Rio Algom Mining LLC

July 30, 2012

Certified Mail
Return Receipt (7010 1870 0000 3702 9627)

Mr. Tom McLaughlin, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop T-8F5
Washington, DC 20555

Re: **Ambrosia Lake Facility**
License SUA-1473, Docket No. 40-8905
License Condition #34, Semiannual Groundwater Report

Dear Mr. McLaughlin,

Pursuant to license condition #34 of the above referenced license, please find attached the semiannual groundwater monitoring report for the above referenced facility for the first half of 2012.

This report describes the groundwater stability monitoring plan, as approved by Amendment #56.

A digital copy of the semiannual groundwater monitoring report is also included in the package.

If you have any questions concerning this submittal, please contact me at (505) 287-8851, extension 15.

Regards,

Chuck Wentz
Environmental Department Supervisor
Radiation Safety Officer

Attachment

cc: Document Control (NRC-MD)
J. Shoeppner (NMED-NM)
File

FSME 21

P.O. Box 218, Grants, NM USA 87020 - Tel: 505.287.8851 - Fax: 505.285.5550

RIO ALGOM LLC
AMBROSIA LAKE FACILITY

License SUA-1473 Docket 40-8905

Groundwater Stability Monitoring Report

1st Half 2012

July 30, 2012

RIO ALGOM MINING LLC
AMBROSIA LAKE FACILITY
GROUNDWATER STABILITY MONITORING REPORT – 1st HALF 2012

Nuclear Regulatory Commission (NRC) source material license SUA-1473, condition #34(D), requires Rio Algom Mining LLC (RAML) to submit semi-annual groundwater monitoring reports associated with the facility's groundwater stability monitoring plan established by Amendment 56. Condition 34.D states:

> *Submit, by February 1 and August 1 of each year groundwater monitoring reports to include a minimum of the following: potentiometric surface maps for each aquifer; time vs. concentration plots for all parameters for which ACLs have been issued, hydrographs for the downgradient most trend well or POE well in each aquifer, hydraulic gradient calculations, and tabulated analytical data for each ACL parameter for each well.*

Background

RAML's Ambrosia Lake facility is located in McKinley County approximately 24 miles due north of Grants, New Mexico, in the Ambrosia Lake valley. Uranium milling activities started at the site in 1957. The waste management structures were Tailings Impoundments 1 and 2, Decantation Pond 3, and Evaporation Ponds 4 through 10. Tailings Impoundments 1 and 2 were built in late 1958, along with Pond 3 at the eastern toe of Tailings Impoundment 1, to accept decanted tailings liquids. Tailings were first produced at the site in November 1958. In 1976, RAML diverted the natural course of the Arroyo del Puerto east of Ponds 4, 5, and 6, and lined Ponds 9 and 10. The solids fraction was disposed through a slurry transfer system to the tailings impoundments, while the liquids fraction was transferred to the evaporation ponds. Evaporation pond residues from Ponds 3, 4, 5, 6, 7, and 8 were placed in Tailings Impoundments 1 and 2 prior to final reclamation. All the aforementioned tailings impoundments and ponds were unlined. Seepage from the tailings impoundments and Evaporation Ponds 3 through 6, along with seepage from unrelated mining and milling operations, has saturated and impacted the Alluvium of the Arroyo del Puerto (Alluvium). Seepage from the tailings impoundments and evaporation Ponds 7 and 8 has recharged and impacted the Tres

Hermanos B sandstones within the Mancos Formation shale, and the Dakota Sandstone, which underlies the Mancos Formation.

Consequently, in 1983, RAML entered into an Assurance of Discontinuance (AOD) with the State of New Mexico to minimize the future impact of mill tailings solutions seepage on groundwater. The approved AOD remedial action required the construction and maintenance of an interceptor trench (IT-1) and the cessation of discharges to unlined Ponds 4 through 8. These ponds were taken out of service in 1983. In the late 1990s, RAML added interceptor trenches IT-2, -3, and -4 south of Pond 10 to collect seepage potentially missed by IT-1.

In 1986, after the State of New Mexico relinquished its licensing authority over uranium mill activities, NRC reasserted jurisdiction at the site and required that the site begin a groundwater detection monitoring program. Data from this program were the basis for the groundwater protection standards (GWPSs) established for the site by NRC, and a corrective action program (CAP) for the groundwater was developed based on this information. The CAP required pumping and treating groundwater to remove certain constituents. RAML implemented the CAP beginning in the mid-1980s. This requirement was removed when the alternate concentration limit (ACL) petition was granted in 2005.

Mining and milling operations in the area have had two notable hydrologic effects: creation and maintenance of a saturated zone at the base of the Alluvium, and creation of a cone of groundwater depression in bedrock aquifers due to dewatering of underground mines. Water quality in the Alluvium and the units into which the Alluvium drains has also been affected by area mining operations not directly related to the licensee.

1st Half 2012 Activities

Activities associated with the groundwater monitoring program at the mill facility during the first half of 2012 consisted of performing sampling pursuant to the approved groundwater stability monitoring plan. The well network was designed to track and assess groundwater contamination between the tailings impoundment and the long-term care boundary and point of exposure (POE). NRC required more frequent monitoring during the beginning of the compliance monitoring program because of uncertainties in the hydrogeologic and transport models. Contaminated groundwater will not express itself as surface water; therefore any exposure must occur through actual groundwater use. The approved ACLs for the site are presented in Table 1 below.

Table 1. Rio Algom Mining – Ambrosia Lake Operation
Approved Alternate Concentration Limits

Parameter	Dakota	Tres Hermanos A	Tres Hermanos B	Alluvium
U-nat (mg/L)	1.6	No ACL	1.6	23
Th-230 (pCi/L)	945	945	945	13,627
Ra-226 and -228 (pCi/L)	218	218	218	3,167
Pb-210 (pCi/L)	88	88	88	1,274
Gross Alpha (pCi/L)	No ACL	No ACL	No ACL	8,402
Molybdenum (mg/L)	No ACL	No ACL	No ACL	176
Nickel (mg/L)	6.8	No ACL	6.8	98
Selenium (mg/L)	No ACL	No ACL	No ACL	49
Chloride (mg/L)	3,200	1,070	2,810	7,110
Nitrate (mg/L)	22.8	9.2	7.7	351
Sulfate (mg/L)	6,480	2,584	4,760	12,000
Total Dissolved Solids (mg/L)	14,100	6,400	11,700	26,100

mg/L = milligrams per liter
pCi/L = picocuries/liter

Appendix 1 contains the analytical data for the Dakota, Tres Hermanos A, Tres Hermanos B, and Alluvial units, respectively. Appendix 2 contains the time versus concentration plots for the ACL parameters for the Dakota, Tres Hermanos A, Tres Hermanos B, and Alluvial units.

Appendix 3 contains the hydrographs for the most downgradient monitoring well for the Dakota, Tres Hermanos A, Tres Hermanos B, and Alluvial units. The most notable observation in the data is that the potentiometric surface in the Alluvium continues to decline. For example, RAML has observed a decline of over 25 feet at

monitoring well 32-69 since February of 2005. This drop is attributable to the discontinuance of the Alluvial CAP, which was maintaining the artificial water mound in the vicinity of the site. RAML's groundwater flow model projected a 65- to 100-year period for the Alluvium to dewater following cessation of the CAP. This water table drop acts to slow the lateral migration rate of milling-related seepage. The area with the greatest drop in potentiometric surface was the southeast region near the POE for the Alluvium.

RAML determined the hydraulic gradients by calculating the difference in groundwater elevation between the most upgradient point of compliance (POC) well in each unit and the farthest downgradient trend or POE well in the same unit. That value was then divided by the distance along a flow path between the two wells. Results of these calculations are summarized below:

- Dakota Sandstone – 0.033 feet per foot
- Tres Hermanos A Sandstone – 0.009 feet per foot
- Tres Hermanos B Sandstone – 0.015 feet per foot
- Alluvium – 0.007 feet per foot

Appendix 4 contains the potentiometric surface maps for the Dakota, Tres Hermanos A, Tres Hermanos B, and Alluvial units, respectively.

Data Evaluation

As a component of the ACL approval process, NRC not only established ACLs for specific parameters, but NRC also maintained the GWPSs for those constituents for which ACLs were not proposed. During the time from initial ACL submission for the bedrock units (February 2000) to ACL approval (2006), the site maintained the CAP. Review of the data has resulted in RAML informing NRC on November 9, 2006, of elevated beryllium concentrations within Dakota POC monitoring well 36-06KD. As a result of this condition, RAML submitted a proposed CAP on January 15, 2007, to address the beryllium concentrations present within monitoring well 36-06KD, which was approved by NRC on April 30, 2007.

RAML has discussed the changes in concentration in samples of groundwater from monitoring well 36-06KD during past meetings with NRC, and both parties concurred that fluctuations in well water quality appear to be linked to surface

reclamation work. The previously increasing trend in beryllium concentration correlated with surface field work in the vicinity of the well. The increasing trend in beryllium leveled and has concentrations have been declining over time. RAML proposed to continue monthly monitoring of well 36-06KD for beryllium so that additional data will be available for evaluating the beryllium concentrations. The beryllium concentration in the samples of groundwater from monitoring well 36-06KD continues to exceed the GWPS of 0.01 mg/L. However, the current value of 0.0155 mg/L continues a downward trend from a ten-year high of near 0.04 mg/L in April of 2007 (Figure 1 and Table 2).

Figure 1. Beryllium Concentrations in Dakota Monitor Well 36-06

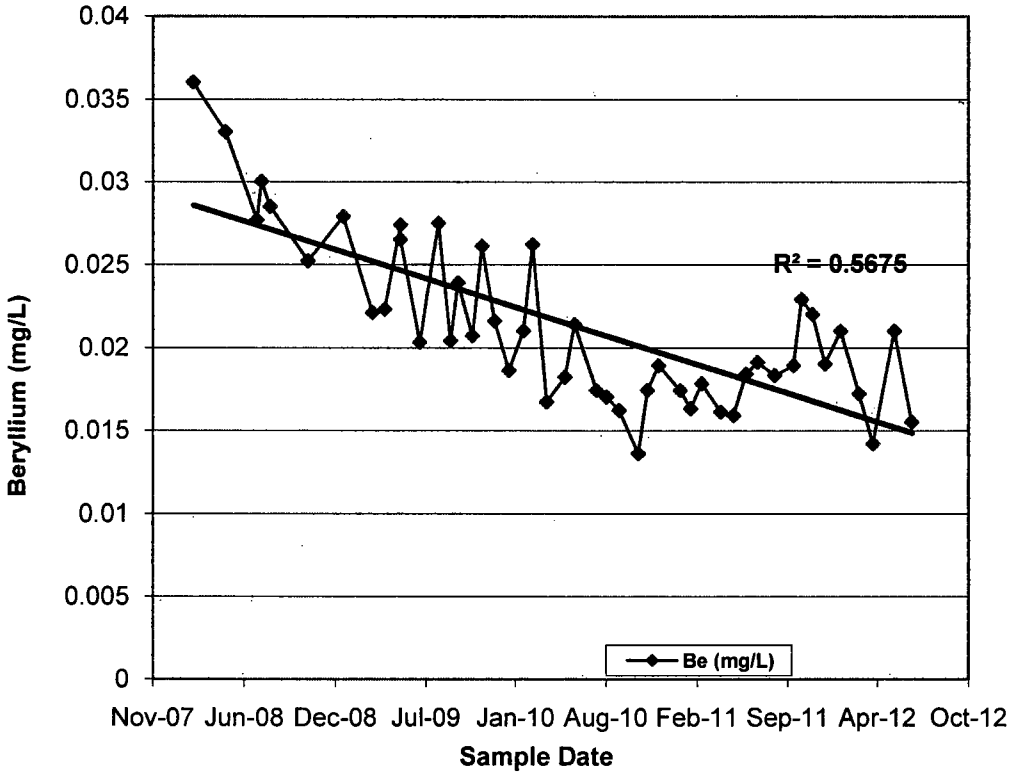
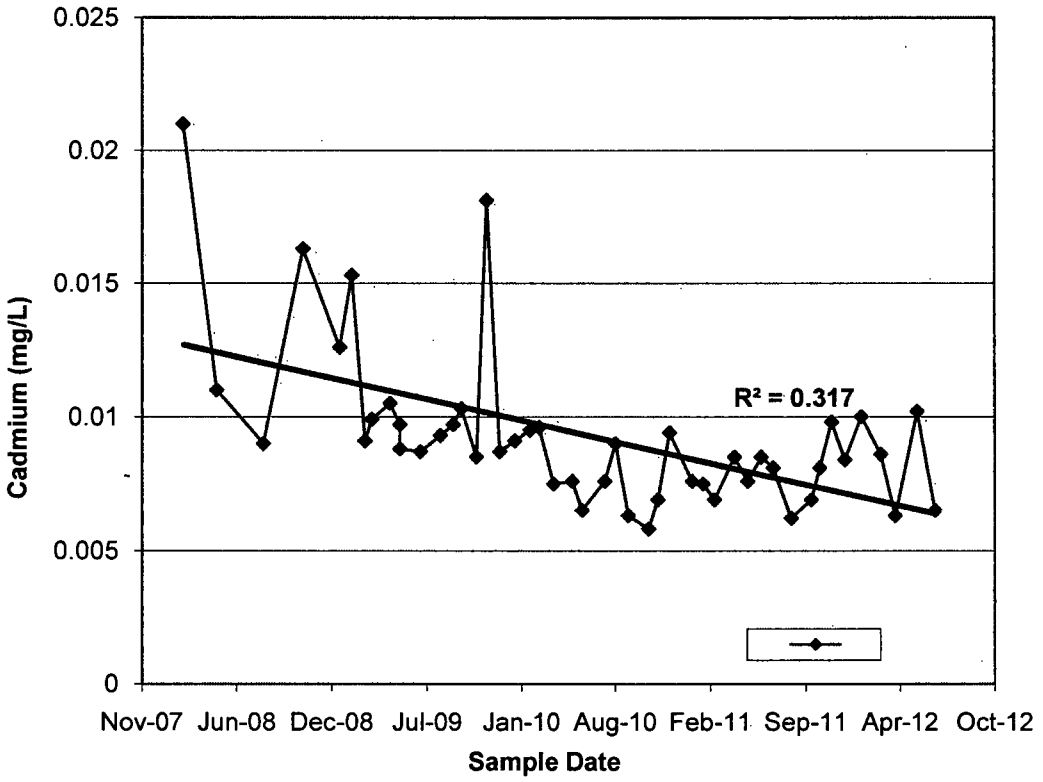


Table 2. 1st Half 2012 Analytical Summary for Uranium in Monitoring Well 31-02 and Beryllium and Cadmium in Monitoring Well 36-06KD

Date	Well 31-02	Well 36-06KD	
	U-nat mg/L	Be mg/L	Cd mg/L
1/10/2012	0.378	0.021	0.01
2/27/2012	0.768	0.0172	0.0086
3/22/2012	0.839	0.0142	0.0063
5/22/2012	0.2125	0.021	0.0102
6/15/2012	0.845	0.0155	0.0065

Because of previous inadvertent omissions in reporting values that exceed a GWPS, in 2009 RAML instituted a policy of third-party review of laboratory data within five working days of receiving it. As a result of this policy, RAML was made aware that cadmium concentrations in the samples of groundwater from monitoring well 36-06KD had exceeded the GWPS of 0.01 mg/L during several sampling rounds beginning in November 2007 (Figure 2). Cadmium concentrations in monitoring well 36-06KD follow a pattern that is very similar to both uranium and beryllium concentrations in the same well. These constituents increase when pH decreases and decrease when pH increases. As with uranium and beryllium, cadmium concentrations are currently declining in monitoring well 36-06KD; the most recent sample was measured at 0.0065 mg/L (Figure 2 and Table 2).

Figure 2. Cadmium Concentrations in Dakota Monitor Well 36-06



As stated in the *Groundwater Stability Monitoring Report – 1st Half 2010,* RAML planned to discontinue monthly sampling and return to quarterly sampling of Tres Hermanos B monitoring well 31-02 in 2011. However, there has been a recent drop in water level and an increase in the concentrations for well 31-02. Uranium concentrations collected in July through November of 2011 exceeded the ACL of 1.6 mg/L. However, uranium concentrations measured in samples from 31-02 during the first half of 2012 have all been well below the ACL (Table 2). It should be noted that concerns over the well's integrity have been raised as part of a review of the integrity of the entire monitoring network. The well is scheduled for replacement pending New Mexico Environment Department and NRC approval of the recently submitted well replacement work plan. RAML will continue to monitor monthly, and if it is determined that the recent results are indicative of a trend, the site conditions will be evaluated to identify the cause of the recent changes.

Groundwater samples from 36-06KD were collected monthly and analyzed for gross alpha. The results of the corrected gross alpha values (gross alpha – uranium) exceeded the GWPS of 56 pCi/L for four of the six sampling events and are presented in Table 3 below.

Table 3. 1st Half 2012 Analytical Summary for Gross Alpha in Monitoring Well 36-06KD

Date	Corrected Gross Alpha value (pCi/L)
1/10/12	117
2/20/12	179
3/22/12	-51
4/24/12	319
5/8/12	208
6/15/12	-235

Conclusions

Based on the developments with monitoring well 36-06KD, RAML proposes to continue to conduct monthly sampling of the well for beryllium, cadmium, and gross alpha until the beryllium and cadmium concentrations clearly decrease to below the ACL of 0.01 mg/L and gross alpha concentrations are below the GWPS of 56 pCi/L. Water levels will also be monitored to determine whether the water available within the Dakota formation is continuing to decline. Results of this test phase will be presented within the 2nd half 2012 groundwater report.

Because of water level decrease and increased uranium concentration levels in samples from Tres Hermanos B monitoring well 31-02 during the second half of 2011, RAML will continue monthly sampling for uranium concentrations in this well.

APPENDIX 1

Stability Monitoring Plan
Analytical Results

RIO ALGOM MINING LLC
1ST HALF 2012
DAKOTA WELL RESULTS - ACL PARAMETERS

Well	Date	Depth To Water	Total Depth	Spec. (Cond.)	Temp C	pH	Chloride (mg/L)	Sulfate (mg/L)	T.D.S. (mg/L)	Nitrate (mg/L)
17-01KD	27-Feb-12	683.69	807.9	1365	18.9	9.91	39	680	1060	<0.02
17-01KD	07-May-12	683.97	807.9	1319	21.2	9.63	37	720	1100	<0.02
30-02KD	21-Feb-12	310.23	313.42	6930	14.8	7.15	2200	1720	6060	1.49
30-02KD	29-May-12	310.27	313.38	7120	16.7	6.88	2180	1500	6210	0.21
30-48KD	23-Feb-12	Dry	332.36							
30-48KD	29-May-12	Dry	332.27							
32-45KD	21-Feb-12	245.81	269.7	1783	13.3	7.1	190	740	1570	0.39
32-45KD	29-May-12	245.94	269.7	1731	14.6	7.25	200	710	1590	0.03
36-06KD	20-Feb-12	184.24	198	7000	12.4	3.92	1100	4100	7700	0.13
36-06KD	08-May-12	184.64	197.98	8320	14.3	3.39	1200	4000	8070	0.09
5-02KD	23-Feb-12	186.85	190.54	Insufficient Water						
5-02KD	21-May-12	186.59	190.54	Insufficient Water						
ACL							**3200**	**6480**	**14100**	**22.8**

Well	Date	Ni (mg/L)	U-nat (mg/L)	Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)
17-01KD	27-Feb-12	0.0031	0.0002	0.06	3.5	0.72
17-01KD	07-May-12	0.0027	0.0003	0.3	2.6	0.59
30-02KD	21-Feb-12	0.018	0.0007	0.18	0	1.61
30-02KD	29-May-12	0.017	0.0109	-0.34	0.15	3.9
30-48KD	23-Feb-12					
30-48KD	29-May-12					
32-45KD	21-Feb-12	0.0007	0.0099	-0.34	2.1	1.85
32-45KD	29-May-12	0.0007	0.012	0.08	0	3.5
36-06KD	20-Feb-12	0.204	0.6135	23	0	17.3
36-06KD	08-May-12	0.235	0.735	48	0	21.2
5-02KD	23-Feb-12					
5-02KD	21-May-12					
ACL		**6.8**	**1.6**	**945**	**88**	**218**

Well 30-48KD is dry.
Well 5-02KD did not have sufficient water to collect a sample.
< = constituent was not detected above the method detection limit.

RIO ALGOM MINING LLC
1ST HALF 2012
TRA WELL RESULTS - ACL PARAMETERS

Well	Date	Depth To Water	Total Depth	Spec. (Cond.)	Temp C	pH	Chloride (mg/L)	Sulfate (mg/L)	T.D.S. (mg/L)	Nitrate (mg/L)
30-01	23-Feb-12	205.1	207.38	Insufficient Water						
30-01	22-May-12	204.93	207.36	Insufficient Water						
31-01	27-Feb-12	202.54	249.81	1516	12.6	7.87	34	680	1410	0.03
31-01	22-May-12	202.63	249.8	1455	15.2	7.86	28	700	1460	0.06
33-01TRA	21-Feb-12	118.65	181.03	3210	12.5	7.56	35	1600	2720	0.09
33-01TRA	08-May-12	118.72	181.04	3560	14.2	7.65	33	1600	2760	0.03
ACL							**1070**	**2584**	**6400**	**9.2**

Well	Date	Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)
30-01	23-Feb-12			
30-01	22-May-12			
31-01	27-Feb-12	0.06	0.85	2.4
31-01	22-May-12	-0.04	0.18	3.4
33-01TRA	21-Feb-12	-0.12	0	0.7
33-01TRA	08-May-12	0.27	0.41	2.83
ACL		**945**	**88**	**218**

< = constituent was not detected above the method detection limit.
Well 30-01 contained insufficient water for sample collection.

RIO ALGOM MINING LLC
1ST HALF 2012
TRB WELL RESULTS - ACL PARAMETERS

Well	Date	Depth To Water	Total Depth	Spec. (Cond.)	Temp C	pH	Chloride (mg/L)	Sulfate (mg/L)	T.D.S. (mg/L)	Nitrate (mg/L)
19-77	21-Feb-12	272.1	287.95	4150	14.2	7.26	19	2100	3460	0.24
19-77	07-May-12	272.09	287.92	4350	14.5	7.34	18	2000	3530	0.16
31-02	27-Feb-12	93.29	104.64	4600	12	7.24	670	2400	5030	0.32
31-02	22-May-12	94.11	104.11	4760	14.1	7.28	700	2200	5060	0.09
31-67	20-Feb-12	30.37	97.25	6070	11.04	6.79	960	3000	6460	0.04
31-67	22-May-12	30.84	97.2	6160	13.1	6.79	960	2700	6550	0.05
36-01	22-Feb-12	58.07	58.41	Insufficient Water						
36-01	30-May-12	58.07	58.41	Insufficient Water						
36-02	20-Feb-12	43.13	57.36	7870	11.3	7.13	2400	3200	8980	0.84
36-02	08-May-12	45.09	57.31	8340	13.6	6.99	2170	3200	8660	<0.02
ACL							**2810**	**4760**	**11700**	**7.7**

Well	Date	Ni (mg/L)	U-nat (mg/L)	Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)
19-77	21-Feb-12	0.002	0.0167	-0.04	0	1.67
19-77	07-May-12	0.003	0.0194	0.48	0	2.41
31-02	27-Feb-12	0.005	0.768	-0.06	0	2.35
31-02	22-May-12	0.004	0.2125	0.66	0.55	4.1
31-67	20-Feb-12	0.007	0.0223	0.06	1.5	6.8
31-67	22-May-12	0.007	0.0242	0.14	0.82	11.5
36-01	22-Feb-12					
36-01	30-May-12					
36-02	20-Feb-12	0.008	0.0163	-0.15	0.37	1.63
36-02	08-May-12	0.007	0.0113	0.02	0	2.35
ACL		**6.8**	**1.6**	**945**	**88**	**218**

< = constituent was not detected above the method detection limit.
Monitor Well 36-01 was dry or contained insufficient water for sample collection.

RIO ALGOM MINING LLC
1ST HALF 2012
ALLUVIAL WELL RESULTS - ACL PARAMETERS

Well	Date	Depth To Water	Total Depth	Spec. (Cond.)	Temp C	pH	Chloride (mg/L)	Sulfate (mg/L)	T.D.S. (mg/L)	Nitrate (mg/L)
5-73	14-Feb-12	16.88	31.34	5770	11.8	7.1	1770	1520	5240	0.32
5-73	21-May-12	17.13	31.34	6540	12.1	7.22	1900	1600	5530	0.23
5-03	14-Feb-12	24.31	41.27	3880	12	9.57	470	1790	3440	0.1
5-03	21-May-12	24.81	41.2	4580	13.5	7.59	495	1900	4010	0.2
5-04	14-Feb-12	21.23	63.89	4590	11.5	6.98	860	2000	4870	0.07
5-04	21-May-12	21.44	63.85	5080	13.4	6.97	840	2400	5130	0.09
5-08	14-Feb-12	30.82	87.11	3490	12.1	6.31	430	1670	3300	0.04
5-08	21-May-12	31.11	87.07	3730	15	6.98	450	1700	3310	0.16
31-61	14-Feb-12	14.04	29.16	10870	11.5	6.33	2500	5800	13500	1.84
31-61	22-May-12	14.44	29.16	12200	11.9	6.4	2400	5900	14300	2.03
31-65	14-Feb-12	16.01	46	10000	11.8	6.39	2500	5500	13300	0.1
31-65	22-May-12	16.4	45.95	10950	12.3	6.36	2500	5300	14300	0.12
32-59	20-Feb-12	18.09	28.02	4670	10.4	7.44	610	2300	4630	0.25
32-59	21-May-12	18.66	27.97	4970	13.6	7.33	560	2300	4730	0.25
MW-24	23-Feb-12	Dry	50.14							
MW-24	21-May-12	Dry	50.14							
ACL							**7110**	**12000**	**26100**	**351**

< = constituent was not detected above the method detection limit.
Monitor Well MW-24 was dry.

RIO ALGOM MINING LLC
1ST HALF 2012
ALLUVIAL WELL RESULTS - ACL PARAMETERS

Well	Date	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	U-nat (mg/L)	Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)	Gross Alpha (pCi/L)
5-73	14-Feb-12	<0.003	0.004	<0.001	0.2113	-0.13	3.9	1.82	110
5-73	21-May-12	<0.003	0.005	<0.001	0.336	-0.44	1.2	1.2	170
5-03	14-Feb-12	<0.001	<0.001	<0.001	0.0116	-0.15	0	1.13	-4.7
5-03	21-May-12	<0.003	<0.003	<0.001	0.0162	0.1	2	2.26	8.7
5-04	14-Feb-12	<0.003	<0.003	<0.001	0.0111	-0.2	4.4	0.88	1.1
5-04	21-May-12	<0.003	<0.003	<0.001	0.0058	-0.13	2.5	2.1	1.1
5-08	14-Feb-12	0.001	<0.001	<0.001	0.0027	-0.14	3.4	13.87	20
5-08	21-May-12	<0.001	0.003	<0.001	0.0692	-0.36	0.46	13.5	57
31-61	14-Feb-12	<0.005	0.061	0.0043	0.573	0.64	2	3.7	150
31-61	22-May-12	<0.005	0.061	0.0048	0.587	0.62	2	2.87	260
31-65	14-Feb-12	<0.005	0.09	0.001	0.112	-0.11	7.8	1.16	58
31-65	22-May-12	<0.005	0.092	<0.005	0.124	0.61	0	1.99	60
32-59	20-Feb-12	0.005	<0.02	0.0219	0.1108	0.23	7.6	1.35	61
32-59	21-May-12	0.005	<0.02	0.0162	0.1501	0.19	0	0.77	81
MW-24	23-Feb-12								
MW-24	21-May-12								
ACL		**176**	**98**	**49**	**23**	**13627**	**1274**	**3167**	**8402**

< = constituent was not detected above the method detection limit.
Monitor Well MW-24 was dry.

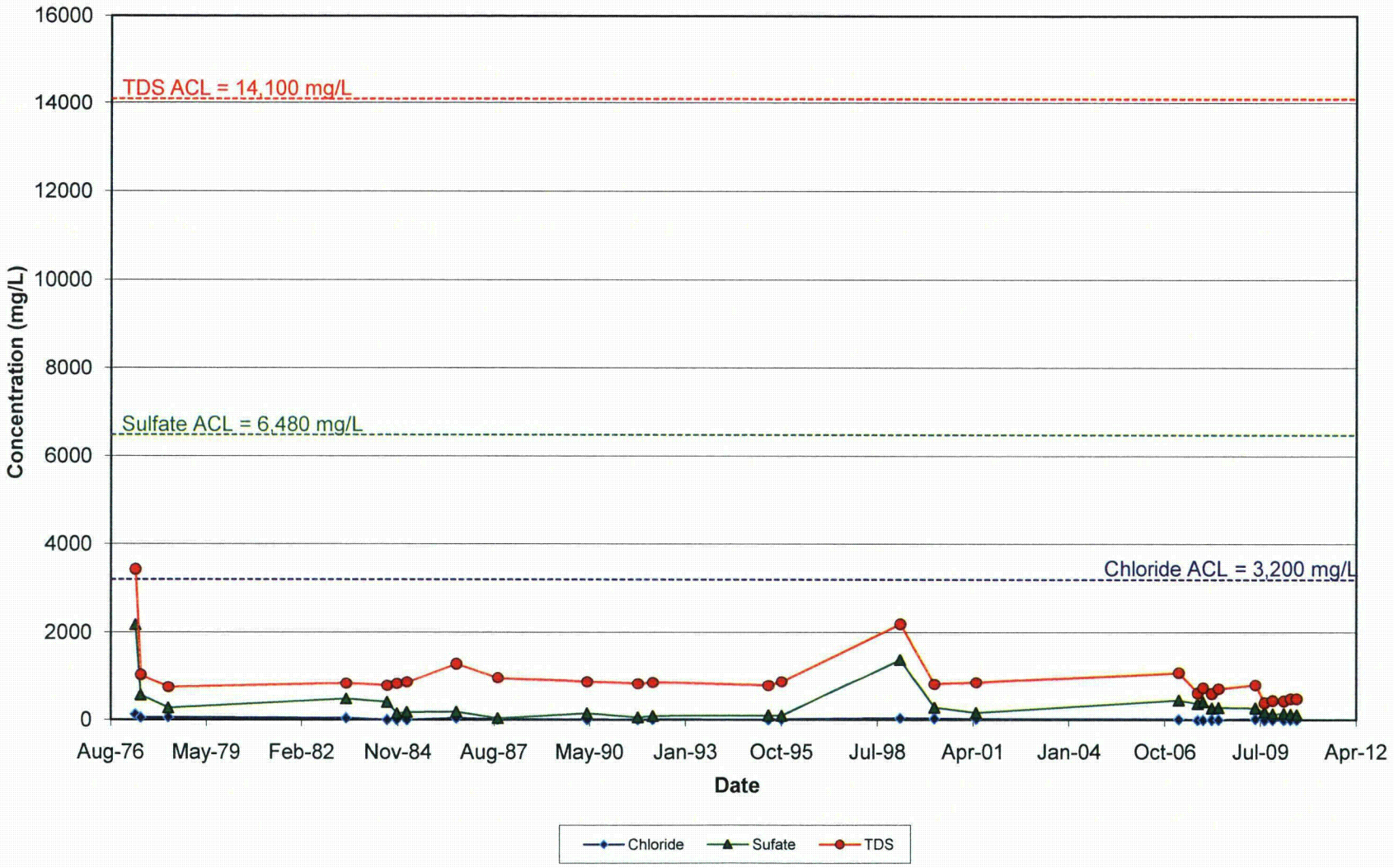
APPENDIX 2

Stability Monitoring Plan
Time Versus Concentration Plots

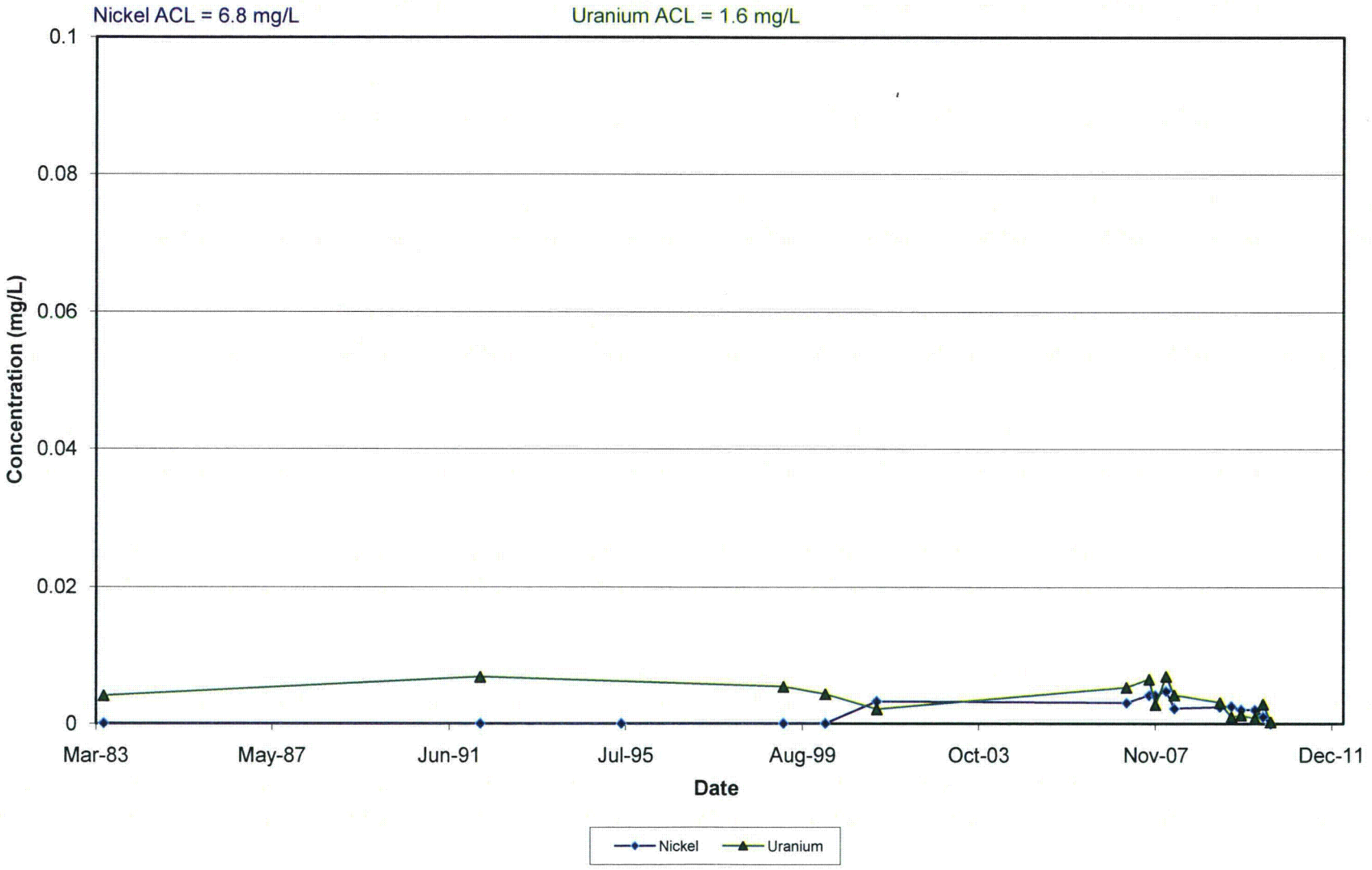
Stability Monitoring Plan
Time Versus Concentration Plots

Dakota

Anions and TDS in Monitoring Well 5-02KD

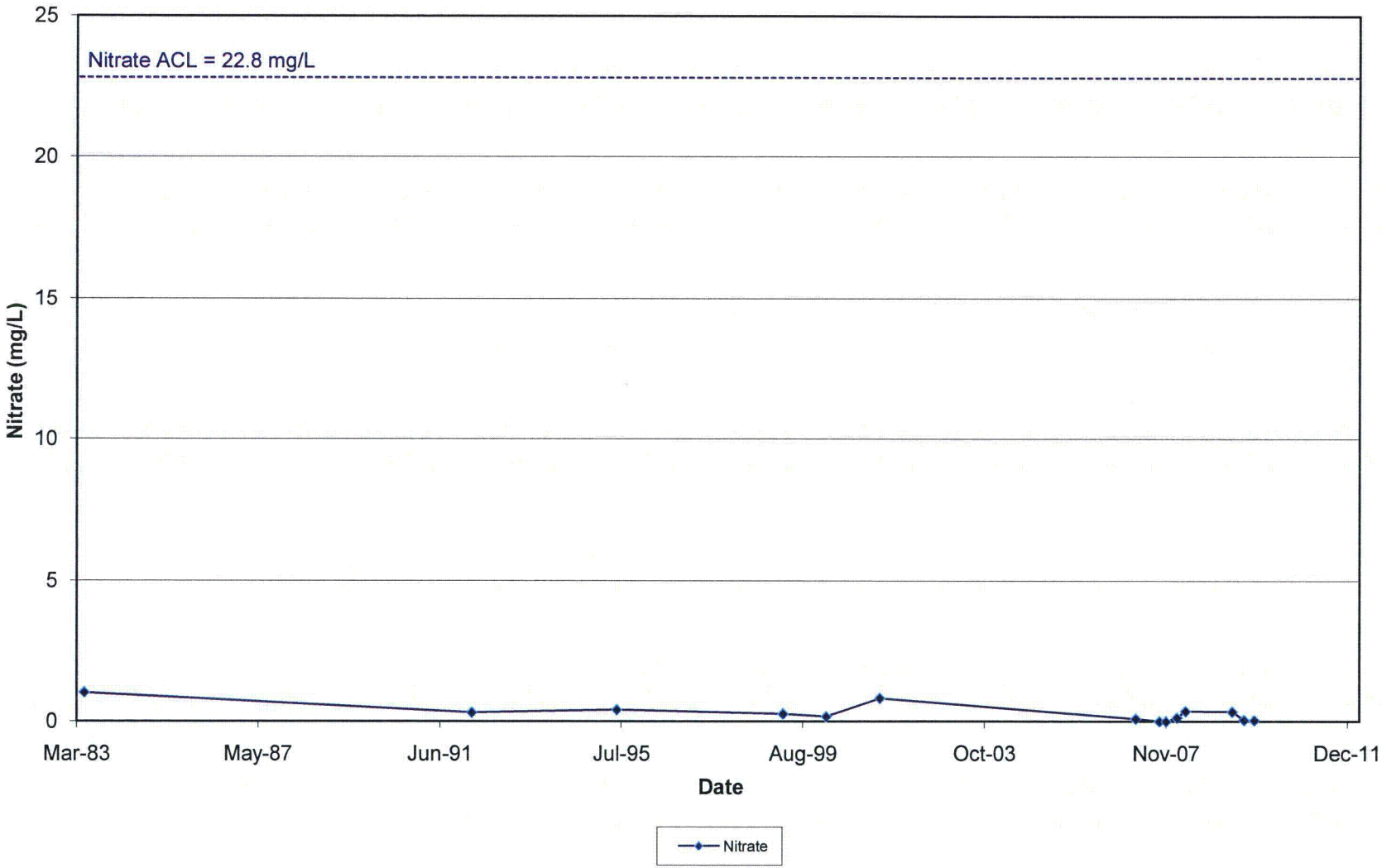


Metals in Monitoring Well 5-02KD

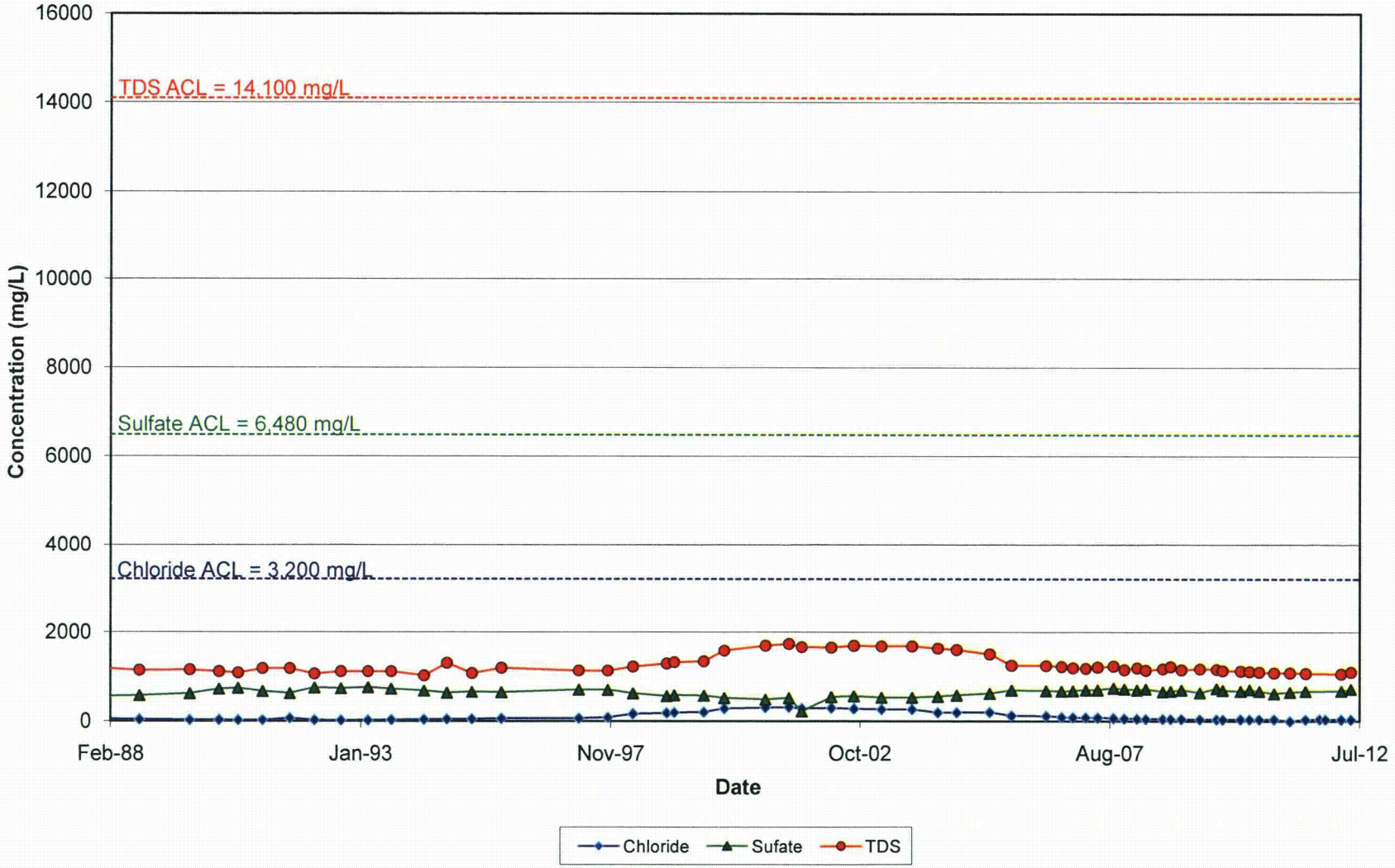


Radionuclides in Monitoring Well 5-02KD

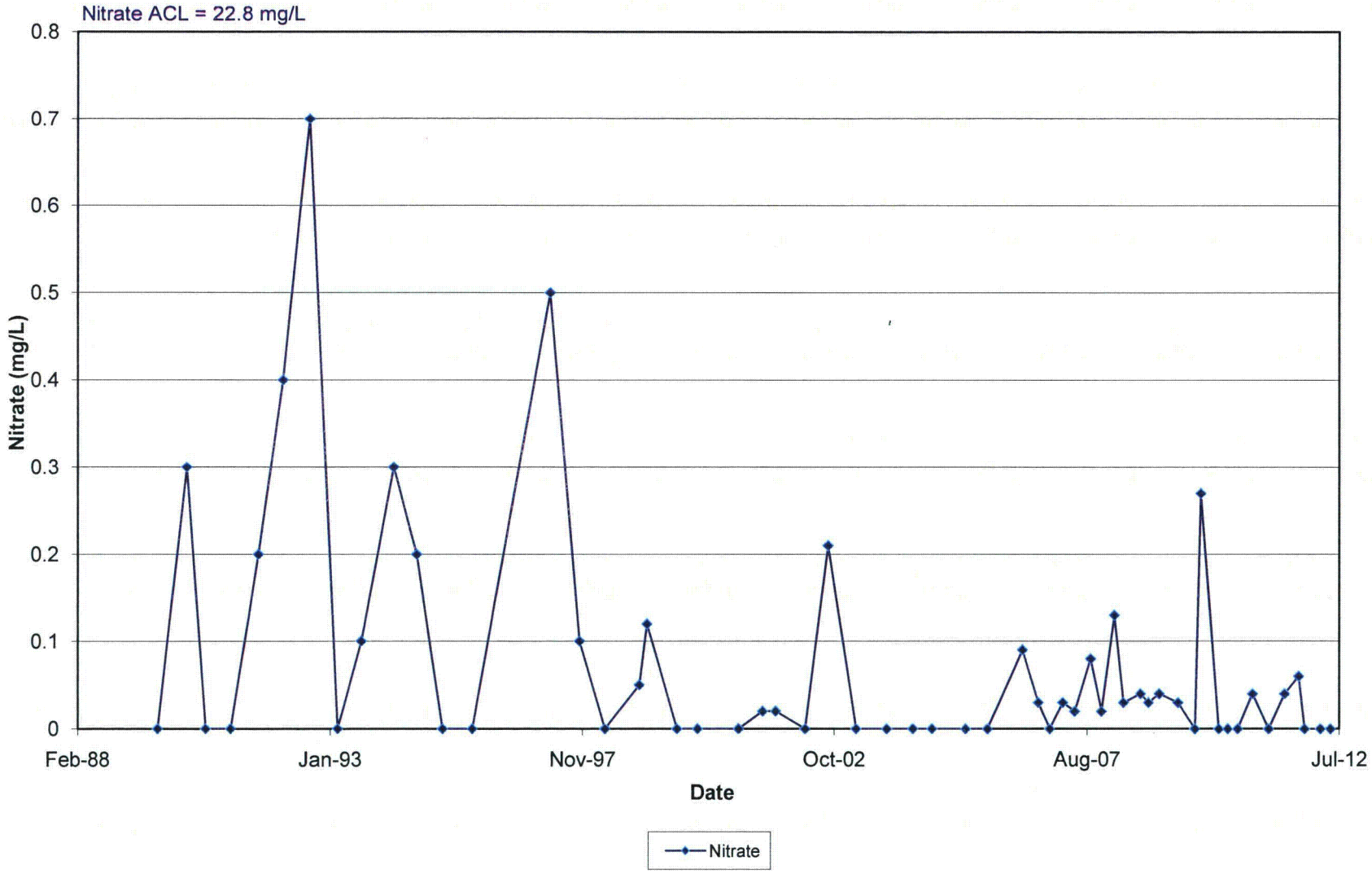
Nitrate in Monitoring Well 5-02KD



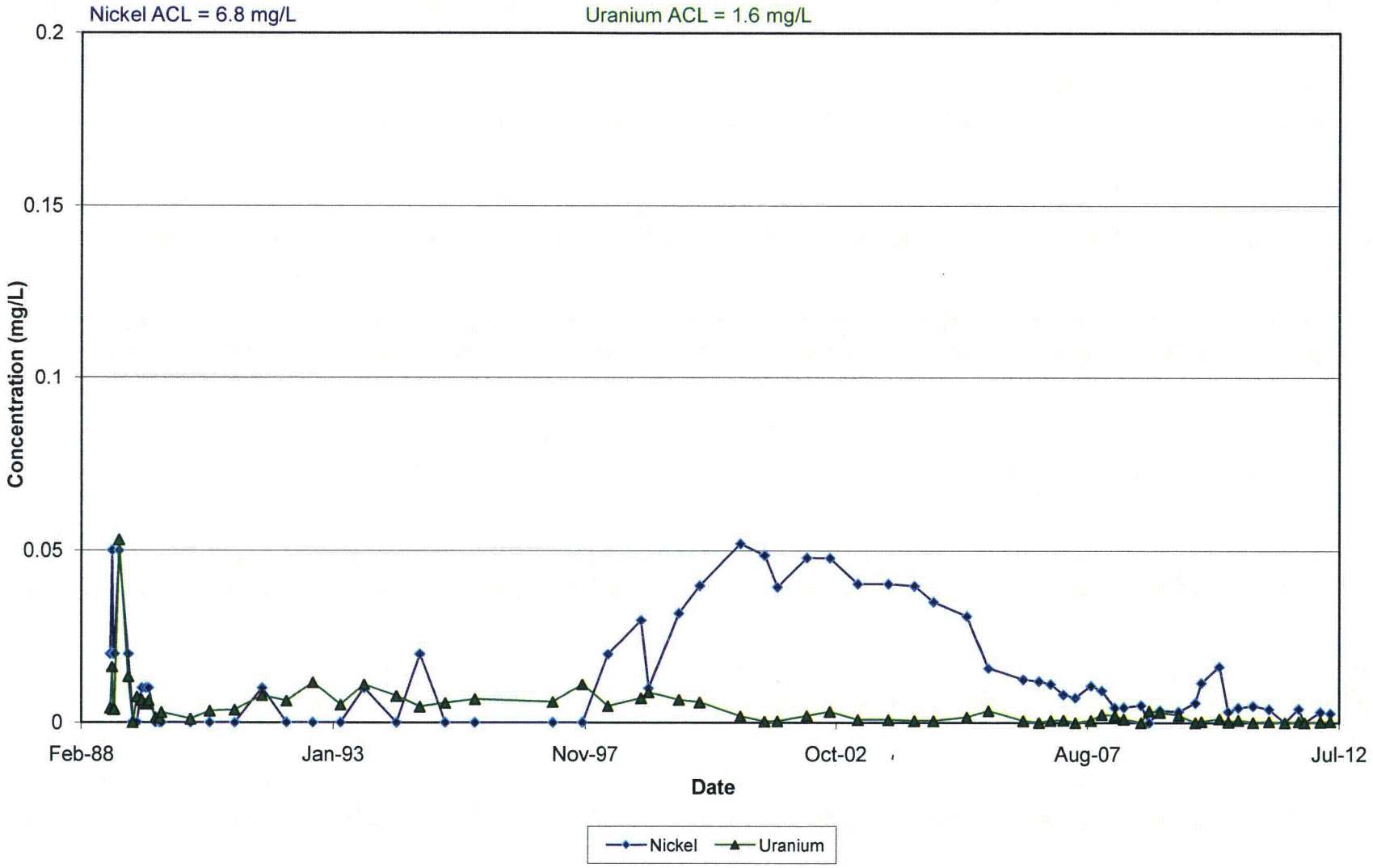
Anions and TDS in Monitoring Well 17-01KD



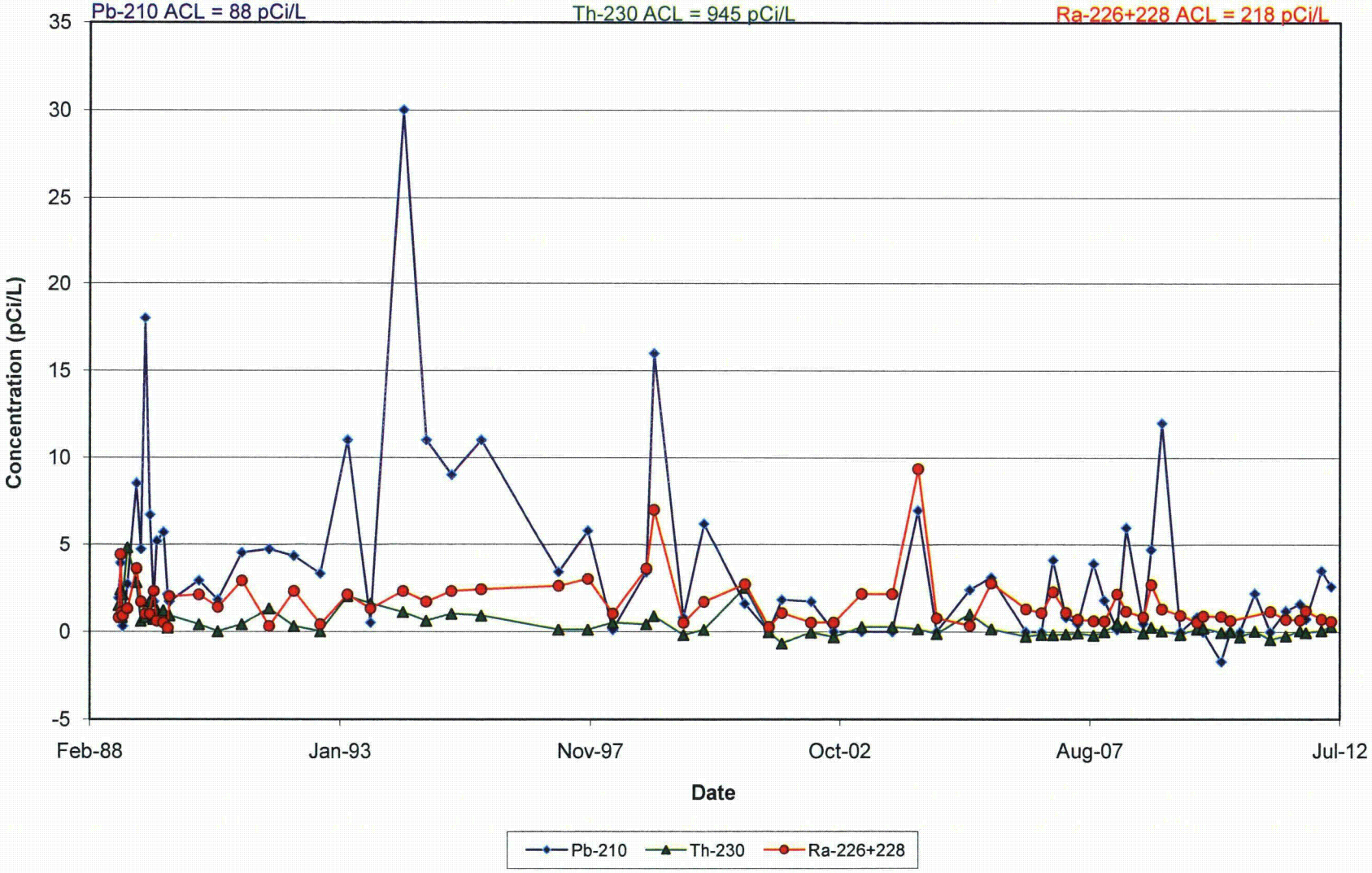
Nitrate in Monitoring Well 17-01KD



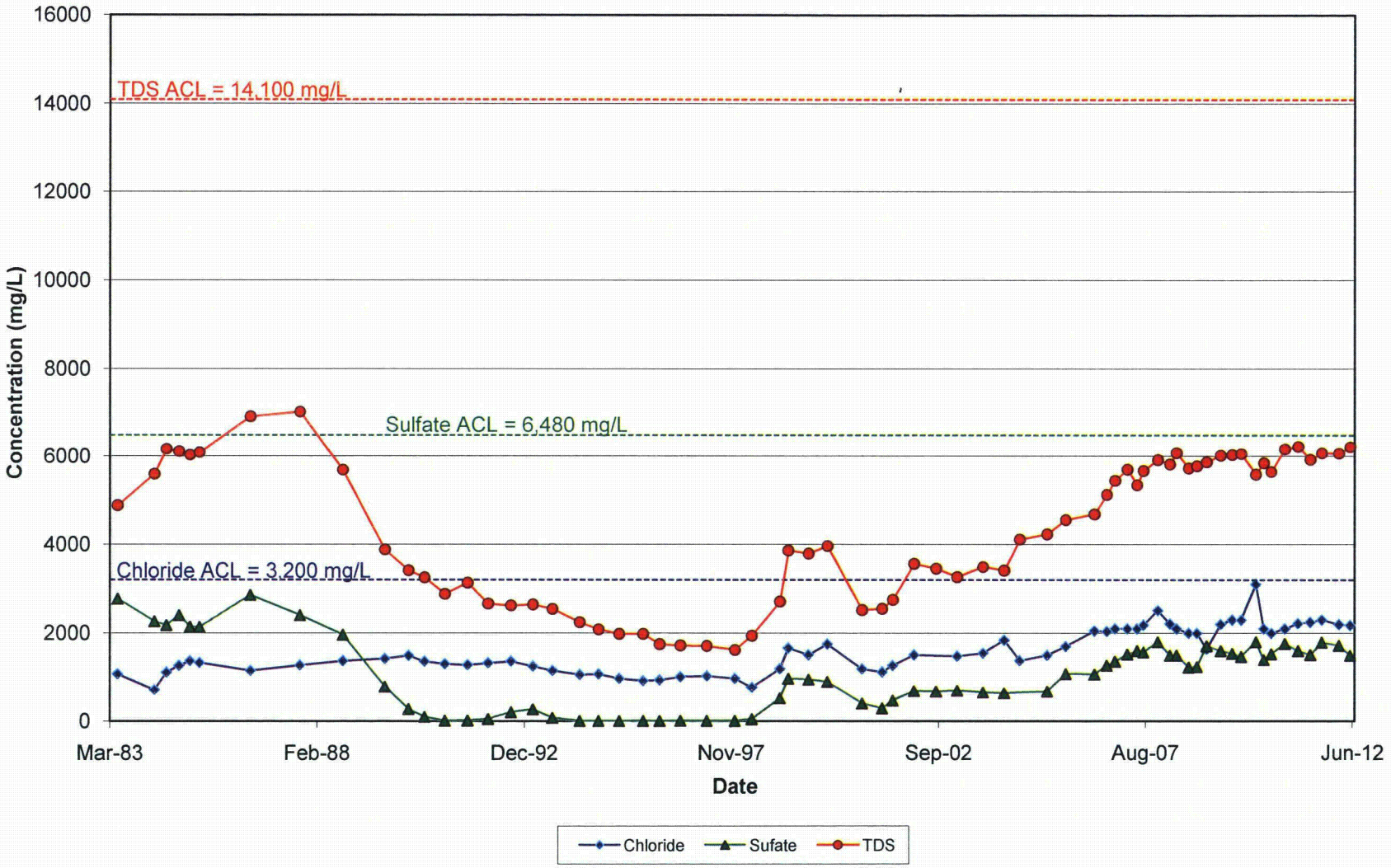
Metals in Monitoring Well 17-01KD



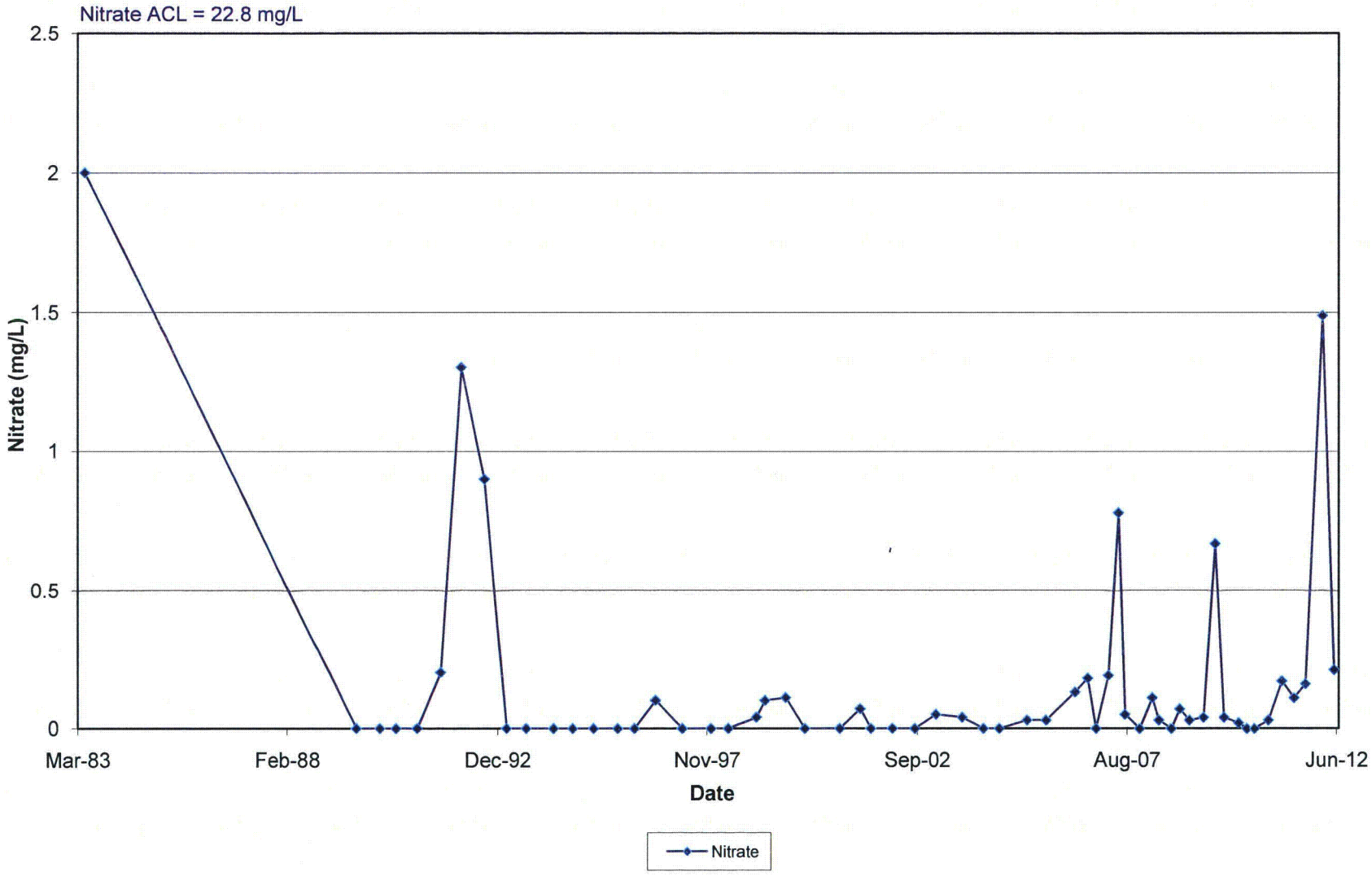
Radionuclides in Monitoring Well 17-01KD



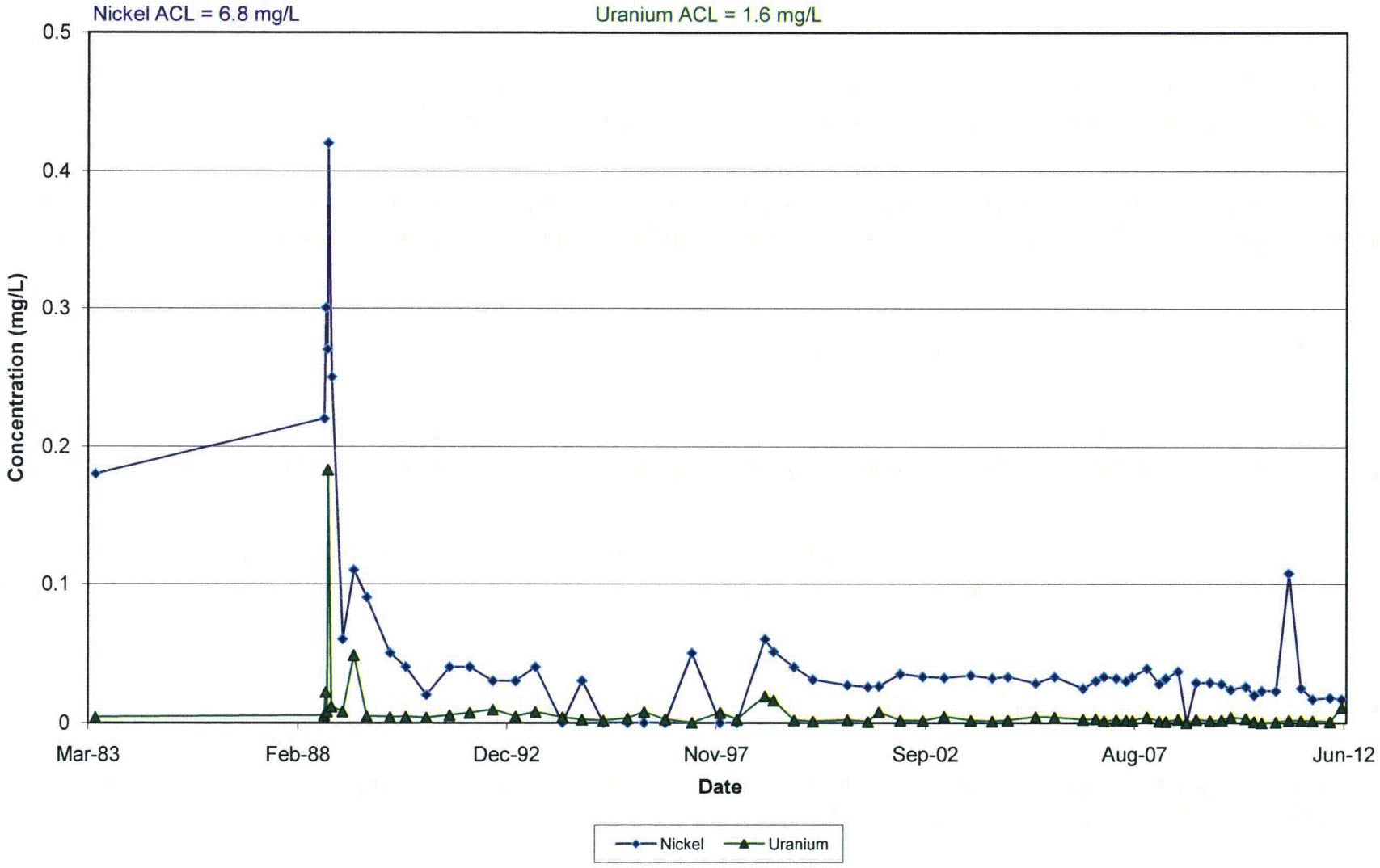
Anions and TDS in Monitoring Well 30-02KD



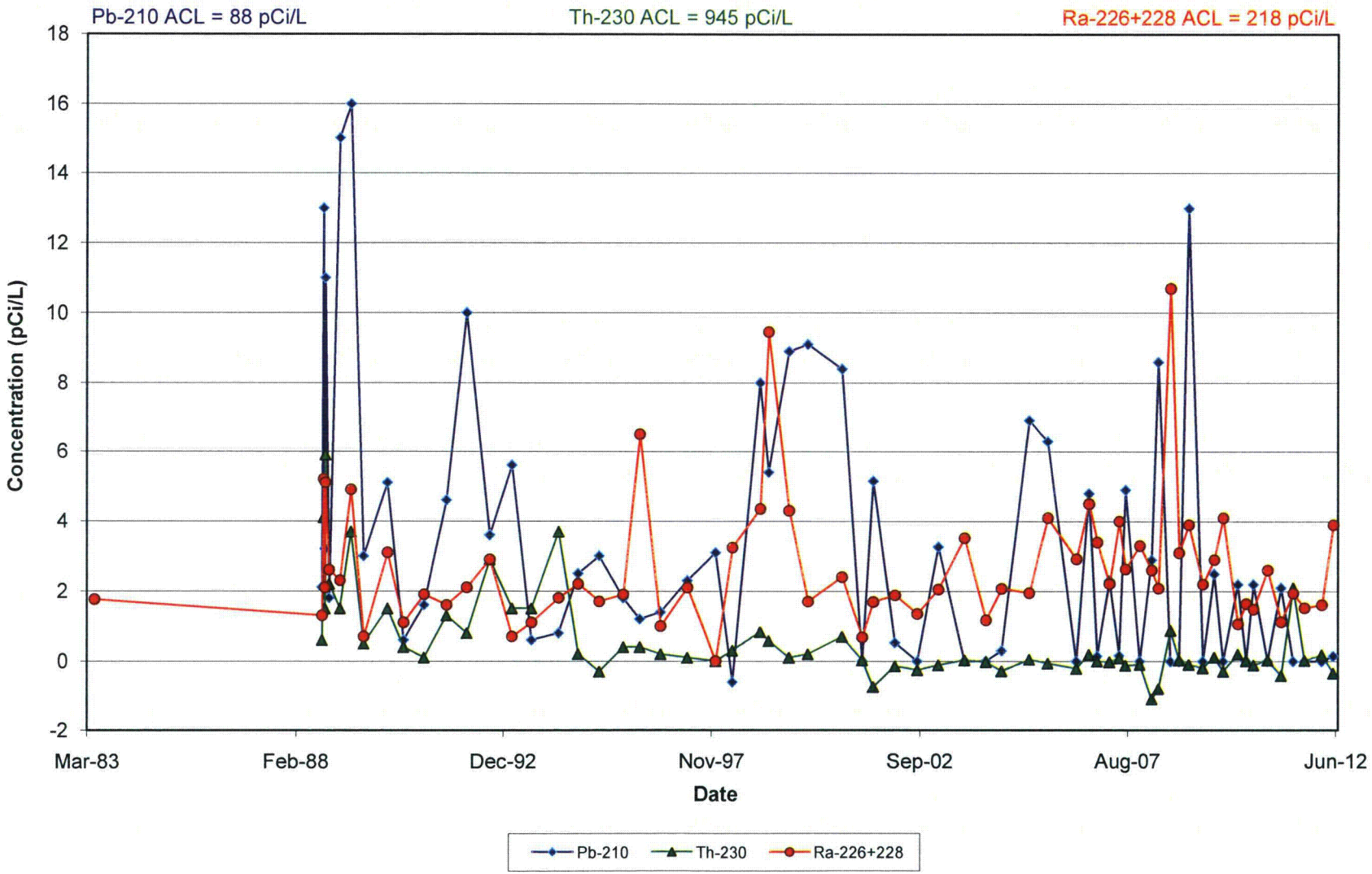
Nitrate in Monitoring Well 30-02KD



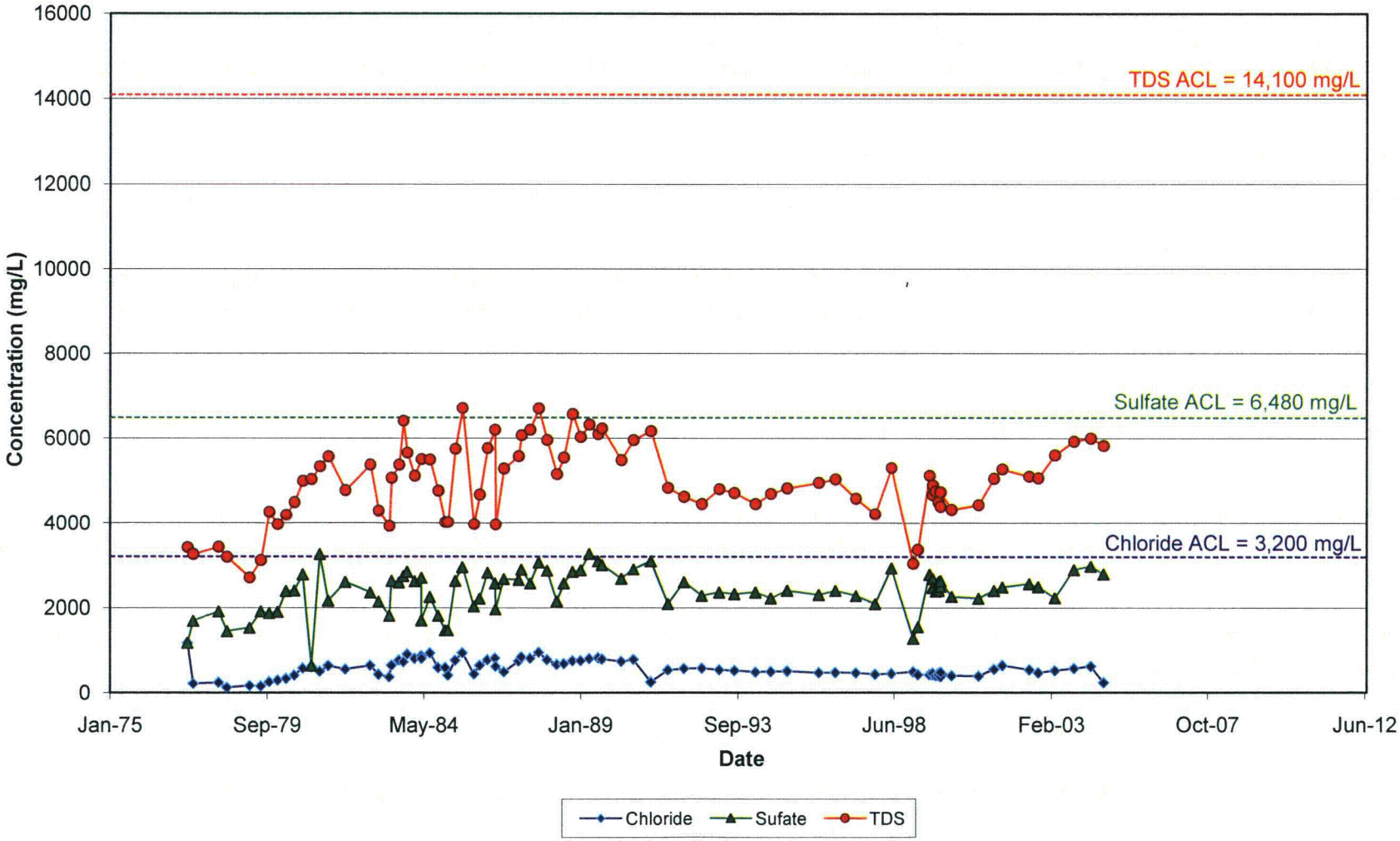
Metals in Monitoring Well 30-02KD



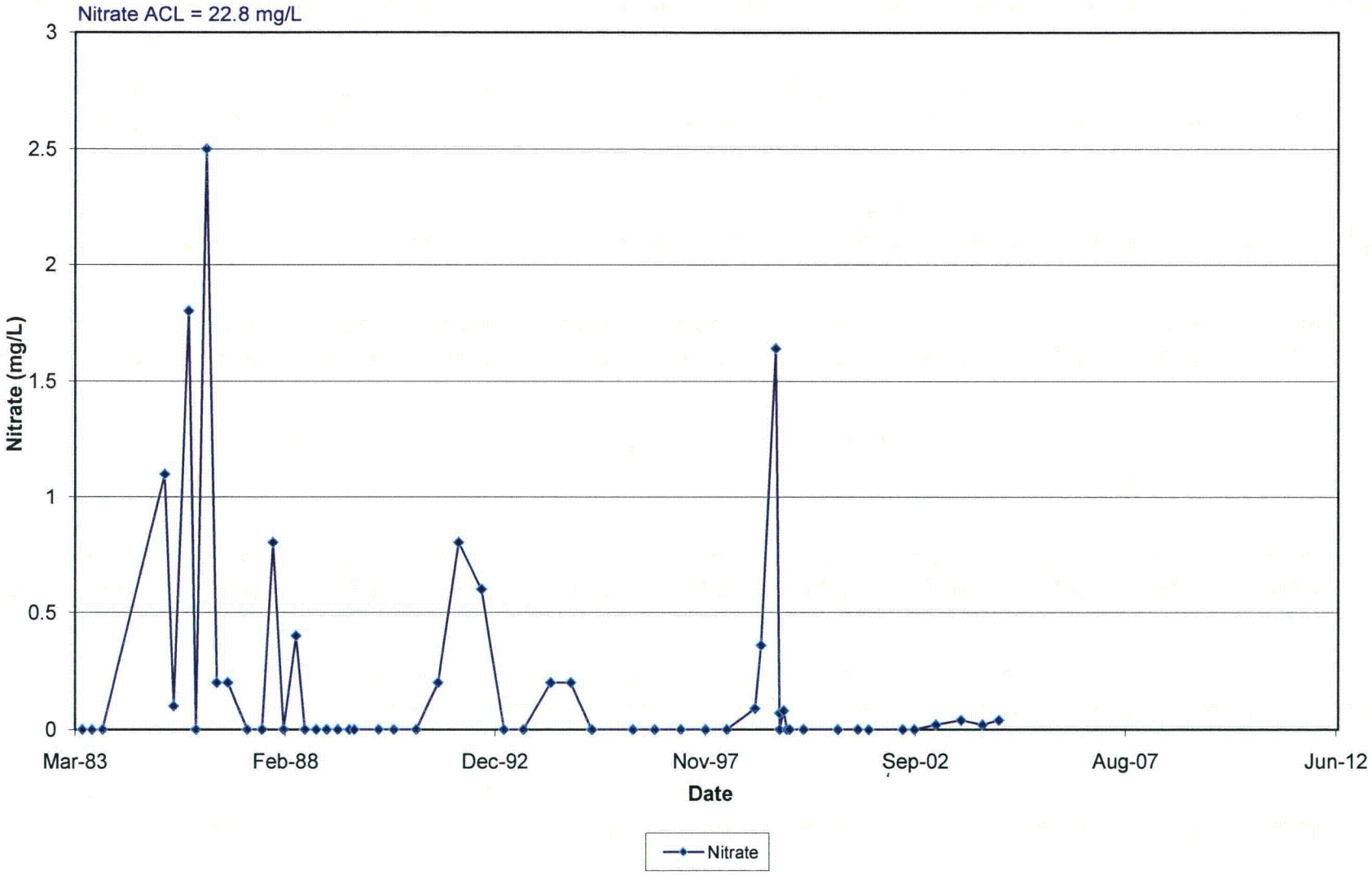
Radionuclides in Monitoring Well 30-02KD



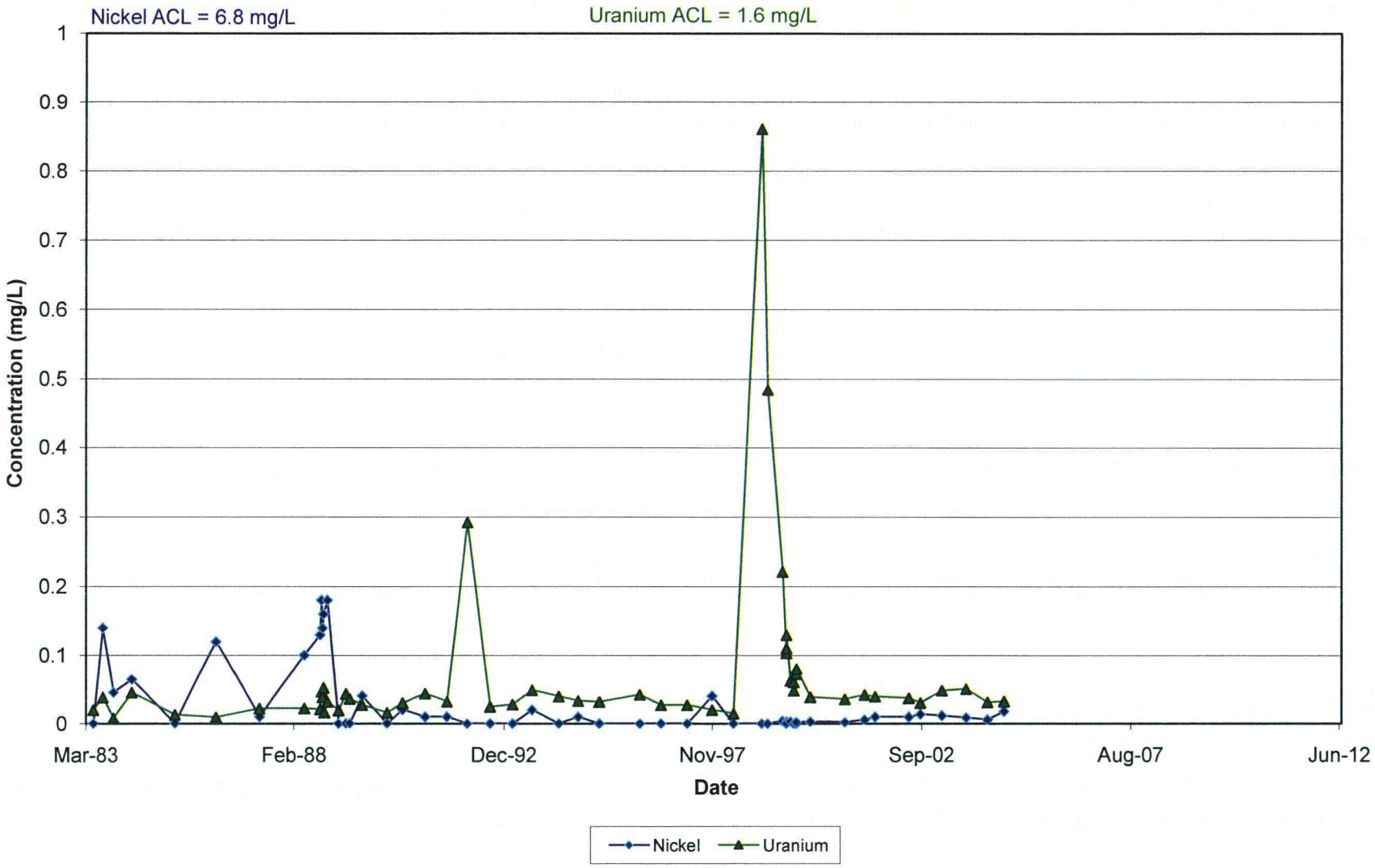
Anions and TDS in Monitoring Well 30-48KD



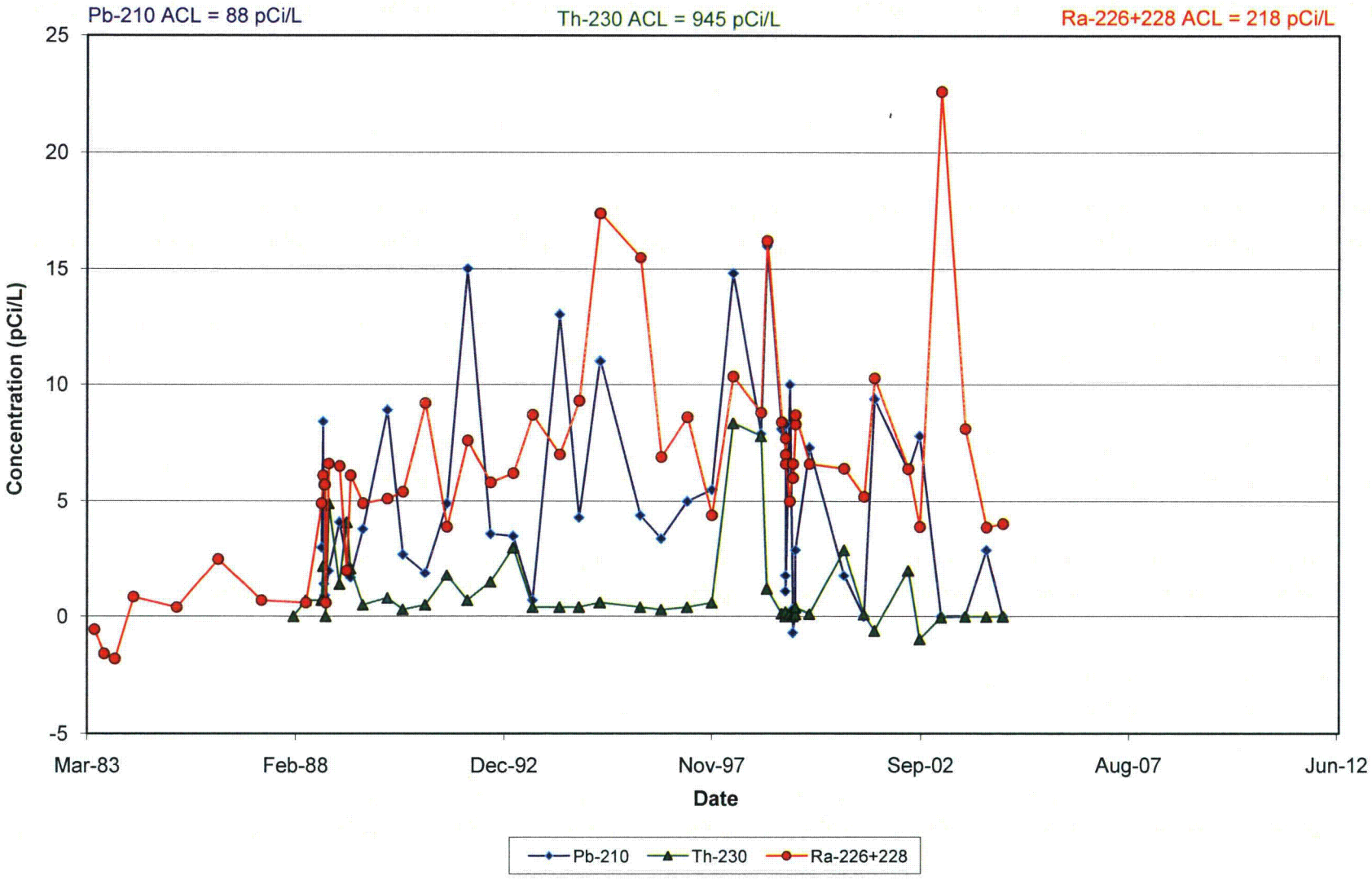
Nitrate in Monitoring Well 30-48KD



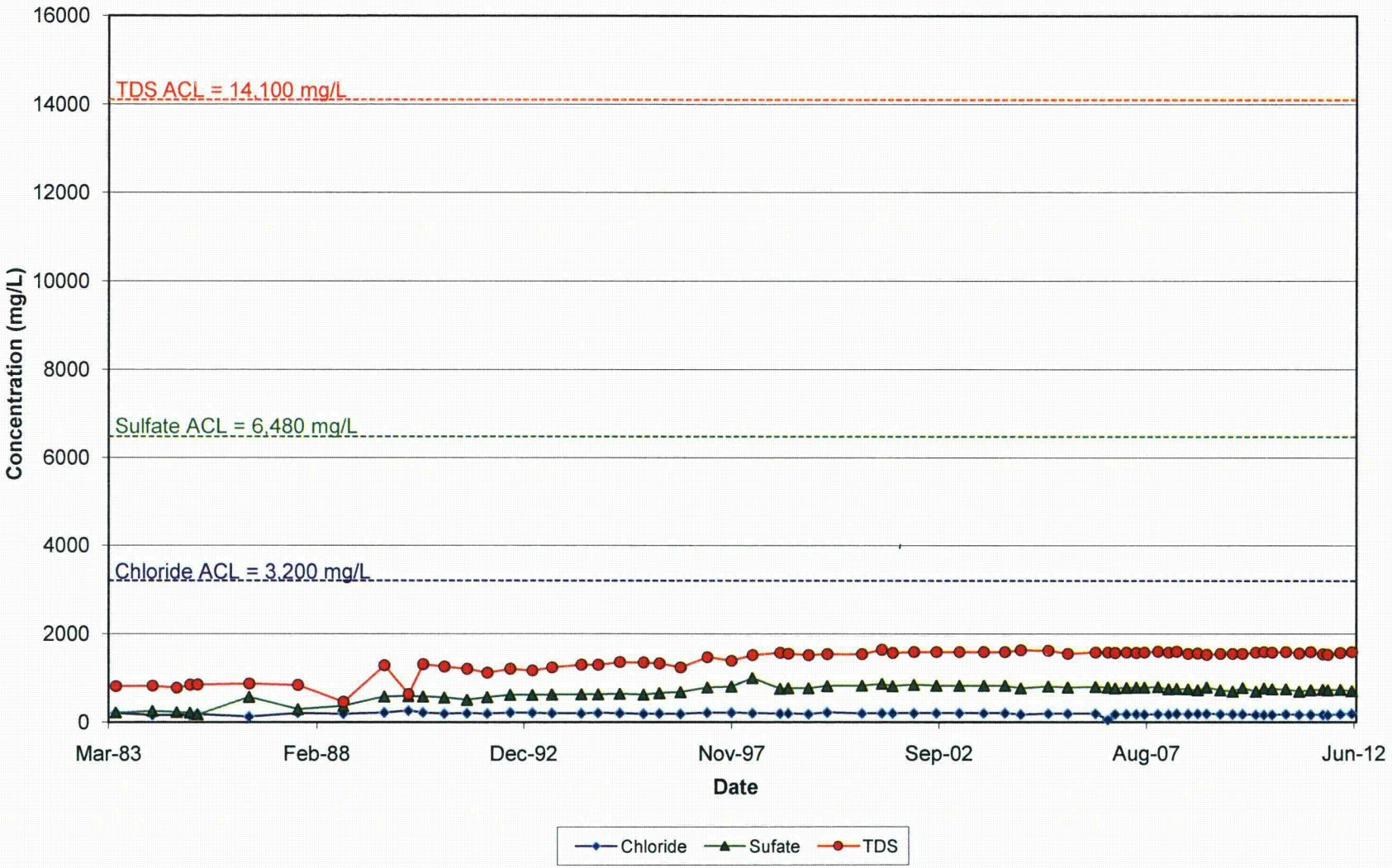
Metals in Monitoring Well 30-48KD



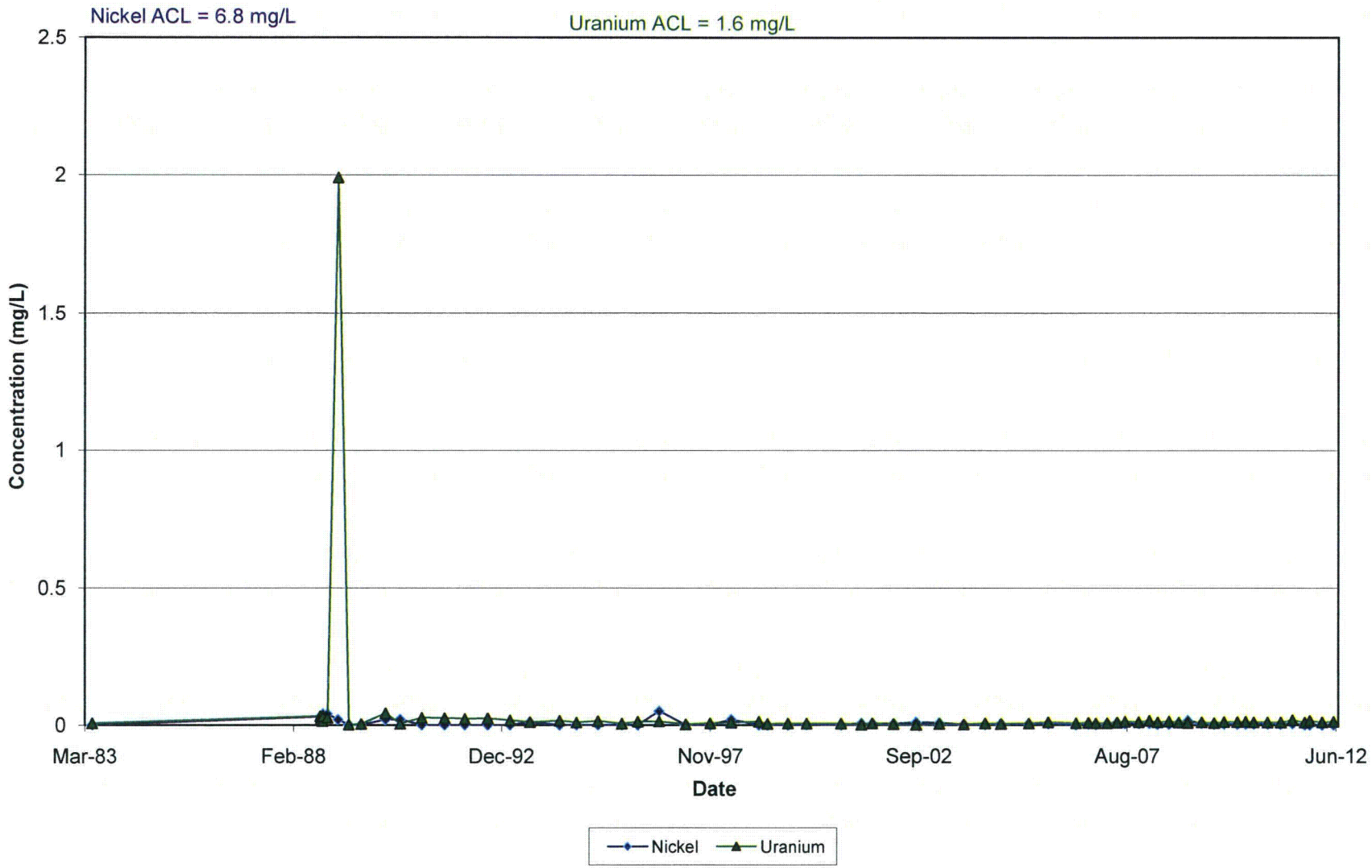
Radionuclides in Monitoring Well 30-48KD



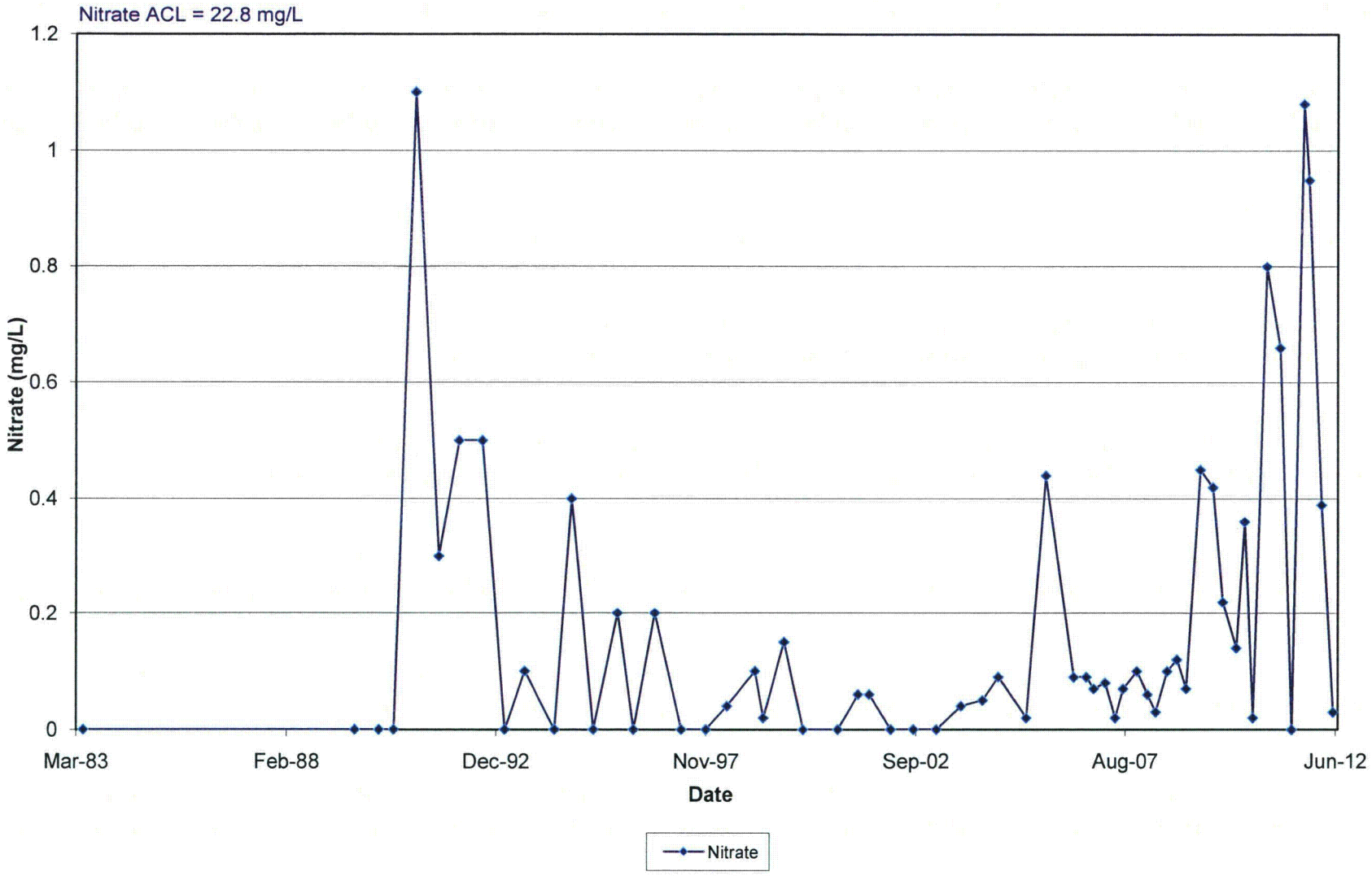
Anions and TDS in Monitoring Well 32-45KD



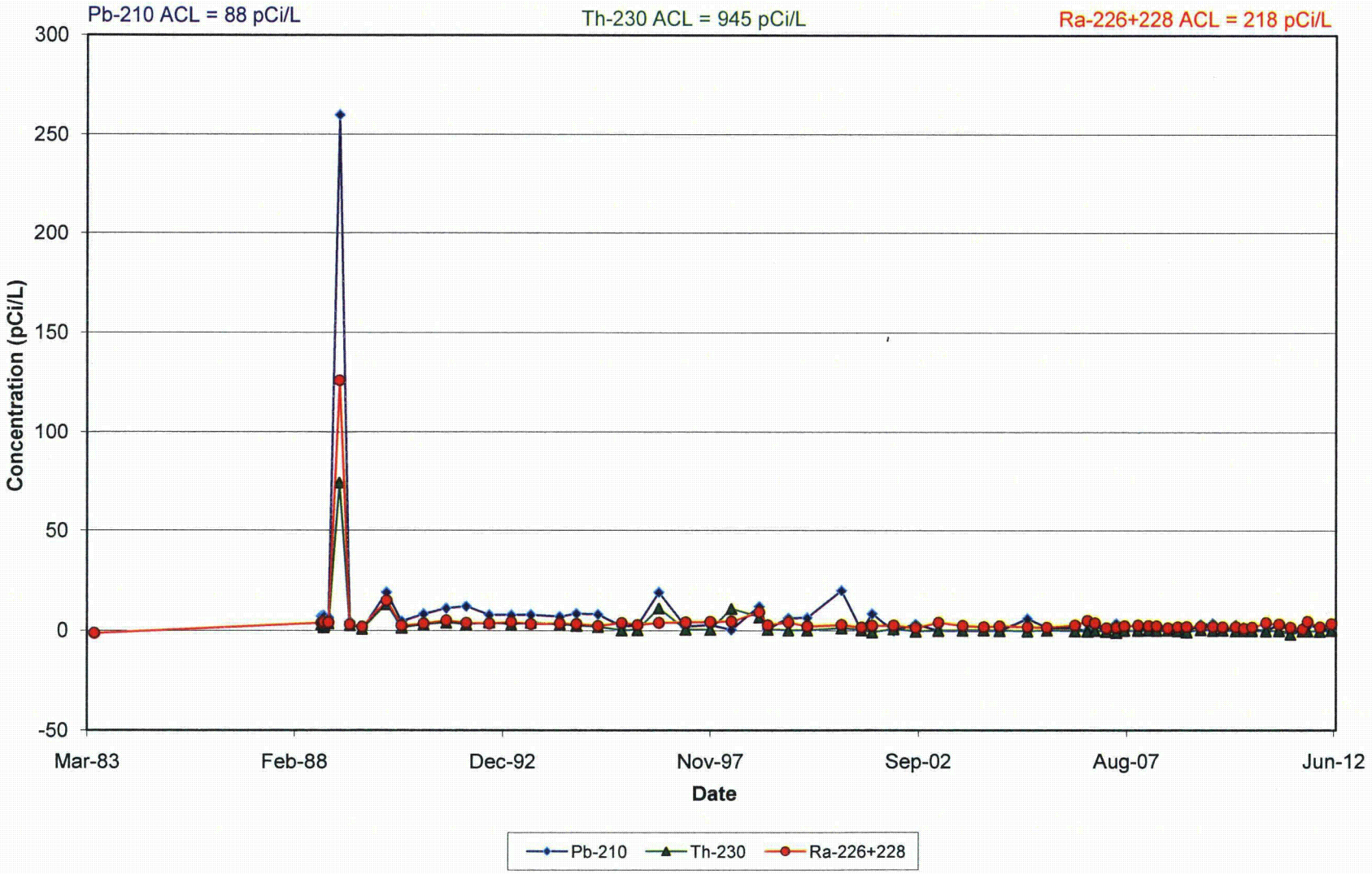
Metals in Monitoring Well 32-45KD



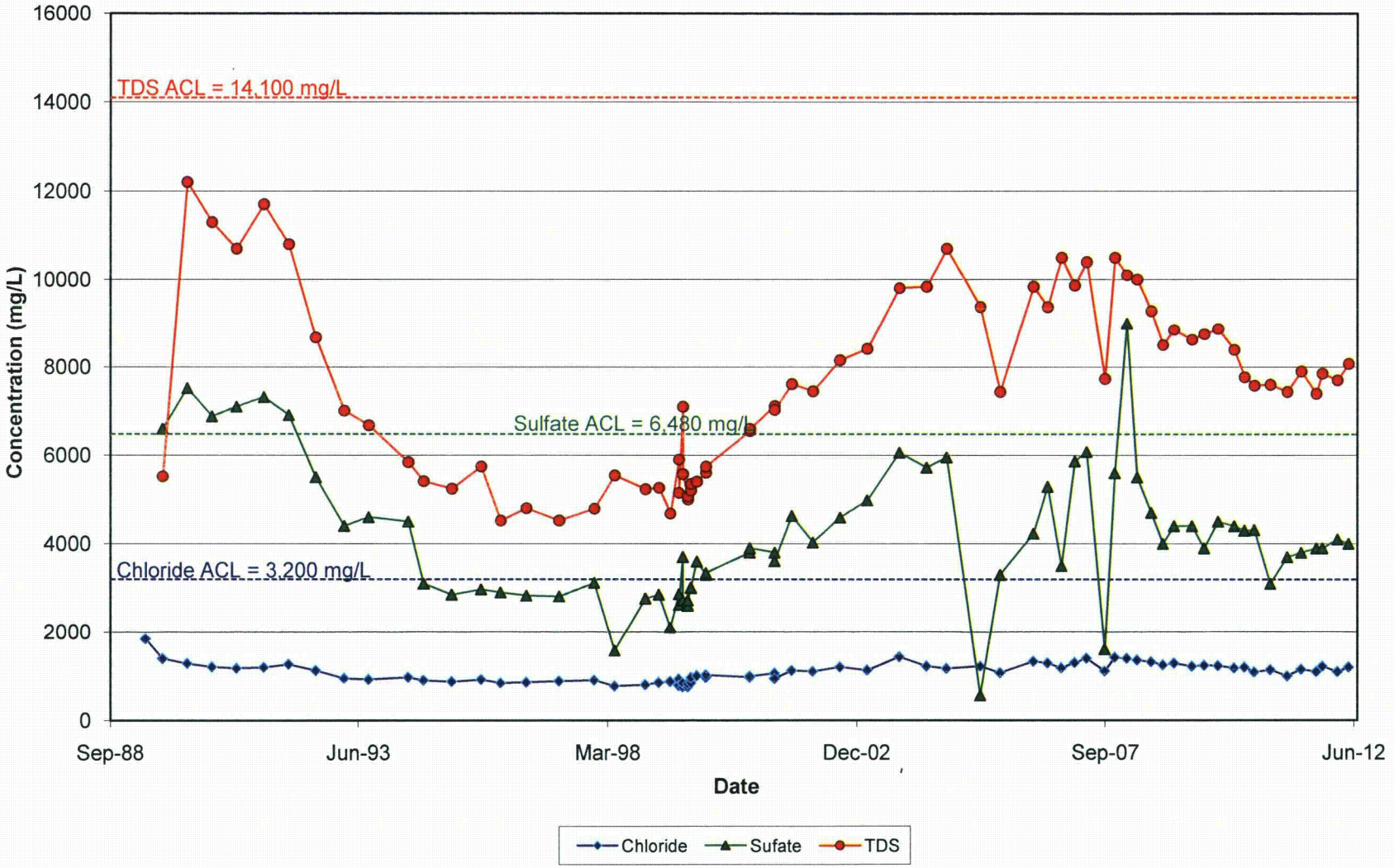
Nitrate in Monitoring Well 32-45KD



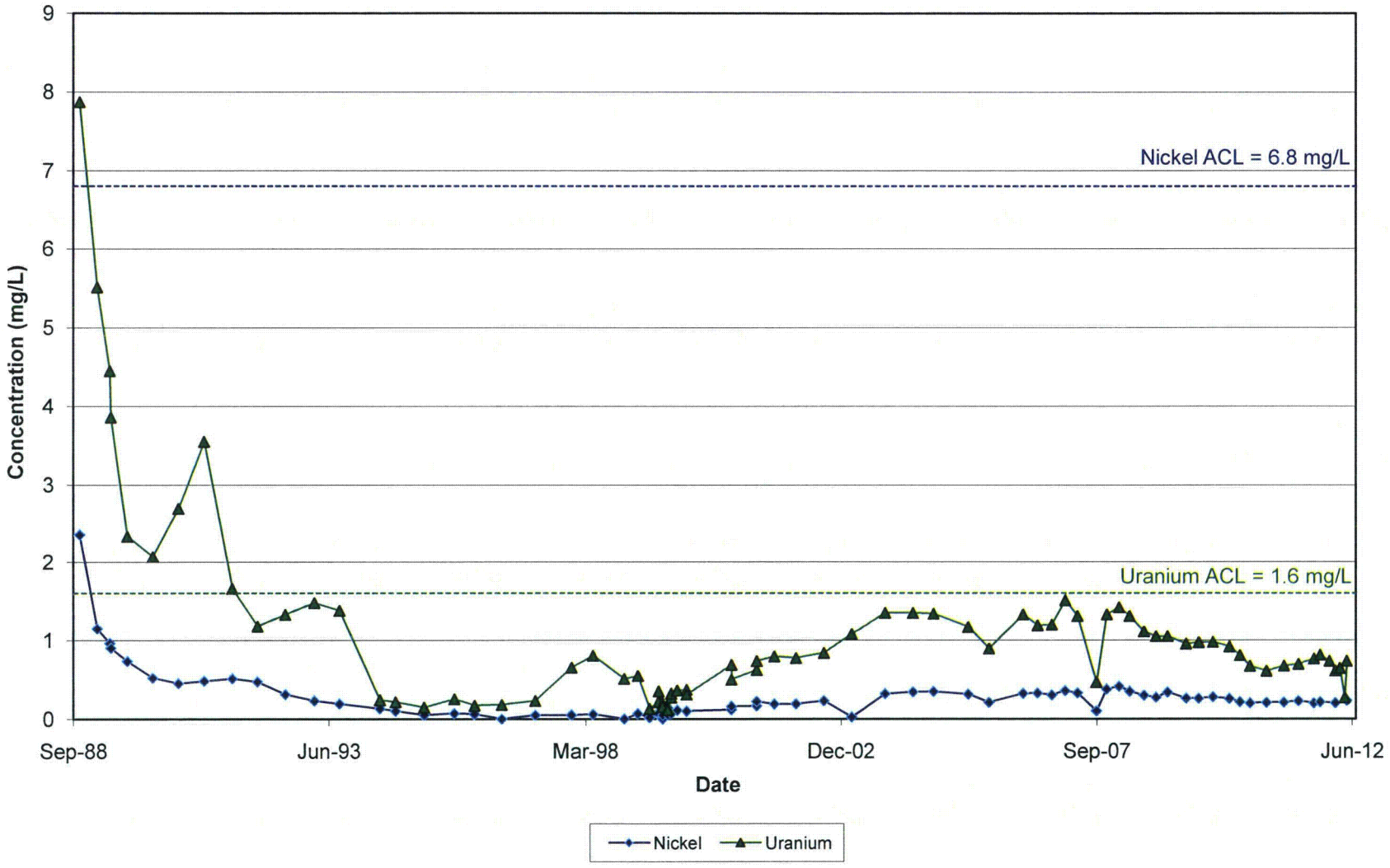
Radionuclides in Monitoring Well 32-45KD



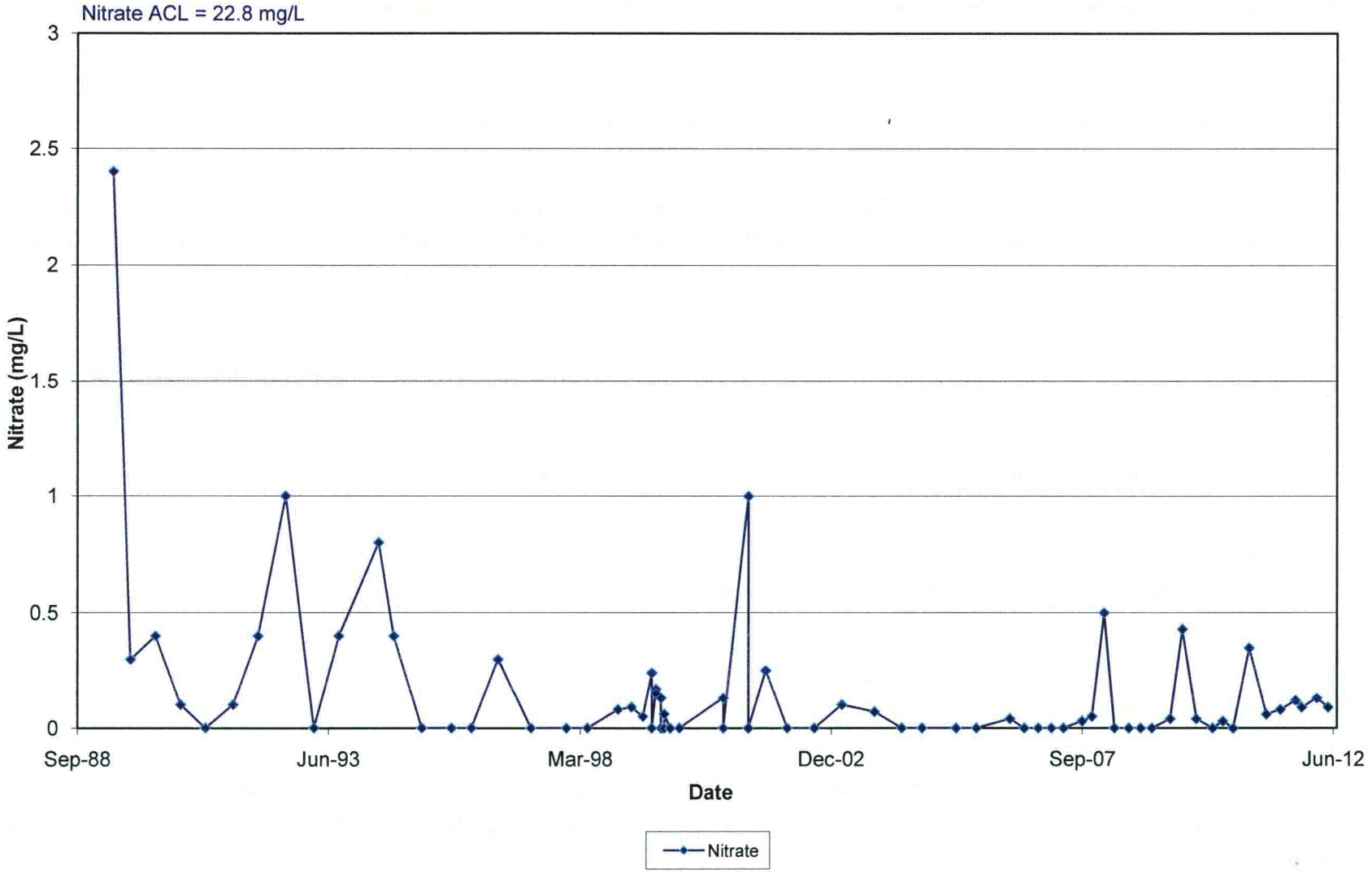
Anions and TDS Well 36-06KD



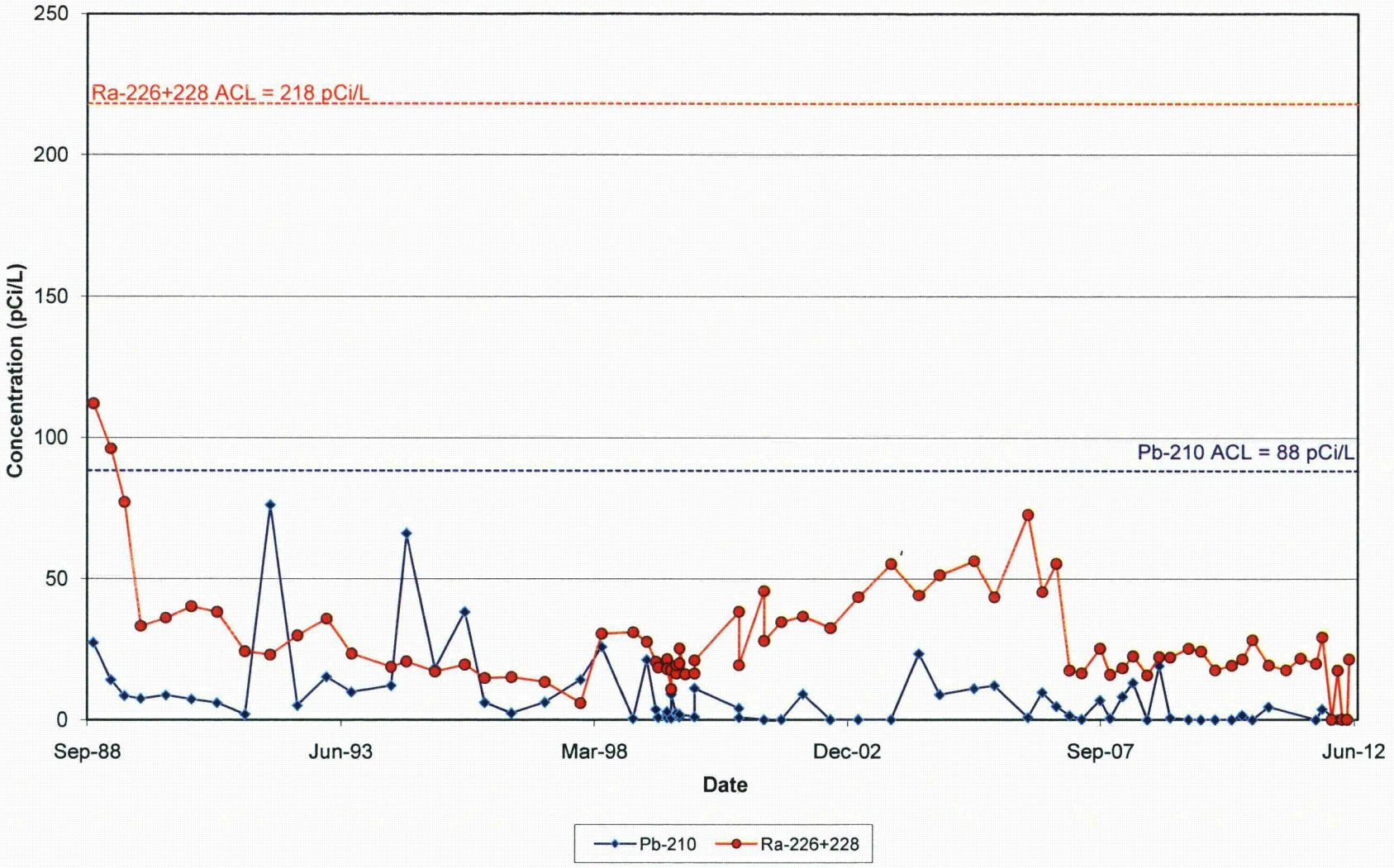
Metals in Monitoring Well 36-06KD



Nitrate in Monitoring Well 36-06KD



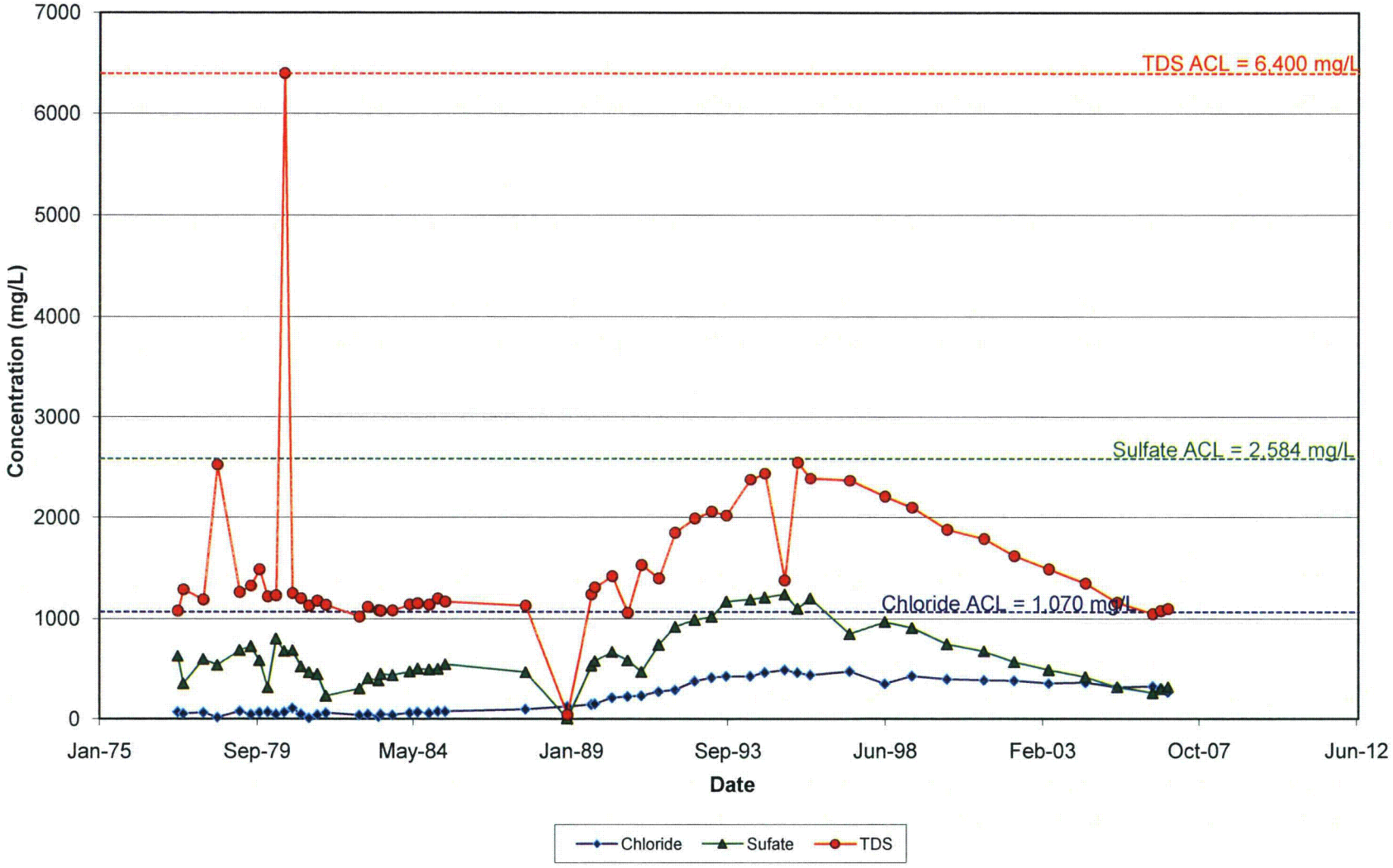
Radionuclides in Monitoring Well 36-06KD



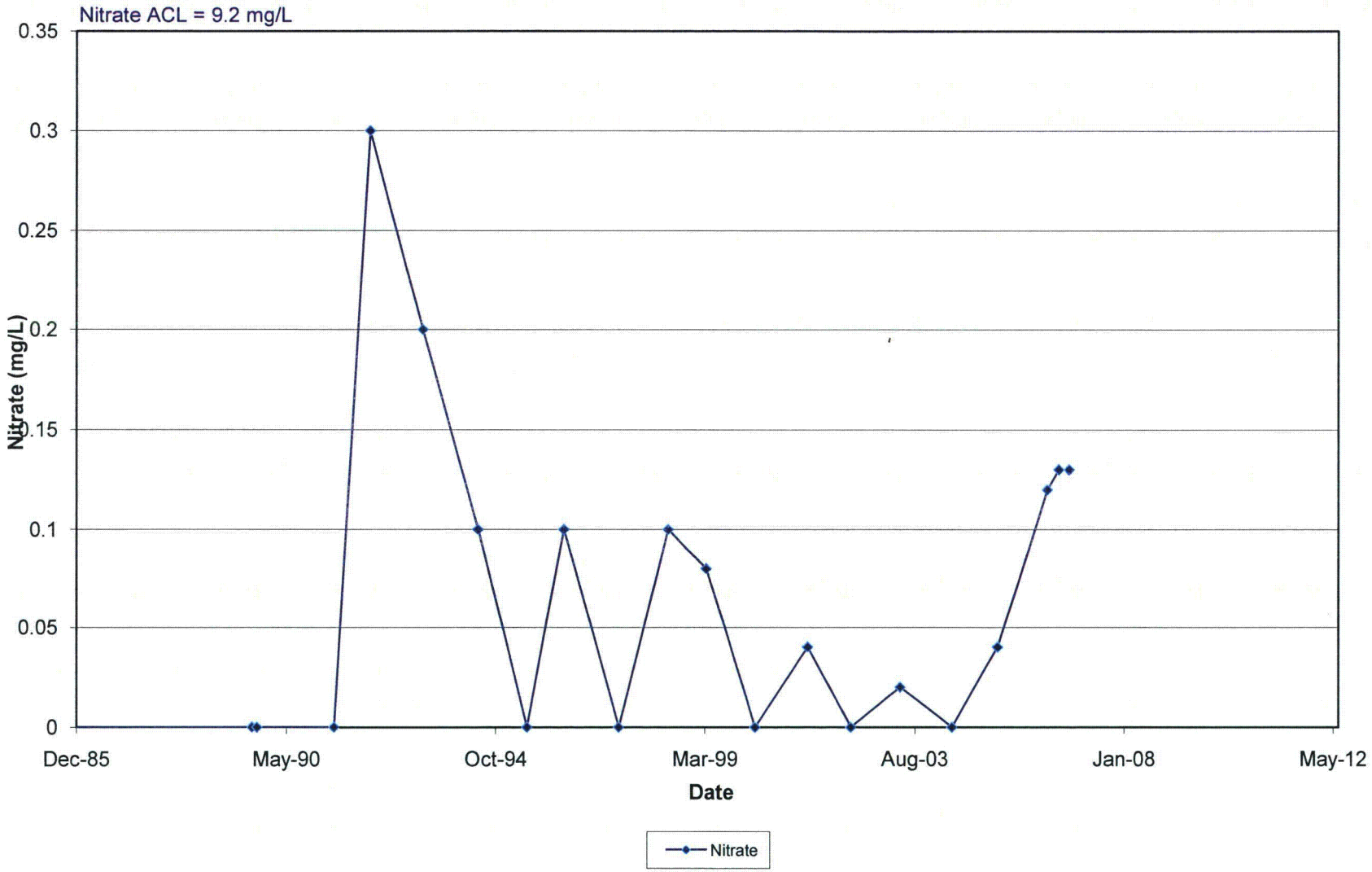
Stability Monitoring Plan
Time Versus Concentration Plots

Tres Hermanos A

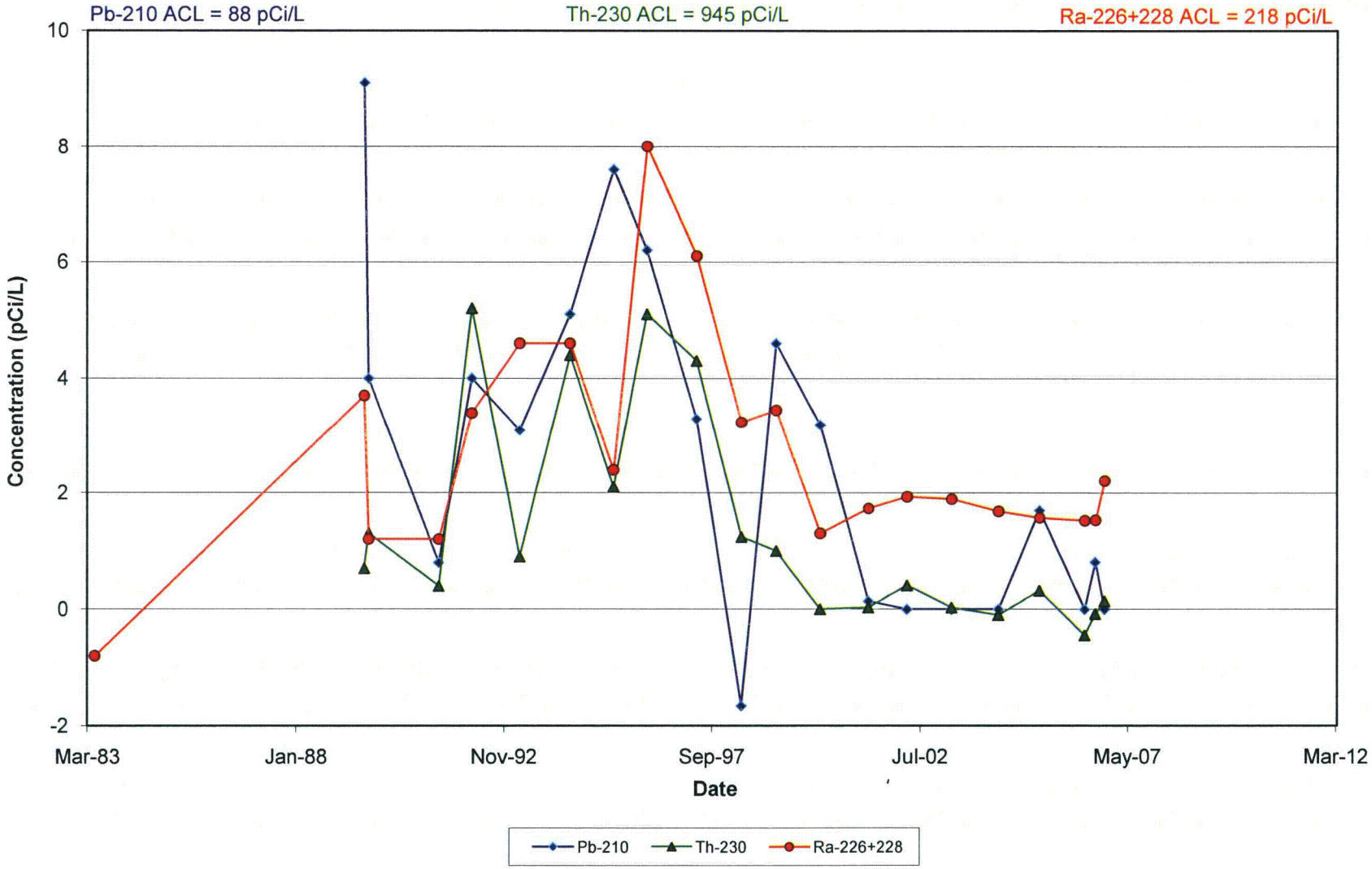
Anions and TDS in Monitoring Well 30-01



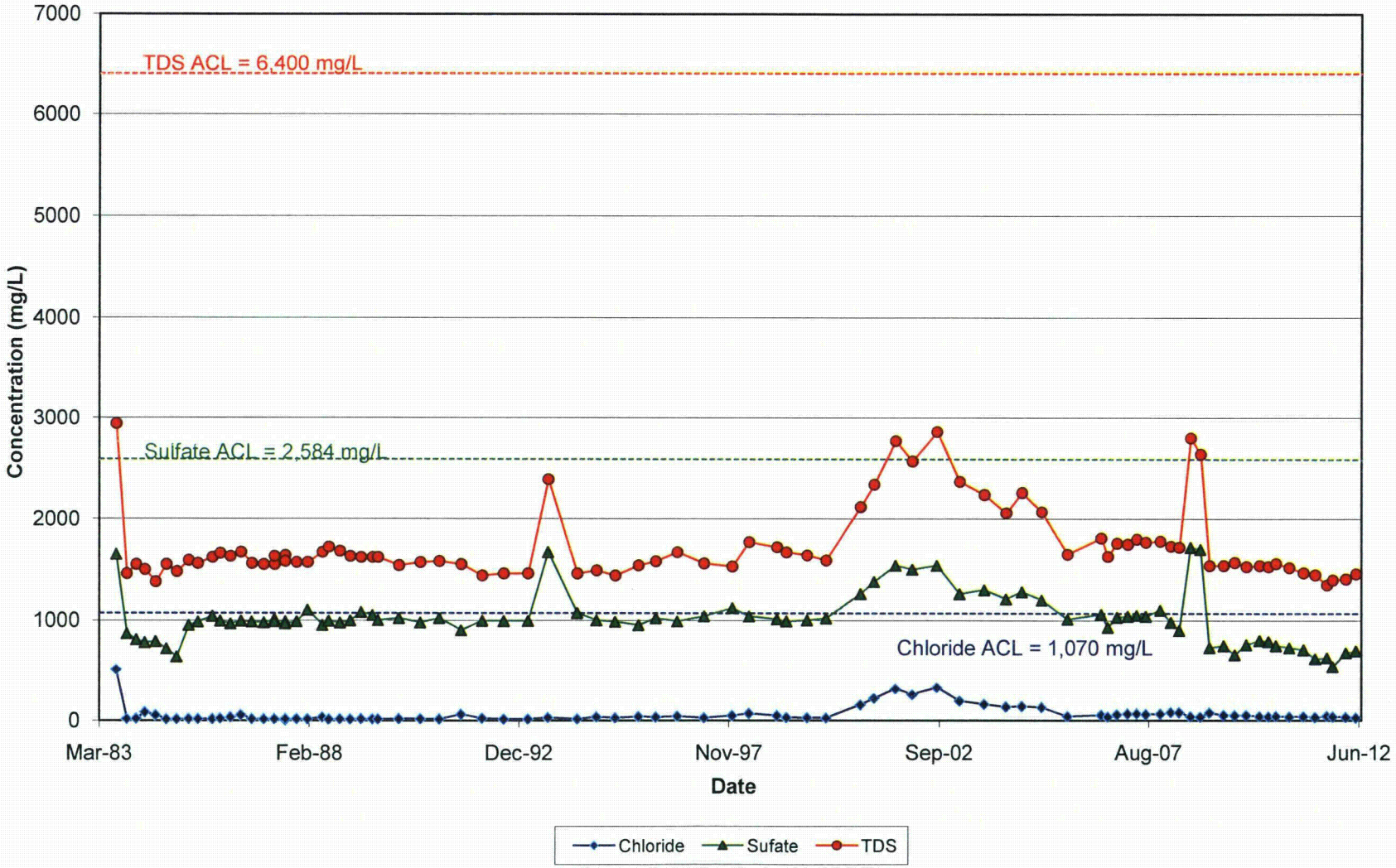
Nitrate in Monitoring Well 30-01



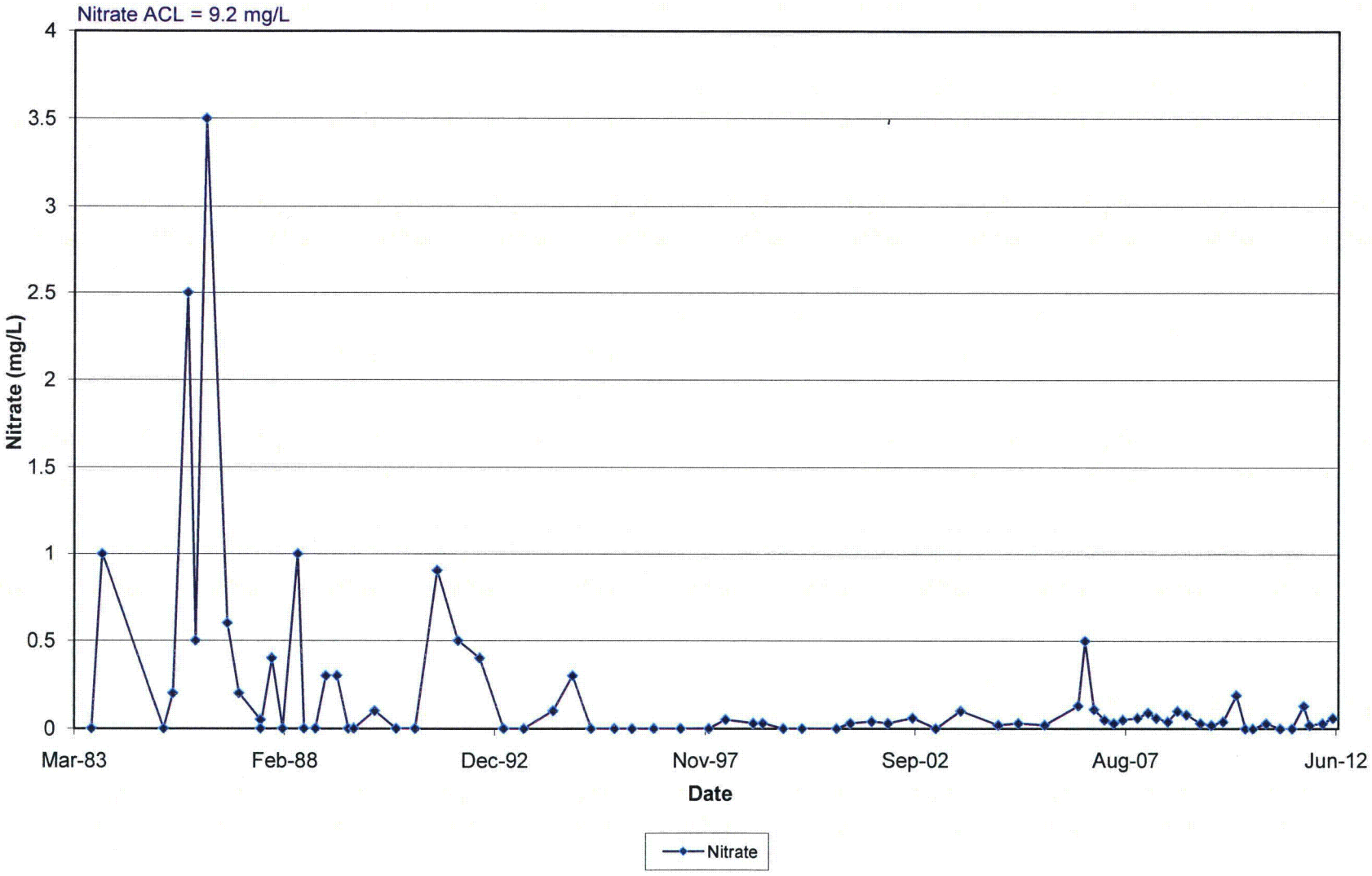
Radionuclides in Monitoring Well 30-01



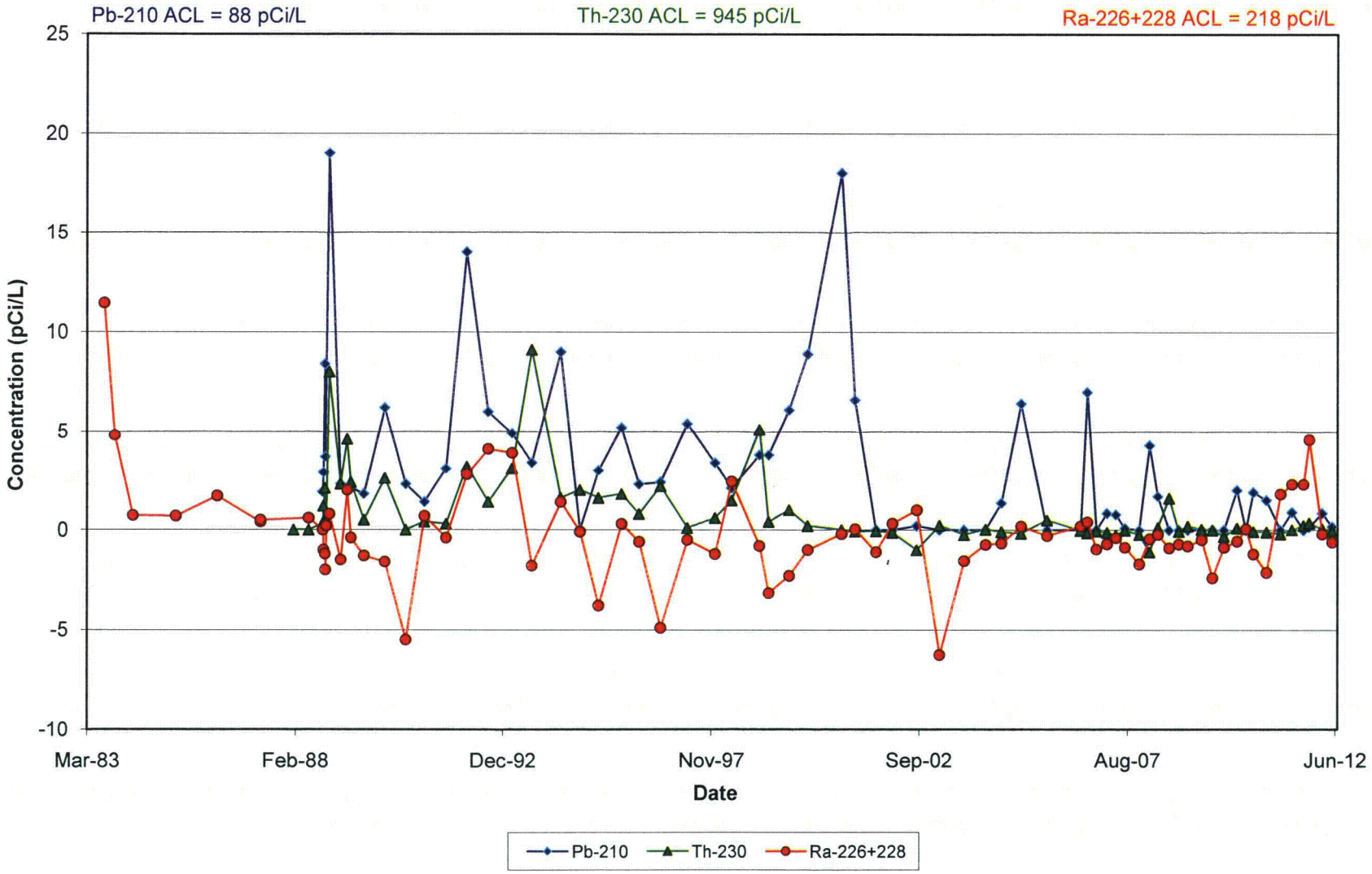
Anions and TDS in Monitoring Well 31-01



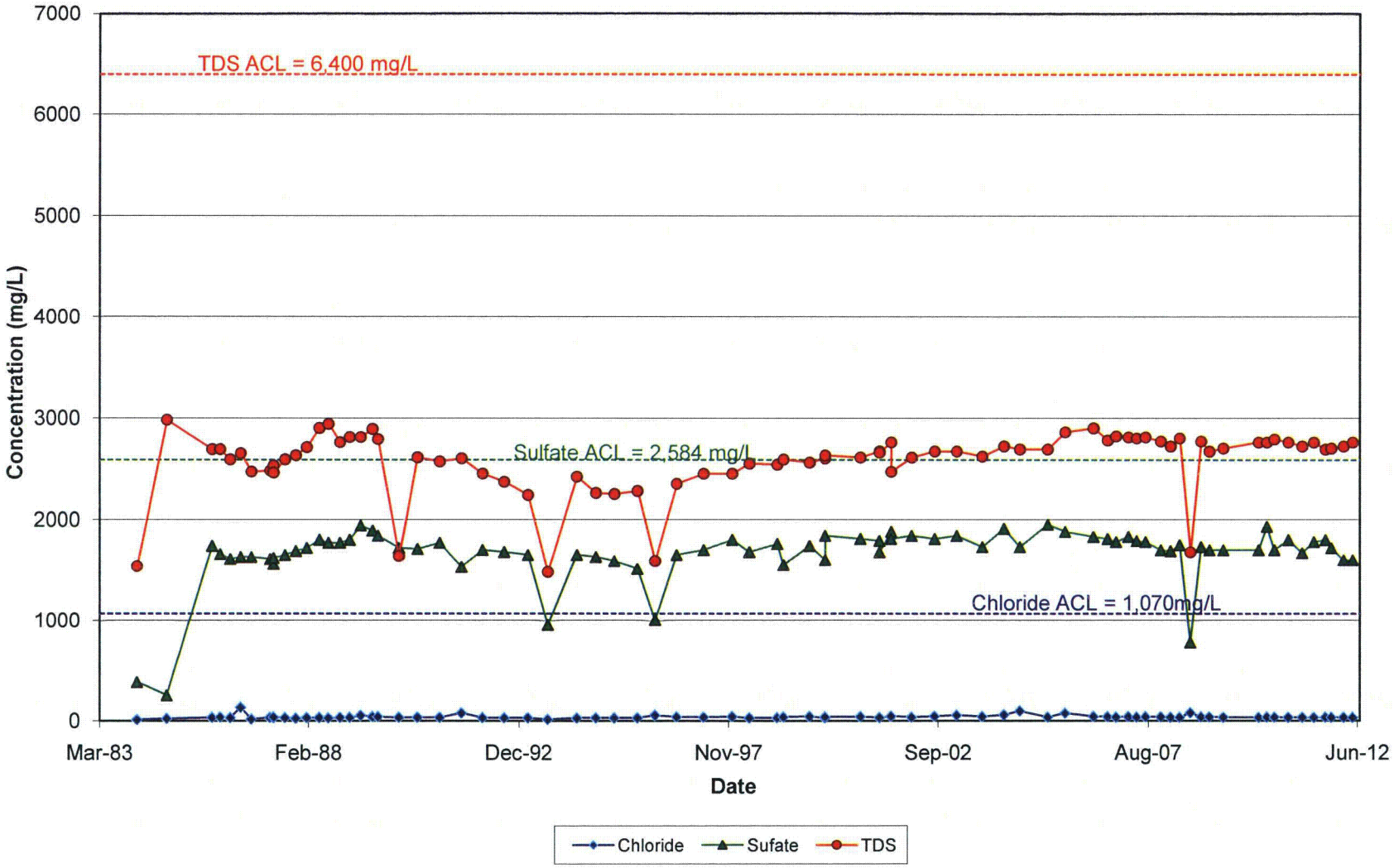
Nitrate in Monitoring Well 31-01



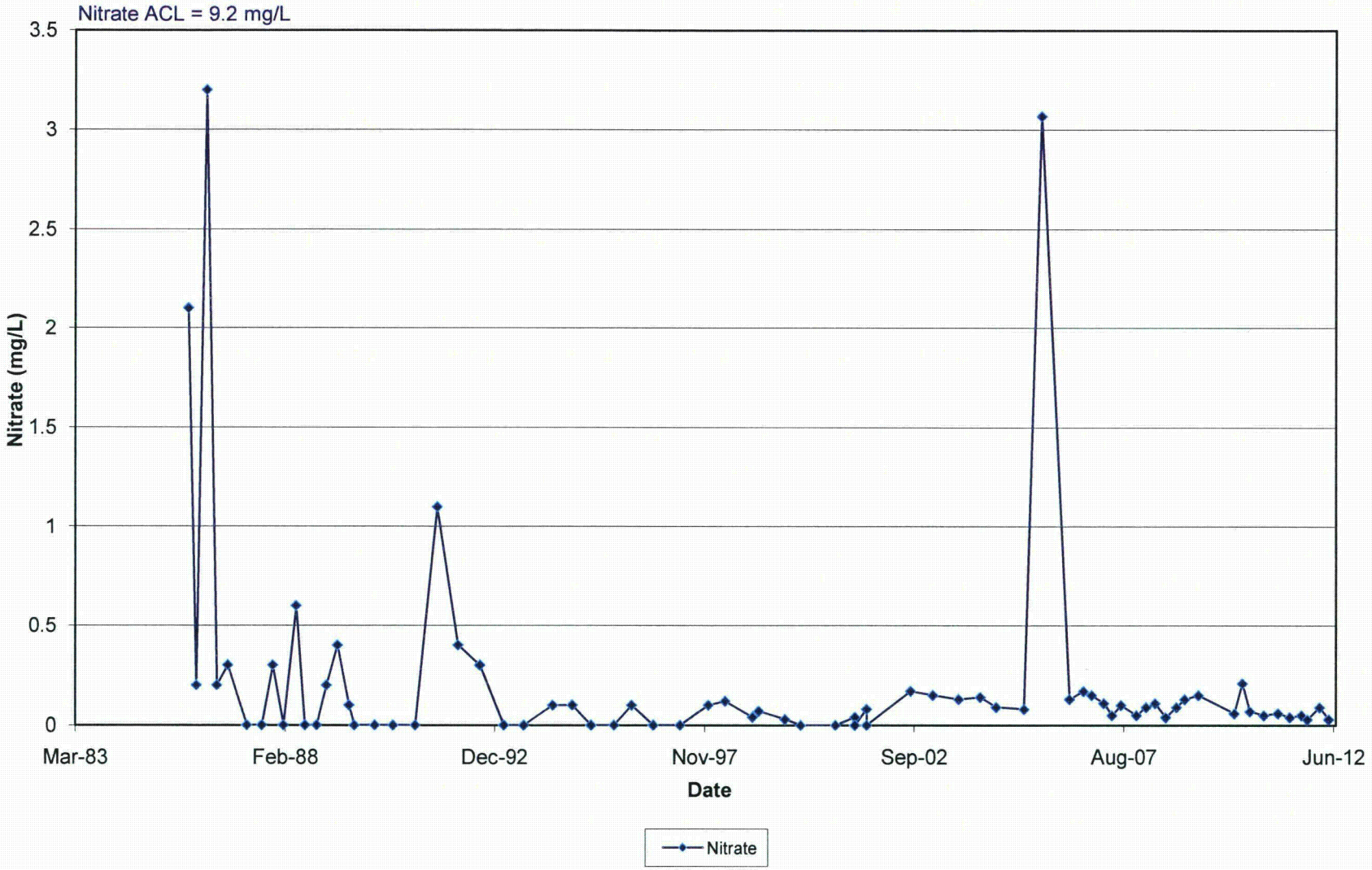
Radionuclides in Well 31-01



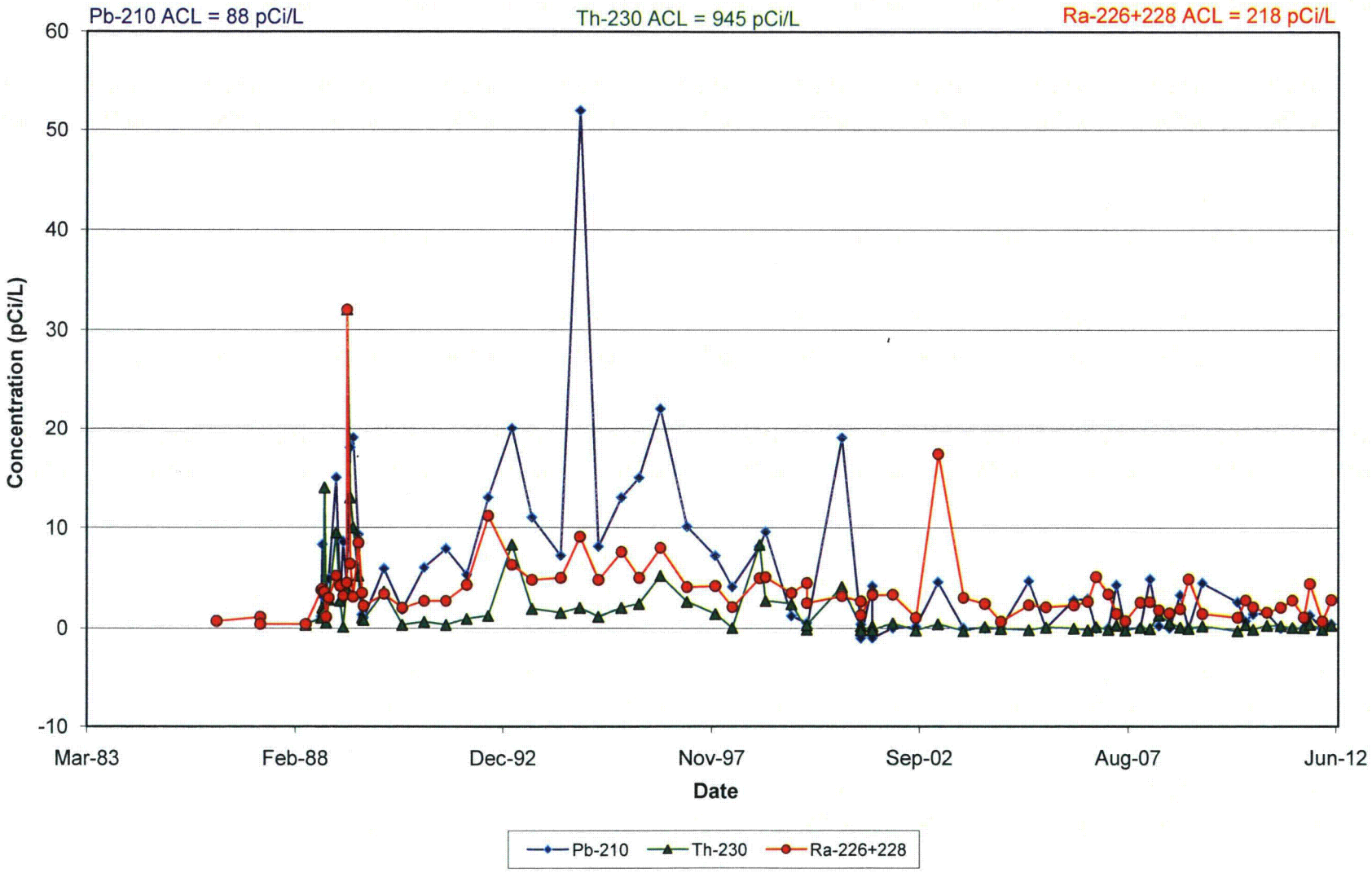
Anions and TDS in Monitoring Well 33-01TRA



Nitrate in Monitoring Well 33-01TRA



Radionuclides in Monitoring Well 33-01TRA

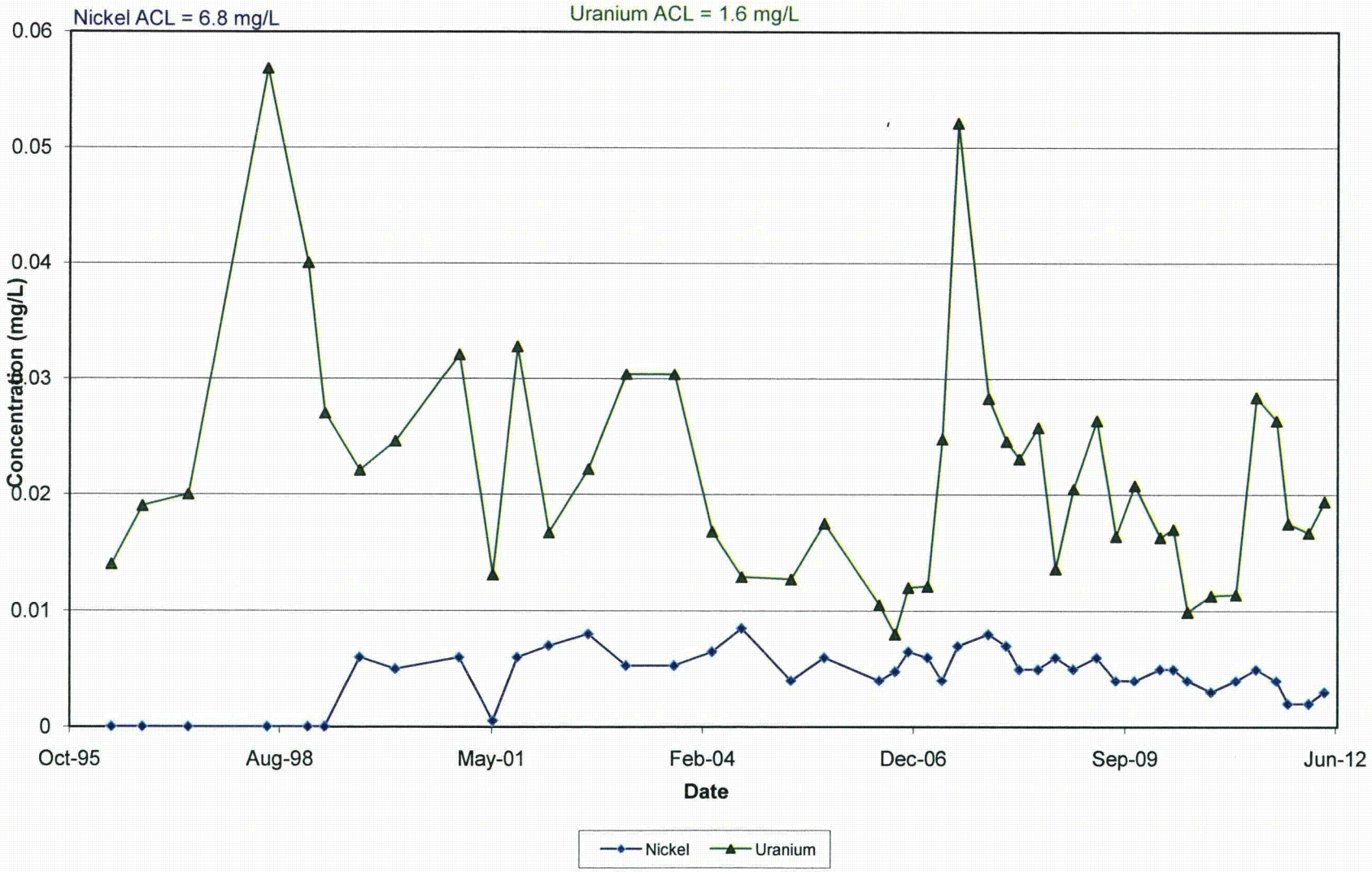


Stability Monitoring Plan
Time Versus Concentration Plots

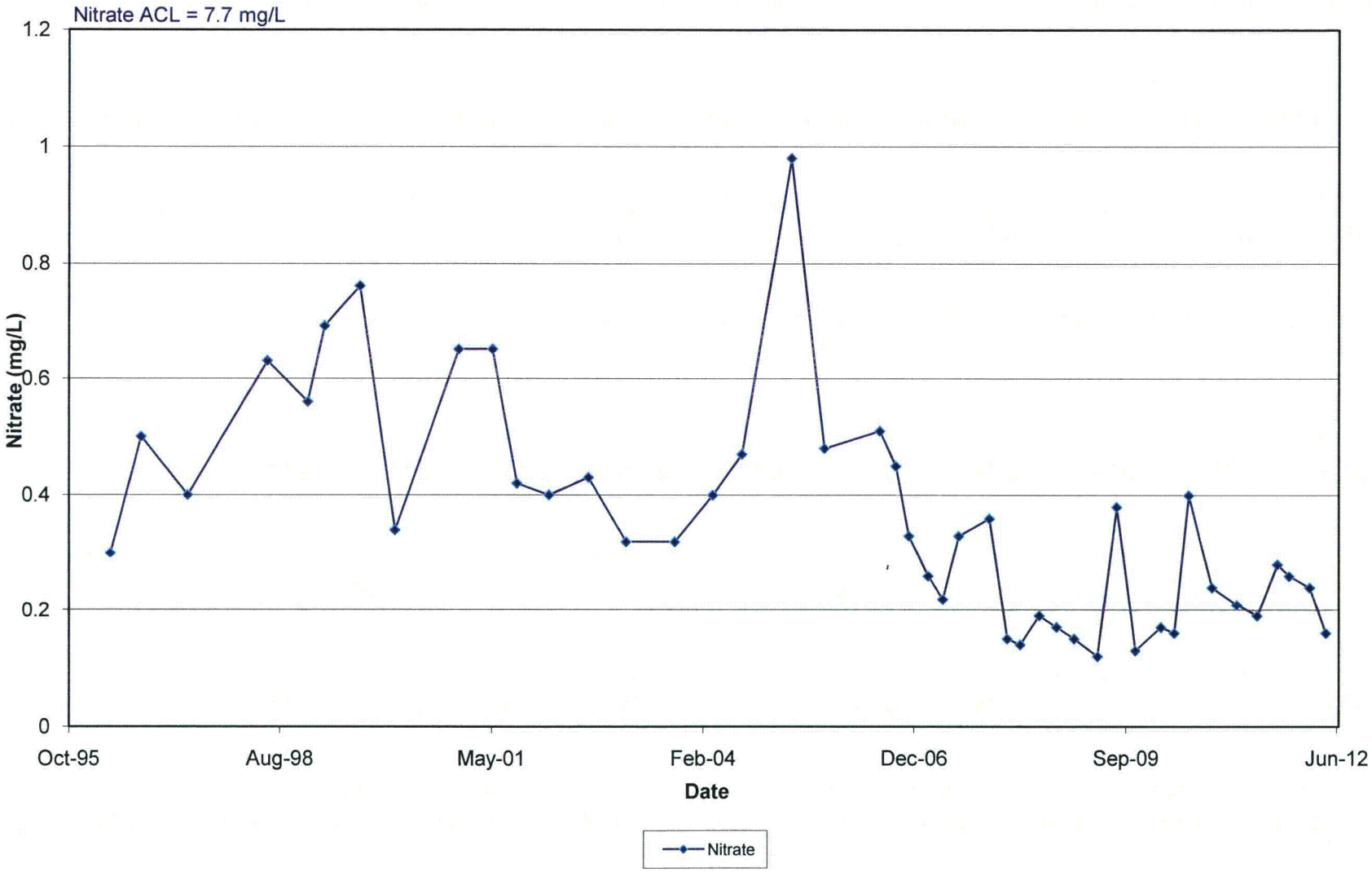
Tres Hermanos B

Anions and TDS in Monitoring Well 19-77

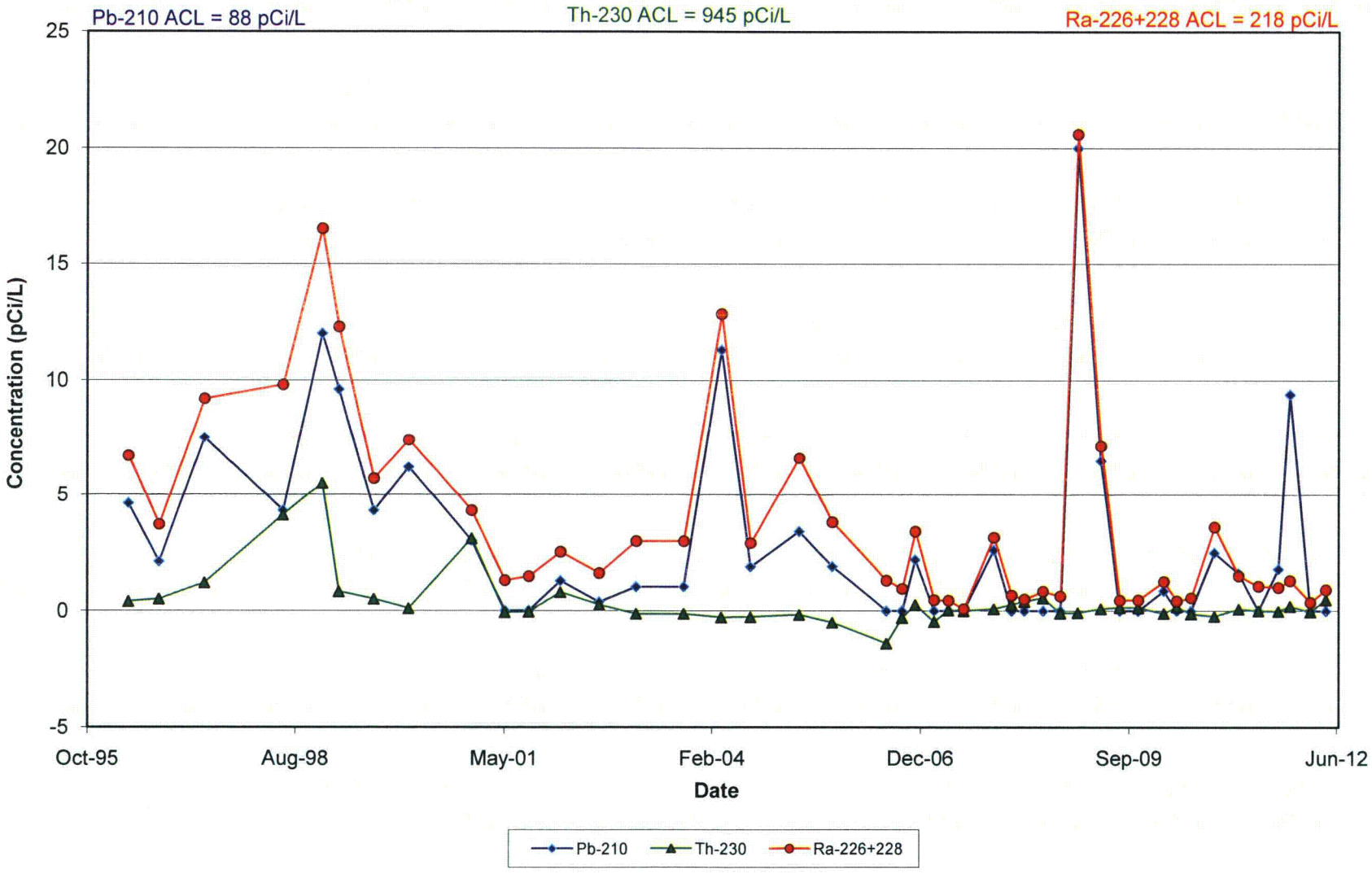
Metals in Monitoring Well 19-77



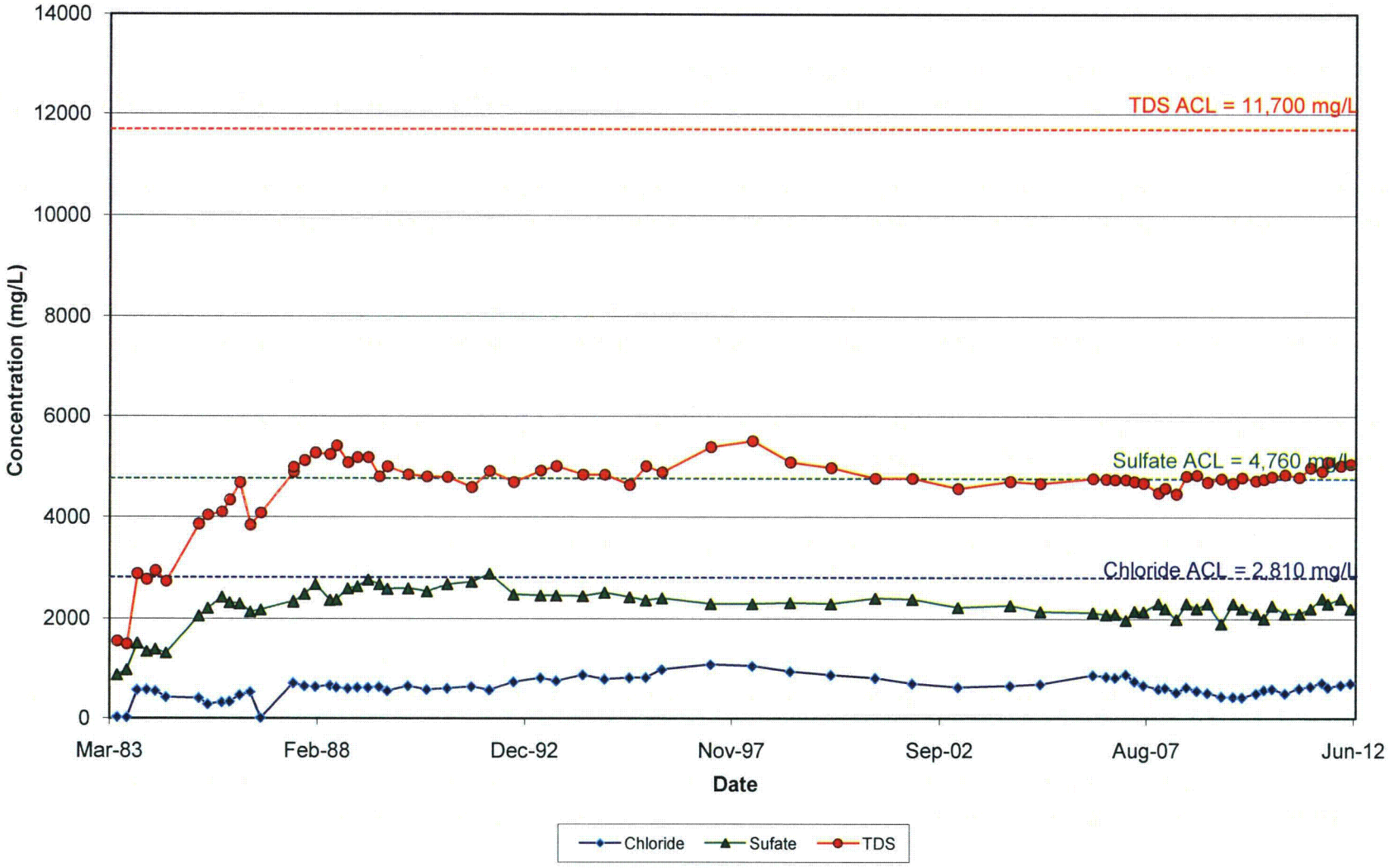
Nitrate in Monitoring Well 19-77



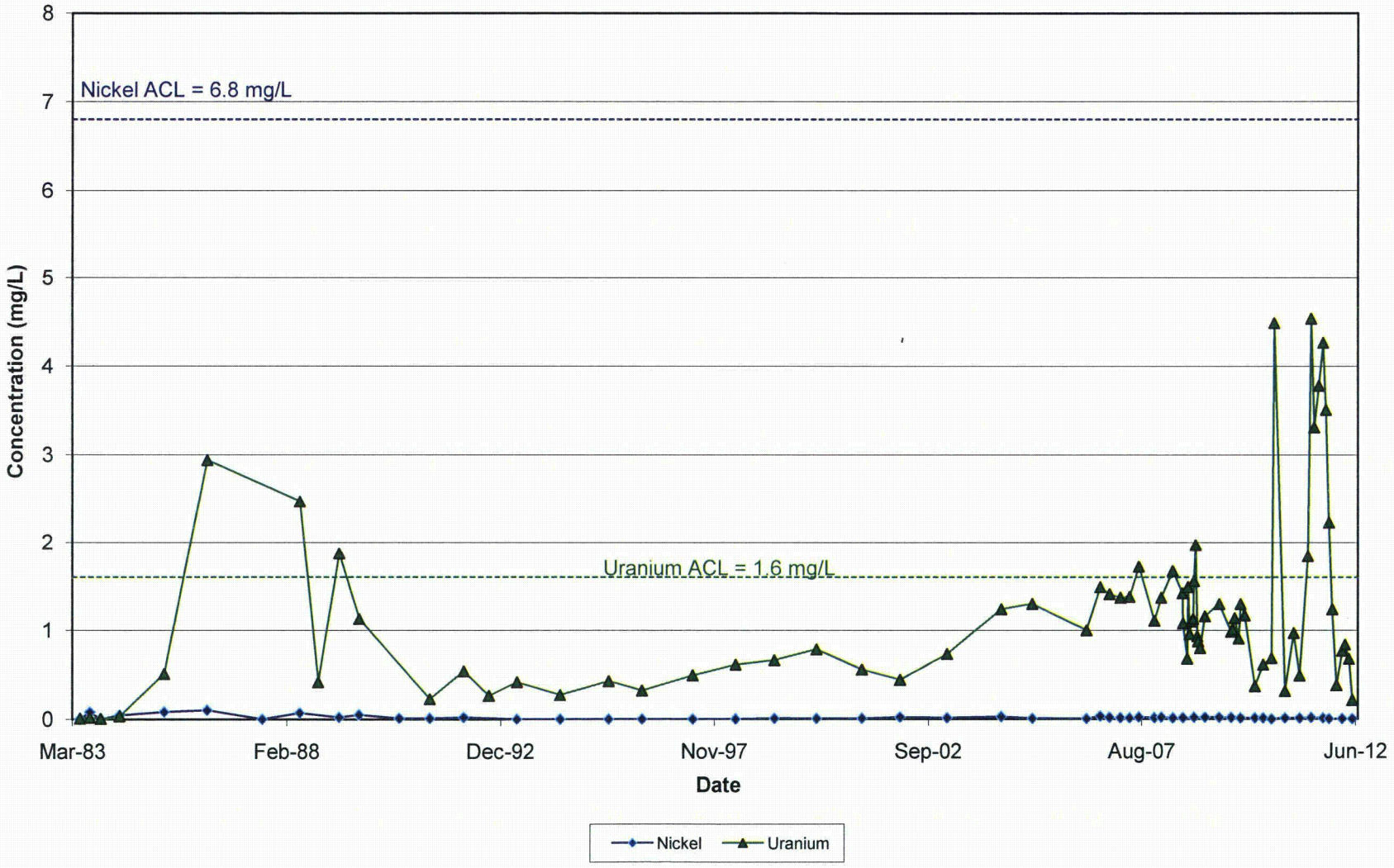
Radionuclides in Monitoring Well 19-77



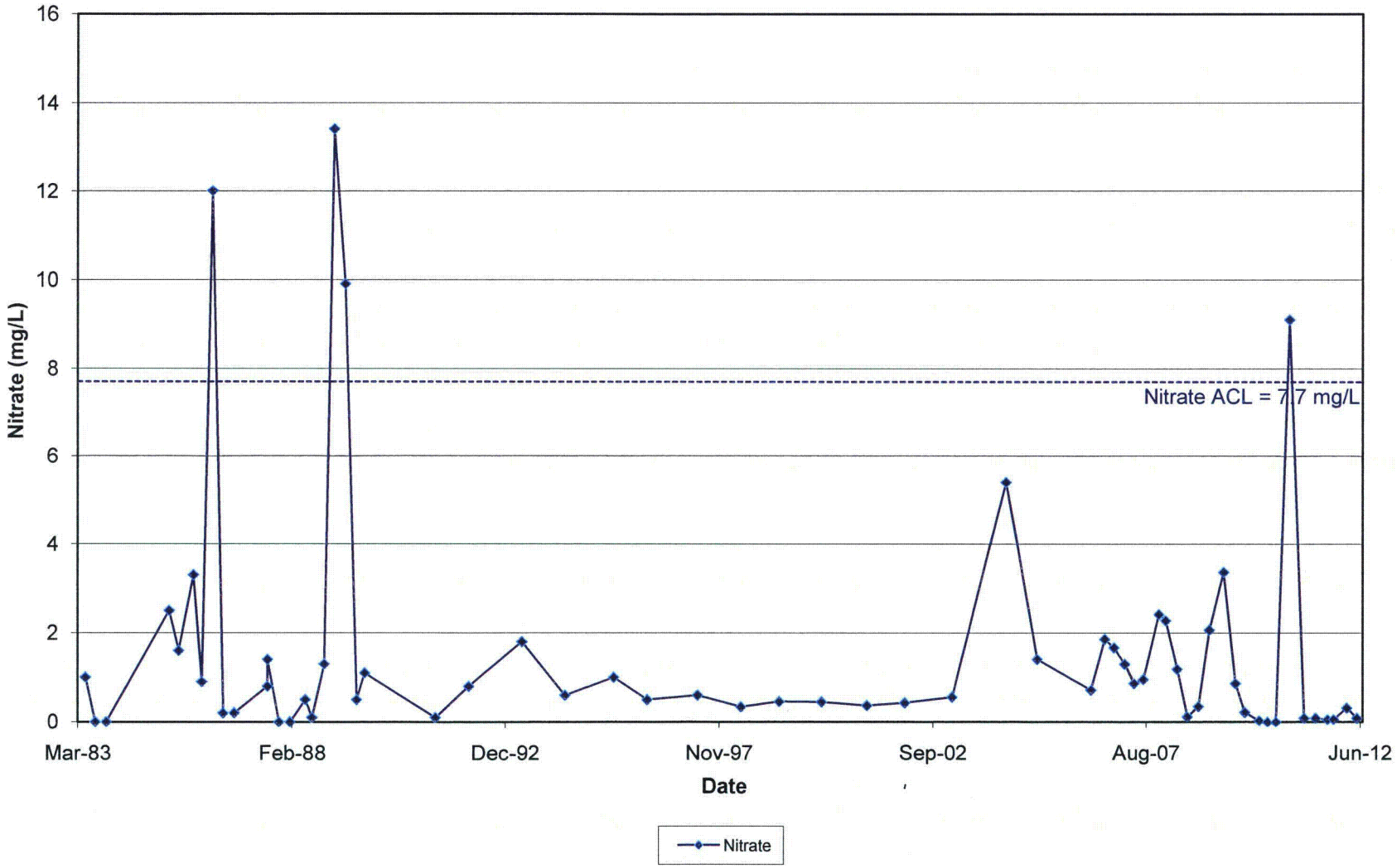
Anions and TDS in Monitoring Well 31-02



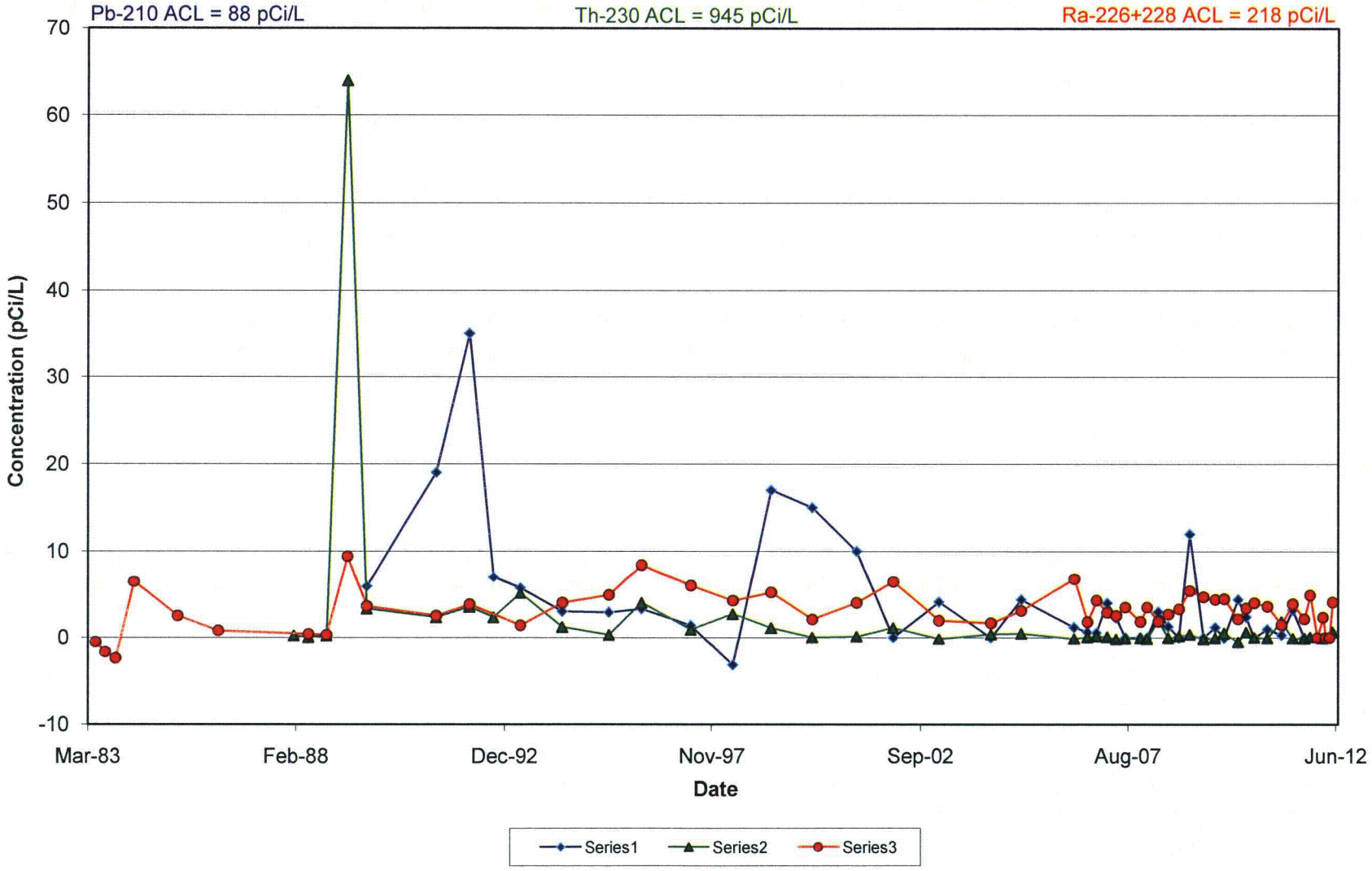
Metals in Monitoring Well 31-02



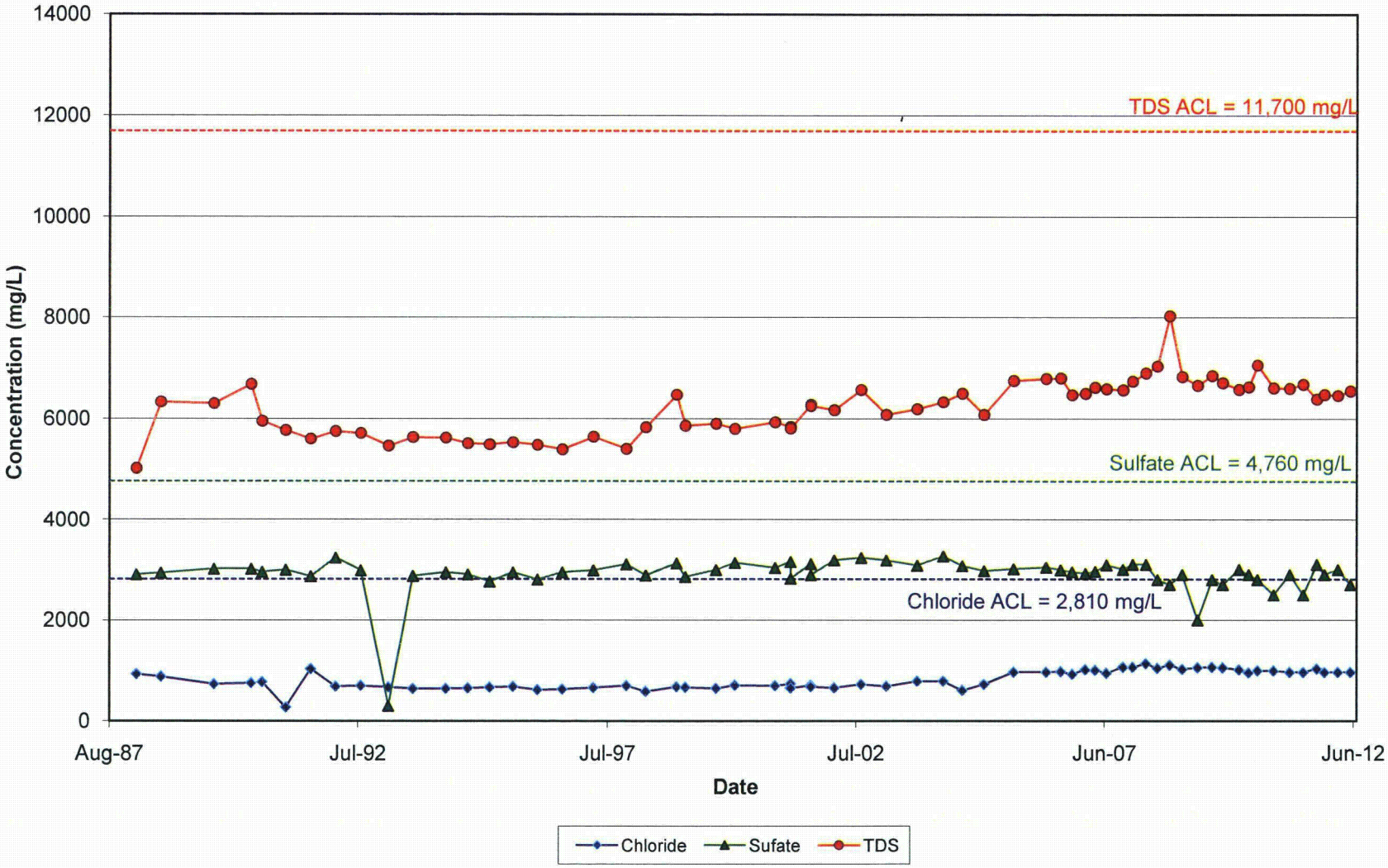
Nitrate in Monitoring Well 31-02



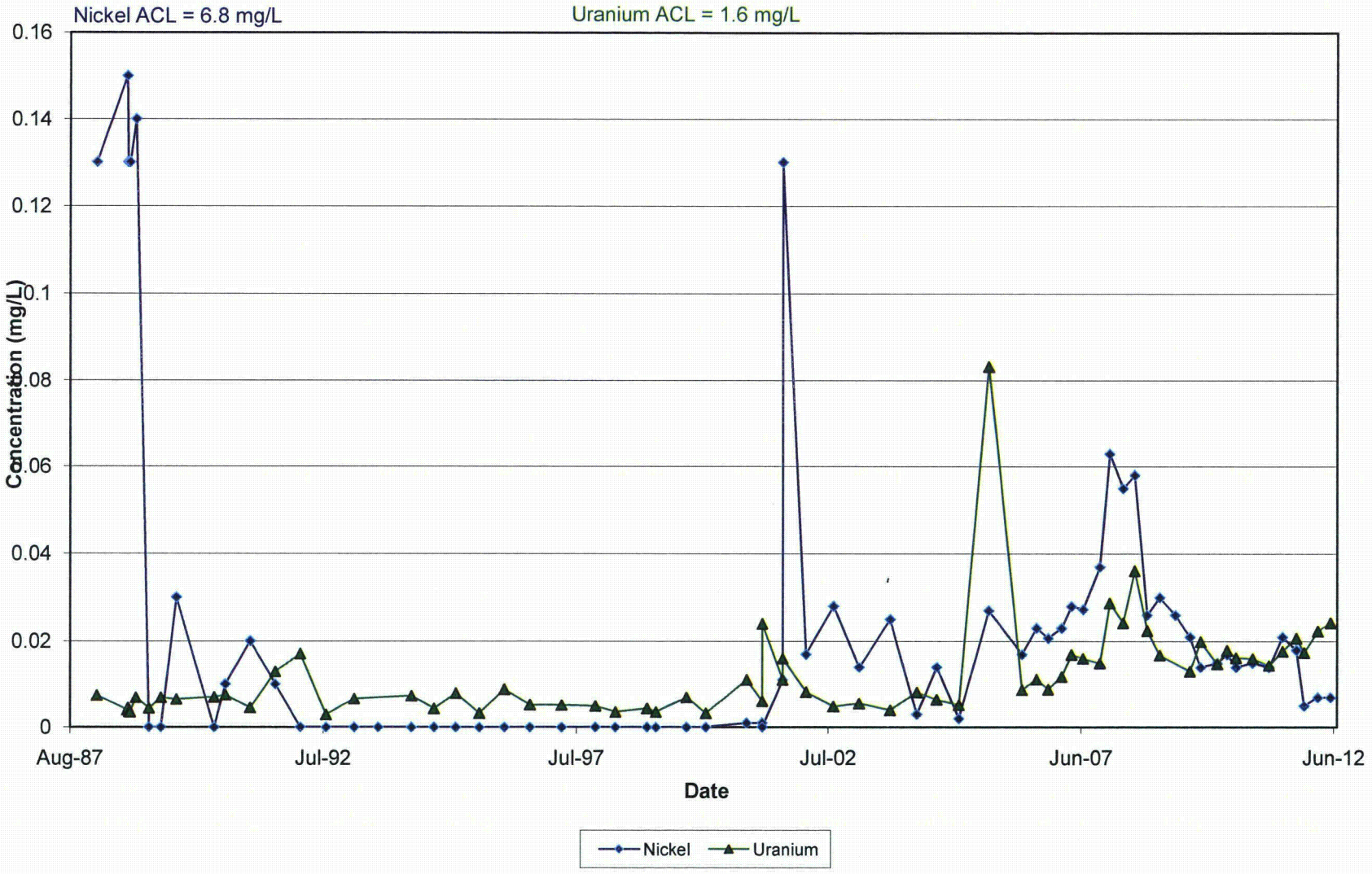
Radionuclides in Monitoring Well 31-02



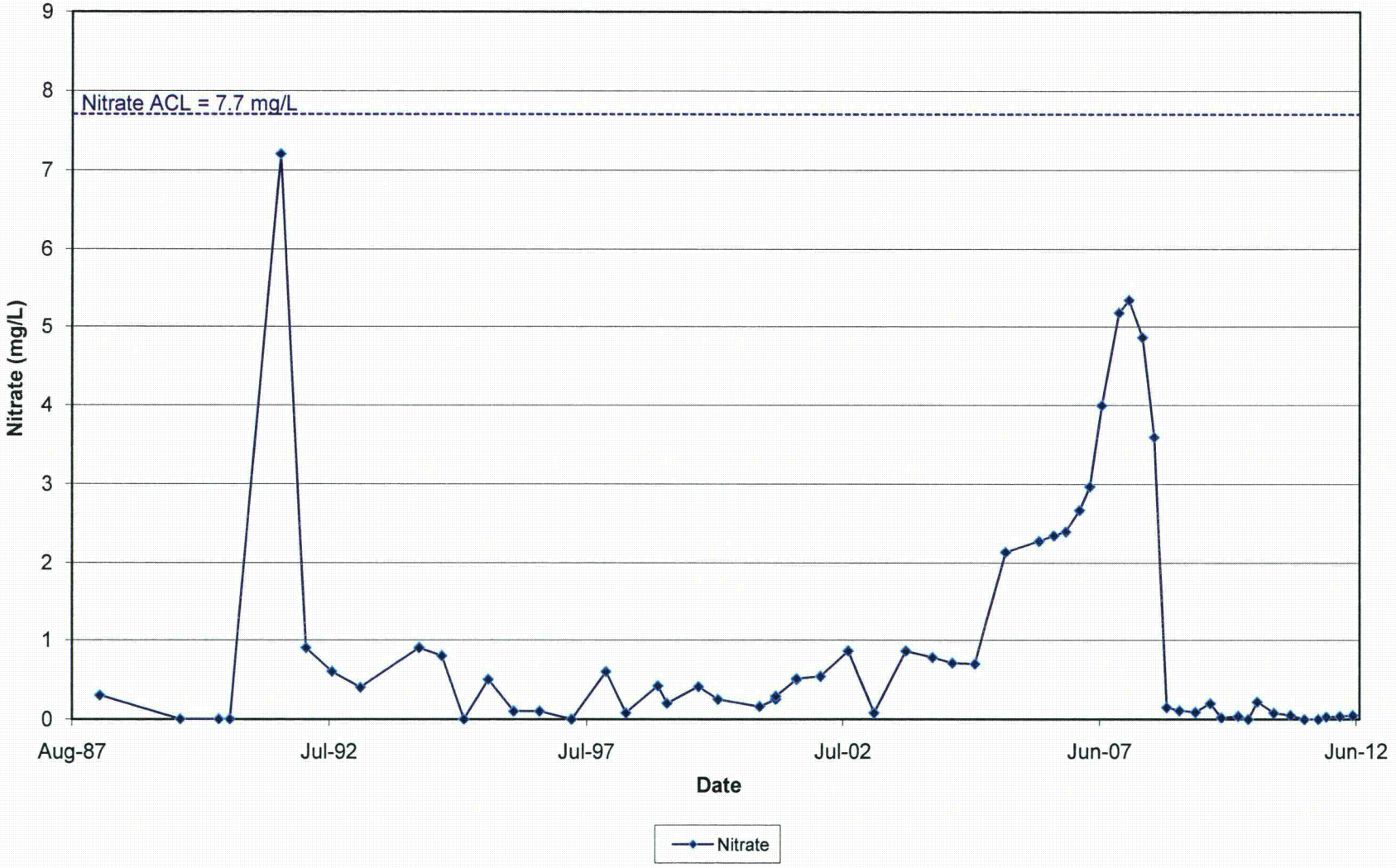
Anions and TDS in Monitoring Well 31-67



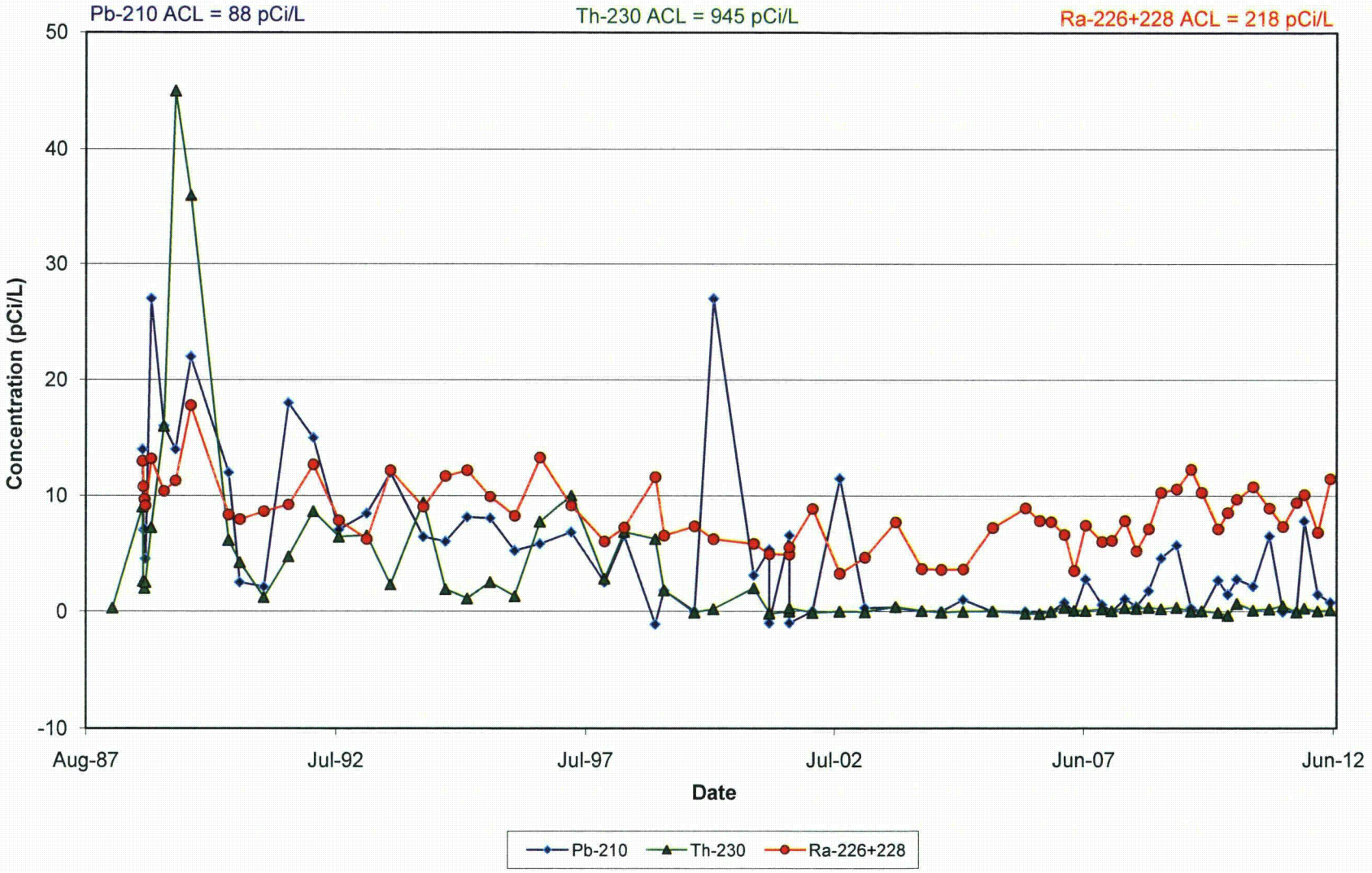
Metals in Monitoring Well 31-67



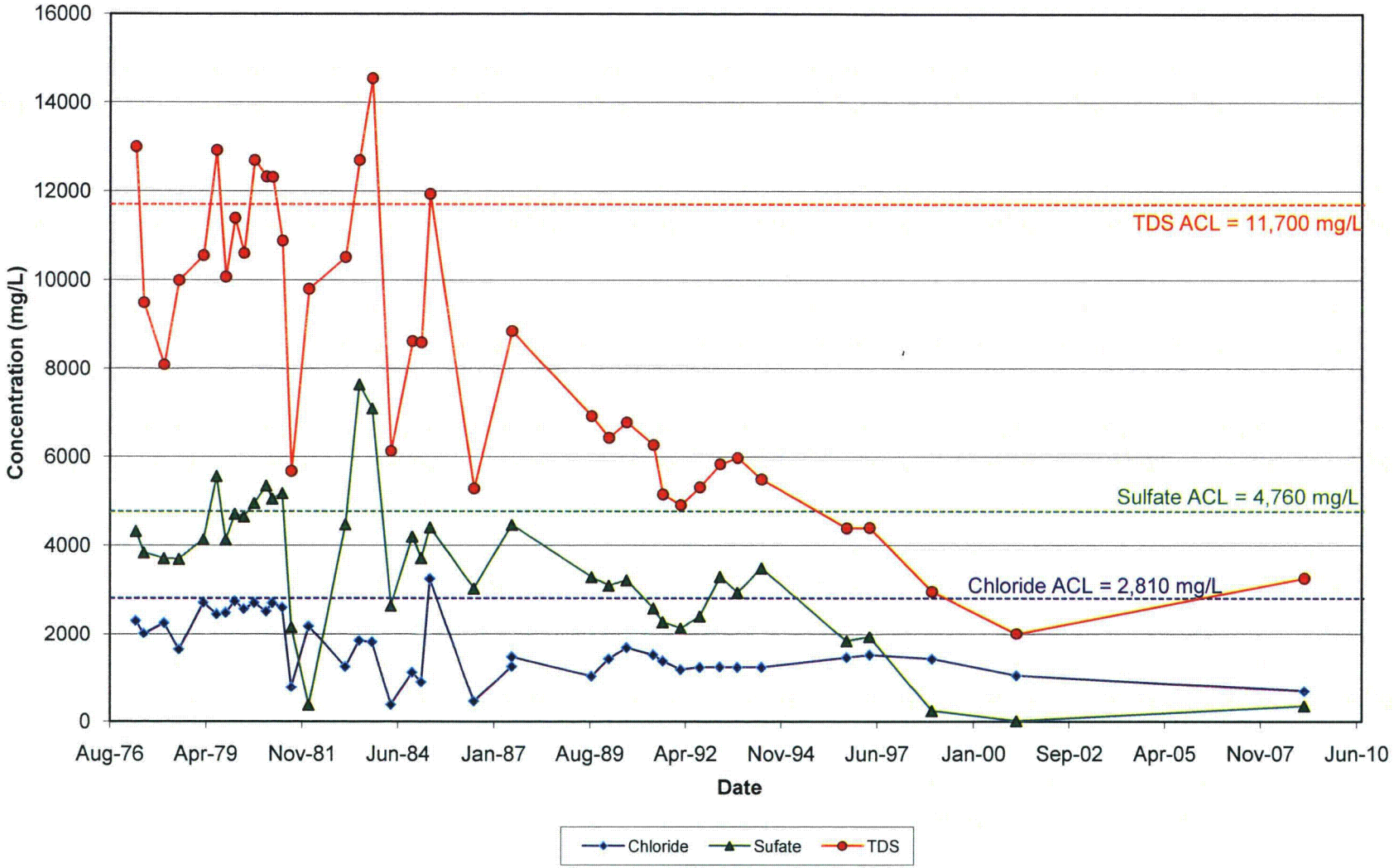
Nitrate in Monitoring Well 31-67



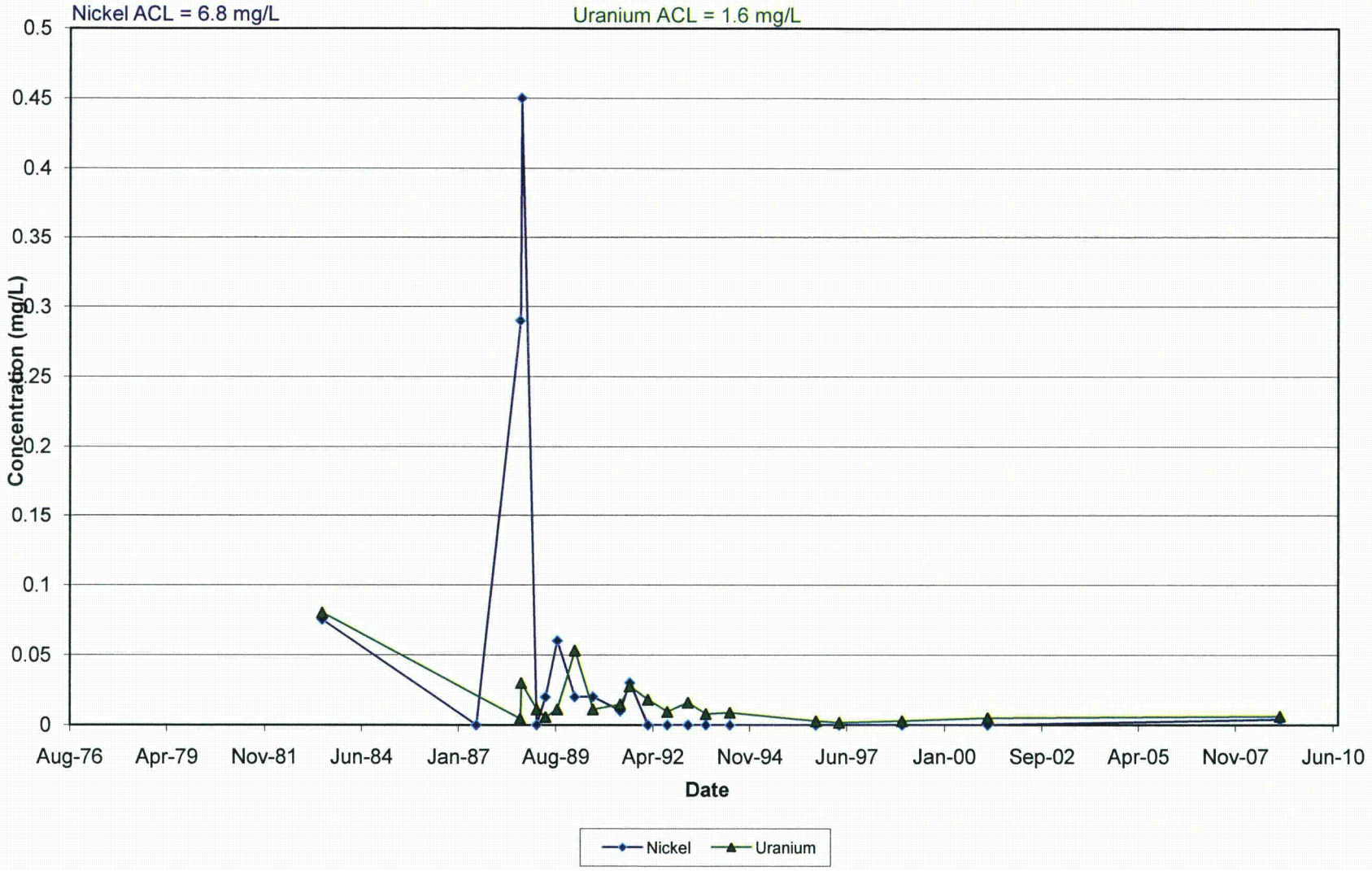
Radionuclides in Monitoring Well 31-67



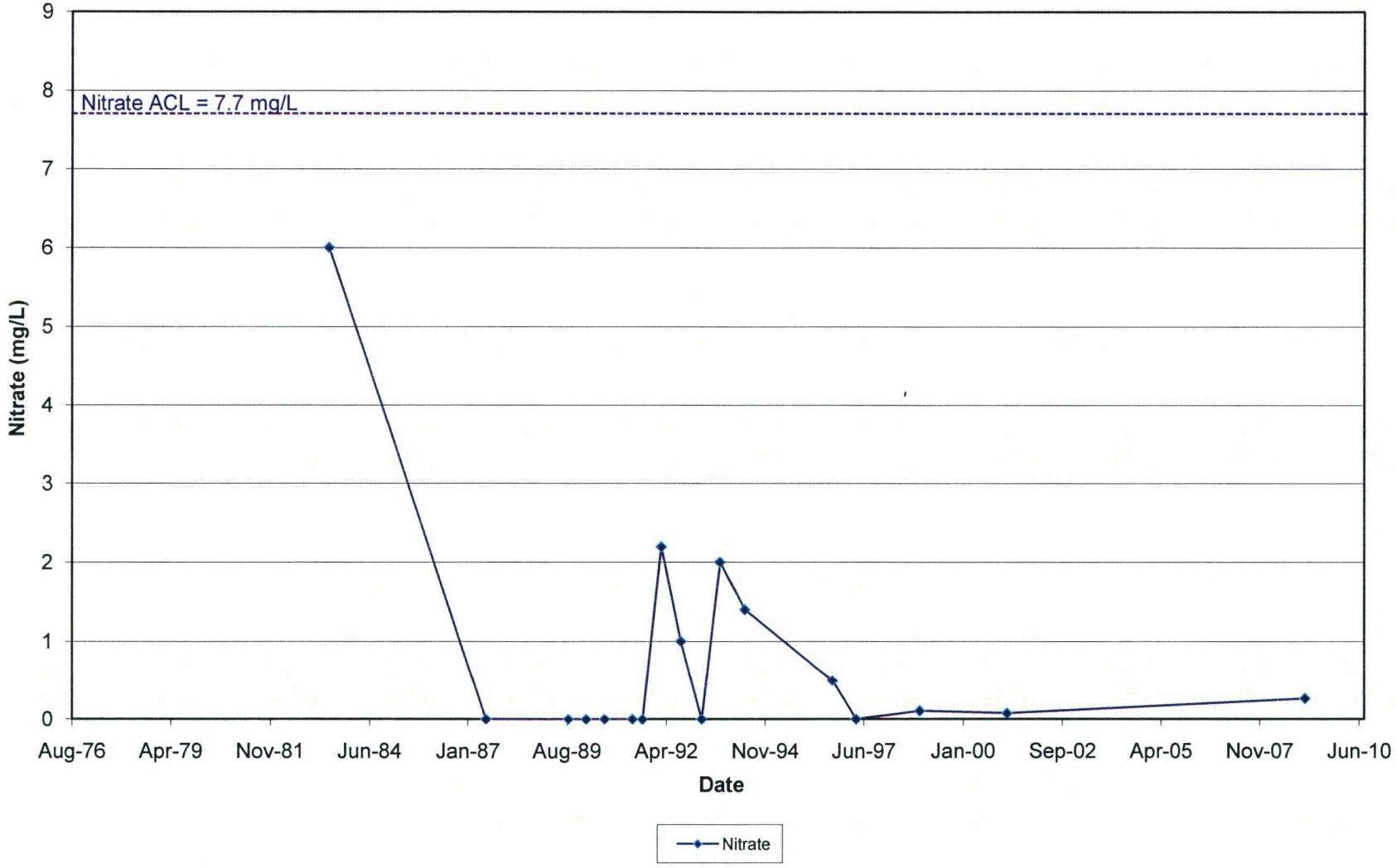
Anions and TDS in Monitoring Well 36-01TRB



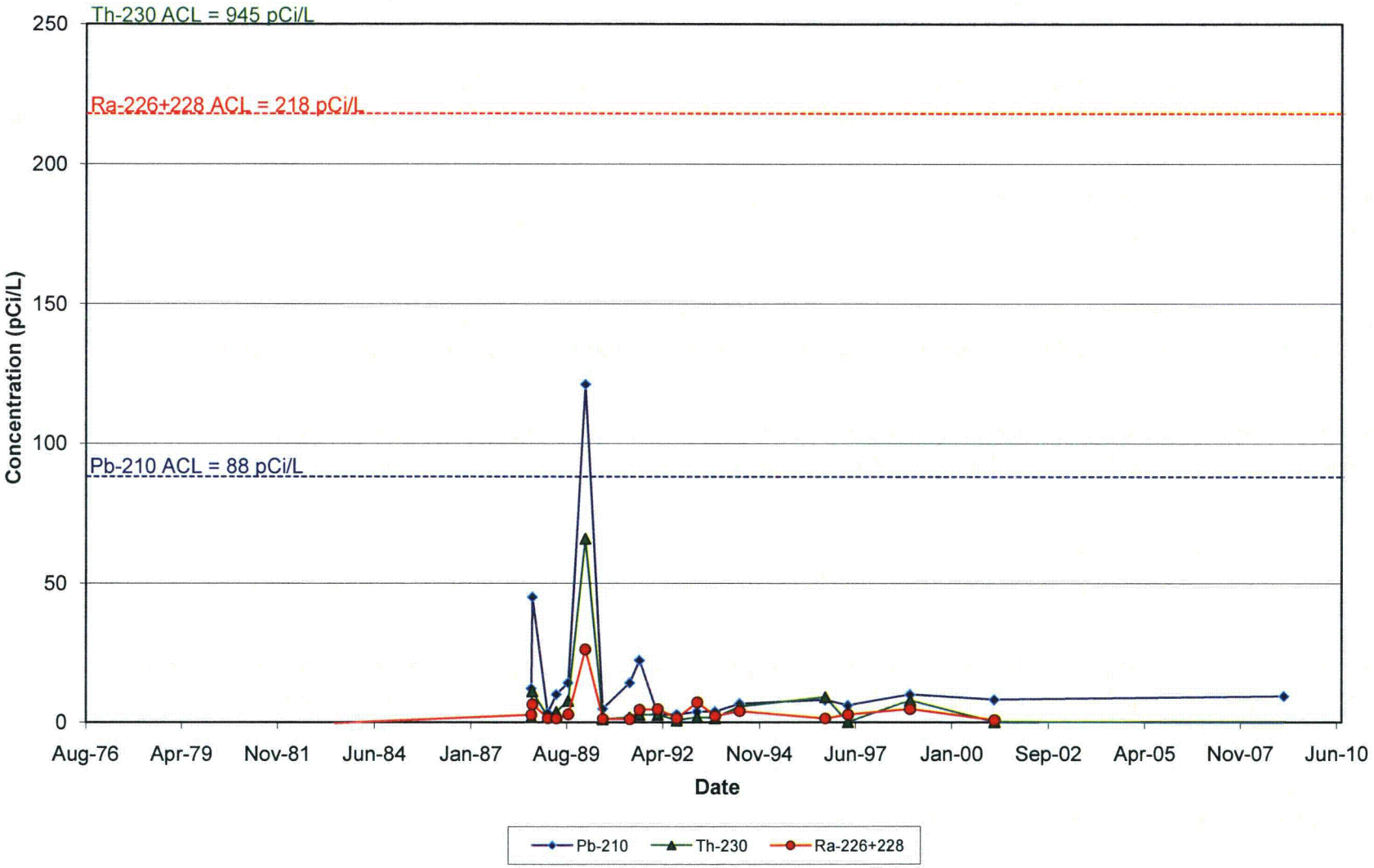
Metals in Monitoring Well 36-01TRB



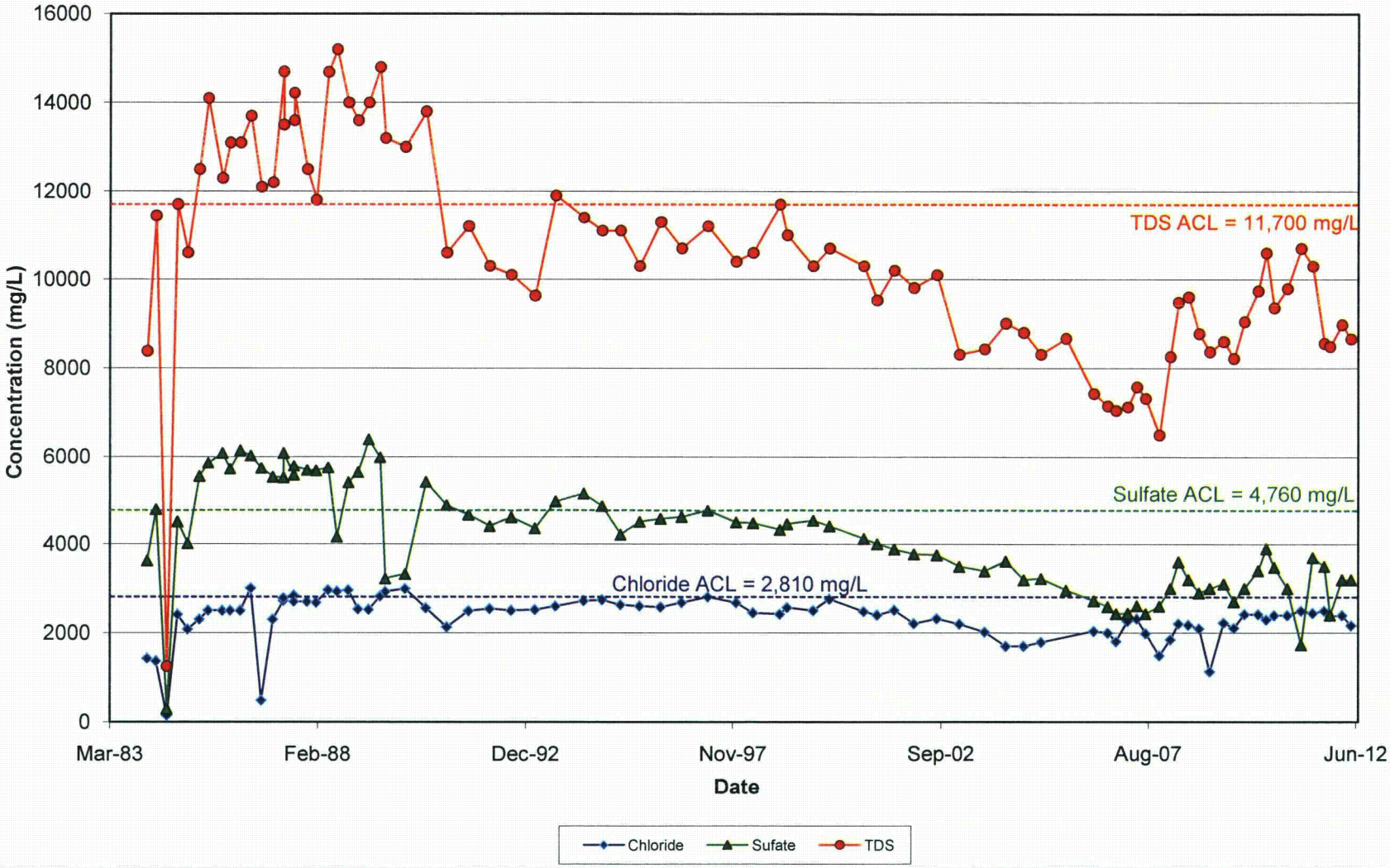
Nitrate in Monitoring Well 36-01TRB



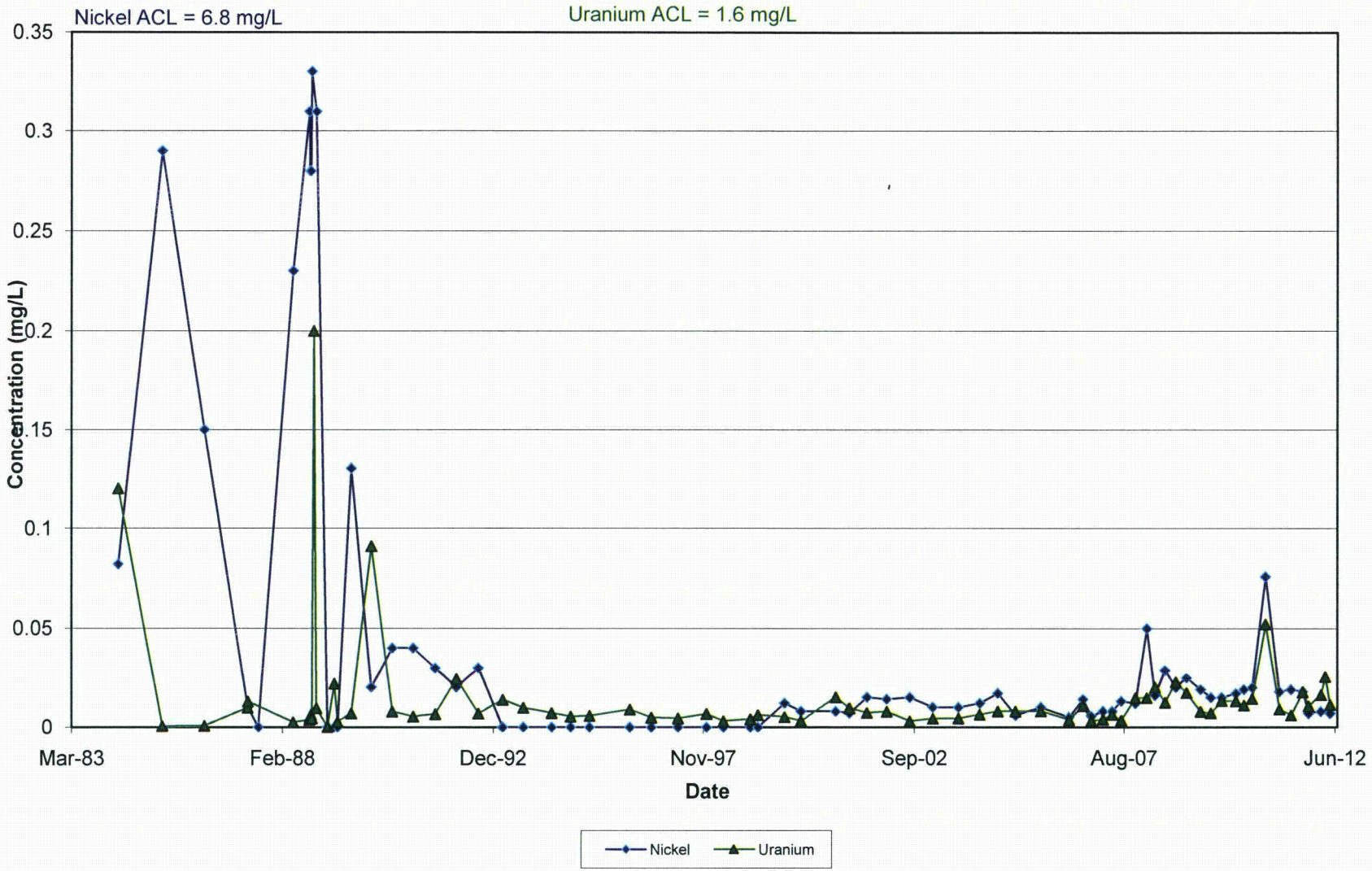
Radionuclides in Monitoring Well 36-01TRB



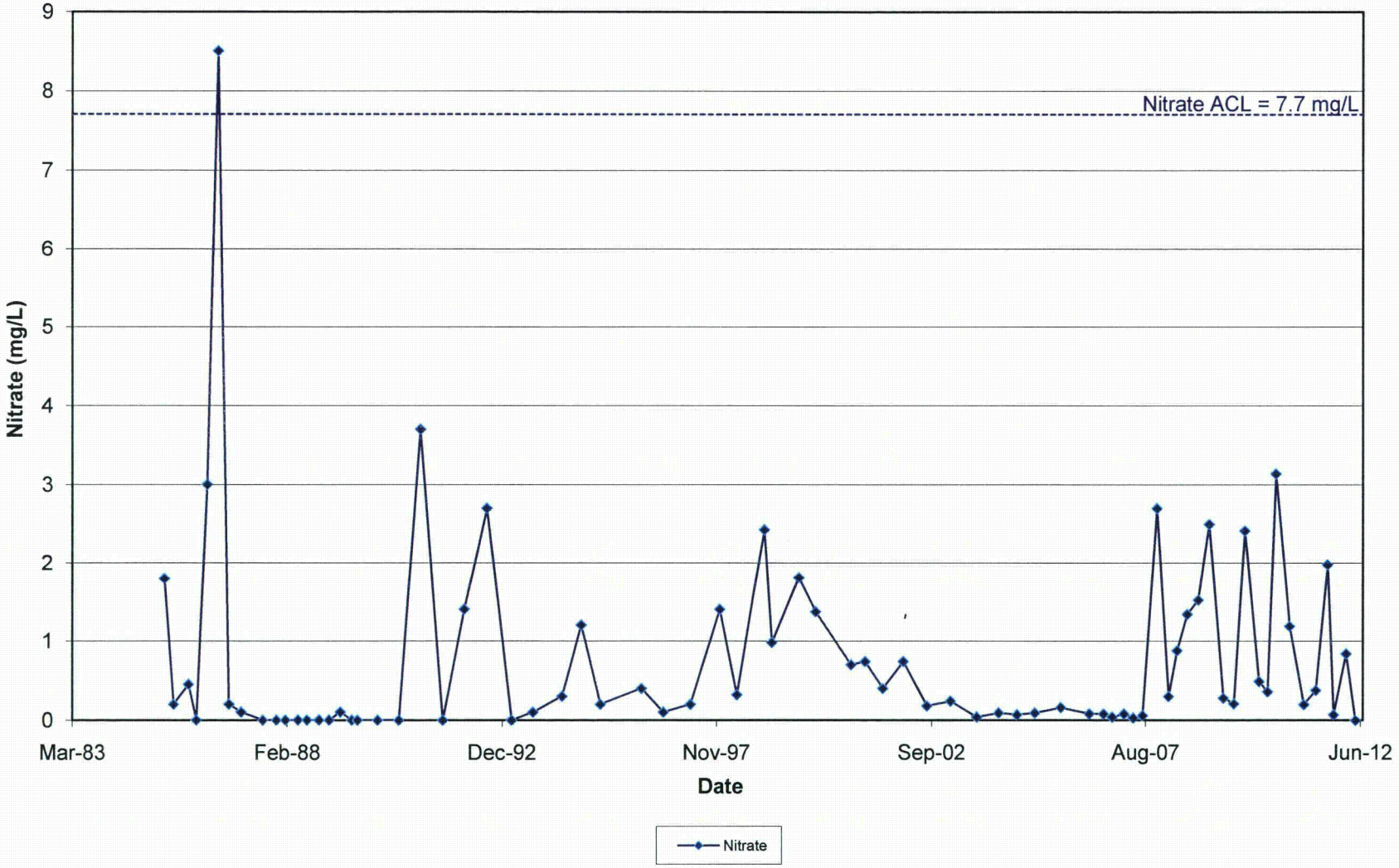
Chloride, Sulfate, and TDS in Monitoring Well 36-02



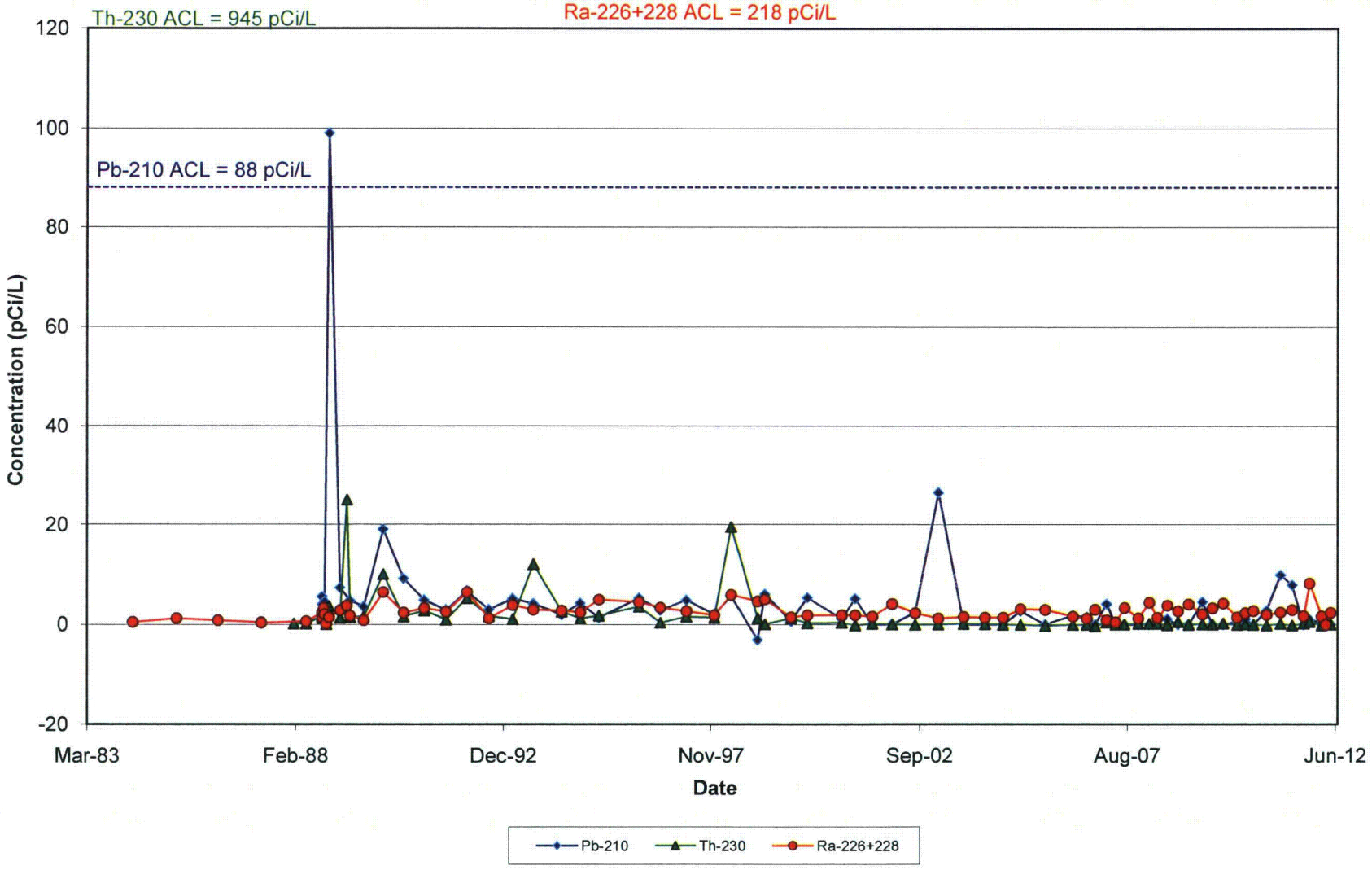
Metals in Monitoring Well 36-02



Nitrate in Monitoring Well 36-02



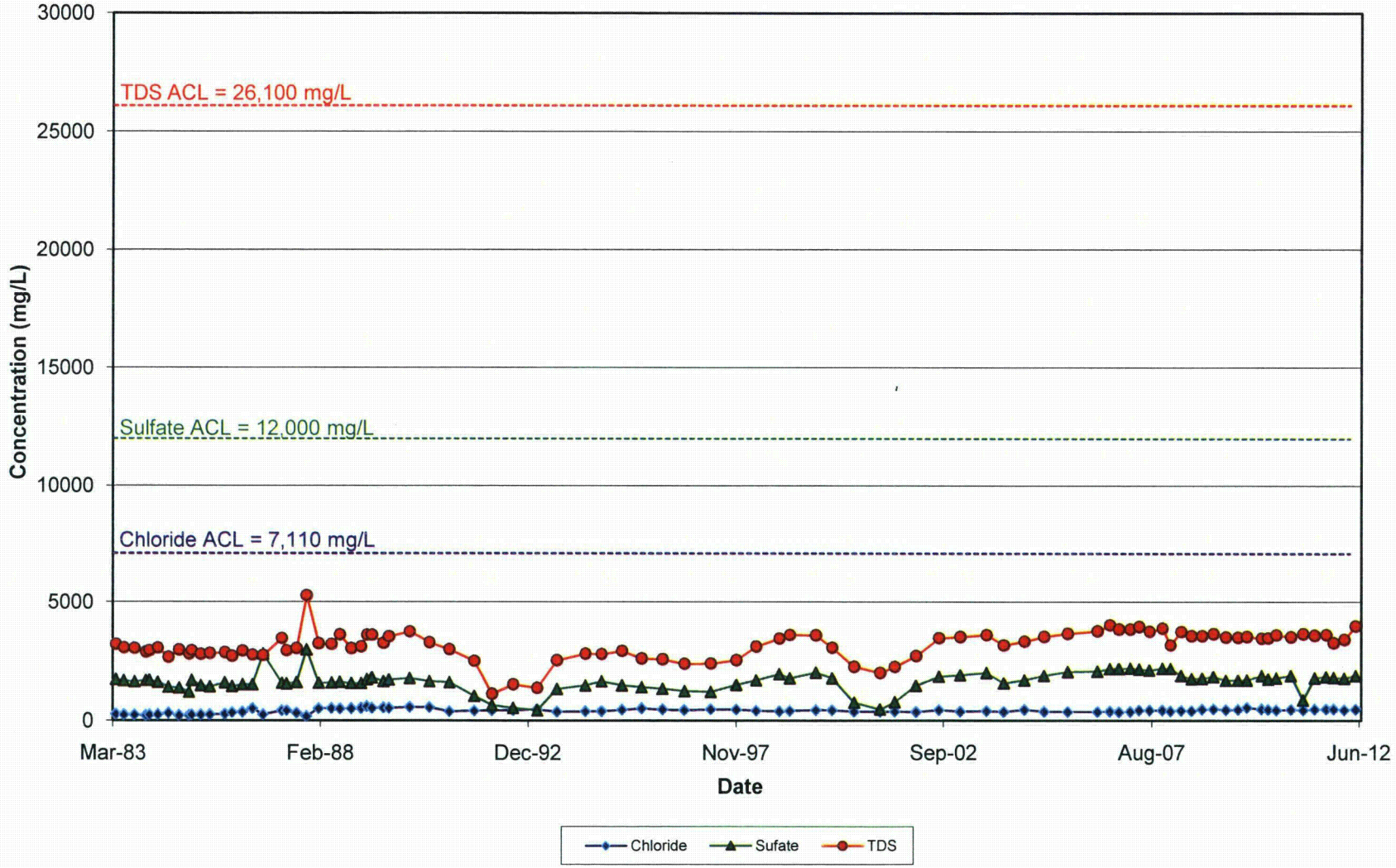
Radionuclides in Monitoring Well 36-02



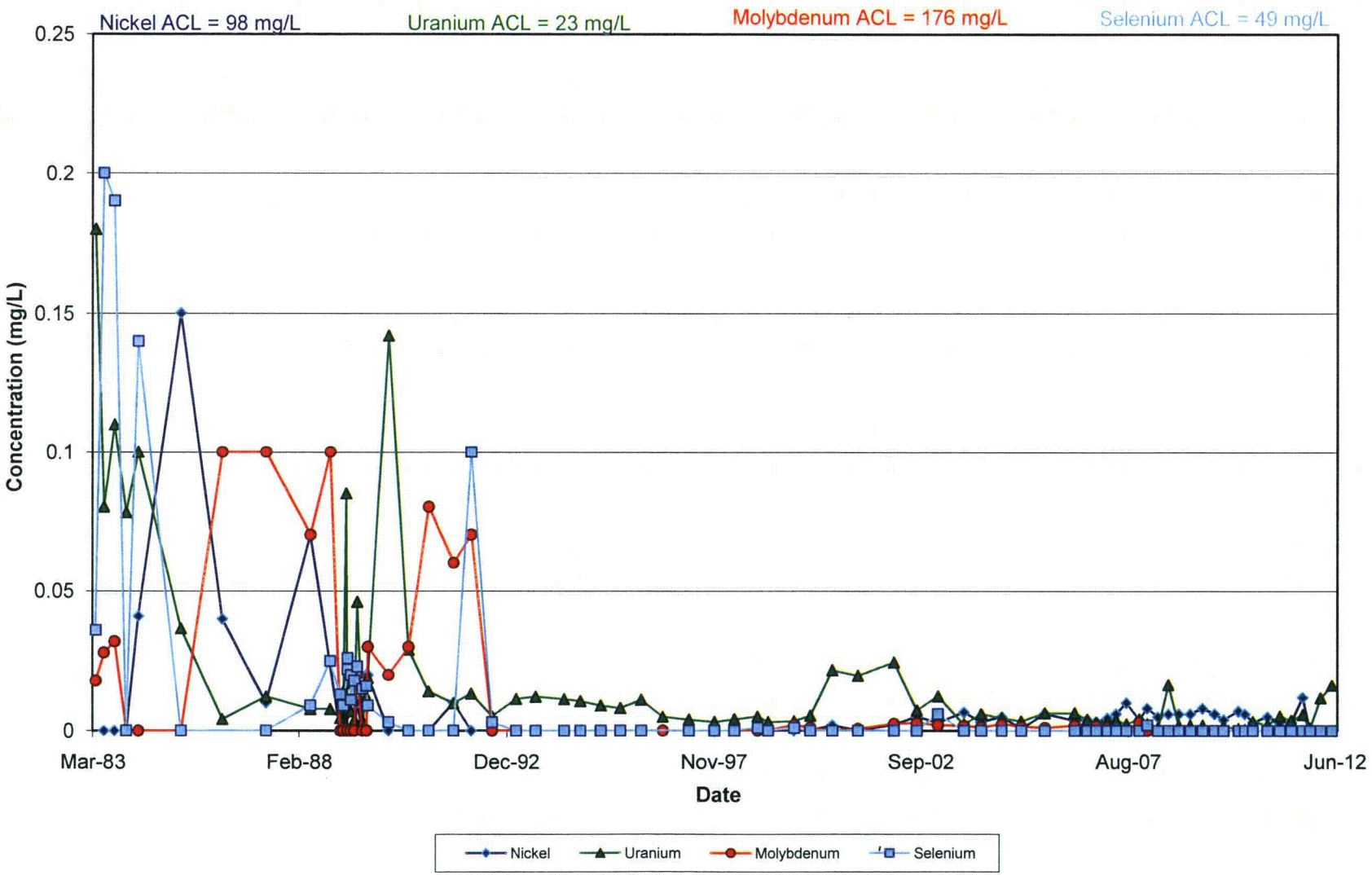
Stability Monitoring Plan
Time Versus Concentration Plots

Alluvium

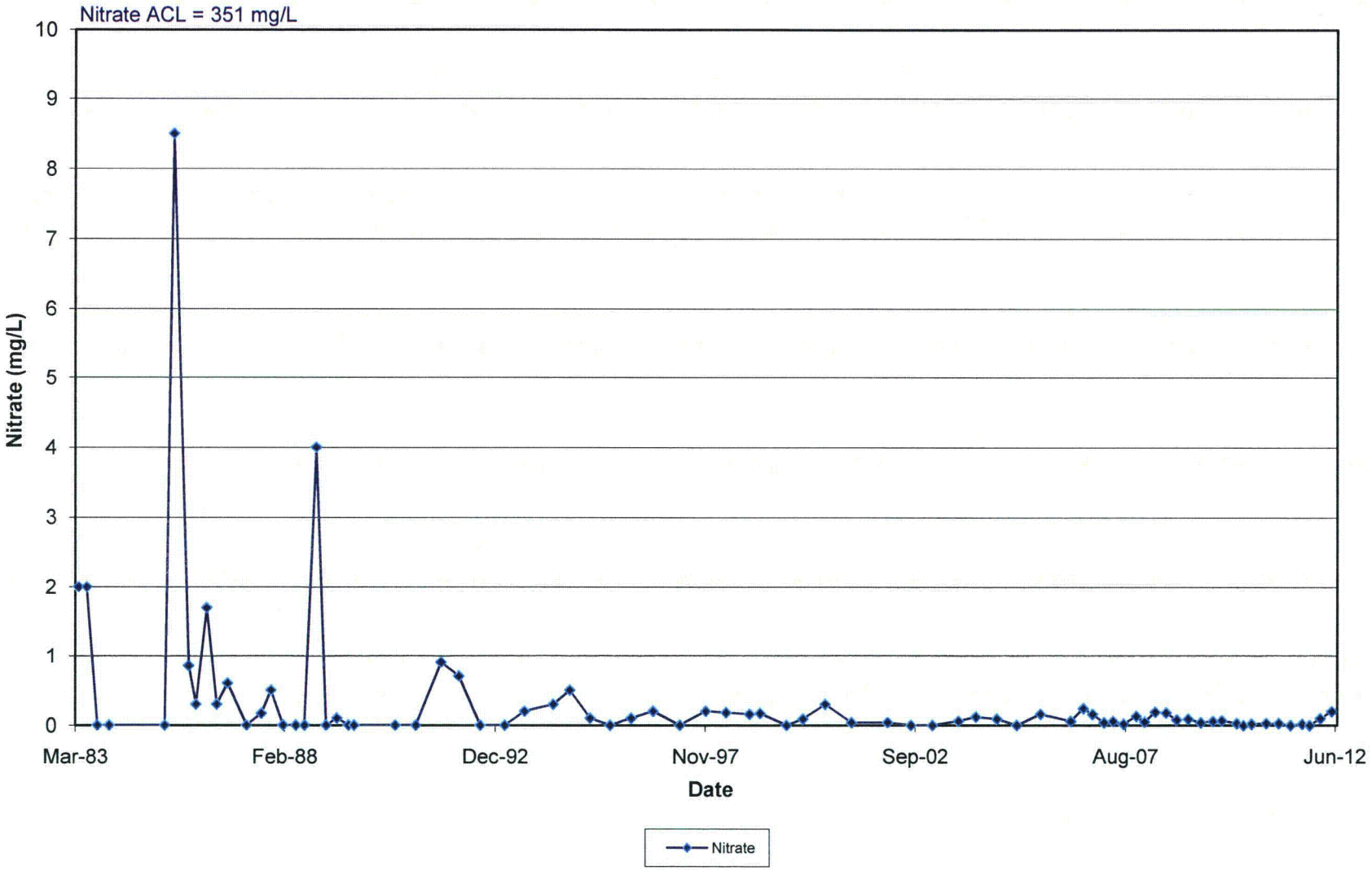
Anions and TDS in Monitoring Well 5-03



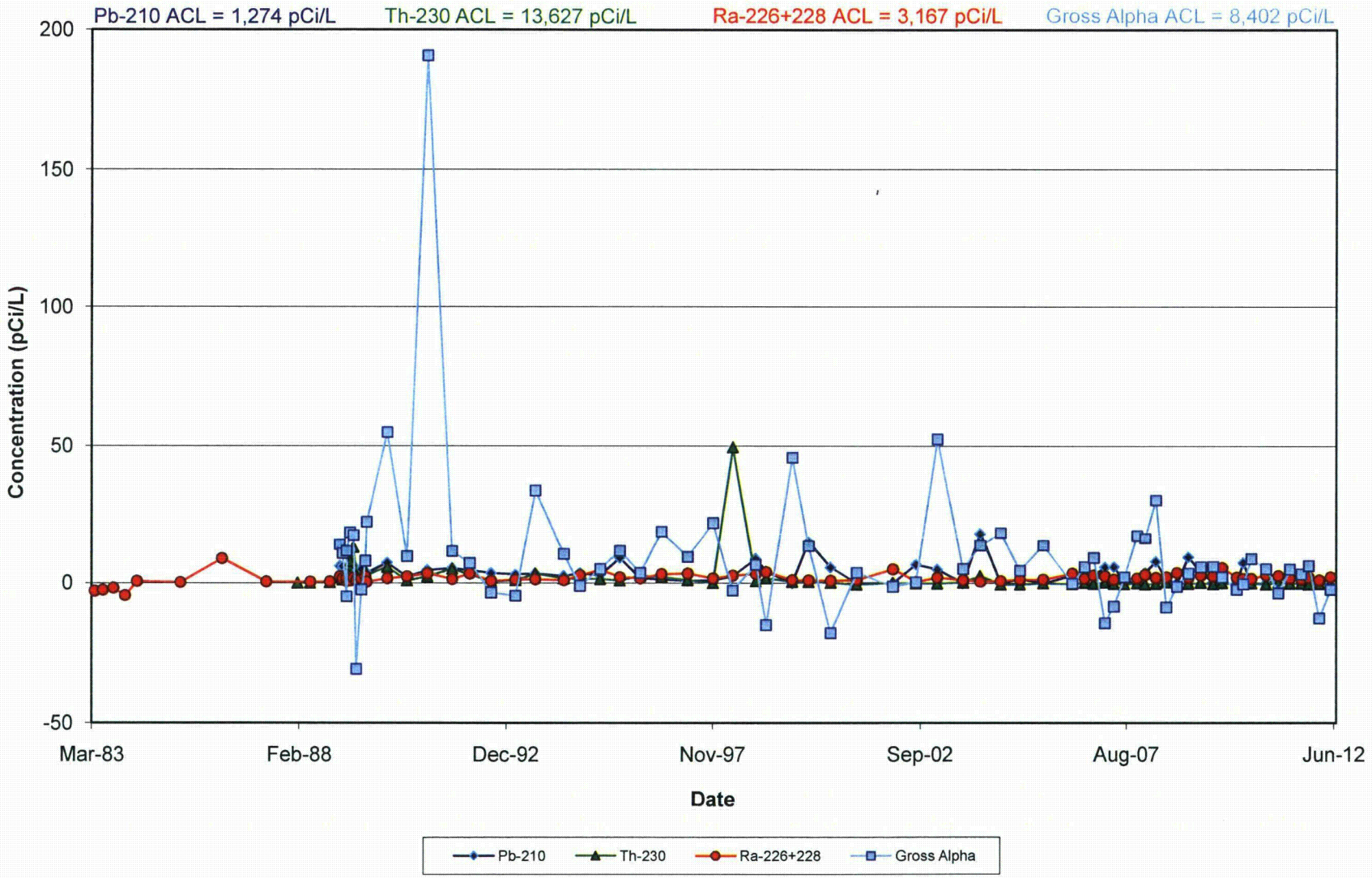
Metals in Monitoring Well 5-03



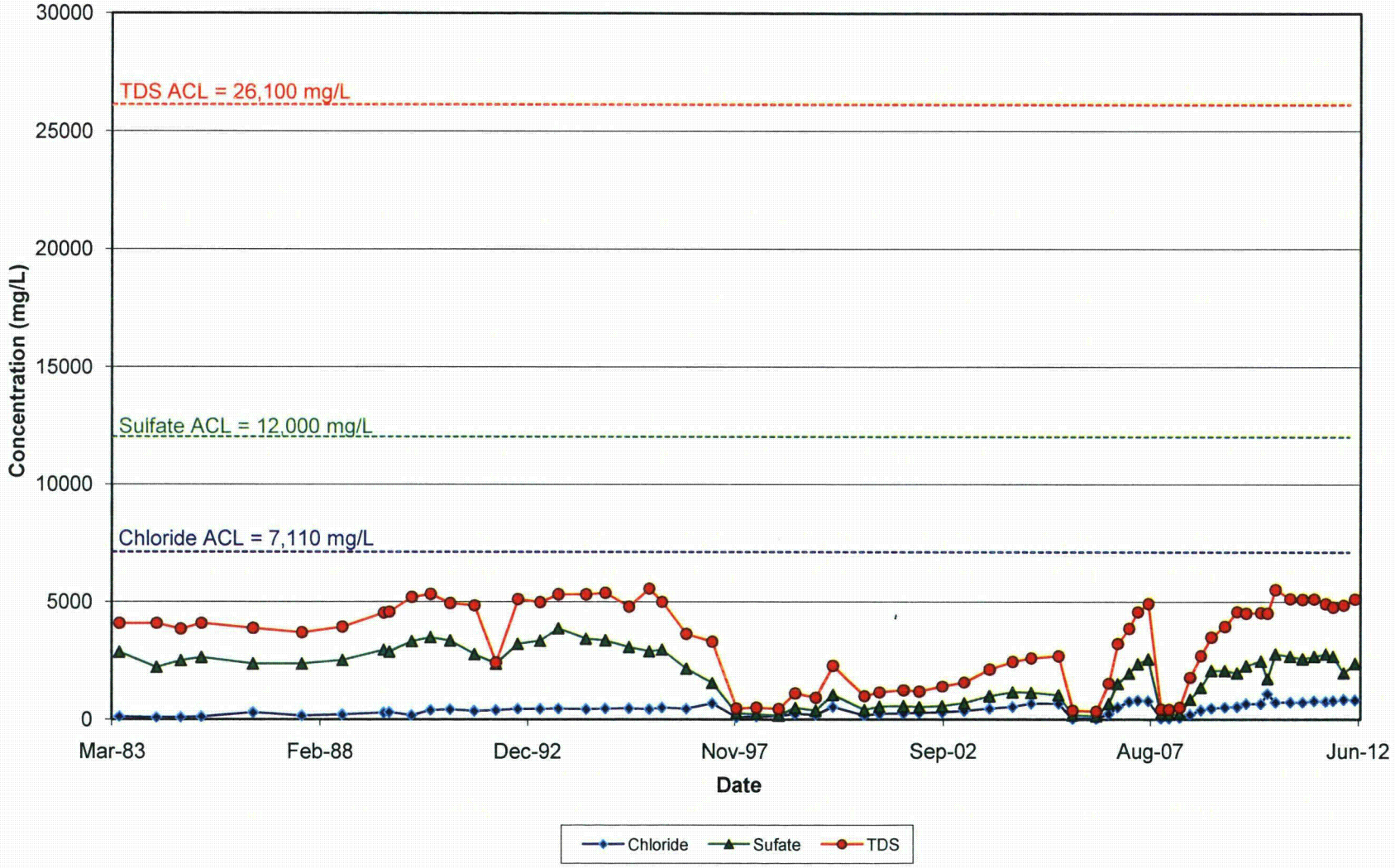
Nitrate in Monitoring Well 5-03



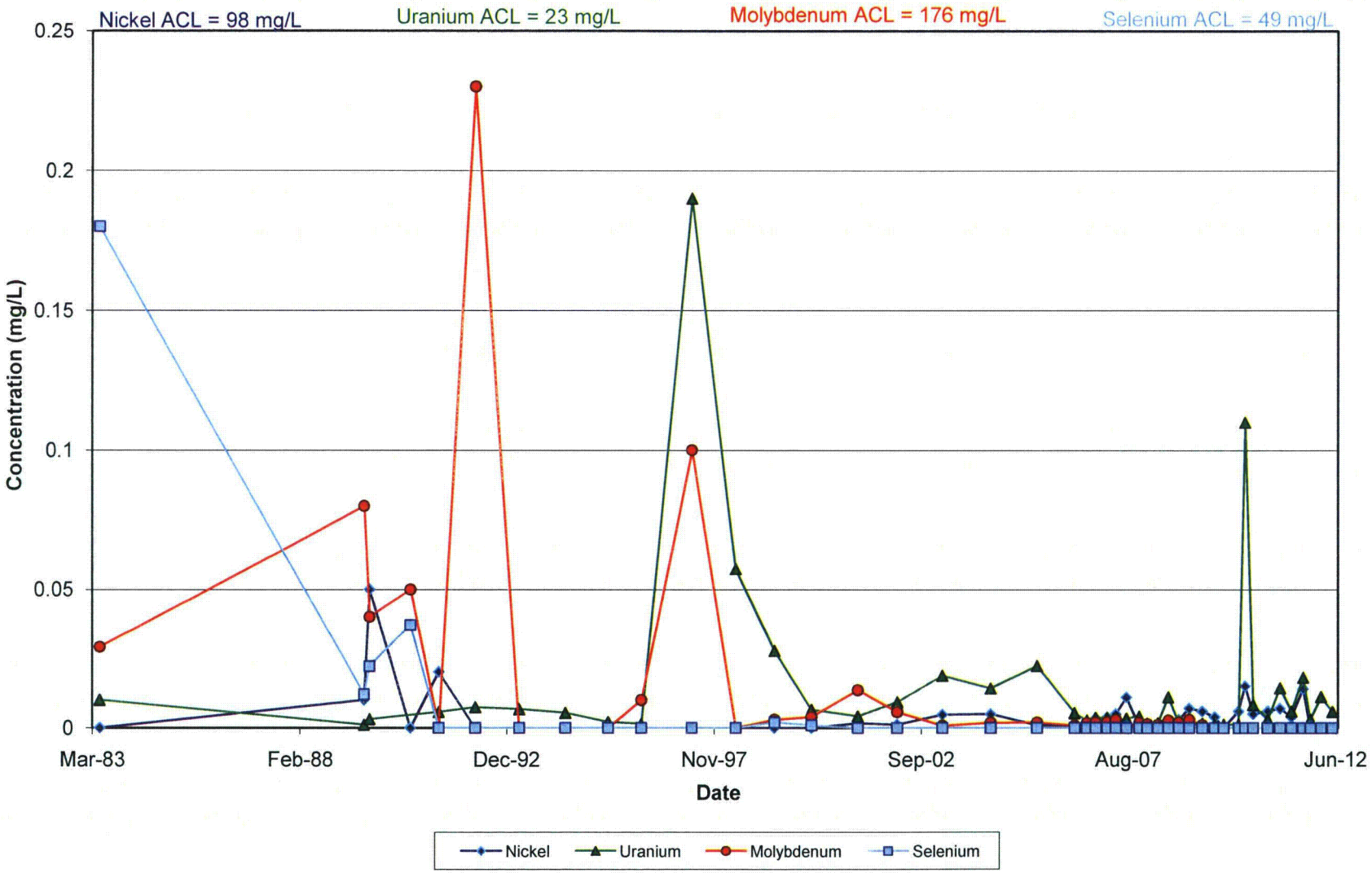
Radionuclides in Monitoring Well 5-03



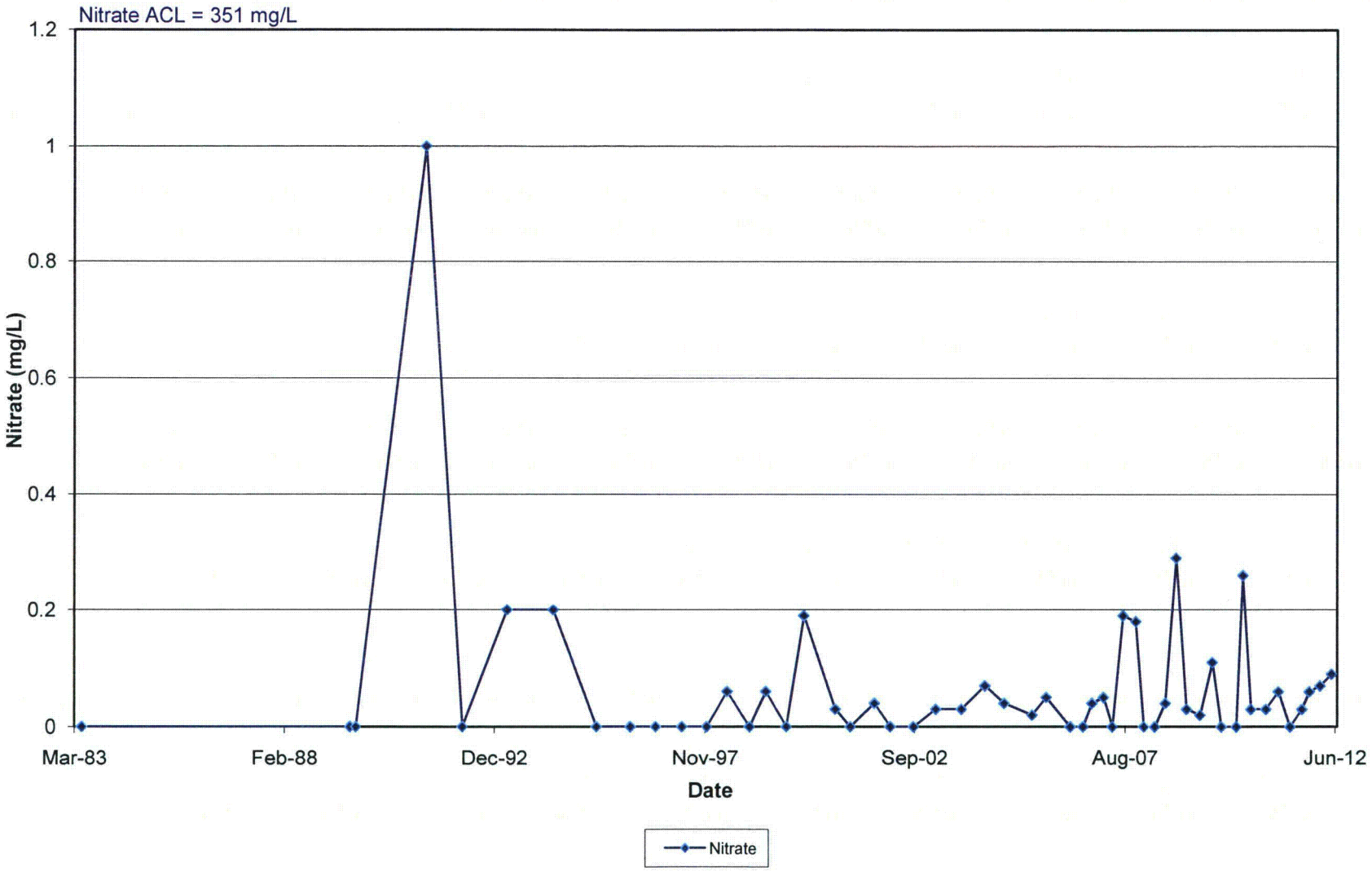
Anions and TDS in Monitoring Well 5-04



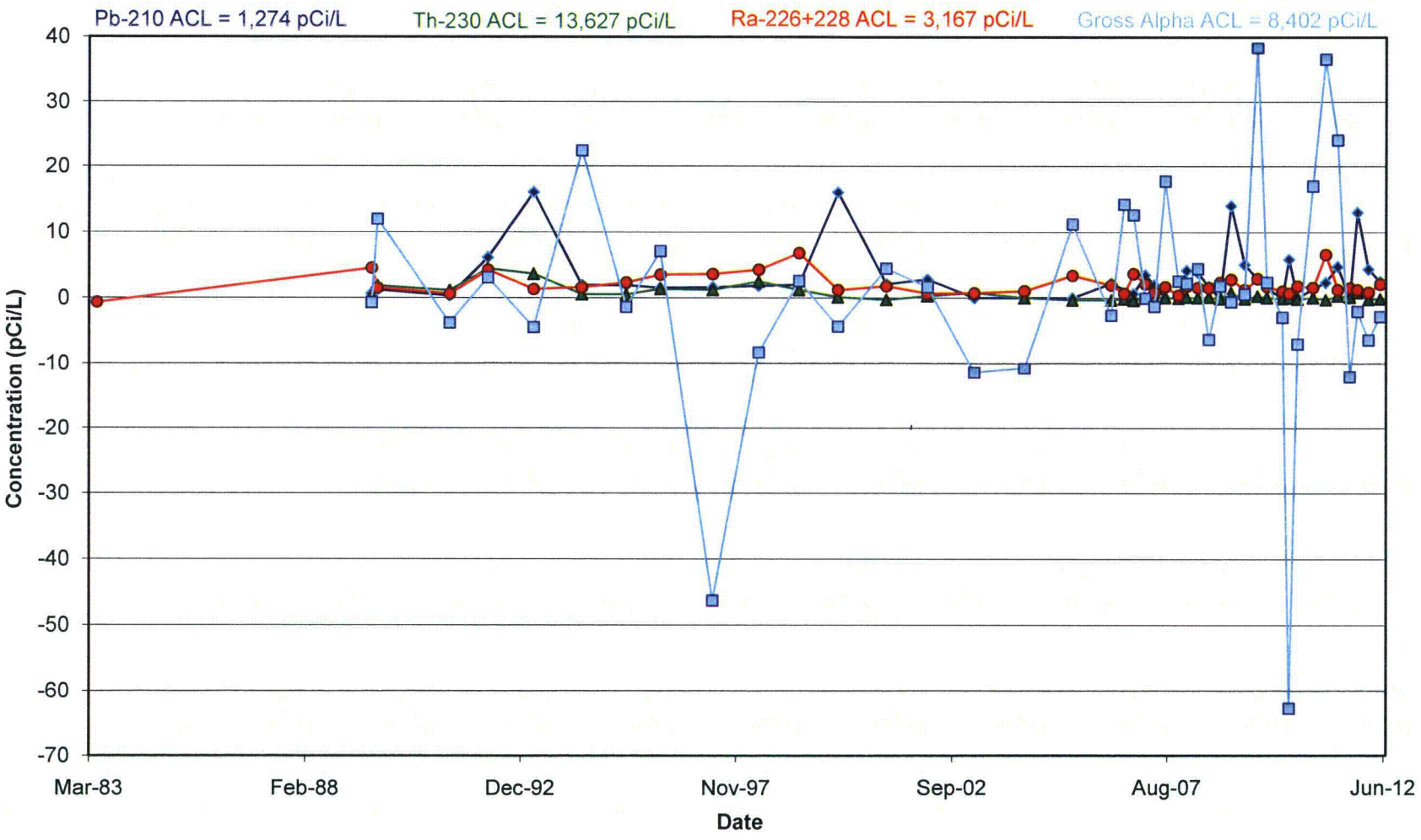
Metals in Monitoring Well 5-04



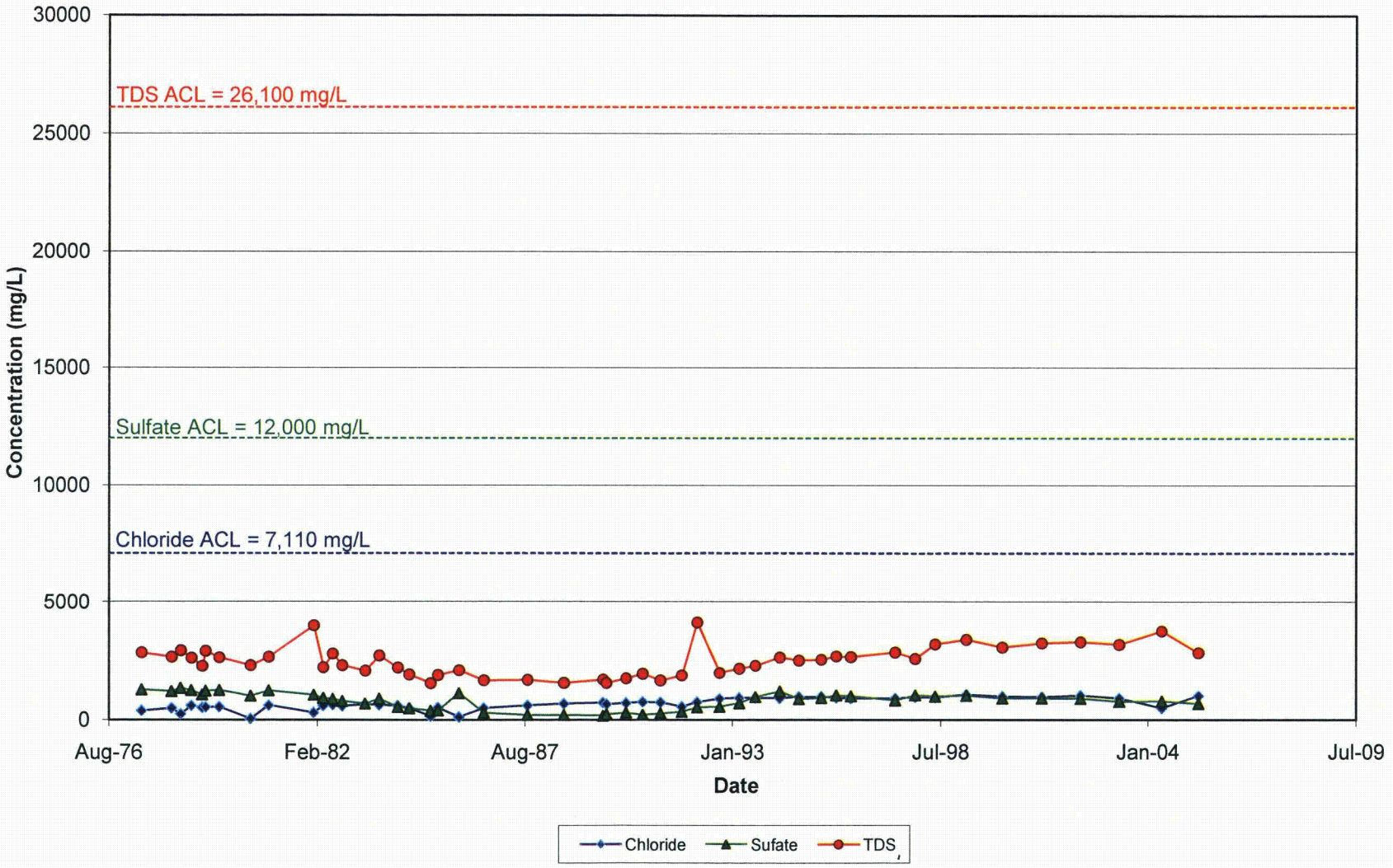
Nitrate in Monitoring Well 5-04



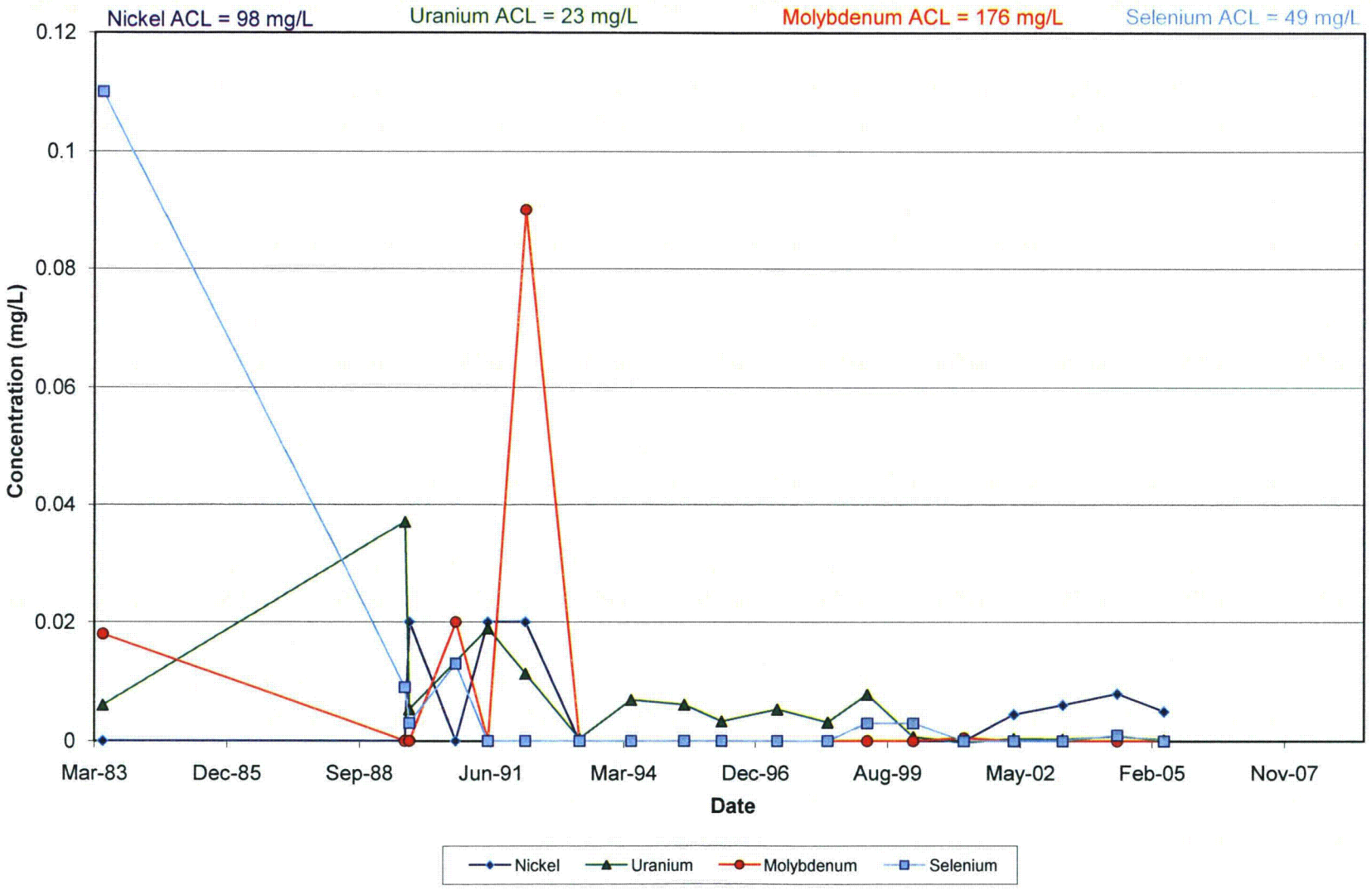
Radionuclides in Monitoring Well 5-04



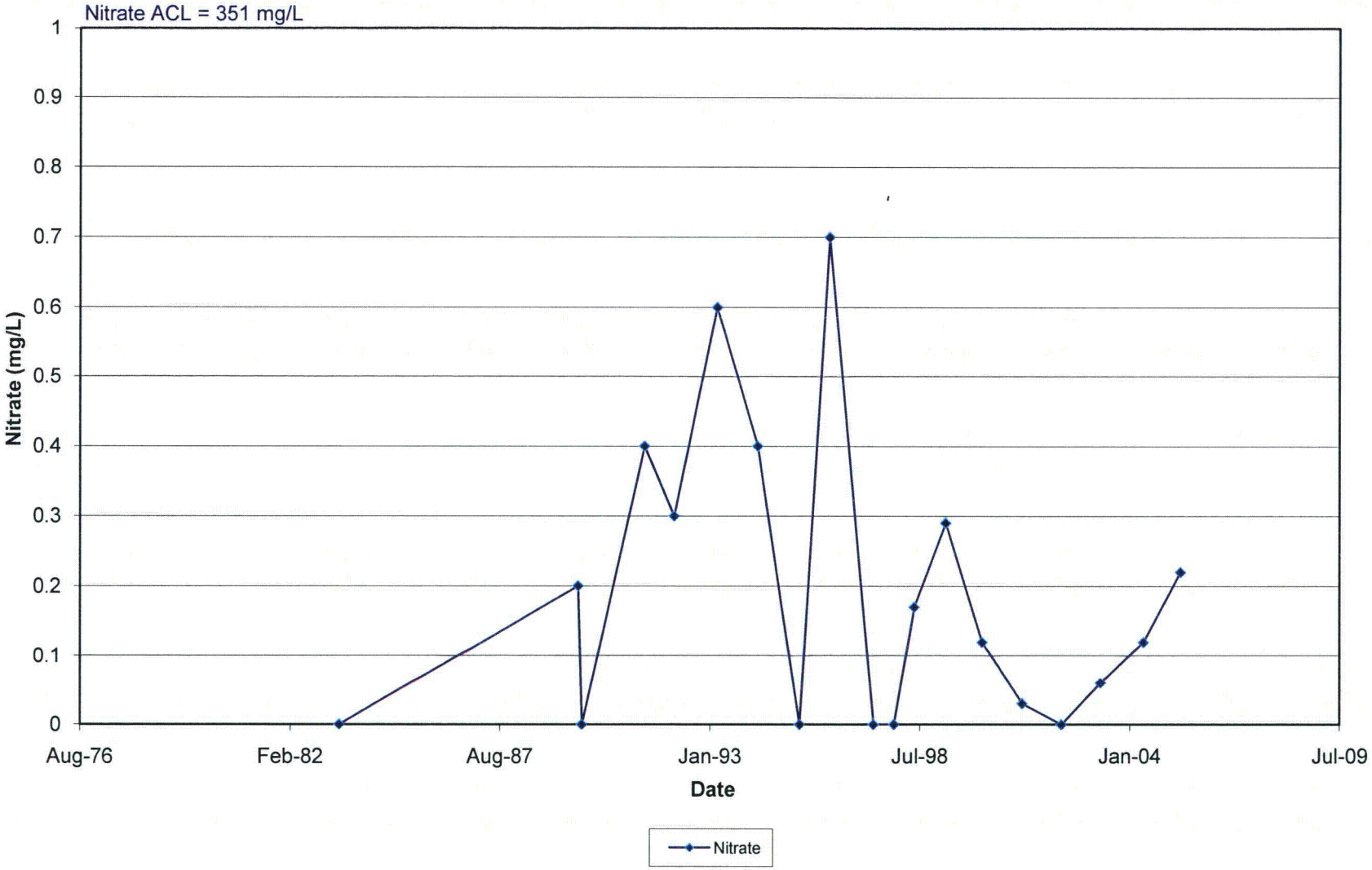
Anions and TDS in Monitoring Well 5-05



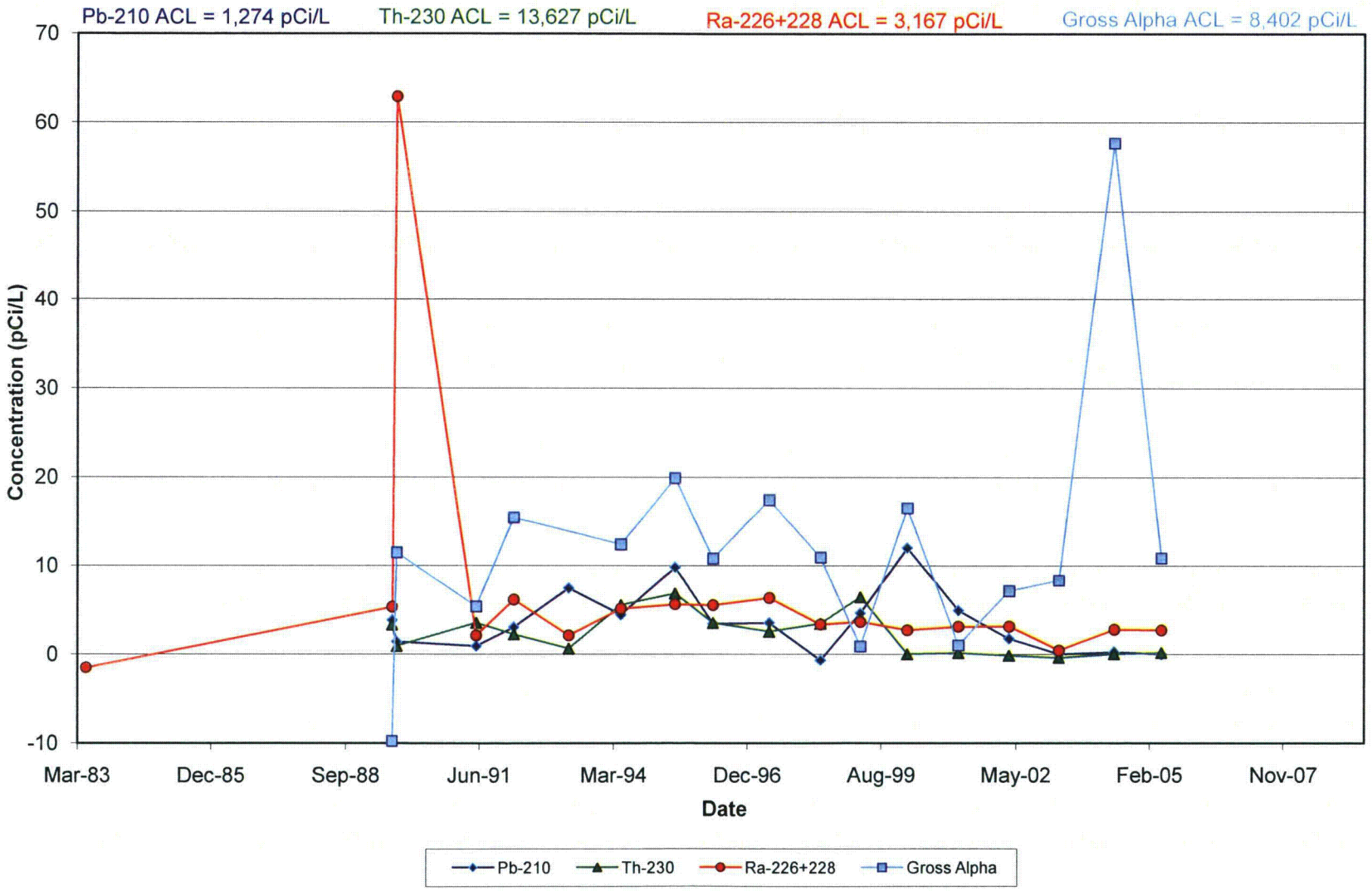
Metals in Monitoring Well 5-05



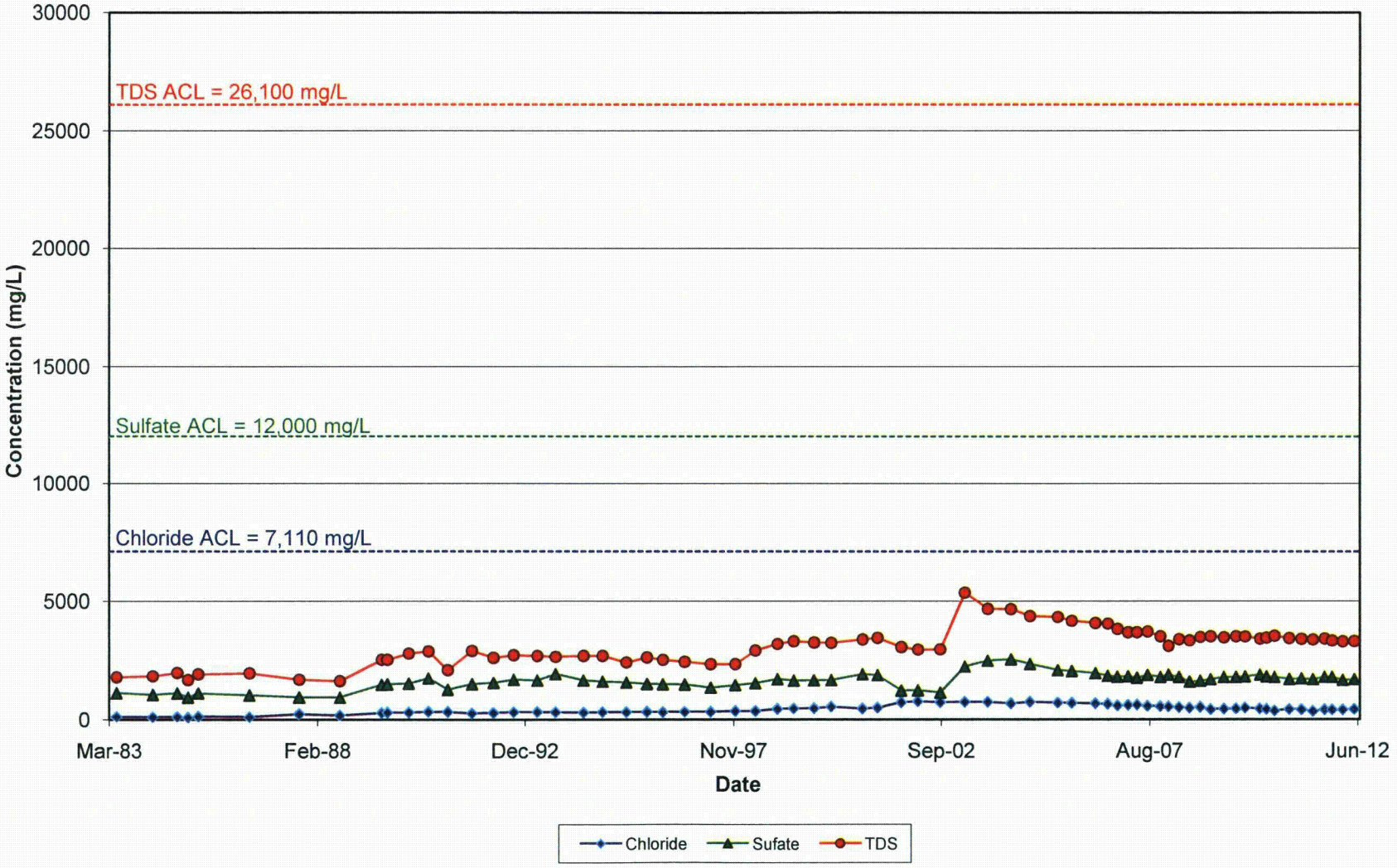
Nitrate in Monitoring Well 5-05



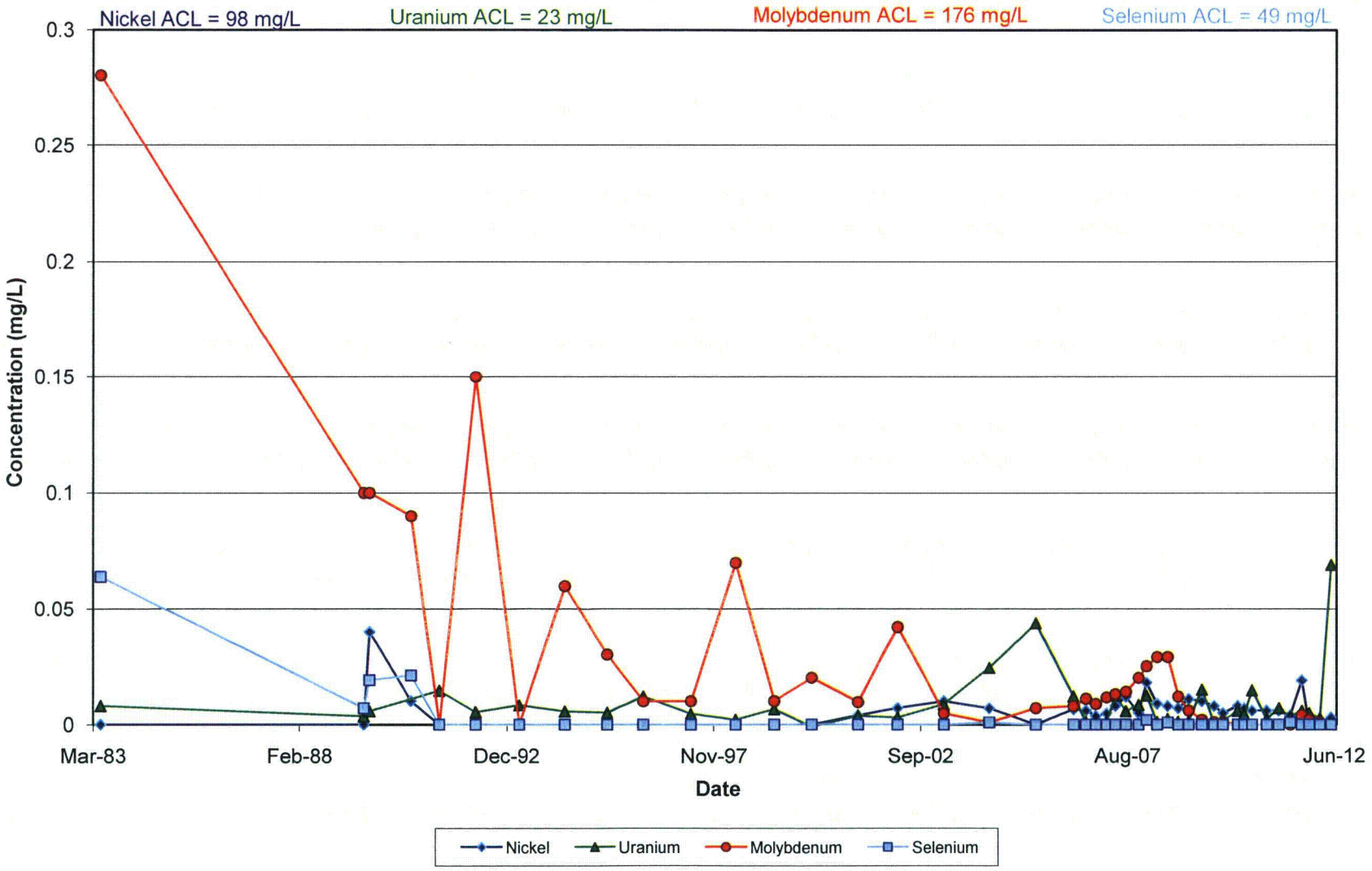
Radionuclides in Monitoring Well 5-05



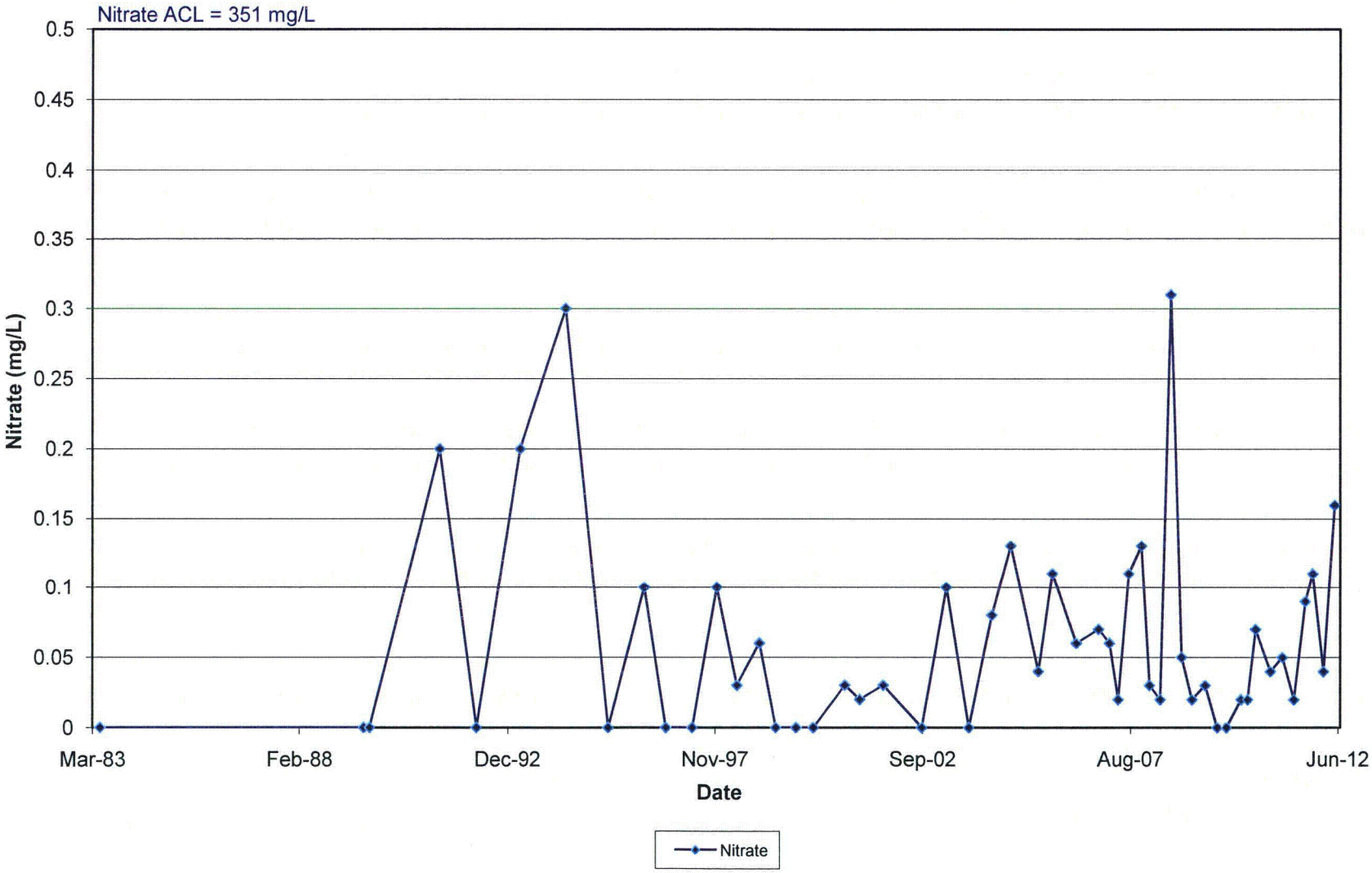
Anions and TDS in Monitoring Well 5-08



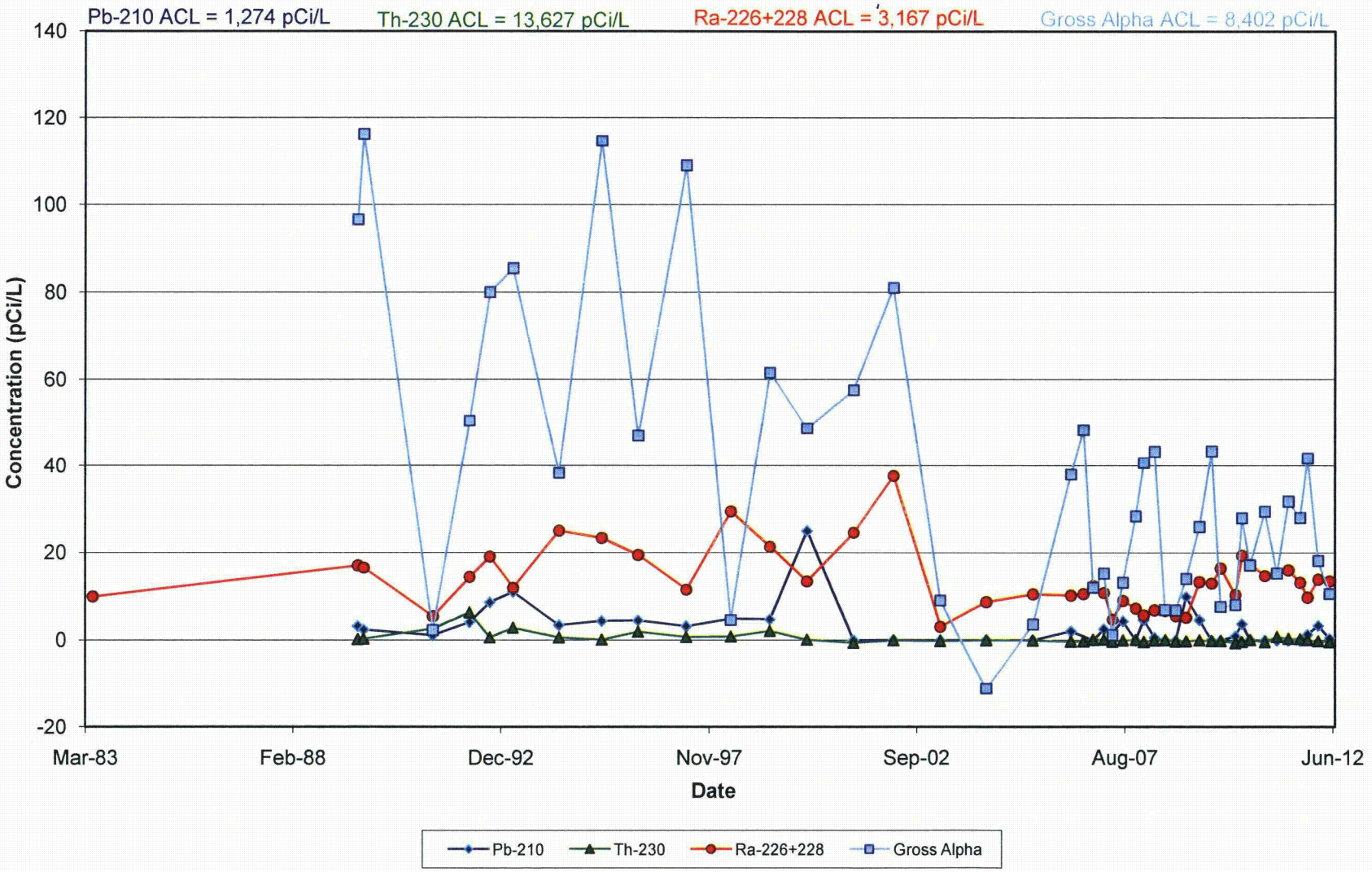
Metals in Monitoring Well 5-08



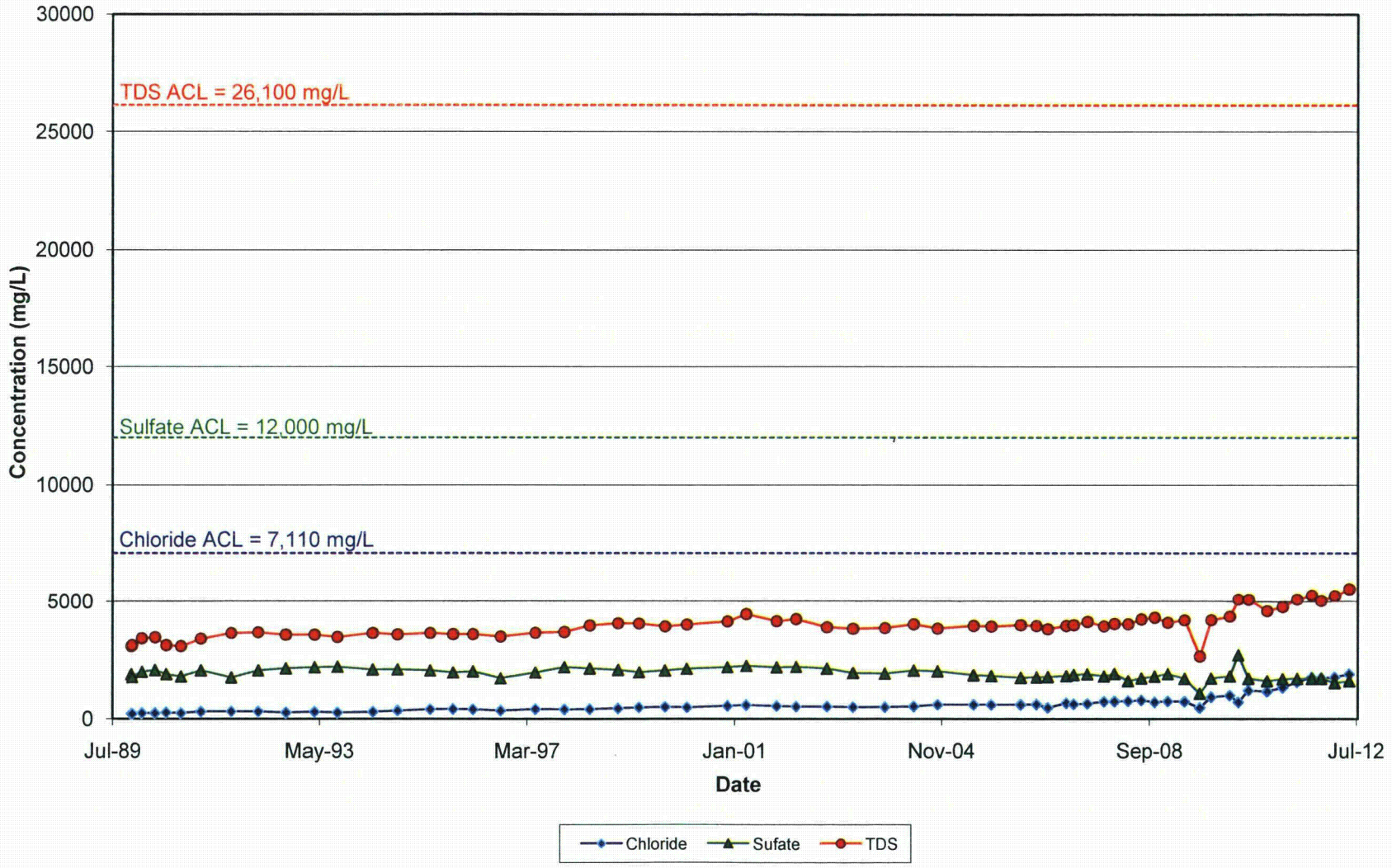
Nitrate in Monitoring Well 5-08



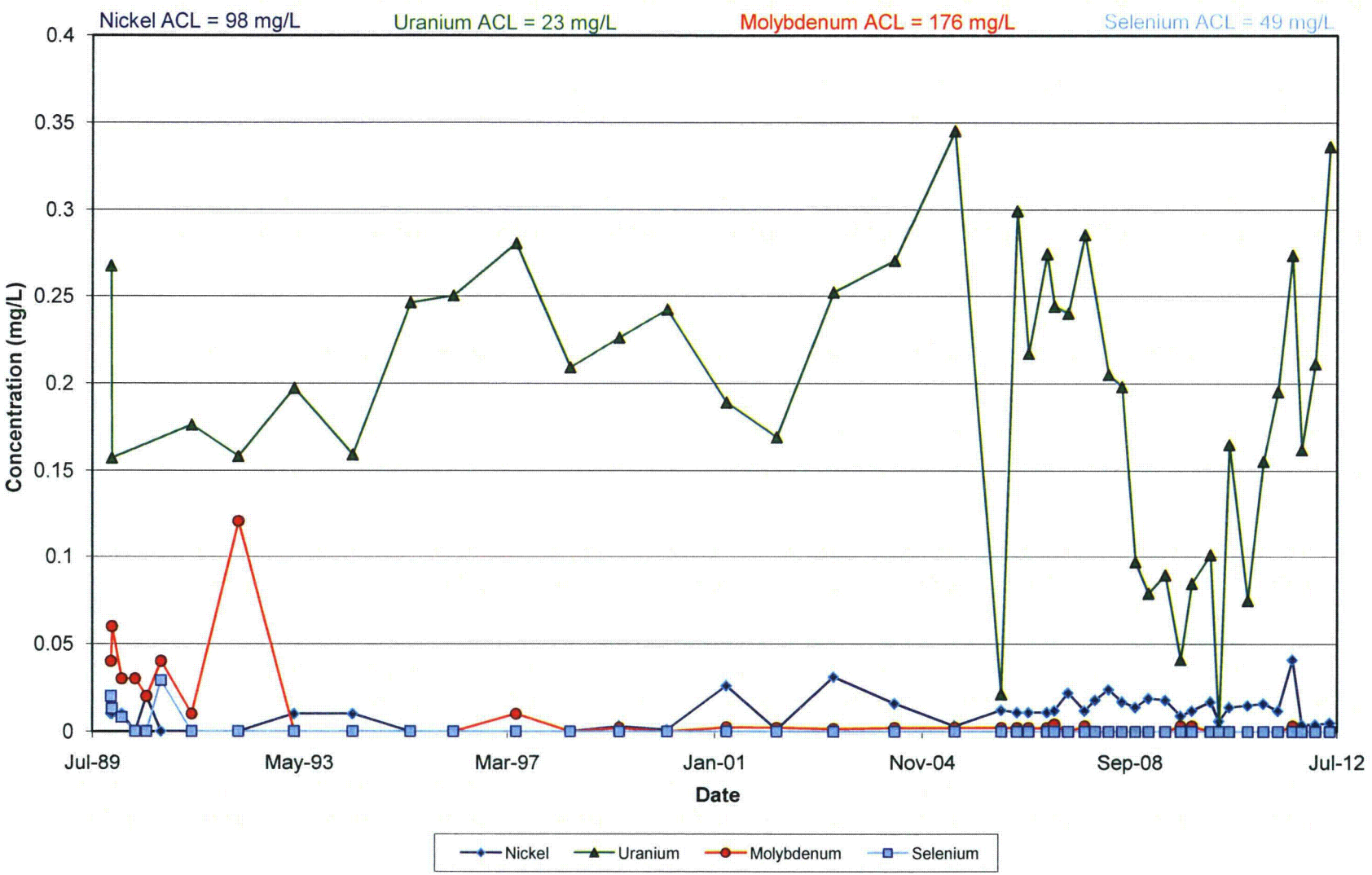
Radionuclides in Monitoring Well 5-08



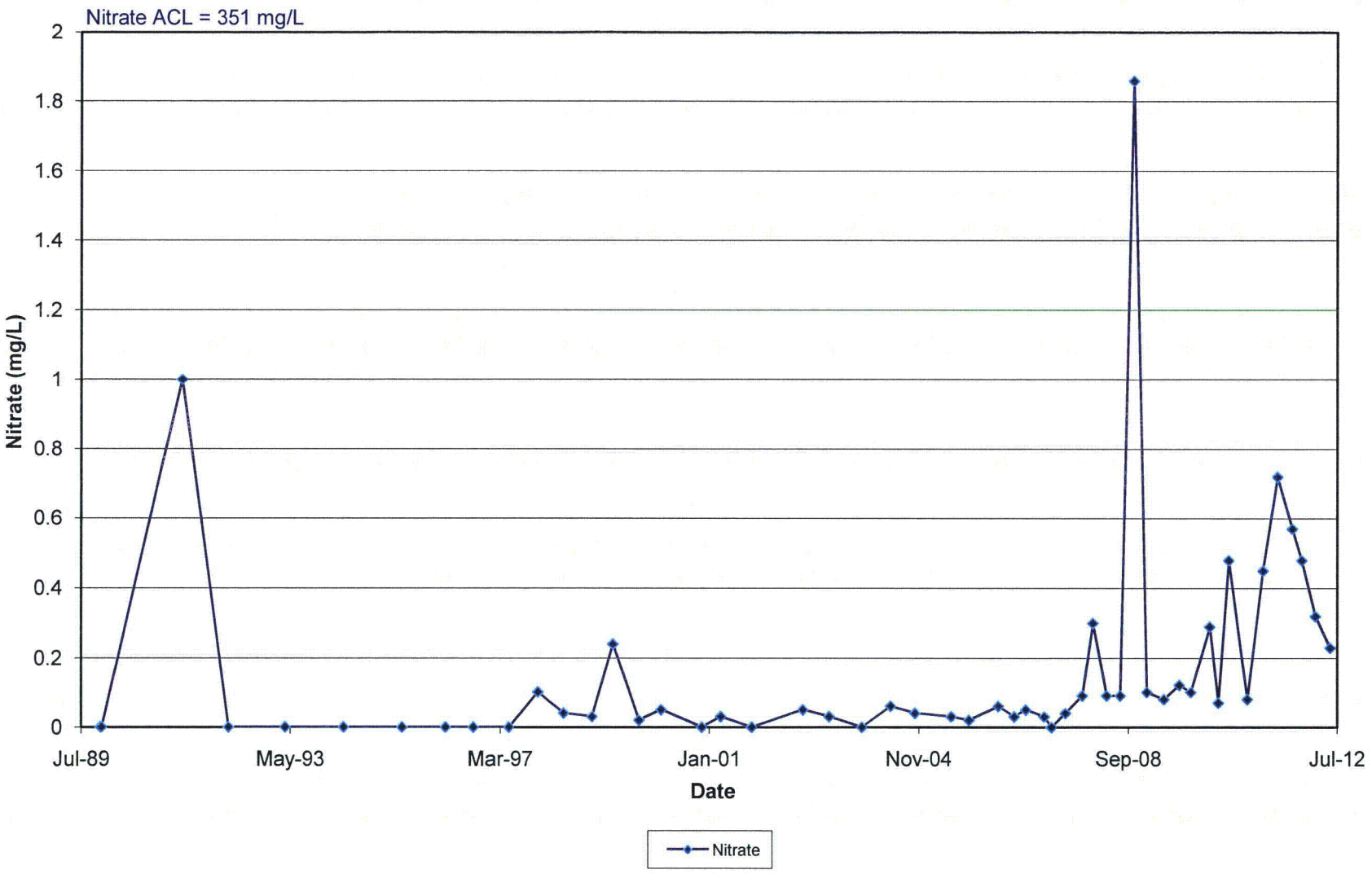
Anions and TDS in Monitoring Well 5-73



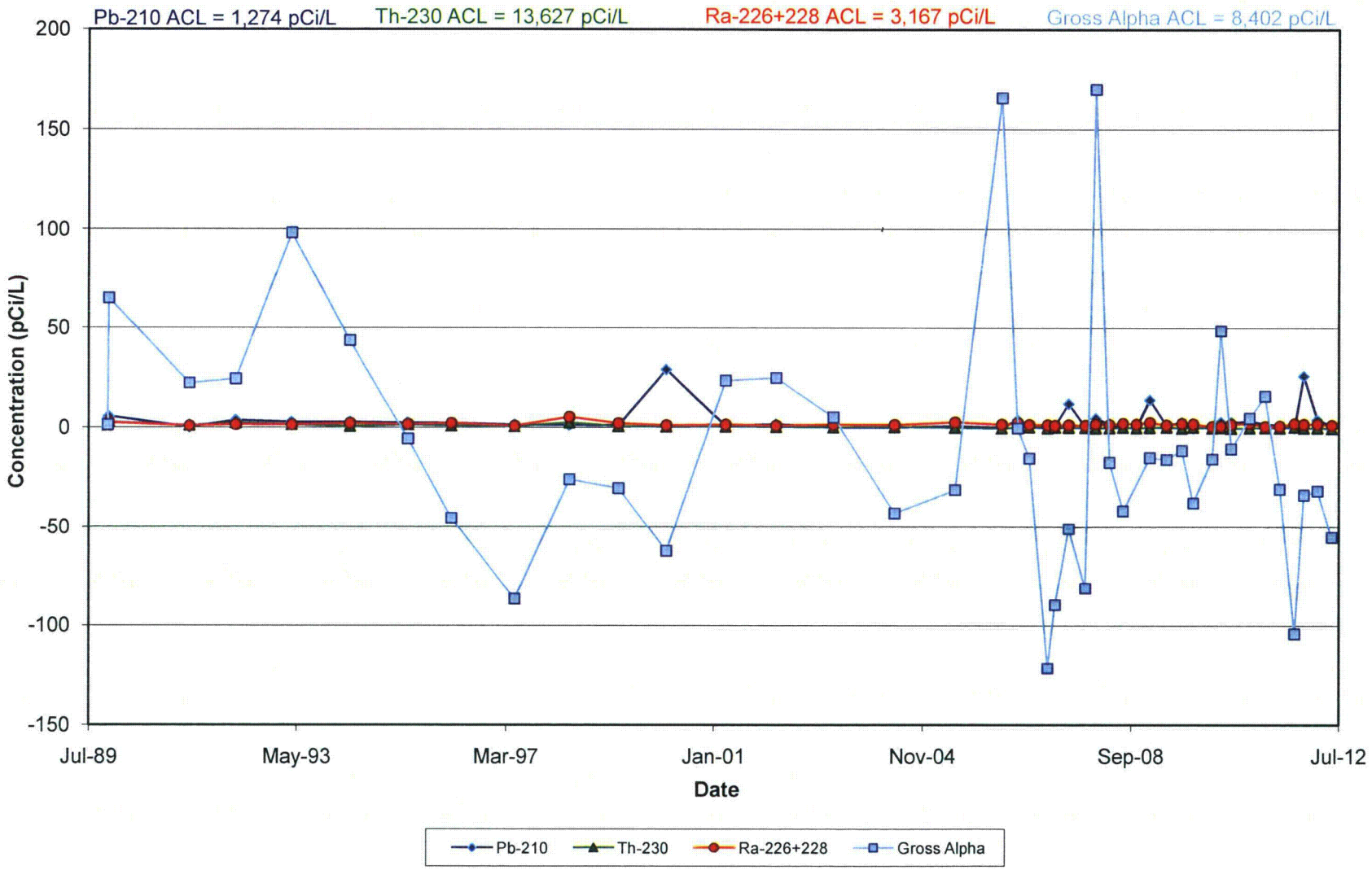
Metals in Monitoring Well 5-73



Nitrate in Monitoring Well 5-73

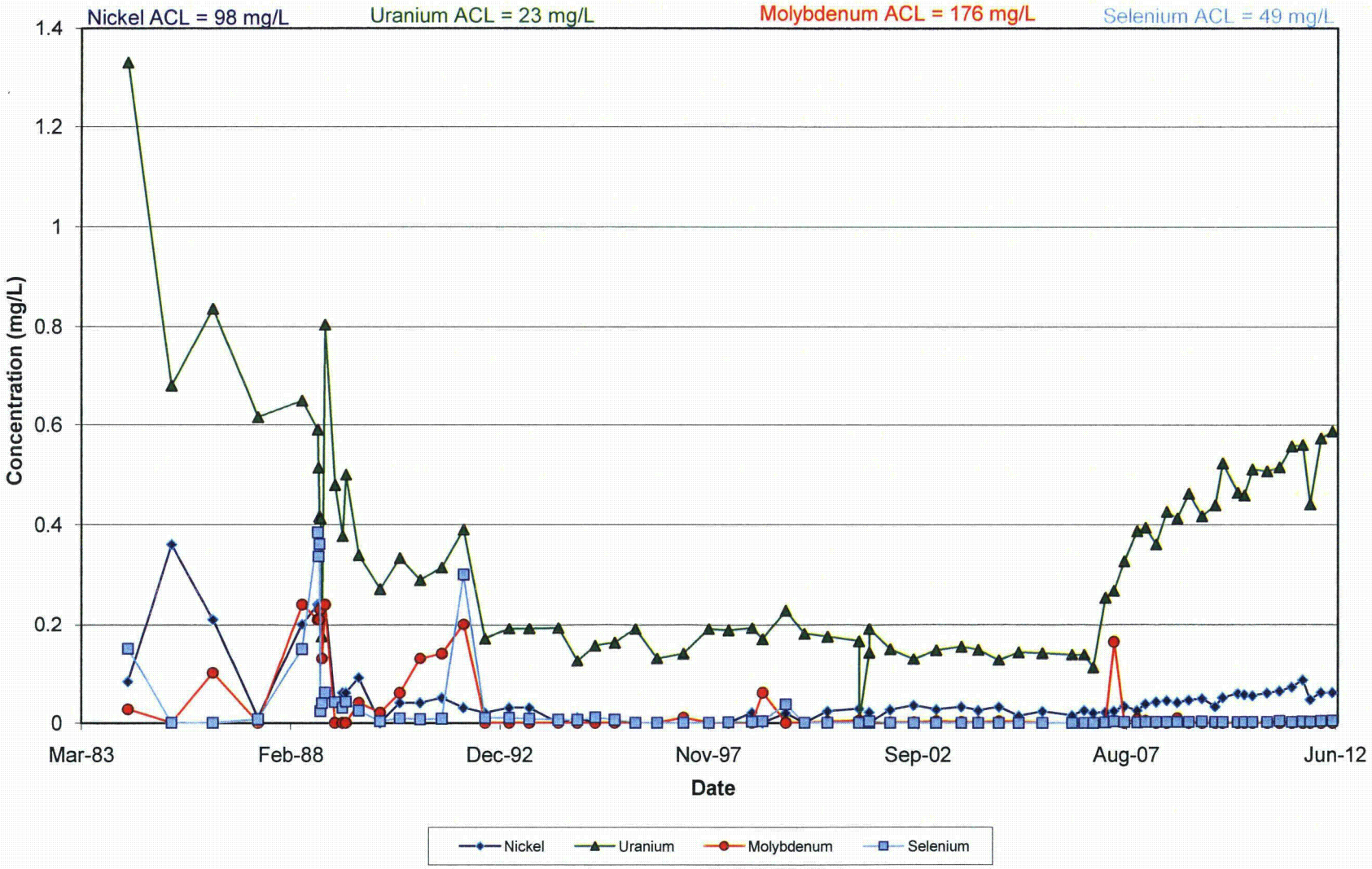


Radionuclides in Monitoring Well 5-73

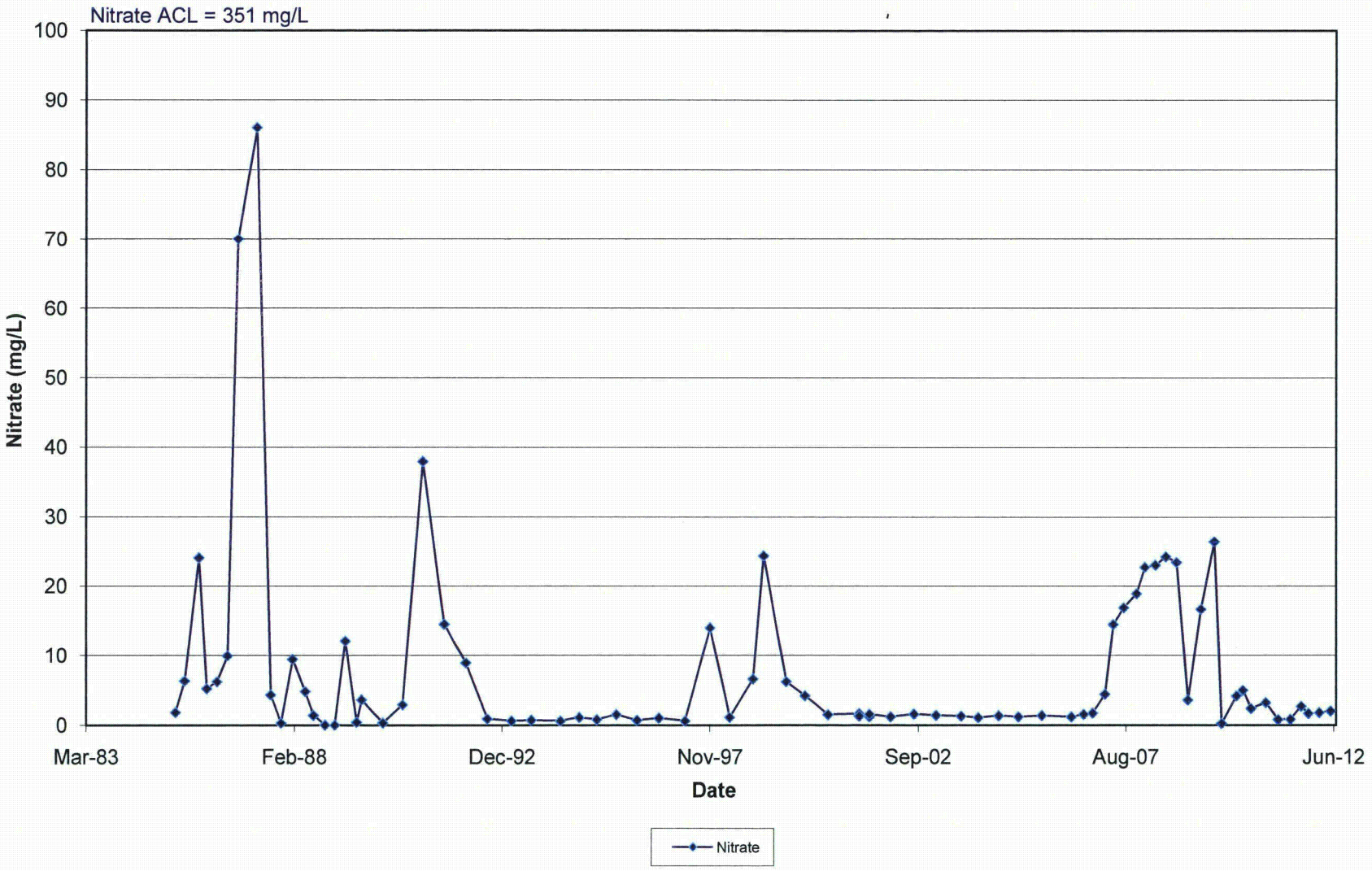


Anions and TDS in Monitoring Well 31-61

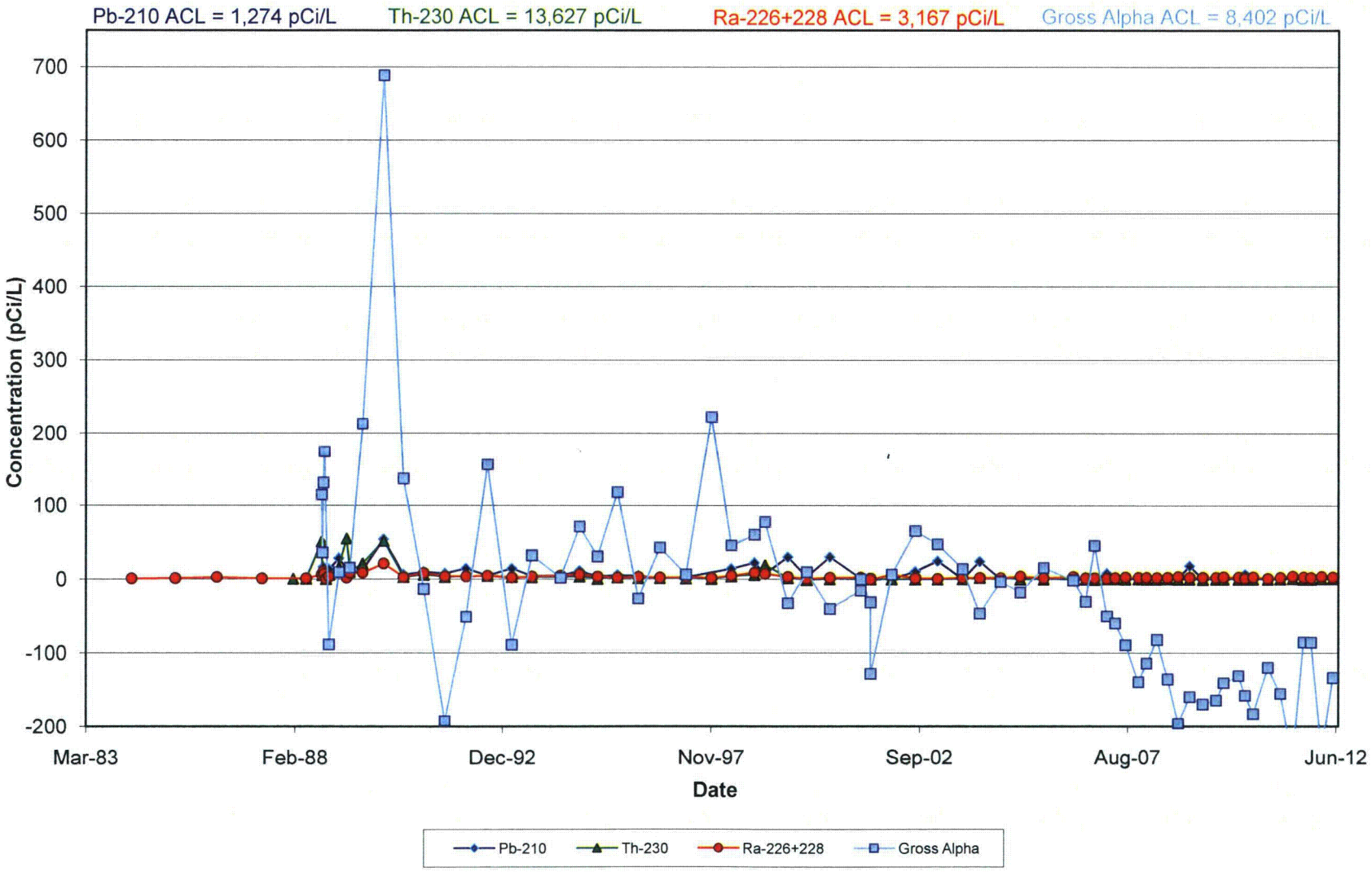
Metals in Monitoring Well 31-61



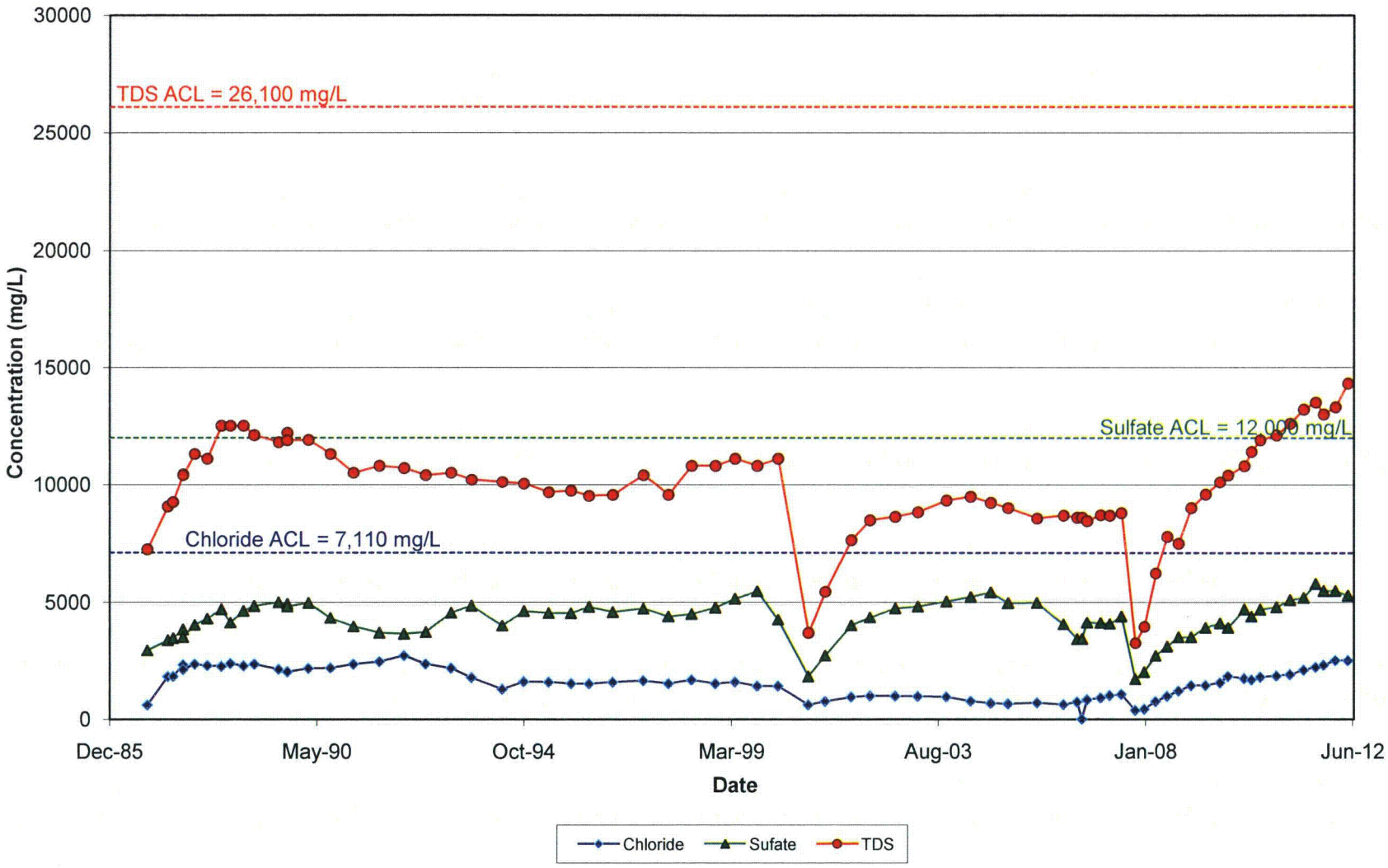
Nitrate in Monitoring Well 31-61



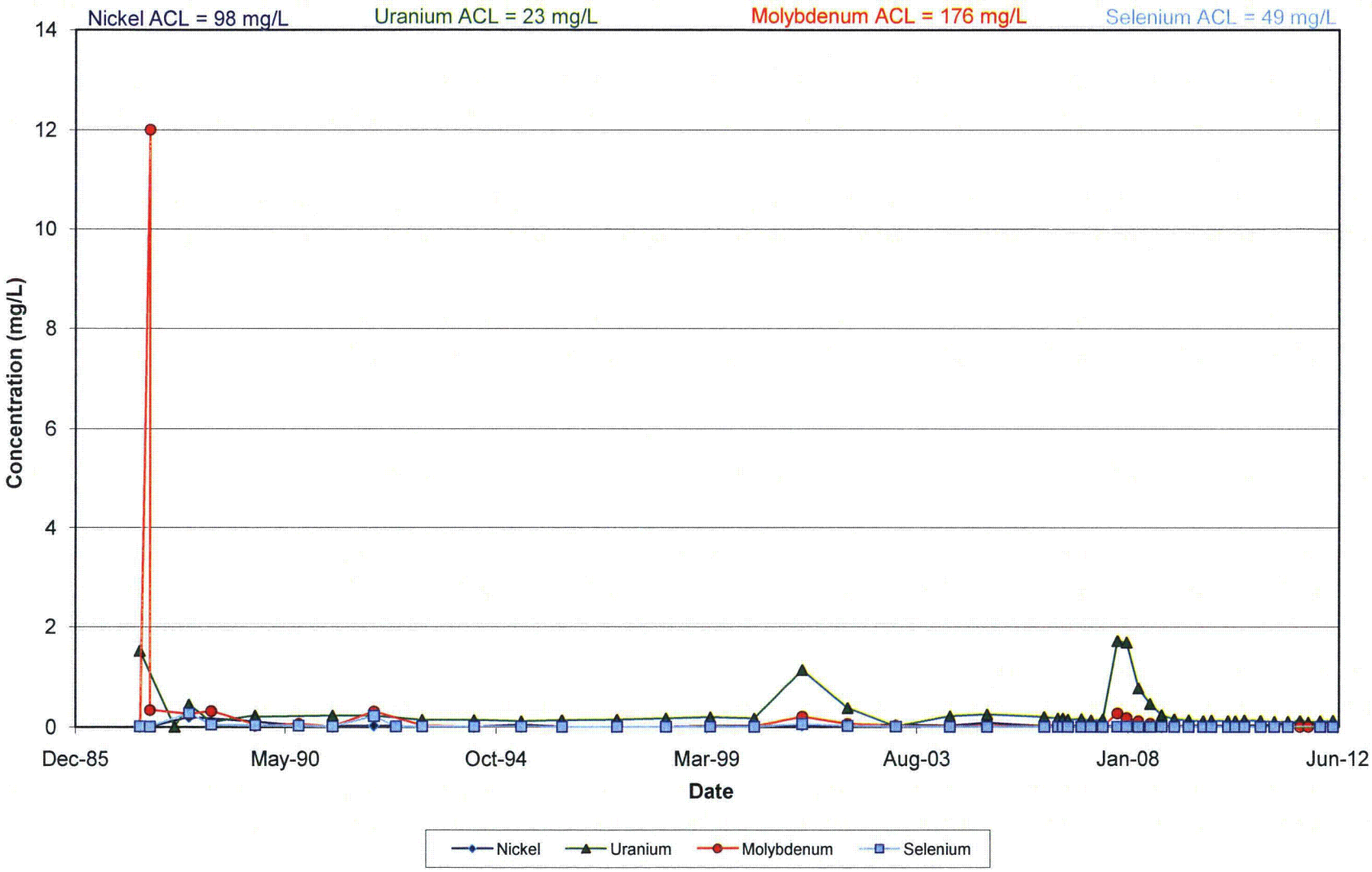
Radionuclides in Monitoring Well 31-61



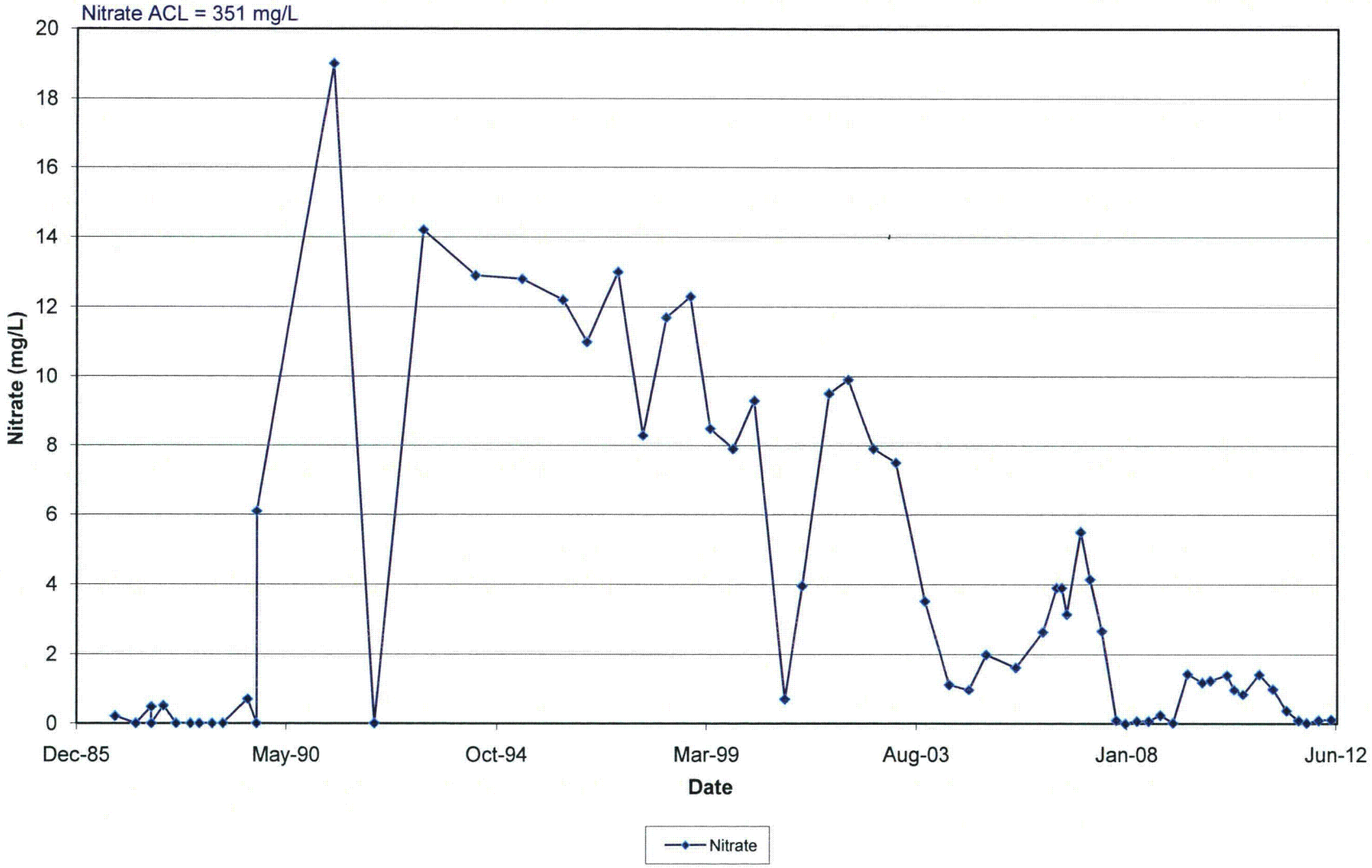
Anions and TDS in Monitoring Well 31-65



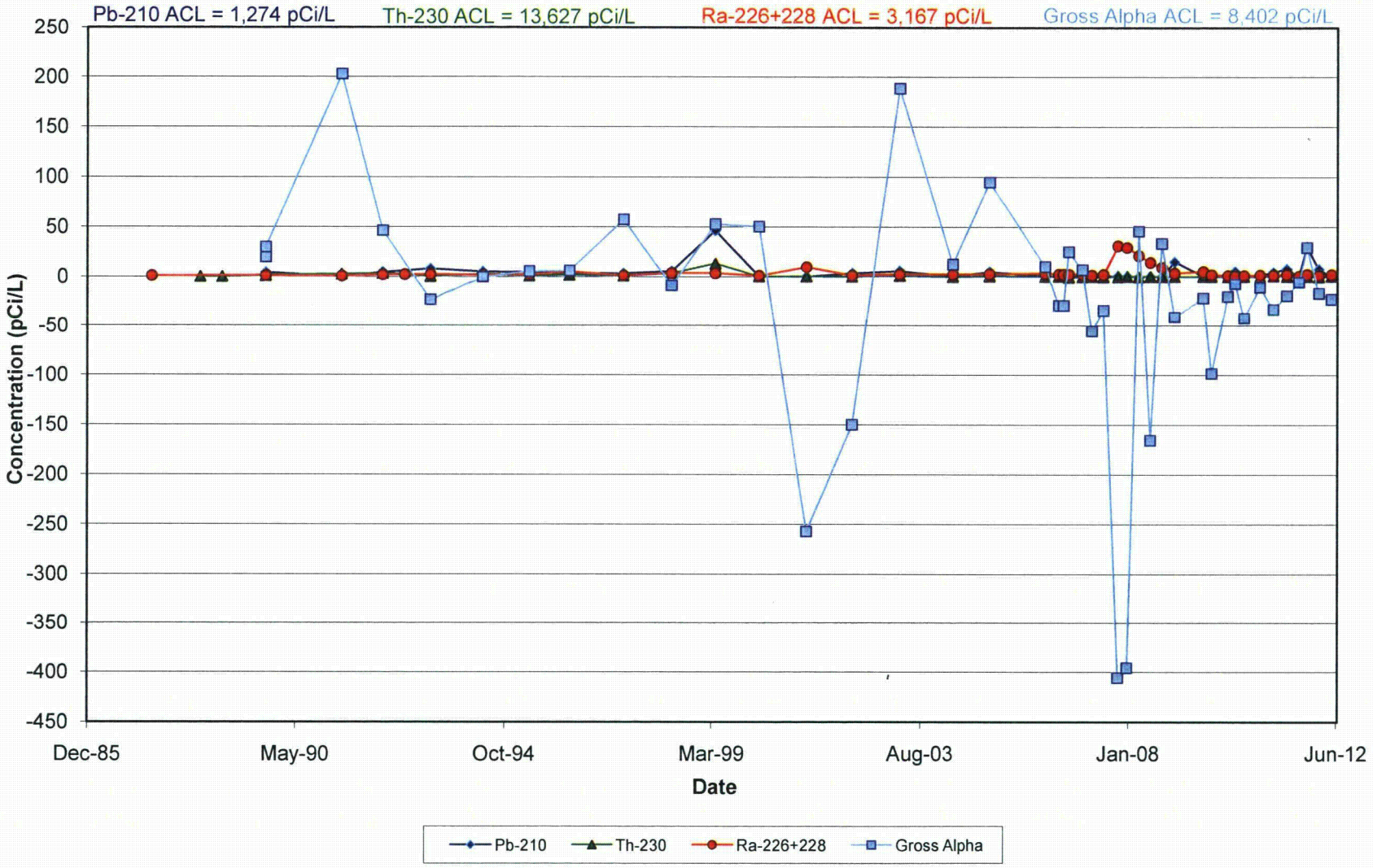
Metals in Monitoring Well 31-65



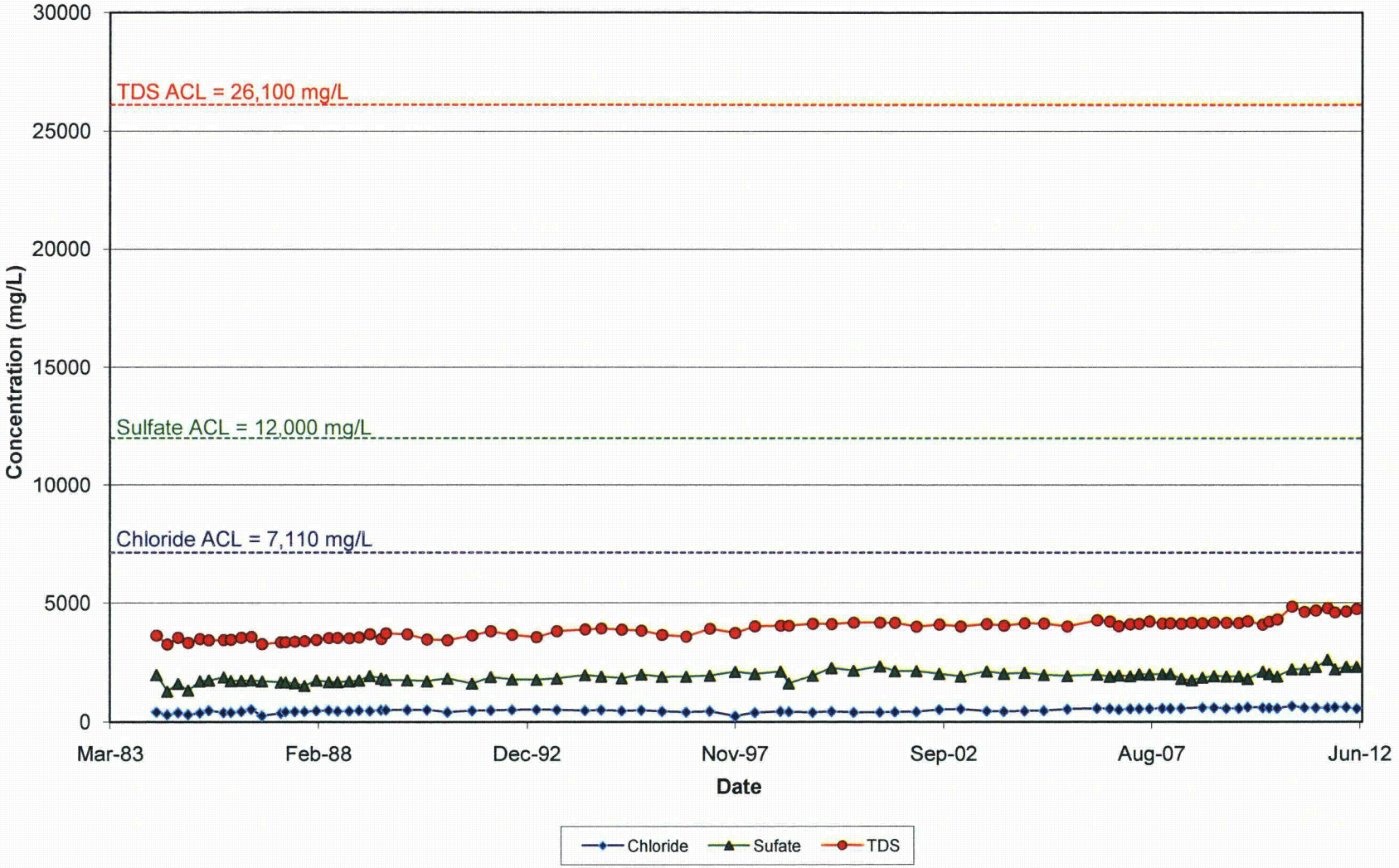
Nitrate in Monitoring Well 31-65



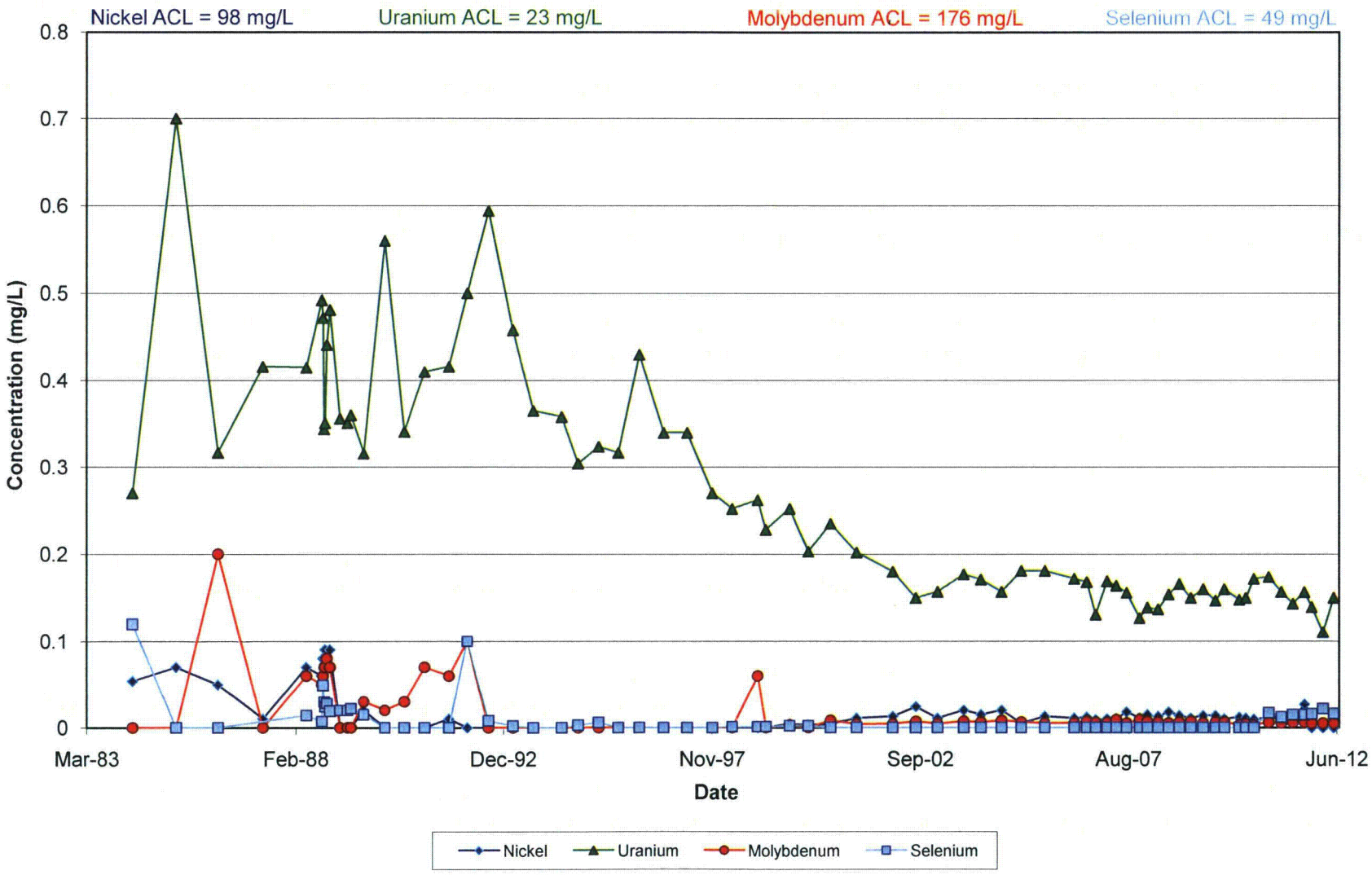
Radionuclides in Monitoring Well 31-65



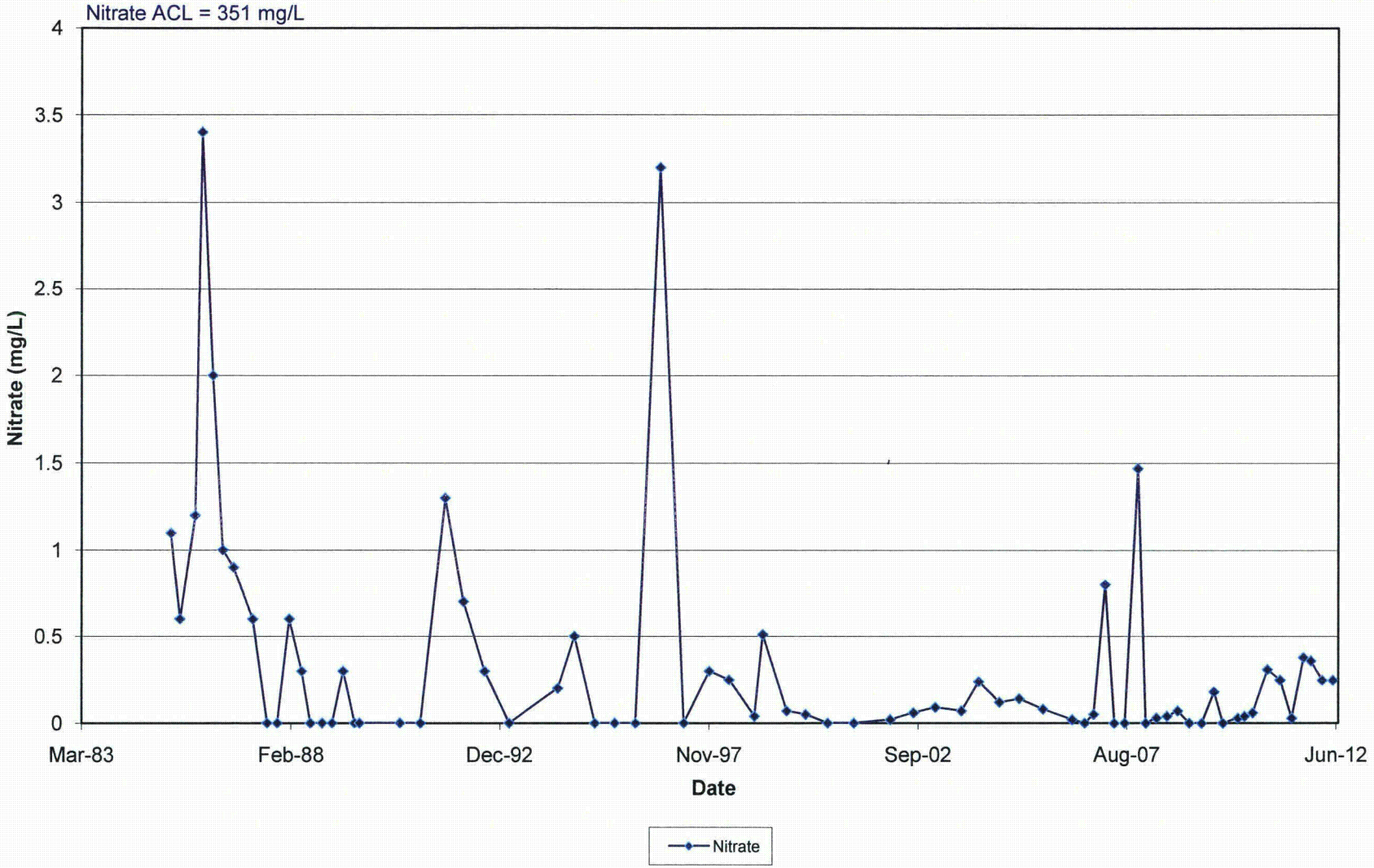
Anions and TDS in Monitoring Well 32-59



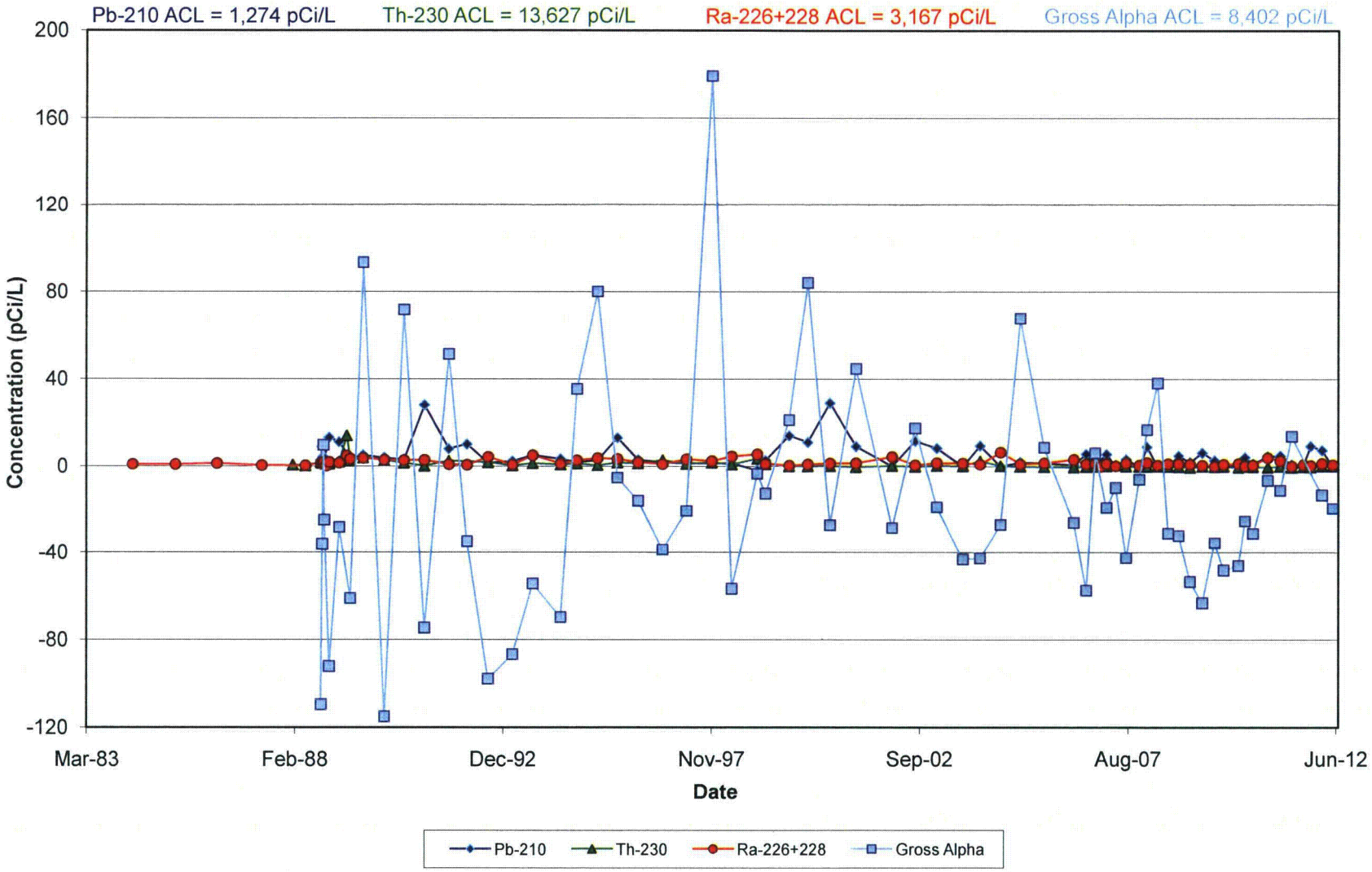
Metals in Monitoring Well 32-59



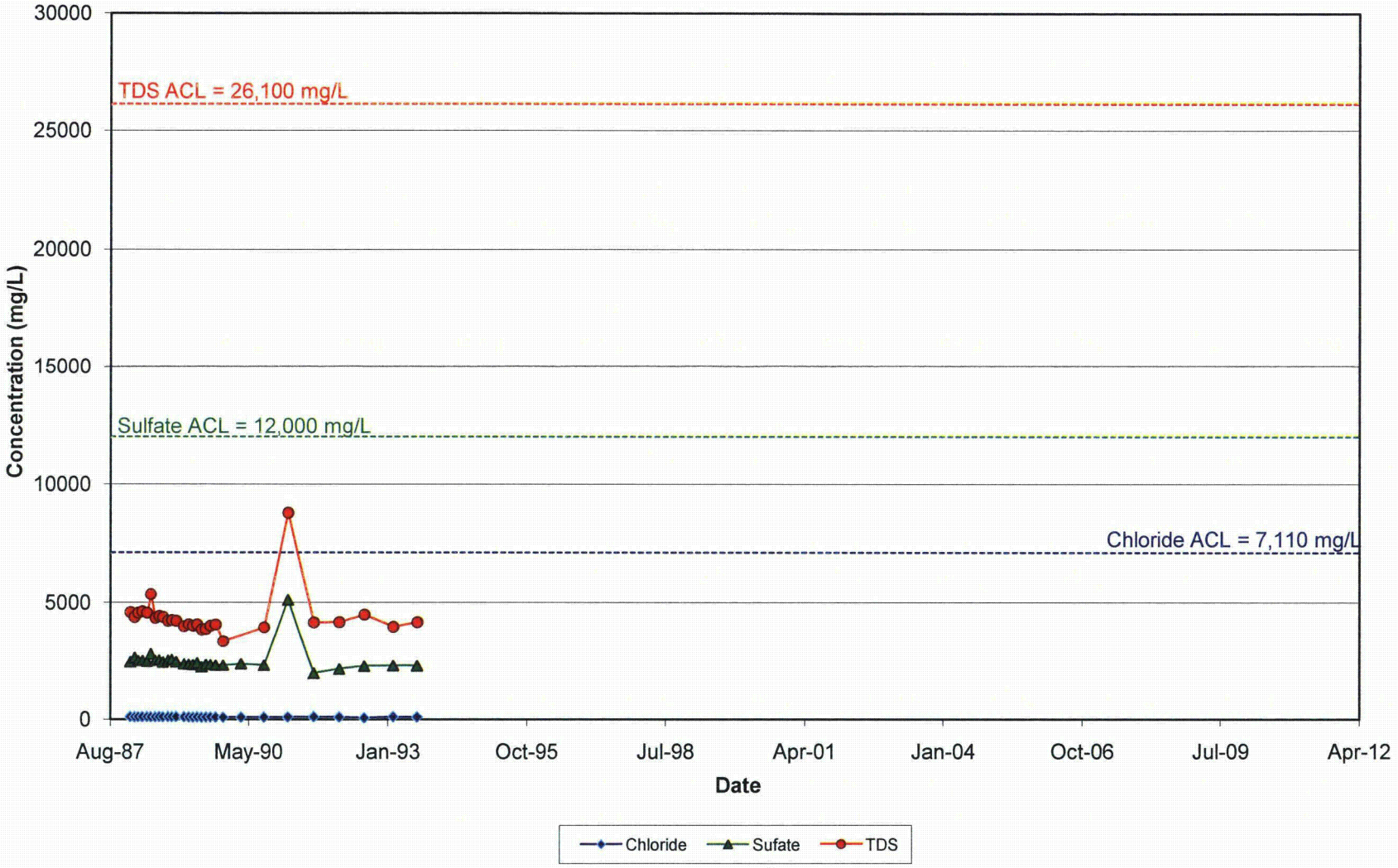
Nitrate in Monitoring Well 32-59



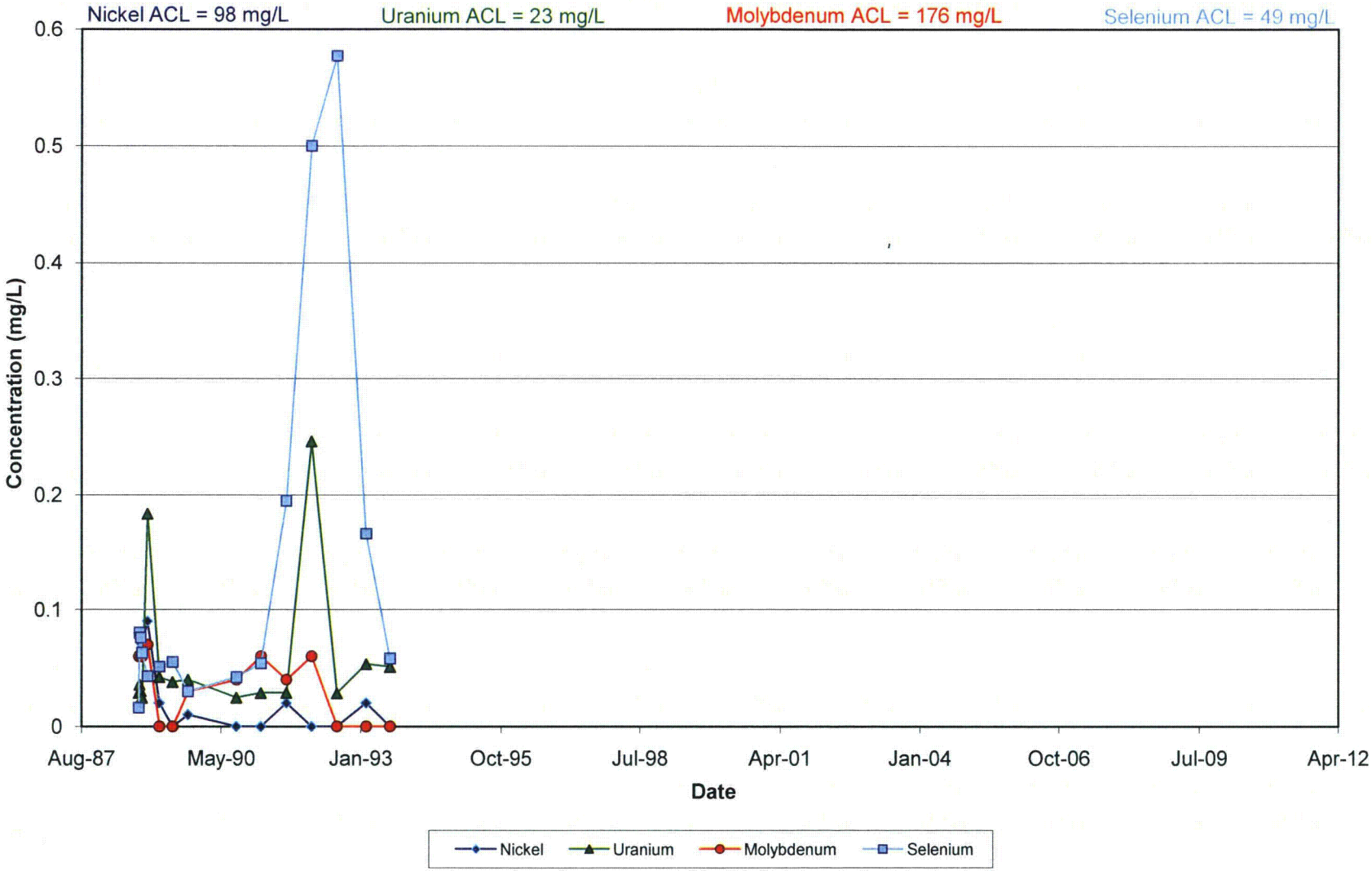
Radionuclides in Monitoring Well 32-59



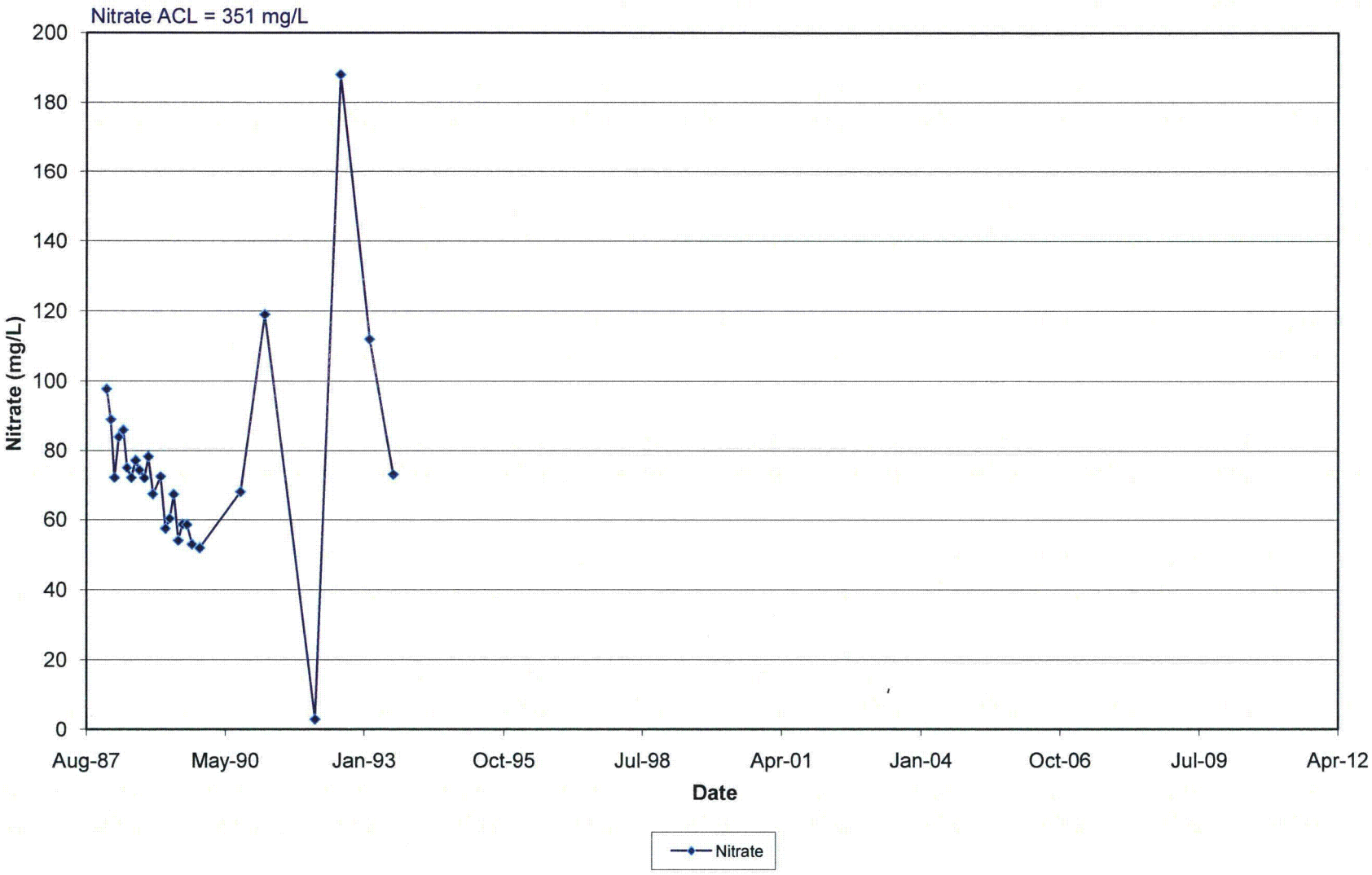
Anions and TDS in Monitoring Well MW-24



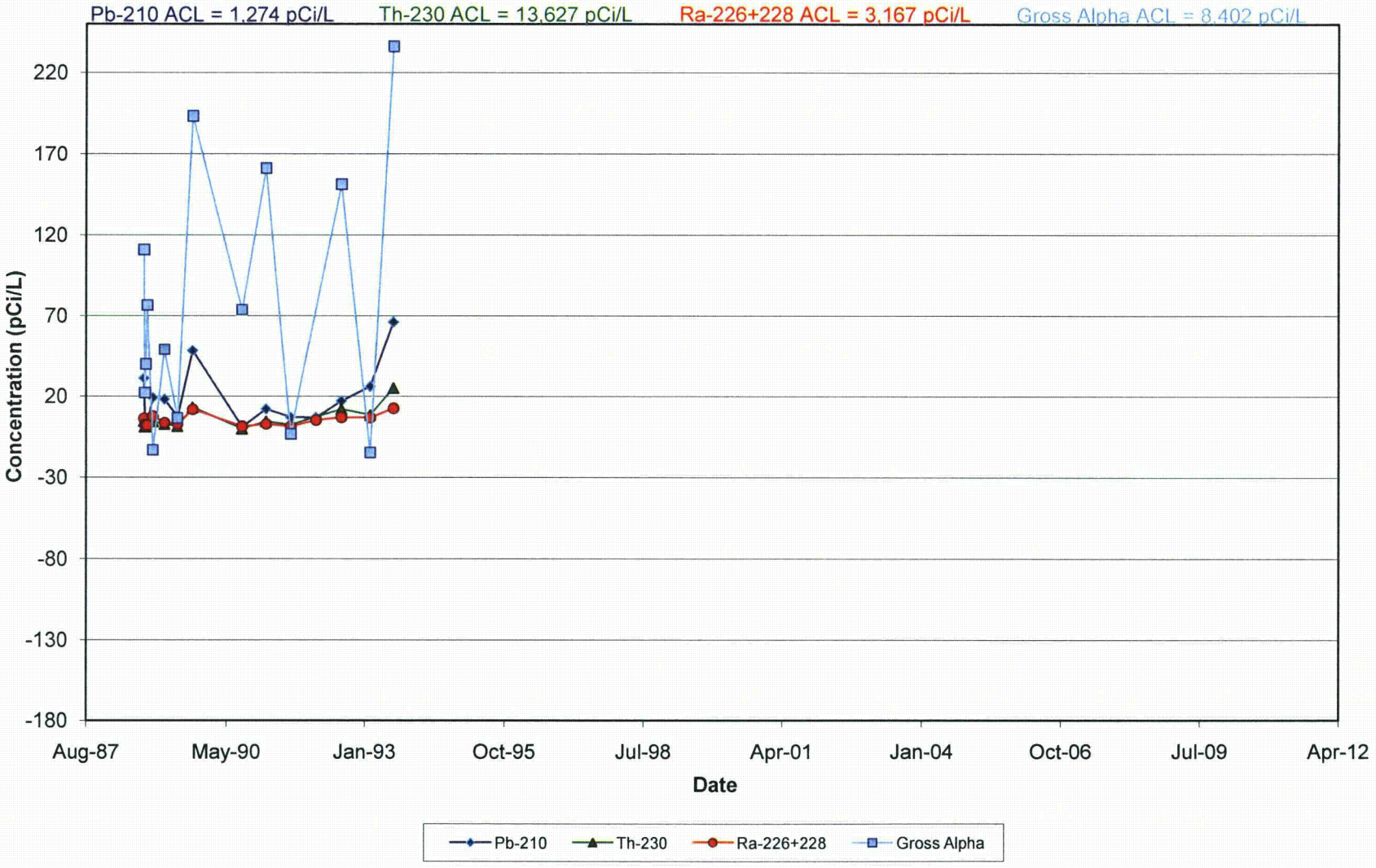
Metals in Monitoring Well MW-24



Nitrate in Monitoring Well MW-24



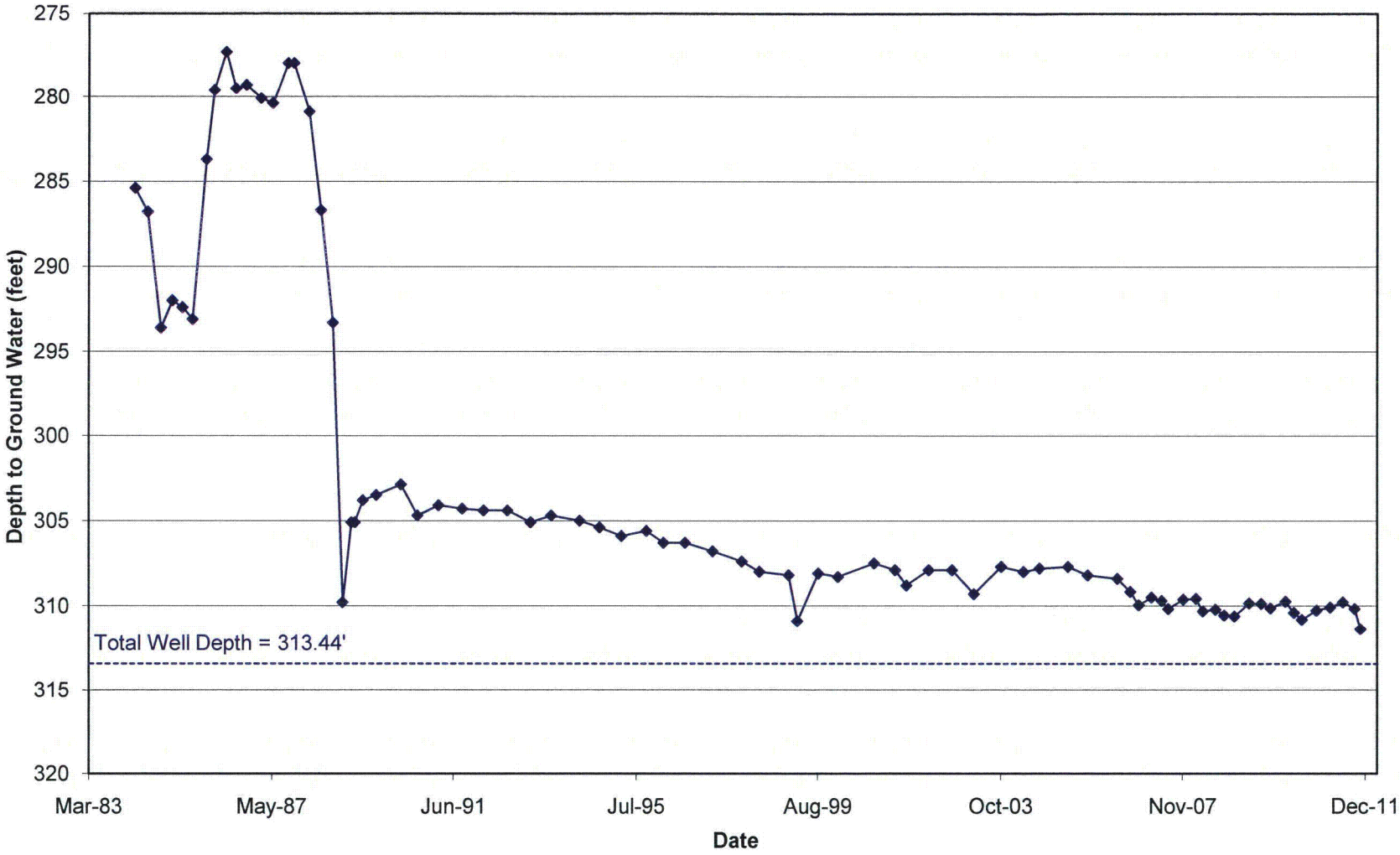
Radionuclides in Monitoring Well MW-24



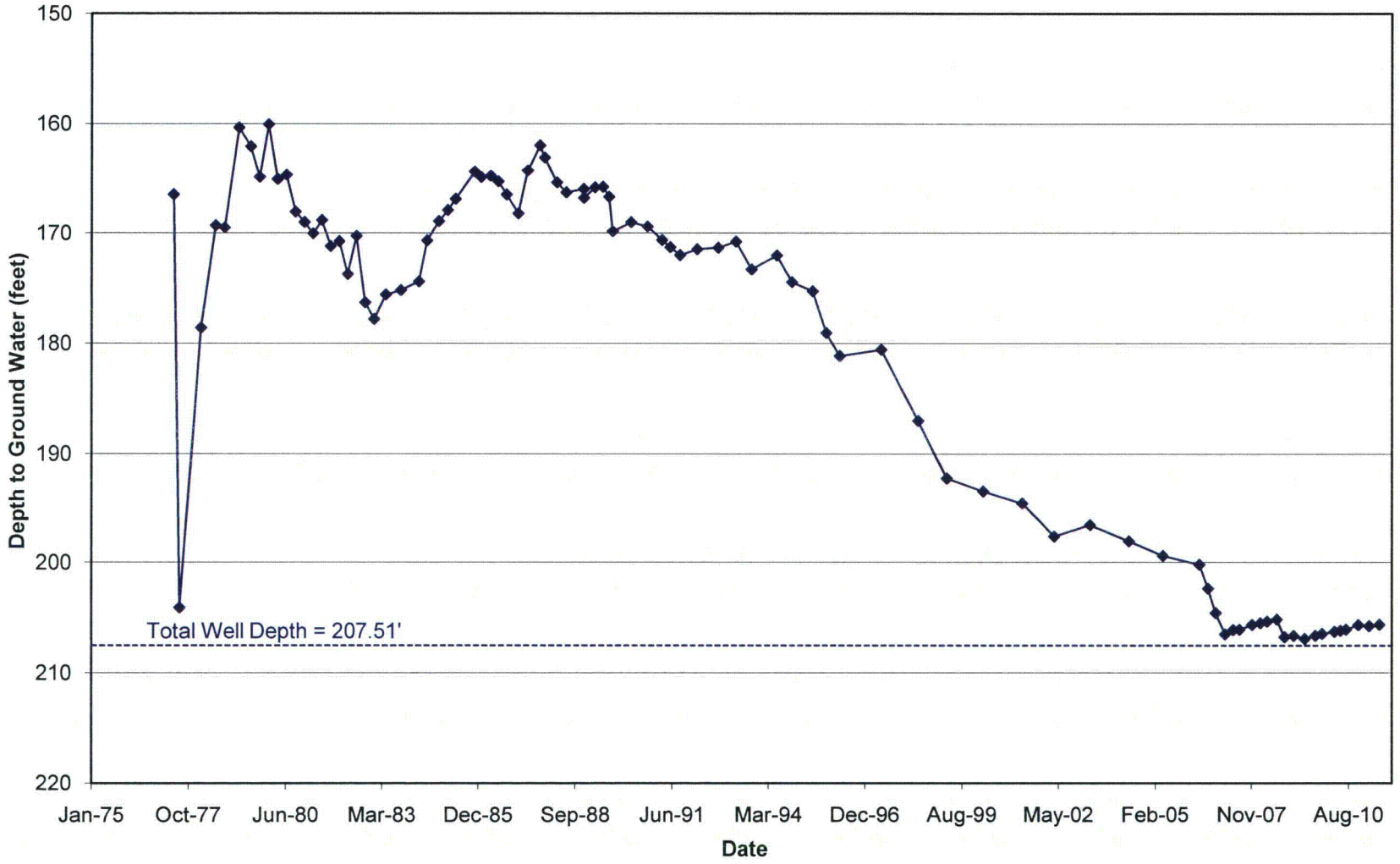
APPENDIX 3

Stability Monitoring Plan
Hydrographs

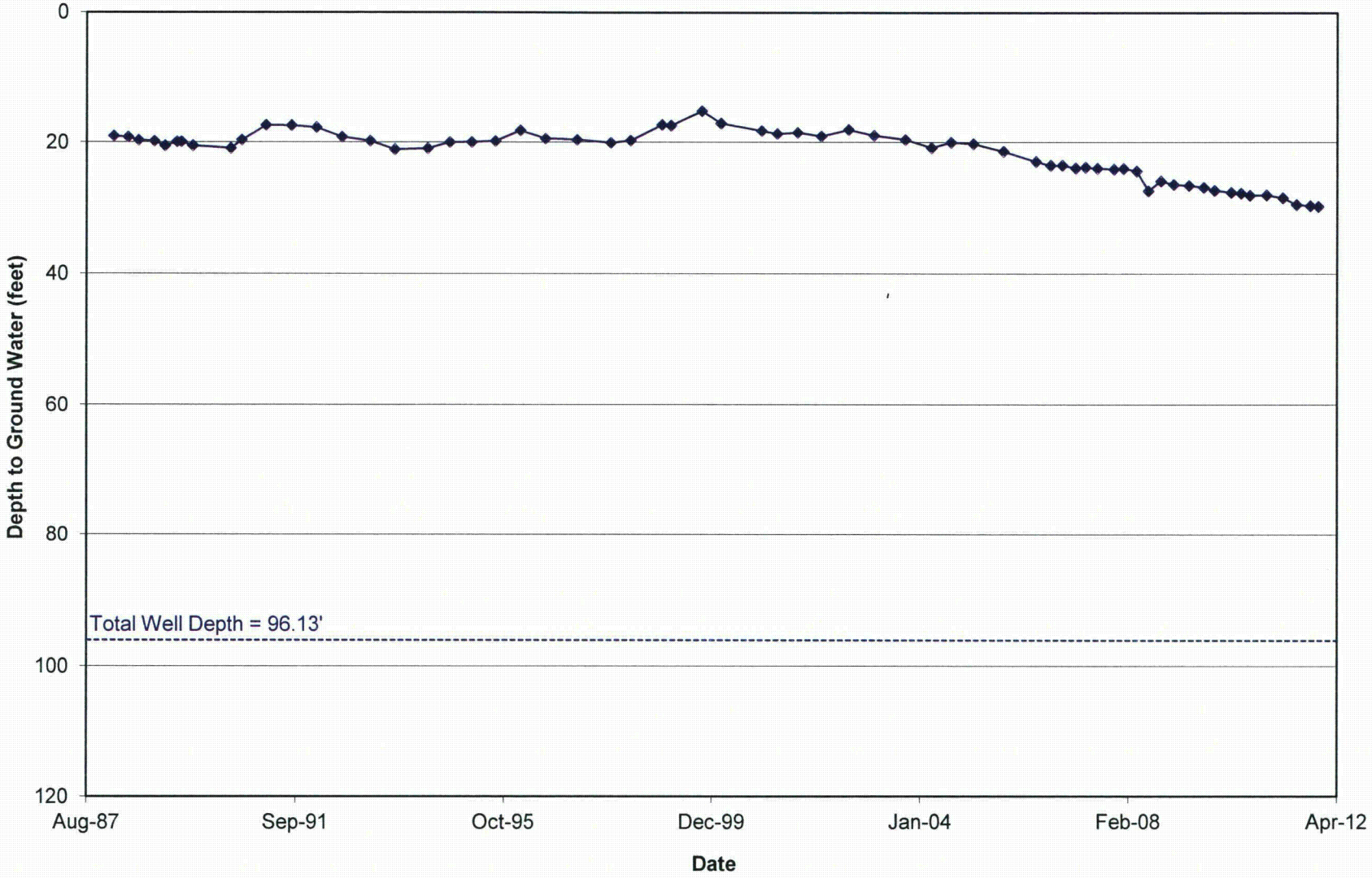
Hydrograph for Dakota Monitoring Well 30-02KD



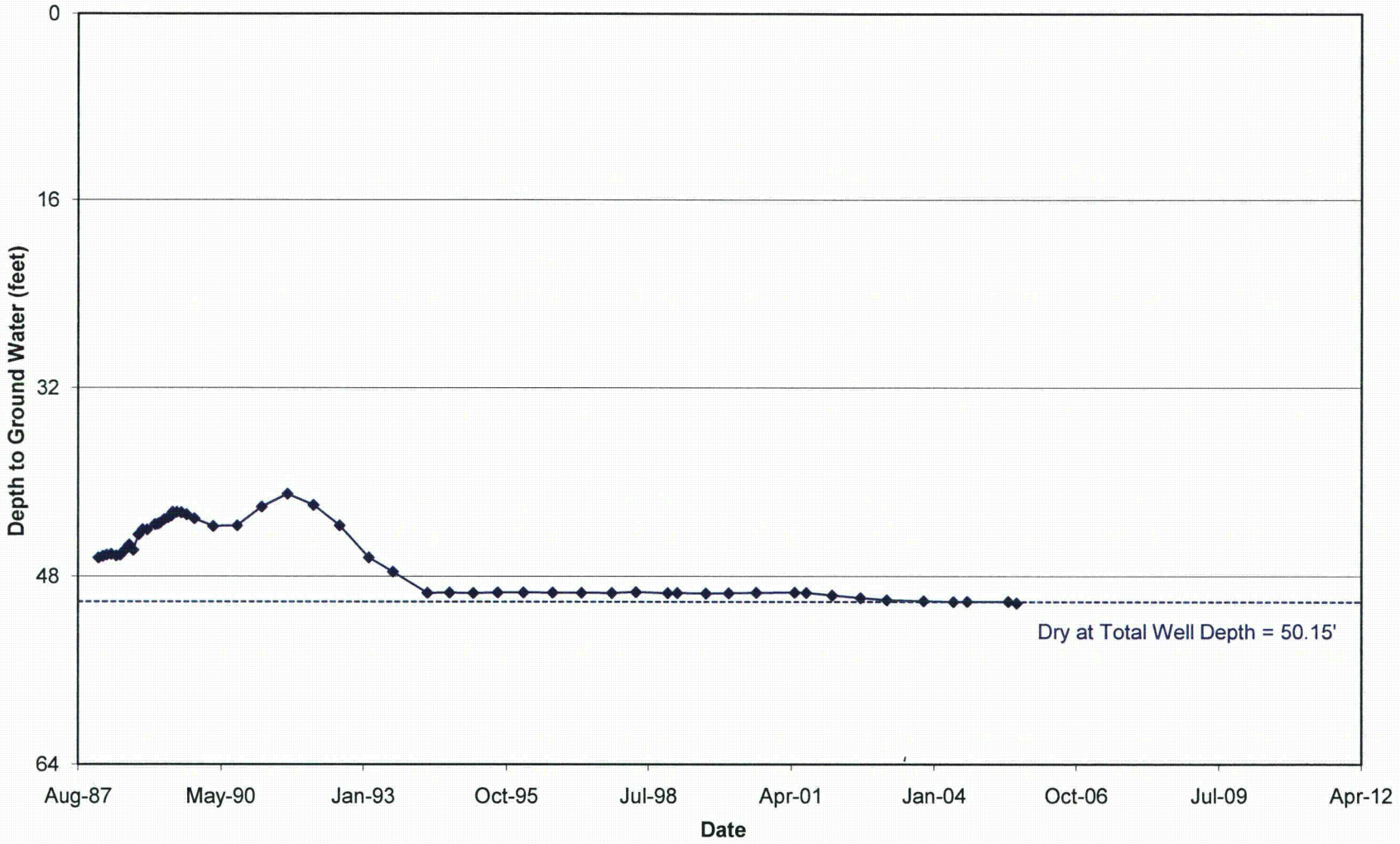
Hydrograph for TRA Monitoring Well 30-01



Hydrograph for TRB Monitoring Well 31-67

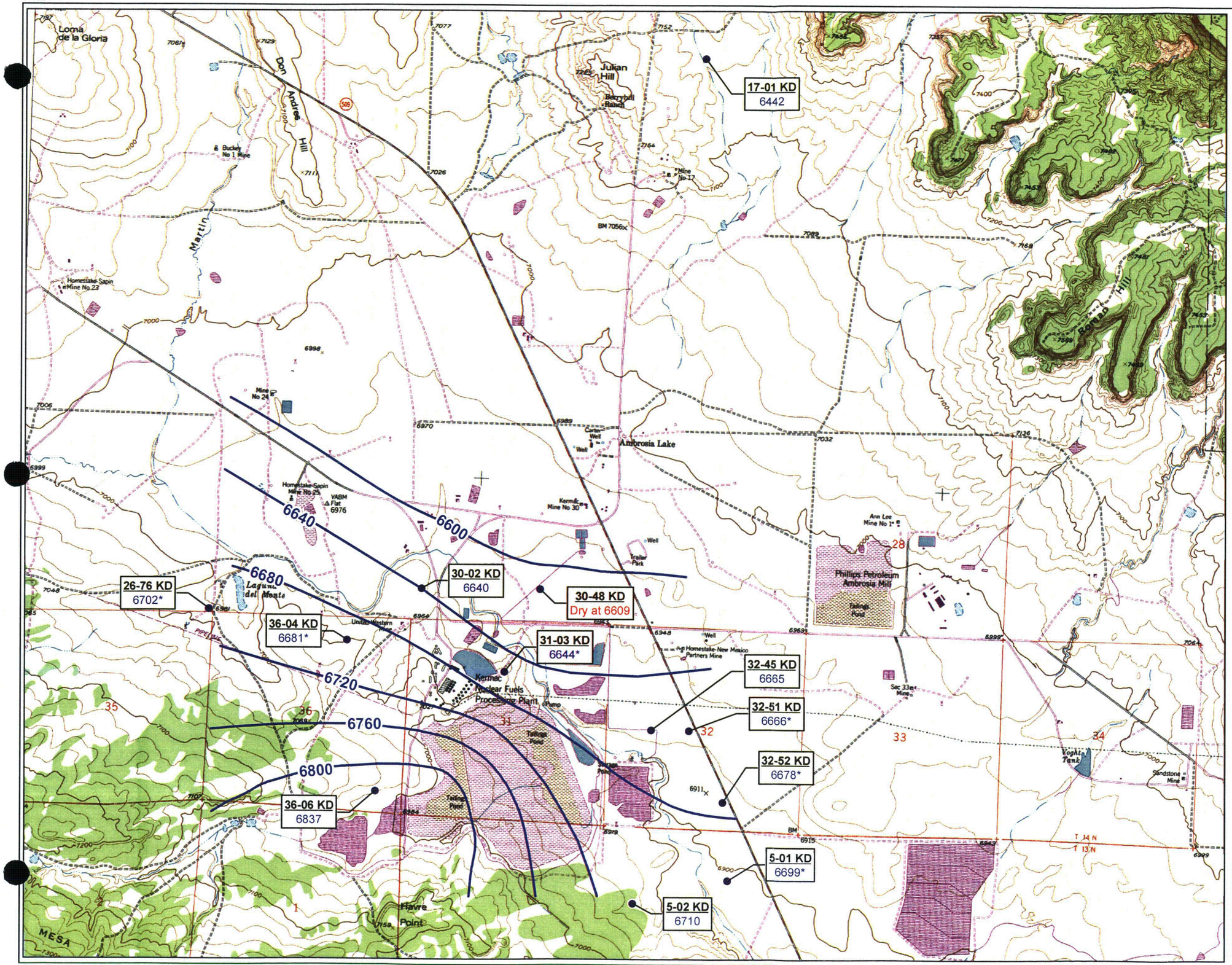


Hydrograph for Alluvial Monitoring Well MW-24



APPENDIX 4

Stability Monitoring Plan
Potentiometric Surface Maps



N

0 1,250 2,500 5,000 Feet

USGS 7.5 Minute Topographic Maps:
Ambosia Lake Quadrangle, 1957/rev.1980;
Contour Interval 20 Feet

Legend

- Dakota Monitoring Well Location
- Dakota Potentiometric Iso-Contours (ft amsl)

Well ID
Groundwater Surface Elevation (ft amsl)

* = Values from 2005

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 36-06 KD and Trend Well 30-02 KD= 6,837 - 6,640 = 197 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 36-06 KD and Trend Well 32-02 KD = 6,000 feet)

= 0.033 feet per foot

1st Half 2012 Dakota Potentiometric Surface Elevation Iso-Contours

Rio Algom DP-169 ACL
Semi-Annual Report

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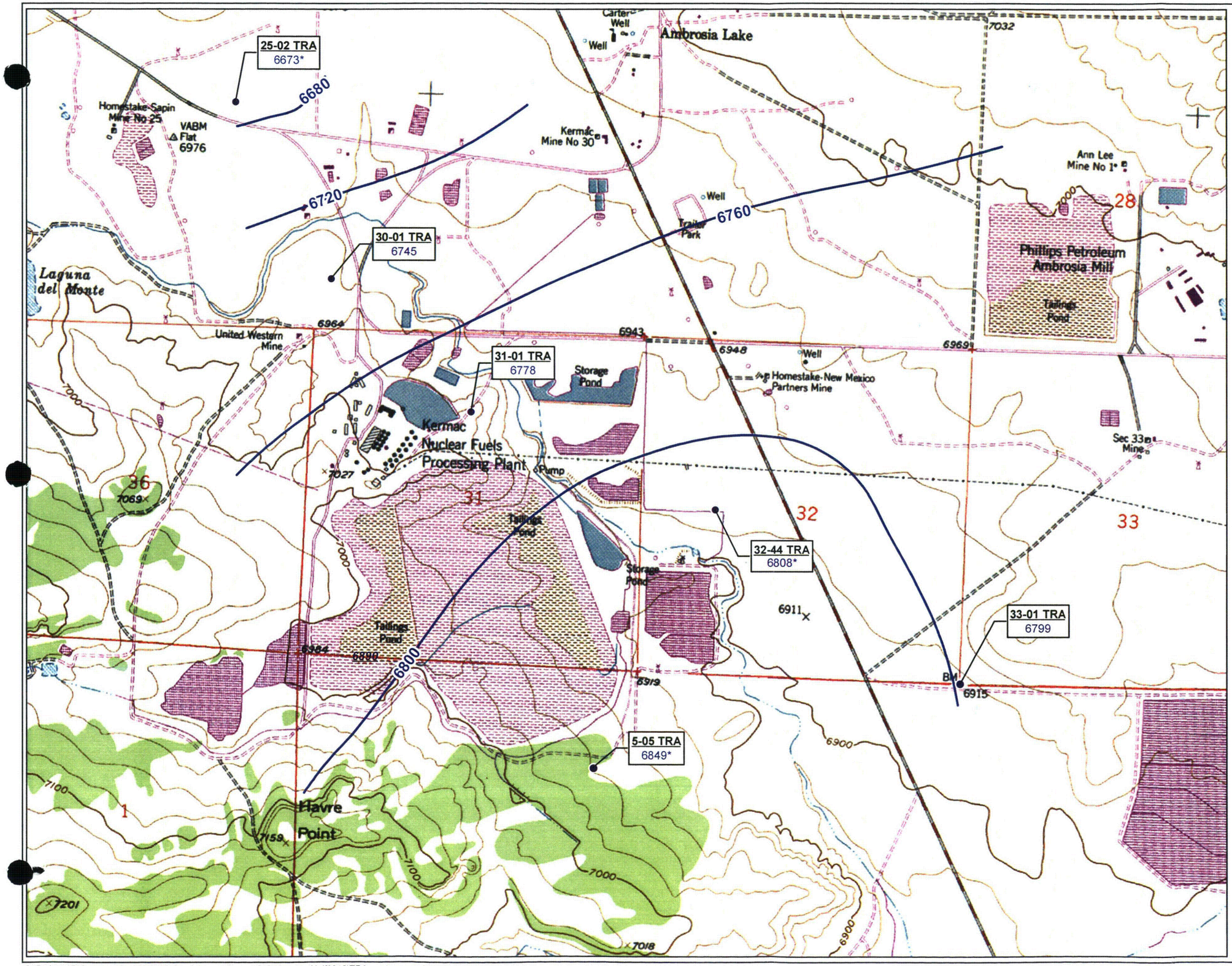

N

0 750 1,500 3,000 Feet

USGS 7.5 Minute Topographic Maps:
Ambosia Lake Quadrangle, 1957/rev.1980;
Contour Interval 20 Feet

Legend

- TRA Well Location
- TRA Potentiometric Surface Elevation Iso-Contours (ft amsl)

Well ID
Groundwater Surface Elevation (ft amsl)

* = Values from 2005

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 31-01 and Trend Well 30-01 = 6,778 - 6,745 = 33 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 31-01 and Trend Well 30-01= 3,750 feet)

= 0.009 feet per foot

1st Half 2012 TRA Potentiometric Surface Elevation Iso-Contours

Rio Algom DP-169 ACL
Semi-Annual Report

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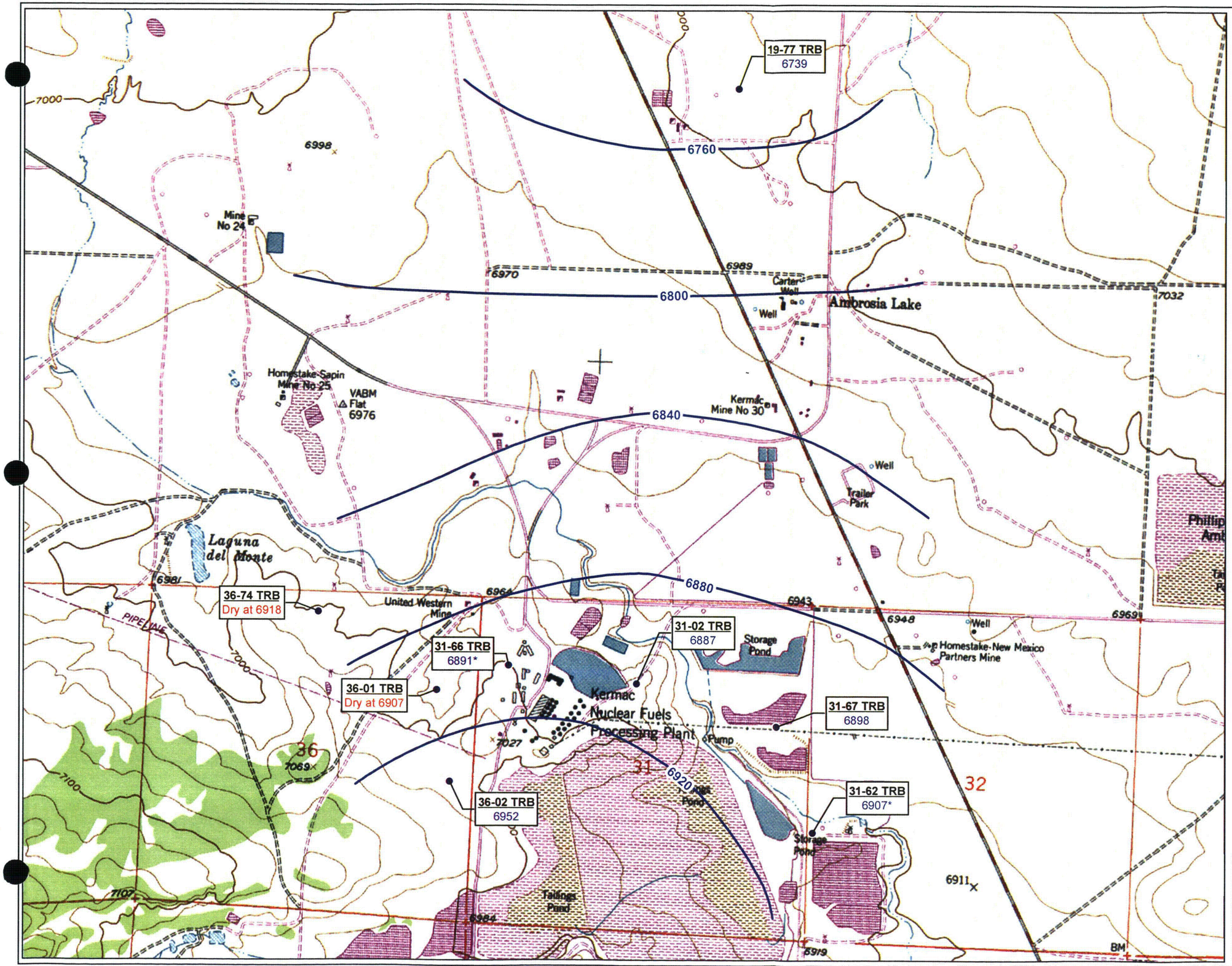

INTERA

N

0 750 1,500 3,000 Feet

USGS 7.5 Minute Topographic Maps:
Ambosia Lake Quadrangle, 1957/rev.1980;
Contour Interval 20 Feet

Legend

- TRB Monitoring Well Location
- TRB Potentiometric Surface Elevations (ft amsl)

Well ID
Groundwater Surface Elevation (ft amsl)

* = Values from 2005

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 31-02 and far downgradient Well 19-77 = 6,887 - 6,739 = 148 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 31-02 and far downgradient Well 19-77 = 9,677 feet)

= 0.015 feet per foot

1st Half 2012 TRB Potentiometric Surface Elevation Iso-Contours

Rio Algom DP-169 ACL
Semi-Annual Report

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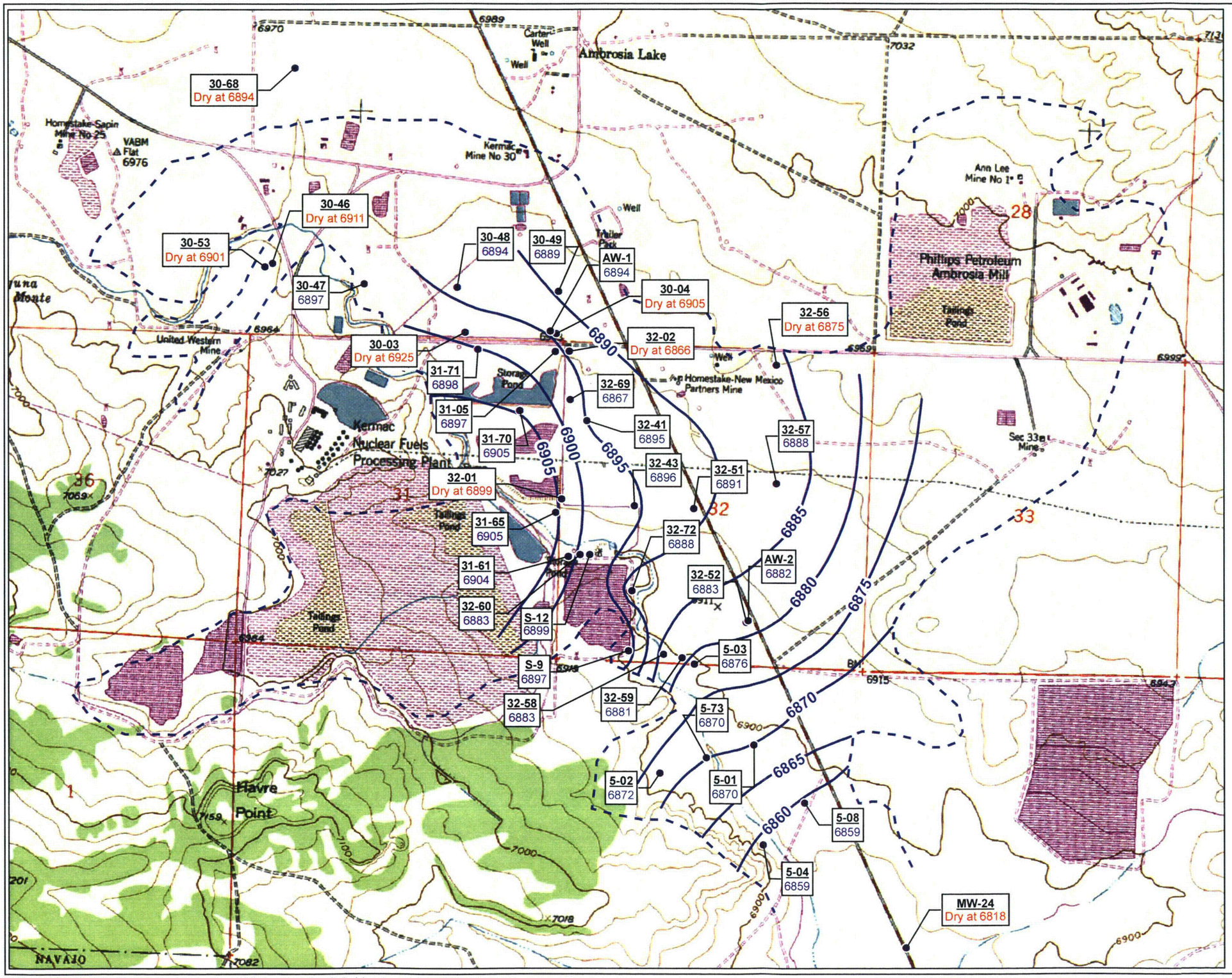

USGS 7.5 Minute Topographic Maps:
Ambosia Lake Quadrangle, 1957/rev.1980;
Contour Interval 20 Feet

Legend

- Alluvial Monitoring Well Location
- Alluvial Groundwater Surface Elevation (ft amsl)
- 1998 Boundary of Saturated Alluvium

Well ID
Groundwater Surface Elevation (ft amsl)

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 31-61 and Trend Well 5-08 = 6,904 - 6,859 = 45 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 31-61 and Trend Well 5-08 = 6,875 feet)

= 0.007 feet per foot

1st Half 2012 Alluvial Groundwater Surface Elevation Iso-Contours

Rio Algom DP-169 ACL
Semi-Annual Report

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