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Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

BRAD HENRY  
Governor

May 24, 2004

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 first round of samples of the Long Term Monitoring (LTM) project at Tar Creek for the Roubidoux aquifer. The table of results is attached for your review. A map with the well locations (Figure 1) is also included in Attachment 1. The primary and secondary MCLs are identified in the header of the table for data comparison. Also, the tolerance limits and Roubidoux background concentrations for the indicator parameters of mine water contamination (sulfate, iron, and zinc) are provided in the footnotes. 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).

The first round of LTM sampling was originally scheduled for April 2003 but was postponed until the Fall because the QAPP and SAP were not approved until May. The sampling event was pushed back further so the Fernandez well, a private source of drinking water, could be incorporated into the monitoring network. This well was formerly the water supply well for the Ontario Smelter located near Hockerville that operated during the 1920s.

Results of the baseline samples from the Fernandez well are included in the table. Total lead concentrations in this well exceeded primary drinking water standards on a few occasions. However, the dissolved concentrations were below the action level of 15 ug/l in all cases and samples of tap water tested ok. The tap water sample results are not in the table but are included for review as Attachment 2, a letter to Mr. Fernandez.

Secondary standards were violated in the Fernandez well, the Picher #6, the Quapaw #5, and the Miami #1 wells. One sample from the Miami #1 tested slightly above the iron standard with a total iron concentration of 372 ug/l. The filtered sample and a duplicate sample from this well tested well below the iron standard - near background concentrations for the Roubidoux (61.5 ug/l for iron).

Tests of the Quapaw #5 well continue to show that the Roubidoux water near 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 3.7, 1050, and 401 mg/l, respectively. Also, the manganese concentration (47 ug/l) is very near the standard of 50 ug/l.

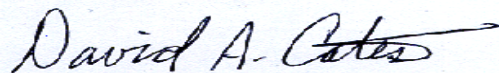
Water quality from the Picher #6 well appears to be much improved compared to initial results in October 2000 when iron, total dissolved solids, and sulfate concentrations (2.29, 843, 294 mg/l, respectively) greatly exceeded the standards. Iron at an average concentration of 0.4 mg/l is the only parameter above a standard in this well now. The reason for the water quality improvement is unknown. It may be related to the installation of an inflatable packer in the well (indicating the casing was leaking) or due to a shorter duration of purging prior to sampling (24 hours now compared to seven days originally), indicating a nearby contaminant source was drawn into the well when it was stressed by prolonged pumping. Both the Picher #6 and the Quapaw #5 are monitor wells drilled by DEQ in cooperation with EPA as part of After Action Monitoring project in 2000 and neither is hooked into a public water supply system.

The water quality of the Roubidoux at the Fernandez well shows no signs of degradation as a result of the placement of chat in the nearby sinkhole at the McNeely – Green site (Figure 1). The results of monitoring the sinkhole well are provided in Attachment 3. The water quality of the McNeely-Green monitor well, installed immediately after filling the sinkhole with chat, shows numerous violations of drinking water standards. The water samples are very turbid resulting in very high total metals concentrations but filtered samples also show poor water quality, including high dissolved iron, manganese, zinc, and TDS. The high values of specific conductance (SC), hardness, and sulfate observed in the monitor well have not shown up in the Fernandez well.

The Commerce #5, Quapaw #4, and the Rural Water District #4 (Bluehole well) have the best water quality, with SC values less than 300 uS/cm, and TDS concentrations less than 200 mg/l. Indicator parameters of mine water contamination (sulfate, iron and zinc) are below tolerance limits and are at or below background concentrations in these wells.

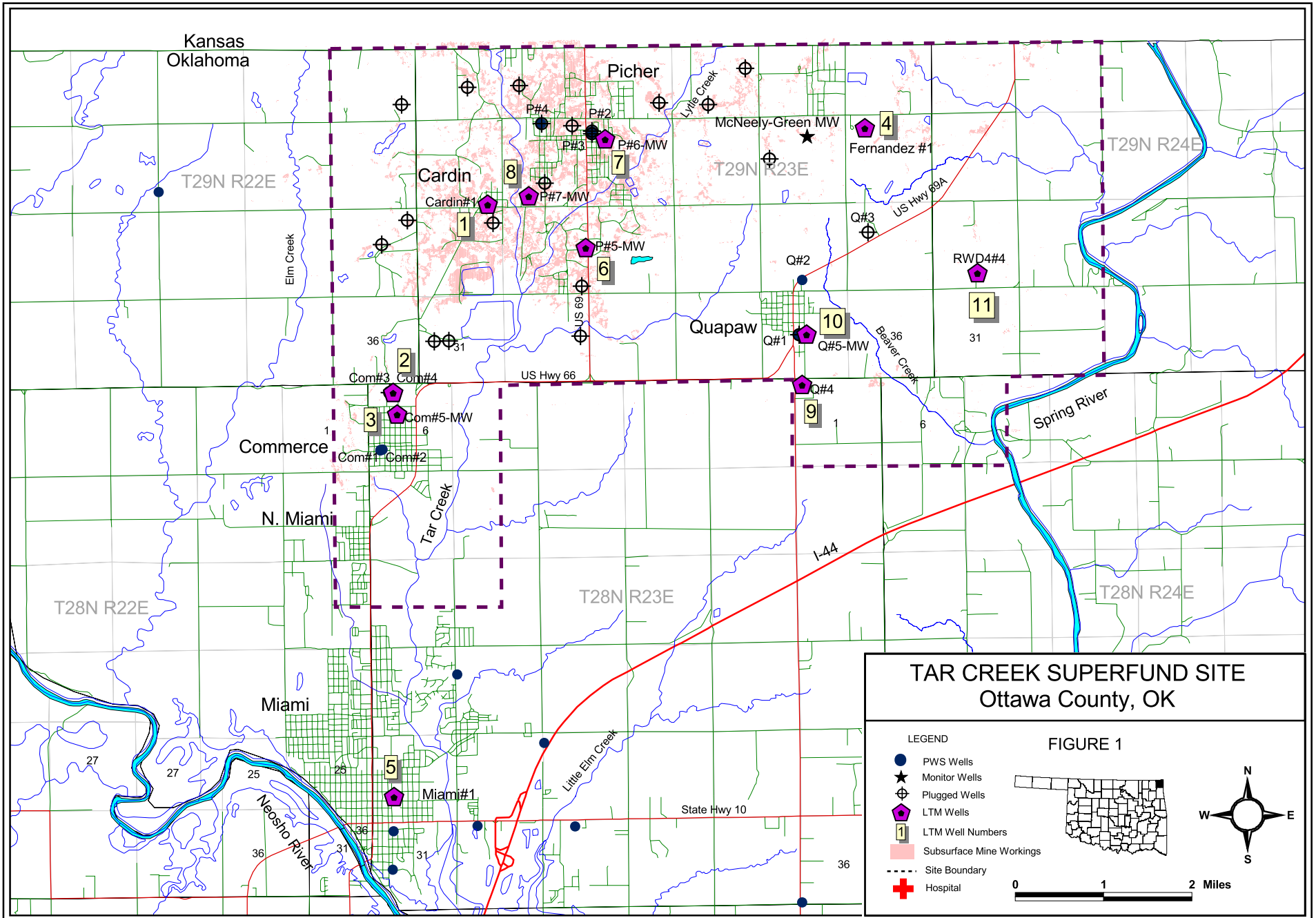
Please take a look at these data and let me know if you have any comments. Thank you for your attention to this matter. If you have any questions please call me at (405) 702-5124.

Sincerely,

A handwritten signature in black ink that reads "David A. Cates". The signature is written in a cursive style with a long horizontal stroke at the end.

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

## ATTACHMENT 1



## Analytical Data for Tar Creek Long Term Monitoring of Roubidoux Wells

WELL	DATE	Spec Cond (Field) uS/cm	Temp (Field) °C	pH (Field)	Alk (Field) CaCO <sub>3</sub> mg/l	Alkalinity CaCO <sub>3</sub> mg/l	Chloride Cl mg/l	Sulfate SO <sub>4</sub> mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO <sub>3</sub> mg/l	Calcium Ca mg/l	Magnesium Mg mg/l	Sodium Na mg/l	Potassium K mg/l	
							(250)	(250)	(500)						
<b>Cardin #1:</b>		<b>SW SE SE 19-T29N-R23E; N 36 58 23.3, W 94 51 07.2, EL 817</b>													
	11/6/03	Totals	595	17.6	6.47	145	149	27.1	134	388	281	61	30	17	3
		Dissolved	-	-	-	-	-	-	-	-	-	61	30	17	3
		<b>Averages</b>	<b>595</b>	<b>17.6</b>	<b>6.47</b>	<b>145</b>	<b>149</b>	<b>27.1</b>	<b>134</b>	<b>388</b>	<b>281</b>	<b>61</b>	<b>30</b>	<b>17</b>	<b>3</b>
<b>Commerce #4:</b>		<b>NW NE NW 6-T28N-R23E; N 36 56 31.9, W 94 52 21.1, EL 812</b>													
	11/6/03	Totals	615	17.9	6.42	153	150	37.9	119	383	260	61	26	28	3
		Dissolved	-	-	-	-	-	-	-	-	-	57	25	27	3
		<b>Averages</b>	<b>615</b>	<b>17.9</b>	<b>6.42</b>	<b>153</b>	<b>150</b>	<b>37.9</b>	<b>119.0</b>	<b>383</b>	<b>260</b>	<b>59</b>	<b>26</b>	<b>28</b>	<b>3</b>
<b>Commerce #5 MW:</b>		<b>NW SE NW 6-T28N-R23E; N 36 56 19.4, W 94 52 17.9, EL 812</b>													
	11/6/03	Totals	294	17.7	7.29	108	112	15.6	12	155	127	26	13	11	2
		Dissolved	-	-	-	-	-	-	-	-	-	26	13	11	2
		<b>Averages</b>	<b>294</b>	<b>17.7</b>	<b>7.29</b>	<b>108</b>	<b>112</b>	<b>15.6</b>	<b>12.0</b>	<b>155</b>	<b>127</b>	<b>26</b>	<b>13</b>	<b>11</b>	<b>2</b>
<b>Fernandez Well:</b>		<b>SE NW NW 24-T29N-R23E; N 36 59 04.7, W 94 46 20.3, EL 852</b>													
	7/30/03	Dis Met	370	18.2	8.19	na	145.0	11.1	126.0	368	na	60	29	8	2
	10/6/03	Totals	257	18.3	7.08	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	130	98.6	< 10.0	16.4	132	126	26	14	5	2
		Dissolved	-	-	-	-	-	-	-	-	-	26	14	5	2
	11/4/03	Totals	252	17.1	7.83	115	114.0	< 10.0	16.4	138	126	27	14	5	2
		Dissolved	-	-	-	-	-	-	-	-	-	27	14	5	2
	12/19/03	Totals	415	14.8	6.64	125	147.0	< 10.0	85.5	274	213	46	23	8	2
		Dissolved	-	-	-	-	-	-	-	-	-	46	24	8	2
		<b>Averages</b>	<b>310</b>	<b>17.3</b>	<b>7.36</b>	<b>125</b>	<b>120.7</b>	<b>10.2</b>	<b>51.7</b>	<b>212</b>	<b>147</b>	<b>34</b>	<b>18</b>	<b>6</b>	<b>2</b>
<b>Miami #1:</b>		<b>SW NE SW 30-T28N-R23E; N 35 52 30.9, W 94 52 23.4; EL 790</b>													
	11/4/03	Totals	500	15.7	7.15	na	117.0	83.6	12.4	262	133	30	15	50	3
		Dissolved	-	-	-	-	-	-	-	-	-	30	15	50	3
	* 11/4/03	Totals	500	15.7	7.15	na	116.0	84.5	12.5	264	135	29	14	49	3
		Dissolved	-	-	-	-	-	-	-	-	-	30	15	50	3
		<b>Averages</b>	<b>500</b>	<b>15.7</b>	<b>7.15</b>	<b>116.5</b>	<b>84.1</b>	<b>84.1</b>	<b>12.5</b>	<b>263</b>	<b>134</b>	<b>30</b>	<b>15</b>	<b>50</b>	<b>3</b>
<b>Picher #5-MW:</b>		<b>SE SE NE 29-T29N-R23E; N 36 57 55.6, W 94 49 54.7; GL(topo) 815.</b>													
	11/5/03	Totals	590	14	6.52	na	140	25.6	135	381	278	61	29	18	3
		Dissolved	-	-	-	-	-	-	-	-	-	59	28	18	3
		<b>Averages</b>	<b>590</b>	<b>14.0</b>	<b>6.52</b>	<b>140.0</b>	<b>25.6</b>	<b>25.6</b>	<b>135.0</b>	<b>381</b>	<b>278</b>	<b>60</b>	<b>29</b>	<b>18</b>	<b>3</b>
<b>Picher #6 MW:</b>		<b>SE NW NW 21-T29N-R23E; N 36 59 00.7, W 94 49 38.7, EL 824 Topo</b>													
	12/9/03	Totals	537	18.2	6.83	135	143	< 10	150	380	280	65	29	13	2
		Dissolved	-	-	-	-	-	-	-	-	-	60	27	12	2
	* 12/9/03	Totals	-	-	-	-	142	< 10	150	381	277	64	29	13	2
		Dissolved	-	-	-	-	-	-	-	-	-	61	27	12	2
		<b>Averages</b>	<b>537</b>	<b>18.2</b>	<b>6.83</b>	<b>135</b>	<b>143</b>	<b>10.0</b>	<b>150</b>	<b>381</b>	<b>279</b>	<b>63</b>	<b>28</b>	<b>13</b>	<b>2</b>

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:

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	
	0.002	0.002	0.002	0.010	0.100	0.005	0.010	0.0001	0.010	0.010	0.001	0.016	-1.58

Commerce #4:

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	
	0.002	0.002	0.002	0.010	0.091	0.005	0.010	0.0001	0.010	0.010	0.001	0.010	-0.50

Commerce #5 MW:

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	
	0.002	0.002	0.002	0.010	0.064	0.005	0.010	0.0001	0.010	0.010	0.001	0.010	-0.530

Fernandez Well:

7/30/03	na	na	na	na	0.410	0.056	< 0.010	na	< 0.010	na	na	0.239	-0.46
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	
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	
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	
	0.002	0.002	0.002	0.010	0.307	0.016	0.010	0.0001	0.010	0.010	0.001	0.145	-0.314

Miami #1:

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	
	0.002	0.002	0.002	0.010	0.128	0.005	0.010	0.0001	0.010	0.010	0.001	0.010	-0.644

Picher #5-MW:

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	
	0.002	0.002	0.002	0.010	0.223	0.005	0.010	0.0001	0.010	0.010	0.001	0.01	-0.32

Picher #6 MW:

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	
	0.002	0.002	0.002	0.010	0.400	0.005	0.011	0.0001	0.010	0.010	0.001	0.015	-0.25

WELL	DATE		Spec Cond (Field) uS/cm	Temp (Field) °C	pH (Field)	Alk (Field) CaCO <sub>3</sub> mg/l	Alkalinity CaCO <sub>3</sub> mg/l	Chloride Cl mg/l	Sulfate SO <sub>4</sub> mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO <sub>3</sub> mg/l	Calcium Ca mg/l	Magnesium Mg mg/l	Sodium Na mg/l	Potassium K mg/l	
			<b>MCL/(SMCL)</b>				<b>(250)</b>		<b>(250)</b>		<b>(500)</b>					
<b>Picher #7 MW:</b>			<b>aka: PICHER - CARDIN MW; NW SE SW 20-T29N-R23E; N 36 58 28.2, W 94 50 38.3, EL 815</b>													
	11/5/03	Totals	563	14.7	6.89	na	145	< 10	141	374	284	60	31	12	3	
		Dissolved	-	-	-	-	-	-	-	-	-	59	31	12	3	
		<b>Averages</b>	<b>563</b>	<b>14.7</b>	<b>6.89</b>		<b>145.00</b>	<b>10.00</b>	<b>141.0</b>	<b>374</b>	<b>284</b>	<b>60</b>	<b>31</b>	<b>12</b>	<b>3</b>	
<b>Quapaw #4:</b>			<b>NW NW NW 1-T28N-R23E; N 36 56 33.4, W 94 47 11.2, EL Topo 845</b>													
	11/6/97	Totals	249	17.7	7.03	107	109	< 10	11.1	129	120	25	13	5	1	
		Dissolved	-	-	-	-	-	-	-	-	-	24	13	5	1	
	* 11/6/97	Totals	-	-	-	109	109	< 10	11.1	131	121	24	13	5	1	
		Dissolved	-	-	-	-	-	-	-	-	-	25	13	5	1	
		<b>Averages</b>	<b>249</b>	<b>17.7</b>	<b>7.03</b>	<b>107</b>	<b>109</b>	<b>10</b>	<b>11.1</b>	<b>130</b>	<b>121</b>	<b>25</b>	<b>13</b>	<b>5</b>	<b>1</b>	
<b>Quapaw #5 MW:</b>			<b>SW SW NE 35-T29N-R23E; N 36 57 04.4, W 94 47 07.3, EL 850 Topo</b>													
	11/6/03	Totals	1427	18.5	6.41	265	250	102	401	1050	751	146	70	58	8	
		Dissolved	-	-	-	-	-	-	-	-	-	147	71	59	8	
		<b>Averages</b>	<b>1427</b>	<b>18.5</b>	<b>6.41</b>	<b>265</b>	<b>250</b>	<b>102.0</b>	<b>401</b>	<b>1050</b>	<b>751</b>	<b>147</b>	<b>71</b>	<b>59</b>	<b>8</b>	
<b>RWD4 #4</b>			<b>(aka: Blue hole Well): NE SE SW 30-T29N-R24E; N 36 57 38.7, W 94 44 56.3, EL Topo 900</b>													
	11/7/03	Totals	283	17.7	6.65	110	114	14.8	< 10.0	133	135	27	15	6	2	
		Dissolved	-	-	-	-	-	-	-	-	-	27	15	6	2	
	* 11/7/03	Totals	-	-	-	114	114	14.6	< 10.0	136	134	27	16	6	2	
		Dissolved	-	-	-	-	-	-	-	-	-	27	16	6	2	
		<b>Averages</b>	<b>283</b>	<b>17.7</b>	<b>6.65</b>	<b>110</b>	<b>114</b>	<b>14.7</b>	<b>10.0</b>	<b>135</b>	<b>135</b>	<b>27</b>	<b>16</b>	<b>6</b>	<b>2</b>	

NOTE: Detection limits used in calculation of means; total and dissolved metals concentrations used in calculation of means; means are in bold type; Duplicate samples are highlighted with asterisk near date of sample; a box indicates an MCL or SMCL violation; shaded box is a Roubidoux background value underlines indicates a value detected in blank; na indicates not analyzed; dash indicates not relevant; Indicator Parameters of Mine Water Contamination with tolerance limit 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
		<b>0.006</b>	<b>0.01</b>	<b>0.005</b>	<b>0.1</b>	<b>(0.3)</b>	<b>0.015</b>	<b>0.05</b>	<b>0.002</b>	<b>0.1</b>	<b>0.05</b>	<b>0.002</b>	<b>(5)</b>	
Picher #7 MW:														
	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	
		<b>0.002</b>	<b>0.002</b>	<b>0.002</b>	<b>0.010</b>	<b>0.163</b>	<b>0.005</b>	<b>0.010</b>	<b>0.0001</b>	<b>0.010</b>	<b>0.010</b>	<b>0.001</b>	<b>0.010</b>	<b>0.236</b>
-----														
Quapaw #4:														
	11/6/97	< 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	
	* 11/6/97	< 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	
		<b>0.002</b>	<b>0.002</b>	<b>0.002</b>	<b>0.010</b>	<b>0.020</b>	<b>0.005</b>	<b>0.010</b>	<b>0.0001</b>	<b>0.010</b>	<b>0.010</b>	<b>0.001</b>	<b>0.010</b>	<b>-2.98</b>
-----														
Quapaw #5 MW:														
	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	
		<b>0.002</b>	<b>0.005</b>	<b>0.002</b>	<b>0.010</b>	<b>3.705</b>	<b>0.005</b>	<b>0.047</b>	<b>0.0001</b>	<b>0.010</b>	<b>0.010</b>	<b>0.001</b>	<b>0.218</b>	<b>-1.40</b>
-----														
RWD4 #4														
	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	
		<b>0.002</b>	<b>0.002</b>	<b>0.002</b>	<b>0.010</b>	<b>0.041</b>	<b>0.005</b>	<b>0.010</b>	<b>0.0001</b>	<b>0.010</b>	<b>0.010</b>	<b>0.001</b>	<b>0.010</b>	<b>0.58</b>

NOTE:

Detection limits used in calculation of means; total and dissolved metals concentrations used in calculation of means; means are in bold type; Duplicate samples are highlighted with asterisk near date of sample; a box indicates an MCL or SMCL violation; shaded box is a Roubidoux background value underlines indicates a value detected in blank; na indicates not analyzed; dash indicates not relevant; Indicator Parameters of Mine Water Contamination with tolerance limit and Roubidoux background concentration: **Sulfate** (82 / 25 mg/l); **Iron** (207 / 61.5 ug/l); **Zinc** (43 / 8.8 ug/l).

## ATTACHMENT 2



STEVEN A. THOMPSON  
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

BRAD HENRY  
Governor

May 21, 2004

Louis Fernandez  
P.O. Box 217  
Quapaw, OK 74363

RE: Results of Water Samples from the Fernandez Well and Taps

Dear Mr. Fernandez:

Please find the enclosed analytical results of water samples from the sources referenced above, collected monthly during the period from July 31<sup>st</sup> through December 19<sup>th</sup>, 2003. Your well is part of the Long Term Monitoring program being conducted by DEQ and EPA over the next five years for the Roubidoux aquifer. These are the baseline samples for this well. We will continue to provide you with the results of subsequent semi-annual sampling events, planned for April and October of each year, after we get them from the laboratory.

Please note that the well water contains lead at very small concentrations in both the total and dissolved samples. However, the samples from the taps in your residence and rental property, collected on November 4, showed no lead in the drinking water. The standard for assessing suitability of a drinking water source is 15 micrograms per liter (ug/l), so the well water tested ok sometimes, but not ok on other occasions. Continued use and maintenance of the water treatment units at the taps is highly recommended and continued close monitoring is advised.

Thank you for your continued cooperation in this matter. Your assistance is appreciated very much. If you have any questions or comments regarding this letter, please call me at (405) 702-5124.

Sincerely,

A handwritten signature in black ink that reads "David A. Cates". The signature is written in a cursive style with a long horizontal stroke at the end.

David A. Cates, P.E.  
Project Manager  
Land Protection Division  
May 24, 2004

Sample Number: 342371  
 Agency Number:  
 Date Collected: 11/04/2003  
 Time Collected: 1530  
 Date Received: 11/13/2003  
 Date Completed: 12/05/2003  
 PWS Id:  
 Location Code:  
 Station:  
 Facility:  
 Collected By: DC  
 Report Date: 01/13/2004

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

Report of Analysis by Metals

LAND PROTECTION DIVISION  
 DAVID CATES

CC:FILE COPY

PARAMETER NAME	CONCENTRATION IN SAMPLE		UNITS	ANALYZED	METHOD
	CM	VALUE			
Copper, Total	<	10.	UG/L	12/04/03	6010
Iron, Total		339	UG/L	12/04/03	6010
Lead, Total	<	5.	UG/L	11/13/03	200.8
Manganese, Total	<	10	UG/L	12/04/03	6010
Zinc, Total		44	UG/L	12/04/03	6010

Page 1 of 1

SOURCE: FERNANDEZ RES TAP  
 PROGRAM:  
 COUNTY: OTTAWA CITY: HOCKERVILLE

LEGAL DESCRIPTION:  
 /4 /4 /4 SEC: T: R: M:

LAB REFERENCES: METALS;

SAMPLERS COMMENTS:

ANALYST`S COMMENTS:  
 SAMPLE REPRINTED USING MS LEAD VALUE.

  
 Cliff Petree  
 State Environmental Laboratory

\* ANALYST \_\_\_\_\_

Sample Number: 342372  
 Agency Number:  
 Date Collected: 11/04/2003  
 Time Collected: 1545  
 Date Received: 11/10/2003  
 Date Completed: 12/05/2003  
 PWS Id:  
 Location Code:  
 Station:  
 Facility:  
 Collected By: DC  
 Report Date: 01/13/2004

**OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY**  
  
**Report of Analysis by Metals**

LAND PROTECTION DIVISION  
 DAVID CATES

CC:FILE COPY

CONCENTRATION IN SAMPLE					Page 1 of 1
PARAMETER NAME	CM	VALUE	UNITS	ANALYZED	METHOD
Copper, Total		41.	UG/L	12/04/03	6010
Iron, Total		359	UG/L	12/04/03	6010
Lead, Total	<	5.	UG/L	11/13/03	200.8
Manganese, Total	<	10	UG/L	12/04/03	6010
Zinc, Total		188	UG/L	12/04/03	6010

SOURCE: FERNANDEZ RENTAL TAP  
 PROGRAM:  
 COUNTY: OTTAWA      CITY: HOCKERVILLE

LEGAL DESCRIPTION:  
 /4 /4 /4 SEC: T: R: M:

LAB REFERENCES: METALS;

SAMPLERS COMMENTS:

ANALYST'S COMMENTS:  
 SAMPLE REPRINTED USING MS LEAD VALUES

  
 Cliff Petree  
 State Environmental Laboratory

ANALYST \_\_\_\_\_

\*

## ATTACHMENT 3

Analytical Data for Green Sink Hole Monitoring

Sample ID	DATE	Water Level Elev	Spec Cond (Field) uS/cm	Temp (Field) °C	D.O. (Field) mg/l	pH (Field)	pH (Lab)	Alkalinity (Field) mg/l	Alkalinity CaCO <sub>3</sub> mg/l	HCO <sub>3</sub> CaCO <sub>3</sub> mg/l	CO <sub>3</sub> CaCO <sub>3</sub> mg/l	Chloride Cl mg/l	Sulfate SO <sub>4</sub> mg/l	Tot Dis Sol TDS mg/l	Hardness CaCO <sub>3</sub> mg/l	Nitrate N mg/l	Calcium Ca mg/l	Magnesium Mg mg/l					
MCL/(SMCL)													(250)	(250)	(500)								
<b>Sink Hole:</b>		<b>NW SW NE 23-T29N-R23E; EL BM 849.60; WL EI 800.73</b>																					
#1a	7/30/03	Dis Met	800.73	462	29.0	6.78	7.29	8.43	106.4	105	95	20	< 10	113	418	na	<0.05	66	12				
#1b		Dis Met	-	462	29.1	6.93	7.64	8.43	na	104	94	20	< 10	114	347	na	<0.05	66	12				
#1c		Dis Met	-	465	28.8	5.85	7.6	8.1	111.1	103	103	<10	< 10	114	320	na	<0.05	64	12				
#1d		Dis Met	-	462	29.1	7.73	7.76	8.19	na	105	105	<10	< 10	112	314	na	<0.05	64	12				
<b>Mine Shaft:</b>		<b>Meteor # 3 Shaft in NW SW NE 23-T29N-R23E; Collar EL 841.58; EI (topo) 852; WLEI: 800.33; TD EI: 691.58</b>																					
1a-65'	7/30/03	Dis Met	800.33	699	15.2	1.24	6.93	7.57	na	116	116	<10	< 10	228	506	na	0.13	91	20				
1b-95'		Dis Met	-	697	15.2	1.01	6.90	7.48	na	117	117	<10	< 10	223	512	na	0.14	93	20				
1c-125'		Dis Met	-	704	15.2	0.85	6.88	7.48	114.3	118	118	<10	< 10	228	606	na	0.13	93	20				
1d-125'	*	Dis Met	-	704	15.2	0.85	6.88	7.51	na	119	119	<10	< 10	223	485	na	0.13	91	20				
1e-145'	8/6/03	Dis Met	-	829	15.2	0.18	6.79	7.29	127.1	117	-	< 10	201	457	na	0.09	92	20					
2-145	10/6/03	Dis Met	800.58	759	20.6	4.96	6.75	-	150	129	129	< 10	288	601	422	0.05	138	22					
<b>Fernandez Well:</b>		<b>SE NW NW 24-T29N-R23E; EL 852</b>																					
#1	7/30/03	Dis Met	na	370	18.2	1.2	8.19	7.71	na	145	145	<10	11.1	126	368	na	<0.05	60	29				
#2	10/6/03	Tot Met	na	257	18.3	2.46	7.08	na	130	98.9	98.9	na	< 10	14	148	124	<0.05	26	14				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	14				
#2-dup	10/6/03	Tot Met	na	257	18.3	2.46	7.08	na	130	98.6	98.6	na	< 10	16.4	132	126	<0.05	26	14				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	14				
#3	11/4/03	Tot Met	na	257	17.1	na	7.83	na	115	114	114	<10	< 10	16.4	138	126	na	27	14				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	14				
#4	12/19/03	Tot Met	na	415	14.8	na	6.64	na	125	147	147	<10	< 10	85.5	274	213	na	46	23				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	24				
<b>Green MW:</b>		<b>NW SW NE 23-T29N-R23E; N 36 59 00.1, W 94 47 01.0; EL (PVC) 857.97; WL EI 811.79 (10/06/03)</b>																					
10/2/03		<i>Chat Fill Composite: Total Metals in soil (mg/kg):</i>													na	na	na	na	na	na	na	na	na
#1	10/6/03	Tot Met	811.79	2370	24.5	1.2	7.08	na	398	187	187	na	15.70	1610	2660	1960	<0.050	668	55				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	660	53				
#2	11/4/03	Tot Met	810.75	2320	17.5	na	7.19	na	390	363	363	na	22.10	1390	2680	1900	0.05	662	60				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	643	62				
#3	12/19/03	Tot Met	809.18	2400	23.5	na	6.70	na	440	419	419	<10	13.40	1230	2540	2240	3.37	689	62				
		Dis Met	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	619	55				

NOTE: Detection limits used in calculation of means; dissolved metals concentrations used in calculation of means; means are in bold type; Duplicate samples are highlighted with asterisk near date of sample; a box indicates an MCL or SMCL violation; shaded box is a Roubidoux background value underlines indicate either value detected in blank; na indicates not analyzed; dash indicates not relevant; Indicator Parameters of Mine Water Contamination with tolerance limit and Roubidoux background concentration: **Sulfate** (82 / 25 mg/l); **Iron** (207 / 61.5 ug/l); **Zinc** (43 / 8.8 ug/l).

Sample ID	DATE	Sodium Na mg/l	Potassium K mg/l	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
M				0.006	0.05	0.005	0.1	(0.3)	0.015	0.05	0.002	0.1	0.05	0.002	(5)	

Sink Hole:

#1a	7/30/03	7	4	na	< 0.002	< 0.002	na	< 0.020	< 0.005	< 0.010	na	< 0.010	na	na	0.025	-0.48
#1b		6	4	na	< 0.002	< 0.002	na	< 0.020	< 0.005	< 0.010	na	< 0.010	na	na	0.015	-0.95
#1c		6	4	na	< 0.002	< 0.002	na	< 0.020	< 0.005	< 0.010	na	< 0.010	na	na	< 0.010	-1.83
#1d		7	5	na	< 0.002	< 0.002	na	< 0.020	< 0.005	< 0.010	na	< 0.010	na	na	< 0.010	-1.05

Mine Shaft:

1a-65'	7/30/03	17	6	na	< 0.002	< 0.002	na	< 0.020	< 0.005	0.735	na	< 0.010	na	na	0.018	-1.85
1b-95'		17	6	na	< 0.002	< 0.002	na	< 0.020	< 0.005	0.753	na	< 0.010	na	na	0.016	-0.58
1c-125'		17	6	na	< 0.002	< 0.002	na	< 0.020	< 0.005	0.752	na	< 0.010	na	na	0.021	-1.42
1d-125'	*	17	6	na	< 0.002	< 0.002	na	< 0.020	< 0.005	0.735	na	< 0.010	na	na	0.021	-1.55
1e-145'	8/6/03	16	6	na	< 0.002	< 0.002	na	0.068	< 0.005	0.782	na	< 0.010	na	na	0.016	2.03
2-145	10/6/03	14	9	na	< 0.060	< 0.005	na	0.140	< 0.050	1.180	na	< 0.025	na	na	0.023	3.70

Fernandez Well:

#1	7/30/03	8	2	na	< 0.002	< 0.002	na	0.410	0.056	< 0.010	na	< 0.010			0.239	-0.46
#2	10/6/03	5	2	< 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
		5	2	< 0.002	< 0.002	< 0.002	< 0.010	0.288	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.067	
#2-dup	10/6/03	5	2	< 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
		5	2	< 0.002	< 0.002	< 0.002	< 0.010	0.224	0.008	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.033	
#3	11/4/03	5	2	< 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
		5	2	< 0.002	< 0.002	< 0.002	< 0.010	0.246	0.013	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.07	
#4	12/19/03	8	2	< 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
		8	2	< 0.002	< 0.002	< 0.002	< 0.010	0.464	< 0.005	< 0.010	< 0.00005	< 0.010	< 0.010	< 0.001	0.464	

Green MW:

	10/2/03	na	na	na	< 12	51	na	14,700	425	203	na	na	na	na	8,440	
#1	10/6/03	11	29	na	< 0.060	0.018	na	32.80	0.371	16.100	na	0.030	na	na	7.860	1.80
		15	20	na	< 0.060	< 0.005	na	17.70	< 0.050	16.000	na	< 0.025	na	na	4.200	
#2	11/4/03	27	17	na	< 0.060	< 0.005	na	20.20	< 0.050	10.700	na	< 0.025	na	na	1.600	3.62
		30	18	na	< 0.060	< 0.005	na	2.50	< 0.050	9.900	na	< 0.025	na	na	0.711	
#3	12/19/03	10	35	< 350	< 0.060	0.170	0.129	109.00	3.3	11.8	0.00125	0.094	< 0.070	< 0.200	34.80	8.59
		18	18	< 350	< 0.060	< 0.005	< 0.010	1.90	< 0.050	9.35	< 0.00005	< 0.025	< 0.070	< 0.200	1.240	

NOTE: Detection limits used in calculation of means; total and dissolved metals concentrations used in calculation of means; means are in bold type; Duplicate samples are highlighted with asterisk near date of sample; a box indicates an MCL or SMCL violation; shaded box is a Roubidoux background value underlines indicate either value detected in blank or no blank for the sample; na indicates not analyzed; dash indicates not relevant; Indicator Parameters of Mine Water Contamination with tolerance limit and Roubidoux background concentration: **Sulfate** (82 / 25 mg/l); **Iron** (207 / 61.5 ug/l); **Zinc** (43 / 8.8 ug/l).