Rio Algom Mining LLC

January 15, 2018

Mr. Varughese Kurian
Nuclear Regulatory Commission
Two White Flint, Mail Stop T8F5
11545 Rockville Pike
Rockville, MD 20852

Re: **Ambrosia Lake Facility**
License SUA-1473, Docket No. 40-8905
License Condition #34
2nd Half 2017 Groundwater Stability Monitoring Report

Dear Mr. Kurian:

Pursuant to license condition #34 for License SUA-1473, attached is the Semi-Annual Groundwater Stability Monitoring Report for the Second Half of 2017. This report describes the results associated with the groundwater stability monitoring plan established by Amendment #56.

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

If you have any questions or need additional information, please call me at (209) 736-4803.

Sincerely,

Rio Algom Mining LLC

Theresa Ballaine
Manager

Attachment: As stated

cc: NRC – Document Control (certified mail)
NMED, Kurt Vollbrecht (email)
DOE, Bernadette Tsosie (email)
Mike Schierman, ERG (email)

IE25
NM5501
NMSS

RIO ALGOM LLC
AMBROSIA LAKE FACILITY

License SUA-1473 Docket 40-8905

Groundwater Stability Monitoring Report

Second Half 2017

January 23, 2018

RIO ALGOM LLC
AMBROSIA LAKE FACILITY

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Groundwater Stability Monitoring Report

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January 23, 2018

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ACRONYMS AND ABBREVIATIONS

ACL	alternate concentration limit
AOD	Assurance of Discontinuance
CAP	corrective action program
EPA	Environmental Protection Agency, United States
GPS	groundwater protection standard
KD	Dakota Sandstone
License	source material license SUA-1473
LTSM	long-term surveillance and maintenance boundary
mg/L	milligrams per liter
NMED	New Mexico Environment Department
NRC	Nuclear Regulatory Commission
pCi/L	picocuries per liter
POC	point of compliance
POE	point of exposure
RAML	Rio Algom Mining LLC
Site	Rio Algom Mining LLC – Ambrosia Lake Facility

RIO ALGOM MINING LLC
AMBROSIA LAKE FACILITY
GROUNDWATER STABILITY MONITORING REPORT – SECOND HALF 2017

Nuclear Regulatory Commission (NRC) source material license SUA-1473 (the "License"), Condition #34.D, requires Rio Algom Mining LLC (RAML) to submit semiannual 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.*

1.0 BACKGROUND

RAML's Ambrosia Lake facility (Site) 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 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 of the tailings 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, except Ponds 9 and 10. Seepage from the tailings impoundments and Evaporation Ponds 3 through 6, along with seepage from unrelated mining and milling operations, saturated and impacted the alluvium of the Arroyo del Puerto. Seepage from the tailings impoundments and Evaporation Ponds 7 and 8 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 Environmental Improvement Division (currently the New Mexico Environment Department [NMED]) 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, IT-3, and IT-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, the 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 (GPSs) 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, treating, and discharging treated groundwater into the Arroyo del Puerto. The treated groundwater would sweep through the alluvium, creating a hydraulic barrier between the tailings ponds and the Arroyo del Puerto while flushing existing impacts toward the interceptor trench where it was then captured and disposed of into Tailings Impoundment 1. RAML implemented the CAP beginning in the mid-1980s; however, the CAP and its requirements to pump and treat were removed when the alternate concentration limit (ACL) petition was granted by the NRC in 2006.

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 depression in bedrock aquifers due to dewatering of underground mines. The saturated zone in the alluvium has continued to decrease since the mine dewatering, milling processes, and CAP were terminated.

2.0 SECOND HALF 2017 ACTIVITIES

Activities associated with the groundwater monitoring program at the mill facility during the second half of 2017 consisted of performing sampling pursuant to SUA-1473. The well network was designed to track and assess groundwater impacts between the tailings impoundment and the point of exposure (POE), which is the proposed long-term surveillance and maintenance boundary (LTSM), in the alluvium, Tres Hermanos A, Tres Hermanos B, and the Dakota. The current ACLs for the Site are presented in **Table 1** below.

Table 1. Rio Algom Mining – Ambrosia Lake Operation
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 per liter

Appendix 1 of this report contains the analytical data for the Dakota, Tres Hermanos A, Tres Hermanos B, and alluvial units. **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. This decrease in groundwater is attributable to the discontinuance of the alluvial CAP, which was maintaining the artificial water mound in the vicinity of the Site. The decreasing groundwater elevation slows the lateral migration rate of milling-related seepage.

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 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 – 0.028 foot per foot
- Tres Hermanos A – 0.003 foot per foot
- Tres Hermanos B – 0.016 foot per foot
- Alluvium – 0.008 foot per foot

Appendix 4 contains monitoring well network and potentiometric surface maps for the Dakota, Tres Hermanos A, Tres Hermanos B, and alluvial units.

3.0 IMPROVEMENTS TO THE MONITORING PROGRAM

Improvements to the groundwater monitoring program included replacing monitoring wells where measured total depth varied from total depth on construction logs, or wells with visible or suspected damage. The ACL wells that have been replaced are alluvial wells 5-03, 5-08, and 5-73; Dakota wells 30-48 KD and 32-45 KD; Tres Hermanos A well 31-01 TRA; and Tres Hermanos B well 31-02 TRB. The well replacement program was completed in 2013 (INTERA, 2013). Analytical data and time versus concentration plots for the replacement wells are included in **Appendices 1** and **2**, respectively, and sampling results are discussed in Section 4.0.

Dedicated pumps have been installed in 17 of the NRC groundwater monitoring network wells, including 5-03 ALL-R, 5-08 ALL-R, 5-73 ALL-R, 30-48 KD-R, 31-02 TRB-R, 32-45 KD-R, 32-50 TRB-R, 36-06 KD, 33-01 TRA, 19-77 TRB, 31-67 TRB, 36-02 TRB, 32-59 ALL, 31-61 ALL, 31-65 ALL, and 5-04 ALL. A dedicated electric submersible pump was installed in 17-01 KD due to its depth.

3.1 Wells Requiring Further Investigation

Monitoring wells 30-02 KD and 30-01 TRA have not contained sufficient water to collect a sample since 2012 and 2009, respectively. Review of the well construction diagrams for 30-02 KD and 30-01 TRA revealed 20 feet of solid casing (or sump) below the bottom of the screened interval in each well.

Desaturation of the alluvium and upper bedrock units is expected at the Site due to the termination of surface water discharge associated with the groundwater CAP in 2006. The unusual well construction of 30-02 KD and 30-01 TRA (20-foot sump) creates uncertainty in groundwater elevation measurements, since the water level in those wells is below the screened interval. 30-02 KD is one of six monitoring wells in the Dakota. According to available screen depth and depth-to-water measurements, the last sample collected from within the screened interval of 30-02 KD was in 1988. Similarly, a representative groundwater sample from within the screened interval for 30-01 TRA was last collected in 1998. Collecting a sample from the screened interval of these monitoring wells ensures that the sample is representative of formation groundwater; however, since the water levels are below the screened interval, the water in the sumps is likely stagnant water. For these reasons, RAML proposes to review historical data for these wells and present justification for plugging and abandoning these wells in a request for a License amendment.

4.0 DATA EVALUATION

As a component of the ACL approval process, NRC not only established ACLs for specific parameters, but also maintained the GPSs for those constituents for which ACLs were not proposed. Data collected during the second half of 2017 were compared to ACLs and GPSs. Notable results are described in detail in the following sections.

4.1 Dakota

Analytical results from groundwater samples collected from the Dakota well network are tabulated in **Appendix 1** and presented in time series plots for the ACL parameters in **Appendix 2.** Dakota monitoring wells 36-06 KD and 32-45 KD-R have been monitored monthly due to exceedances of GPSs for beryllium, cadmium, and gross alpha in 36-06 KD, and molybdenum in 32-45 KD-R. The results of monthly monitoring are discussed below. Groundwater sampling results from Dakota monitoring wells 17-01 KD and 30-48 KD-R did not reveal any exceedances of ACLs or GPSs in the second half of 2017. Monitoring well 30-02 KD did not contain enough water for sample collection.

4.1.1 36-06 KD

Monitoring well 36-06 KD has been monitored monthly for beryllium, cadmium, gross alpha, and uranium. RAML's interpretation, as previously discussed with NRC, is that fluctuations in groundwater quality in 36-06 KD appear to be linked to surface reclamation work.

4.1.1.1 Beryllium and Cadmium

Elevated beryllium concentrations were identified in 2006 in Dakota POC monitoring well 36-06 KD. As a result of this condition, RAML submitted a proposed CAP on January 15, 2007, to address the beryllium concentrations present within monitoring well 36-06 KD. This CAP was approved by NRC on April 30, 2007.

The initial increasing trend in beryllium concentrations (2001 to 2007) correlated with surface field work in the vicinity of the well. The increasing trend in beryllium stabilized, and concentrations began trending downward after 2007. RAML proposed to continue monthly monitoring of well 36-06 KD for beryllium so that additional data would be available. Beryllium concentrations in 36-06 KD continue to decrease, and have been below the GPS in 2017 (**Table 2** and **Figure 1**).

Table 2. Second Half 2017 Analytical Summary for Beryllium and Cadmium in Monitoring Well 36-06 KD

Date	Beryllium (mg/L)	Cadmium (mg/L)
GPS (mg/L)	**0.01**	**0.01**
7/13/2017	**0.0125**	0.0076
8/14/2017	**0.0117**	0.0082
9/07/2017	**0.0102**	0.0066
10/10/2017	**0.0104**	0.0029
11/16/2017	0.00791	0.0039
12/06/2017	0.0065	0.0035

*Bold values indicate an exceedance of the KD GPS.

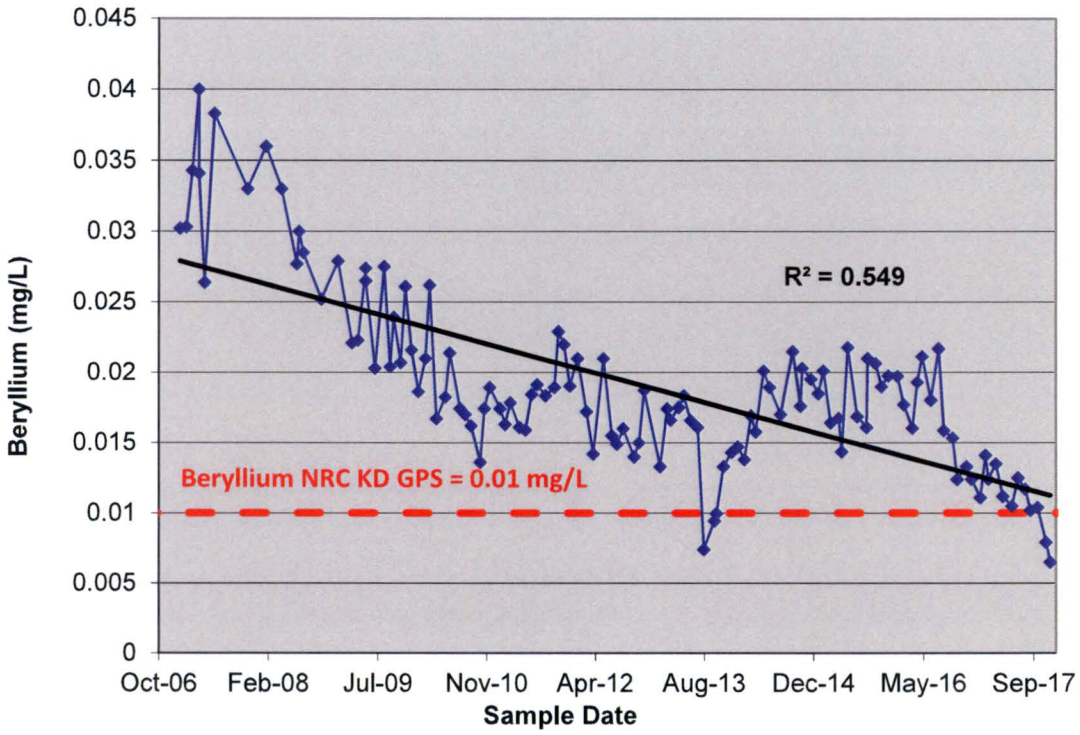

Figure 1. Beryllium Concentrations in Dakota Monitoring Well 36-06 KD

In 2009 RAML instituted a policy of third-party review of laboratory data within five working days of receipt of data. As a result of this policy, RAML was made aware that cadmium concentrations in the samples of groundwater from monitoring well 36-06 KD had exceeded the GPS of 0.01 mg/L during several sampling rounds beginning in November 2007 (**Figure 2**).

Cadmium concentrations in monitoring well 36-06 KD follow a pattern that is very similar to both uranium and beryllium concentrations in the same well. Concentrations of these constituents are sensitive to changes in pH. As with uranium and beryllium, cadmium concentrations continue to exhibit an overall decreasing trend. Cadmium concentrations remained below the GPS throughout the second half of 2017 (**Table 2** and **Figure 2**).

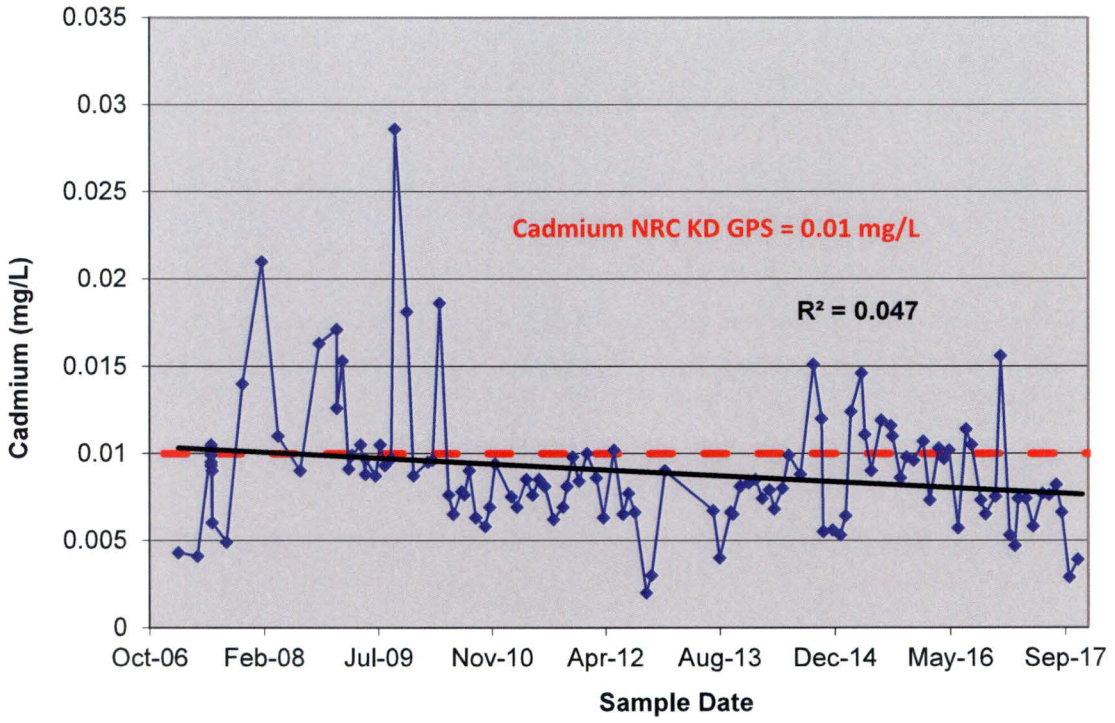

Figure 2. Cadmium Concentrations in Dakota Monitoring Well 36-06 KD

4.1.1.2 Gross Alpha and Uranium

At the time of the Bedrock ACL application (AVM and AHA, 2000), gross alpha, among other constituents, was in exceedance of the GPS in the Dakota. The Bedrock ACL application proposed that the GPS for gross alpha be removed from the License as a hazardous constituent in bedrock aquifers and noted that a GPS for gross alpha is unnecessary since the alpha activity hazard is addressed by ACLs for uranium, Th-230, Ra-226, and Pb-210 (which decays to Po-210). Additionally, the Proposed Groundwater Stability Monitoring Plan (included in the December 7, 2005, Response to Request for Additional Information Accession number ML053480214 [RAML, 2005]) does not list gross alpha as a monitoring constituent for any of the bedrock units. In the Technical Evaluation Report, which was prepared by the NRC (NRC, 2006) to document its review of the of the various submittals during the six-year ACL application process, NRC

acknowledges that gross alpha was evaluated as a constituent of concern and that the proposed ACLs (including ACLs for radiologic constituents) are appropriate and protective of human health and the environment; however, an ACL for gross alpha was never proposed by RAML, likely because the ACLs for the major alpha-emitting constituents were proposed instead and because the GPS for gross alpha was requested to be removed from the License.

In order to evaluate the gross alpha activity in water from 36-06 KD, factors including alpha-emitting constituents, laboratory uncertainty, and alpha-emitter compliance standards were considered. Semiannual samples collected in 36-06 KD are also analyzed for alpha emitters Th-230 and Ra-226. The monthly samples are analyzed for gross alpha and uranium. **Table 3** shows the results of the alpha emitters, the calculated gross alpha based on these results, the measured gross alpha minus uranium, and the corresponding ACLs or GPSs from 2014 to the present. It is important to note that individual alpha emitters in the Dakota are subject to ACLs, while gross alpha has a more conservative GPS. The sum of the ACLs for the major alpha emitters (Th-230 and Ra-226) is 1,163 picoCuries per liter (pCi/L), which is 20 times greater than the gross alpha GPS of 56 pCi/L.

Table 3. Summary of the Effects of Gross Alpha Calculation Methods in Monitoring Well 36-06 KD.

Date Sampled	Ra-226 (pCi/L)	Th-230 (pCi/L)	Gross Alpha[A] (Summed Isotopes) (pCi/L)	Gross Alpha (U Corrected) (pCi/L)
GPS/ACL	**218 (ACL)**	**945 (ACL)**	**56 (GPS)**	**56 (GPS)**
6/10/2014	9.2	29	38.2	55.5
9/24/2014	10	25	35	-122
11/6/2014	15	13	28	**68.9**
2/11/2015	12	30	42	-39.4
8/26/2015	11	13	24	-66.1
2/11/2016	16	11	27	-18
7/18/2016	19	84	**103**	34
2/15/2017	17	21	38	**180**
8/14/2017	12	23	35	-23

*Bold values indicate an exceedance of the KD gross alpha GPS of 56 pCi/L.

[A]Gross Alpha (Summed Isotopes) is calculated from the sum of Ra-226 and Th-230 activities. Isotopes selected for the Gross Alpha summation have long half lives, are alpha emitters, and are sourced from either U-238 or Th-232, the most abundant isotopes of each element.

The gross alpha analysis is performed in accordance with EPA Method 900.0. This method is a commonly used gross alpha screening method for groundwater. The corrected gross alpha values are presented in **Table 4.** Two out of six of the corrected gross alpha values (gross alpha – gross

alpha derived from uranium) were greater than the GPS of 56 pCi/L in the second half of 2017. **Figure 3** shows gross alpha results over time with error bars signifying the range of possible results. Monthly sampling and analysis will continue for gross alpha and uranium in 36-06 KD pending preparation of a License amendment with proposed modifications to the gross alpha standards in the upper bedrock units.

Table 4. Second Half 2017 Analytical Summary for Gross Alpha and Uranium in Monitoring Well 36-06 KD

Date	Corrected Gross Alpha Value (pCi/L)	Uranium (mg/L)
GPS/ACL	**56 (GPS)**	**1.6 (ACL)**
7/13/2017	-4.2	0.588
8/14/2017	-23	0.496
9/07/2017	13	0.488
10/10/2017	34	0.457
11/16/2017	**130**	0.430
12/06/2017	**110**	0.335

*Bold values indicate an exceedance of the KD GPS or ACL.

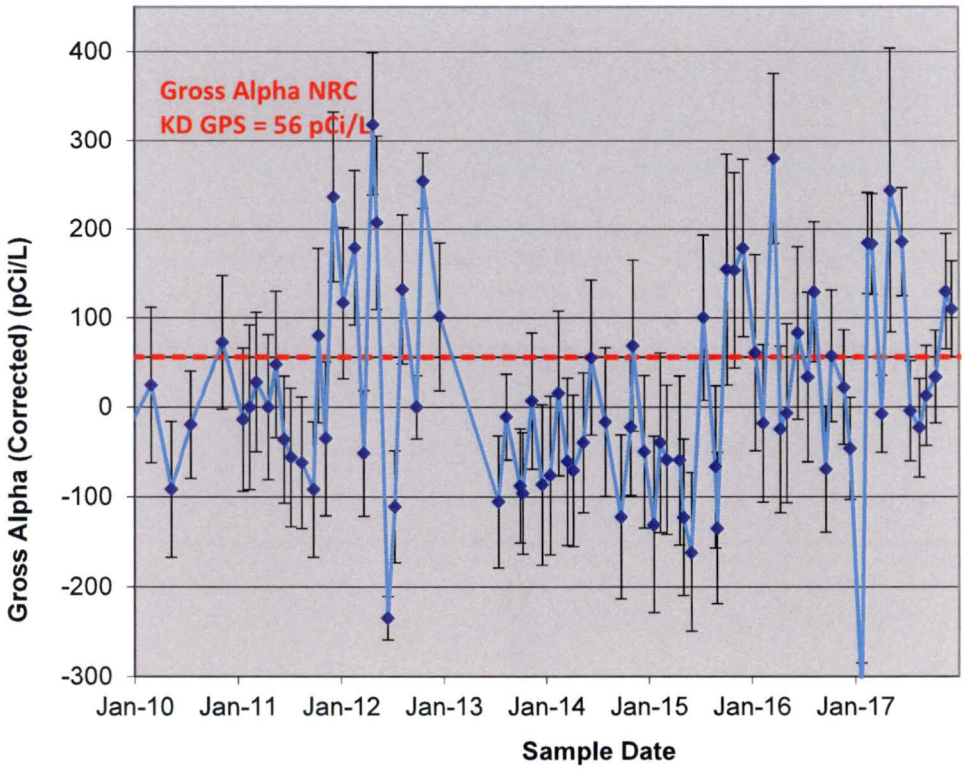

Figure 3. Gross Alpha Activities in Dakota Monitoring Well 36-06 KD

Uncertainties in gross alpha analysis are due to application of an analytical method for drinking water (Environmental Protection Agency [EPA] method 900.0) to waters with high dissolved solids. Using EPA Method 600/00-02 does not result in decreased uncertainties; both methods are limited by matrix interferences in the 36-06 KD samples (detailed in RAML, 2016).

4.1.2 32-45 KD-R

Pursuant to Condition 34.F and Criterion 5D of 10 CFR part 40 Appendix A, RAML proposed a CAP to address the exceedances of nitrate and molybdenum in 32-45 KD-R in the Groundwater Stability Monitoring Report, Second Half 2014 (RAML, 2015). Since 32-45 KD-R is a replacement well, RAML proposed the continuation of monthly monitoring for these parameters to gather more information as the well continues to stabilize. Nitrate concentrations in monitoring well 32-45 KD-R have continued to decrease and have remained below the ACL of 22.8 mg/L since April 2015. RAML ceased monthly analysis of nitrate in 32-45 KD-R after the February 2016 event, as described in the Groundwater Stability Monitoring Report, Second Half 2015 (RAML, 2016). Nitrate in 32-45 KD-R will continue to be analyzed on a semiannual basis.

4.1.2.1 Molybdenum

Molybdenum in 32-45 KD-R reached a maximum concentration of 0.505 mg/L in March of 2015. Although concentrations have been decreasing, they continue to exceed the GPS of 0.06 mg/L (**Table 5** and **Figure 4**). **Table 5** presents molybdenum concentrations in monitoring well 32-45 KD-R during the second half of 2017. Time series plots for molybdenum (**Figure 4**) in 32-45 KD-R show that concentrations during the second half of 2017 appear to follow a generally decreasing trend. While the molybdenum concentration remains above the GPS of 0.06 mg/L, the concentration continues to decrease.

Table 5. Second Half 2017 Analytical Result Summary for Molybdenum in Monitoring Well 32-45 KD-R

Sample Date	Molybdenum (mg/L)
GPS/ACL	**0.06 (GPS)**
7/13/2017	**0.171**
8/10/2017	**0.175**
9/07/2017	**0.191**
10/10/2017	**0.182**
11/15/2017	**0.214**
12/06/2017	**0.169**

*Bold values indicate an exceedance of the KD GPS or ACL.

Molybdenum is known to occur naturally near uranium deposits (Guilbert and Park, 1986). Molybdenum is not included in primary or secondary EPA Maximum Contaminant Levels for drinking water; however, NMED has a molybdenum standard for irrigation, which is 1.0 mg/L, and concentrations of molybdenum in groundwater samples from this well do not exceed that standard.

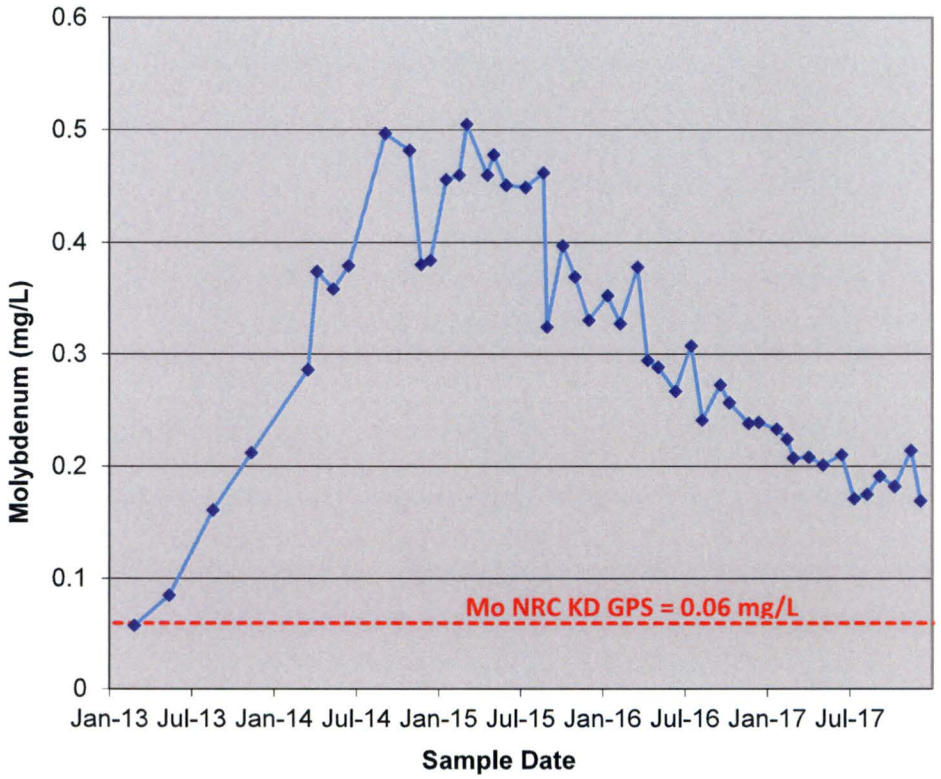

Figure 4. Molybdenum Concentration in Dakota Monitoring Well 32-45 KD-R

Monthly sampling and analysis for molybdenum will continue pending preparation of a License amendment, which may include a proposed GPS modification or an ACL for molybdenum in the Dakota.

4.2 Tres Hermanos A

Analytical results from Tres Hermanos A wells are tabulated in **Appendix 1** and presented graphically as time series plots in **Appendix 2**. As discussed in Section 3.1, well 30-01 TRA did not contain enough water to collect a sample. No exceedances of License groundwater standards were observed in groundwater samples from Tres Hermanos A monitoring wells.

4.3 Tres Hermanos B

Analytical results from Tres Hermanos B wells are tabulated in **Appendix 1** and presented graphically as time series plots in **Appendix 2**. Well 36-01 TRB was last sampled in 2009, and has not contained enough water for a sample since then. No new exceedances of ACLs or GPSs were observed in groundwater collected from Tres Hermanos B wells in the second half of 2017.

4.3.1 31-02 TRB-R

Uranium concentrations in groundwater samples collected from former monitoring well 31-02 TRB from July through November of 2011 exceeded the ACL of 1.6 mg/L. RAML continued monthly sampling, and uranium concentrations were observed below the ACL throughout 2012. As part of the Site-wide well-replacement program, monitoring well 31-02 TRB was identified for replacement; and a new well (31-02 TRB-R) was installed on December 14, 2012. Monthly sampling and analysis for uranium and gross alpha in well 31-02 TRB-R continued, and results are provided below.

4.3.1.1 Uranium and Gross Alpha

Results from groundwater sampling for the second half of 2017 are presented in **Table 6.** Gross alpha over time is shown in **Figure 5**. Uranium concentrations in this replacement well have never exceeded the ACL. There were no exceedances of gross alpha activity measured in samples from 31-02 TRB-R during the second half of 2017 (**Table 6**).

Table 6. Second Half 2017 Analytical Summary for Uranium and Gross Alpha in Monitoring Well 31-02 TRB-R

Date	Uranium (mg/L)	Gross Alpha Corrected (pCi/L)
ACL/GPS	**1.6 (ACL)**	**21 (GPS)**
7/13/2017	0.0045	-14
8/10/2017	0.0039	-9.8
9/07/2017	0.0039	-0.81
10/10/2017	0.0044	19
11/15/2017	0.0045	17
12/06/2017	0.0042	3.4

*Bold values indicate an exceedance of the TRB GPS.

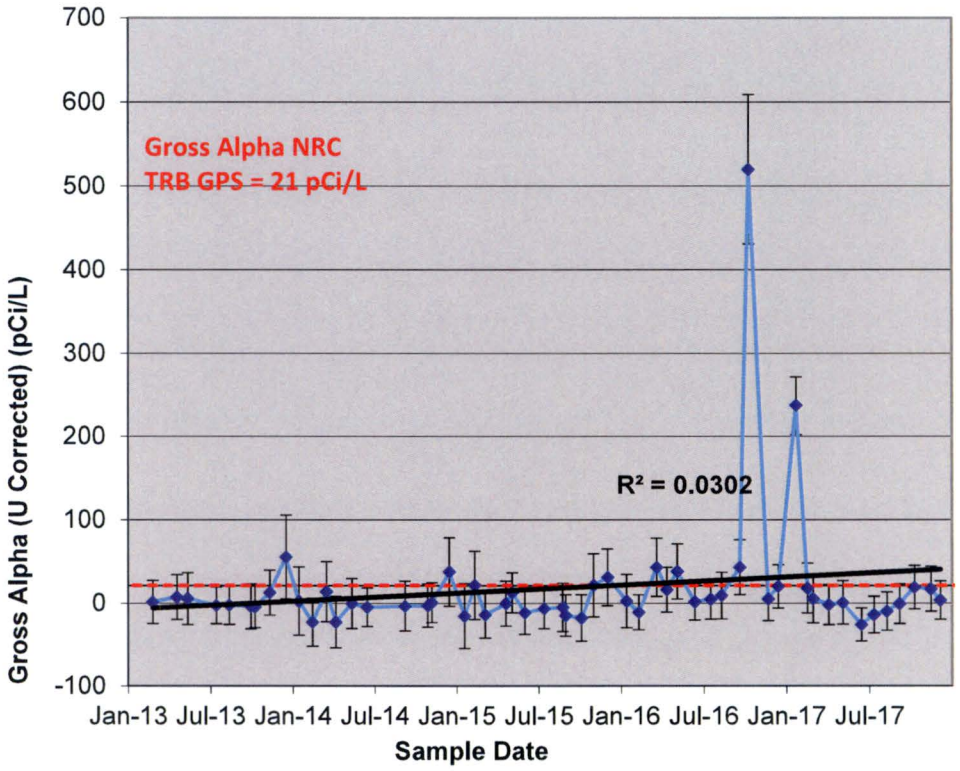

Figure 5. Gross Alpha (U Corrected) Activities in Tres Hermanos B Monitoring Well 31-02 TRB-R

As with the gross alpha results in 36-06 KD described in Section 4.1.1.2, the Tres Hermanos B does not have an ACL for gross alpha, but does have ACLs for the other alpha emitters. Monthly

sampling and analysis will continue for gross alpha and uranium in 31-02 TRB-R, pending preparation of a License amendment with proposed modifications to the gross alpha standards in the upper bedrock units.

4.4 Alluvium

Analytical results from the alluvial well network are tabulated in **Appendix 1** and presented graphically as time series plots in **Appendix 2**. MW-24 ALL did not contain enough water to collect a sample. Groundwater from all other NRC alluvial wells did not exceed ACLs.

5.0 CONCLUSIONS

Table 7 summarizes the notable results from the second half of 2017 groundwater monitoring and provides path forward recommendations.

Table 7. Rio Algom Mining – Ambrosia Lake
First Half 2017 Summary and Path Forward

Well	Summary	Status	Path Forward
36-06 KD	Beryllium, cadmium, and gross alpha above GPSs	CAP submitted for beryllium 2007; monthly monitoring (plus uranium)	Continue with monthly monitoring until development and approval of ACLs or GPS modification for gross alpha for License amendment.
32-45 KD-R	Molybdenum above GPS	Replacement well stabilizing, monthly monitoring	Continue with monthly monitoring and quarterly reporting for molybdenum until concentrations drop below the GPS; consider revision of GPS for molybdenum in upcoming License amendment.
31-02 TRB-R	Gross alpha above GPS	Replacement well stabilizing; monthly monitoring	Continue monthly monitoring and quarterly reporting until well stabilizes; consider revision of GPS or ACLs for License amendment.

RAML proposes to continue monthly sampling of constituents exceeding their GPSs. Replacement wells that are in the process of stabilization will also be sampled monthly for constituents exceeding GPSs or ACLs. The path forward for constituents with exceedances of GPSs is to develop ACLs and amend the License to include these values as described in RAML's letter to NRC dated April 13, 2017. Wells with construction specifications that allow for collection of samples that may not be representative of formation conditions will be monitored for total depth and depth to water, and sampled if the water level is sufficient.

Monitoring of the well network is required on a semiannual basis, with the exception of the wells involved in accelerated monthly sampling. RAML will continue to conduct monthly and semiannual monitoring in accordance with the requirements in Condition #34 of the License.

6.0 REFERENCES

AVM Environmental Services, Inc., and Applied Hydrology Associates, Inc. (AVM and AHA), 2000. Corrective Action Program and Alternate Concentration Limits Petition for Upper Most Bedrock Units Ambrosia Lake Uranium Mill Facility Near Grants, New Mexico.

Guilbert, J.M. and C.F. Park, 1986. *The Geology of Ore Deposits*. Waveland Press, IL.

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———, 2015. Rio Algom LLC Ambrosia Lake Facility, License SUA-1473 Docket 40-8905, Groundwater Stability Monitoring Report, Second Half 2014.

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U.S. Nuclear Regulatory Commission (NRC), 2006. Technical Evaluation Report Alternate Concentration Limits Application, Rio Algom Mining, LLC. Ambrosia Lake Uranium Mill Facility, New Mexico.

APPENDIX 1

Stability Monitoring Plan
Analytical Results

RIO ALGOM MINING LLC
2nd HALF 2017
DAKOTA WELL RESULTS - ACL PARAMETERS

Well	Date		Depth To Water	Total Depth	Specific Conductivity	Temp (°C)	pH s.u.	Chloride (mg/L)	Nitrate (mg/L)	T.D.S. (mg/L)	Sulfate (mg/L)
17-01 KD	8/15/2017	Q3 2017	-	-	1,651	21.7	9.14	11.4	<0.02	1,120	720
30-02 KD	7/31/2017	Q3 2017	307.45	313.07			Insufficient Water				
30-48 KD-R	8/14/2017	Q3 2017	327.06	-	5,170	14.92	7.1	549	0.03 B	4,140	2,040
32-45 KD-R	8/10/2017	Q3 2017	257.75	278.71	2,141	14.89	8.0	96.7	0.86	1,630	737
36-06 KD	8/14/2017	Q3 2017	188.31	198.45	7,678	15.49	2.95	979	<0.02	6,170	3,240
5-02 KD	8/10/2017	Q3 2017	185.62	190.26	1,285	17.04	3.4	11.3	0.78	780	356 H*
ACL								3,200	22.8	14,100	6,480

Well	Date		Ni (mg/L)	U-nat (mg/L)	Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)
17-01 KD	8/15/2017	Q3 2017	<0.0006	<0.0001	0.18	1.7	2.16 y
30-02 KD	7/31/2017	Q3 2017			Insufficient Water		
30-48 KD-R	8/14/2017	Q3 2017	<0.003	<0.0005	-0.13	1.5	6.6 y
32-45 KD-R	8/10/2017	Q3 2017	0.0019 B	0.0659	-0.05	3	1.27 y
36-06 KD	8/14/2017	Q3 2017	0.119	0.496	23	5.8	19 y
5-02 KD	8/10/2017	Q3 2017	0.0006 B	0.0011	-0.23	2.8	0.99 y
ACL			6.8	1.6	945	88	218

Total depth could not be measured at 17-01 KD, 32-45 KD-R, and 30-38 KD-R. Depth to water could not be measured at 17-01 KD.
Monitoring well 30-02 KD contained insufficient water for sample collection.
< = constituent was not detected above the method detection limit.
'y' indicates the value is calculated from analytical results.
'B' indicates that the analyte was detected in both the blank and sample.
'H*' indicates sample was out of hold time due to requested reanalysis.

RIO ALGOM MINING LLC
2nd HALF 2017
TRA WELL RESULTS - ACL PARAMETERS

Well	Date		Depth To Water	Total Depth	Specific Conductivity	Temp (°C)	pH s.u.	Chloride (mg/L)	Nitrate (mg/L)	T.D.S. (mg/L)	Sulfate (mg/L)
30-01 TRA	7/31/2017	Q3 2017	204.12	207.56			Insufficient Water				
31-01 TRA-R	8/10/2017	Q3 2017	213.78	204.86	2,100	14.12	7.33	23.3	0.09 B	1,760	1,260 H*
33-01 TRA	8/14/2017	Q3 2017	118.5	181.44	3,606	13.58	7.89	32.8	0.04 B	2,690	1,770
ACL								1,070	9.2	6,400	2,584

Well	Date		Th-230 (pCi/L)	Pb-210 (pCi/L)	Ra-226+Ra-228 (pCi/L)
30-01 TRA	7/31/2017	Q3 2017	Insufficient Water		
31-01 TRA-R	8/10/2017	Q3 2017	-0.04	2.7	0.5 y
33-01 TRA	8/14/2017	Q3 2017	-0.51	3.5	0.71 y
ACL			945	88	218

< = constituent was not detected above the method detection limit.
Well 30-01 TRA contained insufficient water for sample collection.
'y' indicates the value is calculated from analytical results.
'B' indicates that the analyte was detected in both the blank and sample.
'H*' indicates sample was out of hold time due to requested reanalysis.

RIO ALGOM MINING LLC
2nd HALF 2017
TRB WELL RESULTS - ACL PARAMETERS

Well	Date		Depth To Water	Total Depth	Specific Conductivity	Temp (°C)	pH s.u.	Chloride (mg/L)	Nitrate (mg/L)	T.D.S. (mg/L)	Sulfate (mg/L)
19-77 TRB	8/15/2017	Q3 2017	271.63	288.35	4,887	14.52	7.26	16.3	0.32	3,420 H*	2,000
31-02 TRB-R	8/10/2017	Q3 2017	97.15	128.38	8,901	13.11	6.44	1,180	0.04 B	7,660	3,500
31-67 TRB	8/10/2017	Q3 2017	36.81	96.28	8,216	12.51	6.44	1,100	0.02 B	7,350	2,850
36-01 TRB	8/15/2017	Q3 2017	Dry	58.46				Dry			
36-02 TRB	8/15/2017	Q3 2017	51.7	57.5	11,567	13.98	6.71	2,290	<0.02	7,960	2,840
ACL								2,810	7.7	11,700	4,760

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 TRB	8/15/2017	Q3 2017	0.0021 B	0.0103	-0.05	2.3	0.82 y
31-02 TRB-R	8/10/2017	Q3 2017	<0.003	0.0039	0.07	1.8	14.9 y
31-67 TRB	8/10/2017	Q3 2017	0.007 B	0.0135	-0.21	1.3	68.2 y
36-01 TRB	8/15/2017	Q3 2017			Dry		
36-02 TRB	8/15/2017	Q3 2017	0.006 B	0.0031	-0.2	3.4	2.35 y
ACL			6.8	1.6	945	88	218

< = constituent was not detected above the method detection limit.
Monitoring Well 36-01 TRB was dry and therefore not sampled.
'y' indicates the value is calculated from analytical results.
'B' indicates that the analyte was detected in both the blank and sample.
'H*' indicates sample was out of hold time due to requested reanalysis.

RIO ALGOM MINING LLC
2nd HALF 2017
ALLUVIAL WELL RESULTS - ACL PARAMETERS

Well	Date		Depth To Water	Total Depth	Specific Conductivity	Temp (°C)	pH s.u.	Chloride (mg/L)	Nitrate (mg/L)	T.D.S. (mg/L)	Sulfate (mg/L)
5-73 ALL-R	8/10/2017	Q3 2017	22.89	35.69	7,203	11.45	6.88	1,200	1.73	5,530	2,440
5-03 ALL-R	8/9/2017	Q3 2017	28.09	55.88	5,226	12.69	7	571	0.50	4,340	2,330
5-04 ALL	8/9/2017	Q3 2017	25.29	60.16	5,973	12.68	8.21	857	0.04 B	4,690	2,690
5-08 ALL-R	8/9/2017	Q3 2017	38.19	76.53	4,198	13.02	7.38	189	17.9	3,880	2,230
31-61 ALL	8/7/2017	Q3 2017	17.07	29.12	15,706	12.15	6.2	2,440	5.3	13,900	6,740
31-65 ALL	8/10/2017	Q3 2017	14.37	41.58	16,704	10.95	6.14	2,610	<0.2	15,600	8,150
32-59 ALL	8/9/2017	Q3 2017	23.29	28.28	5,262	13.69	7.45	488	2.54	4,790	2,480
MW-24 ALL	8/9/2017	Q3 2017	50.15	50.37			Insufficient Water				
ACL								**7,110**	**351**	**26,100**	**12,000**

RIO ALGOM MINING LLC
2nd HALF 2017
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 ALL-R	8/10/2017	Q3 2017	0.004 B	0.005 B	0.432	1.37	-0.76	2.7	-1.27 y	-888 y
5-03 ALL-R	8/9/2017	Q3 2017	<0.003	<0.003	<0.001	0.0964	0.03	3.8	-0.46 y	-17 y
5-04 ALL	8/9/2017	Q3 2017	<0.003	<0.003	<0.001	<0.0005	-0.85	1.6	-0.49 y	4.5 y
5-08 ALL-R	8/9/2017	Q3 2017	0.005	0.002 B	0.0060	0.0255	-0.34	1.4	-0.60 y	0 y
31-61 ALL	8/7/2017	Q3 2017	<0.005	0.056	0.0060	0.643	-0.11	10	2.78 y	-111 y
31-65 ALL	8/10/2017	Q3 2017	<0.005	0.149	<0.005	0.101	-0.03	2.1	7 y	1,132 y
32-59 ALL	8/9/2017	Q3 2017	0.005 B	0.005 B	0.0821 B	0.168	-0.09	2.5	0.5 y	-30 y
MW-24 ALL	8/9/2017	Q3 2017				Insufficient Water				
ACL			**176**	**98**	**49**	**23**	**13,627**	**1,274**	**3,167**	**8,402**

< = constituent was not detected above the method detection limit.
'y' indicates the value is calculated from analytical results.
'B' indicates that the analyte was detected in both the blank and sample.
MW-24 ALL contained insufficient water for sample collection.

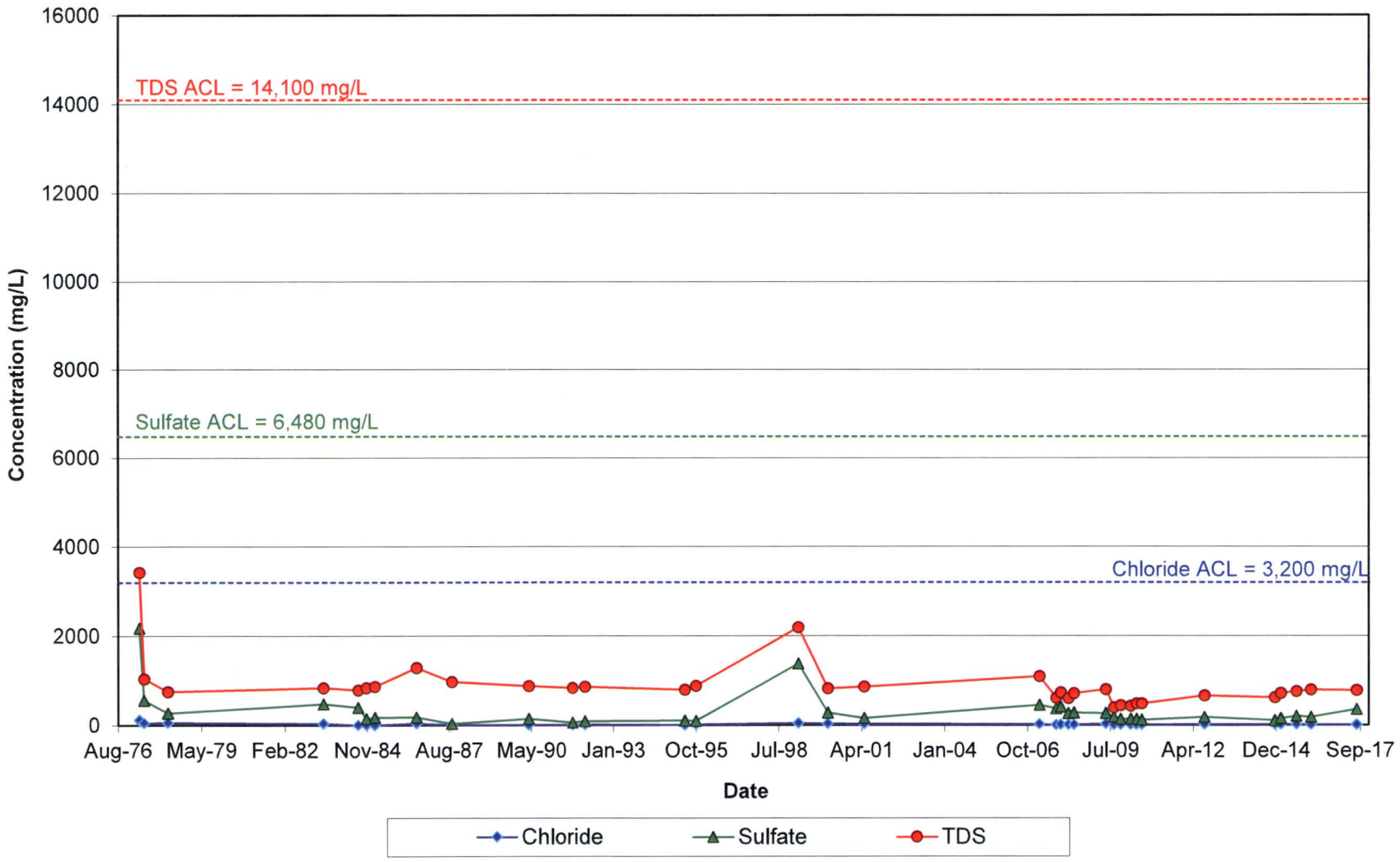
APPENDIX 2

Stability Monitoring Plan
Time Versus Concentration Plots

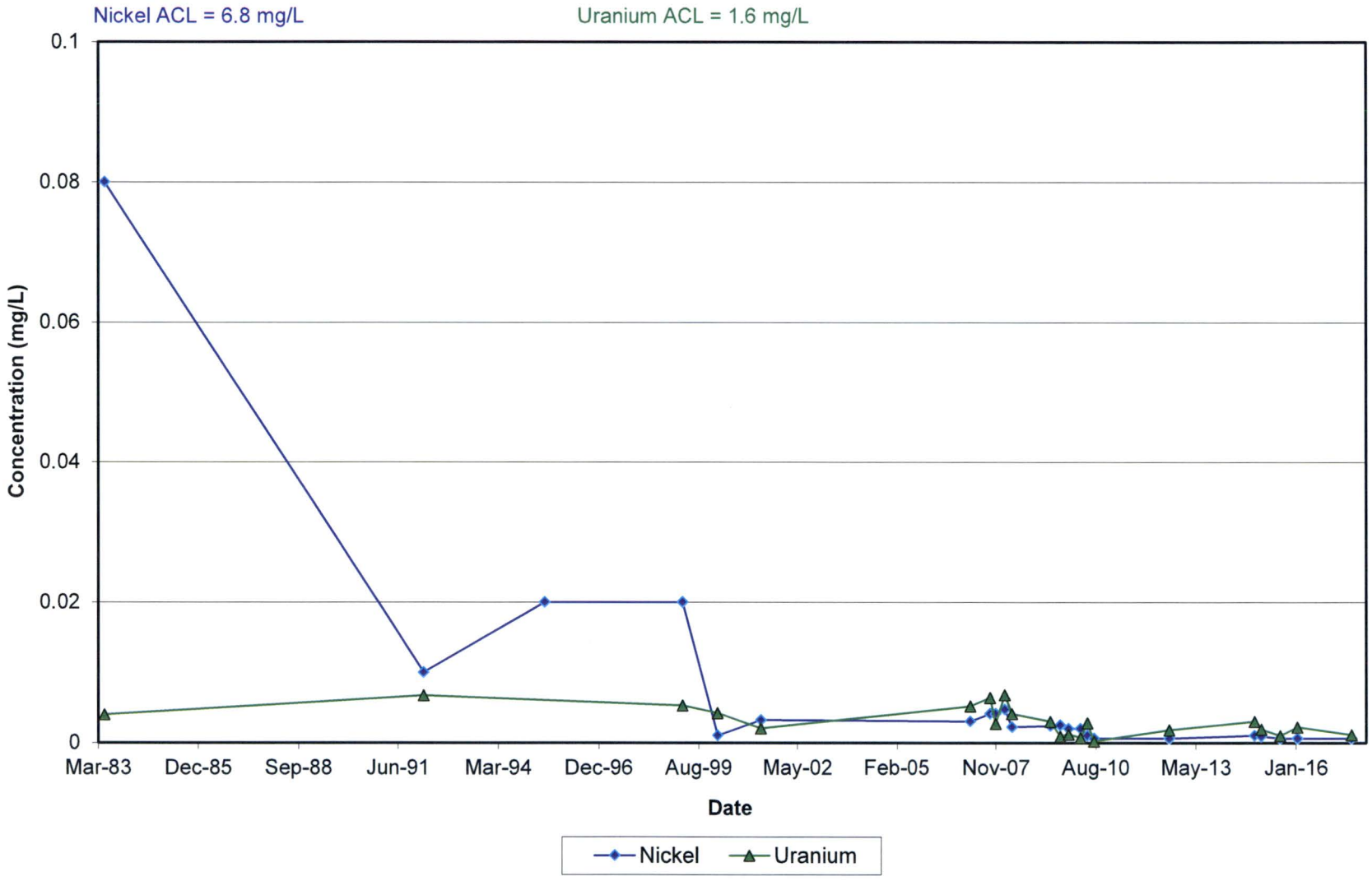
Stability Monitoring Plan
Time Versus Concentration Plots

Dakota

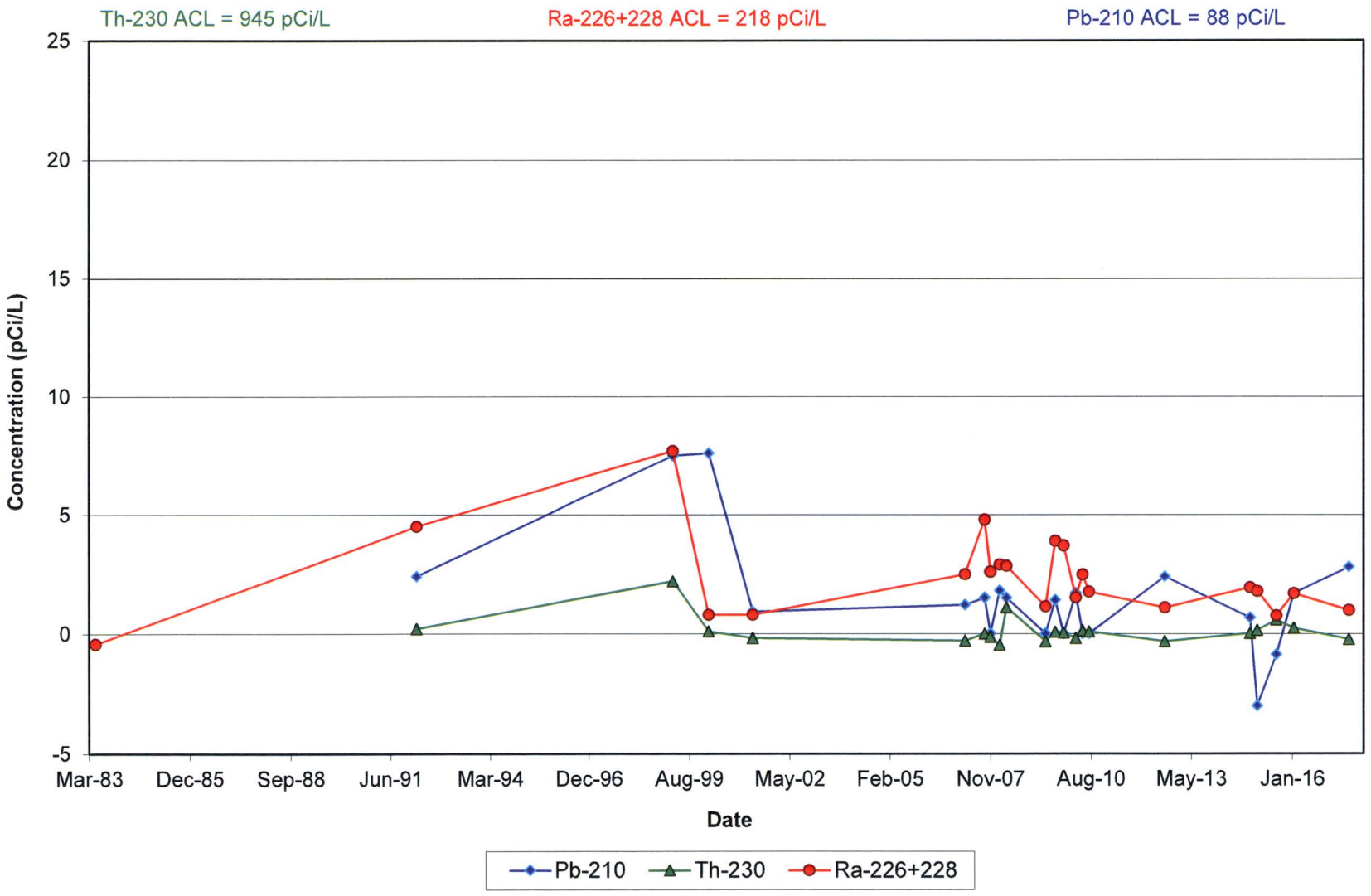
Anions and TDS in Monitoring Well 5-02 KD



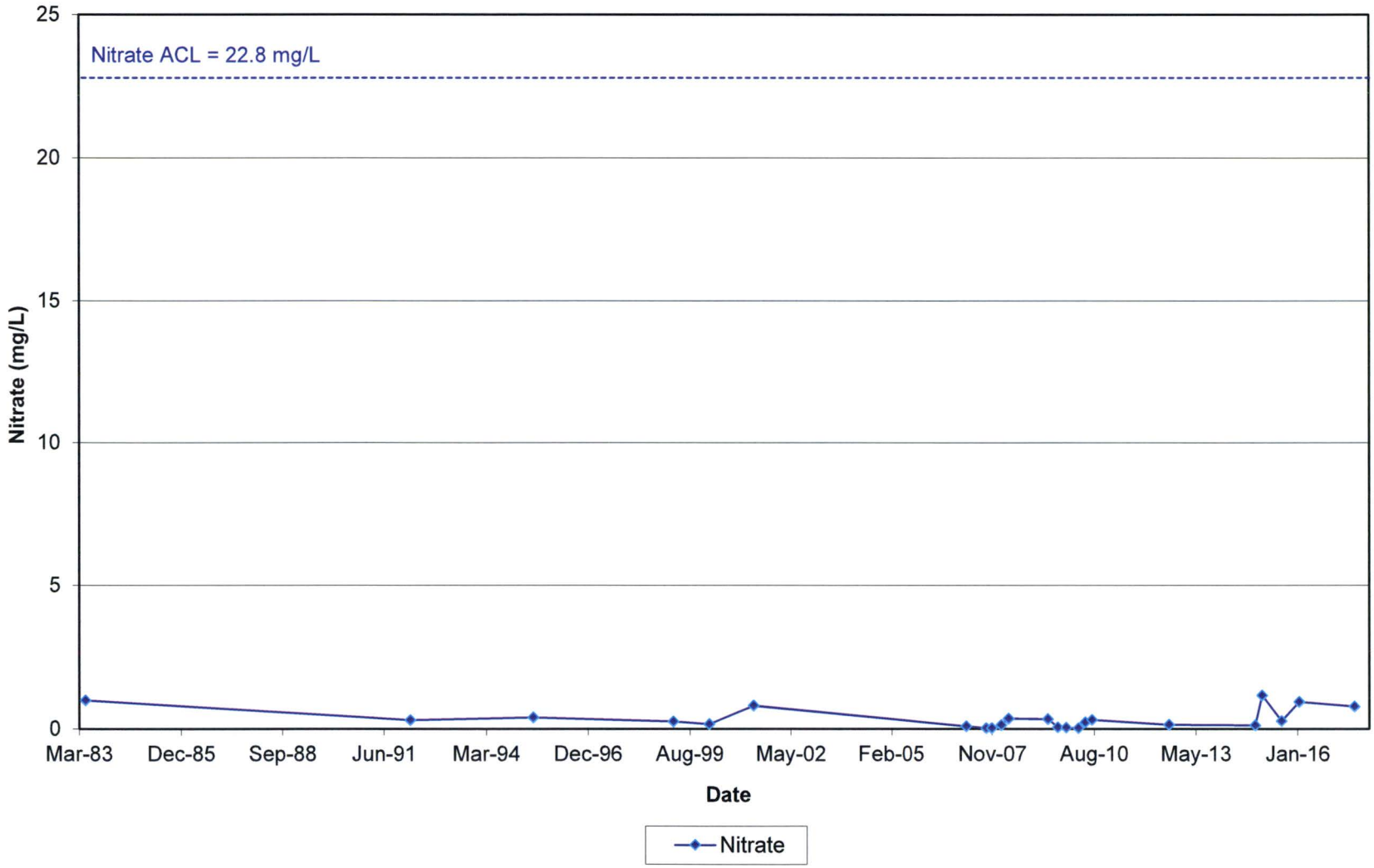
Metals in Monitoring Well 5-02 KD



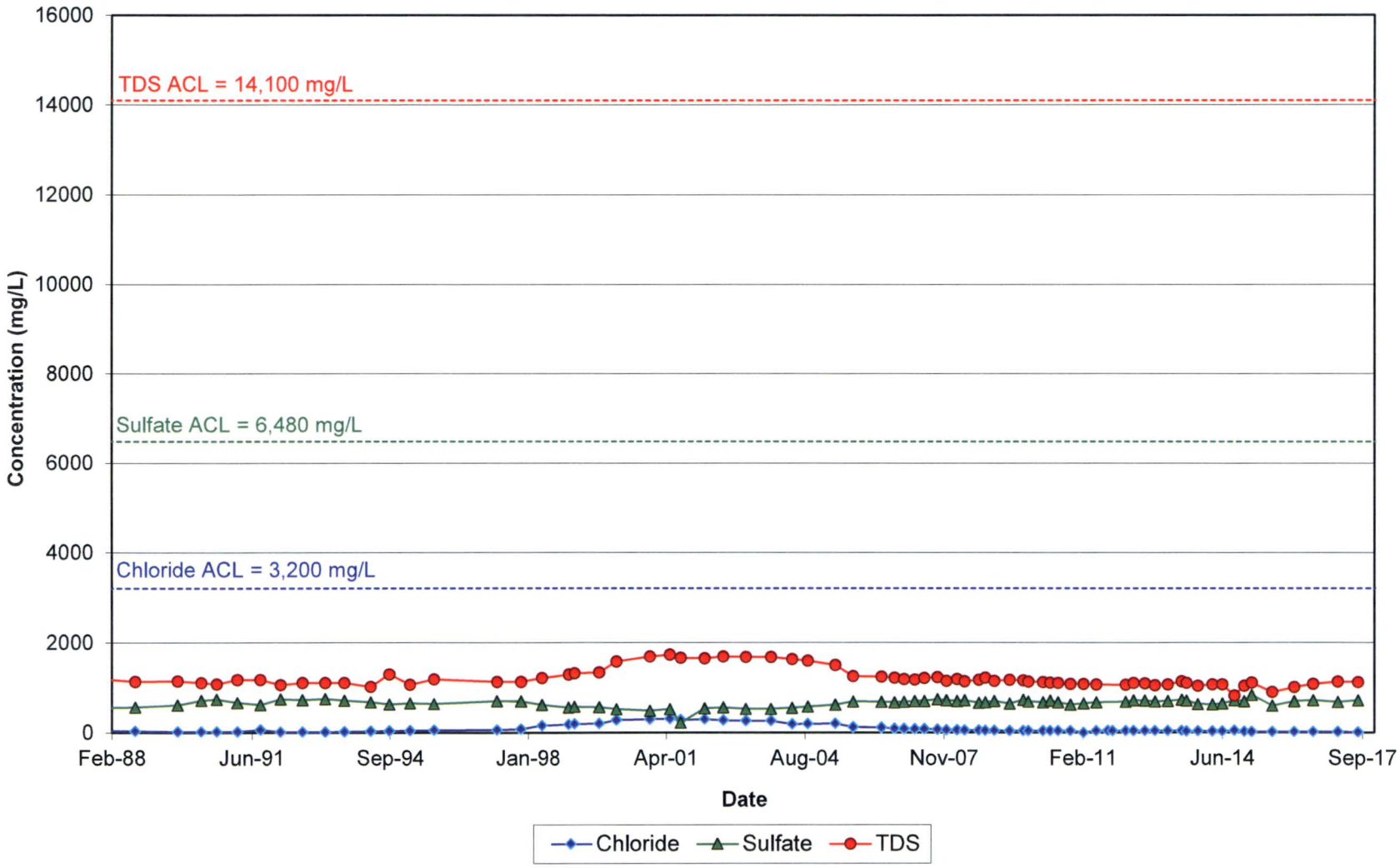
Radionuclides in Monitoring Well 5-02 KD



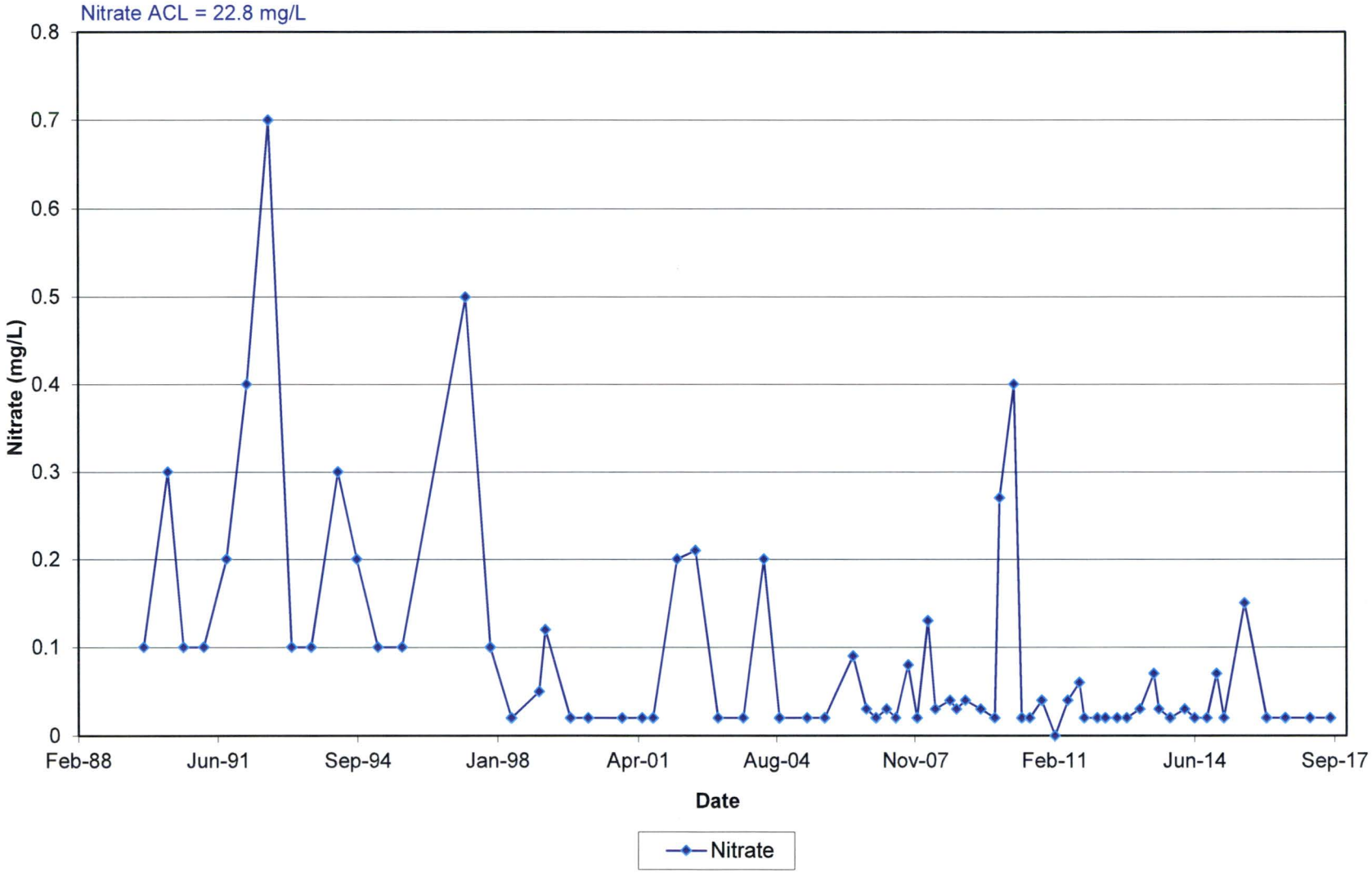
Nitrate in Monitoring Well 5-02 KD



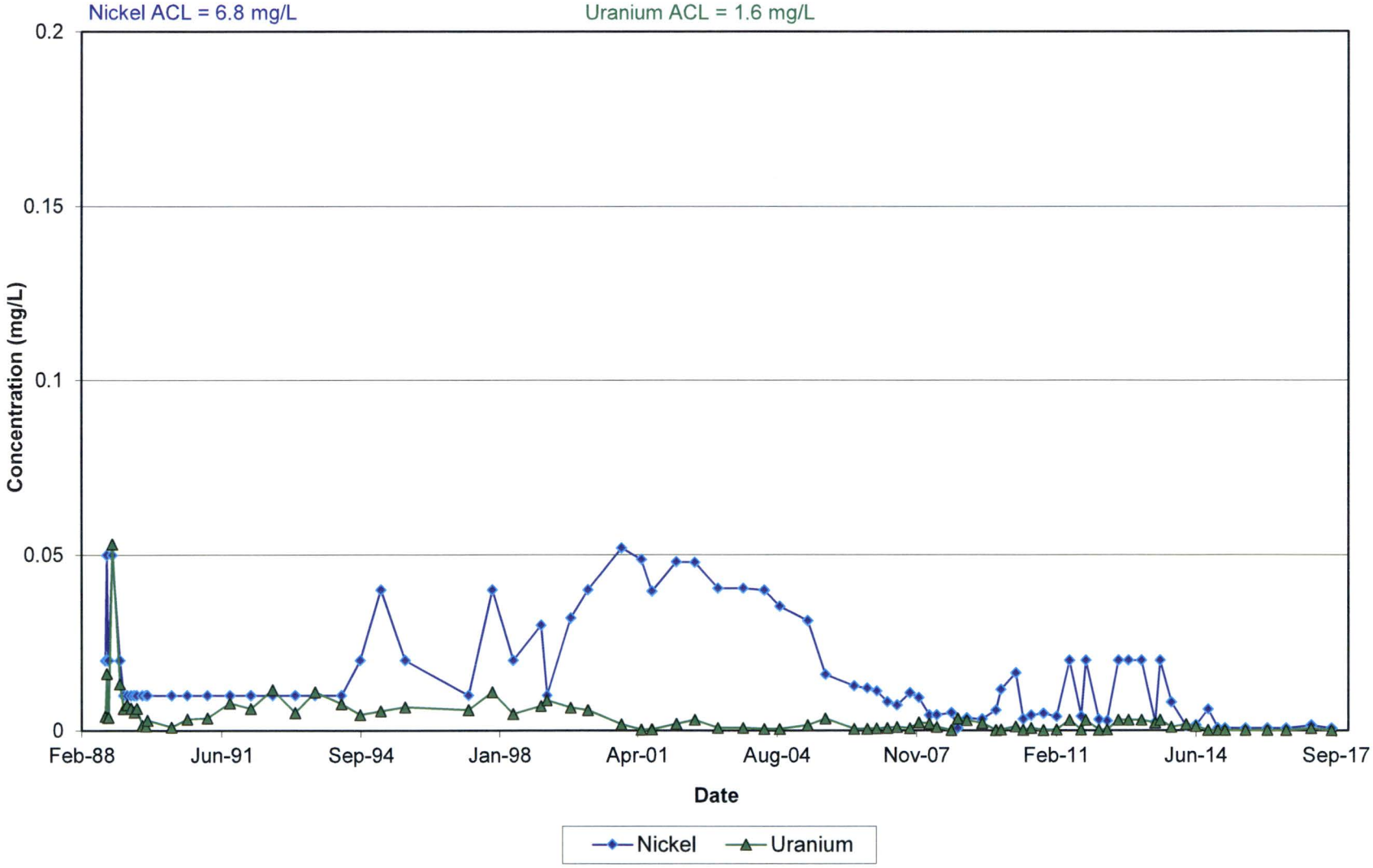
Anions and TDS in Monitoring Well 17-01 KD



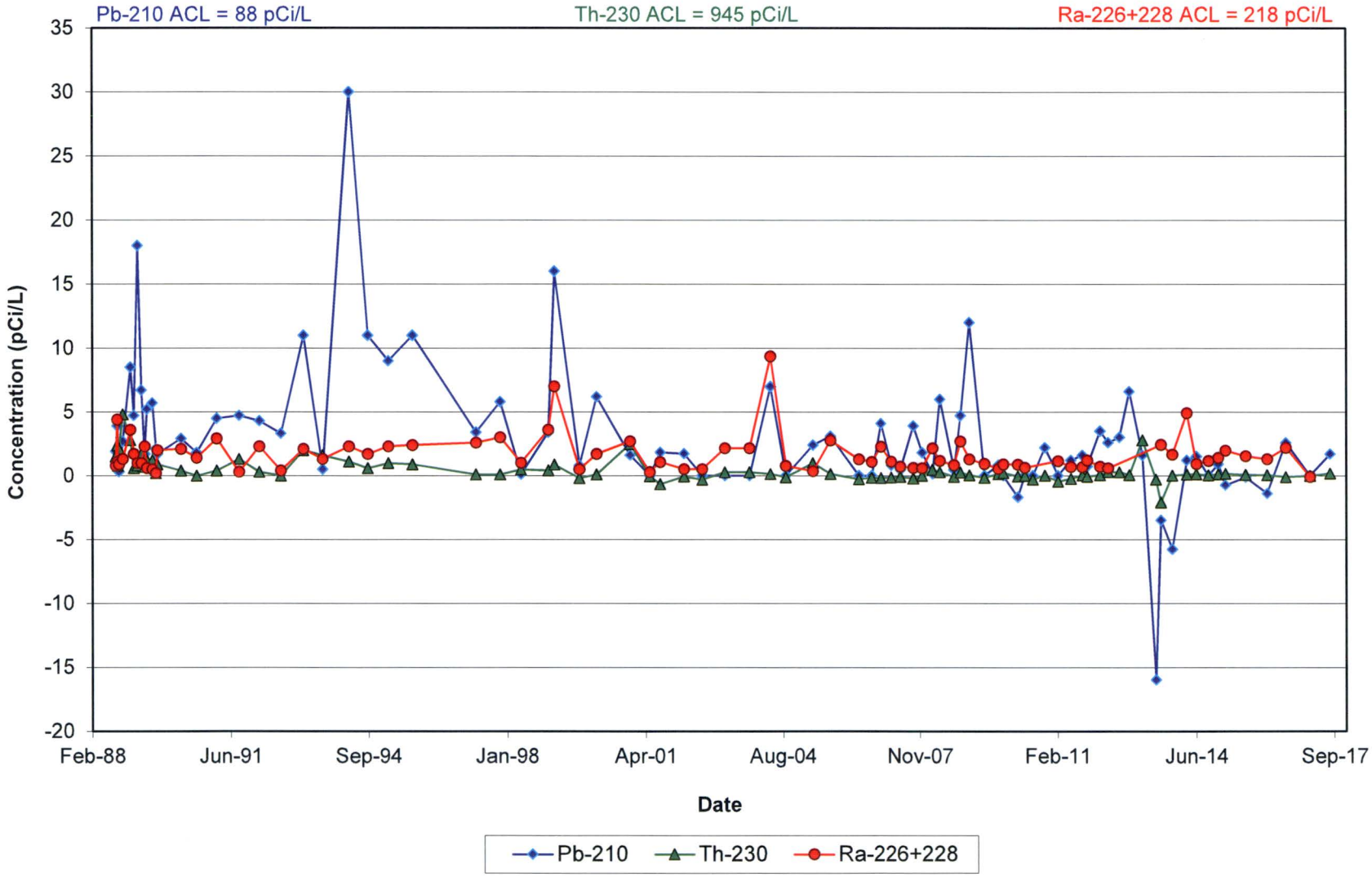
Nitrate in Monitoring Well 17-01 KD



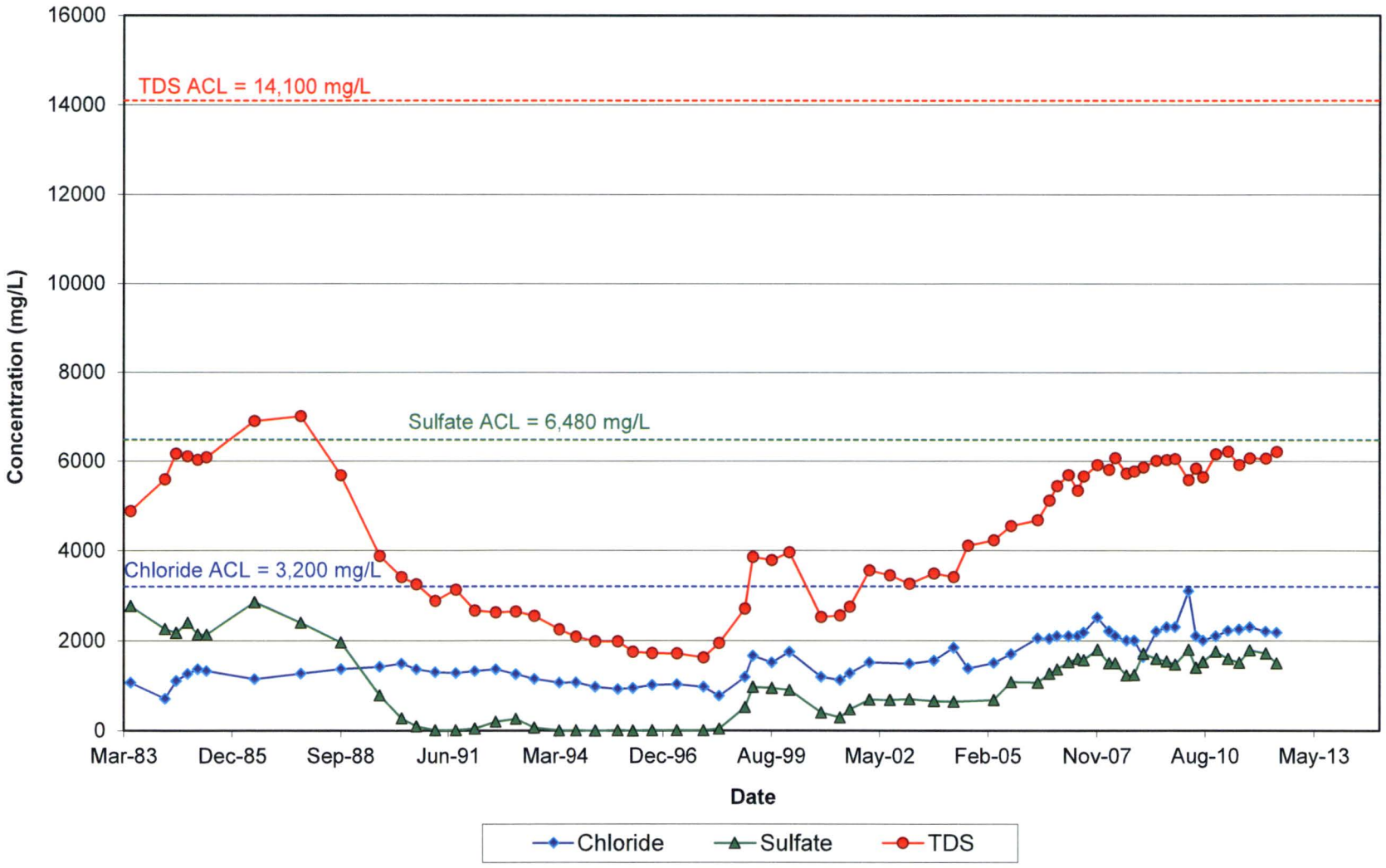
Metals in Monitoring Well 17-01 KD



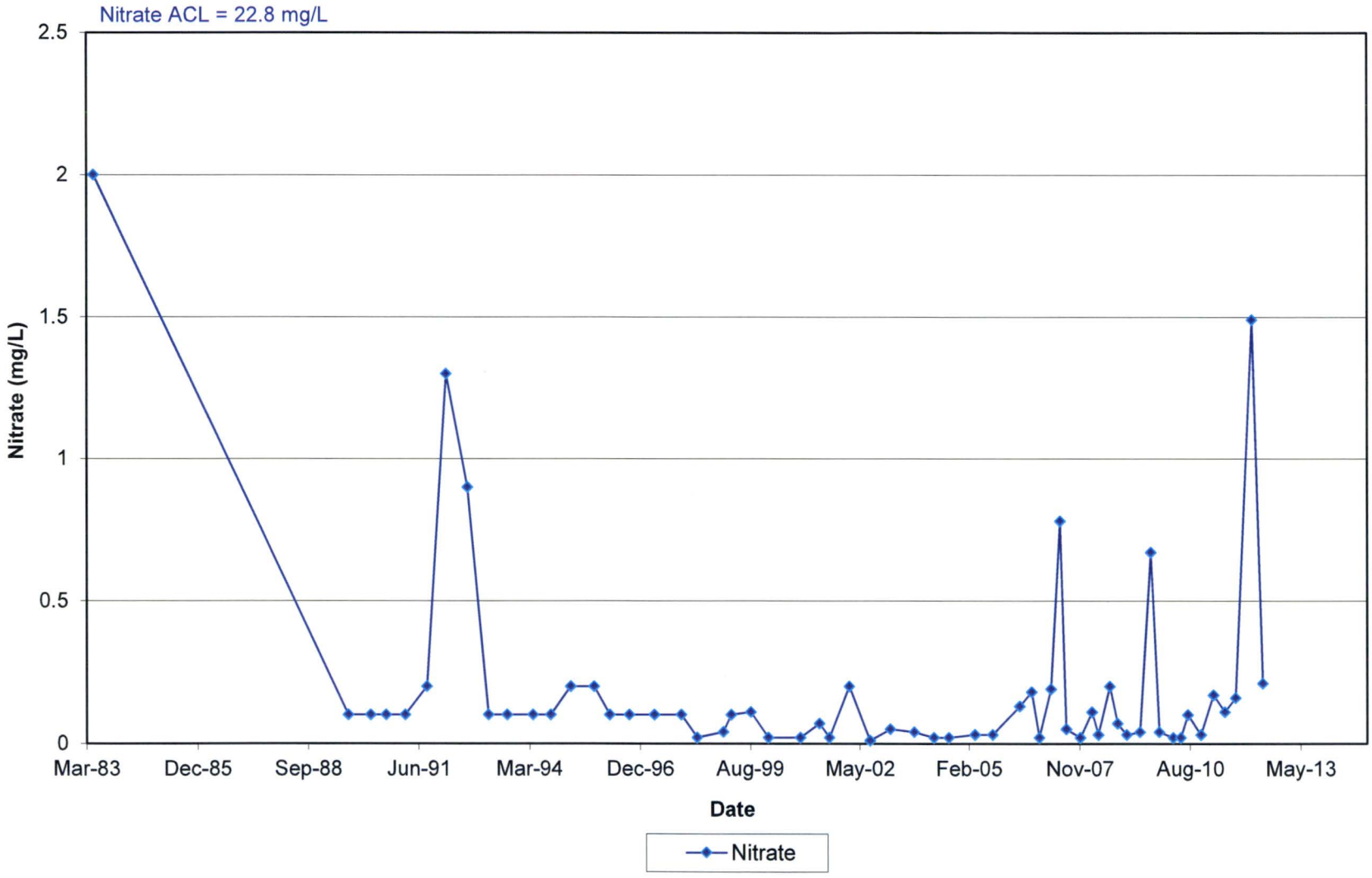
Radionuclides in Monitoring Well 17-01 KD



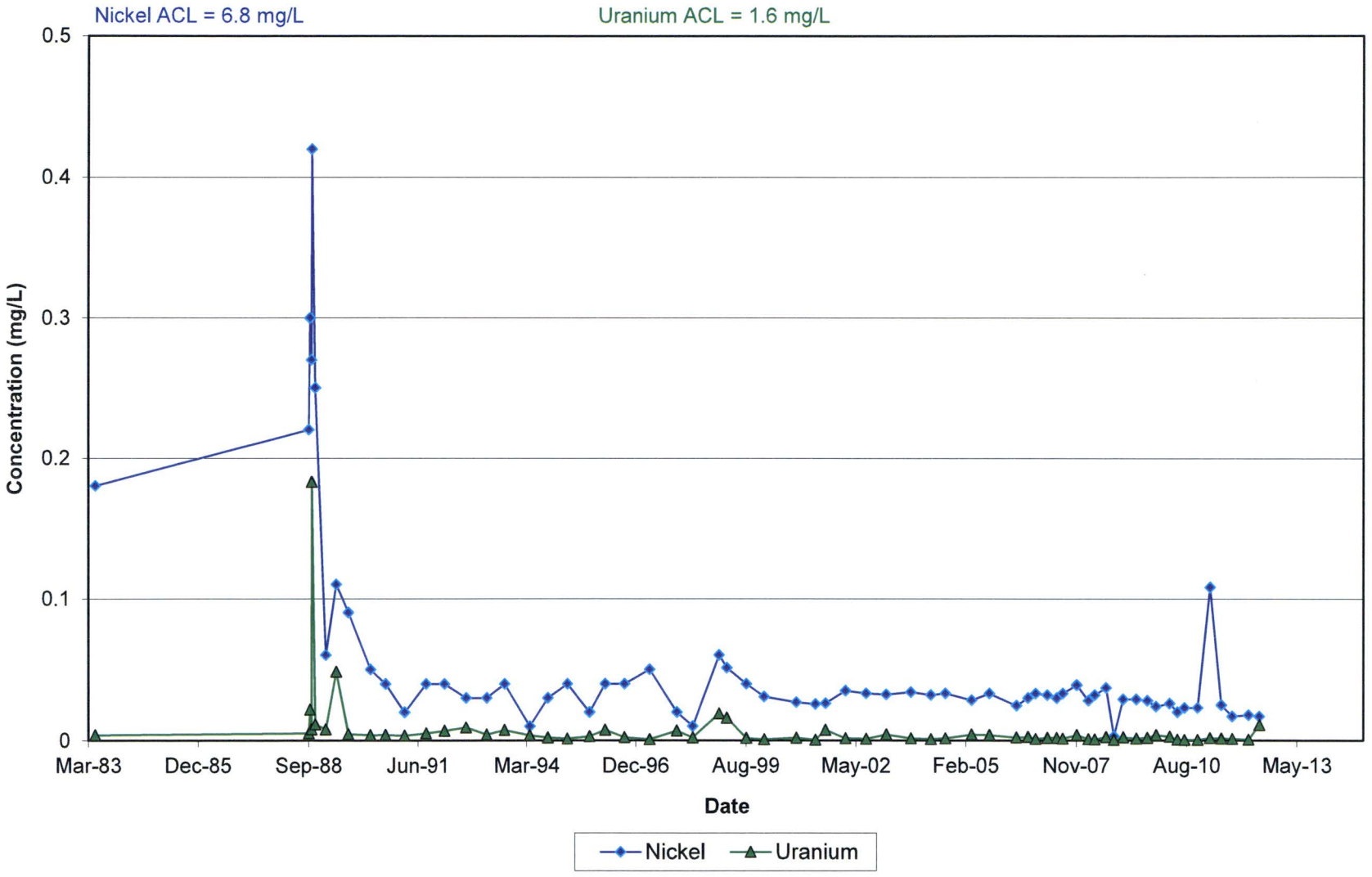
Anions and TDS in Monitoring Well 30-02 KD



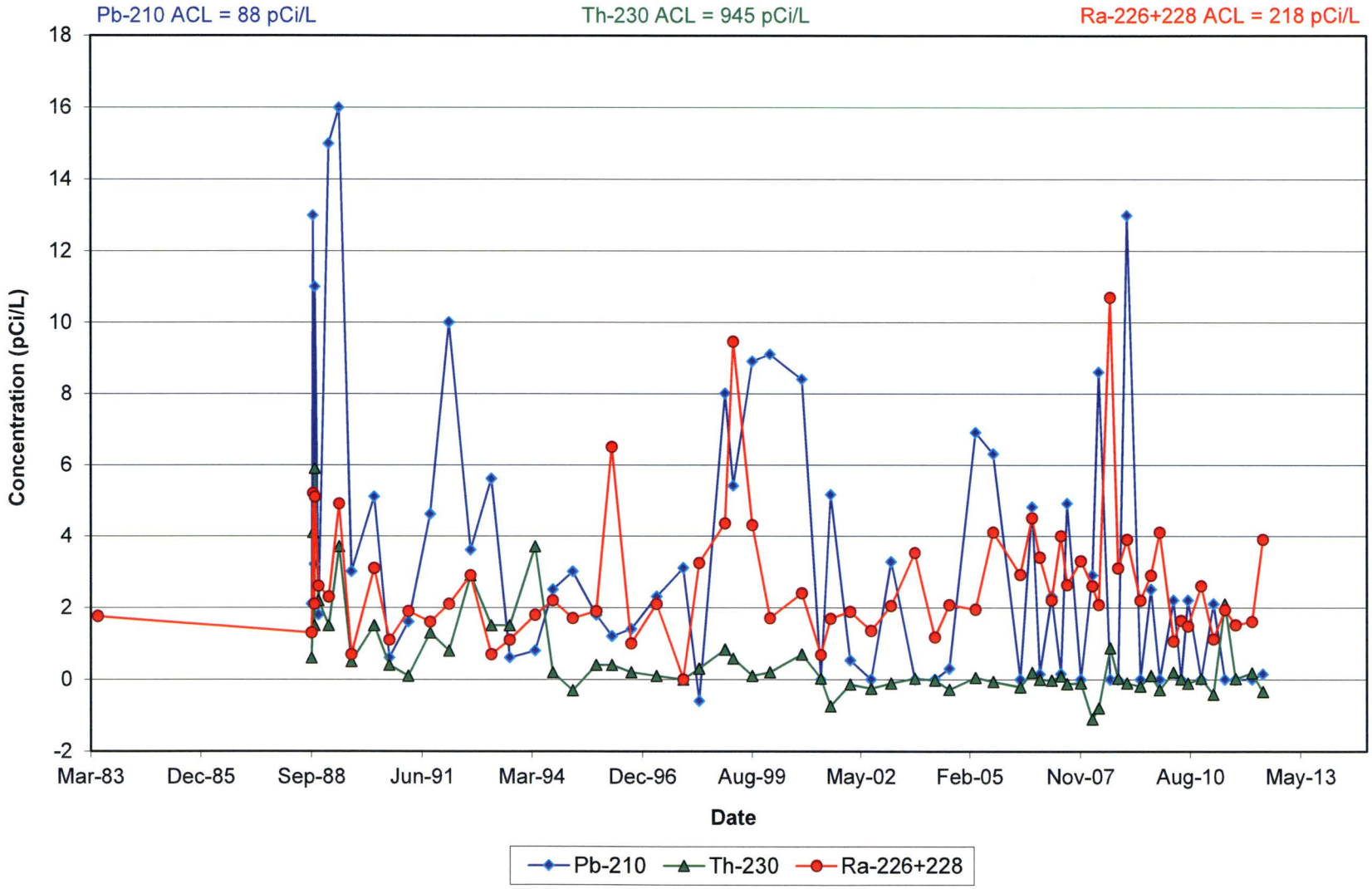
Nitrate in Monitoring Well 30-02 KD



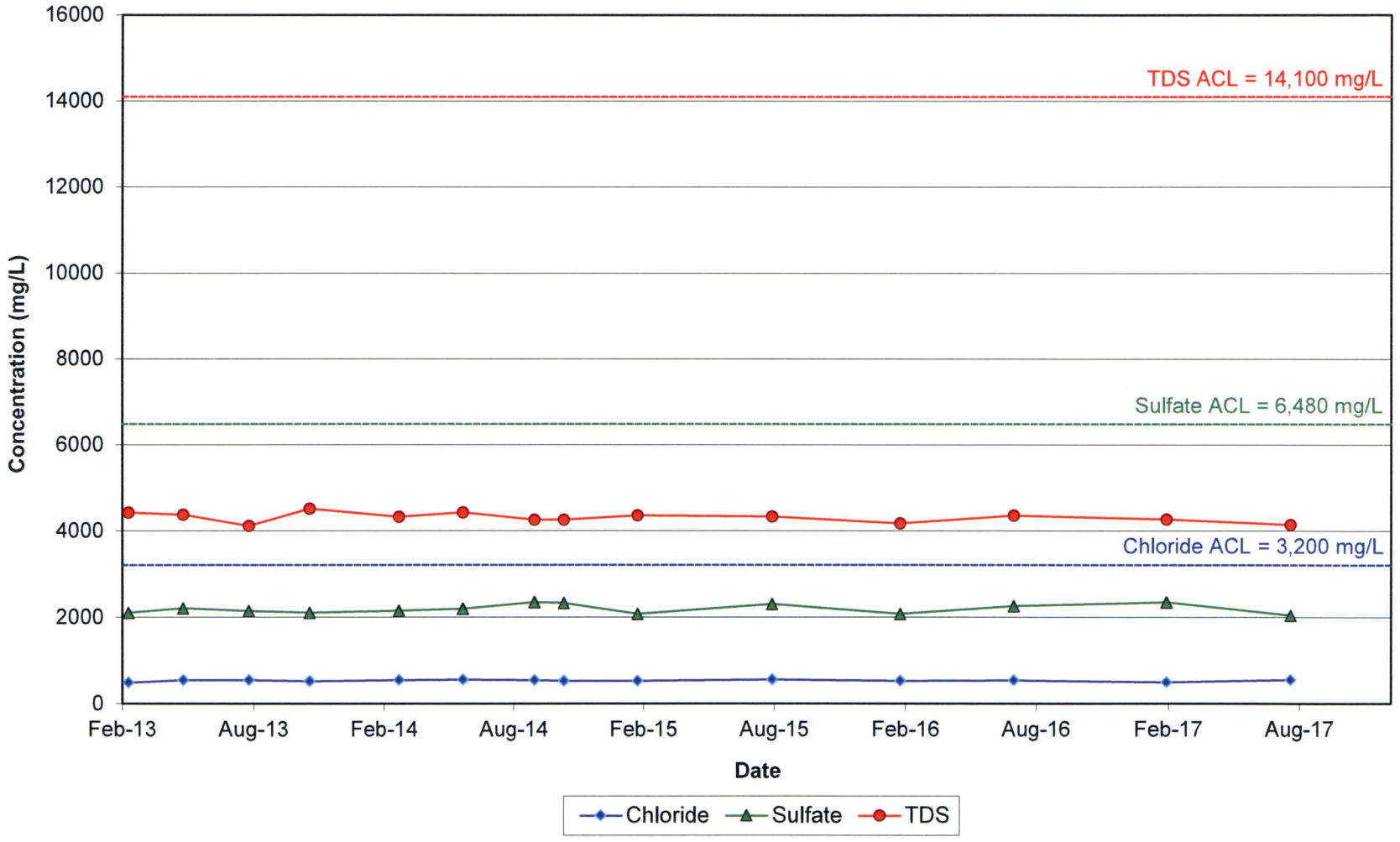
Metals in Monitoring Well 30-02 KD



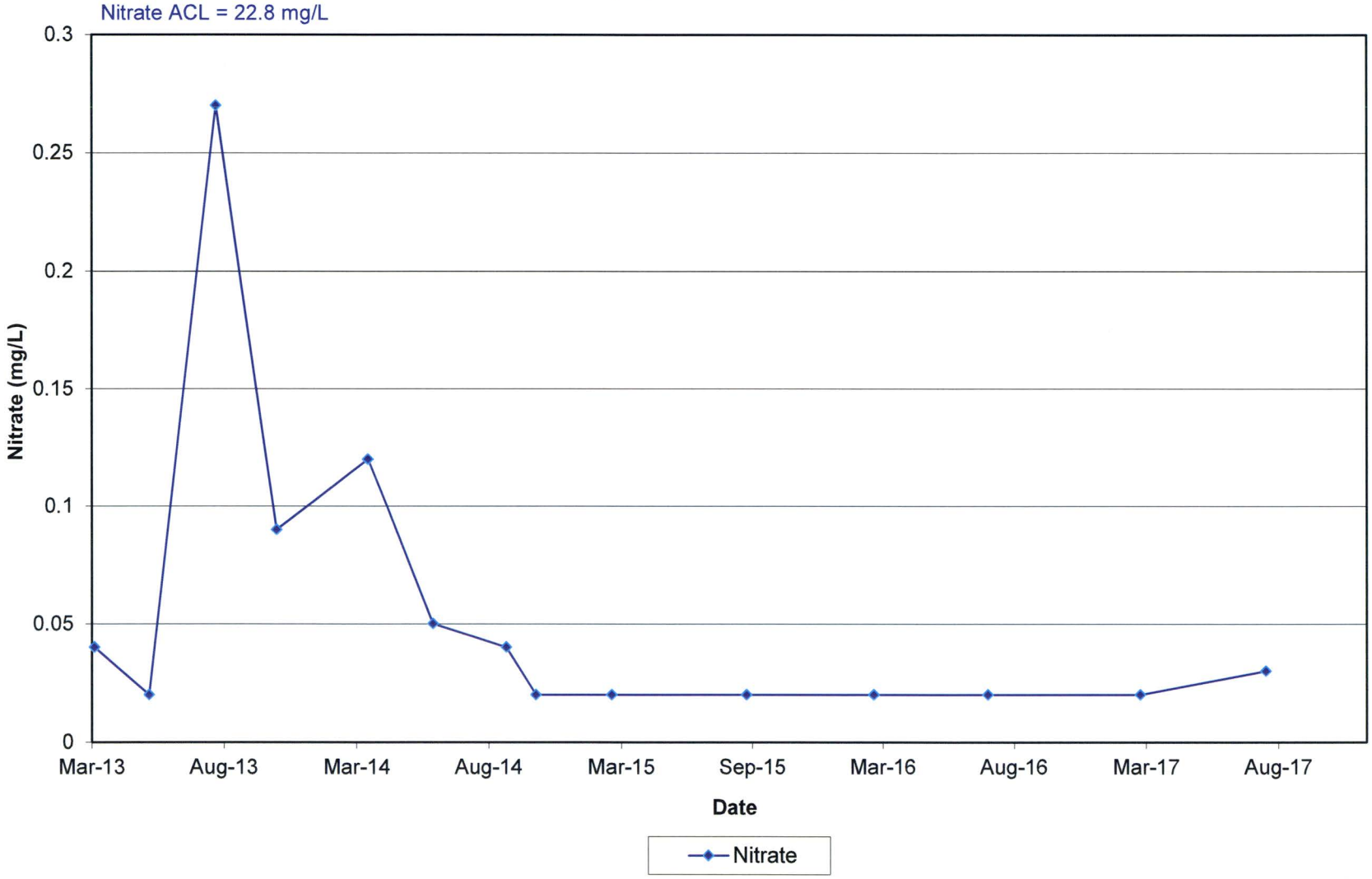
Radionuclides in Monitoring Well 30-02 KD



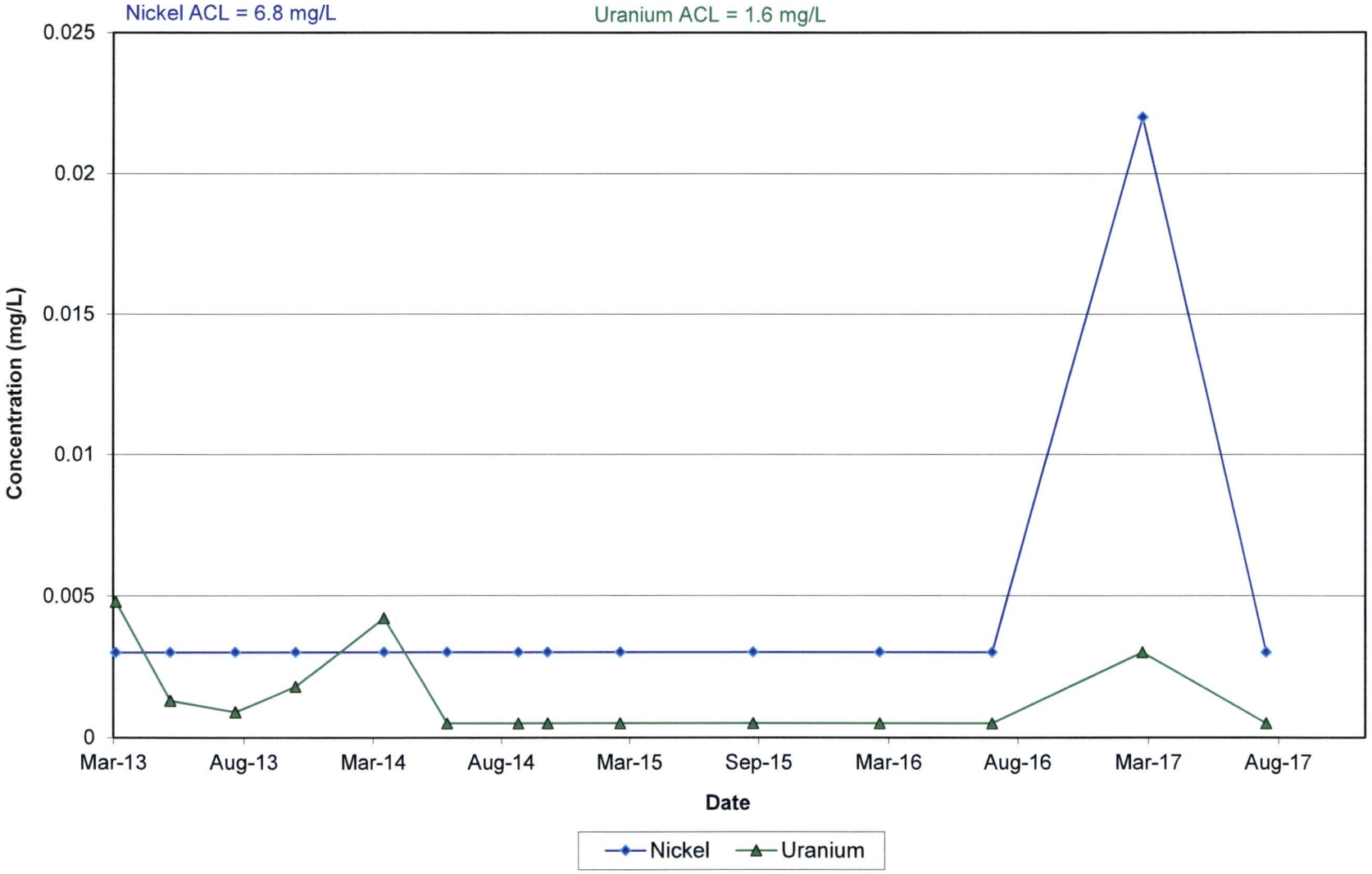
Anions and TDS in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)

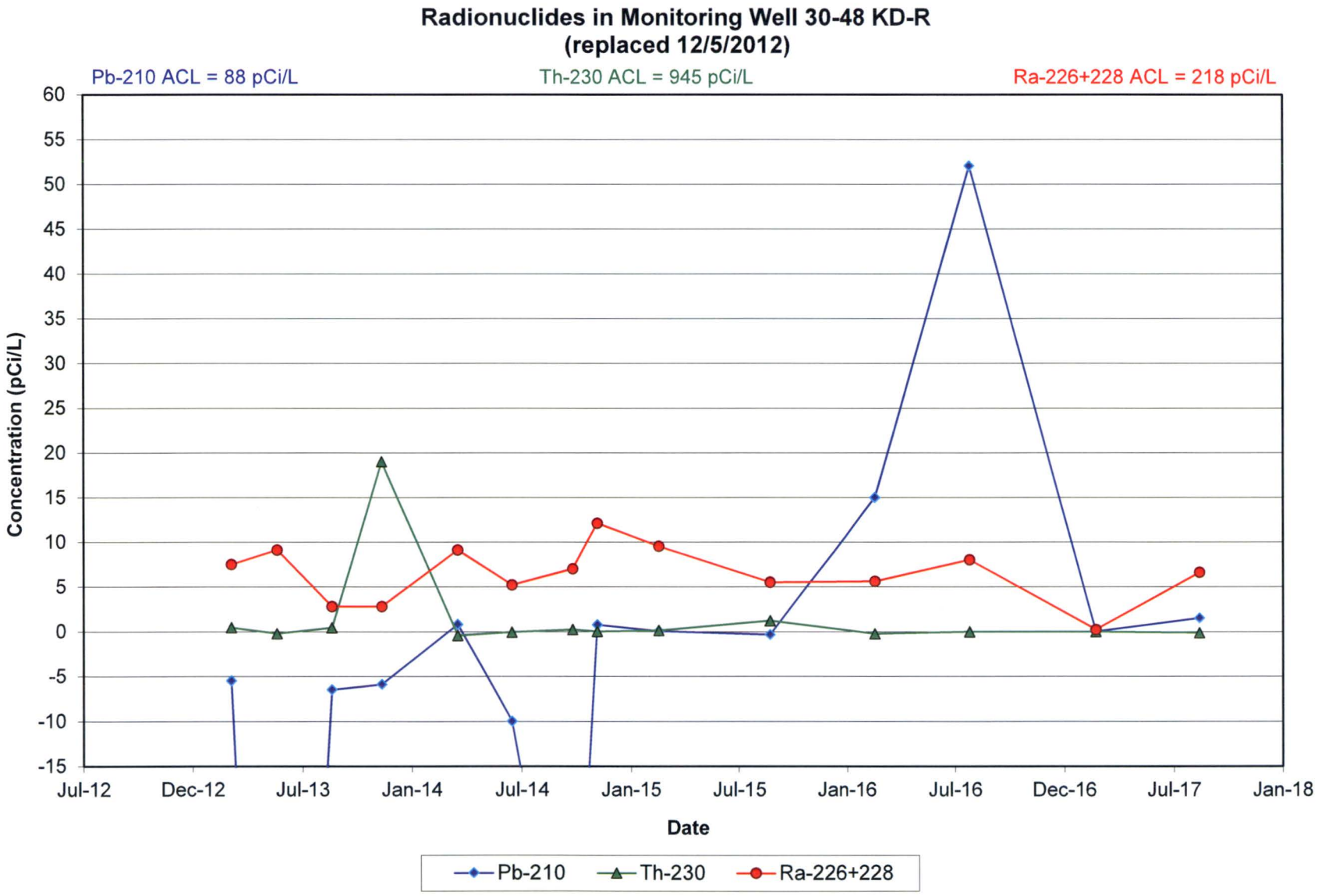


Nitrate in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)

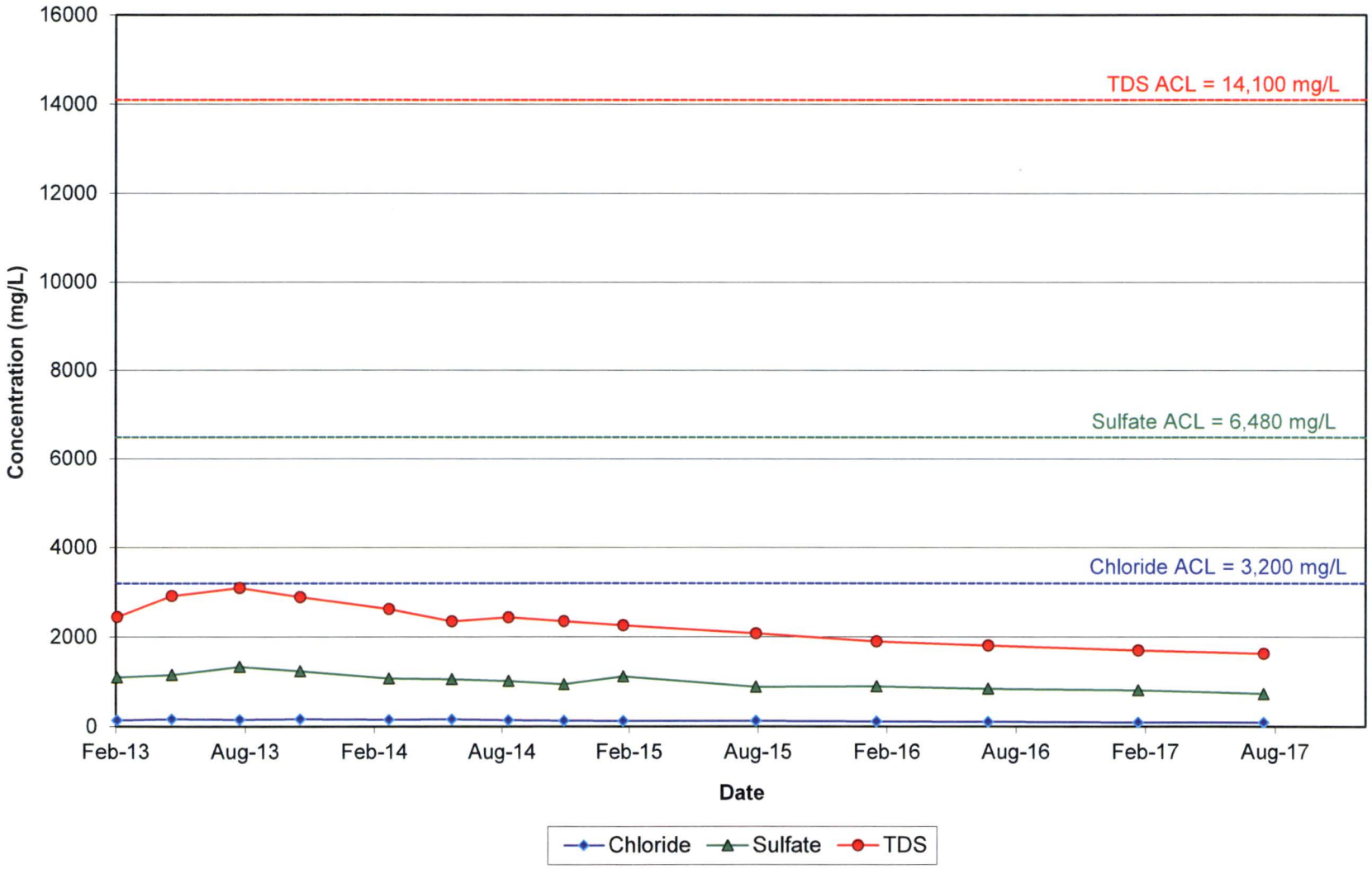


Metals in Monitoring Well 30-48 KD-R (replaced 12/5/2012)

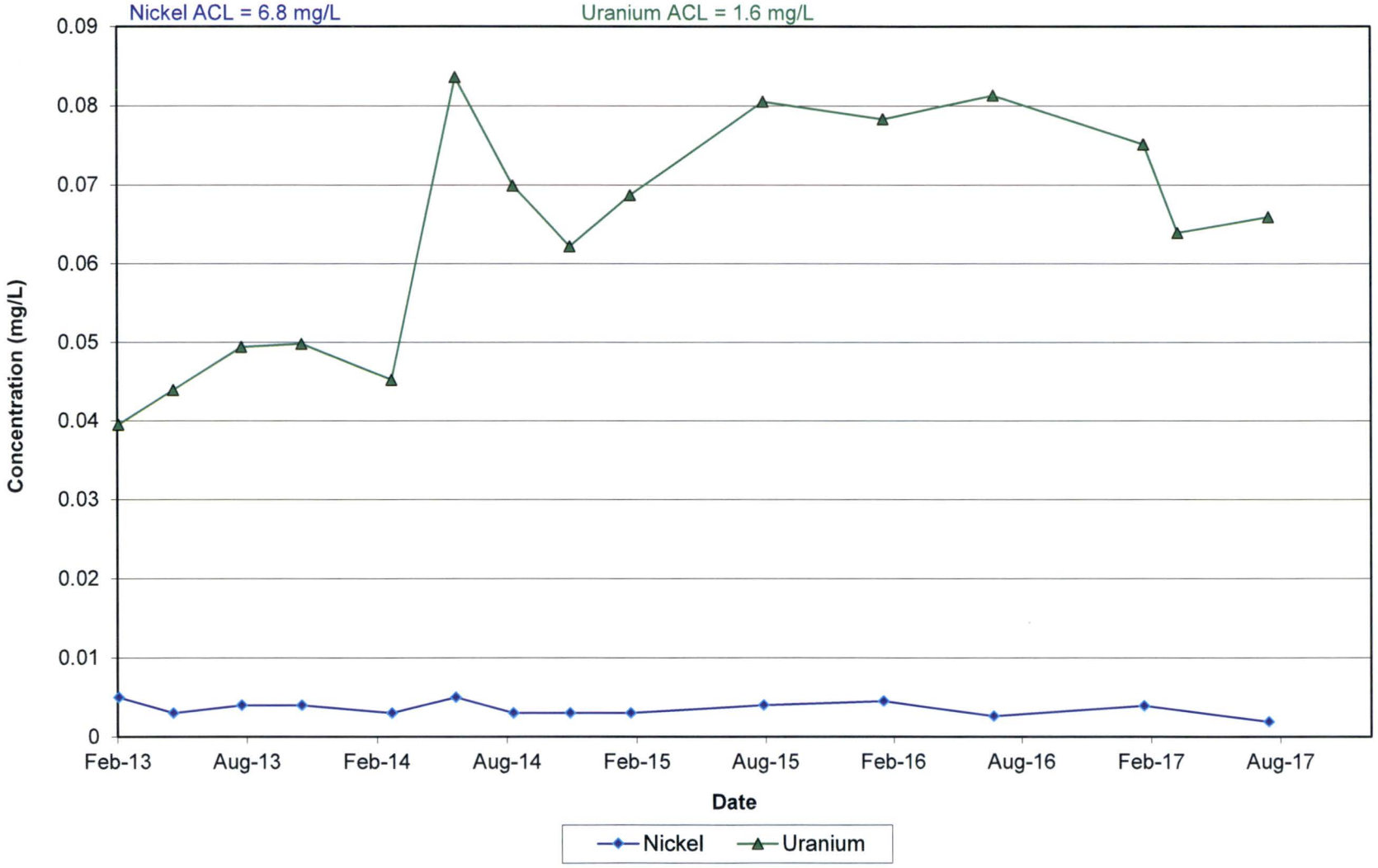



Radionuclides in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)
Pb-210 ACL = 88 pCi/L
Th-230 ACL = 945 pCi/L
Ra-226+228 ACL = 218 pCi/L
Concentration (pCi/L)
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
Jul-12
Dec-12
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Dec-16
Jul-17
Jan-18
Date
Pb-210
Th-230
Ra-226+228

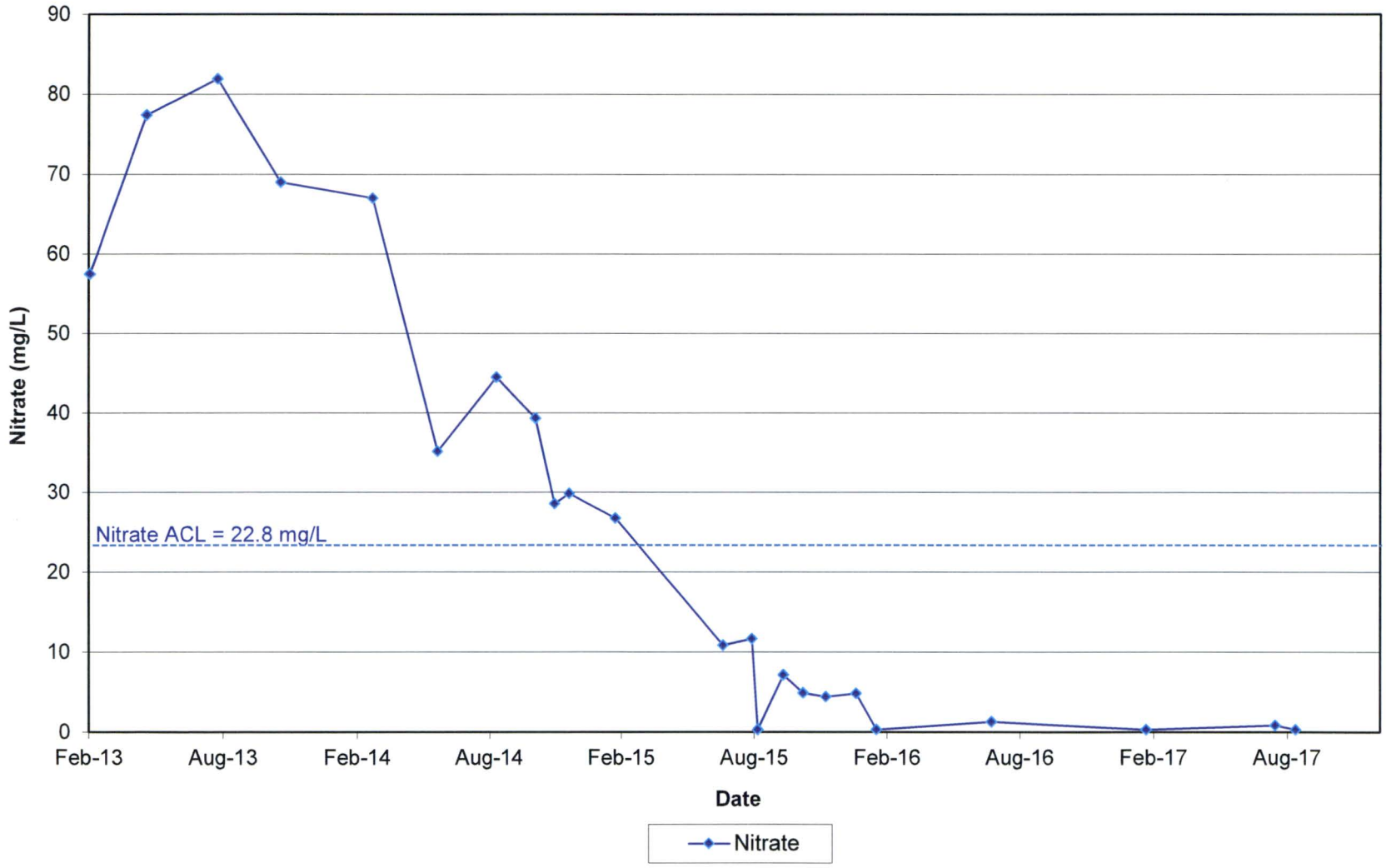
Anions and TDS in Monitoring Well 32-45 KD-R (replaced 11/28/12)



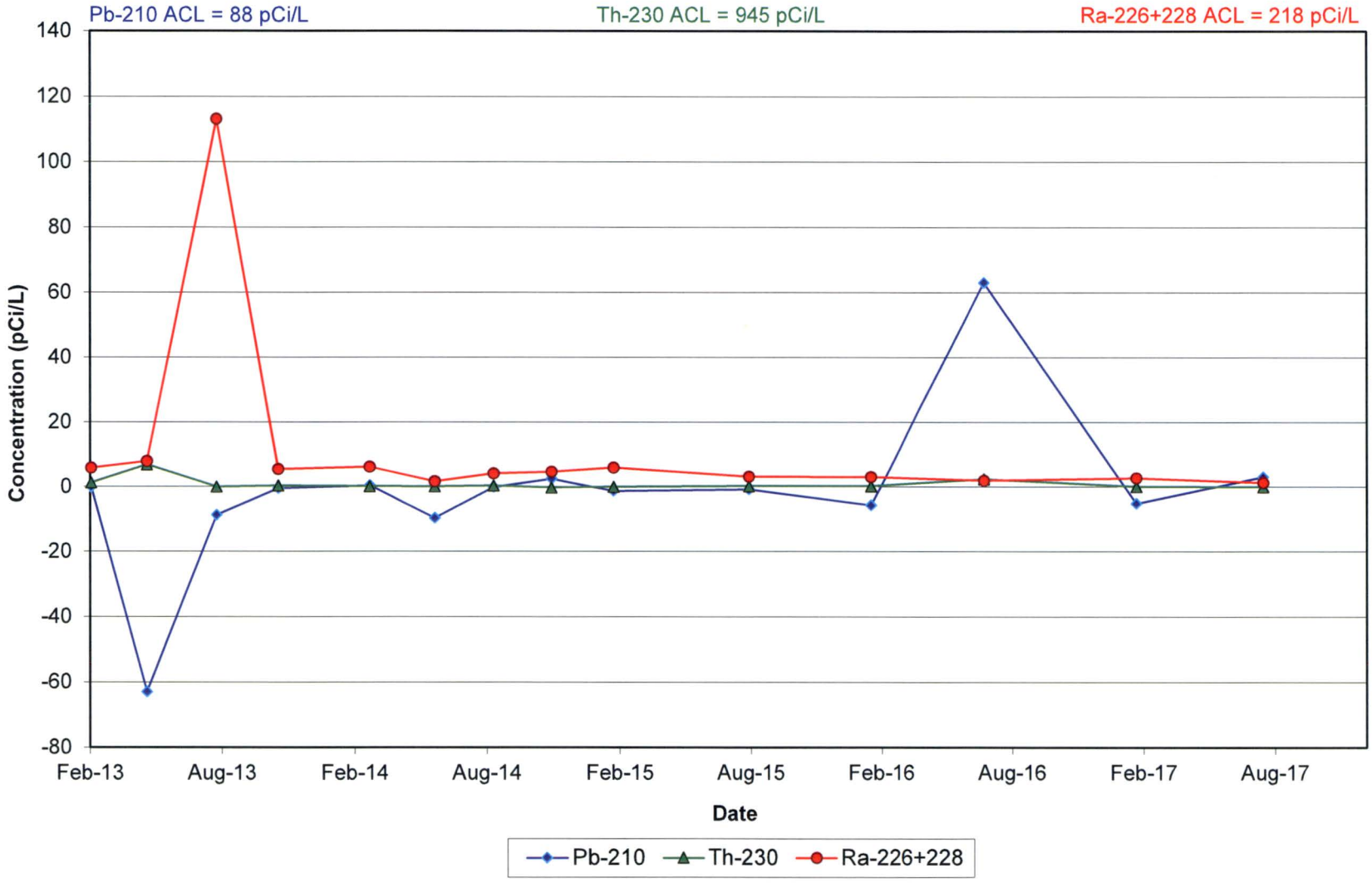
Metals in Monitoring Well 32-45 KD-R (replaced 11/28/12)



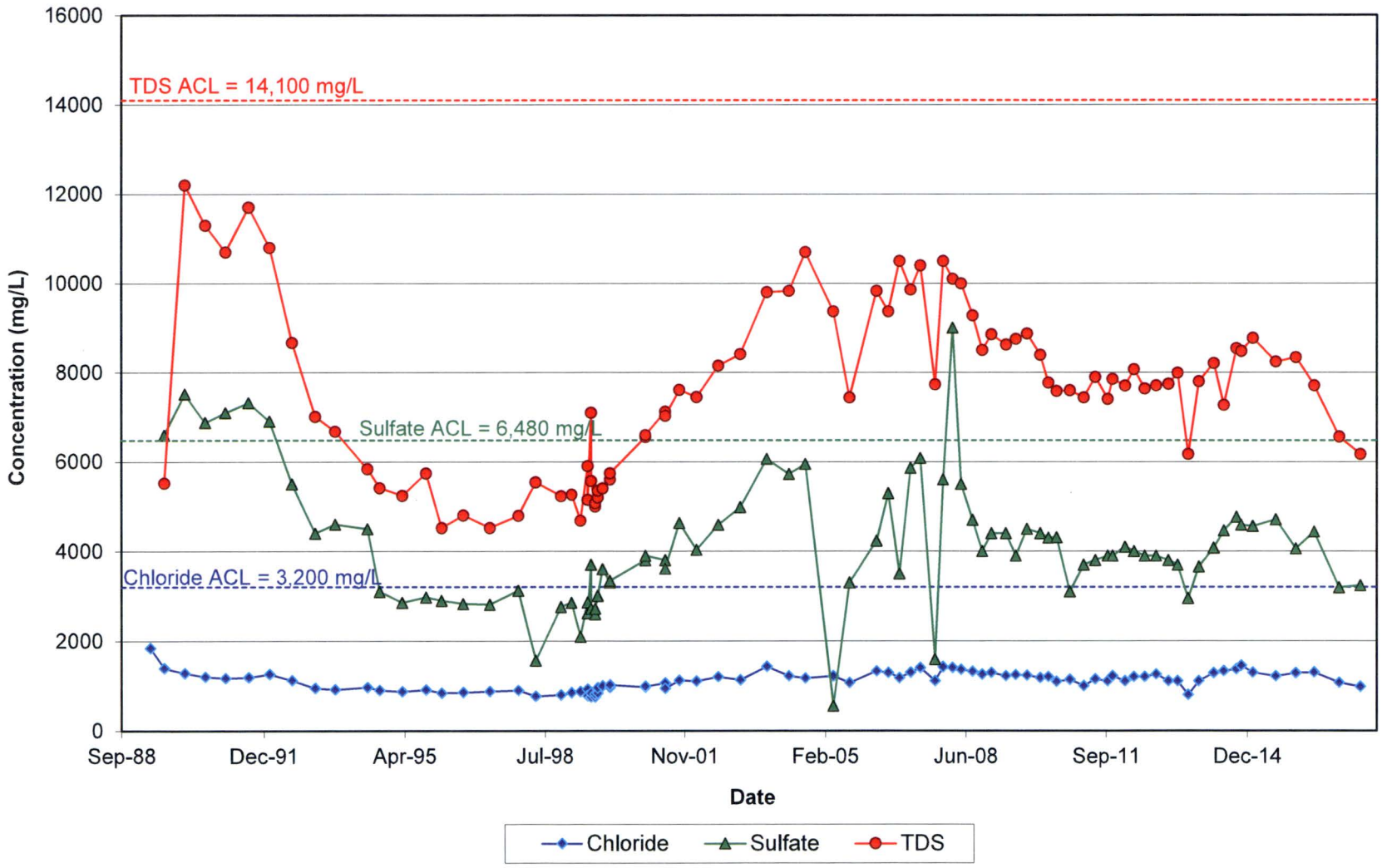
Nitrate in Monitoring Well 32-45 KD-R (replaced 11/28/12)



Radionuclides in Monitoring Well 32-45 KD-R (replaced 11/28/12)



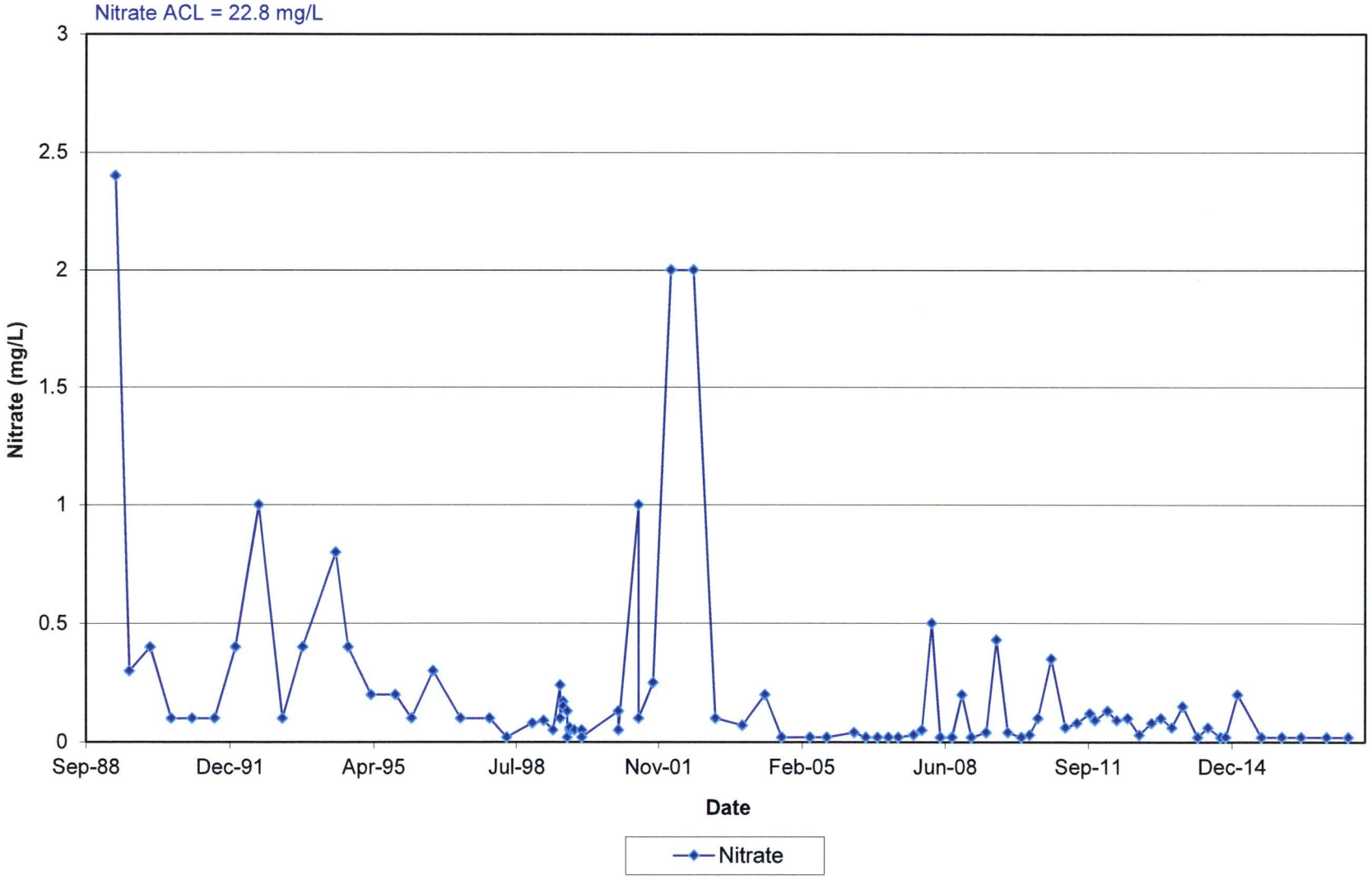
Anions and TDS Well 36-06 KD



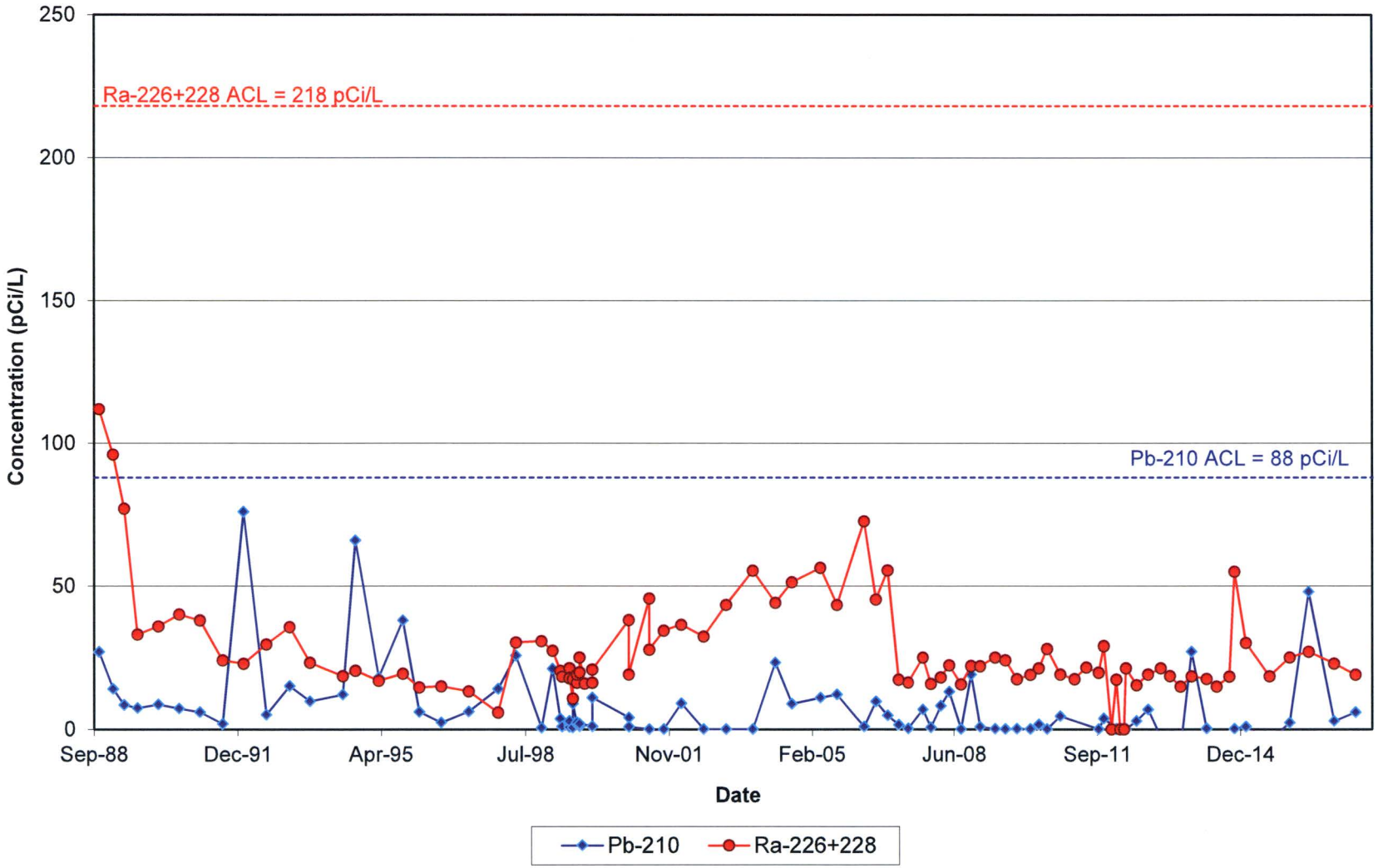
Metals in Monitoring Well 36-06 KD

INTERA

Nitrate in Monitoring Well 36-06 KD



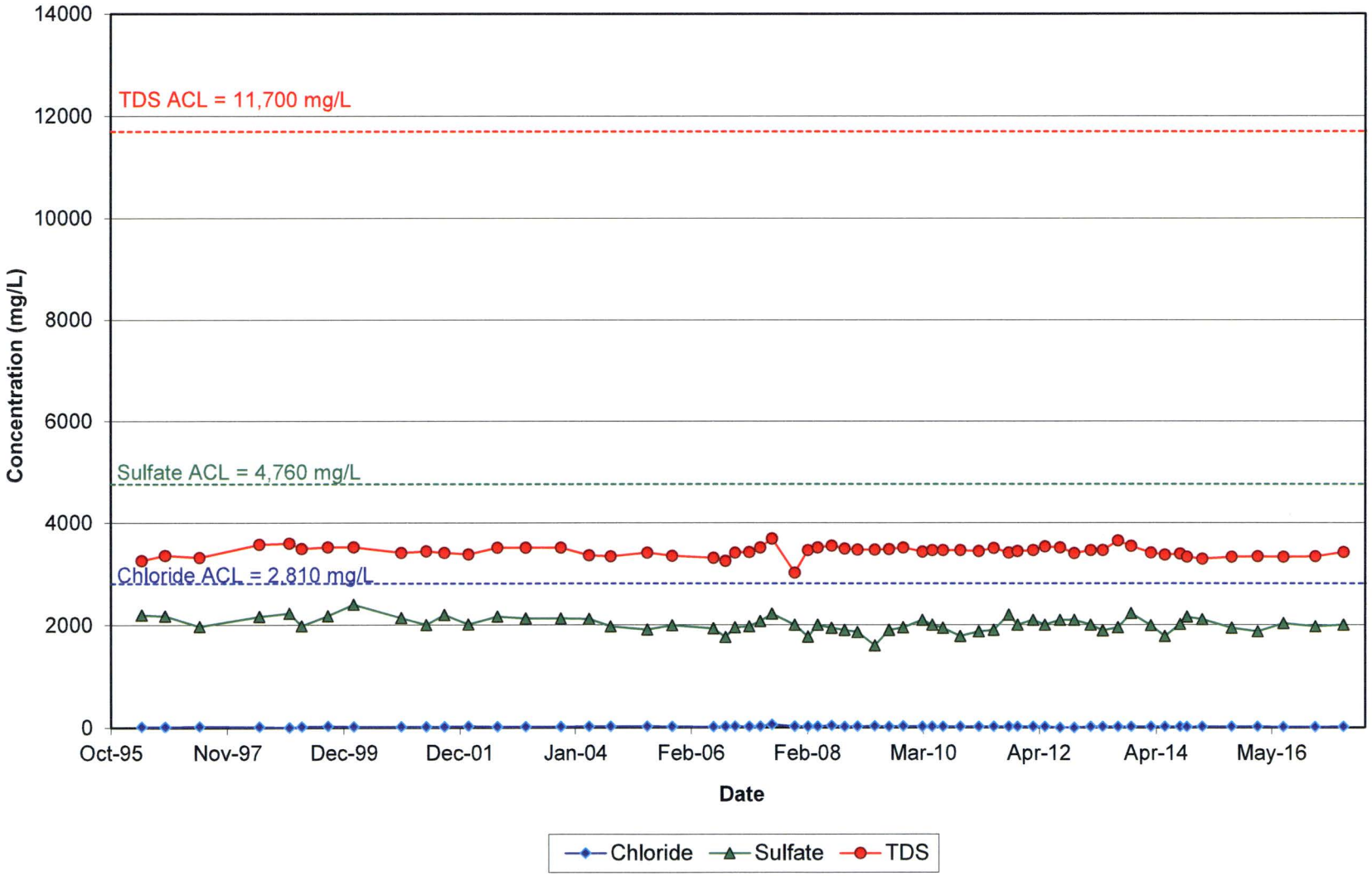
Radionuclides in Monitoring Well 36-06 KD



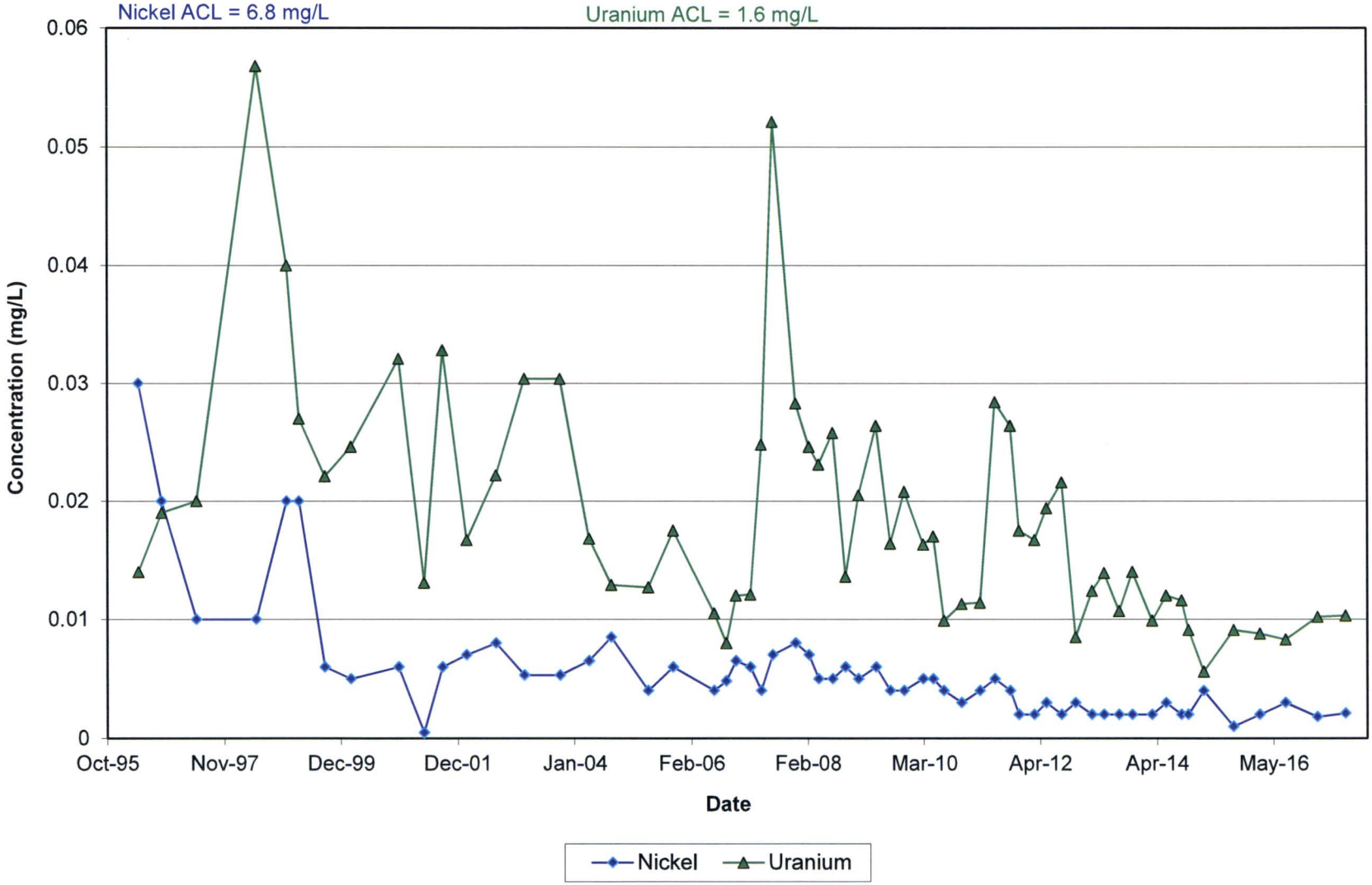
Stability Monitoring Plan
Time Versus Concentration Plots

Tres Hermanos B

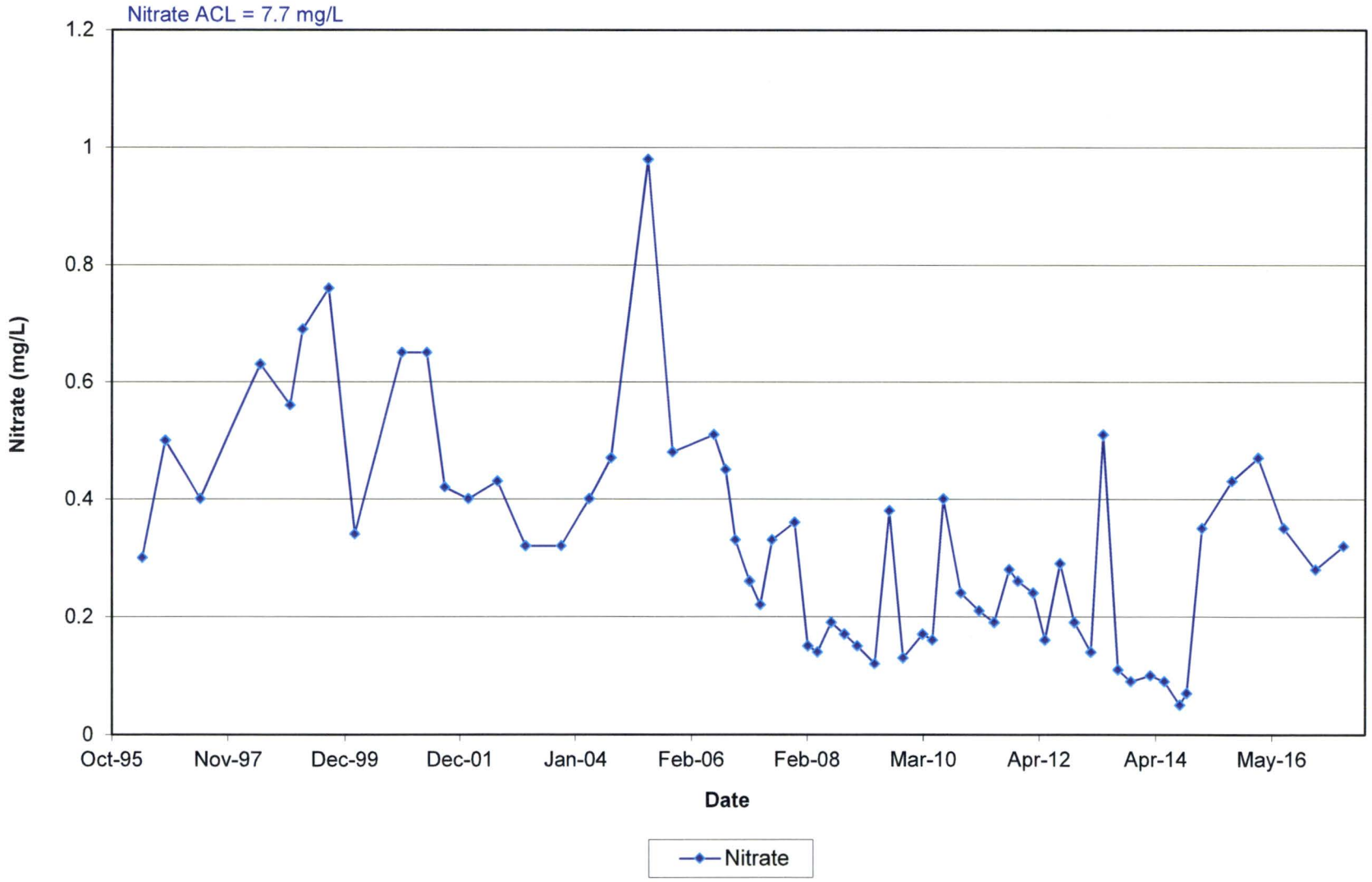
Anions and TDS in Monitoring Well 19-77 TRB



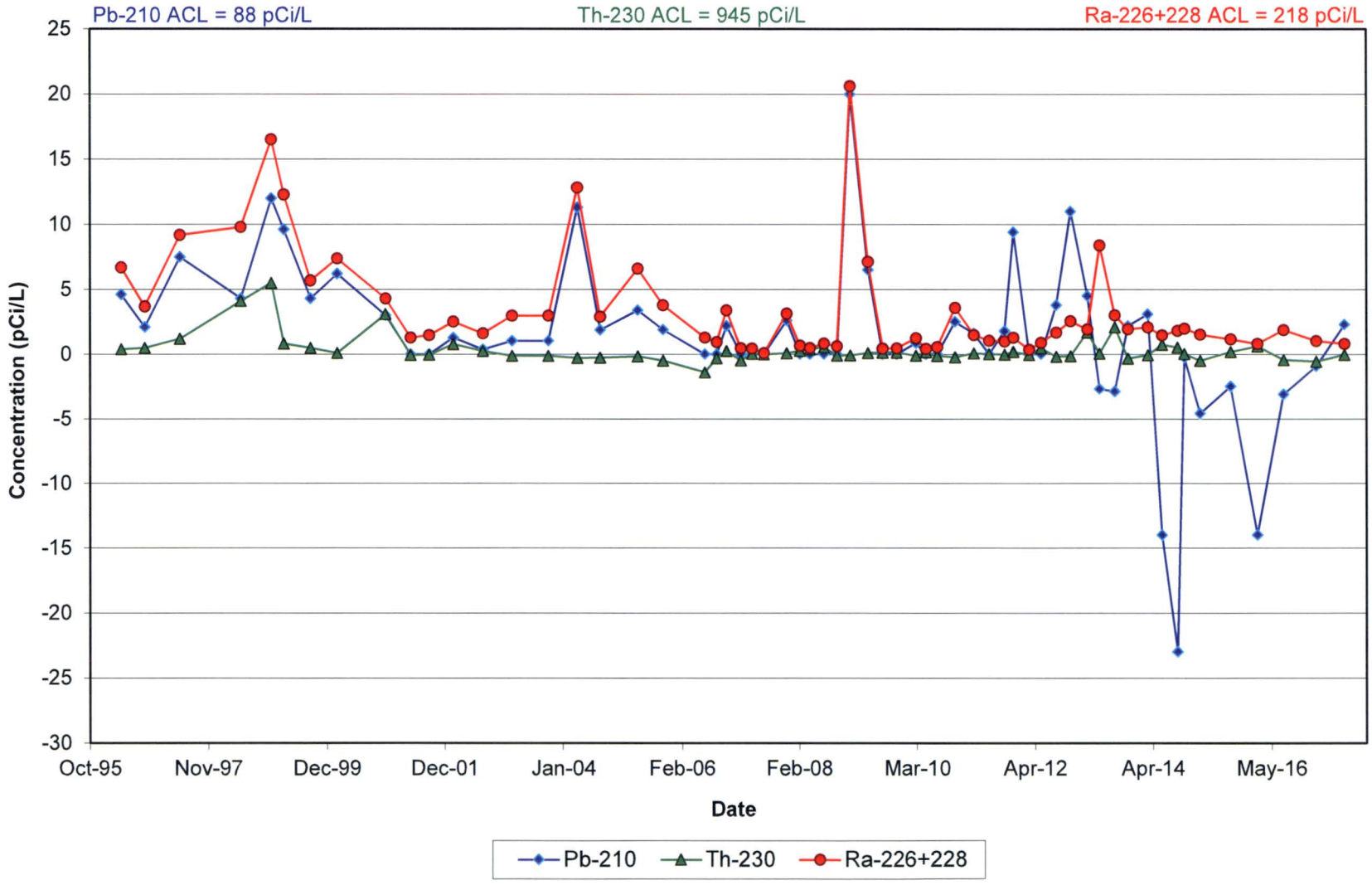
Metals in Monitoring Well 19-77 TRB



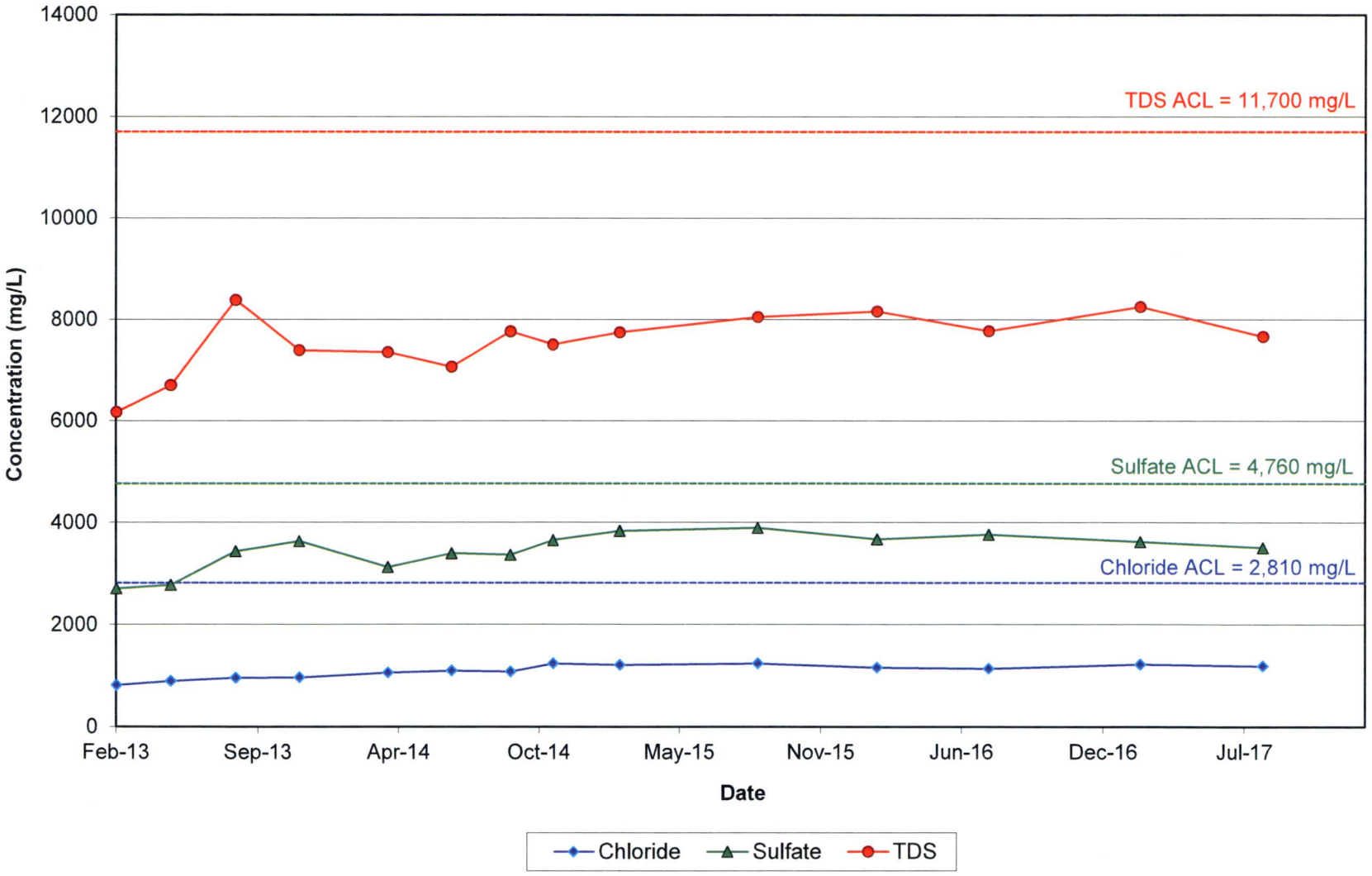
Nitrate in Monitoring Well 19-77 TRB



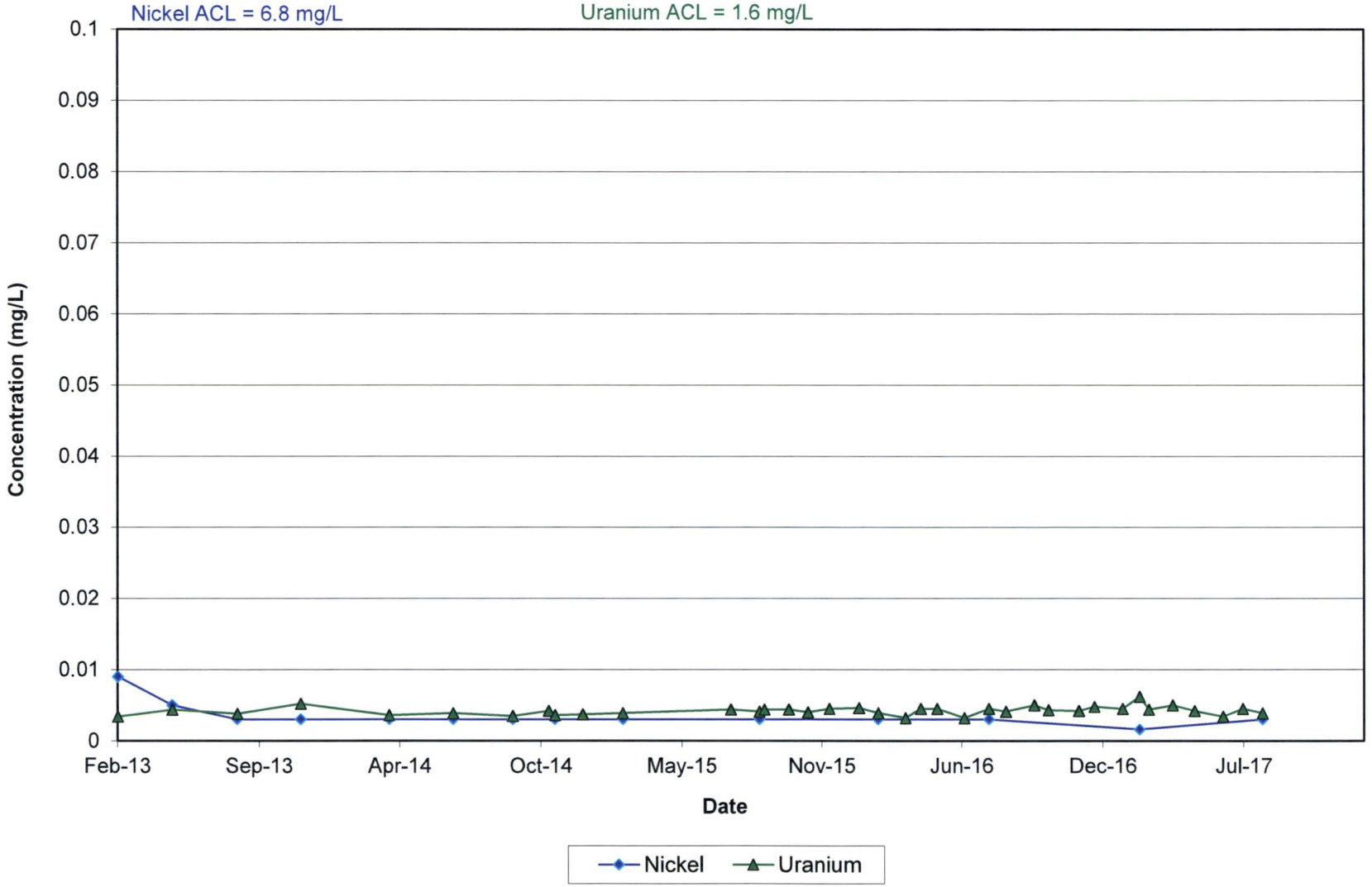
Radionuclides in Monitoring Well 19-77 TRB



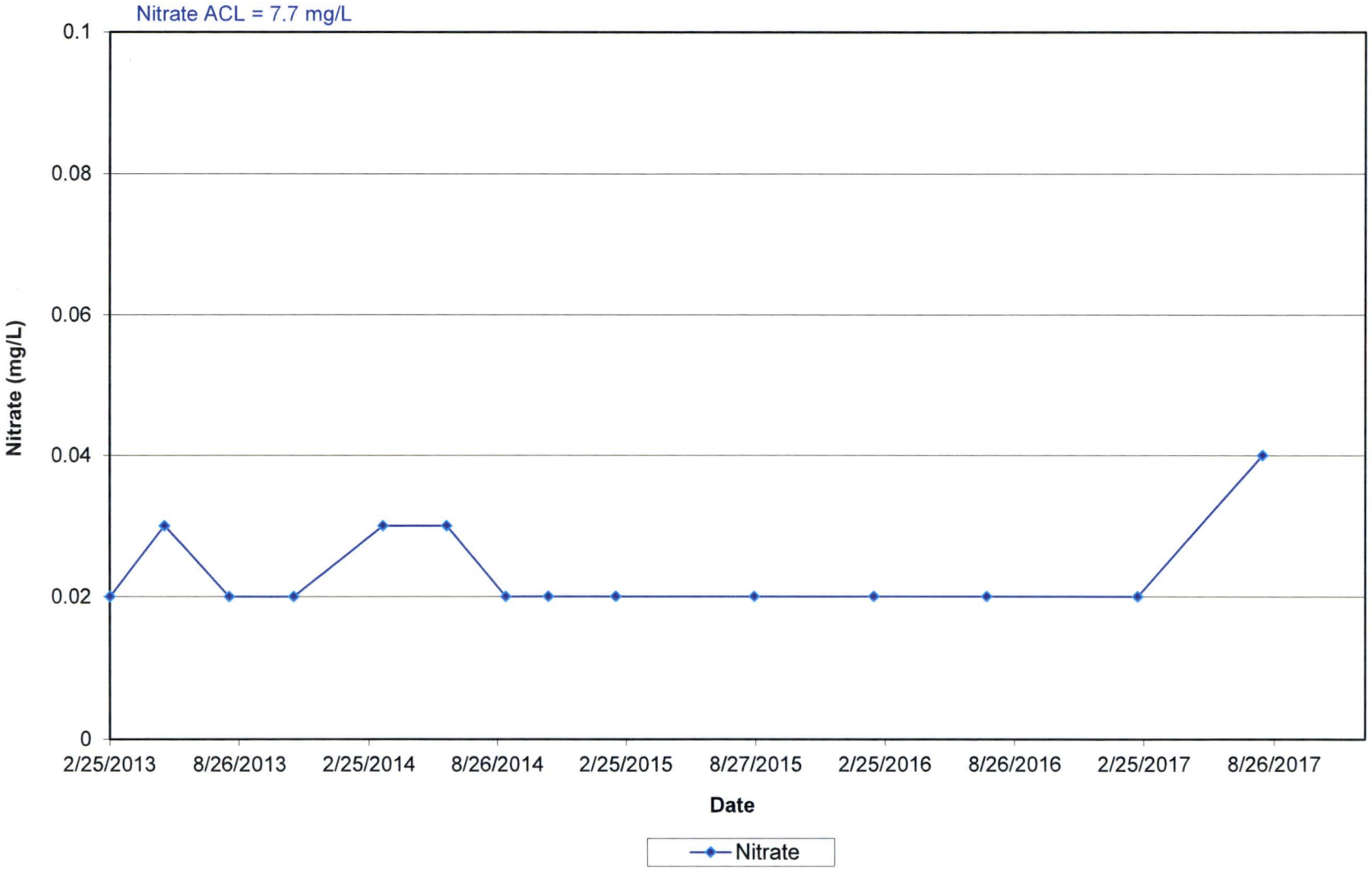
Anions and TDS in Monitoring Well 31-02 TRB-R (replaced 12/14/2012)



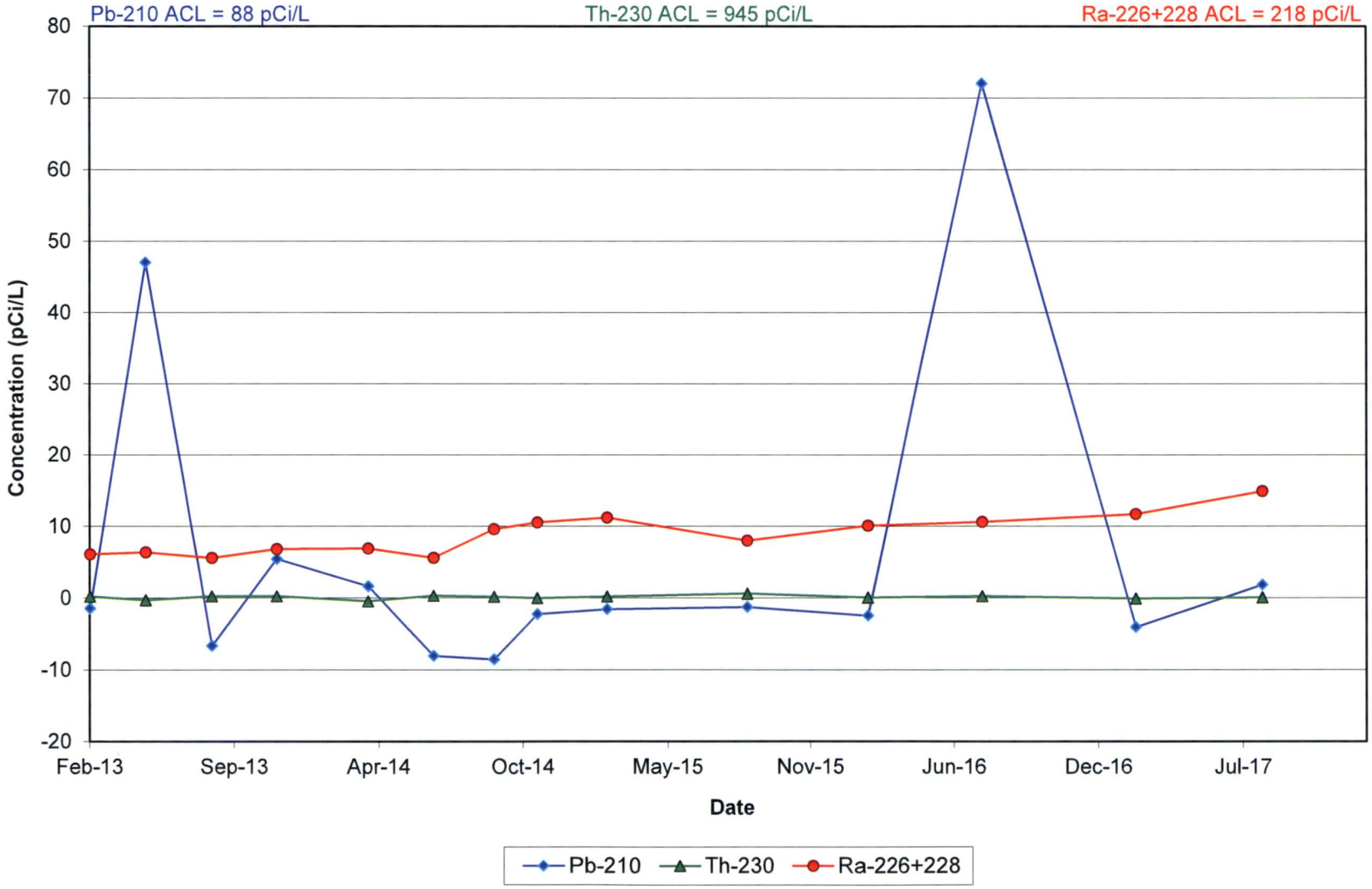
Metals in Monitoring Well 31-02 TRB-R (replaced 12/14/2012)



Nitrate in Monitoring Well 31-02 TRB-R (replaced 12/14/2012)

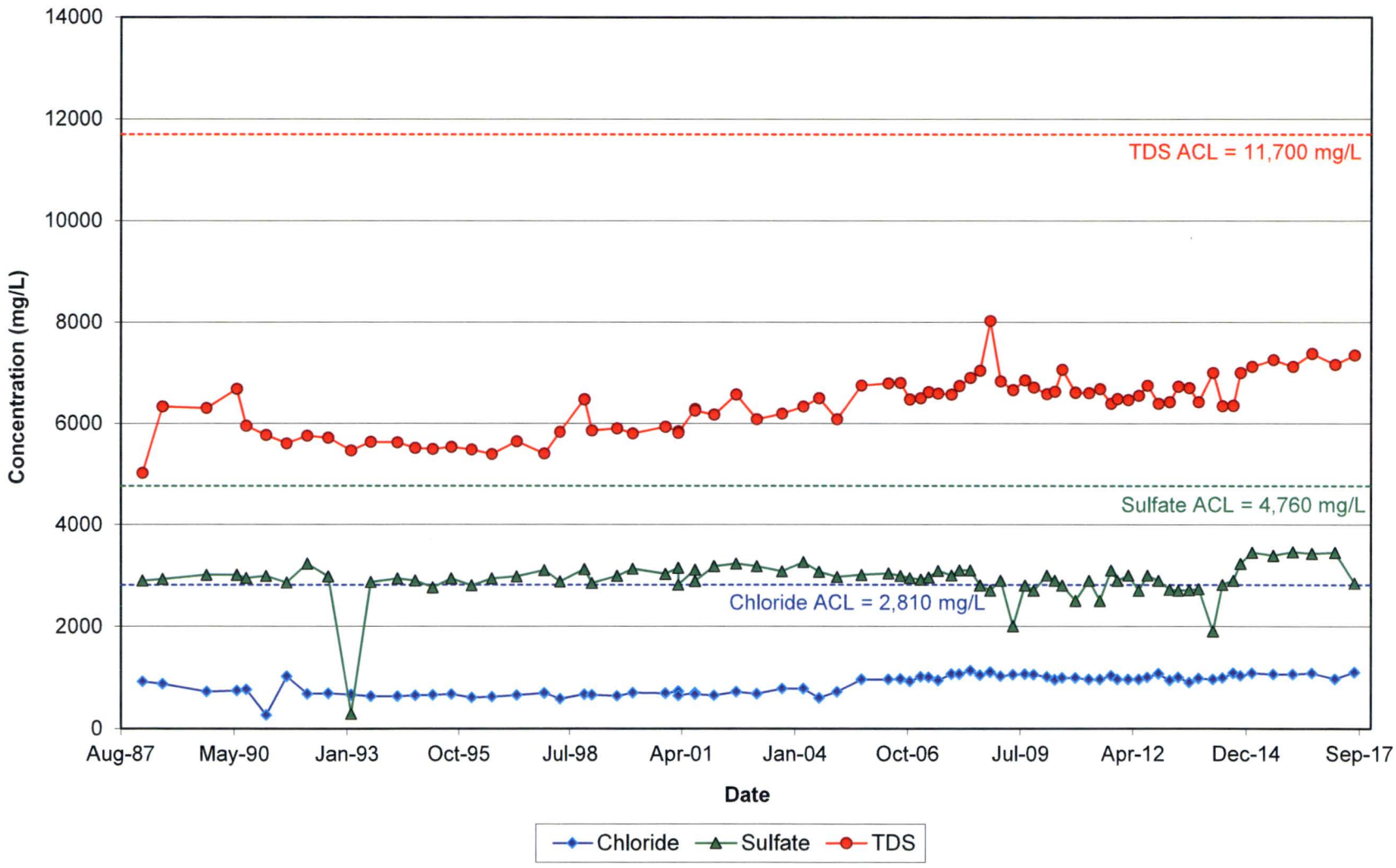


Radionuclides in Monitoring Well 31-02 TRB-R (replaced 12/14/2012)

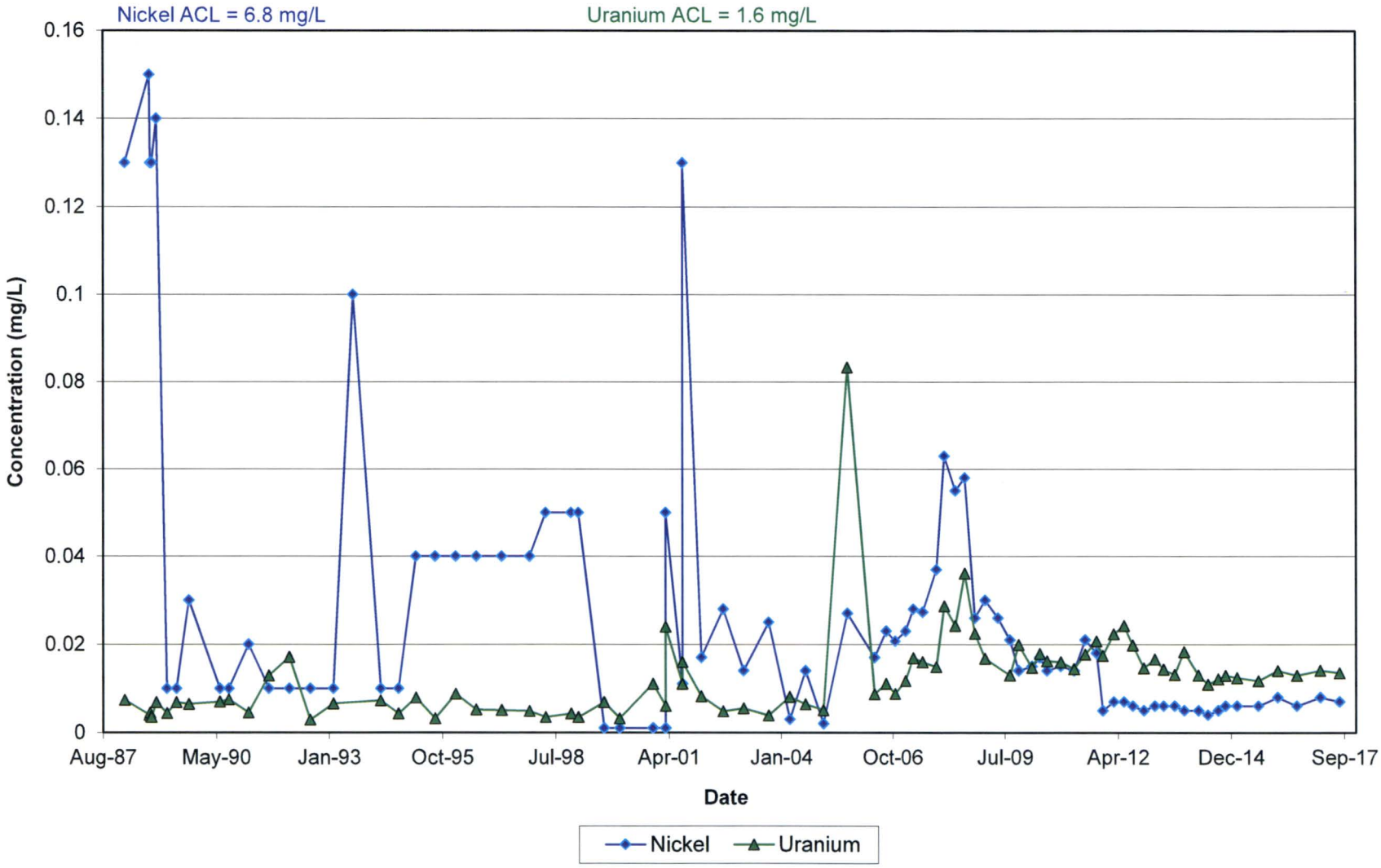


INTERA

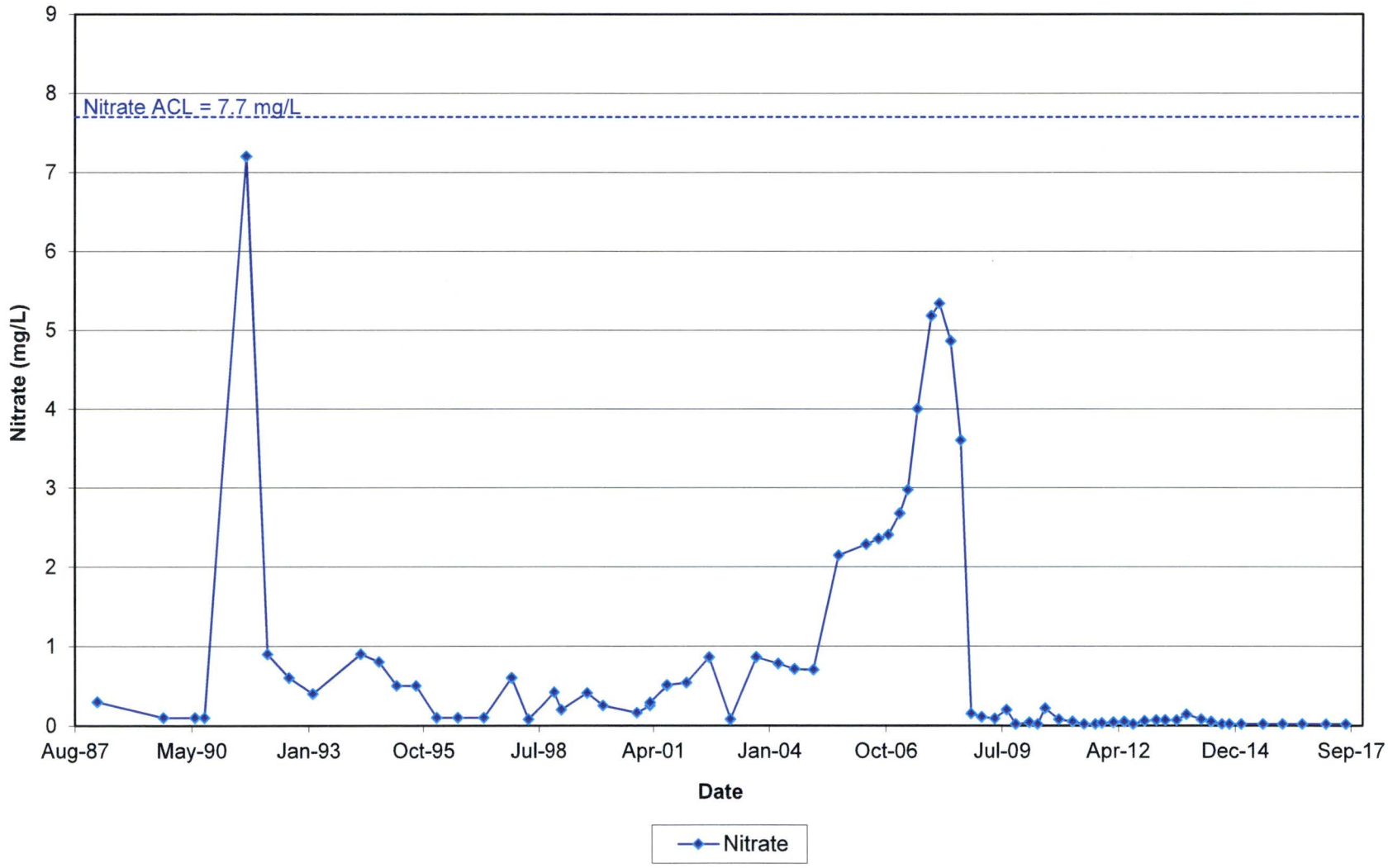
Anions and TDS in Monitoring Well 31-67 TRB



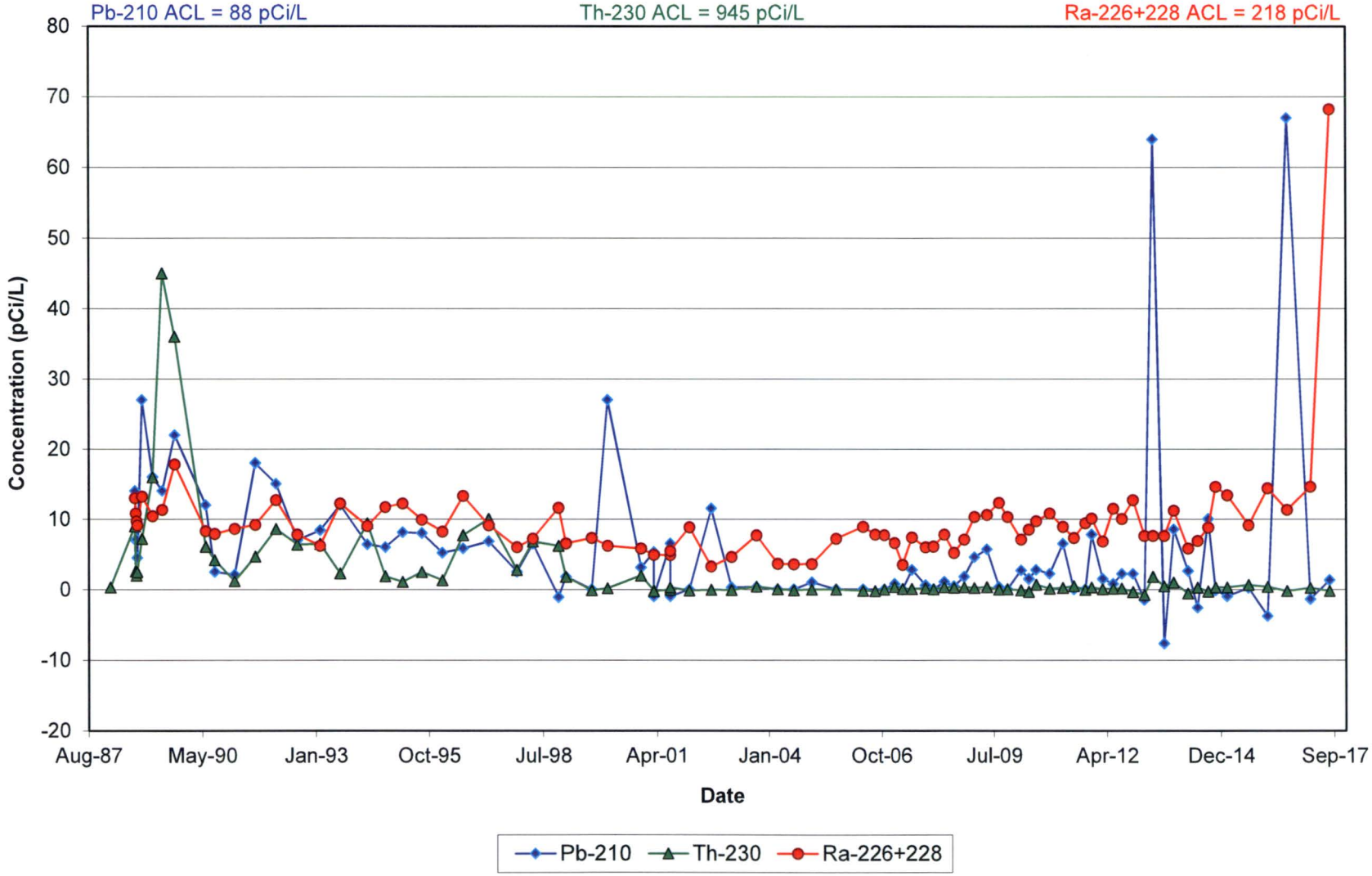
Metals in Monitoring Well 31-67 TRB



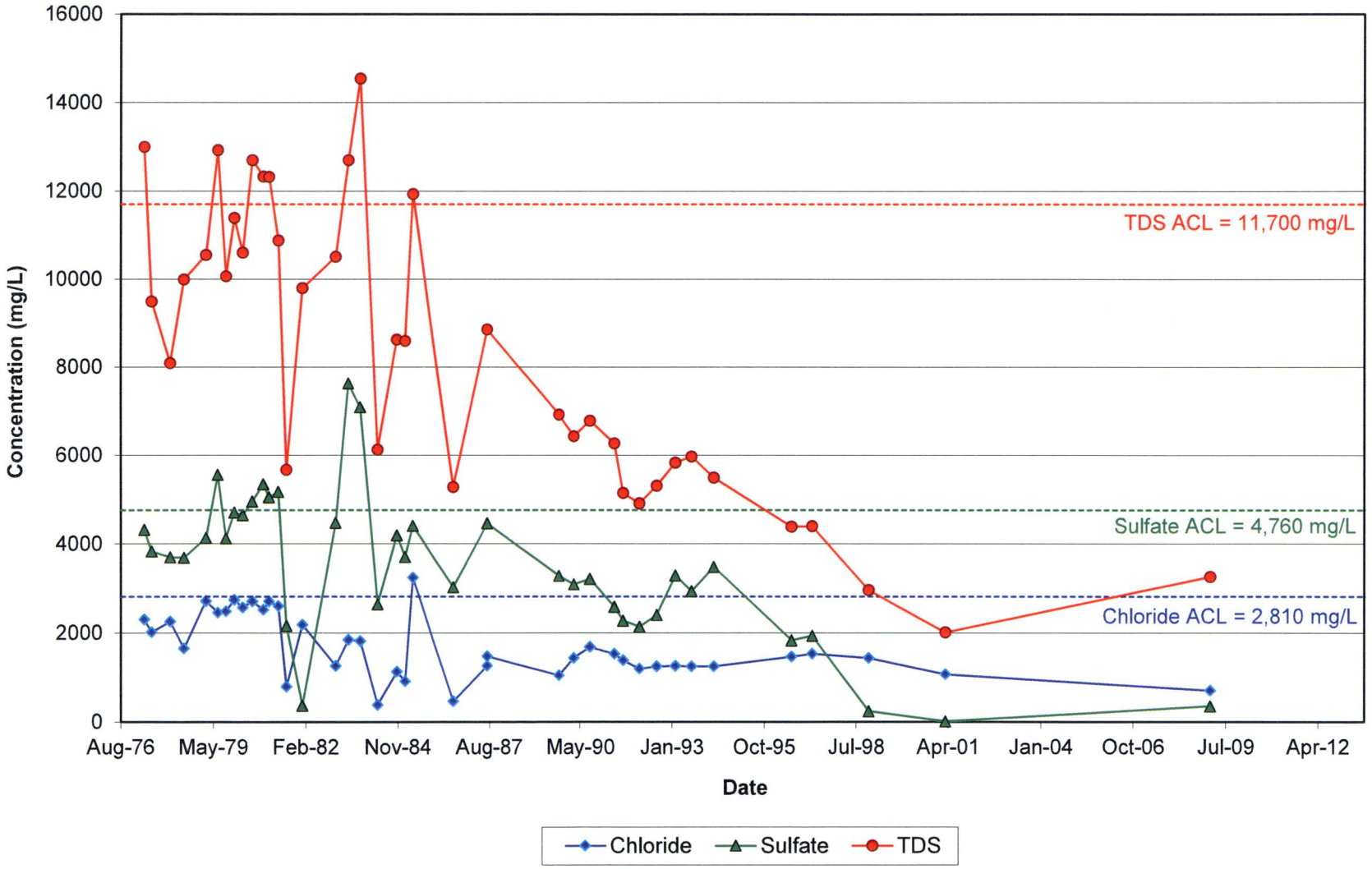
Nitrate in Monitoring Well 31-67 TRB



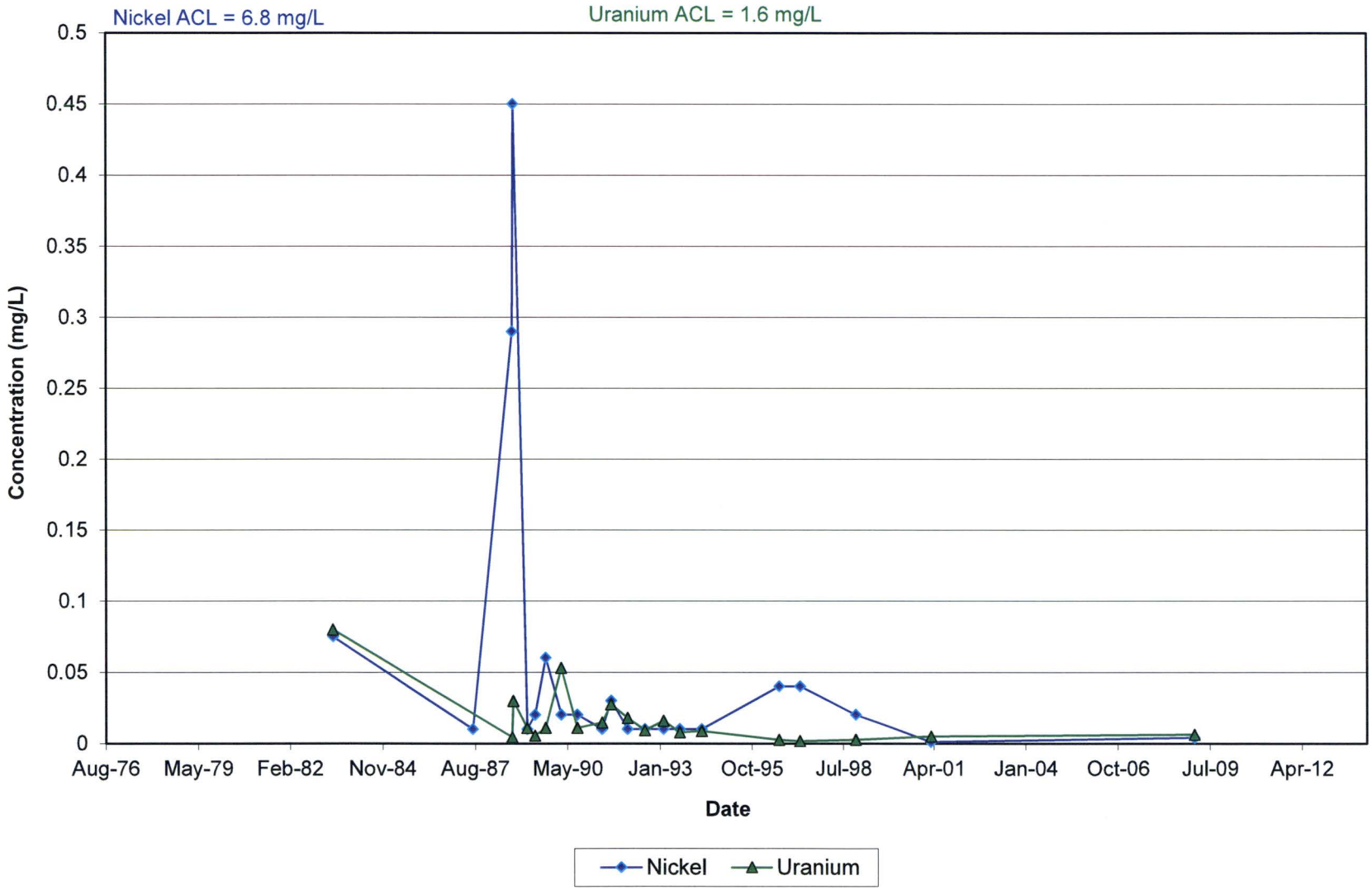
Radionuclides in Monitoring Well 31-67 TRB



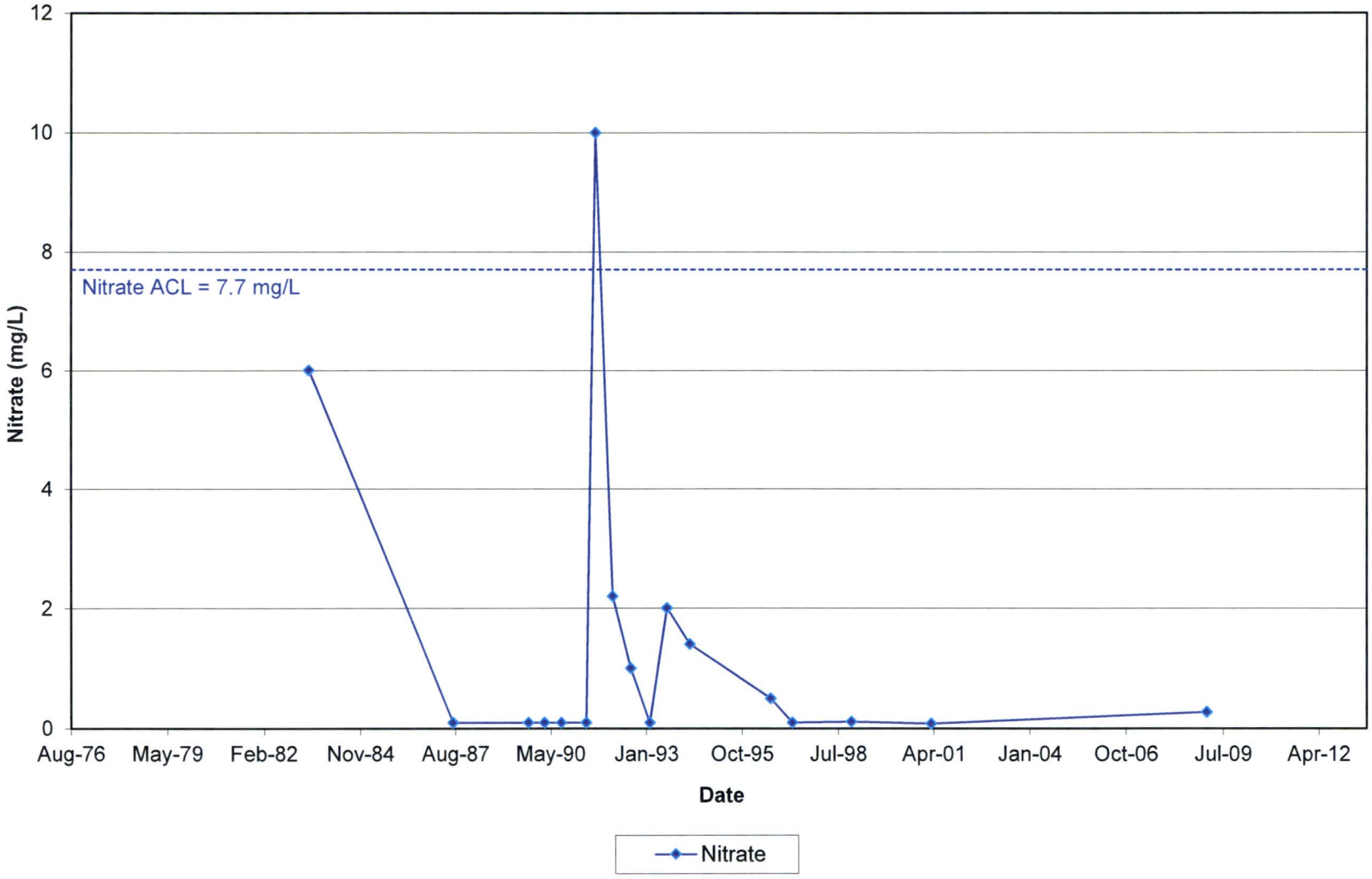
Anions and TDS in Monitoring Well 36-01 TRB



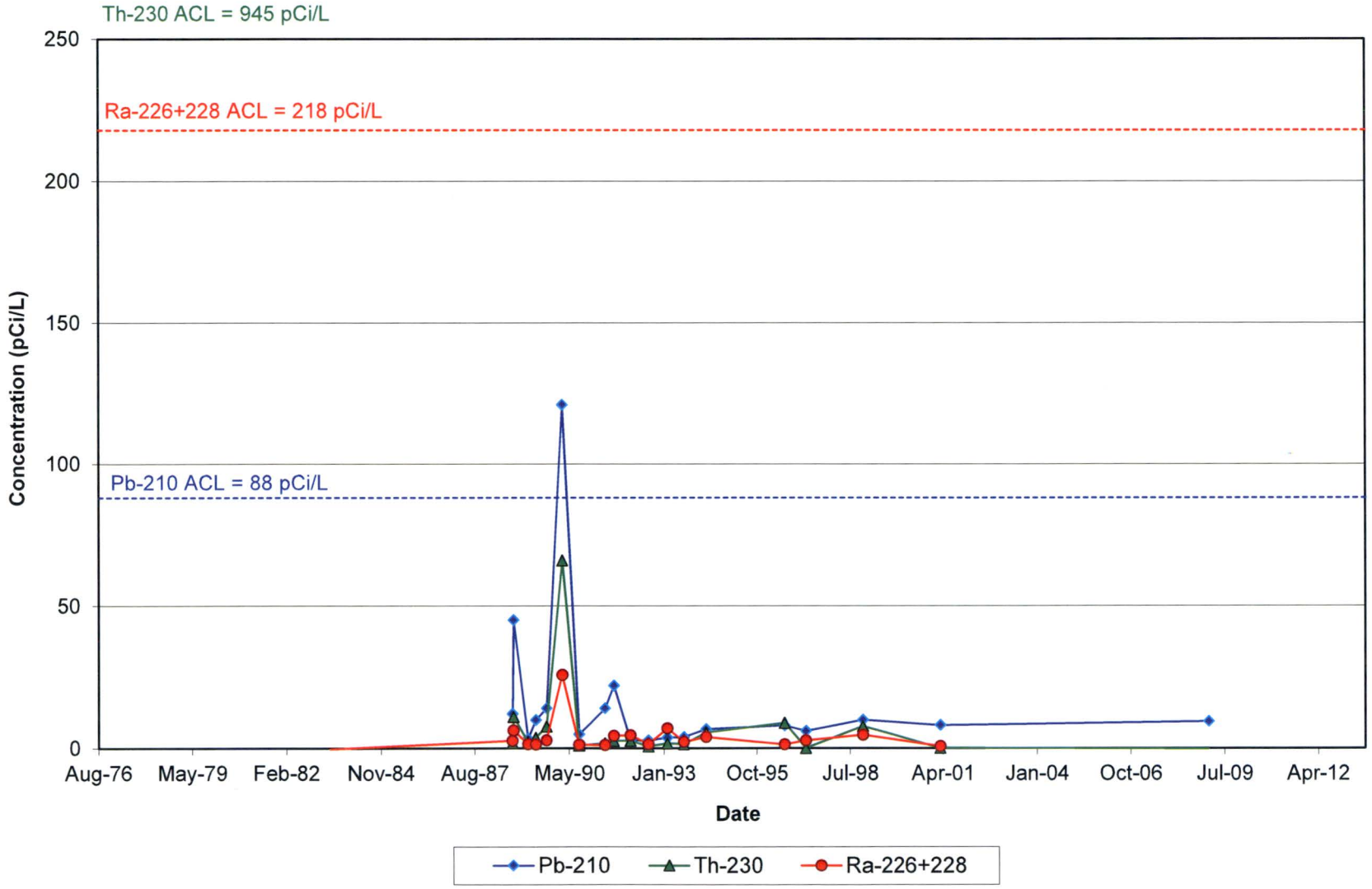
Metals in Monitoring Well 36-01 TRB



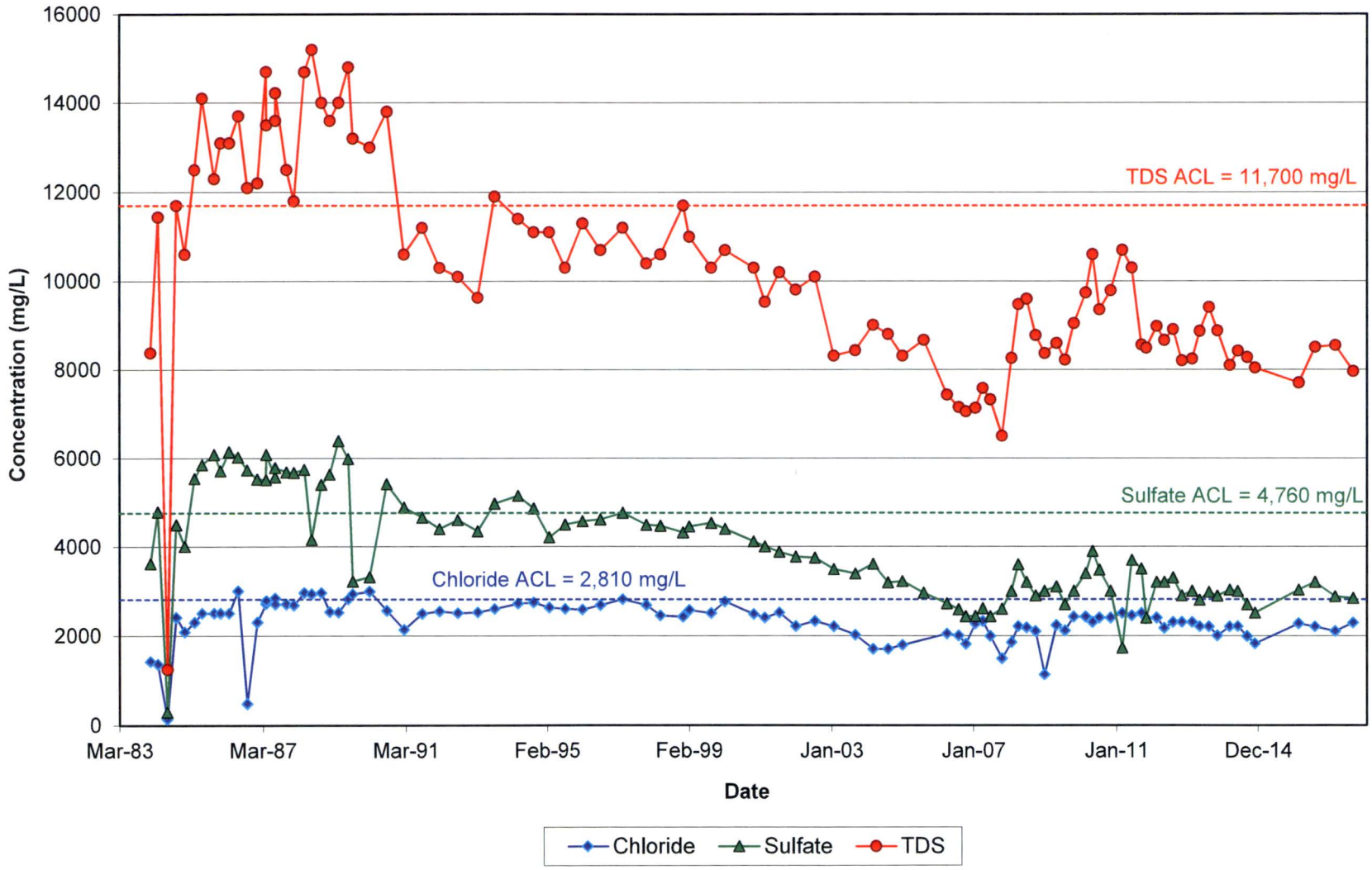
Nitrate in Monitoring Well 36-01 TRB



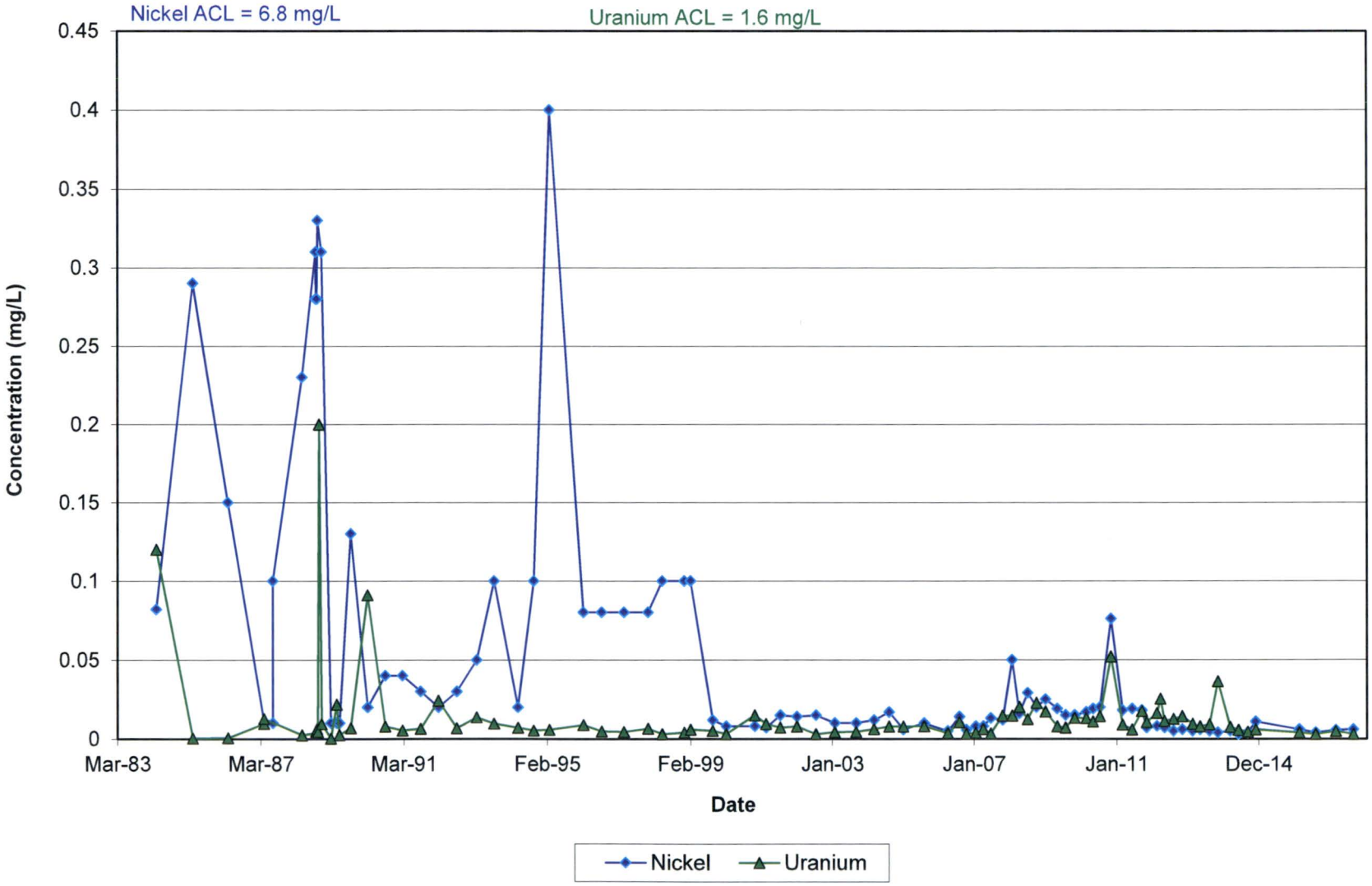
Radionuclides in Monitoring Well 36-01 TRB



Anions and TDS in Monitoring Well 36-02 TRB

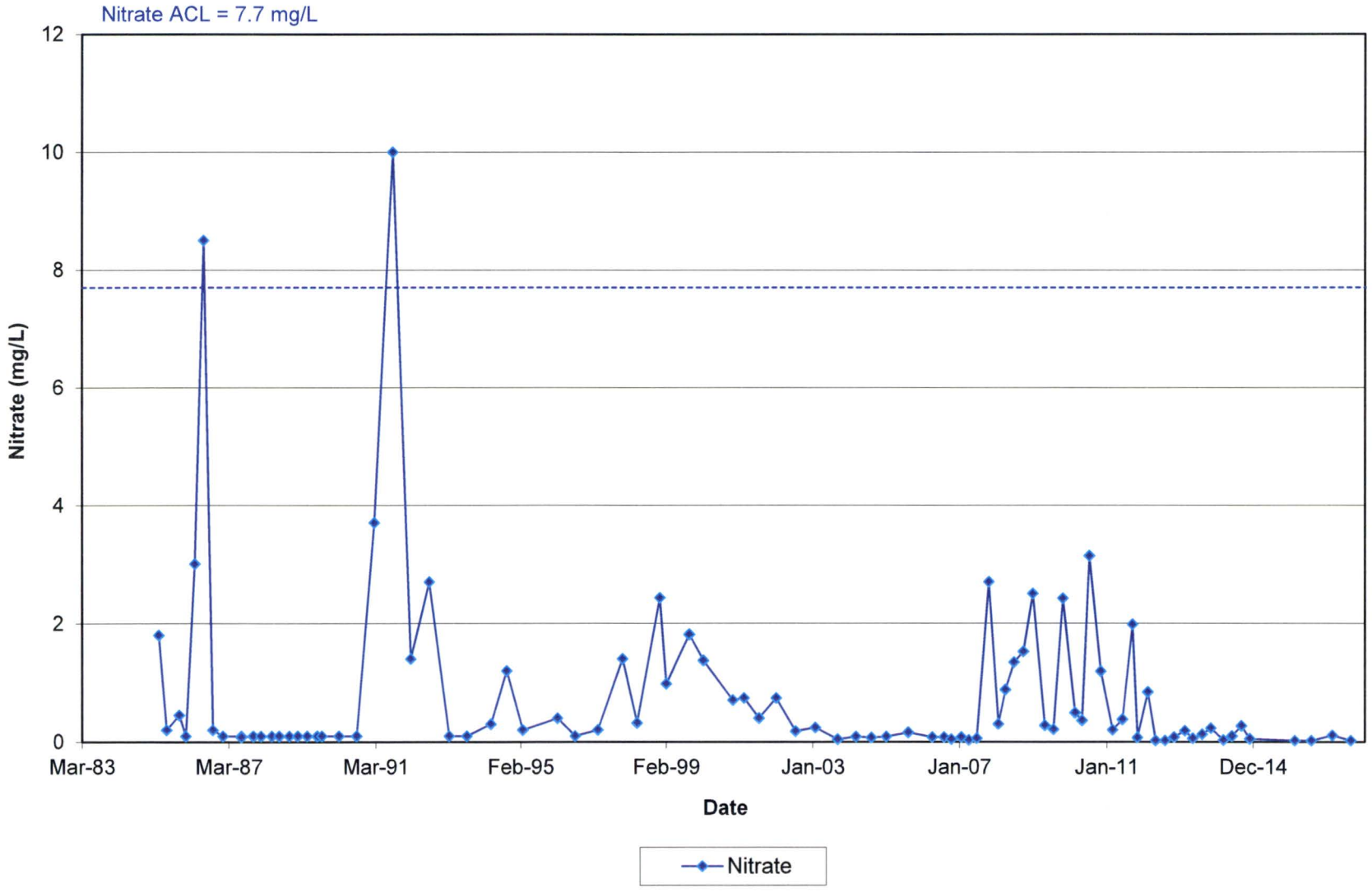


Metals in Monitoring Well 36-02 TRB

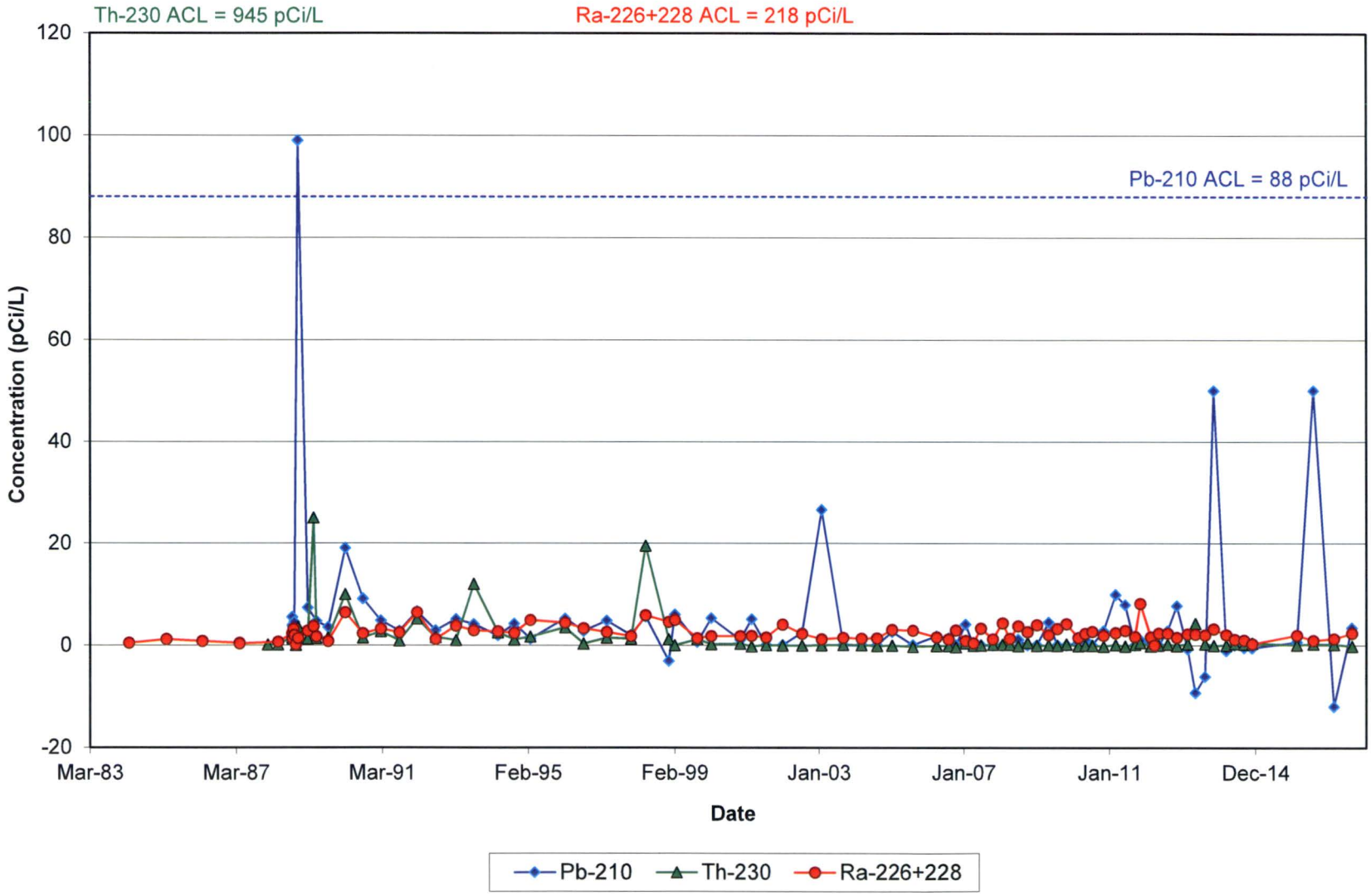


INTERA

Nitrate in Monitoring Well 36-02 TRB



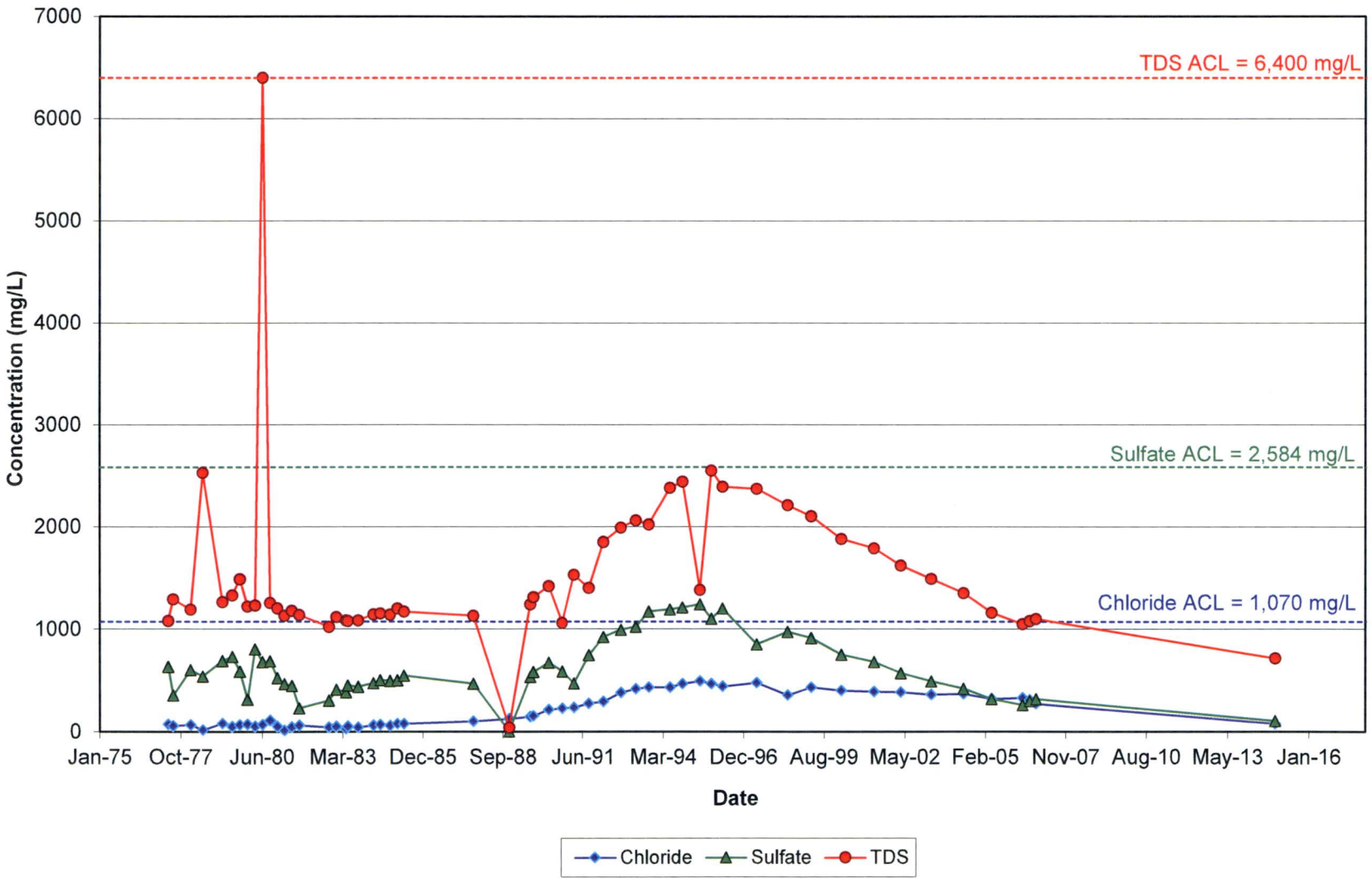
Radionuclides in Monitoring Well 36-02 TRB



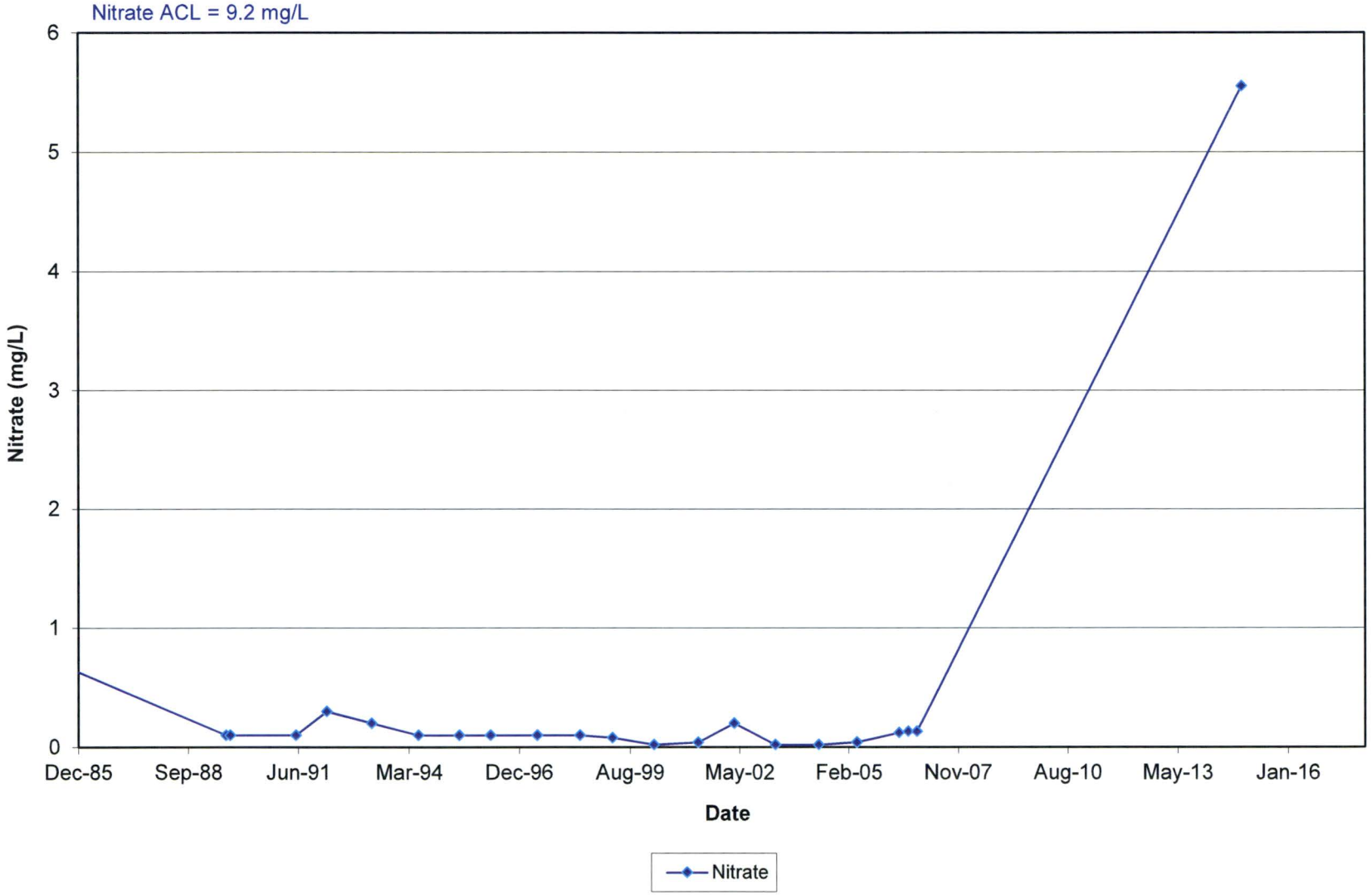
Stability Monitoring Plan
Time Versus Concentration Plots

Tres Hermanos A

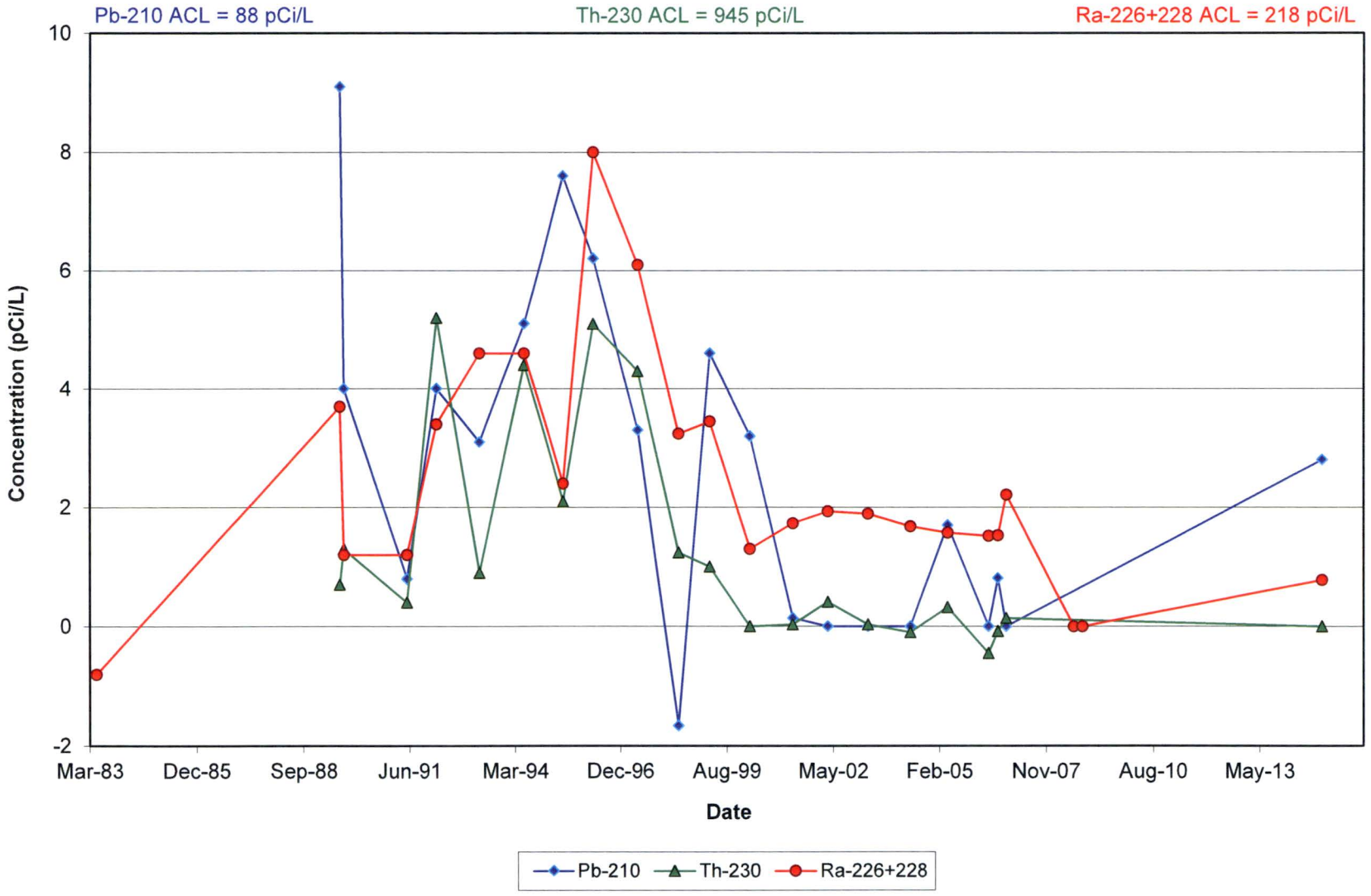
Anions and TDS in Monitoring Well 30-01 TRA



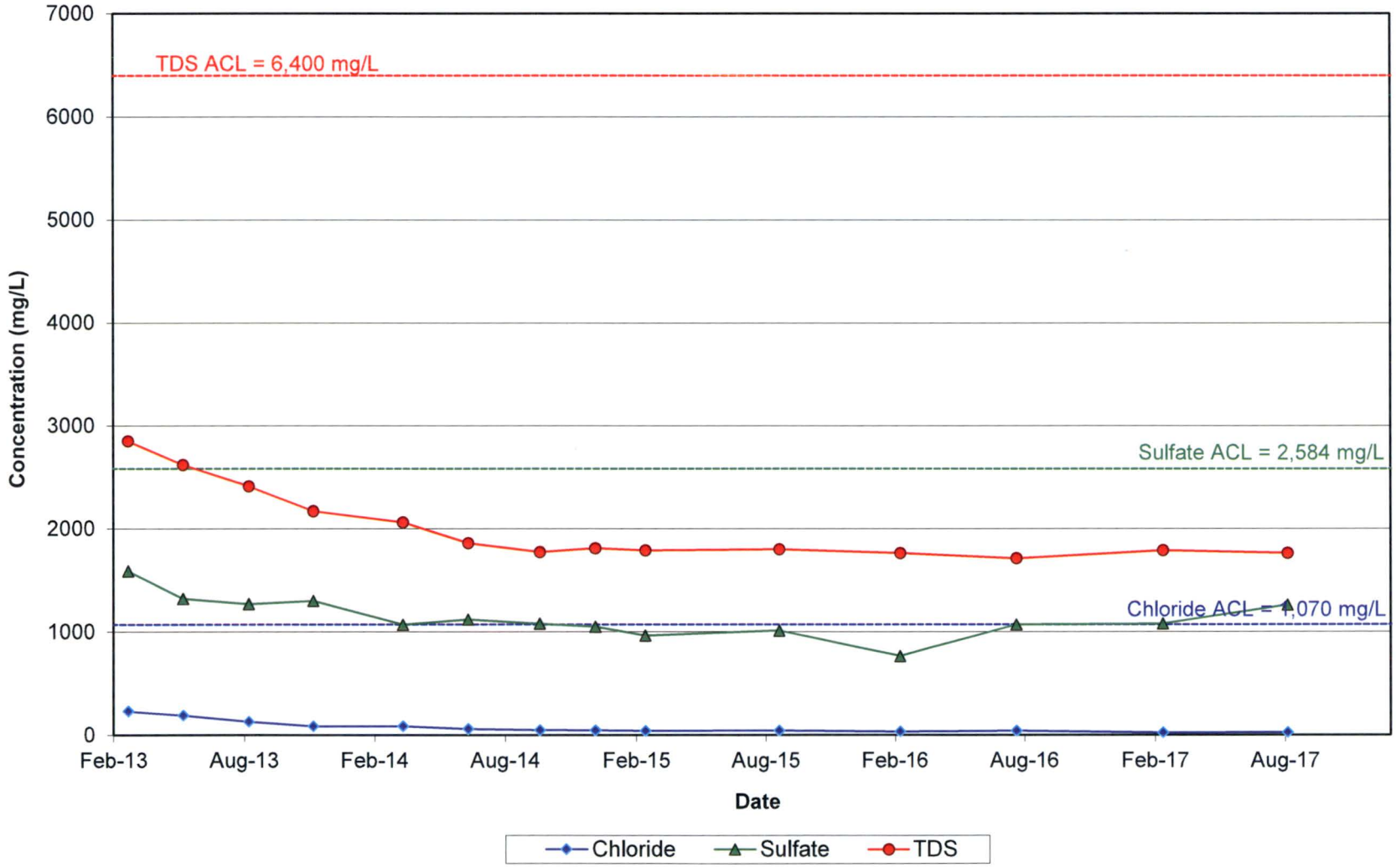
Nitrate in Monitoring Well 30-01 TRA



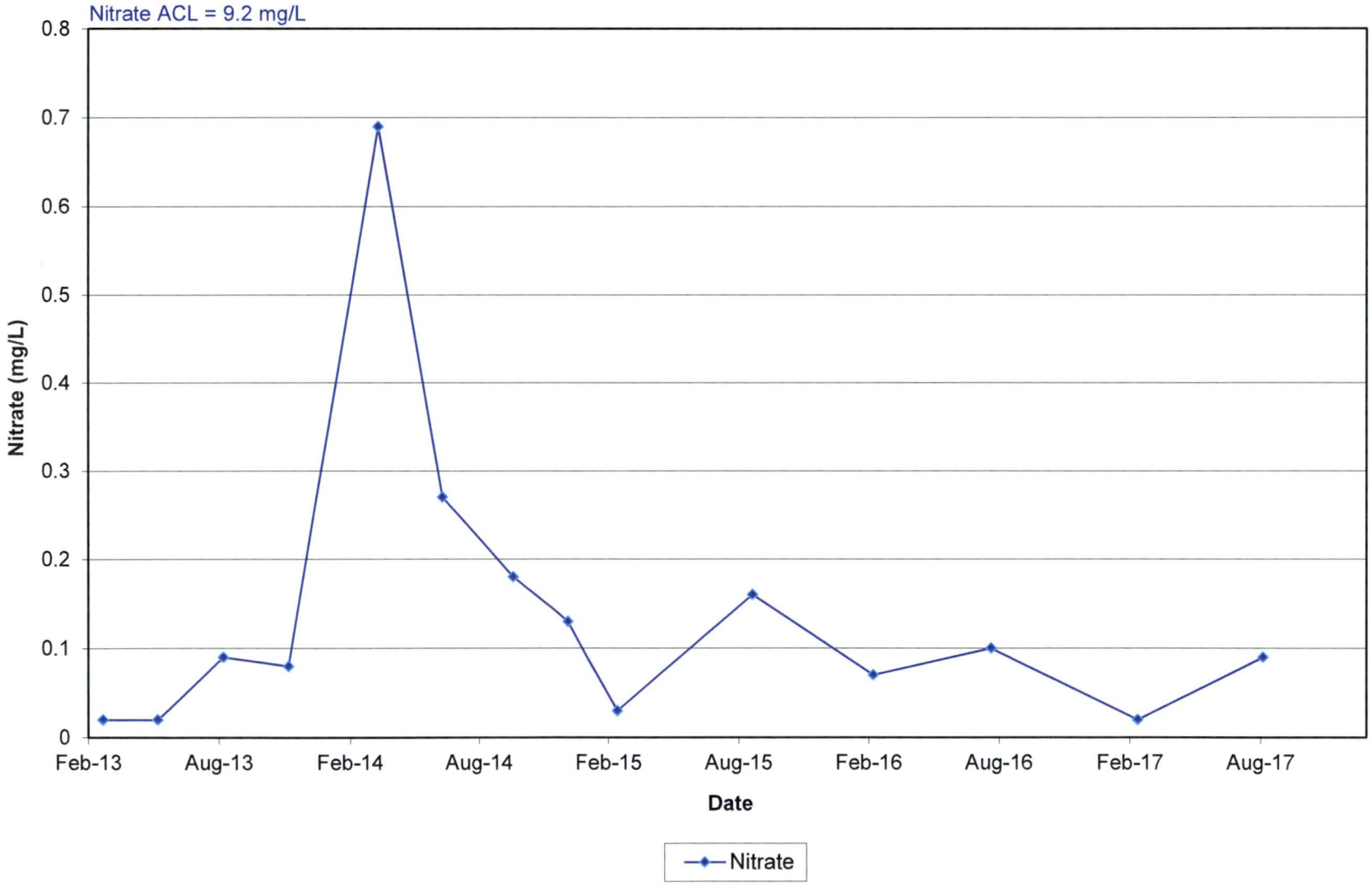
Radionuclides in Monitoring Well 30-01 TRA



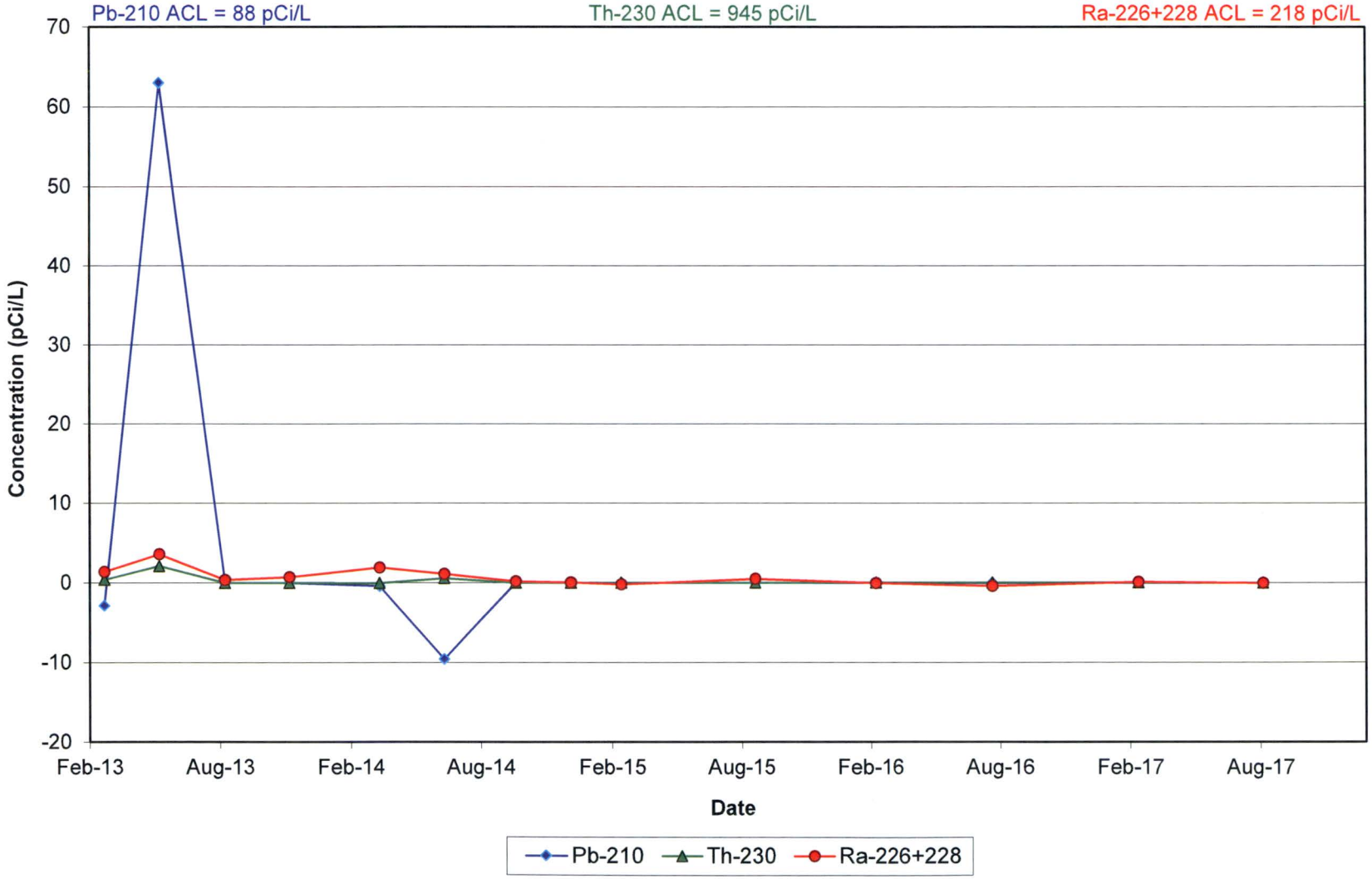
Anions and TDS in Monitoring Well 31-01TRA-R (replaced 12/12/2012)



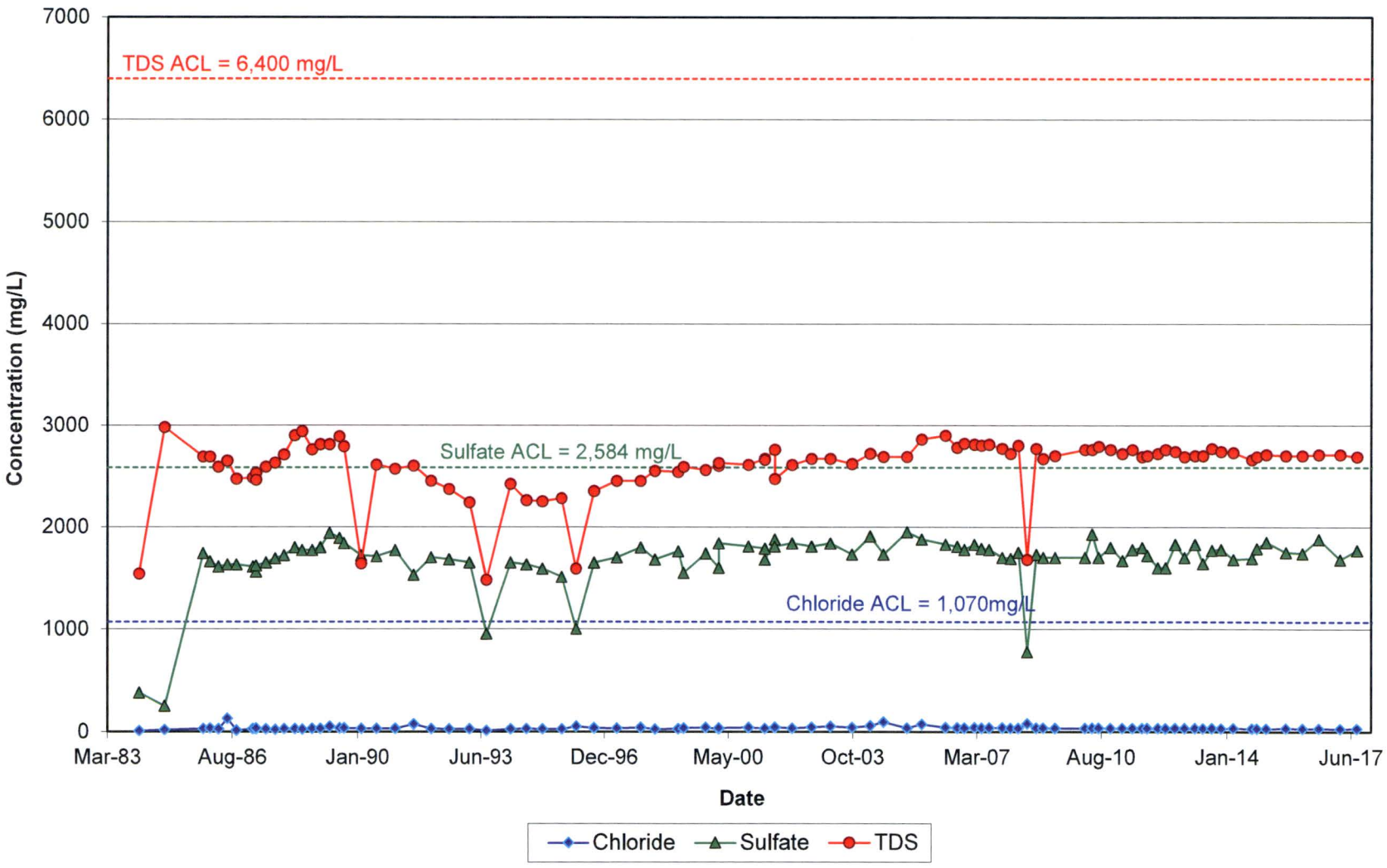
Nitrate in Monitoring Well 31-01 TRA-R (replaced 12/12/2012)



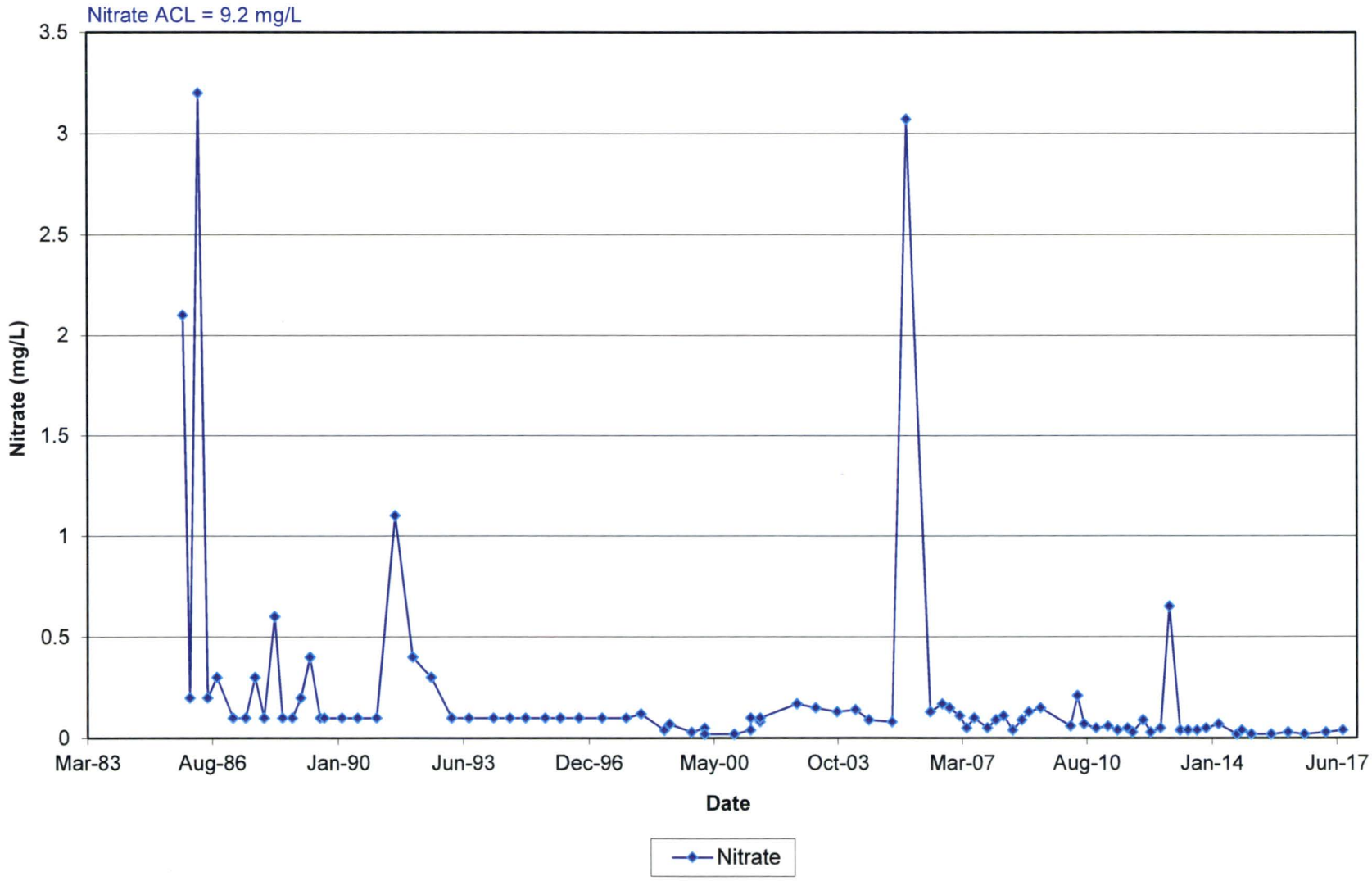
Radionuclides in Well 31-01 TRA-R
(replaced 12/12/2012)



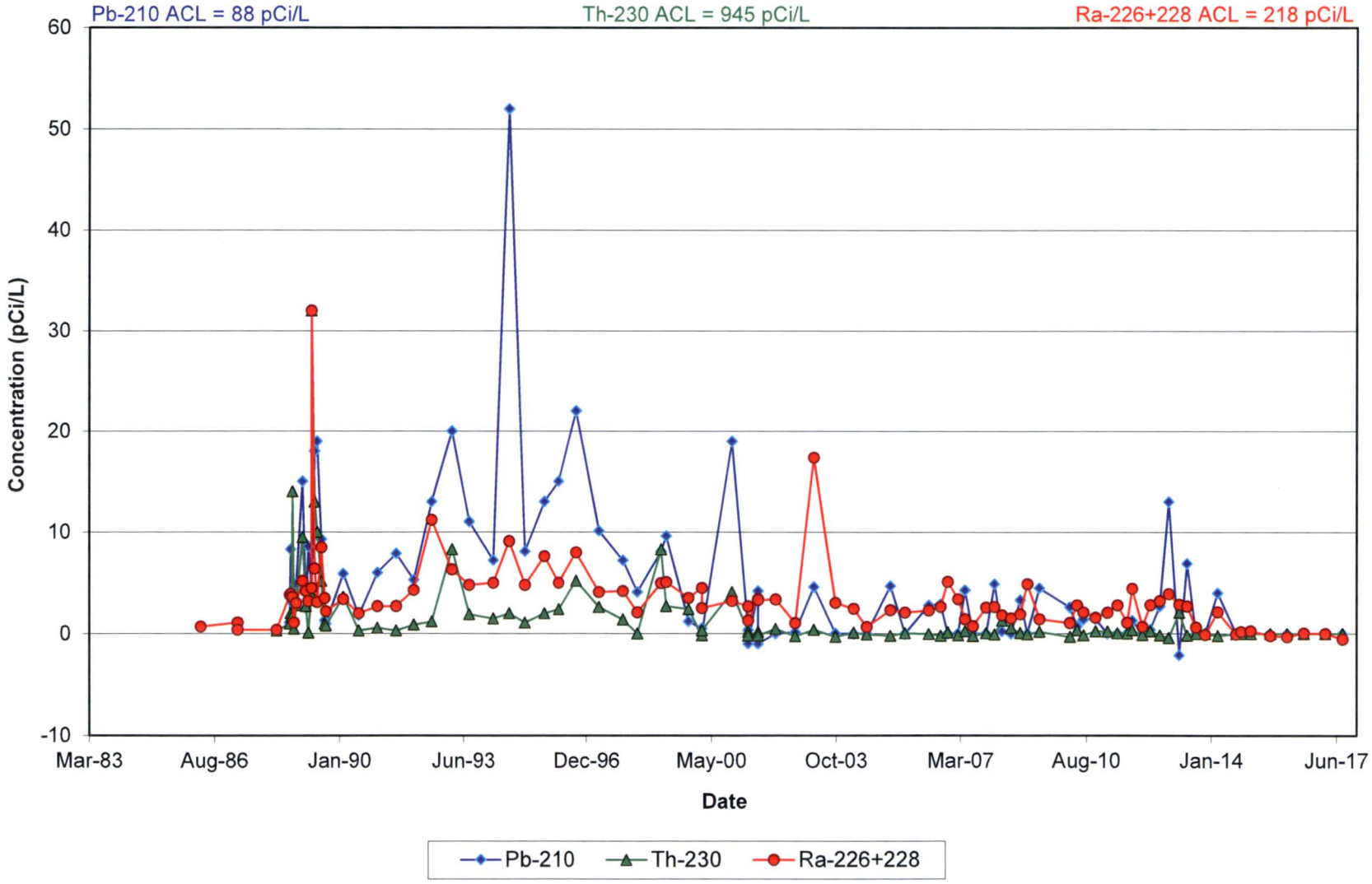
Anions and TDS in Monitoring Well 33-01 TRA



Nitrate in Monitoring Well 33-01 TRA



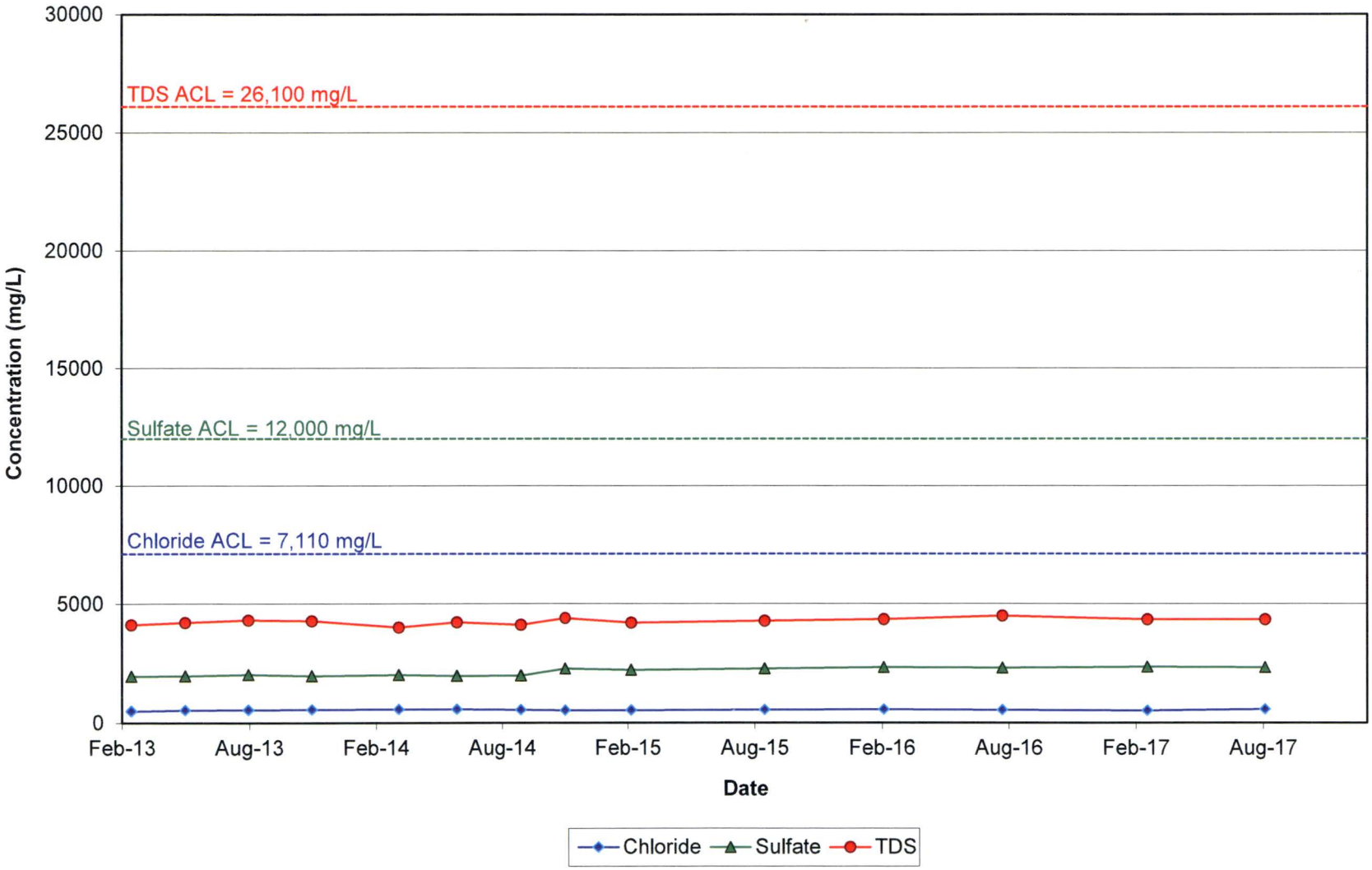
Radionuclides in Monitoring Well 33-01 TRA

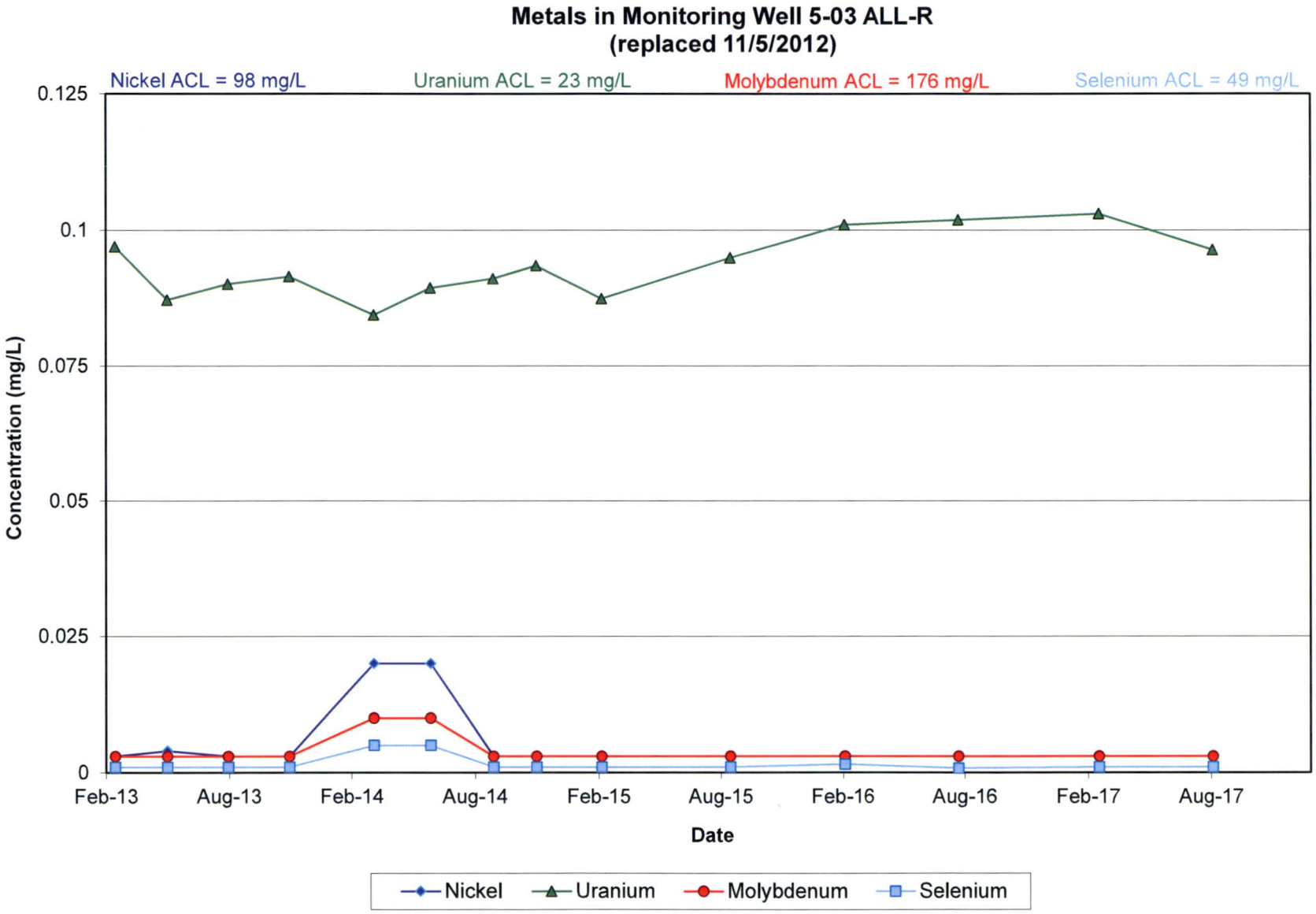


Stability Monitoring Plan
Time Versus Concentration Plots

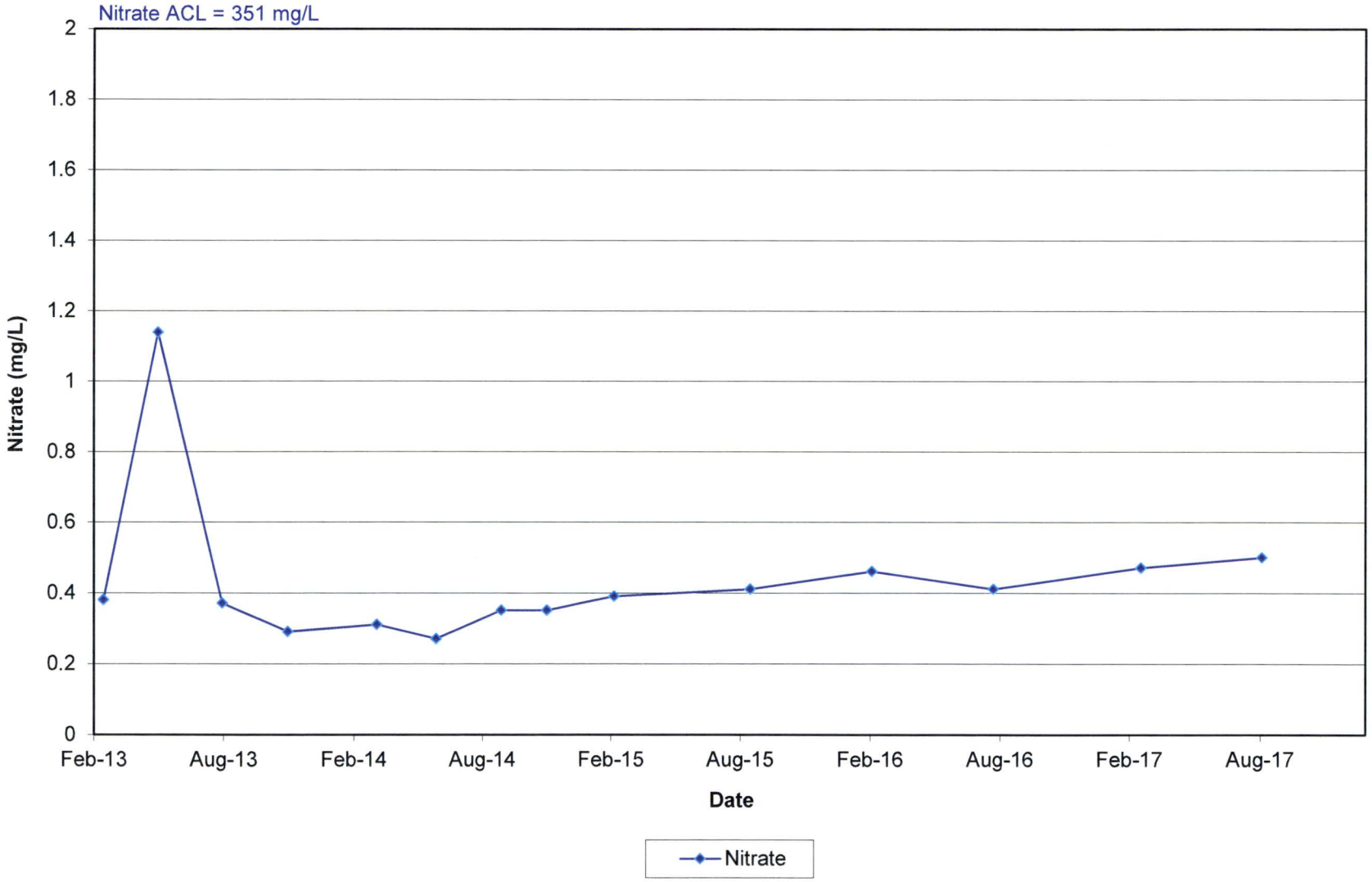
Alluvium

Anions and TDS in Monitoring Well 5-03 ALL-R (replaced 11/5/2012)

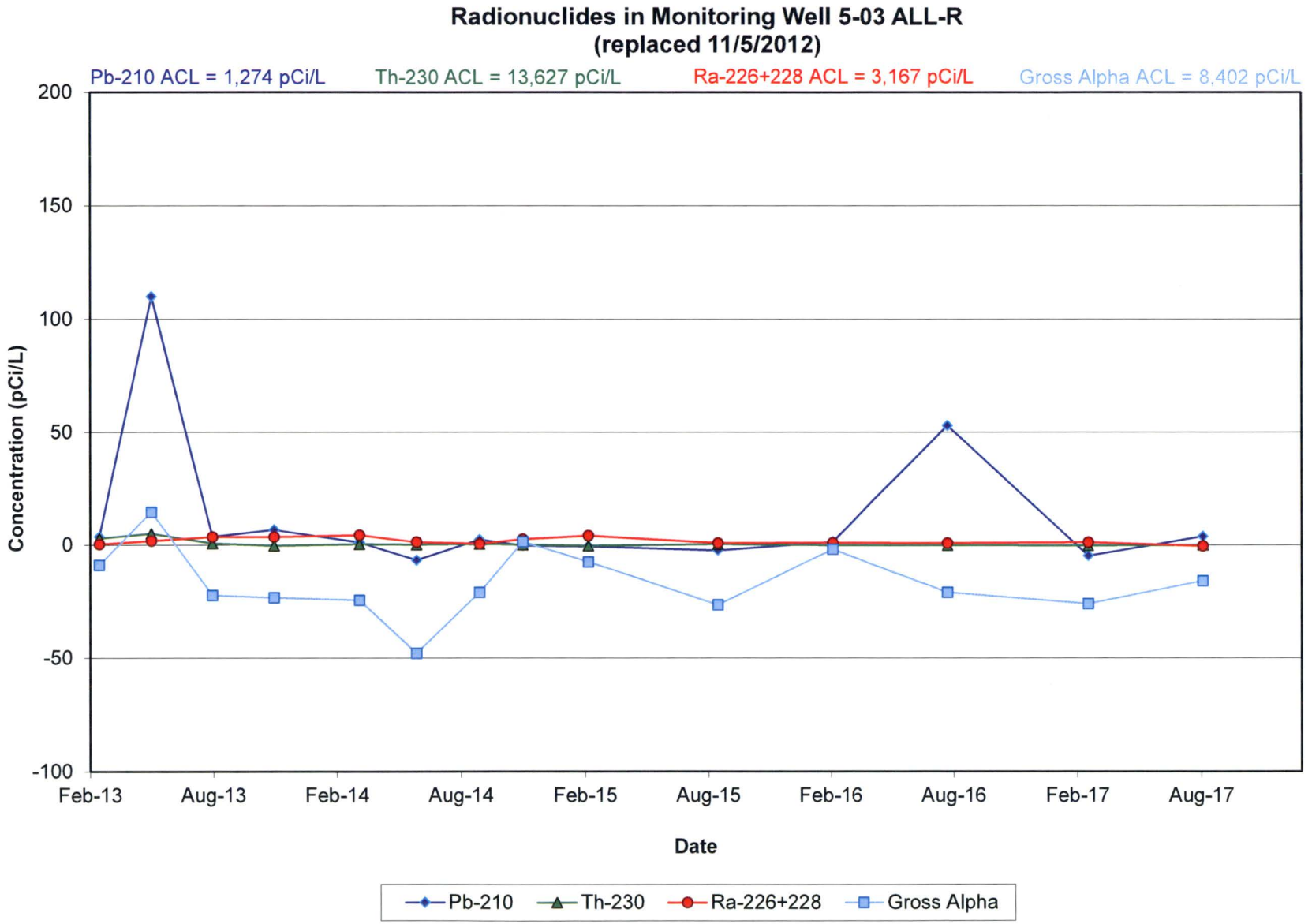



Metals in Monitoring Well 5-03 ALL-R
(replaced 11/5/2012)
Nickel ACL = 98 mg/L
Uranium ACL = 23 mg/L
Molybdenum ACL = 176 mg/L
Selenium ACL = 49 mg/L
0.125
0.1
0.075
0.05
0.025
0
Concentration (mg/L)
Feb-13
Aug-13
Feb-14
Aug-14
Feb-15
Aug-15
Feb-16
Aug-16
Feb-17
Aug-17
Date
Nickel
Uranium
Molybdenum
Selenium

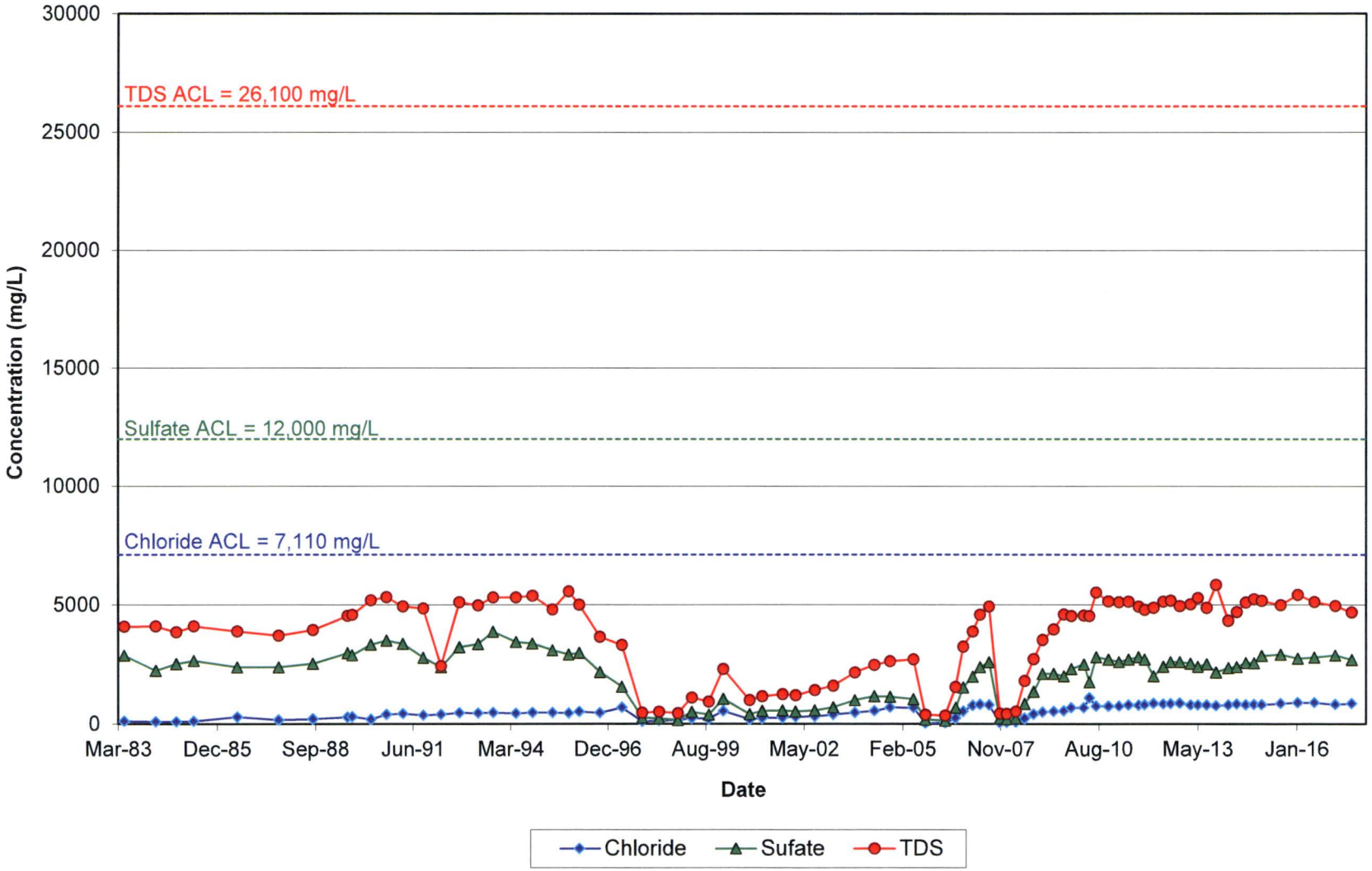
Nitrate in Monitoring Well 5-03 ALL-R
(replaced 11/5/2012)



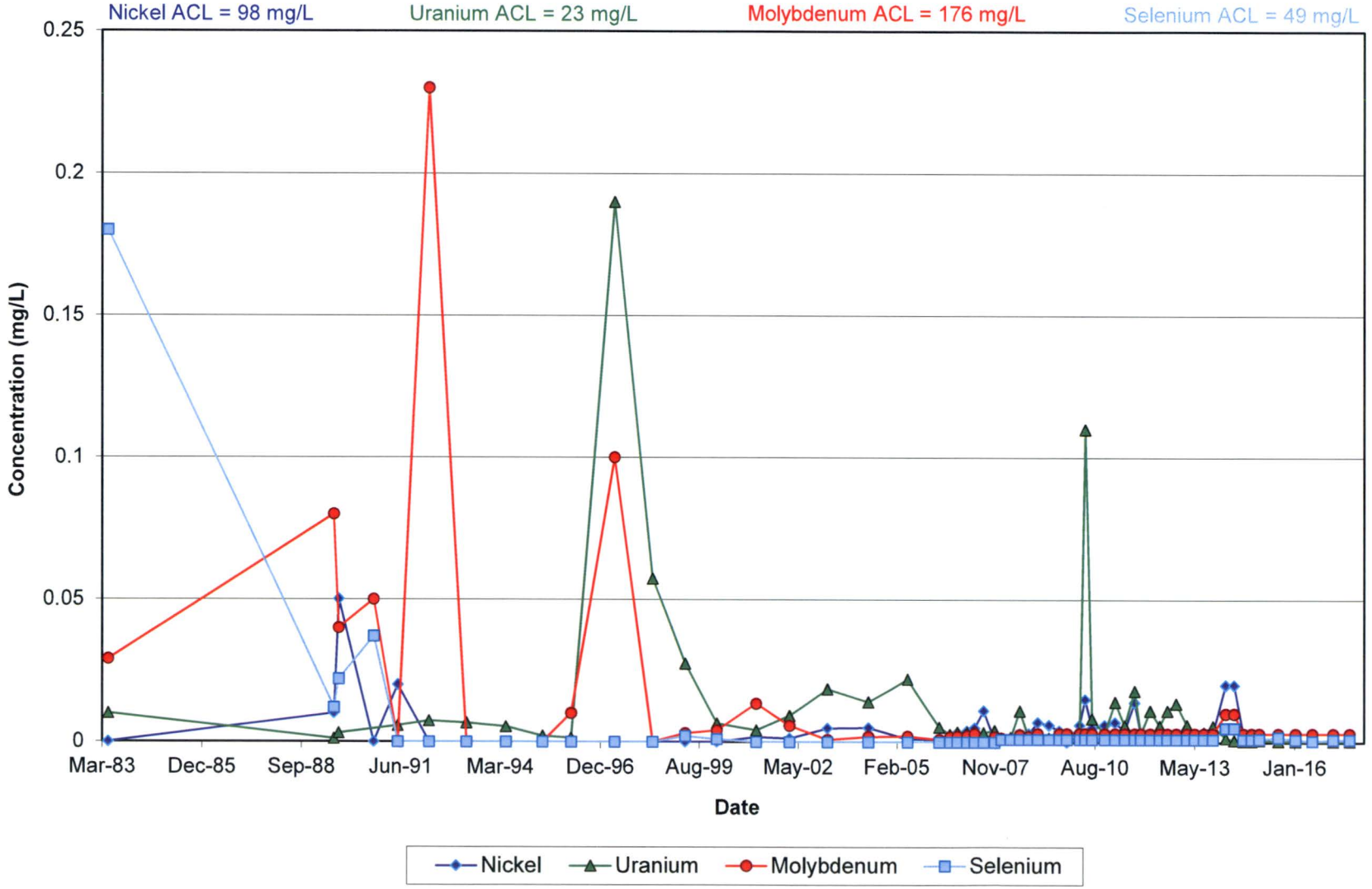
INTERA


Radionuclides in Monitoring Well 5-03 ALL-R
(replaced 11/5/2012)
Pb-210 ACL = 1,274 pCi/L
Th-230 ACL = 13,627 pCi/L
Ra-226+228 ACL = 3,167 pCi/L
Gross Alpha ACL = 8,402 pCi/L
Concentration (pCi/L)
200
150
100
50
0
-50
-100
Feb-13
Aug-13
Feb-14
Aug-14
Feb-15
Aug-15
Feb-16
Aug-16
Feb-17
Aug-17
Date
Pb-210
Th-230
Ra-226+228
Gross Alpha

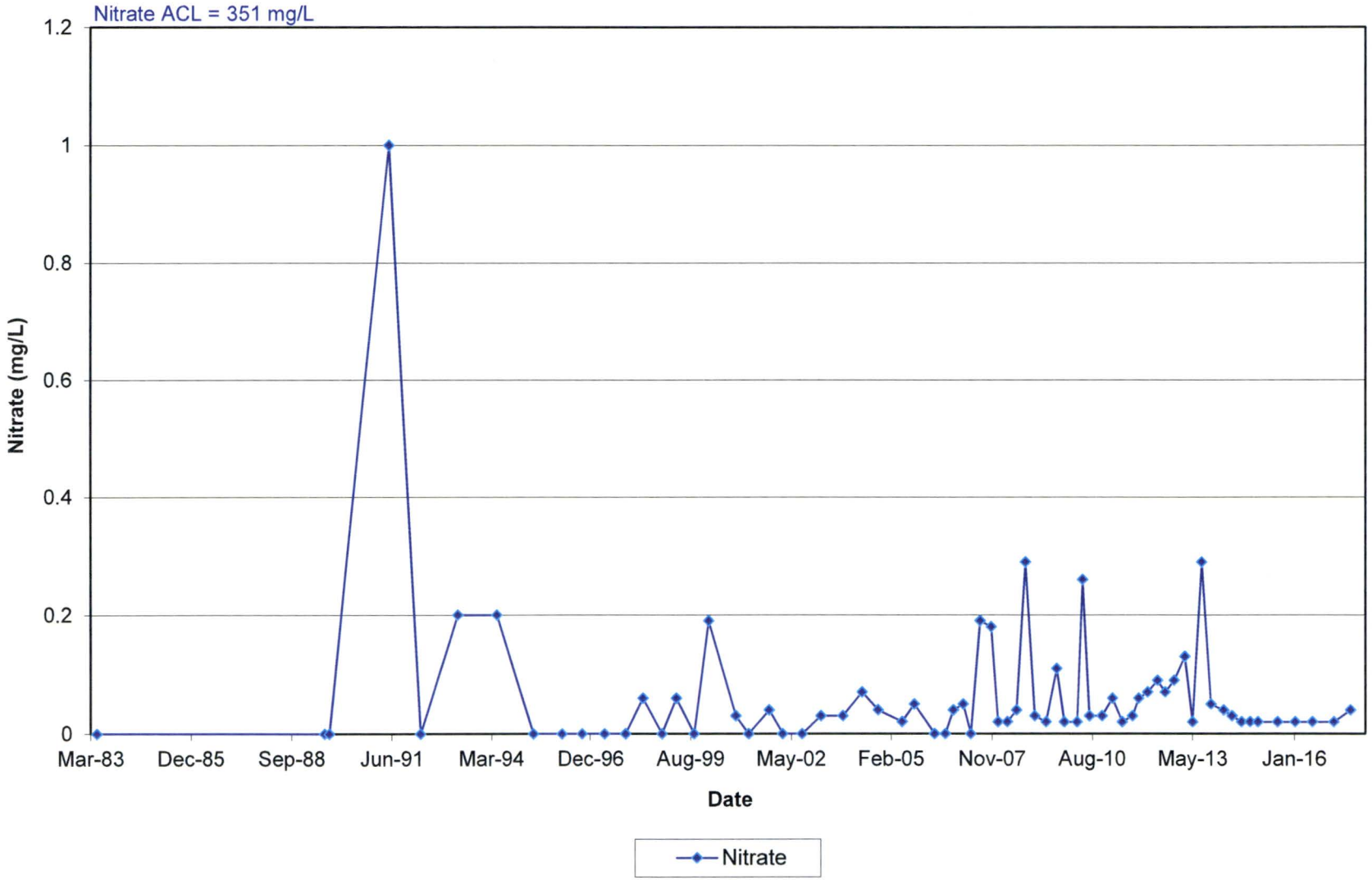
Anions and TDS in Monitoring Well 5-04 ALL



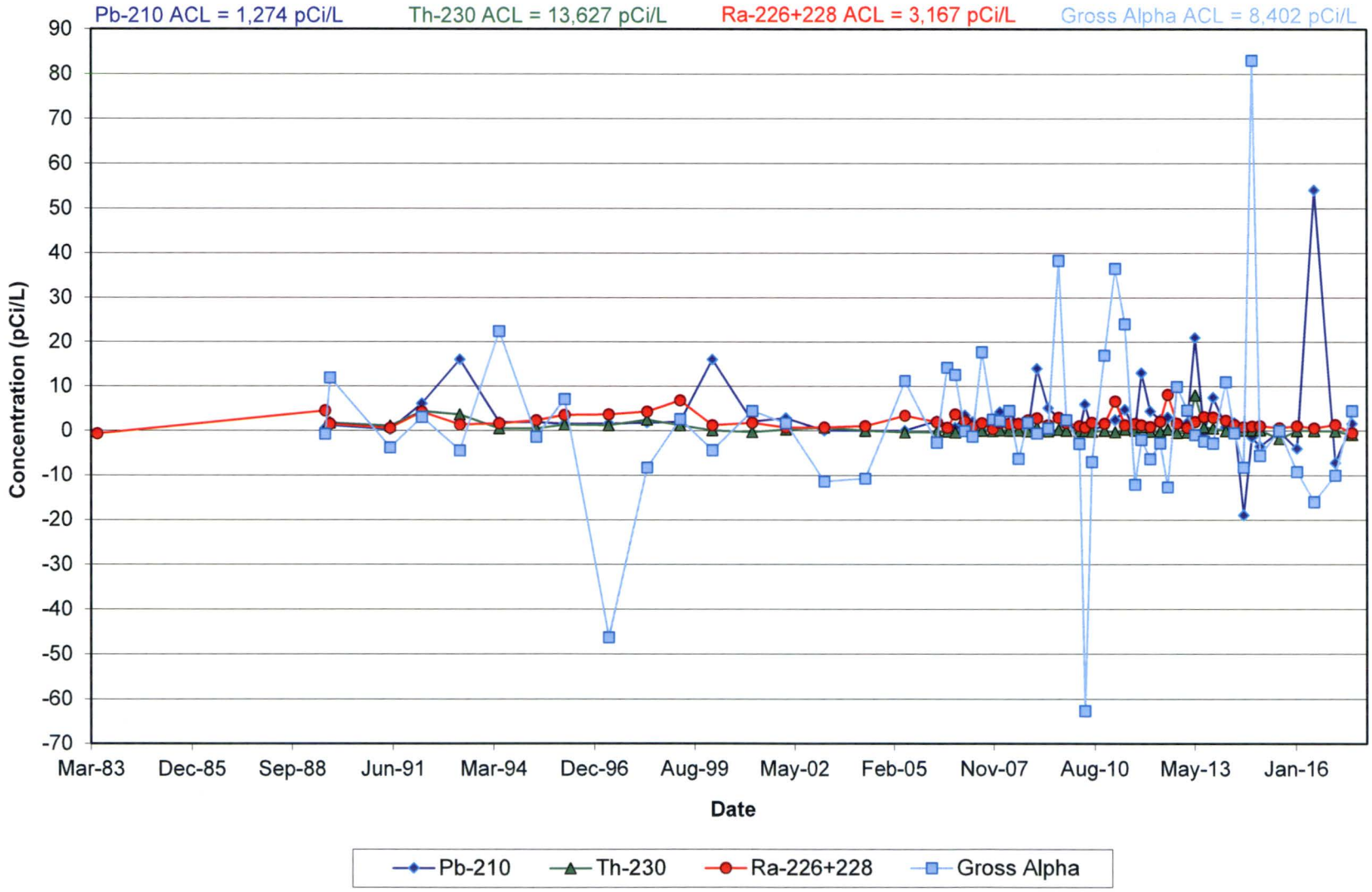
Metals in Monitoring Well 5-04 ALL



Nitrate in Monitoring Well 5-04 ALL

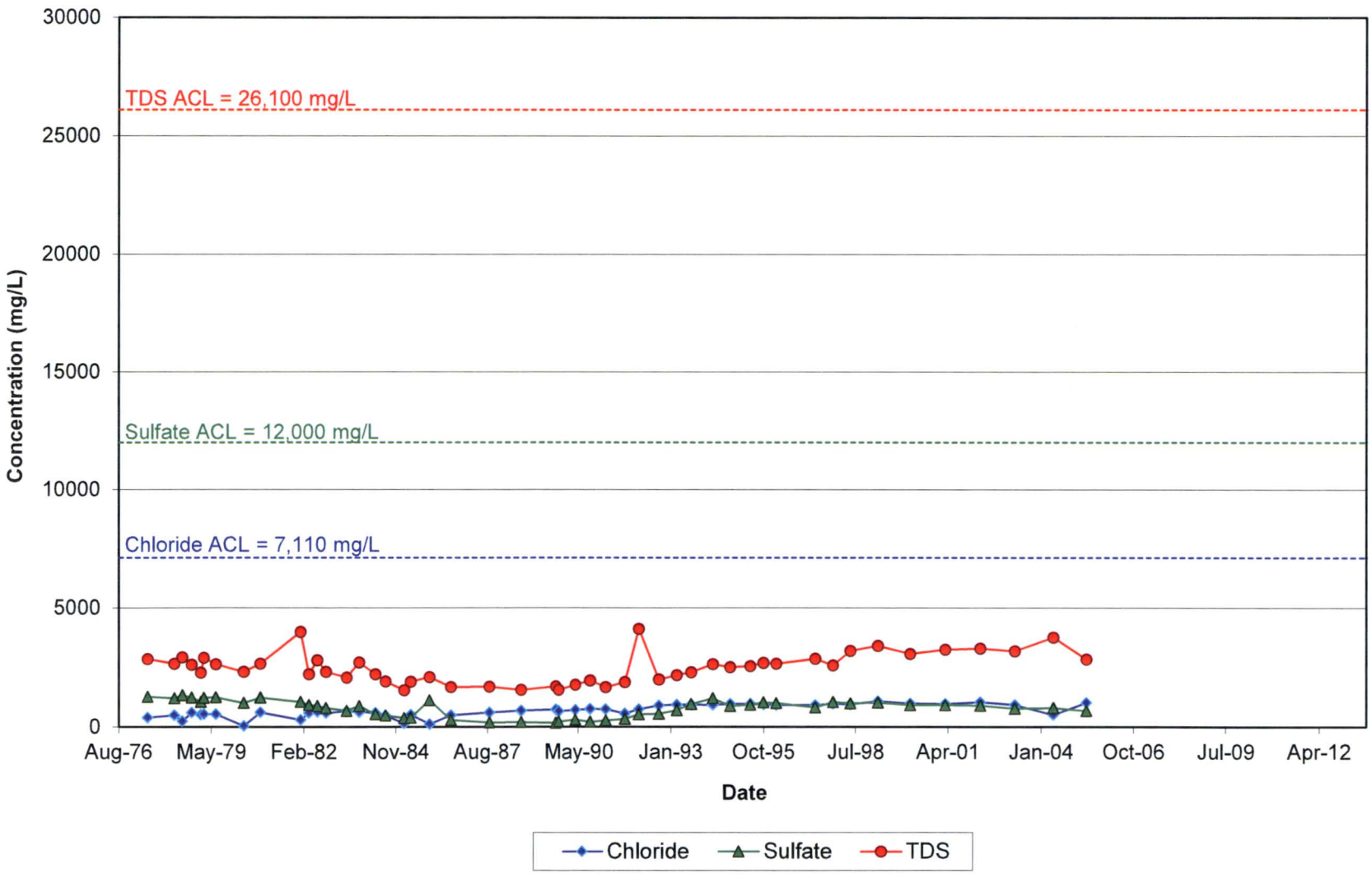


Radionuclides in Monitoring Well 5-04 ALL

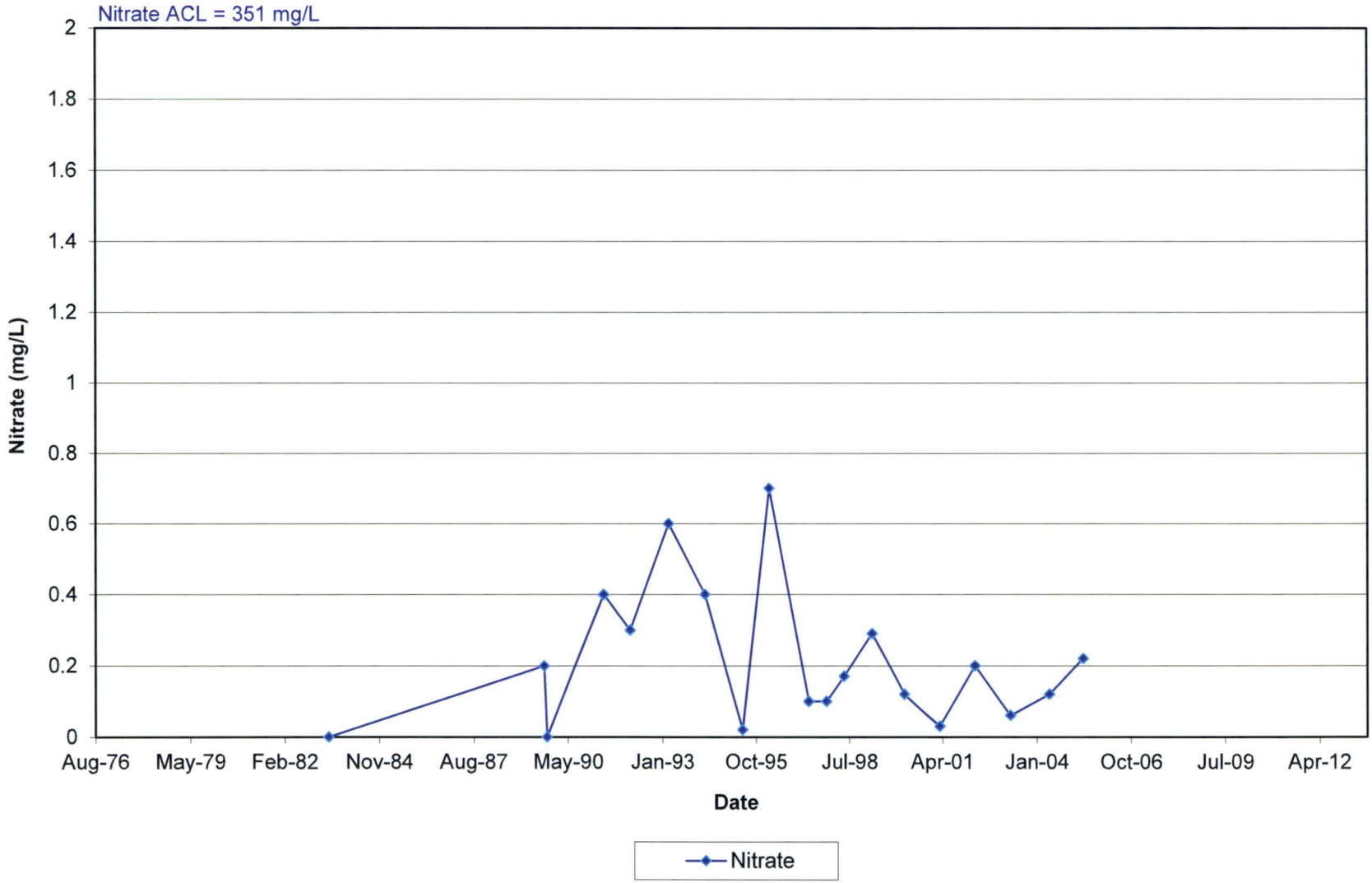


INTERA

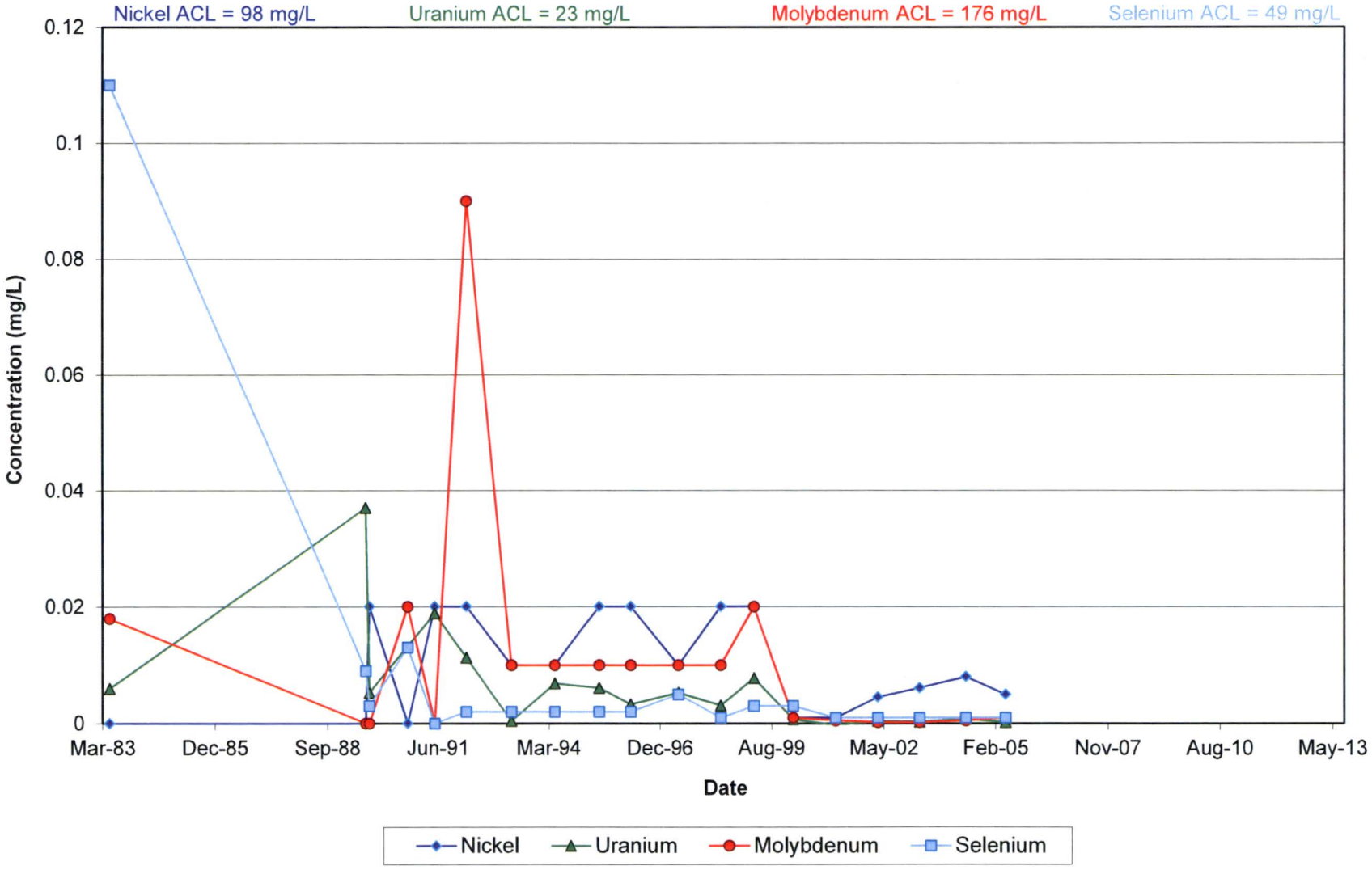
Anions and TDS in Monitoring Well 5-05



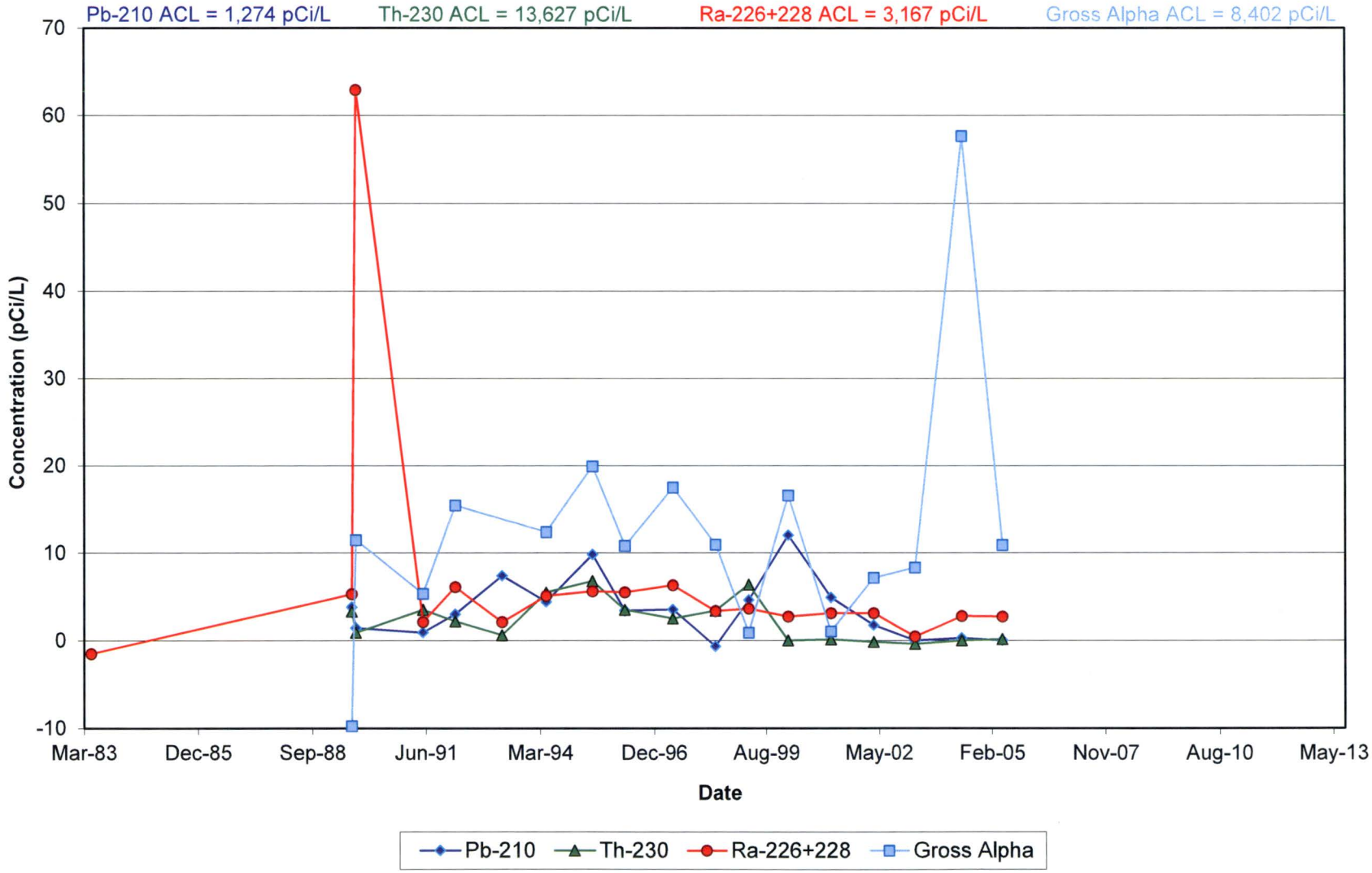
Nitrate in Monitoring Well 5-05



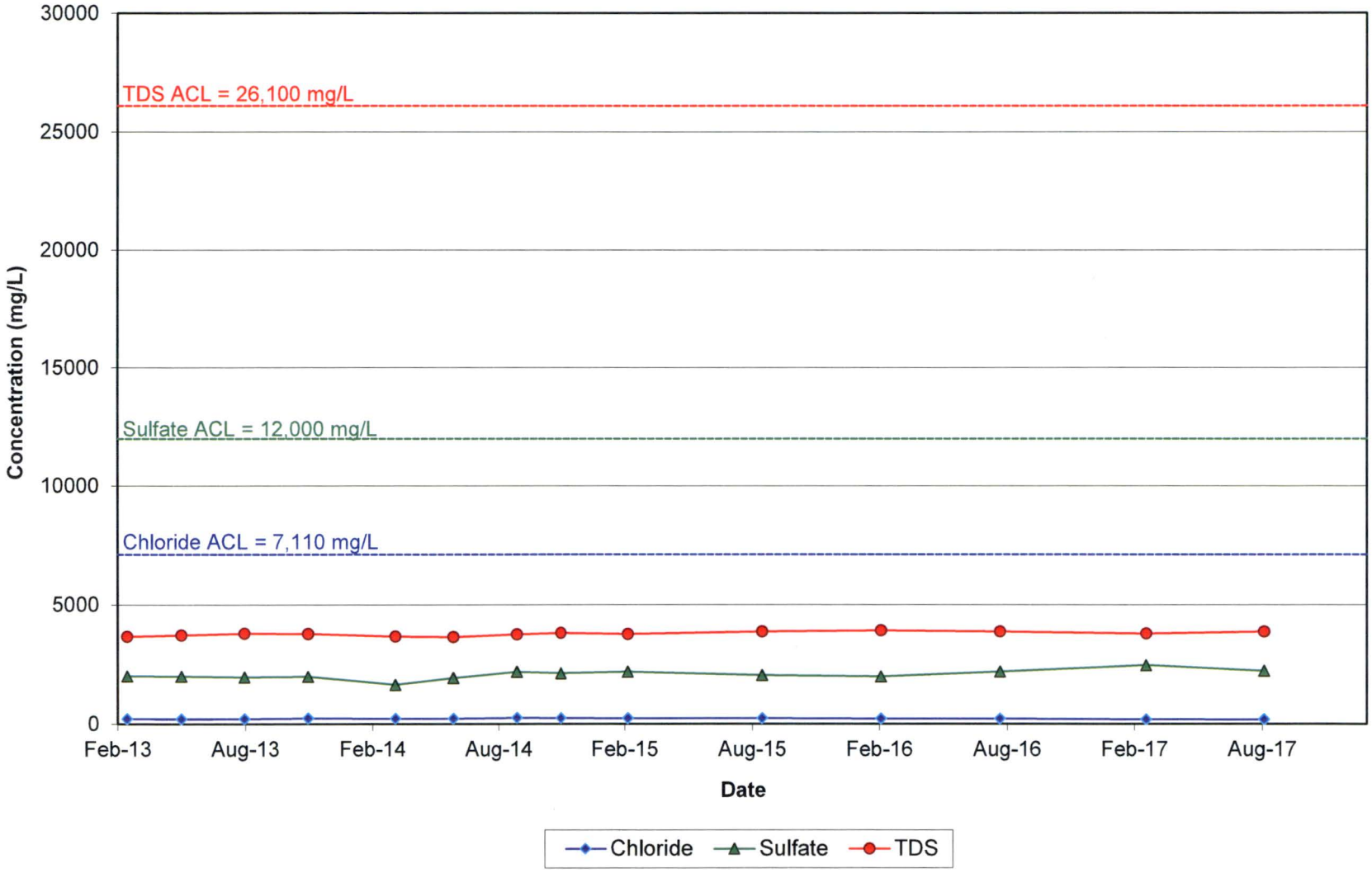
Metals in Monitoring Well 5-05



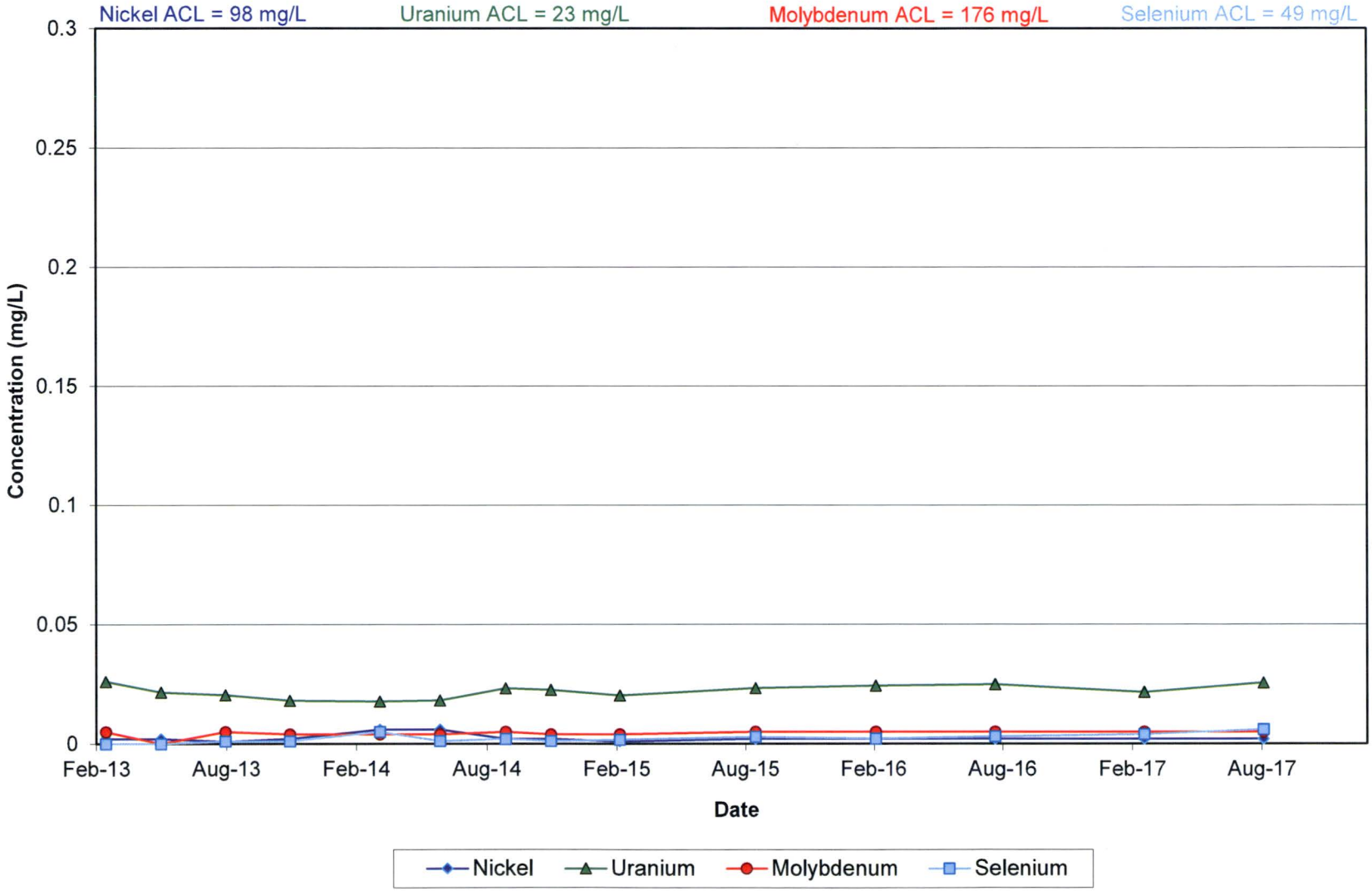
Radionuclides in Monitoring Well 5-05



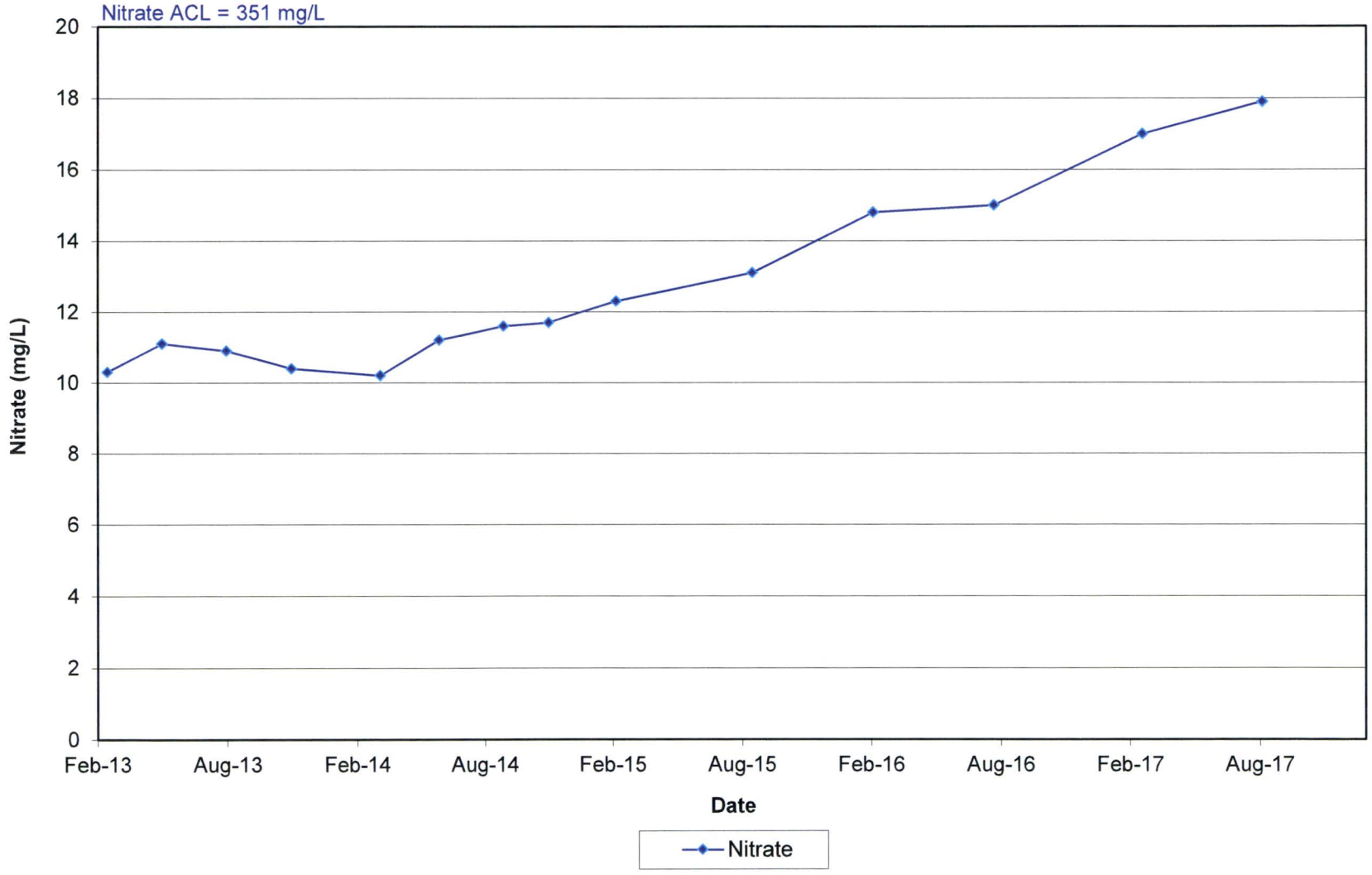
Anions and TDS in Monitoring Well 5-08 ALL-R (replaced 11/2/2012)



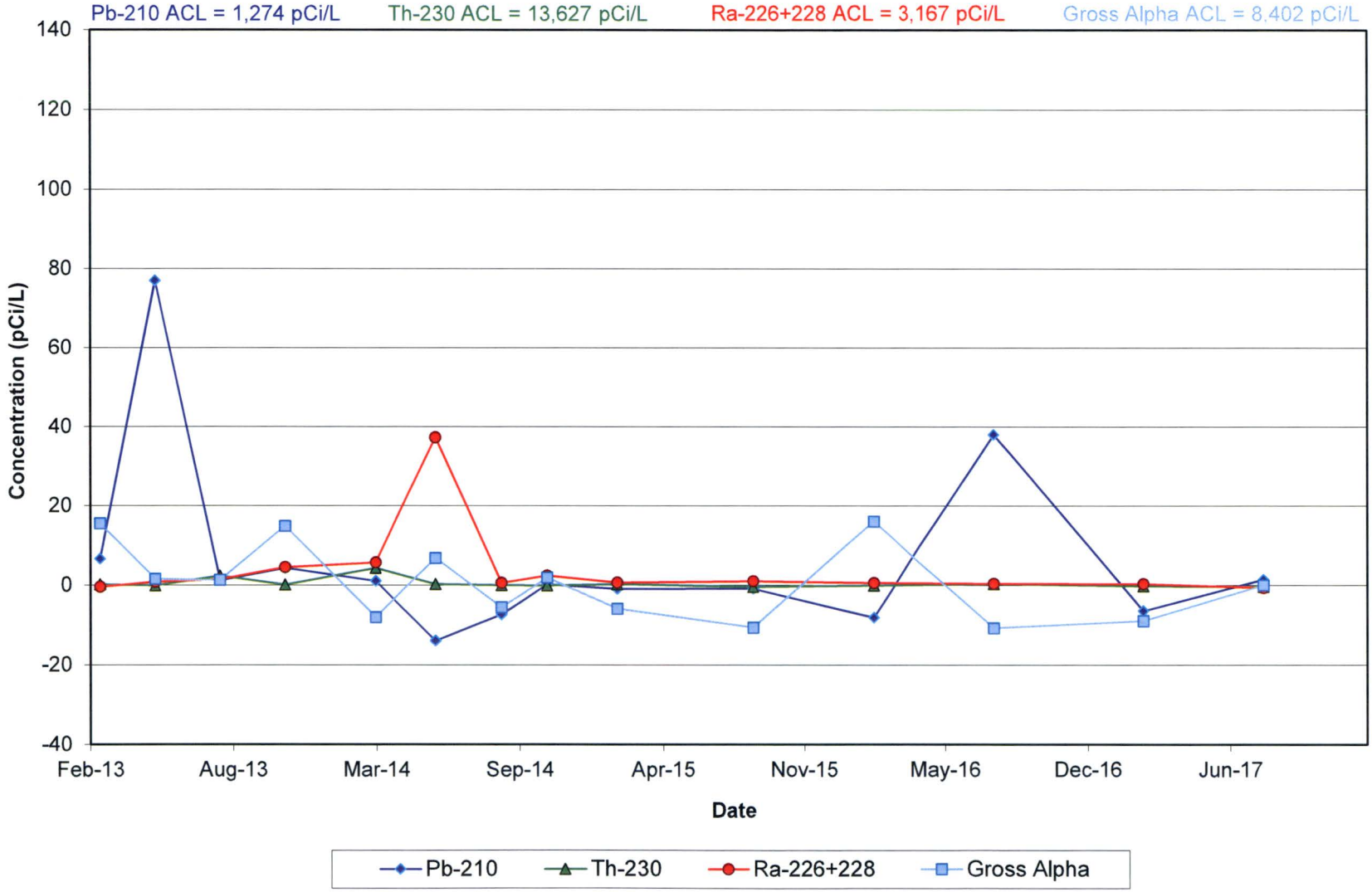
Metals in Monitoring Well 5-08 ALL-R
(replaced 11/2/2012)



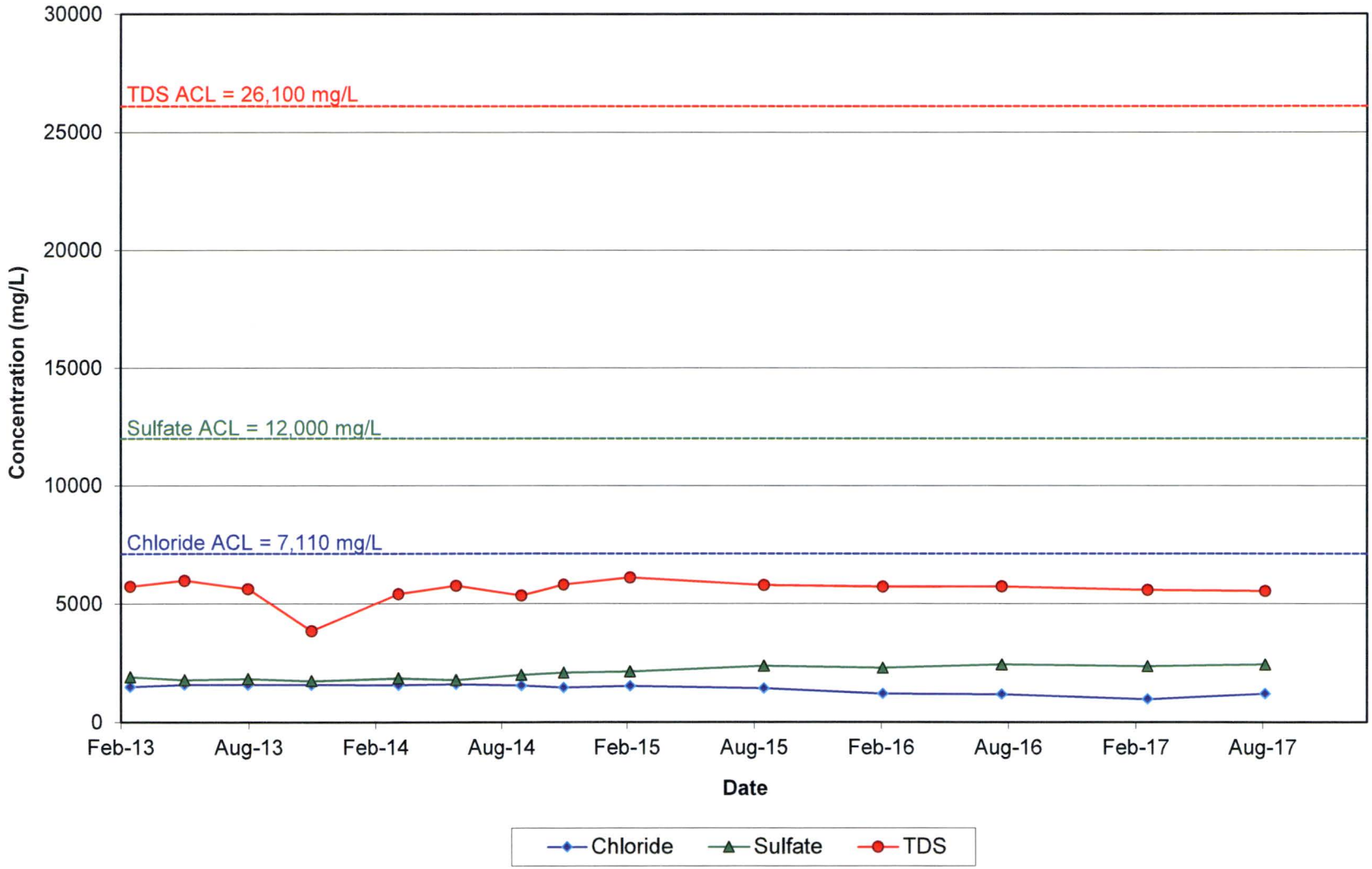
Nitrate in Monitoring Well 5-08 ALL-R (replaced 11/2/2012)



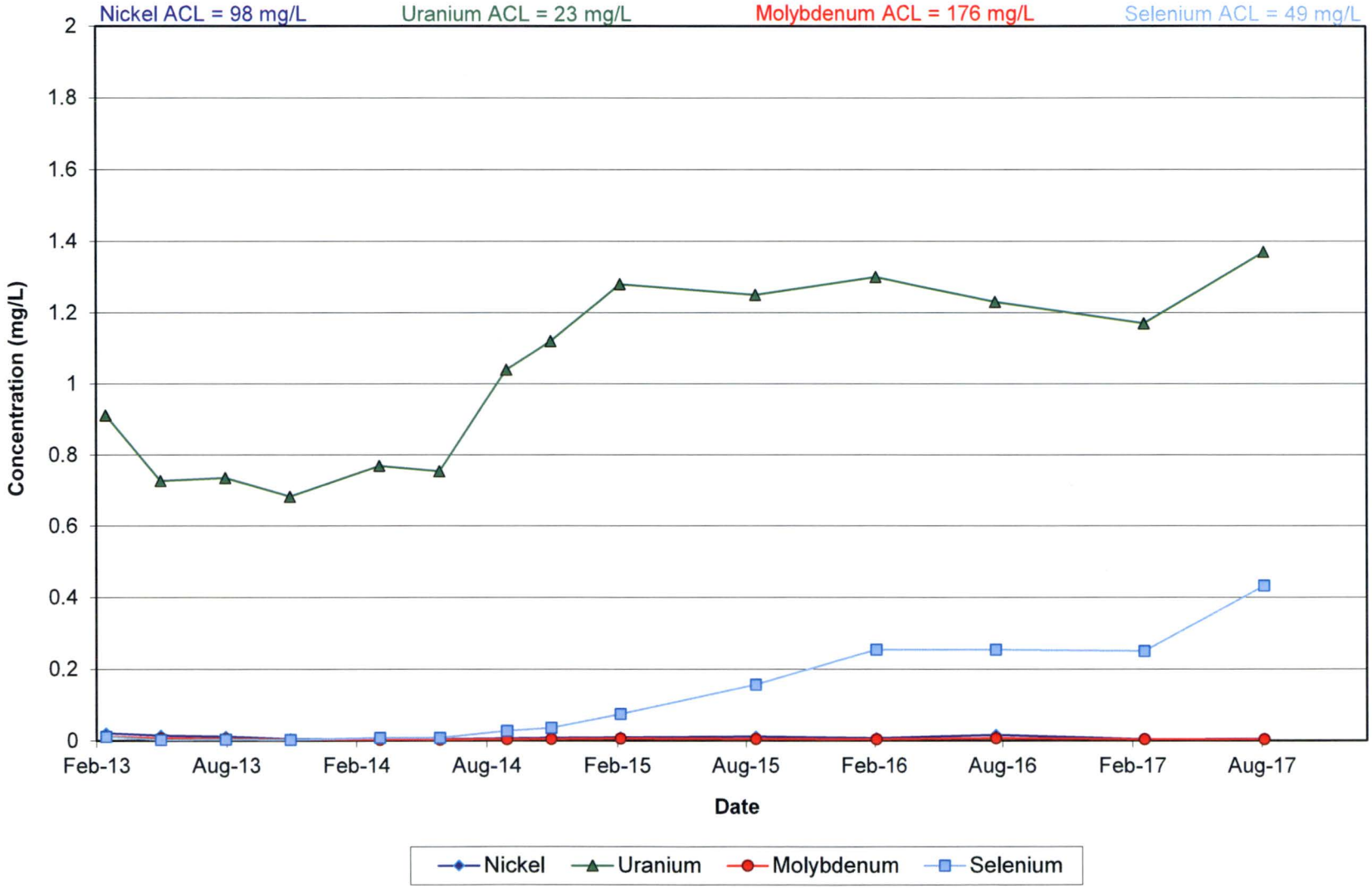
Radionuclides in Monitoring Well 5-08 ALL-R (replaced 11/2/2012)



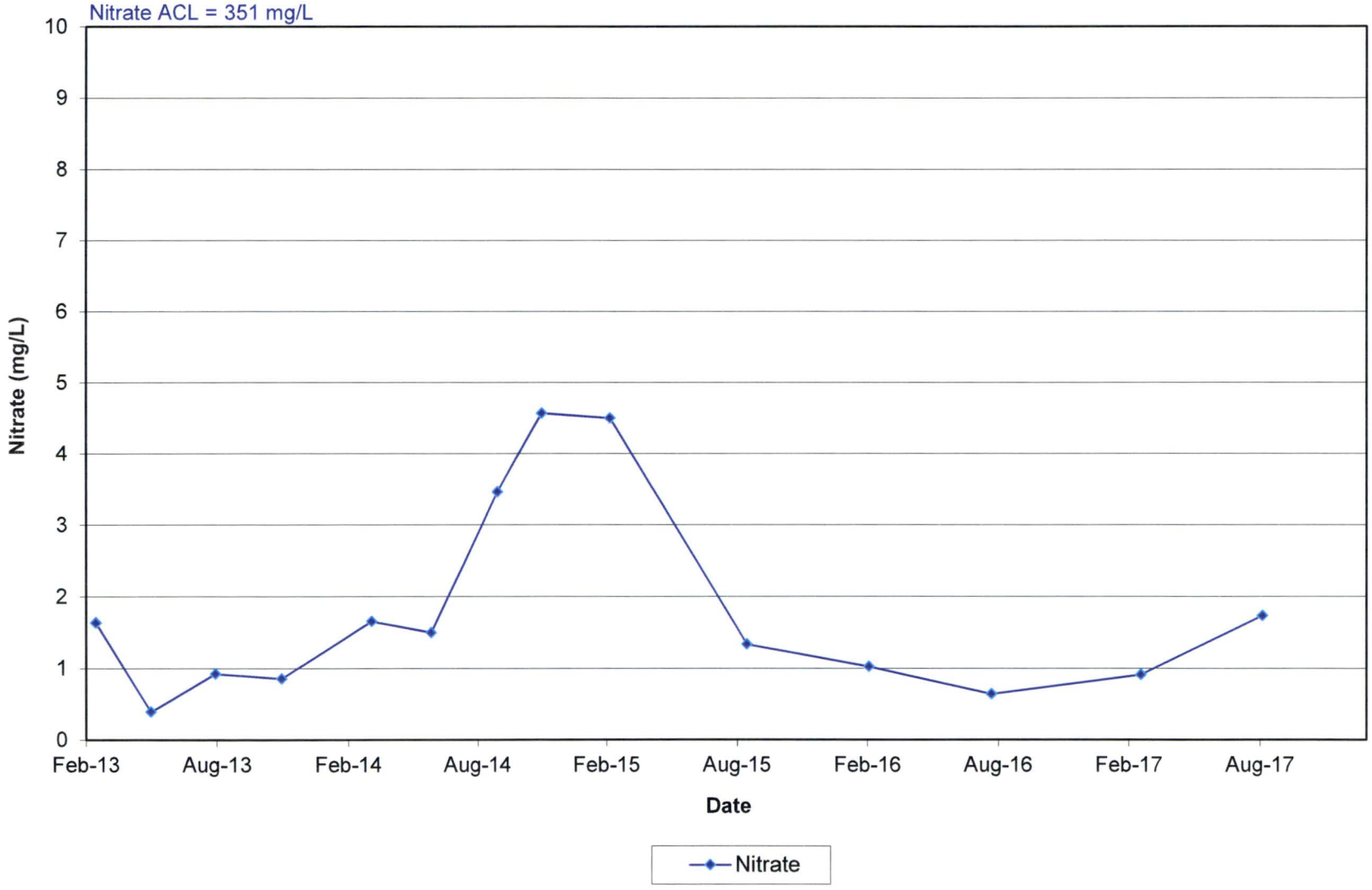
Anions and TDS in Monitoring Well 5-73 ALL-R (replaced 11/4/2012)



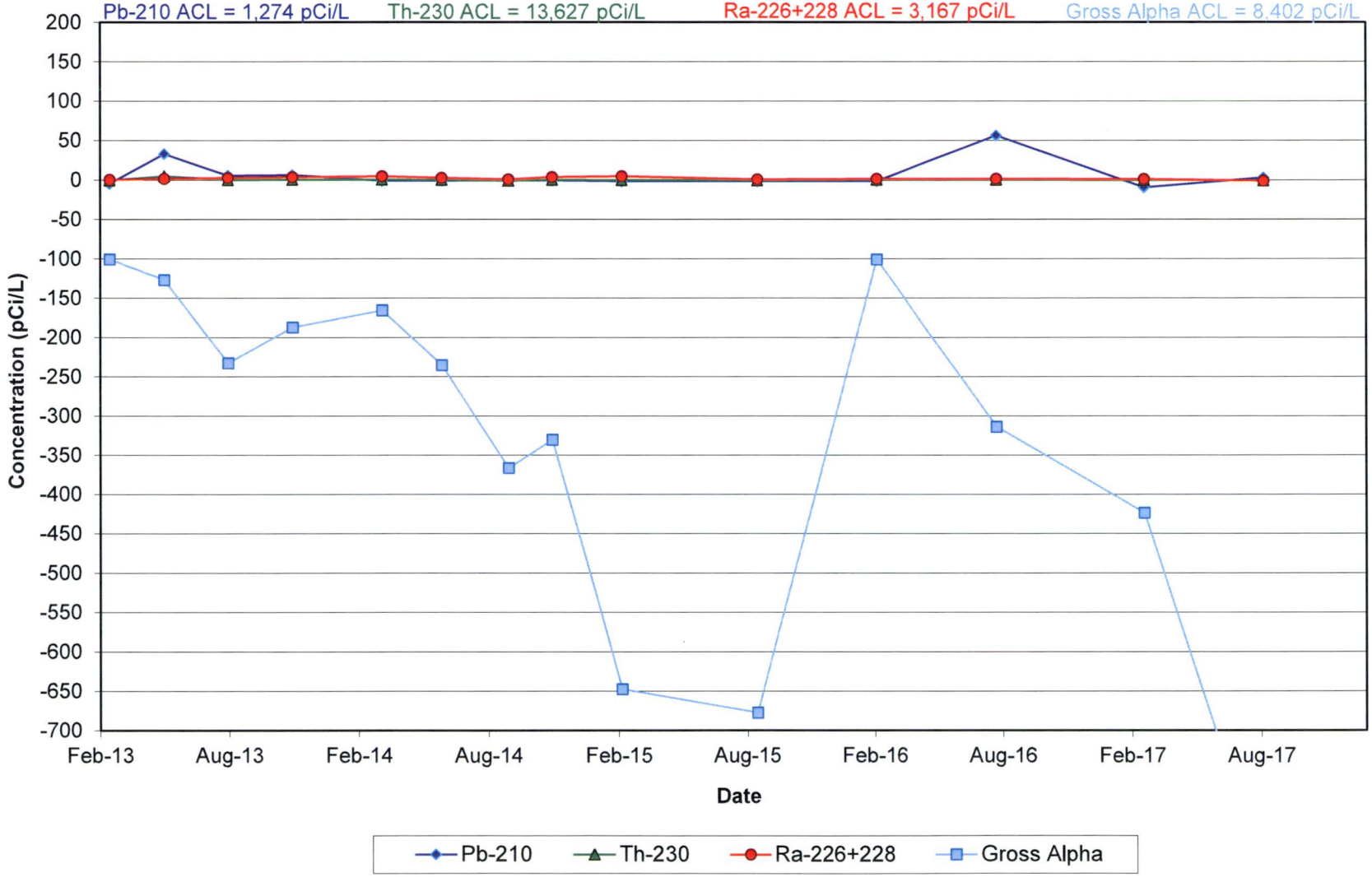
Metals in Monitoring Well 5-73 ALL-R
(replaced 11/4/2012)



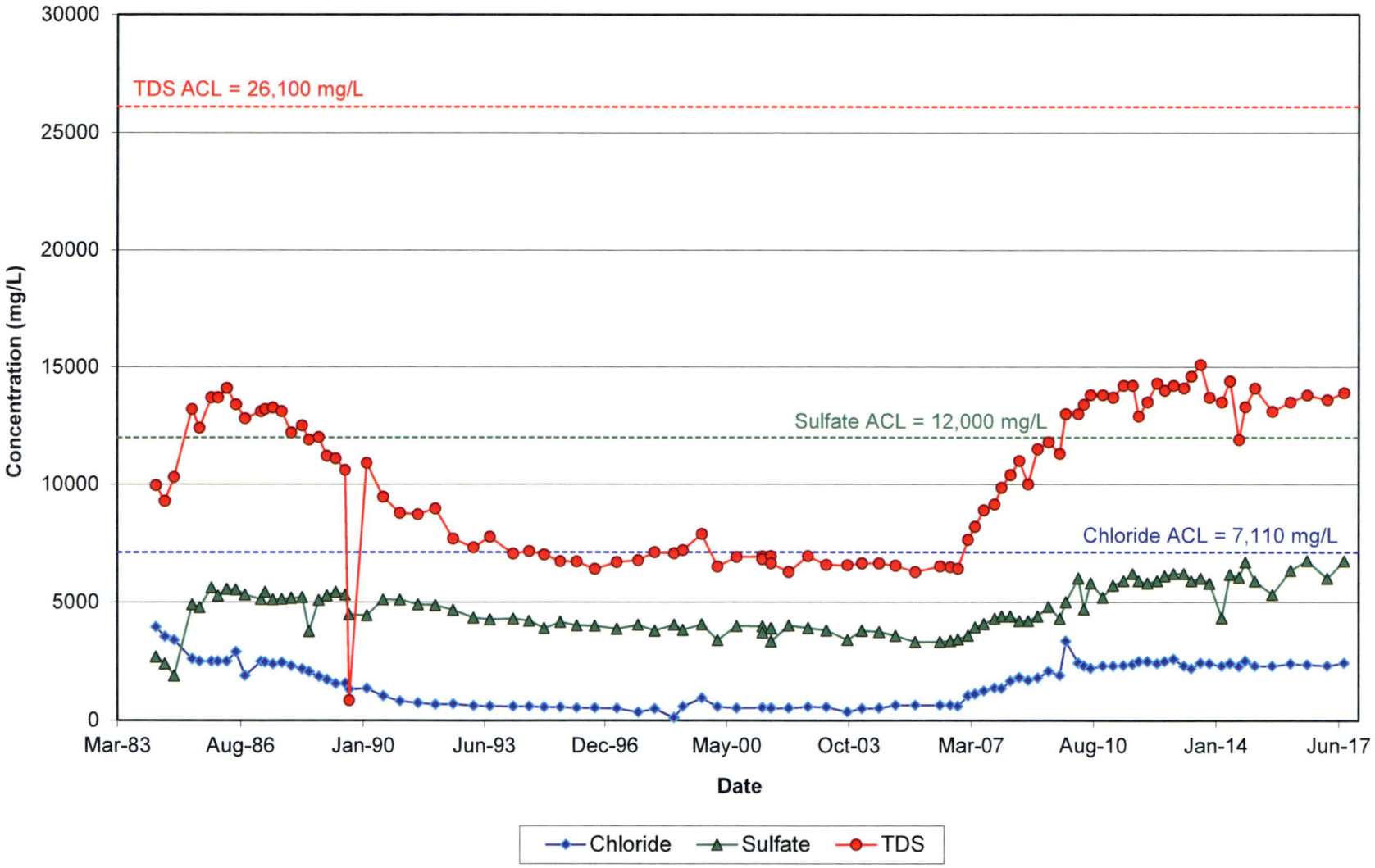
Nitrate in Monitoring Well 5-73 ALL-R
(replaced 11/4/2012)



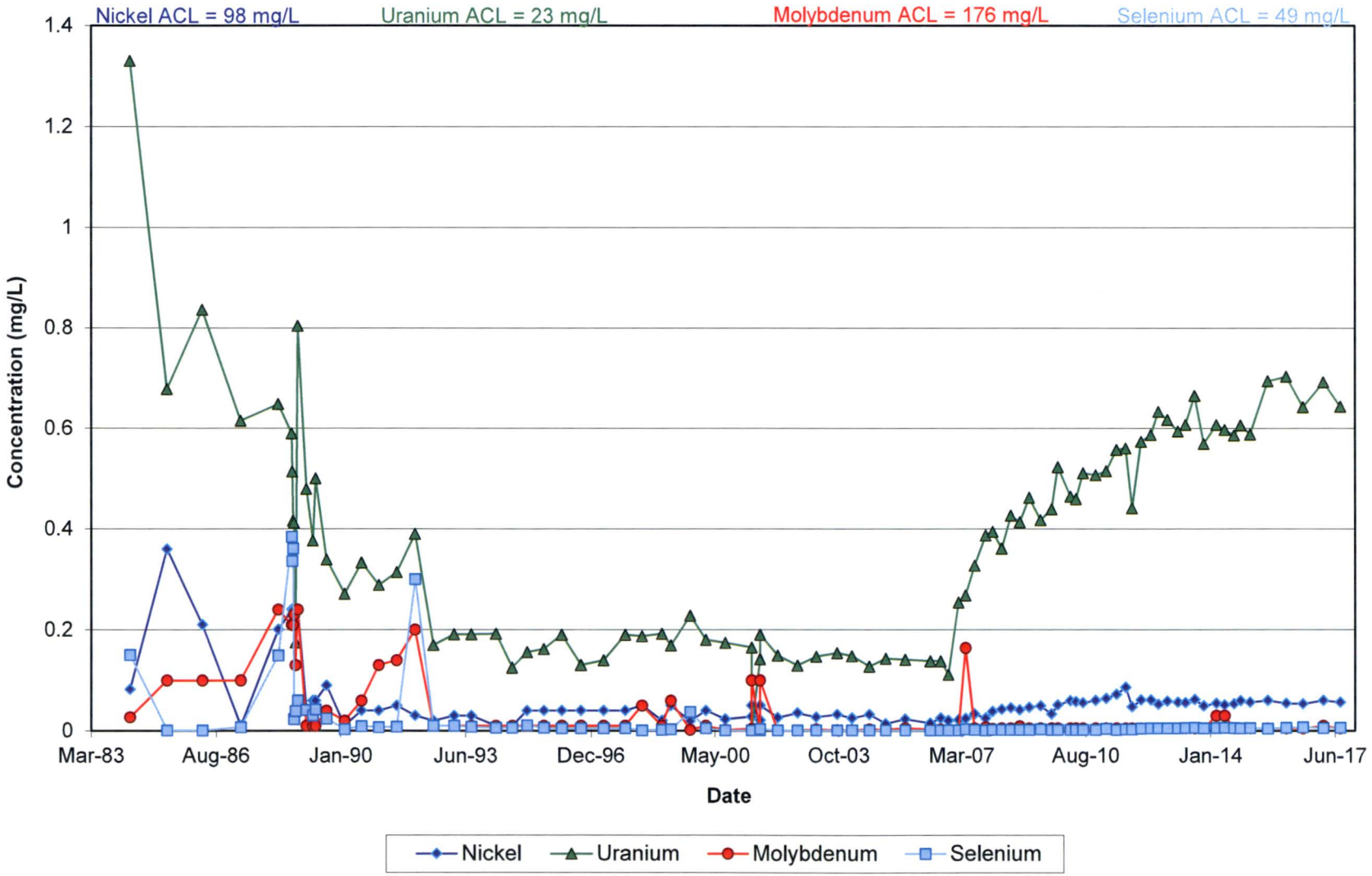
Radionuclides in Monitoring Well 5-73 ALL-R
(replaced 11/4/2012)



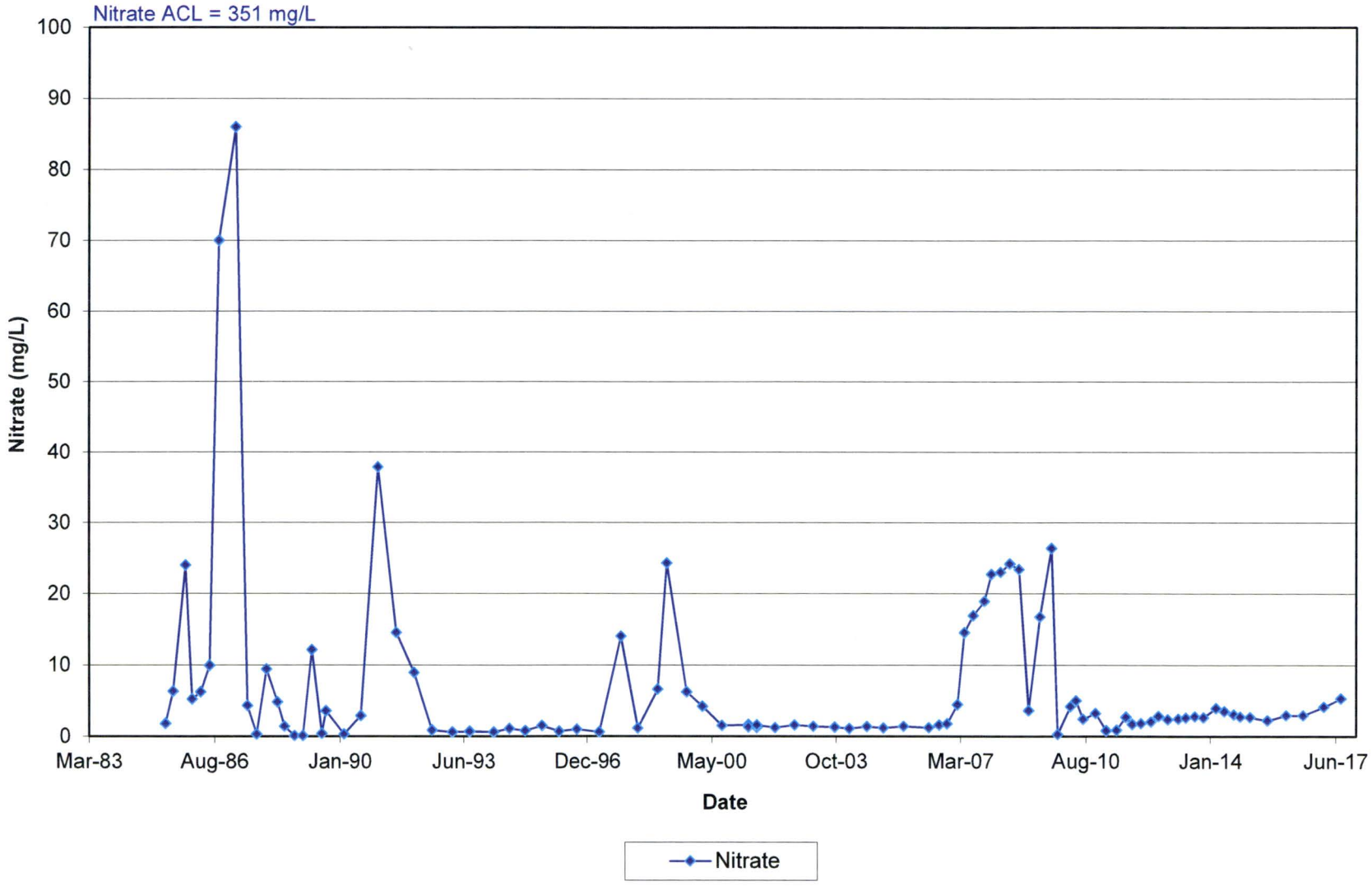
Anions and TDS in Monitoring Well 31-61 ALL



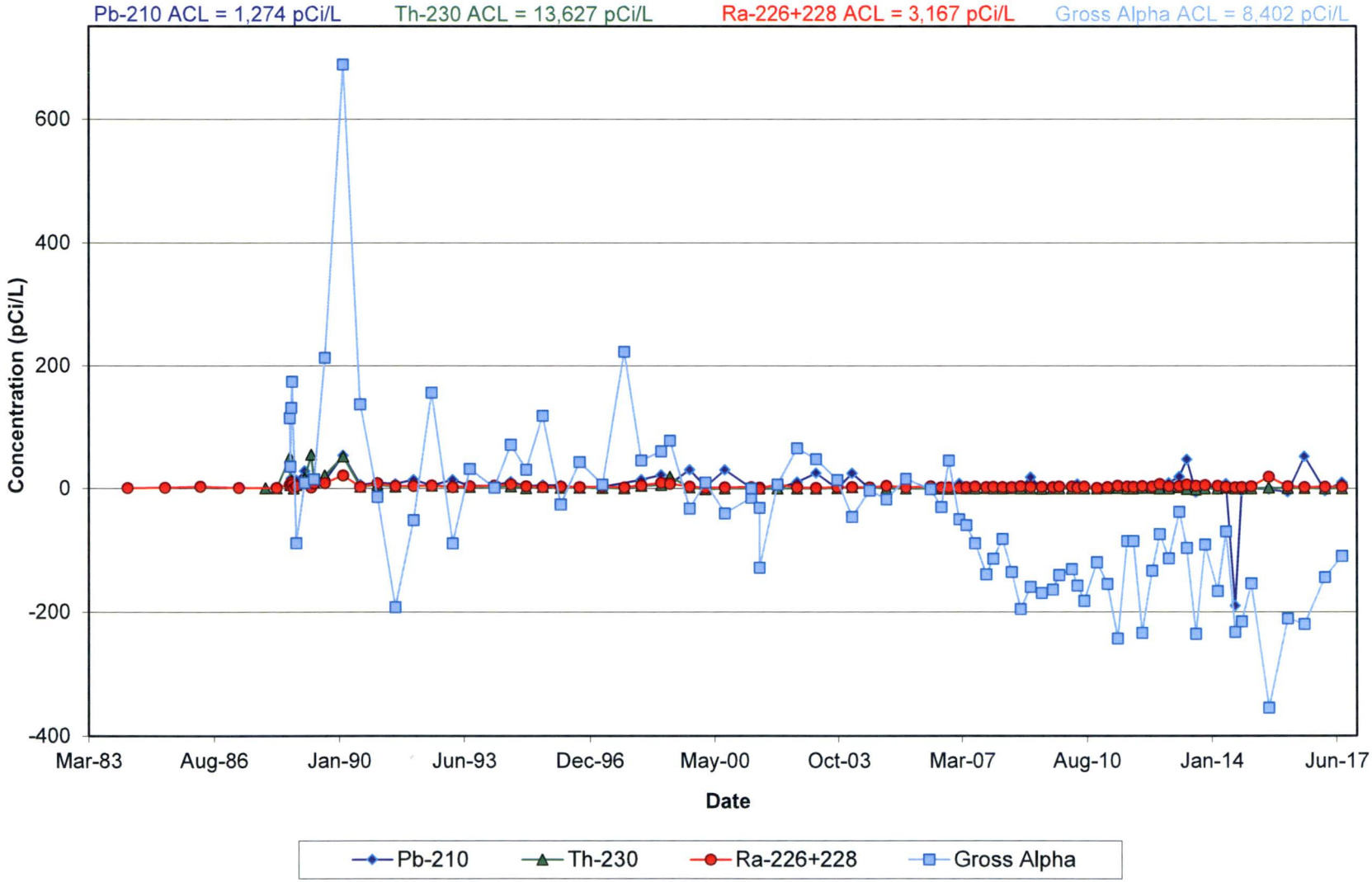
Metals in Monitoring Well 31-61 ALL



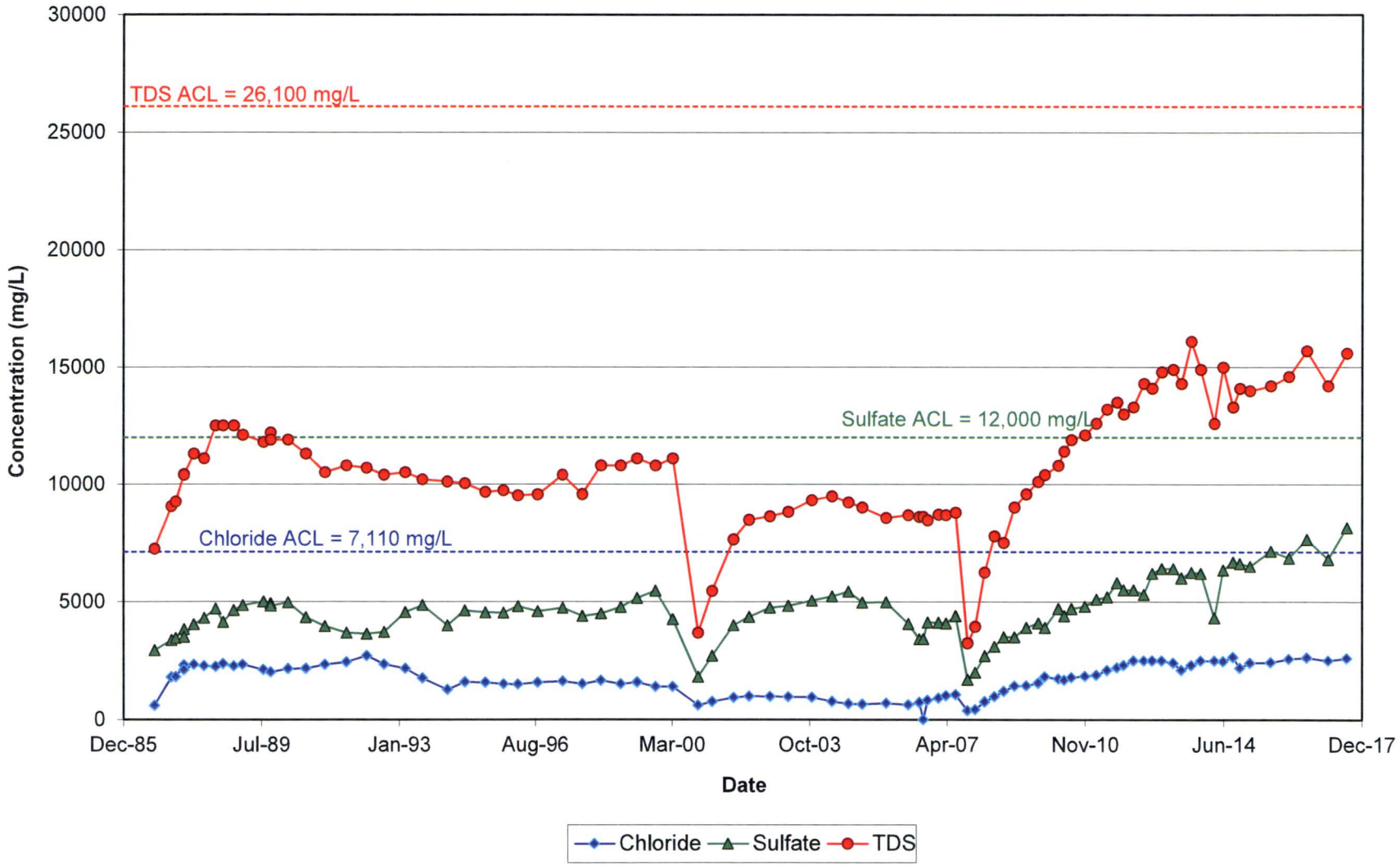
Nitrate in Monitoring Well 31-61 ALL



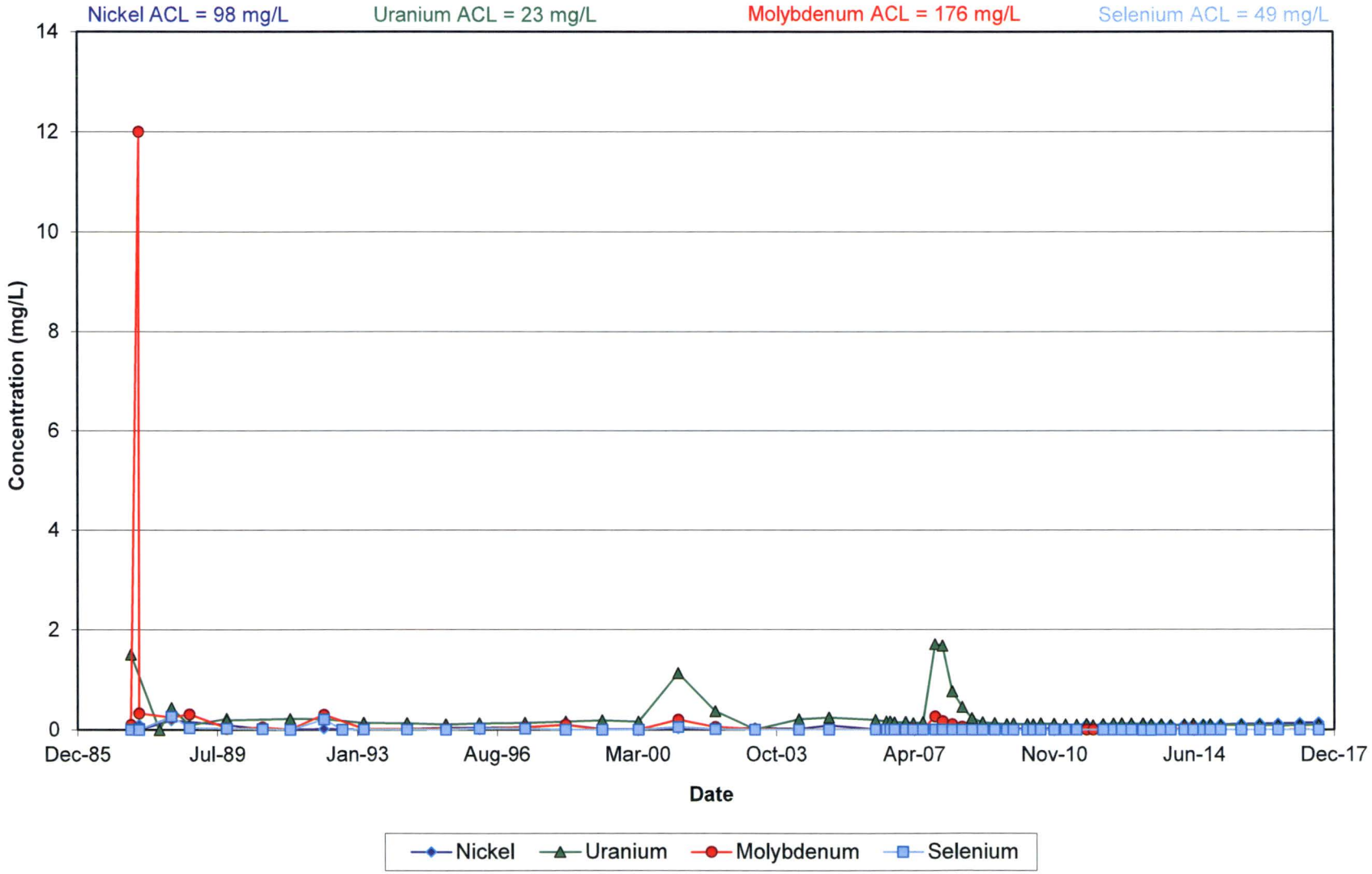
Radionuclides in Monitoring Well 31-61 ALL



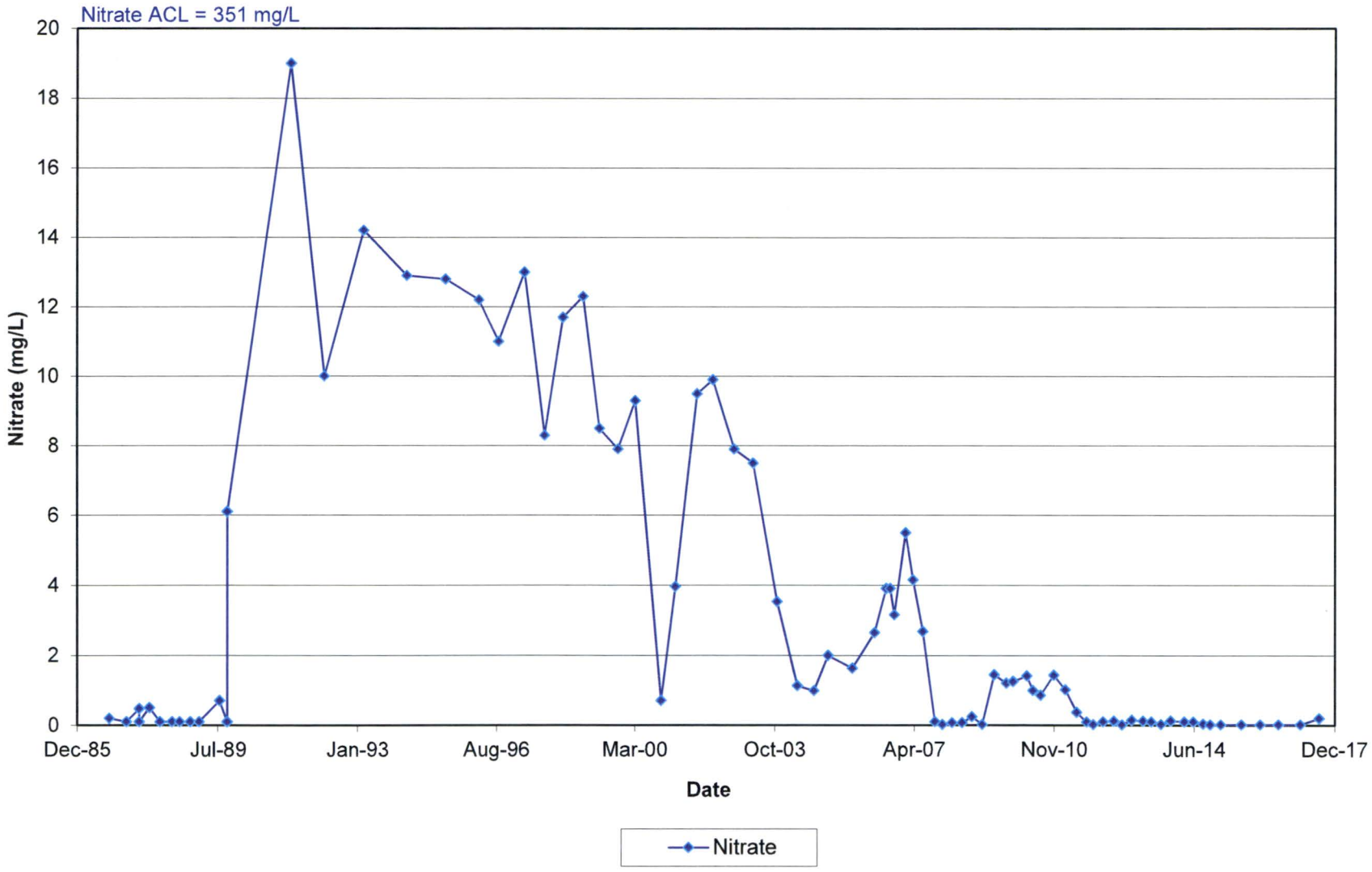
Anions and TDS in Monitoring Well 31-65 ALL



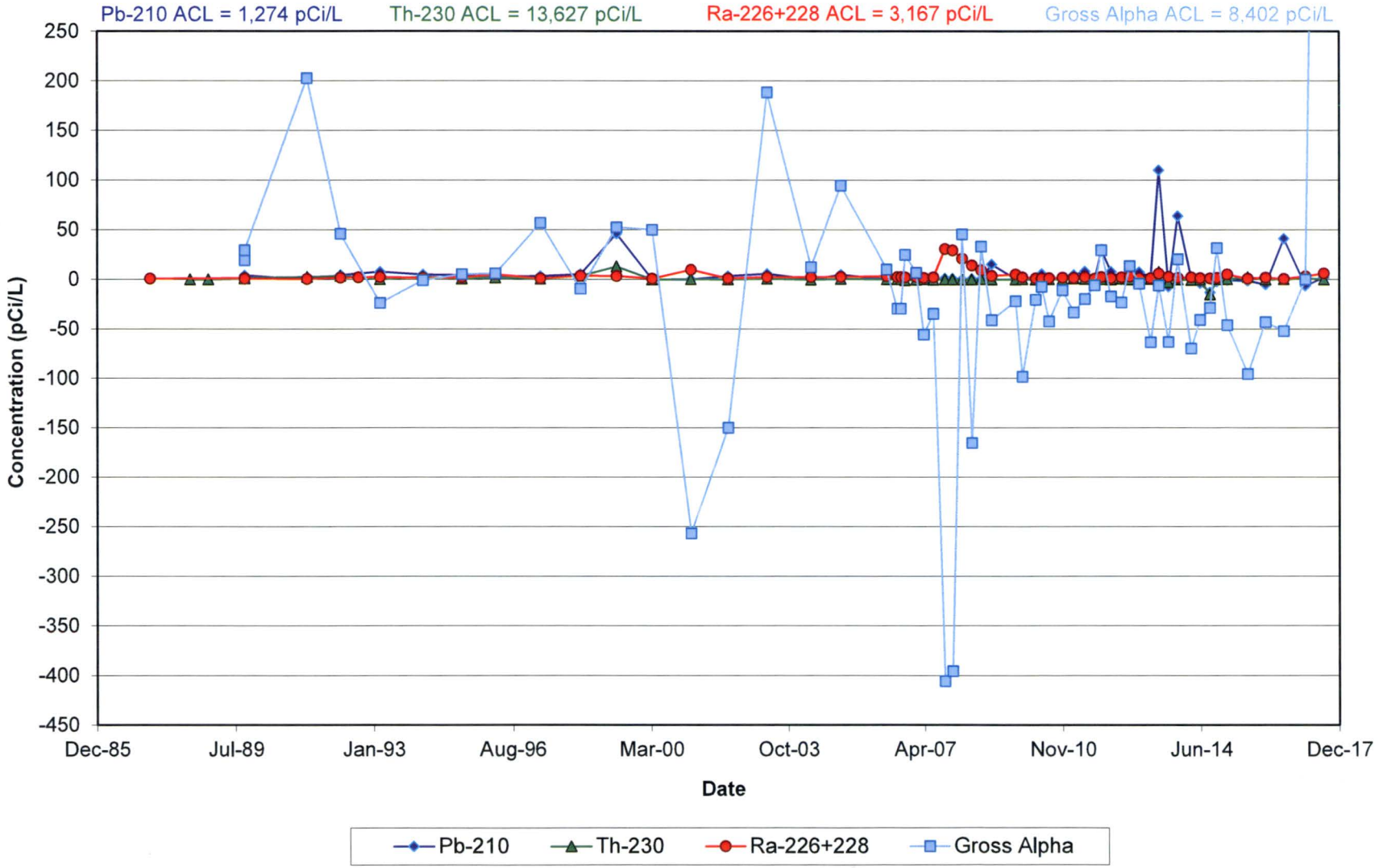
Metals in Monitoring Well 31-65 ALL



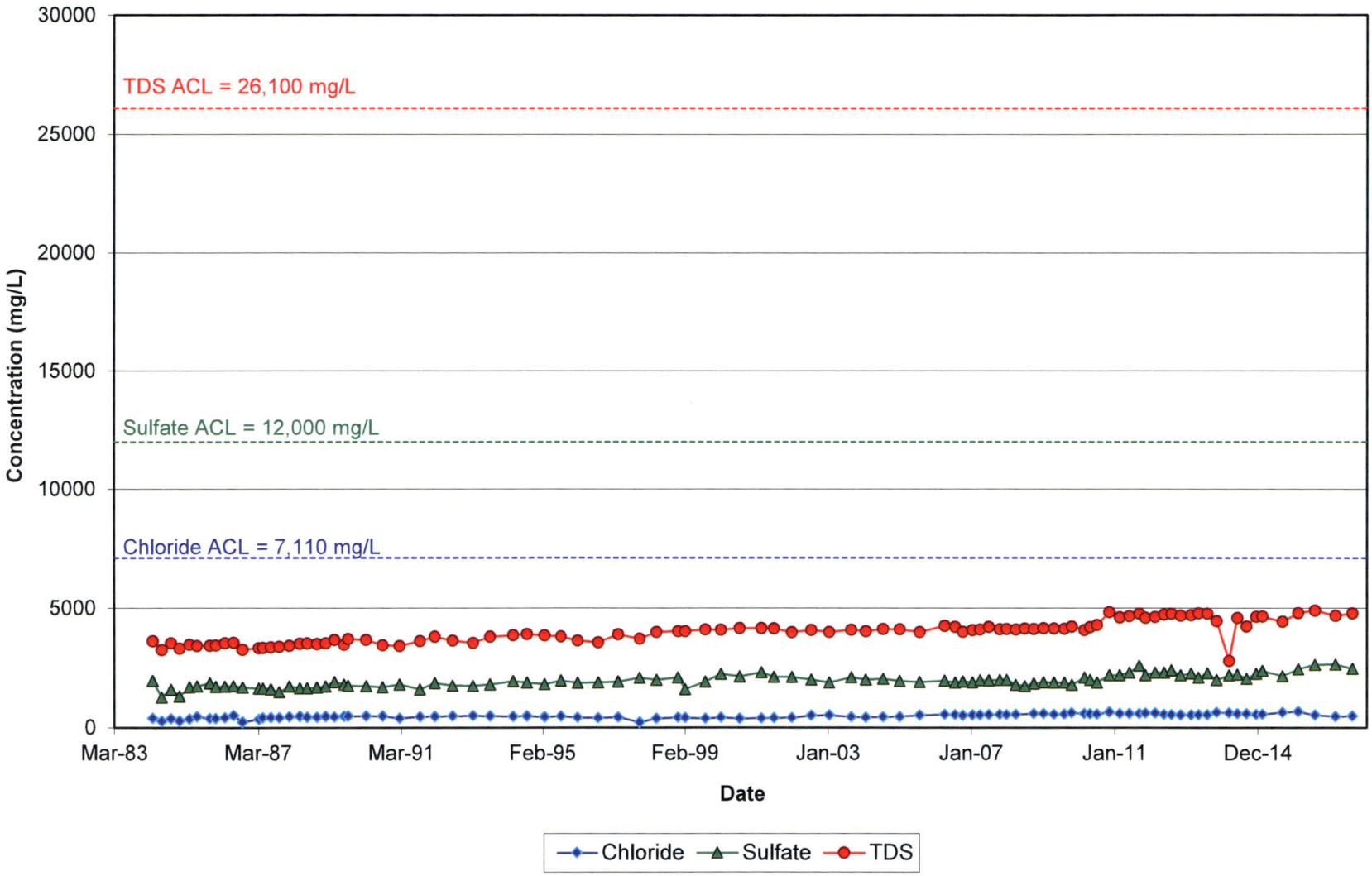
Nitrate in Monitoring Well 31-65 ALL



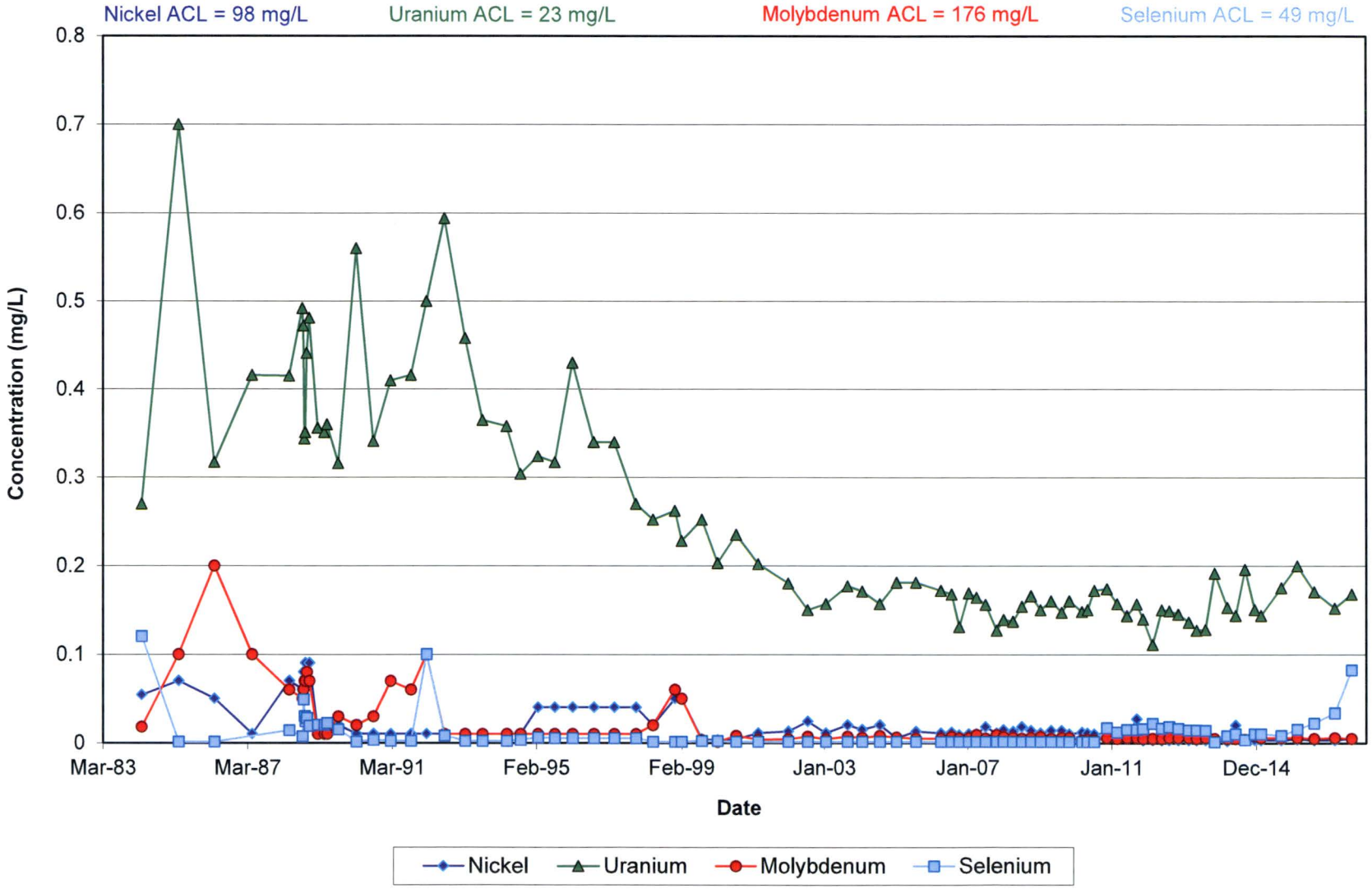
Radionuclides in Monitoring Well 31-65 ALL



Anions and TDS in Monitoring Well 32-59 ALL

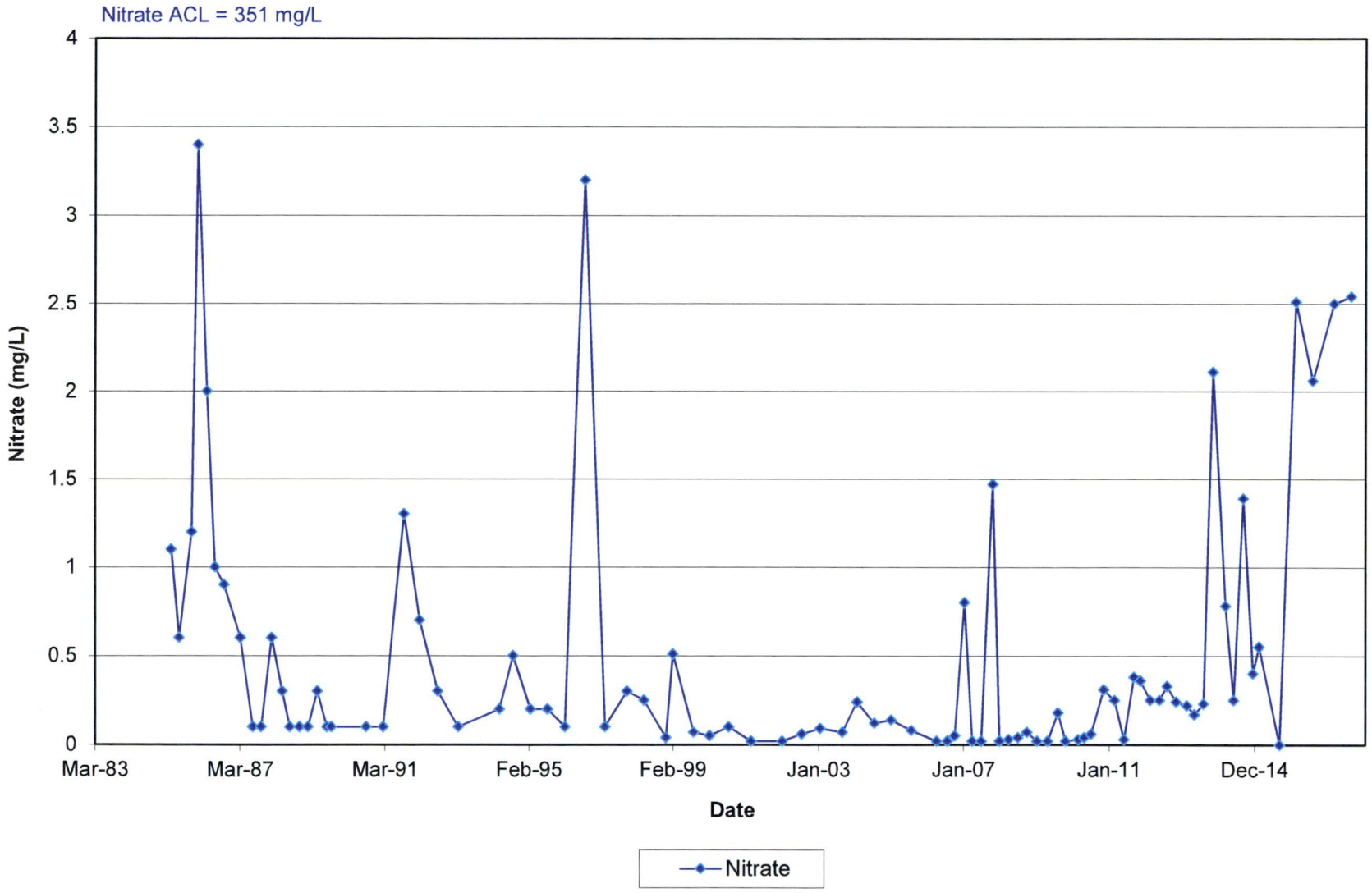


Metals in Monitoring Well 32-59 ALL

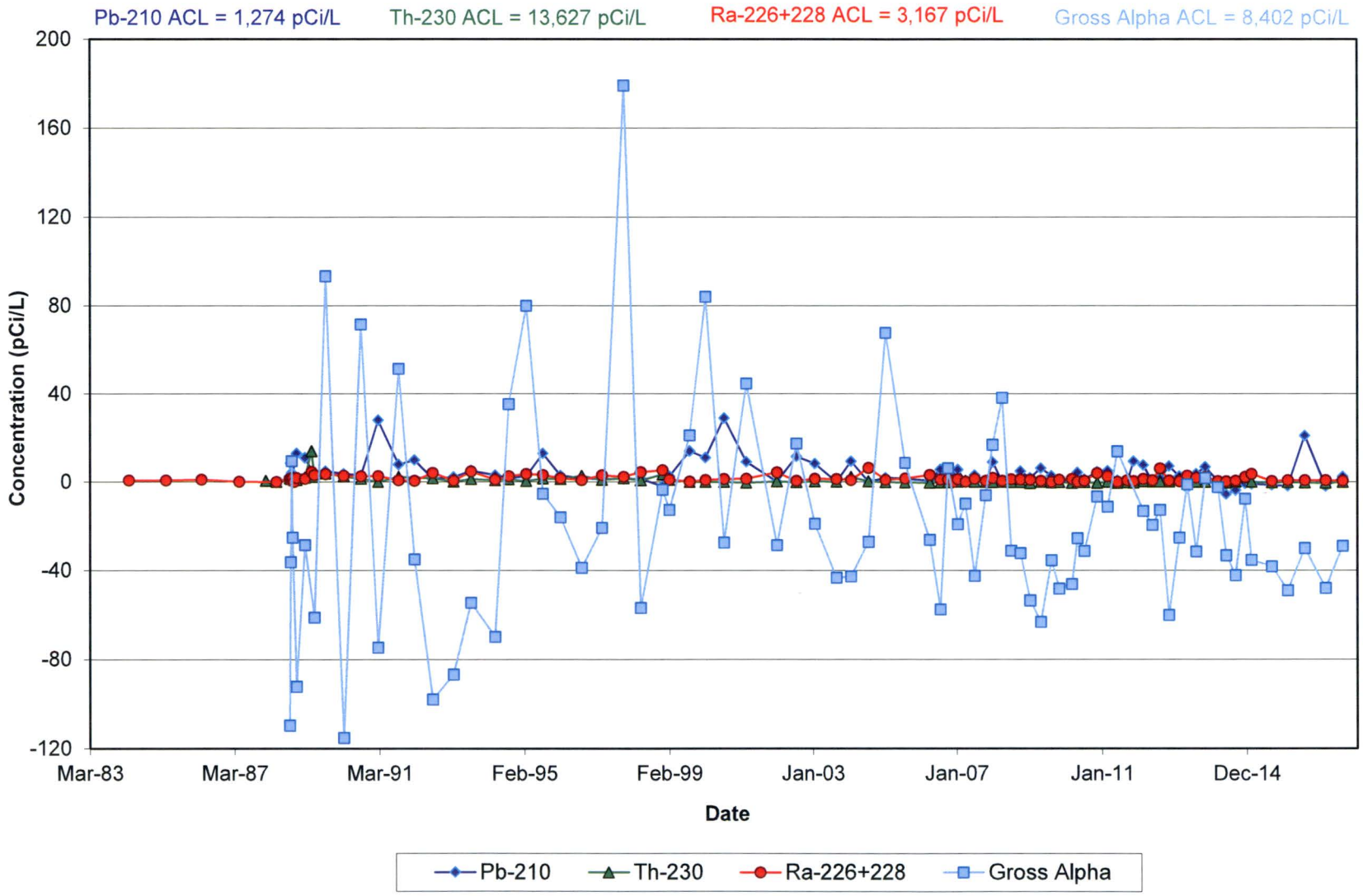


INTERA

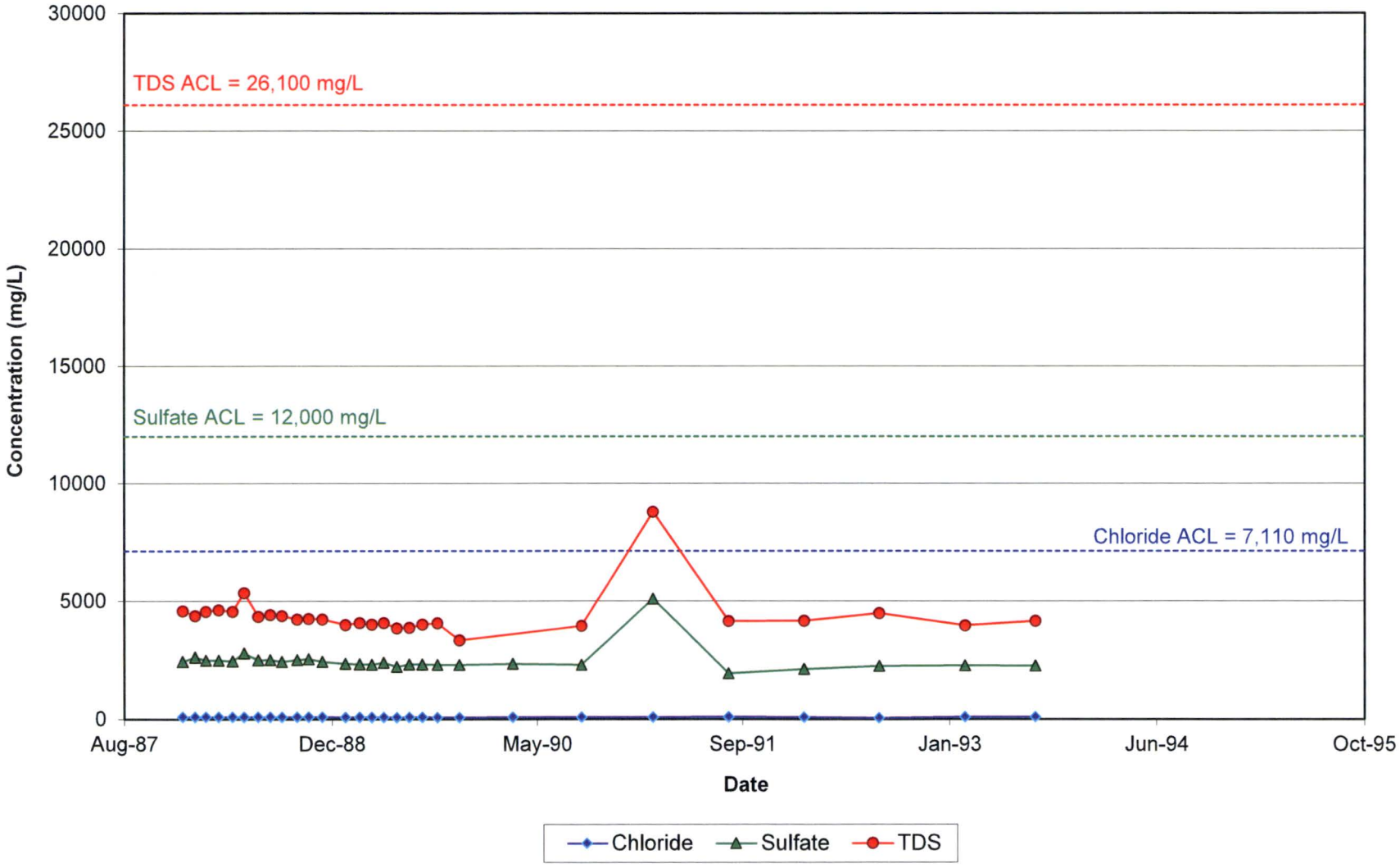
Nitrate in Monitoring Well 32-59 ALL



Radionuclides in Monitoring Well 32-59 ALL



Anions and TDS in Monitoring Well MW-24 ALL



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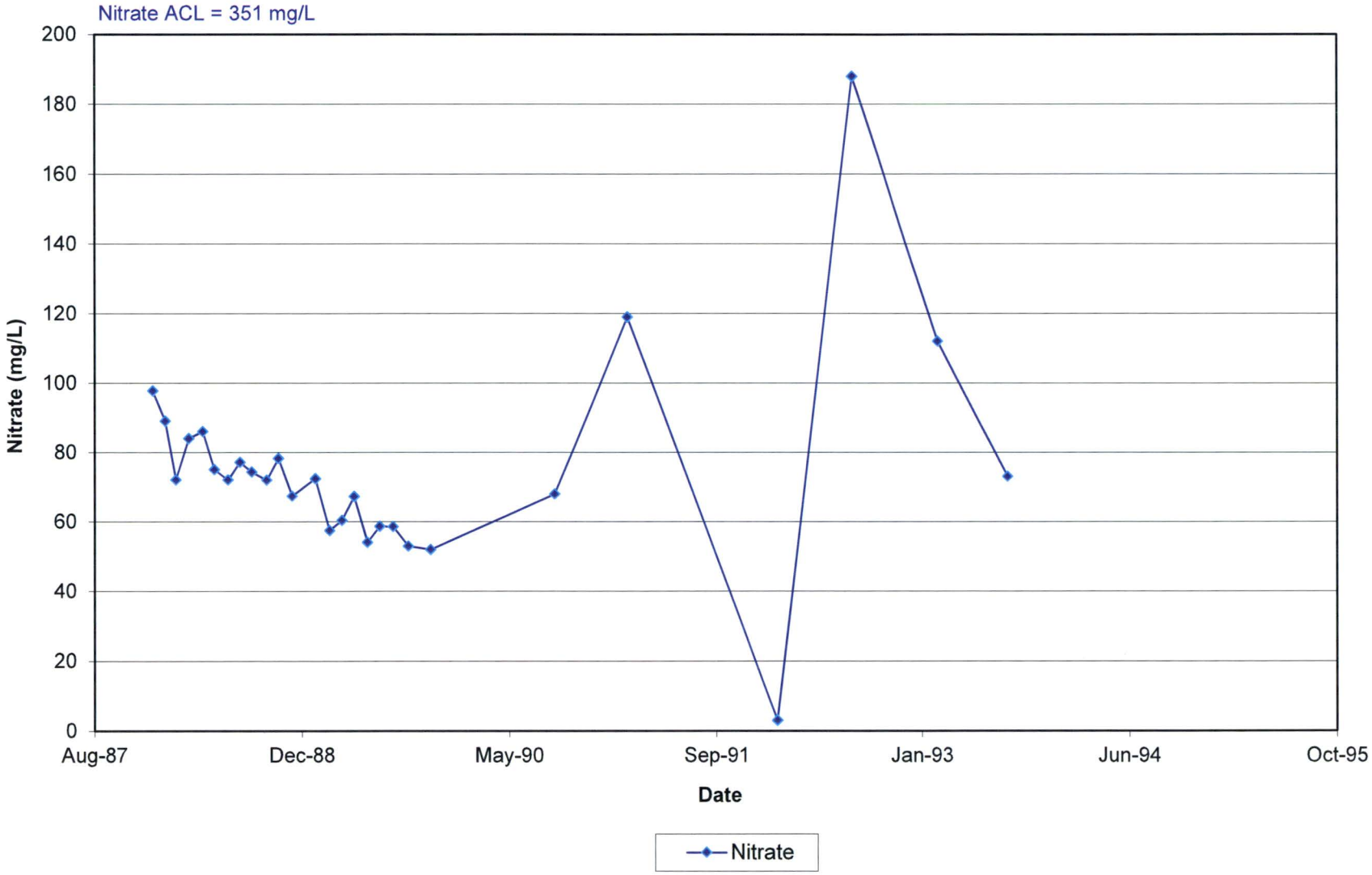
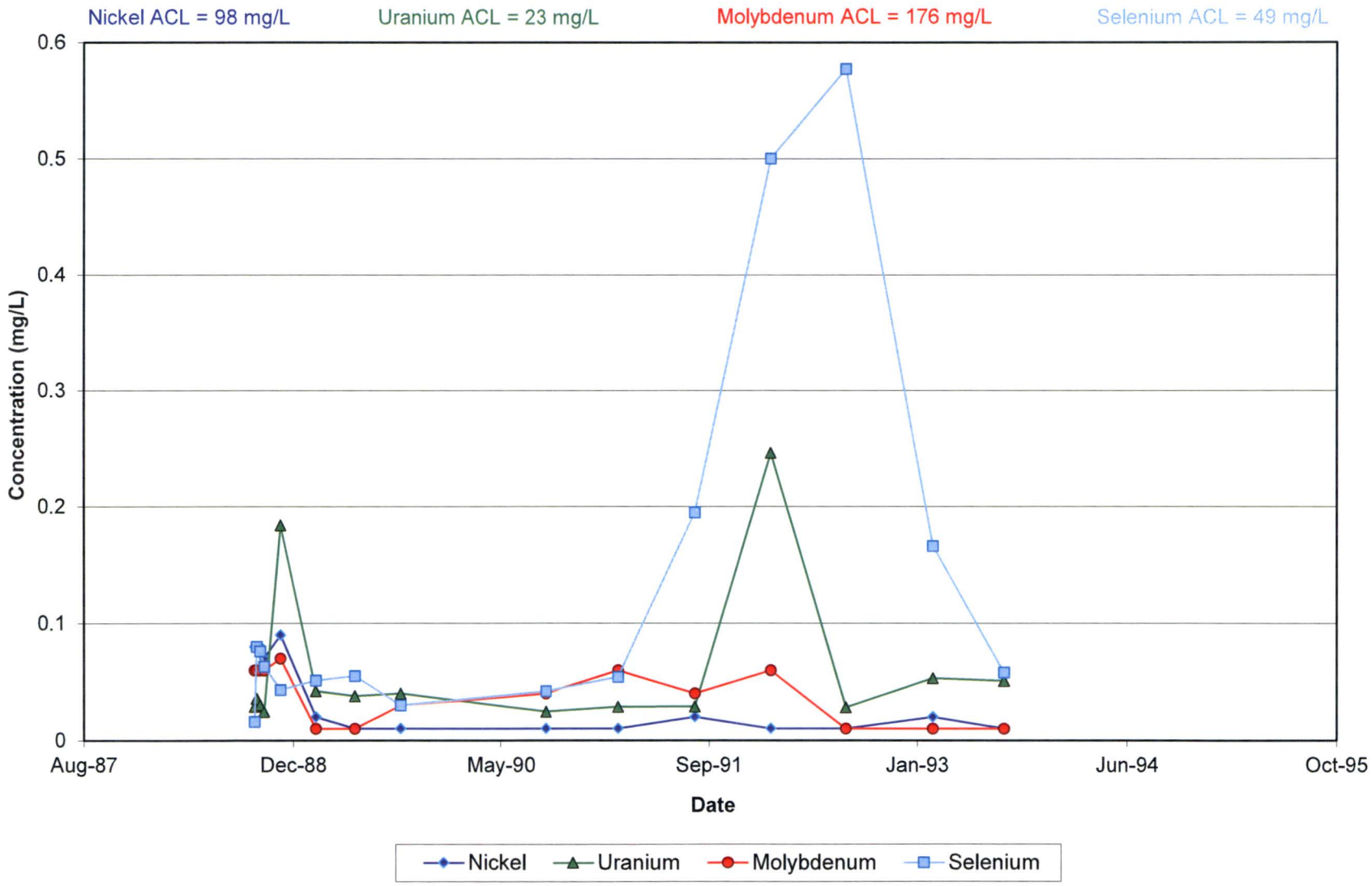
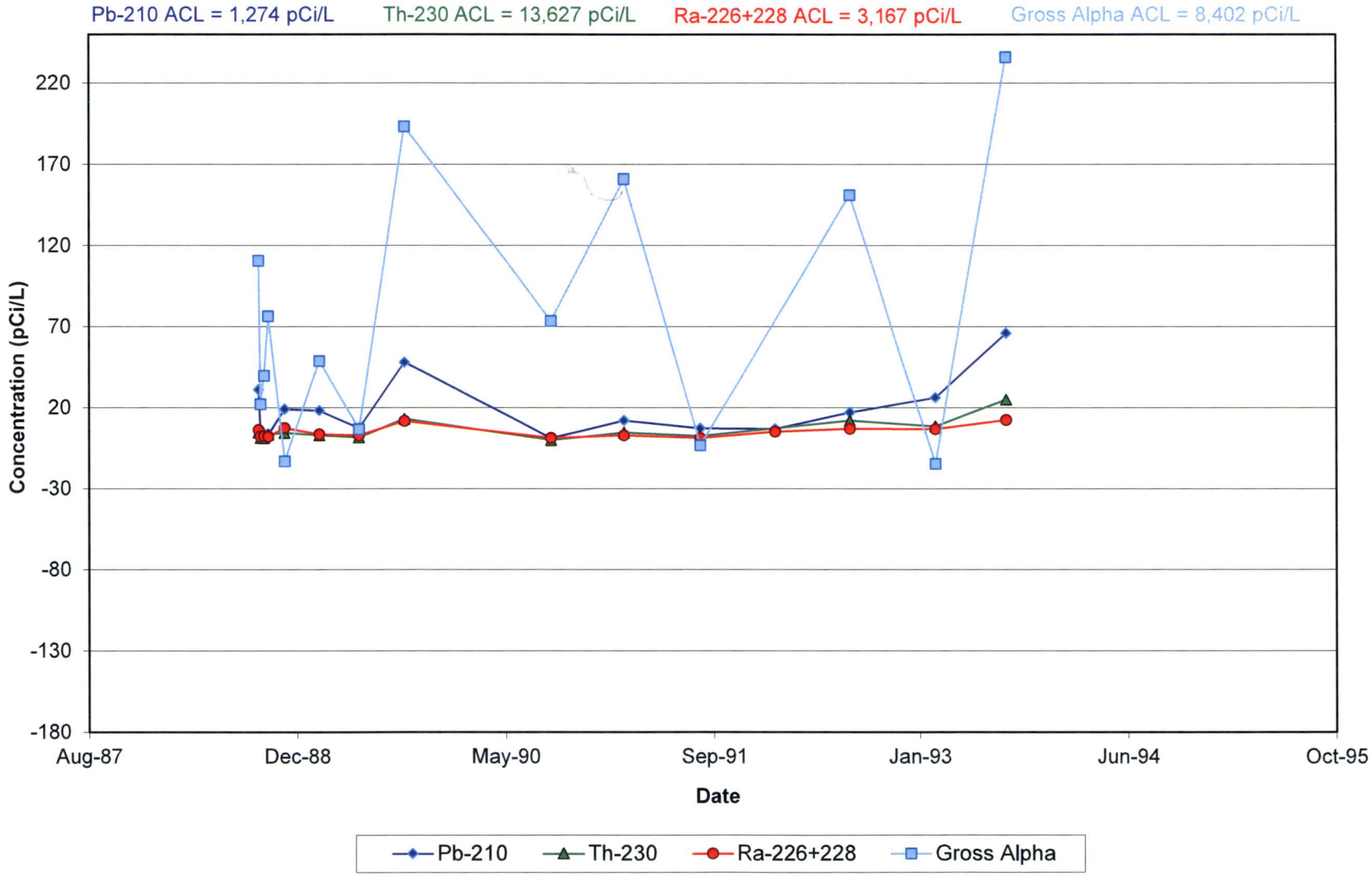
Nitrate in Monitoring Well MW-24 ALL



Metals in Monitoring Well MW-24 ALL



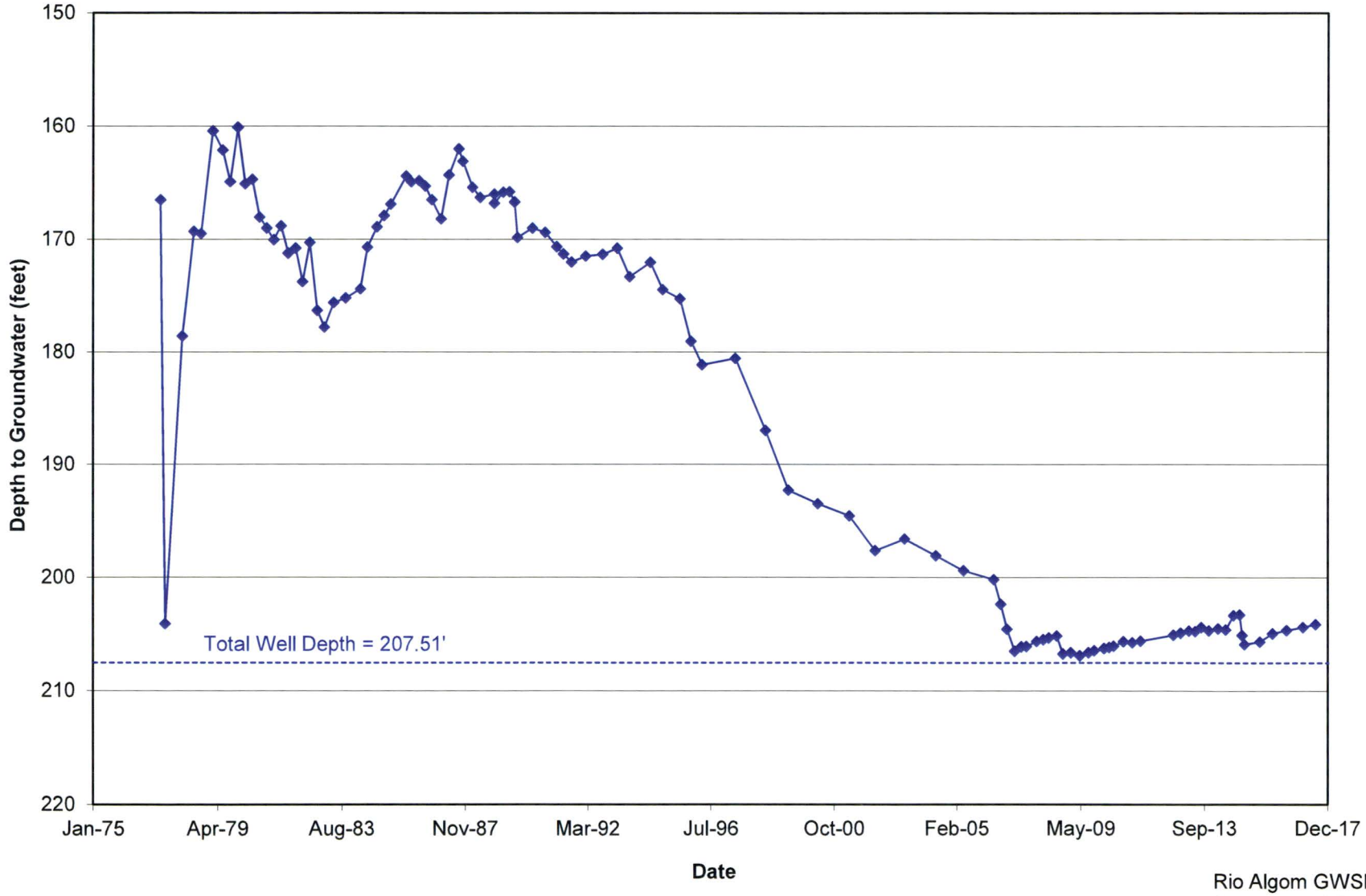
Radionuclides in Monitoring Well MW-24 ALL



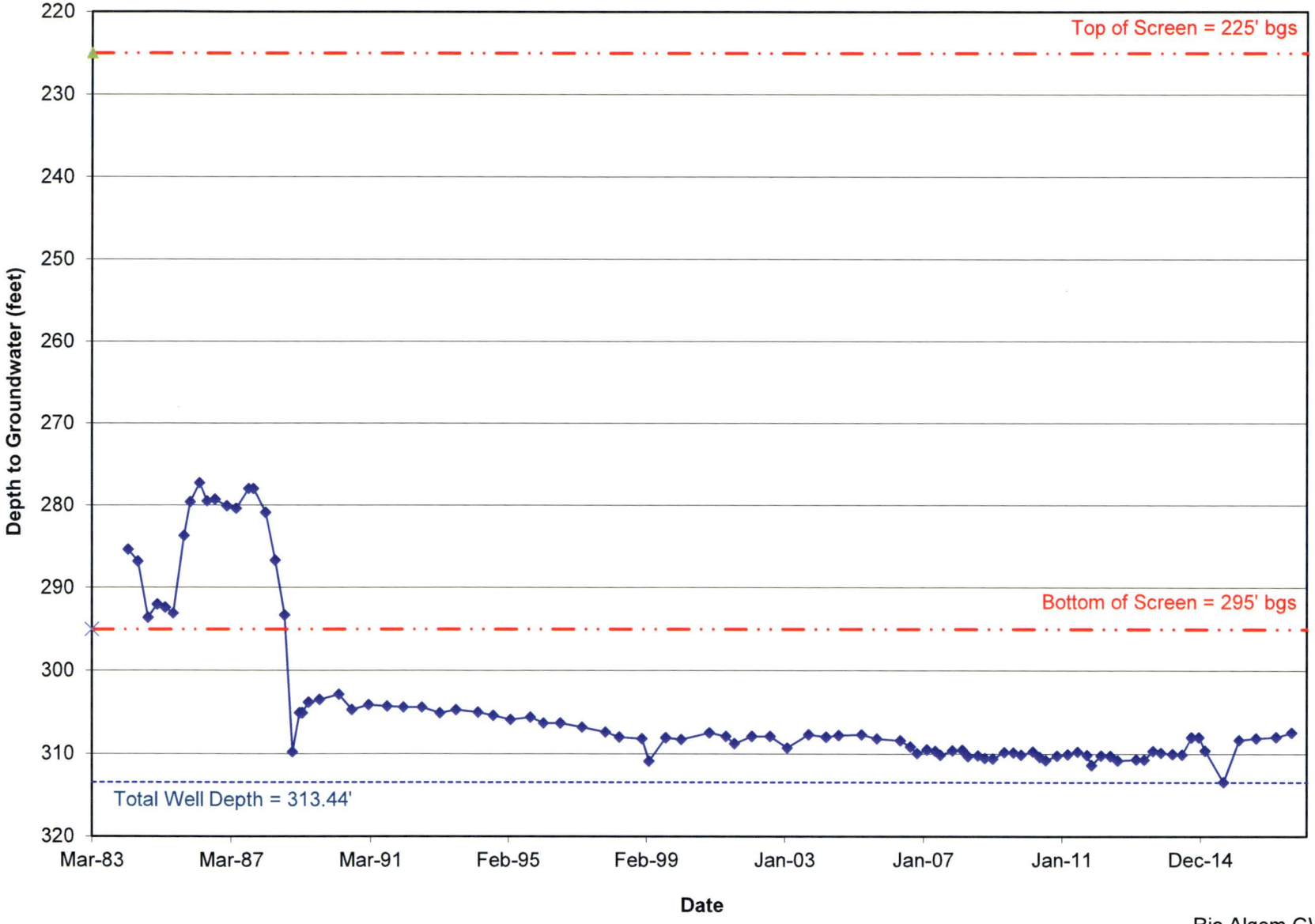
APPENDIX 3

Stability Monitoring Plan
Hydrographs

Hydrograph for TRA Monitoring Well 30-01 TRA

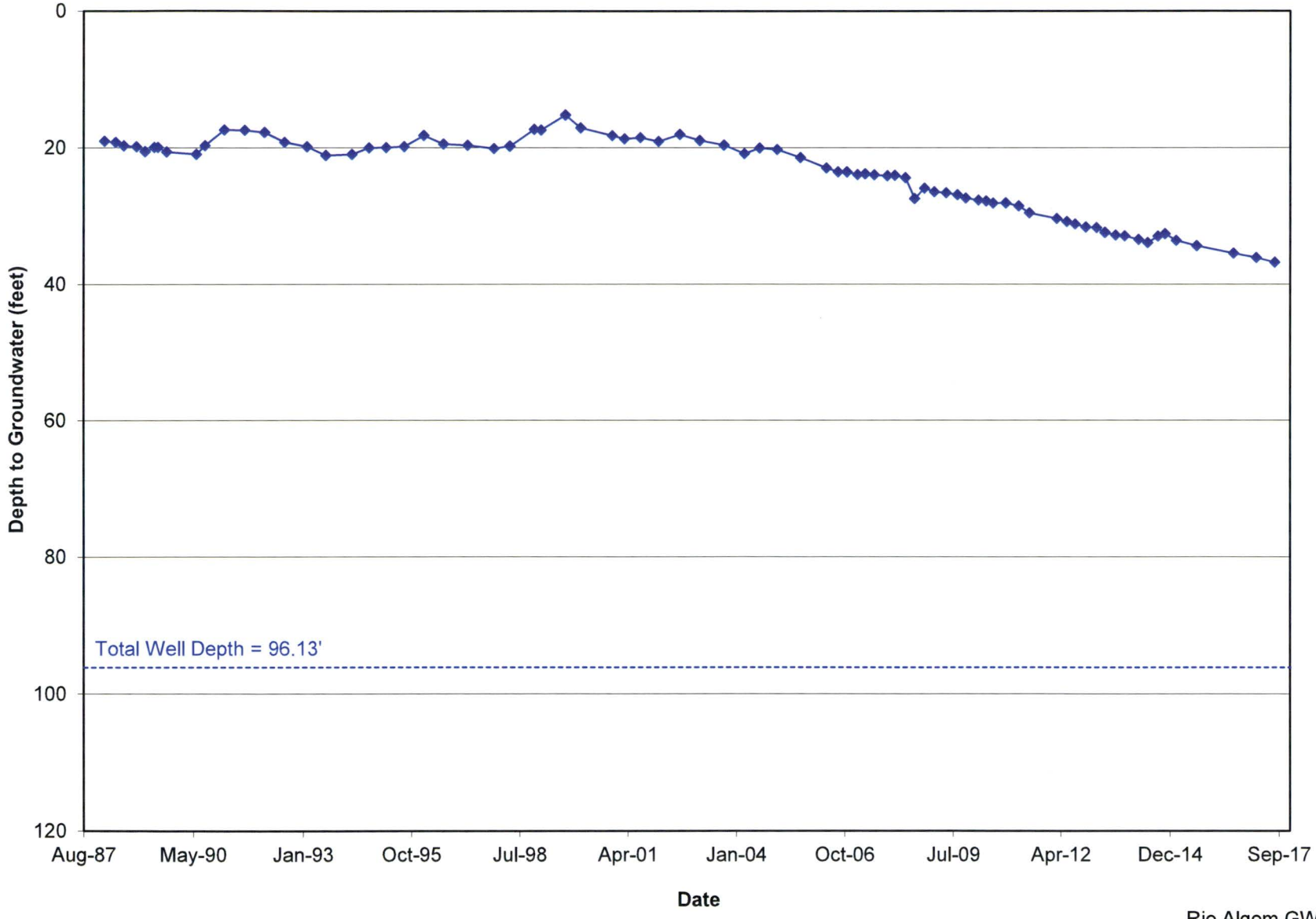


Hydrograph for Dakota Monitoring Well 30-02 KD

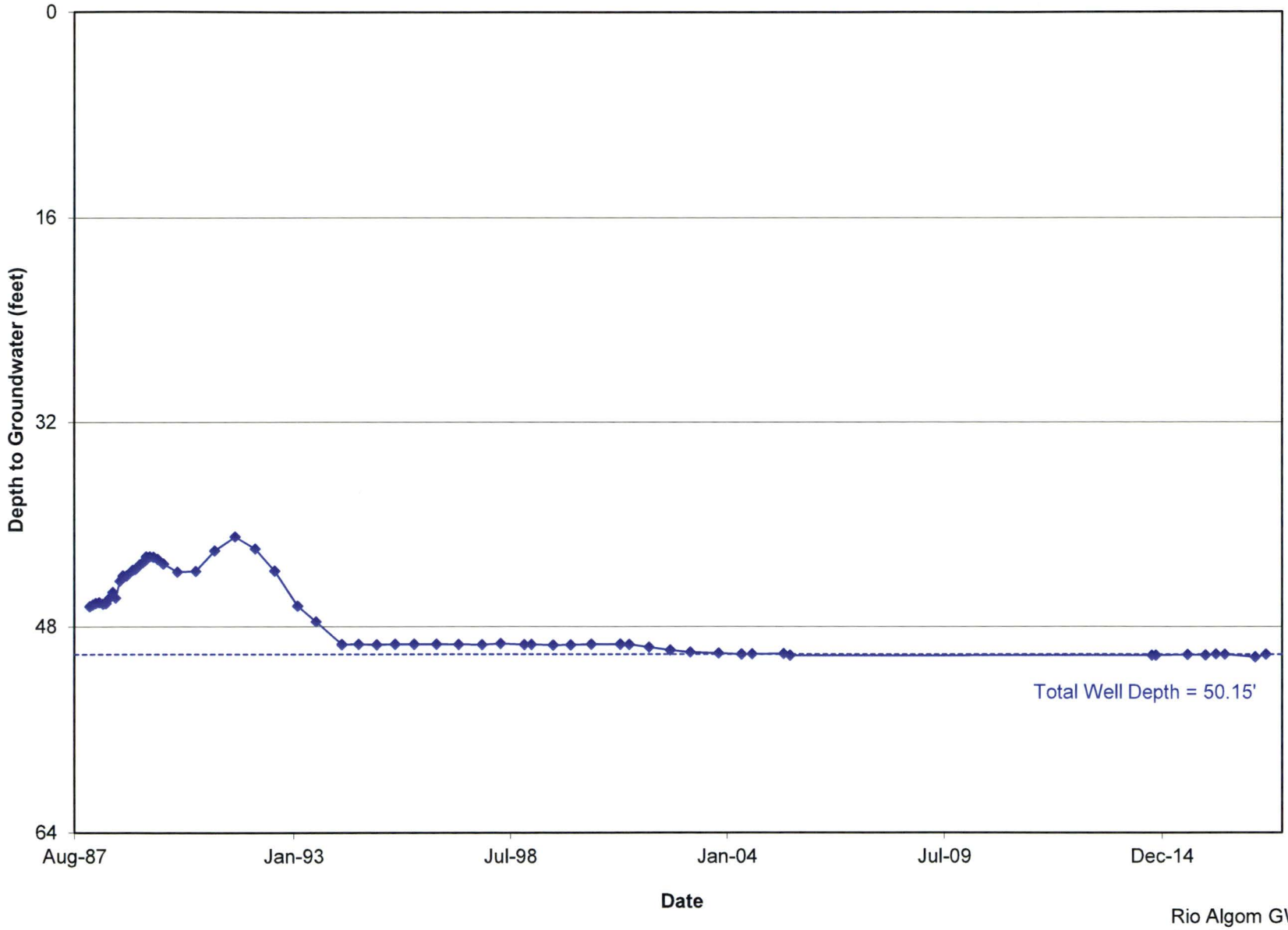


INTERA

Hydrograph for TRB Monitoring Well 31-67 TRB



Hydrograph for Alluvial Monitoring Well MW-24 ALL

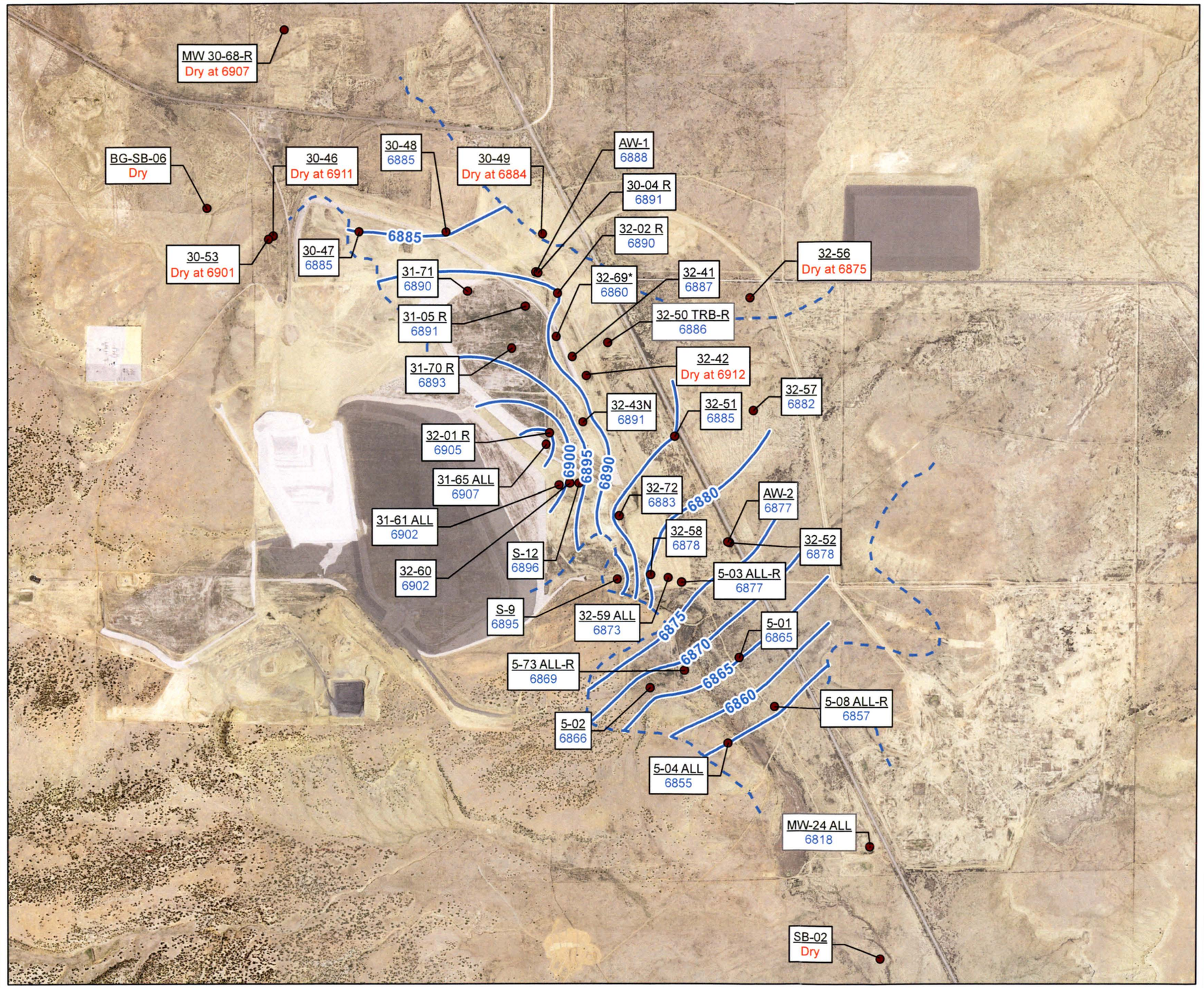


INTERA

Rio Algom GWSMR
Semi Annual Report
Appendix 3

APPENDIX 4

Stability Monitoring Plan
Potentiometric Surface Maps



INTERA

N

0 1,800 3,600

Feet

Aerial – NAIP imagery, dated 2016

Legend

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

Notes:
All data collected 2nd half, 2017.
* = Water level at well not used for contouring due to inaccurate TOC survey.

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 31-61 and Trend Well 5-08 ALL-R = 6,902 - 6,858 = 44 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 31-61 and Trend Well 5-08 = 5560 feet)

= 0.008 feet per foot

2nd Half 2017 Alluvial Potentiometric Surface Elevation Iso-Contours ACL

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Groundwater Stability Monitoring Report

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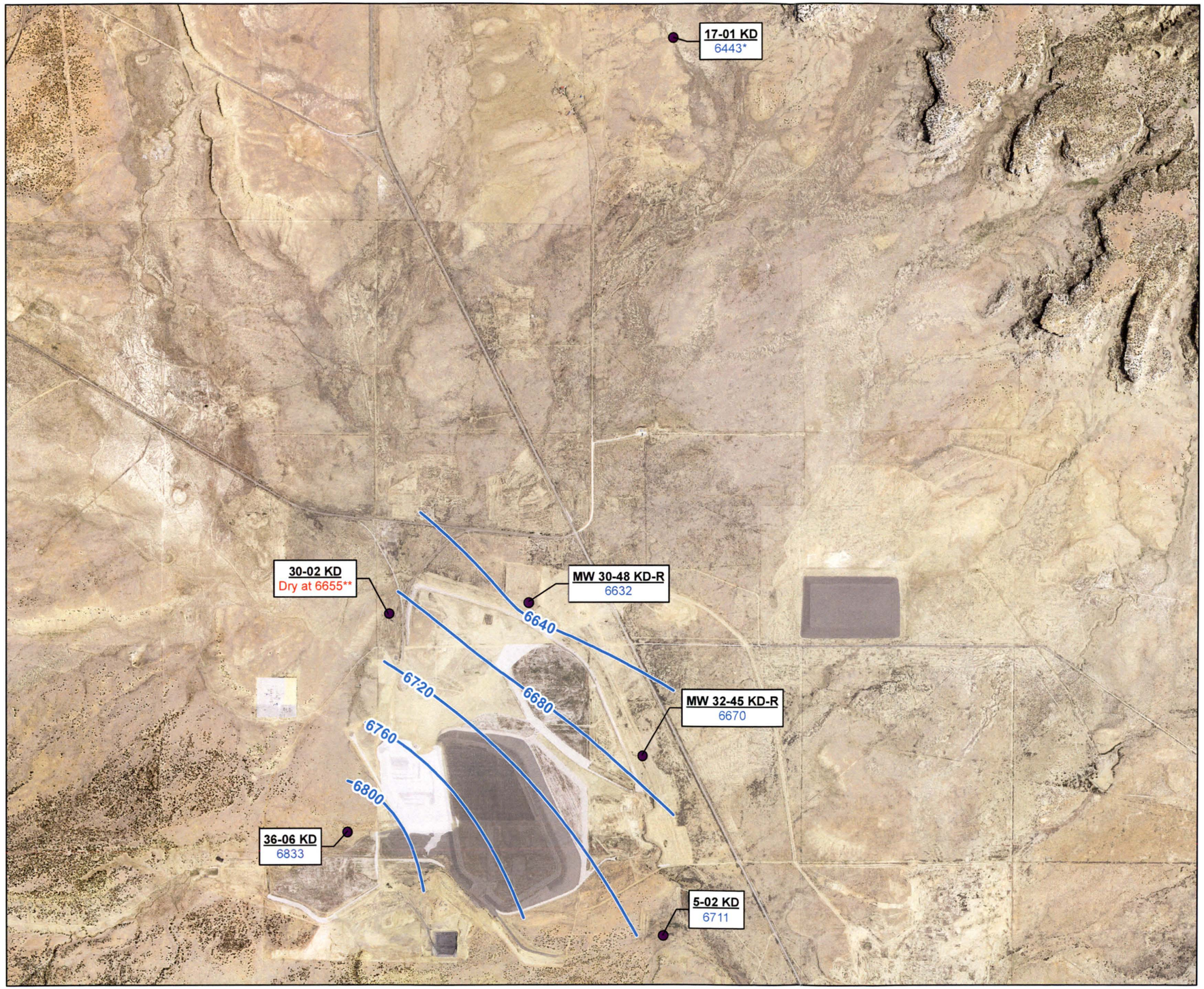

INTERA

N

0 1,250 2,500 5,000

Feet

Aerial – NAIP imagery, dated 2016

Legend

- Dakota Monitoring Well
- KD Potentiometric Surface Elevations (ft amsl)

Well ID
Groundwater Surface Elevation (ft amsl)

* indicates well 17-01 KD reading was taken 9/23/14, prior to pump install

** Elevation at bottom of screen since water level is below the bottom of the screened interval in the 30-02 KD well casing (sump)

Note: All data collected 2nd half, 2017 except 17-01 KD

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 36-06 KD and Trend Well 30-48 KD-R = 6,833 - 6,632 = 201 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 36-06 KD and Trend Well 30-48 KD-R = 7300 feet)

= 0.028 feet per foot

2nd Half 2017 Dakota Potentiometric Surface Elevation Iso-Contours

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Groundwater Stability Monitoring Report

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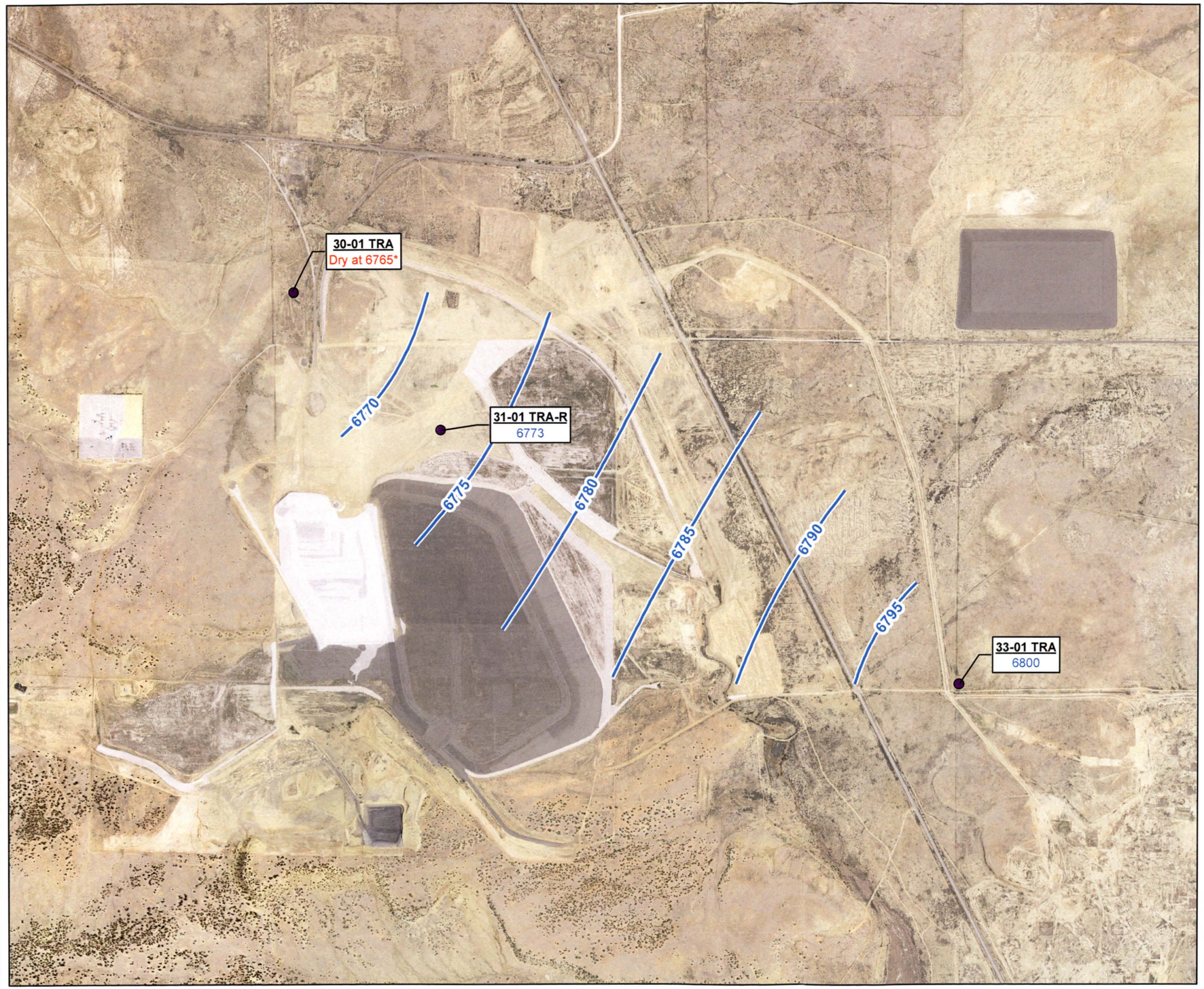

INTERA

N

0 750 1,500 3,000

Feet

Aerial – NAIP imagery, dated 2016

Legend

- TRA Monitoring Well Location
- TRA Potentiometric Surface Elevations (ft amsl)
- **Well ID** Groundwater Surface Elevation (ft amsl)

* Elevation at bottom of screen since water level is below the bottom of the screened interval in the 30-01 TRA well casing (sump)

Note: All data collected 2nd half, 2017

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well MW 31-01 TRA-R and Trend Well 33-01 TRA = 6,800 - 6,773 = 27 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well MW 31-01 TRA-R and Trend Well 33-01 TRA = 8947 feet)

= 0.003 feet per foot

2nd Half 2017 TRA Potentiometric Surface Elevation Iso-Contours

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INTERA

N

0 750 1,500 3,000

Feet

Aerial – NAIP imagery, dated 2016

Legend

- TRB Monitoring Well Location
- TRB Potentiometric Surface Elevations (ft amsl)
- **Well ID**
  Groundwater Surface Elevation (ft amsl)

Note: All data collected 2nd half, 2017

Gradient calculation:
(Difference in Groundwater Elevation
Between Point of Compliance
Well 31-02 TRB-R and far downgradient
Well 19-77 = 6,890 - 6,739 = 151 feet)
Divided by
(Distance Along a Flow Path
Between Point of Compliance
Well 31-02 TRB-R and far downgradient
Well 19-77 = 9,640 feet)

= 0.016 feet per foot

2nd Half 2017 TRB Potentiometric Surface Elevation Iso-Contours ACL

Rio Algom Mining LLC
Groundwater Stability Monitoring Report

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