



STEVEN A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

BRAD HENRY
Governor

July 28, 2005

Ursula Lennox (6SF-LL)
US EPA – Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Re: Long Term Monitoring at Tar Creek, a part of After Action Monitoring

Dear Ursula:

Please find the analytical results for the fourth round of samples of the Long Term Monitoring (LTM) project at Tar Creek for the Roubidoux aquifer. The results are presented in the report attached for your review.

Please let me know if you have any comments. Thank you for your attention to this matter. If you have any questions please call me at (405) 702-5124.

Sincerely,

A handwritten signature in black ink that reads 'David A. Cates' with a long horizontal flourish extending to the right.

David A. Cates, P.E.
Land Protection Division

Long Term Monitoring Report (Fourth Round of Semi-annual Roubidoux Samples)
July 2005

Introduction:

The fourth round of samples of the Long Term Monitoring (LTM) project at Tar Creek for the Roubidoux aquifer were collected in April 2005. The analytical results are shown in Table 1. The previous results for the LTM wells are also included in the table. A map with the well locations (Figure 1) is attached along with graphs of the Picher #5 iron and sulfate concentrations over time (Figure 2), and a Piper Diagram for the water samples from the LTM wells (Figure 3).

The primary and secondary maximum contaminant levels (MCLs) are identified in the header of the table for data comparison. The tolerance limits and Roubidoux background concentrations for the indicator parameters of mine water contamination are provided in the footnotes. The indicator parameters are: sulfate, iron, and zinc. The values for tolerance limits and Roubidoux background concentrations, respectively, are: 82 mg/l & 25 mg/l for **sulfate**; 207 ug/l & 61.5 ug/l for **iron**; and 43 ug/l & 8.8 ug/l for **zinc**. These parameters and their values were determined in Phase I of After Action Monitoring (AAM) of the Roubidoux at Tar Creek and are included in the Phase II AAM report "Summary of Roubidoux Water Quality Tests" (September, 2002).

QA/QC: Blanks, RPD, Cation-Anion Balance:

The analytical methods for metals analyses defined in the QAPP for the LTM project (EPA 200.8) were used for this round of sampling and the reporting limits (detection limits) for all the parameters analyzed are below the respective MCL values.

The Miami #1 well continues to be inoperable at the time of sampling so the nearby Miami #3 well was again substituted to provide a Roubidoux sample from outside the mine area for inter-well water quality comparisons. The Miami #3 well is located about 1/2 mile south of the Miami #1 well as shown on the figure. It is of similar age and completed similarly as indicated on the list of LTM wells. Historical water quality and production data is also available for the Miami #3 well.

The blanks for the two days of sampling showed no exceedances of detection limits for all parameters. For the two duplicates taken this round of sampling, the relative percent difference (RPD) calculations showed mostly less than 1 percent difference between the duplicate concentrations and the respective sample concentrations. A 15.4 percent difference between the sample and the duplicate was calculated for dissolved (filtered) zinc at the Picher #6 well. This is acceptable considering the low concentrations of only 6 and 7 ug/l for the duplicates. The next highest RPD was 9.52% for sulfate at the Miami #3 well. The RPD for all other parameters were less than 5% with most (65) being less than 1% difference. The cation-anion balance calculations were good (< 10 %) for all samples.

Results:

The Commerce #5, the Quapaw #4, and the Rural Water District #4 (Bluehole well) again have the best water quality, with conductivity values less than 300 uS/cm, and total dissolved solids (TDS) concentrations less than 200 mg/l. The concentrations of sulfate, iron and zinc, the

indicator parameters of mine water contamination, are below tolerance limits and are at or below background concentrations in these wells and at the Miami #3 well. The total iron concentration of 70 ug/l in the unfiltered sample from the Commerce #5 well is slightly above the background level of 61.5 ug/l for iron in the Roubidoux. However, the water from this well is considered representative of Roubidoux background concentrations because the dissolved iron concentration (filtered sample) is less than 20 ug/l. The unfiltered sample may contain some rust particles that probably are the cause for the slightly elevated total iron above background.

The primary MCL for lead (15 ug/l) was not exceeded in any samples and all samples tested less than reporting limits of 5 ug/l. There were no exceedances of primary drinking water standards from any of the wells. Secondary standards were violated in the Picher #6, Quapaw #5, and the Fernandez wells for iron. The Quapaw #5 also had violations of SMCLs for sulfate and total dissolved solids concentrations. The well owners will be notified of these LTM results.

Three wells showed impacts by mine water: Quapaw #5, Picher #6 and the Fernandez well. Each well is discussed below. Mine water impacts are concluded when the indicator parameter concentrations exceed the tolerance limits. These are shown in bold type in Table 2 below.

Table 2: Concentrations of Indicator Parameters in LTM Wells (April 2005).

WELL	Zinc (ug/l)		Iron (ug/l)		Sulfate (mg/l)
	Total	Dissolved	Total	Dissolved	
Background Conc.	8.8		61.5		25
Tolerance Limit	43		207		82
Secondary MCL	5,000		300		250
Cardin #1	36	<5	<i>193</i>	<i>152</i>	111
Commerce #4	<5	<5	77	72	76
Commerce #5	<5	<5	70	34	13.9
Fernandez	689	321	630	526	72.5
Miami #1	<i>Ns</i>	<i>ns</i>	<i>Ns</i>	<i>ns</i>	<i>Ns</i>
<u>Miami #3</u>	<5	<5	<20	<20	14.7
Picher #5	<5	<5	93	61	132
<u>Picher #6</u>	6	6	341.5	336	125.5
Picher #7	<5	<5	90	90	125
Quapaw #4	<5	<5	<20	<20	13.5
Quapaw #5	167	159	2,860	2,680	412
RWD4 #4	<5	<5	31	26	10.2

* Note: Bold type indicates value greater than tolerance limit.
 Italicized values are above background but below tolerance limits.
 Shaded area indicates value at or below background.
 Underlined wells have duplicate samples and mean values shown were calculated.
 Detection limit values were used in calculation of means.
 Ns - not sampled.

Tests of the Quapaw #5 well continue to show that the Roubidoux water from this well is of very poor quality, exceeding secondary standards for iron, total dissolved solids (TDS), and sulfate.

The iron, TDS, and sulfate concentrations observed are 2,860 ug/l, 1,020 mg/l and 412 mg/l, respectively. Although it is below the MCL of 10 ug/l, an arsenic concentration of 5 ug/l was also detected and the manganese concentration (39 ug/l) is near the standard of 50 ug/l. Concentrations for all three of the indicator parameters (412 mg/l, 2,680 ug/l and 159 ug/l, respectively for sulfate, iron and zinc) are greater than tolerance limits at this well. Although the water is considered treatable (TDS < 3,000 mg/l), this well is not hooked up to the public water system. The concentrations for two of the three indicator parameters at the Fernandez well (iron and zinc) and the Picher #6 well (iron and sulfate) exceed tolerance limits, so both of these wells are considered impacted by mine water. In the case of the Quapaw #5 well, which is relatively new and has casing installed to a depth of 850 feet, it is concluded that, since all three indicator parameters are exceeded, the Roubidoux aquifer is impacted by mine water near this well.

As already mentioned, concentrations greater than tolerance limits for two of three indicator parameters were observed at the Picher #6 well. Specifically, the iron and sulfate concentrations exceeded tolerance limits, but the zinc concentrations were background. The sulfate and iron concentrations averaged: 125.5 mg/l and 336 ug/l, respectively. The Picher #6 continues to show improved water quality compared to the first samples collected after the well was completed in October 2000 and purged for about 1 week where sulfate and iron concentrations were tested at 307 mg/l and 2,304 ug/l, respectively. The effects of long term purging prior to sampling were evaluated during the last LTM monitoring event in October 2004. Increased purging of the Picher #6 well to 4 days from 24 hours or less did not show an increase in concentrations compared to previous sampling events. However, the concentrations of most parameters were smaller this time with normal purging. The probable explanation for the improved iron and sulfate concentrations is the presence of an inflatable packer in the well that was installed in 2001 after the well was first tested. This well is not hooked up to distribution system and is not used as a public water supply well.

The iron concentration in the Picher #5 well decreased again over the last two sampling events as seen in Table 1 and the graph (Figure 2). The higher than normal iron concentration at the Picher #5, observed in April 2004 and the spike in 2001, are attributed to holes in the production pipe that allows some of the water to circulate out of the production pipe, down the casing, into the water column, and back into the pipe through the downhole pump.

Concentrations greater than tolerance limits for one of the three indicator parameters were observed at the Cardin Well (sulfate = 111 mg/l), the Picher #5 (sulfate = 132 mg/l), and the Picher #7 (sulfate = 125 mg/l). The tolerance limit for sulfate is 82 mg/l. While the iron concentrations in these wells are above Roubidoux background values, both iron and zinc concentrations are below tolerance limits of 207 and 43 ug/l, respectively. Since all three wells in Picher and the Cardin well had sulfate concentrations greater than the tolerance limit, **possible** impacts from mine water to the Roubidoux near Picher and Cardin are indicated.

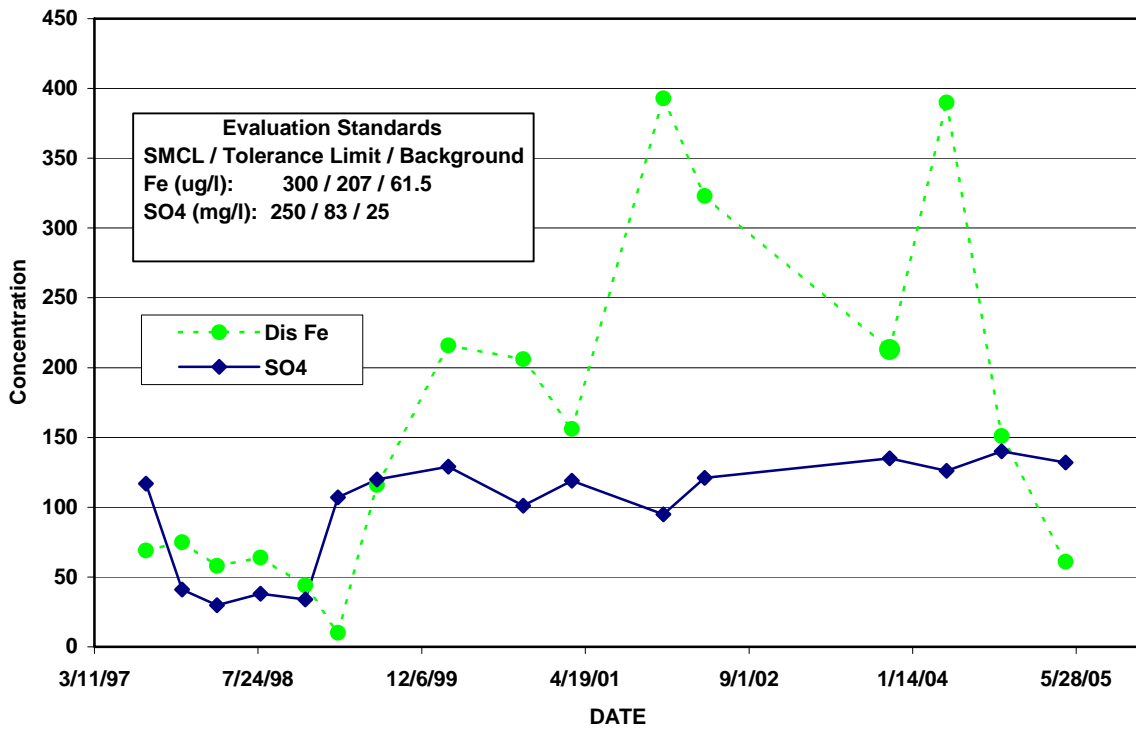


Figure 2: Picher #5 (Dissoved Iron and Sulfate Concentrations)

The Piper diagram (Figure 3) of the April 2005 LTM water quality data shows that all but four wells are impacted slightly by mine water. This is graphically displayed in the lower right triangle of the diagram where the points representing the anion percentage composition of the water samples from the four wells (Commerce #5, Miami #3, Quapaw #4, and RWD4#4) plot near the Roubidoux background endpoint. The points representing the anion composition of the other wells plot midway between the mine water and Roubidoux background endpoints.

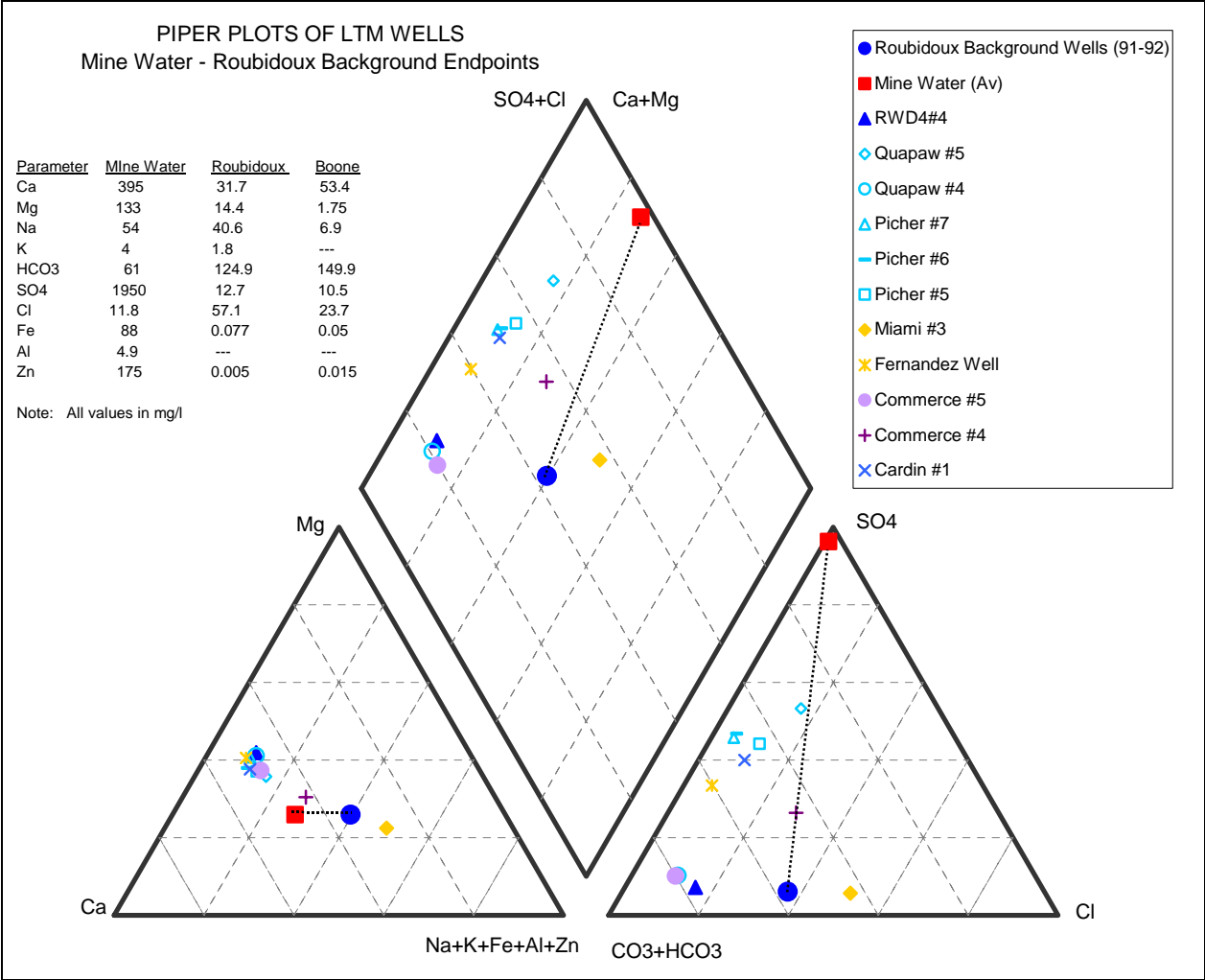


Figure 3 – Piper Diagram of LTM Water Quality (April 2005)

Table 1 – Analytical Results for Tar Creek Long Term Monitoring of Roubidoux Wells

Analytical Data for Tar Creek Long Term Monitoring of Roubidoux Wells

WELL	DATE		Cond. (Field) uS/cm	Temp. (Field) °C	pH (Field)	D.O. (Field) mg/l	Alk (Field) CaCO ₃ mg/l	Alkalinity CaCO ₃ mg/l	Chloride Cl mg/l	Sulfate SO ₄ mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO ₃ mg/l	Calcium Ca mg/l	Magnesium Mg mg/l	Sodium Na mg/l	Potassium K mg/l
									(250)	(250)	(500)					
MCL(SMCL)																
Cardin #1:			SW SE SE 19-T29N-R23E; N 36 58 23.3, W 94 51 07.2, EL=817; TD=1150													
	4/25/05	Totals	510	18.3	7.56	1.58	177	144	21	111	347	260	59	27	14	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	58	26	13	3
	10/12/04	Totals	498	18.3	7.62	1.82	199	140	20.4	107	333	250	59	27	14	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	56	26	13	3
	4/27/04	Totals	334	19.6	7.43	3.48	150	138	14.5	93.3	319	231	50	24	12	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	50	24	12	3
	11/6/03	Totals	595	17.6	6.47	n.a.	145	149	27.1	134	388	281	61	30	17	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	61	30	17	3
		Averages	484	18.5	7.27	2.29	168	143	20.8	111.3	347	256	57	27	14	3
Commerce #4:			NW NE NW 6-T28N-R23E; N 36 56 31.9, W 94 52 21.1, EL=812; TD=1250													
	4/26/05	Totals	577	19.4	7.7	1.8	n.a.	135	60.5	76	342	214	49	22	34	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	48	21	34	3
	10/12/04	Totals	614	19	7.47	1.61	183	148	43.5	126	403	270	65	27	29	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	63	26	29	3
	4/27/04	Totals	403	18.7	7.75	3.39	218	144	59.5	107	409	252	54	24	35	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	56	25	35	3
	11/6/03	Totals	615	17.9	6.42	n.a.	153	150	37.9	119	383	260	61	26	28	3
		Dissolved	-	-	-	-	-	-	-	-	-	-	57	25	27	3
		Averages	552	18.8	7.34	2.27	185	144	50.4	107.0	384	249	57	25	31	3
Commerce #5 MW:			NW SE NW 6-T28N-R23E; N 36 56 19.4, W 94 52 17.9, EL=812; TD=1100													
	4/26/05	Totals	268	18.4	8.17	5.18	n.a.	115	< 10	13.9	150	121	28	13	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	28	13	8	2
	10/12/04	Totals	260	17.9	8.64	5.65	152	111	< 10	13	154	124	28	13	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	28	13	8	2
	4/27/04	Totals	252	18.9	7.82	5.75	158	111	< 10	11.8	158	122	25	13	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	25	13	8	2
	* 4/27/04	Totals	252	18.9	7.82	5.75	158	111	< 10	11.8	158	123	25	13	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	26	13	8	2
	11/6/03	Totals	294	17.7	7.29	n.a.	108	112	15.6	12	155	127	26	13	11	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	26	13	11	2
		Averages	265	18.4	7.95	5.58	144	112	11.1	12.5	155	123	27	13	9	2
Fernandez Well:			SE NW NW 24-T29N-R23E; N 36 59 04.7, W 94 46 20.3, EL=852; TD=1050													
	4/25/05	Totals	402	15.8	7.27	1.4	180	136	< 10.0	72.5	241	199	44	21	7	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	43	21	7	2
	1/28/05	Totals	756	12.1	7.03	2.63	n.a.	211	< 10.0	282	648	477	-	-	49	13
	10/11/04	Totals	445	15.4	7.41	2.09	128	138	< 10.0	92.4	284	219	57	27	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	56	26	8	2
	* 10/11/04	Totals	445	15.4	7.41	2.09	128	148	< 10.0	115	327	248	57	27	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	54	25	7	2
	4/29/04	Totals	427	17.3	7.5	2.27	134	128	< 10.0	56.3	233	185	43	22	7	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	28	15	6	2
	* 4/29/04	Totals	427	17.3	7.5	2.27	134	144	< 10.0	103	328	236	39	20	7	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	28	15	6	2
	12/19/03	Totals	415	14.8	6.64	n.a.	125	147.0	< 10.0	85.5	274	213	46	23	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	46	24	8	2
	11/4/03	Totals	252	17.1	7.83	n.a.	115	114.0	< 10.0	16.4	138	126	27	14	5	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	27	14	5	2
	10/6/03	Totals	257	18.3	7.08	n.a.	130	98.9	< 10.0	14.0	148	124	26	14	5	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	26	14	5	2
	* 10/6/03	Totals	257	18.3	7.08	n.a.	130	98.6	< 10.0	16.4	132	126	26	14	5	2
		Dissolved	-	-	-	-	-	-	-	-	-	-	26	14	5	2
	7/30/03	Dis Met	370	18.2	8.19	n.a.	na	145.0	11.1	126.0	368	na	60	29	8	2
		Averages	405	16.4	7.36	2.13	134	137.1	10.1	89.0	284	215	40	20	9	3

WELL	DATE	Antimony Sb mg/l	Arsenic As mg/l	Cadmium Cd mg/l	Chromium Cr mg/l	Iron Fe mg/l	Lead Pb mg/l	Manganese Mn mg/l	Mercury Hg mg/l	Nickel Ni mg/l	Selenium Se mg/l	Thallium Tl mg/l	Zinc Zn mg/l	CAT / AN BALANCE % Error
		0.006	0.01	0.005	0.1	(0.3)	0.015	0.05	0.002	0.1	0.05	0.002	(5)	
Cardin #1:														
	4/25/05	< 0.002	< 0.002	< 0.002	< 0.010	0.193	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.036	0.61
		< 0.002	< 0.002	< 0.002	< 0.010	0.152	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	0.139	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.009	2.19
		< 0.002	< 0.002	< 0.002	< 0.010	0.114	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.132	< 0.010	0.009	0.00005	< 0.010	< 0.010	< 0.010	0.033	-0.39
		< 0.010	< 0.010	< 0.005	< 0.005	0.112	< 0.010	0.009	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/6/03	< 0.002	< 0.002	< 0.002	< 0.010	0.101	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.022	-1.58
		< 0.002	< 0.002	< 0.002	< 0.010	0.098	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.004	0.004	0.003	0.009	0.130	0.006	0.010	0.00005	0.010	0.010	0.003	0.016	0.21
Commerce #4:														
	4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	0.077	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-1.48
		< 0.002	< 0.002	< 0.002	< 0.010	0.072	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	0.090	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.03
		< 0.002	< 0.002	< 0.002	< 0.010	0.086	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.087	< 0.010	0.009	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-3.94
		< 0.010	< 0.010	< 0.005	< 0.005	0.085	< 0.010	0.010	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/6/03	< 0.002	< 0.002	< 0.002	< 0.010	0.095	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-0.50
		< 0.002	< 0.002	< 0.002	< 0.010	0.086	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.004	0.004	0.003	0.009	0.085	0.006	0.010	0.00005	0.010	0.010	0.003	0.006	-1.49
Commerce #5 MW:														
	4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	0.070	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.05
		< 0.002	< 0.002	< 0.002	< 0.010	0.034	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	0.092	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	1.70
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.093	< 0.010	< 0.010	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-0.53
		< 0.010	< 0.010	< 0.005	< 0.005	0.034	< 0.010	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	* 4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.114	< 0.010	< 0.010	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-0.53
		< 0.010	< 0.010	< 0.005	< 0.005	0.039	< 0.010	< 0.010	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/6/03	< 0.002	< 0.002	< 0.002	< 0.010	0.080	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-0.53
		< 0.002	< 0.002	< 0.002	< 0.010	0.048	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.010	
		0.005	0.005	0.003	0.008	0.062	0.007	0.010	0.00005	0.010	0.010	0.005	0.006	0.01
Fernandez Well:														
	4/25/05	< 0.002	< 0.002	< 0.002	< 0.010	0.630	< 0.005	0.011	< 0.00005	< 0.010	< 0.010	< 0.001	0.689	-2.61
		< 0.002	< 0.002	< 0.002	< 0.010	0.526	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.321	
	1/28/05	na	na	< 0.002	< 0.005	0.512	< 0.005	0.013	na	na	na	na	1.200	na
	10/11/04	< 0.002	< 0.002	< 0.002	< 0.010	0.349	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.244	4.82
		< 0.002	< 0.002	< 0.002	< 0.010	0.343	0.015	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.148	
	* 10/11/04	< 0.002	< 0.002	< 0.002	< 0.010	0.358	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.251	-1.52
		< 0.002	< 0.002	< 0.002	< 0.010	0.318	0.021	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.169	
	4/29/04	< 0.010	< 0.010	< 0.005	< 0.005	0.359	< 0.010	0.006	0.00006	< 0.010	< 0.010	< 0.010	0.299	3.60
		< 0.010	< 0.010	< 0.005	< 0.005	0.238	0.012	< 0.005	< 0.00005	< 0.010	< 0.010	< 0.010	0.089	
	* 4/29/04	< 0.010	< 0.010	< 0.005	< 0.005	0.359	< 0.010	0.006	< 0.00005	< 0.010	< 0.010	< 0.010	0.228	-14.66
		< 0.010	< 0.010	< 0.005	< 0.005	0.249	< 0.010	< 0.005	< 0.00005	< 0.010	< 0.010	< 0.010	0.037	
	12/19/03	< 0.002	< 0.002	< 0.002	< 0.010	0.319	0.026	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.236	-4.30
		< 0.002	< 0.002	< 0.002	< 0.010	0.464	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.464	
	11/4/03	< 0.002	< 0.002	< 0.002	< 0.010	0.316	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.083	-2.35
		< 0.002	< 0.002	< 0.002	< 0.010	0.246	0.013	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.070	
	10/6/03	< 0.002	< 0.002	< 0.002	< 0.010	0.208	0.017	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.050	3.20
		< 0.002	< 0.002	< 0.002	< 0.010	0.288	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.067	
	* 10/6/03	< 0.002	< 0.002	< 0.002	< 0.010	0.287	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.065	2.34
		< 0.002	< 0.002	< 0.002	< 0.010	0.224	0.008	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.033	
	7/30/03	na	na	na	na	0.410	0.056	< 0.010	na	< 0.010	< 0.010	na	0.239	-0.46
		0.004	0.004	0.003	0.009	0.350	0.012	0.009	0.00005	0.010	0.010	0.003	0.249	-1.19

WELL	DATE	Cond. (Field) uS/cm	Temp. (Field) °C	pH (Field)	D.O. (Field) mg/l	Alk (Field) CaCO ₃ mg/l	Alkalinity CaCO ₃ mg/l	Chloride Cl mg/l	Sulfate SO ₄ mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO ₃ mg/l	Calcium Ca mg/l	Magnesium Mg mg/l	Sodium Na mg/l	Potassium K mg/l	
MCL(SMCL)								(250)	(250)	(500)						
Miami #1:	SW NE SW 30-T28N-R23E; N 36 52 30.9, W 94 52 23.4; EL=790; TD=1233															
	4/27/04	Totals	413	19.6	8.27	3.3	120	78.8	12.6	265	133	29	14	47	3	
		Dissolved	-	-	-	-	-	-	-	-	-	28	14	45	2	
	11/4/03	Totals	500	15.7	7.15	n.a.	na	117.0	12.4	262	133	30	15	50	3	
		Dissolved	-	-	-	-	-	-	-	-	-	30	15	50	3	
	* 11/4/03	Totals	500	15.7	7.15	n.a.	na	116.0	12.5	264	135	29	14	49	3	
		Dissolved	-	-	-	-	-	-	-	-	-	30	15	50	3	
		Averages	471	17.0	7.52	3.30	120	82.3	12.5	264	134	29	15	49	3	
Miami #3:	NE NW 31-T28N-R23E; N 36 52 10.28, W 94 52 23.82; EL=783; TD=1252															
	4/26/05	Totals	527	18.8	7.77	1.47	n.a.	116	14	282	131	30	14	56	3	
		Dissolved	-	-	-	-	-	-	-	-	-	29	14	57	3	
	* 4/26/05	Totals	527	18.8	7.77	1.47	n.a.	117	15.4	283	130	29	14	56	3	
		Dissolved	-	-	-	-	-	-	-	-	-	29	14	56	3	
	10/12/04	Totals	506	16.5	8.00	1.65	102	114	13.4	293	134	30	14	57	3	
		Dissolved	-	-	-	-	-	-	-	-	-	32	15	56	3	
	* 10/12/04	Totals	506	16.5	8.00	1.65	102	114	13.6	291	132	28	13	54	3	
		Dissolved	-	-	-	-	-	-	-	-	-	30	14	56	3	
		Averages	517	17.7	7.89	1.56	102	115	14.1	287	132	30	14	56	3	
Picher #5-MW:	SE SE NE 29-T29N-R23E; N 36 57 55.6, W 94 49 54.7; GL(topo)=815; TD=1100.															
	4/25/05	Totals	581	18.5	7.56	2.91	132	138	132	373	273	61	28	17	3	
		Dissolved	-	-	-	-	-	-	-	-	-	62	28	17	3	
	10/12/04	Totals	569	18.3	7.68	2.33	122	136	140	398	279	63	29	17	3	
		Dissolved	-	-	-	-	-	-	-	-	-	62	28	17	3	
	4/27/04	Totals	536	20.7	7.33	3.19	142	134	126	384	253	55	26	19	3	
		Dissolved	-	-	-	-	-	-	-	-	-	55	27	18	3	
	11/5/03	Totals	590	14	6.52	n.a.	na	140	135	381	278	61	29	18	3	
		Dissolved	-	-	-	-	-	-	-	-	-	59	28	18	3	
		Averages	569	17.9	7.27	2.81	132	137	133.3	384	271	60	28	18	3	
Picher #6 MW:	SE NW NW 21-T29N-R23E; N 36 59 00.7, W 94 49 38.7, EL=824 Topo; TD=1100															
	4/25/05	Totals	510	18.6	7.77	3.24	n.a.	135	< 10	125	333	251	60	26	12	2
		Dissolved	-	-	-	-	-	-	-	-	-	58	26	12	2	
	* 4/25/05	Totals	510	18.6	7.77	3.24	n.a.	134	< 10	126	336	251	61	26	12	2
		Dissolved	-	-	-	-	-	-	-	-	-	56	25	12	2	
	10/11/04	Totals	553	19.1	7.44	2.06	193	147	< 10	170	417	303	71	30	13	2
		Dissolved	-	-	-	-	-	-	-	-	-	71	30	13	2	
	4/27/04	Totals	555	20.9	7.26	4.92	157	143	< 10	156	407	293	63	29	14	2
		Dissolved	-	-	-	-	-	-	-	-	-	62	29	13	2	
	12/9/03	Totals	537	18.2	6.83	n.a.	135	143	< 10	150	380	280	65	29	13	2
		Dissolved	-	-	-	-	-	-	-	-	-	60	27	12	2	
	* 12/9/03	Totals	537	18.2	6.83	n.a.	135	142	< 10	150	381	277	64	29	13	2
		Dissolved	-	-	-	-	-	-	-	-	-	61	27	12	2	
		Averages	534	18.9	7.32	3.37	155	141	10.0	146.2	376	276	63	28	13	2
Picher #7 MW:	aka: PICHER - CARDIN MW; NW SE SW 20-T29N-R23E; N 36 58 28.2, W 94 50 38.3, EL=815; TD=1100															
	4/25/05	Totals	524	18.3	7.71	1.87	174	140	10.1	125	341	261	59	28	11	3
		Dissolved	-	-	-	-	-	-	-	-	-	56	28	11	3	
	10/12/04	Totals	483	17.9	7.83	1.31	129	136	13.5	112	306	244	54	26	12	3
		Dissolved	-	-	-	-	-	-	-	-	-	55	27	12	3	
	4/27/04	Totals	480	20.2	7.5	4.35	105	134	12.6	112	335	237	51	26	12	3
		Dissolved	-	-	-	-	-	-	-	-	-	49	26	12	3	
	11/5/03	Totals	563	14.7	6.89	n.a.	na	145	< 10	141	374	284	60	31	12	3
		Dissolved	-	-	-	-	-	-	-	-	-	59	31	12	3	
		Averages	513	17.8	7.48	2.51	136	139	11.6	122.5	339	257	55	28	12	3

WELL	DATE	Antimony Sb mg/l	Arsenic As mg/l	Cadmium Cd mg/l	Chromium Cr mg/l	Iron Fe mg/l	Lead Pb mg/l	Manganese Mn mg/l	Mercury Hg mg/l	Nickel Ni mg/l	Selenium Se mg/l	Thallium Tl mg/l	Zinc Zn mg/l	CAT / AN BALANCE % Error
		0.006	0.01	0.005	0.1	(0.3)	0.015	0.05	0.002	0.1	0.05	0.002	(5)	
Miami #1:														
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	1.130	< 0.010	0.012	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-0.03
		< 0.010	< 0.010	< 0.005	< 0.005	0.042	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/4/03	< 0.002	< 0.002	< 0.002	< 0.010	0.372	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.010	0.29
		< 0.002	< 0.002	< 0.002	< 0.010	0.062	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
	* 11/4/03	< 0.002	< 0.002	< 0.002	< 0.010	0.057	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-1.58
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.005	0.005	0.003	0.008	0.281	0.007	0.010	0.0001	0.010	0.010	0.004	0.008	-0.44
Miami #3:														
	4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-1.70
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	* 4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-2.80
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.89
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	* 10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-3.62
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
		0.002	0.002	0.002	0.010	0.020	0.005	0.010	0.00005	0.010	0.010	0.001	0.005	-2.25
Picher #5-MW:														
	4/25/05	< 0.002	< 0.002	< 0.002	< 0.010	0.093	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.47
		< 0.002	< 0.002	< 0.002	< 0.010	0.061	< 0.005	< 0.010	0.00011	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	0.171	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.24
		< 0.002	< 0.002	< 0.002	< 0.010	0.151	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.433	< 0.010	0.007	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-2.62
		< 0.010	< 0.010	< 0.005	< 0.005	0.390	< 0.010	0.007	0.00008	< 0.010	< 0.010	< 0.010	< 0.005	
	11/5/03	< 0.002	< 0.002	< 0.002	< 0.010	0.232	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-0.32
		< 0.002	< 0.002	< 0.002	< 0.010	0.213	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.004	0.004	0.003	0.009	0.218	0.006	0.009	0.00006	0.010	0.010	0.003	0.006	-0.91
Picher #6 MW:														
	4/25/05	< 0.002	0.002	< 0.002	< 0.010	0.345	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.006	1.11
		< 0.002	0.002	< 0.002	< 0.010	0.341	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.007	
	* 4/25/05	< 0.002	0.002	< 0.002	< 0.010	0.338	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.006	1.53
		< 0.002	0.002	< 0.002	< 0.010	0.331	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.006	
	10/11/04	< 0.002	0.002	< 0.002	< 0.010	0.531	< 0.005	0.012	< 0.00005	< 0.010	< 0.010	< 0.001	0.021	-0.97
		< 0.002	0.002	< 0.002	< 0.010	0.507	< 0.005	0.012	< 0.00005	< 0.010	< 0.010	< 0.001	0.020	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.444	< 0.010	0.011	0.00005	< 0.010	< 0.010	< 0.010	0.015	-1.57
		< 0.010	< 0.010	< 0.005	< 0.005	0.414	< 0.010	0.011	0.00005	< 0.010	< 0.010	< 0.010	0.019	
	12/9/03	< 0.002	0.002	< 0.002	< 0.010	0.464	< 0.005	0.013	< 0.00005	< 0.010	< 0.010	< 0.001	0.016	-0.13
		< 0.002	0.002	< 0.002	< 0.010	0.337	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.015	
	* 12/9/03	< 0.002	0.002	< 0.002	< 0.010	0.460	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.014	-0.37
		< 0.002	0.002	< 0.002	< 0.010	0.337	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.016	
		0.003	0.003	0.003	0.009	0.404	0.006	0.011	0.00005	0.010	0.010	0.003	0.013	-0.07
Picher #7 MW:														
	4/25/05	< 0.002	< 0.002	< 0.002	< 0.010	0.090	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	1.03
		< 0.002	< 0.002	< 0.002	< 0.010	0.090	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/12/04	< 0.002	< 0.002	< 0.002	< 0.010	0.127	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	0.03
		< 0.002	< 0.002	< 0.002	< 0.010	0.121	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/27/04	< 0.010	< 0.010	< 0.005	< 0.005	0.078	< 0.010	0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-0.76
		< 0.010	< 0.010	< 0.005	< 0.005	0.072	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/5/03	< 0.002	< 0.002	< 0.002	< 0.010	0.166	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	0.24
		< 0.002	< 0.002	< 0.002	< 0.010	0.160	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.004	0.004	0.003	0.009	0.113	0.006	0.009	0.00005	0.010	0.010	0.003	0.006	0.13

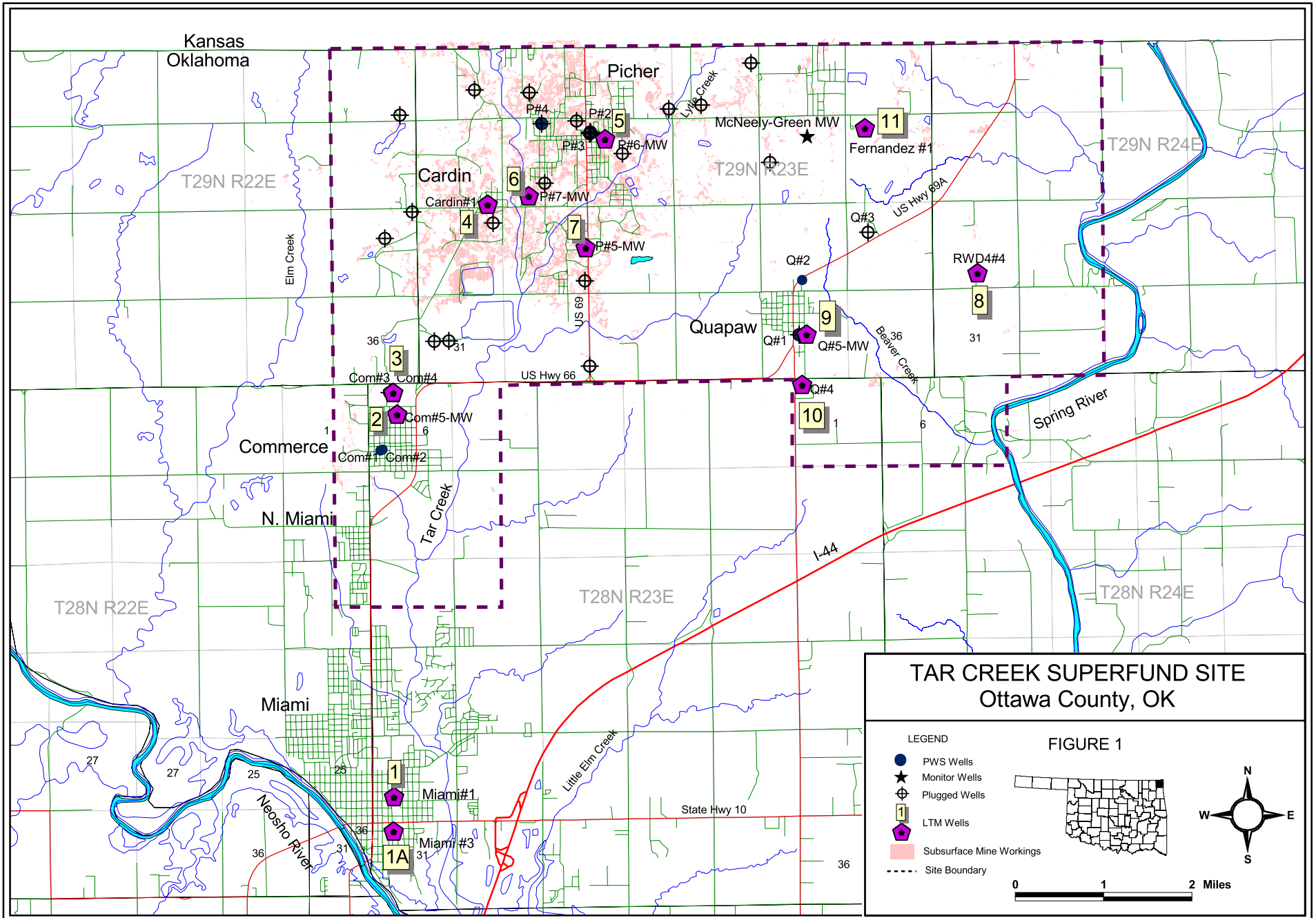
WELL	DATE	Cond. (Field) uS/cm	Temp. (Field) °C	pH (Field)	D.O. (Field) mg/l	Alk (Field) CaCO ₃ mg/l	Alkalinity CaCO ₃ mg/l	Chloride Cl mg/l	Sulfate SO ₄ mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO ₃ mg/l	Calcium Ca mg/l	Magnesium Mg mg/l	Sodium Na mg/l	Potassium K mg/l	
Quapaw #4:		MCL(SMCL)							(250)	(250)	(500)					
NW NW NW 1-T28N-R23E; N 36 56 33.4, W 94 47 11.2, EL(Topo)=845; TD=135f																
4/26/05	Totals	261	16.8	8.04	1.57	n.a.	109	< 10	13.5	138	119	26	13	6	1	
	Dissolved	-	-	-	-	-	-	-	-	-	-	25	13	6	1	
10/13/04	Totals	242	17.4	7.86	1.43	124	104	< 10	12.7	149	121	27	14	5	1	
	Dissolved	-	-	-	-	-	-	-	-	-	-	27	13	5	1	
* 10/13/04	Totals	242	17.4	7.86	1.43	124	104	< 10	12.8	147	121	27	13	5	1	
	Dissolved	-	-	-	-	-	-	-	-	-	-	27	14	5	1	
4/28/04	Totals	275	19.4	7.31	2.29	146	107	< 10	11.8	152	122	25	13	8	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	24	13	7	2	
11/6/03	Totals	249	17.7	7.03	n.a.	107	109	< 10	11.1	129	120	25	13	5	1	
	Dissolved	-	-	-	-	-	-	-	-	-	-	24	13	5	1	
* 11/6/03	Totals	249	17.7	7.03	n.a.	107	109	< 10	11.1	131	121	24	13	5	1	
	Dissolved	-	-	-	-	-	-	-	-	-	-	25	13	5	1	
	Averages	253	17.7	7.52	1.68	122	107	10.0	12.2	141	121	26	13	6	1	
Quapaw #5 MW: SW SW NE 35-T29N-R23E; N 36 57 04.4, W 94 47 07.3, EL=850 Topo; TD=110f																
4/26/05	Totals	1350	19.2	7.1	1.93	n.a.	246	92.4	412	1020	733	159	72	52	7	
	Dissolved	-	-	-	-	-	-	-	-	-	-	152	68	51	7	
10/13/04	Totals	1341	18.6	7.01	2.43	247	250	95.9	410	1010	739	159	70	53	7	
	Dissolved	-	-	-	-	-	-	-	-	-	-	144	65	48	7	
4/28/04	Totals	1372	21.7	6.87	1.75	260	254	104	455	1083	754	148	71	59	8	
	Dissolved	-	-	-	-	-	-	-	-	-	-	147	72	58	7	
11/6/03	Totals	1427	18.5	6.41	n.a.	265	250	102	401	1050	751	146	70	58	8	
	Dissolved	-	-	-	-	-	-	-	-	-	-	147	71	59	8	
	Averages	1373	19.5	6.85	2.04	257	250	98.6	419.5	1041	744	150	70	55	7	
RWD4 #4 (aka: Blue hole Well): NE SE SW 30-T29N-R24E; N 36 57 38.7, W 94 44 56.3, EL(Topo)=900; TD=110f																
4/26/05	Totals	282	18.4	8.01	1.91	n.a.	114	16.5	10.2	157	133	28	15	6	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	28	15	6	2	
10/13/04	Totals	275	18.9	7.97	2.3	157	109	16.6	10.2	154	132	29	16	7	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	28	15	6	2	
4/28/04	Totals	273	19.9	7.42	3.34	124	110	15.2	< 10.0	160	135	26	15	6	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	26	15	6	2	
* 4/28/04	Totals	273	19.9	7.42	3.34	124	110	15.2	< 10.0	159	132	25	15	6	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	26	15	6	2	
11/7/03	Totals	283	17.7	6.65	n.a.	110	114	14.8	< 10.0	133	135	27	15	6	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	27	15	6	2	
* 11/7/03	Totals	283	17.7	6.65	n.a.	110	114	14.6	< 10.0	136	134	27	16	6	2	
	Dissolved	-	-	-	-	-	-	-	-	-	-	27	16	6	2	
	Averages	278	18.8	7.35	2.72	125	112	15.5	10.1	150	134	27	15	6	2	

NOTE: 1) Detection limits used in calculation of means; 2) total and dissolved metals concentrations used in calculation of means; 3) means are in bold type
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7) underline indicates a value detected in blank; 8) na indicates not analyzed; 9) dash indicates not relevant; 10) Italics indicates value > Tolerance Limi
11) Indicator parameters of mine water contamination with tolerance limits and Roubidoux background concentration: **Sulfate** (82 / 25 mg/l); **Iron** (207 / 61.5 ug/l); **Zinc** (43 / 8.8 ug/l).

WELL	DATE	Antimony Sb mg/l	Arsenic As mg/l	Cadmium Cd mg/l	Chromium Cr mg/l	Iron Fe mg/l	Lead Pb mg/l	Manganese Mn mg/l	Mercury Hg mg/l	Nickel Ni mg/l	Selenium Se mg/l	Thallium Tl mg/l	Zinc Zn mg/l	CAT / AN BALANCE % Error
Quapaw #4:														
		0.006	0.01	0.005	0.1	(0.3)	0.015	0.05	0.002	0.1	0.05	0.002	(5)	
	4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-1.62
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/13/04	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	2.20
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.005	
	* 10/13/04	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	0.64
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/28/04	< 0.010	< 0.010	< 0.005	< 0.005	< 0.020	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	0.005	0.94
		< 0.010	< 0.010	< 0.005	< 0.005	< 0.020	< 0.010	< 0.005	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/6/03	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-2.49
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
	* 11/6/03	< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-3.47
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.003	0.003	0.003	0.009	0.020	0.006	0.009	0.00005	0.010	0.010	0.003	0.007	-0.63
Quapaw #5 MW:														
	4/26/05	< 0.002	0.005	< 0.002	< 0.010	2.860	< 0.005	0.039	< 0.00005	< 0.010	< 0.010	< 0.001	0.167	0.62
		< 0.002	0.005	< 0.002	< 0.010	2.680	< 0.005	0.039	< 0.00005	< 0.010	< 0.010	< 0.001	0.159	
	10/13/04	< 0.002	0.005	< 0.002	< 0.010	3.060	< 0.005	0.043	< 0.00005	< 0.010	< 0.010	< 0.001	0.178	-0.18
		< 0.002	0.005	< 0.002	< 0.010	2.750	< 0.005	0.042	< 0.00005	< 0.010	< 0.010	< 0.001	0.160	
	4/28/04	< 0.010	< 0.010	< 0.005	< 0.005	3.680	< 0.010	0.050	< 0.00005	< 0.010	< 0.010	< 0.010	0.208	-4.43
		< 0.010	0.011	< 0.005	< 0.005	3.580	< 0.010	0.049	< 0.00005	< 0.010	< 0.010	< 0.010	0.194	
	11/6/03	< 0.002	0.005	< 0.002	< 0.010	3.720	< 0.005	0.046	< 0.00005	< 0.010	< 0.010	< 0.001	0.222	-1.40
		< 0.002	0.005	< 0.002	< 0.010	3.690	< 0.005	0.047	< 0.00005	< 0.010	< 0.010	< 0.001	0.213	
		0.004	0.006	0.003	0.009	3.253	0.006	0.044	0.00005	0.010	0.010	0.003	0.188	-1.35
RWD4 #4														
	4/26/05	< 0.002	< 0.002	< 0.002	< 0.010	0.031	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	-0.20
		< 0.002	< 0.002	< 0.002	< 0.010	0.026	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	10/13/04	< 0.002	< 0.002	< 0.002	< 0.010	0.026	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	4.36
		< 0.002	< 0.002	< 0.002	< 0.010	< 0.020	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.005	
	4/28/04	< 0.010	< 0.010	< 0.005	< 0.005	0.026	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	0.16
		< 0.010	< 0.010	< 0.005	< 0.005	0.027	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	* 4/28/04	< 0.010	< 0.010	< 0.005	< 0.005	0.025	< 0.010	< 0.005	0.00005	< 0.010	< 0.010	< 0.010	< 0.005	-0.72
		< 0.010	< 0.010	< 0.005	< 0.005	0.029	< 0.010	< 0.005	< 0.00005	< 0.010	< 0.010	< 0.010	< 0.005	
	11/7/03	< 0.002	< 0.002	< 0.002	< 0.010	0.044	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	-0.17
		< 0.002	< 0.002	< 0.002	< 0.010	0.038	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
	* 11/7/03	< 0.002	< 0.002	< 0.002	< 0.010	0.045	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	1.33
		< 0.002	< 0.002	< 0.002	< 0.010	0.038	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	< 0.010	
		0.005	0.005	0.003	0.008	0.031	0.007	0.008	0.00005	0.010	0.010	0.004	0.007	0.79

NOTE: 1) Detection limits used in calculation of means; 2) total and dissolved metals concentrations used in calculation of means; 3) means are in bold type
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7) underline indicates a value detected in blank; 8) na indicates not analyzed; 9) dash indicates not relevant; 10) Italics indicates value > Tolerance Limi
11) Indicator parameters of mine water contamination with tolerance limits and Roubidoux background concentration: **Sulfate** (82 / 25 mg/l); **Iron** (207 / 61.5 ug/l); **Zinc** (43 / 8.8 ug/l).

Figure 1 – Map of Site and Long Term Monitoring Wells



List of Long Term Monitoring Wells

- 1a. **Miami # 1:** SW NE SW S30-T28N-R23E (N 36° 52' 30.9'' W 94° 52' 23.4''); Public Water Supply Well; Elevation: 795'; Total Depth: 1233'; Casing Depth: 433'.
- 1b. **Miami #3:** SWNENW S31-T28N-R23E (N 36° 52' 06.0'' W 94° 52' 22.0''); Public Water Supply Well; Elevation: 783'; Total depth: 1252'; Casing Depth: 460'.
2. **Commerce # 5:** NW SE NW S6-T28N-R23E (N 36° 56' 19.4'' W 94° 52' 17.9''); Monitoring Well; Elevation: 810'; Total depth: 1100'; Casing Depth: 850'.
3. **Commerce # 4:** NW NE NW S6-T28N-R23E (N 36° 56' 31.9'' W 94° 52' 21.1''); Public Water Supply Well; Elevation: 812'; Total depth: 1,250'; Casing Depth: 680'.
4. **Cardin # 1:** SW SE SE S19-T29N-R23E (N 36° 58' 23.3'' W 94° 51' 07.2''); Public Water Supply Well; Elevation: 817'; Total depth: 1150'; Casing Depth: 600'.
5. **Picher # 6:** SE NW NW S21-T29N-R23E (N 36° 59' 00.7'' W 94° 49' 38.7''); Monitoring Well; Elevation: 822'; Total depth: 1100'; Casing Depth: 850'; Inflatable Packer at 800'.
6. **Picher # 7 (aka Picher-Cardin Well):** NW SE SW S20-T29N-R23E (N 36° 58' 28.2'' W 94° 50' 38.3''); Stand-By Well; Elevation: 814'; Total depth: 1100'; Casing Depth: 850'.
7. **Picher # 5:** SE SE NE S29-T29N-R23E (N 36° 57' 55.6'' W 94° 49' 54.7''); Public Water Supply Well; Elevation: 812'; Total depth: 1100'; Casing Depth: 850'.
8. **RWD4 # 4 (aka Bluehole Well):** NE SE SW S30-T29N-R24E (N 36° 57' 38.7'' W 94° 44' 56.3''); Public Water Supply Well; Elevation: 831'; Total depth: 1100'; Casing Depth: 800'.
9. **Quapaw # 5:** SW SW NE S35-T29N-R23E (N 36° 57' 04.4'' W 94° 47' 07.3''); Monitoring Well; Elevation: 850'; Total depth: 1100'; Casing Depth: 850'.
10. **Quapaw # 4:** NW NW NW S1-T28N-R23E (N 36° 56' 33.4'' W 94° 47' 11.2''); Public Water Supply Well; Elevation: 845'; Total depth: 1,350'; Casing Depth: 620'.
11. **Fernandez Well:** SE NW NW S24-T29N-R23E (N 36° 59' 04.7'' W 94° 46' 20.3''); Domestic Drinking Water Well; Elevation: 850'; Total depth: 1050'; Casing Depth: 450'.