PATHFINDER

August 19, 2005

Mr. Gary Janosko, Branch Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, Maryland 20852

Ref: Docket No. 40-2259, Source Material License No. SUA-672

Dear Mr. Janosko:

Enclosed please find two copies of the semi-annual ground water monitoring report as required by condition 60B of the referenced license. We apologize for the lateness of this report. Please let us know if there are any questions regarding the report.

Sincerely,

Tom Hardgrove

T. W. Hardgrove
Manager, Reclamation Operations

Enclosure

Cc: J. Whitten, USNRC Region IV
D. L. Wichers
Hydro-Engineering, LLC, w/o encl.

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SEMI-ANNUAL
GROUND-WATER MONITORING
FOR LUCKY Mc MINE

PREPARED FOR:

PATHFINDER MINES CORPORATION
LUCKY Mc MINE

BY:

HYDRO-ENGINEERING, L.L.C.

AUGUST, 2005

George L. Hoffman

GEORGE L. HOFFMAN, P.E.
HYDROLOGIST

8/19/05

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1.0 Introduction and Summary of Results

This semi-annual report presents the results of ground-water monitoring for the first half of 2005 for the Lucky Mc tailings area. This report covers the requirement of NRC License SUA-672, License Condition 60B.

The following table lists the site standards that are in effect at Lucky Mc tailings POC well T1-12. The tabulation also lists the measured June 2005 concentrations for POC well T1-12. All of the present concentrations in POC well T1-12 are significantly below the site standards except a recent higher radium-226 plus radium-228 value of 14.2 pCi/l. This value is greater than 4 times larger than any of the previous four quarterly values. Since no other parameters for T1-12 exhibited comparable increases, there is a question about the validity of the elevated radium-226 plus radium-228 value. No significance should be given this value unless additional sampling confirms this result. The second quarter 2005 sample is currently being reanalyzed for radium-226 plus radium-228, and the third quarter sample for T1-12 will be taken in August 2005. Otherwise, plots of the key constituent concentrations for POC well T1-12 show that the concentrations at this well are steady or gradually declining. Comparison of the present concentrations at the POC and POE wells to the ACL model predictions indicates that the model results were conservative (higher than observed).

GROUND-WATER PROTECTION STANDARDS FOR POINT-OF COMPLIANCE WELL T1-12 AND JUNE 2005 POC CONCENTRATION

POC STANDARD & CONCENTRATION	CONSTITUENT								
	Arsenic	Beryllium	Cadmium	Chromium	Nickel	RA-226 + RA-228	Selenium	Thorium-230	Uranium
SITE STANDARD	0.05	0.07	0.02	0.05	0.85	7.5	1.10	13.2	1.70
T1-12, June 2005	0.01	<0.01	<0.01	<0.05	0.31	14.2	0.54	<0.2	0.36

NOTE: All concentrations in mg/l except for radium and thorium in pCi/l.

2.0 Piezometric Data

The water-level data collected during the first six months of 2005 is presented in Table 1 along with the 2004 water-level data. Figure 1 presents the piezometric surface of the Lucky Mc aquifer from the POC well through the Fraser Draw alluvium, while Figure 2 presents plots of the water-level elevations versus time for wells AL-6, T1-6, T1-12, AL-1, AL-7, AL-8 and AL-9. The corresponding water-level elevation or constituent concentration is posted adjacent to the well location on the plan view figures of the area (such as Figure 1). Water-level elevations in 2005 have been steady in these wells.

3.0 Water-Quality Data

License Condition 60B requires monitoring of water from the POC and POE wells and other selected wells for the constituents presented in Table 1. An analysis of the selenium,

uranium, combined radium-226 plus radium-228, sulfate, chloride and TDS concentrations is required.

Figure 3 presents the June 2005 chloride concentrations for the Lucky Mc aquifer. The chloride concentrations are highest in the Wind River Channel at POC well T1-12 and decrease significantly beyond POE well AL-6. Figure 4 presents the plots of chloride concentrations versus time for the seven monitored wells. Overall, chloride concentrations are gradually declining in POC well T1-12.

Figure 5 presents the TDS concentrations for June 2005 water samples from the Lucky Mc aquifer. The TDS concentrations are greater than 5000 mg/l at POC well T1-12 and are generally slightly less than 4000 mg/l in the western portion of the Fraser Draw alluvium. Figure 6 presents the plots of TDS concentrations versus time and illustrates that the 2005 TDS concentrations are less than the average value for the previous few years for wells AL-1, AL-6, AL-7 and AL-8.

The measured sulfate concentrations for the Lucky Mc aquifer during June of 2005 are presented in Figure 7 and show that the sulfate concentrations in the western portion of the Fraser Draw alluvium are greater than 2000 mg/l while concentrations are less than 2000 mg/l in the eastern half. The sulfate concentrations versus time plots in Figure 8 show that sulfate concentrations have been fairly steady in 2005 in POC well T1-12 near the 2003 and 2004 average.

Uranium concentrations for the Lucky Mc aquifer during June of 2005 are presented in Figure 9 and show the highest observed uranium concentration at POE well AL-6. Figure 10 shows that the uranium concentration in the POE well has gradually declined over the last few years. The uranium concentrations have overall been steady in POC well T1-12.

Figure 11 presents the selenium concentrations for June 2005 for the Lucky Mc aquifer. Selenium concentrations are greatest at POC well T1-12. Selenium concentrations in POC well T1-12 have overall been steady for the last year (see Figure 12).

Figure 13 presents the radium-226 plus radium-228 activity for June 2005 at the Lucky Mc aquifer in pCi/l. The concentration at POC well T1-12 is above the radium-226 plus radium-228 site standard. Radium values are typically variable and little significance should be given this value until additional data with time is available. Figure 14 shows plots of the radium-226 plus radium-228 activity versus time for the monitored wells. These plots show significant variability in these values, which is thought to be due to variability in the laboratory analysis. Some of the values in the first half of 2005 are above typical values for these two constituents and additional monitoring of these variable results are needed before giving these results any significance.

Concentrations of the remainder of the constituents at the site are gradually decreasing or are not significant at POC well T1-12.

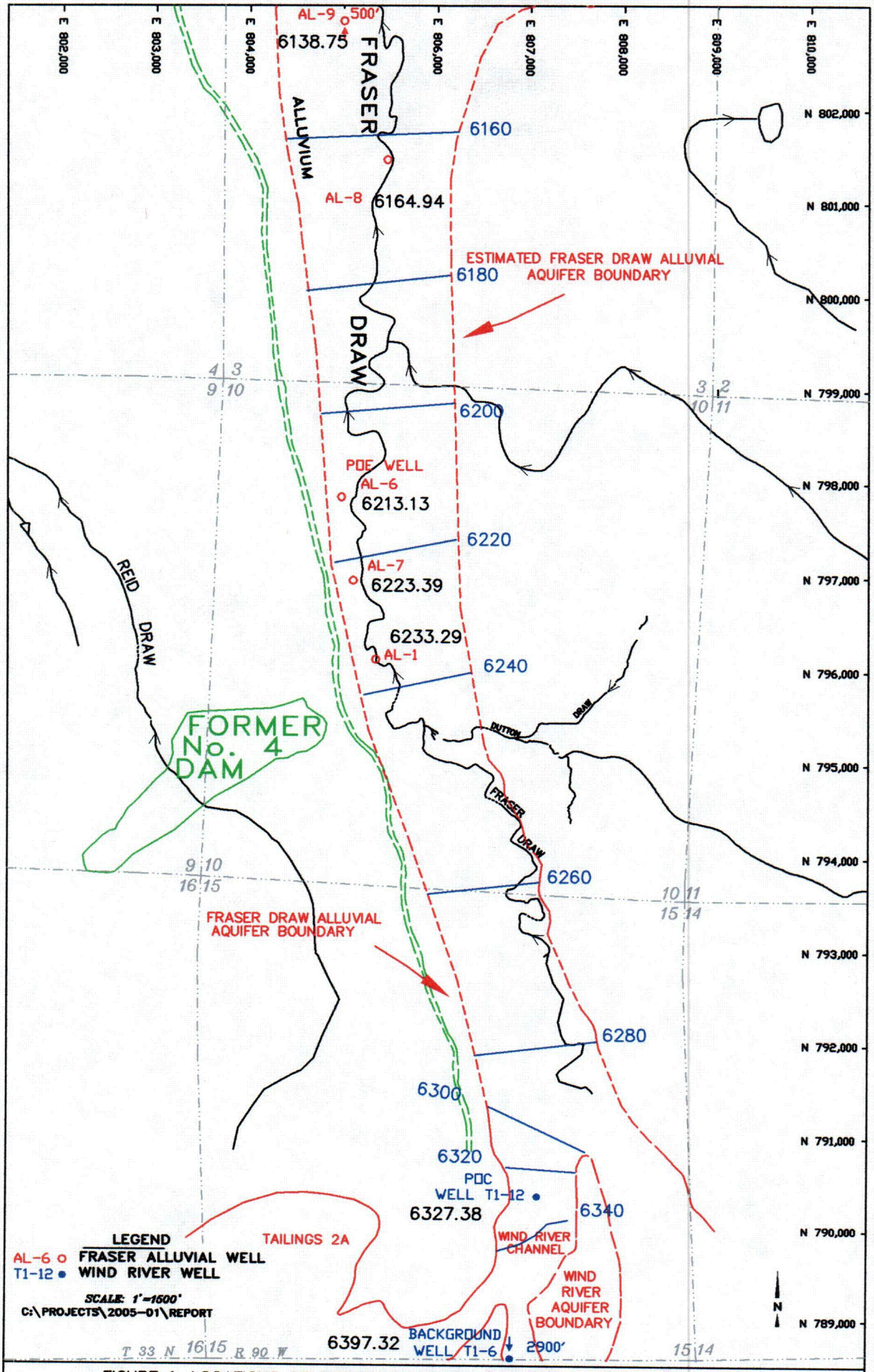
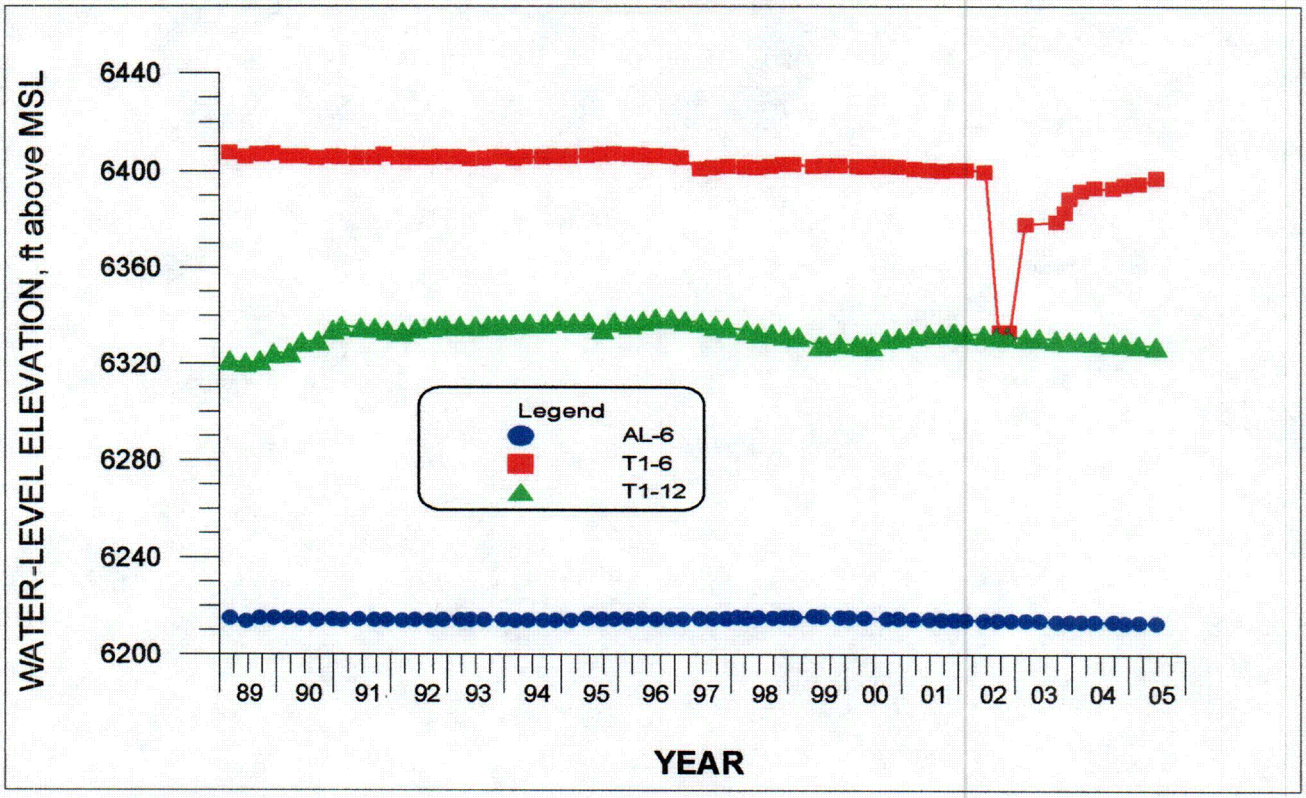


FIGURE 1. LOCATIONS OF MONITORING WELLS AND PIEZOMETRIC CONTOURS AT LUCKY MC IN JUNE 2005, FT-MSL.

C01



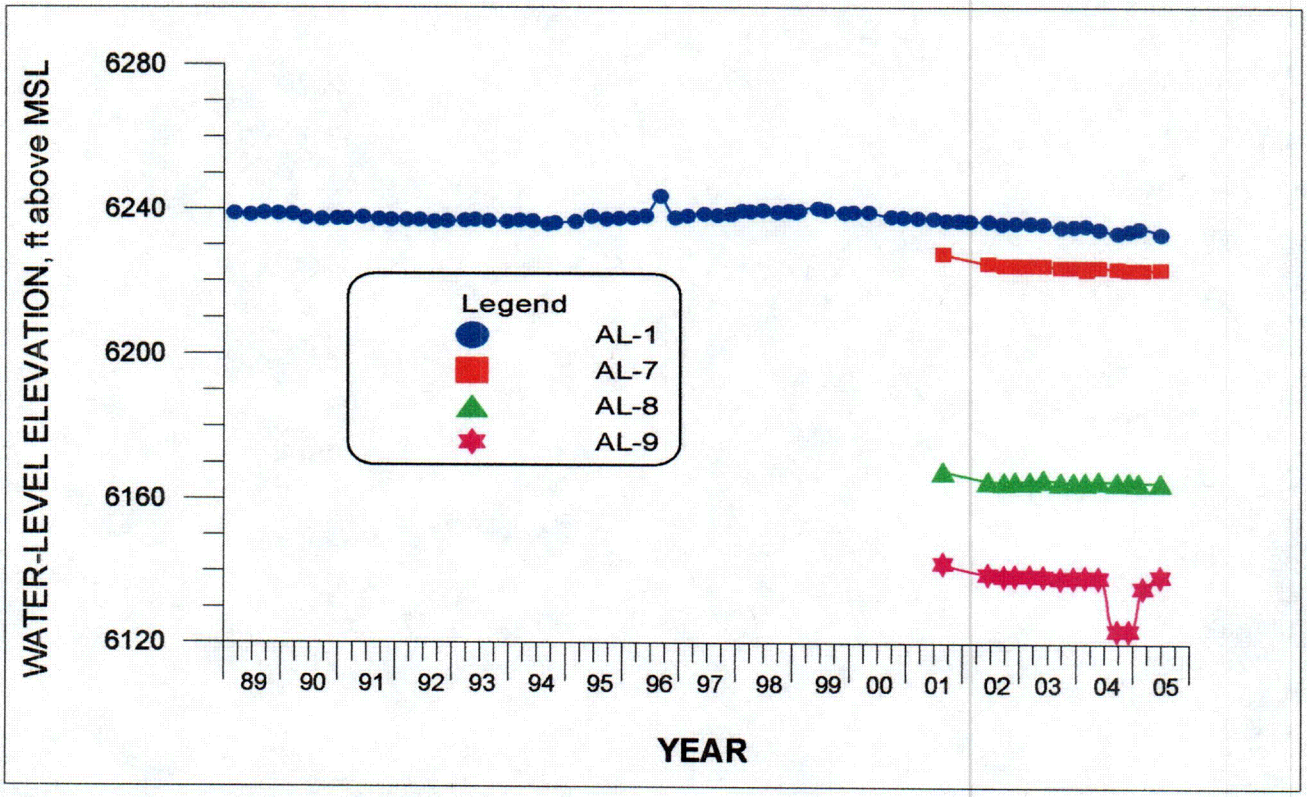


FIGURE 2. WATER-LEVEL ELEVATION VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C02

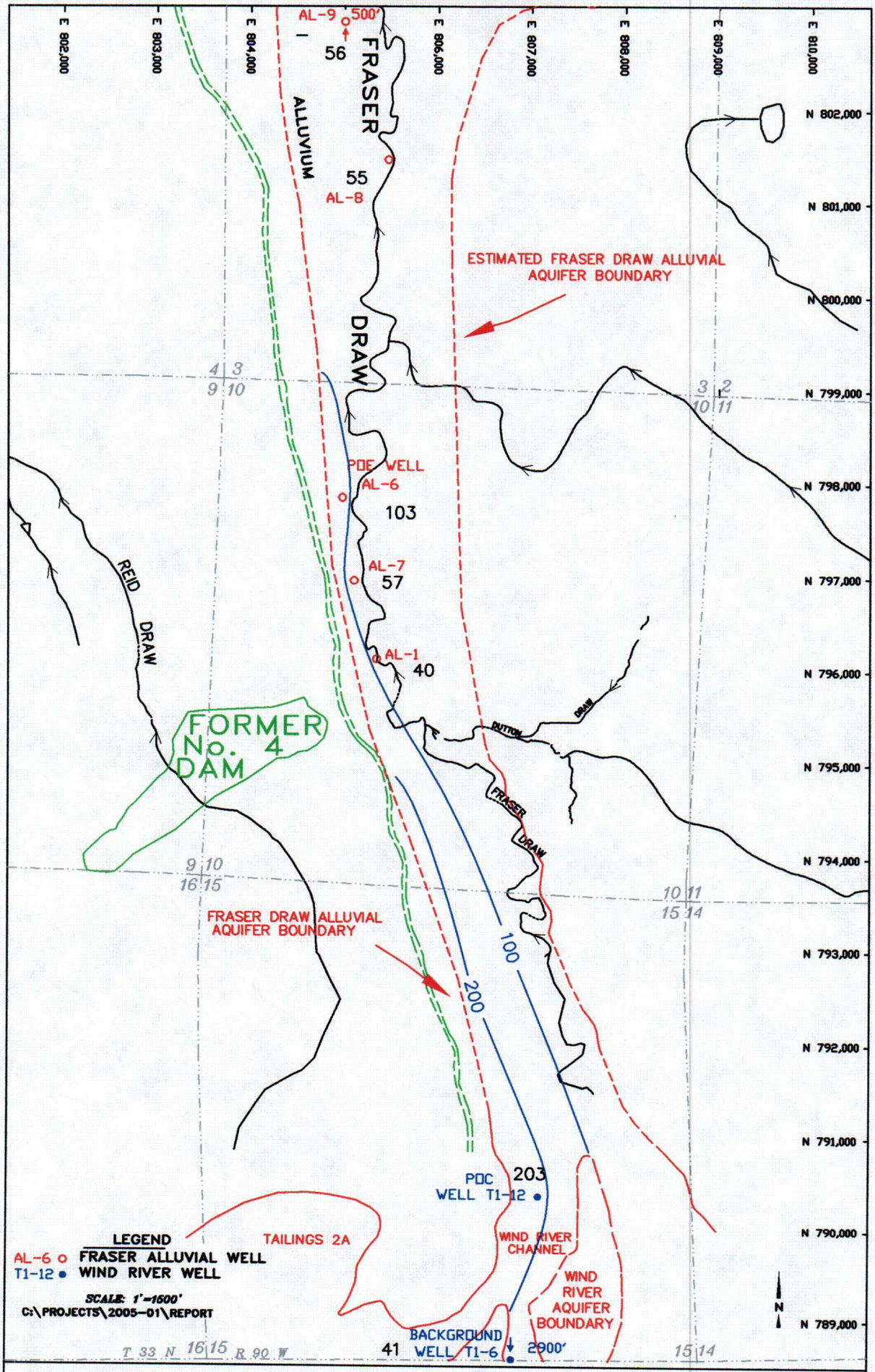
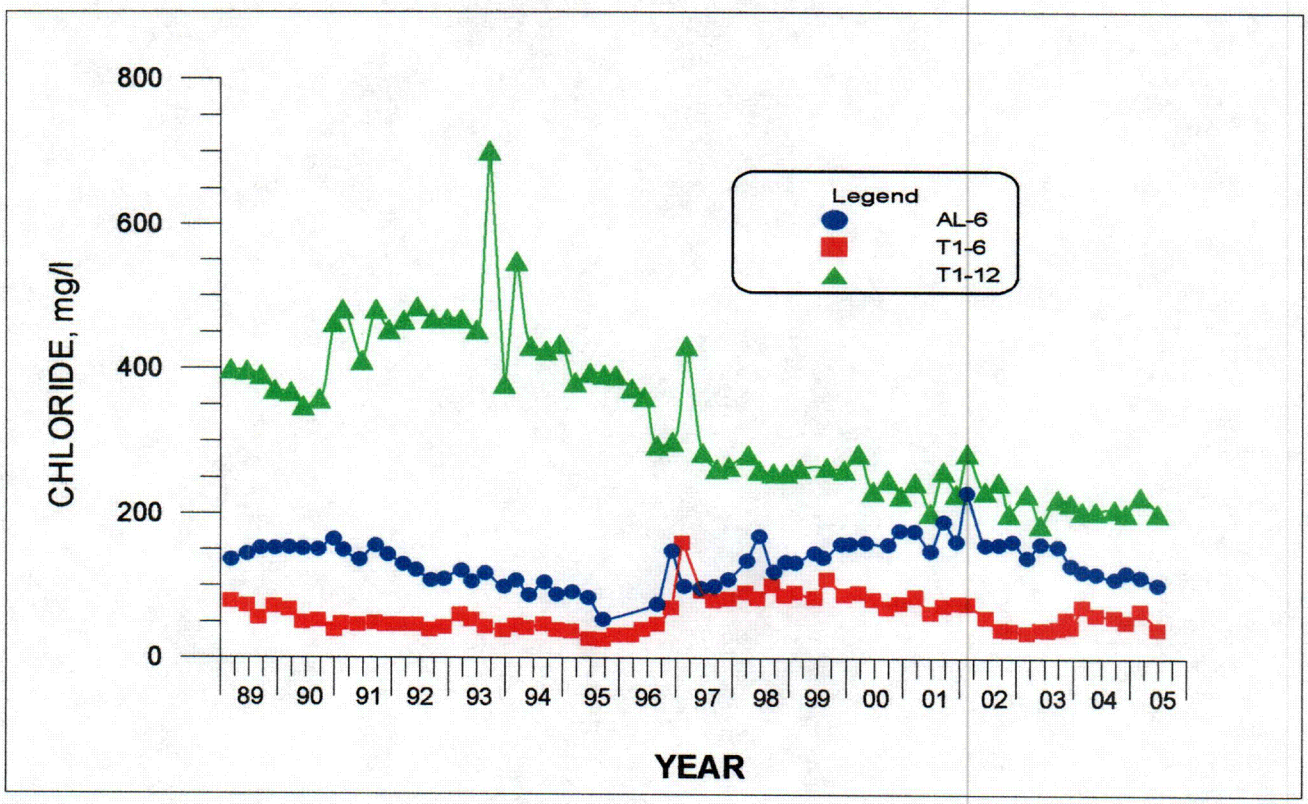


FIGURE 3. CHLORIDE CONCENTRATIONS IN JUNE 2005 AT LUCKY MC, IN mg/l

C03



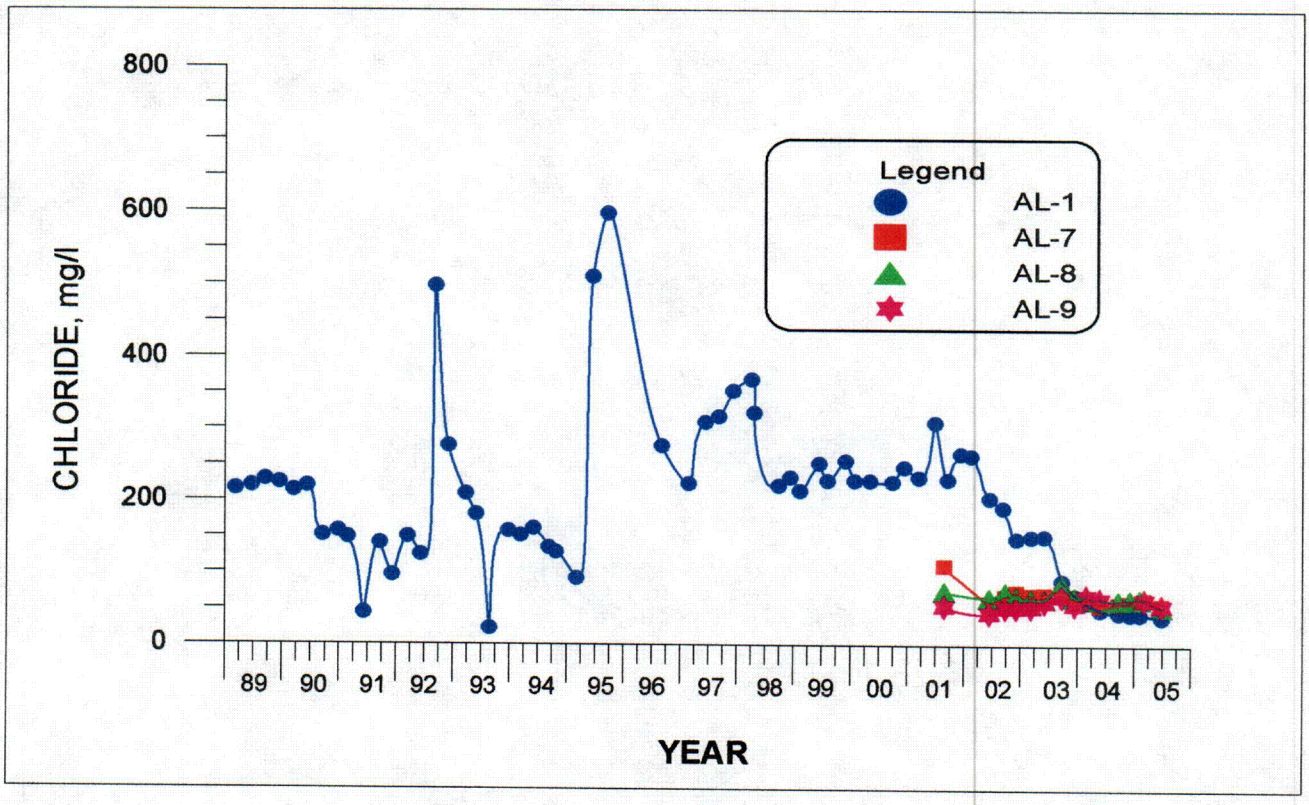


FIGURE 4. CHLORIDE CONCENTRATIONS VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C04

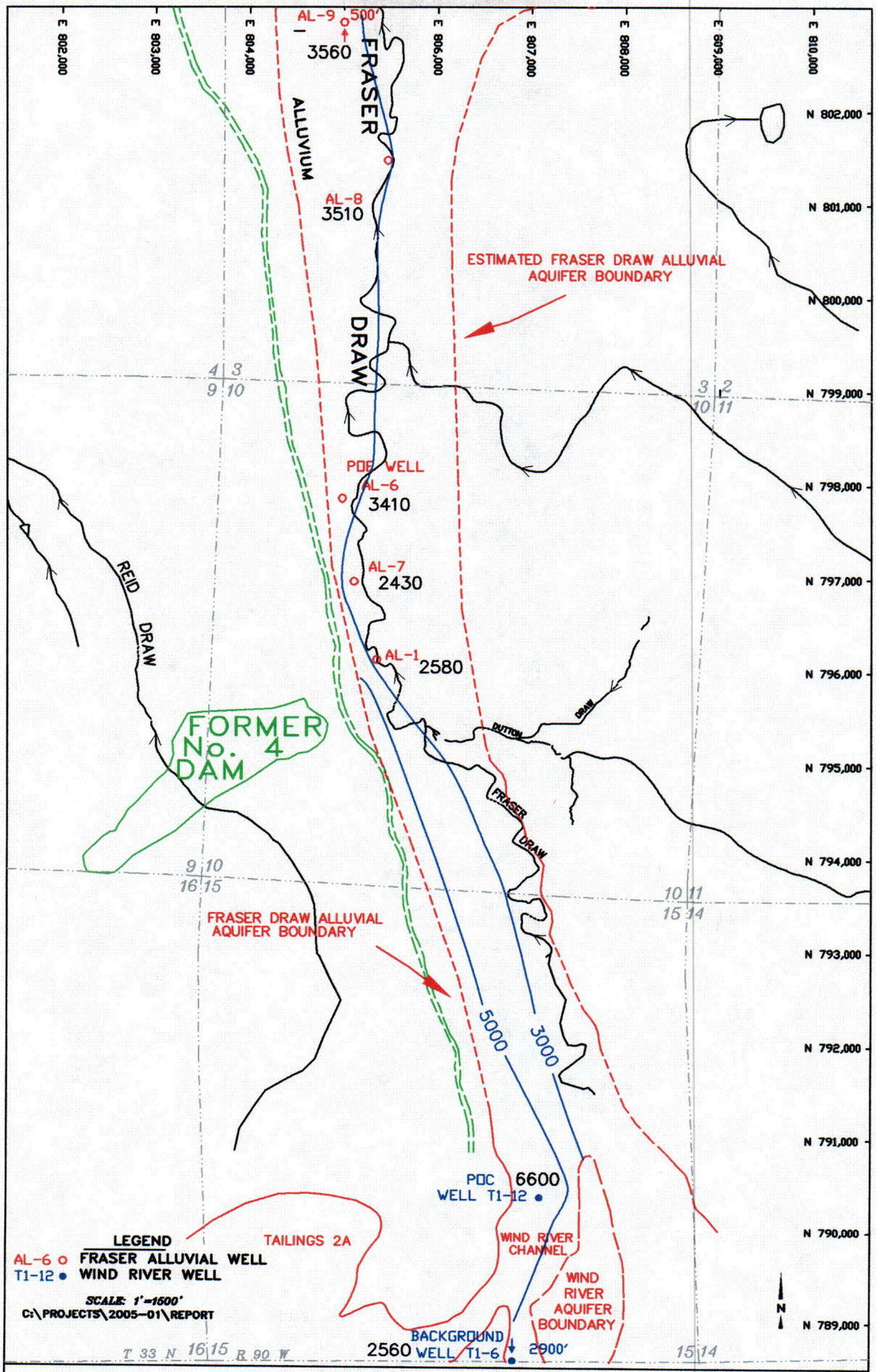
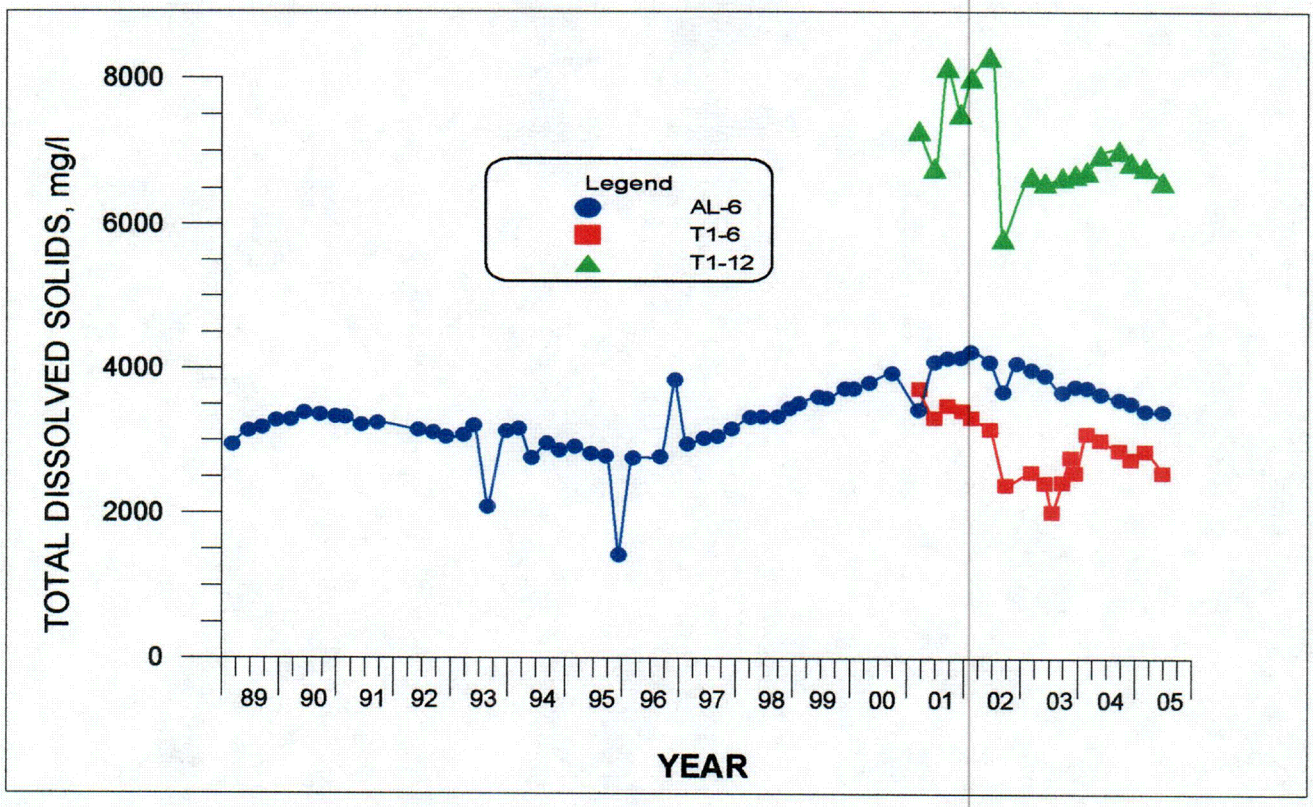


FIGURE 5. TDS CONCENTRATIONS IN JUNE 2005 AT LUCKY MC, IN mg/l

C05



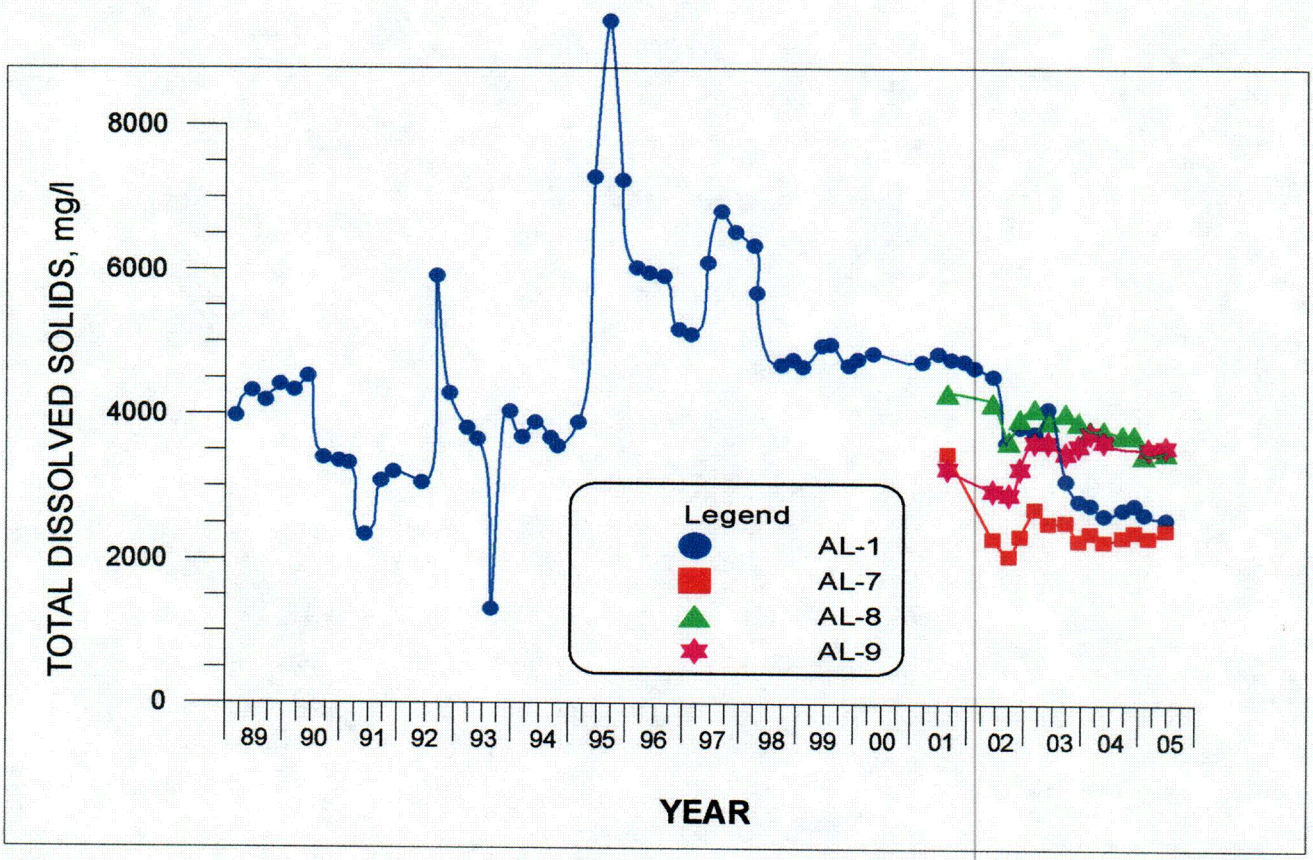


FIGURE 6. TDS CONCENTRATIONS VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

COG

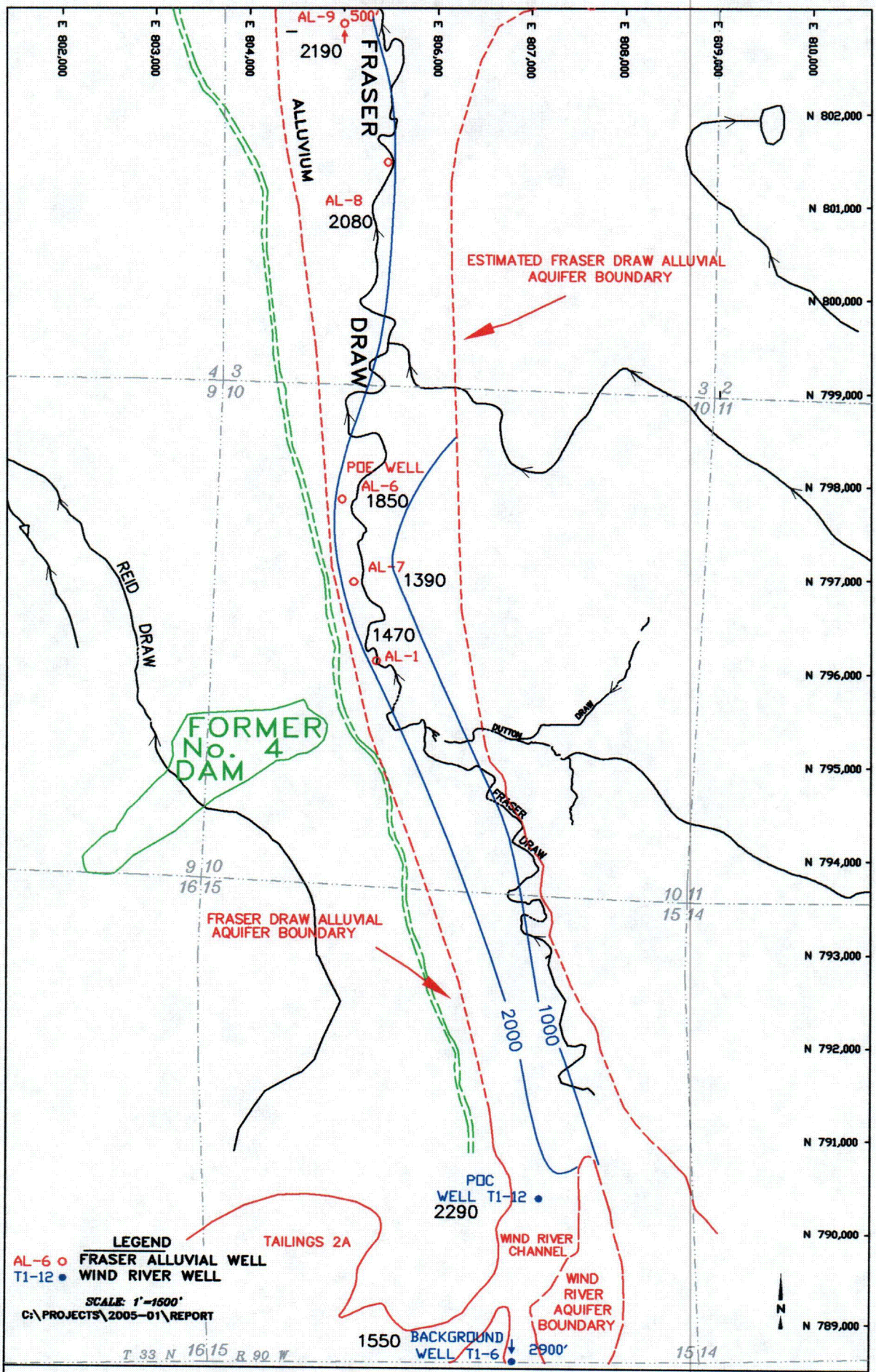
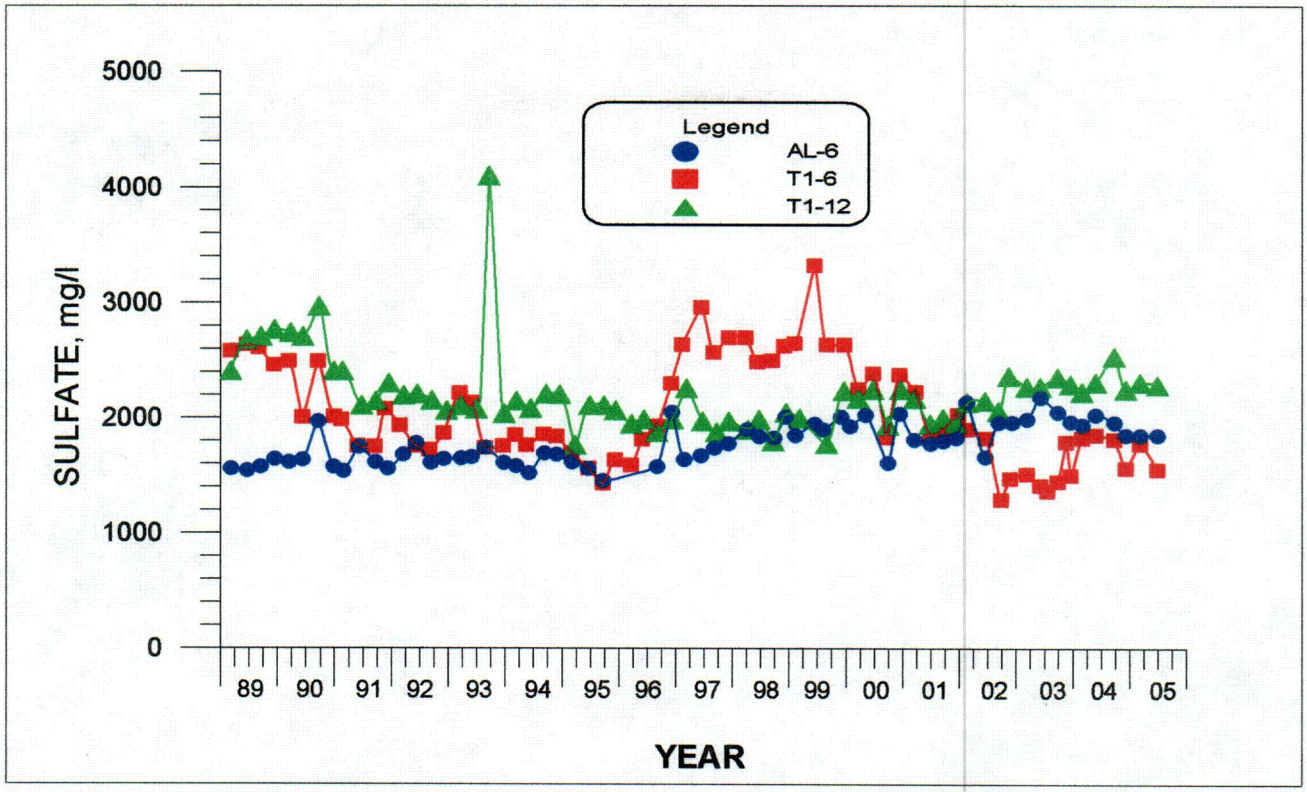


FIGURE 7. SULFATE CONCENTRATIONS IN JUNE 2005 AT LUCKY MC, IN mg/l

C07



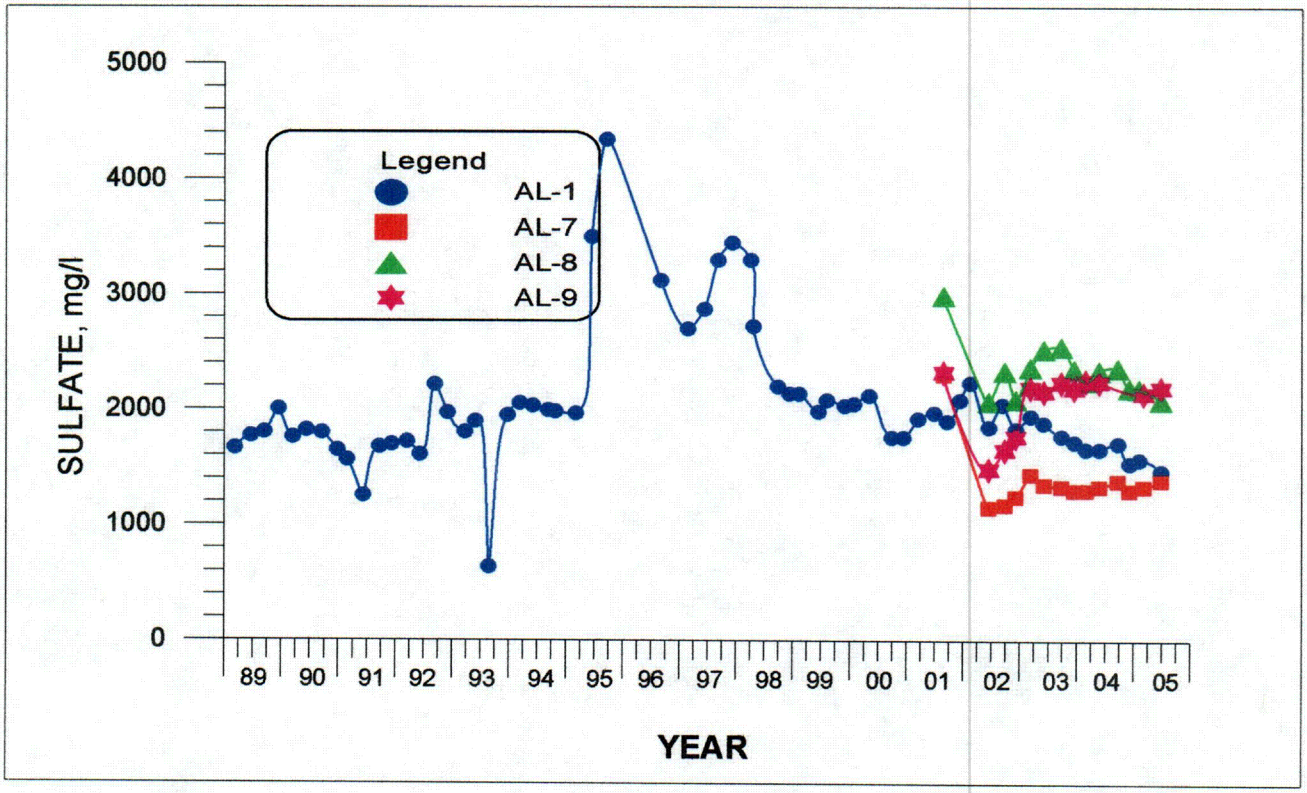


FIGURE 8. SULFATE CONCENTRATIONS VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C08

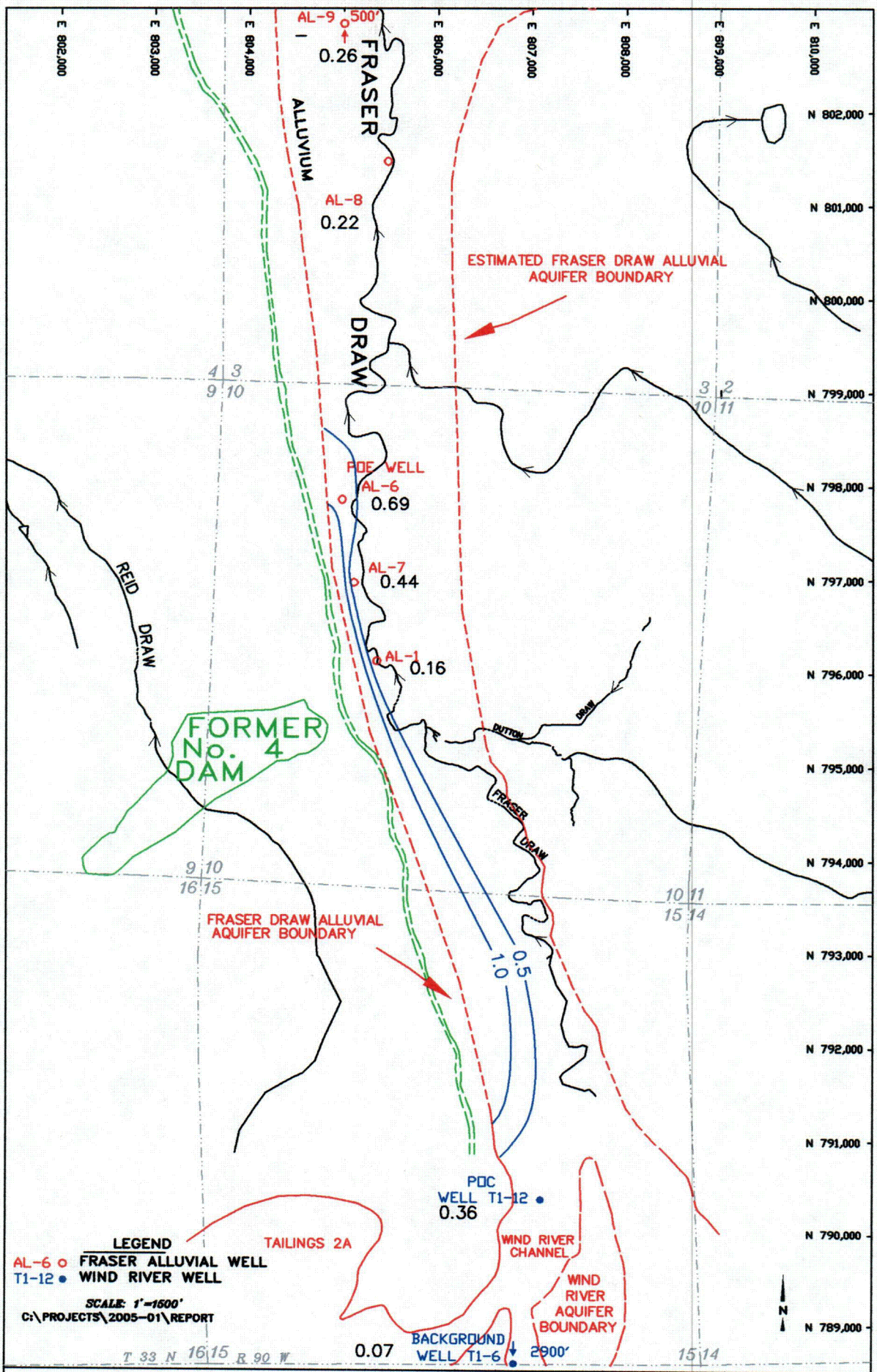
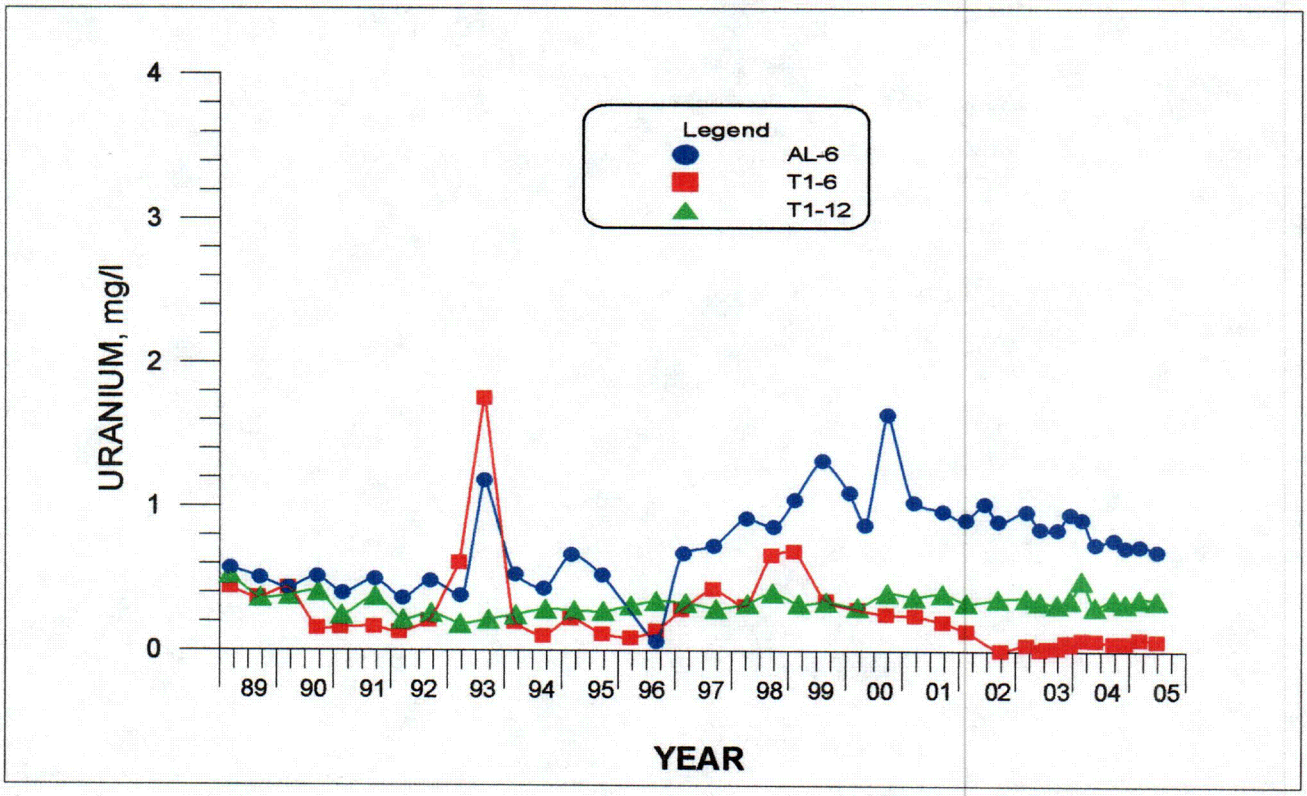


FIGURE 9. URANIUM CONCENTRATIONS IN JUNE 2005 AT LUCKY MC, IN mg/l

C09



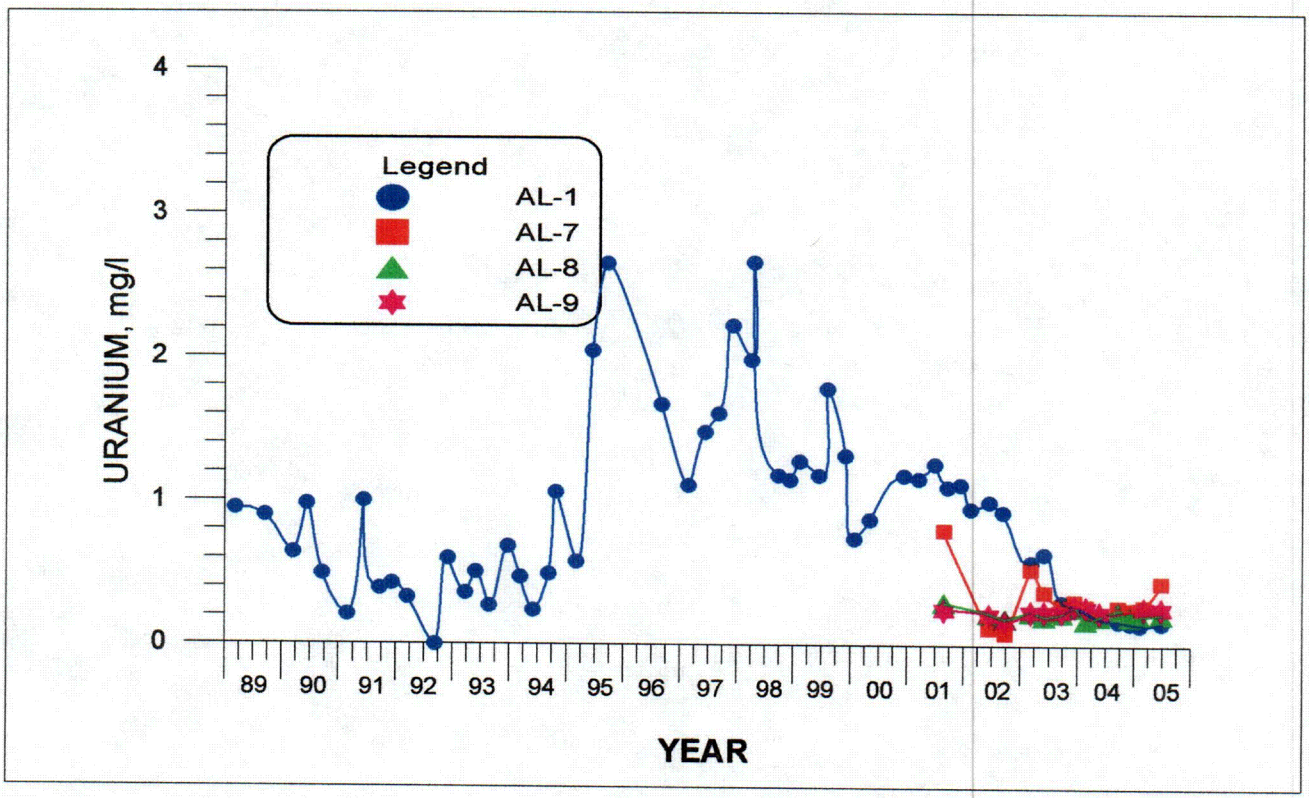


FIGURE 10. URANIUM CONCENTRATIONS VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C10

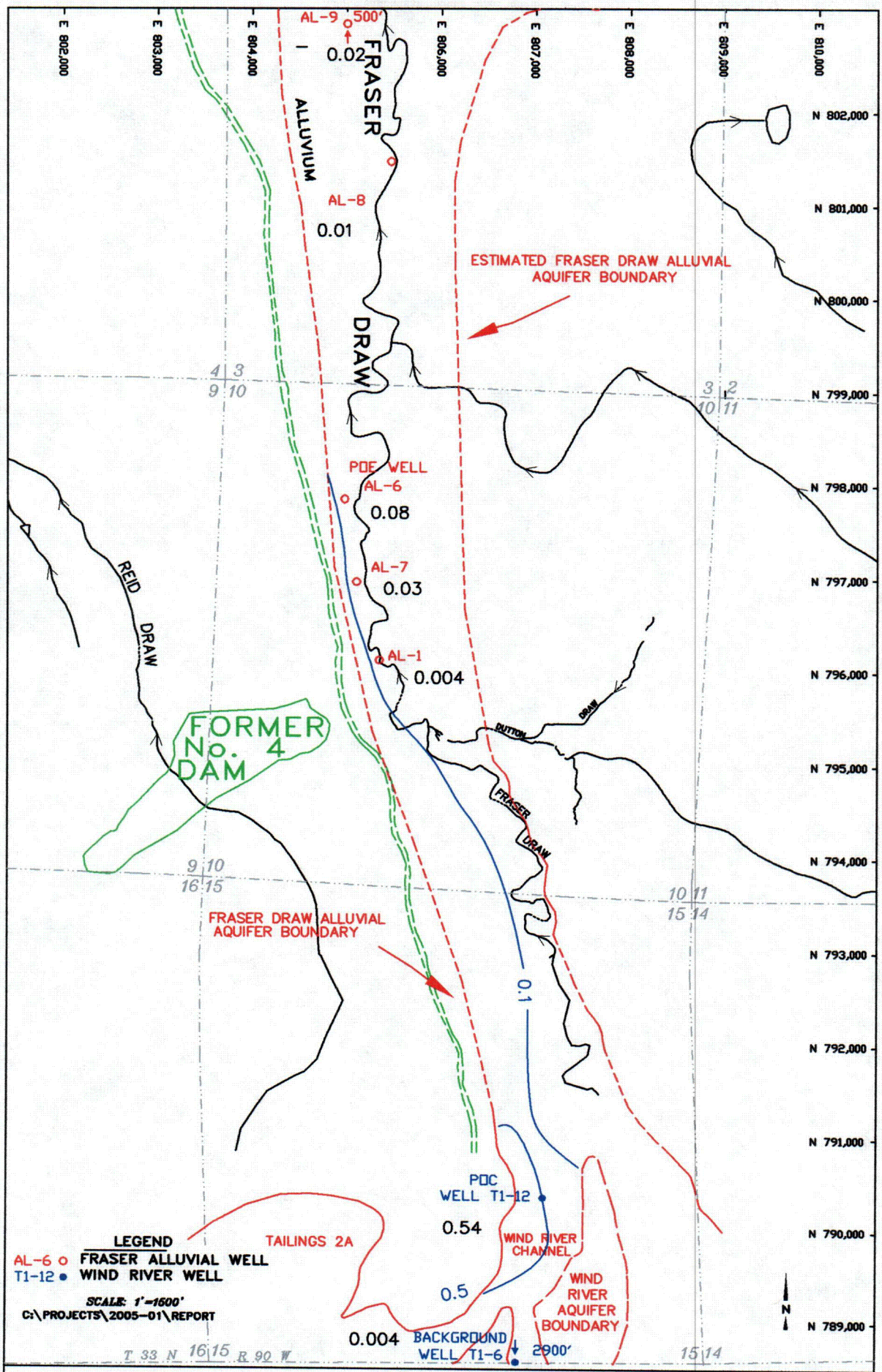
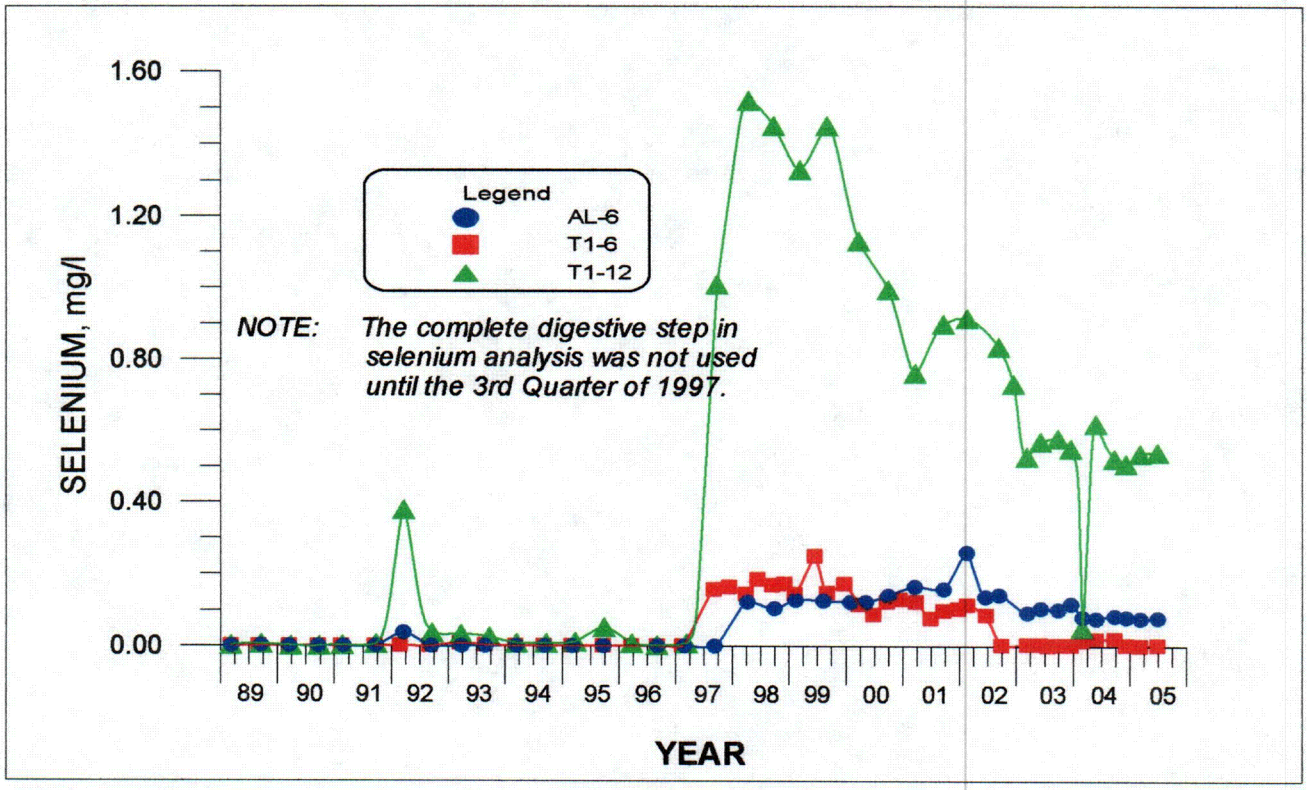


FIGURE 11. SELENIUM CONCENTRATIONS IN JUNE 2005 AT LUCKY MC, IN mg/l

C11



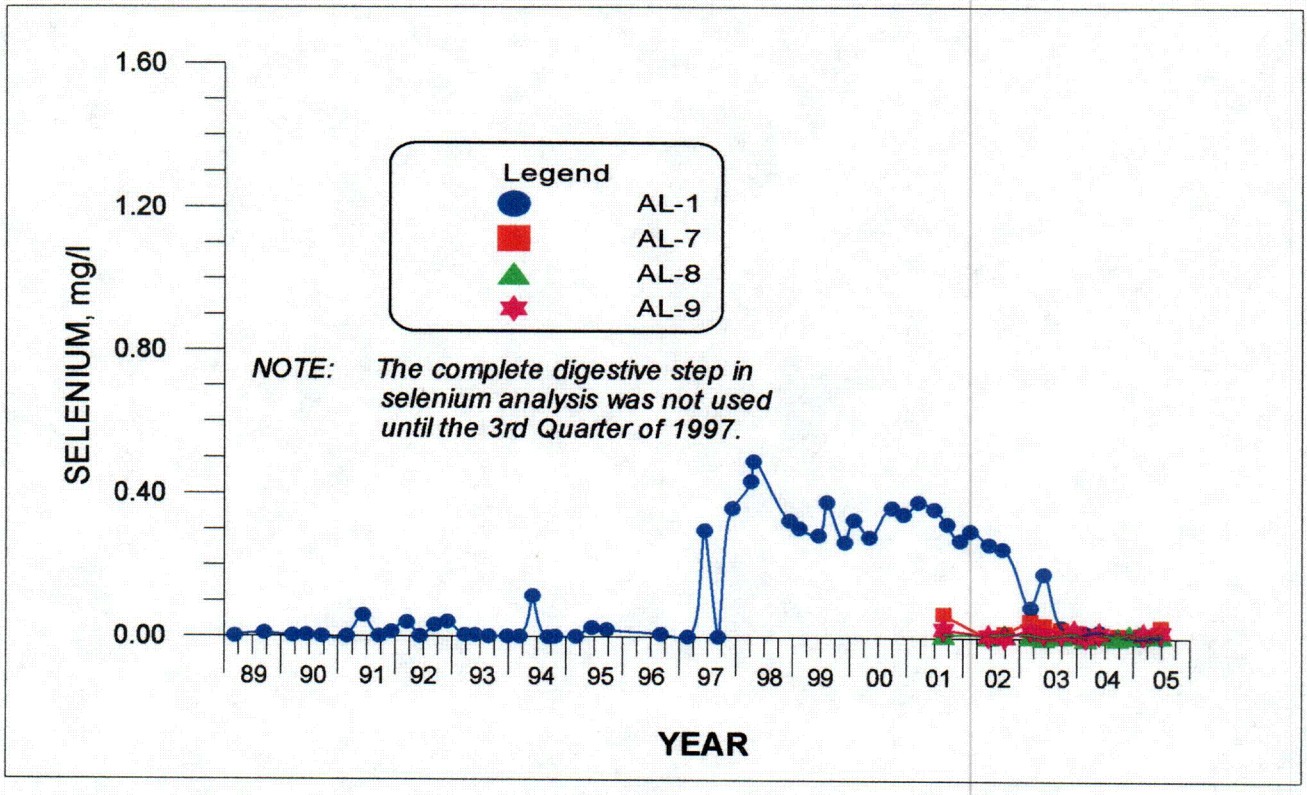


FIGURE 12. SELENIUM CONCENTRATIONS VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C12

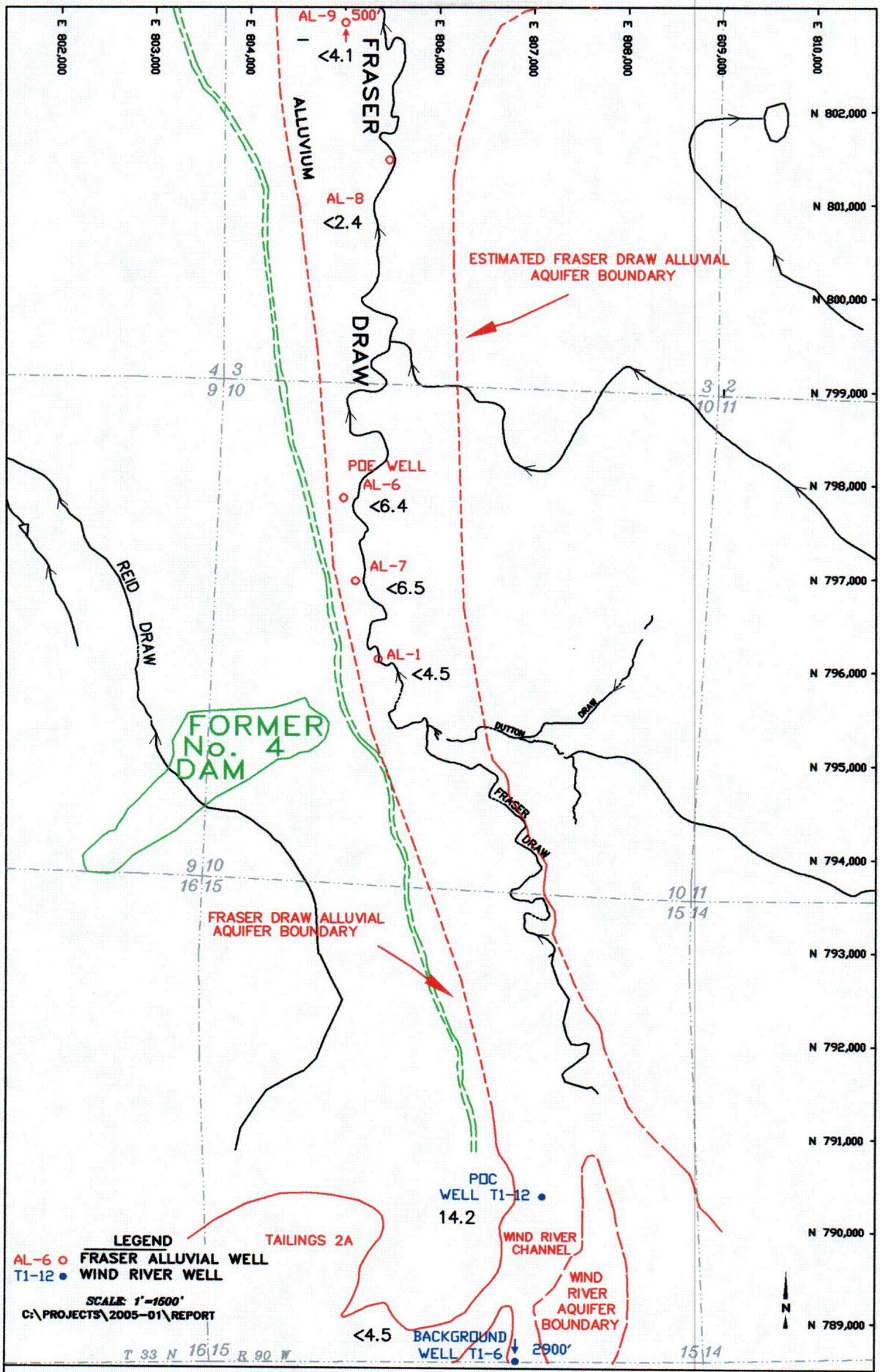
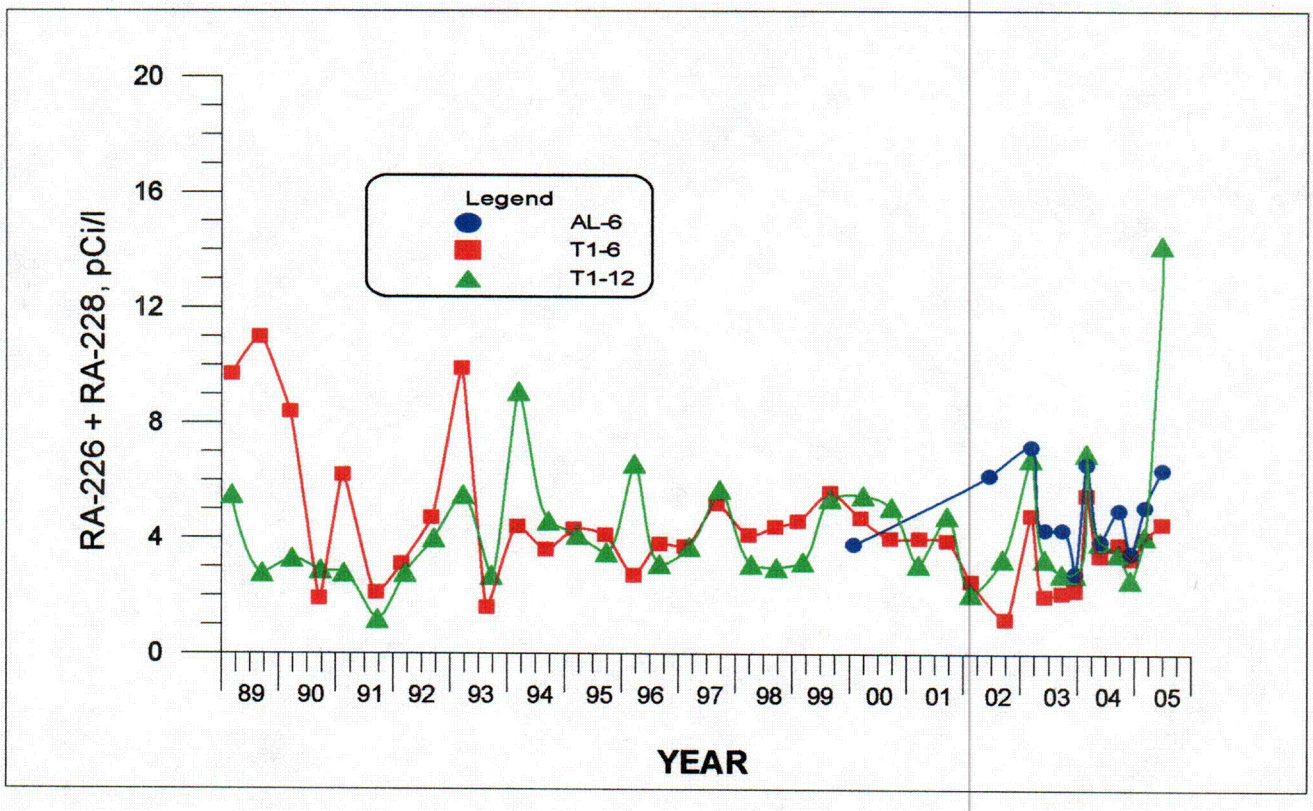


FIGURE 13. RADIUM-226 + RADIUM-228 ACTIVITY IN JUNE 2005 AT LUCKY MC, IN pCi/l

C13



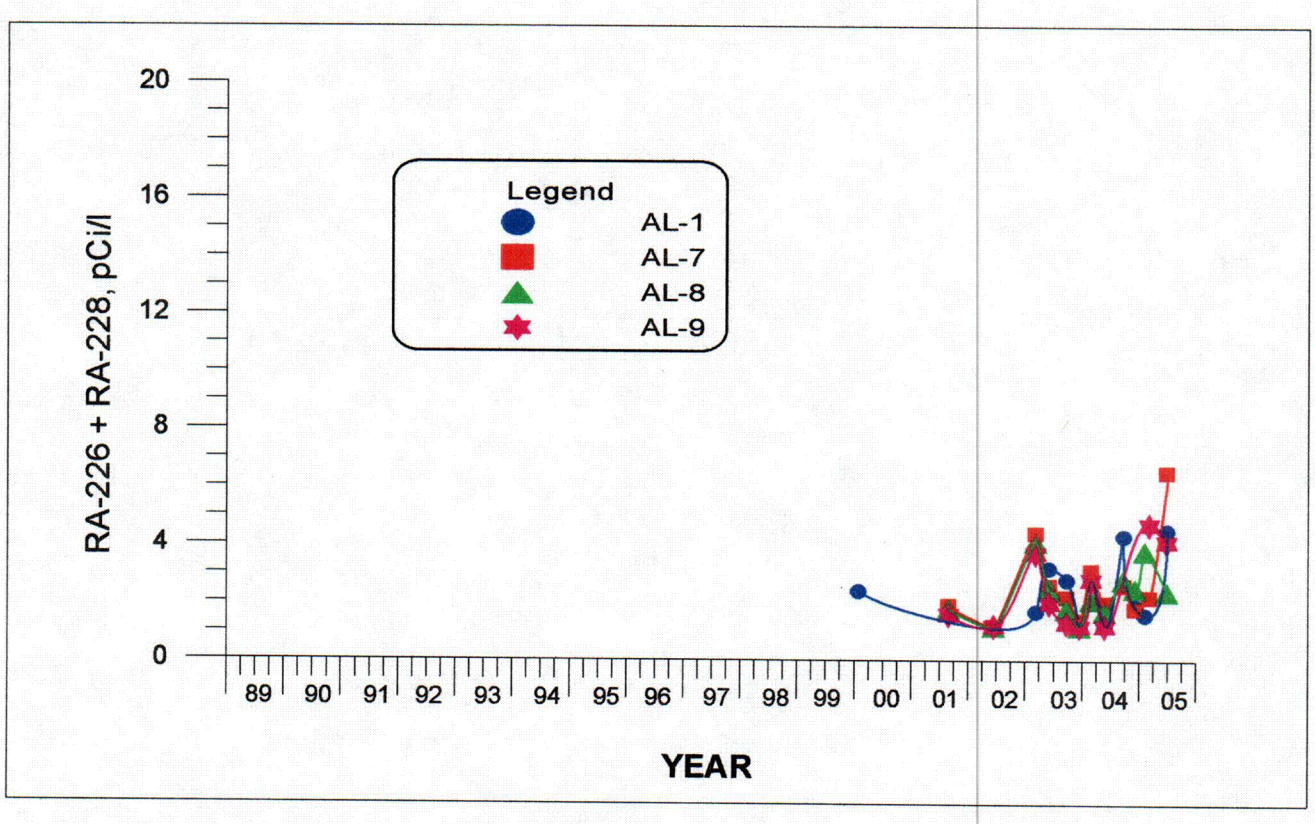


FIGURE 14. RADIUM-226 + RADIUM-228 ACTIVITY VERSUS TIME FOR WELLS T1-6, T1-12, AL-1, AL-6, AL-7, AL-8 AND AL-9.

C14

TABLE 1. WATER-LEVEL AND WATER-QUALITY DATA.

Lucky MC Mine - Pathfinder Mines Corp.

Sample Point Name	Date	WL (feet)	WL_ELEV (ft-msl)	pH(f) (std. units)	Cond(f) (µmhos)	TDS (mg/l)	SO4 (mg/l)	Cl (mg/l)	NO3+NO2 (mg/l)	Unat (mg/l)
AL-1	3/2/2004	29.15	6235.45	—	3380	2770	1660	61.2	2.9	0.245
	5/26/2004	29.93	6234.67	7.2	3080	2630	1660	50.1	1.6	0.190
	9/22/2004	30.96	6233.64	7.5	2830	2710	1710	46.0	0.3	0.175
	12/6/2004	30.54	6234.06	7.0	2910	2770	1540	44.0	0.1	0.159
	2/9/2005	29.73	6234.87	7.2	1885	2650	1570	44.0	< 0.1	0.147
	6/27/2005	31.31	6233.29	6.9	3140	2580	1470	40.0	< 0.1	0.162
AL-6	3/2/2004	23.18	6213.62	7.0	3970	3740	1940	121.0	41.5	0.916
	5/26/2004	23.14	6213.66	7.0	3820	3650	2030	118.0	40.3	0.740
	9/22/2004	23.31	6213.49	7.3	3500	3580	1960	111.0	69.1	0.772
	12/6/2004	23.77	6213.03	6.9	3490	3530	1850	120.0	41.7	0.718
	3/8/2005	23.45	6213.35	6.9	3730	3420	1850	114.0	37.2	0.731
	6/27/2005	23.65	6213.15	7.2	3740	3410	1850	103.0	29.5	0.693
AL-7	3/2/2004	28.12	6223.88	6.9	2710	2380	1300	62.5	3.6	0.274
	3/8/2004	28.71	6223.29	7.1	2550	—	—	—	—	—
	5/26/2004	28.04	6223.96	7.2	2580	2270	1330	56.3	0.4	0.210
	9/22/2004	28.33	6223.67	7.4	2360	2330	1380	59.0	1.9	0.272
	12/6/2004	28.79	6223.21	7.4	2400	2400	1300	60.0	2.3	0.255
	3/8/2005	28.71	6223.29	7.1	2550	2320	1330	65.0	0.6	0.276
	6/28/2005	28.61	6223.39	6.9	2750	2430	1390	57.0	8.9	0.439
AL-8	3/2/2004	29.85	6165.15	7.2	4910	3800	2250	69.5	< 0.1	0.180
	5/26/2004	29.53	6165.47	7.1	4310	3800	2340	65.1	< 0.1	0.210
	9/22/2004	29.89	6165.11	7.5	3950	3740	2360	64.0	0.2	0.242
	12/6/2004	29.91	6165.09	7.1	3960	3740	2190	65.0	< 0.1	0.206
	2/9/2005	30.02	6164.98	7.3	3160	3470	2180	66.0	0.3	0.210
	6/27/2005	30.06	6164.94	7.3	4240	3510	2080	55.0	< 0.1	0.223
AL-9	3/2/2004	35.38	6138.62	7.3	4290	3760	2250	68.8	0.6	0.266
	5/26/2004	35.53	6138.47	6.9	4020	3640	2240	64.5	< 0.1	0.230
	9/22/2004	50.30	6123.70	—	—	—	—	—	—	—
	12/6/2004	> 50.30	6123.70	—	—	—	—	—	—	—
	3/8/2005	38.34	6135.66	6.7	3850	3540	2140	64.0	< 0.1	0.261
	6/27/2005	35.25	6138.75	7.3	4000	3560	2190	56.0	< 0.1	0.256
T1-6	3/2/2004	36.18	6392.04	7.6	4090	3100	1820	72.3	0.5	0.080
	5/26/2004	35.00	6393.22	6.8	3400	3010	1850	60.7	0.2	0.075
	9/22/2004	35.25	6392.97	7.8	3230	2870	1810	58.0	0.3	0.059
	12/7/2004	33.72	6394.50	7.5	2900	2750	1560	51.0	0.3	0.056
	3/8/2005	33.28	6394.94	7.5	3270	2860	1770	67.0	< 0.1	0.083
	6/28/2005	30.90	6397.32	7.8	3470	2560	1550	41.0	< 0.1	0.071
T1-12	3/2/2004	11.26	6329.54	6.7	7060	6750	2230	205.0	310.0	0.493
	5/26/2004	11.40	6329.40	6.3	7240	6970	2310	205.0	340.0	0.310
	9/22/2004	11.95	6328.85	6.6	6550	7030	2540	208.0	550.0	0.361
	12/6/2004	12.17	6328.63	6.7	6450	6870	2250	203.0	321.0	0.333
	3/8/2005	12.87	6327.93	6.7	6840	6800	2310	226.0	298.0	0.364
	6/29/2005	13.42	6327.38	6.5	7110	6600	2290	203.0	259.0	0.356

TABLE 1. WATER-LEVEL AND WATER-QUALITY DATA. (cont.)

Lucky MC Mine - Pathfinder Mines Corp.

Sample Point Name	Date	Th230 (pCi/l)	Th230(e) (pCi/l)	Ra226 (pCi/l)	Ra226(e) (pCi/l)	Ra228 (pCi/l)	Ra228(e) (pCi/l)	Ra226+Ra228 (pCi/l)
AL-1	3/2/2004	< 0.2	—	1.8	0.4	< 1.0	—	< 2.8
	5/26/2004	< 0.2	—	< 0.2	—	< 1.0	—	< 1.2
	9/22/2004	< 0.2	—	1.3	—	3.0	—	4.3
	12/6/2004	< 0.2	—	0.9	—	< 1.0	—	< 1.9
	2/9/2005	< 0.2	—	0.6	0.4	< 1.0	—	< 1.6
	6/27/2005	2.0	0.6	3.5	1.0	< 1.0	—	< 4.5
AL-6	3/2/2004	< 0.2	—	3.4	0.5	3.2	1.2	6.6
	5/26/2004	< 0.2	—	2.9	0.7	< 1.0	—	< 3.9
	9/22/2004	< 0.2	—	4.0	—	< 1.0	—	< 5.0
	12/6/2004	< 0.2	—	2.5	—	< 1.0	—	< 3.5
	3/8/2005	< 0.2	—	4.1	0.7	< 1.0	—	< 5.1
	6/27/2005	< 0.2	—	5.4	1.5	< 1.0	—	< 6.4
AL-7	3/2/2004	< 0.2	—	2.1	0.5	< 1.0	—	< 3.1
	5/26/2004	< 0.2	—	1.0	0.5	< 1.0	—	< 2.0
	9/22/2004	< 0.2	—	1.6	—	< 1.0	—	< 2.6
	12/6/2004	< 0.2	—	0.8	—	< 1.0	—	< 1.8
	3/8/2005	< 0.2	—	1.2	0.5	< 1.0	—	< 2.2
	6/28/2005	< 0.2	—	5.5	1.4	< 1.0	—	< 6.5
AL-8	3/2/2004	< 0.2	—	1.1	0.4	< 1.0	—	< 2.1
	5/26/2004	< 0.2	—	0.7	0.5	< 1.0	—	< 1.7
	9/22/2004	< 0.2	—	1.8	—	< 1.0	—	< 2.8
	12/6/2004	< 0.2	—	1.5	—	< 1.0	—	< 2.5
	2/9/2005	< 0.2	—	2.8	0.5	< 1.0	—	< 3.8
	6/27/2005	< 0.2	—	1.4	0.5	< 1.0	—	< 2.4
AL-9	3/2/2004	0.7	0.4	1.8	0.4	< 1.0	—	< 2.8
	5/26/2004	< 0.2	—	< 0.2	—	< 1.0	—	< 1.2
	3/8/2005	< 0.2	—	3.7	0.7	< 1.0	—	< 4.7
	6/27/2005	< 0.2	—	3.1	0.8	< 1.0	—	< 4.1
T1-6	3/2/2004	< 0.2	—	4.5	0.6	< 1.0	—	< 5.5
	5/26/2004	< 0.2	—	2.4	0.7	< 1.0	—	< 3.4
	9/22/2004	< 0.2	—	2.8	0.5	< 1.0	—	< 3.8
	12/7/2004	< 0.2	—	2.3	0.5	< 1.0	—	< 3.3
	3/8/2005	< 0.2	—	3.0	0.6	< 1.0	—	< 4.0
	6/28/2005	4.5	1.0	3.5	0.8	< 1.0	—	< 4.5
T1-12	3/2/2004	< 0.2	—	6.0	0.7	< 1.0	—	< 7.0
	5/26/2004	< 0.2	—	2.9	0.7	< 1.0	—	< 3.9
	9/22/2004	< 0.2	—	2.5	—	< 1.0	—	< 3.5
	12/6/2004	< 0.2	—	1.6	—	< 1.0	—	< 2.6
	3/8/2005	< 0.2	—	3.1	0.6	< 1.0	—	< 4.1
	6/29/2005	< 0.2	—	10.4	1.6	3.8	1.5	14.2

TABLE 1. WATER-LEVEL AND WATER-QUALITY DATA. (cont.)

Lucky MC Mine - Pathfinder Mines Corp.

Sample Point Name	Date	As (mg/l)	Be (mg/l)	Cd (mg/l)	Cr (mg/l)	Ni (mg/l)	Se (mg/l)
AL-1	3/2/2004	0.003	< 0.010	< 0.005	< 0.050	0.04	0.015
	5/26/2004	< 0.004	< 0.010	< 0.010	< 0.050	< 0.05	0.020
	9/22/2004	< 0.001	—	< 0.010	< 0.050	< 0.05	0.007
	12/6/2004	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.003
	2/9/2005	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.002
	6/27/2005	0.001	< 0.010	< 0.010	< 0.050	< 0.05	0.004
AL-6	3/2/2004	0.007	< 0.001	< 0.005	< 0.050	0.01	0.081
	5/26/2004	0.006	< 0.010	< 0.010	< 0.050	< 0.05	0.079
	9/22/2004	0.006	—	< 0.010	< 0.050	< 0.05	0.085
	12/6/2004	0.007	< 0.010	< 0.010	< 0.050	< 0.05	0.082
	3/8/2005	< 0.006	< 0.010	< 0.010	< 0.050	< 0.05	0.078
	6/27/2005	0.006	< 0.010	< 0.010	< 0.050	< 0.05	0.080
AL-7	3/2/2004	0.001	< 0.001	< 0.005	< 0.050	0.01	0.006
	5/26/2004	0.001	< 0.010	< 0.010	< 0.050	< 0.05	0.003
	9/22/2004	0.001	—	< 0.010	< 0.050	< 0.05	0.009
	12/6/2004	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.007
	3/8/2005	0.001	< 0.010	< 0.010	< 0.050	< 0.05	0.007
	6/28/2005	0.003	< 0.010	< 0.010	< 0.050	< 0.05	0.031
AL-8	3/2/2004	0.002	< 0.001	< 0.005	< 0.050	0.01	0.004
	5/26/2004	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.012
	9/22/2004	0.004	—	< 0.010	< 0.050	< 0.05	0.006
	12/6/2004	0.005	< 0.010	< 0.010	< 0.050	< 0.05	0.013
	2/9/2005	0.005	< 0.010	< 0.010	< 0.050	< 0.05	0.011
	6/27/2005	0.004	< 0.010	< 0.010	< 0.050	< 0.05	0.013
AL-9	3/2/2004	0.002	< 0.001	< 0.005	< 0.050	0.01	0.006
	5/26/2004	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.014
	3/8/2005	0.004	< 0.010	< 0.010	< 0.050	< 0.05	0.013
	6/27/2005	0.002	< 0.010	< 0.010	< 0.050	< 0.05	0.018
T1-6	3/2/2004	0.003	< 0.001	< 0.005	< 0.050	0.06	0.016
	5/26/2004	< 0.001	< 0.010	< 0.010	< 0.050	< 0.05	0.020
	9/22/2004	< 0.001	—	< 0.010	< 0.050	< 0.05	0.021
	12/7/2004	0.001	< 0.010	< 0.010	< 0.050	< 0.05	0.003
	3/8/2005	0.001	< 0.010	< 0.010	< 0.050	< 0.05	< 0.002
	6/28/2005	0.001	< 0.010	< 0.010	< 0.050	0.06	0.004
T1-12	3/2/2004	< 0.001	< 0.001	< 0.005	< 0.050	0.03	0.054
	5/26/2004	< 0.004	< 0.001	< 0.001	< 0.050	0.28	0.620
	9/22/2004	< 0.002	—	< 0.010	< 0.050	0.29	0.523
	12/6/2004	< 0.002	< 0.010	< 0.010	< 0.050	0.28	0.509
	3/8/2005	0.003	< 0.010	< 0.010	< 0.050	0.30	0.536
	6/29/2005	0.010	< 0.010	< 0.010	< 0.050	0.31	0.540