KAISER MEAD NPL

MTCA/CERCLA PERFORMANCE EVALUATION REPORT

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KAISER MEAD NPL
MTCA/CERCLA PERFORMANCE EVALUATION REPORT

1.0 INTRODUCTION

Hydrometrics, Inc. was retained by the Mead Custodial Trust to conduct a Groundwater MTCA/CERCLA Performance Evaluation (PE) to determine whether cyanide and fluoride concentrations in groundwater have attained MTCA and CERCLA requirements at a defined boundary downgradient of the Kaiser Mead Aluminum Smelter. This report documents the findings of the PE. See Figure 1-1 for a depiction of the site location.

1.1 BACKGROUND

The Mead Custodial Trust (Trust) was established as part of the Consent Decree by and between Kaiser Aluminum, U. S. Environmental Protection Agency and the State of Washington. The Trust was funded by Kaiser in the bankruptcy settlement and its purpose is to own and take title to the Site (as defined by the Consent Decree) and manage cleanup activities. As such, the Trust has obligations to perform tasks specified in the Consent Decree.

The Trust has completed, among other tasks, the following:

- Replacement of specified sections of pressure main water pipes used by the Facility at large;
- Installation of a groundwater monitoring network of wells and monitoring the wells on a monthly and quarterly basis as outlined in the Consent Decree; and
- Collection of surface water samples at specific groundwater seep locations and one surface water site on the Little Spokane River as outlined in the Consent Decree.

At the completion of four quarters of groundwater monitoring following a time period, specified as not exceeding 60 months after replacement of the aforementioned pressure main pipes, the Trust is obligated to conduct a PE.

1.2 PURPOSE OF PE

This PE, conducted by Hydrometrics on behalf of the Trust, satisfies the Trust's obligation under the Consent Decree. As described as Task 4 of the Remedial Action Plan (part of Exhibit C of the Consent Decree), the PE "shall consist of an evaluation, using the methods specified in then-applicable MTCA and CERCLA regulations, of groundwater monitoring results collected during four consecutive quarters preceding the Performance Evaluation".

2.0 PE REQUIREMENTS

As discussed earlier, the Consent Decree (CD 2002) identifies the components of the PE as 1) "using methods specified in then-applicable MTCA and CERCLA regulations" to evaluate 2) "four consecutive quarters of groundwater monitoring results preceding the PE". The following sections present these two components.

2.1 MTCA AND CERCLA REQUIREMENTS

In the Consent Decree the Washington Department of Ecology (Ecology) was named as the Oversight Agency, serving as lead agency overseeing implementation of the Consent Decree and the Statement of Work. A review of MTCA and CERCLA requirements entailed contact with Ecology for background information on development of the cleanup standards at the Site at the time of the signing of the Consent Decree and the approach that would be followed today. Ecology used the Model Toxics Control Act Cleanup (MTCA) Regulation for determining cleanup standards for the Site in 2002 (Ecology 2002). Initial groundwater standards considered impacts to surface water as groundwater was impacting the Little Spokane River. The initial standards were 5.2 ug/L cyanide (Free), which is consistent with chronic water quality criteria, and 960 ug/L for fluoride. Following public notice the final cleanup action plan (CAP) adopted MTCA Method B standards for cyanide and fluoride in groundwater, surface water, and soil.[1] The Method B groundwater standard for human health is the drinking water maximum contaminant level (MCL). These levels are listed in the CAP as 4 mg/L fluoride and 200 ug/L cyanide (free). [2]

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[1] The MTCA B cleanup levels established for surface water in the CAP were 960 ug/L fluoride and 5.2 ug/L cyanide (free). The Consent Decree did mandate the monitoring of surface water at surface water seeps and in the Little Spokane River, but surface water is not a component of the Performance Evaluation. For completeness the results of surface water sampling conducted under the Consent Decree are provided in Appendix B.

[2] Note that the cyanide standard refers to "free" cyanide. Free cyanide refers to the sum of HCN and CN ions in a sample and is the most toxic form of cyanide. Weak to moderately strong metal-cyanide complexes are compounds that dissociate and release HCN under mildly acidic conditions. The WAD method was developed to quantify available cyanide, which measures the weak and moderately strong metal cyanide complexes plus

A review of the present day state and federal MCLs indicate that the MCLs for fluoride and cyanide have not changed and are therefore applicable as the cleanup standards for this performance review.

2.2 CONSENT DECREE GROUNDWATER MONITORING PROGRAM

In 2005 the Trust contracted the installation of a network of groundwater monitoring wells, as specified by the Remedial Action Plan (RAP, a component of the Scope of Work), and began monitoring the wells on a specified frequency. The network consisted of two well designations; effectiveness wells (labeled KM) and compliance wells labeled KMCP. The effectiveness wells were designed to track the identified contaminant plumes of cyanide and fluoride north of the Site and also included one background well located south of known waste handling and accumulations in the smelter facility. The compliance wells are aligned with the western boundary of a Kaiser Aluminum-owned parcel (referred to as Parcel 6 in the Consent Decree), including its alignment with Highway 2. See Figure 2-2 for a depiction of monitoring wells.

As required by the Consent Decree the wells were monitored for the following parameters:

- Total Cyanide
- Weak Acid Dissociable (WAD) Cyanide
- Fluoride
- Conductivity
- Temperature
- pH

Groundwater monitoring conducted under this program spanned from the 3rd Quarter of 2005 to the 1st Quarter of 2012.

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free cyanide (Lipps). The Consent Decree specifies that WAD CN be analyzed in the mandated groundwater monitoring program. Ecology elected to use the WAD CN method as they determined the analytical method for WAD CN provided more consistent results at low levels than free CN methods and its use is consistent with the state clean water act for surface water (WAC 173-201A-240).

2.2.1 Groundwater Monitoring Results

Groundwater monitoring has been conducted by the Trust from July 2005 to January 2012. The PE requirements specify that the final four quarters prior to the PE are to be used for the evaluation, which includes data from 2nd, 3rd, and 4th Quarters of 2011 and 1st Quarter of 2012. This data is presented in Table 2-1.

The data from the four quarters presented in Table 2-1 are also shown graphically relative to the MTCA/CERCLA cleanup level in Figures 2-2 through 2-11. To provide a longer term perspective on the wells that report WAD CN and F above the cleanup level Figures 2-4, 2-5, 2-9, and 2-10 show the data results for all sampling events for wells KMCP-3B and KMCP-4B.

The presence of contaminant plumes for WAD CN and F can be mapped using all of the data from the Consent Decree program over the last four quarters. These plumes are shown in Figures 2-12 and 2-13.

In 2010 and 2011 additional groundwater sampling activity occurred as additional wells were accessed in an effort to better define the plume in terms of geographic distribution and geochemistry. These additional wells were constructed prior to the Consent Decree program as part of various site investigations by Kaiser Aluminum. The data from these 2010 and 2011, as well as results from the Kaiser Aluminum sampling efforts are presented in Appendix A. A figure showing the location of all wells reported in Appendix A is also included.

Table 2-1 Kaiser Mead NPL Groundwater Monitoring

Descriptive Name Well ID	Sample Formation	Date Sampled	Depth to Water (feet, btoc)	Top of PVC Casing Elev.	Groundwater Elev.	pH (Std Units)	Conductivity (umhos/cm)	Temperature (Deg. C)	Total CN	WAD CN	F
KMCP-1B		6/6/2011	161.79	1934.43	1772.64	7.28	510	14.80	0.088	< 0.0100	0.57
		8/22/2011	161.68	1934.43	1772.75	6.40	480	14.73	0.087	0.0120	0.58
		10/31/2011	162.43	1934.43	1772	7.01	521	11.70	0.096	0.0120	0.54
		1/3/2012	162.81	1934.43	1771.62	7.13	528	10.28	0.115	< 0.0100	0.46
KMCP-2B		6/6/2011	155.75	1926.25	1770.50	7.43	390	14.9	0.0650	< 0.0100	0.28
		8/22/2011	155.56	1926.25	1770.69	7.23	517	12.2	0.0680	0.0170	0.26
		10/31/2011	156.38	1926.25	1769.87	7.04	440	10.1	0.0130	< 0.0100	0.22
		1/3/2012	156.64	1926.25	1769.61	7.1	397	10.9	0.0670	< 0.0100	0.21
KMCP-3B		6/7/2011	149.89	1919.07	1769.18	9.82	3,369	11.93	58.8	0.825	30.4
		8/23/2011	149.42	1919.07	1769.65	6.81	4,228	13.11	48.5	1.3	34.9
		10/31/2011	150.15	1919.07	1768.92	8.81	4,630	12.5	64.6	0.377	30.1
		1/4/2012	150.09	1919.07	1768.98	8.86	4,238	11.7	68.3	0.43	27.1
KMCP-4B		6/6/2011	144.61	1912.52	1767.91	7.78	1,062	13.9	16.6	0.361	14.9
		8/22/2011	144.3	1912.52	1768.22	5.99	2,018	12.23	13.7	0.828	13.7
		10/31/2011	145.12	1912.52	1767.4	7.36	1,733	11.3	19.8	0.294	12.5
		1/3/2012	145.23	1912.52	1767.29	7.40	1,610	11.1	24.8	0.383	12.8
KMCP-5B		6/6/2011	142.29	1908.80	1766.51	7.38	357	14.9	0.108	< 0.0100	0.22
		8/22/2011	141.05	1908.80	1767.75	6.28	439	13.76	0.092	0.0180	0.26
		10/31/2011	141.72	1908.80	1767.08	6.81	402	10.4	0.195	0.0170	0.2
		1/3/2012	141.89	1908.80	1766.91	6.9	437	11.1	0.177	0.0140	0.14

Notes:
< = chemical was not detected at or above the method reporting limit
CN = cyanide
WAD = weak acid dissociable
F = fluoride
mg/L = milligrams per liter
All elevations are above mean sea level
btoc = below top of casing

3.0 PERFORMANCE EVALUATION

The current MTCA and CERCLA regulations indicate the use of Federal and State maximum contaminant levels (MCL) for groundwater are applicable or relevant and appropriate requirements (ARARs) for the site and were selected as the MTCA Method B cleanup levels. The MCLs for fluoride and cyanide in groundwater are 4.0 mg/L and 0.2 mg/L respectively. A review of the compliance wells results for the four-quarter evaluation period indicates that two of the wells, KMCP-3B and KMCP-4B, consistently reported WAD CN and F concentrations above the MTCA B cleanup levels. A review of the historical data from these two wells indicate little change in WAD CN concentrations over time and a slight upward trend can be discerned from the graphs showing concentrations of F. From a larger areal perspective, upgradient wells located in the vicinity of the historical source area, also indicate the presence of a groundwater plume with concentrations of both WAD CN and F above the MTCA B cleanup levels. Historical and current data indicate that this plume is likely to continue to impact KMCP-3B and KMCP-4B for a period of years.

The reported concentrations of WAD CN and F in groundwater along the compliance boundary have been compared to the MTCA and CERCLA requirements as mandated by the Consent Decree. Based upon results of the comparison, the MTCA and CERCLA requirements have not been attained.

According to the RAP (Exhibit A to the Scope of Work) if the Oversight Agency determines that the PE “indicates that cyanide or fluoride concentrations in groundwater do not meet MTCA and CERCLA requirements, the Oversight Agency may require the Trust to implement Task 5” of the RAP. Task 5 of the RAP entails the preparation of “a Supplemental Feasibility Study (“SFS”) evaluating groundwater remedial action alternatives for the Site, in accordance with the MTCA and CERCLA regulations applicable at that time”.

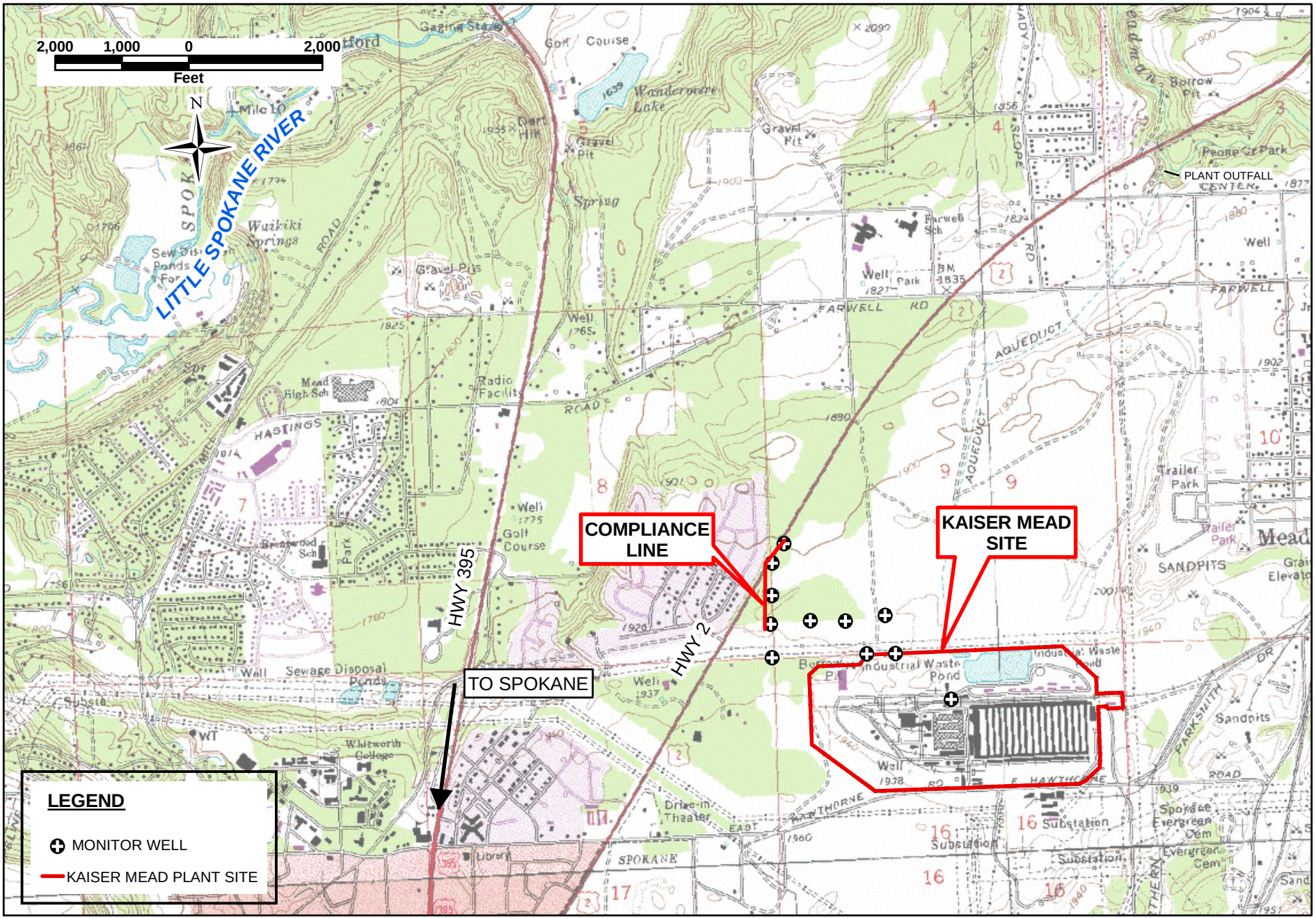
4.0 REFERENCES

CD 2002. Consent Decree Related to Mead Aluminum Reduction Works, In the United States Bankruptcy Court for the District of Delaware, Case No. 02-10429 (JKF). 2002

Ecology, 2002. Washington Department of Ecology, Cleanup Action Plan, Kaiser Aluminum National Priorities List Site, Mead, Washington. May 1, 2002.

Lipps. Lipps, William. Overview of Cyanide Methods of Analysis, OI Analytical PowerPoint Presentation. Undated.

FIGURES



KAISER MEAD NPL MEAD, WA	MTCA\CERCLA PERFORMANCE EVALUATION LOCATION MAP

FIGURE 1 - 1

* SEE FIGURE 2 FOR MONITOR WELL IDENTIFICATION NUMBERS

F:\DATA\KAISER\9088_LOC_MAP FIG 1.mxd 2/21/2012

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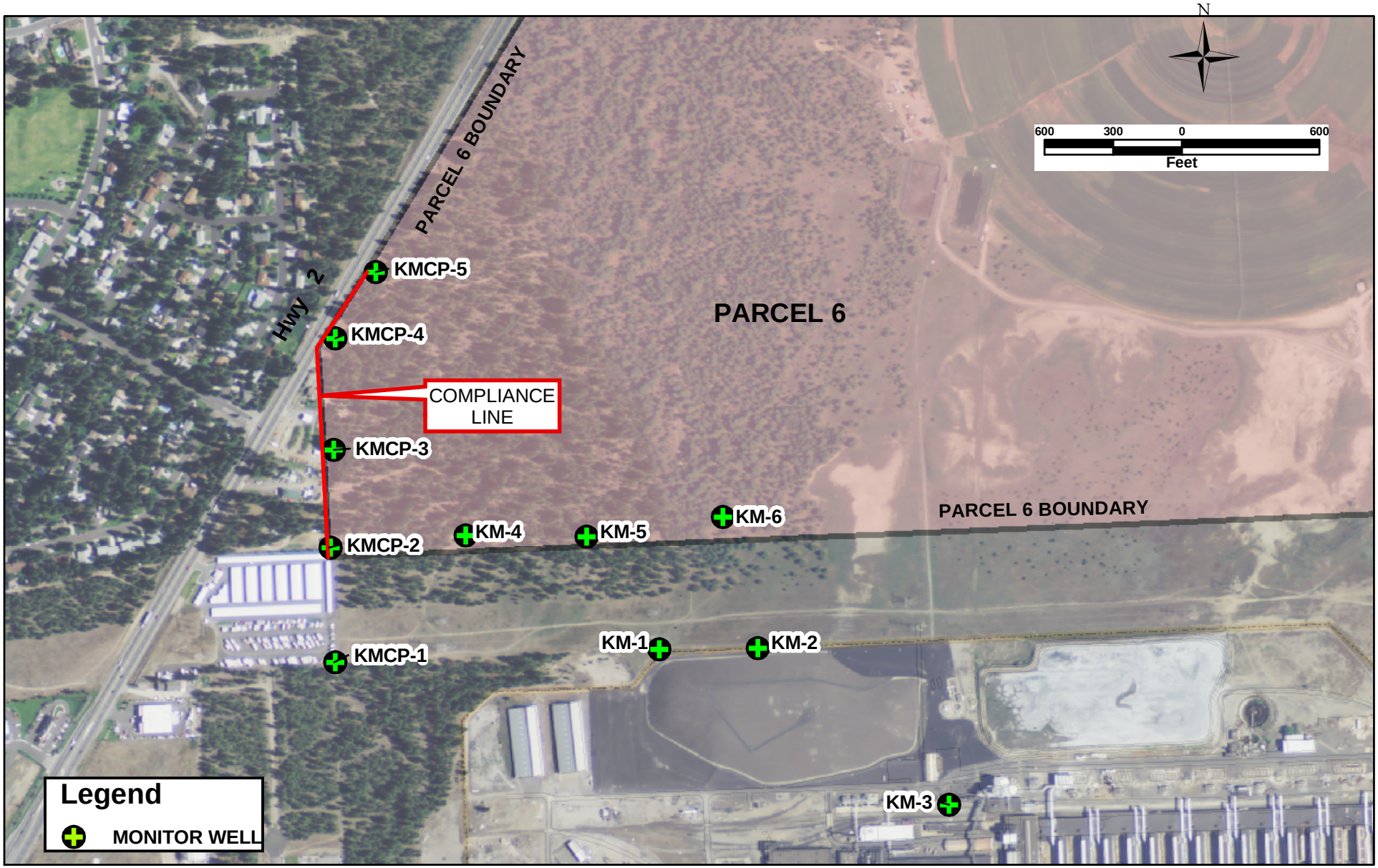

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KAISER MEAD NPL MEAD, WASHINGTON	MTCA\CERCLA PERFORMANCE EVALUATION GROUNDWATER MONITORING NETWORK	FIGURE 2-1

LMJ F:\DATA\KAISER\COMPLIANCE WELLS2.MXD 2/21/2012

FIGURE 2-2
KAISER MEAD NPL
COMPLIANCE WELL KMCP-1B

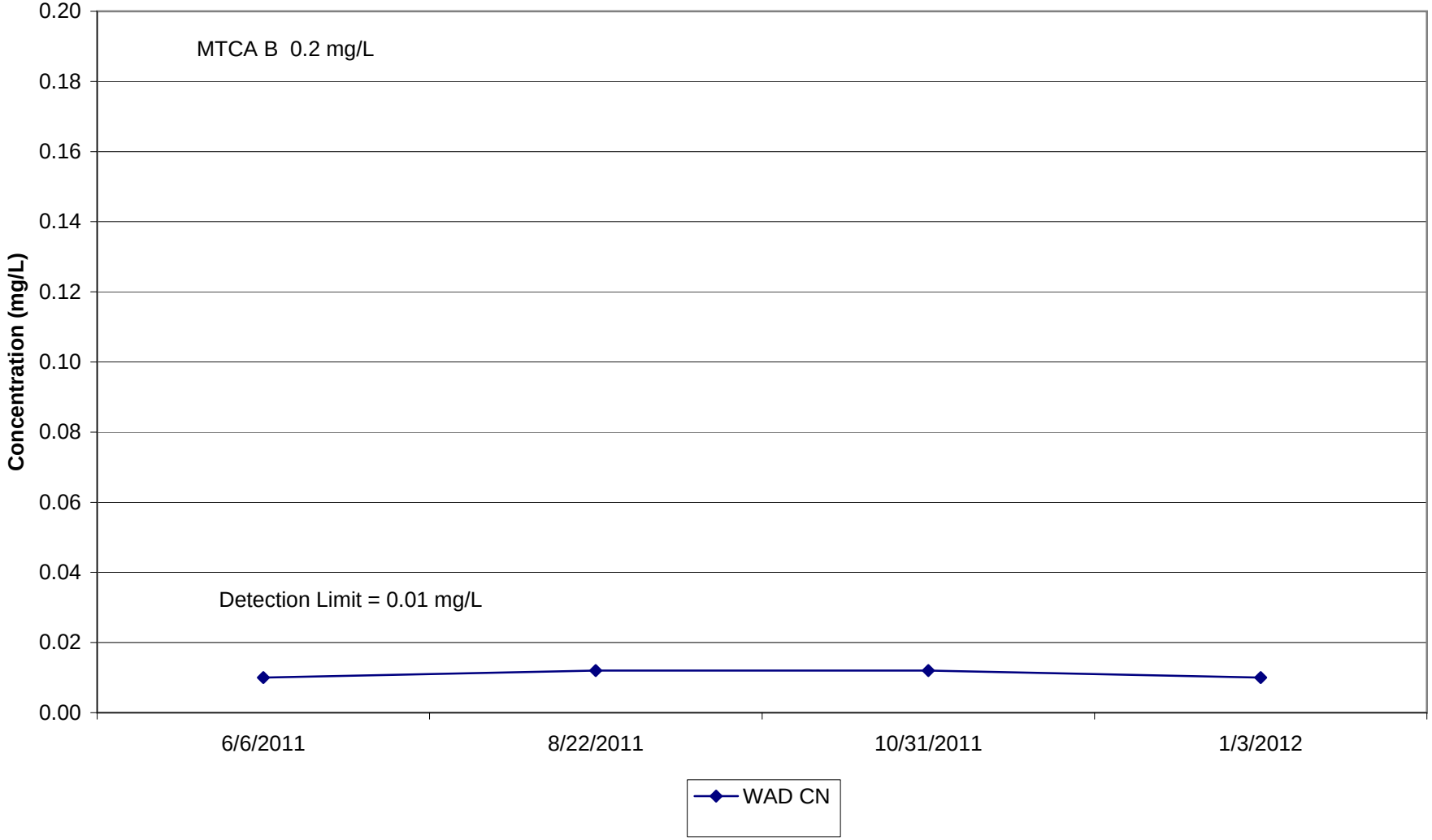


FIGURE 2-3
KAISER MEAD NPL
COMPLIANCE WELL KMCP-2B

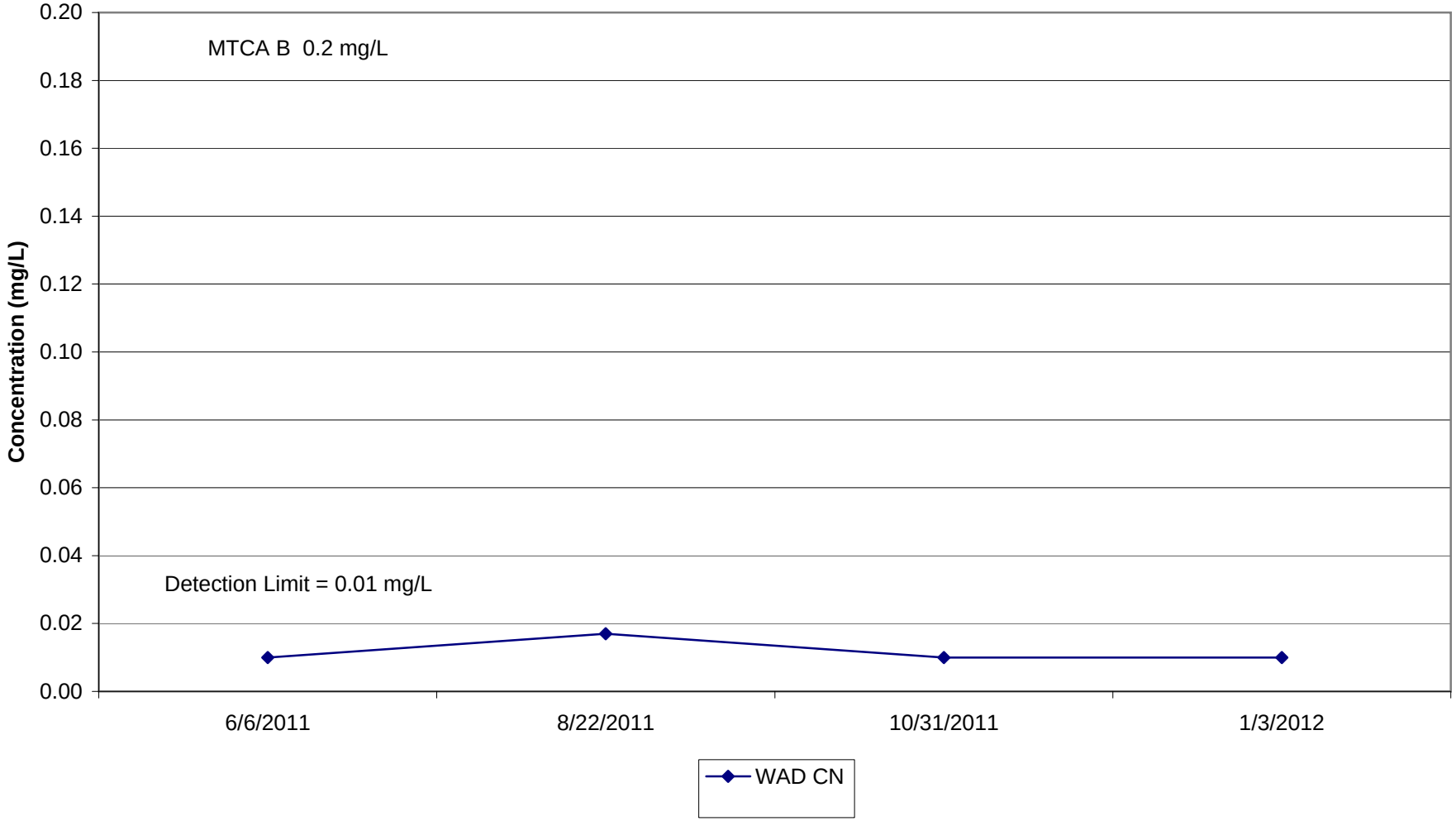


FIGURE 2-4
KAISER MEAD NPL
COMPLIANCE WELL KMCP-3B

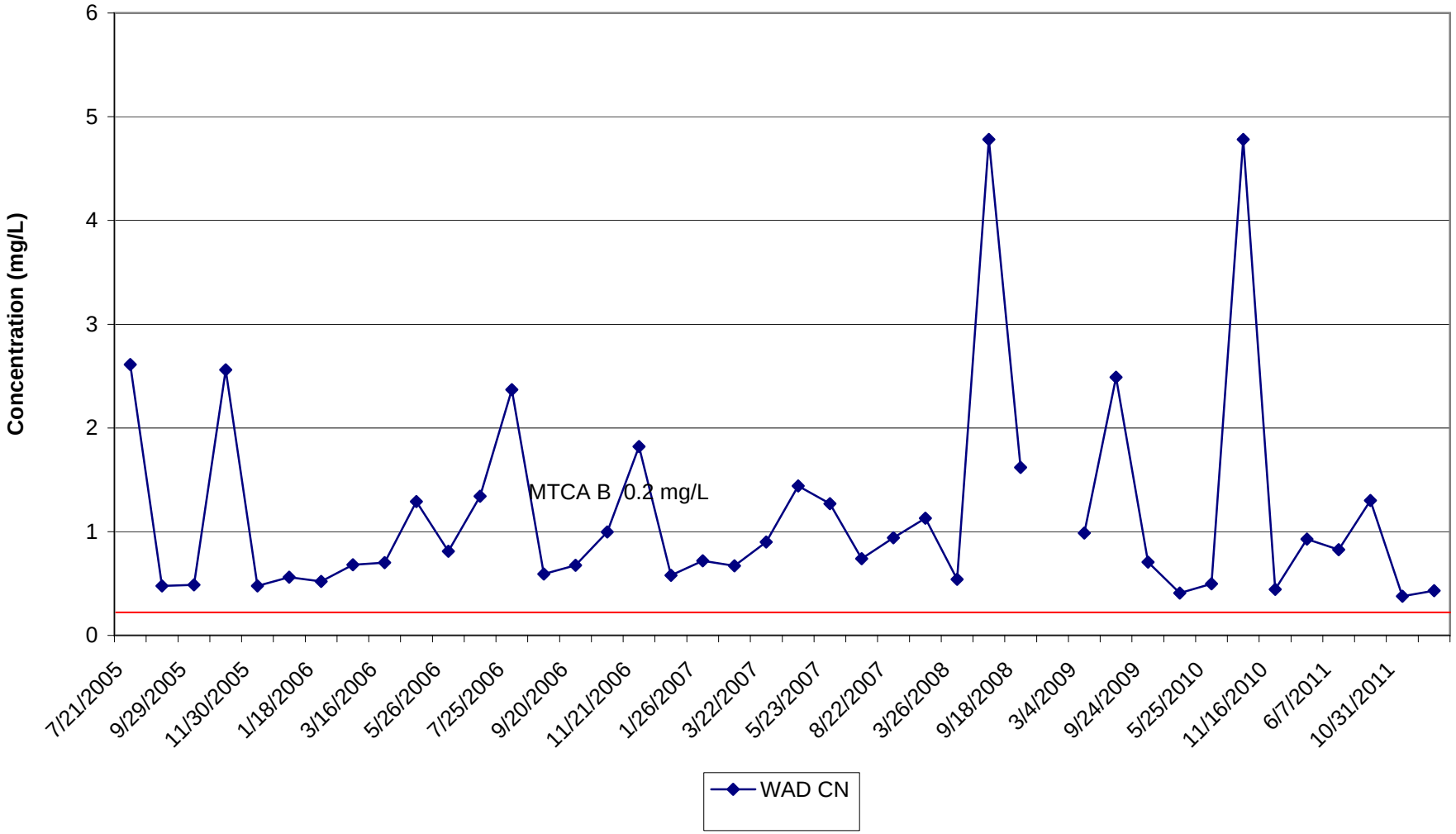


FIGURE 2-5
KAISER MEAD NPL
COMPLIANCE WELL KMCP-4B

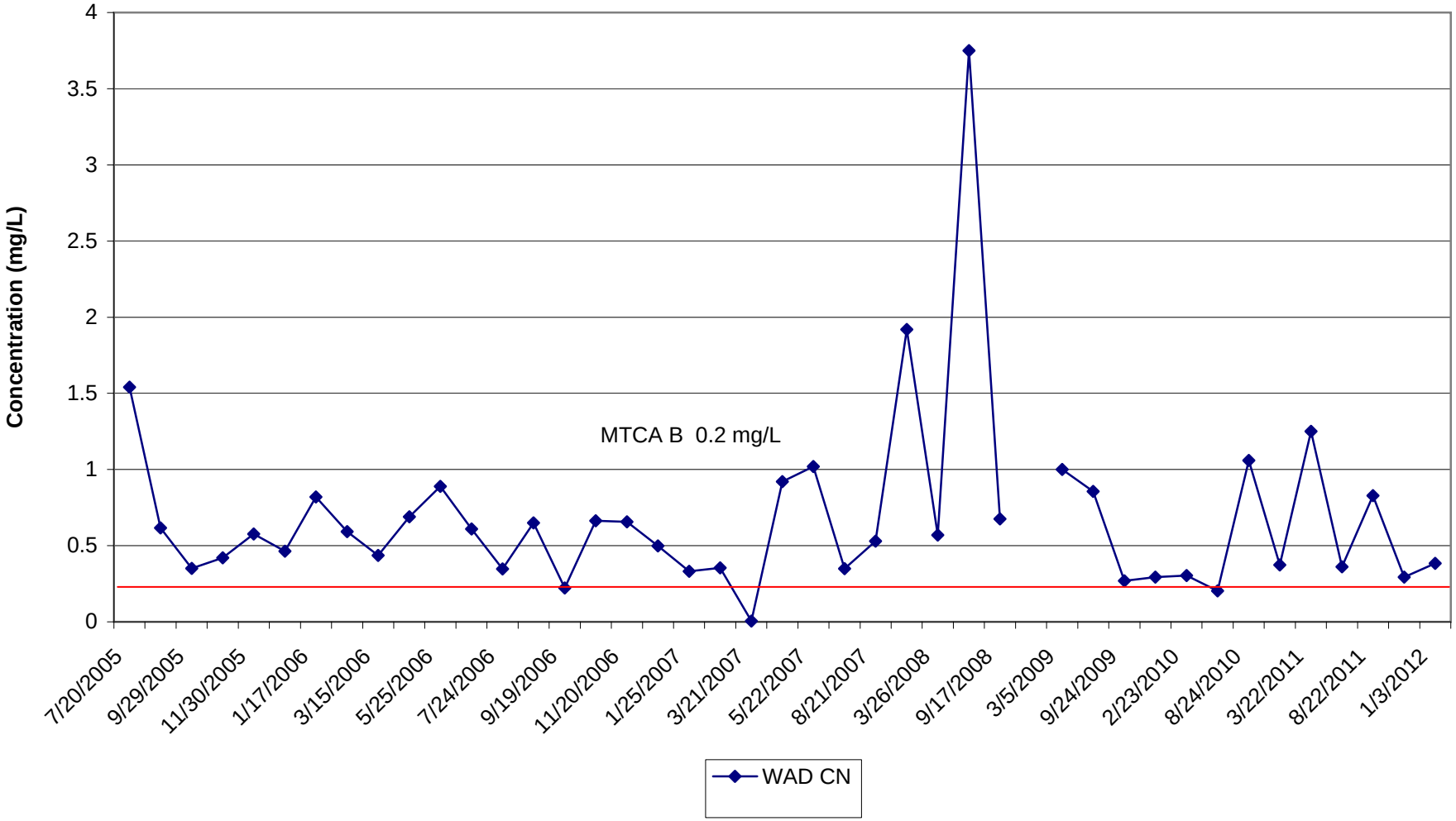


FIGURE 2-6
KAISER MEAD NPL
COMPLIANCE WELL KMCP-5B

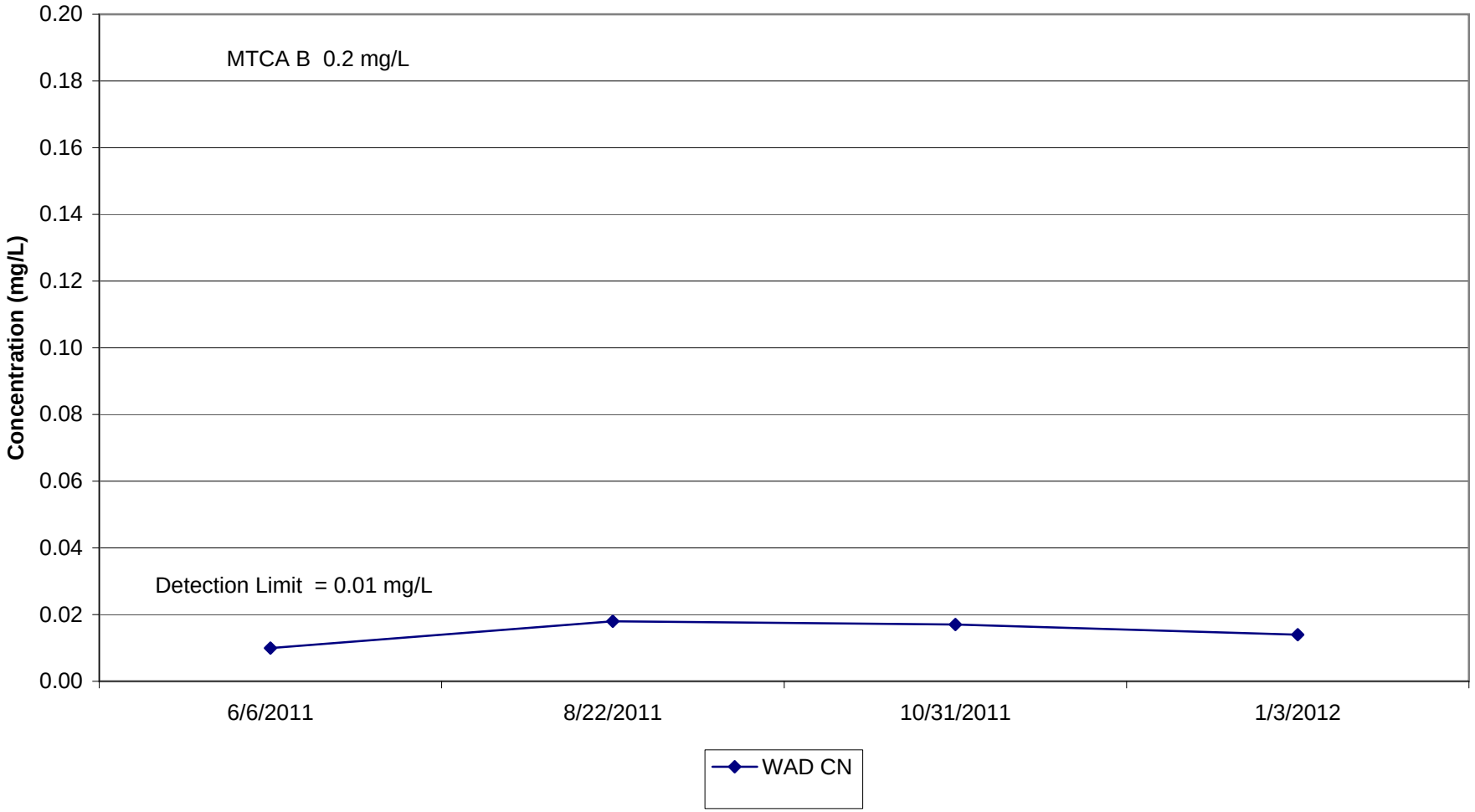


FIGURE 2-7
KAISER MEAD NPL
COMPLIANCE WELL KMCP-1B

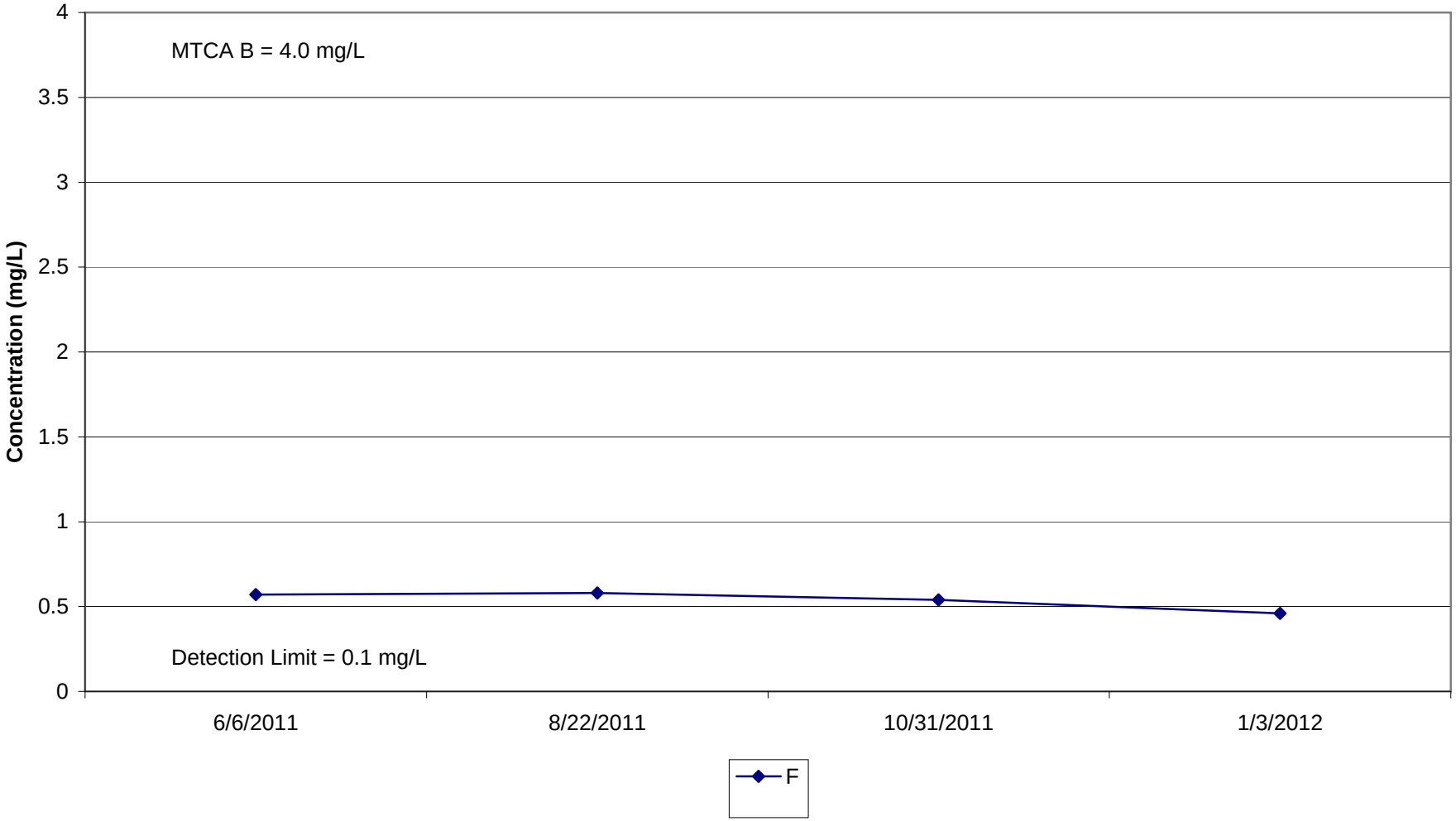


FIGURE 2-8
KAISER MEAD NPL
COMPLIANCE WELL KMCP-2B

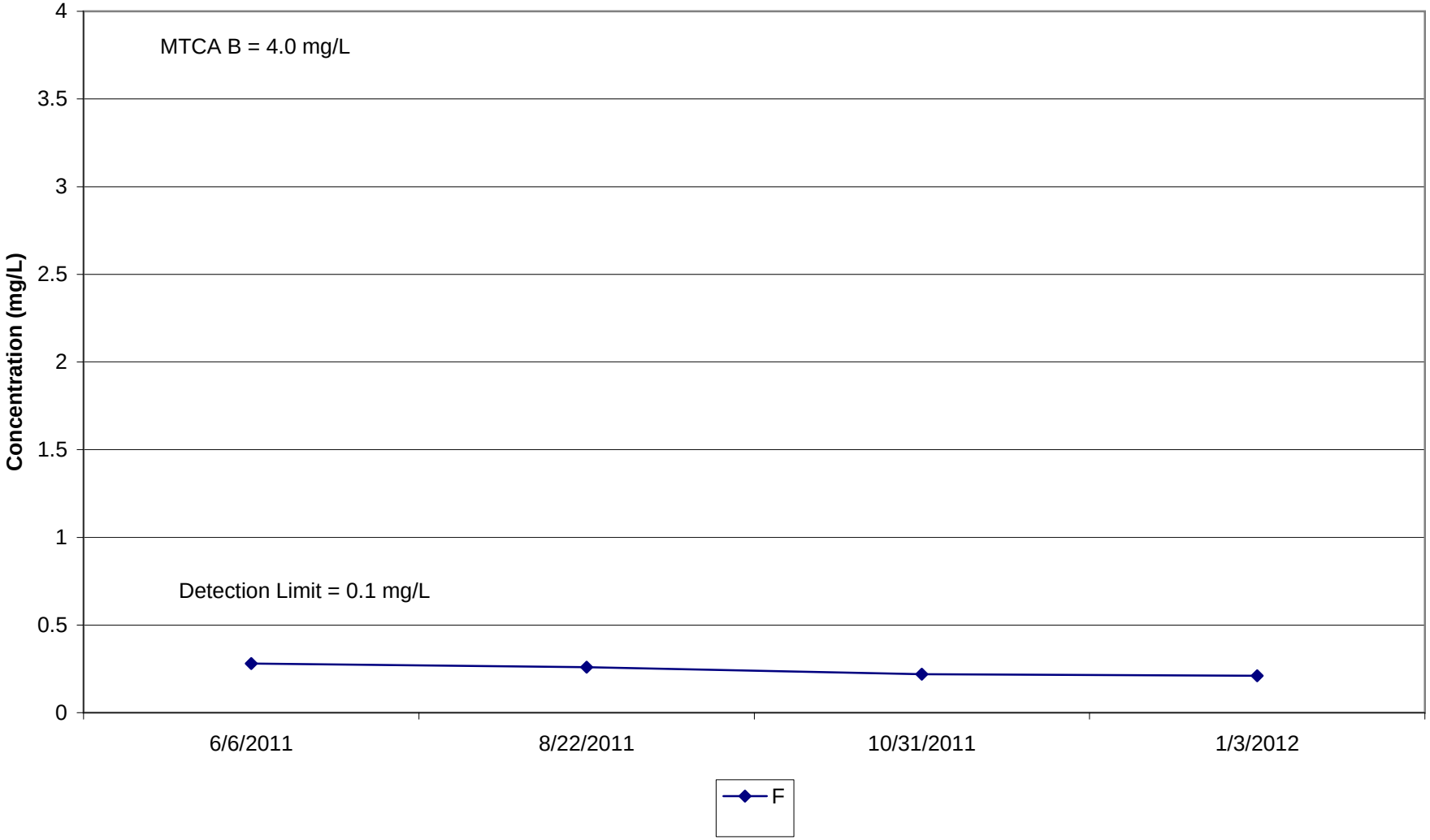


FIGURE 2-9
KAISER MEAD NPL
COMPLIANCE WELL KMCP-3B

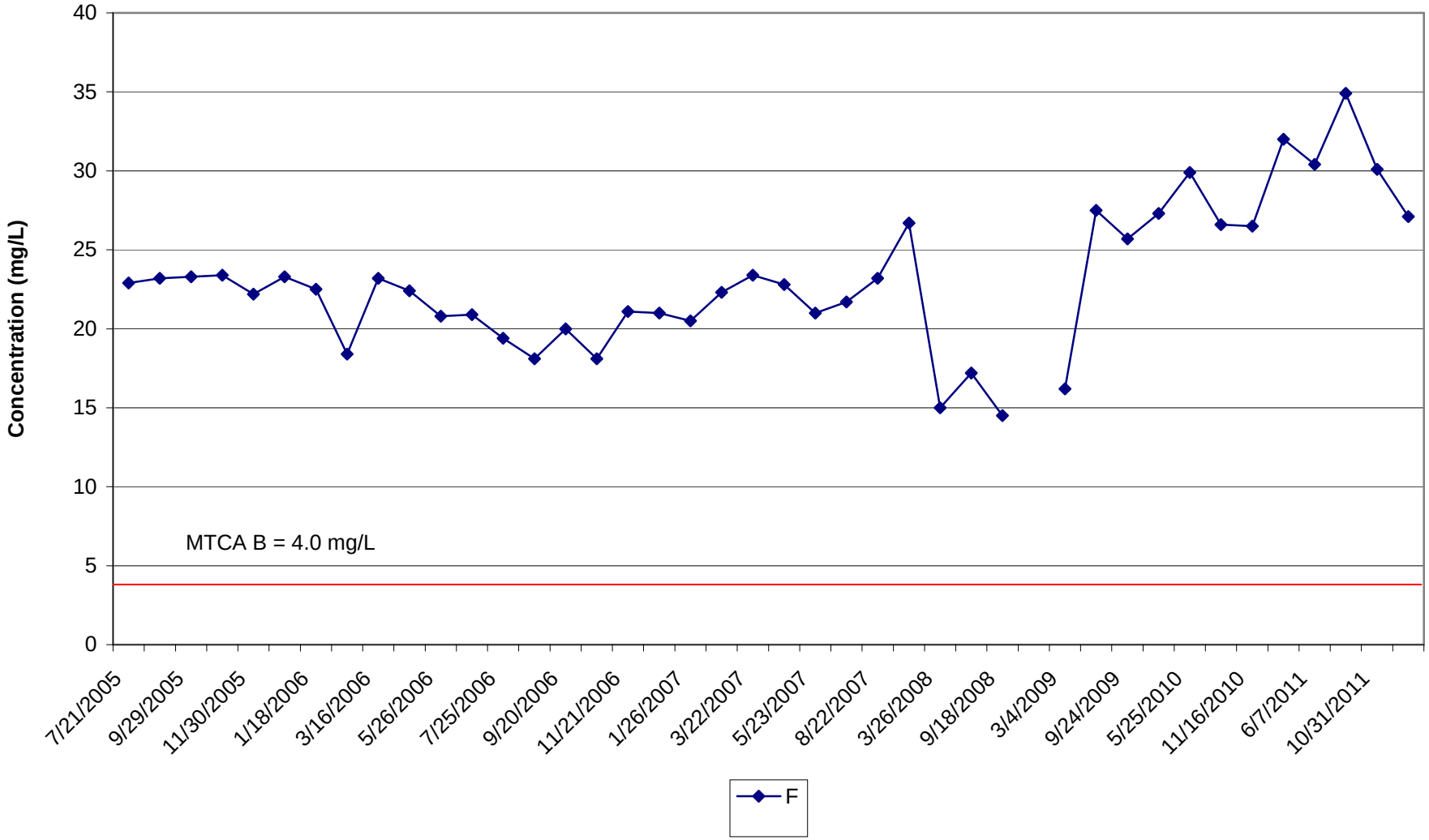


FIGURE 2-10
KAISER MEAD NPL
COMPLIANCE WELL KMCP-4B

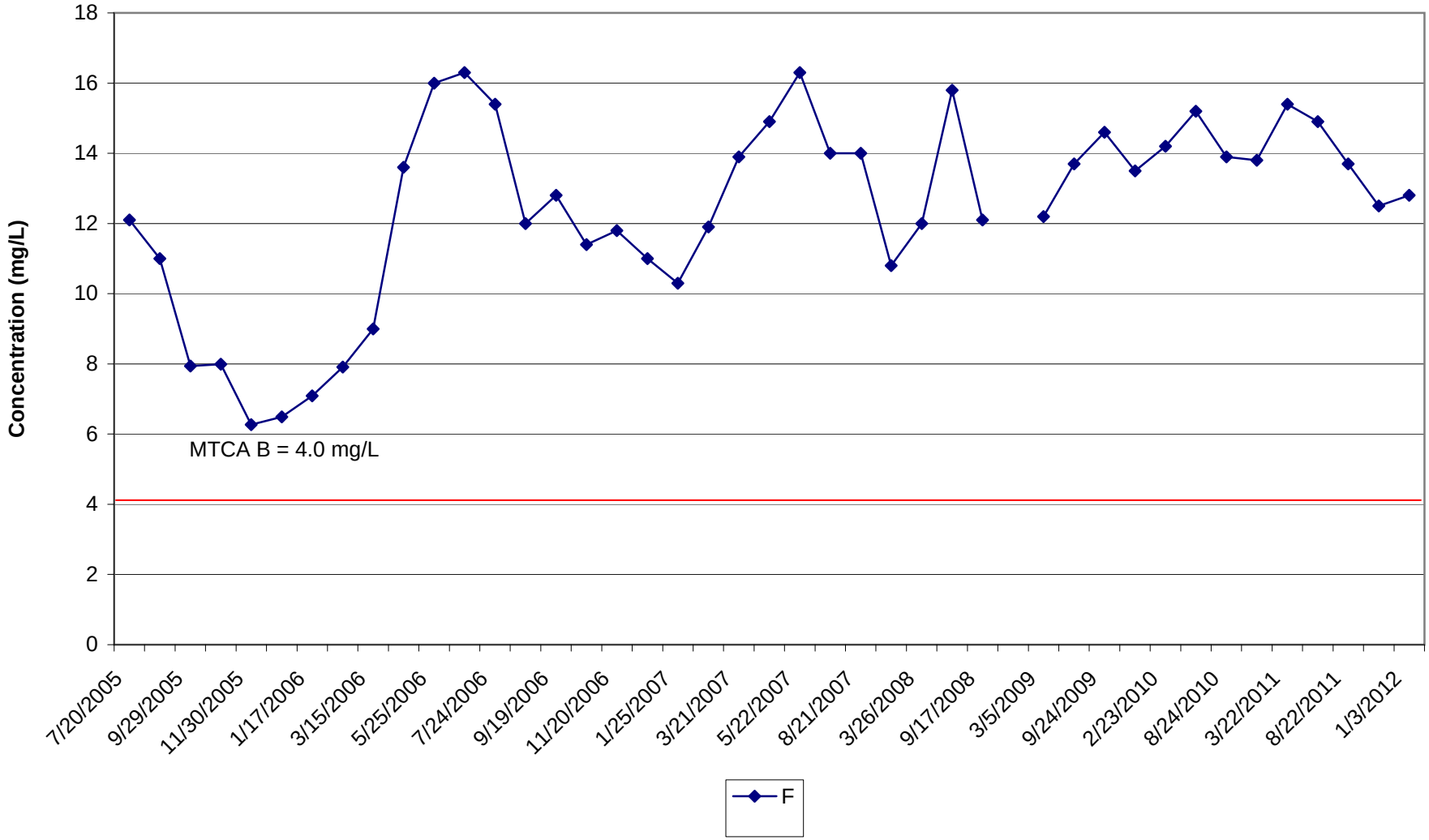
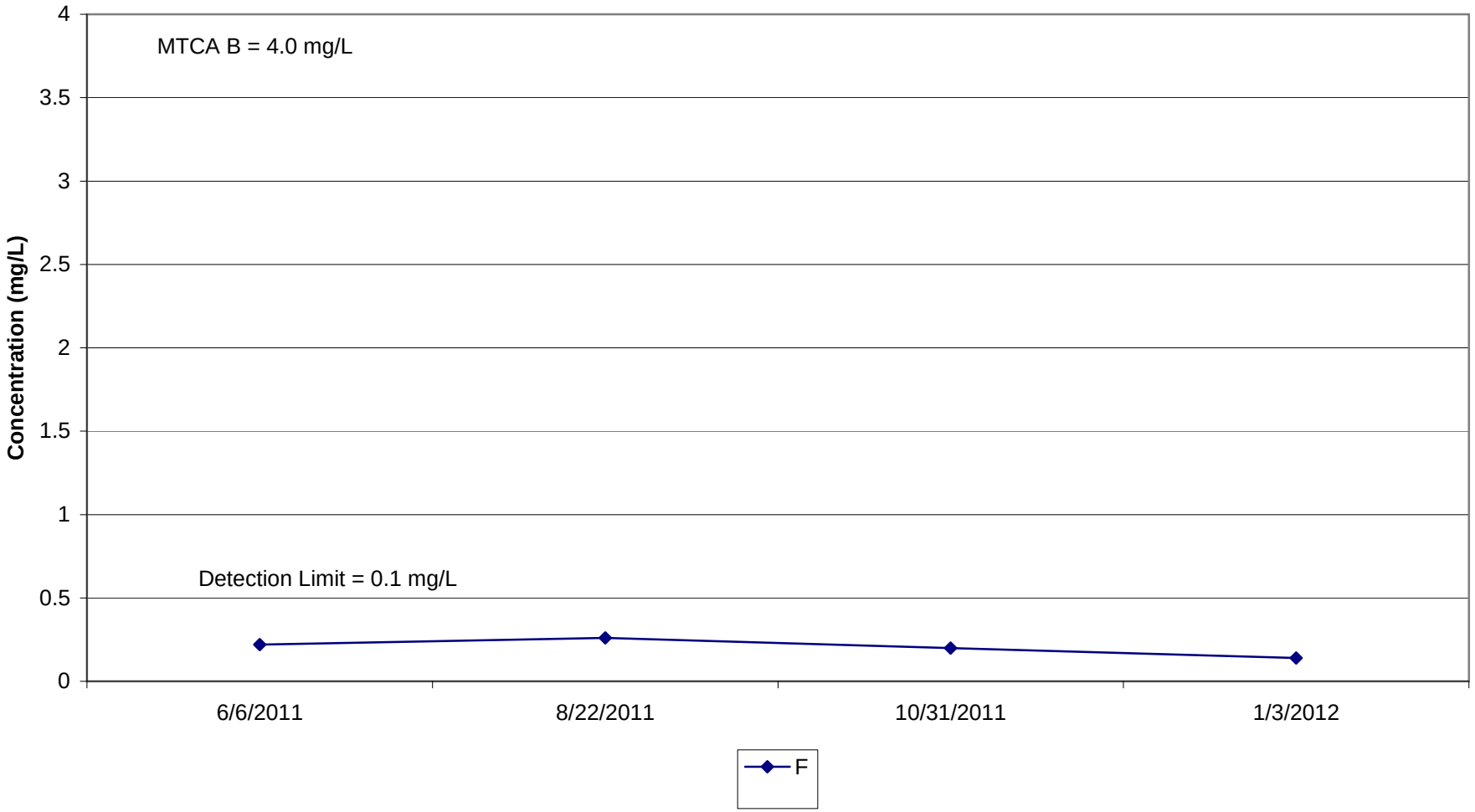


FIGURE 2-11
KAISER MEAD NPL
COMPLIANCE WELL KMCP-5B



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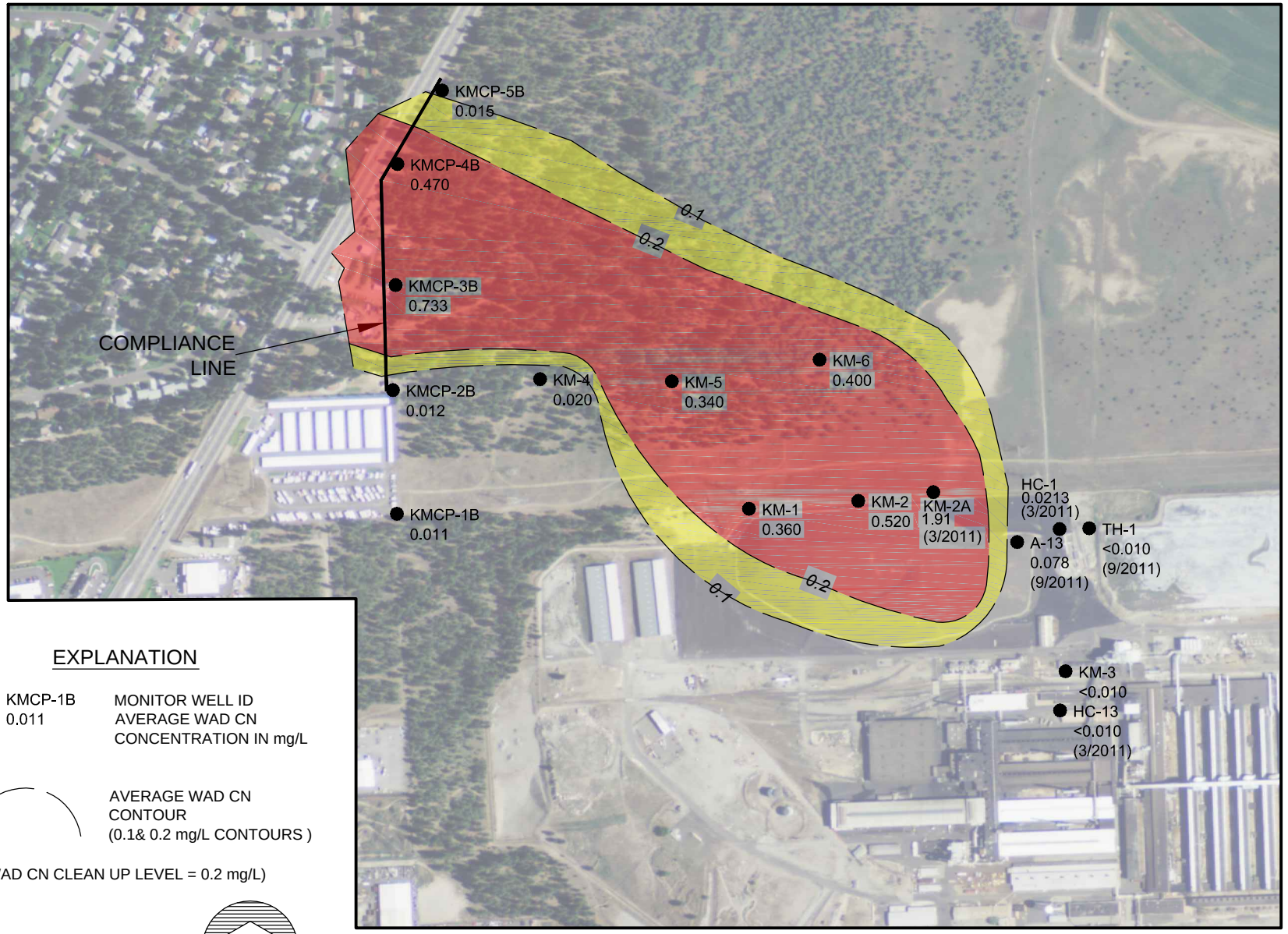

EXPLANATION

KMCP-1B 0.011 — MONITOR WELL ID
AVERAGE WAD CN
CONCENTRATION IN mg/L

AVERAGE WAD CN
CONTOUR
(0.1& 0.2 mg/L CONTOURS)

(WAD CN CLEAN UP LEVEL = 0.2 mg/L)

SCALE
0 (In Feet) 600

NORTH

KAISER MEADE NPL MEAD, WASHINGTON	MTCA\CERCLA PERFORMANCE EVALUATION AVERAGE WAD CYANIDE CONCENTRATIONS (mg/L) 2nd QUARTER 2011 THROUGH 1st QUARTER 2012

FIGURE
2-12

lmj F:\DATA\KAISER\COMP FIG3.DWG

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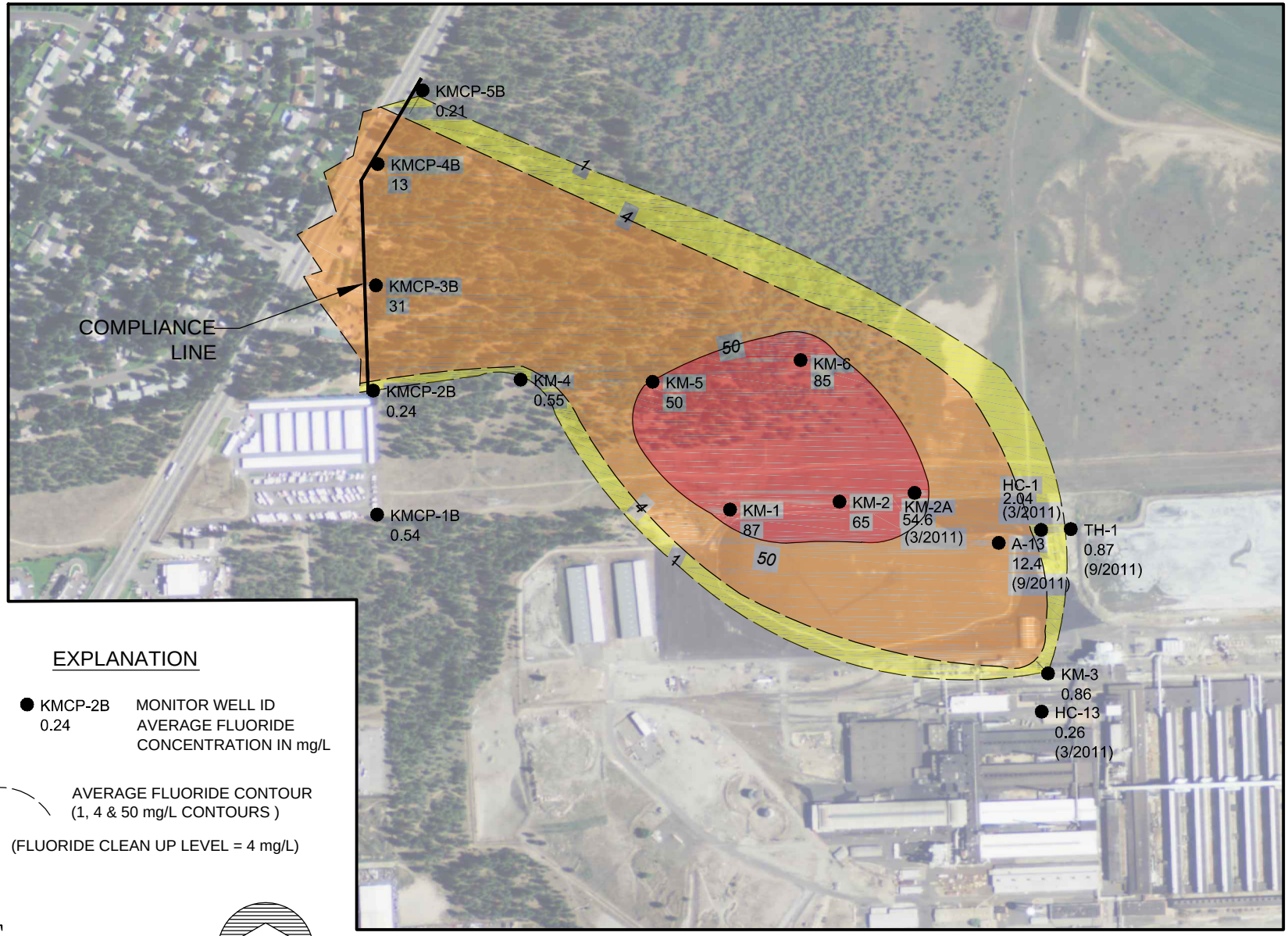


EXPLANATION

KMCP-2B 0.24 — MONITOR WELL ID
AVERAGE FLUORIDE CONCENTRATION IN mg/L

AVERAGE FLUORIDE CONTOUR
(1, 4 & 50 mg/L CONTOURS)

(FLUORIDE CLEAN UP LEVEL = 4 mg/L)

SCALE
0 (In Feet) 600

NORTH

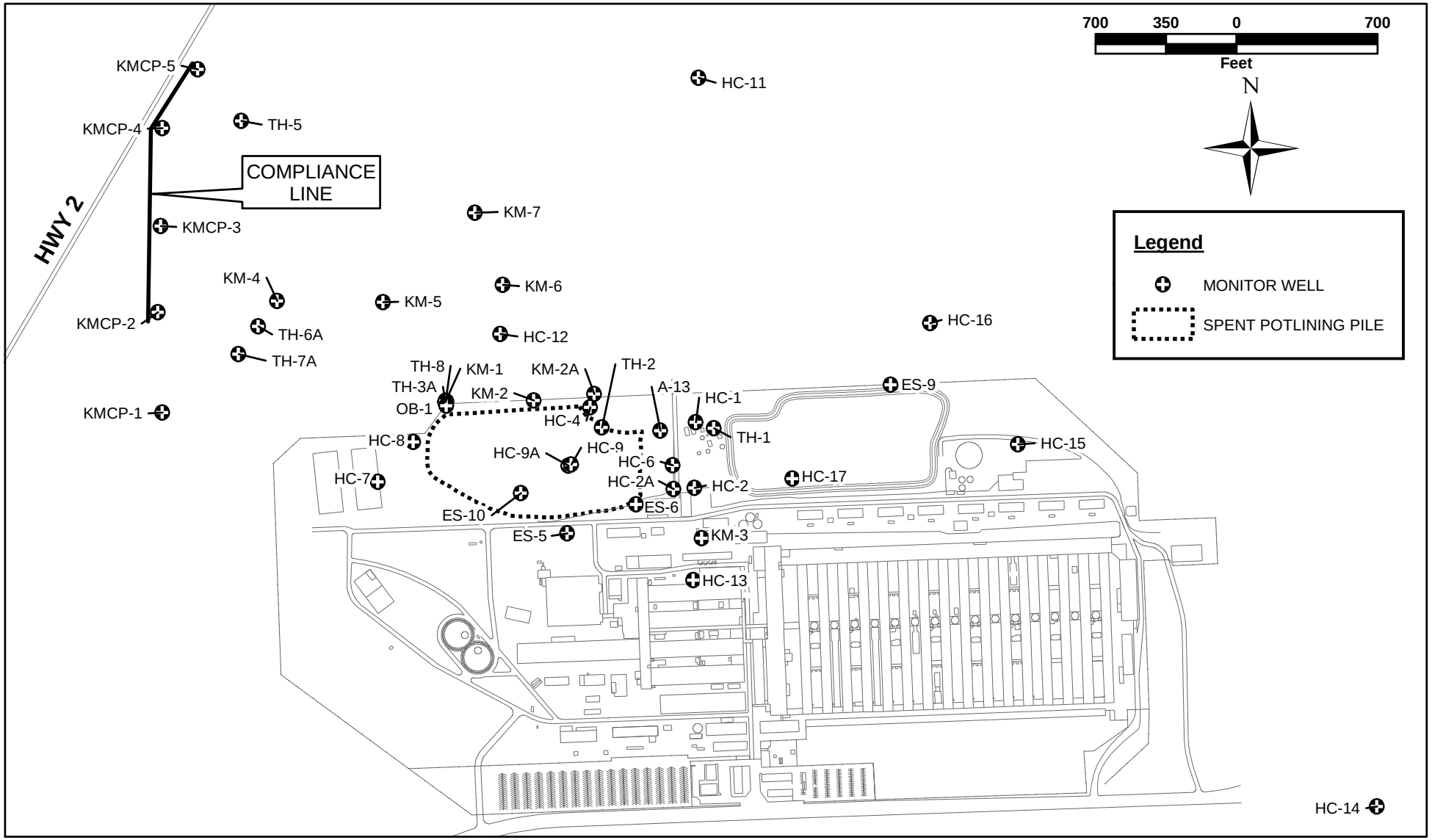
KAISER MEADE NPL MEAD, WASHINGTON	MTCA\CERCLA PERFORMANCE EVALUATION AVERAGE FLUORIDE CONCENTRATIONS (mg/L) 2nd QUARTER 2011 THROUGH 1st QUARTER 2012

FIGURE
2-13

lmj F:\DATA\KAISER\COMP FIG4.DWG

APPENDIX A

HISTORICAL SITE WIDE MONITORING DATA



KAISER MEAD NPL
MEAD, WASHINGTON

KAISER MEAD ALUMINUM PLANT
MONITOR WELL LOCATIONS
AND SITE PLAN

FIGURE A-1

F:\DATA\KAISER\FIGURE A_SITE_PLAN.mxd

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APPENDIX B

SURFACE WATER MONITORING DATA UNDER CONSENT DECREE

Kaiser Mead NPL Surface Water Monitoring

Descriptive Name	Date Sampled	pH Std Units	Conductivity umhos/cm	Temp. Deg. C	Total CN mg/L	WAD CN mg/L	F mg/L
Little Spokane River							
Dartford/Minidhoka (W-24)	3/23/2005	6.94	270	6.8	<0.010	<0.010	0.17
	6/27/2005	7.57	528	17.5	<0.010	<0.010	0.16
	7/21/2005	7.73	227.4	18.09	<0.010	<0.010	0.16
	10/28/2005	7.92	218.8	11.45	<0.010	<0.010	0.13
	1/18/2006	7.84	104.6	5.02	0.019	<0.010	0.14
	5/26/2006	8.21	180.7	15.57	0.011	<0.010	0.12
	9/20/2006	7.78	256.3	13.18	<0.010	<0.010	0.16
	12/20/2006	6.48	228.6	4.30	<0.010	<0.010	<0.100
	3/22/2007	7.66	150.3	10.16	<0.005	<0.005	0.1
	6/26/2007	8.02	193.1	16.51	<0.005	<0.005	<0.1
	8/22/2007	7.8	260.2	17.09	<0.005	<0.005	<0.1
	11/14/2007	7.59	247.1	8.76	<0.005	<0.005	0.1
	3/4/2008	8.01	384.1	9.41	<0.005	<0.005	0.1
	6/16/2008	7.69	335.1	10.15	<0.01	<0.01	0.155
	9/18/2008	7.69	335.1	10.15	<0.01	<0.01	0.158
	1/14/2009	8	248	4.15	<0.01	<0.01	0.123
	5/8/2009	7.82	162	10.21	<0.01	<0.01	<0.01
	9/24/2009	7.42	294	13.97	<0.01	<0.01	0.105
	11/10/2009	7.82	287	7.03	0.0218	<0.01	0.102
	2/24/2010	7.81	228	3.25	0.0121	<0.01	<0.100
	5/25/2010	6.93	218	13.03	<0.0100	<0.0100	0.136
	8/25/2010	7.72	289	13.51	<0.0100	<0.0100	0.159
	11/17/2010	7.98	263	6.52	<0.0100	<0.0100	0.172
	3/23/2011	7.73	325	3.35	<0.0100	<0.0100	0.160
	6/8/2011	7.79	348	4.03	<0.0100	<0.0100	0.19
	8/23/2011	7.35	444	16.93	<0.0100	<0.0100	0.19
	11/1/2011	7.30	409	9.75	0.011	<0.0100	0.16
	1/5/2012	7.01	276	5.80	<0.0100	<0.0100	0.15

Notes:
< = chemical was not detected at or above the method reporting limit
CN = cyanide
WAD = weak acid dissociable
F = fluoride
mg/L = milligrams per liter

Kaiser Mead NPL Surface Water Monitoring

Descriptive Name	Date Sampled	pH Std Units	Conductivity umhos/cm	Temp. Deg. C	Total CN mg/L	WAD CN mg/L	F mg/L
Springs							
Dan Lake (W-195)	3/23/2005	7.55	582	10.7	2.47	0.073	1.08
	6/27/2005	6.69	310	13.1	1.48	0.100	0.97
	7/21/2005	6.77	669.4	11.78	1.44	0.394	1.00
	10/28/2005	7.52	549.1	13.71	1.25	0.080	0.98
	1/18/2006	7.45	569.4	9.40	1.02	0.118	1.01
	5/26/2006	7.70	588.0	12.29	1.23	0.142	1.06
	9/20/2006	7.25	761.2	13.61	1.42	0.387	0.87
	12/20/2006	6.64	690.8	11.86	1.41	0.0932	0.97
	3/22/2007	7.76	609.1	11.38	1.13	1.03	1.1
	6/26/2007	7.33	596.9	14.25	1.51	0.215	1.1
	8/22/2007	6.99	692.2	14.49	1.50	0.138	1.1
	11/14/2007	7.02	721.3	9.54	1.33	0.132	1.1
	3/4/2008	7.04	728.4	9.64	1.28	0.11	1.1
	6/16/2008	6.97	580.7	10.97	2.28	0.127	1.11
	9/18/2008	6.67	598.3	14.2	2.41	0.4	0.944
	1/14/2009	7.7	586	11.5	1.77	0.0684	1.08
	5/8/2009	7.82	375	12.13	2.07	0.189	1.14
	9/24/2009	7.1	745	11.83	2.57	0.0498	<0.100
	11/10/2009	7.1	618	11.16	1.37	0.0328	0.94
	2/24/2010	7.69	619	10.82	2.48	0.193	0.974
	5/25/2010	6.55	632	11.62	1.62	0.235	1.06
	8/25/2010	7.14	755	11.55	*1.68	0.158	0.99
	11/17/2010	8.83	760	11.21	1.85	0.063	1.02
	3/23/2011	7.69	627	10.76	1.82	0.386	1.02
	6/8/2011	7.59	621	11.21	1.80	0.102	1.08
	8/23/2011	5.99	1074	11.51	1.28	0.176	1.15
	11/1/2011	6.48	976	10.70	1.48	0.037	0.98
	1/5/2012	6.78	781	10.6	1.86	0.055	0.95

Notes:
< = chemical was not detected at or above the method reporting limit
CN = cyanide
WAD = weak acid dissociable
F = fluoride
mg/L = milligrams per liter
* -Result is from re-analysis outside holding time

Kaiser Mead NPL Surface Water Monitoring

Descriptive Name	Date Sampled	pH Std Units	Conductivity umhos/cm	Temp. Deg. C	Total CN mg/L	WAD CN mg/L	F mg/L
Springs							
Bill Rubright (W-2326)	3/23/2005	7.49	434	8.8	0.177	0.016	0.17
	6/27/2005	7.18	409	12.7	0.183	<0.010	0.19
	7/21/2005	7.25	392.1	12.76	0.171	0.159	0.16
	10/28/2005	7.61	344.1	12.51	0.163	<0.010	0.16
	1/18/2006	7.58	237.3	8.43	0.144	0.017	0.18
	5/26/2006	8.15	396.4	12.08	0.142	0.016	0.14
	9/20/2006	7.87	391.6	14.03	0.154	0.017	0.14
	12/20/2006	6.7	408.1	10.53	0.16	0.0154	0.11
	3/22/2007	7.89	379	10.72	0.145	0.118	0.200
	6/26/2007	7.49	324.4	14.12	0.200	0.07	<0.1
	8/22/2007	7.43	389.6	13.48	0.179	0.038	<0.1
	11/14/2007	7.41	388.4	9.86	0.164	0.015	0.1
	3/4/2008	7.41	480.1	10.03	0.175	0.02	0.1
	6/16/2008	7.41	386.1	11.31	0.186	0.025	0.156
	9/18/2008	7.01	301.2	13.2	0.188	0.028	0.154
	1/14/2009	7.84	383	9.1	0.181	<0.0100	0.151
	5/8/2009	7.83	325	12.13	0.153	0.036	0.148
	9/24/2009	7.43	431	12.13	0.174	<0.0100	0.146
	11/10/2009	7.25	439	10.03	0.190	0.012	0.108
	2/24/2010	7.85	278	8.83	0.237	<0.0100	0.123
	5/25/2010	6.62	384	11.15	0.221	0.024	0.143
	8/25/2010	7.79	265	12.05	*0.259	0.0216	0.193
	11/17/2010	8.14	126	10.33	0.248	<0.0100	0.200
	3/23/2011	7.74	267	9.05	0.216	0.0513	0.208
	6/8/2011	7.63	271	9.75	0.198	0.013	0.170
	8/23/2011	7.45	427	12.34	0.207	0.015	0.20
	11/1/2011	7.42	454	12.1	0.218	0.014	0.20
	1/5/2012	6.86	721	9.8	0.243	<0.0100	0.14

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