Rio Algom Mining LLC

February 1, 2023

Mr. Thomas Lancaster
Nuclear Regulatory Commission
Mail Stop T-A10
Washington, DC 20555-0001

Re: **Ambrosia Lake Facility**
License SUA-1473, Docket No. 40-8905
License Condition #34
Groundwater Stability Monitoring Report, Second Half of 2022

Dear Mr. Lancaster:

Pursuant to Condition 34 for License SUA-1473, attached is the *Rio Algom Mining LLC Ambrosia Lake West Facility Groundwater Stability Monitoring Report, Second Half of 2022.* 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. One hardcopy of the report is being provided to you and one hardcopy to is being provided to NRC Document Control. Electronic copies of the report will also be delivered by email attachment and/or file share to you, Anne Maurer and Amber Rheubottom (NMED), Joni Tallbull (DOE), Dana Ravelojaona (DOE contractor), and Mike Schierman (H3 Environmental). This cover letter is also being provided by email to Linda Gersey (NRC).

As I informed you during our telephone conversation on January 25, 2023, this report documents errors RAML made during the second half (H2) 2022 monitoring period. Wells 5-02 KD and 32-59 ALL were not sampled during the H2 2022 sampling event, but were sampled on January 4, 2023, so the data could be included in this report. Additionally, the field sheet completed while sampling well 17-01 KD was misplaced before data entry, resulting in a loss of the field parameter readings. The required field parameter readings for well 17-01 KD were retrieved from water level transducer and laboratory analyses instead of from the field monitoring equipment specified in RAML's standard operating procedure for well sampling. Corrective actions under the existing radiation protection and environmental monitoring program are being developed to ensure all samples and field data are obtained as required by the License.

If you have any questions or need additional information, please call me at (916) 947-7637.

Sincerely,
Rio Algom Mining LLC

Sandra L. Ross, P.G.
Manager US Legacy Assets

NMSS01

Attachment: As stated

cc: NRC Document Control (MD) – License SUA-1473, Docket No. 40-8905
NRC – Linda Gersey (email; cover letter)
NMED – Anne Maurer (email), Amber Rheubottom (email)
DOE – Joni Tallbull (email), Dana Ravelojaona (email)
H3 Environmental – Mike Schierman (email)

RIO ALGOM MINING LLC

AMBROSIA LAKE WEST FACILITY

License SUA-1473 Docket 40-8905

Groundwater Stability Monitoring Report

Second Half of 2022

February 1, 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

ACL	alternate concentration limit
AOD	Assurance of Discontinuance
Be	beryllium
CAP	corrective action program
EDD	electronic data deliverable
EPA	Environmental Protection Agency, United States
ft	feet
ft/ft	feet per foot
GPS	groundwater protection standard
H1	first half
H2	second half
KD	Dakota Sandstone
License	source material license SUA-1473
mg/L	milligram per liter
Mo	molybdenum
NMED	New Mexico Environment Department
NRC	Nuclear Regulatory Commission
pCi/L	picocurie per liter
POE	point of exposure
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
RAML	Rio Algom Mining LLC
Site	Rio Algom Mining LLC – Ambrosia Lake West Facility
TRA	Tres Hermanos A
TRB	Tres Hermanos B

RIO ALGOM MINING LLC
AMBROSIA LAKE WEST FACILITY
GROUNDWATER STABILITY MONITORING REPORT – SECOND HALF OF 2022

The United States 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 Ambrosia Lake West facility's groundwater stability monitoring plan established by Amendment 56. Condition 34.D states (bracketed definitions added):

> *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* [alternate concentration limits] *have been issued, hydrographs for the downgradient most trend well or POE* [point of exposure] *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 West 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. Site features are shown in **Figure 1**.

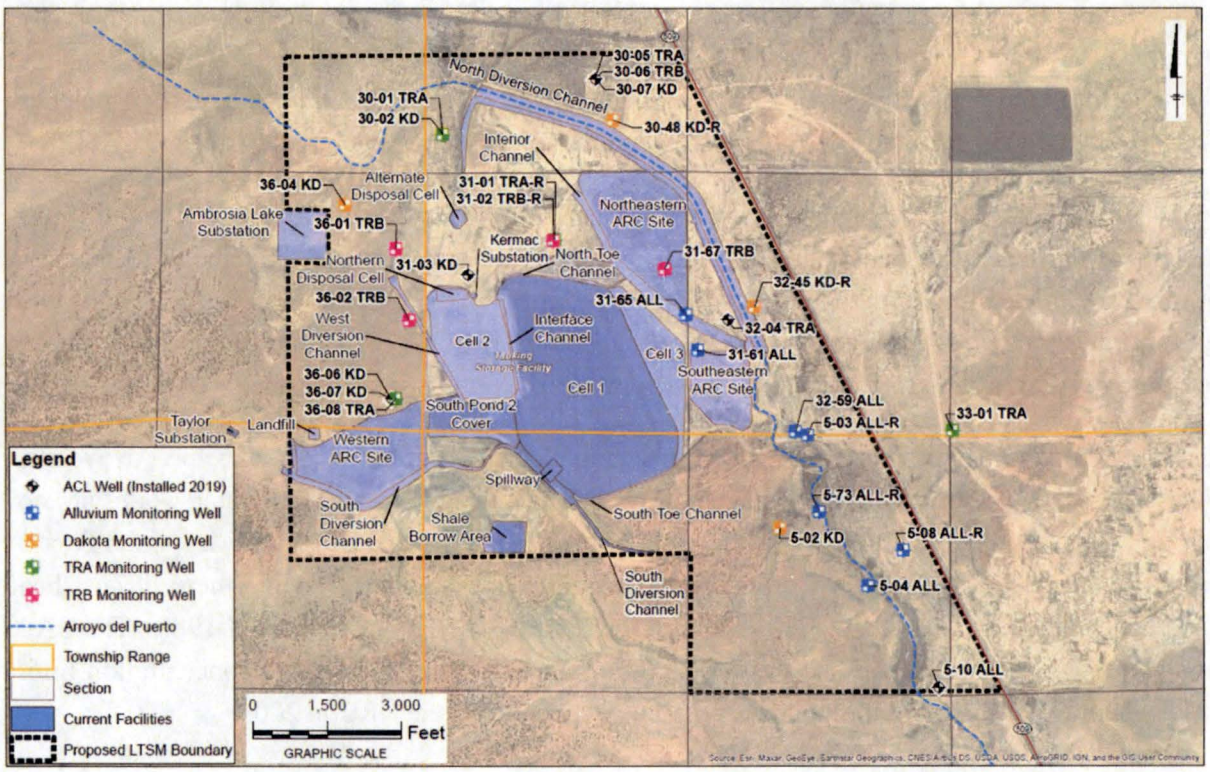


Figure 1. Monitoring Well Network with Site Features

Cells 1 and 2 were built in 1958 and were constructed to accept tailings material. Cell 3 (formerly Pond 3) was also constructed in 1958 but was originally designed to accept decanted tailings liquids. Tailings were first produced at the Site in November 1958. In 1976, the natural course of the Arroyo del Puerto was diverted east of the Northeastern and Southeastern ARC sites (formerly Ponds 4, 5, 6, 9, and 10) and construction of the Section 4 Evaporation Ponds began. The solid fraction of the tailings were disposed through a slurry transfer system to Cells 1 and 2, while the liquid fraction was transferred to the evaporation ponds. Evaporation pond residues were placed in Cells 1 and 2 prior to final reclamation. The aforementioned cells and ponds were unlined, except Pond 9, Pond 10, and the Section 4 Evaporation Ponds. Seepage from Cells 1 and 2 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 and the Tres Hermanos B (TRB) sandstone. Seepage from Cells 1 and 2 and the former Evaporation Ponds 7 and 8 recharged and

impacted the Tres Hermanos A (TRA) sandstone within the Mancos Formation shale, and the Dakota Sandstone (KD), which underlies the Mancos Formation.

In 1983, RAML's predecessor entered into an Assurance of Discontinuance (AOD) with the State of New Mexico Environmental Improvement Division [NMEID, 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 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, interceptor trenches IT-2, IT-3, and IT-4 south of Pond 10 were added 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 its 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 management was implemented so that this water would sweep through the alluvium, creating a hydraulic barrier between Cells 1 and 2 and the Arroyo del Puerto while flushing existing impacted groundwater toward the interceptor trench, where it was then captured and disposed into Cell 1. The CAP was implemented beginning in the mid-1980s. The CAP and its requirements to pump and treat were discontinued when the alternate concentration limit (ACL) petition was granted through License Amendment 56 by the NRC in 2006.

Mining and milling operations in the area have had two notable hydrologic effects: (1) creation of a saturated zone in the alluvium and (2) 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 mine dewatering, milling processes, and the CAP were terminated. The cone of depression in bedrock aquifers which contains groundwater within these units is expected to remain for hundreds of years (INTERA 2018).

2.0 SECOND HALF OF 2022 ACTIVITIES

Groundwater monitoring and associated activities at the Site during the second half (H2) of 2022 were completed in accordance with the requirements of Condition 34 of the License. The monitoring well network was designed to track and assess groundwater impacts between Cells 1 and 2 and the proposed point of exposure (POE) for the alluvium, TRA, TRB, and KD, which is currently the proposed long-term surveillance and maintenance boundary. The ACLs and GPSs for the Site are presented in **Table 1a** and **Table 1b**.

Table 1a. Rio Algom Mining LLC – Ambrosia Lake West Facility
Alternate Concentration Limits

Parameter	Dakota Sandstone	Tres Hermanos A Sandstone	Tres Hermanos B Sandstone	Alluvium
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
Molybdenum (mg/L)	-	-	-	176
Nickel (mg/L)	6.8	-	6.8	98
Selenium (mg/L)	-	-	-	49
Uranium (mg/L)	1.6	-	1.6	23
Thorium-230 (pCi/L)	945	945	945	13,627
Radium-226 and Radium-228 (pCi/L)	218	218	218	3,167
Lead-210 (pCi/L)	62	62	62	891

Notes:
- = No ACL is defined by the License
mg/L = milligram per liter
pCi/L = picocurie per liter

Table 1b. Rio Algom Mining LLC – Ambrosia Lake West Facility
Groundwater Protection Standards

Parameter	Dakota Sandstone	Tres Hermanos A Sandstone	Tres Hermanos B Sandstone	Alluvium
Cyanide (mg/L)	0.04	0.01	0.01	-
Antimony (mg/L)	0.05	-	-	-
Arsenic (mg/L)	0.1	-	-	-
Beryllium (mg/L)	0.01	-	-	-
Cadmium (mg/L)	0.01	-	-	-
Lead (mg/L)	0.14	-	-	-
Molybdenum (mg/L)	0.06	0.03	0.08	-
Nickel (mg/L)	-	0.05	-	-
Selenium (mg/L)	0.04	0.03	0.04	-
Uranium (mg/L)	-	0.01	-	-

Notes:
- = No GPS is defined in the License

Attachments to this report present the following information as outlined in Conditions 19 and 34.D of the License: **Appendix 1** contains analytical data for ACL and GPS parameters for the KD, TRA, TRB, and alluvium units for H2 2022. **Appendix 2** contains time versus concentration plots for ACL parameters for the KD, TRA, TRB, and alluvium. **Appendix 3** contains hydrographs for the most downgradient monitoring well for the KD, TRA, TRB, and alluvium. **Appendix 4** contains monitoring well network and potentiometric surface maps for the KD, TRA, TRB, and alluvium during H2 2022. The monitoring well network is also illustrated on **Figure 1**. **Appendix 5** contains analytical laboratory reports and electronic data deliverables (EDDs) of groundwater monitoring data required by the License. As a courtesy to NRC, **Appendix 6** contains tabulated analytical data collected during H2 2022 from additional monitoring wells that have been installed to evaluate potential additional ACL requirements for the ACL program. **Appendix 7** is an electronic-only appendix containing analytical laboratory reports and EDDs of groundwater monitoring data for the ACL program.

Wells 5-02 KD and 32-59 ALL were not sampled during the H2 2022 sampling event and instead sampled on January 4, 2023, so the data could be included in this report. Additionally, the field sheet completed while sampling well 17-01 KD was misplaced before data entry, resulting in a loss of the field parameter readings. The required field parameter readings (temperature, depth to water, pH, and specific conductivity) for well 17-01 KD were retrieved from water level transducer and laboratory analyses instead of from the field monitoring equipment specified in the RAML's standard operating procedure for well sampling. Corrective actions under the existing radiation

protection and environmental monitoring program are being developed to ensure all samples are collected on schedule and by the appropriate methods.

2.1 Improvements to the Monitoring Program

Eight monitoring wells (**Figure 1**) were installed between July and November 2019, in accordance with the *Data Collection Work Plan in Support of Additional ACLs* (INTERA 2017). Alluvial well 5-10 ALL has been dry since installation. Groundwater monitoring of the new wells began in December 2019. Water quality data collected from these wells during H2 2022 are included in **Appendix 6**. RAML completed 8 quarters of monitoring of these wells, which started in the first quarter (Q1) of 2020, to track the stabilization of the wells and obtain representative groundwater quality data to aid in the evaluation of the ACL program. The quarterly water quality data was reported in the *Groundwater Stability Monitoring Report - Second Half (H2) of 2021* (RAML 2022a). Groundwater monitoring of these wells continues on a semi-annual basis. Groundwater elevations from these wells have been incorporated into the potentiometric surface contours presented in **Appendix 4** and the hydraulic gradient calculations, where appropriate.

RAML evaluated the condition of Dakota Sandstone monitoring well 36-06 KD, where anomalous water elevation and chemistry conditions have been observed since the well was redeveloped in the third quarter (Q3) of 2020. RAML submitted the *Summary of Investigation of Groundwater Conditions at 36-06 KD and 36-07 KD* (Intera 2022) to NRC on June 6, 2022, along with a request to amend the License to replace well 36-06 KD with well 36-07 KD on the basis that well 36-06 KD is disconnected from, and not representative of, the Dakota aquifer that it is Licensed to monitor. RAML will continue to sample well 36-06 KD as required by the License until a change is formally approved by NRC.

A flash flood occurred in and around Ambrosia Lake in August 2021 and one well, 5-04 ALL, was affected, resulting in approximately 30 feet of mud in the well casing. RAML attempted to redevelop this well in December 2021; however, it was found that the well casing had collapsed approximately 5 feet below the top of the well housing. RAML has been unable to sample well 5-04 ALL since the first semi-annual monitoring event in 2021. On May 27, 2022, RAML submitted a request to amend the License by abandoning damaged well 5-04 ALL and installing and sampling a nearby replacement well, which will be called 5-04 ALL-R (RAML 2022b); fieldwork is scheduled for January 2023.

3.0 DATA EVALUATION

As a component of the ACL approval process, NRC established ACLs for specific parameters and retained the GPSs for those constituents for which ACLs were not proposed (**Tables 1a** and **1b**) (NRC 2022). Data collected during H2 2022 were compared to ACLs and GPSs (**Appendix 1**). Notable results are described in the following sections.

3.1 Dakota Sandstone

Analytical results from the KD groundwater monitoring well network specified in SUA-1473 are tabulated in **Appendix 1,** and ACL parameters are presented in time series plots in **Appendix 2**. A hydrograph for the most downgradient KD well, 30-02 KD, is included in **Appendix 3**. The KD potentiometric surface elevation is displayed in **Appendix 4**, page 4-1 and was used to calculate a hydraulic gradient of 0.028 feet per foot (ft/ft) toward the northeast during H2 2022.

KD monitoring wells 36-06 KD and 32-45 KD-R have been sampled monthly during H2 2022 due to exceedances of GPSs for beryllium in 36-06 KD and molybdenum in 32-45 KD-R. No other constituents were detected above applicable ACLs in KD monitoring wells during H2 2022. Monitoring well 30-02 KD was constructed with an 18-foot sump (**Appendix 3**) and contains up to 5 feet of water, therefore monitoring of 30-02 KD is limited to water level and total depth measurements. The results of monthly sampling are discussed below.

3.1.1 36-06 KD

Monitoring well 36-06 KD was sampled monthly for beryllium in H2 2022 (**Table 2**). Beryllium concentrations are presented in **Figure 2**.

The *Quarterly Groundwater Monitoring Report, Third Quarter of 2020* (RAML 2020) describes recent beryllium exceedances and proposed a corrective action of the ongoing ACL program (INTERA 2017), and six months of monthly monitoring followed by a data evaluation that also considers nearby well 36-07 KD. The six-month period was completed in March 2021. As noted in Section 2.1, RAML submitted an evaluation of the condition of well 36-06 KD on June 6, 2022, which concluded that samples from this well are not representative of groundwater in the Dakota aquifer.

Elevated beryllium concentrations have been observed in 36-06 KD since 2006 and have gradually trended downward. Beryllium remained at or below the GPS in 2018 and 2019 until the well was redeveloped in Q3 2020. After redevelopment, beryllium concentrations increased above the GPS in fourth quarter (Q4) 2020 and Q1 2021 and then declined to below the GPS in second quarter (Q2) 2021. Beryllium concentrations have fluctuated in H2 2022 and are currently above the GPS. The water level in well 36-06 KD also increased after redevelopment and has since declined to approximately the same elevation as before redevelopment. Beryllium in 36-06 KD will continue

to be monitored monthly. The results of the monthly monitoring will be presented in future quarterly and semiannual groundwater monitoring reports.

Beryllium concentrations were above the GPS in July, August, September, October, November and December 2022 samples.

Table 2. Second Half of 2022 Analytical Result Summary for Beryllium in Monitoring Well 36-06 KD

Date	Beryllium (mg/L)
GPS	**0.01**
7/12/22	**0.0138**
8/16/22	**0.0146**
9/7/22	**0.0177**
10/05/22	**0.0110**
11/15/22	**0.0120**
12/13/22	**0.0164**

Note: exceedances are bolded

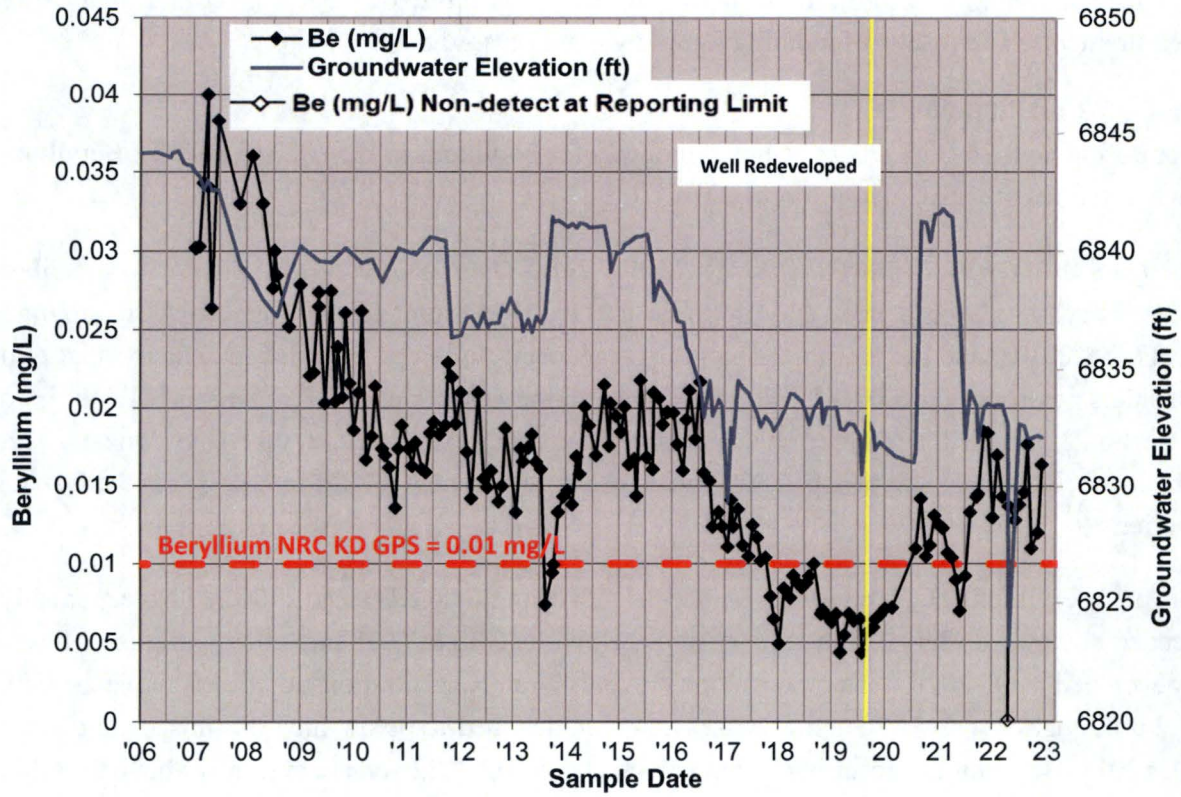


Figure 2. Beryllium Concentrations in Dakota Sandstone Monitoring Well 36-06 KD

Note: April 2022 data presented in the graph was not detected above the reported limit.

3.1.2 32-45 KD-R

RAML performs monthly sampling for molybdenum at monitoring well 32-45 KD-R in response to historical exceedances of the molybdenum GPS.

Molybdenum in monitoring well 32-45 KD-R reached a maximum concentration of 0.505 mg/L in March of 2015 (**Figure 3**). Although molybdenum concentrations have generally decreased since then, they continue to exceed the GPS of 0.06 mg/L (**Table 3** and **Figure 3**). **Table 3** presents molybdenum concentrations in monitoring well 32-45 KD-R during H2 2022.

Molybdenum is not included in primary or secondary United States Environmental Protection Agency (EPA) Maximum Contaminant Levels for drinking water; however, NMED has a molybdenum standard for irrigation, which is 1.0 mg/L. Concentrations of molybdenum in groundwater samples from 32-45 KD-R do not exceed that standard.

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 KD.

Molybdenum concentrations were above the GPS in July, August, September, October, November and December 2022 samples.

Table 3. First Half of 2022 Analytical Result Summary for Molybdenum in Monitoring Well 32-45 KD-R

Date	Molybdenum (mg/L)
GPS	**0.06**
7/12/22	**0.105**
8/16/22	**0.0790**
9/7/22	**0.0882**
10/03/22	**0.0863**
11/15/22	**0.102**
12/13/22	**0.0968**

Note: exceedances are bolded

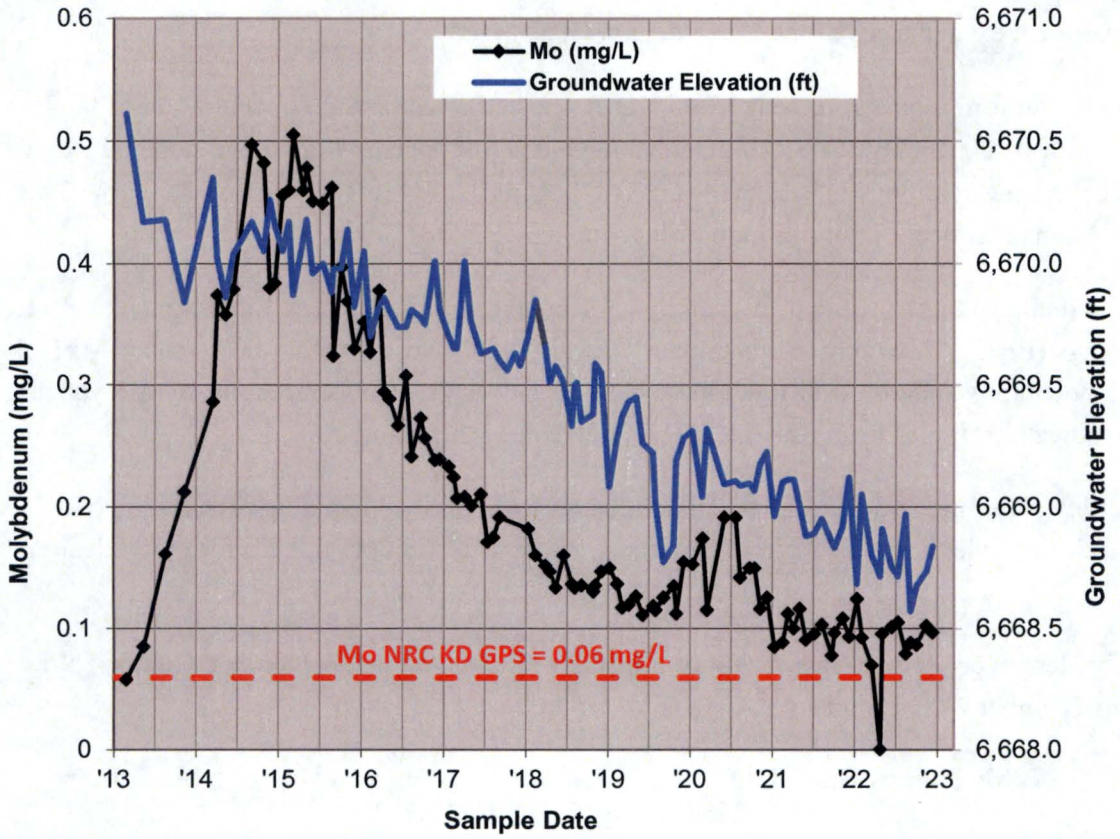


Figure 3. Molybdenum Concentration in Dakota Sandstone Monitoring Well 32-45 KD-R

3.2 Tres Hermanos A

Analytical results from TRA wells are tabulated in **Appendix 1** and presented graphically as time series plots in **Appendix 2**. A hydrograph for the most downgradient TRA well, 30-01 TRA, is included in **Appendix 3**. The TRA potentiometric surface elevation is displayed in **Appendix 4**, page 4-2 and was used to calculate a hydraulic gradient of 0.030 ft/ft toward the northeast for H2 2022.

As illustrated in **Appendix 3**, monitoring well 30-01 TRA was constructed with a 20-foot sump and generally contains less than 5 feet of water; therefore, monitoring of 30-01 TRA is limited to water level and total depth measurements. It was not sampled during H2 2022. Groundwater samples from background well 33-01 TRA and monitoring well 31-01 TRA-R did not exceed License groundwater standards during H2 2022. No constituents were detected above applicable ACLs or GPSs in samples collected from TRA monitoring wells in H2 2022.

3.3 Tres Hermanos B

Analytical results from TRB monitoring wells are tabulated in **Appendix 1** and are presented graphically as time series plots in **Appendix 2**. A hydrograph for the most downgradient TRB monitoring well, 31-67 TRB, is included in **Appendix 3**. TRB potentiometric surface elevation is displayed in **Appendix 4**, page 4-3, and was used to calculate a hydraulic gradient of 0.014 ft/ft toward the north-northeast for H2 2022.

Monitoring well 36-01 TRB was last sampled in 2009 and has not contained enough water for a sample since then. No exceedances of ACLs or GPSs were observed in groundwater collected from TRB License monitoring wells in H2 2022.

3.4 Alluvium

Analytical results from the alluvial well network are tabulated in **Appendix 1** and are presented graphically as time series plots in **Appendix 2**. A hydrograph for the most downgradient alluvial well, MW-24 ALL, is included in **Appendix 3**. MW-24 ALL was dry in H2 2022. The Alluvial potentiometric surface elevation is displayed in **Appendix 4**, page 4-4, and was used to calculate a hydraulic gradient of 0.008 ft/ft toward the southeast for H2 2022.

Well 5-04 ALL has not been sampled since Q1 of 2021 because of damage from an August 2021 flood event and subsequent casing collapse. RAML submitted a request to amend the License by abandoning damaged well 5-04 ALL and installing and sampling a replacement alluvial well nearby (to be called 5-04 ALL-R) (RAML, 2022).

Groundwater samples collected from License alluvial wells did not exceed ACLs during H2 2022.

4.0 CONCLUSIONS

Constituent concentrations in groundwater samples collected from License wells were below applicable ACLs and GPSs except for beryllium in well 36-06 KD and molybdenum in well 32-45 KD-R. **Table 4** summarizes the notable results from H2 2022 groundwater monitoring and provides path forward recommendations. RAML is establishing corrective actions under the existing radiation protection and environmental monitoring program to address the groundwater sampling issues identified in Section 2.0 (late samples from wells 5-02 KD and 32-59 ALL, and field parameter data for well 17-01 KD obtained by methods other than what is specified in RAML's standard operating procedure). RAML obtained the required groundwater data that were delayed; the results are presented in this report and were all below the respective ACLs and GPSs.

Table 4. Rio Algom Mining LLC – Ambrosia Lake West
Second Half of 2022 Summary and Path Forward

Well(s)	Summary	Status	Path Forward
36-06 KD	Beryllium above GPS	Monthly sampling	RAML submitted a technical evaluation of well 36-06 KD along with a request to remove the well from the License. RAML will continue monthly sampling and quarterly reporting for beryllium until a change is formally approved by NRC.
32-45 KD-R	Molybdenum above GPS	Monthly sampling	Continue monthly sampling and quarterly reporting for molybdenum until a change is formally approved by NRC.
30-02 KD; 30-01 TRA; 36-01 TRB; MW-24 ALL	Dry; water level below screened interval (RAML 2019)	Not sampled	Propose removal from monitoring program in a future License amendment.
5-04 ALL	5-04 ALL was damaged due to floods in August 2021	Not sampled	This well cannot be sampled in its current condition. RAML submitted a request to amend the License to install and sample a new alluvial monitoring well to replace damaged well 5-04 ALL. Well replacement will occur in January 2023.

32-04 TRA; 36-07 KD; 36-08 TRA; 31-03 KD; 5-10 ALL; 30-05 TRA; 30-06 TRB; 30-07 KD	Installed in 2019 (INTERA 2017)	Semi-annual sampling	RAML completed 8 quarters of monitoring for these wells and changed the sampling frequency to semi-annual starting in H1 of 2022. These wells are not subject to License monitoring requirements. As a courtesy to NRC, RAML will continue to provide laboratory and field data from these wells as a separate appendix in semiannual reports.

5.0 REFERENCES

Intera. 2017. Rio Algom Mining LLC's Ambrosia Lake Mill Site Data Collection Work Plan in Support of Additional Alternate Concentration Limits. November. ML17340A826.

Intera. 2018. Groundwater Modeling for Closure of Old Stope Leaching Operations, Ambrosia Lake Facility. May.

Intera. 2022. Summary of Investigation of Groundwater Conditions at 36-06 KD and 36-07 KD. June 6. ML22174A016.

Nuclear Regulatory Commission (NRC), United States. 2022. SUA-1473 Docket No. 40-8905, NRC Materials License SUA 1473, Amendment 63. February 2. ML22024A446.

RAML. 2019. SUA-1473 Docket 40-8905, Groundwater Stability Monitoring Report First Half 2019, Rio Algom Mining LLC, Ambrosia Lake Facility. ML19219A137.

RAML. 2020. Ambrosia Lake Facility Quarterly Groundwater Monitoring Report, Third Quarter 2020. December 1. ML21056A012.

RAML. 2022a. SUA-1473 Docket 40-8905, Groundwater Stability Monitoring Report Second Half 2021, Rio Algom Mining LLC, Ambrosia Lake Facility. ML22041A324.

RAML. 2022b. SUA-1473 Docket 40-8905, Request for Amendment to SUA-1473 Regarding the Replacement of Alluvial Monitoring Well 5-04 ALL, Rio Algom Mining LLC, Ambrosia Lake Facility. ML22147A179.

APPENDIX 1

Stability Monitoring Plan
Analytical Results

Appendix 1A: RIO ALGOM MINING LLC
Second Half 2022 ACL Parameters

Dakota Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Chloride	Nitrate	Sulfate	TDS	Ni	U	Pb-210	Ra-226 + Ra-228	Th-230
Unit		ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L
Alternate Concentration Limit							3,200	22.8	6,480	14,100	6.8	1.6	62	218	945
17-01 KD[1]	8/13/2022	678.53	NM	1,430**	23.47	7.2**	17.6	<0.02	694	1,010 H	<0.0004	<0.0001	1.9	2.71*	1.39
30-02 KD	8/11/2022	307.88	313.10	INSUFFICIENT WATER (WATER LEVEL BELOW SCREENED INTERVAL) – NOT SAMPLED											
30-48 KD-R	8/11/2022	331.50	358.00	4,517	15.7	6.98	537	<0.02	2,100	4,130 H	<0.002	<0.0005	1.6	5.47*	1.11
30-48 KD-R (DUP)	8/11/2022	331.50	358.00	4,517	15.7	6.98	537	<0.02	2,260	4,280 H	<0.002	<0.0005	0.32	5.77	0.978
32-45 KD-R	8/16/2022	258.61	278.71	1,773.1	20.98	7.77	82.6	0.063 B	568	1,290	0.00176	0.0348	0.45	3.1*	-0.219
36-06 KD	8/16/2022	188.85	NM	0.43	20.28	3.53	1,300	<0.02	3,780	6,790	0.182	0.543	-0.86	22.6	22.1
5-02 KD[2]	1/4/2023	186.05	190.38	904	13.0	7.93	9.49	0.115	347	906	0.00059 B	0.00114	0.23	3.27*	0.206

TRA Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Chloride	Nitrate	Sulfate	TDS	Pb-210	Ra-226 + Ra-228	Th-230
Unit		ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L
Alternate Concentration Limit							1,070	9.2	2,584	6,400	62	218	945
30-01 TRA	8/11/2022	201.72	207.09	INSUFFICIENT WATER (WATER LEVEL BELOW SCREENED INTERVAL) – NOT SAMPLED									
31-01 TRA-R	8/11/2022	204.71	NM	1,874.6	15.2	7.29	14.7	0.039 B	1,000	1,640 H	-2.7	3.4*	0.318
33-01 TRA	8/10/2022	118.58	NM	72.2	15.3	8.16	31.4	<0.02	1,840	2,650	-0.62	4.80	1.25

TRB Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Chloride	Nitrate	Sulfate	TDS	Ni	U	Pb-210	Ra-226 + Ra-228	Th-230
Unit		ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L
Alternate Concentration Limit							2,810	7.7	4,760	11,700	6.8	1.6	62	218	945
19-77 TRB	8/11/2022	263.31	288.40	4,706.4	15.13	7.35	15.1	0.336	2,120	3,540	0.00162 B	0.00865	-1.6	3.5*	1.23
31-02 TRB-R	8/11/2022	98.84	NM	8,604.1	16.95	6.35	1,250	0.046 B	3,660	8,110	0.0136	0.00483	0.73	27	0.049
31-67 TRB	8/10/2022	42.38	96.53	8,266.7	18.53	6.54	1,030	0.691	3,720	7,160 H	0.00923	0.0117	-0.83	12.6	0.619
36-01 TRB	8/10/2022	57.86	58.32	INSUFFICIENT WATER -- NOT SAMPLED											
36-02 TRB	8/12/2022	52.23	58.00	10,006	16.53	7.46	2,150	<0.02	2,810	7,210 H	0.00436 B	0.00326	1.50	0.05*	1.85

Appendix 1A: RIO ALGOM MINING LLC
Second Half 2022 ACL Parameters

Alluvial Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Chloride	Nitrate	Sulfate	TDS	Mo	Ni	Se	U	Pb-210	Ra-226 + Ra-228	Th-230
	Unit	ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L
	Alternate Concentration Limit						7,110	351	12,000	26,100	176	98	49	23	891	3,167	13,627
5-73 ALL-R	8/9/2022	27.69	NM	9,121.3	14.76	6.75	1,760	5.11	2,780	6,970	0.00736	0.0128	0.158	1.83	0.15	3.17*	2.04
5-03 ALL-R	8/9/2022	32.98	NM	6,116.0	17.58	6.84	807	1.28	2,530	5,080	<0.001	0.00216 B	0.0122	0.132	0.38	6.3*	1.14
5-04 ALL	8/9/2022	Well Collapsed															
5-08 ALL-R	8/10/2022	41.98	NM	3,960.9	14.68	7.24	93.0	28.6	2,240	3,730	0.00420	0.00148 B	0.0116	0.0228	2.6	3.38*	0.915
31-61 ALL	8/12/2022	19.79	29.05	15,788	13.55	7.02	2,490	9.89	6,110	13,800 H	<0.002	0.0558	0.0050 B	0.689	1.9	4.7*	1.06
31-65 ALL	8/12/2022	16.73	41.5	17,139	13.59	6.94	2,470	0.177	7,330	17,000 H	<0.002	0.162	0.0040 B	0.0822	-3.3	-1.92*	19.7
32-59 ALL[2]	1/4/2023	28.65	36.90	6,314	9.30	7.04	1,090	9.46	2,390	5,170 H	0.00514	0.0137	0.0855	0.403	-1.5	2.8*	0.0451
MW-24 ALL	8/12/2022	50.16	50.38	INSUFFICIENT WATER - NOT SAMPLED													

Notes:

Exceedances are bolded.

<= constituent was not detected above the method detection limit.

B = the analyte was detected at a value between method detection limit and practical quantitation limit. The associated value is an estimated quantity.

NM = not measured

H = sample required re-analysis because of a laboratory quality control issue; re-analysis occurred after the method hold time

[1] = Depth to water and temperature readings taken from transducer measurements

[2] = 5-02 KD and 32-59 ALL were inadvertently missed in Q3, but sampled in January 2023.

Monitoring wells 30-02 KD, 30-01 TRA, 36-01 TRB, and MW-24 ALL contained insufficient water for sample collection.

* = either Ra-226, Ra-228, or both were not detected above the lower level of detection (LLD); in this case, the LLD was used in the sum in lieu of the reported result.

** = specific conductivity and pH values indicated are not field measurements, but provided by the laboratory analytical report

µS/cm = microSiemen per centimeter
°C = degree Celsius
ACL = alternate concentration limit
ft BTOC = feet below top of casing
mg/L = milligram per liter
pCi/L = picocurie per liter
Spec. Cond. = specific conductivity
s.u. = standard units
TDS = total dissolved solids
Temp. = temperature

Appendix 1B: RIO ALGOM MINING LLC
Second Half 2022 GPS Parameters

Dakota Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Cyanide	As	Be	Cd	Mo	Pb	Sb	Se
	Unit	ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
					Groundwater Protection Standard		0.04	0.1	0.01	0.01	0.06	0.14	0.05	0.04
17-01 KD[1]	8/13/2022	678.53	NM	1,430**	23.47	7.2**	<0.003	<0.0002	<0.00008	<0.00005	0.00224	<0.0001	0.00058 B	<0.002
30-02 KD	8/11/2022	307.88	313.10	INSUFFICIENT WATER (WATER LEVEL BELOW SCREENED INTERVAL) – NOT SAMPLED										
30-48 KD-R	8/11/2022	331.50	358.00	4,517	15.7	6.98	<0.003	<0.001	<0.0004	<0.00025	0.0192	<0.0005	<0.002	<0.002
30-48 KD-R (DUP)	8/11/2022	331.50	358.00	4,517	15.7	6.98	<0.003	<0.001	<0.0004	<0.00025	0.0191	<0.0005	<0.002	<0.002
32-45 KD-R	8/16/2022	258.61	278.71	1,773.1	20.98	7.77	<0.003	0.00035 B	<0.00008	<0.00005	**0.0790**	<0.0001	0.00051 B	<0.002
36-06 KD	8/16/2022	188.85	NM	0.43	20.28	3.53	<0.003	0.00365 B	**0.0146**	0.00415	<0.001	<0.0005	<0.002	0.0023 B
5-02 KD[2]	1/4/2023	186.05	190.38	904	13.0	7.93	<0.003	<0.0002	<0.00008	<0.00005	<0.0002	<0.0001	<0.0004	<0.002

TRA Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Cyanide	Mo	Ni	Se	U
	Unit	ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L
					Groundwater Protection Standard		0.01	0.03	0.05	0.03	0.01
30-01 TRA	8/11/2022	201.72	207.09	INSUFFICIENT WATER (WATER LEVEL BELOW SCREENED INTERVAL) – NOT SAMPLED							
31-01 TRA-R	8/11/2022	204.71	NM	1,874.6	15.2	7.29	<0.003	0.00548	0.00598	<0.002	0.00067
33-01 TRA	8/10/2022	118.58	NM	72.2	15.3	8.16	<0.003	0.00172	<0.0008	<0.002	0.00042 B

TRB Well Results

Well	Date	Depth to Water	Total Depth	Spec. Cond. (field)	Temp. (field)	pH (field)	Cyanide	Mo	Se
	Unit	ft BTOC	ft BTOC	µS/cm	°C	s.u.	mg/L	mg/L	mg/L
					Groundwater Protection Standard		0.01	0.08	0.04
19-77 TRB	8/11/2022	263.31	288.40	4,706.4	15.13	7.35	<0.003	0.00346	<0.002
31-02 TRB-R	8/11/2022	98.84	NM	8,604.1	16.95	6.35	<0.003	<0.001	<0.002
31-67 TRB	8/10/2022	42.38	96.53	8,266.7	18.53	6.54	<0.003	<0.001	<0.002
36-01 TRB	8/10/2022	57.86	58.32	INSUFFICIENT WATER - NOT SAMPLED					
36-02 TRB	8/12/2022	52.23	58.00	10,006	16.53	7.46	<0.003	0.00168 B	<0.002

Notes:

Exceedances are bolded.

* = 19-77 TRB is a background well and is not screened against standards.

<= constituent was not detected above the method detection limit.

[1] = Depth to water and temperature readings taken from transducer measurements

[2] = 5-02 KD was inadvertently missed in Q3, but sampled in January 2023.

B = the analyte was detected at a value between MDL and practical quantitation limit. The associated value is an estimated quantity.

NM = Not Measured

Monitoring wells 30-02 KD, 30-01 TRA, and 36-01 TRB contained insufficient water for sample collection.

** = specific conductivity and pH values indicated are not field measurements, but provided by the laboratory analytical report

µS/cm = microSiemen per centimeter

°C = degree Celsius

ft BTOC = feet below top of casing

GPS = groundwater protection standard.

MDL = method detection limit

mg/L = milligram per liter

Spec. Cond. = specific conductivity

s.u. = standard units

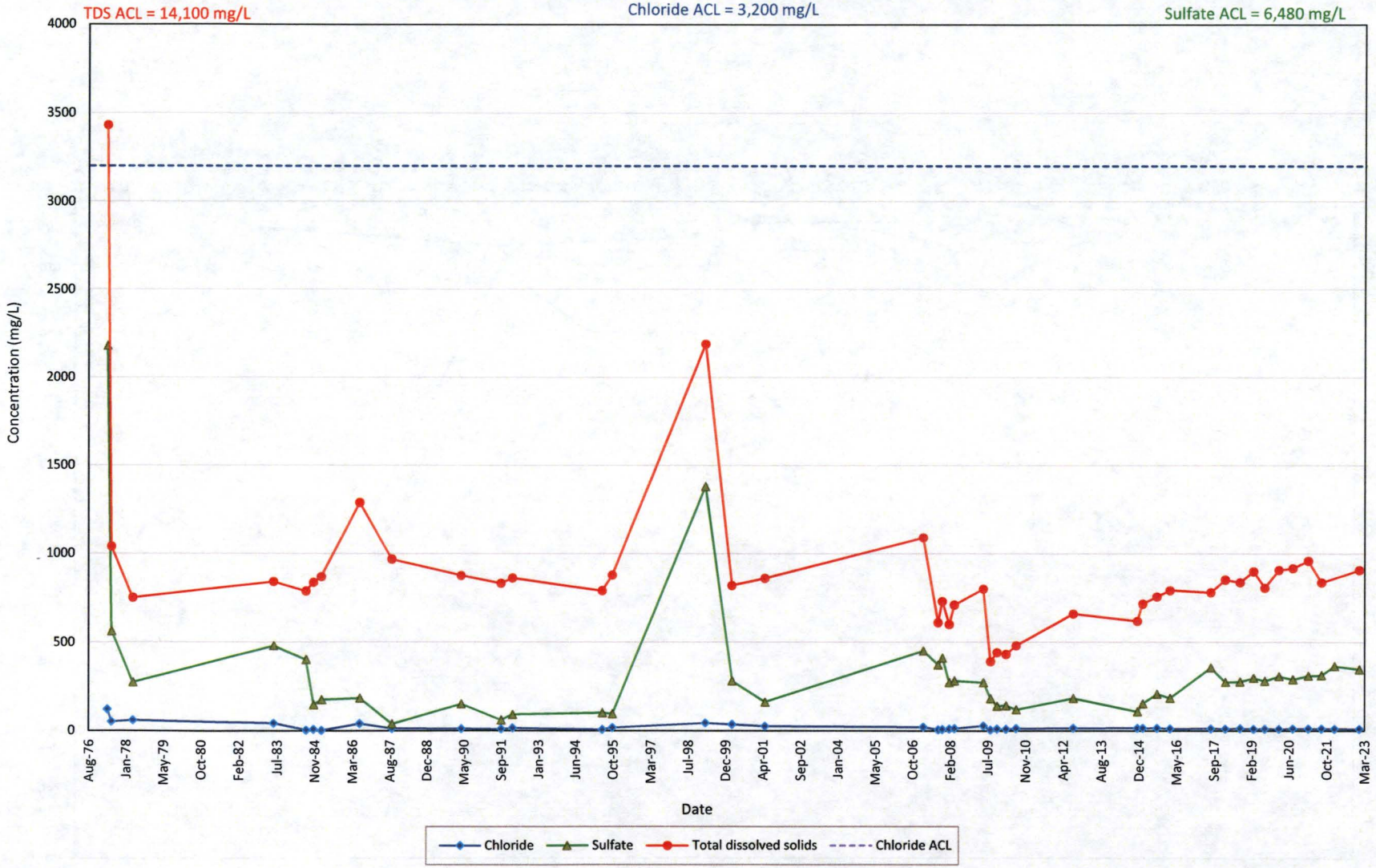
Temp = temperature

APPENDIX 2

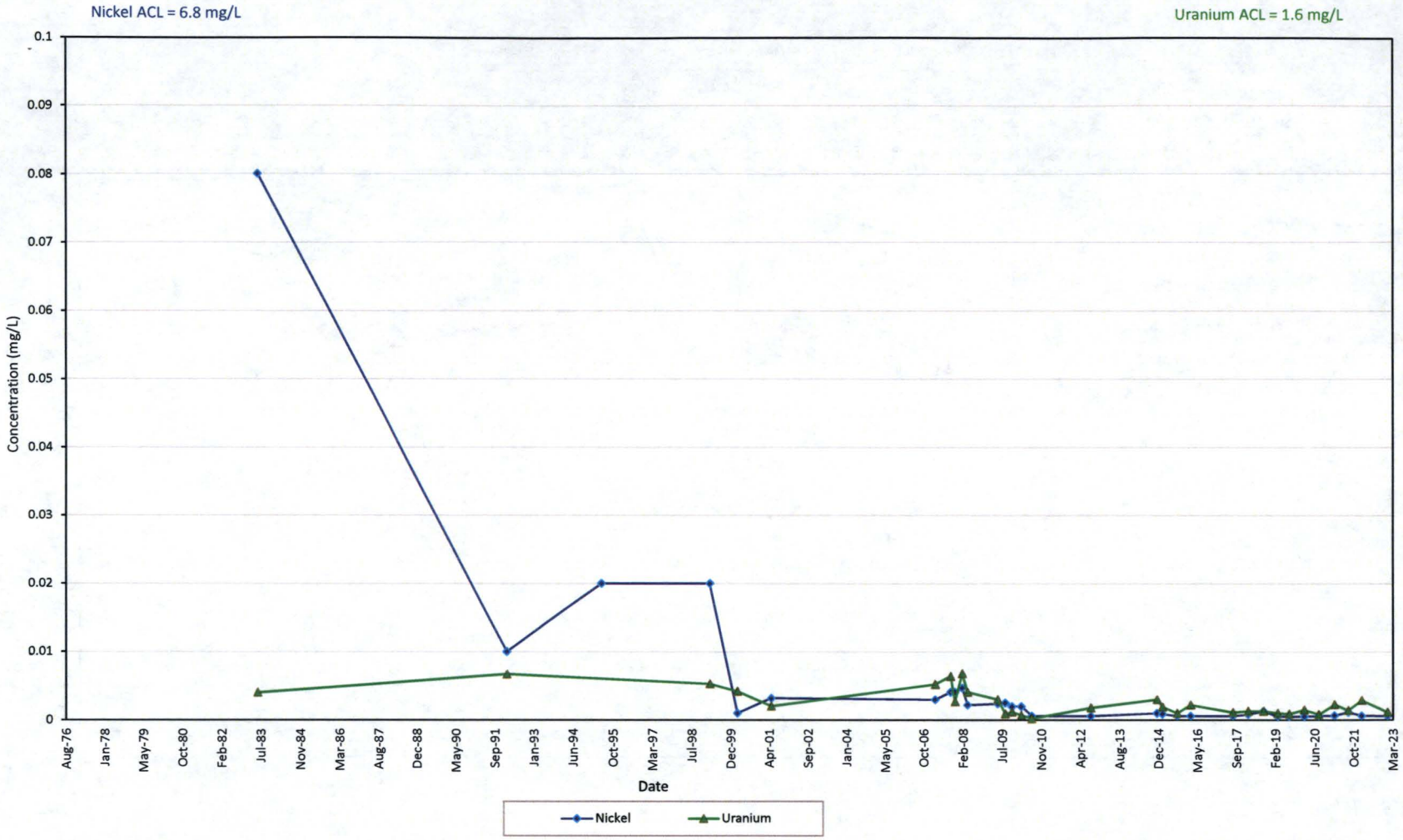
Stability Monitoring Plan
Time Versus Concentration Plots

Stability Monitoring Plan
Time Versus Concentration Plots
Dakota

Anions and TDS in Monitoring Well 5-02 KD

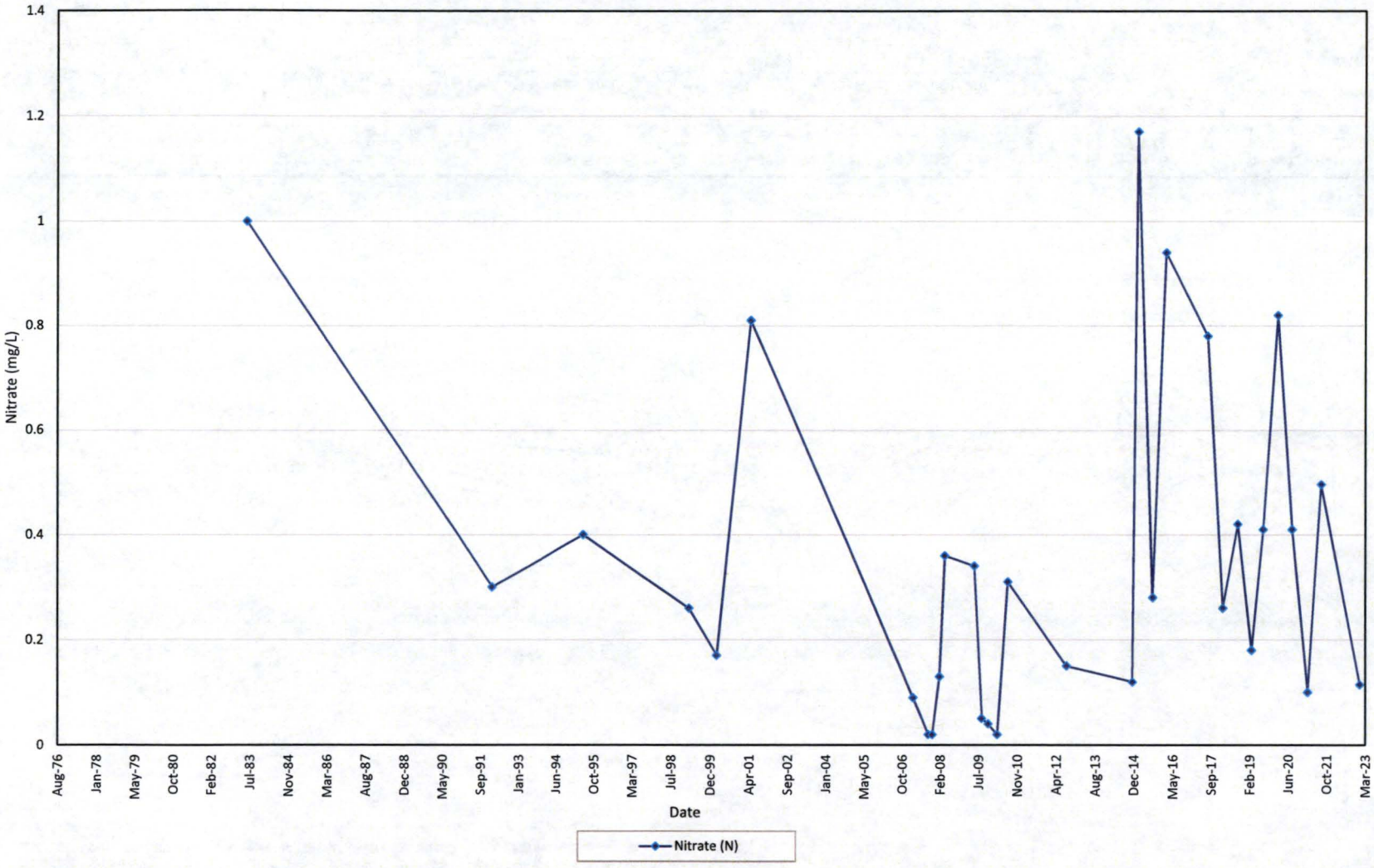


Metals in Monitoring Well 5-02 KD



Nitrate in Monitoring Well 5-02 KD

Nitrate ACL = 22.8 mg/L

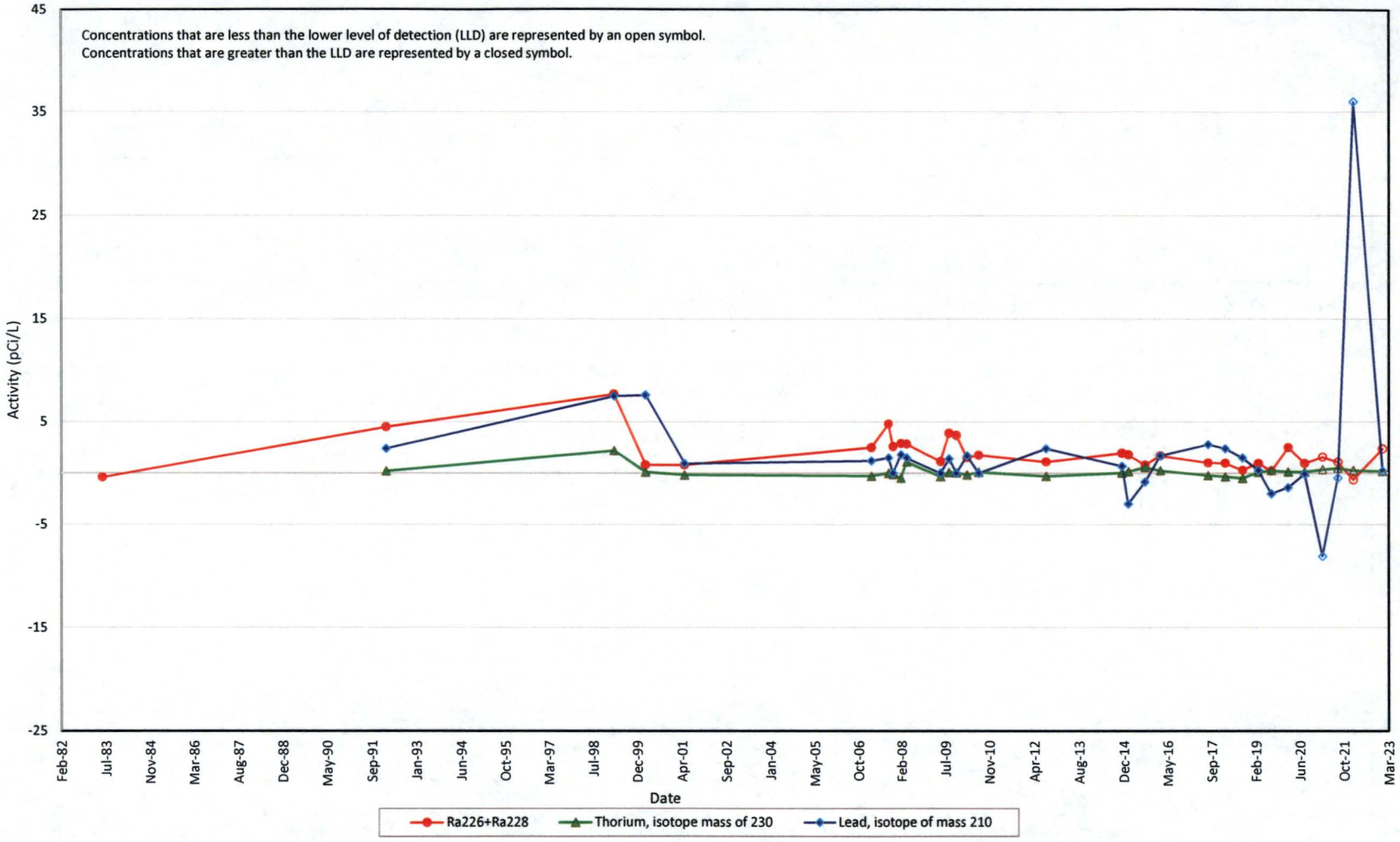


Radionuclides in Monitoring well in 5-02 KD

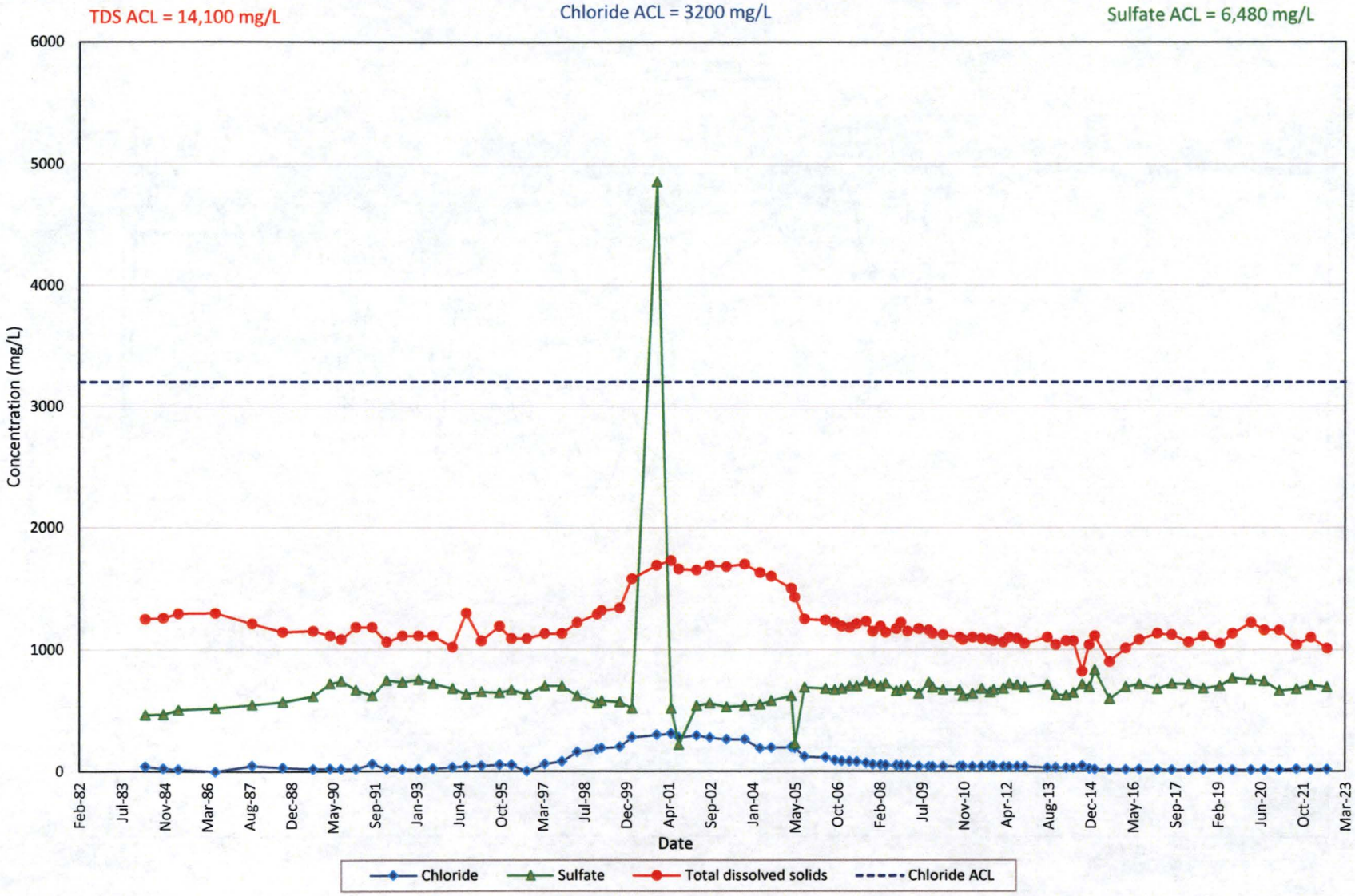
Pb-210 ACL = 62 pCi/L

Th-230 ACL = 945 pCi/L

Ra-226+228 ACL = 218 pCi/L



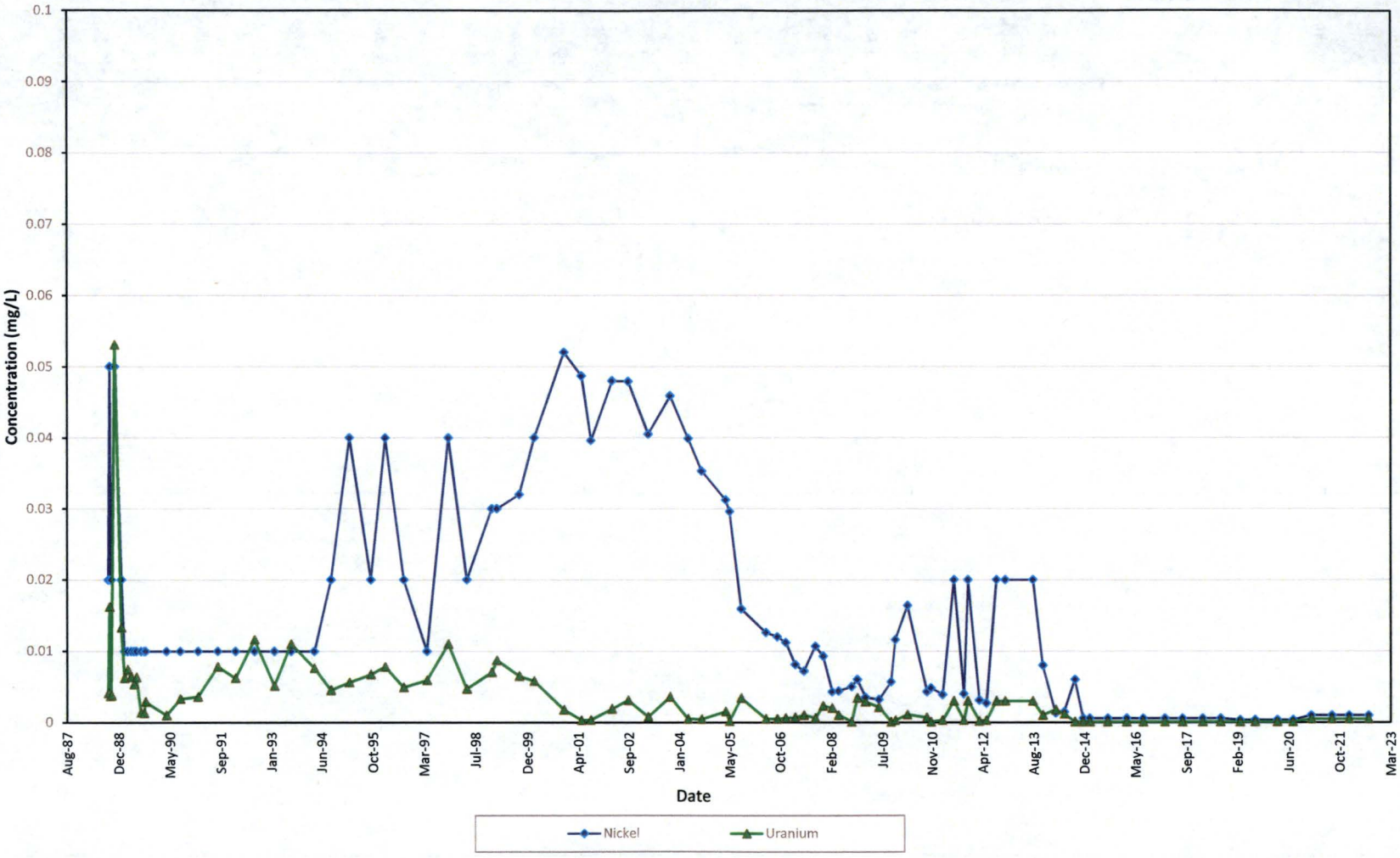
Anions and TDS in Monitoring Well 17-01 KD



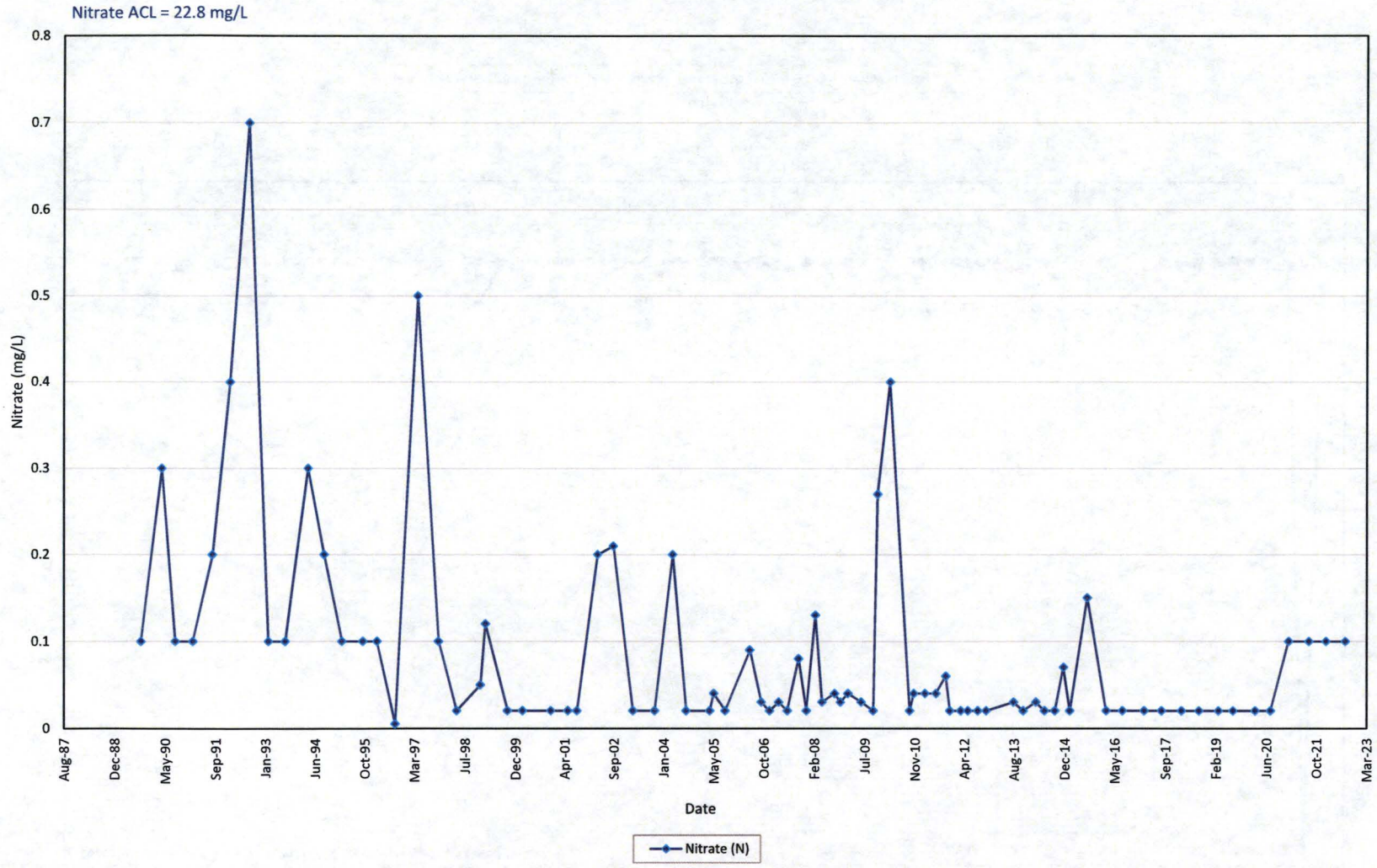
Metals in Monitoring Well 17-01 KD

Nickel ACL = 6.8 mg/L

Uranium ACL = 1.6 mg/L



Nitrate in Monitoring Well 17-01 KD

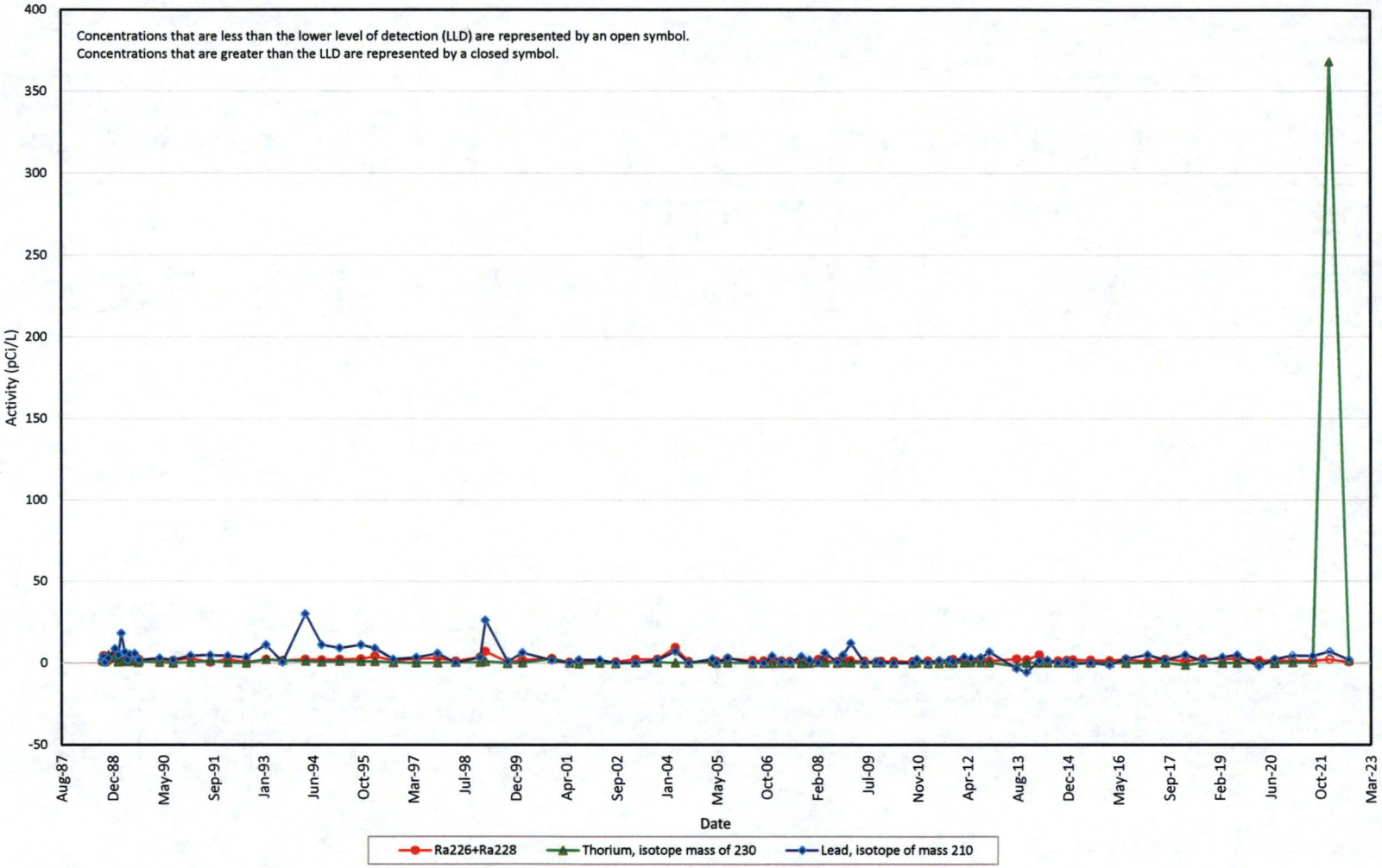


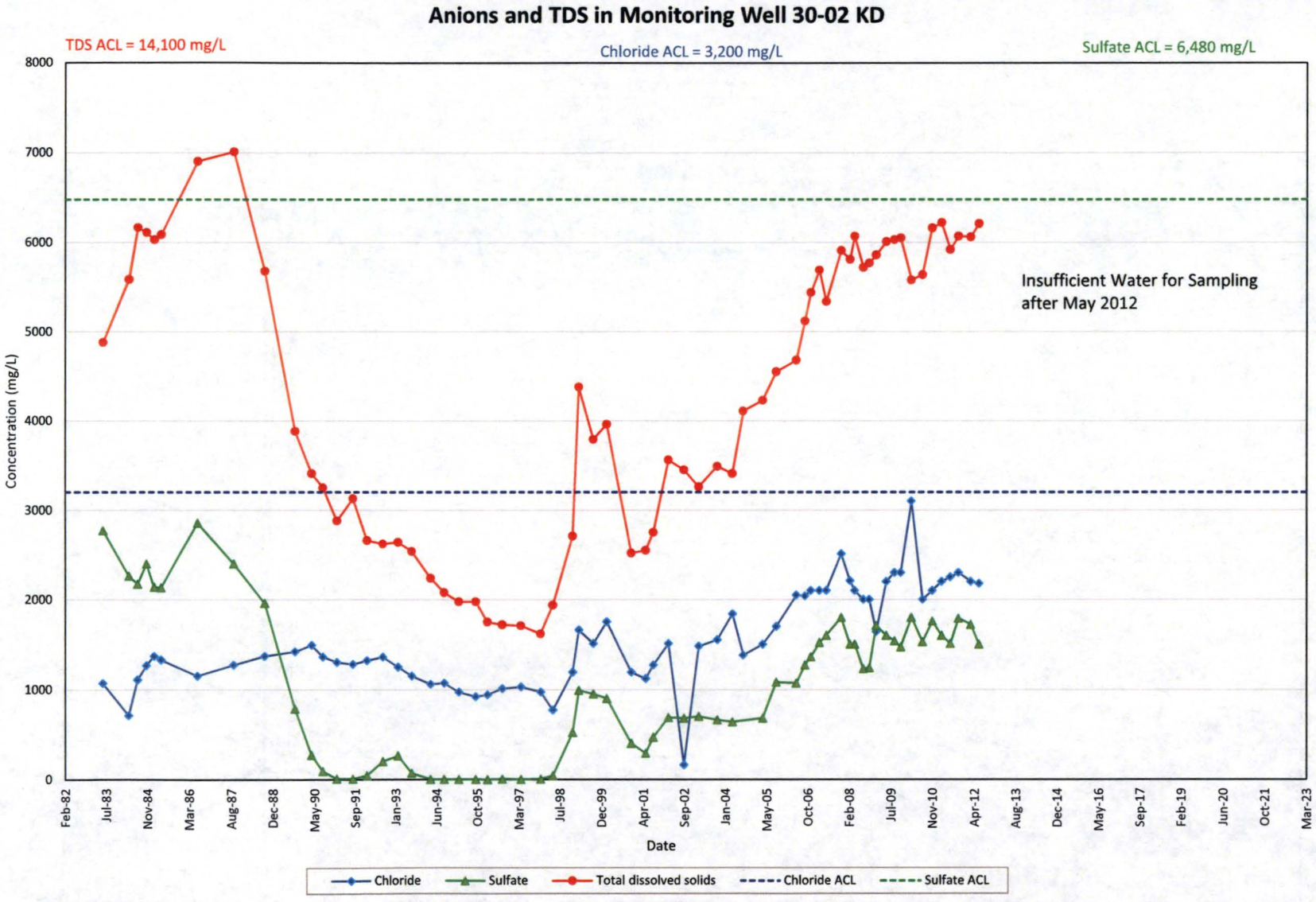
Radionuclides in Moniotring Well 17-01 KD

Pb-210 ACL = 62 pCi/L

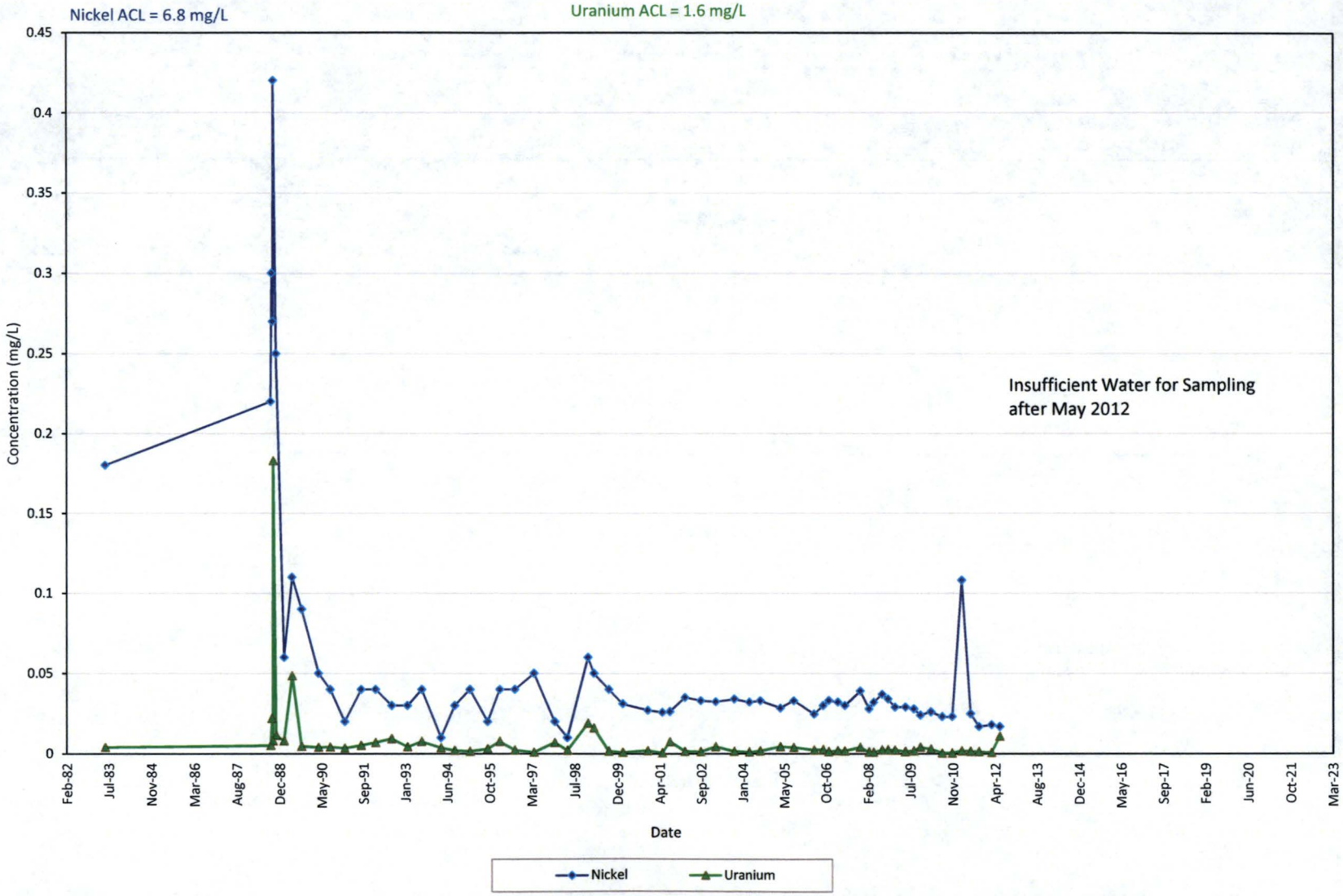
Th-230 ACL = 945 pCi/L

Ra-226+228 ACL = 218 pCi/L

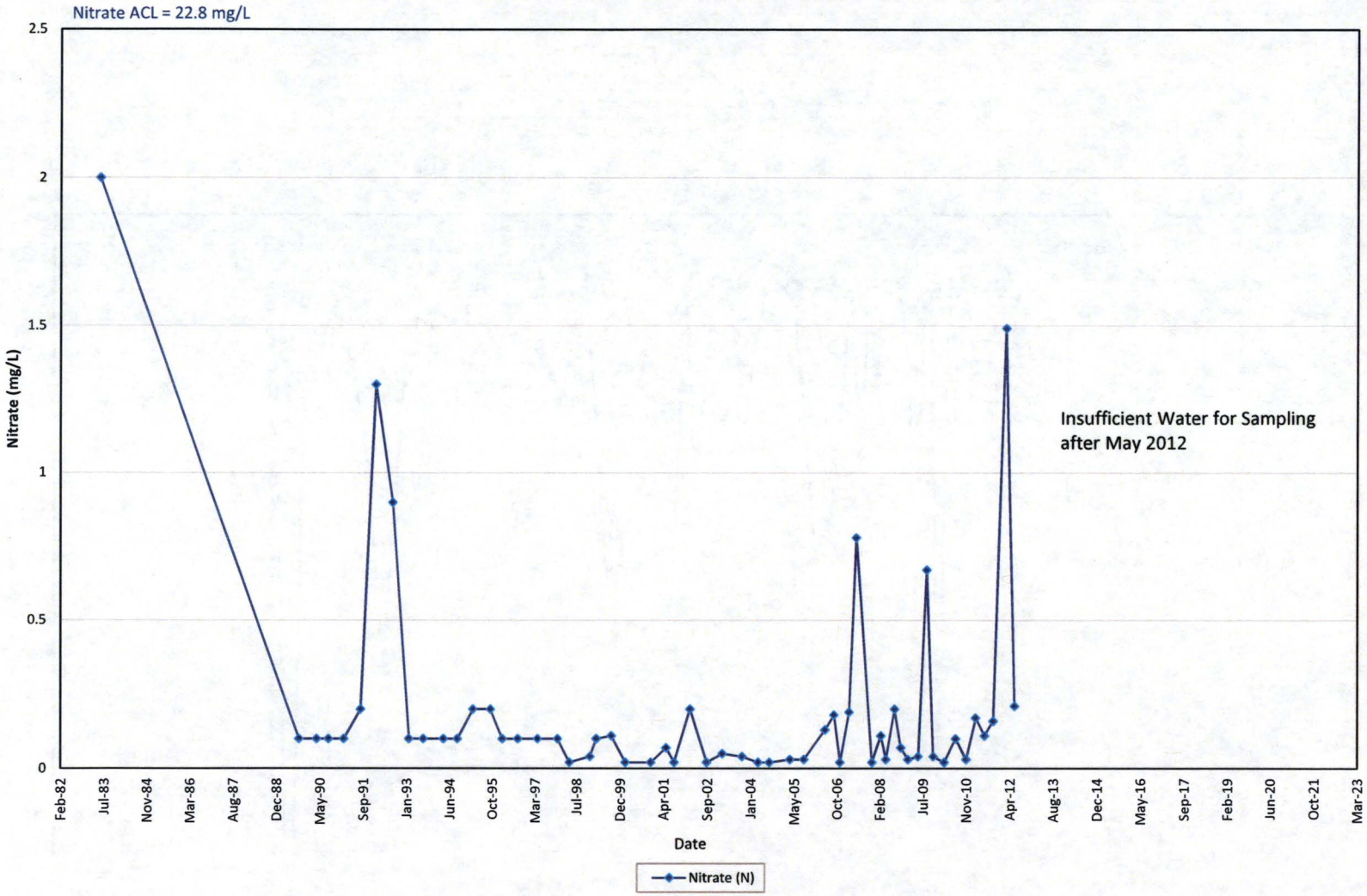



Anions and TDS in Monitoring Well 30-02 KD
TDS ACL = 14,100 mg/L
Chloride ACL = 3,200 mg/L
Sulfate ACL = 6,480 mg/L
Insufficient Water for Sampling after May 2012
Concentration (mg/L)
Date
Chloride
Sulfate
Total dissolved solids
Chloride ACL
Sulfate ACL

Metals in Monitoring Well 30-02 KD



Nitrate in Monitoring Well 30-02 KD

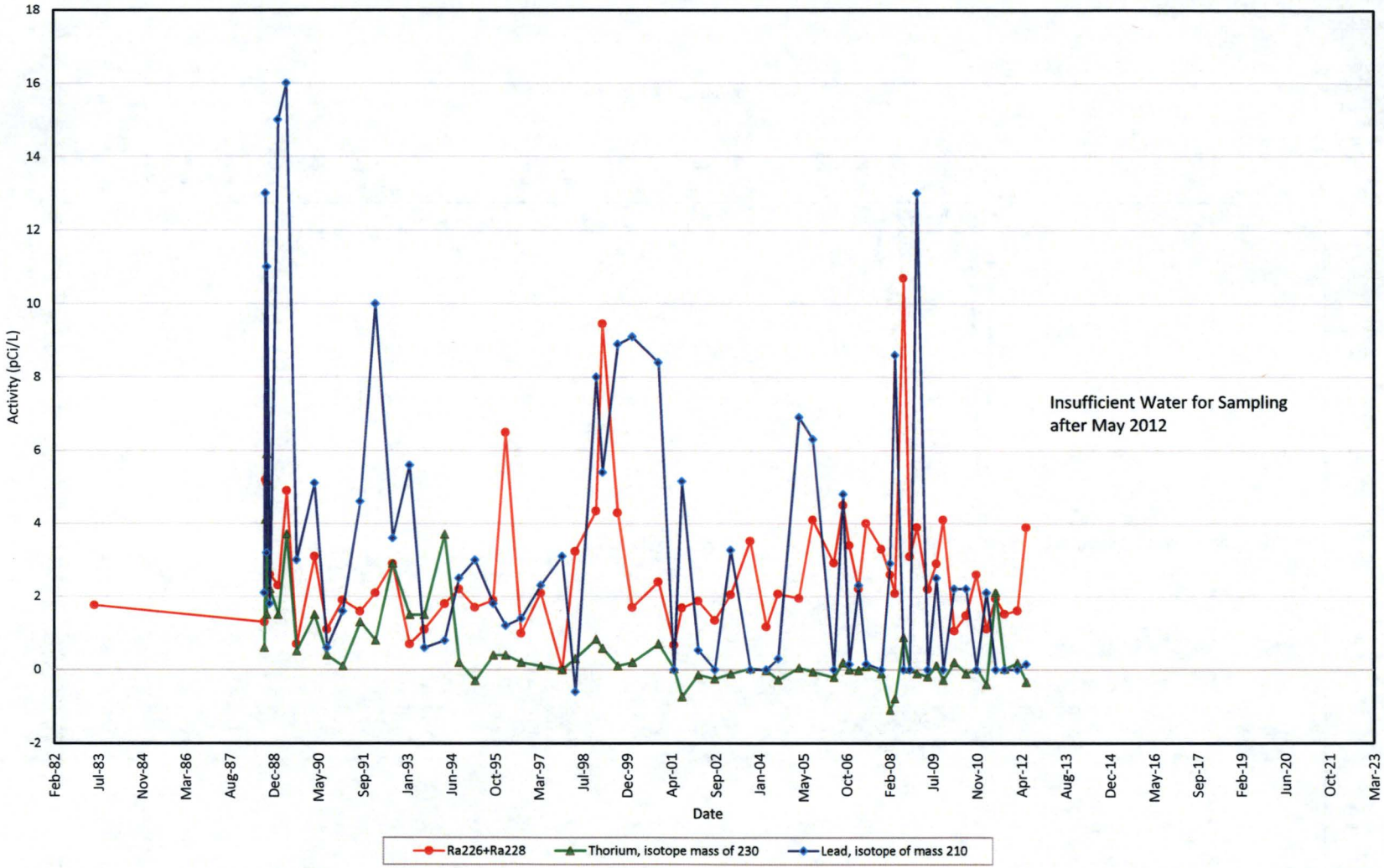


Radionuclides in Monitoring Well 30-02 KD

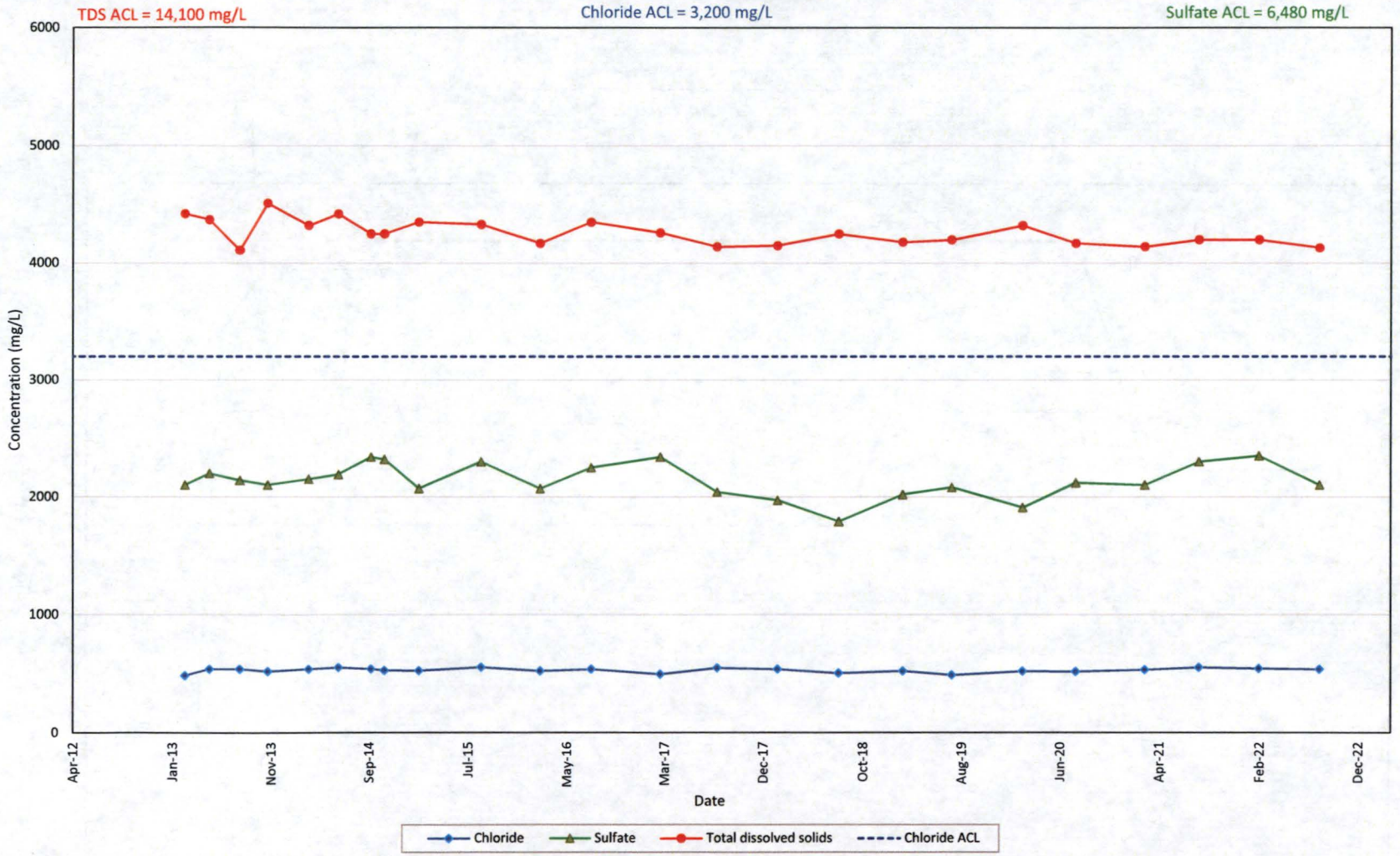
Pb-210 ACL = 62 pCi/L

Th-230 ACL = 945 pCi/L

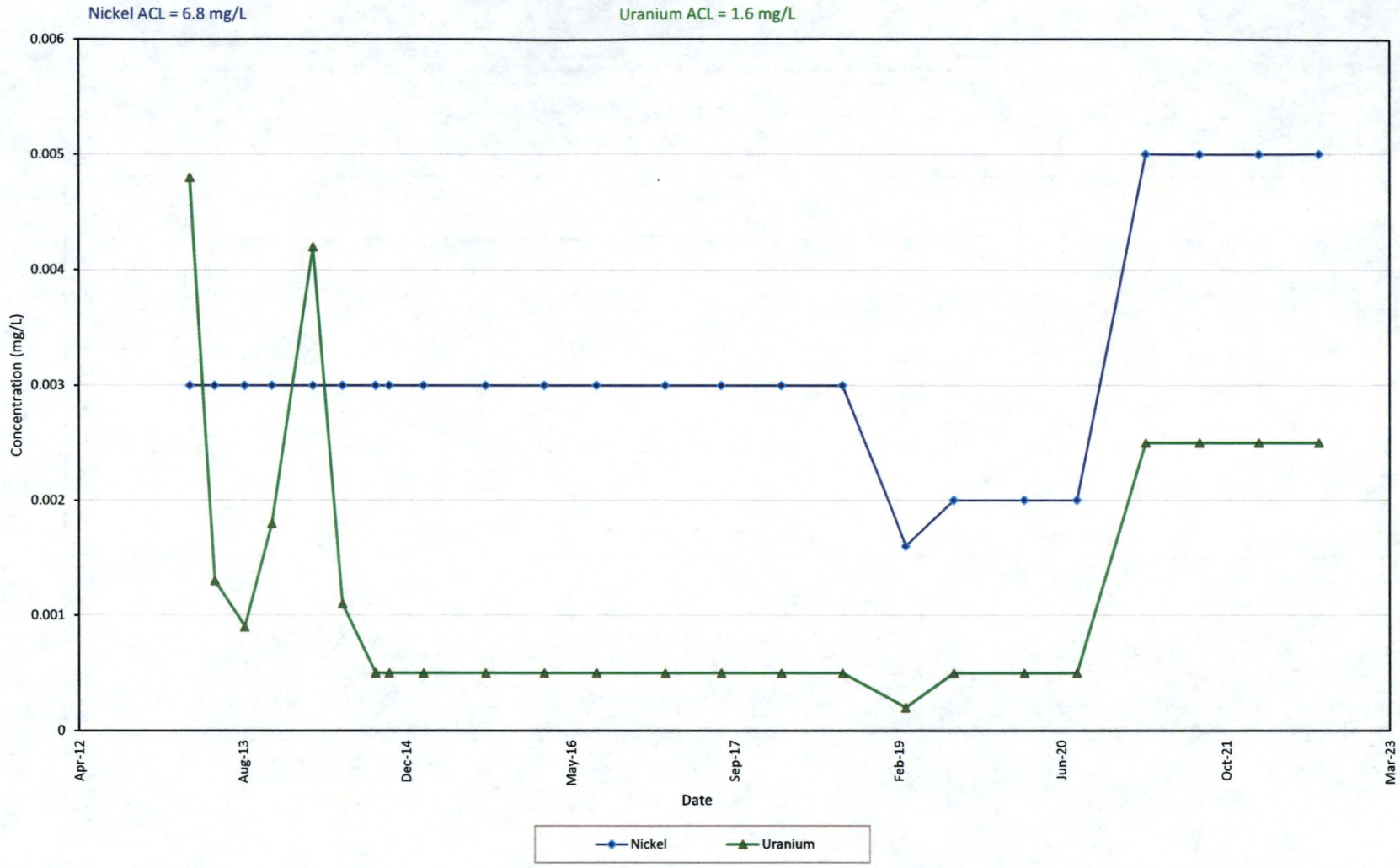
Ra-226+228 ACL = 218 pCi/L

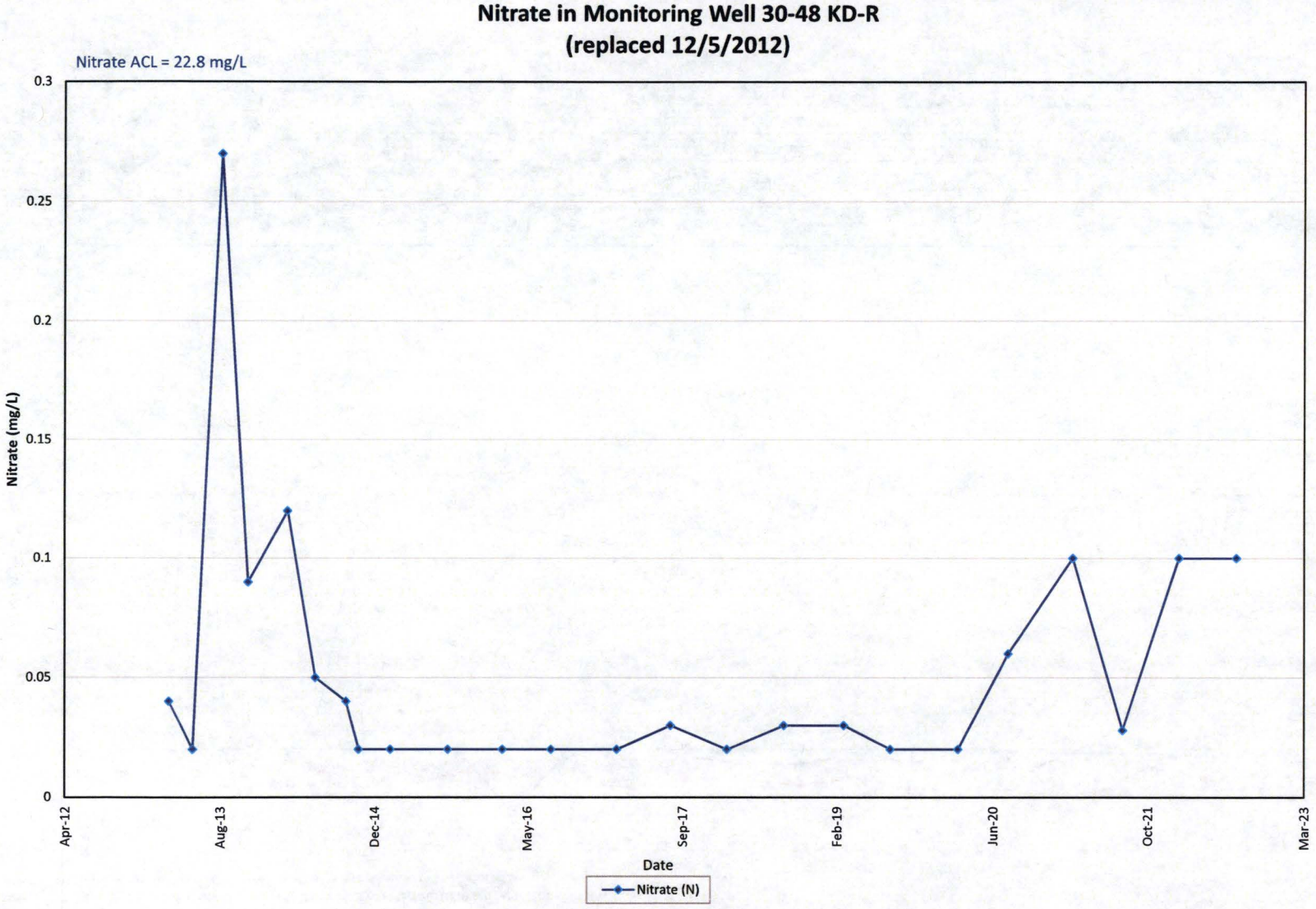


Anions and TDS in Monitoring Well 30-48 KD-R (replaced 12/5/2012)

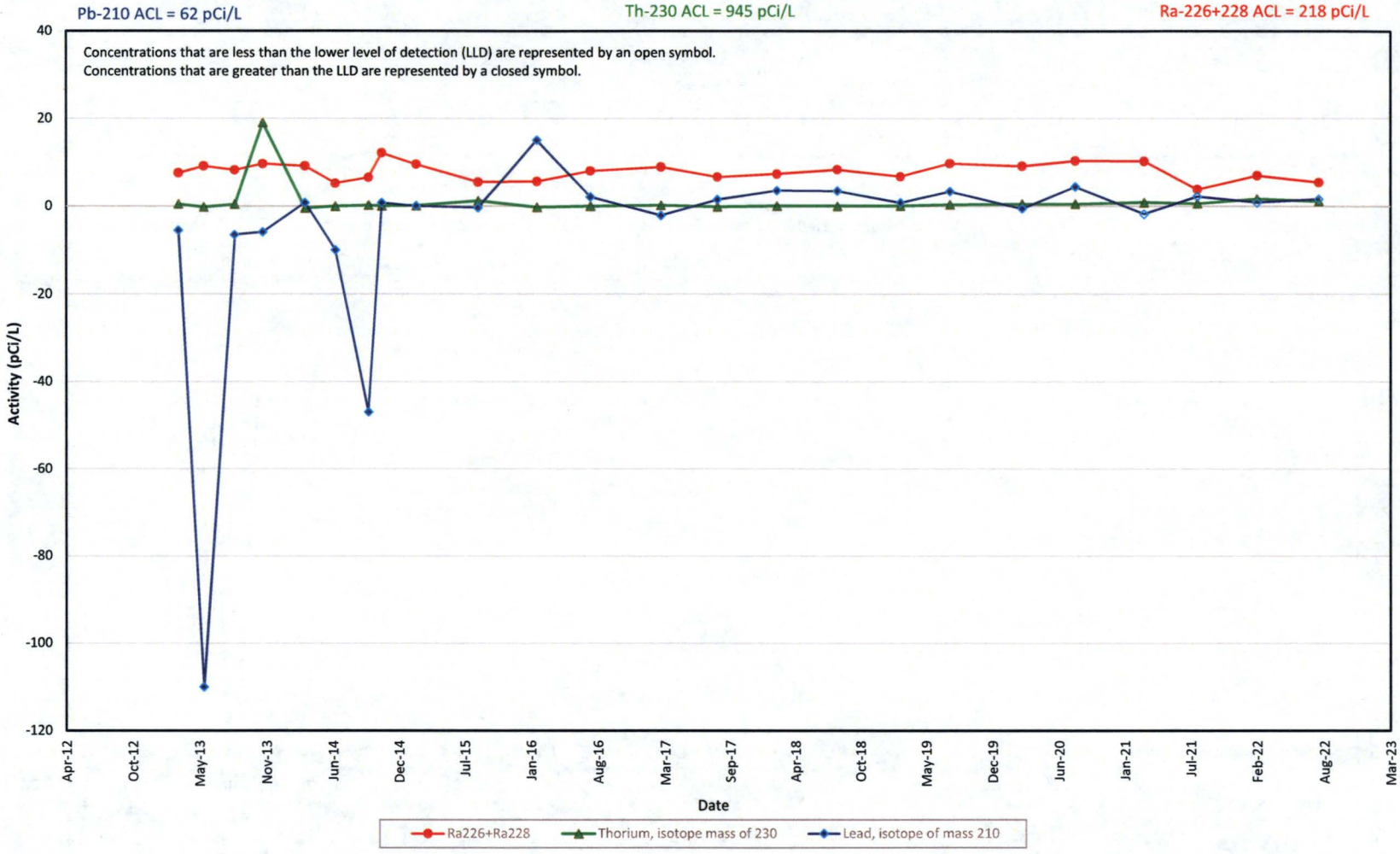


Metals in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)

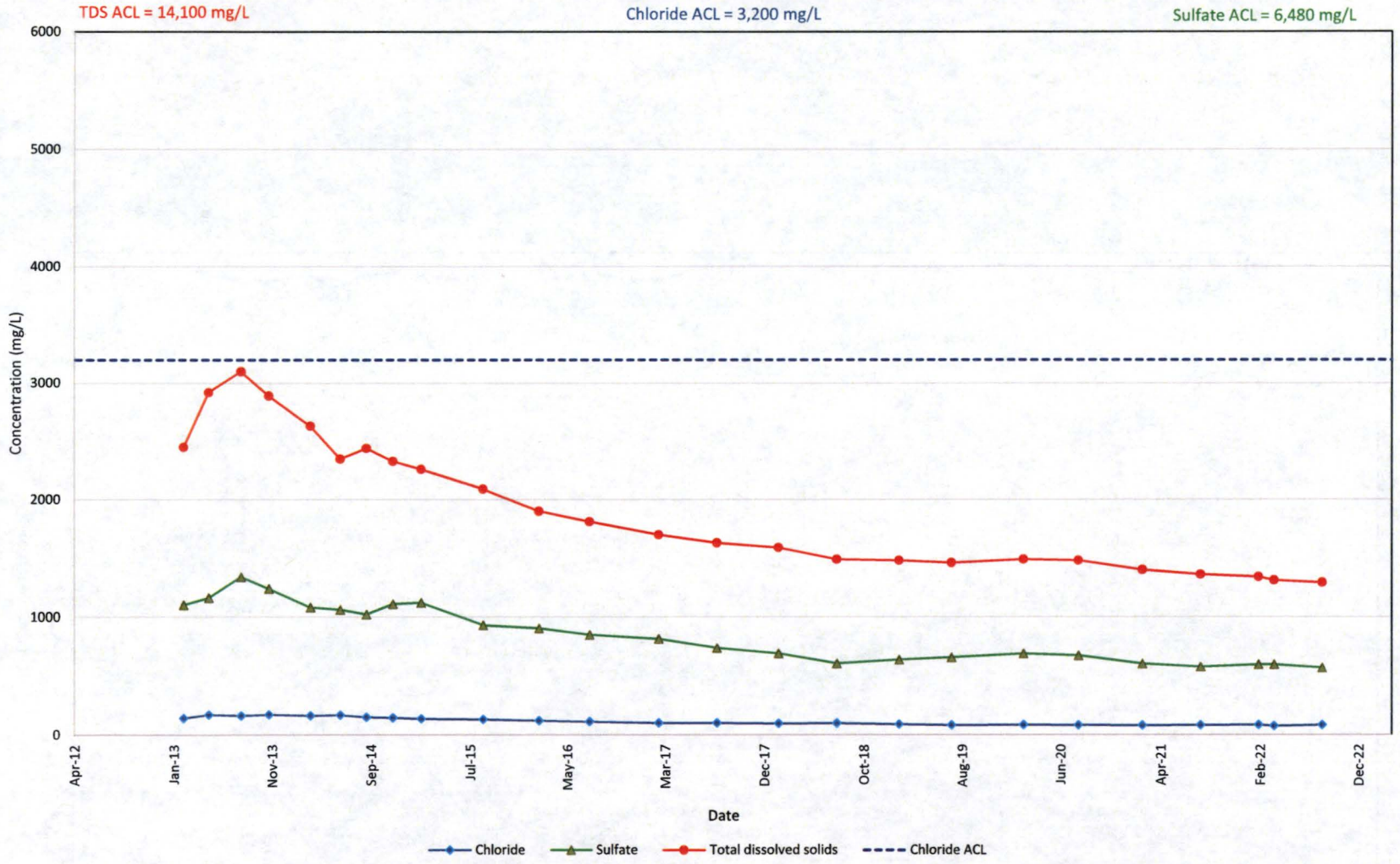



Nitrate in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)
Nitrate ACL = 22.8 mg/L
0.3
0.25
0.2
0.15
0.1
0.05
0
Nitrate (mg/L)
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)

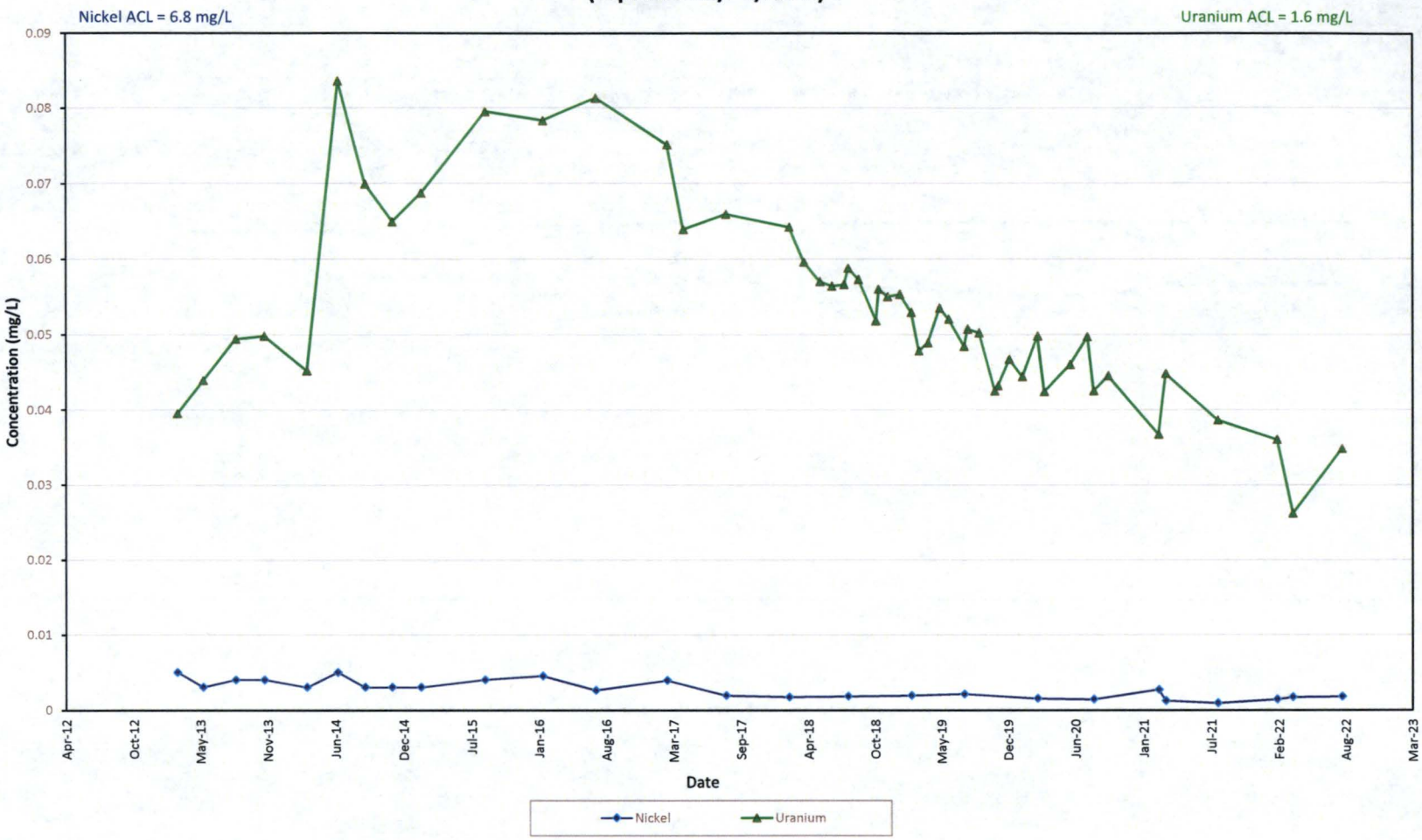
Radionuclides in Monitoring Well 30-48 KD-R
(replaced 12/5/2012)



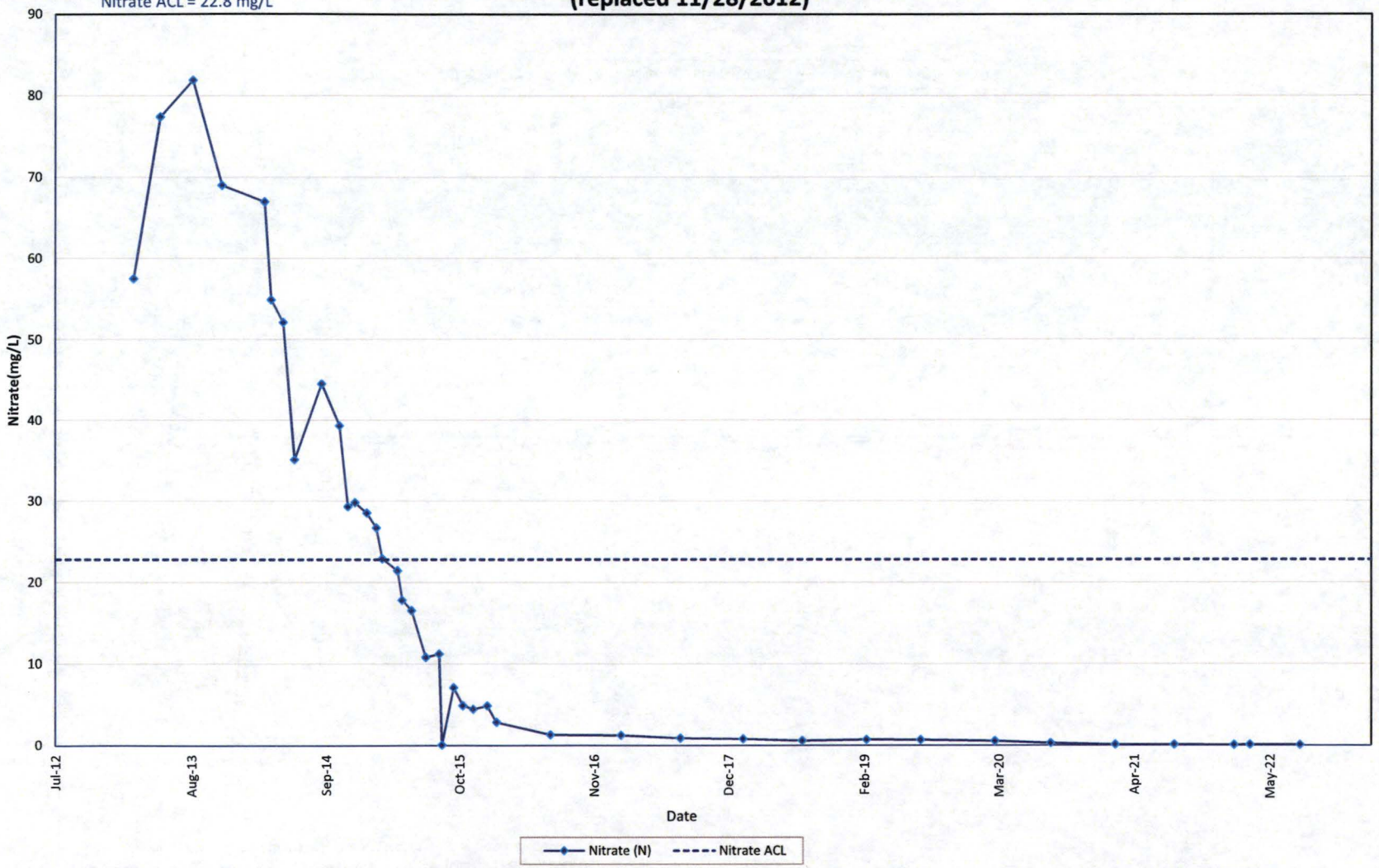
Anions and TDS in Monitoring Well 32-45 KD-R (replaced 11/28/2012)



Metals in Monitoring Well 32-45 KD-R
(replaced 11/28/2012)



Nitrate in Monitoring Well 32-45 KD-R
(replaced 11/28/2012)

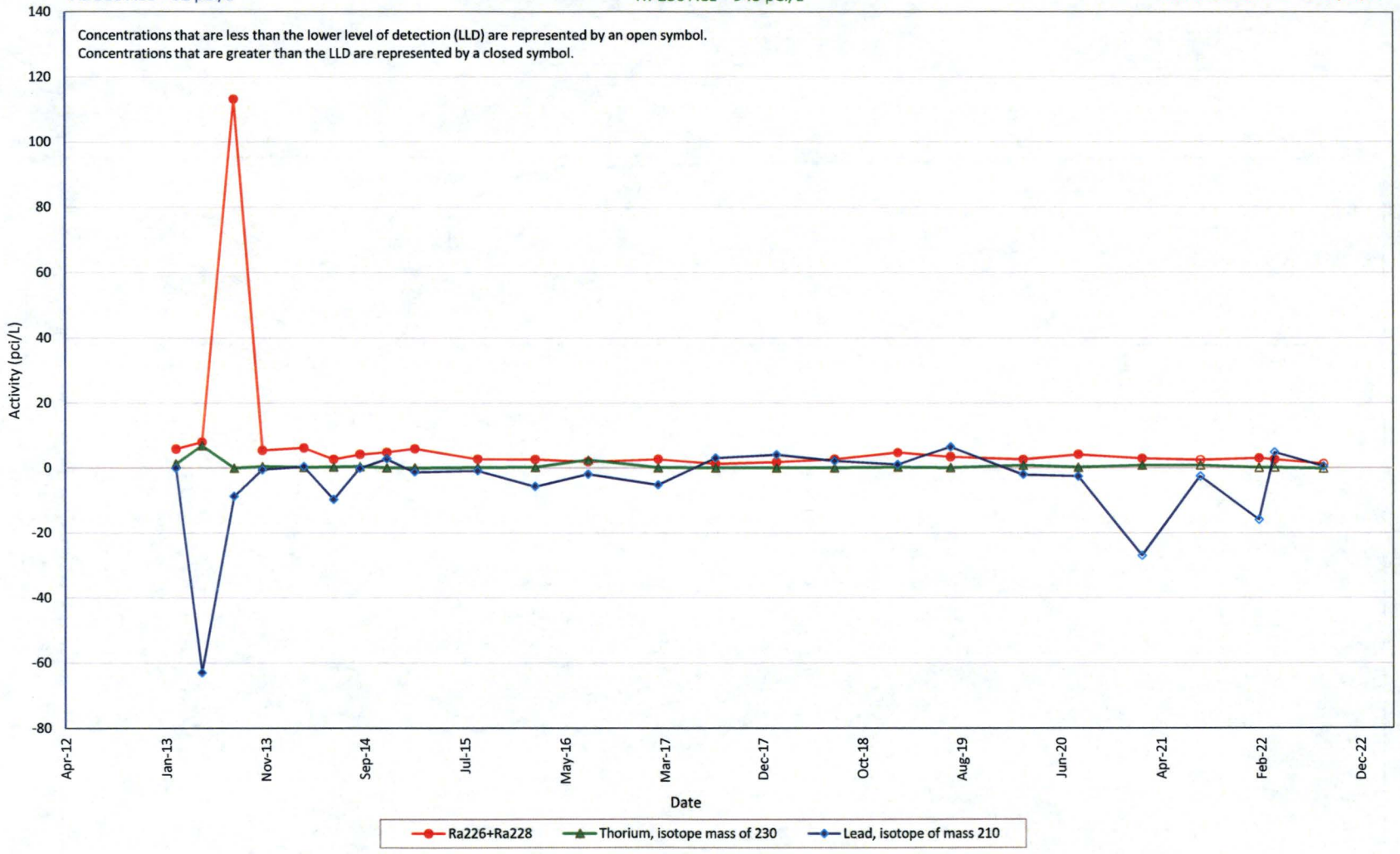


Radionuclides in Monitoring Well 32-45 KD-R
(replaced 11/28/2012)

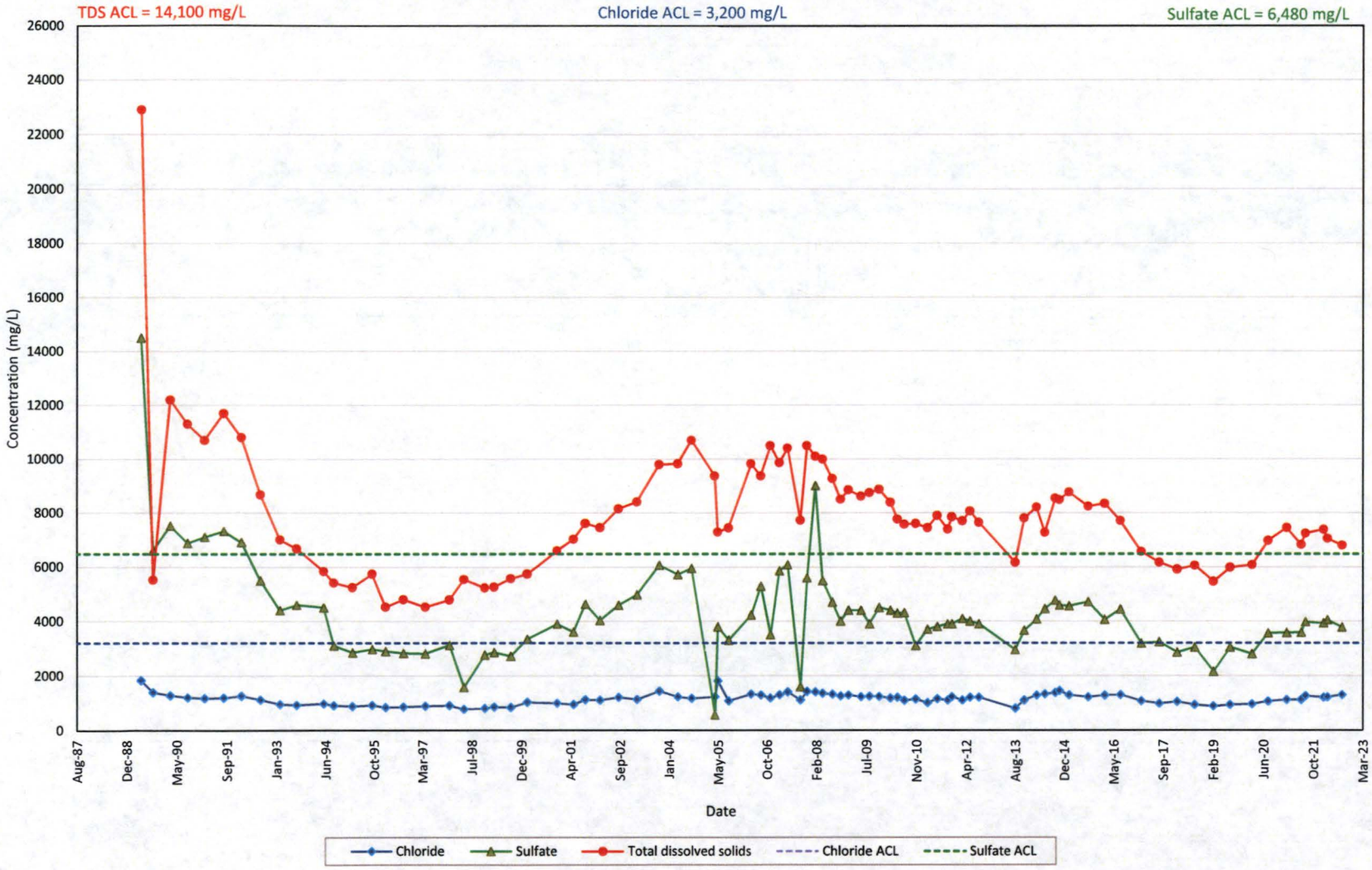
Pb-210 ACL = 62 pCi/L

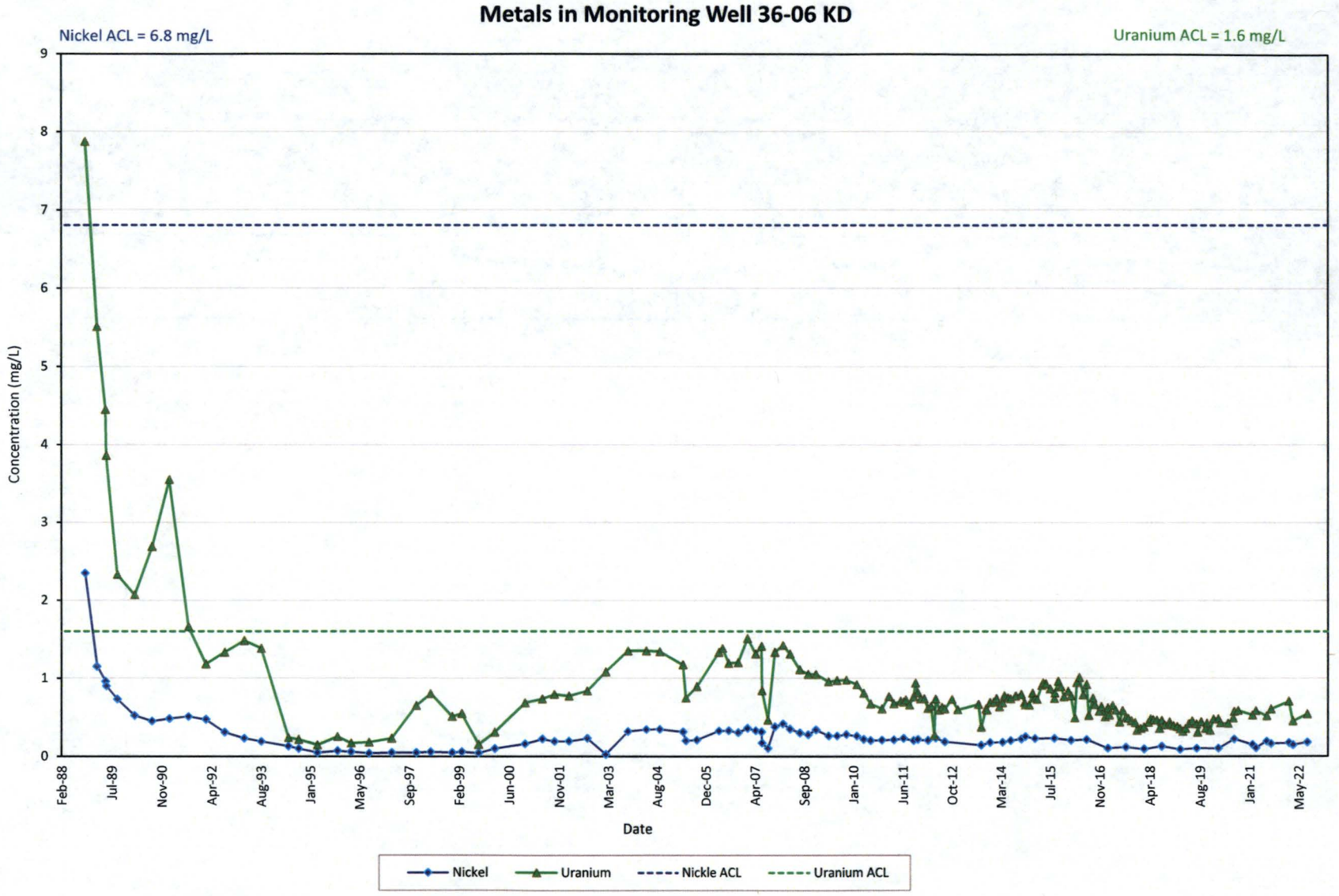
Th-230 ACL = 945 pCi/L

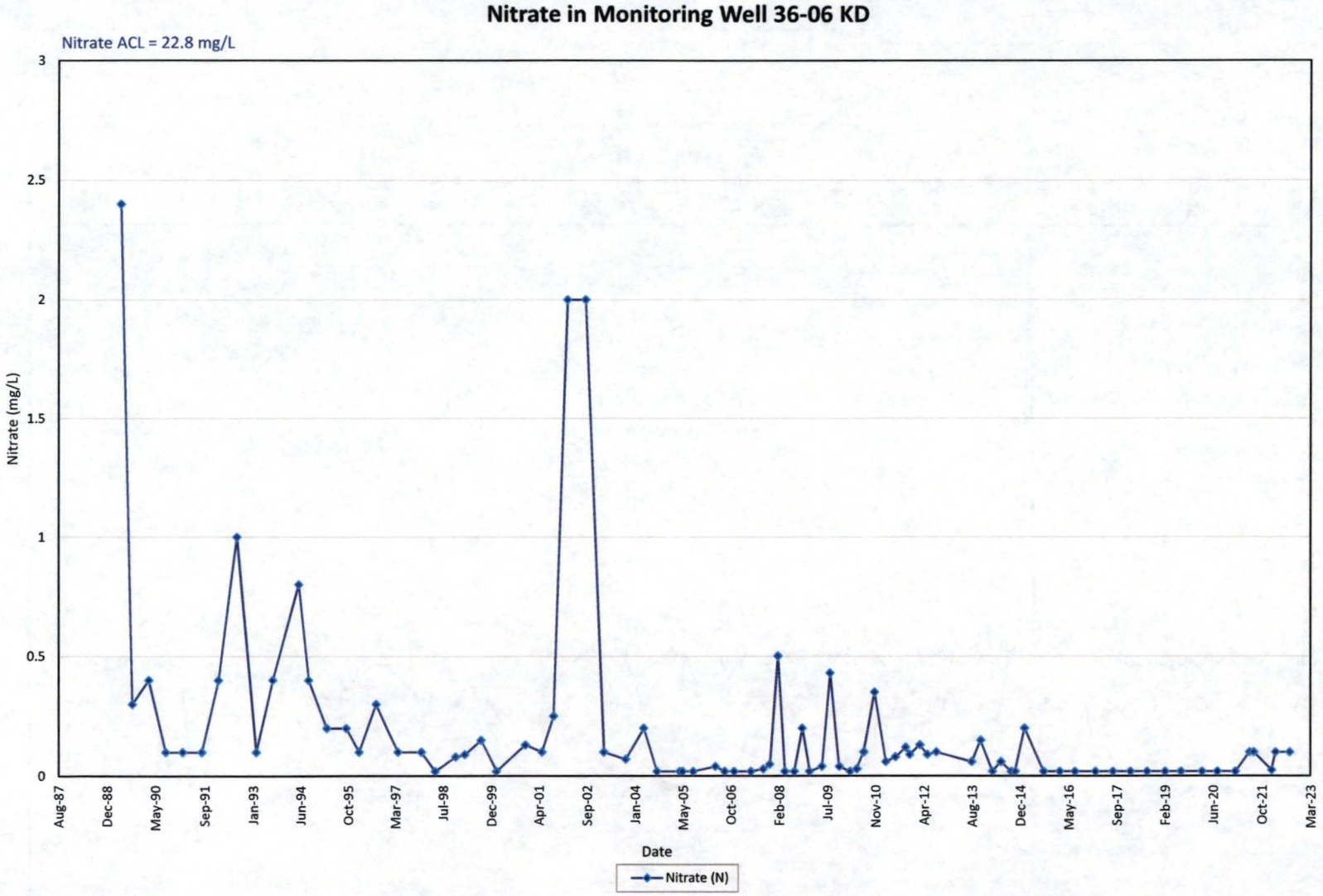
Ra-226+228 ACL = 218 pCi/L



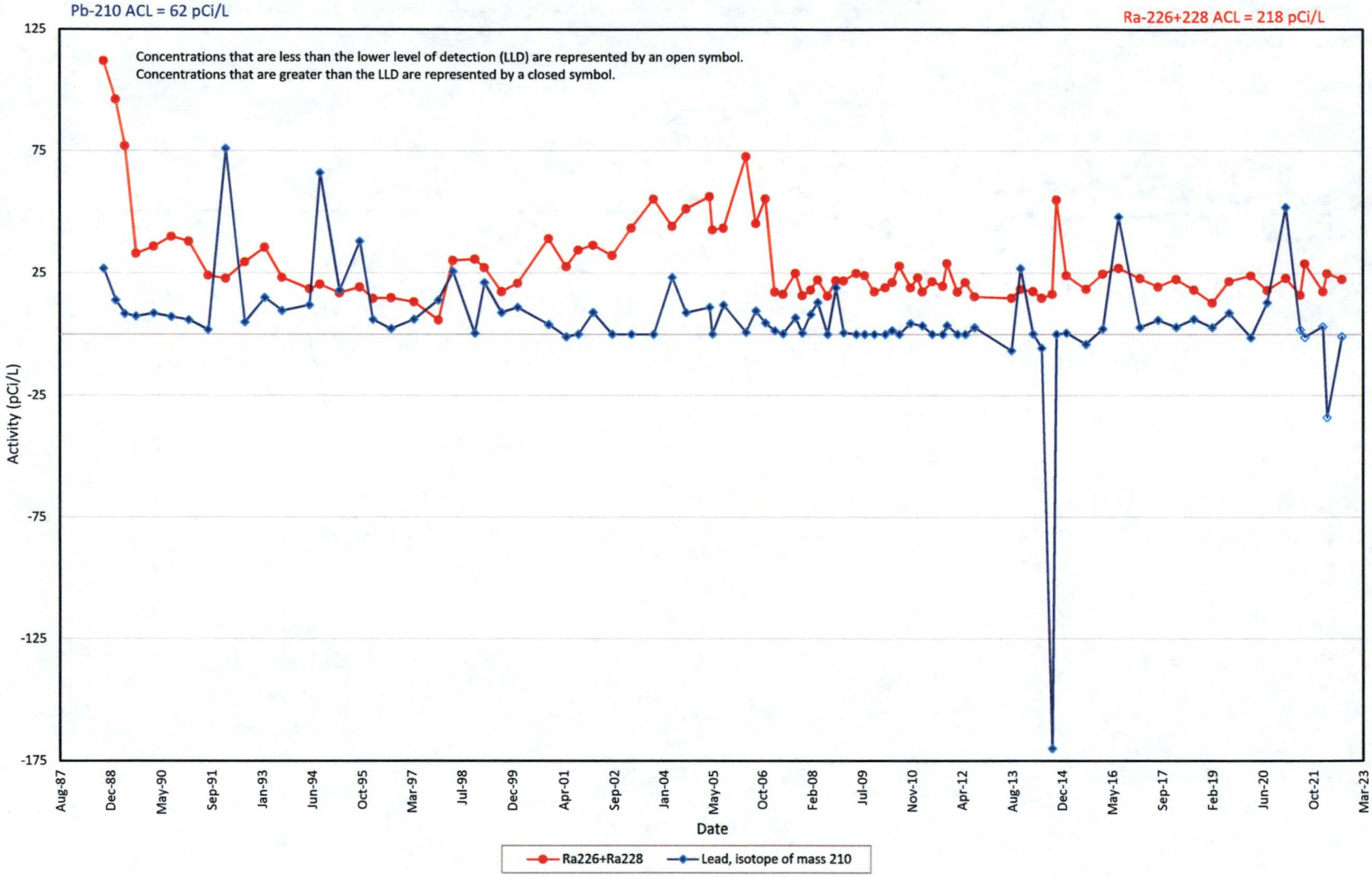
Anions and TDS in Monitoring Well 36-06 KD



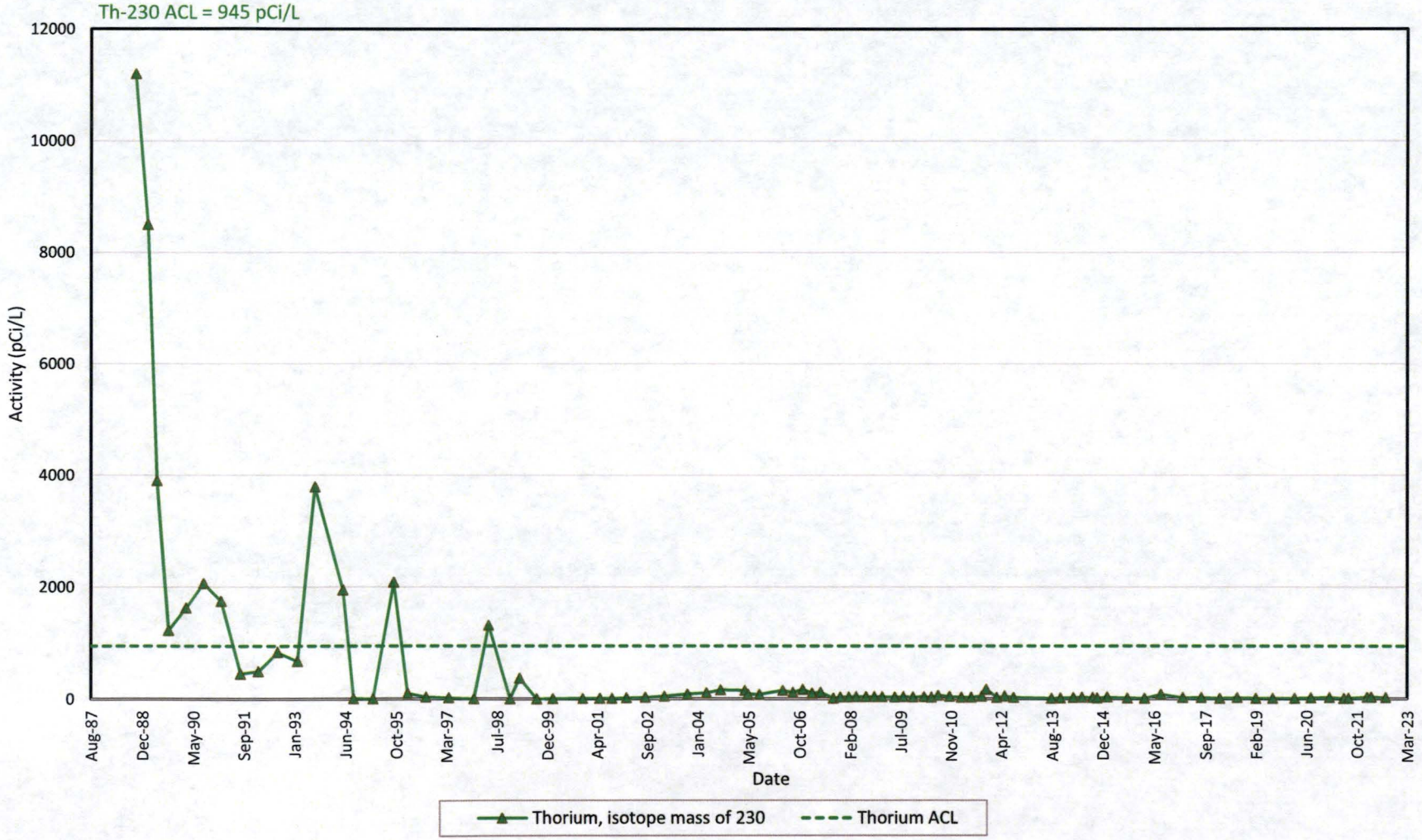

Metals in Monitoring Well 36-06 KD
Nickel ACL = 6.8 mg/L
Uranium ACL = 1.6 mg/L
Concentration (mg/L)
0
1
2
3
4
5
6
7
8
9
Feb-88
Jul-89
Nov-90
Apr-92
Aug-93
Jan-95
May-96
Sep-97
Feb-99
Jun-00
Nov-01
Mar-03
Aug-04
Dec-05
Apr-07
Sep-08
Jan-10
Jun-11
Oct-12
Mar-14
Jul-15
Nov-16
Apr-18
Aug-19
Jan-21
May-22
Date
Nickel
Uranium
Nickle ACL
Uranium ACL


Nitrate in Monitoring Well 36-06 KD
Nitrate ACL = 22.8 mg/L
Nitrate (mg/L)
3
2.5
2
1.5
1
0.5
0
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)

Radionuclides in Monitoring Well 36-06 KD

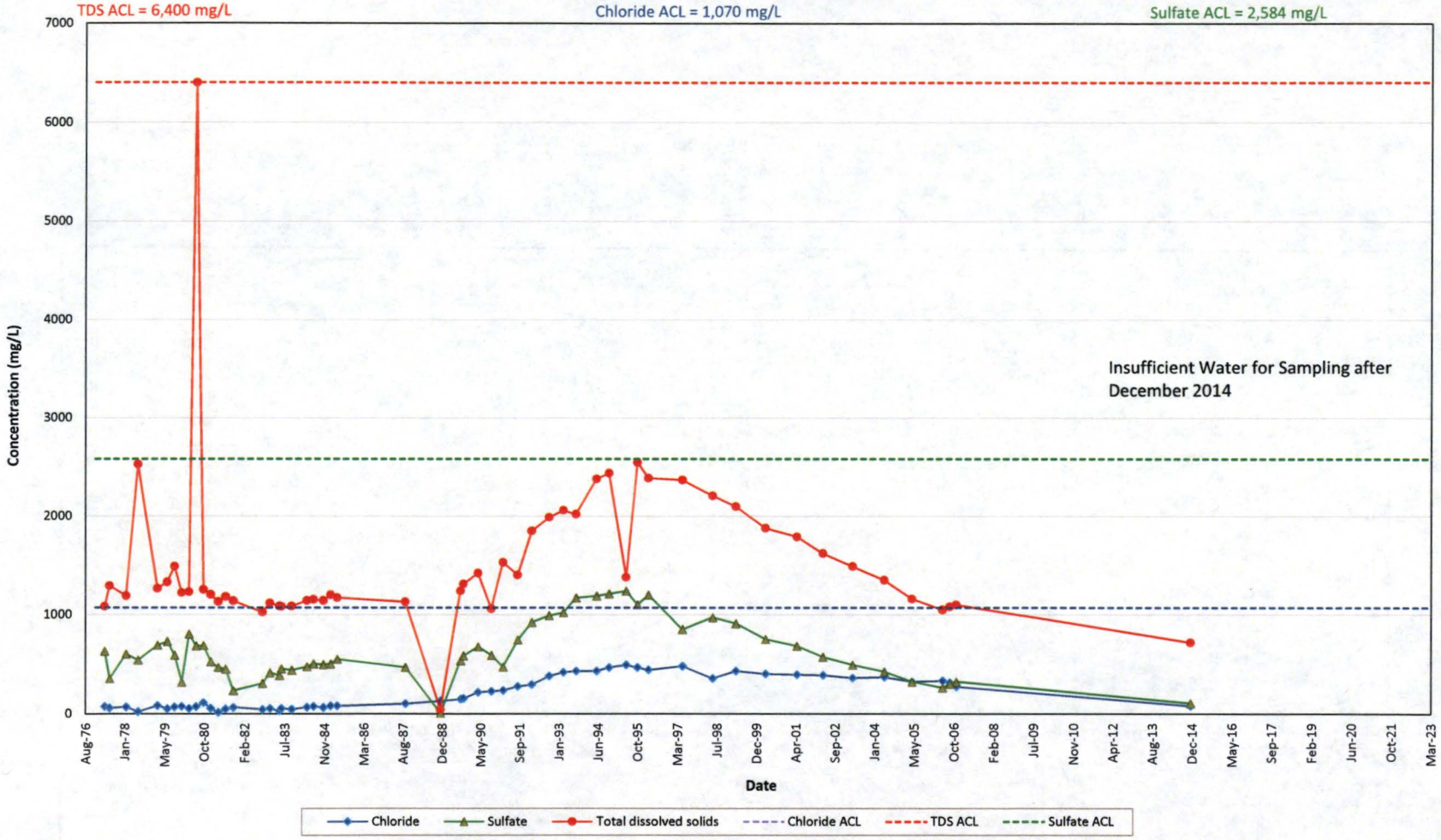


Thorium -230 in Monitoring Well 36-06 KD

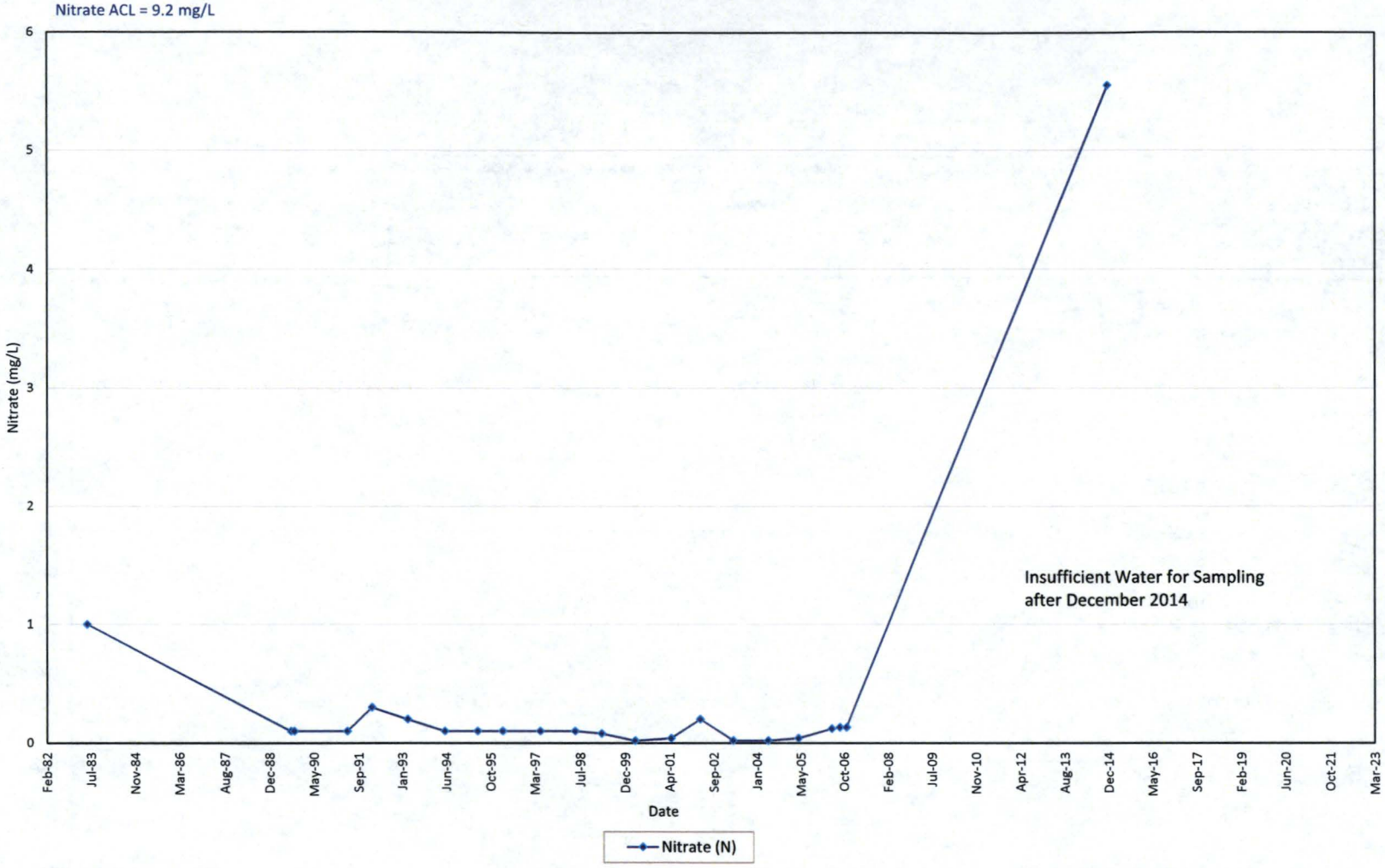


Stability Monitoring Plan
Time Versus Concentration Plots
Tres Hermanos A

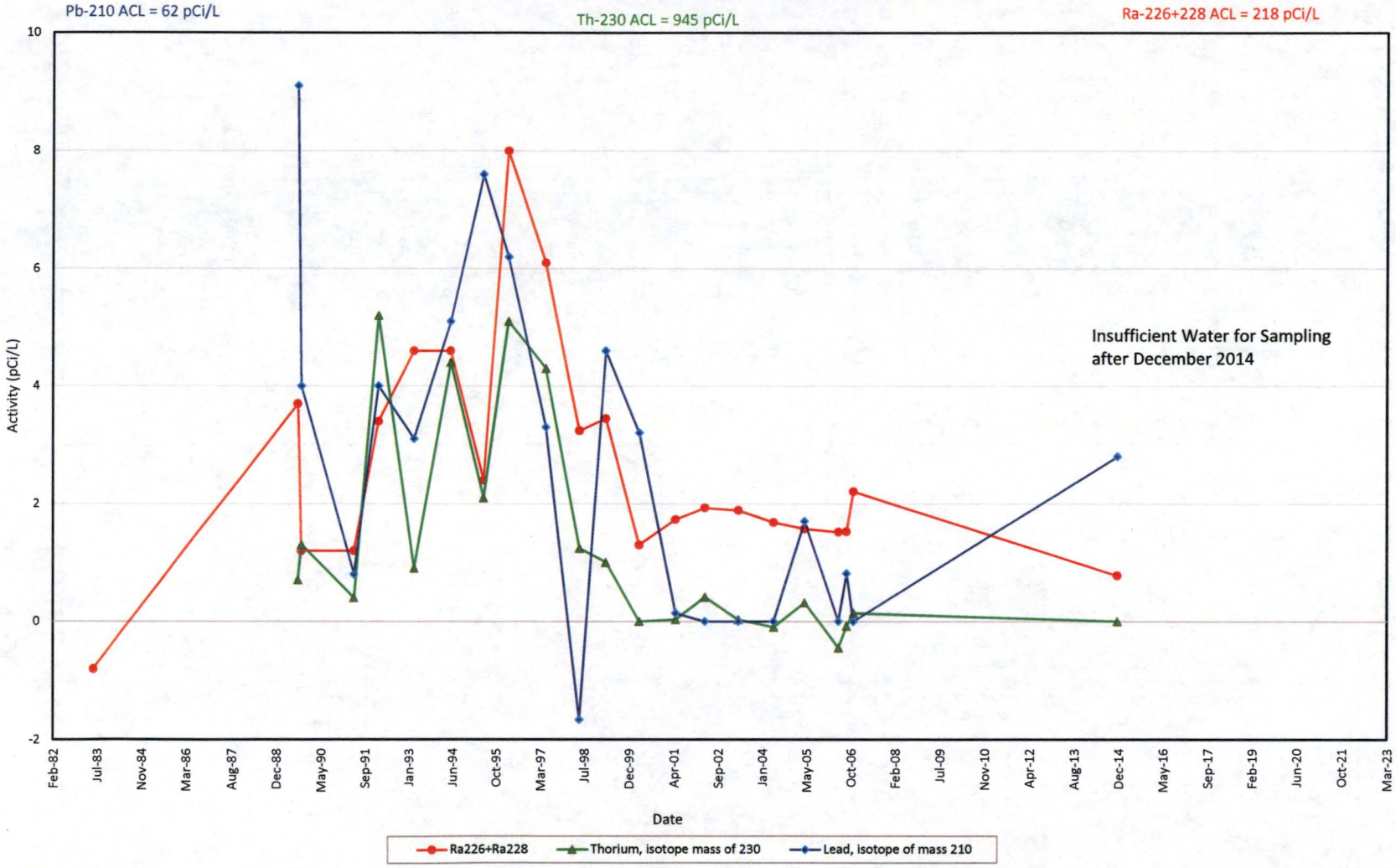
Anions and TDS in Monitoring Well 30-01 TRA



Nitrate in Monitoring Well 30-01 TRA

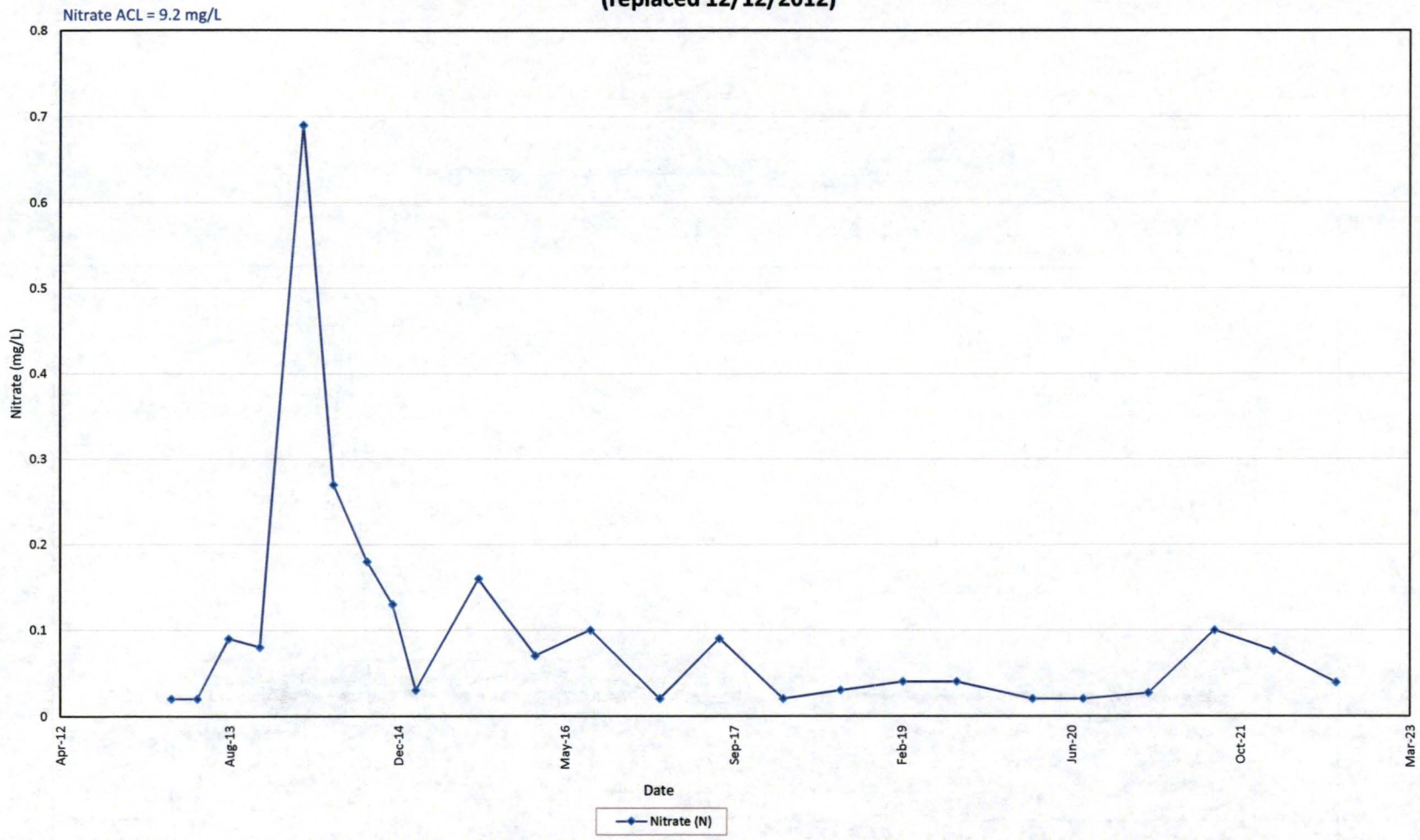


Radionuclides in Monitoring Well 30-01 TRA

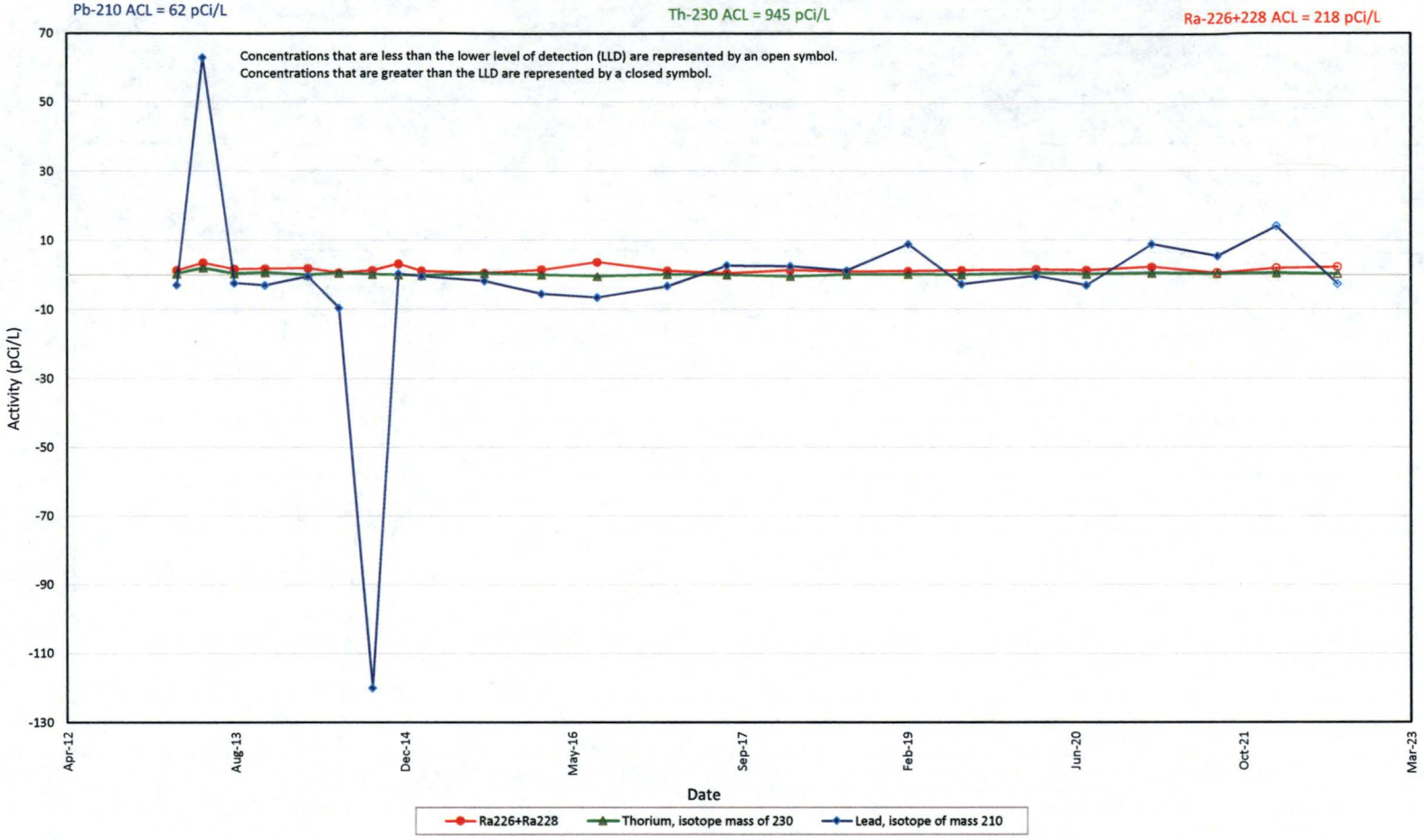


Anions and TDS in Monitoring Well 31-01 TRA-R (replaced 12/12/2012)

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



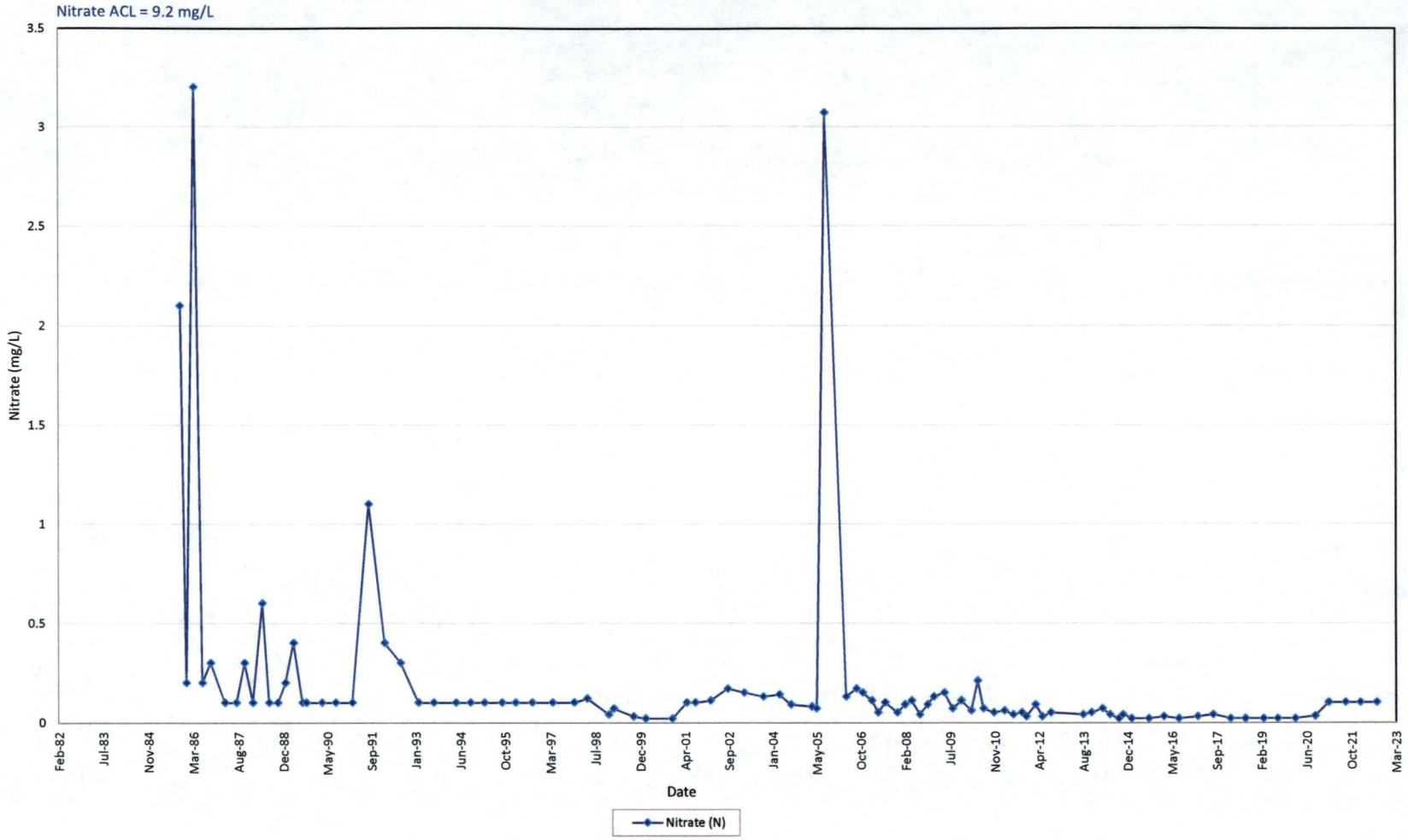
Radionuclides in Monitoring Well 31-01 TRA-R
(replaced 12/12/2021)



[redacted]

Anions and TDS in Monitoring Well 33-01 TRA-R

Nitrate in Monitoring Well 33-01 TRA



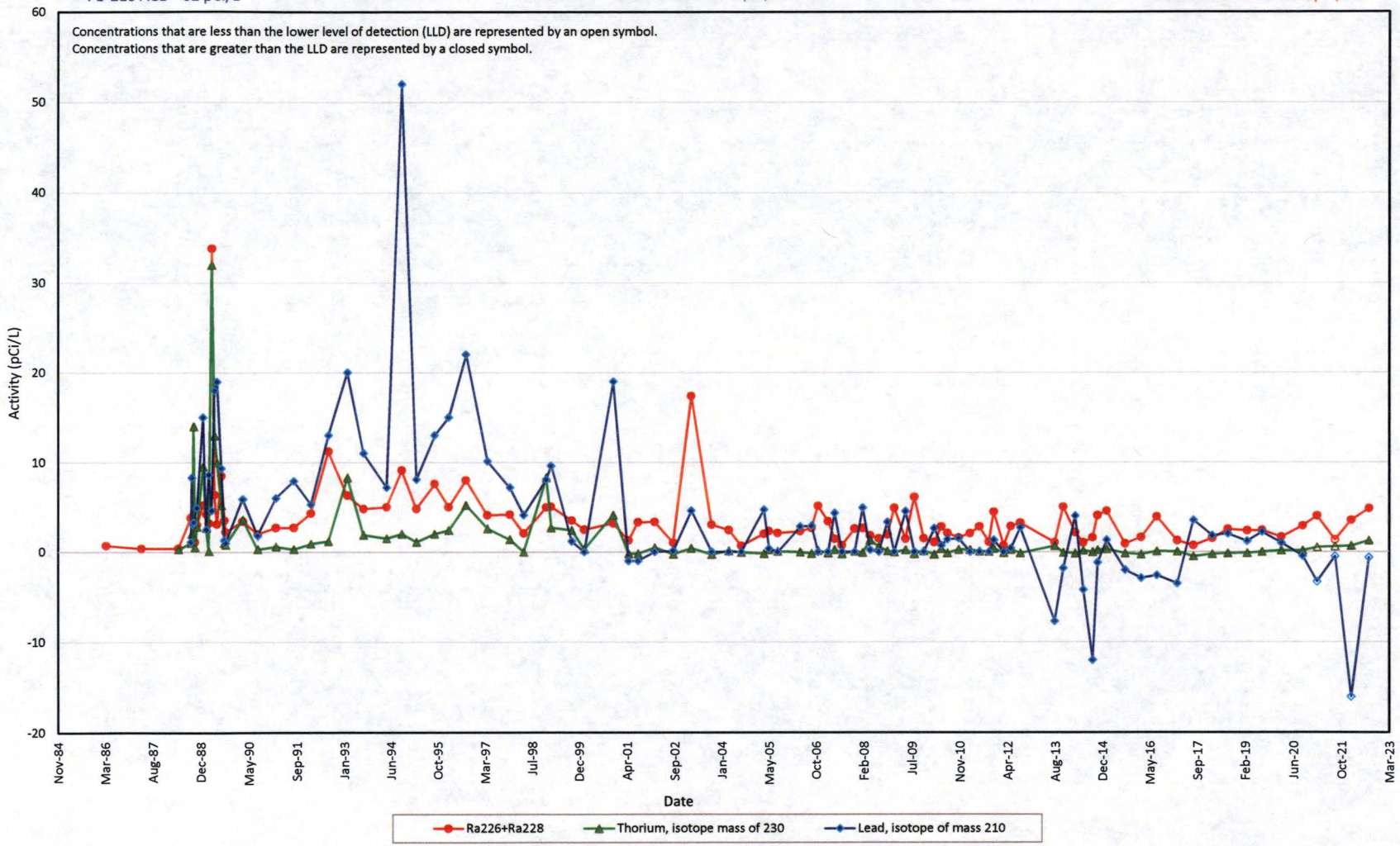
[redacted]

Radionuclides in Monitoring Well 33-01 TRA

Pb-210 ACL = 62 pCi/L

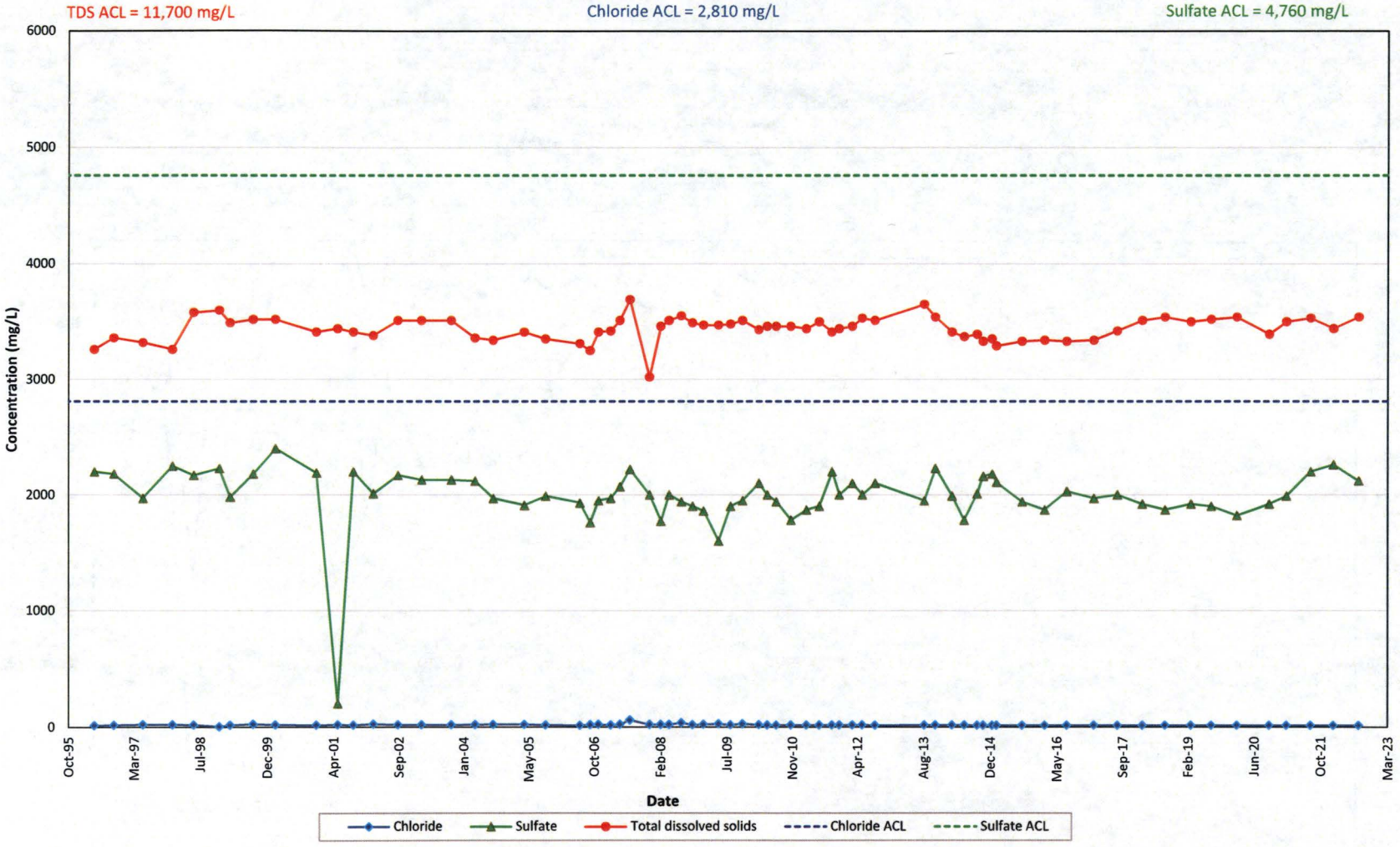
Th-230 ACL = 945 pCi/L

Ra-226+228 ACL = 218 pCi/L

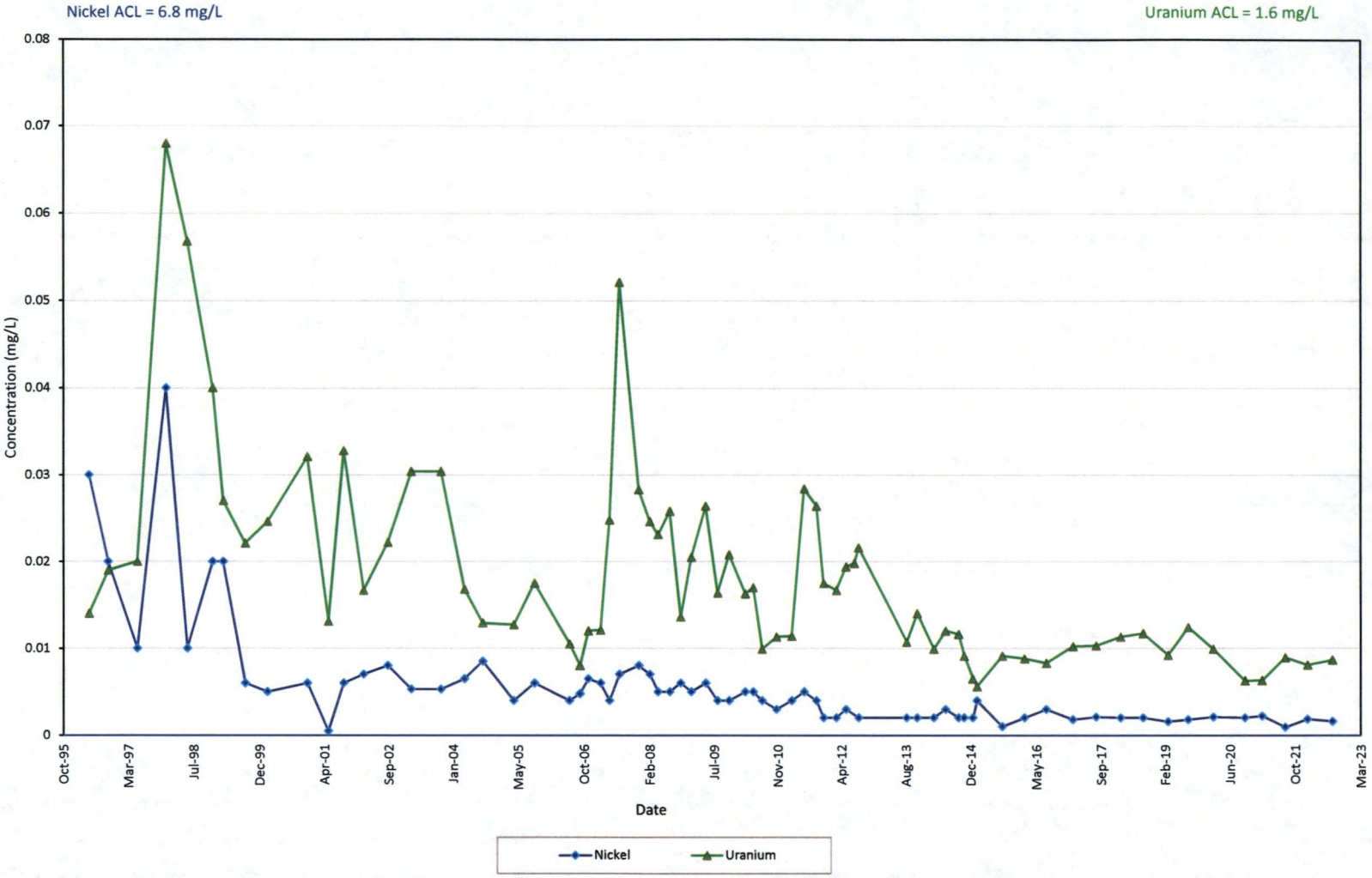


Stability Monitoring Plan
Time Versus Concentration Plots
Tres Hermanos B

Anions and TDS in Monitoring Well 19-77 TRB

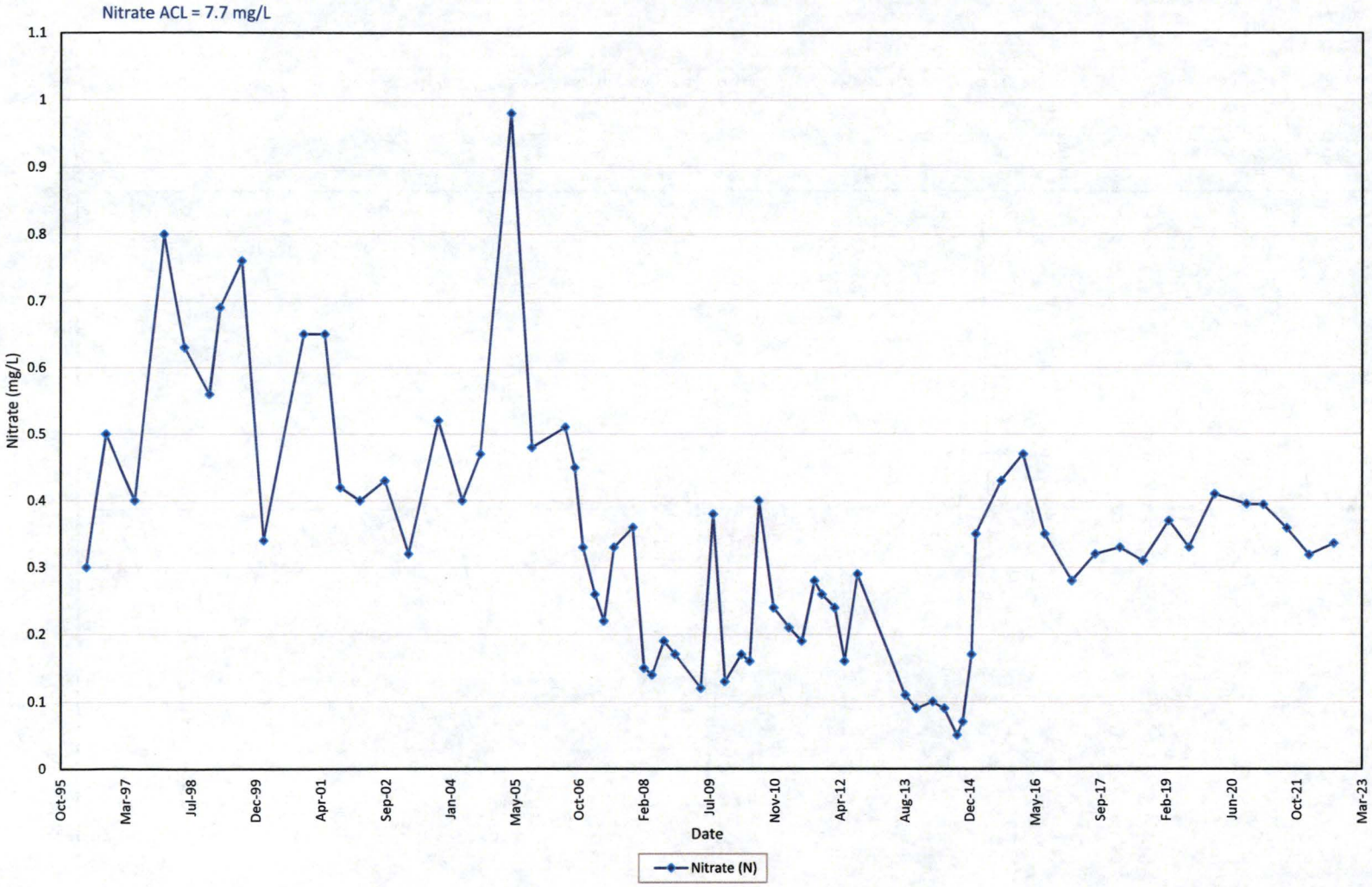


Metals in Monitoring Well 19-77 TRB



[redacted]

Nitrate in Monitoring Well 19-77 TRB

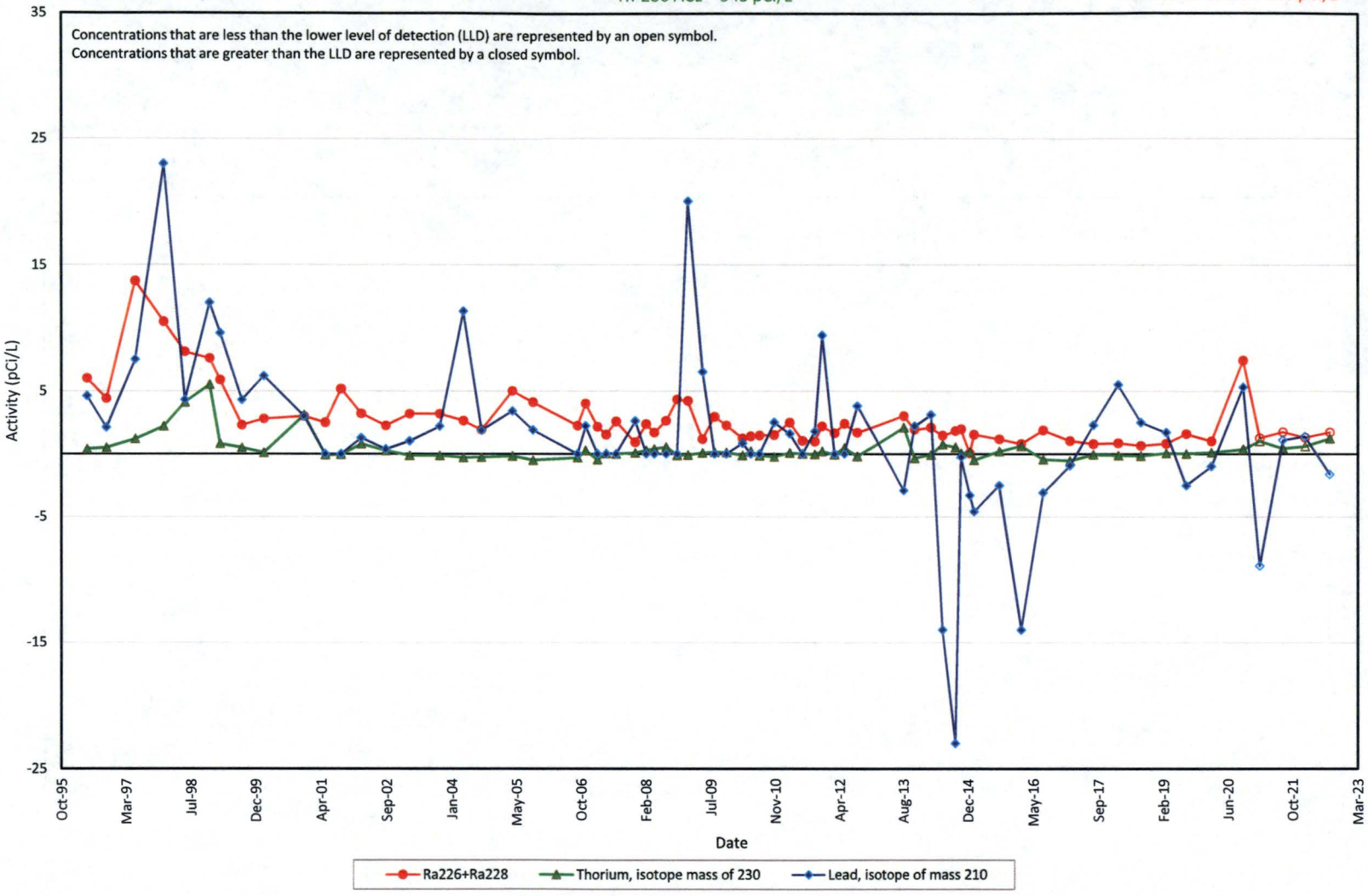


Radionuclides in Monitoring Well 19-77 TRB

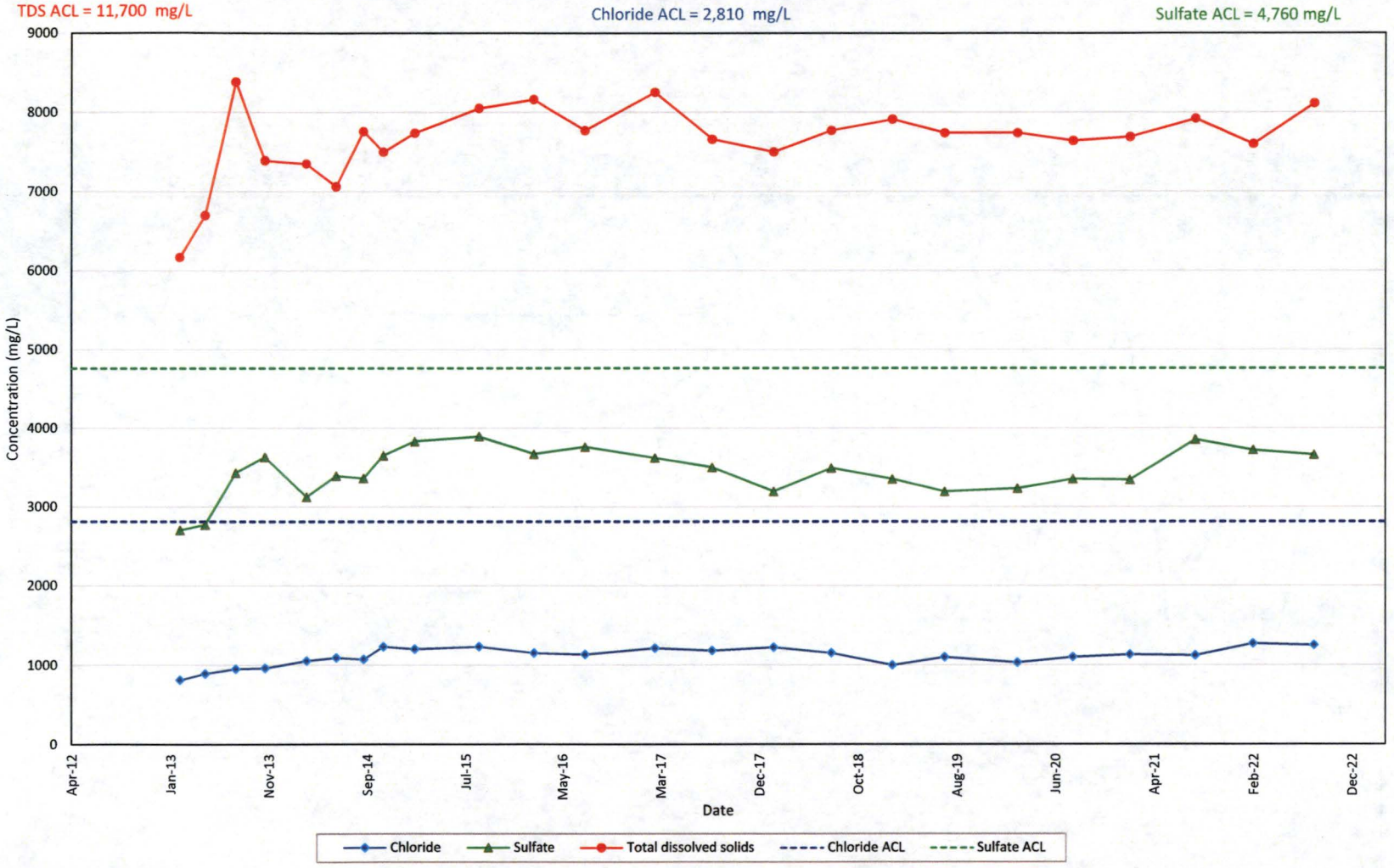
Pb-210 ACL = 62 pCi/L

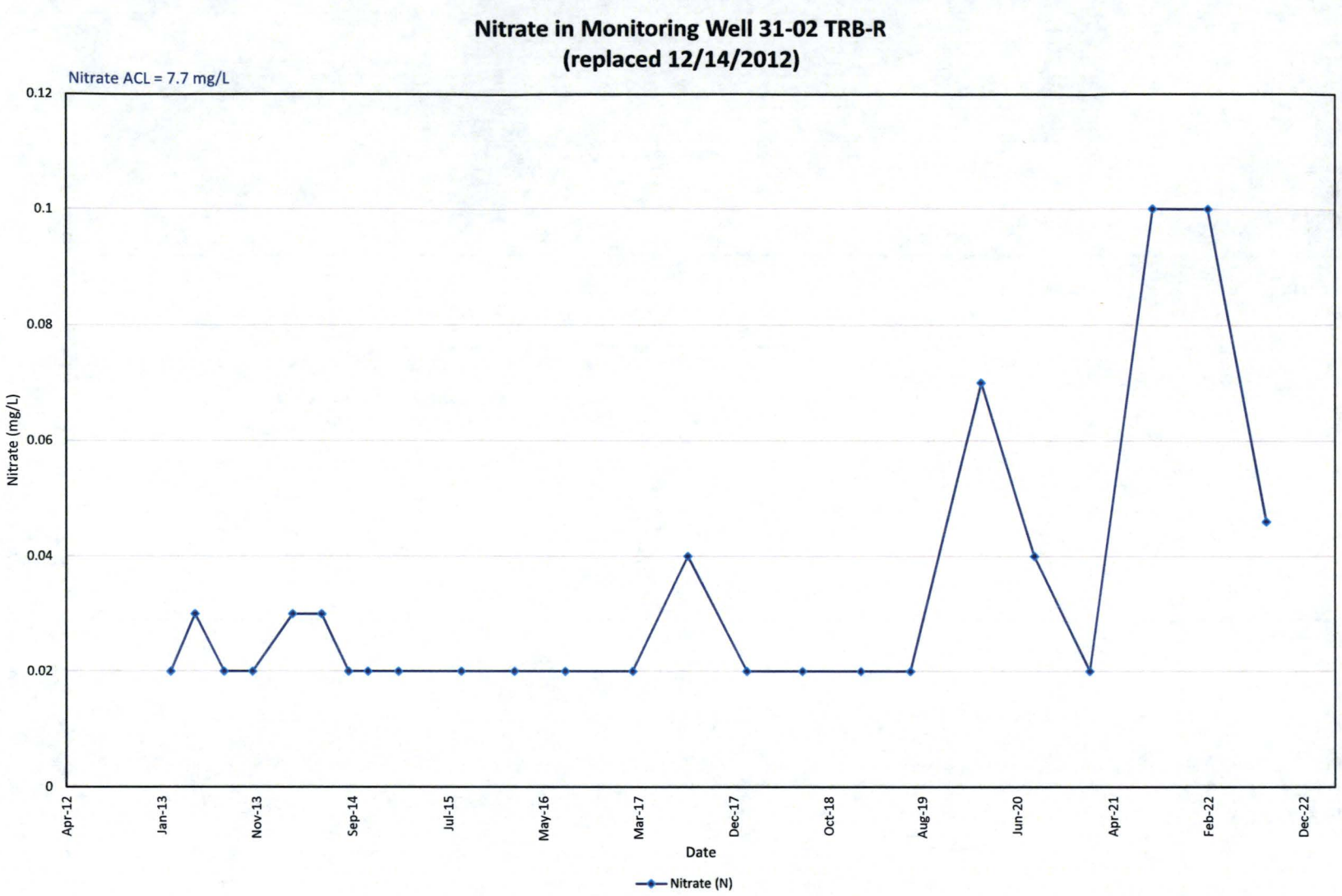
Th-230 ACL = 945 pCi/L

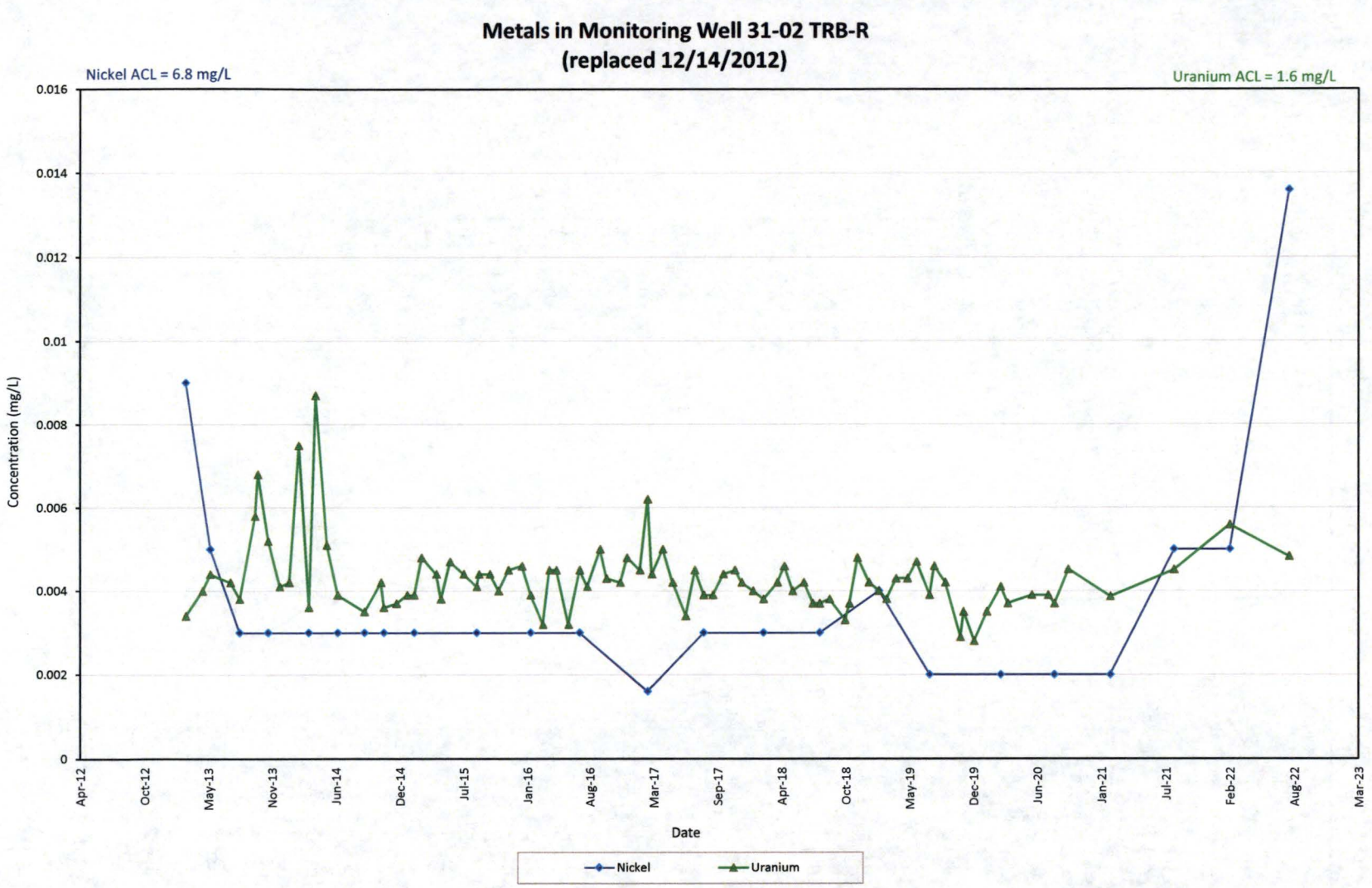
Ra-226+228 ACL = 218 pCi/L



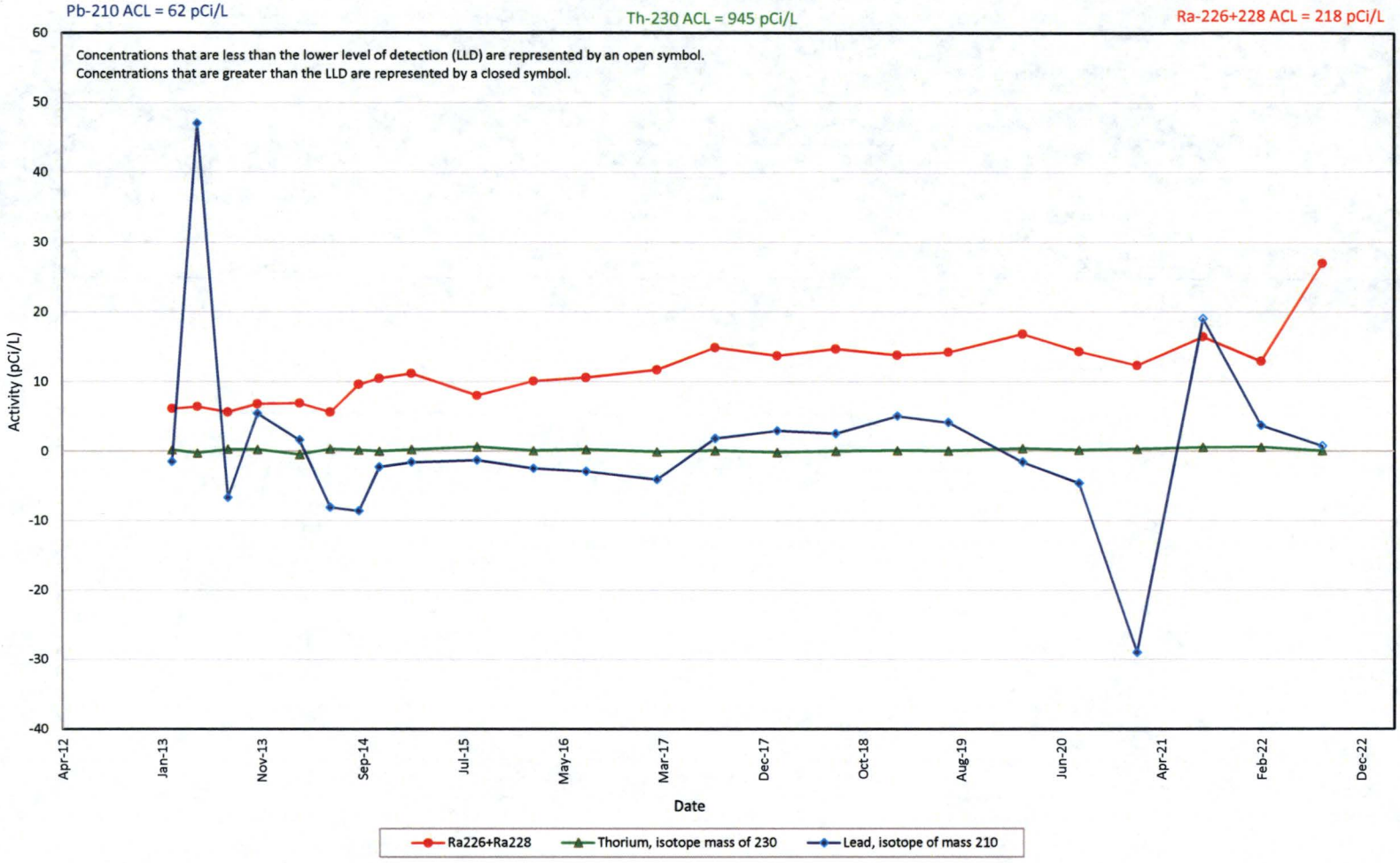
Anions and TDS in Monitoring Well 31-02 TRB-R (replaced 12/14/2012)

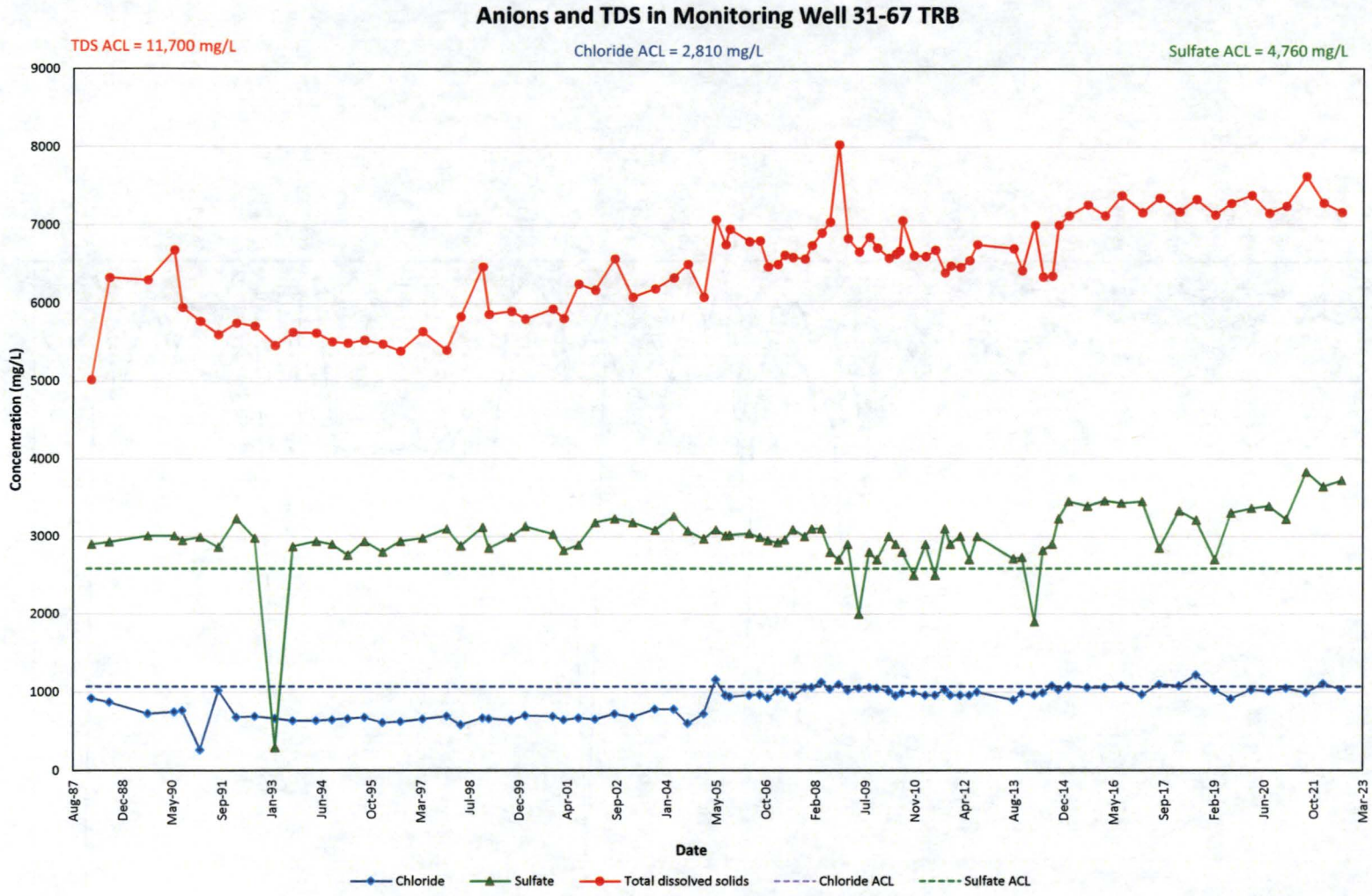


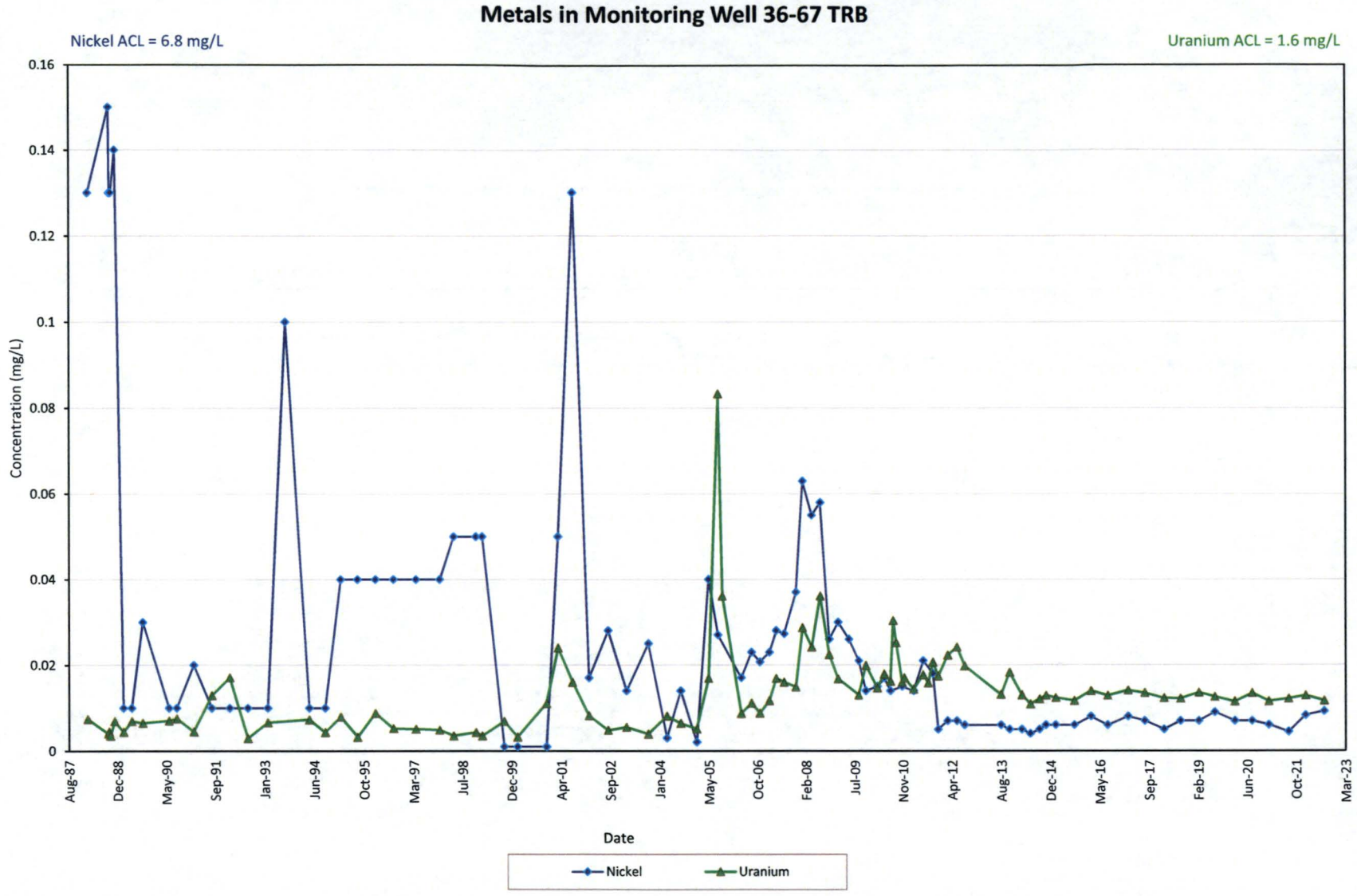

Nitrate in Monitoring Well 31-02 TRB-R
(replaced 12/14/2012)
Nitrate ACL = 7.7 mg/L
0.12
0.1
0.08
0.06
0.04
0.02
0
Nitrate (mg/L)
Apr-12
Jan-13
Nov-13
Sep-14
Jul-15
May-16
Mar-17
Dec-17
Oct-18
Aug-19
Jun-20
Apr-21
Feb-22
Dec-22
Date
Nitrate (N)


Metals in Monitoring Well 31-02 TRB-R
(replaced 12/14/2012)
Nickel ACL = 6.8 mg/L
Uranium ACL = 1.6 mg/L
Concentration (mg/L)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Apr-12
Oct-12
May-13
Nov-13
Jun-14
Dec-14
Jul-15
Jan-16
Aug-16
Mar-17
Sep-17
Apr-18
Oct-18
May-19
Dec-19
Jun-20
Jan-21
Jul-21
Feb-22
Aug-22
Mar-23
Date
Nickel
Uranium

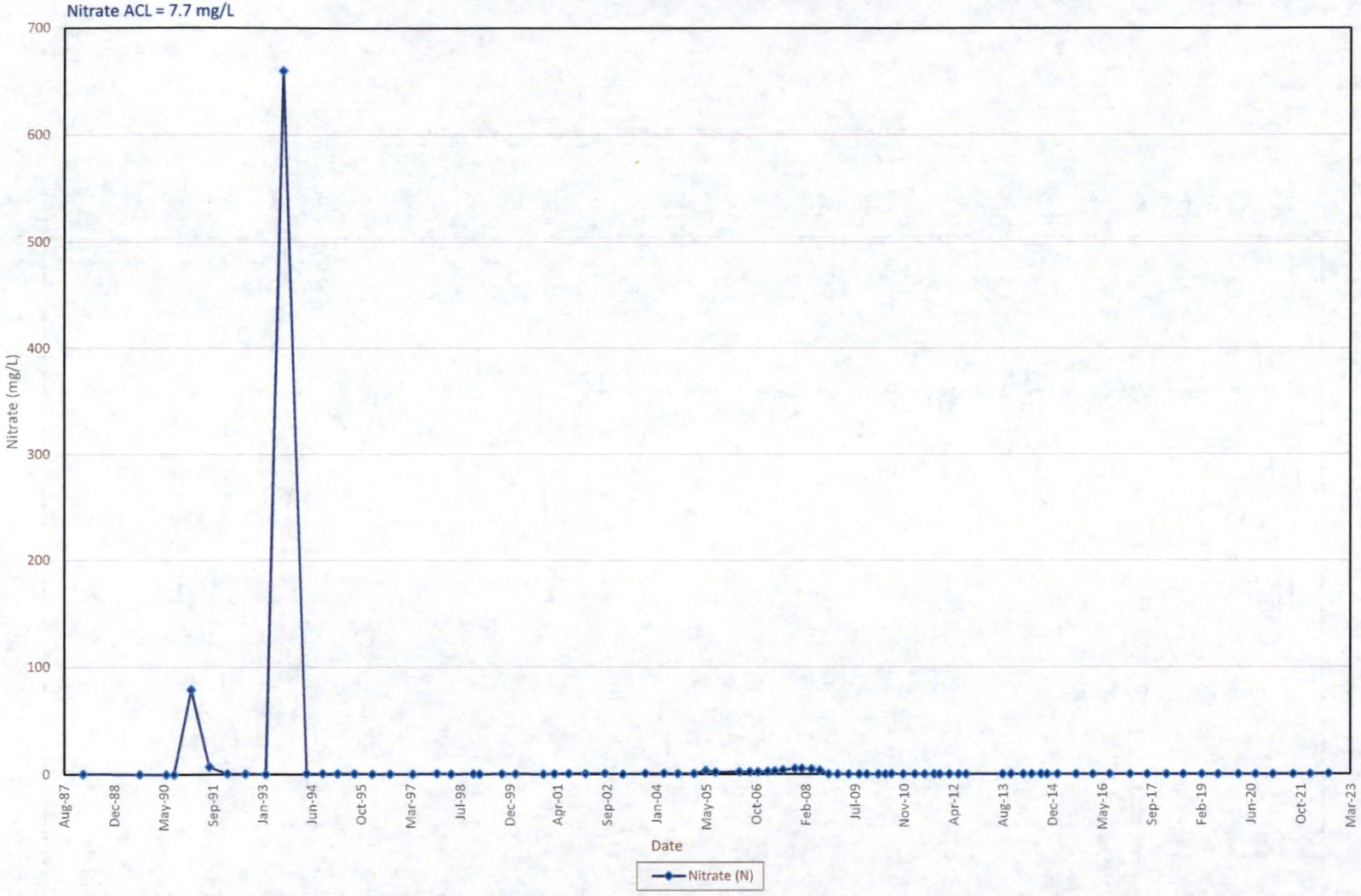
Radionuclides in Monitoring Well 31-02 TRB-R
(replaced 12/14/2012)




Anions and TDS in Monitoring Well 31-67 TRB
TDS ACL = 11,700 mg/L
Chloride ACL = 2,810 mg/L
Sulfate ACL = 4,760 mg/L
Concentration (mg/L)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Chloride
Sulfate
Total dissolved solids
Chloride ACL
Sulfate ACL


Metals in Monitoring Well 36-67 TRB
Nickel ACL = 6.8 mg/L
Uranium ACL = 1.6 mg/L
Concentration (mg/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nickel
Uranium

Nitrate in Monitoring Well 31-67 TRB

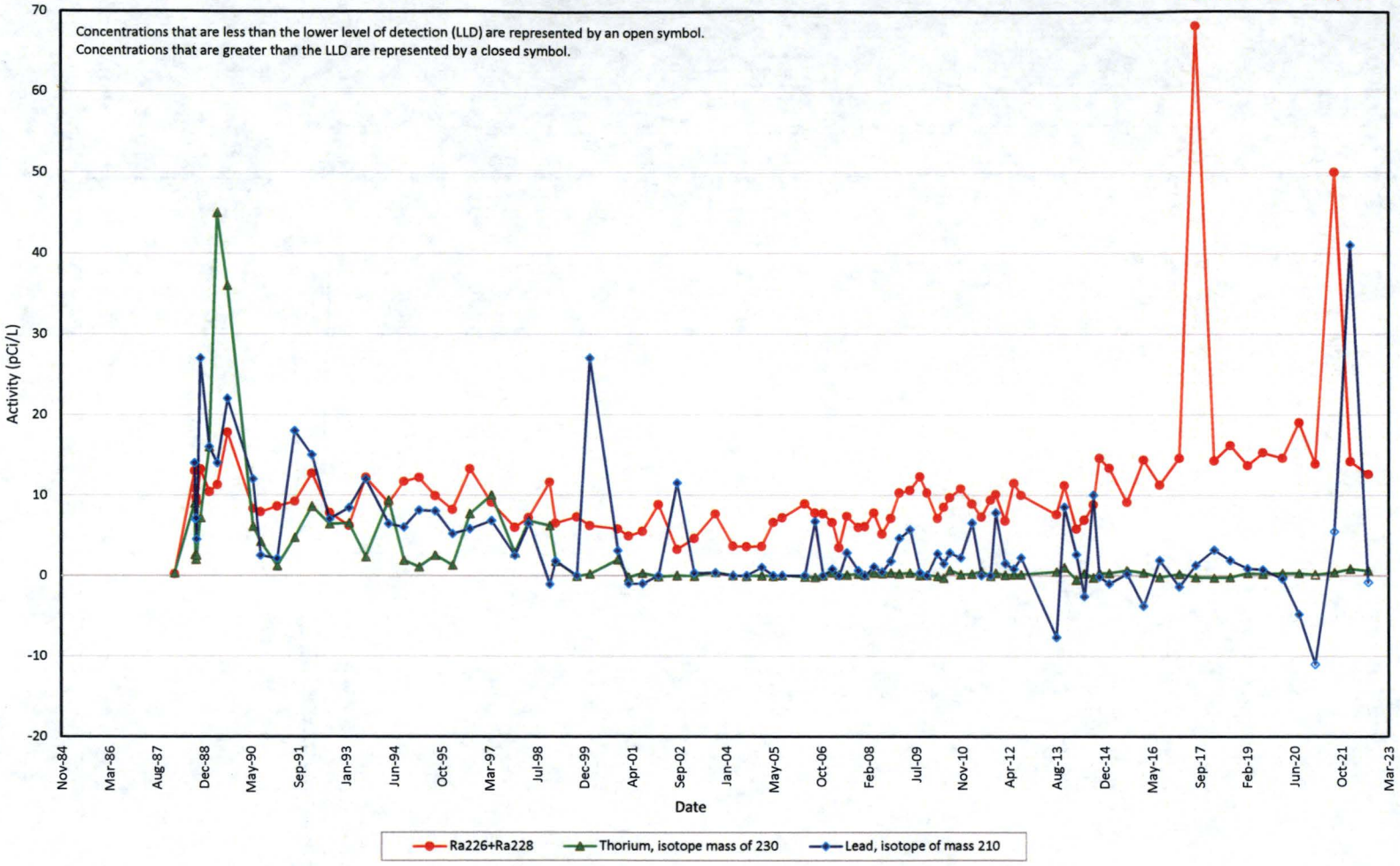


Radionuclides in Monitoring Well 31-67 TRB

Pb-210 ACL = 62 pCi/L

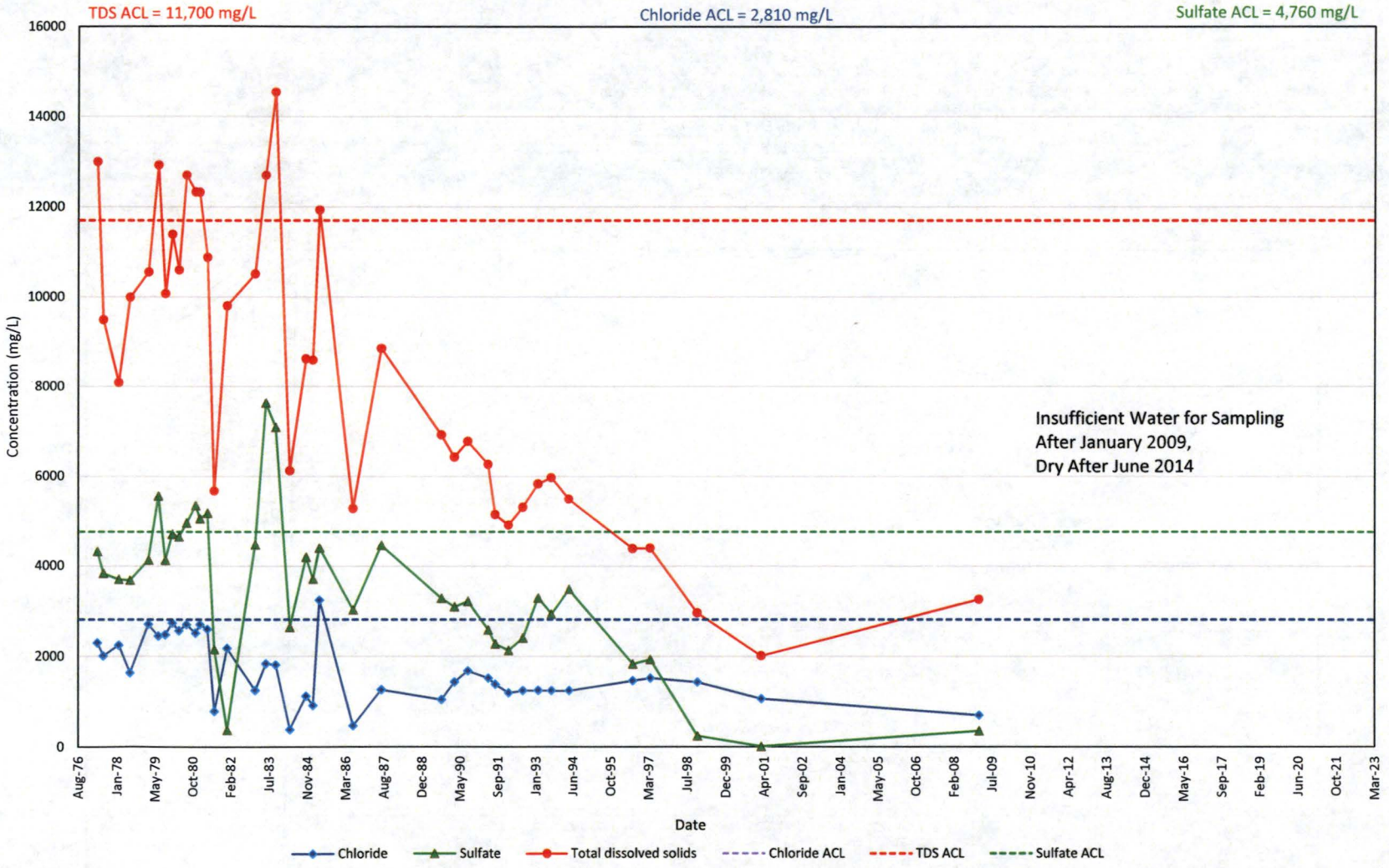
Th-230 ACL = 945 pCi/L

Ra-226+228 ACL = 218 pCi/L

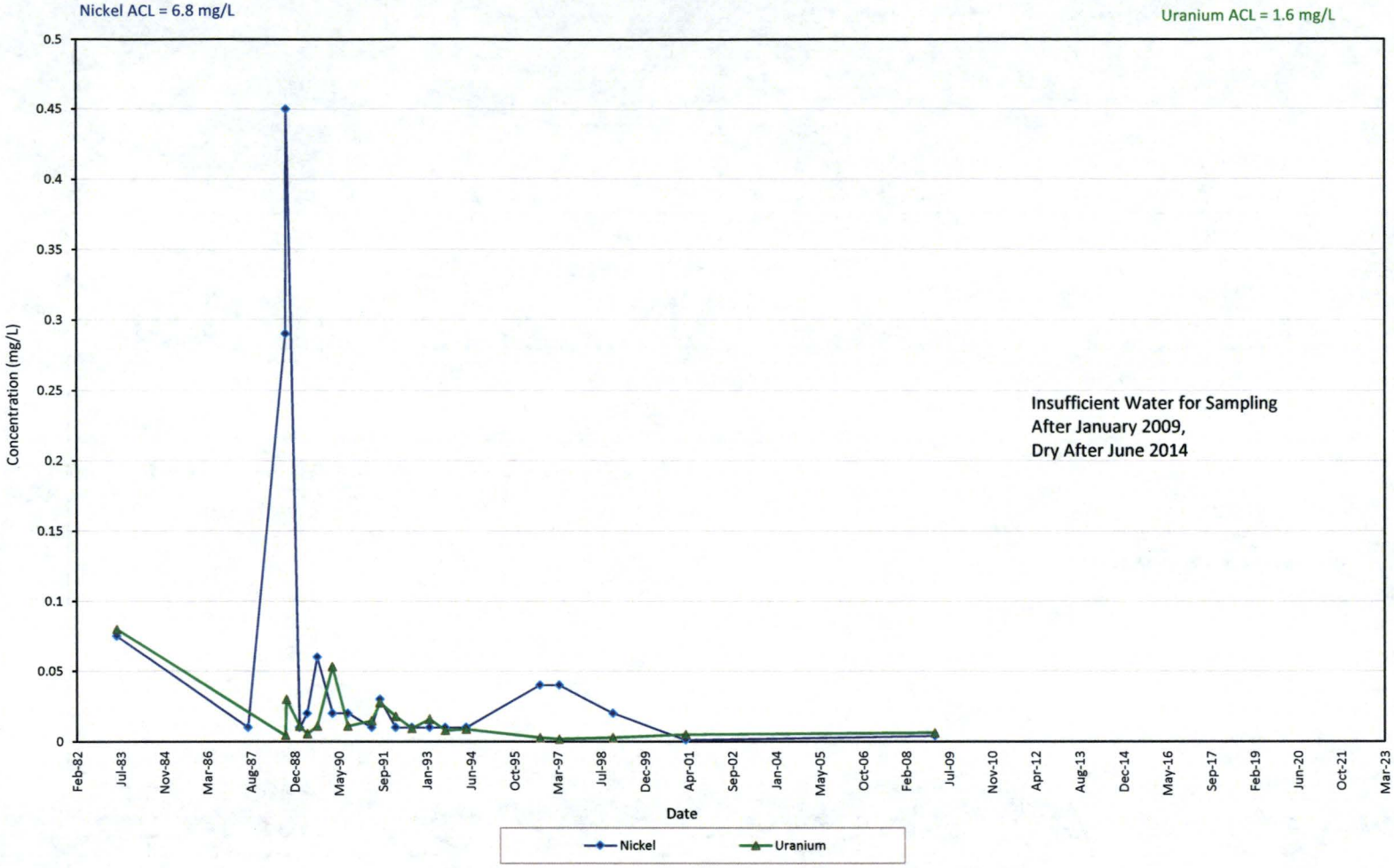


[redacted]

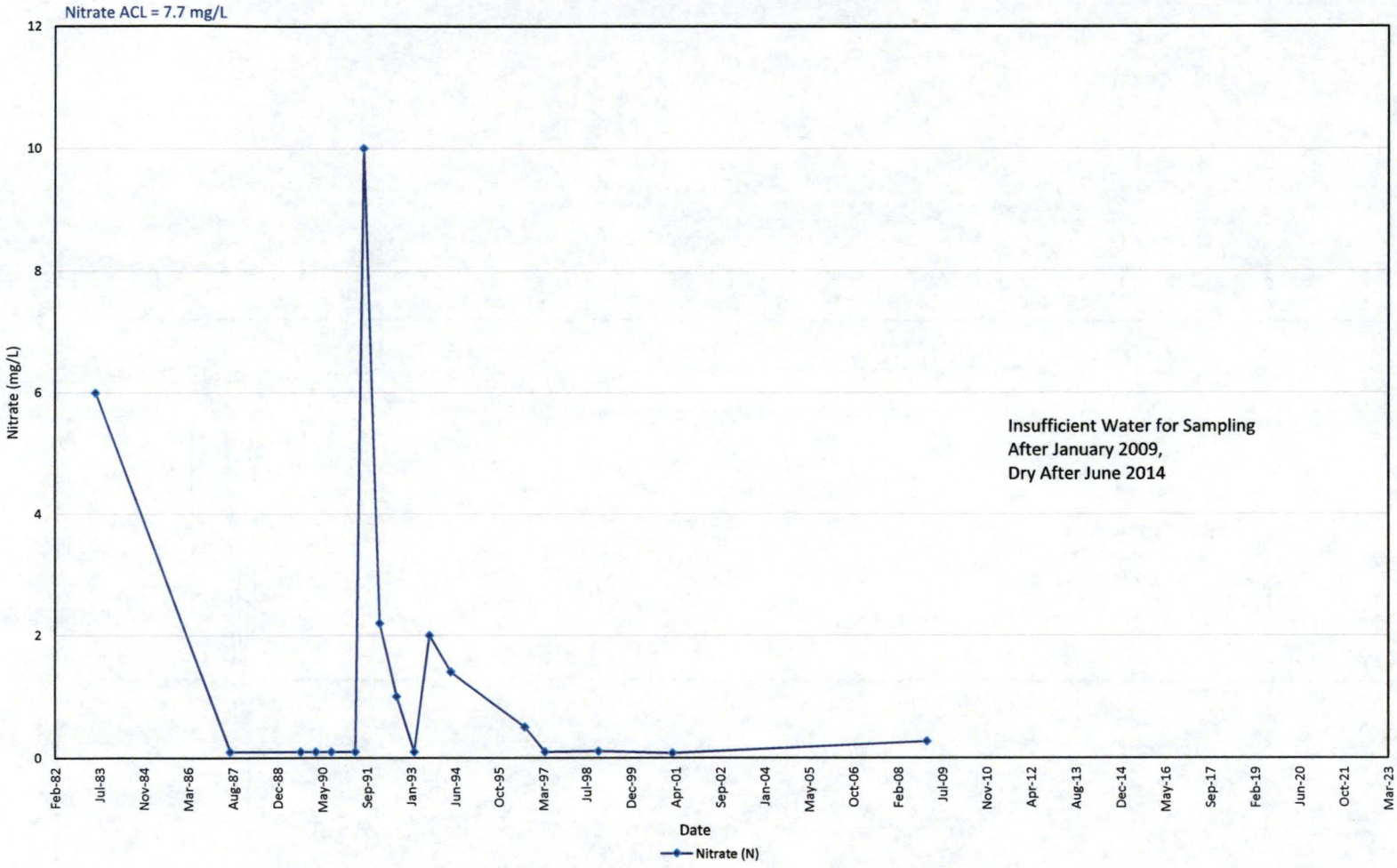
Anions and TDS in Monitoring Well 36-01 TRB



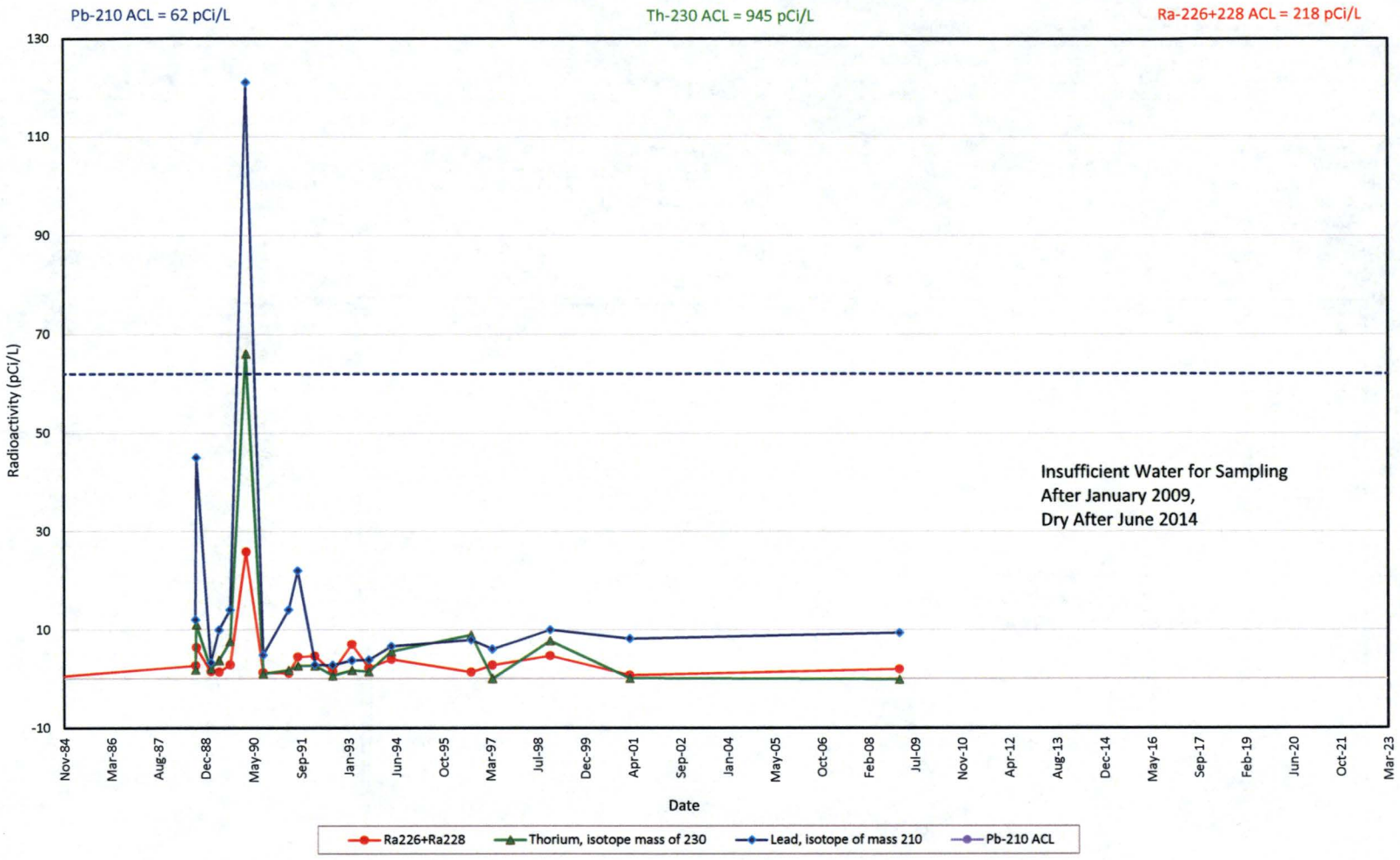
Metals in Monitoring Well 36-01 TRB



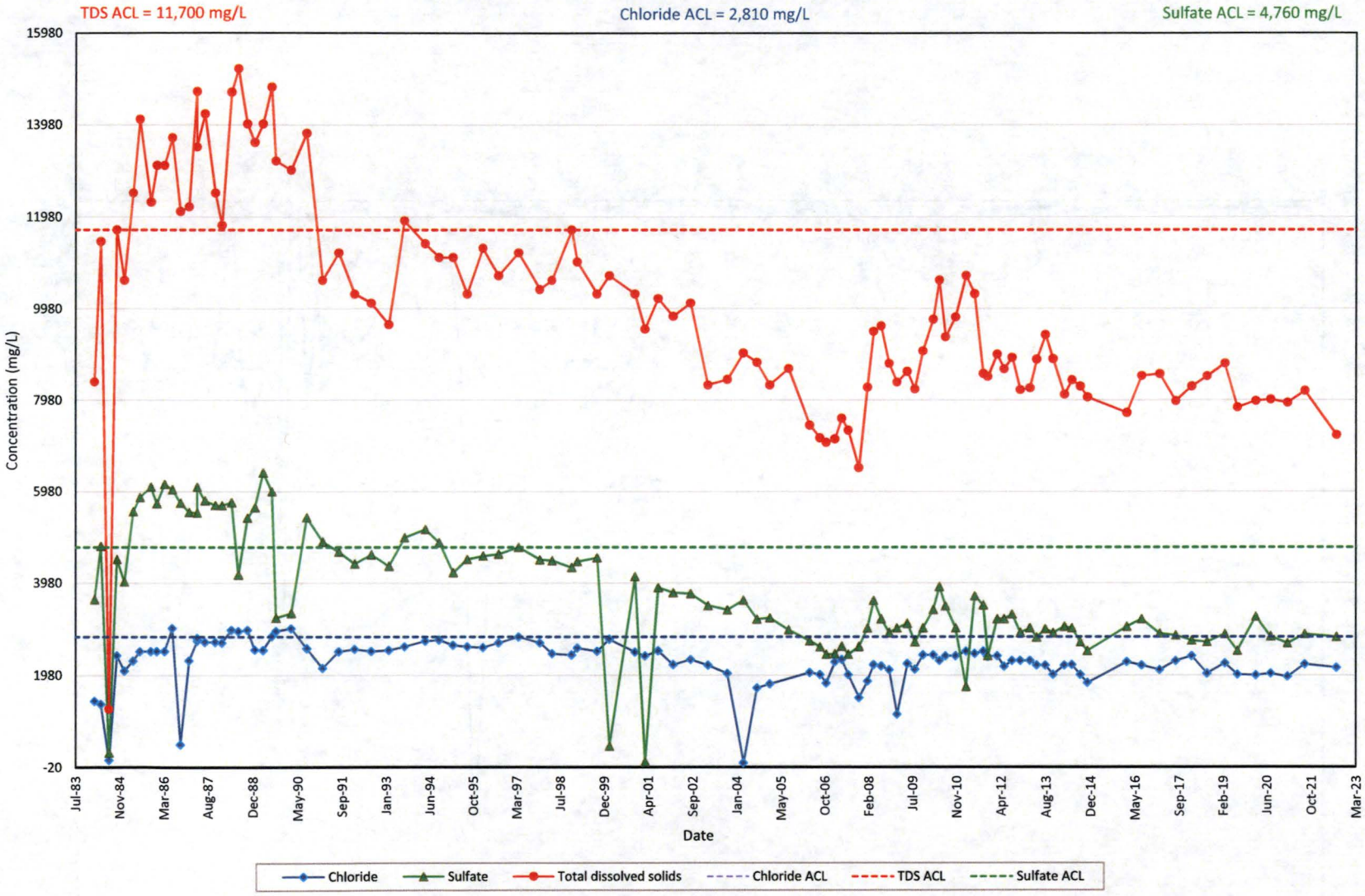
Nitrate in Monitoring Well 36-01 TRB



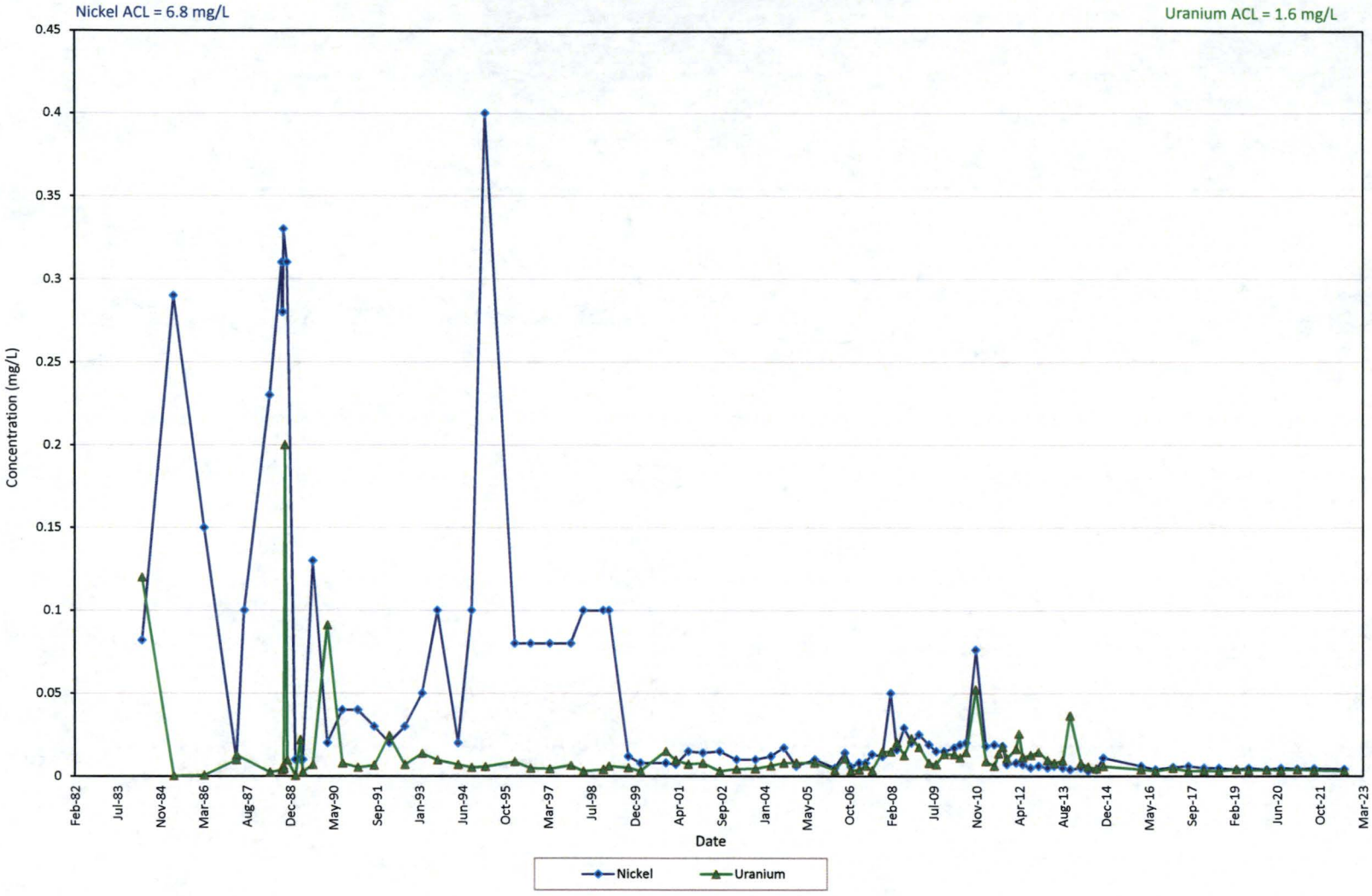
Radionuclides in Monitoring Well 36-01 TRB

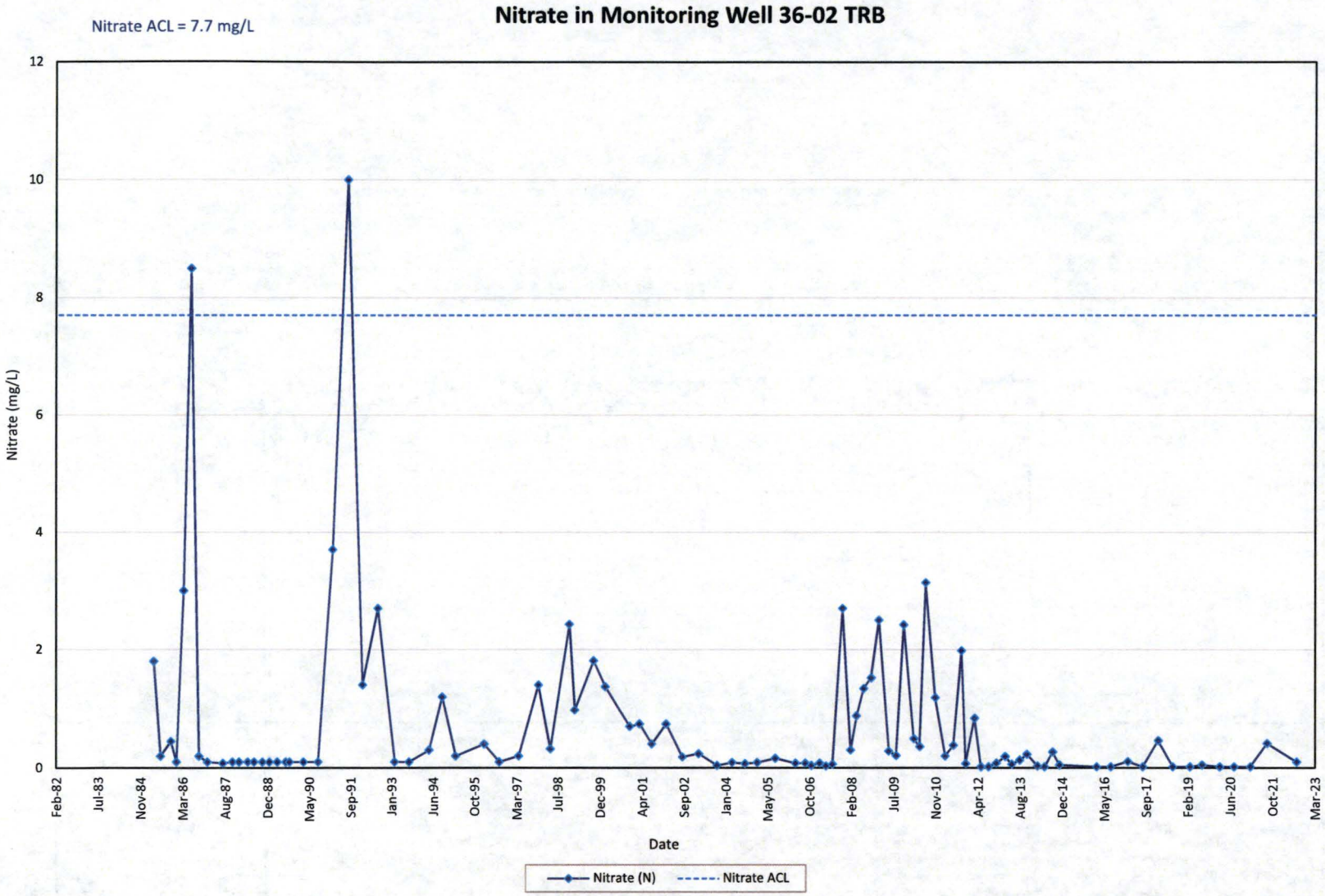


Anions and TDS in Monitoring Well 36-02 TRB



Metals in Monitoring Well 36-02 TRB



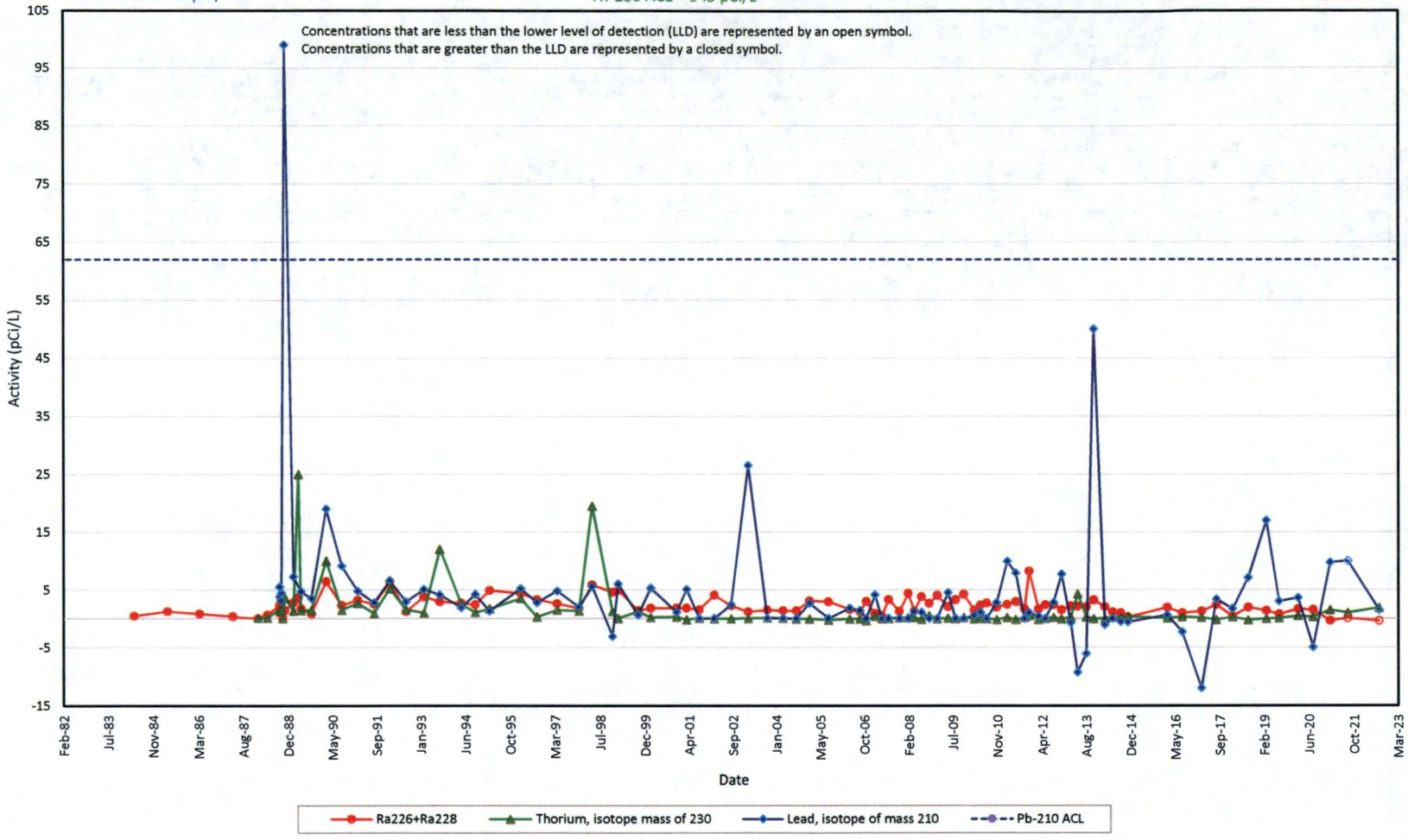

Nitrate in Monitoring Well 36-02 TRB
Nitrate ACL = 7.7 mg/L
Nitrate (mg/L)
12
10
8
6
4
2
0
Feb-82
Jul-83
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)
Nitrate ACL

Radionuclides in Monitoring Well 36-02 TRB

Pb-210 ACL = 62 pCi/L

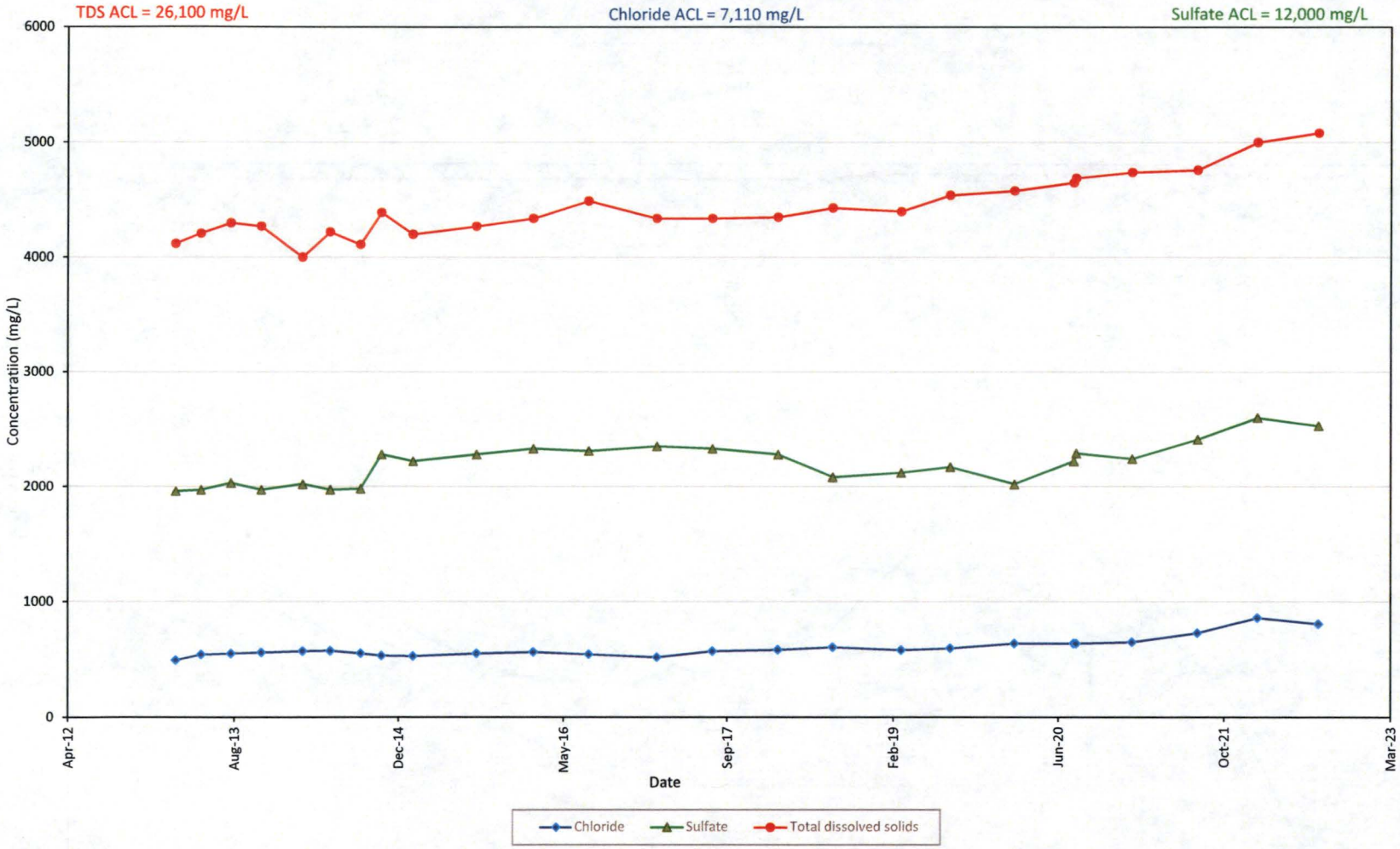
Th-230 ACL = 945 pCi/L

Ra-226+228 ACL = 218 pCi/L

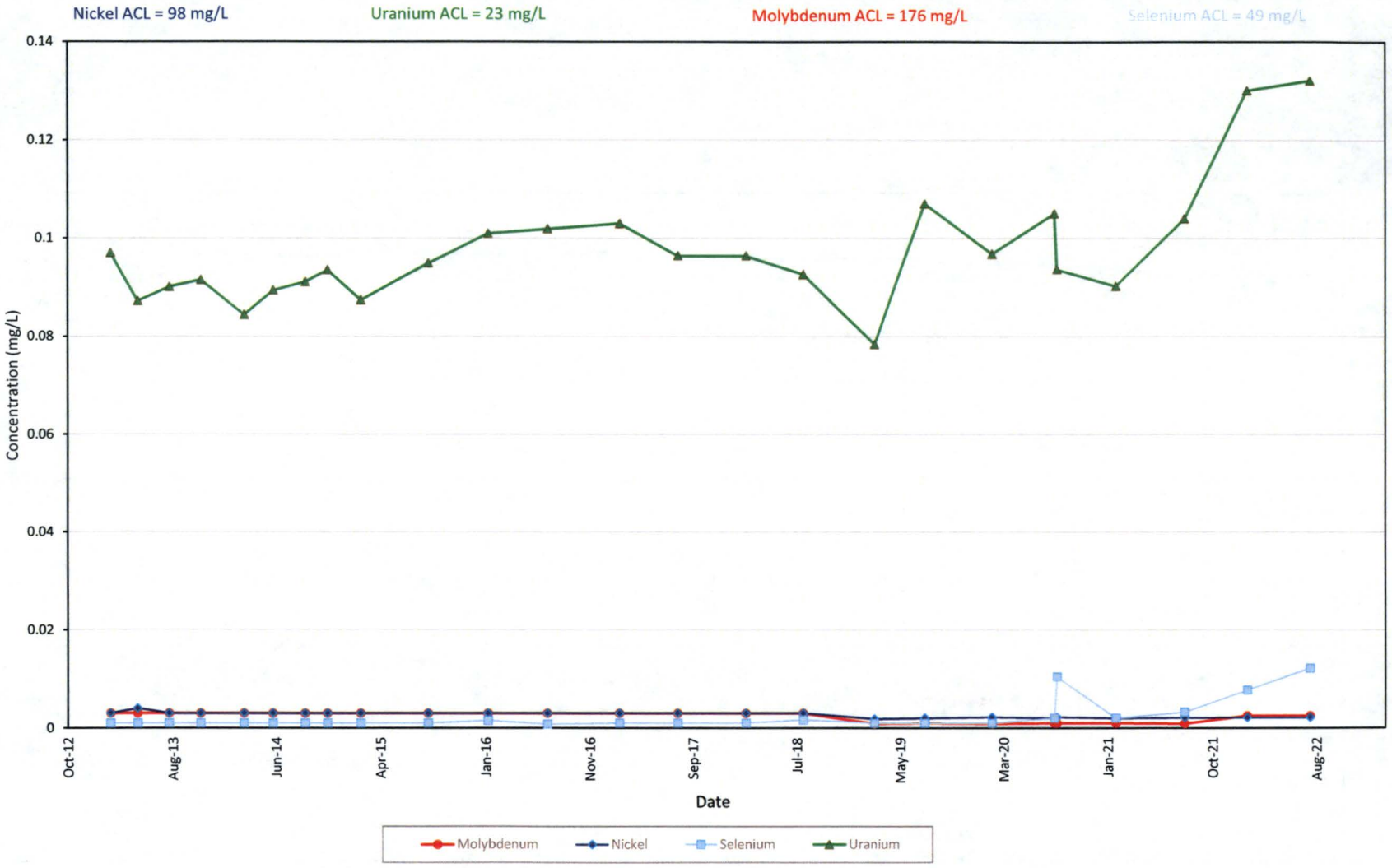


Stability Monitoring Plan
Time Versus Concentration Plots
Alluvium

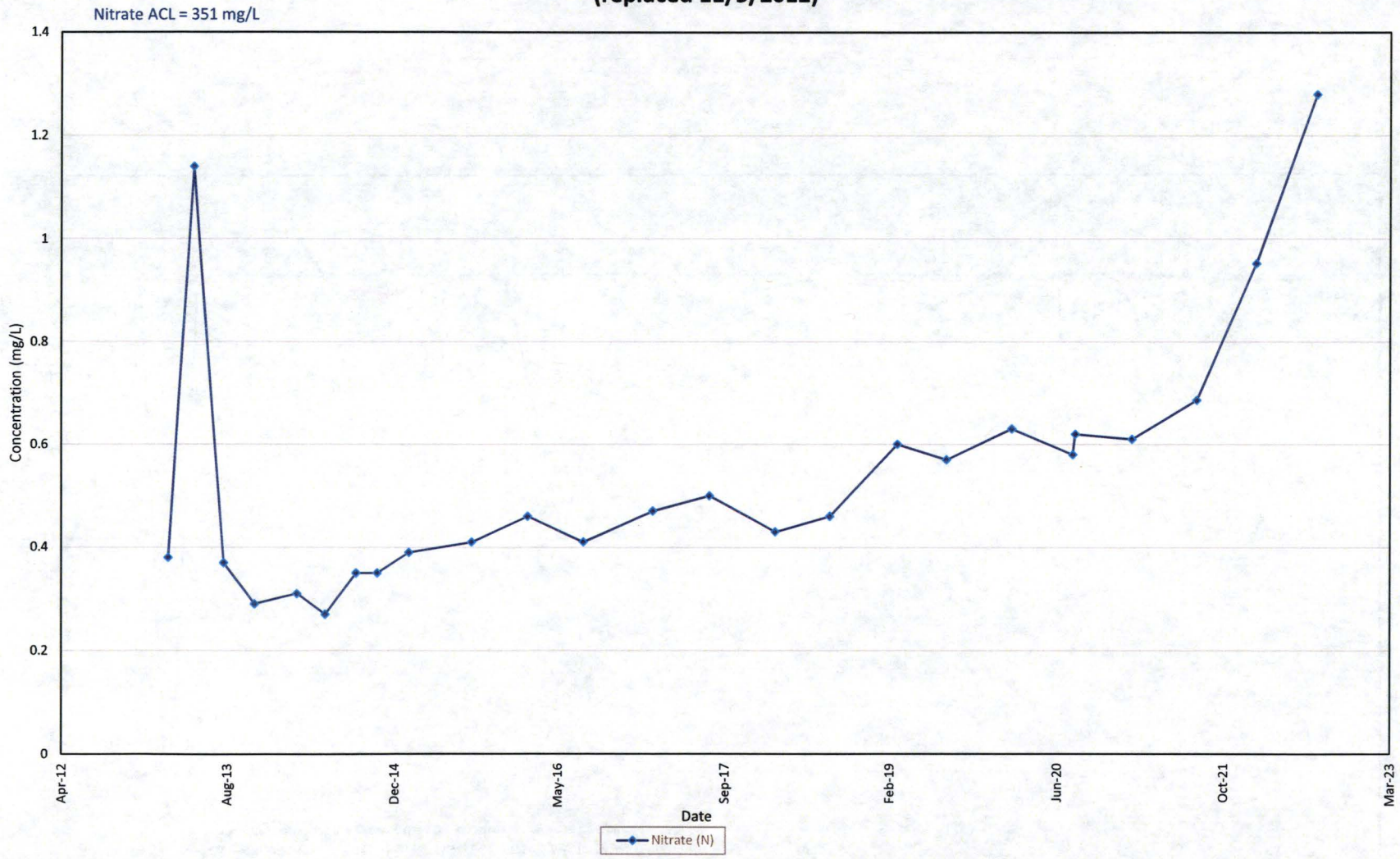
Anions and TDS in Monitoring Well 5-03 ALL-R (replaced 11/5/2012)



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



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

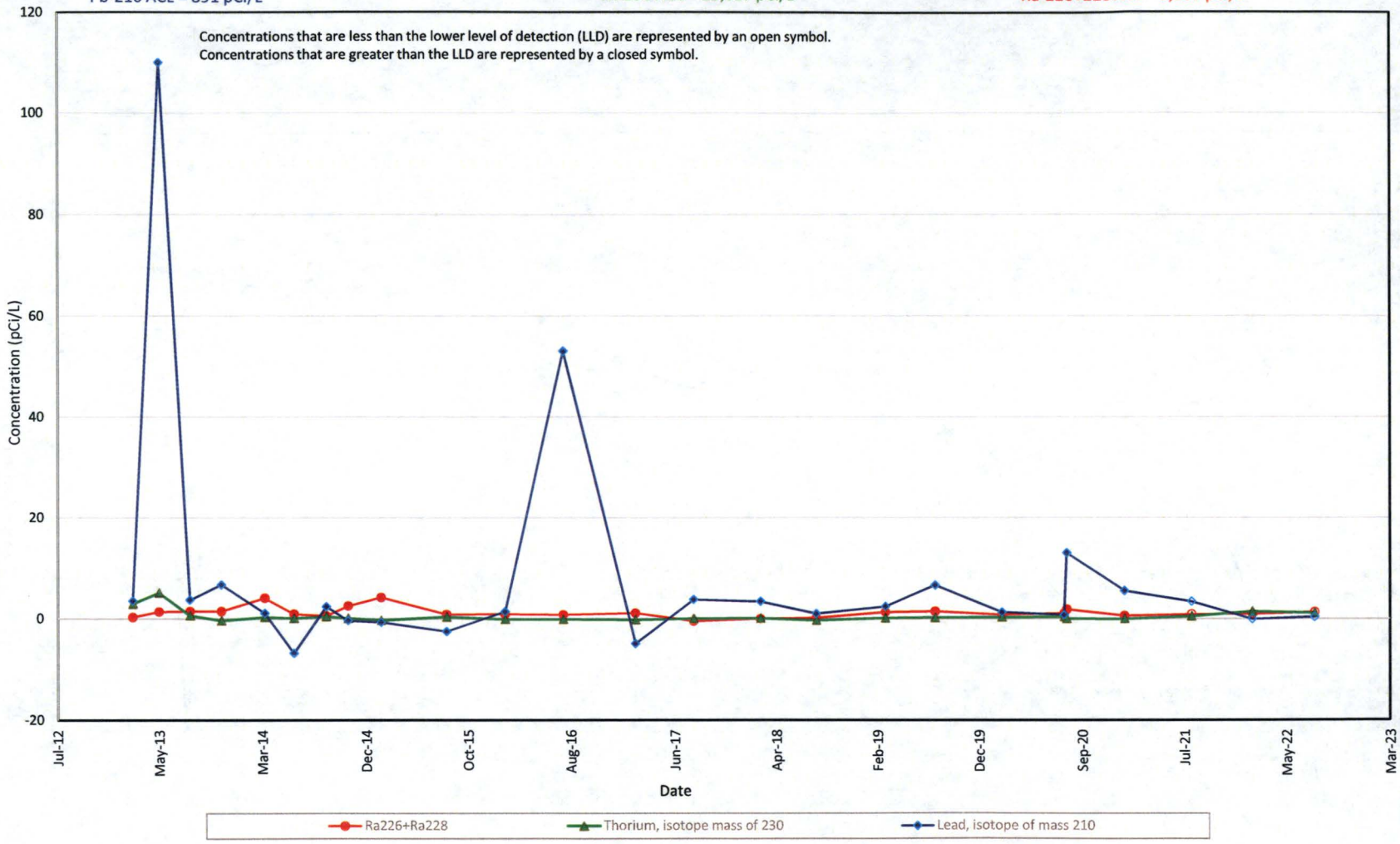


Radionuclides in Monitoring Well 5-03 ALL-R
(replaced 11/5/2012)

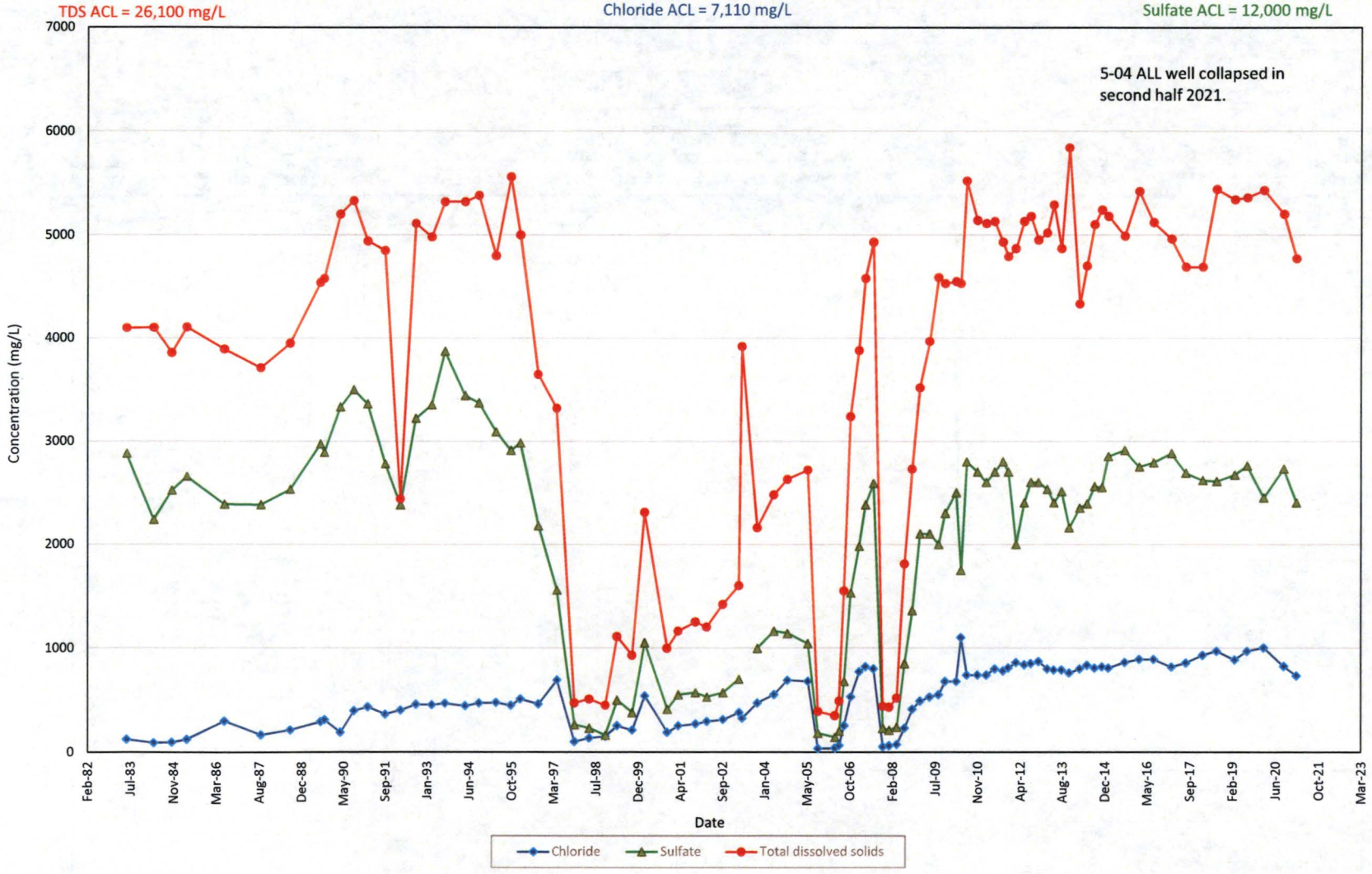
Pb-210 ACL = 891 pCi/L

Th-230 ACL = 13,627 pCi/L

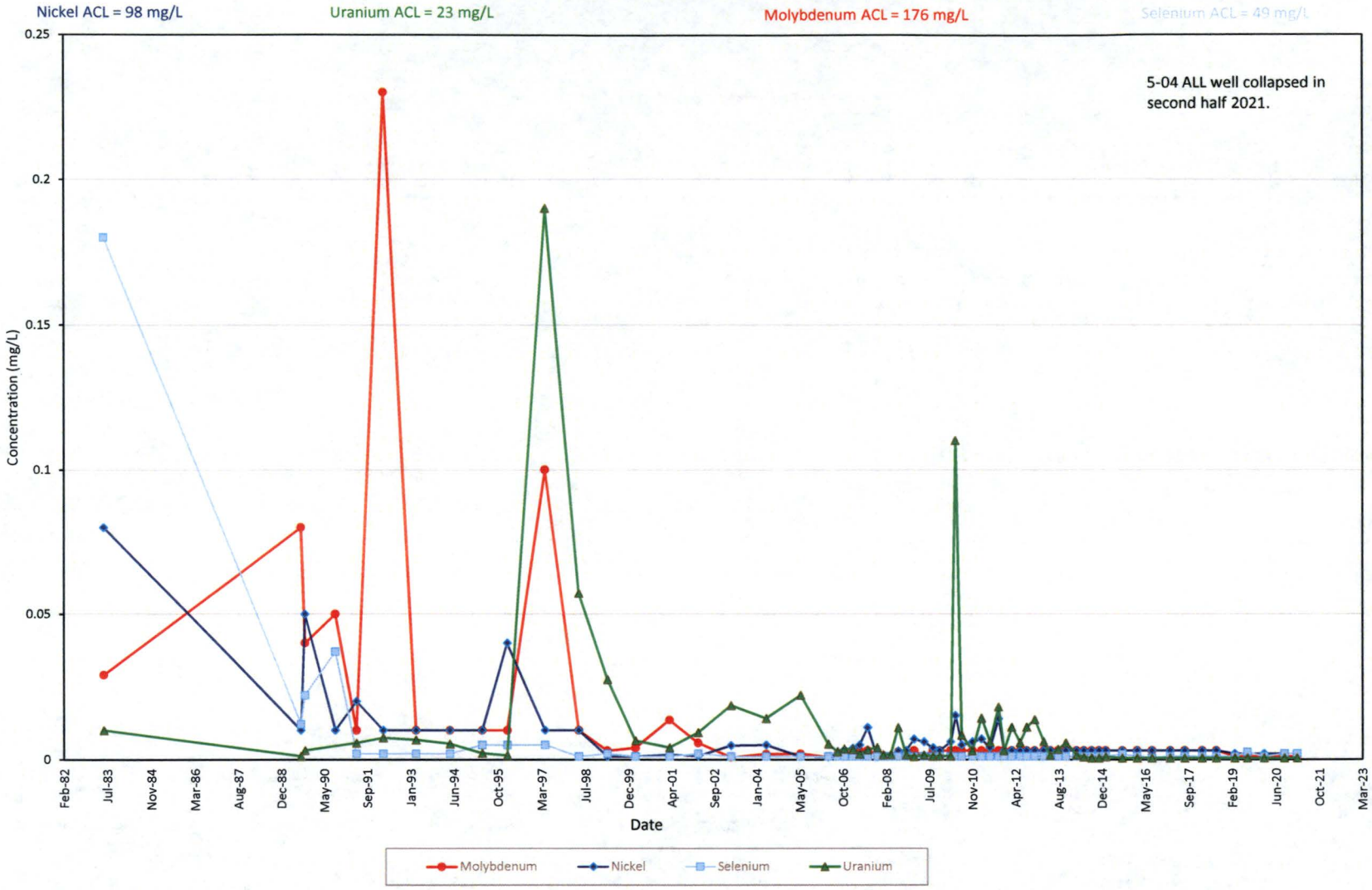
Ra-226+228 ACL = 3,167 pCi/L



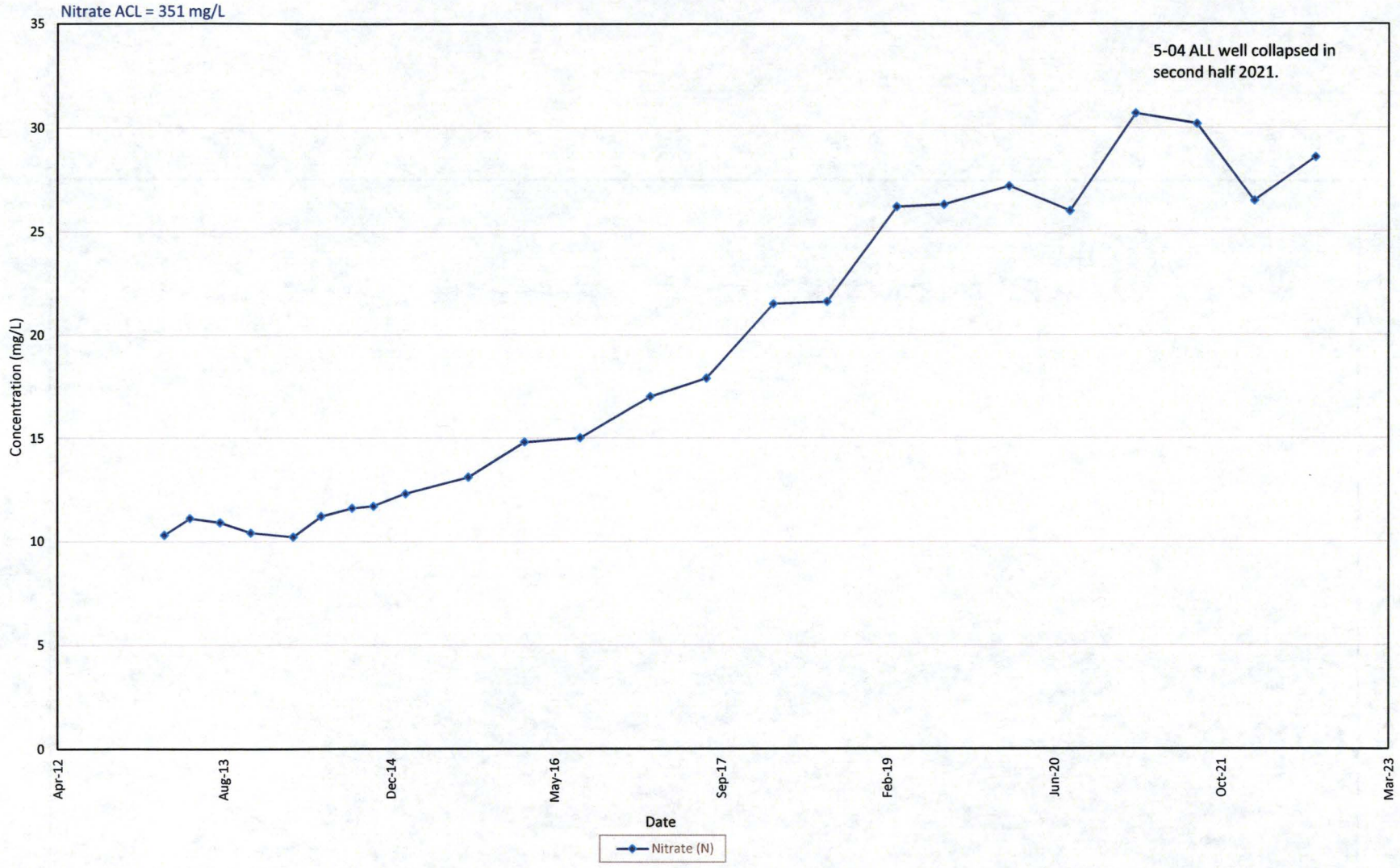
Anions and TDS in monitoring well 5-04 ALL



Metals in Monitoring Well 5-04 ALL



Nitrate in Monitoring Well 5-04 ALL

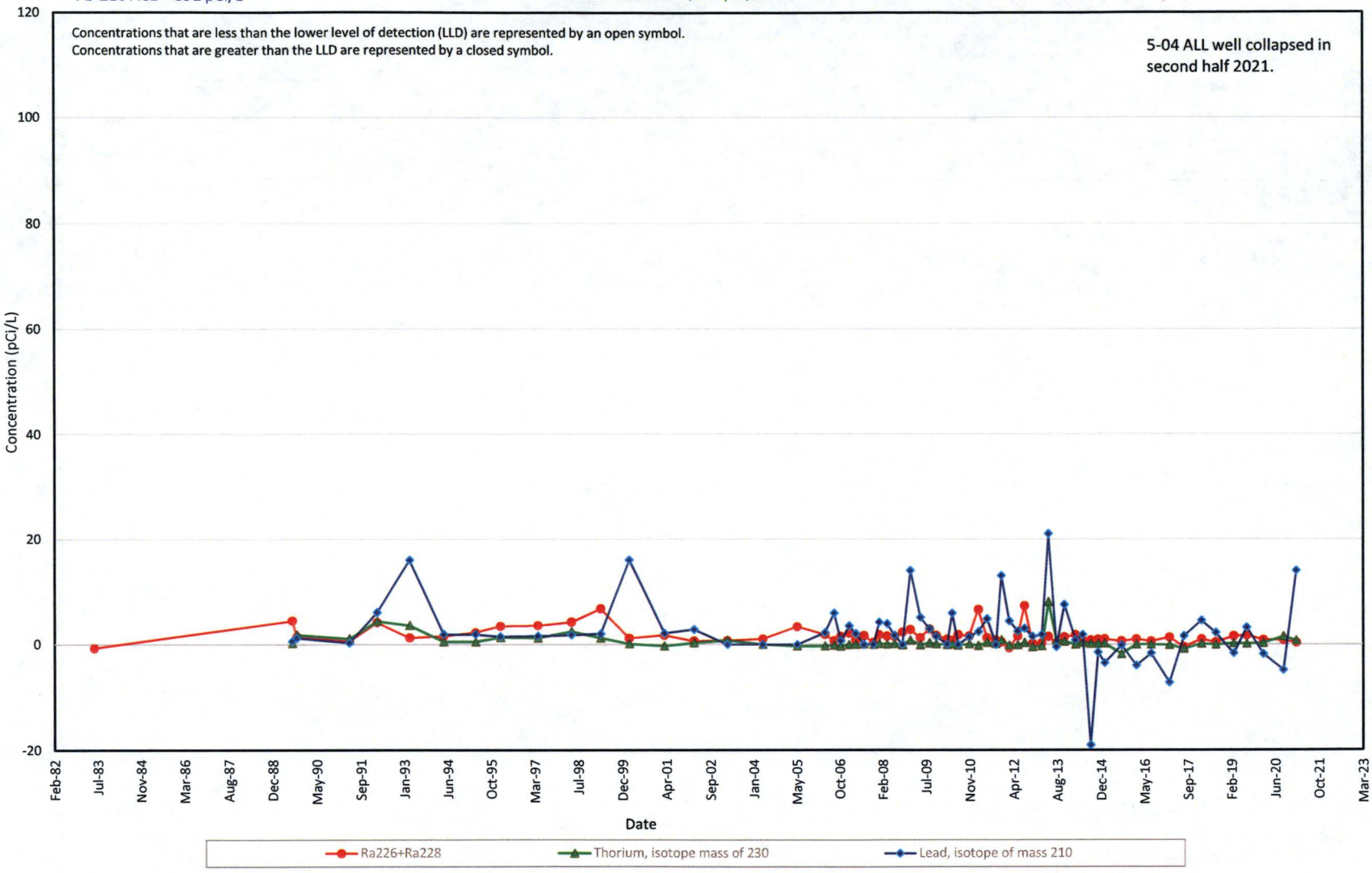


Radionuclides in Monitoring Well 5-04 ALL

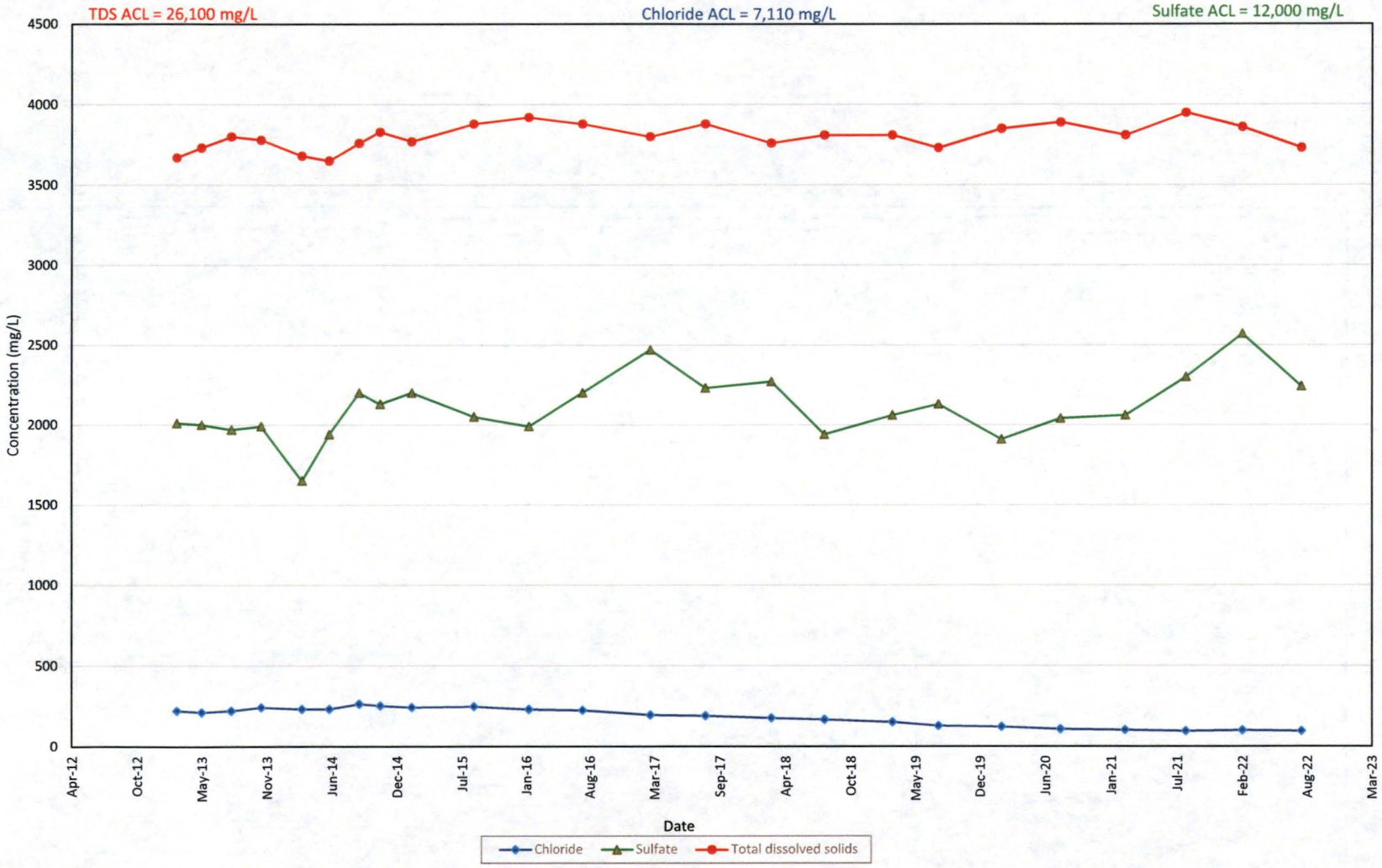
Pb-210 ACL = 891 pCi/L

Th-230 ACL = 13,627 pCi/L

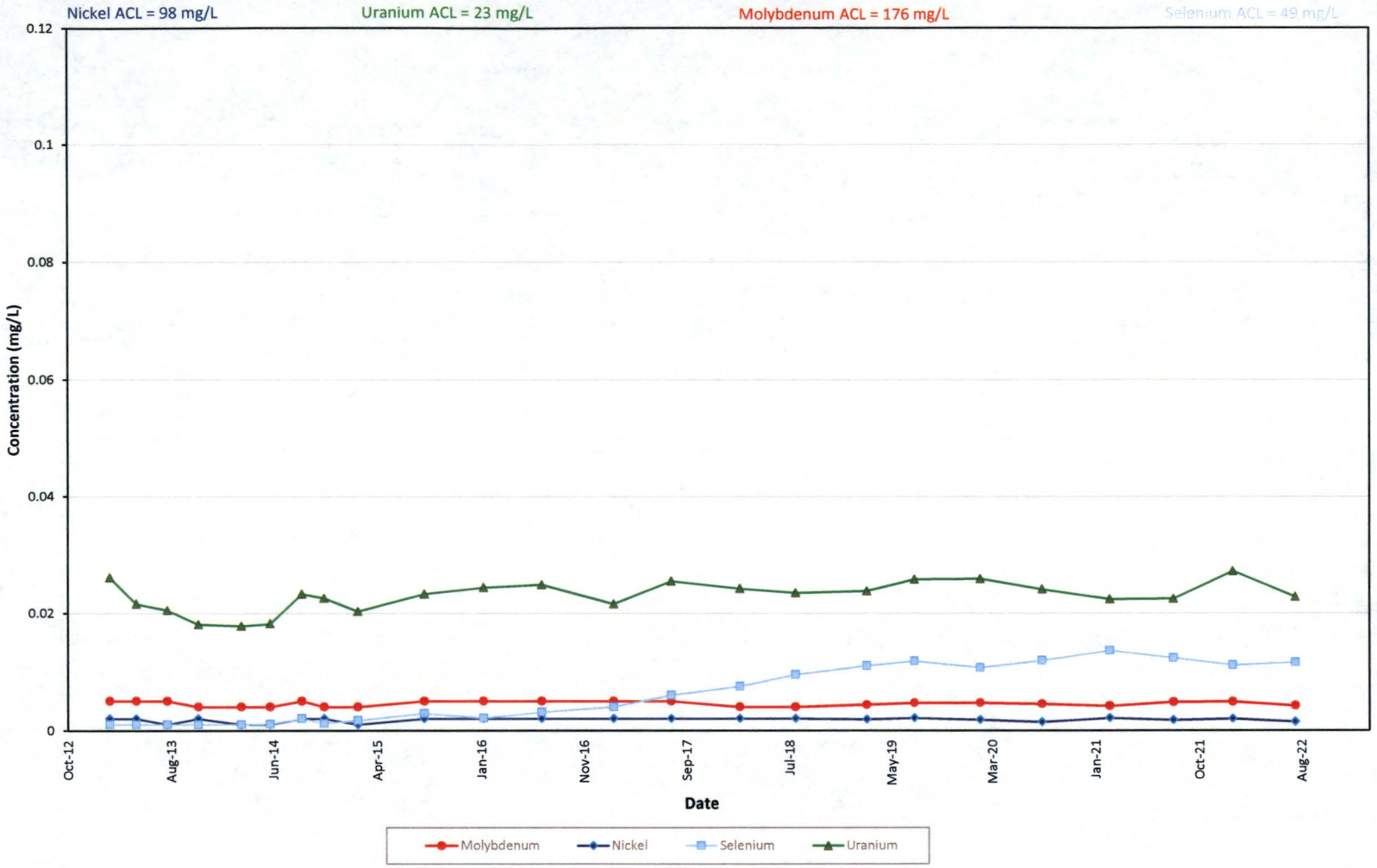
Ra-226+228 ACL = 3,167 pCi/L

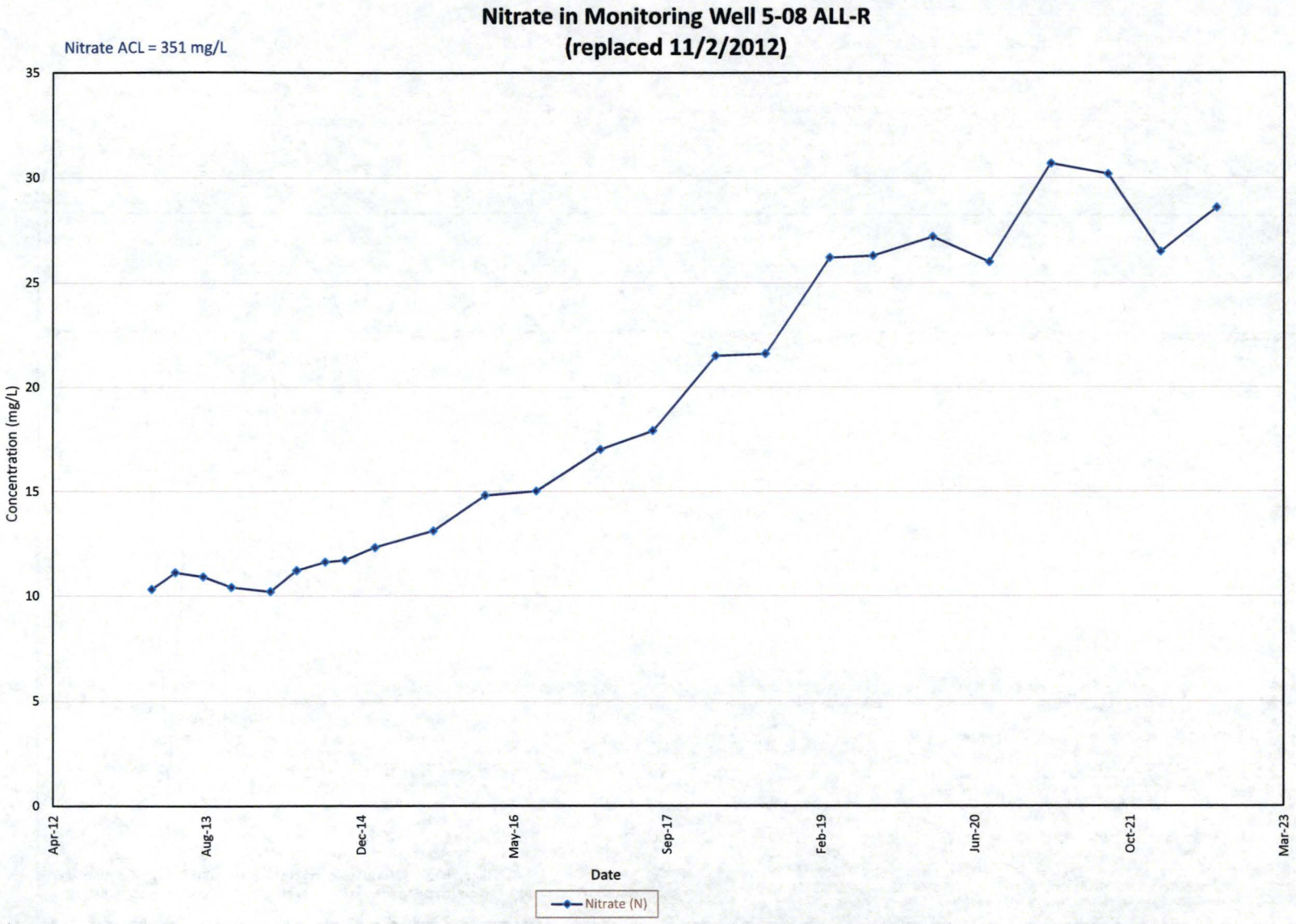


Anions and TDS in Monitoring Well 5-08 ALL-R (replaced 11/2/2012)

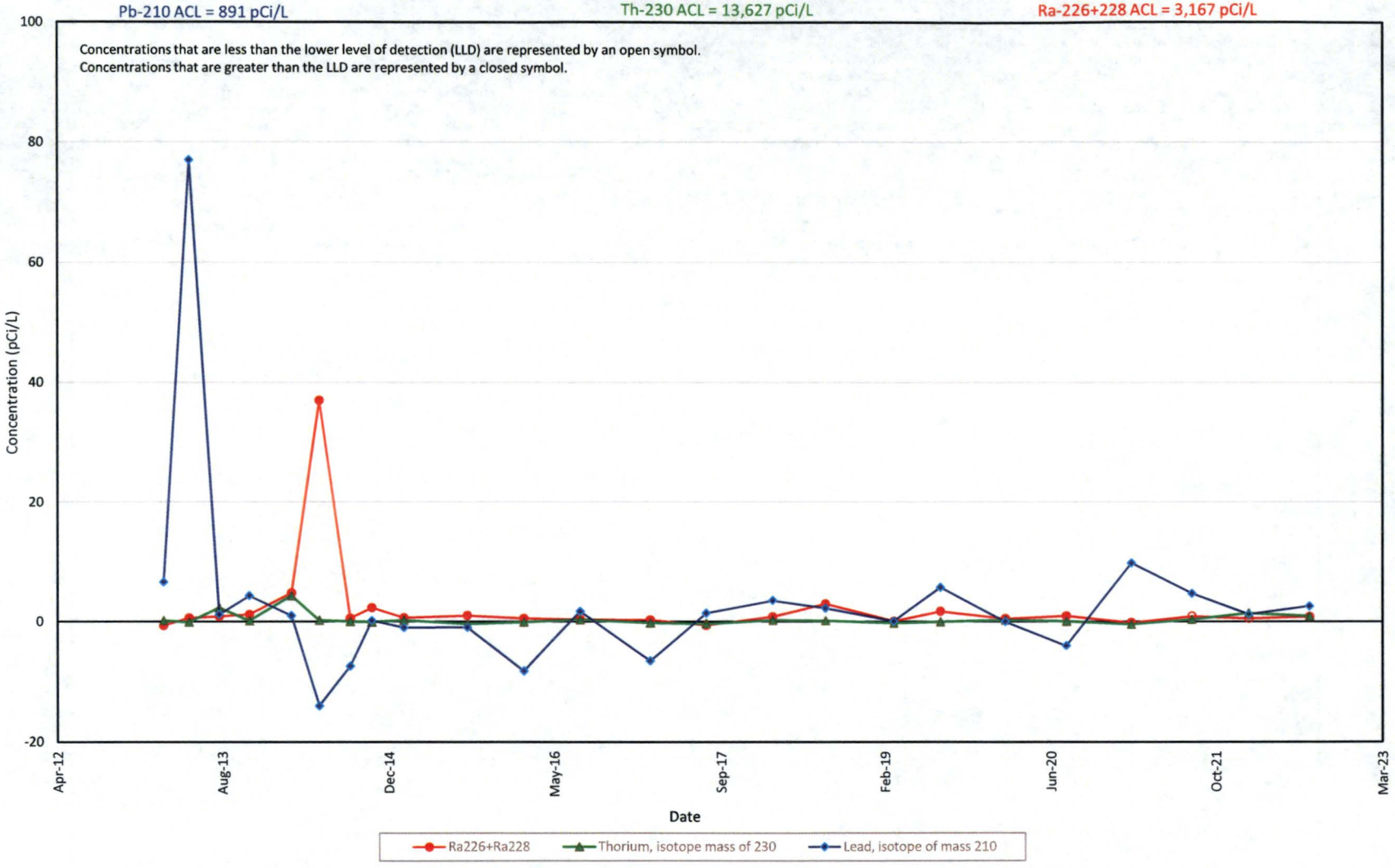


Metals in Monitoring Well 5-08 ALL-R
(replaced 11/2/2012)

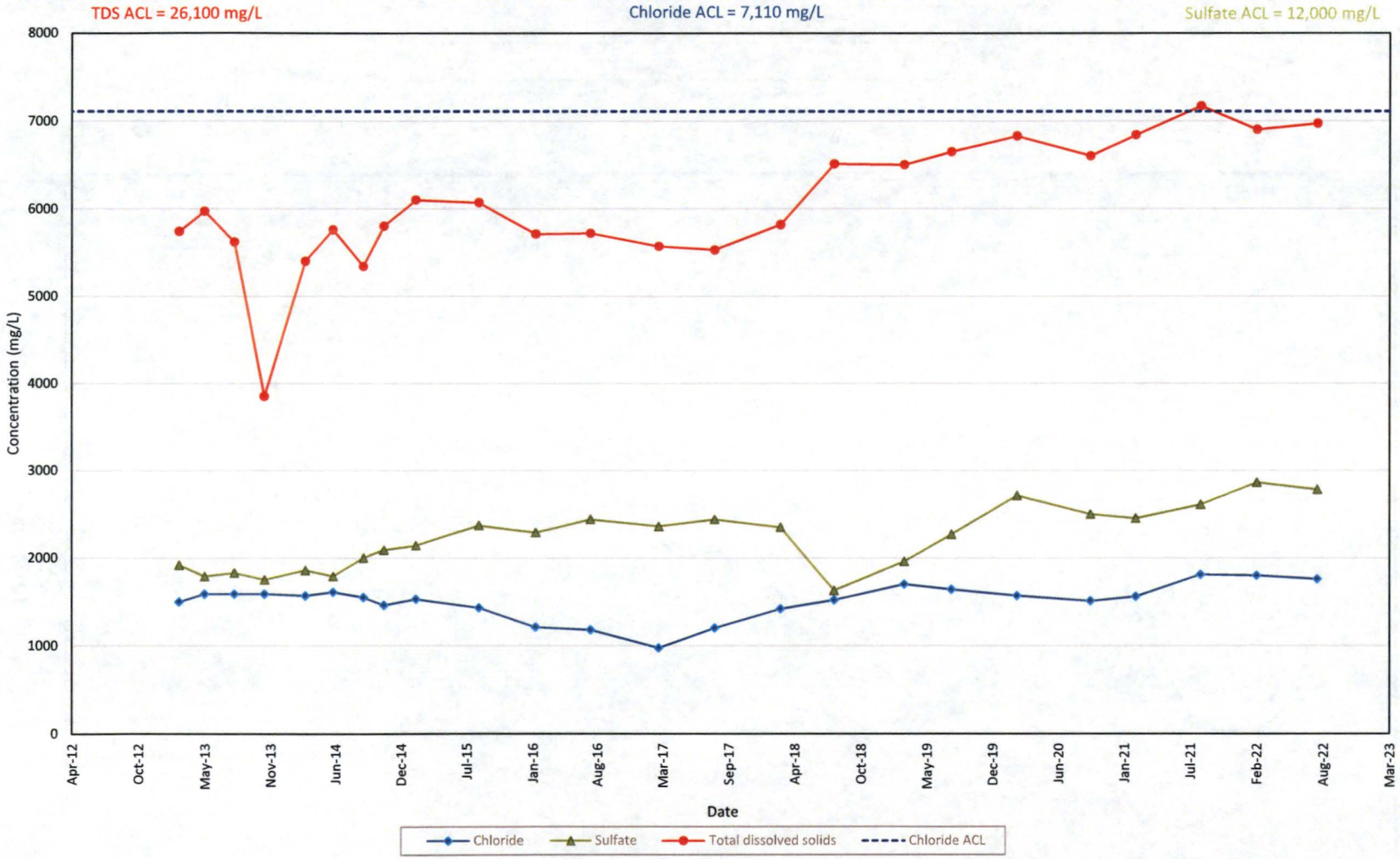



Nitrate in Monitoring Well 5-08 ALL-R
(replaced 11/2/2012)
Nitrate ACL = 351 mg/L
Concentration (mg/L)
0
5
10
15
20
25
30
35
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)

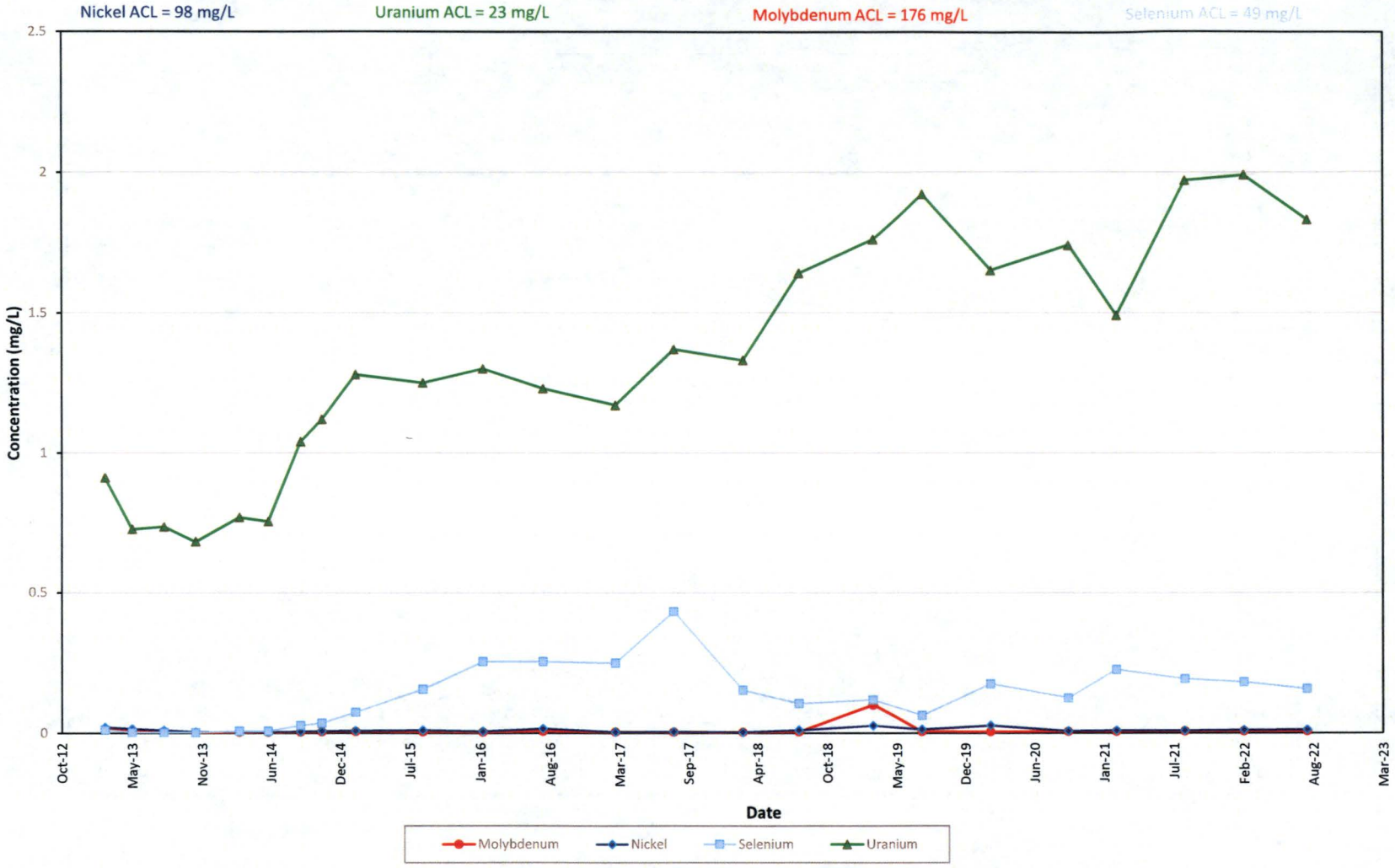
Radionuclides in Monitoring Well 5-08 ALL-R
(replaced 11/2/2012)

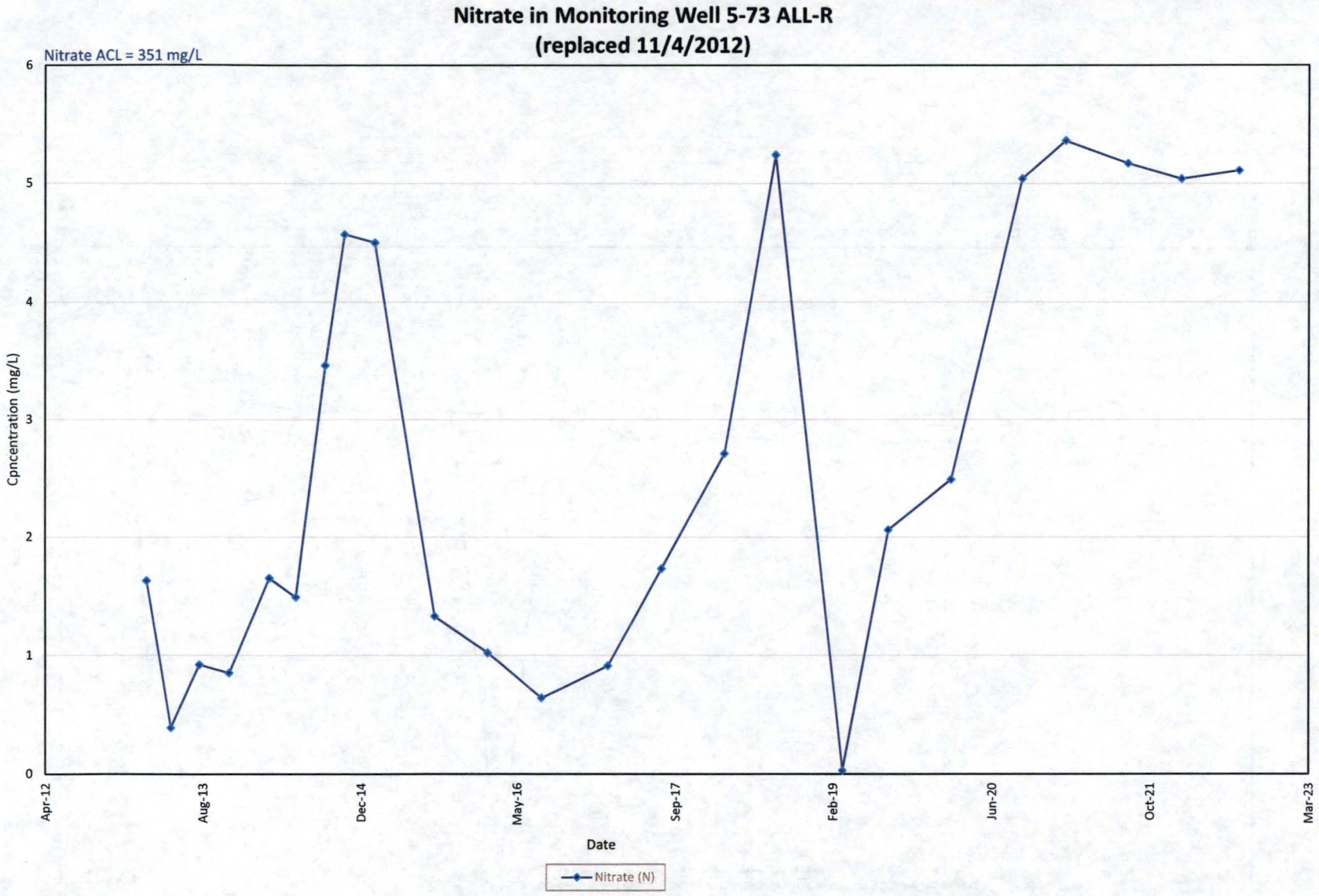


Anions and TDS in Monitoring Well 5-73 ALL-R (replaced 11/4/2012)

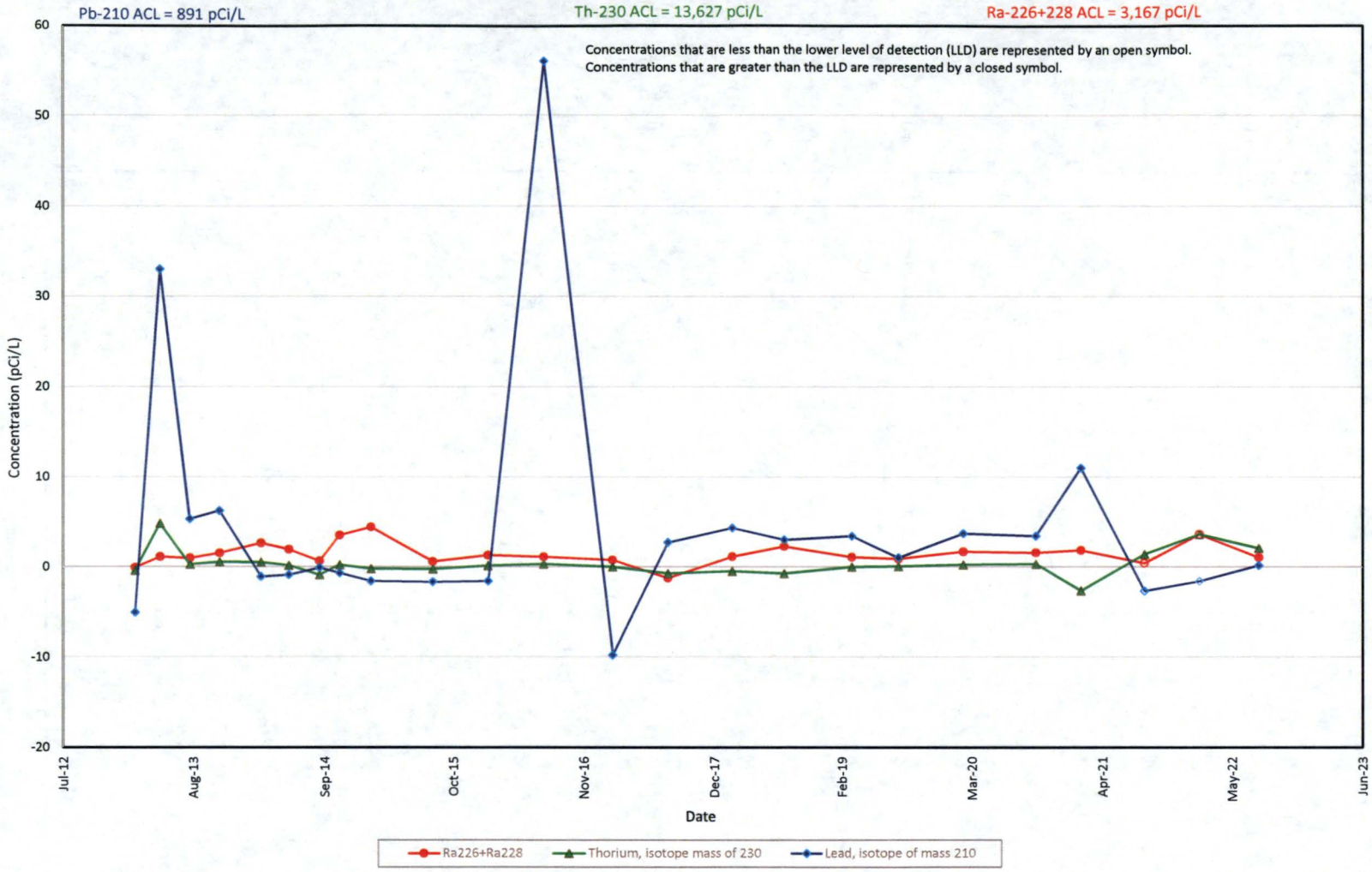


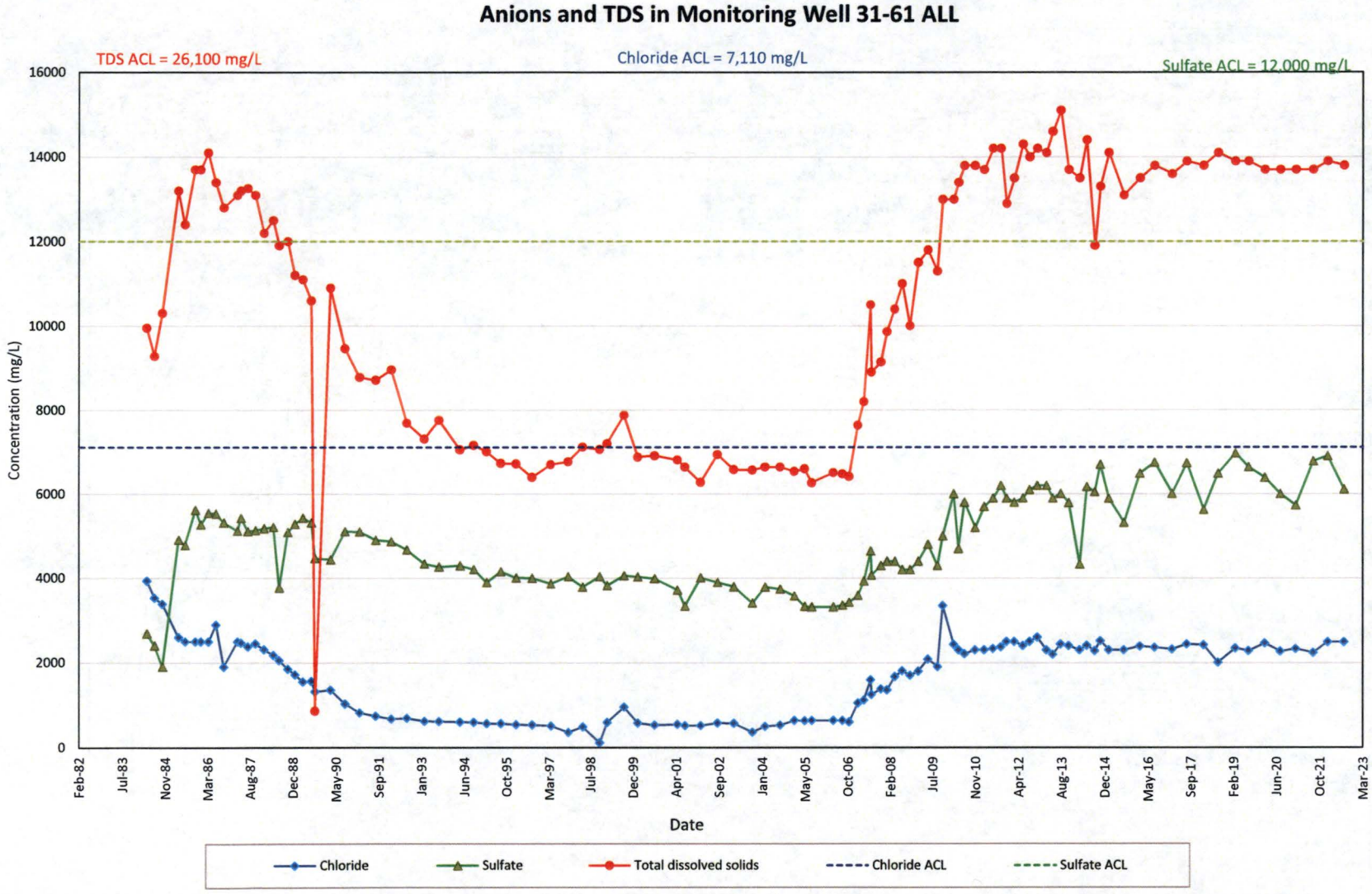
Metals in Monitoring Well 5-73 ALL-R
(replaced 11/4/2012)



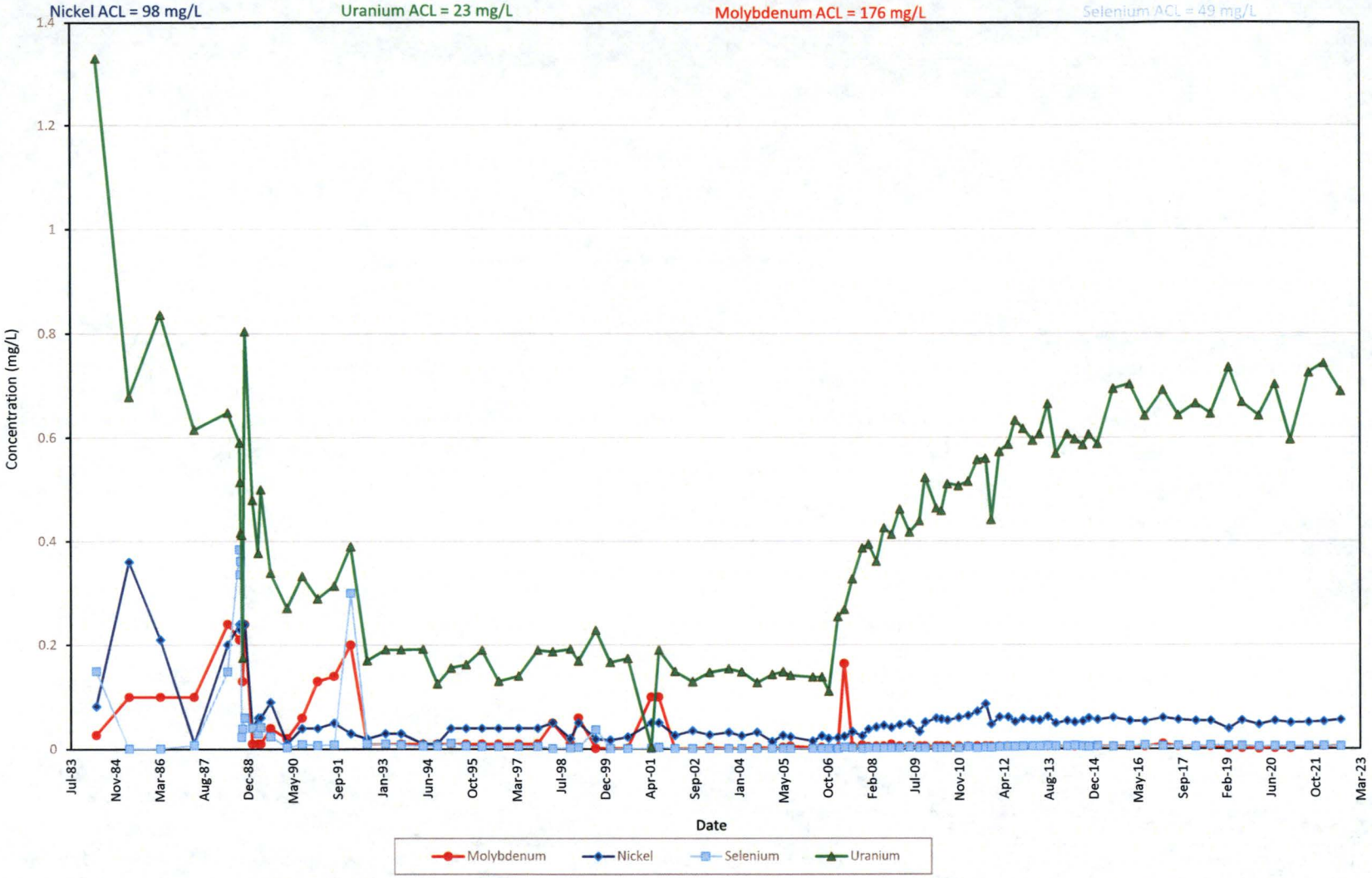

Nitrate in Monitoring Well 5-73 ALL-R
(replaced 11/4/2012)
Nitrate ACL = 351 mg/L
Cpncentration (mg/L)
0
1
2
3
4
5
6
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)

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

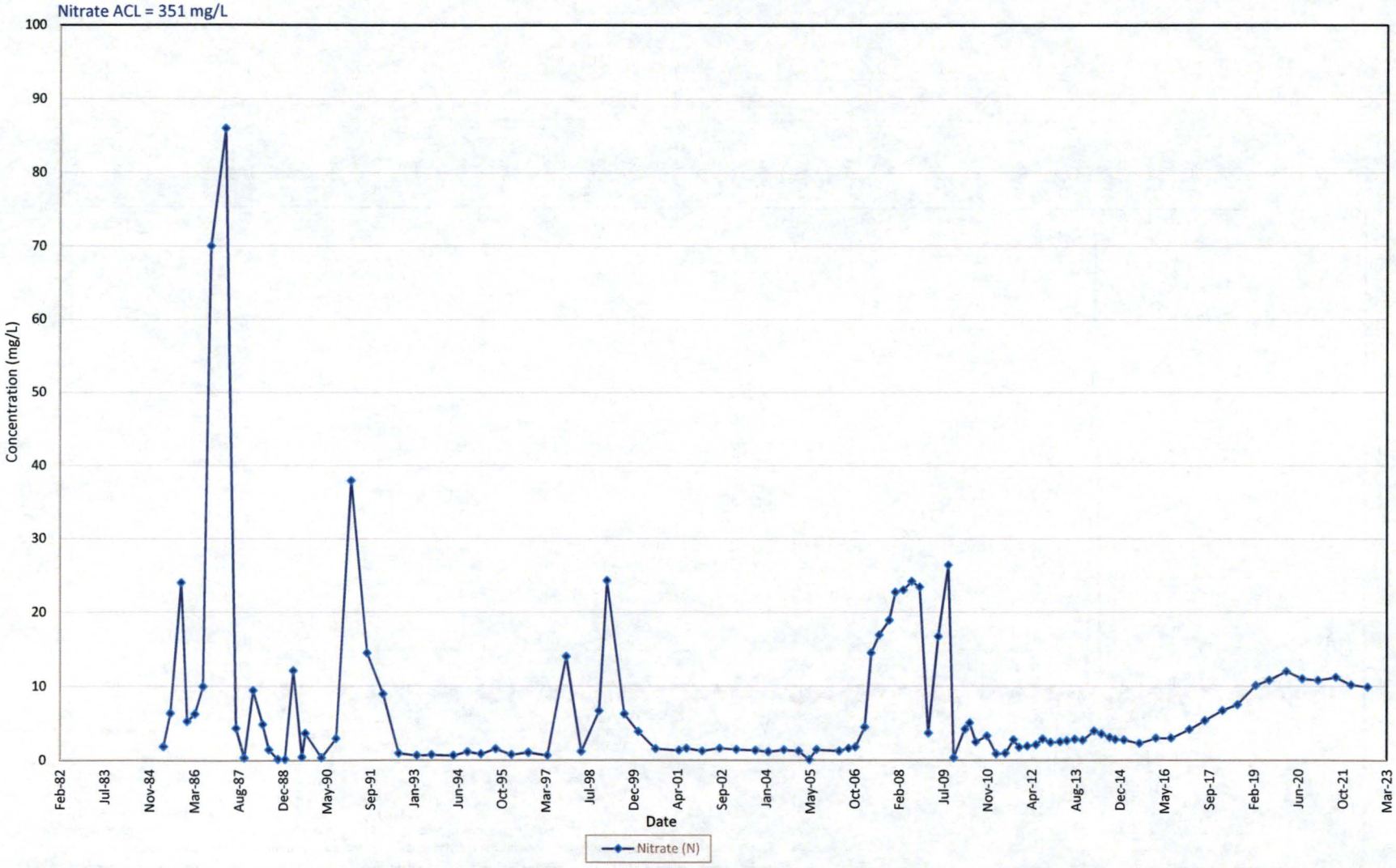



Anions and TDS in Monitoring Well 31-61 ALL
TDS ACL = 26,100 mg/L
Chloride ACL = 7,110 mg/L
Sulfate ACL = 12,000 mg/L
Concentration (mg/L)
16000
14000
12000
10000
8000
6000
4000
2000
0
Feb-82
Jul-83
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Chloride
Sulfate
Total dissolved solids
Chloride ACL
Sulfate ACL

Metals in Monitoring Well 31-61 ALL



Nitrate in Monitoring Well 31-61 ALL

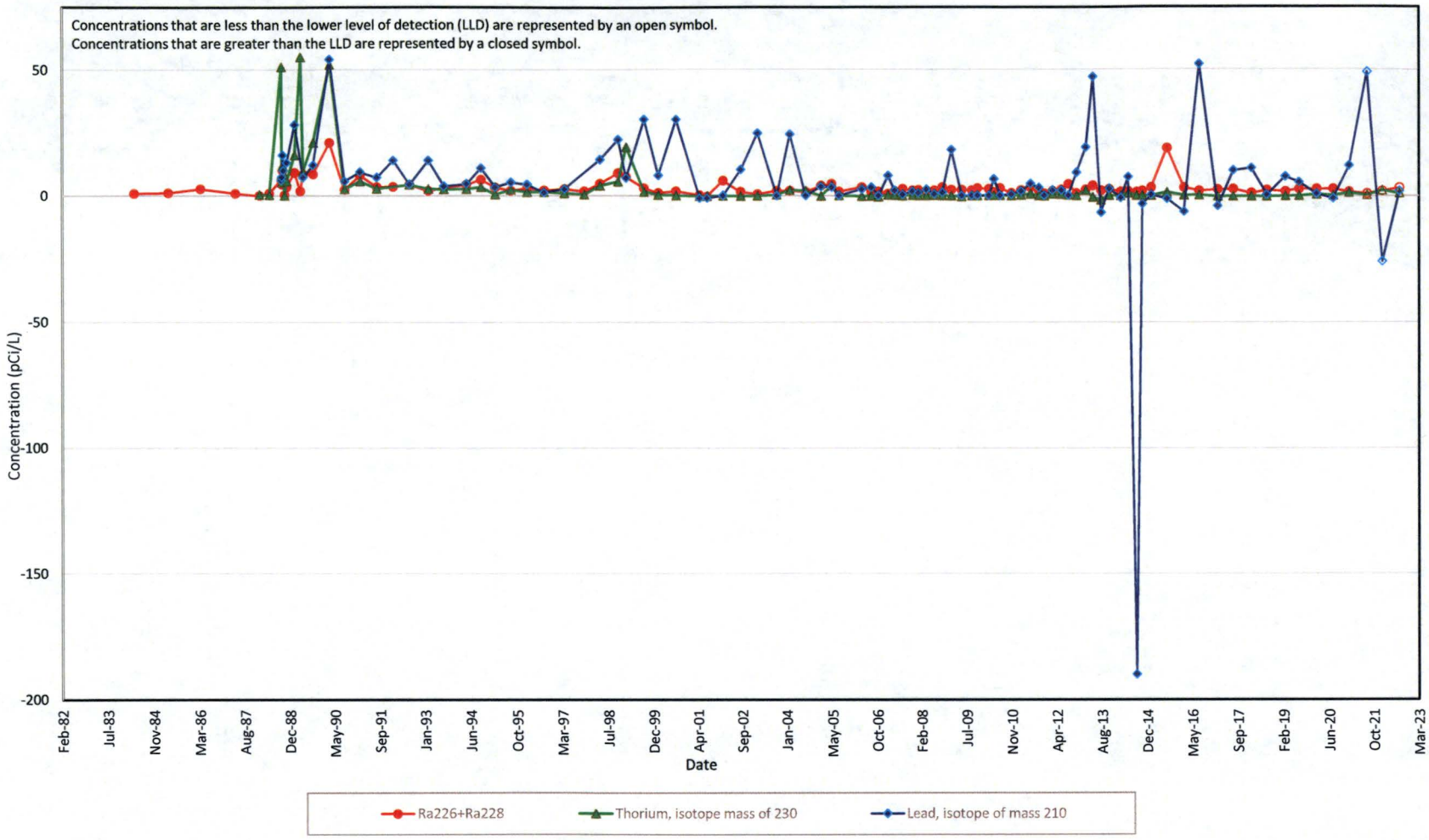


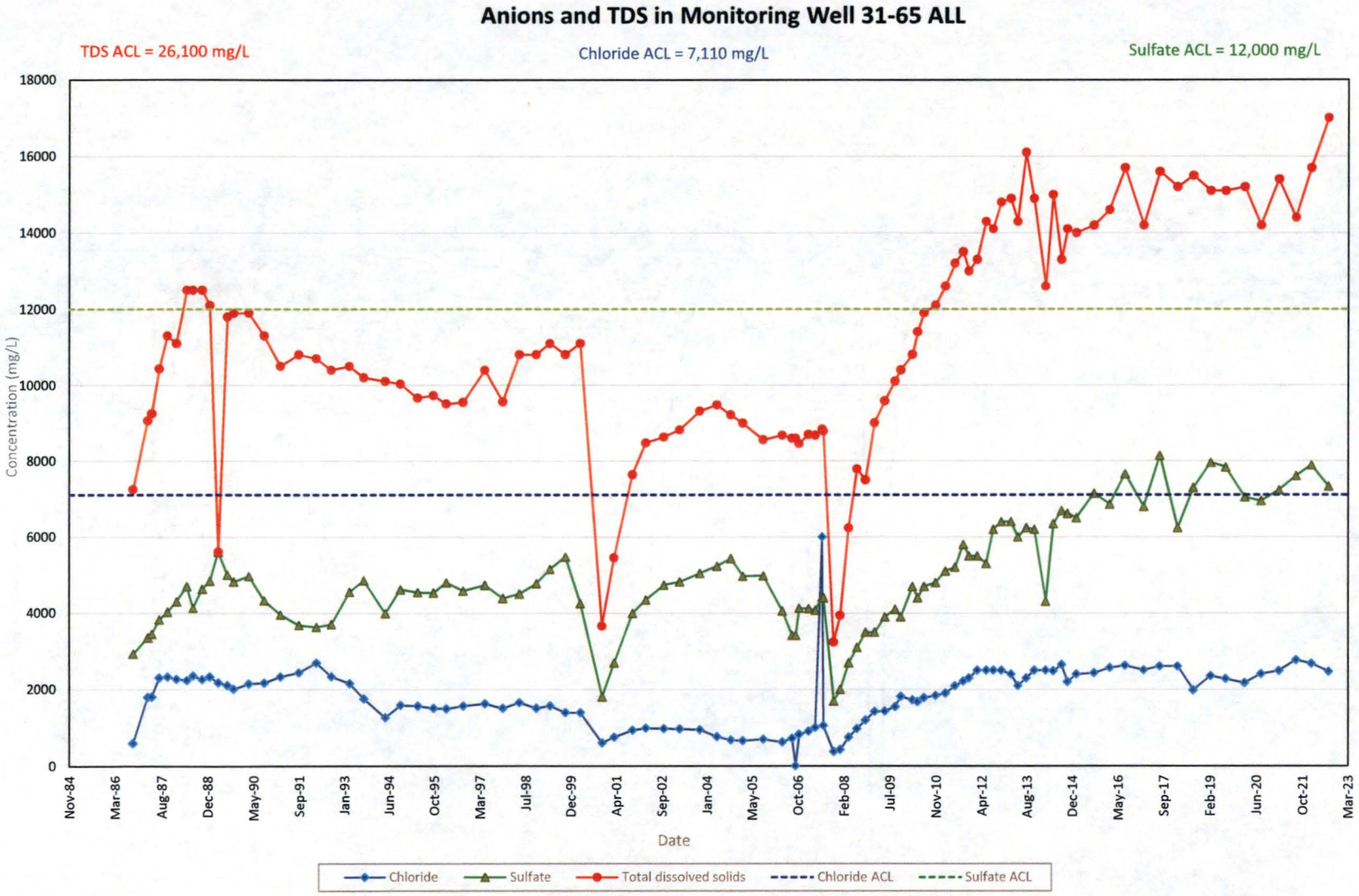
Radionuclides in Monitoring Well 31-61 ALL

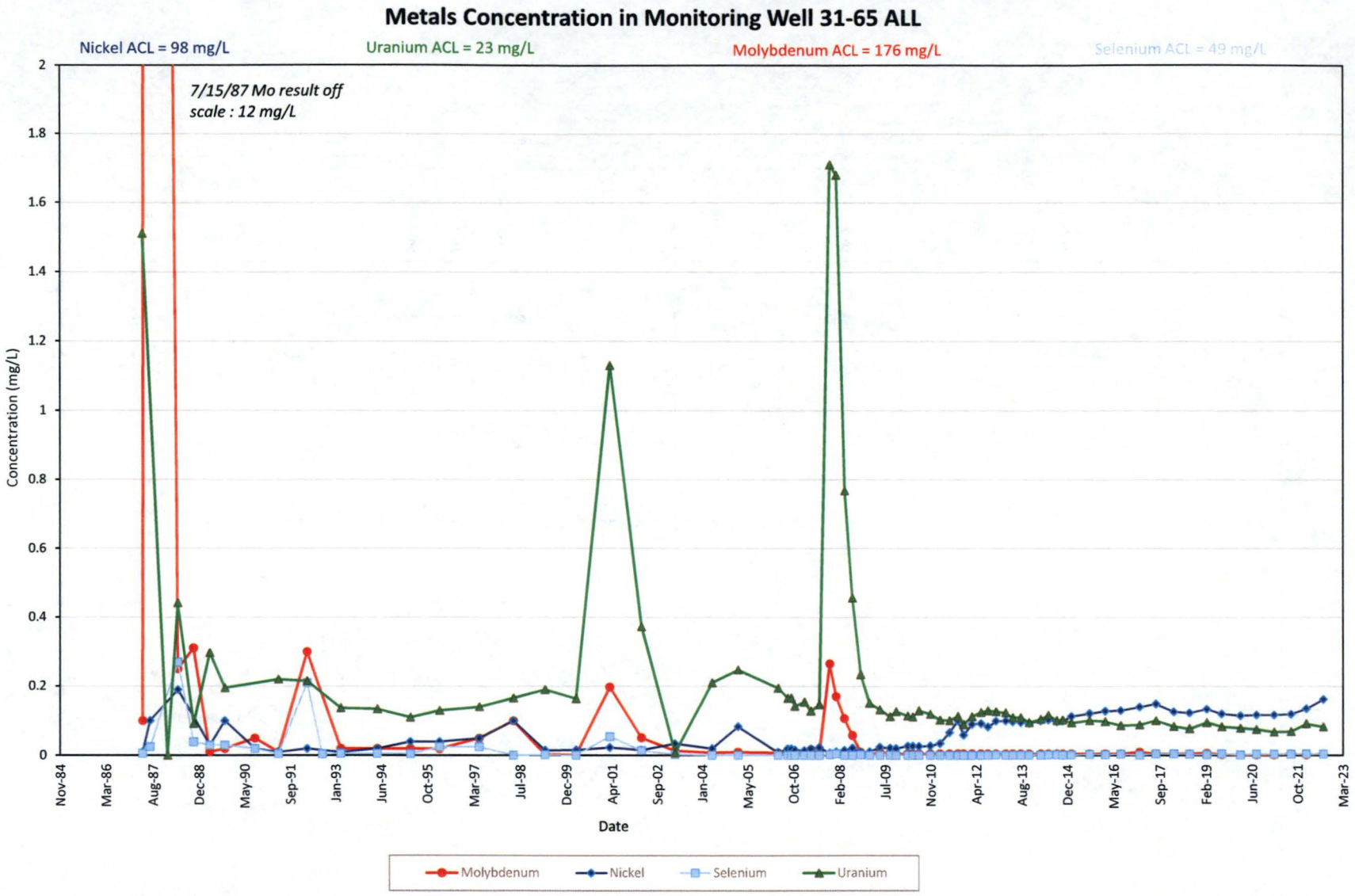
Pb-210 ACL = 891 pCi/L

Th-230 ACL = 13,627 pCi/L

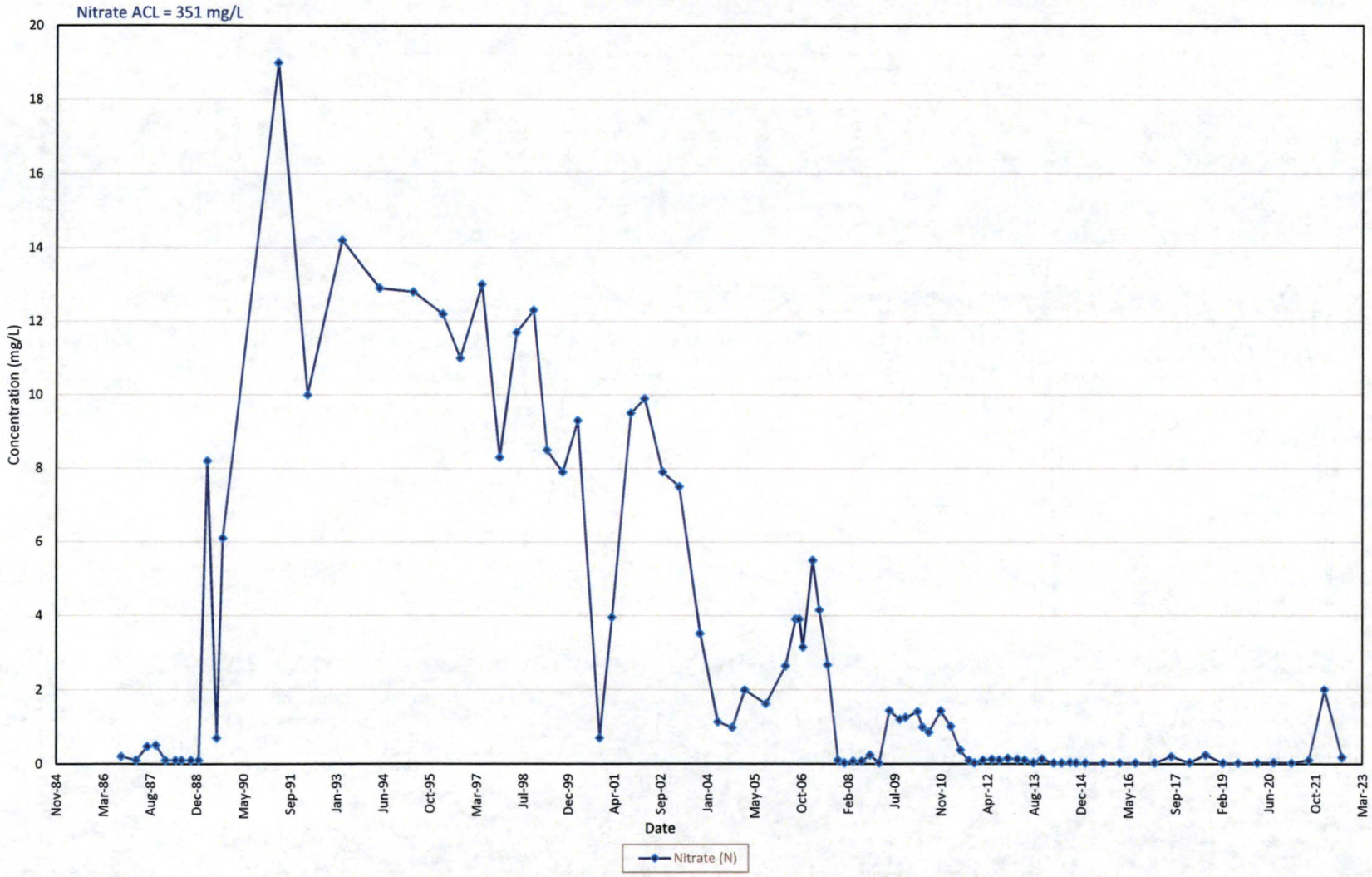
Ra-226+228 ACL = 3,167 pCi/L




Anions and TDS in Monitoring Well 31-65 ALL
TDS ACL = 26,100 mg/L
Chloride ACL = 7,110 mg/L
Sulfate ACL = 12,000 mg/L
Concentration (mg/L)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Chloride
Sulfate
Total dissolved solids
Chloride ACL
Sulfate ACL


Metals Concentration in Monitoring Well 31-65 ALL
Nickel ACL = 98 mg/L
Uranium ACL = 23 mg/L
Molybdenum ACL = 176 mg/L
Selenium ACL = 49 mg/L
7/15/87 Mo result off scale : 12 mg/L
Concentration (mg/L)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Molybdenum
Nickel
Selenium
Uranium

Nitrate in Monitoring Well 31-65 ALL

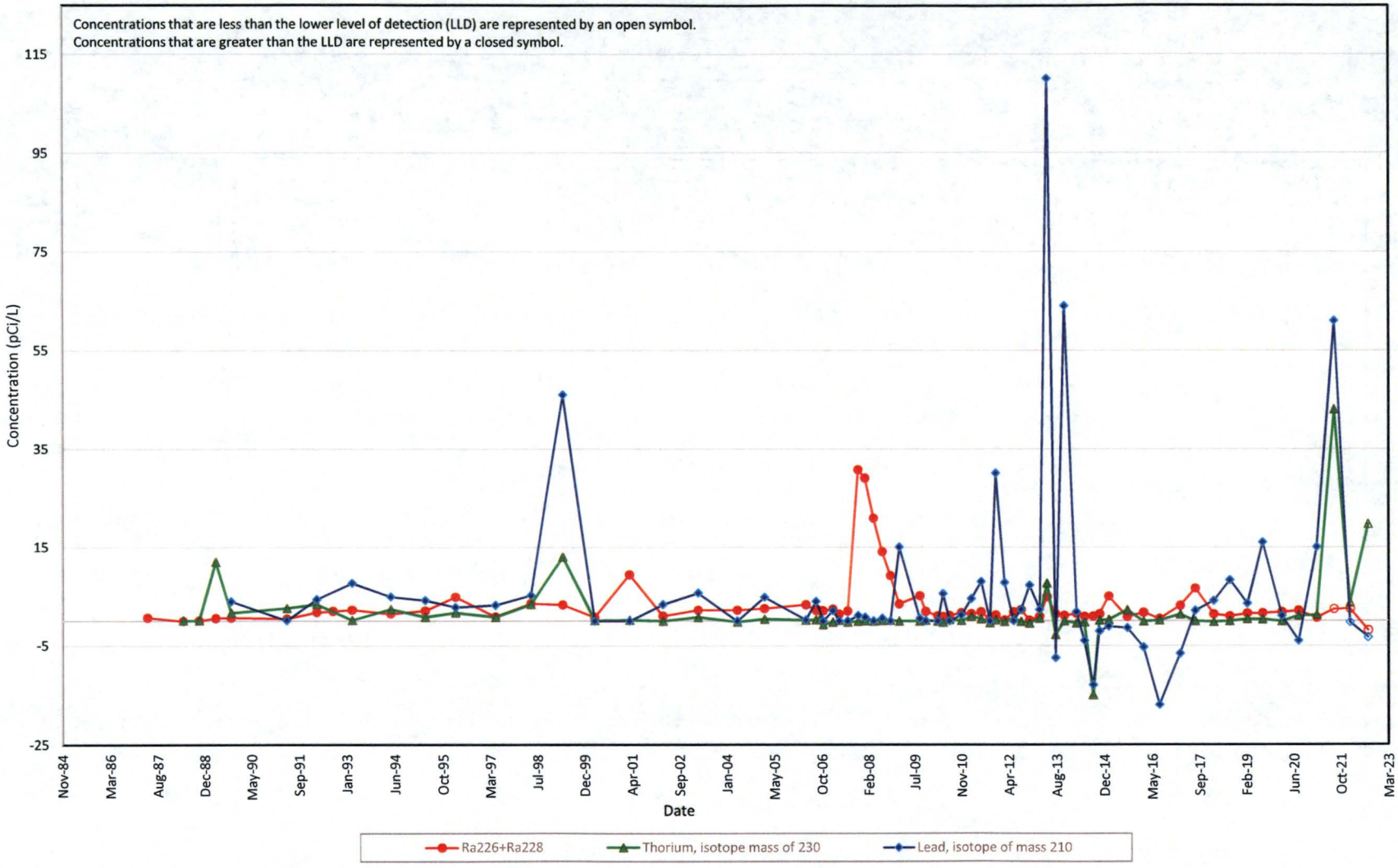


Radionuclides in Monitoring Well 31-65 ALL

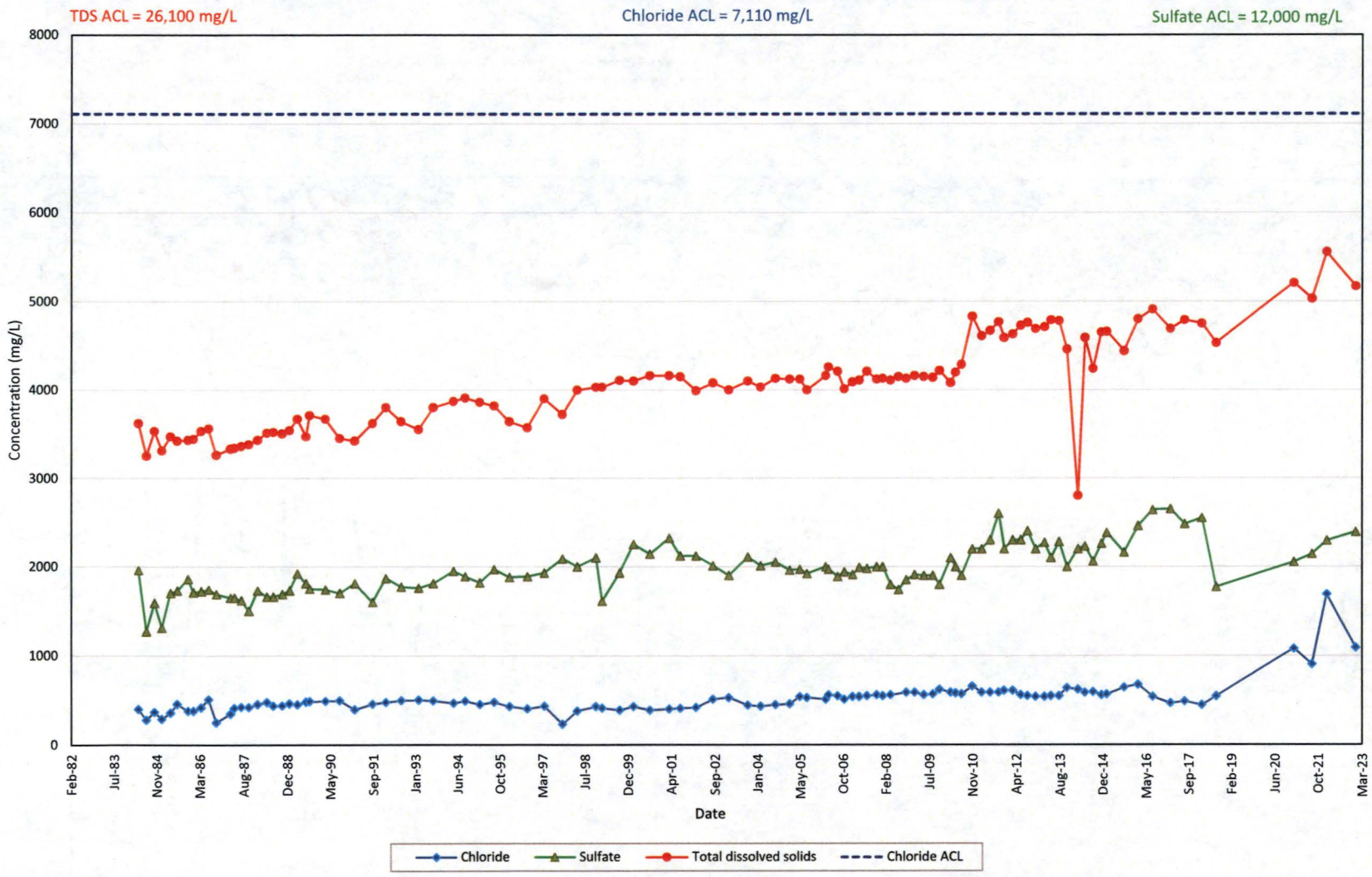
Pb-210 ACL = 891 pCi/L

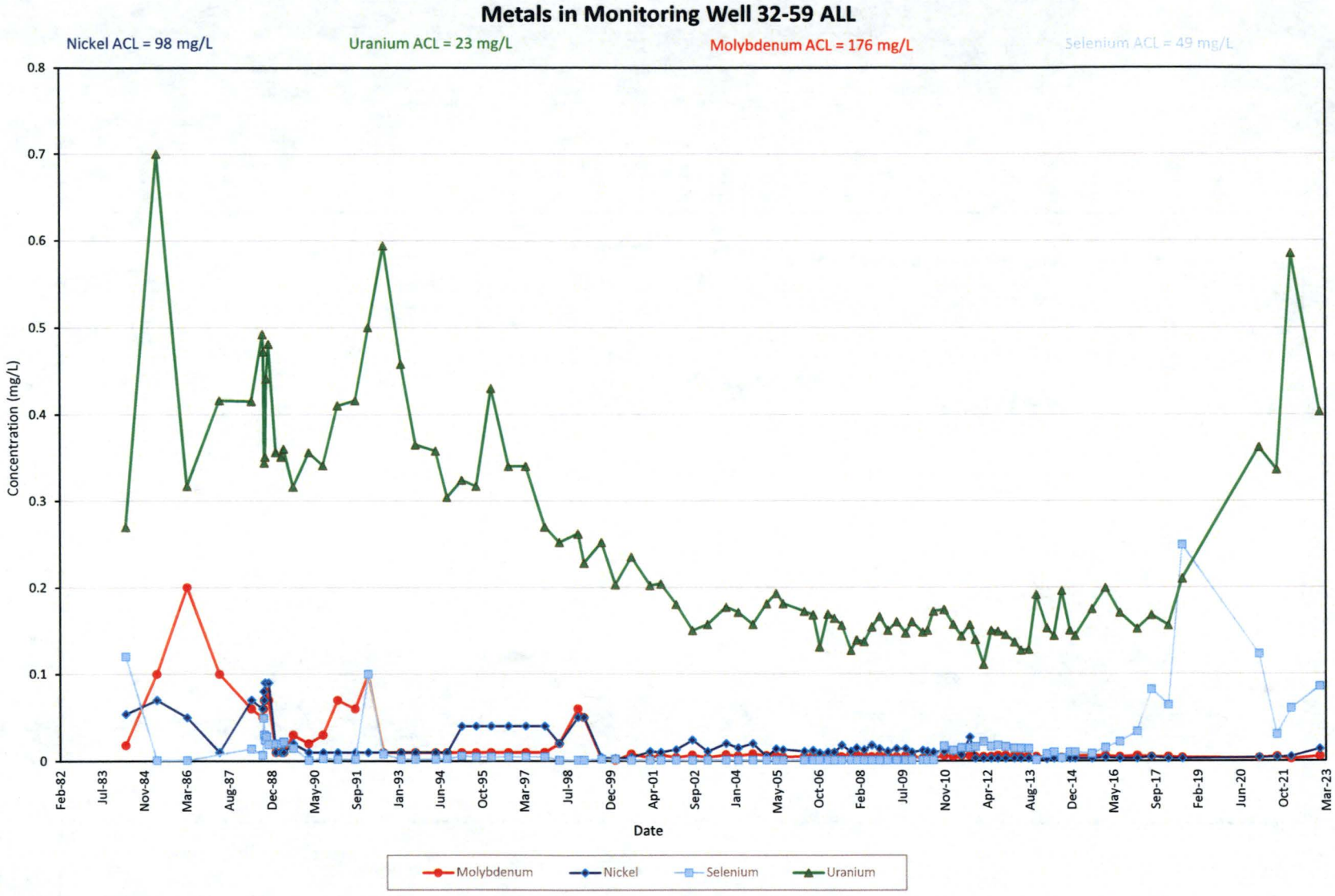
Th-230 ACL = 13,627 pCi/L

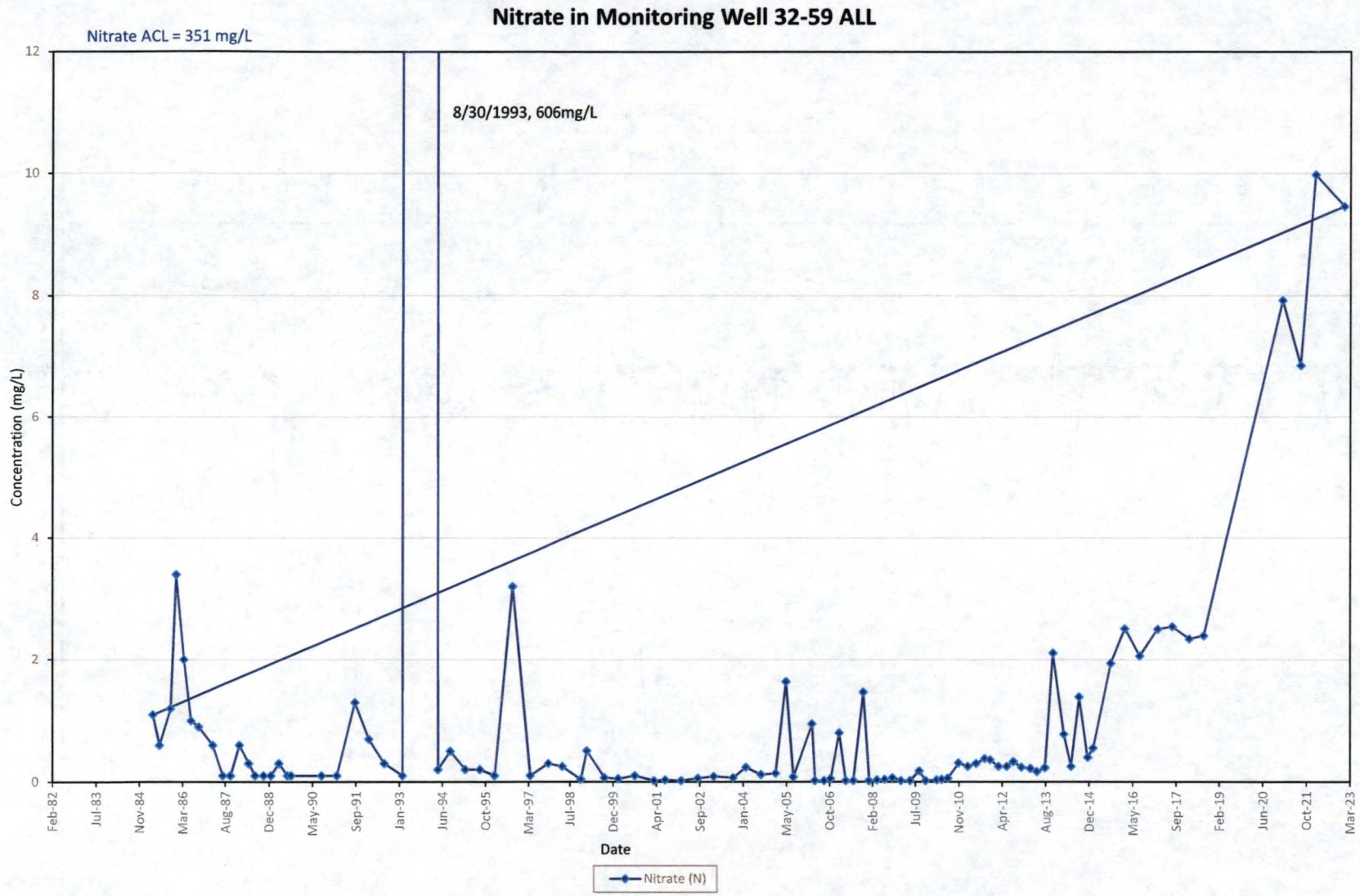
Ra-226+228 ACL = 3,167 pCi/L



Anions and TDS in Monitoring Well 32-59 ALL




Metals in Monitoring Well 32-59 ALL
Nickel ACL = 98 mg/L
Uranium ACL = 23 mg/L
Molybdenum ACL = 176 mg/L
Selenium ACL = 49 mg/L
Concentration (mg/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Feb-82
Jul-83
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Molybdenum
Nickel
Selenium
Uranium

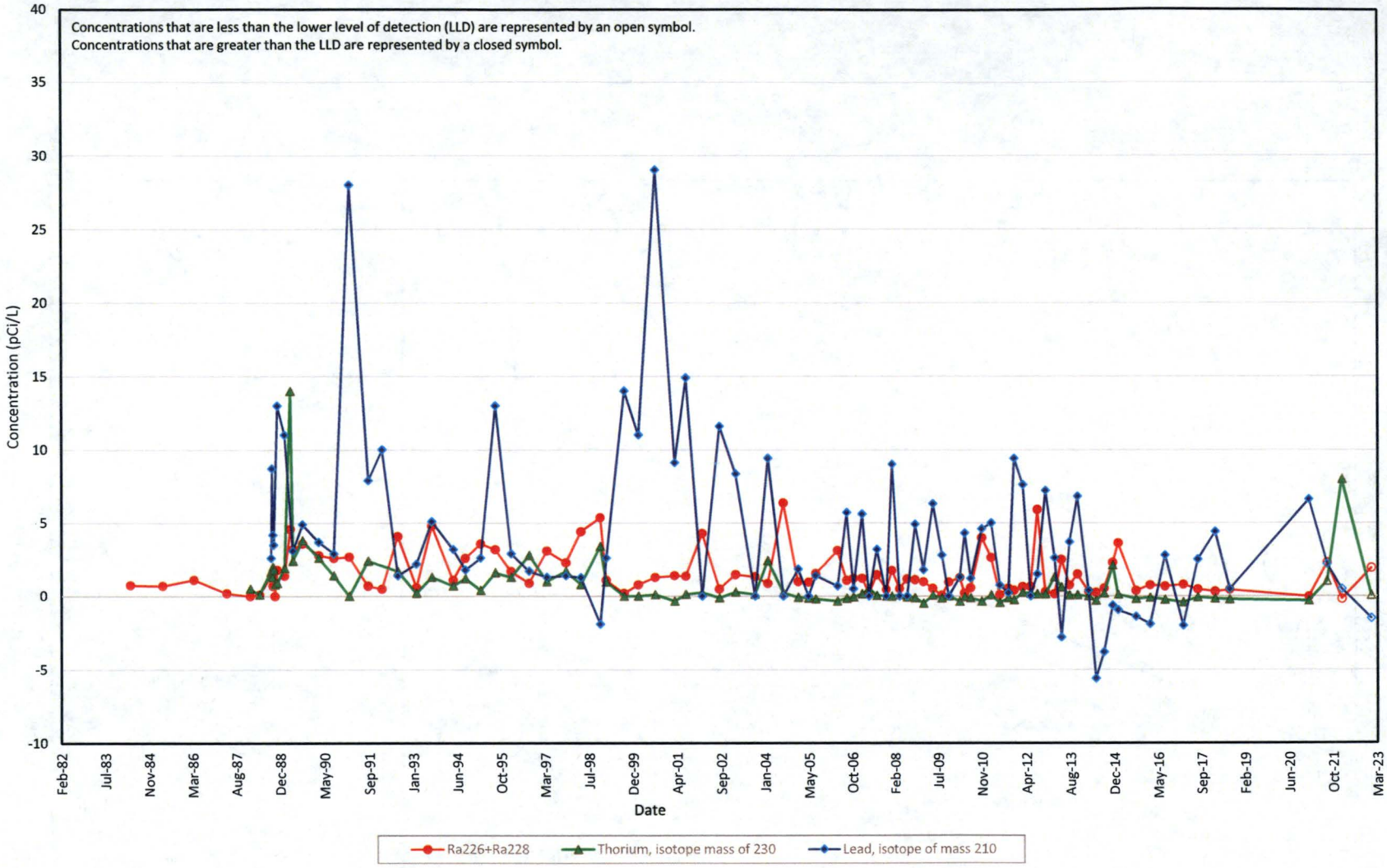

Nitrate in Monitoring Well 32-59 ALL
Nitrate ACL = 351 mg/L
8/30/1993, 606mg/L
Concentration (mg/L)
0
2
4
6
8
10
12
Feb-82
Jul-83
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate (N)

Radionuclides in Monitoring Well 32-59 ALL

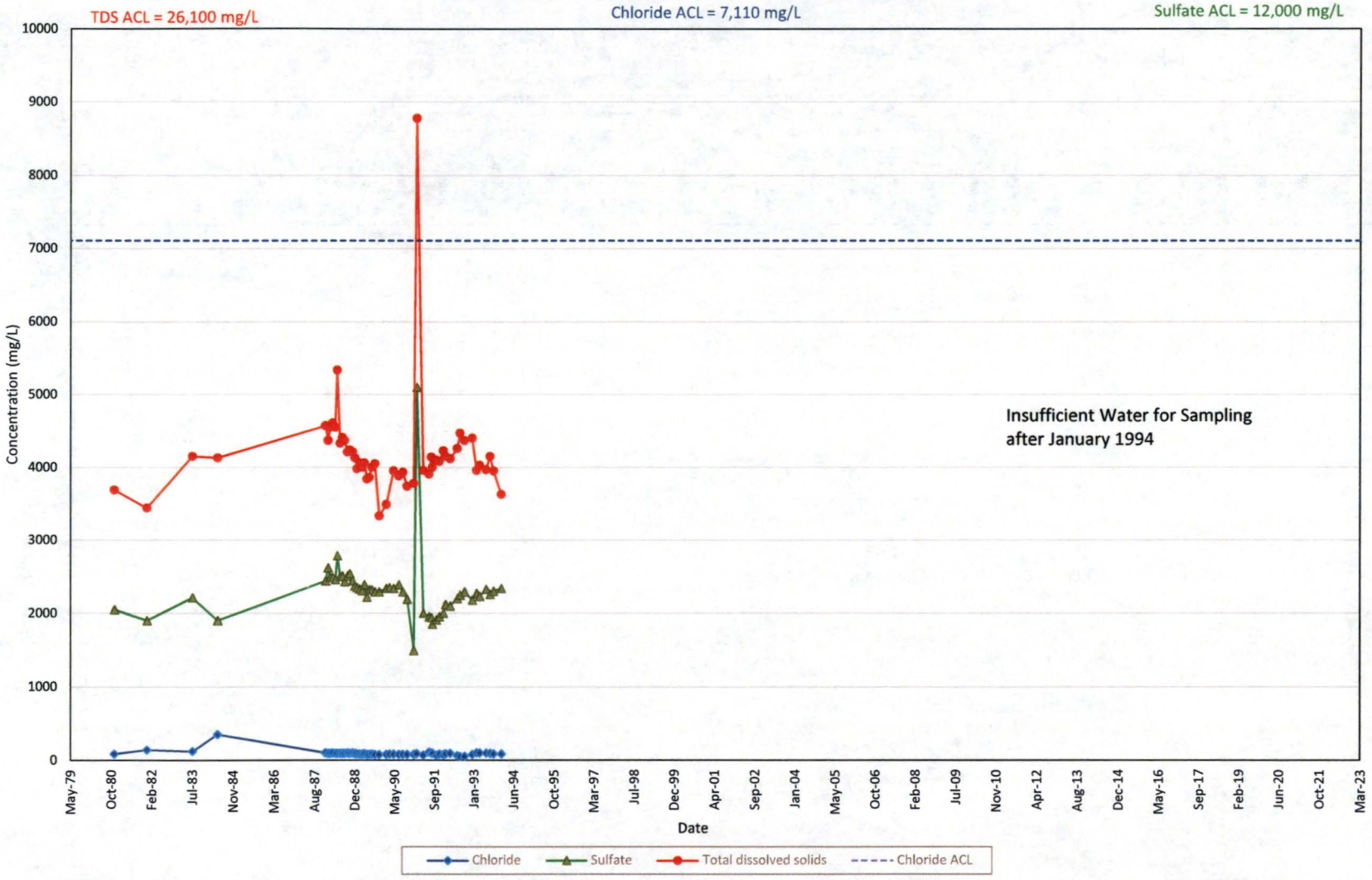
Pb-210 ACL = 891 pCi/L

Th-230 ACL = 13,627 pCi/L

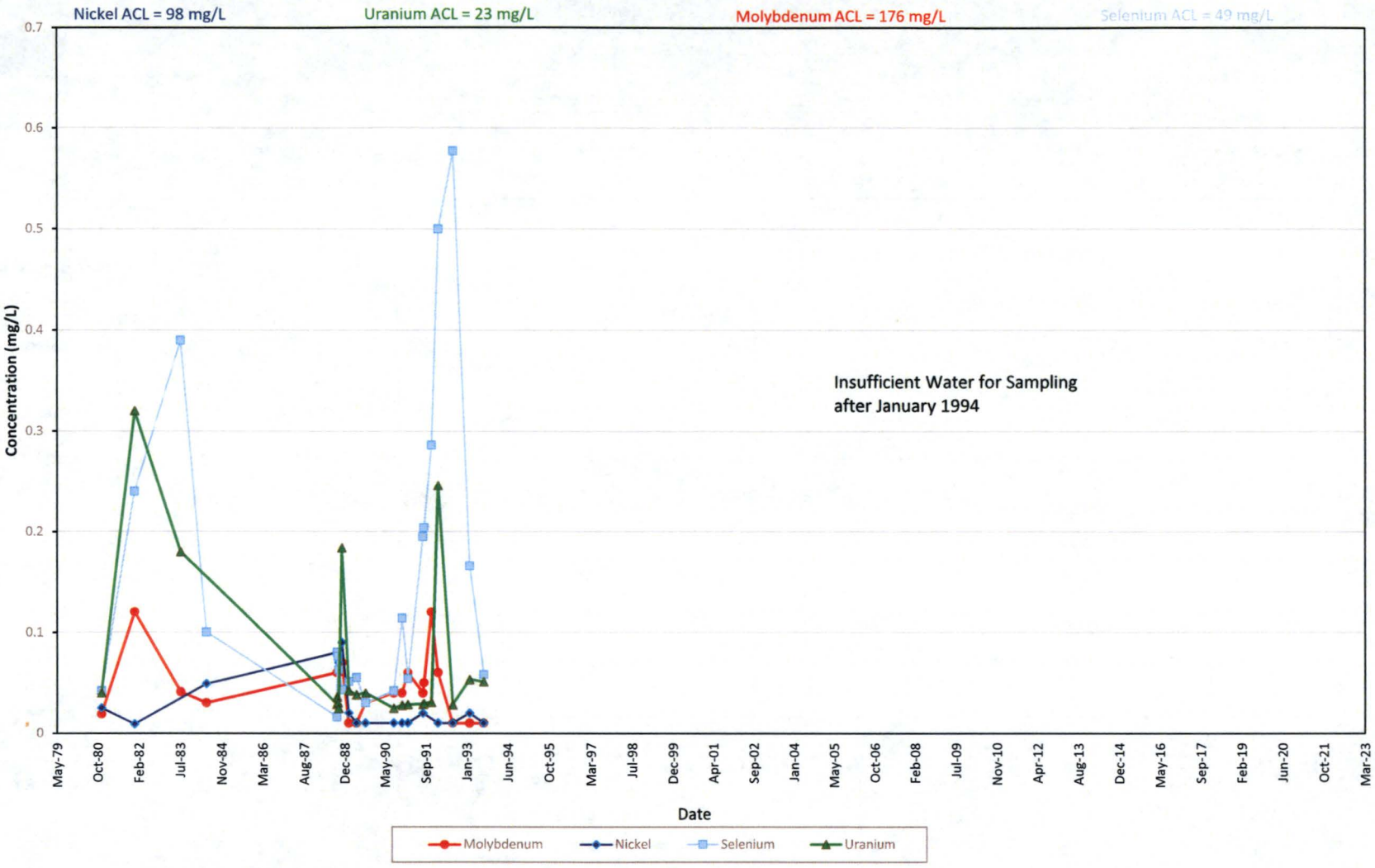
Ra-226+228 ACL = 3,167 pCi/L

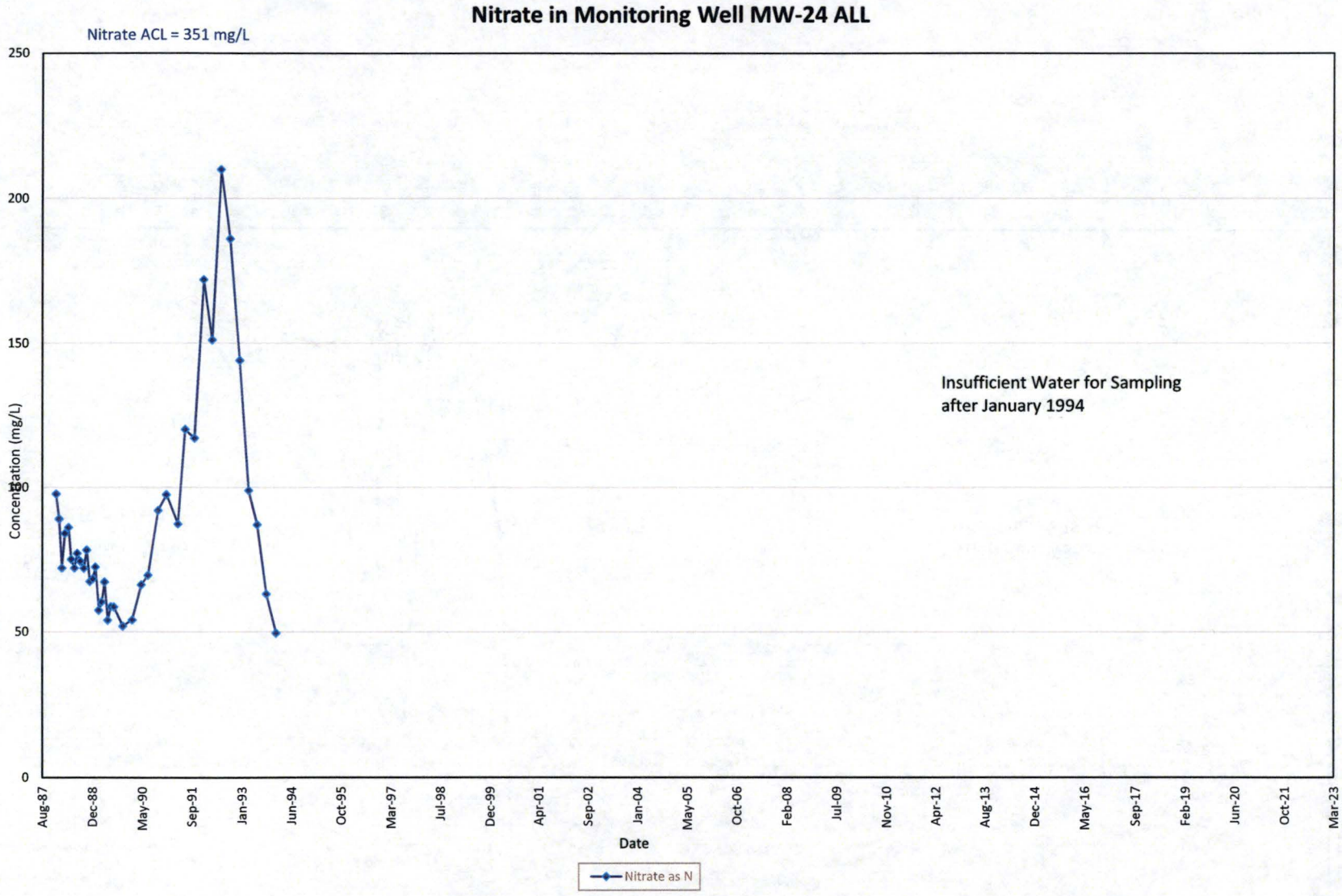


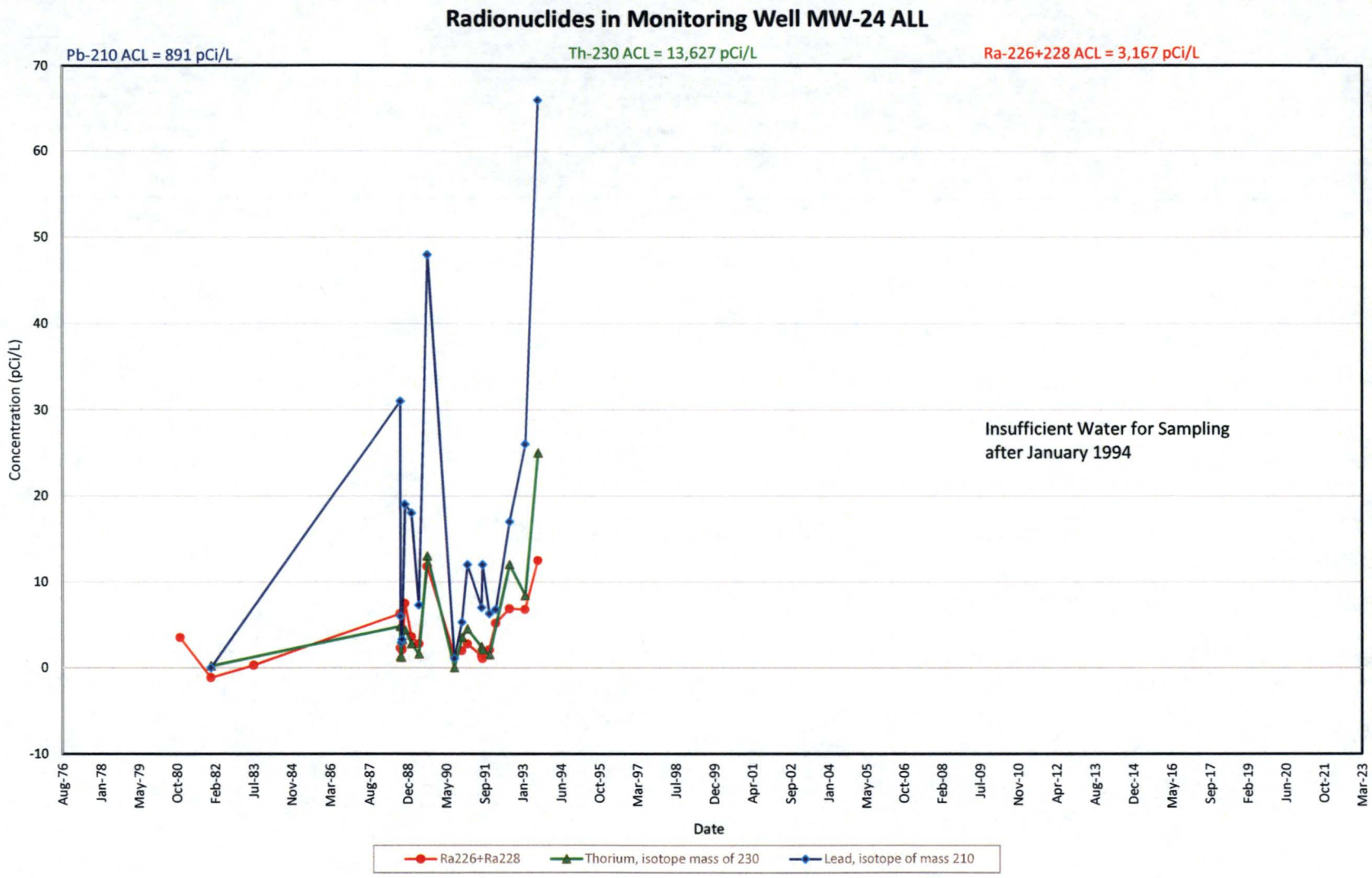
Anions and TDS in Monitoring Well MW-24 ALL



Metals in Monitoring Well MW-24 ALL



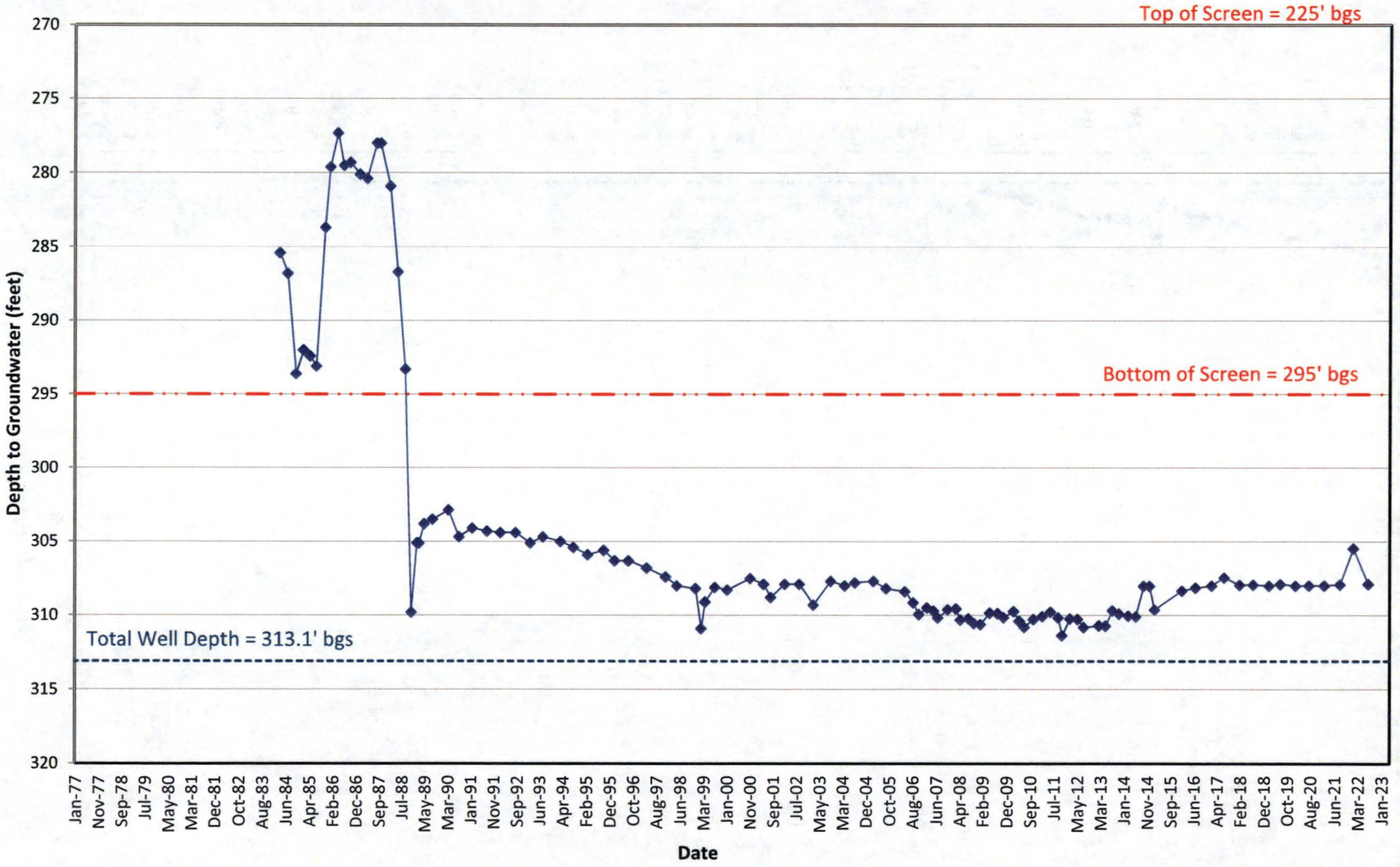

Nitrate in Monitoring Well MW-24 ALL
Nitrate ACL = 351 mg/L
Insufficient Water for Sampling
after January 1994
Concentration (mg/L)
250
200
150
100
50
0
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Nitrate as N


Radionuclides in Monitoring Well MW-24 ALL
Pb-210 ACL = 891 pCi/L
Th-230 ACL = 13,627 pCi/L
Ra-226+228 ACL = 3,167 pCi/L
Concentration (pCi/L)
70
60
50
40
30
20
10
0
-10
Insufficient Water for Sampling
after January 1994
Aug-76
Jan-78
May-79
Oct-80
Feb-82
Jul-83
Nov-84
Mar-86
Aug-87
Dec-88
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13
Dec-14
May-16
Sep-17
Feb-19
Jun-20
Oct-21
Mar-23
Date
Ra226+Ra228
Thorium, isotope mass of 230
Lead, isotope of mass 210

APPENDIX 3

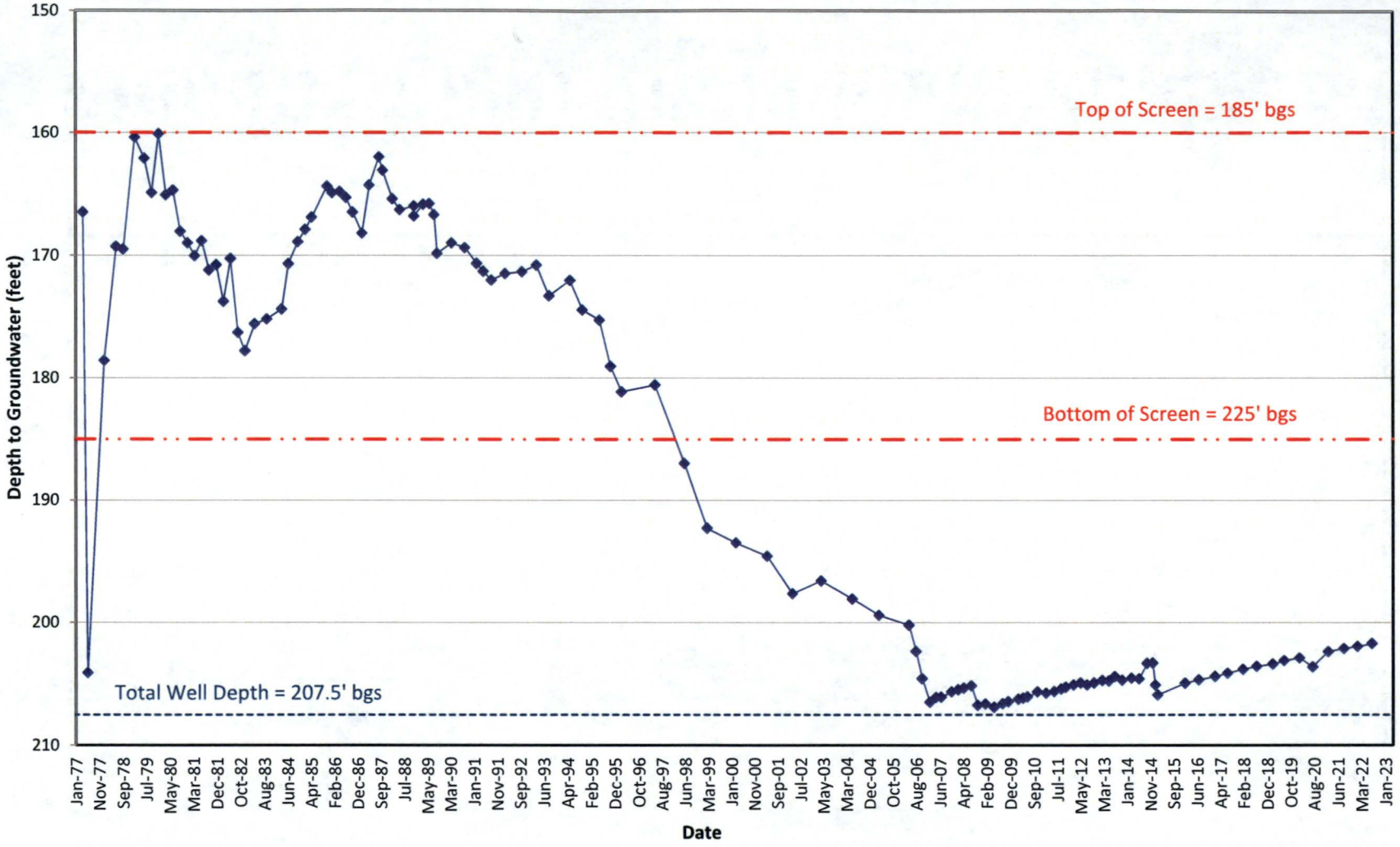
Stability Monitoring Plan
Hydrographs

Hydrograph for Dakota Monitoring Well 30-02 KD

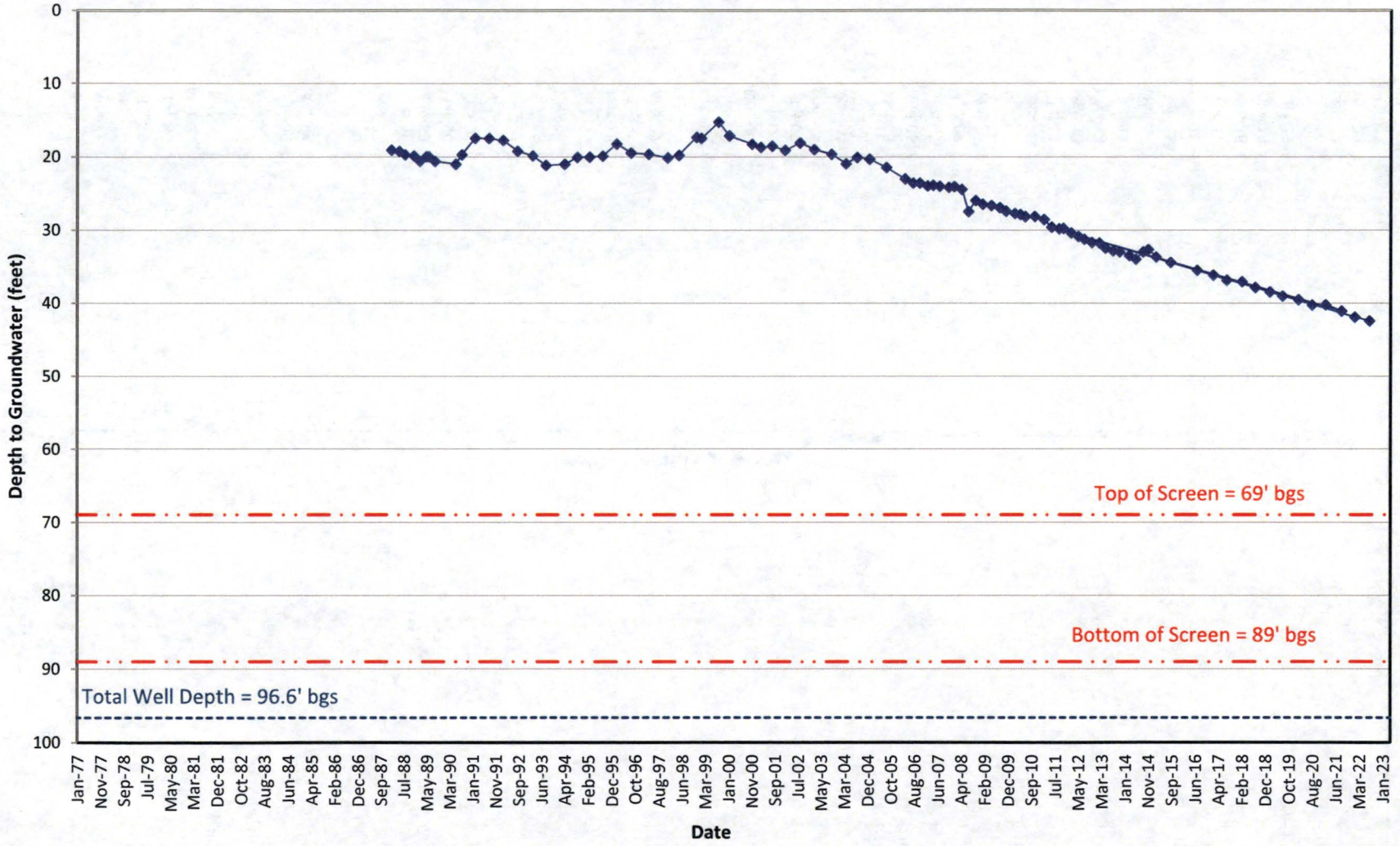


ARCADIS

Hydrograph for TRA Monitoring Well 30-01 TRA

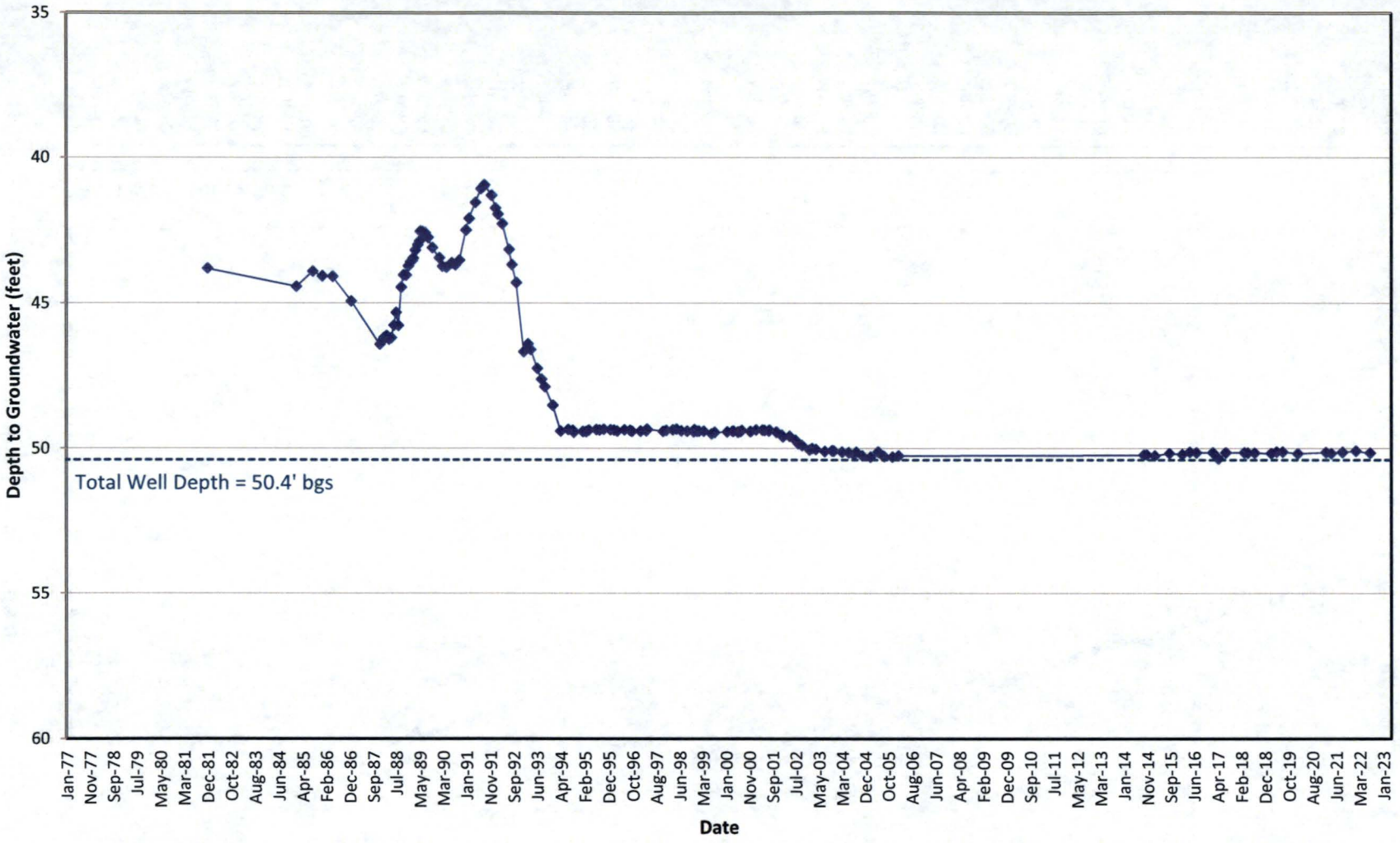


Hydrograph for TRB Monitoring Well 31-67 TRB



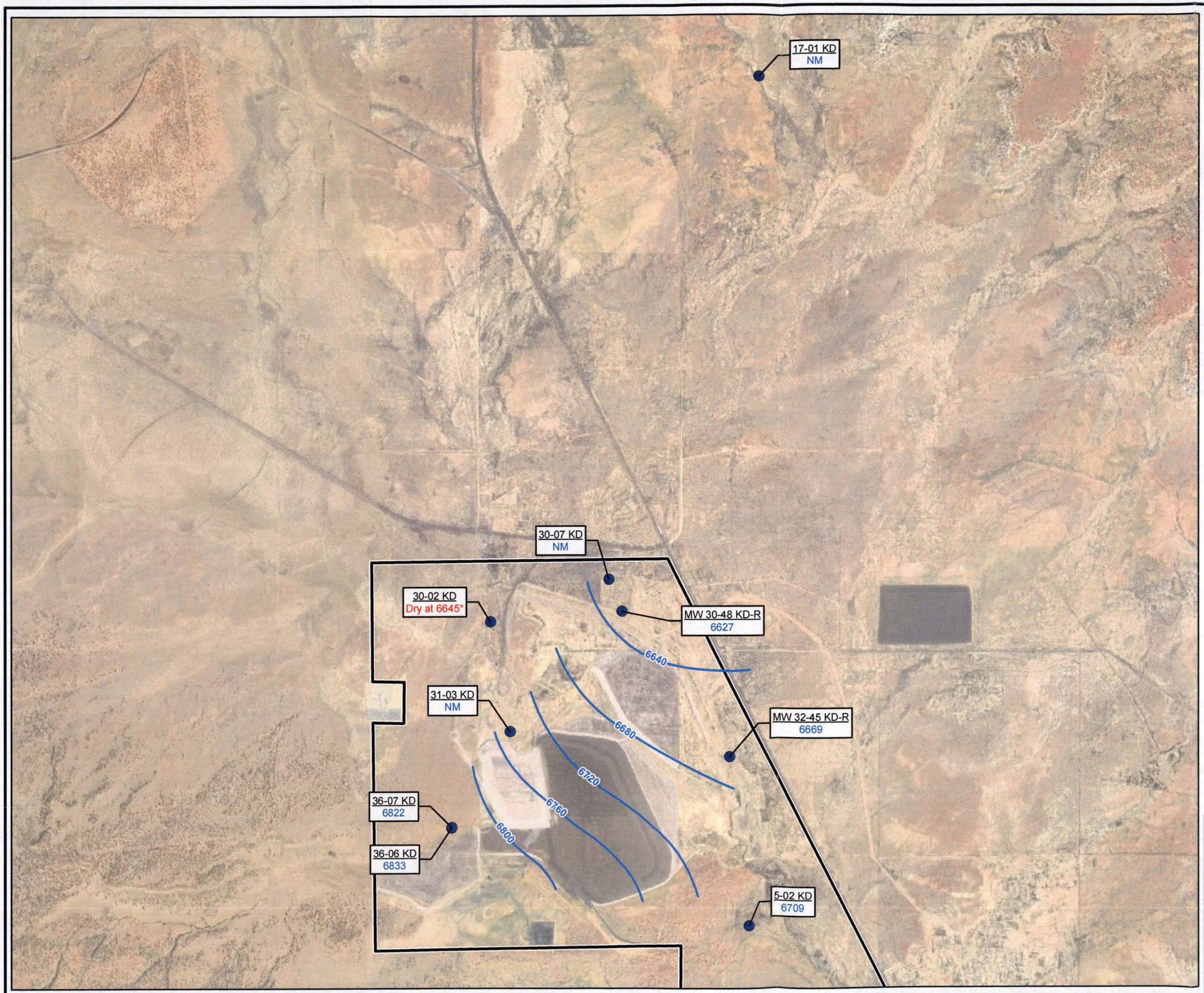
ARCADIS

Hydrograph for Alluvial Monitoring Well MW-24 ALL



APPENDIX 4

Stability Monitoring Plan
Potentiometric Surface Maps



LEGEND

- Dakota Monitoring Well
- KD Potentiometric Surface Elevations (ft amsl)
- Proposed Long-Term Surveillance and Maintenance (LTSM) Boundary

Well ID
Groundwater Surface Elevation (ft amsl)

* Elevation at bottom of screen (Appendix 3). Data not used in contouring.

NM Not Measured

NOTES:
Groundwater elevations measured in August 2022.
Groundwater elevations noted as "NM" at 30-07 KD and 31-03 KD:
- 30-07 KD depth to water measurement collected but documentation misplaced.
- 31-03 KD -- obstruction encountered at 306 feet below top of casing and not passable.

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 36-06 KD and MW-30-48 KD-R = 6,833 - 6,627 = 206 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 36-06 KD and MW-30-48 KD-R = 7,277 feet)

= 0.028 feet per foot

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 2,500 5,000
Feet
GRAPHIC SCALE

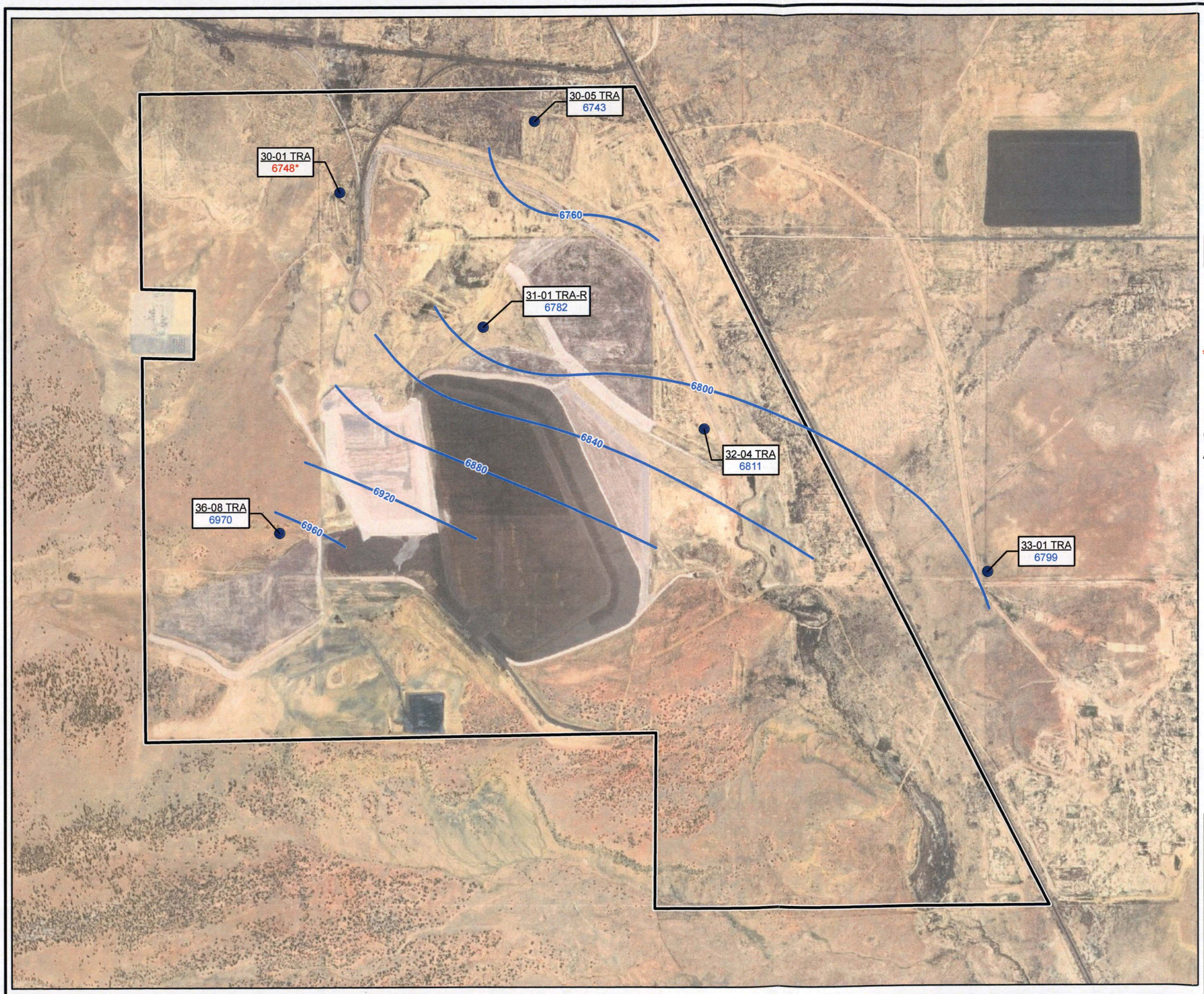
RIO ALGOM MINING LLC
AMBROSIA LAKE WEST FACILITY
MCKINLEY COUNTY, NEW MEXICO
GROUNDWATER MONITORING REPORT - 2H 2022

DAKOTA POTENTIOMETRIC SURFACE ELEVATION CONTOURS MAP

ARCADIS

T:_ENV\BHP\Ambrosia\MXD\NRC Semiannual 2H 2022\Figure 4-1 Dakota Contour Map.mxd 12/20/2022 1:53:09 PM

T:_ENV\BHP\Ambrosia\MXD\NRC Semiannual 2H 2022\Figure 4-2 TRA Contour Map.mxd 1/23/2023 4:23:53 PM



LEGEND

- TRA Monitoring Well Location
- TRA Potentiometric Surface Elevations (ft amsl)
- Proposed Long-Term Surveillance and Maintenance (LTSM) Boundary

Well ID
Groundwater Surface Elevation (ft amsl)

* Elevation at bottom of screen (Appendix 3). Data not used in contouring.

NOTE:
Groundwater elevation measured in August 2022

Gradient calculation:
(Difference in Groundwater Elevation Between MW 36-08 TRA and 30-05 TRA = 6,970 - 6,743 = 227 feet) Divided by (Distance Along a Flow Path Between MW 36-08 TRA and 30-05 TRA = 7,678 feet)

= 0.030 feet per foot

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

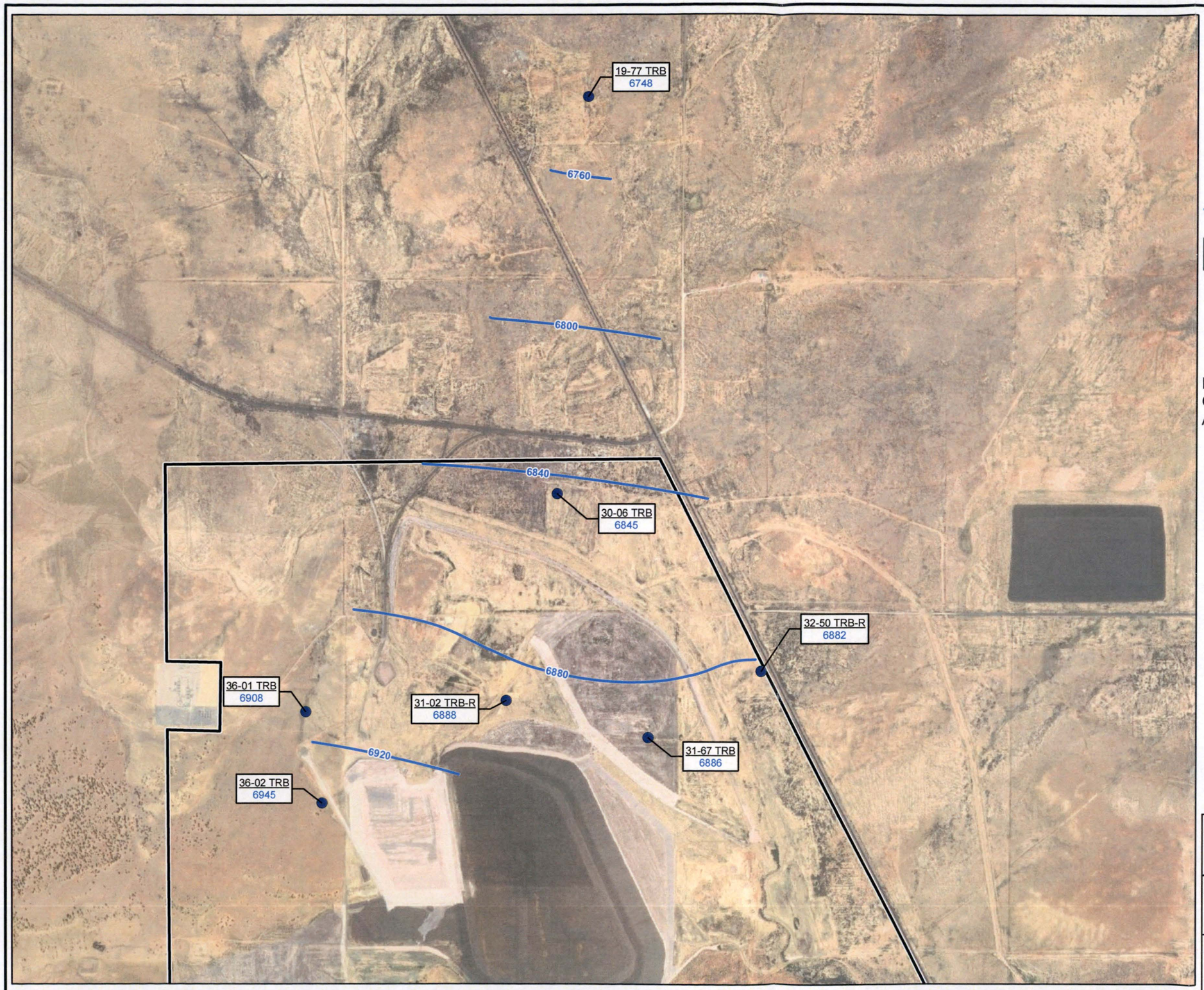
0 1,500 3,000
Feet
GRAPHIC SCALE

RIO ALGOM MINING LLC
AMBROSIA LAKE WEST FACILITY
MCKINLEY COUNTY, NEW MEXICO
GROUNDWATER MONITORING REPORT - 2H 2022

TRA POTENTIOMETRIC SURFACE ELEVATION CONTOURS MAP

ARCADIS

T:_ENV\BHP\Ambrosia\MXD\NRC Semiannual 2H 2022\Figure 4-3 TRB Contour Map.mxd 12/20/2022 1:38:44 PM



LEGEND

- TRB Monitoring Well Location
- TRB Potentiometric Surface Elevations (ft amsl)
- Proposed Long-Term Surveillance and Maintenance (LTSM) Boundary
- Well ID / Groundwater Surface Elevation (ft amsl)

NOTE:
Groundwater elevation measured in August 2022

Gradient calculation:
(Difference in Groundwater Elevation
Between Point of Compliance
Well 31-02 TRB-R and far downgradient
Well 19-77 TRB = 6,888 - 6,748 = 140 feet)
Divided by
(Distance Along a Flow Path
Between Point of Compliance
Well 31-02 TRB-R and far downgradient
Well 19-77 TRB = 9,664 feet)

= 0.014 feet per foot

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 1,500 3,000 Feet

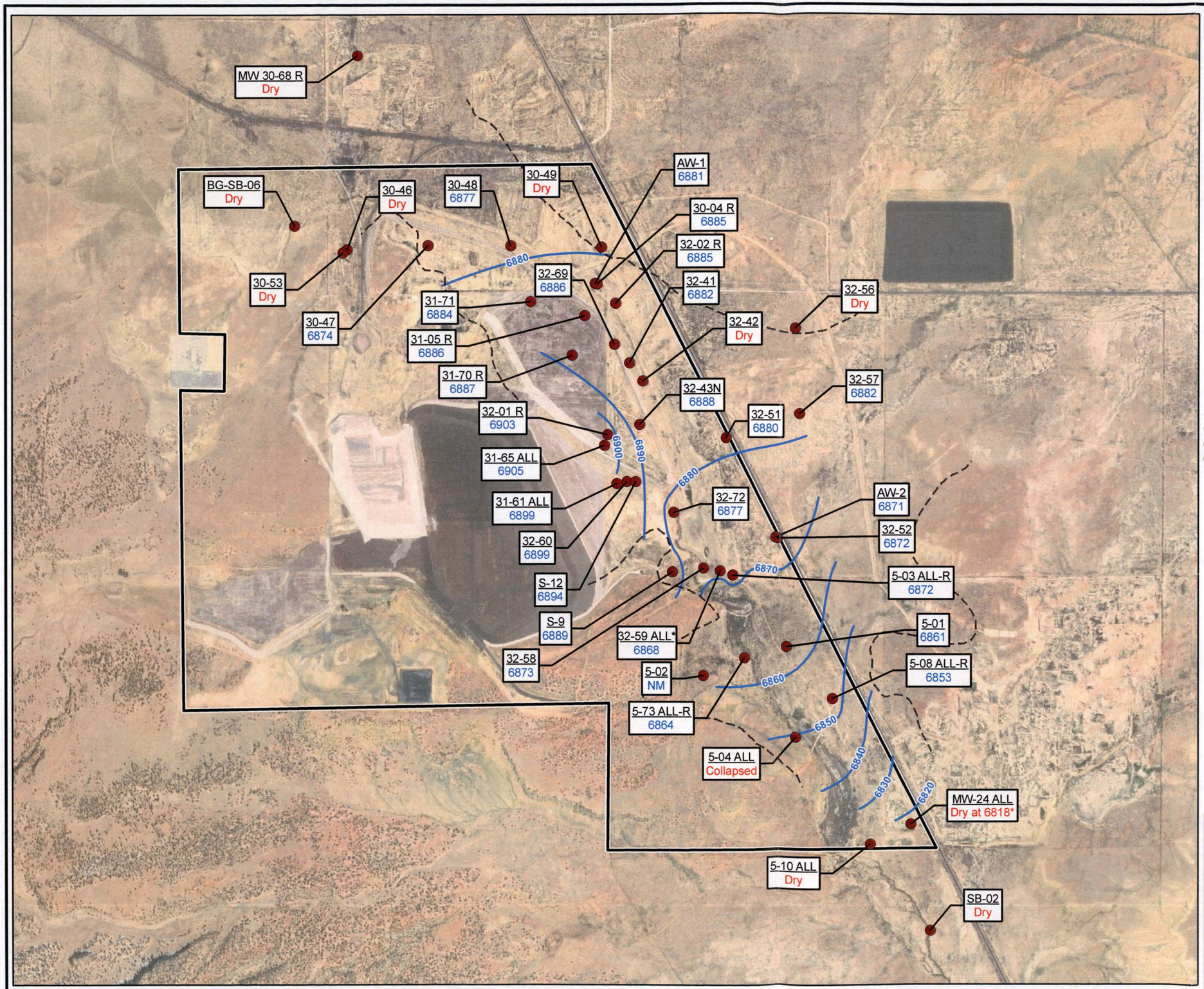
GRAPHIC SCALE

RIO ALGOM MINING LLC
AMBROSIA LAKE WEST FACILITY
MCKINLEY COUNTY, NEW MEXICO
GROUNDWATER MONITORING REPORT - 2H 2022

TRB POTENTIOMETRIC SURFACE ELEVATION CONTOURS MAP

ARCADIS

T:_ENV\BHP\Ambrosia\MXD\NRC Semiannual 2H 2022\Figure 4-4 Alluvial Contour Map.mxd 1/26/2022 3:47:08 PM



LEGEND

- Alluvial Monitoring Well Location
- Alluvial Groundwater Surface Elevation (ft amsl)
- Estimated Boundary of Saturated Alluvium
- Proposed Long-Term Surveillance and Maintenance (LTSM) Boundary

Well ID
Groundwater Surface Elevation (ft amsl)

* Elevation at bottom of screen (Appendix 3). Data not used in contouring.

* Elevation at 32-59 ALL measured in January 2023. Data not used in contouring.

NM Not Measured

NOTE:
Groundwater elevations measured in August 2022.
Groundwater elevation noted as "NM" at 5-02 -- obstruction encountered at 16.45 feet below top of casing and not passable.

Gradient calculation:
(Difference in Groundwater Elevation Between Point of Compliance Well 31-61 ALL and Trend Well 5-08 ALL-R = 6,899 - 6,853 = 46 feet) Divided by (Distance Along a Flow Path Between Point of Compliance Well 31-61 ALL and Trend Well 5-08 ALL-R = 5,802 feet)

= 0.008 feet per foot

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 1,800 3,600
Feet
GRAPHIC SCALE

RIO ALGOM MINING LLC
AMBROSIA LAKE WEST FACILITY
MCKINLEY COUNTY, NEW MEXICO
GROUNDWATER MONITORING REPORT - 2H 2022

ALLUVIAL POTENTIOMETRIC SURFACE ELEVATION CONTOUR MAP

ARCADIS

APPENDIX 5

Analytical Lab Reports and EDDs For License Wells
(Electronic Submittal Only)

APPENDIX 6

Tabulated Analytical Results for H2 2022
ACL Program Wells

Station Name		30-05 TRA	30-06 TRB	30-06 TRB (DUP-01)	30-07 KD	31-03 KD	32-04 TRA	36-07 KD	36-08 TRA
Sample Date		8/8/2022	8/15/2022	8/15/2022	8/11/2022	8/11/2022	8/15/2022	8/16/2022	8/8/2022
Parameter	Units								
Depth to Water	ft	213.7	111.44	111.44	NM[1]	NM[2]	109.22	202.32	54.24
Total Depth	ft	234.45	143.25	143.25	NM[1]	NM[2]	127	206	70.09
Groundwater Elevation	ft amsl	6742.99	6845.31	6845.31	NM[1]	NM[2]	6811.1	6822.37	6969.51
Dissolved Oxygen	mg/L	2.48	0.42	0.42		0.88	1.38	0.80	0.31
Oxidation Reduction Potential	mv	158.8	125.8	125.8		30.6	139.1	-43.3	246.5
pH	s.u.	7.35	6.93	6.93		6.84	7.00	6.20	6.32
Specific Conductivity	µS/cm	2,797.4	5,533.0	5,533.0		8,097.6	2,301.9	5,616.8	19,598
Temperature	degrees C	13.88	15.69	15.69		16.21	15.34	16.76	16.69
Alkalinity (as CaCO3)	mg/L	154	605	601		247	167	287	639
Aluminum	mg/L	<0.1	<0.25	<0.25		<0.25	<0.05	<0.25	<1
Arsenic	mg/L	0.00205	<0.001	<0.001		0.00539	0.00077 B	<0.001	<0.004
Barium	mg/L	0.0230 B	<0.045	<0.045		<0.045	0.0149 B	<0.045	<0.18
Bicarbonate (as CaCO3)	mg/L	154	605	601		247	167	287	639
Boron	mg/L	0.394	0.431 B	0.425 B		<0.15	0.407	0.189 B	<0.6
Cadmium	mg/L	<0.0001	<0.00025	<0.00025		<0.00025	<0.00005	<0.00025	0.00208 B
Calcium	mg/L	161	605	596		714	177	688	477
Carbonate (as CaCO3)	mg/L	<2	<2	<2		<2	<2	<2	<2
Cation-Anion Balance	%	-9.1	-4.5	-5.5		0.0	-7.4	-5.4	-6.0
Chloride	mg/L	46.2 H2	777 H2	786 H2		1,500	28.7 BH2	914 H2	640 H2
Chromium	mg/L	<0.001	<0.0025	<0.0025		<0.0025	<0.0005	<0.0025	<0.01
Cobalt	mg/L	<0.04	<0.1	<0.1		<0.1	<0.02	<0.1	<0.4
Copper	mg/L	<0.02	<0.05	<0.05		<0.05	<0.01	<0.05	<0.2
Fluoride	mg/L	<1 H2	<2.5 H2	<2.5 H2		<2.5	<1 H2	<2.5 H2	<10 H2
Hydroxide (as CaCO3)	mg/L	<2	<2	<2		<2	<2	<2	<2
Iron	mg/L	<0.12	<0.3	<0.3		1.52	<0.06	11.2	<1.2
Lead	mg/L	<0.0002	<0.0005	<0.0005		<0.0005	<0.0001	<0.0005	<0.002
Magnesium	mg/L	64.6	513	507		389	58.4	222	4,860
Manganese	mg/L	<0.02	0.378	0.373		7.24	<0.01	11.9	8.82
Mercury	mg/L	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0109	0.00176 B	0.00175 B		0.693	0.00868	<0.001	<0.004
Nickel	mg/L	<0.0008	0.0072	0.00653		0.00625	0.00089 B	0.00422 B	0.113
Nitrate/Nitrite (as N)	mg/L	0.175	0.078 B	0.077 B		<0.02	0.056 B	0.115	87.9
Pb-210	pCi/L	0.99	3.3	10		-1.8	-0.86	-1.7	-2.2
Potassium	mg/L	7.46	14.4	14.3		16.9	7.40	16.8	19.1 B
Ra-226	pCi/L	<0.64	1.2	1.7		11	-0.01	1.9	1.4
Ra-226+Ra-228	pCi/L	2.94*	9.3	10.8		13.6*	2.39*	6.5	11.3
Ra-228	pCi/L	<2.3	8.1	9.1		<2.6	<2.4	4.6	9.9
Th-230	pCi/L	2.19	0.828	0.899		0.0656	0.441	0.248	1.85
Thallium	mg/L	<0.0002	<0.0005	<0.0005		<0.0005	<0.0001	<0.0005	<0.002
Selenium	mg/L	<0.0002	0.00051 B	<0.0005		<0.0005	<0.0001	0.00139	0.122
Silver	mg/L	<0.02	<0.05	<0.05		<0.05	<0.01	<0.05	<0.2
Sodium	mg/L	383	538	531		632	246	348	363
Sulfate	mg/L	1,520 H2	3,380 H2	3430 H2		2,390	1160 H2	2,230 H2	22,100 H2
Sum of Anions	mEq/L	36	105	106		97	29	78	495
Sum of Cations	mEq/L	30	96	95		97	25	70	439
TDS (calculated)	mg/L	2,280	6,200	6,230		5,800	1,780	4,620	28,900
TDS (ratio - meas/calc)	Unitless	0.99	0.97	0.97		1.06	0.98	0.94	1.07
Total Dissolved Solids	mg/L	2,250	6,040	6,070		6,170 H1	1,750	4,330	31,000 H1
Uranium	mg/L	0.00245	0.0718	0.0748		0.00874	0.00646	0.0194	0.0255
Zinc	mg/L	<0.04	<0.1	<0.1		<0.1	<0.02	<0.1	<0.4

NOT SAMPLED

Notes:

* = either Ra-226, Ra-228, or both were not detected above the lower level of detection (LLD); in this case, the LLD was used in lieu of the reported result.

< = the parameter is less than the associated minimum detection limit (MDL) or lower limit of detection (LLD)

B = analyte was detected at a value between MDL and practical quantitation limit (PQL). The associated value is an estimated quantity.

H1 = sample required re-analysis because of a laboratory quality control issue; re-analysis occurred after the method hold time.

H2 = sample analysis occurred after the method hold time due to laboratory capacity limitations

Monitoring well 30-07 KD contained insufficient water for sample collection.

pCi/L = picocurie per liter
s.u. = standard units
TDS = total dissolved solids

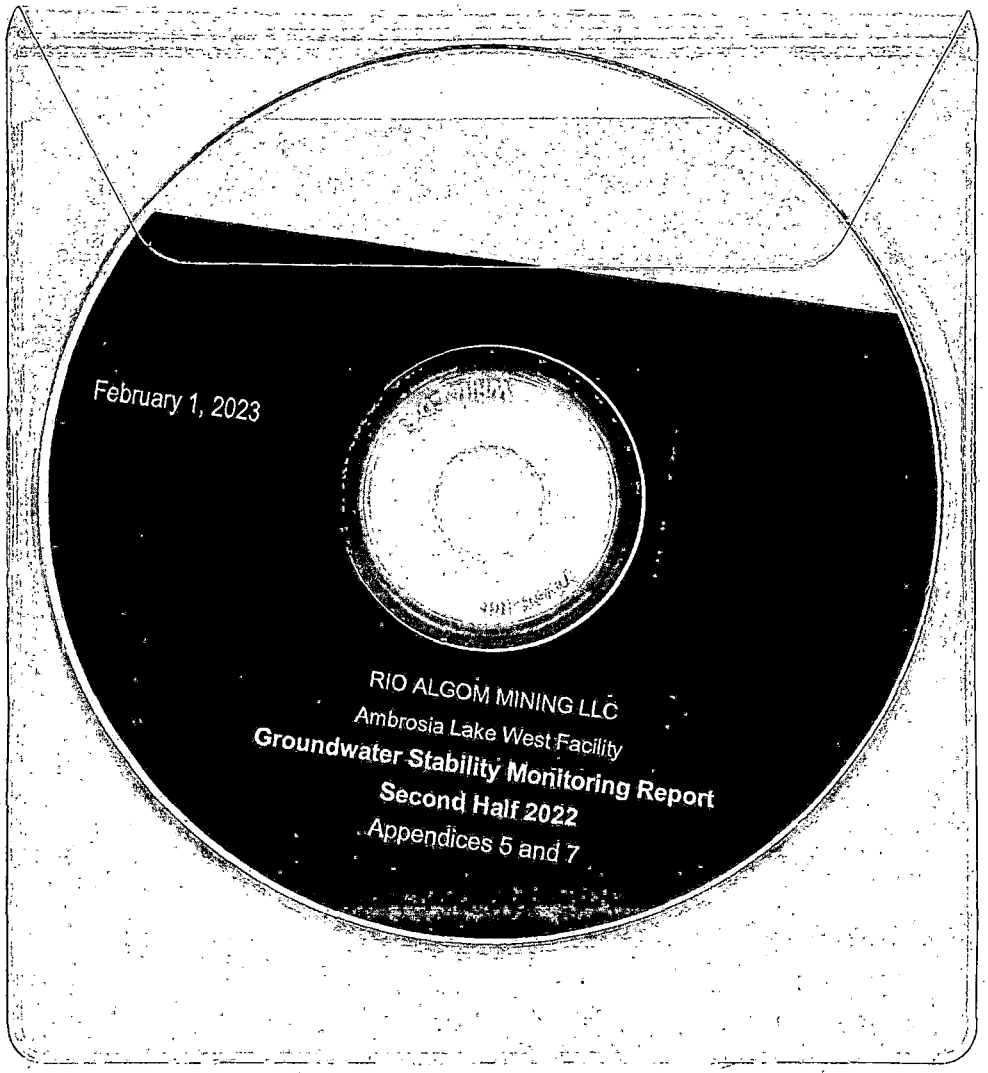
[1] Field documentation with depth to water and total depth measurements misplaced. Field personnel reported there was insufficient water to sample.

[2] Obstruction encountered at 306 feet below top of casing which was not passable and above pump intake (approximately 315 feet below top of casing). Depth to water and total depth measurements not possible.

APPENDIX 7

Analytical Lab Reports and EDDs For ACL Program Wells

(Electronic Submittal Only)


February 1, 2023
RIO ALGOM MINING LLC
Ambrosia Lake West Facility
Groundwater Stability Monitoring Report
Second Half 2022
Appendices 5 and 7