction for a snapshot in time. The general flow direction within the repository footprint in 2014 was from the northeast to southwest for most of the year. Figure 5 represents groundwater contours from the July 2014 quarterly monitoring event showing the typical groundwater flow direction within the repository footprint, where MW-D is upgradient of EMFR. Well MW-E is considered to be in a different hydrologic unit and MW-C-Deep is screened deeper than other monitoring wells; therefore, data from these wells were not used to develop the groundwater contour maps. In the spring and also during rising CDA River and groundwater levels in the late fall, the gradient shifts and flow is mostly toward the west/northwest, where MW-A is the upgradient well (Figure 6).

Based on data from the 2014 quarterly sampling events, the lowest horizontal hydraulic gradient near the repository footprint was 1.3×10^{-4} feet/foot (April) and the highest hydraulic gradient near the repository footprint was 4.3×10^{-4} feet/foot (July).

Water levels from MW-C and MW-C-Deep were used to evaluate the vertical hydraulic gradient. These two wells are located less than 50 feet apart and 09-EMF-MW-C-Deep is approximately 67.5 feet deeper than MW-C. Generally, there was a slight downward hydraulic gradient during most of the year. However, an upward hydraulic gradient was noted during periods of elevated river discharge and corresponding periods of elevated groundwater levels. The downward gradient returns upon decreases in river and groundwater levels.

4.4 Groundwater Monitoring Data

One of the objectives of quarterly monitoring is to evaluate the potential effects of the repository on groundwater. Applicable data and 2014 monitoring results are presented below.

4.4.1 Dissolved Metals

The following summarizes 2014 regulatory threshold exceedances and results of prediction limit testing.

Regulatory Threshold Exceedances:

During 2014 the dissolved cadmium concentration of 0.0073 mg/L at MW-C exceeded the groundwater regulatory threshold of 0.005 mg/L during the July monitoring event. No other regulatory exceedances were reported.

Prediction limits testing:

- A dissolved cadmium concentration of 0.0073 mg/L at MW-C exceeded the prediction limit of 0.00364 mg/L during the July event.
- Dissolved zinc concentrations of 2.53 and 2.21 mg/L at MW-C during the July and October events respectively, exceeded the prediction limit of 2.03 mg/L.

- Dissolved cadmium concentrations at MW-F exceeded the prediction limit of 0.001 during all four events.

Exceedances of the upper prediction limit are expected as the sample size increases and data points from the upper tail of the distribution are observed. During 2014 a statistically significant increase in concentration can only be concluded if all four quarterly results are above the prediction limit identified for a constituent. This is not the case for cadmium and zinc concentrations in MW-C.

Dissolved cadmium concentrations at MW-F exceeded the prediction limit during all four events and a statistically significant increase can be concluded at this location. The 2014 cadmium results at MW-F ranged from 0.0012 to 0.0019 and remained below the regulatory threshold of 0.005 mg/L. Based on the offsite location of MW-F, the increase in cadmium concentration cannot be conclusively attributed to a contaminant release from the repository but provides important details regarding the conditions in the surrounding area. If the increase was attributed to the leaching of repository contaminants, similar confirmed increases might be expected in wells MW-C and MW-B located directly downgradient from the repository. Based on the historical cadmium concentrations measured at MW-C, the concentrations measured at MW-F do not justify additional action or assessment at this time. These results provide additional data suggesting that sources unrelated to the repository may contribute to increased contaminant concentrations in the groundwater.

4.4.2 Total Metals

Total metals analysis was discontinued following the April 2014 sampling event. Dissolved metals data are used as the primary indicator of contamination in groundwater.

4.4.3 Other Constituents and Analytes

In addition to metals data, field parameters were collected and other analytes have been analyzed by the laboratory. These are monitored to provide information on physical and chemical processes occurring at the site and to support ongoing evaluations of floodwater and repository pore water. The additional analytes and field parameter data are maintained electronically for use in future evaluations.

4.5 Data Quality Review Summary

A total of 39 groundwater samples were submitted for laboratory analysis during 2014. Twenty-eight (28) samples were collected from eight sites and 11 samples were collected for QA/QC purposes (i.e., field duplicates, field blanks, and a sample for the matrix spike [MS]). All field QA/QC samples were collected at the appropriate frequency. All samples were analyzed within the required holding times, except for nitrate as nitrogen in July, which was analyzed 5 to 7 hours after the required holding time for all samples. These nitrogen results were qualified as estimates (*J or UJ*) and may be biased low. Preservation was confirmed by the laboratories. Laboratory analyses were performed through the USEPA CLP and the local analytical laboratory (SVL in Kellogg, Idaho). The data validation reports and a detailed record of qualified results can be found in the associated quarterly QA/QC memoranda (TerraGraphics 2014d, 2014e, 2014f, 2015c).

Procedures for sample collection, labeling, handling, and analysis were performed as described in the EMFR SAP/QAPP (TerraGraphics 2014g) with the following exceptions:

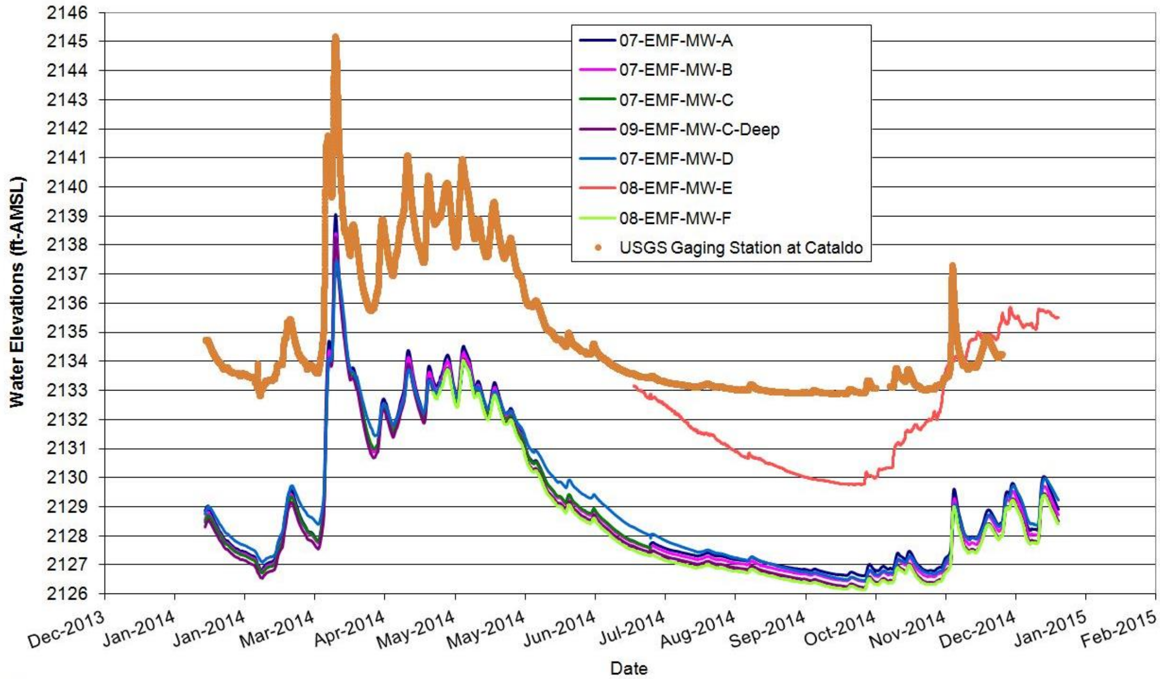
- For the April event, samples for 09-EMF-MW-C Deep were mislabeled in the field as "07-EMF-MW-C Deep." Consequently, the laboratory results are labeled "07-MW-C Deep." The well is correctly identified in the quarterly memo and this report.
- For the July event, the USEPA CLP laboratory inadvertently analyzed samples for dissolved selenium, which is not required for this project. Selenium data are not included in this report.

Sample results were qualified as estimates (J) by the laboratory, by the USEPA chemist, or as part of the data quality review for the following reasons:

- Reported results were above the method detection limit (MDL) but below the contract required quantitation limit (CRQL).
- Laboratory serial dilution results were outside of acceptable range.
- Detected sample analyte results were less than 10 times the detected field blank concentrations.
- Low MS and post-digestion spike percent recoveries.
- MS and post-digestion spike percent recoveries were outside of acceptable ranges.
- Analysis occurred outside of the required holding times.

No laboratory sample results were rejected and the final completeness in 2014 is assessed at 100%.

Chemicals of concern have historically been detected in field and rinsate blanks. An investigation into the source(s) of contamination in the blanks was conducted, including additional sampling and analysis in mid-2014. The findings indicated the possible causes of increased detections in the blanks could be from any combination of the following: 1) low-level metals concentrations in the deionized (DI) water used for the field and rinsate blanks, 2) the low CLP laboratory analytical detection limits, and 3) low-level contamination due to field conditions or inherent to the sampling process. Results, conclusions, and recommendations of the blank detection investigation are described in TerraGraphics (2015d).



Notes:
- All elevations are based on the NGVD29 datum

Figure 4. Coeur d'Alene River and groundwater elevations near the East Mission Flats Repository - Cataldo, Idaho.

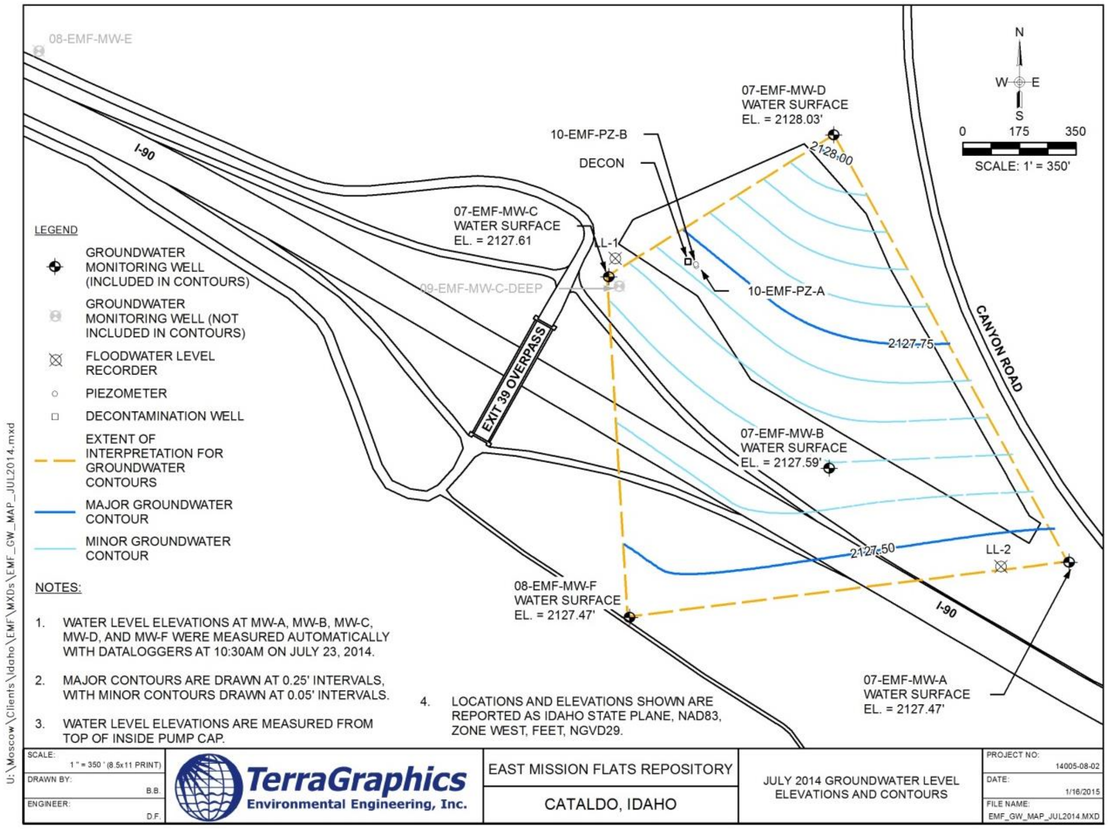


Figure 5. Typical groundwater contours measured at East Mission Flats Repository during the 2014 monitoring events.

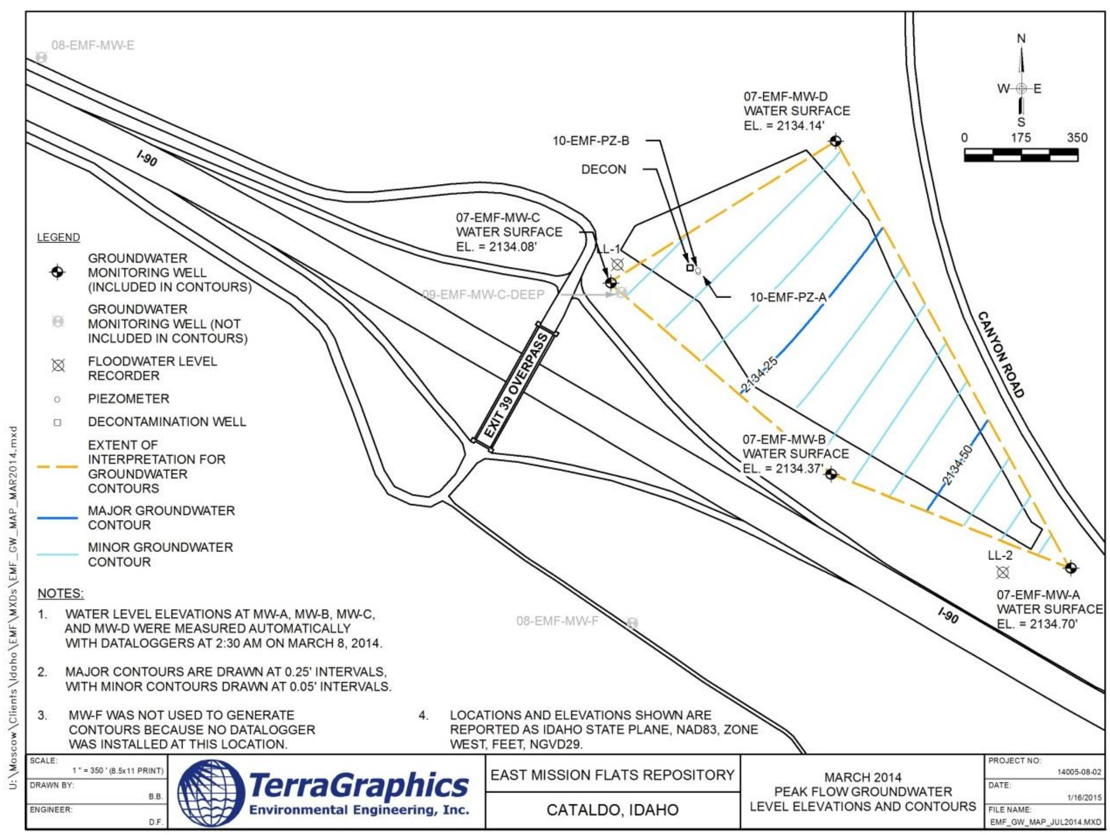


Figure 6. Groundwater contours measured at the East Mission Flats Repository during periods of increased discharge on the Coeur d'Alene River and elevated groundwater levels

5 Conclusions and Recommendations

Conclusions and recommendations for the EMFR sampling and monitoring objectives are summarized in Table 4.

Table 4. East Mission Flats Repository monitoring objectives, conclusions, and recommendations.

Monitoring Objective	Conclusion	Recommendation
Evaluate water levels and water quality parameters of pore water within the repository waste.	No repository pore water was detected in 2014.	Continue monitoring water levels at both piezometers, and collect water quality samples if sufficient water is detected.
Evaluate surface water influence on groundwater levels and flow direction at the site.	Surface water influences groundwater elevation and flow direction at the site. The results of 2014 monitoring are consistent with historical data.	Continue to review hydrographs and maintain water level data to aid in the interpretation of metals and piezometer data at the site.
Evaluate the quality of floodwater entering and leaving the site.	Lead concentration decreases as flood water recedes from the area while cadmium and zinc results are inconclusive.	Discontinue flood water monitoring. Continue visual inspections to identify surface erosion or deficiencies in sediment controls and groundwater and repository pore water monitoring to evaluate the potential migration of dissolved contaminants away from the repository.
Evaluate hydraulic gradients and groundwater flow direction over time, both vertically and horizontally, at the EMFR site.	The general 2014 flow direction and hydraulic gradients were consistent with the historical data.	Continue monitoring hydraulic gradients to aid evaluation of metals data.
Evaluate the potential effects of the repository on groundwater.	A cadmium concentration of 0.0073 mg/L at MW-C exceeded the groundwater regulatory threshold of 0.005 mg/L and the prediction limit of 0.00364 mg/L during the July monitoring event. Dissolved zinc concentrations of 2.53 and 2.21 mg/L at MW-C during the July and October events respectively, exceeded the prediction limit of 2.03 mg/L. Cadmium concentrations at MW-F exceeded the prediction limit during all four events and a statistically significant increase can be concluded at this location. The 2014 cadmium results at MW-F ranged from 0.0012 to 0.0019 and remained below the regulatory threshold of 0.005 mg/L.	Continue quarterly monitoring of dissolved metals, field parameters, and other non-metal analytes. Based on the historical cadmium concentrations measured at MW-C and the ubiquitous contamination in the area, the increased concentrations measured at MW-F do not justify additional action or assessment at this time. It is recommended that retesting at MW-F is not performed for future exceedances of the cadmium prediction limit as a confirmed increase has already occurred. The MW-F prediction limit should be re-evaluated when prediction limits are updated. With the exception of cadmium at MW-F, retesting should be conducted at all applicable wells for any constituents exceeding the prediction limits.

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Appendix A. Analyte and Field Parameter Data

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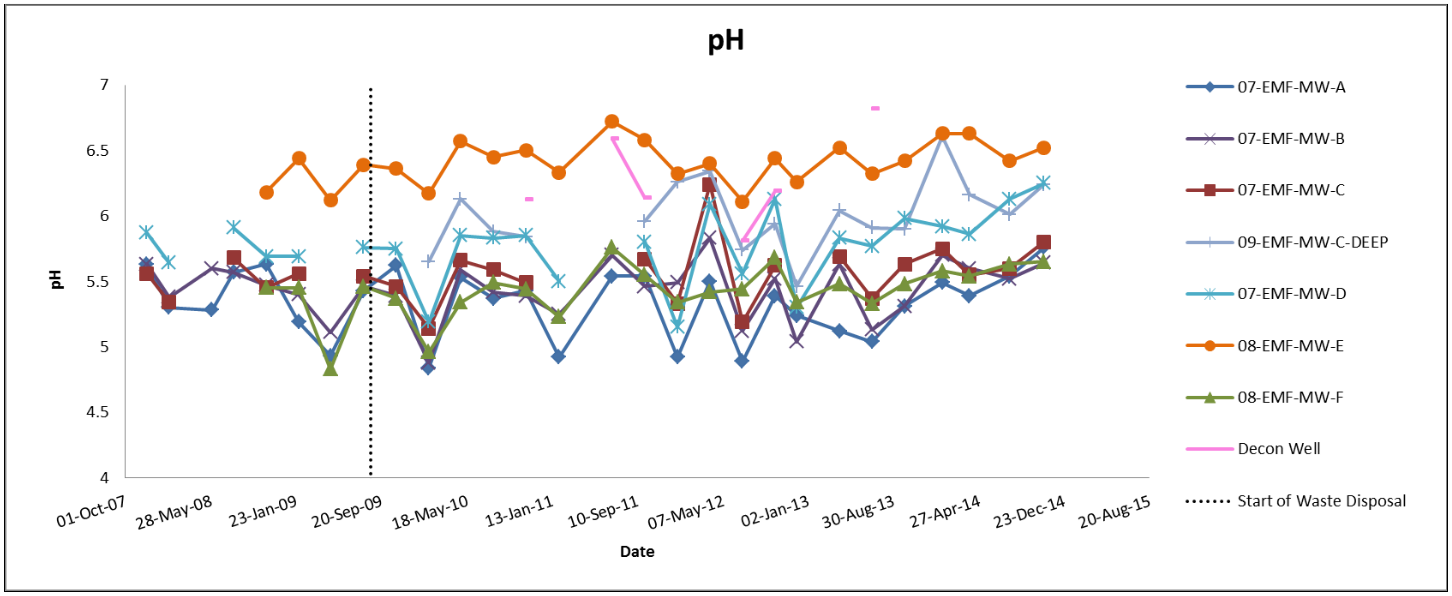
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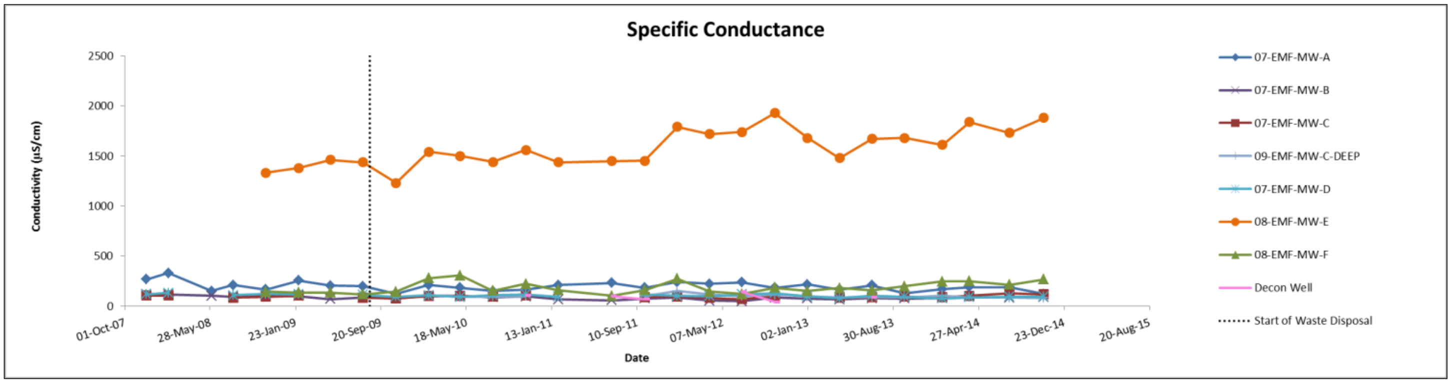
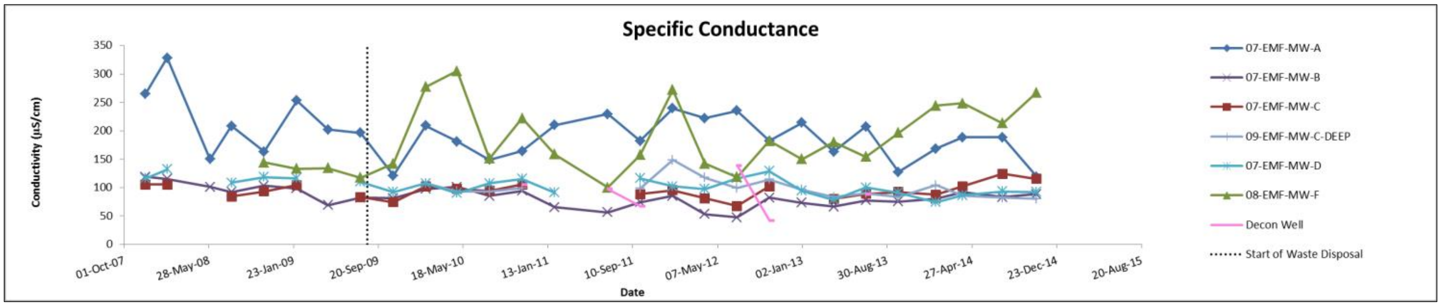
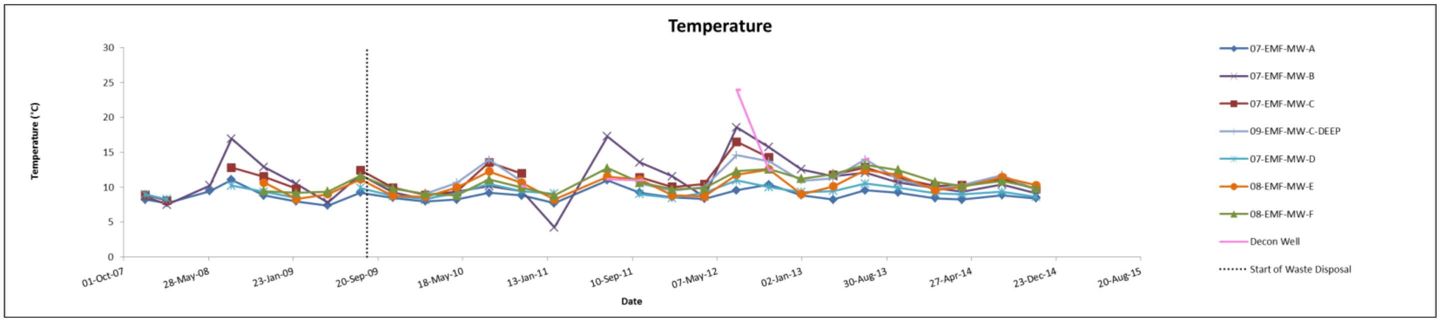
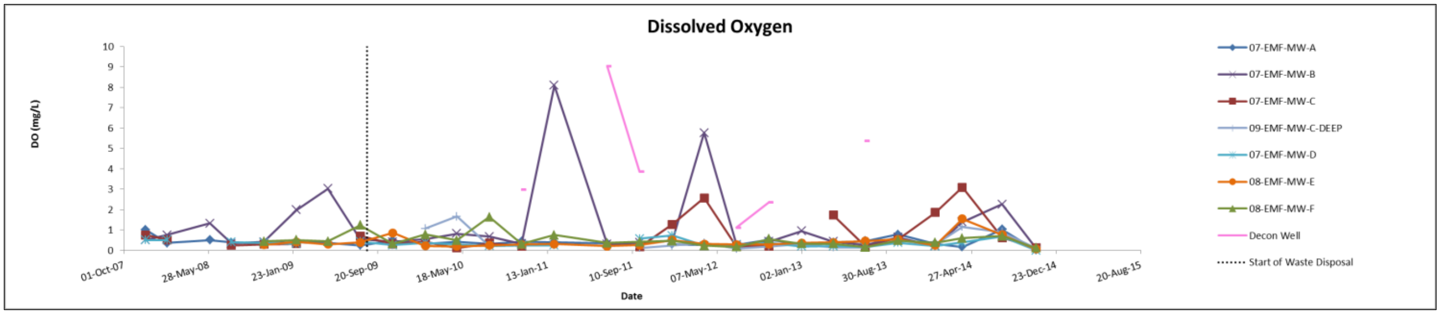
7
6.5
6
5.5
5
4.5
4
pH
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal


Specific Conductance
2500
2000
1500
1000
500
0
Conductivity (µS/cm)
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal


Specific Conductance
350
300
250
200
150
100
50
0
Conductivity (µS/cm)
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-F
Decon Well
Start of Waste Disposal


Temperature
Temperature (°C)
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal


Dissolved Oxygen
DO (mg/L)
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal

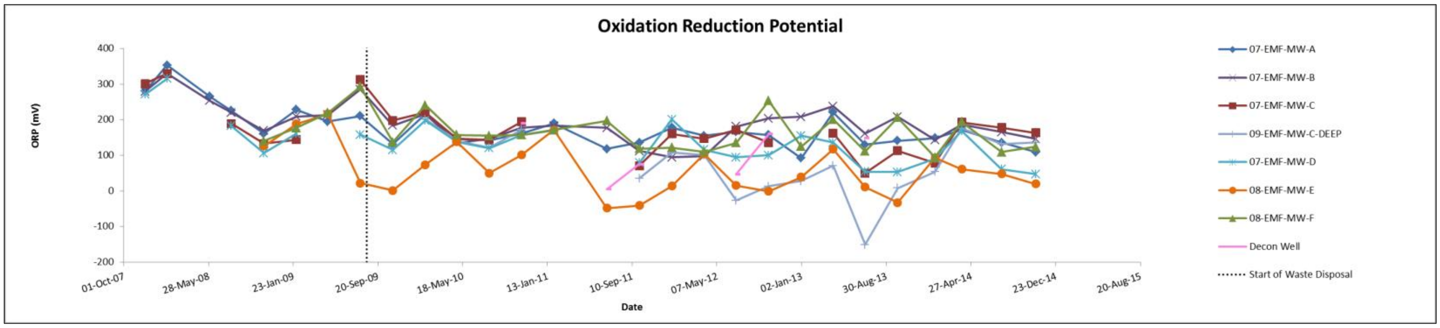

Oxidation Reduction Potential
ORP (mV)
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal

Table A-1. Field Parameter Data East Mission Flats Repository

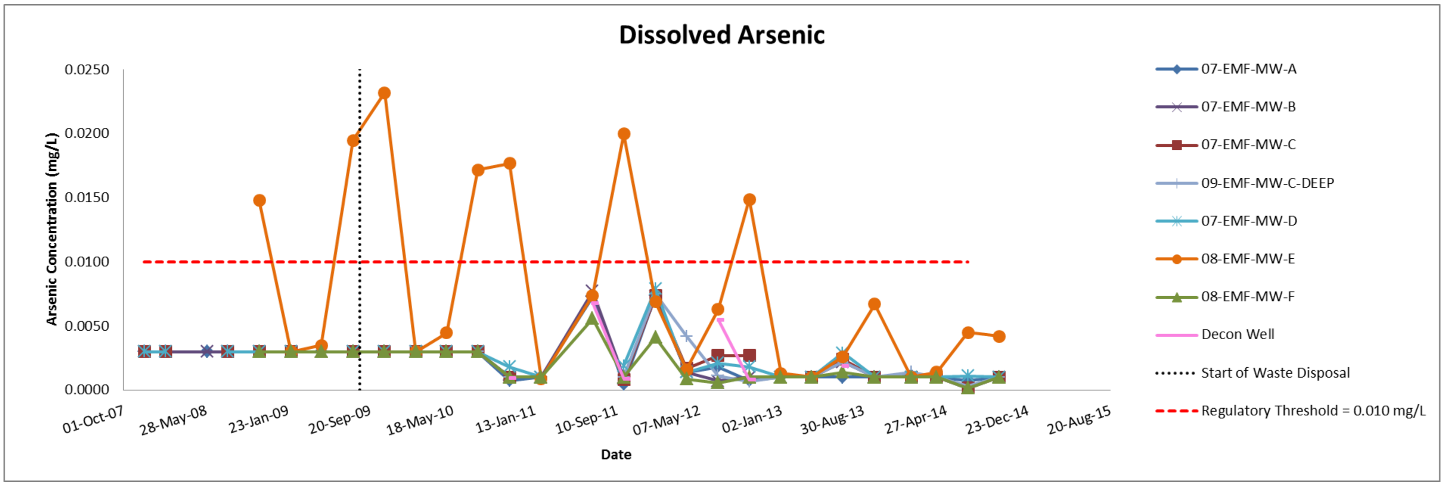
Well	Parameter					
	Date	pH	Specific Conductance (µS/cm)	Temperature (^{O}C)	DO (mg/L)	ORP (mV)
07-EMF-MW-A	11-Dec-07	5.63	265	8.21	1.01	280
	25-Feb-08	5.30	328	7.73	0.36	353
	3-Jun-08	5.28	150	9.45	0.51	265
	19-Aug-08	5.57	208	11.05	0.39	225
	10-Nov-08	5.63	163	8.79	0.34	161
	4-Feb-09	5.19	253	7.95	0.39	228
	7-May-09	4.93	202	7.35	0.38	195
	10-Aug-09	5.43	196	9.23	0.24	210
	11-Nov-09	5.62	121	8.49	0.48	131
	25-Feb-10	4.84	209	7.97	0.32	216
	19-May-10	5.53	181	8.21	0.42	147
	25-Aug-10	5.37	149	9.17	0.33	142
	16-Nov-10	5.43	164	8.81	0.43	161
	10-Feb-11	4.92	210	7.69	0.40	190
	6-Jul-11	5.54	229	10.98	0.35	118
	24-Oct-11	5.54	182	9.21	R	136
	25-Jan-12	4.92	239	8.54	0.30	178
	10-Apr-12	5.50	222	8.34	0.26	155
	31-Jul-12	4.89	235	9.53	0.26	166
	29-Oct-12	5.39	182	10.35	0.52	157
	23-Jan-13	5.24	214	8.84	0.30	92
	2-Apr-13	5.12	163	8.23	0.39	221
	23-Jul-13	5.04	207	9.54	0.45	130
	17-Oct-13	5.31	127	9.22	0.78	141
	15-Jan-14	5.49	168	8.39	0.33	148
	1-Apr-14	5.39	188	8.23	0.17	172
	23-Jul-14	5.54	188	8.83	1.02	136
	27-Oct-14	5.76	119	8.39	0.01	109
07-EMF-MW-B	10-Dec-07	5.63	119	8.71	0.51	279
	25-Feb-08	5.38	115	7.46	0.75	330
	3-Jun-08	5.60	101	10.26	1.32	253
	19-Aug-08	5.57	92	16.92	0.34	220
	10-Nov-08	5.47	103	12.88	0.42	169
	4-Feb-09	5.40	98	10.48	1.98	209
	7-May-09	5.11	69	7.8	3.02	213
	10-Aug-09	5.46	82	11.81	0.55	285
	11-Nov-09	5.39	81	9.24	0.42	184
	25-Feb-10	4.88	97	8.2	0.55	216
	19-May-10	5.59	101	9.37	0.82	135
	25-Aug-10	5.42	85	10.13	0.67	146
	16-Nov-10	5.39	94	9.44	0.32	177
	10-Feb-11	5.25	65	4.24	8.09	183
	6-Jul-11	5.70	56	17.28	0.30	177
	24-Oct-11	5.46	74	13.55	0.37 J	112
	25-Jan-12	5.49	85	11.53	0.47	94
	10-Apr-12	5.83	53	8.61	5.77	97
	31-Jul-12	5.12	47	18.55	0.28	181
	29-Oct-12	5.52	82	15.71	0.43	204
	24-Jan-13	5.04	73	12.53	0.95	208

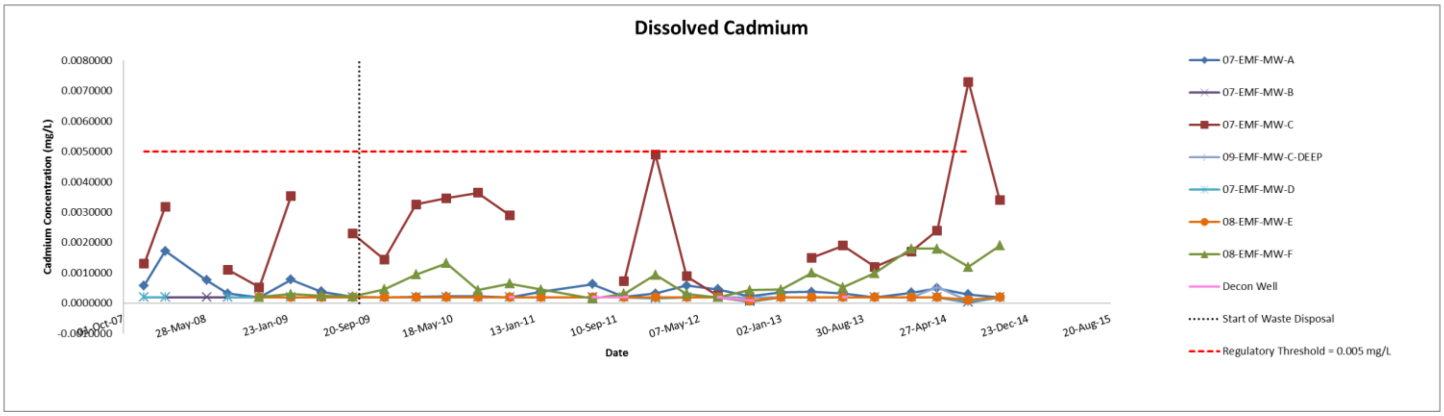
Well	Parameter						
	Date	pH	Specific Conductance (µS/cm)	Temperature (^{O}C)	DO (mg/L)		ORP (mV)
	2-Apr-13	5.63	66	11.54	0.43		238
	23-Jul-13	5.13	77	12.06	0.27		161
	17-Oct-13	5.31	75	10.67	0.64		208
	15-Jan-14	5.70	80	9.88	0.22		143
	1-Apr-14	5.60	92	9.38	1.39		186
	23-Jul-14	5.52	83	10.38	2.26		165
	27-Oct-14	5.64	88	9.10	0.11		146
07-EMF-MW-C	10-Dec-07	5.56	105	8.89	0.75		301
	25-Feb-08	5.34	105	8.07	0.52		329
	3-Jun-08	NS	NS	NS	NS		NS
	19-Aug-08	5.68	84	12.81	0.24		189
	10-Nov-08	5.45	93	11.51	0.3		133
	3-Feb-09	5.56	104	9.76	0.32		144
	7-May-09	NS	NS	NS	NS		NS
	10-Aug-09	5.54	83	12.42	0.7		312
	11-Nov-09	5.46	74	9.91	0.31		198
	25-Feb-10	5.14	102	8.89	0.42		220
	19-May-10	5.66	97	9.33	0.11	J	147
	25-Aug-10	5.59	94	13.54	0.35		143
	16-Nov-10	5.49	105	11.94	0.21		194
	10-Feb-11	NS	NS	NS	NS		NS
	6-Jul-11	NS	NS	NS	NS		NS
	24-Oct-11	5.67	88	11.41	0.17	J	71
	25-Jan-12	5.33	95	10.03	1.27		160
	10-Apr-12	6.24	81	10.45	2.57		147
	31-Jul-12	5.19	67	16.51	0.2		171
	29-Oct-12	5.62	102	14.22	0.20		136
	23-Jan-13	NS	NS	NS	NS		NS
	2-Apr-13	5.69	80	11.78	1.73		162
	23-Jul-13	5.37	89	12.85	0.2		50
	17-Oct-13	5.63	92	11.36	0.52		113
	15-Jan-14	5.75	87	10.14	1.85		78
	1-Apr-14	5.55	102	10.27	3.09		193
	23-Jul-14	5.6	124	11.21	0.62		178
	27-Oct-14	5.80	115	9.71	0.12		163
09-EMF-MW-C Deep	25-Feb-10	5.65	107	9.07	1.06		201
	19-May-10	6.13	93	10.60	1.66		141
	25-Aug-10	5.88	93	13.90	0.21		122
	16-Nov-10	5.84	99	10.79	0.26		172
	10-Feb-11	NS	NS	NS	NS		NS
	6-Jul-11	NS	NS	NS	NS		NS
	24-Oct-11	5.96	98	10.52	0.11		35
	25-Jan-12	6.26	148	9.46	0.23		108
	10-Apr-12	6.34	117	10.03	0.36		100
	31-Jul-12	5.74	99	14.56	0.08		-27
	29-Oct-12	5.94	114	13.70	0.20		13
	23-Jan-13	5.46	96	10.90	0.32		28
	2-Apr-13	6.04	83	11.29	0.14		71
	23-Jul-13	5.91	90	13.99	0.13		-151
	17-Oct-13	5.9	83	11.09	0.50		8
	15-Jan-14	6.61	104	9.82	0.29		54
	1-Apr-14	6.16	85	10.31	1.15		176

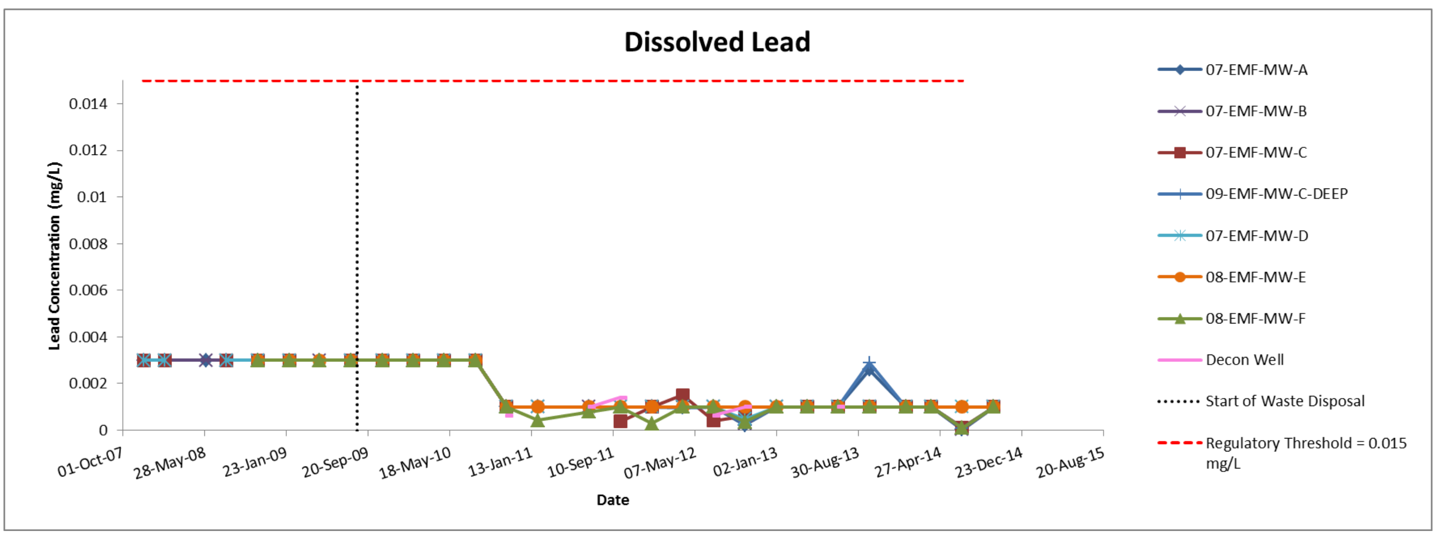
Well	Parameter					
	Date	pH	Specific Conductance (µS/cm)	Temperature (^{O}C)	DO (mg/L)	ORP (mV)
	23-Jul-14	6.01	82	11.72	0.90	131
	27-Oct-14	6.24	80	9.67	0.11	136
07-EMF-MW-D	10-Dec-07	5.87	116	8.95	0.5	271
	25-Feb-08	5.64	132	8.26	0.51	315
	3-Jun-08	NS	NS	NS	NS	NS
	19-Aug-08	5.91	108	10.22	0.4	182
	10-Nov-08	5.69	118	9.34	0.38	106
	3-Feb-09	5.69	116	8.43	0.32	161
	7-May-09	NS	NS	NS	NS	NS
	11-Aug-09	5.76	110	9.87	0.43	158
	11-Nov-09	5.75	92	8.72	0.26	115
	25-Feb-10	5.19	107	8.32	0.38	198
	19-May-10	5.85	90	9.13	0.30	138
	25-Aug-10	5.83	107	10.46	0.22	120
	16-Nov-10	5.85	115	9.44	0.25	157
	10-Feb-11	5.50	91	9.07	0.24	170
	6-Jul-11	NS	NS	NS	NS	NS
	25-Oct-11	5.80	116	9	0.57 J	79
	26-Jan-12	5.15	102	8.44	0.73	201
	10-Apr-12	6.09	97	9.16	0.23	116
	1-Aug-12	5.56	116	10.95	0.29	94
	30-Oct-12	6.13	129	9.99	0.36	100
	24-Jan-13	5.30	94	9.27	0.19	155
	2-Apr-13	5.83	78	9.43	0.21	136
	23-Jul-13	5.77	100	10.52	0.15	54
	17-Oct-13	5.98	91	9.91	0.38	53
	15-Jan-14	5.92	74	9.15	0.21	90
	1-Apr-14	5.86	86	9.00	0.39	168
	23-Jul-14	6.13	93	9.32	0.68	61
	27-Oct-14	6.25	92	8.63	0.00	47
08-EMF-MW-E	10-Nov-08	6.18	1,332	10.66	0.27	126
	3-Feb-09	6.44	1,379	8.29	0.42	188
	7-May-09	6.12	1,461	8.99	0.3	216
	11-Aug-09	6.39	1,435	11.14	0.39	22
	11-Nov-09	6.36	1,228	8.77	0.86	1
	25-Feb-10	6.17	1,540	8.61	0.22	74
	19-May-10	6.57	1,500	9.96	0.20	138
	25-Aug-10	6.45	1,438	12.26	0.25	50
	16-Nov-10	6.50	1,560	10.61	0.29	101
	10-Feb-11	6.33	1,436	8.23	0.31	171
	6-Jul-11	6.72	1,449	11.52	0.21	
	24-Oct-11	6.58	1,450	11.1	0.26	-41
	26-Jan-12	6.32	1,790	8.79	0.51	14
	11-Apr-12	6.40	1,720	8.67	0.31	104
	1-Aug-12	6.11	1,740	11.81	0.29	15
	29-Dec-12	6.44	1,930	12.53	0.30	-1
	23-Jan-13	6.26	1,680	8.99	0.36	39
	2-Apr-13	6.52	1,478	10.10	0.39	117
	23-Jul-13	6.32	1,670	12.43	0.45	11
	17-Oct-13	6.42	1,680	11.79	0.55	-33
	15-Jan-14	6.63	1,610	9.53	0.25	93
	1-Apr-14	6.63	1,840	10.01	1.55	61
	23-Jul-14	6.42	1,730	11.44	0.76	48

Well	Date	pH	Specific Conductance (µS/cm)	Temperature (°C)	DO (mg/L)	ORP (mV)
	27-Oct-14	6.52	1,880	10.28	0.06	20
08-EMF-MW-F	11-Nov-08	5.45	144	9.43	0.44	140
	3-Feb-09	5.45	133	9.16	0.5	177
	7-May-09	4.83	134	9.37	0.44	219
	10-Aug-09	5.46	117	11.63	1.23	293
	11-Nov-09	5.37	142	9.81	0.33	137
	25-Feb-10	4.96	277	9.07	0.78	241
	19-May-10	5.34	305	8.82	0.49	157
	25-Aug-10	5.49	151	11.08	1.63	155
	16-Nov-10	5.44	222	9.94	0.31	157
	10-Feb-11	5.23	158	8.82	0.75	171
	6-Jul-11	5.76	100	12.72	0.36	197
	25-Oct-11	5.55	157	10.65	0.41 J	119
	26-Jan-12	5.34	272	9.70	0.46	122
	11-Apr-12	5.42	142	9.85	0.23	110
	1-Aug-12	5.44	118	12.29	0.17	135
	30-Oct-12	5.68	182	12.59	0.56	253
	23-Jan-13	5.34	150	11.22	0.33	125
	2-Apr-13	5.48	180	11.87	0.32	201
	23-Jul-13	5.33	154	13.18	0.16	111
	17-Oct-13	5.48	196	12.45	0.48	206
	15-Jan-14	5.58	244	10.72	0.37	94
	1-Apr-14	5.54	248	10.17	0.6	194
	23-Jul-14	5.63	213	10.86	0.7	109
	27-Oct-14	5.65	267	9.85	0.12	124
Decon Well	16-Nov-10	6.13	105	10.12	2.98	190
	10-Feb-11	NS	NS	NS	NS	NS
	6-Jul-11	6.59	97	11.14	9.03	5
	25-Oct-11	6.14	67	11.00	3.85	75
	26-Jan-11	NS	NS	NS	NS	NS
	10-Apr-12	NS	NS	NS	NS	NS
	1-Aug-12	5.81	139	23.92	1.12	47
	30-Oct-12	6.19	42	12.40	2.36	160
	23-Jan-13	NS	NS	NS	NS	NS
	2-Apr-13	NS	NS	NS	NS	NS
	24-Jul-13	6.82	88	14.05	5.36	149
	17-Oct-13	NS	NS	NS	NS	NS
sampling discontinued	15-Jan-14	NS	NS	NS	NS	NS
after April 2014	1-Apr-14	NS	NS	NS	NS	NS

Notes:
°C = degrees Celsuis
mg/L = milligrams per liter
mV = millivolts
µS/cm = microSiemens per centimeter
DO = Dissolved oxygen
ORP = Oxidation reduction potential
NS = Not sampled
R = Rejected
J = Estimate


Dissolved Arsenic
Arsenic Concentration (mg/L)
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal
Regulatory Threshold = 0.010 mg/L


Dissolved Cadmium
Cadmium Concentration (mg/L)
0.0080000
0.0070000
0.0060000
0.0050000
0.0040000
0.0030000
0.0020000
0.0010000
0.0000000
-0.0010000
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal
Regulatory Threshold = 0.005 mg/L


Dissolved Lead
Lead Concentration (mg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal
Regulatory Threshold = 0.015 mg/L

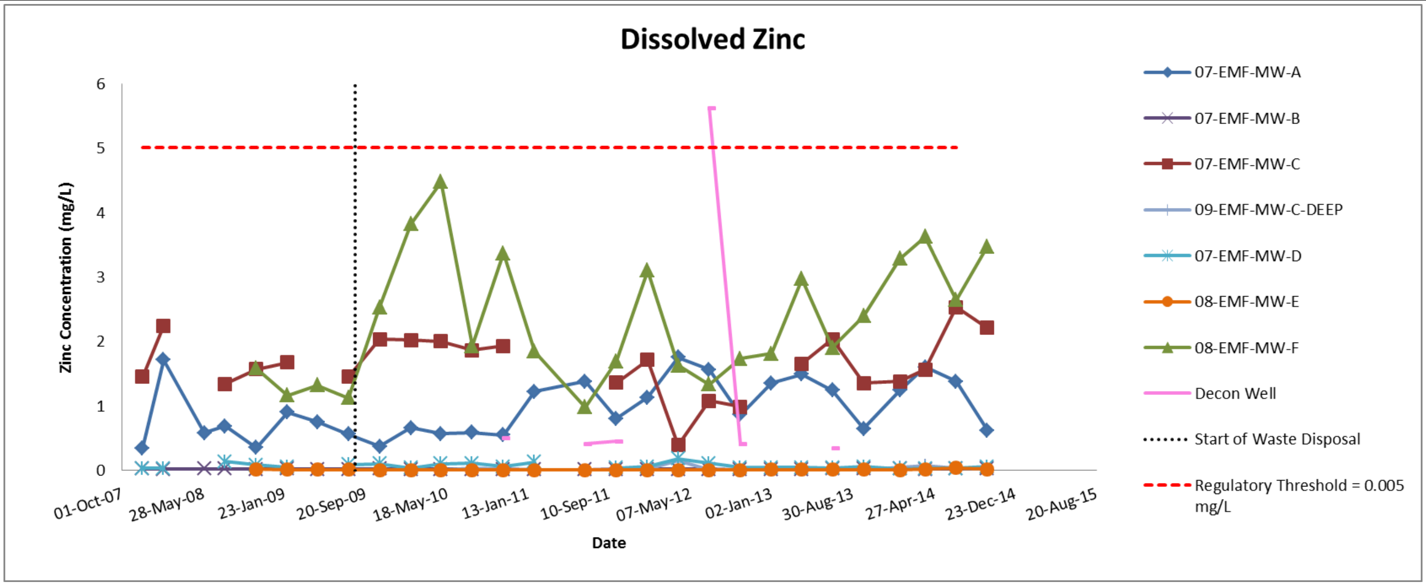

Dissolved Zinc
Zinc Concentration (mg/L)
6
5
4
3
2
1
0
01-Oct-07
28-May-08
23-Jan-09
20-Sep-09
18-May-10
13-Jan-11
10-Sep-11
07-May-12
02-Jan-13
30-Aug-13
27-Apr-14
23-Dec-14
20-Aug-15
Date
07-EMF-MW-A
07-EMF-MW-B
07-EMF-MW-C
09-EMF-MW-C-DEEP
07-EMF-MW-D
08-EMF-MW-E
08-EMF-MW-F
Decon Well
Start of Waste Disposal
Regulatory Threshold = 0.005 mg/L

Table A-2. Groundwater Monitoring Results Dissolved Metals East Mission Flats Repository

Well No.	Sample Date	Constituents (mg/L)									
		Antimony		Arsenic		Cadmium		Lead		Zinc	
07-EMF-MW-A	11-Dec-07	0.003	U	0.003	U	0.000578	J	0.003	U	0.347	J
	25-Feb-08	0.003	U	0.003	U	0.00172		0.003	U	1.71	J
	3-Jun-08	0.003	U	0.003	U	0.000763		0.003	U	0.582	
	19-Aug-08	0.003	U	0.003	U	0.000321		0.003	U	0.683	
	10-Nov-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.353	
	4-Feb-09	0.003	U	0.003	U	0.000777		0.003	U	0.898	
	7-May-09	0.003	U	0.003	U	0.000382		0.003	U	0.753	
	10-Aug-09	0.003	U	0.003	U	0.000204		0.003	U	0.558	
	11-Nov-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.368	
	25-Feb-10	0.003	U	0.003	U	0.000208		0.003	U	0.657	
	19-May-10	0.003	U	0.003	U	0.000225		0.003	U	0.568	
	25-Aug-10	0.003	U	0.003	U	0.000227		0.003	U	0.584	
	16-Nov-10	0.002	U	0.00076	J	0.0002	U	0.001	U	0.544	J
	10-Feb-11	0.002	U	0.001	U	0.00039		0.001	U	1.22	J
	6-Jul-11	0.002	U	0.0073	J*	0.00063		0.001	U	1.38	
	24-Oct-11	0.002	U	0.00044	J	0.000220		0.001	UJ	0.804	
	25-Jan-12	0.002	U	0.0074	J*	0.00032		0.001	U	1.13	
	10-Apr-12	0.002	U	0.0014		0.00058		0.001	U	1.75	
	31-Jul-12	0.002	U	0.0018		0.00046		0.001	U	1.56	
	29-Oct-12	0.002	U	0.00075	J	0.00023		0.00022	J	0.862	J
	23-Jan-13	0.002	U	0.001	U	0.00037		0.001	U	1.35	
	2-Apr-13	0.002	U	0.001	U	0.00038		0.001	U	1.49	
	23-Jul-13	0.002	U	0.001	U	0.00033		0.001	U	1.24	
	17-Oct-13	0.002	U	0.001	U	0.0002	U	0.0026		0.648	
	15-Jan-14	0.002	U	0.0011		0.00035		0.001	U	1.24	J
	1-Apr-14	0.002	U	0.001	U	0.00050		0.001	U	1.60	J
	23-Jul-14	0.002	U	0.00076	J	0.00029		0.000025	J	1.38	J
	27-Oct-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.616	
07-EMF-MW-B	10-Dec-07	0.003	U	0.003	U	0.0002	U	0.003	U	0.0243	J
	25-Feb-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0198	J
	3-Jun-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0212	
	19-Aug-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0244	
	10-Nov-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0197	
	4-Feb-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0210	
	7-May-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0168	
	10-Aug-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0160	
	11-Nov-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0264	
	25-Feb-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0153	
	19-May-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0157	
	25-Aug-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0157	
	16-Nov-10	0.002	U	0.001	U	0.0002	U	0.001	U	0.0187	J
	10-Feb-11	0.002	U	0.001	U	0.0002	U	0.001	U	0.0091	J*
	6-Jul-11	0.002	U	0.0077	J*	0.0002	U	0.001	U	0.0126	
	24-Oct-11	0.002	U	0.001	U	0.0002	U	0.001	UJ	0.0148	J*
	25-Jan-12	0.002	U	0.0073	J*	0.0002	U	0.001	U	0.0180	
	10-Apr-12	0.002	U	0.0014		0.0002	U	0.001	U	0.0162	
	31-Jul-12	0.002	U	0.00071	J	0.0002	U	0.001	U	0.0142	
	29-Oct-12	0.002	U	0.001	U	0.0002	U	0.00028	J	0.0121	J
	24-Jan-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0181	

Well No.	Sample Date	Antimony		Arsenic		Cadmium		Lead		Zinc	
		Constituents (mg/L)									
	2-Apr-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0197	
	23-Jul-13	0.002	U	0.0022	J*	0.0002	U	0.001	U	0.0285	J*
	17-Oct-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0227	
	15-Jan-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0226	J
	1-Apr-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0182	J
	23-Jul-14	0.002	U	0.00016	J	0.000031	J	0.000037	J	0.0219	J
	27-Oct-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0207	
07-EMF-MW-C	10-Dec-07	0.003	U	0.003	U	0.0013	J	0.003	U	1.45	J
	25-Feb-08	0.003	U	0.003	U	0.00318		0.003	U	2.24	J
	3-Jun-08		NS		NS		NS		NS		NS
	19-Aug-08	0.003	U	0.003	U	0.00111		0.003	U	1.34	
	10-Nov-08	0.003	U	0.003	U	0.000522		0.003	U	1.57	
	3-Feb-09	0.003	U	0.003	U	0.00354		0.003	U	1.67	
	7-May-09		NS		NS		NS		NS		NS
	10-Aug-09	0.003	U	0.003	U	0.00229		0.003	U	1.45	
	11-Nov-09	0.003	U	0.003	U	0.00144		0.003	U	2.03	
	25-Feb-10	0.003	U	0.003	U	0.00326		0.003	U	2.02	
	19-May-10	0.003	U	0.003	U	0.00346		0.003	U	2.00	
	25-Aug-10	0.003	U	0.003	U	0.00364		0.003	U	1.86	
	16-Nov-10	0.002	U	0.001	U	0.0029		0.001	U	1.93	J
	10-Feb-11		NS		NS		NS		NS		NS
	6-Jul-11		NS		NS		NS		NS		NS
	24-Oct-11	0.002	U	0.00081	J	0.00072		0.00038	J	1.36	
	25-Jan-12	0.002	U	0.0074	J*	0.0049		0.001	U	1.71	
	10-Apr-12	0.002	U	0.0017		0.00089		0.0015		0.388	
	31-Jul-12	0.002	U	0.0027		0.00025		0.00041	J	1.08	
	29-Oct-12	0.002	U	0.0027		0.00010	J	0.00061	J	0.988	J
	23-Jan-13		NS		NS		NS		NS		NS
	2-Apr-13	0.002	U	0.001	U	0.0015		0.001	U	1.65	
	23-Jul-13	0.002	U	0.0024	J*	0.0019		0.001	U	2.03	
	17-Oct-13	0.002	U	0.001	U	0.0012		0.001	U	1.35	
	15-Jan-14	0.002	U	0.001	U	0.0017		0.001	U	1.38	J
	1-Apr-14	0.002	U	0.001	U	0.0024		0.001	U	1.56	J
	23-Jul-14	0.002	U	0.00019	J	0.0073		0.00012	J	2.53	J
	27-Oct-14	0.002	U	0.001	U	0.0034		0.001	U	2.21	
09-EMF-MW-C Deep	25-Feb-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0113	
	19-May-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.005	U
	25-Aug-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0317	
	16-Nov-10	0.002	U	0.001	U	0.0002	U	0.001	U	0.0216	J
	10-Feb-11		NS		NS		NS		NS		NS
	6-Jul-11		NS		NS		NS		NS		NS
	24-Oct-11	0.002	U	0.001	U	0.0002	U	0.001	UJ	0.0167	
	25-Jan-12	0.002	U	0.0075	J*	0.0002	U	0.001	U	0.0191	
	10-Apr-12	0.002	U	0.0042	J*	0.0002	U	0.00095	J	0.154	
	31-Jul-12	0.002	U	0.0011		0.0002	U	0.001	U	0.0116	
	29-Oct-12	0.002	U	0.00065	J	0.0002	U	0.00028	J	0.0032	J
	23-Jan-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0226	
	2-Apr-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0237	
	23-Jul-13	0.002	U	0.0022	J*	0.0002	U	0.001	U	0.0088	J*
	17-Oct-13	0.002	U	0.001	U	0.0002	U	0.0029		0.0096	J*
	15-Jan-14	0.002	U	0.0014		0.0002	U	0.001	U	0.0463	J
	1-Apr-14	0.002	U	0.001	U	0.00053		0.001	U	0.0724	J
	23-Jul-14	0.002	U	0.00029	J	0.00009	J	0.000079	J	0.0328	J
	27-Oct-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0222	

Well No.	Sample Date	Constituents (mg/L)									
		Antimony		Arsenic		Cadmium		Lead		Zinc	
07-EMF-MW-D	10-Dec-07	0.003	U	0.003	U	0.0002	U	0.003	U	0.0326	J
	25-Feb-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0285	J
	3-Jun-08		NS		NS		NS		NS		NS
	19-Aug-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.132	
	10-Nov-08	0.003	U	0.003	U	0.0002	U	0.003	U	0.0794	
	3-Feb-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0531	
	7-May-09		NS		NS		NS		NS		NS
	11-Aug-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.0918	
	11-Nov-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.103	
	25-Feb-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.0352	
	19-May-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.105	
	25-Aug-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.109	
	16-Nov-10	0.002	U	0.0018		0.0002	U	0.001	U	0.0563	J
	10-Feb-11	0.002	U	0.001	U	0.0002	U	0.001	U	0.127	J*
	6-Jul-11		NS		NS		NS		NS		NS
	25-Oct-11	0.002	U	0.0019		0.0002	U	0.001	UJ	0.0395	
	26-Jan-12	0.002	U	0.0079	J*	0.00016	J	0.001	U	0.0584	
	10-Apr-12	0.002	U	0.0014		0.0002	U	0.001	U	0.184	
	1-Aug-12	0.002	U	0.0021		0.0002	U	0.001	U	0.112	
	30-Oct-12	0.002	U	0.0018		0.00005	J	0.00047	J	0.0464	J
	24-Jan-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0425	
	2-Apr-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0466	
	23-Jul-13	0.002	U	0.0029	J*	0.0002	U	0.001	U	0.0387	J*
	17-Oct-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0537	
	15-Jan-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0210	J
	1-Apr-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0326	J
	23-Jul-14	0.002	U	0.0011		0.000048	J	0.001	U	0.0331	J
	27-Oct-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0587	
08-EMF-MW-E	10-Nov-08	0.003	U	0.0148		0.0002	U	0.003	U	0.0141	
	3-Feb-09	0.003	U	0.003	U	0.0002	U	0.003	U	0.01	U
	7-May-09	0.003	U	0.0035		0.0002	U	0.003	U	0.00889	
	11-Aug-09	0.003	U	0.0195		0.0002	U	0.003	U	0.00848	
	11-Nov-09	0.003	U	0.0232		0.0002	U	0.003	U	0.00671	
	25-Feb-10	0.003	U	0.003	U	0.0002	U	0.003	U	0.00599	
	19-May-10	0.003	U	0.00447		0.0002	U	0.003	U	0.00633	
	25-Aug-10	0.003	U	0.0172		0.0002	U	0.003	U	0.00687	
	16-Nov-10	0.002	U	0.0177		0.0002	U	0.001	U	0.0069	J
	10-Feb-11	0.002	U	0.00089	J	0.0002	U	0.001	U	0.0042	J
	6-Jul-11	0.002	U	0.0074	J*	0.0002	U	0.001	U	0.0048	J
	24-Oct-11	0.002	U	0.020		0.0002	U	0.001	UJ	0.0045	
	26-Jan-12	0.002	U	0.0069	J*	0.0002	U	0.001	U	0.0051	J*
	11-Apr-12	0.002	U	0.002		0.0002	U	0.001	U	0.0063	J*
	1-Aug-12	0.002	U	0.0063		0.0002	U	0.001	U	0.0064	
	29-Oct-12	0.002	U	0.0149		0.00008	J	0.001	U	0.0071	J*
	23-Jan-13	0.002	U	0.0013		0.0002	U	0.001	U	0.0091	J*
	2-Apr-13	0.002	U	0.001	U	0.0002	U	0.001	U	0.0083	J*
	23-Jul-13	0.002	U	0.0026	J*	0.0002	U	0.001	U	0.0124	J*
	17-Oct-13	0.002	U	0.0067		0.0002	U	0.001	U	0.0120	J*
	15-Jan-14	0.002	U	0.001	U	0.0002	U	0.001	U	0.0073	J
	1-Apr-14	0.002	U	0.0014		0.0002	U	0.001	U	0.0175	J
	23-Jul-14	0.002	U	0.0045		0.0001	J	0.001	U	0.0392	J
	27-Oct-14	0.002	U	0.0042		0.0002	U	0.001	U	0.0198	
08-EMF-MW-F	11-Nov-08	0.003	U	0.003	U	0.000205		0.003	U	1.58	
	3-Feb-09	0.003	U	0.003	U	0.000304		0.003	U	1.16	

Well No.	Sample Date	Constituents (mg/L)									
		Antimony		Arsenic		Cadmium		Lead		Zinc	
	7-May-09	0.003	U	0.003	U	0.000258		0.003	U	1.32	
	10-Aug-09	0.003	U	0.003	U	0.00023		0.003	U	1.12	
	11-Nov-09	0.003	U	0.003	U	0.000464		0.003	U	2.53	
	25-Feb-10	0.003	U	0.003	U	0.000947		0.003	U	3.82	
	19-May-10	0.003	U	0.003	U	0.00132		0.003	U	4.47	
	25-Aug-10	0.003	U	0.003	U	0.000436		0.003	U	1.93	
	16-Nov-10	0.002	U	0.001	U	0.00065		0.001	U	3.37	J
	10-Feb-11	0.002	U	0.001	U	0.00045		0.00043	J	1.84	J
	6-Jul-11	0.002	U	0.0056	J*	0.00016	J	0.00079	J	0.976	
	25-Oct-11	0.002	U	0.001	U	0.00031		0.001	UJ	1.69	
	26-Jan-12	0.002	U	0.0041	J*	0.00094		0.00029	J	3.10	
	11-Apr-12	0.002	U	0.00086	J	0.00031		0.001	U	1.63	
	1-Aug-12	0.002	U	0.00057	J	0.0002	U	0.001	U	1.33	
	30-Oct-12	0.002	U	0.001	U	0.00043		0.00036	J	1.73	J
	23-Jan-13	0.002	U	0.001	U	0.00045		0.001	U	1.81	
	2-Apr-13	0.002	U	0.001	U	0.0010		0.001	U	2.97	
	23-Jul-13	0.002	U	0.0014	J*	0.00053		0.001	U	1.90	
	17-Oct-13	0.002	U	0.001	U	0.00099		0.001	U	2.39	
	15-Jan-14	0.002	U	0.001	U	0.0018		0.001	U	3.28	J
	1-Apr-14	0.002	U	0.001	U	0.0018		0.001	U	3.62	J
	23-Jul-14	0.002	U	0.00017	J	0.0012		0.000098	J	2.64	J
	27-Oct-14	0.002	U	0.001	U	0.0019		0.001	U	3.47	
Decon Well	16-Nov-10	0.002	U	0.00092	J	0.0002	U	0.00061	J	0.504	J
	10-Feb-11		NS		NS		NS		NS		NS
	6-Jul-11	0.002	U	0.0068	J*	0.0002	U	0.001	U	0.407	
	25-Oct-11	0.002	U	0.0009	J	0.0002	U	0.0014	J	0.449	
	26-Jan-12		NS		NS		NS		NS		NS
	10-Apr-12		NS		NS		NS		NS		NS
	1-Aug-12	0.002	U	0.0055		0.0002	U	0.00063	J	5.62	
	30-Oct-12	0.002	U	0.00080	J	0.000099	J	0.001	U	0.401	J
	23-Jan-13		NS		NS		NS		NS		NS
	2-Apr-13		NS		NS		NS		NS		NS
	24-Jul-13	0.002	U	0.00190	J*	0.0002	U	0.001	U	0.342	
	17-Oct-13		NS		NS		NS		NS		NS
sampling discontinued	15-Jan-14		NS		NS		NS		NS		NS
after April 2014	1-Apr-14		NS		NS		NS		NS		NS
Regulatory Threshold		0.006[a]		0.01[a]		0.005[a]		0.015[a]		5.0[b]	

Notes:

Mg/L = milligrams per liter

NS = Not sampled

U = Concentration was not detected (detection limits used by the laboratories are the contract required quantitation limit, the reporting limit, or the method detection limit, depending on the laboratory.

J = The results is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J* = The result is an estimated quantity. This analyte was detected in both the sample and an associated field blank sample during the same sampling event.

a. National Primary Drinking Water Regulation (Maximum Contaminant Level)

b. National Secondary Drinking Water Regulation

= Value exceeds the regulatory threshold.