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PATHFINDER

August 24, 2018

Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
Mailstop T8-F5
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Docket No. 40-6622, License No. SUA-442
January-June 2018 Semi-Annual Groundwater Monitoring Report

Dear Deputy Director,

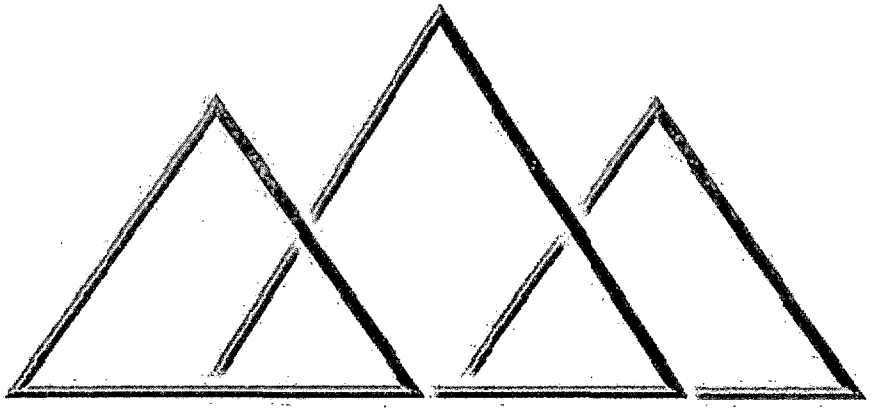
Please find behind this cover the Semi-Annual Groundwater Monitoring Report for the Shirley Basin Tailings.

If you have any questions, please feel free to call me at our Casper office.

Regards,

Mr. John Cash
President

CC: Mr. Dominick Orlando U.S. NRC Project Manager, via email
Mrs. Theresa Horne, Ur-Energy



PATHFINDER

SEMI-ANNUAL
GROUNDWATER MONITORING COMPLIANCE REPORT
FOR THE
SHIRLEY BASIN TAILINGS

PREPARED BY:

PATHFINDER MINES CORPORATION
SHIRLEY BASIN MINE

August 2018

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FIGURES

FIGURES (Continued)

FIGURES (Continued)

TABLES

Executive Summary

This semi-annual report presents the results and conclusions from the groundwater and surface water monitoring programs through April 2018 for Pathfinder Mines Corporation's Shirley Basin mill and tailings facility.

- None of the 16 "Site Standards" were exceeded at either of the two Point-of-Compliance (POC) wells (NP01 and RPI-19B) during this reporting period. Additionally, none of the other 12 non-compliance monitor wells exceeded any of the "Site Standards" either. Hence, PMC's groundwater monitoring program is compliant with all monitor well Point-of-Compliance "Site Standards".
- The surface water quality continues to indicate that there is no deleterious groundwater impact at the downstream "Point-of-Exposure" monitoring site (POE-DS).
- This reporting period water levels continue the decline that has been occurring for the past four quarters. Nevertheless, the groundwater flow regime remains the same.

1.0 Introduction

This report is the twenty-fifth in the series of semi-annual reports required by NRC License SUA-442 under License Condition 47.C. License Condition 47.A requires monitoring of water quality from two Point-of-Compliance wells, 12 other selected wells, four surface-water sites and one Point-of Exposure surface water site for the constituents presented in **Table 1**.

Table 1 also lists the "Site Standards" per License Condition 47.B that are in effect for POC wells NP01 and RPI-19B, which are located east of the Shirley Basin tailings facility (see **Figure 1**). Additionally, **Table 1** presents the March 2018 analytical results for the two POC wells. Data analysis and conclusions are presented in **Sections 4** and **5**, respectively.

2.0 Piezometric Data

The water-level data collected for the reporting period are presented in **Table 2** along with field measurement of pH and conductivity. **Figure 1** shows the current piezometric surface of the surficial aquifer in the area between the tailings impoundment and Spring Creek. The piezometric contours clearly indicate that subsurface flow is toward Spring Creek. **Figure 2** presents a time-series plot of water-level elevation versus time for representative monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. The corresponding March/April 2018 water-level elevation is posted adjacent to the well location on the plan view map (**Figure 1**).

Water-level elevations in background monitor well MC-14 post 2003 show a slow but continuous decline, which is attributed to the decay of the groundwater mound that was generated beneath the historic retention Pond 5 area (Pond 5 has been reclaimed and no longer exists). The other four monitor-well water levels have remained fairly-stable or fluctuated within a narrow range since 2005. Recent water-level elevation changes are more reflective of seasonal recharge, and the piezometric surface appears to be approaching a relatively steady state condition with a general gradient from the tailings impoundment area toward Spring Creek.

There are two anomalous water-level elevations for well MC-14 (2002 and 2011) and one anomalous water-level elevation for wells NP01 (2005) and RPI-18A (2016) shown on **Figure 2** that are likely the result of a measurement or recording error.

The 2018 second quarter water level elevations shown in **Table 2** reveals that monitor well water levels declined in 11 of the 14 wells and one well's water level was unchanged. The declines ranged from 0.1 to 0.7 feet. The observed decline in water levels has been continuous for the past four quarters in most all wells.

3.0 Groundwater and Surface Water Quality

All 2018 groundwater analytical results are compiled in **Table 3** and surface water results in **Table 4**. The 2017 water quality data is also presented on **Tables 3** and **4** for trend analysis purposes. Historical water quality data compiled before 2017 can be found in prior semi-annual report submittals.

Chloride

Figure 3 is the surficial aquifer March/April 2018 chloride iso-concentration contour map. The chloride concentration is greatest at well P-6, which is located approximately 750 feet east of the tailings impoundment in the southern portion of the monitored area. Chloride concentrations are also moderately elevated in some wells located closest to the reclaimed tailings dam. There was a general increasing chloride trend in the Mine Creek area (**Figure 4**) beginning in 2006 after the cessation of corrective action pumping. Note that RPI-18A showed an unexpected jump in concentration last reporting period and the trend continues this period. The chloride concentration in well MC-14 and in surface-water samples, is not significantly elevated over background levels.

Figure 4 presents the chloride concentration versus time plots for monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. **Figure 5** shows that the chloride concentration in POC well NP01 began increasing in 2006 through 2016 then dropped but began increasing again over the past four quarters. However, the current chloride concentration is only one-third the ACL limit (**Figure 5**).

Likewise, **Figure 6** shows a similar chloride trend for POC well RPI-19B; however, the fluctuation has been more pronounced, which is attributed to the small well diameter, shallow depth and limited saturated thickness. A superimposed polynomial trend line helps to clarify the historical trend. Chloride is relatively inert in the groundwater system, thus is a good indicator of seepage migration flow rate and path. The 2018 chloride concentration in POC well RPI-19B is less than one-third the "Site Standard".

The five Spring Creek surface-water sampling sites and the March 2018 chloride analytical concentrations in mg/L are shown on **Figure 3**. The chloride concentrations at the surface-water sampling sites are similar and significantly less than levels found in the underlying groundwater system. **Figure 7** presents the time-series plots of chloride concentration at surface-water sampling locations SW-1A, SC-2 and POE-DS. The fluctuation in concentration is attributed to the intermittent flow nature of Spring Creek and the contribution of surface runoff from tributary drainages located downstream of sampling site SW-1A and upstream of WEIR #2.

Radium 226+228

Figure 8 is the surficial aquifer March/April 2018 Ra 226+228 iso-activity contour map. The highest radium values are typically concentrated in wells located along the toe of the tailings dam and adjacent Mine Creek. **Figure 9** presents the plots of Ra 226+228 activity versus time for monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. The graph shows significant variability in measured values. Measured radium, thorium, and gross alpha activity results are typically more erratic (less consistent) than other non-radionuclide constituents; therefore, the iso-activity contours are believed to be less reliable indicators of the extent of seepage or pathways.

Figures 10 and **11** present the time-series plot for Ra 226+228 activity for POC monitor wells NP01 and RPI-19B, respectively. The figures indicate that results vary significantly from year to year as would be expected for most radionuclides. Despite the variability in results, the measured 2018 Ra 226+228 activity levels at both POC wells are significantly less than their respective "Site Standard".

Spring Creek surface-water sampling sites along with the March 2018 radium analytical results are shown on **Figure 8**. **Figure 12** presents time-series plots of Ra 226+228 activities at surface-water sampling locations SW-1A, SC-2 and POE-DS. Upgradient sample site SW-1A has shown a wide range of Ra 226+228 activity readings in the past few years. However, the surface water radium results appear to be consistent with radiometric land-surface survey results in the area upstream of sampling site SW-1A, which is considered baseline. Although not directly applicable, the reported surface-water radium activity levels are significantly less than the groundwater radium "Site Standard".

Selenium

Figure 13 is the surficial aquifer March/April 2018 selenium iso-concentration contour map. In general, the wells with the higher selenium concentrations are typically the same wells with higher concentrations of sulfate, chloride and TDS. Selenium, being a metal, is not very soluble or mobile in normal pH groundwater environments. Accordingly, the concentrations are very low and selenium is not necessarily a good indicator of seepage impacts.

Figure 14 presents the selenium concentration versus time plots for monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. **Figure 14** indicates that there are no discernable selenium trends developing for monitor wells MC-14, RPI-14 or RPI-18A, and all analytical results are significantly less than the "Site Standard" applicable to the two POC wells. **Figure 15** shows that the selenium concentration in POC well NP01 began increasing in 2001, peaked in 2006, then declined to levels that are an order of magnitude lower than the "Site Standard". **Figure 16** shows the plot of selenium concentration versus time for POC well RPI-19B. For the past 23 years, the reported selenium concentration has been an order of magnitude lower than the applicable "Site Standard", with no developing trend noted.

Spring Creek surface-water sampling sites and the March 2018 selenium analytical results are shown on **Figure 13**. The analytical results for all five sampled locations were at the method detection limit

of 0.001 mg/L. **Figure 17** presents the time-series plots of selenium concentration at surface-water sampling locations SW-1A, SC-2 and POE-DS; no developing selenium trends were noted.

Sulfate

Figure 18 is the surficial aquifer March/April 2018 sulfate iso-concentration contour map. The sulfate concentration is greatest at well P-6, which is located approximately 750 feet east of the tailings impoundment in the southern portion of the monitored area. The sulfate concentration is also moderately elevated in wells MC-10, RPI-10, RPI-16A and RPI-18A, which are wells that consistently contain elevated levels of other constituents.

Figure 19 presents the time-series sulfate concentrations plots for monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. **Figure 20** shows that the sulfate concentration in POC well NP01 began increasing in 2006, peaked in 2013 then declined until recently. The sulfate concentration has been increasing for the past four quarters for unknown reasons. Likewise, **Figure 21** shows a similar sulfate trend for POC well RPI-19B; however, the fluctuation has been more pronounced, which is likely attributable to the well's shallow depth, small diameter, limited saturated thickness and slow recharge rate. Overall, there appears to be a increasing sulfate concentration trend in both POC wells; however, the reported March/April 2018 concentrations are four to five times *less* than their respective "Site Standard".

Spring Creek surface-water sampling sites and the March 2018 sulfate analytical results are shown on **Figure 18**. **Figure 22** presents the time-series plots of sulfate concentration at surface-water sampling locations SW-1A, SC-2 and POE-DS. The reported concentrations for SC-2 and POE-DS fluctuate widely due to seasonal surface runoff. This reporting period sulfate results indicate that both sites are showing a slight increasing trends.

Thorium-230

Figure 23 is the surficial aquifer March/April 2018 thorium-230 iso-activity contour map. Thorium-230 activities in groundwater samples are small except for the slightly higher values noted in wells at the dam toe and along Mine Creek, but even those are more than an order of magnitude lower than the POC Site Standards. **Figure 24** presents the thorium-230 activity versus time plots for monitor wells MC-14, RPI-14, NP01, RPI-18A and RPI-19B. Note that for the past 20 years, the thorium-230 results have shown little variability.

Figures 25 and **26** present the time-series plot for thorium-230 activity for POC monitor wells NP01 and RPI-19B, respectively. The reported 2018 thorium-230 activity levels in both wells are approximately one to two orders of magnitude lower than their respective "Site Standard".

Spring Creek surface-water sampling sites and the March 2018 thorium-230 analytical results are shown on **Figure 23**. **Figure 27** presents the thorium-230 activity time-series plots for surface-water sampling locations SW-1A, SC-2 and POE-DS. The reported thorium-230 values are extremely low and some are negative. Current analytical techniques for thorium-230 activity allow reporting of negative values that indicate levels less than the detection limit. No developing trend is observed.

Total Dissolved Solids

Figure 28 is the surficial aquifer March/April 2018 Total Dissolved Solids (TDS) iso-concentration contour map. Of all the analytes monitored, TDS best reveals the primary seepage flow paths emanating from beneath the tailings impoundment. A review of **Figure 28** shows that there are three primary flow paths, which are discussed in **Section 4**.

Figure 29 presents the plots of TDS concentration versus time for monitor wells MC-14, NP01, RPI-14, RPI-18A and RPI-19B. **Figure 30** shows the time-series TDS concentration in POC well NP01. Note that TDS concentrations began increasing in 2006, peaked in 2013/2014 and then declined until recently. The TDS concentrations have been increasing for the past four quarters, which is likely due to a pulse of tailings groundwater. Likewise, **Figure 31** shows a similar TDS trend for POC well RPI-19B; however, the fluctuation has been more pronounced, which is likely attributable to the well's shallow depth, small diameter, limited saturated thickness and slow recharge rate. Overall, there appears to be an increasing TDS concentration trend in both POC wells; however, the most recent concentrations are three to four times less than their respective "Site Standard" (see **Table 1**).

Spring Creek surface-water sampling sites and the March 2018 TDS analytical results are shown on **Figure 28**. **Figure 32** presents the TDS concentration time-series plots at surface-water sampling locations SW-1A, SC-2 and POE-DS. Note that the results for SC-2 and POE-DS fluctuate for several quarters in one direction then trend the opposite direction for several quarters. Overall, the fluctuation range is between 200 and 400 mg/L TDS.

Uranium

Figure 33 is the surficial aquifer March/April 2018 uranium iso-concentration contour map. Uranium concentrations in monitor wells NP01, RPI-14 and RPI-19B started to increase in 2006 through 2013 (see **Figure 34**), but all monitor well concentrations are now stable or show declining trends from their peaks.

Figure 35 shows that the uranium concentration in POC well NP01 began increasing in 2006, peaked in 2013, and has been generally declining in a fluctuating fashion since then. Likewise, **Figure 36** shows a similar trend for POC well RPI-19B. Overall, there appears to be a decreasing uranium concentration trend in both POC wells subject to seasonal variability, with the reported 2018 concentrations being four times less than their respective "Site Standard" (see **Table 1**).

Spring Creek surface-water sampling sites and the March 2018 uranium analytical results are shown on **Figure 33**. The results are essentially the same for all five sampling locations. **Figure 37** presents the time-series plots of uranium concentration at surface-water sampling locations SW-1A, SC-2 and POE-DS. All March 2018 uranium results are less than 0.0274 mg/L.

Monitor Well P-6

Figure 38 is the time-series composite graph showing chloride, sulfate and TDS concentrations for monitor well P-6. The changes in water quality since 2005 reflects ongoing tailing seepage whereby these constituent concentrations have risen to their pre-corrective action levels. As seen on **Figure**

38, TDS and chloride concentrations increased dramatically beginning in 2006, peaking in late 2013, and have since been in fluctuating, downward trends. The TDS concentration fluctuation is more pronounced than either chloride or sulfate. Sulfate concentrations have fluctuated within a narrow range since 2009 and are now stable or in a slight downward trend. Although most of the major constituents show minor variability, present constituent concentrations are reminiscent of levels that existed prior to the commencement of Corrective Action (left side of **Figure 38**). However, the concentrations are trending downward as the transient flow model predicted, and the April 2018 TDS concentration is, for the third quarter in a row, less than the non-applicable POC "Site Standards".

Figure 39 shows the uranium time-series concentration plot for well P-6. Note that the uranium concentrations have been slowly decreasing since 2006, and appears to be stabilizing at around 1.3 mg/L or less (notable exception is the July 2016 result, which is thought to be an outlier).

4.0 Observations

A review of **Table 2** depth to water measurements indicates that overall the water levels declined this reporting period for the fourth quarter in a row.

A review of **Table 3** analytical results reveals than none of the 16 "Site Standard" parameters listed on **Table 1** were exceeded by any of the 14 monitor wells this reporting period.

The historical water quality data indicates that there are three primary seepage flow paths emanating from the tailings impoundment. **Figure 28** (TDS map) best depicts the approximate flow path locations. The northern most seepage flow path is centered around monitor well MC-10, the center flow path around NP01, RPI-16A and RPI-18A, and the southern flow path around P-6, RPI-10, RPI-8A and RPI-21B.

5.0 Conclusions

All **Table 1** ACL constituent concentrations for both POC wells were reported at levels less than their respective method detection limits or at levels significantly less (sometimes by an order of magnitude) than the corresponding "Site Standard" during this reporting period.

The water-quality data in some monitor wells seems to reflect significant seasonal recharge/discharge influences that appear to sometimes cause fairly-large swings in constituent concentrations. However, the **Table 3** groundwater constituent concentrations, in all 14 monitor wells, are all less than the highest corresponding "Site Standard" (the two POC wells have differing ACLs).

In summary, PMC's groundwater monitoring program is compliant with all monitor well Point-of-Compliance "Site Standards" this reporting period. Additionally, surface water quality measured at the downstream "Point-of-Exposure" monitoring site (POE-DS) indicates no deleterious effects from groundwater tailings seepage.

Table 1 - Groundwater Protection Standards for Point-of-Compliance Monitor Wells

Constituent	Units	POC Well NP01 Site Standard	*Well NP01 Analytical Results	POC Well RPI-19B Site Standard	*Well RPI-19B Analytical Results
Arsenic	mg/L	0.05	0.002	0.05	<0.001
Barium	mg/L	1.00	0.06	1.00	0.08
Beryllium	mg/L	0.02	<0.001	0.02	<0.001
Cadmium	mg/L	0.01	<0.001	0.01	<0.001
Chromium	mg/L	0.05	<0.005	0.05	<0.005
Gross Alpha	pCi/L	15.0	1.10	15.0	0.60
Lead	mg/L	0.05	<0.001	0.05	0.003
Molybdenum	mg/L	0.10	<0.001	0.10	0.001
Nickel	mg/L	0.05	0.005	0.05	0.013
Radium 226+228	pCi/L	12.70	2.30	13.76	1.20
Selenium	mg/L	0.158	0.004	0.163	0.003
Thorium-230	pCi/L	5.53	0.20	5.76	0.03
Uranium	mg/L	4.40	0.947	4.45	1.060
Chloride	mg/L	3,275	1,060	3,712	1,020
TDS	mg/L	11,529	3,830	12,641	3,530
Sulfate	mg/L	4,612	1,050	5,056	984

* = Analytical Results for March 2018 sampling event.

POC = Point-of-Compliance

Table 2 - Field Measurements (Page 1 of 3)

Sample Location	Date	Well Depth (ft.)	Depth to Water (ft.)	Water Level Elevation (ft. amsl)	pH	Conductivity uS/cm
Groundwater						
MC-7	3/23/2017	39.6	12.28	7,037.33	7.87	1,038
MC-7	5/15/2017	39.6	11.92	7,037.69	7.66	1,851
MC-7	7/17/2017	39.6	12.13	7,037.48	7.52	1,947
MC-7	10/19/2017	39.6	12.78	7,036.83	7.57	1,517
MC-7	1/18/2018	39.6	13.19	7,036.42	7.92	1,284
MC-7	4/25/2018	39.6	12.39	7,037.22	7.94	1,453
MC-10	3/23/2017	33.5	14.52	7,038.08	7.28	3,890
MC-10	5/15/2017	33.5	13.40	7,039.20	6.84	5,960
MC-10	7/17/2017	33.5	13.65	7,038.95	6.95	6,090
MC-10	10/19/2017	33.5	14.48	7,038.12	6.83	5,380
MC-10	1/18/2018	33.5	15.06	7,037.54	7.29	4,740
MC-10	4/25/2018	33.5	15.42	7,037.18	7.56	4,430
MC-11	3/23/2017	56.5	14.20	7,042.31	7.94	1,229
MC-11	5/15/2017	56.5	12.93	7,043.58	7.79	1,626
MC-11	7/17/2017	56.5	12.62	7,043.89	7.79	1,527
MC-11	10/19/2017	56.5	13.23	7,043.28	7.97	1,466
MC-11	1/18/2018	56.5	14.1	7,042.41	7.98	1,436
MC-11	4/25/2018	56.5	14.63	7,041.88	8.13	1,449
MC-14	3/23/2017	60.2	27.28	7,057.43	8.14	574
MC-14	5/15/2017	60.2	26.43	7,058.28	8.18	793
MC-14	7/17/2017	60.2	26.28	7,058.43	8.11	702
MC-14	10/19/2017	60.2	26.38	7,058.33	8.43	654
MC-14	1/18/2018	60.2	26.61	7,058.10	8.54	654
MC-14	4/25/2018	60.2	27.3	7,057.41	9.06	620
NP01	3/14/2017	26.9	13.56	7,038.25	7.03	4,150
NP01	5/5/2017	26.9	12.23	7,039.58	7.08	3,890
NP01	7/12/2017	26.9	12.76	7,039.05	7.02	4,320
NP01	10/5/2017	26.9	13.42	7,038.39	7.06	4,560
NP01	1/4/2018	26.9	13.86	7,037.95	7.30	4,730
NP01	3/8/2018	26.9	14.07	7,037.74	7.05	5,280
P-6	3/23/2017	29.72	21.25	7,036.95	6.71	7,590
P-6	5/15/2017	29.72	20.68	7,037.52	6.33	12,400
P-6	7/17/2017	29.72	21.04	7,037.16	6.34	11,770
P-6	10/19/2017	29.72	21.72	7,036.48	6.68	10,440
P-6	1/18/2018	29.72	22.15	7,036.05	6.57	9,310
P-6	4/25/2018	29.72	22.39	7,035.81	6.71	9,860
RPI-8A	2/28/2017	14.44	10.59	7,028.81	7.66	1,672
RPI-8A	5/4/2017	14.44	10.25	7,029.15	7.83	2,340
RPI-8A	7/11/2017	14.44	10.28	7,029.12	7.50	2,160
RPI-8A	10/4/2017	14.44	10.45	7,028.95	7.89	2,060
RPI-8A	1/3/2018	14.44	10.61	7,028.79	8.86	1,972
RPI-8A	3/6/2018	14.44	10.71	7,028.69	7.73	2,060
RPI-10	2/28/2017	25.39	15.53	7,033.88	7.24	5,810
RPI-10	5/4/2017	25.39	14.93	7,034.48	6.73	8,410
RPI-10	7/11/2017	25.39	14.89	7,034.52	7.16	7,580
RPI-10	10/4/2017	25.39	15.28	7,034.13	6.83	7,360
RPI-10	1/3/2018	25.39	15.57	7,033.84	7.62	7,470
RPI-10	3/7/2018	25.39	15.77	7,033.64	7.65	7,680

Table 2 - Field Measurements (Page 2 of 3)

Sample Location	Date	Well Depth	Depth to Water (ft.)	Water Level Elevation	pH	Conductivity uS/cm
RPI-14	5/5/2017	11.83	7.03	7,034.87	7.62	3,650
RPI-14	7/12/2017	11.83	7.24	7,034.66	7.55	3,650
RPI-14	10/5/2017	11.83	7.38	7,034.52	7.49	3,580
RPI-14	1/4/2018	11.83	7.44	7,034.46	8.13	3,620
RPI-14	3/8/2018	11.83	7.59	7,034.31	7.56	3,570
RPI-16A	3/14/2017	20.95	10.92	7,036.68	7.08	4,440
RPI-16A	5/5/2017	20.95	10.15	7,037.45	7.06	6,120
RPI-16A	7/12/2017	20.95	10.39	7,037.21	7.01	6,020
RPI-16A	10/5/2017	20.95	10.87	7,036.73	6.97	5,600
RPI-16A	1/4/2018	20.95	11.15	7,036.45	7.44	5,500
RPI-16A	3/8/2018	20.95	11.36	7,036.24	7.06	5,630
RPI-18A	3/14/2017	10.68	3.45	7,028.40	7.33	4,620
RPI-18A	5/5/2017	10.68	4.10	7,027.75	7.12	5,960
RPI-18A	7/12/2017	10.68	6.00	7,025.85	7.02	6,030
RPI-18A	10/5/2017	10.68	5.72	7,026.13	7.42	6,260
RPI-18A	1/4/2018	10.68	5.41	7,026.44	7.01	6,130
RPI-18A	4/5/2018	10.68	4.82	7,027.03	6.98	5,940
RPI-19B	2/28/2017	15.27	10.12	7,036.69	6.98	4,080
RPI-19B	5/5/2017	15.27	9.52	7,037.29	6.82	5,480
RPI-19B	7/12/2017	15.27	10.20	7,036.61	7.01	3,620
RPI-19B	10/4/2017	15.27	10.43	7,036.38	7.17	3,120
RPI-19B	1/3/2018	15.27	10.74	7,036.07	7.26	4,450
RPI-19B	3/8/2018	15.27	10.92	7,035.89	6.82	4,930
RPI-20A	3/13/2017	7.83	5.80	7,025.81	7.71	3,930
RPI-20A	5/4/2017	7.83	5.77	7,025.84	7.32	5,150
RPI-20A	7/11/2017	7.83	7.40	7,024.21	7.51	4,290
RPI-20A	10/5/2017	7.83	Dry	---	---	---
RPI-20A	1/3/2018	7.83	7.00	7,024.61	7.86	4,710
RPI-20A	3/7/2018	7.83	7.00	7,024.61	7.04	4,820
RPI-21B	2/28/2017	16.11	10.46	7,026.18	7.57	3,780
RPI-21B	5/4/2017	16.11	9.90	7,026.74	7.27	5,420
RPI-21B	7/11/2017	16.11	10.07	7,026.57	7.16	4,930
RPI-21B	10/4/2017	16.11	10.21	7,026.43	7.50	4,690
RPI-21B	1/3/2018	16.11	10.38	7,026.26	9.80	4,500
RPI-21B	3/6/2018	16.11	10.57	7,026.07	7.98	4,570

Table 2 - Field Measurements (Page 3 of 3)

Sample Location	Date	pH	Conductivity uS/cm
Surface Water			
SC-1	3/13/2017	8.53	367
SC-1	5/2/2017	8.24	742
SC-1	7/6/2017	8.66	373
SC-1	10/2/2017	8.25	422
SC-1	1/17/2018	7.98	459
SC-1	3/14/2018	7.87	555
SC-2	3/13/2017	8.52	357
SC-2	5/2/2017	8.21	729
SC-2	7/6/2017	8.65	374
SC-2	10/2/2017	8.04	426
SC-2	1/17/2018	7.91	382
SC-2	3/14/2018	7.56	533
SW-1A	3/14/2017	8.52	338
SW-1A	5/2/2017	8.61	687
SW-1A	7/6/2017	8.56	332
SW-1A	10/2/2017	9.78	402
SW-1A	1/17/2018	9.62	429
SW-1A	3/14/2018	8.75	416
POE-DS	3/13/2017	8.43	364
POE-DS	5/2/2017	8.25	762
POE-DS	7/6/2017	8.65	391
POE-DS	10/2/2017	8.11	434
POE-DS	1/17/2018	7.64	460
POE-DS	3/14/2018	7.72	532
WEIR-2	3/13/2017	8.53	337
WEIR-2	5/2/2017	8.18	712
WEIR-2	7/6/2017	8.48	374
WEIR-2	10/2/2017	8.48	431
WEIR-2	1/17/2018	7.81	469
WEIR-2	3/14/2018	7.71	534

Table 3 - Monitor Well Analytical Results (Page 1 of 2)

Monitor Well	Collection Date	Cl (mg/L)	NO3-T (mg/L)	SO4 (mg/L)	TDS (mg/L)	As-D (mg/L)	Ba-D (mg/L)	Be-D (mg/L)	Cd-D (mg/L)	Cr-D (mg/L)	Pb-D (mg/L)	Mo-D (mg/L)	Ni-D (mg/L)	Se-D (mg/L)	U-D (mg/L)	Gross Alpha-D (pCi/L)	Gross Alpha (MDC)-D (pCi/L)	Ra226-D (pCi/L)	Ra226 (MDC)-D (pCi/L)	Ra228-D (pCi/L)	Ra228 (MDC)-D (pCi/L)	Ra226+228 (pCi/L)	Th230-D (pCi/L)	Th230 (MDC)-D (pCi/L)
MC-7	3/23/17	140	2.1	192	776	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	0.004	0.265	2.3	1.7	0.59	0.18	2.4	1.8	2.99	0.4	0.3
MC-7	5/15/17	253	1.89	288	1110	0.001	0.08	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	0.004	0.344	0.5	1.2	0.6	0.2	0.9	1.9	1.5	-0.01	0.2
MC-7	7/17/17	253	2.38	388	1420	0.002	0.11	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	0.007	0.424	1.3	0.4	0.6	0.2	1.8	1.5	2.4	0.2	0.1
MC-7	10/19/17	163	1.87	250	983	0.001	0.07	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	0.004	0.414	1.1	0.6	0.8	0.3	2.1	1.8	2.9	0.06	0.1
MC-7	1/18/18	150	1.85	216	832	0.001	0.06	<0.001	<0.001	<0.005	0.002	0.002	<0.005	0.004	0.332	2.2	0.6	1.6	0.1	1.6	1.3	3.2	0.2	0.1
MC-7	4/25/18	192	1.85	276	996	<0.001	0.07	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.005	0.39	2.0	0.5	0.6	0.2	1.8	1.3	2.4	-0.007	0.2
MC-10	3/23/17	951	1.8	589	2840	0.001	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.011	0.258	4.7	1.7	1.6	0.17	1.6	1.7	3.2	0.2	0.2
MC-10	5/15/17	1210	2.49	779	3530	0.001	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.016	0.356	1.7	1.1	1.5	0.2	1.6	1.8	3.1	0.06	0.1
MC-10	7/17/17	1200	2.97	815	4010	0.003	0.07	<0.001	0.001	<0.005	<0.001	<0.001	0.012	0.021	0.415	1.6	0.4	1.1	0.2	1.8	1.5	2.9	0.03	0.1
MC-10	10/19/17	1110	2.48	757	3600	0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.015	0.455	3.4	0.7	1.8	0.3	3.8	1.7	5.6	0.2	0.1
MC-10	1/18/18	1030	2.07	693	3140	0.001	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.014	0.343	8.4	0.6	7.4	0.1	1.3	1.3	8.7	0.06	0.2
MC-10	4/25/18	991	1.71	624	2910	0.001	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.012	0.303	4.0	0.5	1.8	0.2	2.2	1.6	4.0	0.1	0.2
MC-11	3/23/17	332	<0.05	33	870	0.001	0.11	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0423	6.3	1.7	3.9	0.17	1.7	1.8	5.6	0.08	0.2
MC-11	5/15/17	347	<0.05	34	864	0.001	0.13	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0484	5.2	1.2	5.3	0.2	2.8	1.9	8.1	0.01	0.2
MC-11	7/17/17	315	<0.05	31	898	0.002	0.13	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.002	0.0475	4.3	0.4	4.1	0.4	2.0	1.7	6.1	0.03	0.1
MC-11	10/19/17	335	<0.05	32	848	0.001	0.13	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0512	5.9	0.6	4.6	0.3	3.3	1.8	7.9	0.03	0.1
MC-11	1/18/18	353	0.03	35	864	0.001	0.13	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0486	8.2	0.6	8.6	0.1	3.0	1.3	11.6	0.09	0.1
MC-11	4/25/18	356	0.03	35	891	<0.001	0.12	<0.001	<0.001	<0.005	0.001	<0.001	<0.005	<0.001	0.0508	6.1	0.5	3.5	0.2	2.8	1.3	6.3	0.06	0.1
MC-14	3/23/17	11	0.1	29	350	0.003	<0.05	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	<0.001	0.0755	1.8	1.7	0.87	0.18	0.6	1.9	1.5	0.1	0.2
MC-14	5/15/17	45	0.12	26	401	0.003	0.06	<0.001	0.002	<0.005	<0.001	<0.001	<0.005	<0.001	0.0788	2.4	1.2	0.7	0.2	2.1	1.9	2.8	-0.007	0.1
MC-14	7/17/17	39	0.12	24	402	0.003	0.06	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	<0.001	0.0760	1.2	0.4	0.3	0.2	1.8	1.5	2.1	0.05	0.1
MC-14	10/19/17	14	0.14	24	346	0.003	0.06	<0.001	<0.001	<0.005	<0.001	0.002	<0.005	<0.001	0.0856	1.7	0.6	0.9	0.3	1.6	1.8	2.5	0.08	0.2
MC-14	1/18/18	39	0.14	40	407	0.002	0.05	<0.001	0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0941	11.6	0.6	10.9	0.1	1.0	1.4	11.9	0.2	0.2
MC-14	4/25/18	14	0.12	31	356	0.003	<0.05	<0.001	0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0897	1.6	0.5	0.6	0.2	1.9	1.4	2.5	0.2	0.2
NP01	3/14/17	1020	3.1	946	3800	0.002	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.003	0.936	7.2	3.2	0.93	0.13	1.4	1.9	2.3	0.2	
NP01	5/5/17	722	2.02	439	2530	0.002	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	0.005	0.005	0.549	3.5	1.7	0.6	0.2	1.0	1.0	1.6	0.03	0.1
NP01	7/12/17	756	3.44	657	3200	0.003	0.07	<0.001	<0.001	<0.005	0.003	0.001	0.006	0.009	0.764	1.1	0.9	0.7	0.2	2.5	1.4	3.2	0.06	0.2
NP01	10/5/17	788	3.84	779	3250	0.003	0.07	<0.001	<0.001	<0.005	<0.001	0.001	0.015	0.008	0.958	0.6	0.7	0.6	0.2	2.8	1.7	3.4	0.1	0.2
NP01	1/4/18	927	3.4	927	3510	0.003	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.006	0.929	1.4	0.6	0.6	0.2	1.8	1.3	2.4	0.2	0.1
NP01	3/8/18	1060	2.76	1050	3830	0.002	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	0.005	0.004	0.947	1.1	0.6	0.8	0.2	1.5	1.2	2.3	0.2	0.2
P-6	3/23/17	2720	2.6	1490	8120	0.003	0.05	<0.001	0.001	<0.005	<0.001	<0.001	<0.005	0.009	1.18	4.0	3.5	1.6	0.16	1.8	1.7	3.4	0.3	0.2
P-6	5/15/17	3160	2.04	1570	8980	0.004	0.07	<0.001	0.002	<0.005	<0.001	<0.001	0.015	0.009	1.33	2.3	1.2	1.5	0.2	1.9	2.3	3.4	0.1	0.2
P-6	7/17/17	3000	1.59	1470	**11900**	0.006	0.08	<0.001	0.003	<0.005	<0.001	<0.001	0.022	0.014	1.23	1.5	1.3	1.3	0.2	3.7	1.3	5.0	0.1	0.2
P-6	10/19/17	2690	2.17	1430	8840	0.004	0.07	<0.001	0.002	<0.005	<0.001	<0.001	0.016	0.010	1.33	2.2	0.6	2.0	0.3	4.6	1.9	6.6	0.2	0.2
P-6	1/18/18	2670	2.53	1580	7690	0.005	0.07	<0.001	0.001	<0.005	<0.001	<0.001	0.016	0.013	1.23	6.8	0.6	4.9	0.2	2.4	1.4	7.3	0.3	0.3
P-6	4/25/18	2970	2.07	1510	8680	0.003	0.06	<0.001	0.002	<0.005	<0.001	<0.001	0.019	0.009	1.17	4.4	0.5	1.2	0.2	2.0	1.2	3.2	0.4	0.3
RPI-8A	2/28/17	396	1.2	335	1510	<0.001	0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.002	0.315	1.9	1.3	0.50	0.24	1.0	1.9	1.5	0.1	
RPI-8A	5/4/17	394	1.12	317	1640	0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.004	0.374	3.9	1.6	0.5	0.1	1.7	1.9	2.2	0.05	0.2
RPI-8A	7/11/17	362	1.08	284	1640	<0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.004	0.361	1.0	0.4	0.3	0.2	0.4	1.9	0.7	0.007	0.1
RPI-8A	10/4/17	371	1.07	279	1510	0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.003	0.373	2.0	0.7	0.7	0.2	2.2	1.9	2.9	0.04	0.2
RPI-8A	1/3/18	407	1.07	285	1390	0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.003	0.308	1.9	0.6	1.7	0.2	2.8	1.4	4.5	0.07	0.2
RPI-8A	3/6/18	400	1.08	288	1420	0.001	0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.002	0.346	1.0	0.4	0.4	0.2	0.9	1.2	1.3	0.05	0.1
RPI-10	2/28/17	1920	2.1	1010	5900	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.006	0.009	1.24	4.0	1.3	0.43	0.23	2.4	1.8	2.8	0.2	
RPI-10	5/4/17	1920	2.04	1060	7240	0.002	<0.05	<0.001	<0.001	<0.005	0.001	<0.001	0.016	0.011	1.44	7.9	1.7	0.6	0.1	1.9	1.7	2.5	0.07	0.1
RPI-10	7/11/17	1790	2.17	982	7070	<0.001	<0.05	<0.001	<0.001	<0.005	0.001	<0.001	0.008	0.012	1.380	1.4	0.4	0.5	0.2	2.0	1.8	2.5	0.03	0.1
RPI-10	10/4/17	1800	1.87	1030	6490	<0.001	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	0.011	0.009	1.490	1.5	0.7	0.7	0.2	4.5	1.8	5.2	0.06	0.2
RPI-10	1/3/18	2040	1.77	1130	6020	0.001	<0.05	<0.001	<0.001	<0.005	0.003	<0.001	0.008	0.014	1.270	1.2	0.6	1.0	0.2	2.6	1.5	3.6	0.09	0.1
RPI-10	4/5/18	2240	9.2	1070	6300	0.005	<0.05	<0.001	<0.001	<0.005	0.006	<0.001	0.025	0.009	1.330	2.3	0.5	1.5	0.2	3.4	1.3	4.9	0.20	0.1
RPI-14	3/14/17	594	0.7	575	2360	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.601	5.4	1.6	0.25	0.13	1.8	2.0	2.1	0.2	
RPI-14	5/5/17	580	0.57	541	2510	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.007	0.003	0.603	2.4	1.7	0.1	0.2	2.6	1.0	2.7	0.03	0.1
RPI-14	7/12/17	586	0.42	546	2620	0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.006	0.003	0.559	1.2	0.9	0.2	0.2	0.8	1.8	1.0	0.01	0.2
RPI-14	10/5/17	658	0.54	597	2550	0.002	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.013	0.003	0.576	1.1	0.7	0.8	0.2	2.0	1.8	2.8	0.1	0.2
RPI-14	1/4/18	672	0.37	633	2540	0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.005	0.001	0.376	0.9	0.6	1.1	0.2	3.0	1.4	4.1	0.1	0.1
RPI-14	3/8/18	676	0.34	619	2400	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.53	0.6	0.6	0.3	0.2	1.0	1.2	1.3	0.02	0.2
RPI-16A	3/14/17	1030	8.2	1140	4180	0.003	<0.05	<0.001	<0.001	<0.005	0.003	<0.001	<0.005	0.009	1.80	3.6	3.2	0.60	0.12	0.8	1.9	1.4	0.2	

Table 3 - Monitor Well Analytical Results (Page 2 of 2)

Monitor Well	Collection Date	Cl (mg/L)	NO3-T (mg/L)	SO4 (mg/L)	TDS (mg/L)	As-D (mg/L)	Ba-D (mg/L)	Be-D (mg/L)	Cd-D (mg/L)	Cr-D (mg/L)	Pb-D (mg/L)	Mo-D (mg/L)	Ni-D (mg/L)	Se-D (mg/L)	U-D (mg/L)	Gross Alpha-D (pCi/L)	Gross Alpha (MDC)-D (pCi/L)	Ra226-D (pCi/L)	Ra226 (MDC)-D (pCi/L)	Ra228-D (pCi/L)	Ra228 (MDC)-D (pCi/L)	Ra226+228 (pCi/L)	Th230-D (pCi/L)	Th230 (MDC)-D (pCi/L)
RPI-16A	5/5/17	1030	7.6	1110	4280	0.004	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	0.011	0.013	1.85	2.9	1.7	0.5	0.2	1.6	1.1	2.1	1.3	0.1
RPI-16A	7/12/17	1010	7.3	1080	4630	0.005	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.007	0.015	1.75	1.2	0.9	0.4	0.2	0.2	1.4	0.6	0.01	0.2
RPI-16A	10/5/17	992	6.9	1060	4190	0.005	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	0.019	0.013	2.04	1.3	0.7	0.3	0.2	1.7	1.7	2.0	0.09	0.2
RPI-16A	1/4/18	1140	7.0	1220	4390	0.003	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	0.006	0.011	1.86	0.5	0.6	0.4	0.2	2.2	1.3	2.6	0.06	0.2
RPI-16A	3/8/18	1150	7.15	1220	4230	0.003	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	<0.005	0.009	1.78	0.9	0.6	0.3	0.2	0.9	1.2	1.2	0.09	0.2
RPI-18A	3/14/17	1150	0.1	1120	4020	0.002	<0.05	<0.001	<0.001	<0.005	<0.001	0.003	0.009	<0.002	0.323	5.7	3.2	1.9	0.13	0.9	1.9	2.8	0.2	
RPI-18A	5/5/17	1110	0.08	1050	4120	0.002	<0.05	<0.001	<0.001	<0.005	<0.001	0.002	0.017	0.003	0.290	3.4	1.7	0.4	0.2	1.2	1.1	1.6	0.2	0.2
RPI-18A	7/12/17	1130	0.06	1020	4600	0.003	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.011	0.004	0.175	0.04	0.4	0.3	0.1	1.2	1.3	1.5	0.04	0.1
RPI-18A	10/5/17	1330	0.26	1140	4400	0.003	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.019	0.004	0.171	0.3	0.7	0.6	0.2	0.7	1.7	1.3	0.05	0.09
RPI-18A	1/4/18	1410	0.03	1210	4310	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.001	0.349	1.3	0.6	0.6	0.2	2.0	1.4	2.6	0.07	0.2
RPI-18A	4/5/18	1370	0.01	1200	4450	0.004	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.009	0.002	0.275	2.9	0.6	3.3	0.2	1.4	1.3	4.7	0.8	0.1
RPI-19B	2/28/17	1010	0.3	828	3750	<0.001	0.07	<0.001	<0.001	<0.005	<0.001	0.001	0.011	0.003	0.932	1.3	1.3	0.43	0.23	0.2	1.8	0.6	0.2	
RPI-19B	5/5/17	1030	0.14	769	3820	0.001	0.07	<0.001	<0.001	<0.005	<0.001	0.002	0.017	0.003	0.912	2.1	1.7	0.4	0.2	1.4	1	1.8	0.08	0.2
RPI-19B	7/12/17	583	0.09	543	2640	0.002	0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.011	0.003	0.612	1.1	0.9	0.4	0.2	1.3	1.4	1.7	0.06	0.1
RPI-19B	10/4/17	562	0.36	469	2240	0.001	0.06	<0.001	<0.001	<0.005	<0.001	0.002	0.008	0.003	0.629	0.9	0.7	0.4	0.2	-0.3	2.1	0.4	0.04	0.1
RPI-19B	1/3/18	950	0.29	805	3450	0.002	0.07	<0.001	<0.001	<0.005	<0.001	0.002	0.012	0.008	0.828	1.4	0.6	0.6	0.2	1.4	1.2	2.0	0.1	0.2
RPI-19B	3/8/18	1020	0.36	984	3530	<0.001	0.08	<0.001	<0.001	<0.005	0.003	0.001	0.013	0.003	1.06	0.6	0.6	0.4	0.2	0.8	1.2	1.2	0.03	0.2
RPI-20A	3/13/17	978	0.02	1010	3430	0.006	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.006	0.003	0.265	7.5	1.6	0.47	0.13	2.7	1.6	3.2	0.2	
RPI-20A	5/4/17	913	<0.05	1020	3580	0.006	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	0.006	0.007	0.434	3.2	1.7	0.4	0.1	0.9	1.8	1.3	0.09	0.2
RPI-20A	7/11/17	793	<0.05	871	3300	0.009	<0.05	<0.001	<0.001	<0.005	<0.001	0.002	0.008	0.004	0.333	1.1	0.4	0.5	0.2	0.7	1.7	1.2	0.1	0.1
RPI-20A	10/4/17	Dry																						
RPI-20A	1/3/18	951	0.1	977	3410	0.007	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.009	0.254	0.9	0.6	0.6	0.2	2.5	1.3	3.1	0.2	0.2
RPI-20A	4/5/18	1010	0.1	978	3470	0.011	<0.05	<0.001	<0.001	<0.005	<0.001	0.00	<0.005	0.005	0.342	1.5	0.5	1.0	0.2	1.7	1.4	2.7	0.1	0.1
RPI-21B	2/28/17	1040	3.2	701	3410	<0.001	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	0.007	0.009	0.844	4.1	1.3	0.93	0.24	2.1	1.9	3.0	0.10	
RPI-21B	5/4/17	1050	2.85	756	3860	0.002	0.06	<0.001	<0.001	<0.005	<0.001	0.001	0.008	0.011	1.00	8.3	1.6	0.8	0.1	1.2	1.8	2.0	0.09	0.1
RPI-21B	7/11/17	914	2.86	677	3770	0.002	0.06	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.012	0.930	1.9	0.4	0.9	0.2	3.2	1.8	4.1	0.07	0.1
RPI-21B	10/4/17	957	2.92	711	3450	0.002	0.06	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.008	1.090	2.9	0.7	2.2	0.2	3.5	1.8	5.7	0.09	0.09
RPI-21B	1/3/18	990	2.98	743	3260	0.002	0.05	<0.001	<0.001	<0.005	<0.001	0.001	0.006	0.013	0.846	6.6	0.6	5.7	0.2	1.9	1.3	7.6	0.04	0.1
RPI-21B	3/6/18	960	3.11	741	3140	0.002	<0.05	<0.001	<0.001	<0.005	0.002	<0.001	<0.005	0.008	0.954	2.5	0.4	0.9	0.2	1.9	1.2	2.8	0.04	0.1
ACL		3,275		4,612	11,529	0.05	1.00	0.02	0.01	0.05	0.05	0.10	0.05	0.158	4.40	15.0						12.70	5.53	

Notes:

-D = Dissolved

-T = Total

Red = Value exceeds ACL

Table 4 - Surface Water Analytical Results

Monitor Well	Collection Date	Cl (mg/L)	NO3-T (mg/L)	SO4 (mg/L)	TDS (mg/L)	As-D (mg/L)	Ba-D (mg/L)	Be-D (mg/L)	Cd-D (mg/L)	Cr-D (mg/L)	Pb-D (mg/L)	Mo-D (mg/L)	Ni-D (mg/L)	Se-D (mg/L)	U-D (mg/L)	Gross Alpha-D (pCi/L)	Gross Alpha (MDC)-D (pCi/L)	Ra226-D (pCi/L)	Ra226 (MDC)-D (pCi/L)	Ra228-D (pCi/L)	Ra228 (MDC)-D (pCi/L)	Ra226+228 (pCi/L)	Th230-D (pCi/L)	Th230 (MDC)-D (pCi/L)
SC-1	3/13/2017	19	0.07	37	230	0.004	0.08	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0205	2.7	3.2	1.8	0.13	0.1	1.9	1.9	0.1	0.3
SC-1	5/2/2017	35	<0.05	87	435	0.005	0.12	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0543	1	1.7	0.5	0.2	-0.6	1.9	0.5	-0.006	0.2
SC-1	7/6/2017	6	<0.05	31	251	0.006	0.09	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0160	0.6	1.5	0.4	0.2	0.7	1.7	1.1	0.03	0.2
SC-1	10/2/2017	10	0.13	29	260	0.005	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0226	0.6	0.7	0.5	0.2	1.0	2.0	1.5	0.05	0.2
SC-1	1/17/2018	10	0.38	32	283	0.006	0.1	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0223	0.7	0.6	0.8	0.2	1.2	1.5	2.0	0.1	0.2
SC-1	3/14/2018	26	0.17	46	326	<0.001	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0274	0.8	0.6	0.6	0.1	-0.2	2.1	0.4	0.03	0.2
SC-2	3/13/2017	18	0.07	35	246	0.003	0.07	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0192	2.7	3.2	0.63	0.12	1.8	1.9	2.43	0.08	0.2
SC-2	5/2/2017	35	<0.05	89	416	0.005	0.12	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0512	1.3	1.7	0.5	0.2	2.8	2.0	3.3	0.03	0.2
SC-2	7/6/2017	6	<0.05	30	249	0.006	0.10	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0171	2.0	1.5	0.3	0.2	1.8	1.8	2.1	0.03	0.2
SC-2	10/2/2017	9	0.13	30	263	0.005	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0220	0.8	0.7	0.4	0.2	0.6	1.9	1.0	-0.02	0.2
SC-2	1/17/2018	11	0.36	32	290	0.006	0.10	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0228	0.6	0.6	0.6	0.2	1.1	1.4	1.7	0.1	0.2
SC-2	3/14/2018	23	0.16	43	330	<0.001	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0256	0.9	0.6	0.4	0.2	0.2	2.1	0.6	0.07	0.4
SW-1A	3/14/2017	4	0.2	22	243	0.004	0.07	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0179	3.2	3.2	1.2	0.13	0.8	2.0	2.0	0.03	0.2
SW-1A	5/2/2017	24	<0.05	81	399	<0.001	<0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	<0.0003	1.2	1.7	0.3	0.2	1.1	1.6	1.4	0.07	0.2
SW-1A	7/6/2017	2	<0.05	13	217	0.006	0.09	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0156	2.3	1.5	0.2	0.2	0.4	1.7	0.6	0.0008	0.2
SW-1A	10/2/2017	2	0.38	13	215	0.004	0.08	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0166	1.1	0.7	0.5	0.2	1.4	2.0	1.9	0.02	0.1
SW-1A	1/17/2018	2	0.56	14	234	0.005	0.08	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0156	0.4	0.6	0.2	0.2	0.6	1.5	0.8	0.05	0.1
SW-1A	3/14/2018	2	0.3	13	214	<0.005	0.05	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	0.001	0.0151	0.7	0.6	0.4	0.2	1.3	2.1	1.7	0.1	0.4
WEIR-2	3/13/2017	14	0.06	30	232	0.004	0.07	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0140	1.1	3.1	0.57	0.13	0.6	2.0	1.17	0.2	0.2
WEIR-2	5/2/2017	28	<0.05	80	408	0.005	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0437	1.8	1.7	0.4	0.2	0.06	1.6	0.46	0.09	0.1
WEIR-2	7/6/2017	6	<0.05	30	250	0.004	0.08	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.001	0.0159	2.2	1.5	0.3	0.2	-0.3	1.7	0.3	0.007	0.1
WEIR-2	10/2/2017	10	0.15	30	272	0.005	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0230	1.1	0.7	0.5	0.2	1.3	1.9	1.8	-0.0006	0.2
WEIR-2	1/17/2018	9	0.36	29	274	0.006	0.09	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0201	0.8	0.6	0.2	0.2	1.9	1.4	2.1	0.2	0.2
WEIR-2	3/14/2018	20	0.16	41	317	<0.007	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0248	0.9	0.6	0.4	0.1	0.6	2.0	1.0	-0.006	0.3
POE-DS	3/13/2017	19	0.06	37	258	0.004	0.07	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0217	0.8	3.2	0.60	0.13	0.3	2.0	0.9	0.3	0.2
POE-DS	5/2/2017	37	<0.05	88	447	0.005	0.13	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0496	2.7	1.7	0.4	0.2	-0.2	2	0.4	-0.003	0.2
POE-DS	7/6/2017	6	<0.05	31	259	0.006	0.10	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0168	0.8	1.5	0.3	0.2	0.2	1.8	0.5	0.1	0.2
POE-DS	10/2/2017	10	0.11	30	268	0.005	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0233	0.4	0.7	0.7	0.2	1.6	2.0	2.3	0.05	0.1
POE-DS	1/17/2018	11	0.4	32	282	0.006	0.10	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	<0.001	0.0218	0.5	0.6	0.4	0.2	1.3	1.6	1.7	0.1	0.1
POE-DS	3/14/2018	24	0.17	43	326	<0.006	0.11	<0.001	<0.001	<0.005	<0.001	0.001	<0.005	0.001	0.0267	0.9	0.6	0.3	0.1	1.2	2.0	1.5	0.07	0.2

Notes:

-D = Dissolved

-T = Total

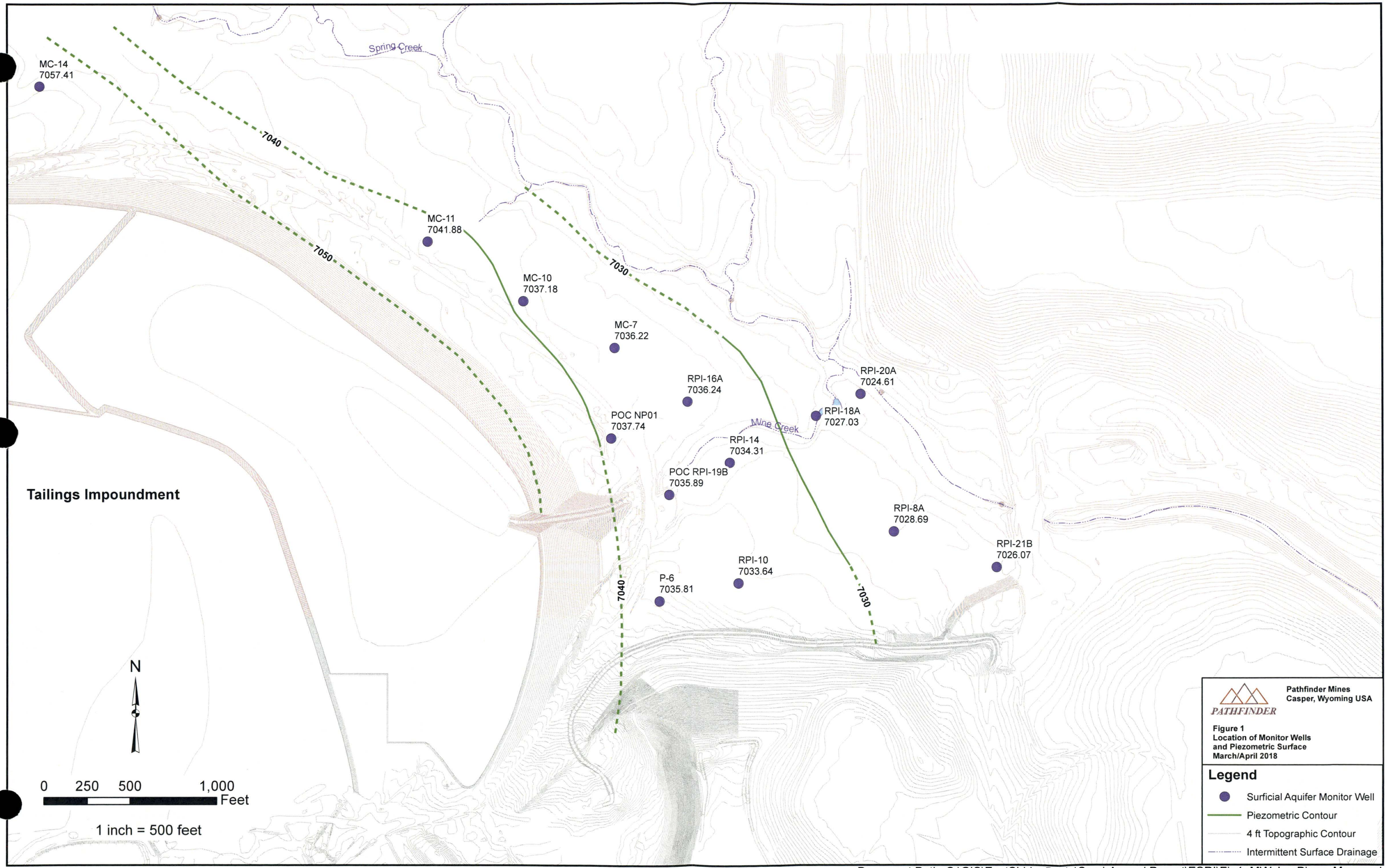

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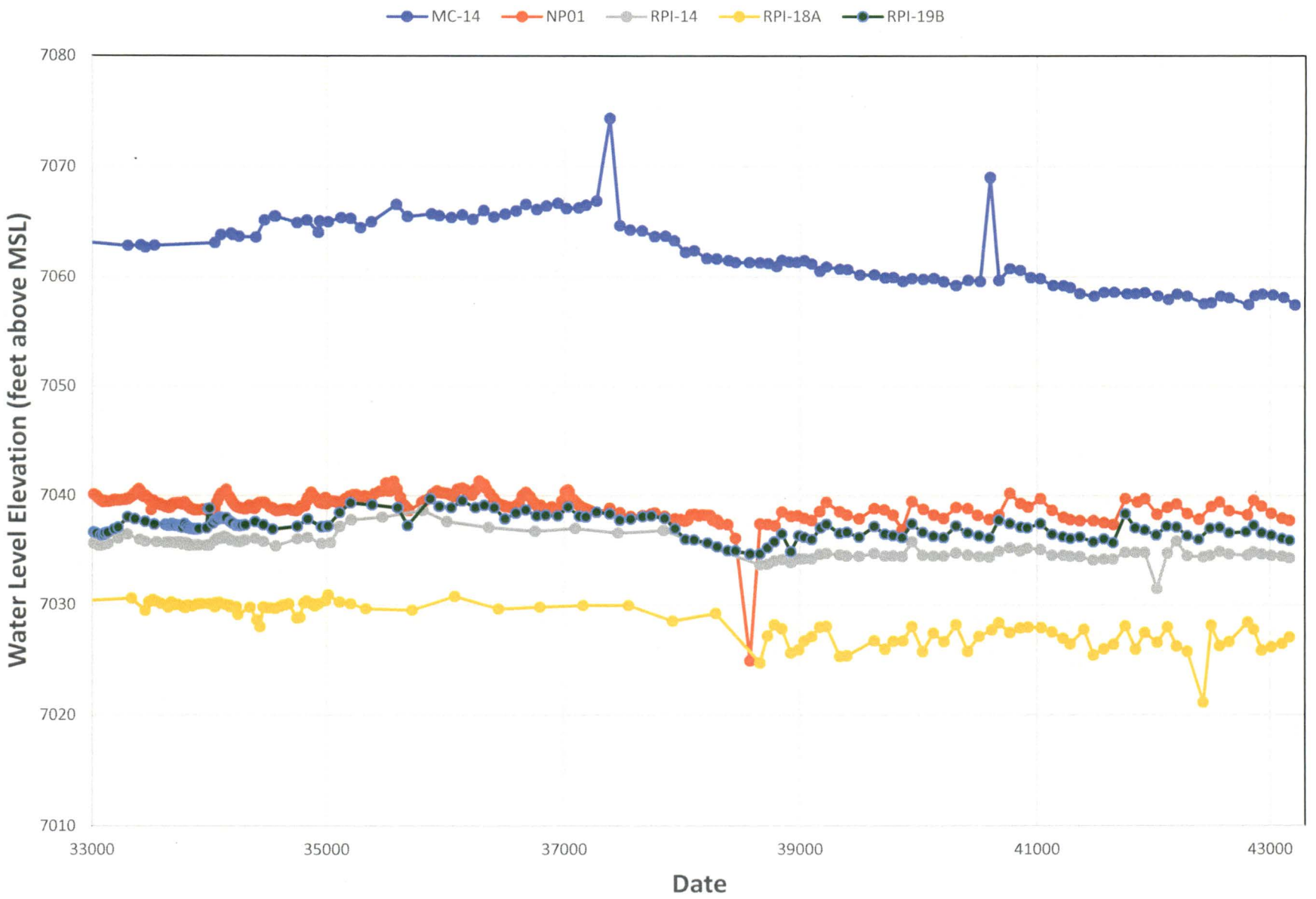
Figure 2 - Water Level Elevation vs. Time



SW-1A
2

MC-14
14

MC-11
356

MC-10
991

500

Spring Creek

WEIR #2
20

MC-7
192

RPI-16A
1150

1000

SC-2
23

RPI-20A
1010

RPI-18A
1310

POC NP01
1060

Mine Creek

RPI-14
676

POC
RPI-19B
1020

1000

500

SC-1
26

POE-DS
24

RPI-8A
400

RPI-21B
960

RPI-10
2240

2000

P-6
2970

3000

Tailings Impoundment

N

0 250 500 1,000 Feet

1 inch = 500 feet

Pathfinder Mines
Casper, Wyoming USA

PATHFINDER

Figure 3
Chloride Concentration (mg/L)
March/April 2018

Legend

- Surface Water Sampling Location
- Surficial Aquifer Monitor Well
- Chloride Contour
- 4 ft Topographic Contour
- Intermittent Surface Drainage

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Figure 4 - Chloride Concentration vs. Time

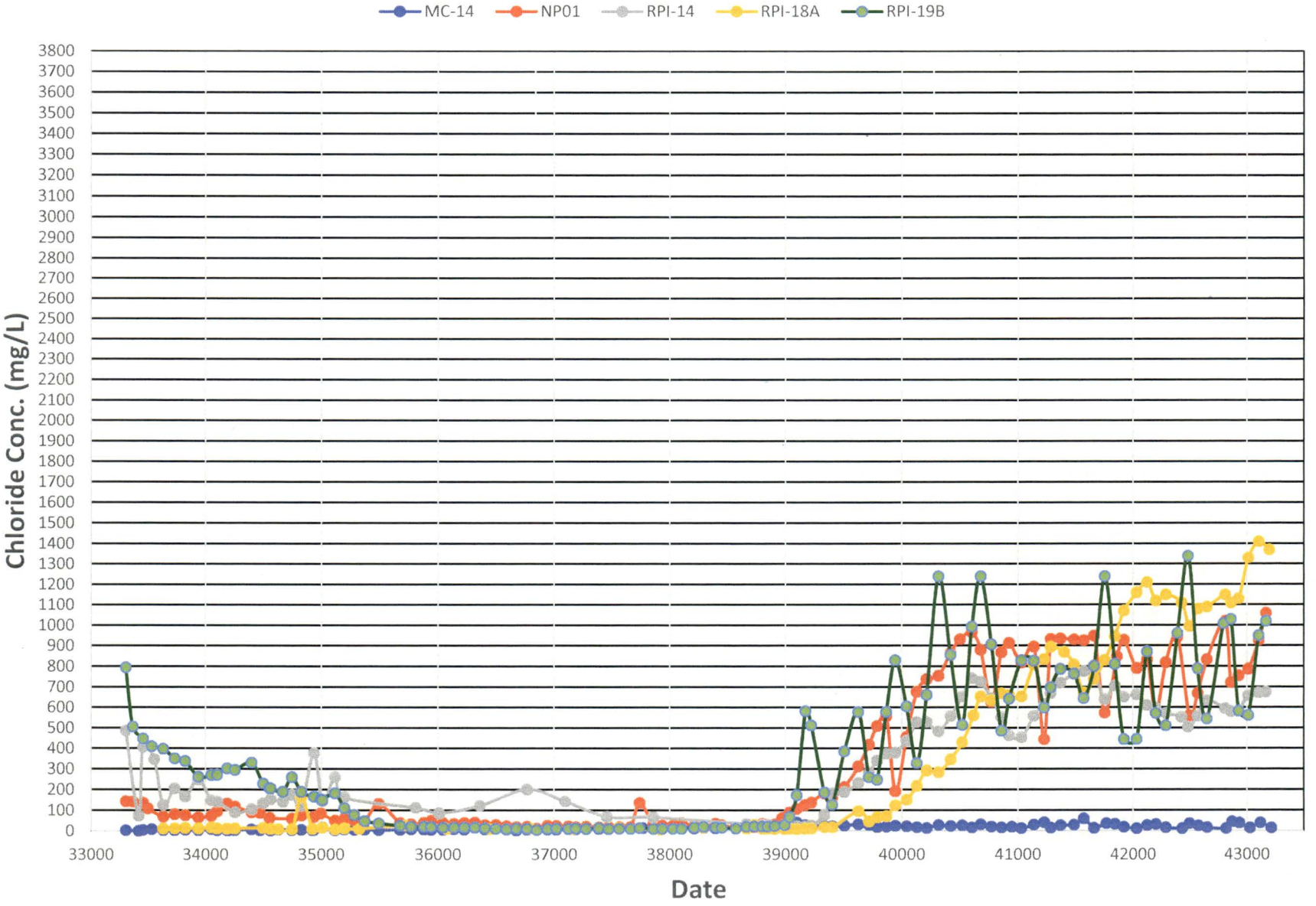


Figure 5 - Chloride Concentration vs. Time for Compliance Well NP01

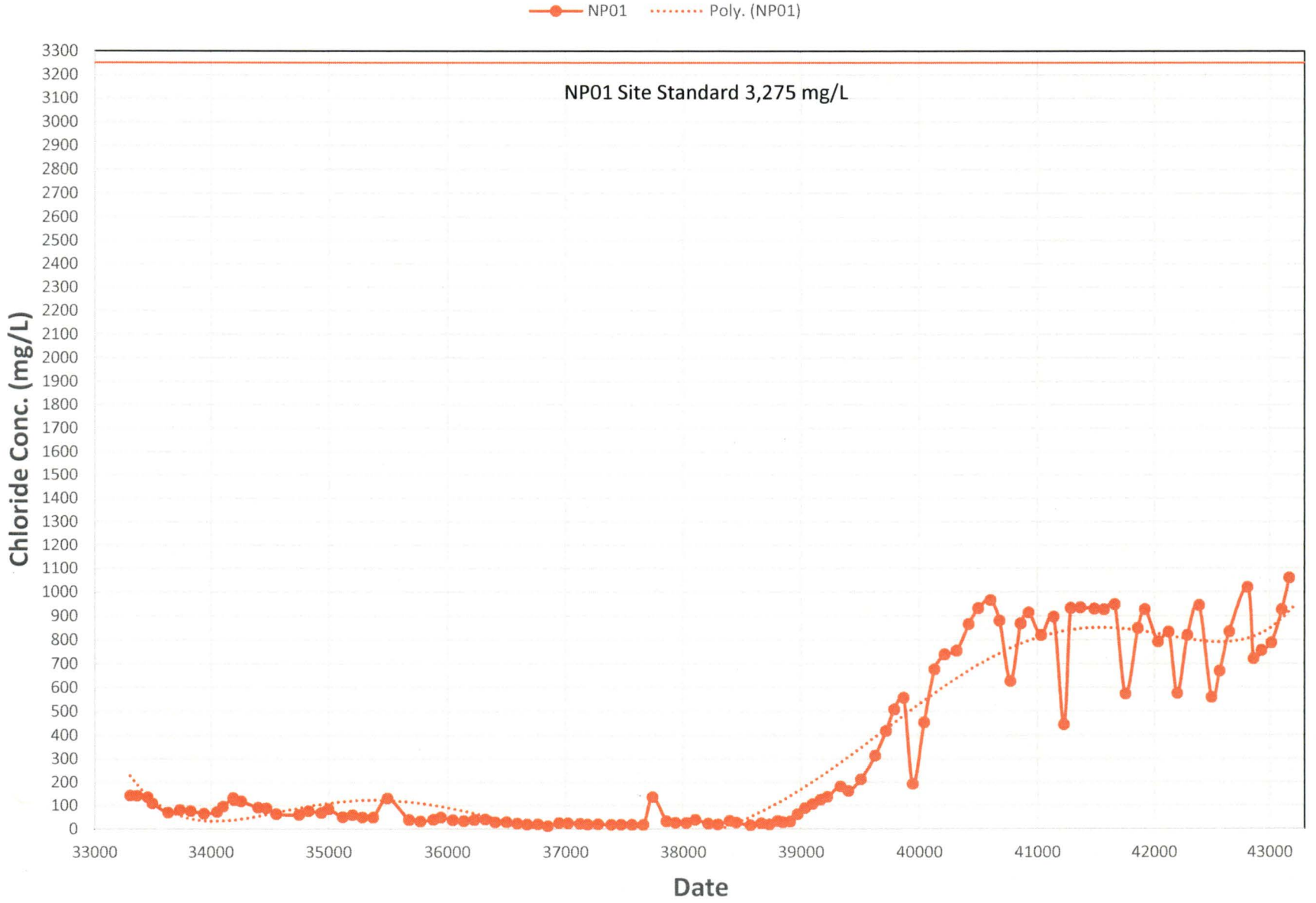


Figure 6 - Chloride Concentration vs. Time for Compliance Well RPI-19B

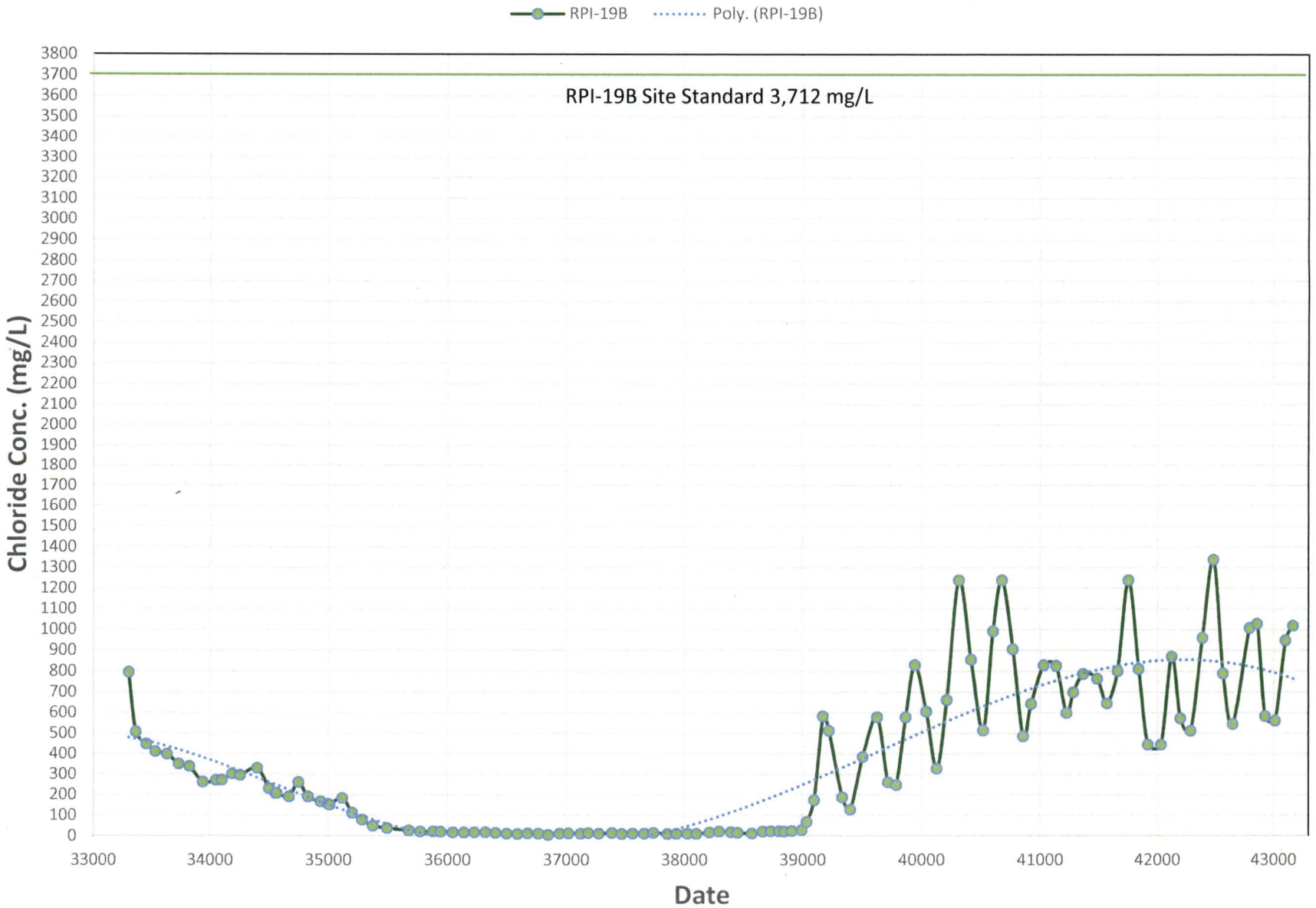
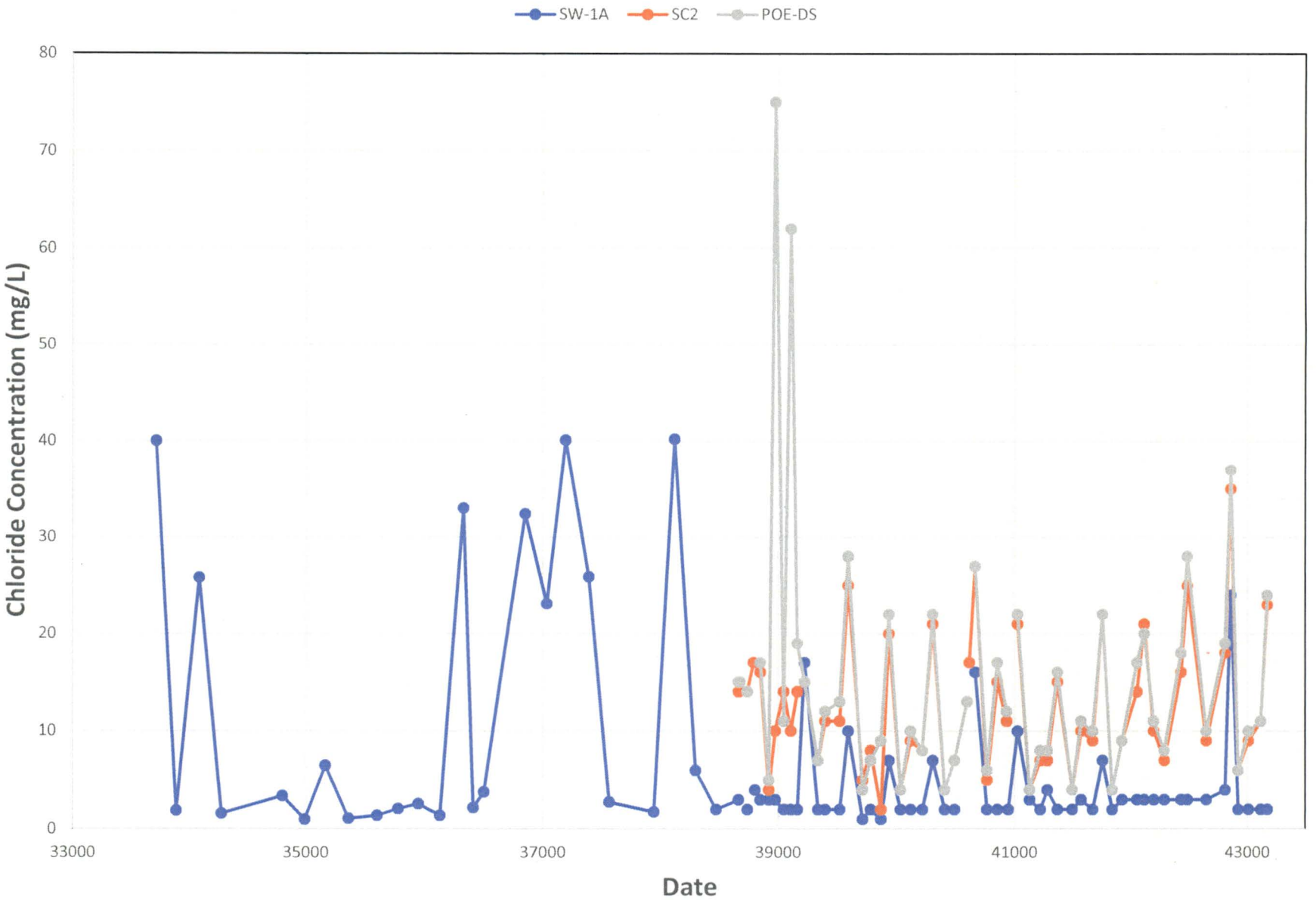


Figure 7 - Chloride Concentration vs. Time for Surface Water Sample Locations



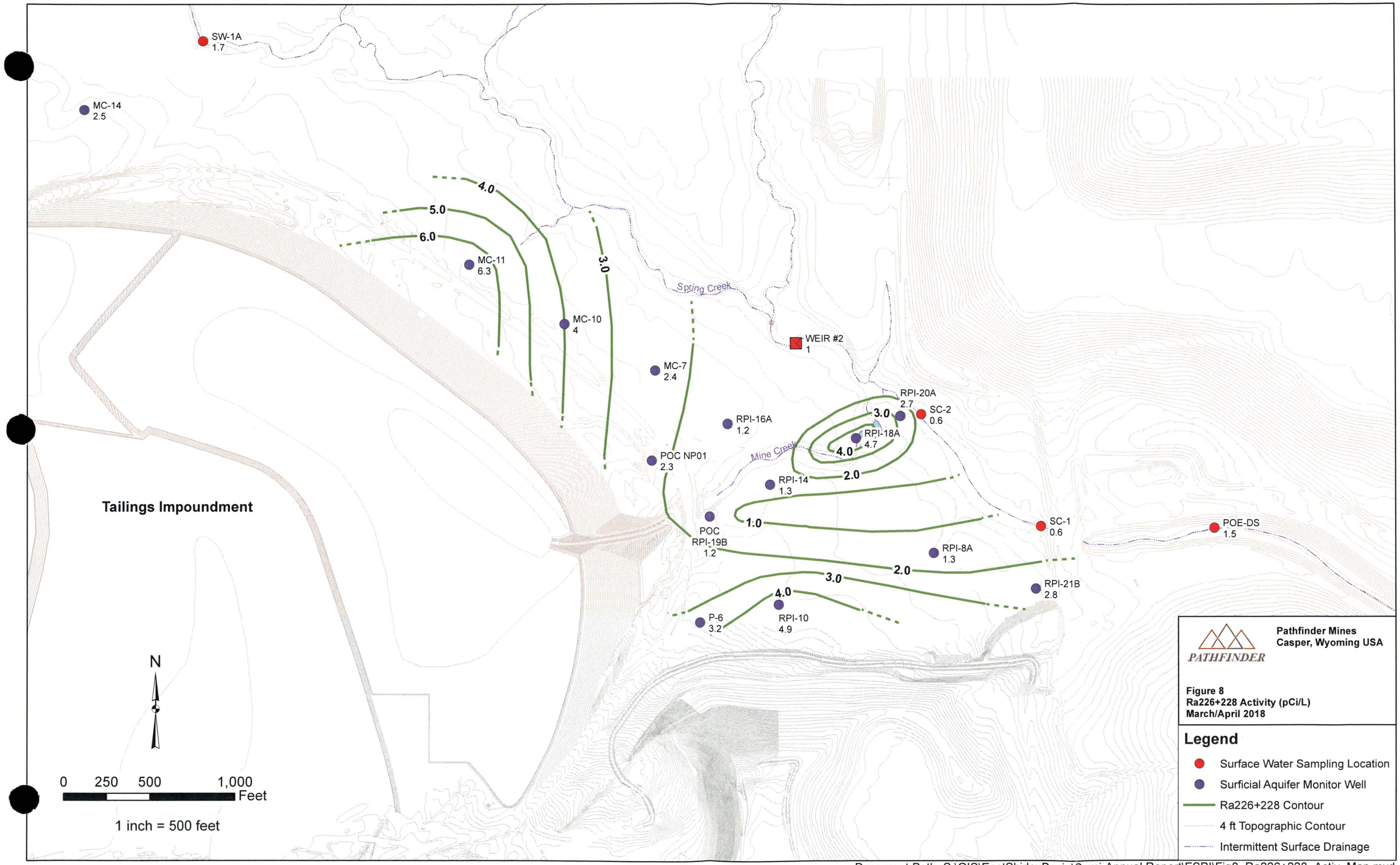


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Figure 9 - Radium 226+228 Activity vs. Time

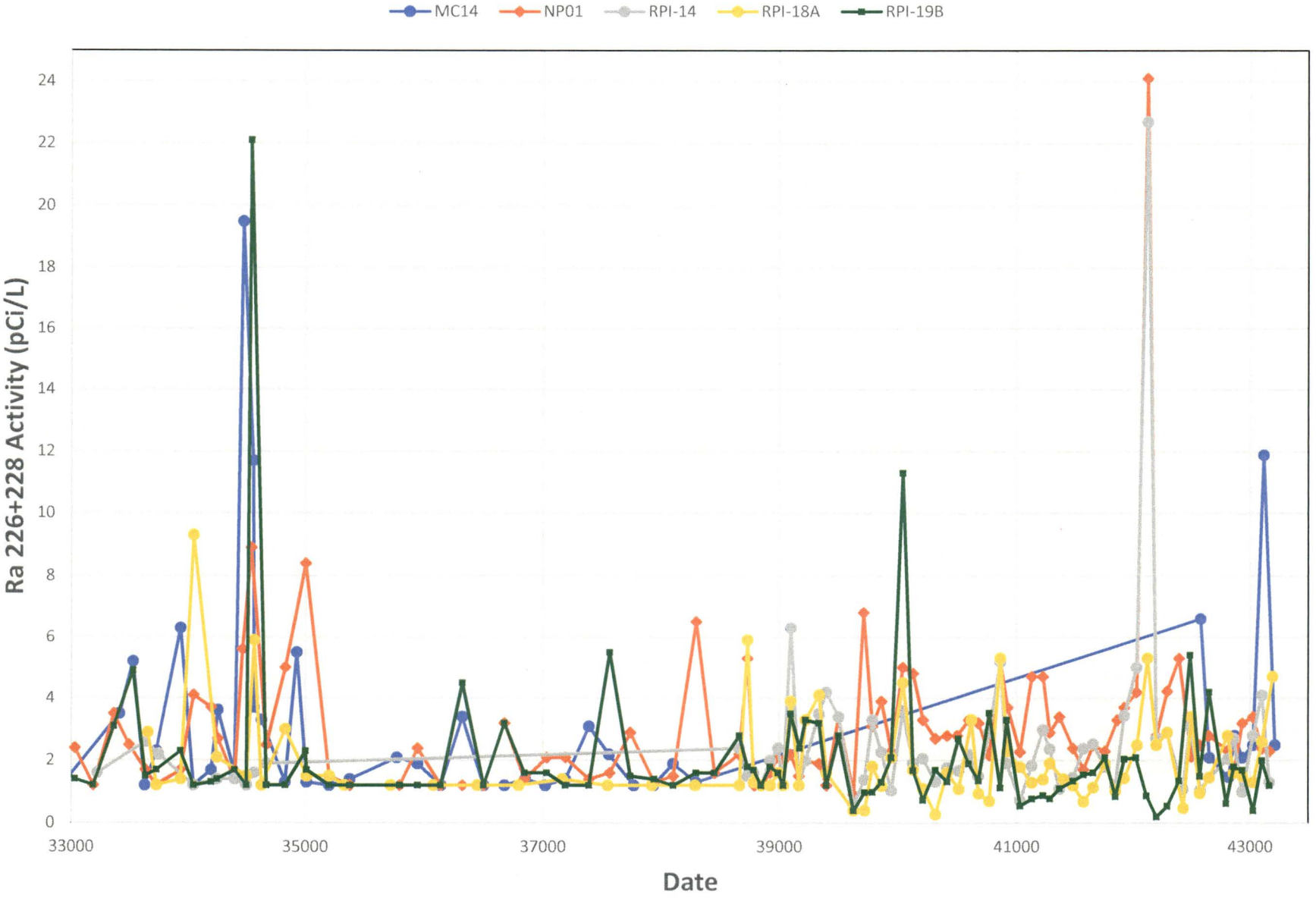


Figure 10 - Radium 226+228 Activity vs. Time for Compliance Well NP-01

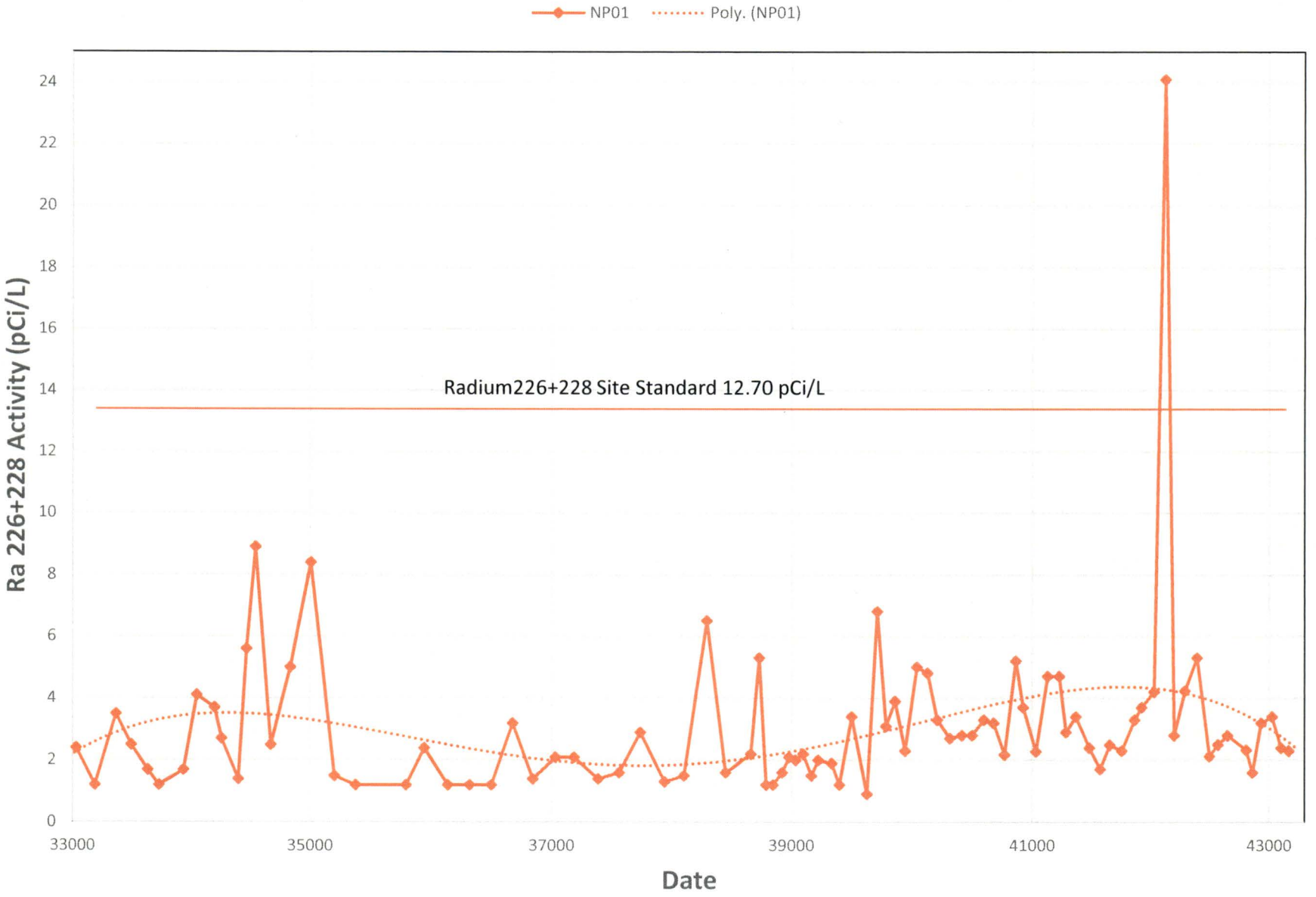


Figure 11 - Radium 226+228 Activity vs. Time for Compliance Well RPI-19B

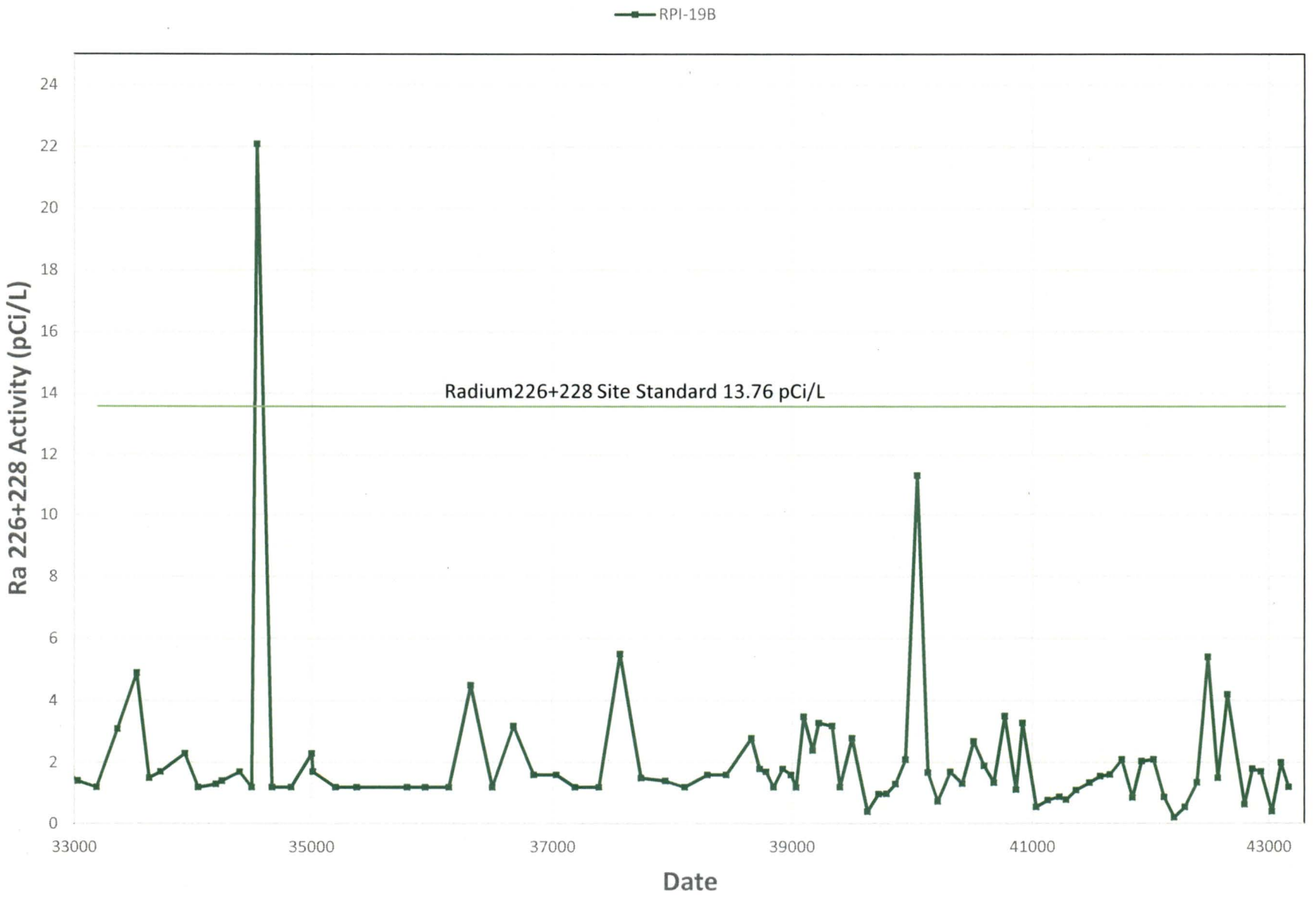
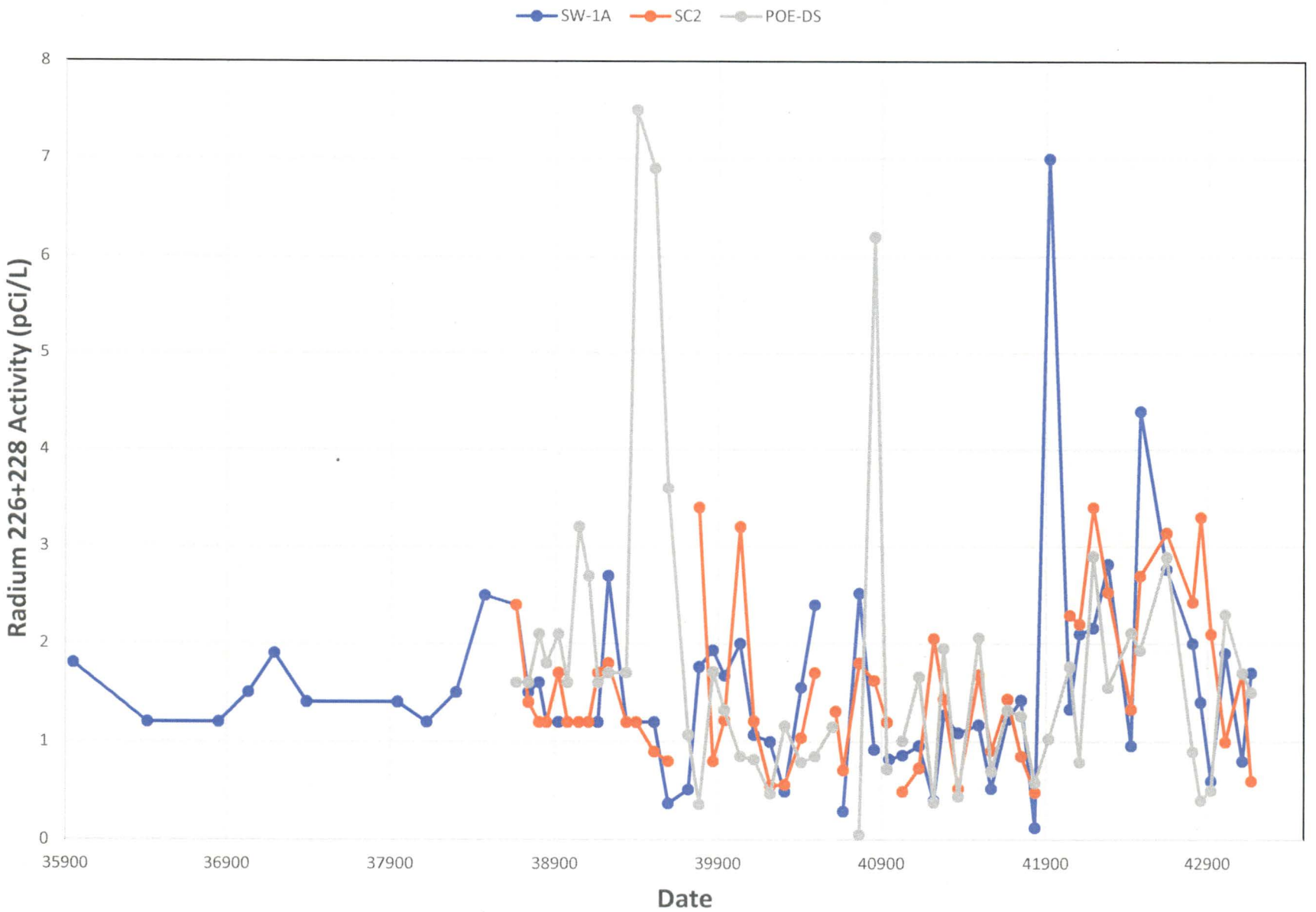


Figure 12 - Radium 226+228 Activity vs. Time for Surface Water Sample Locations



SW-1A
0.001

MC-14
<0.001

MC-11
<0.001

MC-10
0.012

MC-7
0.004

0.010

Spring Creek

WEIR #2
0.001

RPI-16A
0.009

SC-2
0.001

RPI-18A
0.002

RPI-20A
0.005

POC NP01
0.004

Mine Creek

RPI-14
<0.001

POC RPI-19B
0.003

SC-1
0.001

POE-DS
0.001

RPI-8A
0.002

0.005

RPI-21B
0.008

RPI-10
0.009

P-6
0.009

Tailings Impoundment

N

0 250 500 1,000 Feet

1 inch = 500 feet

Pathfinder Mines
Casper, Wyoming USA

PATHFINDER

Figure 13
Selenium Concentration (mg/L)
March/April 2018

Legend

- Surface Water Sampling Location
- Surficial Aquifer Monitor Well
- Selenium Contour
- 4 ft Topographic Contour
- Intermittent Surface Drainage

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Figure 14 - Selenium Concentration vs. Time

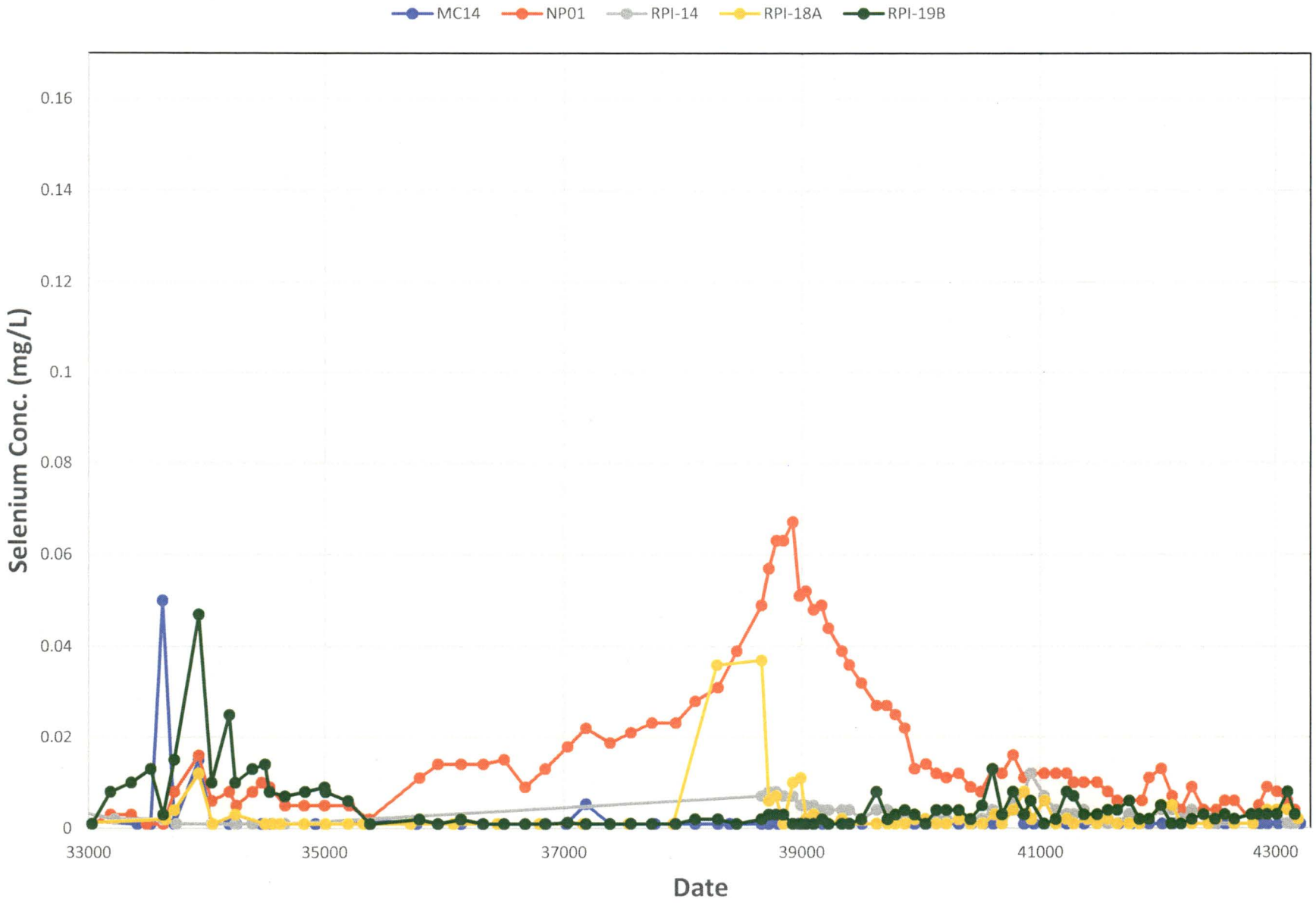


Figure 15 - Selenium Concentration vs. Time for Compliance Well NP-01

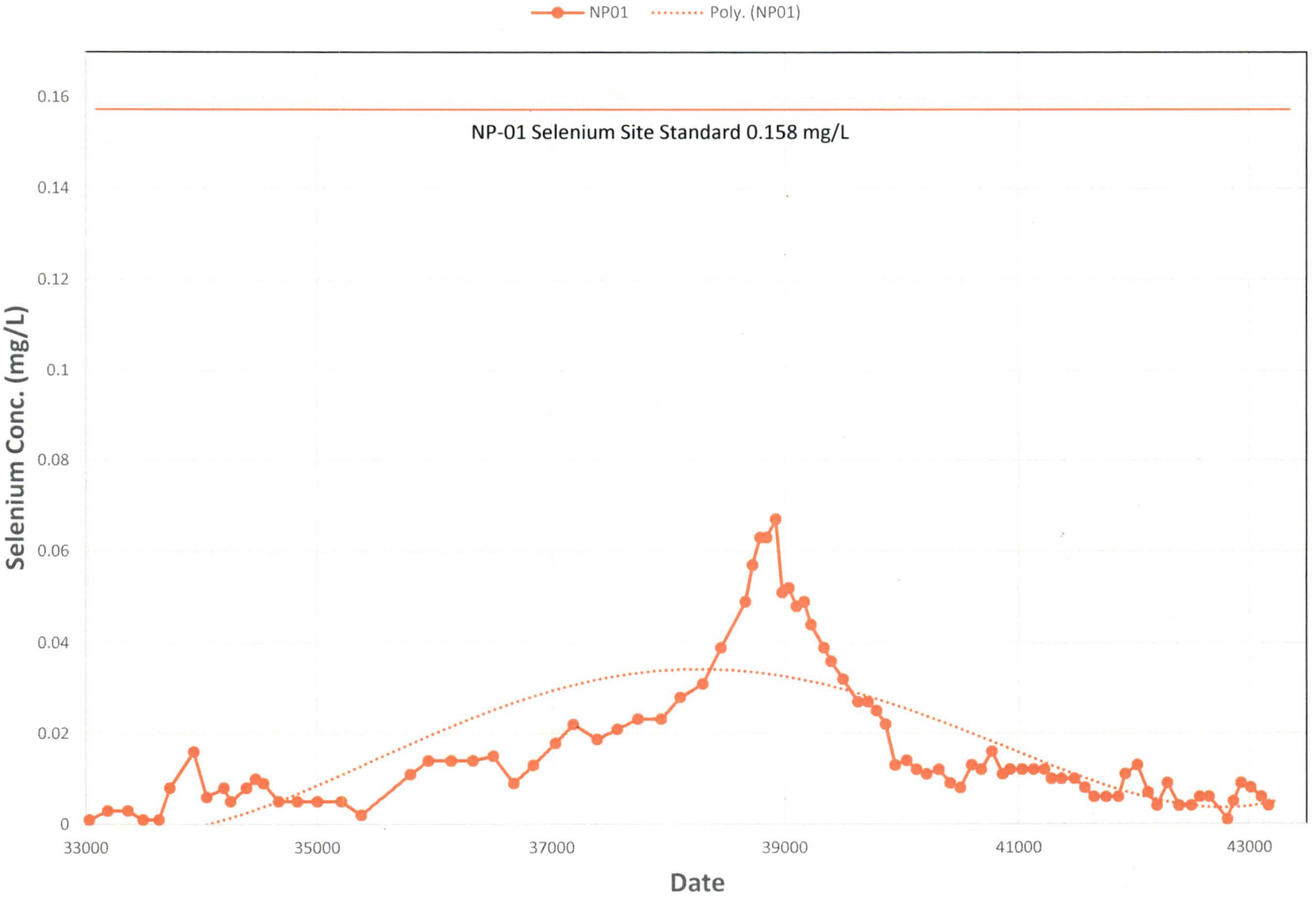


Figure 16 - Selenium Concentration vs. Time for Compliance Well RPI-19B

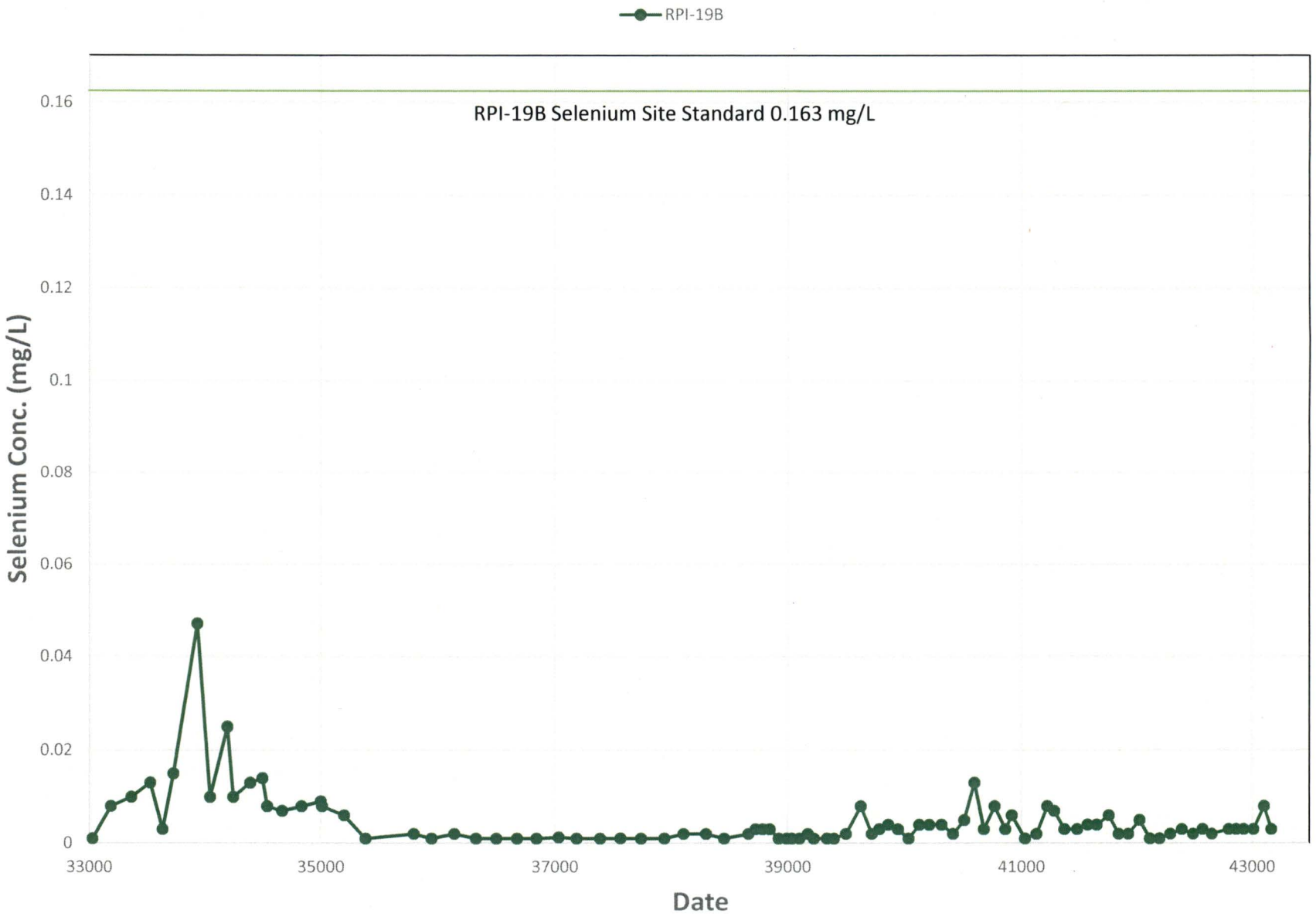
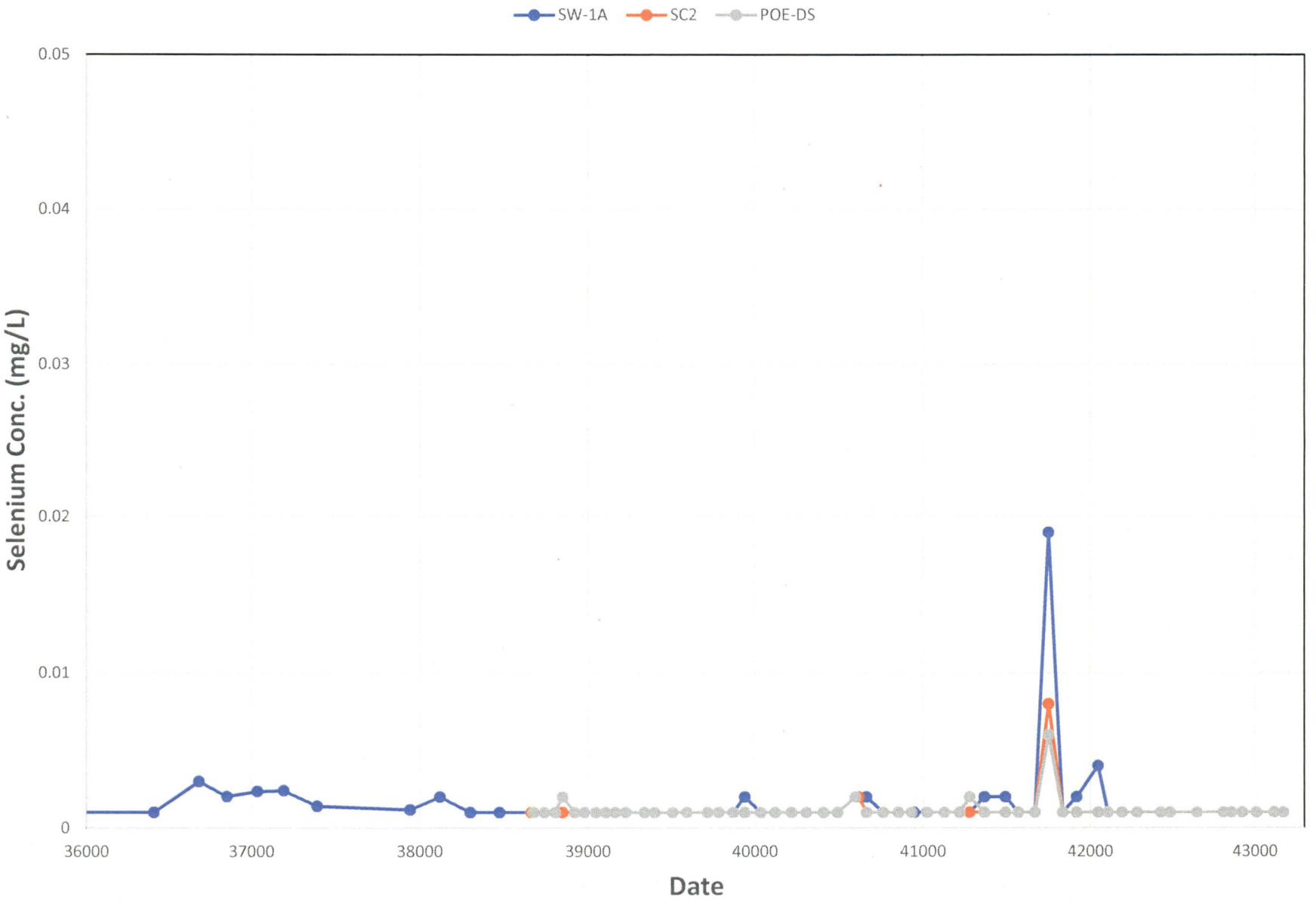


Figure 17 - Selenium Concentration vs. Time for Surface Water Sample Locations



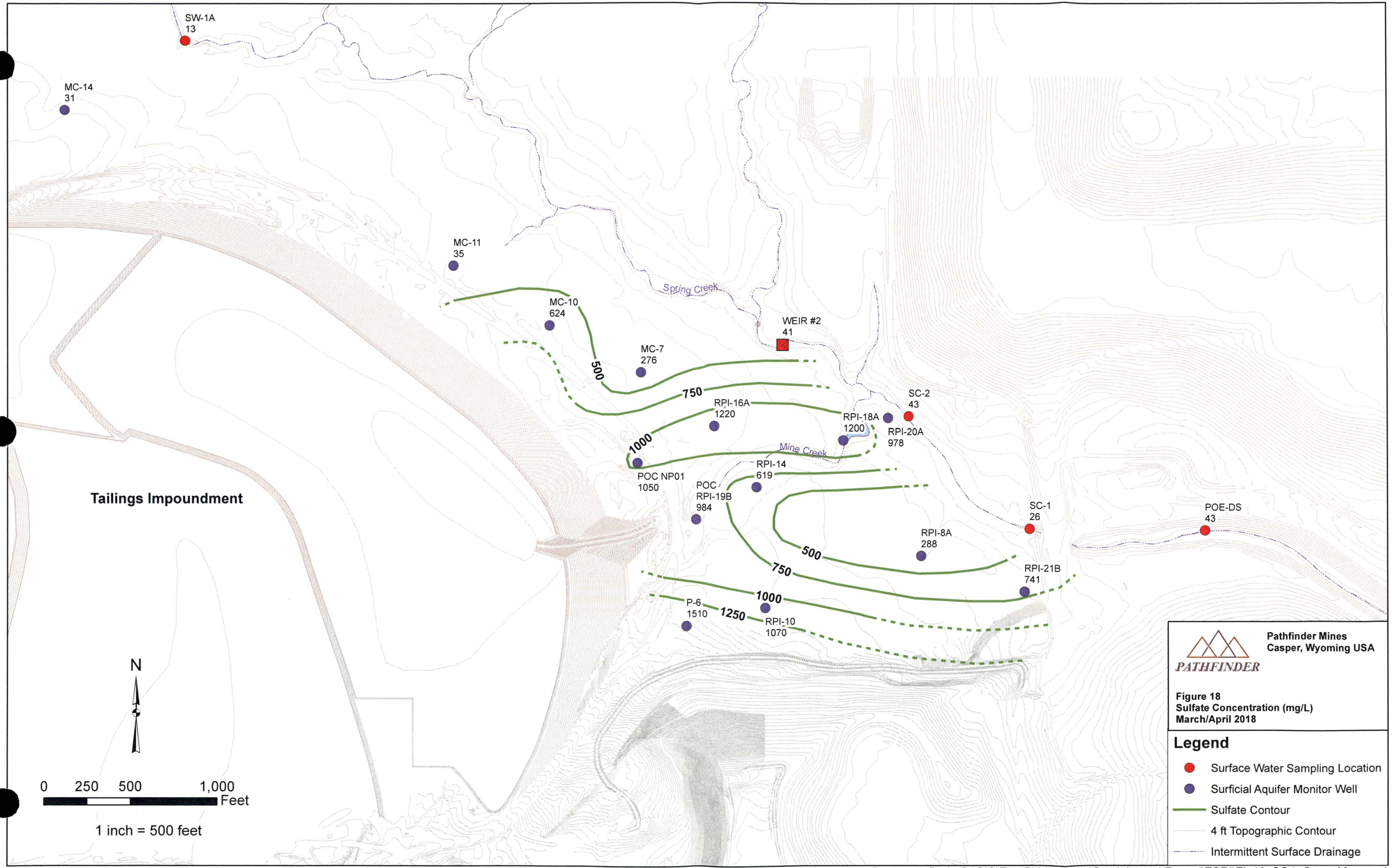


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Figure 19 - Sulfate Concentration vs. Time

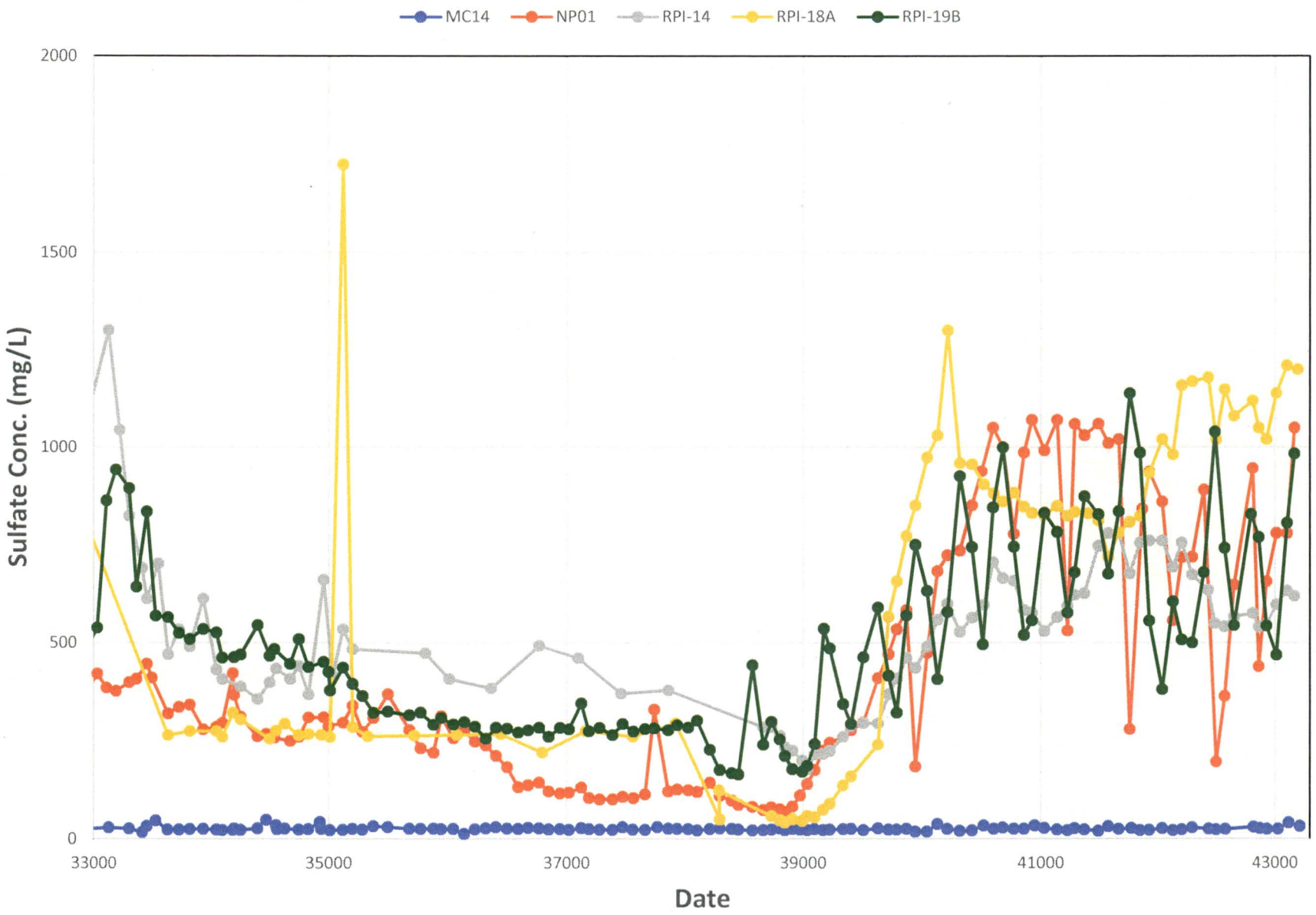


Figure 20 - Sulfate Concentration vs. Time for Compliance Well NP-01

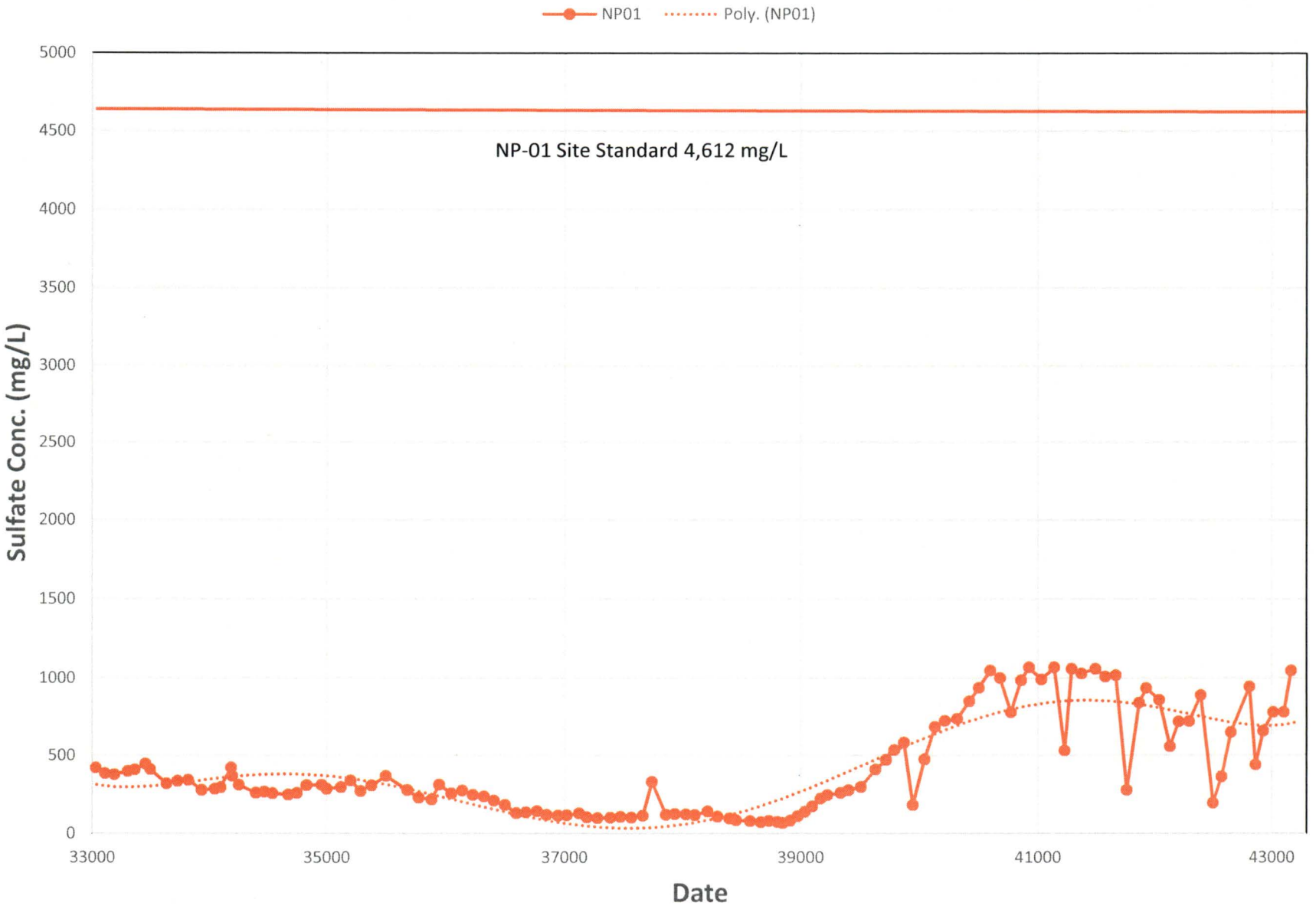


Figure 21 - Sulfate Concentration vs. Time for Compliance Well RPI-19B

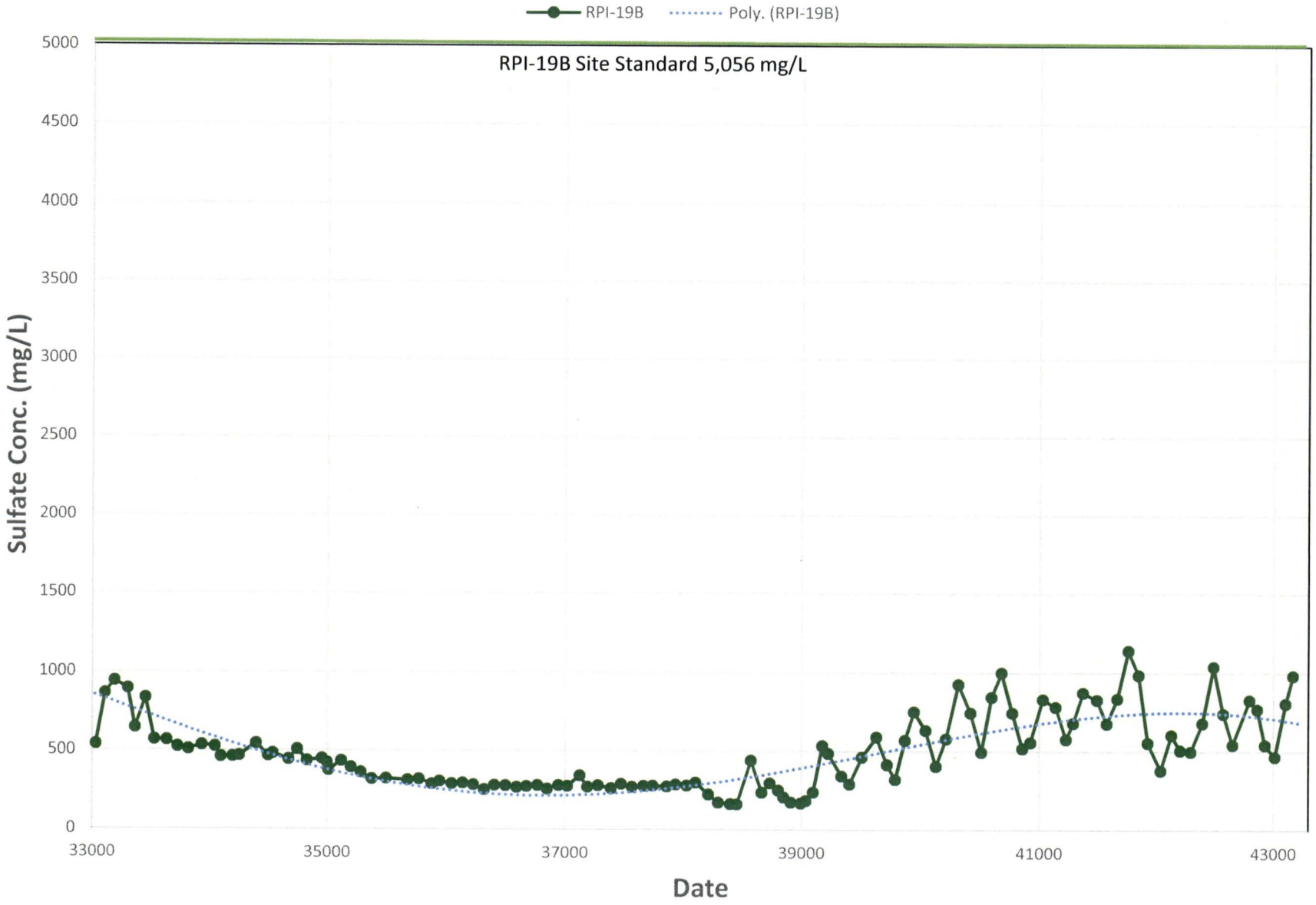
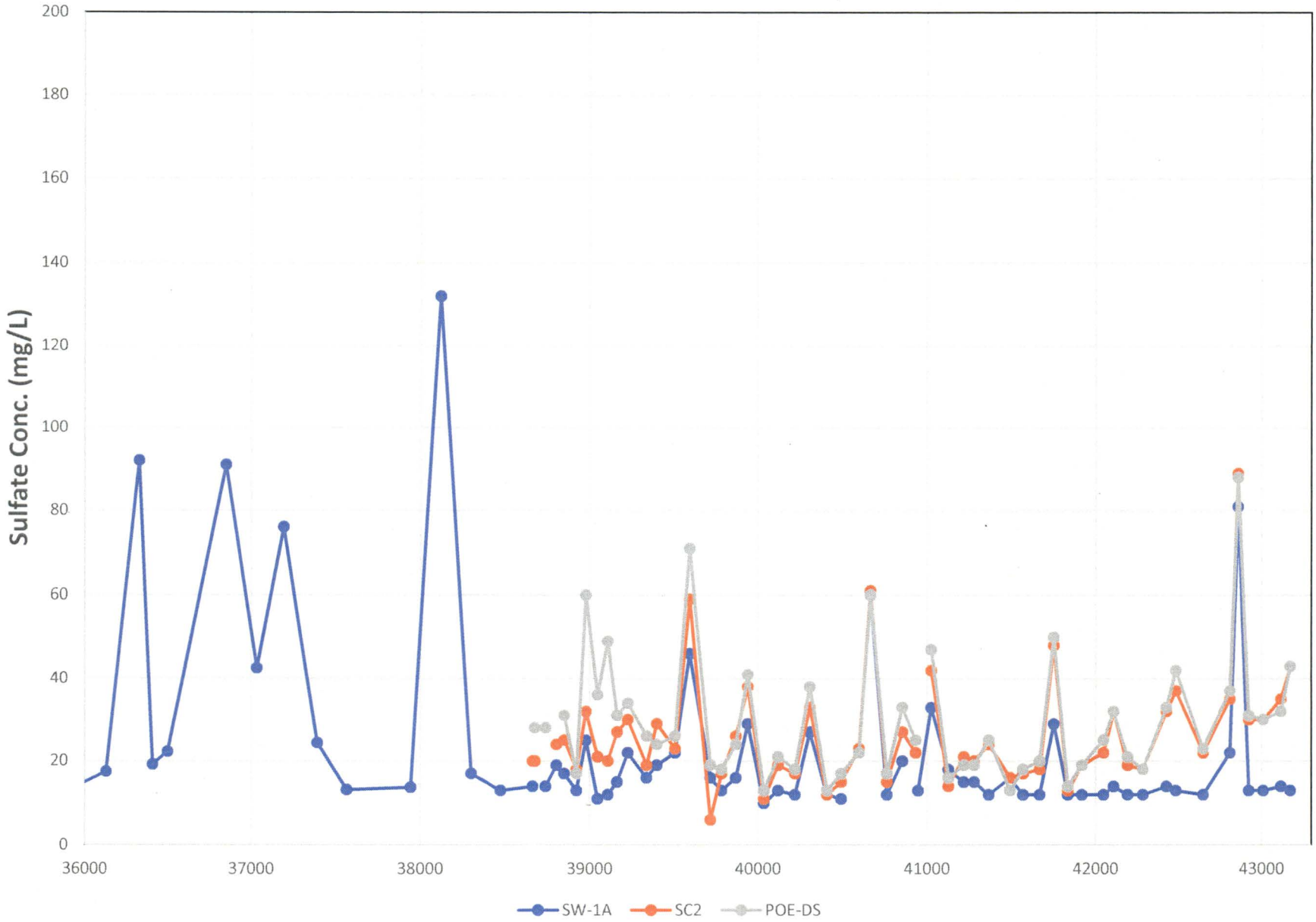


Figure 22 - Sulfate Concentration vs. Time for Surface Water Sample Locations



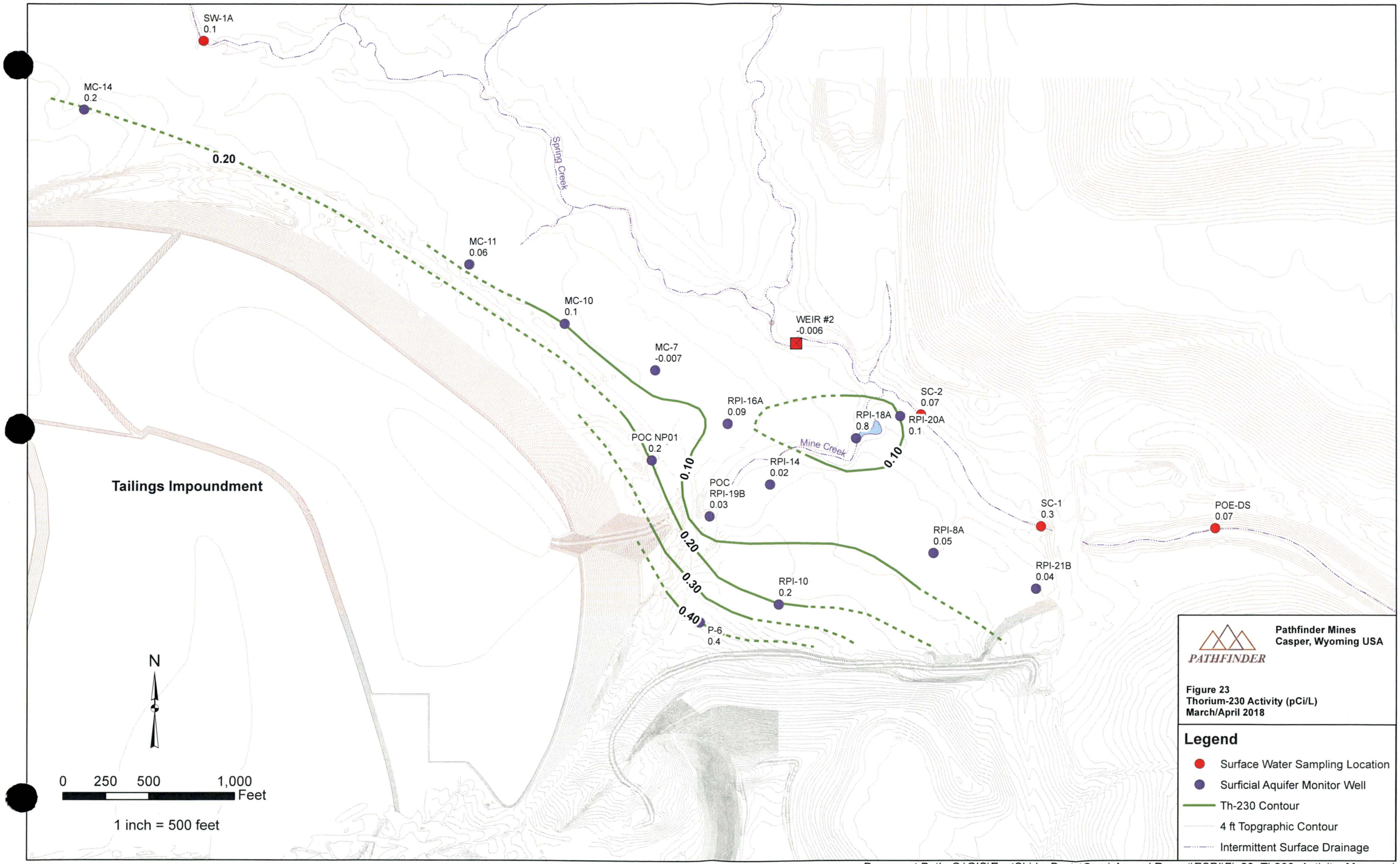


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Figure 24 - Thorium-230 Activity vs. Time

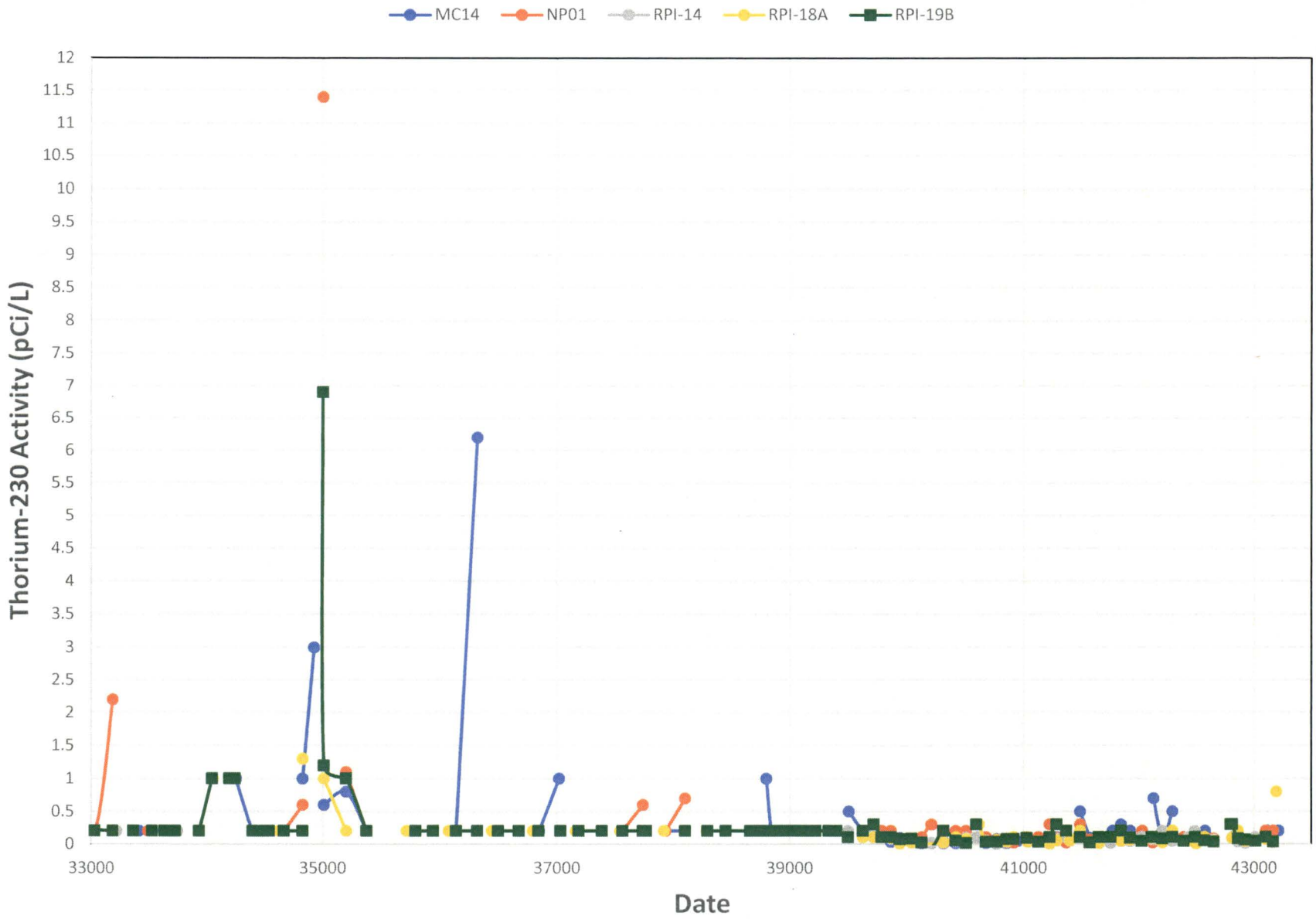


Figure 25 - Thorium-230 Activity vs. Time for Compliance Well NP-01

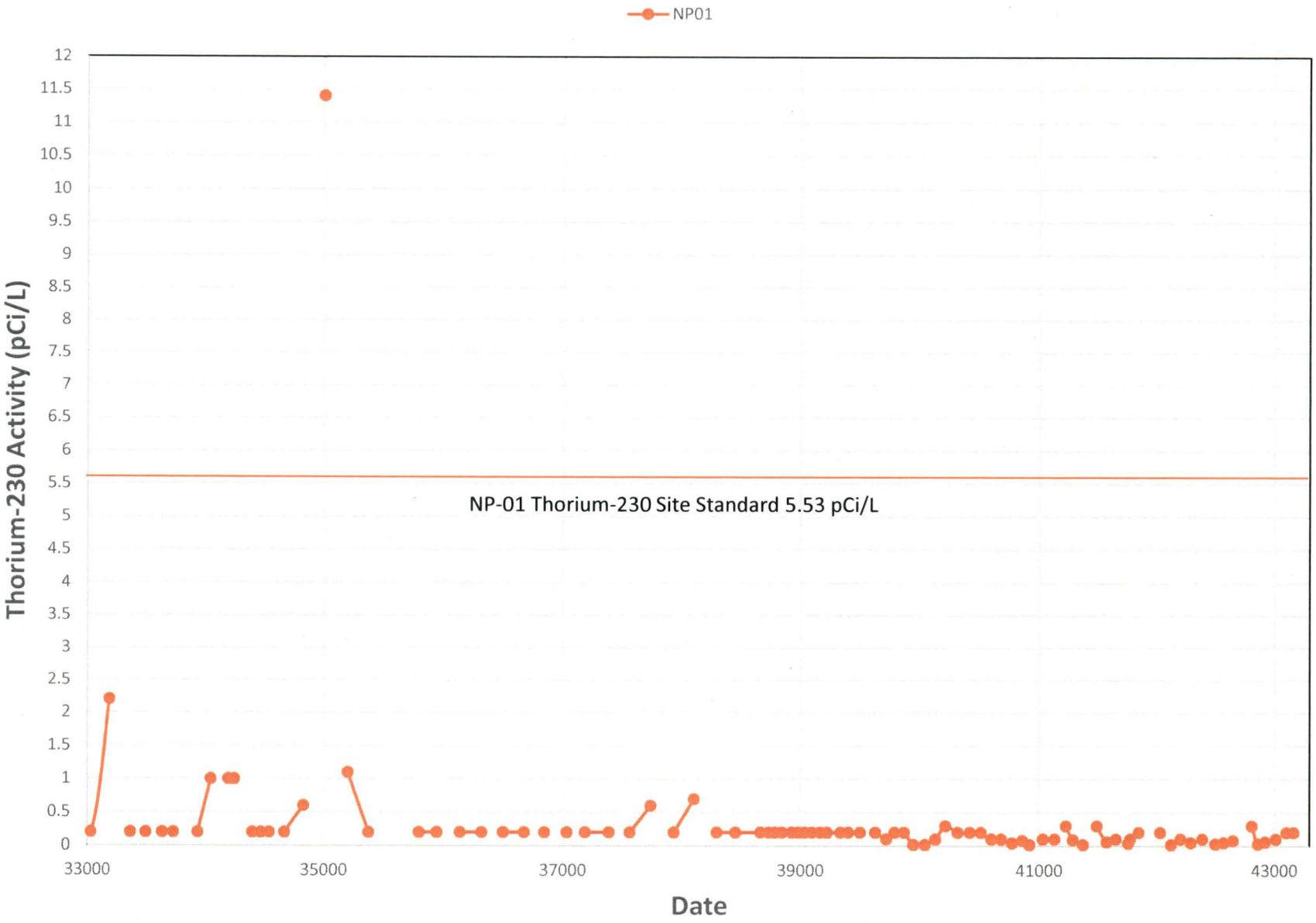


Figure 26 - Thorium-230 Activity vs. Time for Compliance Well RPI-19B

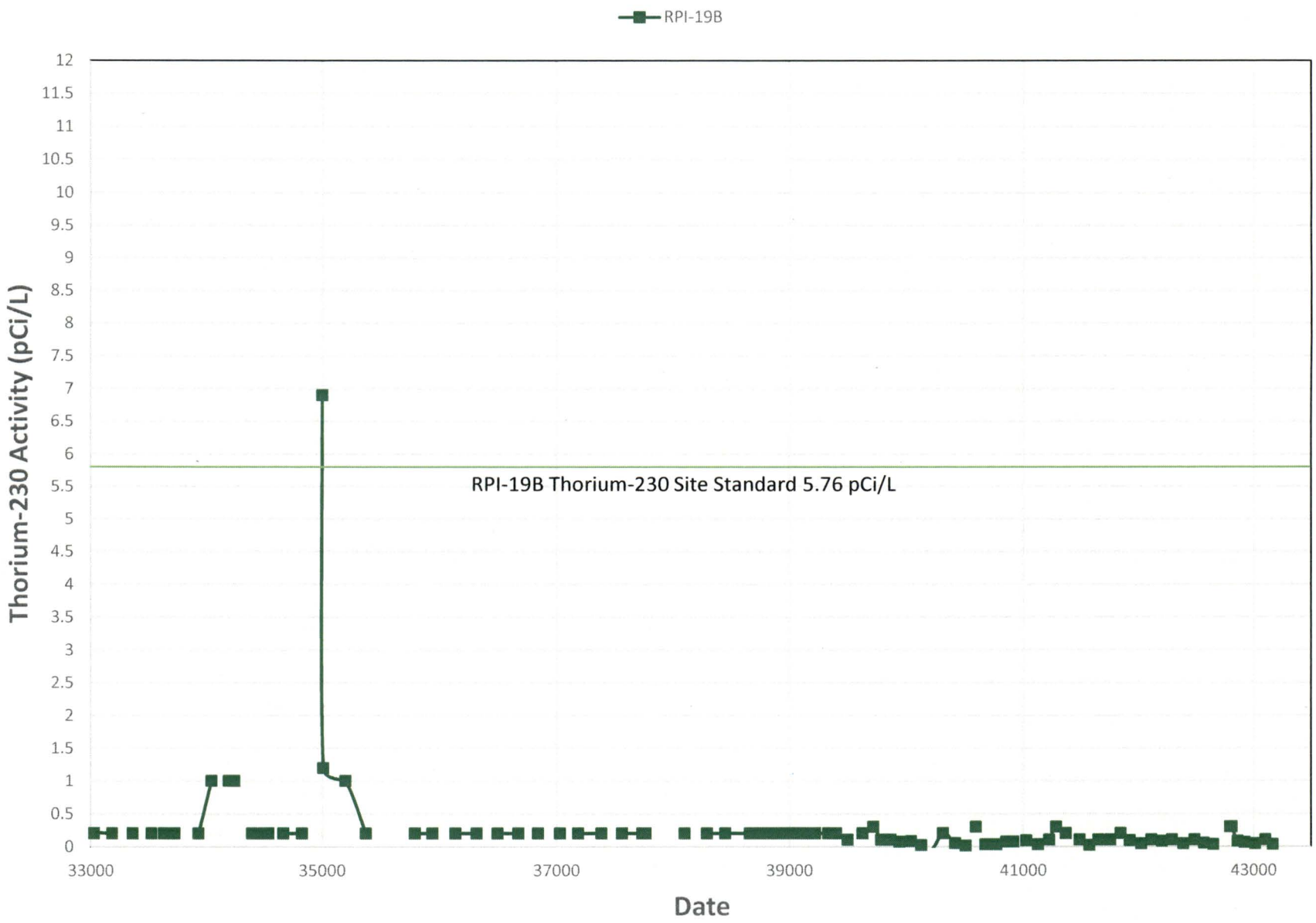
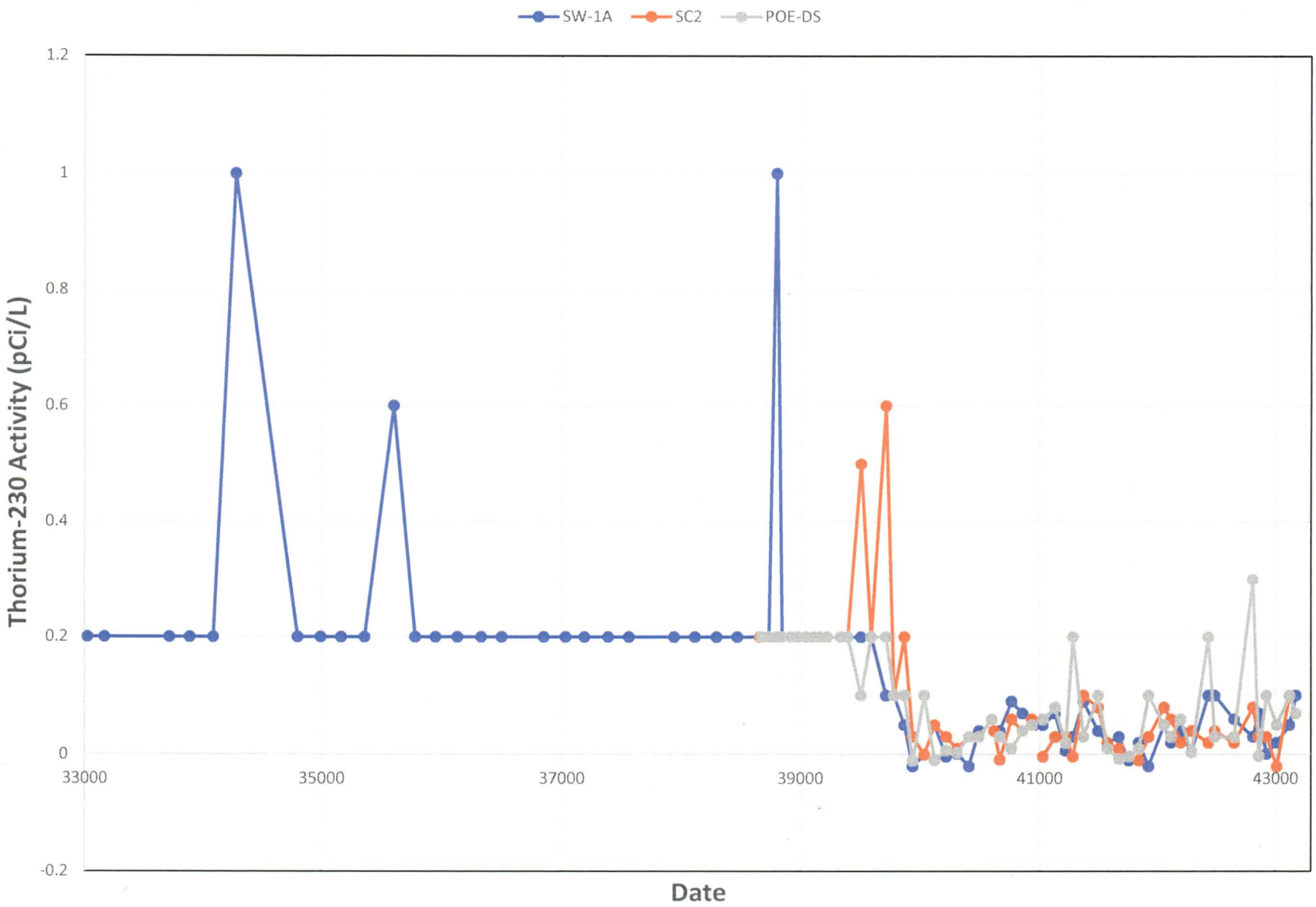


Figure 27 - Thorium-230 Activity vs. Time for Surface Water Sample Locations



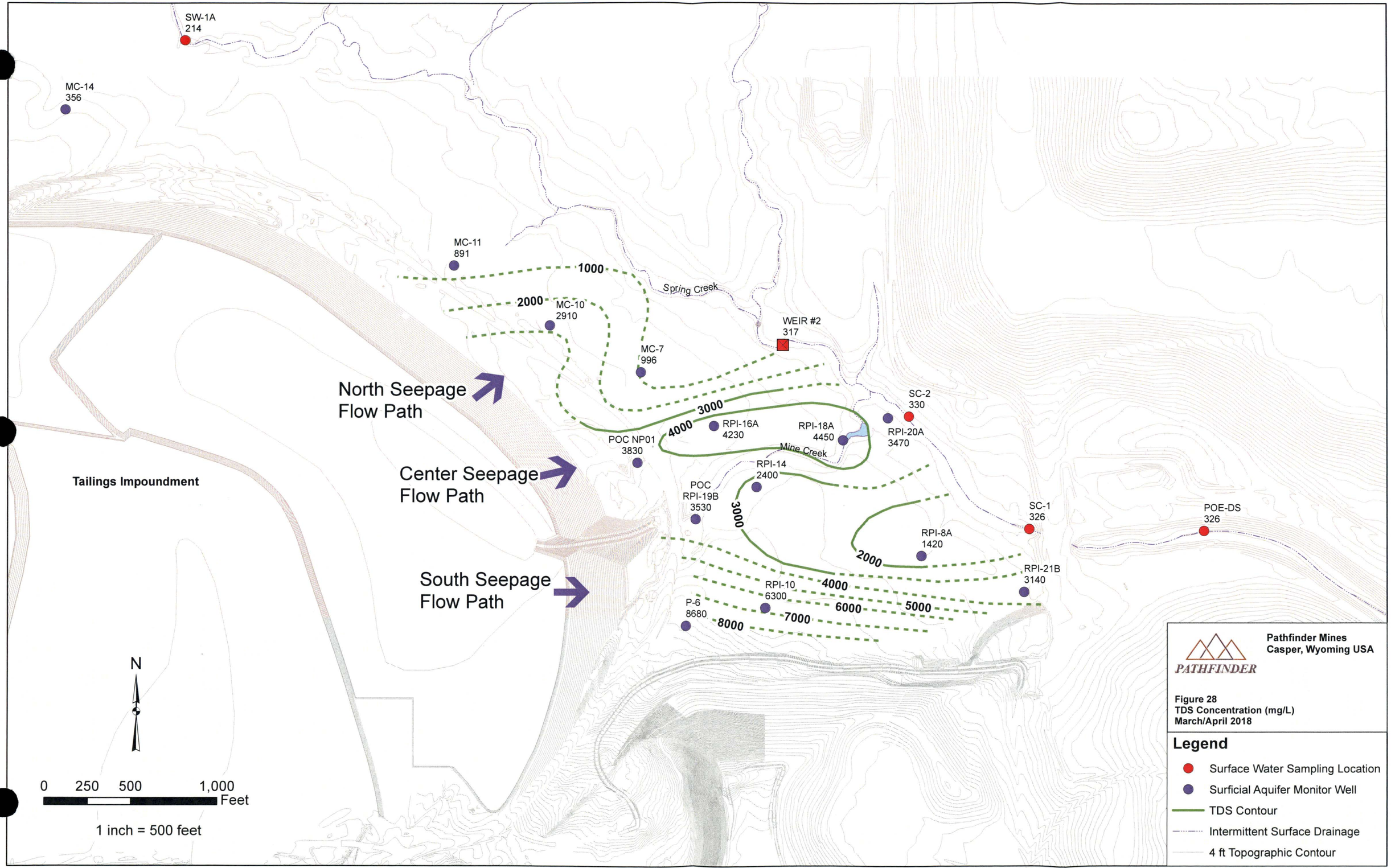


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Figure 29 - Total Dissolved Solids Concentration vs. Time

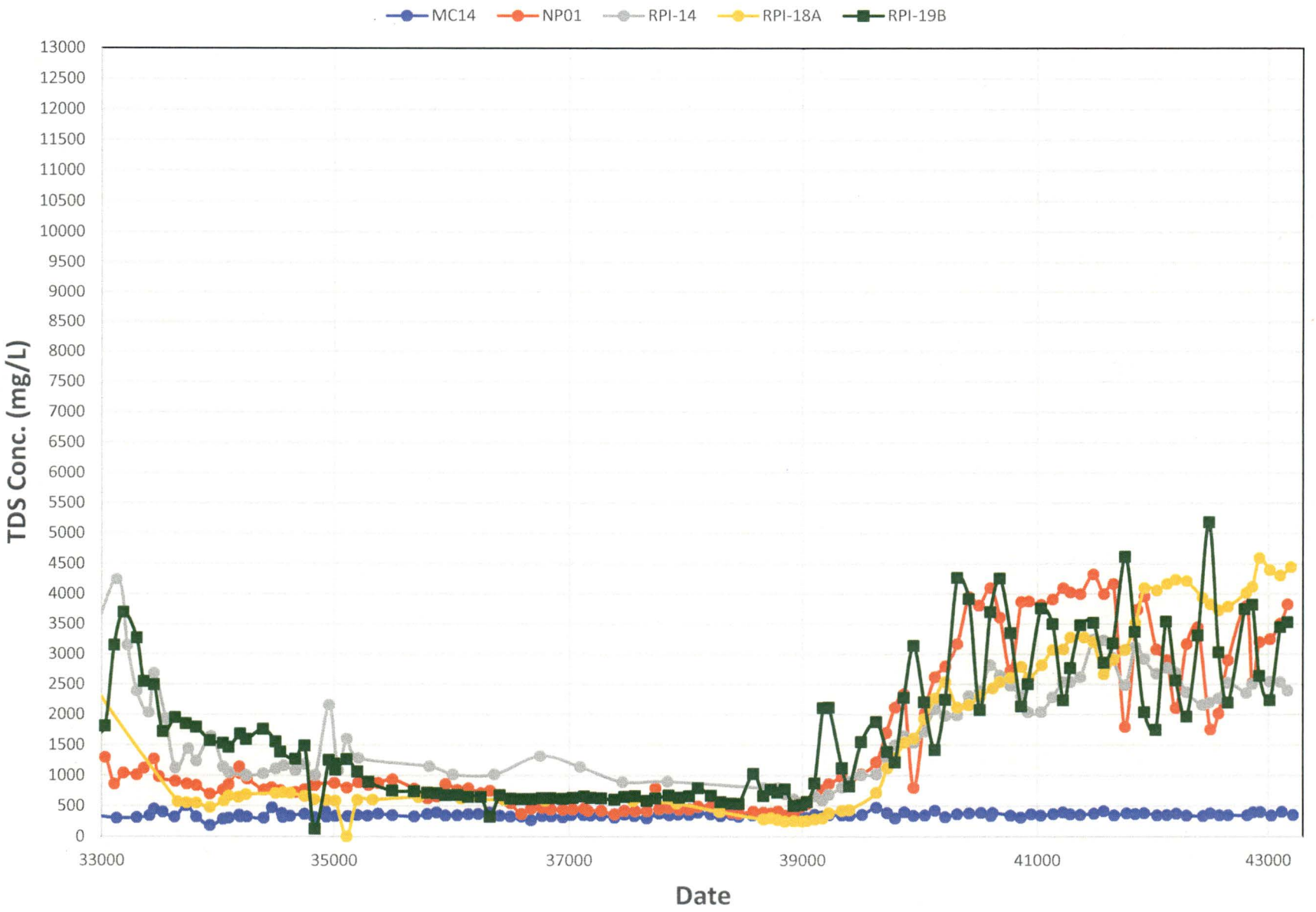


Figure 30 - Total Dissolved Solids Conc. vs. Time for Compliance Well NP-01

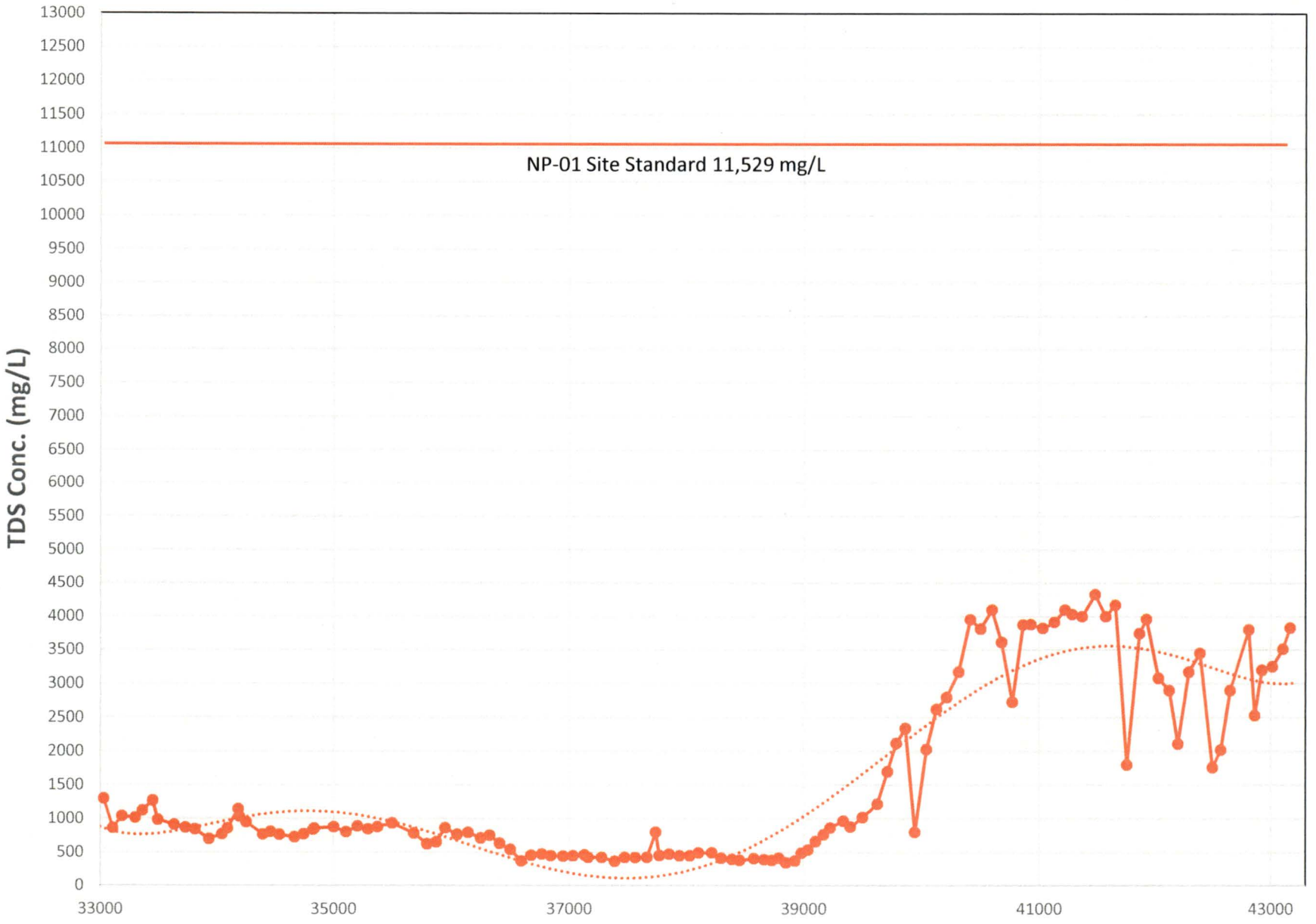


Figure 31 - Total Dissolved Solids Conc. vs. Time for Compliance Well RPI-19B

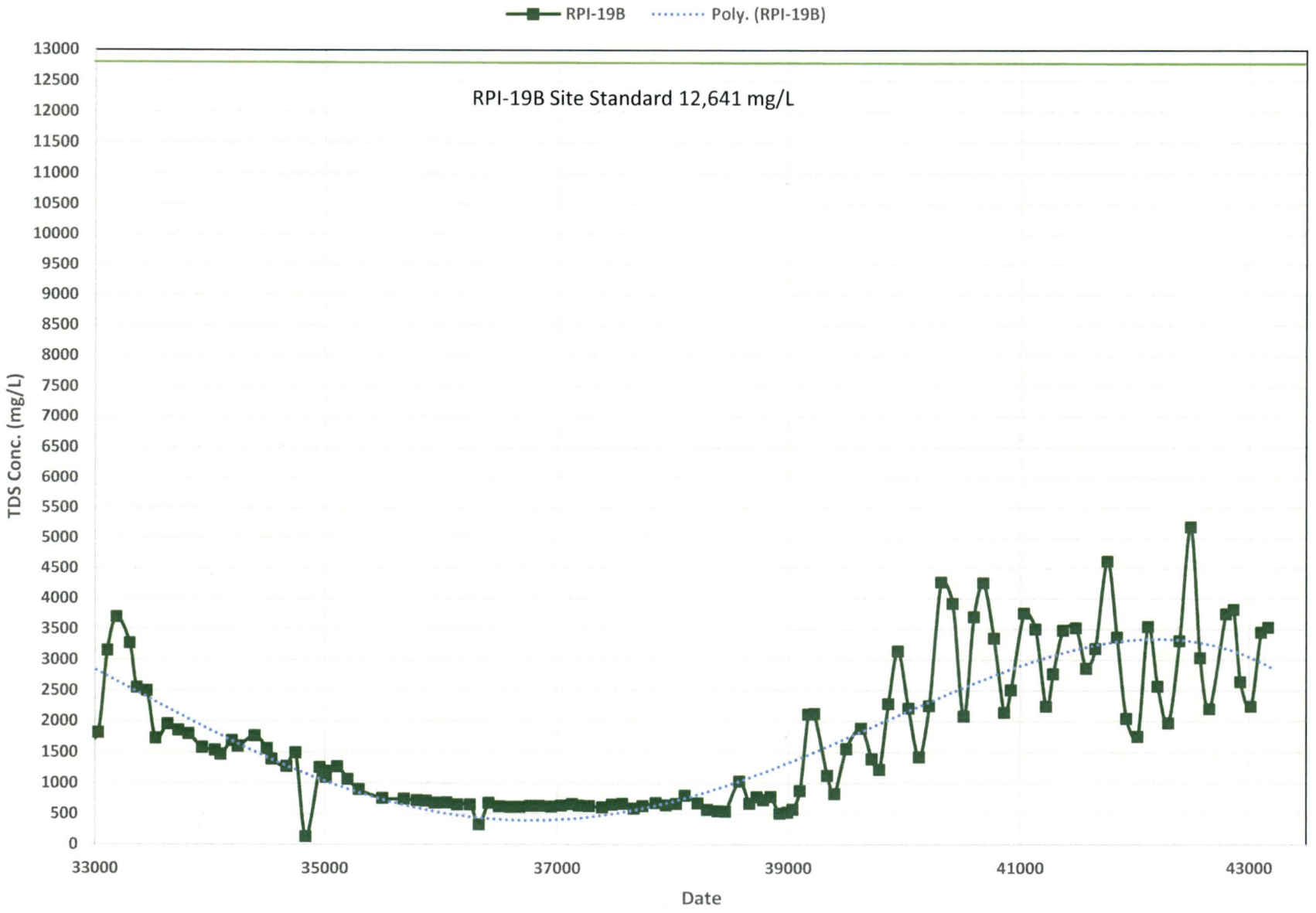
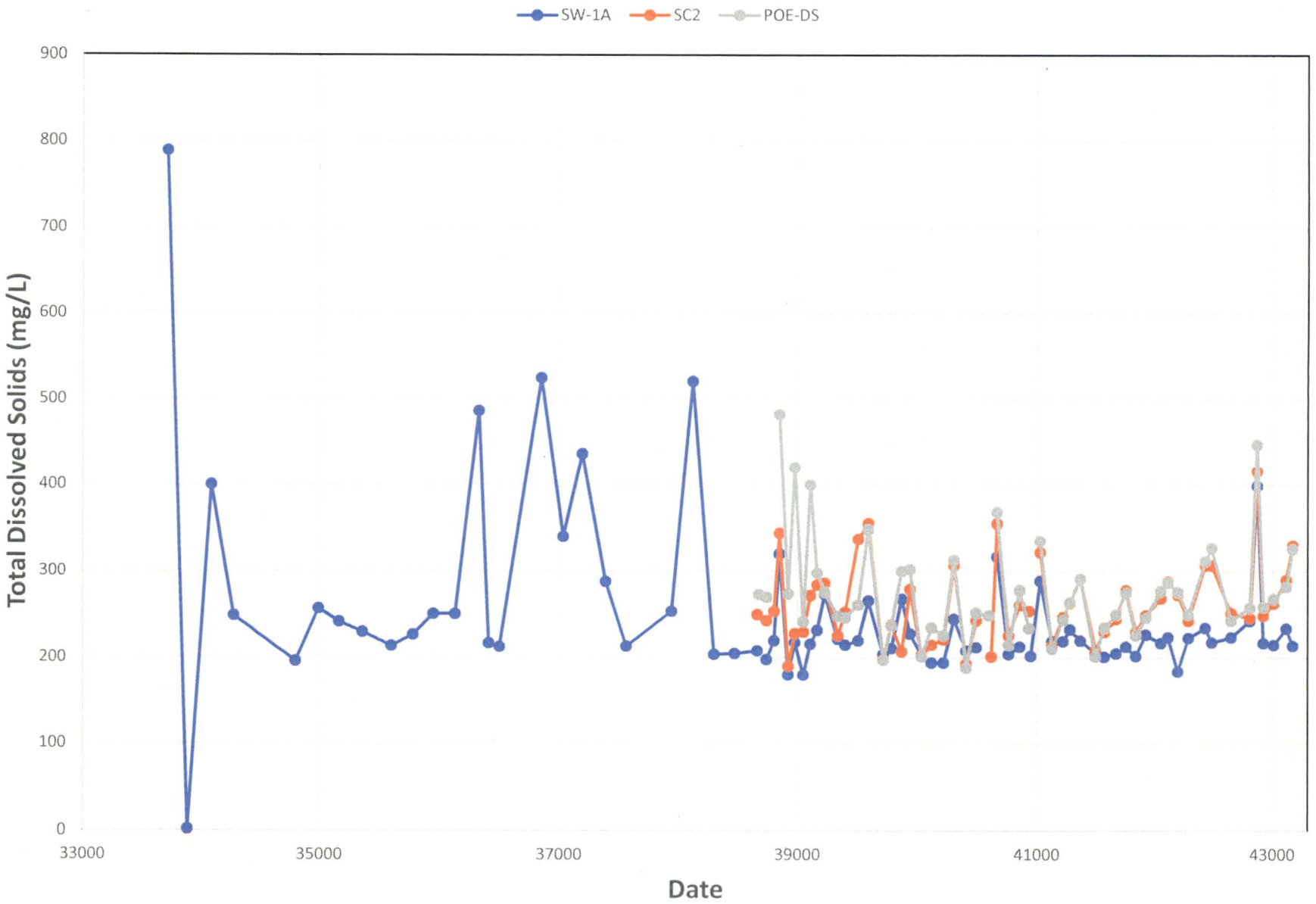


Figure 32 - Total Dissolved Solids vs. Time for Surface Water Sample Locations



SW-1A
0.015

MC-14
0.09

MC-11
0.051

Spring Creek

MC-10
0.303

WEIR #2
0.025

MC-7
0.39

0.5

RPI-20A
0.342

SC-2
0.026

RPI-16A
1.78

RPI-18A
0.275

Mine Creek

POC NP01
0.947

1.0

RPI-14
0.53

POC
RPI-19B
1.06

SC-1
0.027

POE-DS
0.027

RPI-8A
0.346

0.5

RPI-21B
0.954

RPI-10
1.33

1.0

P-6
1.17

Tailings Impoundment

N

0 250 500 1,000
Feet

1 inch = 500 feet

Pathfinder Mines
Casper, Wyoming USA

PATHFINDER

Figure 33
Uranium Concentration (mg/L)
March/April 2018

Legend

- Surface Water Sampling Location
- Surficial Aquifer Monitor Well
- Uranium Contour
- 4 ft Topographic Contour
- Intermittent Surface Drainage

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Figure 34 - Uranium Concentration vs. Time

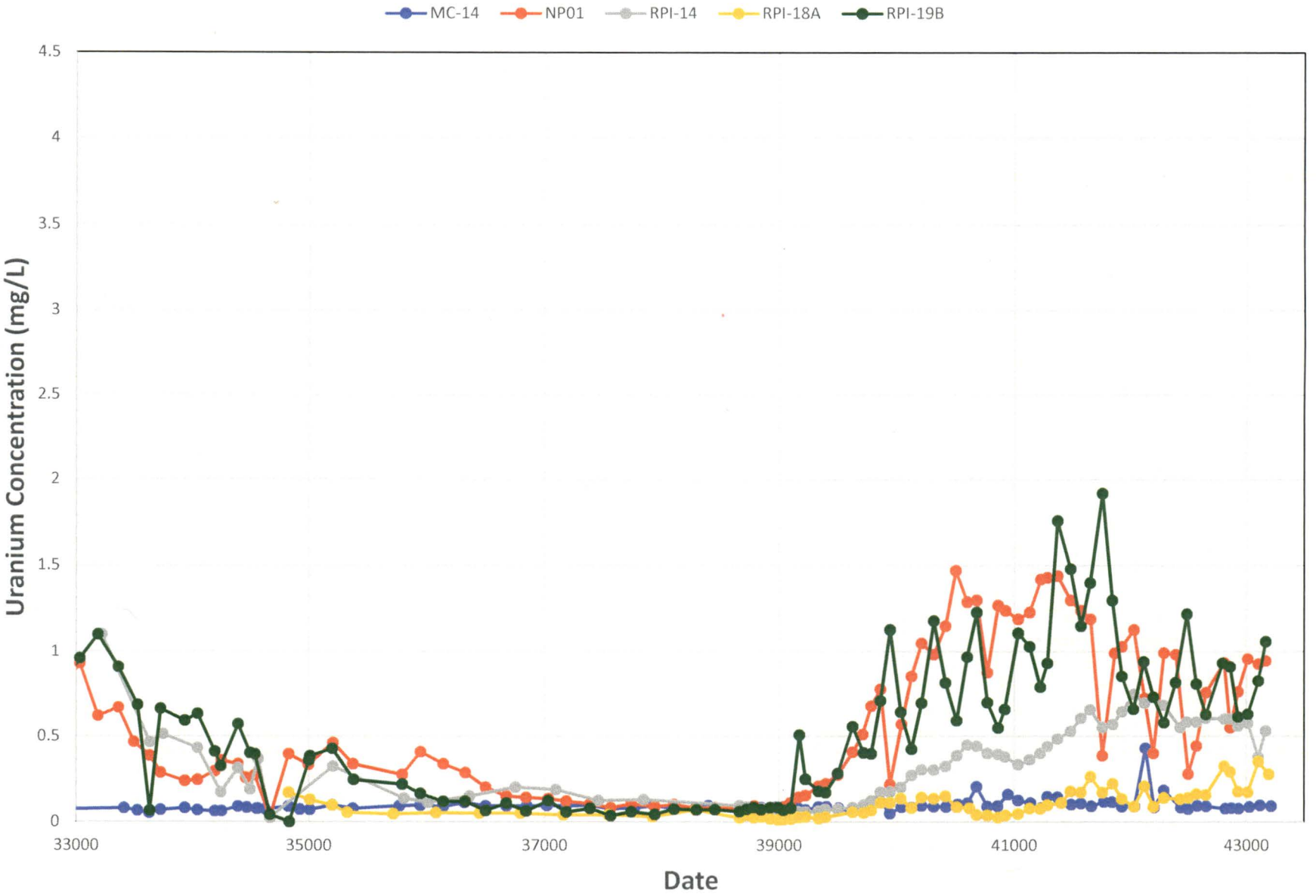

Figure 35 - Uranium Concentration vs. Time for Compliance Well NP-01

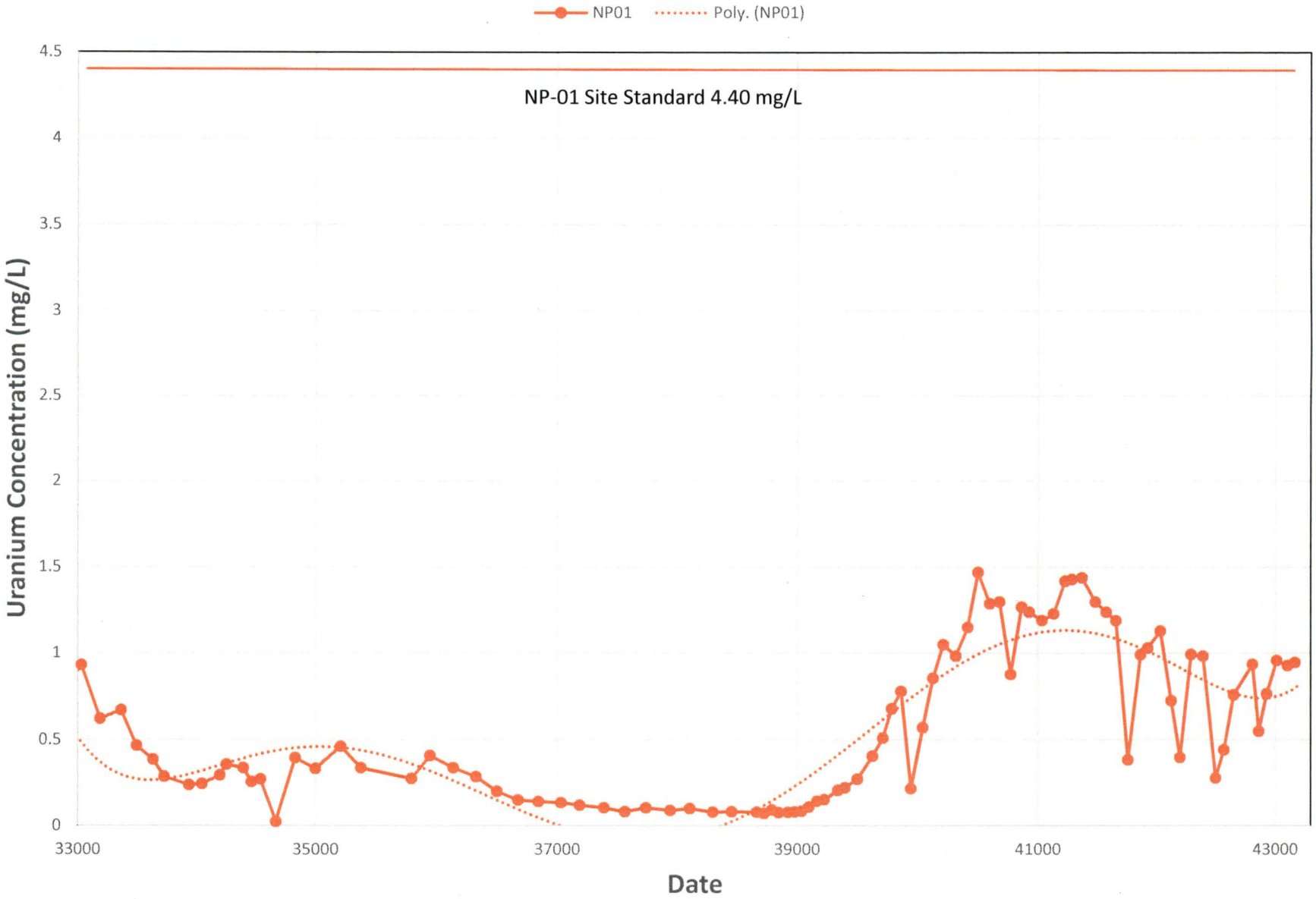

Figure 36 - Uranium Concentration vs. Time for Compliance Well RPI-19B

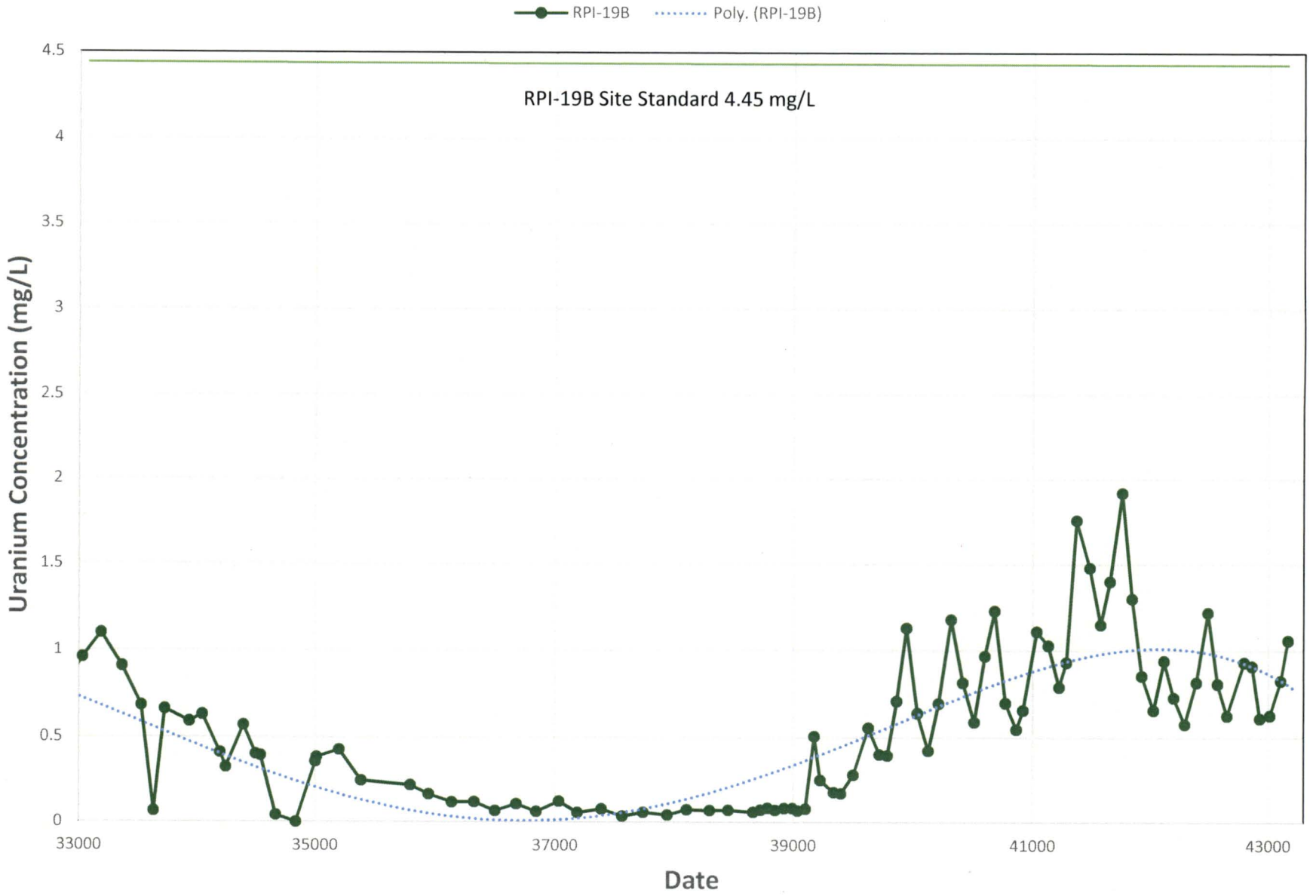

Figure 37 - Uranium Concentration vs. Time for Surface Water Sample Locations

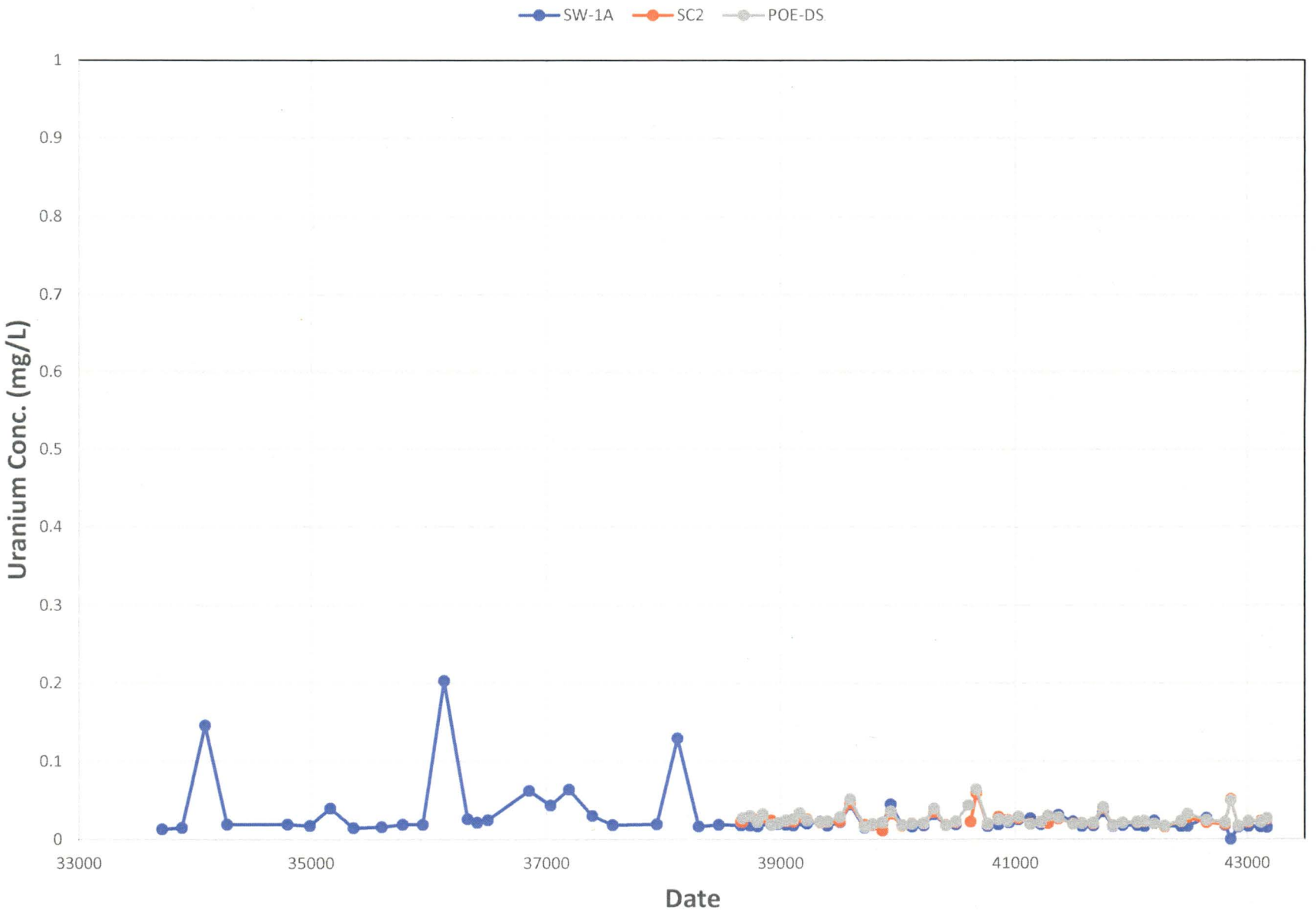

Figure 38 - Chloride, Sulfate and TDS Concentrations vs. Time for Well P-6

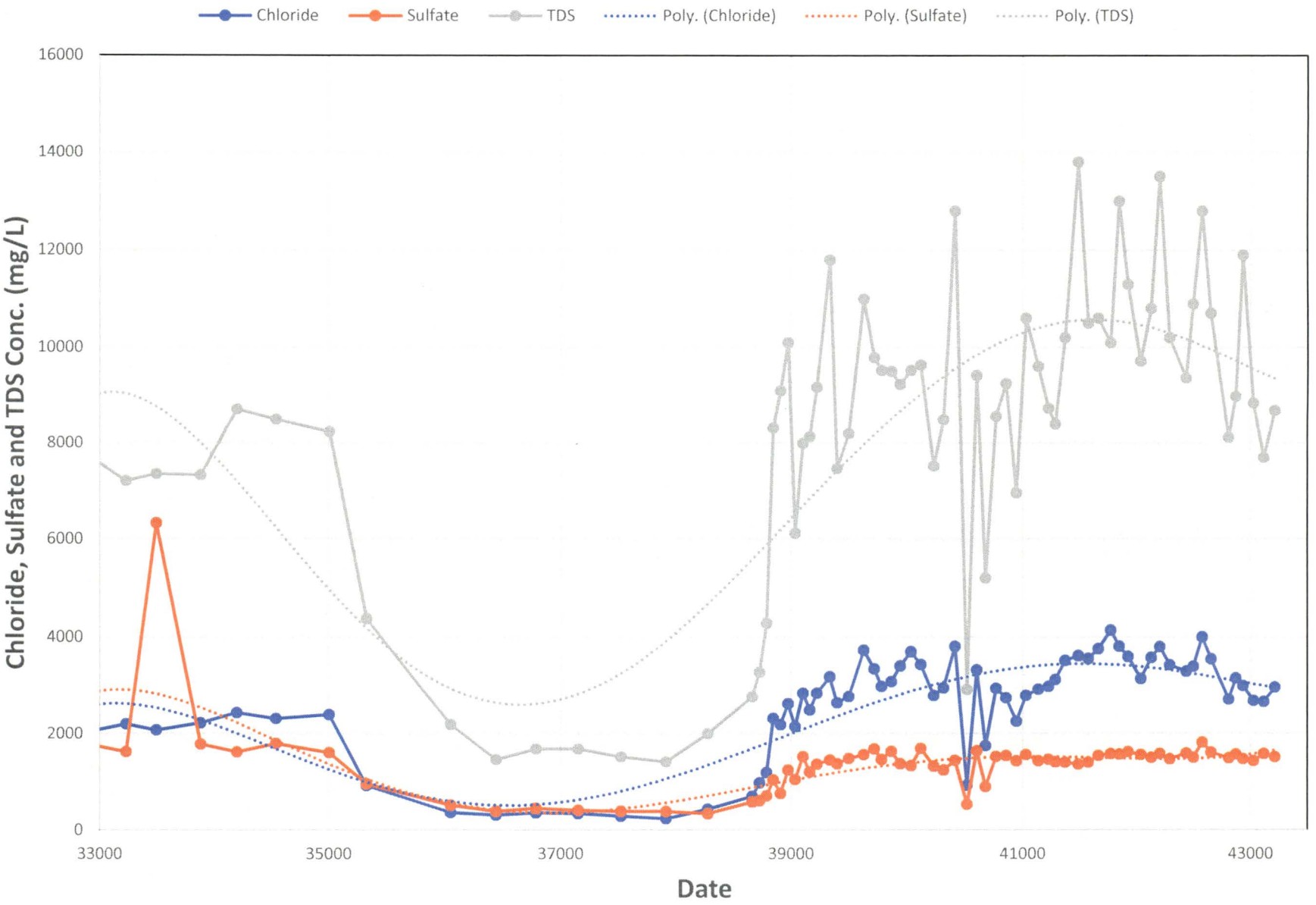

Figure 39 - Uranium Concentration vs. Time for Well P-6