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## TECHNICAL MEMORANDUM

**To:** Don Carpenter, IDEQ, Boise

**From:** Robin Nimmer, TerraGraphics, Moscow

**Date:** April 29, 2015

**Project Code:** IDEQ C985 14005-08-02

**Subject:** First Quarter 2015 Water Monitoring at the East Mission Flats Repository

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The purpose of this memorandum is to summarize the East Mission Flats Repository (EMFR) First Quarter 2015 Water Monitoring Event and present the data. An evaluation and discussion of the quarterly monitoring results will be completed in the 2015 annual report for EMFR.

### 1 Sampling Summary

Figure 1 shows the locations of the seven groundwater monitoring wells, one decontamination well, two piezometers, and two floodwater levellogger sites in the vicinity of EMFR. Samples were collected from all seven of the groundwater monitoring wells on January 14, 2015.

A detailed description of the field sampling, handling, documentation, and analytical procedures is provided in the *Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) for Water Monitoring at the East Mission Flats Repository, Revision No. 2* (TerraGraphics 2014), hereinafter referred to as the EMFR SAP/QAPP. This is the first monitoring event to follow the 2014 SAP/QAPP, and the key revisions implemented for this sampling event include:

- Removed dissolved antimony, nitrate as nitrogen, and total phosphorus from analyte list for piezometers, groundwater wells, and floodwater sites.
- Removed total hardness from analyte list for groundwater wells and piezometers.

All field and analytical procedures were conducted according to the EMFR SAP/QAPP (TerraGraphics 2014) with the following exception:

- At well 07-EMF-MW-A, dissolved oxygen (DO) did not reach the  $\pm 10\%$  stabilization criterion because the MP20 meter was misprogrammed for DO. Meter and sampling procedures have been reviewed with the field crew.

Attachment A contains the field sheets for each sampled well.

## 2 Water Levels and Hydrographs

Figure 2 shows hydrographs of the water levels recorded at seven monitoring wells in the immediate vicinity of the repository and data from the U.S. Geological Survey (USGS) Gage Station 12413500 on the Coeur d'Alene River near Cataldo, Idaho (USGS 2015).

Floodwater levellogger sites (LL-1 and LL-2) could not be checked because the levelloggers were covered with ice and frozen in place. Piezometer 10-EMF-PZ-A contained insufficient water for sampling and piezometer 10-EMF-PZ-B was dry.

## 3 Groundwater Monitoring Results

The hydraulic gradient observed during this First Quarter 2015 Sampling Event is toward the southwest, consistent with past gradients (Figure 3). Data from 09-EMF-MW-C Deep and 08-EMF-MW-E are not used to develop groundwater elevation contours because 09-EMF-MW-C Deep is screened deeper than the other monitoring wells, and 08-EMF-MW-E appears to be in a different hydrologic unit from the other wells based on water levels and water quality data.

Table 1 and Figure 4 display the cumulative field parameter data for the groundwater sites. The temperature value measured at 08-EMF-MW-F, and temperature and specific conductance values measured at 09-EMF-MW-C-Deep were the lowest yet recorded at these sites. The specific conductance value measured at 08-EMF-MW-E, and DO values measured at 07-EMF-MW-A and 09-EMF-MW-C-Deep were the highest yet recorded at these sites. The meter was calibrated at the start of the day and checked at the end of the day and the data were considered acceptable. The DO value at 07-EMF-MW-A was qualified as an estimate (*J*) because it was outside the stabilization criterion (see Section 1).

Table 2 and Figure 5 display the cumulative groundwater sample results for dissolved metals.

Dissolved metal concentrations for this project are compared to the groundwater total metal regulatory thresholds because no specific dissolved metal regulatory thresholds exist, and it is assumed that dissolved concentrations are indicators of contamination in groundwater under all conditions (CH2M Hill 2006). No First Quarter 2015 groundwater analytical results exceed the respective regulatory thresholds.

Attachment B contains the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) analytical results (dissolved cations and dissolved metals). Attachment C contains the SVL analytical results (dissolved anions and total alkalinity).

The First Quarter 2015 Sampling Event data were considered acceptable, and no laboratory or field data were rejected. The following data were qualified as estimates (*J*) as discussed in the data quality review (TerraGraphics 2015):

- Dissolved arsenic results at 07-EMF-MW-B, 07-EMF-MW-C, 07-EMF-MW-D, 08-EMF-MW-F (original and duplicate), and 09-EMF-MW-C-Deep because the results were greater than the method detection limits (MDL) but less than the contract required quantitation limits (CRQL).

- Dissolved cadmium results at 07-EMF-MW-B, 07-EMF-MW-D, 08-EMF-MW-E, and 09-EMF-MW-C-Deep because the results were greater than the MDL but less than the CRQL.
- All dissolved calcium and zinc results due to laboratory serial dilution.
- DO at 07-EMF-MW-A because the stabilization criterion was not met and it was the highest DO recorded at the site.

Any qualified data should be reviewed by an experienced data analyst before data analysis and interpretation.

## 4 References

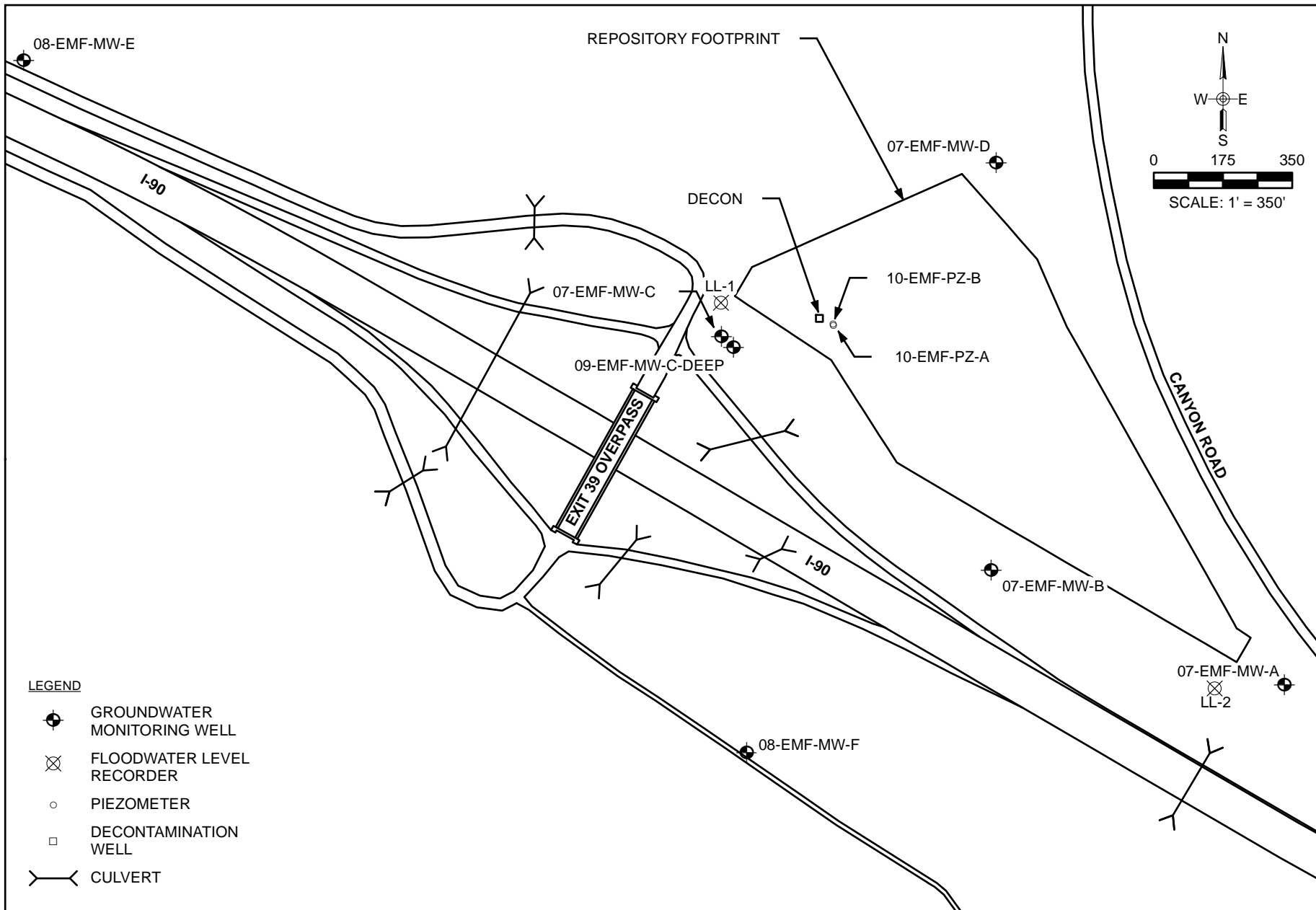
CH2M Hill, 2006. Environmental Monitoring Plan, Operable Unit 2, Bunker Hill Mining and Metallurgical Complex Superfund Site. Prepared for USEPA Region 10. January.

TerraGraphics, 2014. Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) for Water Monitoring at the East Mission Flats Repository, Revision No. 2. December.






TerraGraphics, 2015. QA/QC Review of the First Quarter 2015 Water Monitoring at East Mission Flats Repository. Memorandum. April.

U.S. Geological Survey (USGS), 2015. 12413500 Coeur d'Alene River NR Cataldo ID, [http://waterdata.usgs.gov/id/nwis/uv/?site\\_no=12413500](http://waterdata.usgs.gov/id/nwis/uv/?site_no=12413500). March.

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**LEGEND**

-  GROUNDWATER MONITORING WELL
-  FLOODWATER LEVEL RECORDER
-  PIEZOMETER
-  DECONTAMINATION WELL
-  CULVERT

SCALE:	1" = 350' (8.5x11 PRINT)
DRAWN BY:	D.P.
ENGINEER:	D.F.

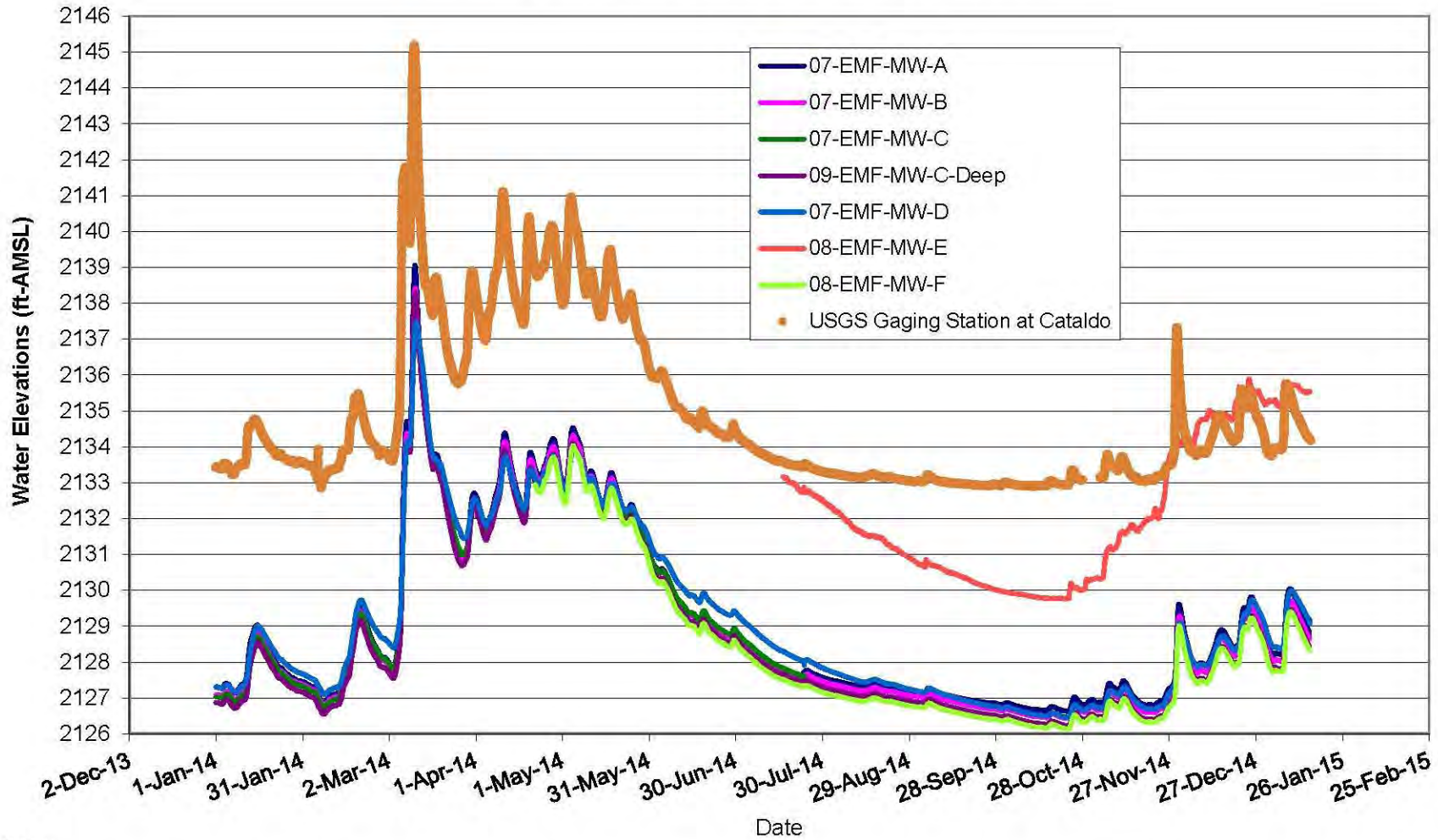


EAST MISSION FLATS  
REPOSITORY  
CATALDO, IDAHO

**FIGURE 1**  
EMFR QUARTERLY  
MONITORING LOCATIONS

PROJECT NO:	14005-08-02
DATE:	1/16/2015
COORDINATE SYSTEM:	NAD83 ISP, West, US FT, NGVD29

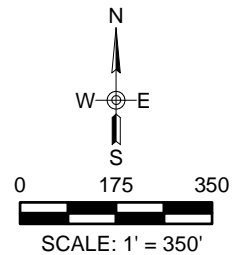
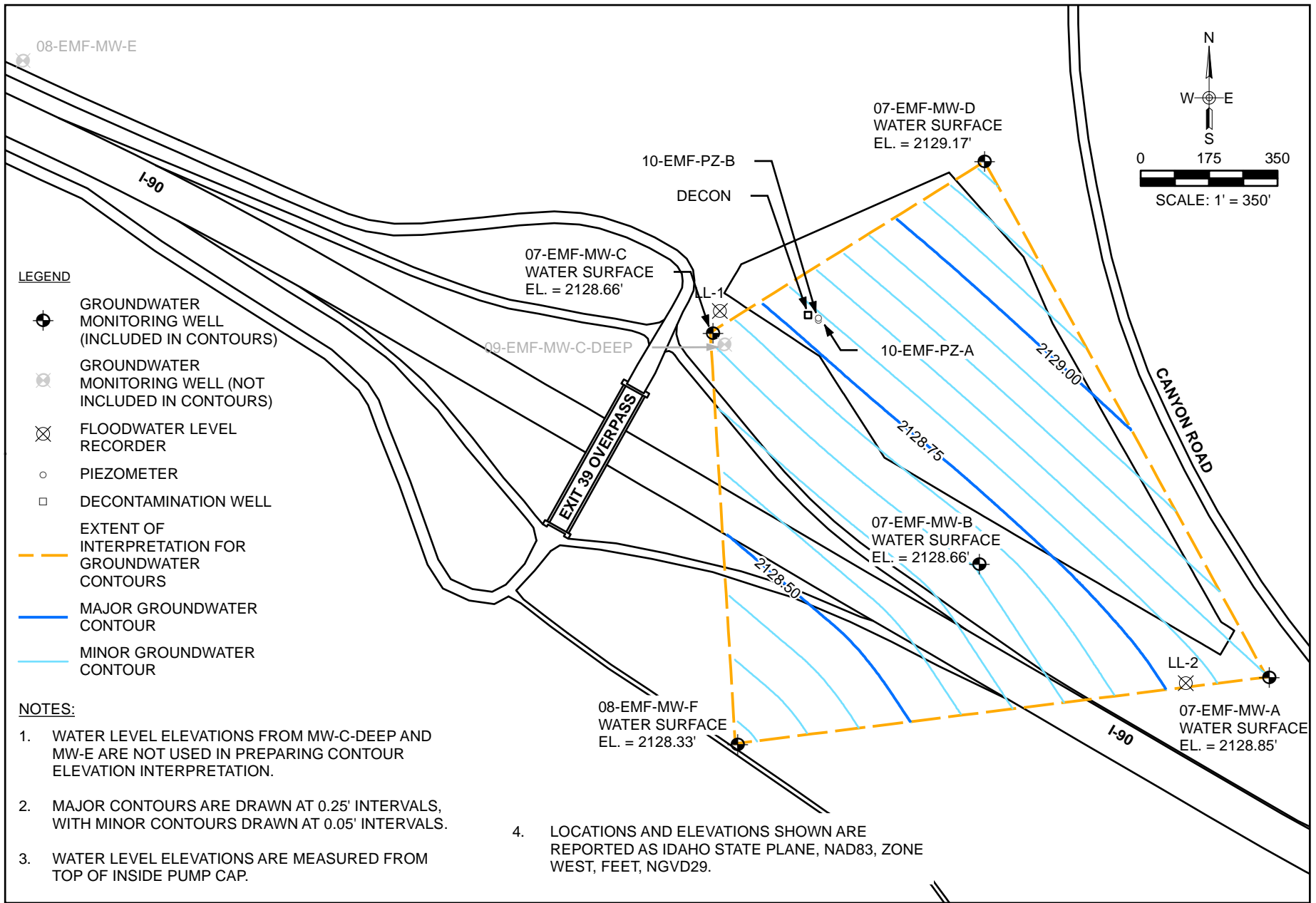
**Figure 2. Water Levels at EMFR Monitoring Wells Compared to River Stage at Cataldo**



Notes:

- All elevations are based on the NGVD29 datum

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SCALE:	1" = 350' (8.5x11 PRINT)
DRAWN BY:	B.B.
ENGINEER:	D.F.



EAST MISSION FLATS REPOSITORY  
 CATALDO, IDAHO

JANUARY 2015  
 GROUNDWATER LEVEL  
 ELEVATIONS AND CONTOURS

PROJECT NO:	14005-08-02
DATE:	1/16/2015
FILE NAME:	EMF_GW_MAP_JUL2014.MXD

Figure 4. Field Parameter Data at EMFR Groundwater Sites

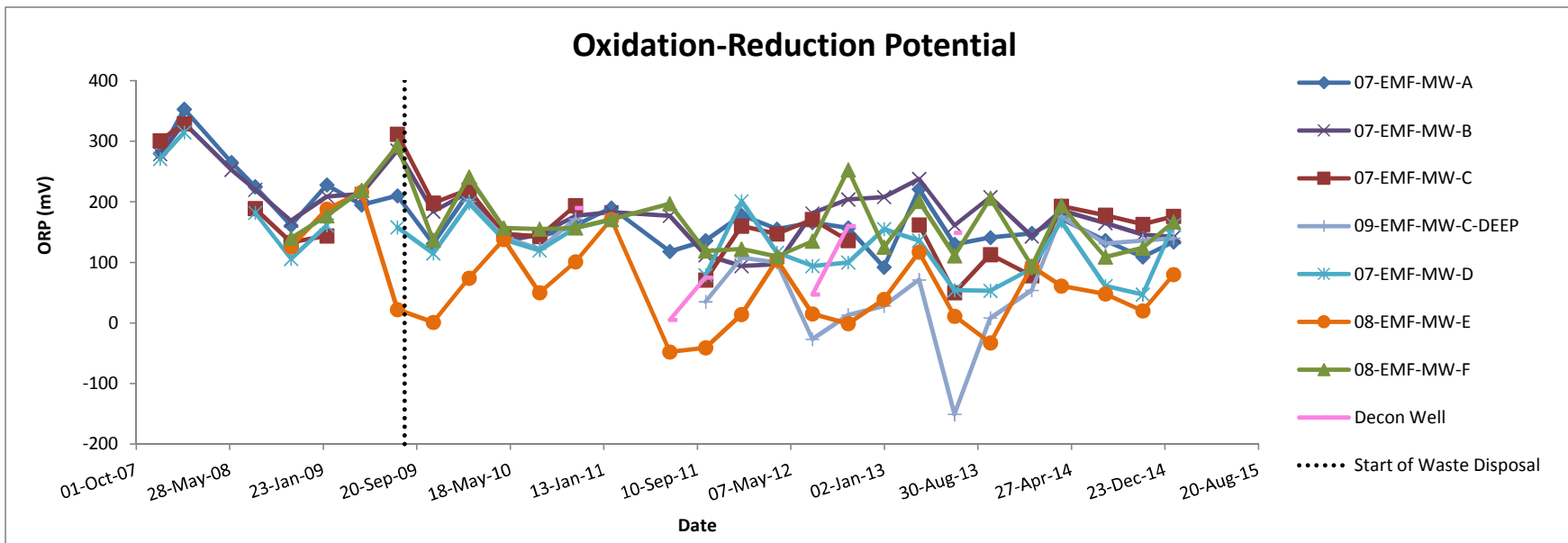
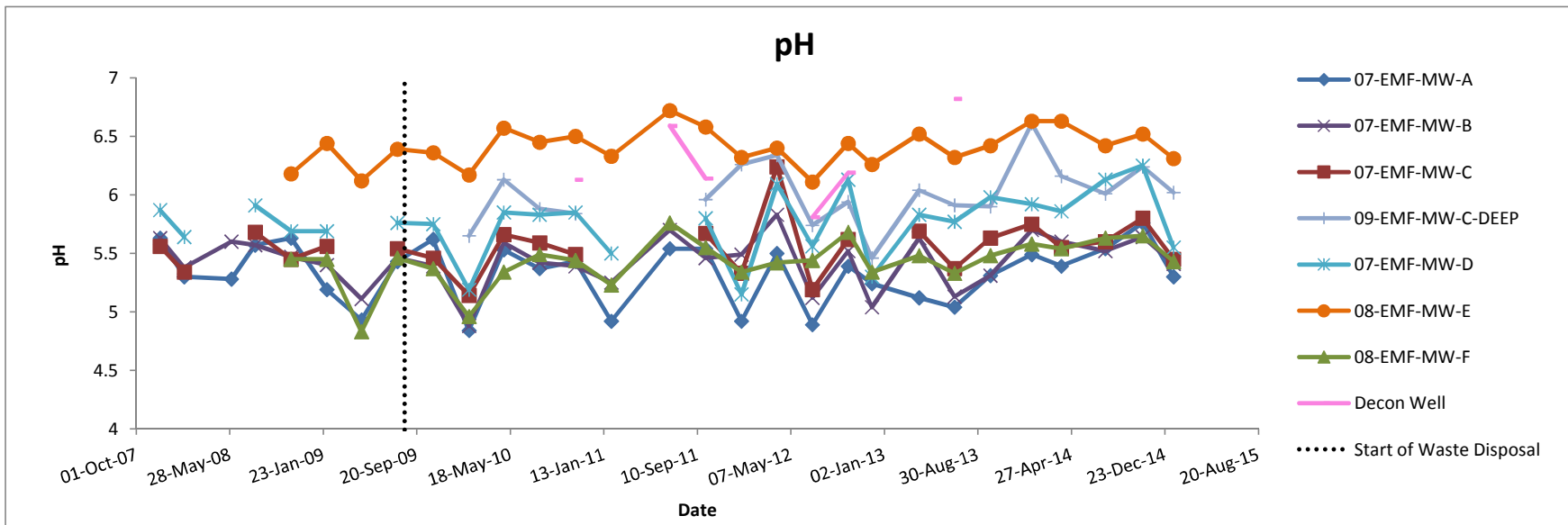


Figure 4. Field Parameter Data at EMFR Groundwater Sites

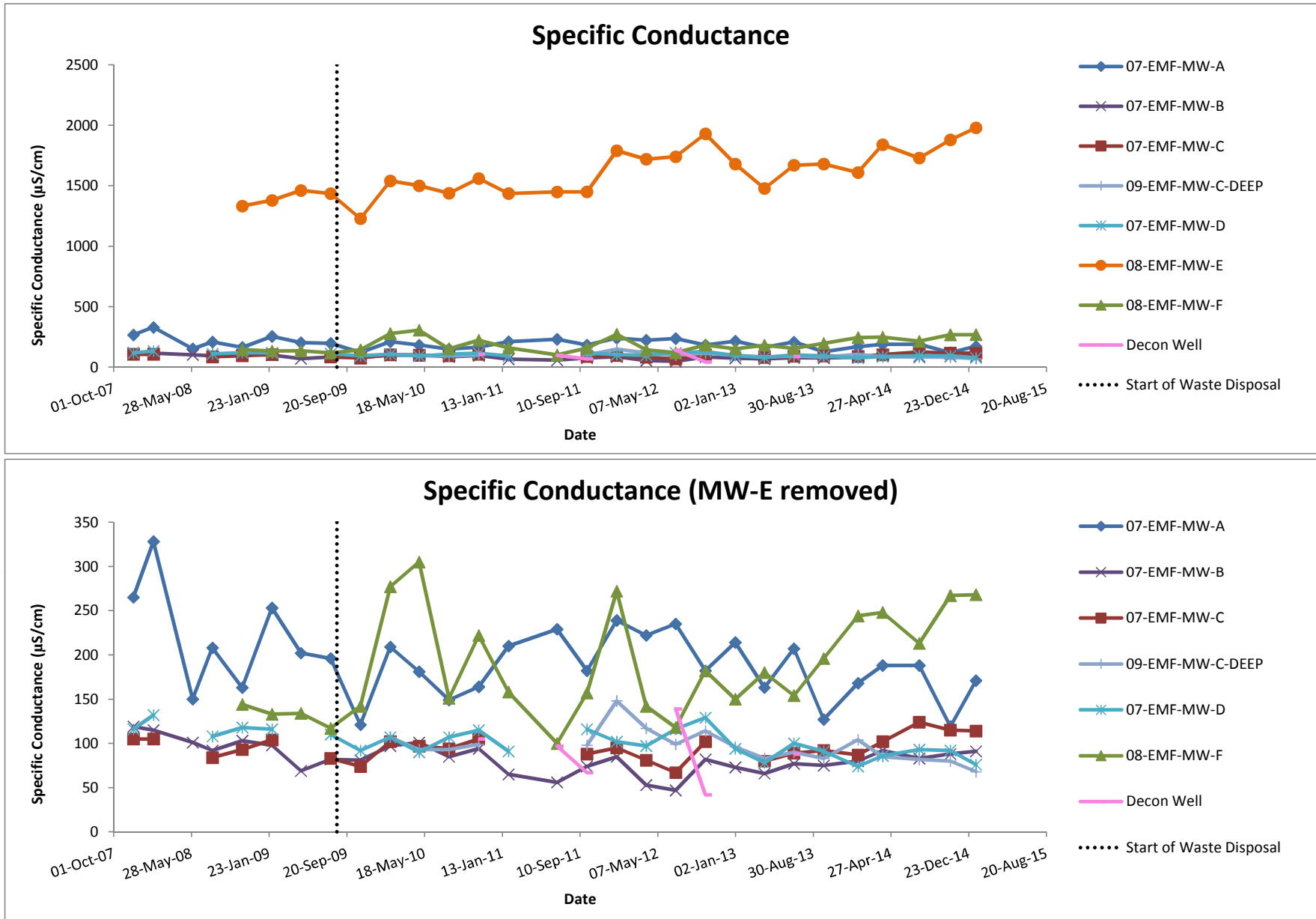




Figure 4. Field Parameter Data at EMFR Groundwater Sites

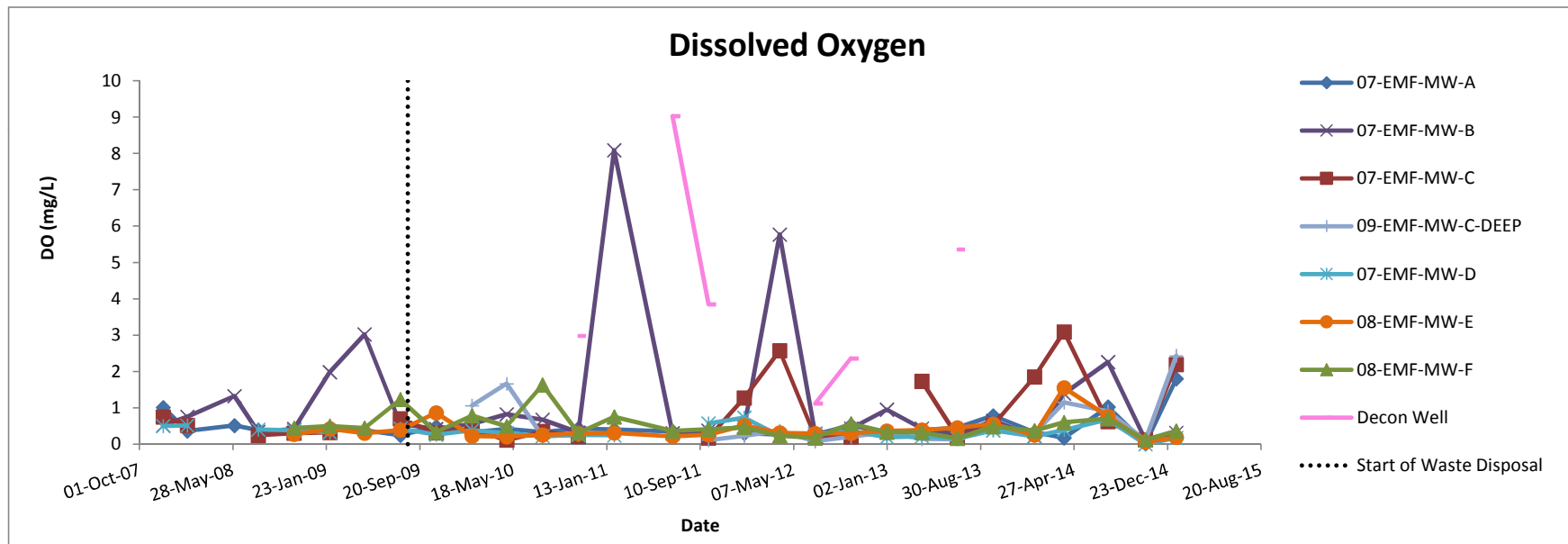
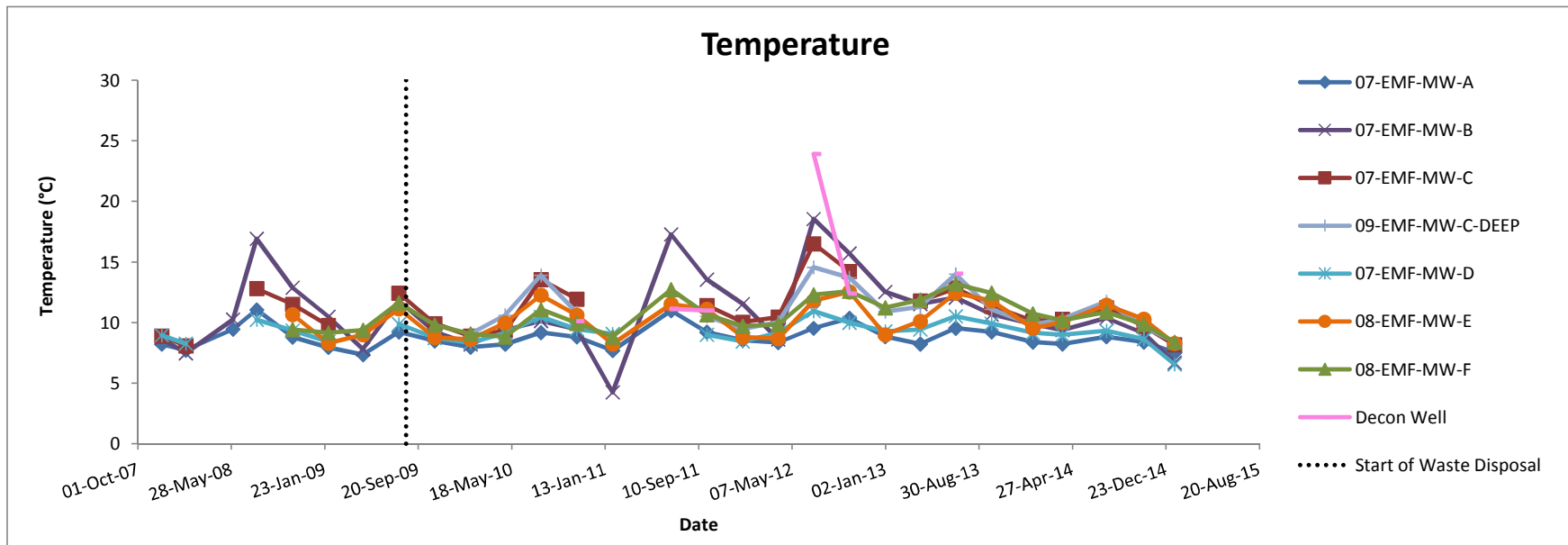


Figure 5. Dissolved Metals Data at EMFR Groundwater Sites

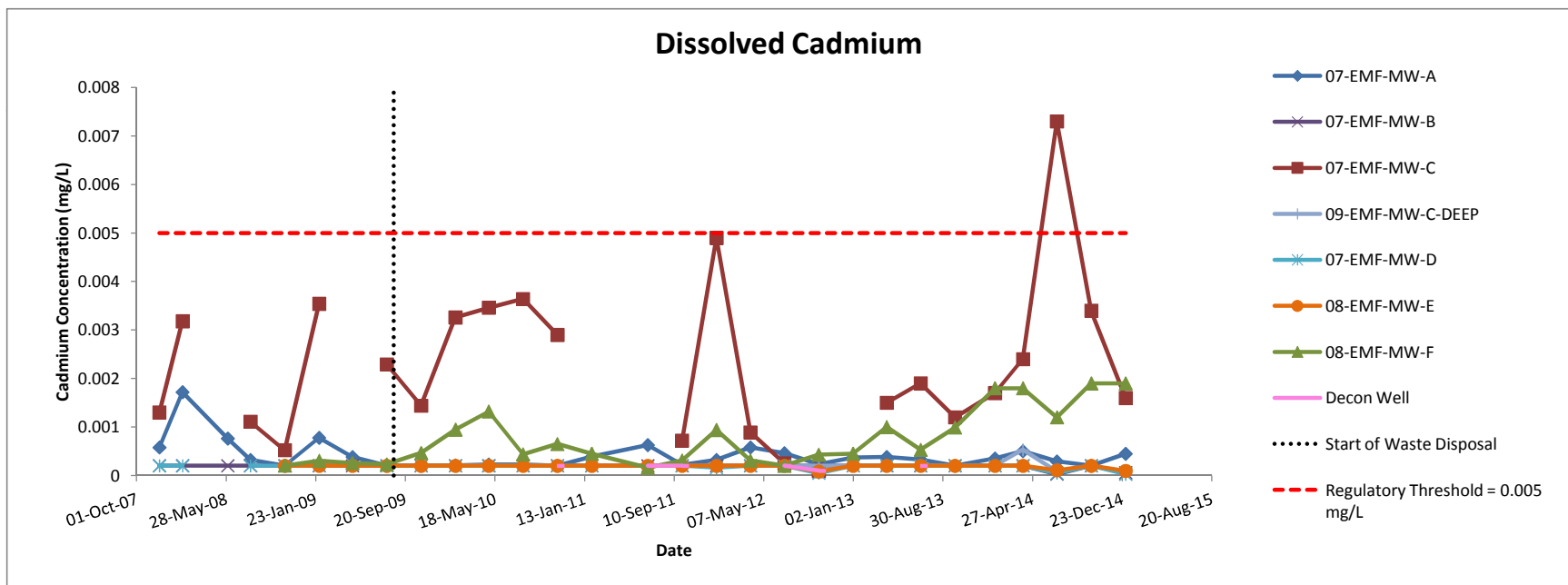
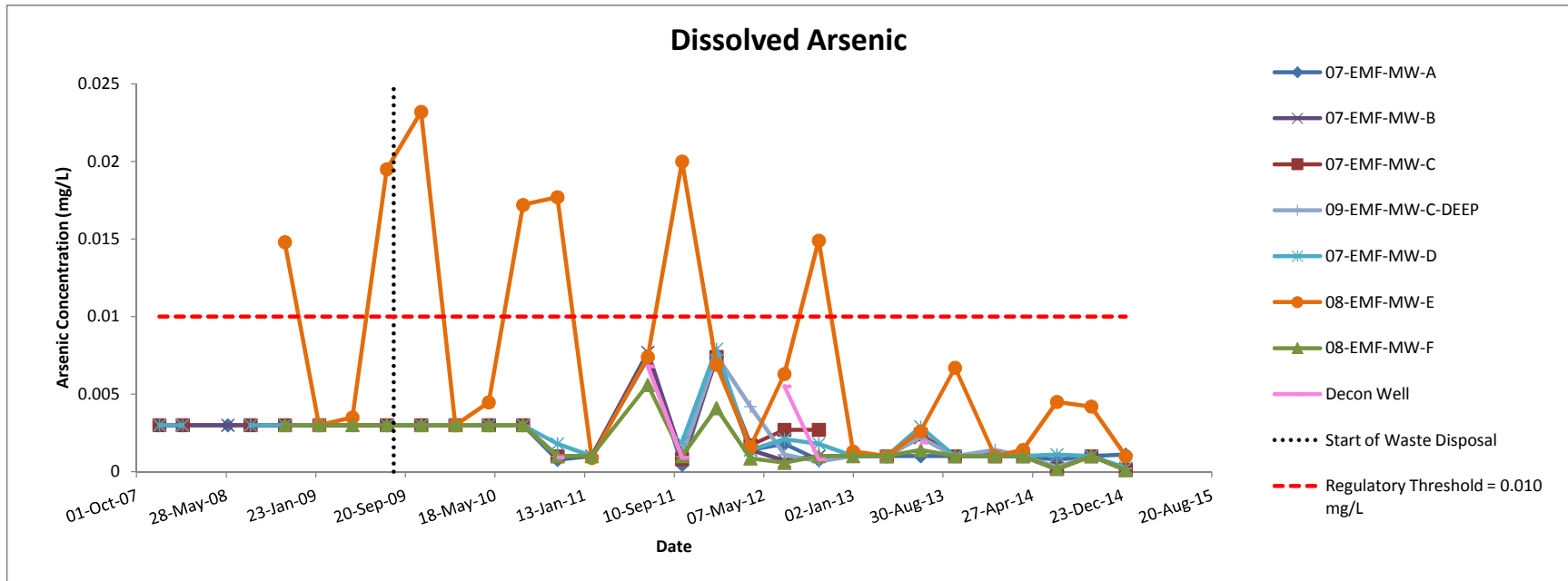
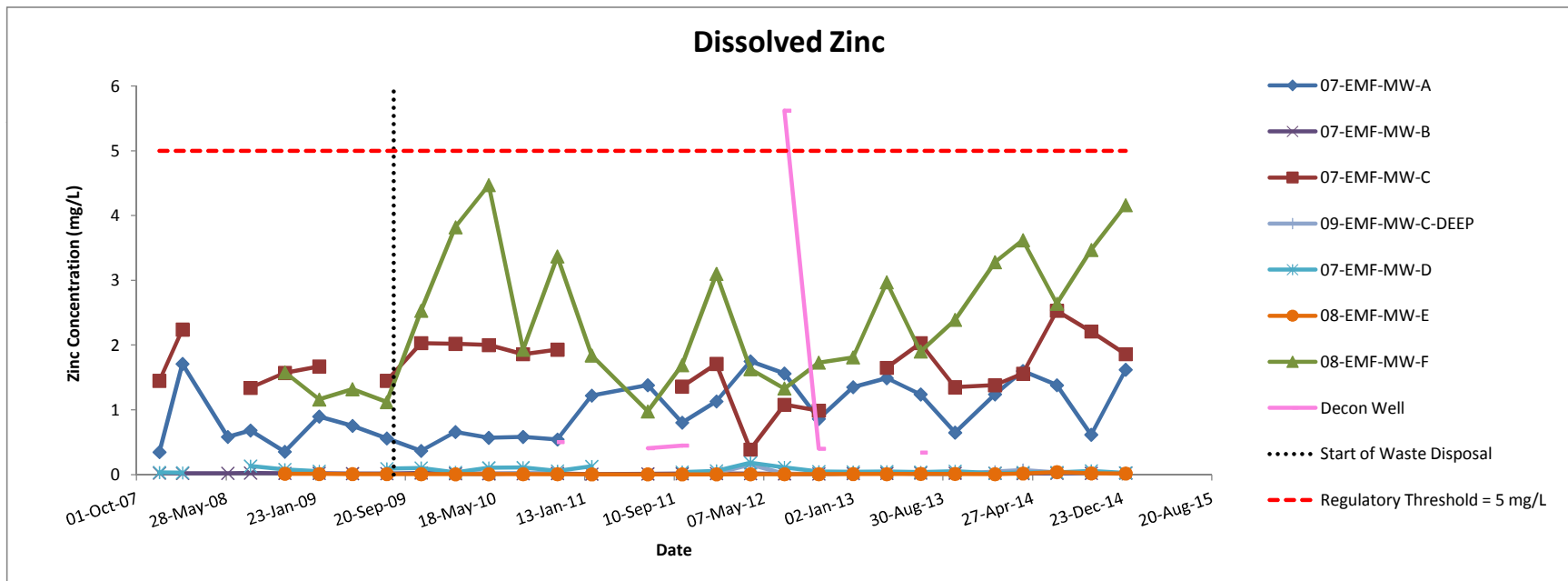
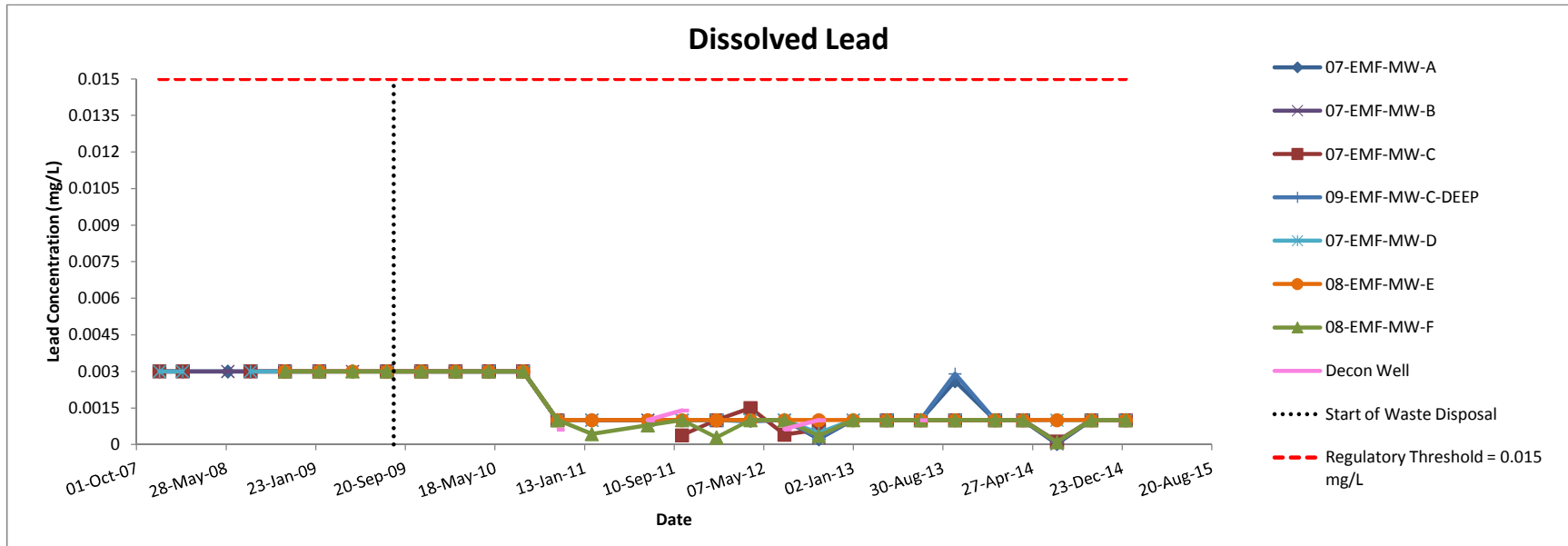


Figure 5. Dissolved Metals Data at EMFR Groundwater Sites



\*Dissolved antimony not shown as it has never been detected at EMFR.

**Table 1  
Field Parameter Data  
East Mission Flats Repository**

Well	Parameter						
	Date	pH	Specific Conductance (µS/cm)	Temperature (°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	
		14-Jan-15	5.30	171	7.51	1.8 J	134
	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	
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	
		14-Jan-15	5.41	91	6.68	0.31	142

Well	Parameter					
	Date	pH	Specific Conductance (µS/cm)	Temperature (°C)	DO (mg/L)	ORP (mV)
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
	14-Jan-15	5.45	114	8.16	2.19	176
	09-EMF-MW-C Deep	25-Feb-10	5.65	107	9.07	1.06
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
23-Jul-14		6.01	82	11.72	0.90	131
27-Oct-14		6.24	80	9.67	0.11	136
14-Jan-15		6.02	68	8.36	2.43	140

Well	Parameter						
	Date	pH	Specific Conductance (µS/cm)	Temperature (°C)	DO (mg/L)	ORP (mV)	
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	
	14-Jan-15	5.55	76	6.55	0.17	162	
	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	-48	
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	
27-Oct-14	6.52	1,880	10.28	0.06	20		
14-Jan-15	6.31	1,980	8.27	0.19	80		

Well	Parameter						
	Date	pH	Specific Conductance (µS/cm)	Temperature (°C)	DO (mg/L)	ORP (mV)	
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	
		14-Jan-15	5.43	268	8.38	0.36	167
	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 after April 2014		15-Jan-14	NS	NS	NS	NS	NS
		1-Apr-14	NS	NS	NS	NS	NS

Notes:

°C = degrees Celsius

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

= Data from the current sampling event.

**Table 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	0.0020 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	1.600 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	
	14-Jan-15		NS	0.0011	0.00045	0.001 U	1.62 J
	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	
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	
14-Jan-15			NS	0.00011 J	0.000058 J	0.001 U	0.0268 J



Well No.	Sample Date	Constituents (mg/L)				
		Antimony	Arsenic	Cadmium	Lead	Zinc
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 J*	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
	14-Jan-15	NS	0.00013 J	0.0016	0.001 U	1.86 J
	09-EMF-MW-C Deep	25-Feb-10	0.003 U	0.003 U	0.0002 U	0.003 U
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
14-Jan-15		NS	0.0002 J	0.000045 J	0.001 U	0.012 J

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	
	14-Jan-15	NS	0.00024 J	0.000028 J	0.001 U	0.0251 J	
	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		
14-Jan-15	NS	0.001	0.000096 J	0.001 U	0.0175 J		

Well No.	Sample Date	Constituents (mg/L)					
		Antimony	Arsenic	Cadmium	Lead	Zinc	
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	
	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	
	14-Jan-15	NS	0.0001 J	0.0019	0.001 U	4.16 J	
	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	
15-Jan-14		NS	NS	NS	NS	NS	
sampling discontinued after April 2014		1-Apr-14	NS	NS	NS	NS	NS
Regulatory Threshold		0.006 <sup>a</sup>	0.01 <sup>a</sup>	0.005 <sup>a</sup>	0.015 <sup>a</sup>	5.0 <sup>b</sup>	

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 result 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

Antimony no longer analyzed for as of December 2014.

	= Value exceeds the regulatory threshold
	= Data from the current sampling event.

**Attachment A**  
**Field Sheets**



# TerraGraphics

Environmental Engineering, Inc.

## Groundwater Sampling Record

Project: East Mission Flats Repository Well Number: 07-EMF-MW-A  
 Project Number: 14005-08-02-01 Sample Number: (07-EMF-MW-A)011415  
 Location: EMF - S of Canyon Road Weather: Sunny 30°  
 Date: 1-14-15 Sampler(s): ACH RJK

[De-Ionized Water Date: ]

Depth to Bottom (ft): Purge Time: 600 min.  
 Depth to Water (ft): 12.80 Purge Method: Low Flow  
 DTB-DTW (ft): Volume Measurement Method:  
 1 Well Volume (gal): Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	5.59	0.153	7.47	4.11	37.1	143
	0200	5.31	0.172	7.41	2.4	21.6	133
	0400	5.32	0.172	5.7.47	1.6	14.5	134
	0600	5.30	0.171	7.51	1.8	16.2	134
		✓	✓				✓

Sampling Date: 01/14/2015 Sampling Method: Low Flow Time Sampled: 1015

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No Duplicate Sample Number:

Chain-of-Custody Number: QC Sample Number: Time:

Notes: Flow meter was running for 6 minutes before storing data. Actual purge time should be 12 minutes.

Deviations/Observations:  
 DO % not recorded due to oversight

Picture Log:  
 Expendable Supplies Used: (standard filter)



# TerraGraphics

Environmental Engineering, Inc.

## Groundwater Sampling Record

Project: East Mission Flats Repository  
 Well Number: 07-EMF-MW-B  
 Project Number: 14005-08-02-01  
 Sample Number: (07-EMF-MW-B) 011415  
 Location: EMF - SE end of repository  
 Weather: Sunny 30° No Wind  
 Date: 1-14-15  
 Sampler(s): ACH RIK

[De-Ionized Water Date: ]

Depth to Bottom (ft):  
 Purge Time: 2000 min.  
 Depth to Water (ft): 0.56'  
 Purge Method: Low Flow  
 DTB-DTW (ft):  
 Volume Measurement Method:  
 1 Well Volume (gal):  
 Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	7.92	0.089	7.40	4.67	42.1	109
	1600	5.45	0.091	7.15 <del>7.45</del>	0.29	2.6	140
	1800	5.45 <del>7.85</del>	0.091	7.85	0.26	2.4	142
	2000	5.41	0.091	6.68	0.31	2.7	142

Sampling Date: 1-14-15      Sampling Method: Low Flow      Time Sampled: 1114

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No      Duplicate Sample Number:  
 Chain-of-Custody Number:      QC Sample Number:      Time: 1114

Notes:

Deviations/Observations: Blow out line dropped into well by accident

Picture Log:

Expendable Supplies Used: 1 standard filter



# TerraGraphics

Environmental Engineering, Inc.

## Groundwater Sampling Record

Project: East Mission Flats Repository  
 Project Number: 14005-08-02-01  
 Location: EMF - ~~W of S of Decon well~~  
 Date: 1-14-15

Well Number: 07-EMF-MW-C  
 Sample Number: 07-EMF-MW-C)01415  
 Weather: Sunny 30° No wind  
 Sampler(s): ACH RJK

[De-Ionized Water Date: ]

Depth to Bottom (ft):  
 Depth to Water (ft): 7.78  
 DTB-DTW (ft):  
 I Well Volume (gal):

Purge Time: 1200 min.  
 Purge Method: Low Flow  
 Volume Measurement Method:  
 Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	6.64	0.110	7.85	6.81	62.1	158
	0800	5.50	0.114	8.09	2.24	20.6	174
	1000	5.50	0.115	8.68	2.19	20.1	175
	1200	5.45	0.114	8.16	2.19	20.1	176

Sampling Date: 01/14/2015 Sampling Method: Low Flow Time Sampled: 12:25

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No Duplicate Sample Number:

Chain-of-Custody Number: QC Sample Number: Time: 12:25

Notes:

Deviations/Observations:

Picture Log:

Expendable Supplies Used: 1 standard filter



# TerraGraphics

Environmental Engineering, Inc.

## Groundwater Sampling Record <sup>09</sup>

Project: East Mission Flats Repository Well Number: ~~27-EMF-MW-C Deep~~  
 Project Number: 14005-08-02-01 Sample Number: (09-EMF-MW-C Deep) 011415  
 Location: ~~EMF-E of 07-EMF-MW-C~~ Weather: Sunny 30' no wind  
 Date: 1-14-15 Sampler(s): ACHRIF

[De-Ionized Water Date: ]

Depth to Bottom (ft): Purge Time: 16 min  
 Depth to Water (ft): ~~0.82~~ 7.82 <sup>GM</sup> 2/2/15 Purge Method: Low Flow  
 DTB-DTW (ft): Volume Measurement Method:  
 1 Well Volume (gal): Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	6.53	0.079	7.33	4.92	46.2	124
	1200	6.02	0.068	8.30	2.42	22.2	137
	1400	5.93	0.068	8.27	2.45	22.5	143
	1600	6.02	0.068	8.36	2.43	22.4	140

Sampling Date: 01/14/2015 Sampling Method: Low Flow Time Sampled: 1150

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No Duplicate Sample Number:

Chain-of-Custody Number: QC Sample Number: Time: 1150

Notes:

Deviations/Observations:

Picture Log:

Expendable Supplies Used: 1 standard filter





**Groundwater Sampling Record**

Project: East Mission Flats Repository Well Number: ~~07-EMF-MF-D~~ <sup>2807</sup> ~~07-EMF-MF-D~~  
 Project Number: 14005-08-02-01 Sample Number: ~~(07-EMF-MF-D)~~ 011415  
 Location: EMF - N of Decon Well Weather: sunny 30° no wind  
 Date: 1-14-15 Sampler(s): ACK RJK

[De-Ionized Water Date: ]  
 Depth to Bottom (ft): Purge Time: 1400 min.  
 Depth to Water (ft): 8.51' Purge Method: Low Flow  
 DTB-DTW (ft): Volume Measurement Method:  
 1 Well Volume (gal): Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	6.06	0.080	7.21	3.26	29.4	164
	10:00	5.62	0.075	6.74	0.23	2.0	161
	1200	5.61	0.075	6.64	0.18	1.5	160
	1400	5.55	0.076	6.85	0.17	1.5	162

Sampling Date: 01/14/2015 Sampling Method: Low Flow Time Sampled: 1305

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No Duplicate Sample Number:  
 Chain-of-Custody Number: QC Sample Number: ~~07-EMF-MF-D~~ 011415-MSD Time: 1305

Notes: MS/D collected

Deviations/Observations:

Picture Log:  
 Expendable Supplies Used: 1 High cap. filter



# TerraGraphics

Environmental Engineering, Inc.

## Groundwater Sampling Record 08

Project: East Mission Flats Repository Well Number: ~~08-EMF-MW-E~~  
 Project Number: 14005-08-02-01 Sample Number: (~~08-EMF-MW-E~~)011415  
 Location: EMF - W of DeCon well Weather: Sunny 30° No wind  
 Date: 1/14/15 Sampler(s): ALH RJK

[De-Ionized Water Date: ]

Depth to Bottom (ft): Purge Time: 14:00 min.  
 Depth to Water (ft): 5.21' Purge Method: Low Flow  
 DTB-DTW (ft): Volume Measurement Method:  
 1 Well Volume (gal): Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor = 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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GROUNDWATER DATA [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	6.19	1.82	8.80	5.50	51.7	172
	1000	6.28	1.99	8.42	1.99	2.0	84
	1200	6.29	1.90	8.29	1.98	2.0	81
	1400	6.31	1.98	8.27	0.19	1.7	80

Sampling Date: 01/14/2015 Sampling Method: Low Flow Time Sampled: 1350

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
Poly	1L	HNO3	Y	Y	DM, Cations	CLP
Poly	500mL	none	Y	N	Alkalinity	SVL
Poly	500mL	none	Y	Y	Anions	SVL

Chain-of-Custody: Yes/No Duplicate Sample Number:  
 Chain-of-Custody Number: QC Sample Number: Time: 1750

Notes:

Deviations/Observations:

Picture Log:  
 Expendable Supplies Used: 1 Hi Cap standard filter



**TerraGraphics**  
Environmental Engineering, Inc.

DUP  
FB

**Groundwater Sampling Record** <sup>08</sup> <sup>ESTC</sup>

Project: East Mission Flats Repository Well Number: **07-EMF-MW-F**  
 Project Number: 14005-08-02-01 Sample Number: **(08-EMF-MW-F)011415**  
 Location: **EMF - Spot I-90** Weather: **Sunny 30° No wind**  
 Date: **01/14/15** Sampler(s): **ACHSK**

[De-Ionized Water Date: **11/12/14**]

Depth to Bottom (ft): Purge Time: **2000 min.**  
 Depth to Water (ft): **10.59'** Purge Method: **Low Flow**  
 DTB-DTW (ft): Volume Measurement Method:  
 1 Well Volume (gal): Purge Volume (Volume x 3) (gal):

Conversion Factors (height x factor= 1 well volume)	¾" diameter 0.023	1" diameter 0.041	1 ½" diameter 0.092	2" diameter 0.163	4" diameter 0.652	6" diameter 1.469	8" diameter 2.611
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**GROUNDWATER DATA** [1 L = 0.2642 gal • 1 gal = 3.7854 L]

Purged Volume (gal)	Time	pH	Spec. Cond. (mS/cm)	Temp (°C)	Dissolved Oxygen		ORP (mV)
					mg/L	%	
	00:00	7.52	0.276	7.98	6.99	64.0	85
	1600	5.47	0.269	8.55	0.44	4.1	161
	1800	5.43	0.268	8.53	0.38	3.5	164
	2000	5.43	0.268	8.38	0.36	3.4	167

Sampling Date: **1/14/2015** Sampling Method: **Low Flow** Time Sampled: **1440**

Container	Volume	Preservative	Cooled	Filtered	Analyte	Lab
<del>Poly</del>	<del>1L</del>	<del>HNO3</del>	<del>Y</del>	<del>N</del>	<del>Hard, TP</del>	<del>CLP</del>
<b>Poly</b>	<b>1L</b>	<b>HNO3</b>	<b>Y</b>	<b>Y</b>	<b>DM, Cations</b>	<b>CLP</b>
<b>Poly</b>	<b>500mL</b>	<b>none</b>	<b>Y</b>	<b>N</b>	<b>Alkalinity</b>	<b>SVL</b>
<b>Poly</b>	<b>500mL</b>	<b>none</b>	<b>Y</b>	<b>Y</b>	<b>Anions</b>	<b>SVL</b>

Chain-of-Custody: Yes/No Duplicate Sample Number: **(08-EMF-MW-F)011415-C**  
 Chain-of-Custody Number: QC Sample Number: **(07-EMF-MW-F)011415-E** Time: **1440**  
 Notes: **(08-EMF-MW-F)011415-E** Time: **1545**

Deviations/Observations:

Picture Log:

Expendable Supplies Used: **1 NALGENE (Standard Filter)**

**Attachment B**  
**CLP Analytical Results**

Table with columns: CASE NUMBER, SAMPLE DELIVERY GROUP, SAMPLE ID, CAS NUMBER, ANALYTE, FINAL RESULT, RESULT UNITS, FINAL VALIDATION QUALIFIER, IDEQ QUALIFIER, COMB QUALIFIER, DATA VAL LABEL, SAMPLE ADJUSTED CRQL, SAMPLE ADJUSTED MDL, LAB RESULT, LAB QUALIFIERS, METHOD CRQL, SAMPLE ADJUSTED CRQL, CRQL UNITS, INSTRUMEN T MDL, NONMOISTURE SAMPLE ADJUSTED MDL, NONMOISTURE SAMPLE UNITS, SAMPLE DATE TIME, LAB SAMPLE TYPE, SPIKE ADDED, STATION LOCATION, SCRIBE SAMPLE NUMBER, PARENT SAMPLE NAME, PARENT LOCATION, LAB REPLICATE TYPE, SAMPLE SOURCE. The table contains detailed analytical data for 100 cases, including sample identifiers, analyte names, and various quality control and laboratory information.

CLP Data

CASE NUMBER	SAMPLE DELIVERY GROUP	SAMPLE ID	CAS NUMBER	ANALYTE	FINAL RESULT	RESULT UNITS	FINAL VALIDATION QUALIFIER	IDEQ QUALIFIER	COMB QUALIFIER	DATA VAL LABEL	NONMOISTURE SAMPLE					NONMOISTURE SAMPLE					LAB SAMPLE TYPE	SPIKE ADDED	STATION	LOCATION	SCRIBE SAMPLE NUMBER	PARENT SAMPLE NAME	PARENT SAMPLE LOCATION	LAB REPLICATE TYPE	SAMPLE SOURCE						
											ADJUSTED CRQL	ADJUSTED MDL	LAB RESULT	LAB QUALIFIERS	METHOD CRQL	ADJUSTED CRQL	CRQL UNITS	INSTRUMEN T MDL	ADJUSTED MDL	UNITS										SAMPLE DATE TIME					
45022	MJG2S0	LCS01	7440-38-2	Arsenic	2.1	ug/L				S4VEM	1.0	0.093	2.1		1	1.0	ug/L	0.093	0.093	ug/L				Laboratory_Con 2.0											
45022	MJG2S0	LCS01	7439-92-1	Lead	2.0	ug/L				S4VEM	1.0	0.017	2.0		1	1.0	ug/L	0.017	0.017	ug/L				Laboratory_Con 2.0											
45022	MJG2S0	LCS01	7440-66-6	Zinc	4.9	ug/L				S4VEM	2.0	0.33	4.9		2	2.0	ug/L	0.33	0.33	ug/L				Laboratory_Con 4.0											
45022	MJG2S0	LCS02	7440-43-9	Cadmium	0.38	ug/L				S4VEM	0.20	0.023	0.38		0.2	0.20	ug/L	0.023	0.023	ug/L				Laboratory_Con 0.40											
45022	MJG2S0	PBW01	7440-70-2	Calcium	35.8	ug/L	J		J	S4VEM	40.0	12.0	35.8	J	40	40.0	ug/L	12.0	12.0	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7439-95-4	Magnesium	60.0	ug/L	U		U	S4VEM	60.0	19.0	37.6	J	60	60.0	ug/L	19.0	19.0	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7440-09-7	Potassium	500	ug/L	U		U	S4VEM	500	38.0	56.8	J	500	500	ug/L	38.0	38.0	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7440-23-5	Sodium	500	ug/L	U		U	S4VEM	500	11.3	18.6	J	500	500	ug/L	11.3	11.3	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7440-38-2	Arsenic	1.0	ug/L	U		U	S4VEM	1.0	0.093	1.0	U	1	1.0	ug/L	0.093	0.093	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7440-43-9	Cadmium	0.20	ug/L	U		U	S4VEM	0.20	0.023	0.20	U	0.2	0.20	ug/L	0.023	0.023	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7439-92-1	Lead	1.0	ug/L	U		U	S4VEM	1.0	0.017	1.0	U	1	1.0	ug/L	0.017	0.017	ug/L				Method_Blank											
45022	MJG2S0	PBW01	7440-66-6	Zinc	0.41	ug/L	J		J	S4VEM	2.0	0.33	0.41	J	2	2.0	ug/L	0.33	0.33	ug/L				Method_Blank											

Highlighted columns IDEQ QUALIFIER and COMB QUALIFIER entered by TerraGraphics to show all data qualifiers.  
 Entire electronic data deliverable is available upon request.

**Attachment C**  
**SVL Analytical Results**

CASE	SDG	EPASAMP	LABID	MATRIX	QCOCDE	SMPQUAL	ANDATE	ANTIME	CASNUM	ANALYTE	STATE	CONC	UNITS	RLIMIT	MDL	LABQUAL	IDEQ	COMB	SMPDATE	VALDQAL	PRPDATE	LRDATE	LEVEL	PERSOLD	SMPTWTVL	FINLVOL	METHOD	STATLOC	PERCENT_RECOVERY	TRUE_VALUE	RPD
W503194	W503194	PBW	W503194-BLK1	WATER	LRB	.	#####	10:19	16887006	CL	Dissolved	0.2	mg/L	0.2	0.06	U	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	Blank	.	.	.	
W503194	W503194	PBW	W503194-BLK1	WATER	LRB	.	#####	10:19	14808798	SO4	Dissolved	0.3	mg/L	0.3	0.05	U	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	Blank	.	.	.	
W503194	W503194	LCSW	W503194-BS1	WATER	LCM	.	#####	10:30	16887006	CL	Dissolved	2.87	mg/L	0.2	0.06	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	LCS	95.6	3	.	
W503194	W503194	LCSW	W503194-BS1	WATER	LCM	.	#####	10:30	14808798	SO4	Dissolved	10.3	mg/L	0.3	0.05	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	LCS	103	10	.	
W503194	W503194	(07-EMF-MW-D)011415MS1	W503194-MS1	WATER	LSF	.	#####	12:15	16887006	CL	Dissolved	7.14	mg/L	0.2	0.06	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	(07-EMF-MW-D)011415	104	3	.	
W503194	W503194	(07-EMF-MW-D)011415MS1	W503194-MS1	WATER	LSF	.	#####	12:15	14808798	SO4	Dissolved	22.7	mg/L	0.3	0.05	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	(07-EMF-MW-D)011415	110	10	.	
W503194	W503194	(07-EMF-MW-D)011415MSD1	W503194-MSD1	WATER	LSFD	.	#####	12:27	16887006	CL	Dissolved	7.22	mg/L	0.2	0.06	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	(07-EMF-MW-D)011415	107	3	1.2	
W503194	W503194	(07-EMF-MW-D)011415MSD1	W503194-MSD1	WATER	LSFD	.	#####	12:27	14808798	SO4	Dissolved	23	mg/L	0.3	0.05	.	U	1/15/2015	.	#####	#####	LOW	0	5	5	EPA 300.0	(07-EMF-MW-D)011415	113	10	1	
W503238	W503238	PBW	W503238-BLK1	WATER	LRB	.	#####	13:53	471341	(CO3)	Alkalinity-CO3	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Blank	.	.	.	
W503238	W503238	PBW	W503238-BLK1	WATER	LRB	.	#####	13:53	471341	(HCO3)	Alkalinity-HCO3	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Blank	.	.	.	
W503238	W503238	PBW	W503238-BLK1	WATER	LRB	.	#####	13:53	471341	(OH)	Alkalinity-OH	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Blank	.	.	.	
W503238	W503238	PBW	W503238-BLK1	WATER	LRB	.	#####	13:53	471341	(ALK)	Alkalinity-Total	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Blank	.	.	.	
W503238	W503238	LCSW	W503238-BS1	WATER	LCM	.	#####	13:57	471341	(HCO3)	Alkalinity-HCO3	Total	96.4	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	LCS	97.1	99.3	.	
W503238	W503238	LCSW	W503238-BS1	WATER	LCM	.	#####	13:57	471341	(ALK)	Alkalinity-Total	Total	96.4	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	LCS	97.1	99.3	.	
W503238	W503238	Duplicate	W503238-DUP1	WATER	LD2	.	#####	14:01	471341	(CO3)	Alkalinity-CO3	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Duplicate	.	.	.	
W503238	W503238	Duplicate	W503238-DUP1	WATER	LD2	.	#####	14:01	471341	(HCO3)	Alkalinity-HCO3	Total	104	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Duplicate	.	.	0.2	
W503238	W503238	Duplicate	W503238-DUP1	WATER	LD2	.	#####	14:01	471341	(OH)	Alkalinity-OH	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Duplicate	.	.	.	
W503238	W503238	Duplicate	W503238-DUP1	WATER	LD2	.	#####	14:01	471341	(ALK)	Alkalinity-Total	Total	104	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	Duplicate	.	.	0.2	
W503238	W503238	(07-EMF-MW-D)011415DUP2	W503238-DUP2	WATER	LD2	.	#####	14:05	471341	(CO3)	Alkalinity-CO3	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	(07-EMF-MW-D)011415	.	.	.	
W503238	W503238	(07-EMF-MW-D)011415DUP2	W503238-DUP2	WATER	LD2	.	#####	14:05	471341	(HCO3)	Alkalinity-HCO3	Total	23	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	(07-EMF-MW-D)011415	.	.	0.2	
W503238	W503238	(07-EMF-MW-D)011415DUP2	W503238-DUP2	WATER	LD2	.	#####	14:05	471341	(OH)	Alkalinity-OH	Total	1	mg/L as CaCO3	1	.	U	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	(07-EMF-MW-D)011415	.	.	.	
W503238	W503238	(07-EMF-MW-D)011415DUP2	W503238-DUP2	WATER	LD2	.	#####	14:05	471341	(ALK)	Alkalinity-Total	Total	23	mg/L as CaCO3	1	.	.	1/16/2015	.	#####	#####	LOW	0	50	50	SM 2320B	(07-EMF-MW-D)011415	.	.	0.2	

Highlighted columns IDEQQUAL and COMBQUAL entered by TerraGraphics to indicate IDEQ/TG and combined data qualifiers.  
Entire electronic data deliverable is available upon request.