ENERGY FUELS

Div of Waste Management and Radiation Control

SEP 29 2023

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September 27, 2023

DRC-2023-073148

Sent VIA E-MAIL AND OVERNIGHT DELIVERY

Mr. Doug Hansen
Director
Division of Waste Management and Radiation Control
Utah Department of Environmental Quality
195 North 1950 West
Salt Lake City, UT 84114-4880

Re: Transmittal of Source Assessment Report for MW-11 and MW-37 White Mesa Mill Groundwater Discharge Permit UGW370004

Dear Mr. Hansen:

Enclosed are two copies of Energy Fuels Resource (USA) Inc.'s ("EFRI's") Source Assessment Report ("SAR") for MW-11 and MW-37 at the White Mesa Mill. This SAR addresses the constituents that were identified as exceeding the GWCL in the 1st Quarter 2023 as described in the Division of Waste Management and Radiation Control ("DWMRC")-approved Q1 2023 Plan and Time Schedule. EFRI submitted the Plan and Time Schedule on May 24, 2023. DWMRC approval of the Plan and Time Schedule was received by EFRI on June 29, 2023. Pursuant to the Plan and Time Schedule EFRI has prepared this SAR.

This transmittal also includes two CDs each containing a word searchable electronic copy of the report.

If you should have any questions regarding this report please contact me.

Yours very truly,

Kathy Weinel

ENERGY FUELS RESOURCES (USA) INC.
Kathy Weinel
Director, Regulatory Compliance

CC: Jordan App
David Frydenlund
Garrin Palmer
Logan Shumway
Scott Bakken
Stewart Smith (HGC)
Angie Persico (Intera)

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White Mesa Uranium Mill

State of Utah Groundwater Discharge Permit No. UGW370004

Source Assessment Report Under Part I.G.4

For Exceedances in MW-11 and MW-37 in the First Quarter of 2023

Prepared by:

Energy Fuels Resources (USA) Inc.
225 Union Boulevard, Suite 600
Lakewood, CO 80228

September 27, 2023

EXECUTIVE SUMMARY

This Source Assessment Report ("SAR") is an assessment of the sources, extent, and potential dispersion of selenium in MW-11 and field pH in MW-37 at the White Mesa Mill ("the Mill") as required under State of Utah Groundwater Discharge Permit UGW370004 (the "GWDP") Part I.G.4 relating to violations of Part I.G.2 of the GWDP. Selenium in MW-11 and field pH in MW-37 have exhibited exceedances of the applicable Groundwater Compliance Limits ("GWCLs").

MW-11 has been included in multiple recent investigations and reports, including the Revised Background Groundwater Quality Report for Existing Wells (INTERA, 2007a), a Regional Background Report (INTERA, 2007b), an isotopic investigation (Hurst and Solomon, 2008), a 2012 SAR (INTERA, 2012a), a pH Report (INTERA, 2012b), a 2019 SAR (INTERA, 2019), and a 2022 SAR (EFRI, 2022). Increasing concentrations of constituents in MW-11 including indicator parameter sulfate, were present at the time of the isotopic investigation (Hurst and Solomon, 2008) which demonstrated no groundwater impacts from the tailings management system ("TMS"). The previous SARs noted that the trends in MW-11 were due to natural influences, consistent with the conclusions of Hurst and Solomon (2008) which included MW-11 in their analysis.

Subsequent to about 2018, both nitrate and chloride show unambiguously increasing trends at MW-11. Although MW-11 is not within the nitrate/chloride plume (because nitrate and chloride concentrations are below 10 milligrams per liter ("mg/L") and 100 mg/L, respectively), these increasing trends are consistent with ongoing downgradient migration of the plume toward MW-11. Selenium concentrations in MW-11 have increased since about fourth quarter 2021 subsequent to the increasing nitrate and chloride trends. The selenium increases are attributable primarily to the oxidation of naturally occurring pyrite that contains selenium as a contaminant and mobilization of naturally occurring selenium by nitrate (including via oxidation of pyrite by nitrate) as the nitrate plume migrates towards MW-11. This conclusion is supported by the fact that indicator parameter fluoride has exhibited a significantly downward trend, indicator parameter sulfate which has exhibited a significantly increasing trend in the past due to background influences, has not exhibited an upward trend since July 2019, (the period during which selenium has exhibited an upward trend) and indicator parameter uranium has exhibited an upward trend but this trend has been attributed to pyrite oxidation with stable to increasing pH, as described in detail below.

Additional factors that contributed to changes in groundwater conditions at MW-11 are discussed in Section 3.0 of this SAR. These factors include the site-wide pH changes, wildlife pond seepage, and the location of MW-11 immediately downgradient of the nitrate/chloride plume which extends approximately 1,000 feet upgradient of the TMS.

GWCLs for field pH in MW-37 were calculated at the time of the background report in May 2014 using 11 data points. Although a minimum of eight data points are required according to the DWMRC-approved Flowsheet (from INTERA [2007a], included as **Appendix D**), this number is truly a minimum requirement. The strength of the statistical analysis will increase with more data points, and caution should be used when setting GWCLs for constituents with a limited data set (fewer than 20 samples, per United States Environmental Protection Agency ["USEPA"] Unified Guidance [USEPA, 2009]). Evaluation of field pH and indicator parameters in MW-37 indicate the exceedances of field pH in MW-37 are due to the unrepresentative data set used to calculate the GWCL at the time of the background report (2014). Significantly more data points are now available, providing a more robust understanding of the water quality and behavior of groundwater conditions at MW-37 and allowing for revision of the GWCL using a more representative data set.

As the results of this analysis will demonstrate, trends in MW-11 and MW-37 are the result of background conditions unrelated to potential seepage from the disposal of materials in the TMS. In addition, selenium in MW-11 and field pH in MW-37 are within the range of site-wide conditions.

Revising the GWCLs to reflect the variations in selenium in MW-11 and field pH in MW-37 is proposed. In accordance with the DWMRC-approved Flowsheet (from INTERA [2007a], included as **Appendix D**), increasing trends may necessitate a modified approach, which has been approved in previous SARs, for calculation of GWCLs. A modified approach for calculating a revised GWCL for selenium in MW-11 used the greater of (1) mean plus two standard deviations, (2) highest historical value, or (3) mean x 1.25 to determine representative and appropriate GWCLs for trending constituents. The GWCL for field pH was calculated using the lowest historical value, following the DWMRC-approved Flowsheet. Regular revisions to GWCLs for constituents in wells with significantly increasing trends over time due to background is consistent with the United States Environmental Protection Agency ("USEPA") Unified Guidance (USEPA, 2009). Such revisions account for variability in larger datasets and minimize unwarranted out-of-compliance status.

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Background Reports	*collectively refers to relevant background reports for this well and site*: the Existing Wells Background Report (INTERA, 2007a), the Regional Background Report (INTERA, 2007b), and the New Wells Background Report (INTERA, 2008)
CAP	Corrective Action Plan
CFCs	chlorofluorocarbons
CIR	Contaminant Investigation Report
DI	Deionized
Director	Director of the Division of Waste Management and Radiation Control
DWMRC	State of Utah Division of Waste Management and Radiation Control
EFRI	Energy Fuels Resources (USA) Inc.
GWCL	Groundwater Compliance Limit
GWDP	State of Utah Ground Water Discharge Permit UGW370004
GWQS	Groundwater Quality Standard
µg/L	micrograms per liter
mg/L	milligrams per liter
Mill	White Mesa Uranium Mill
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
SAR	Source Assessment Report
TDS	Total Dissolved Solids
TMS	Tailings Management System
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Energy Fuels Resources (USA) Inc. ("EFRI") operates the White Mesa Uranium Mill (the "Mill"), located near Blanding, Utah (Figure 1A). Groundwater at the Mill is regulated under the State of Utah Groundwater Discharge Permit UGW370004 (the "GWDP"). This is the Source Assessment Report ("SAR") required under Part I.G.4 of the GWDP relating to Part I.G.2 of the GWDP with respect to selenium in MW-11 and field pH in MW-37.

Part I.G.2 of the GWDP provides that an out-of-compliance status exists when the concentration of a constituent in two consecutive samples from a compliance monitoring point exceeds a groundwater compliance limit ("GWCL") in Table 2 of the GWDP. The GWDP was originally issued in March 2005, at which time GWCLs in MW-11 were set on an interim basis, based on fractions of State of Utah Ground Water Quality Standards ("GWQSs") or the equivalent, without reference to natural background at the Mill. The GWDP also required that EFRI prepare a background groundwater quality report to evaluate all historical data for the purposes of establishing background groundwater quality at the Mill site and developing GWCLs under the GWDP for MW-11. As required by then Part I.H.3 of the GWDP, EFRI submitted three "Background Groundwater Quality Reports" (INTERA 2007a, 2007b, 2008) (collectively, the "Background Reports") to the Director (the "Director") of the State of Utah Division of Waste Management and Radiation Control ("DWMRC") (the Director was formerly the Executive Secretary of the Utah Radiation Control Board and the Co-Executive Secretary of the Utah Water Quality Board).

Based on a review of the Background Reports and other information and analyses, the Director re-opened the GWDP and modified the GWCLs to be equal to the mean concentration plus two standard deviations ("mean + 2σ") or the equivalent for each constituent in each well, based on an "intra-well" approach. That is, the compliance status for each constituent in a well is determined based on current concentrations of that constituent in that well compared to the historical concentrations for that constituent in that well, rather than compared to the concentrations of the same constituent in other monitoring wells. The modified GWCLs for MW-11 became effective on January 20, 2010. On January 19, 2018, March 19, 2019, and March 8, 2021, revised GWDPs were issued, which set revised GWCLs for certain constituents in certain monitoring wells as approved by the Director through previously approved SARs relating to those constituents in those wells. GWCLs apply to groundwater monitoring wells located in the perched aquifer at the Mill.

MW-37 was installed on the southern edge of Cell 4B, in 2011. A Background Report for MW-35, MW-36, and MW-37 (INTERA, 2014) was prepared to meet the requirements stated in then Part I.H.5 of the Mill's GWDP issued by the DWMRC on August 24, 2012. The GWCLs in MW-37 were calculated in accordance with the DWMRC-approved Flowsheet (from INTERA [2007a], included as **Appendix D**) and are equal to mean + 2σ or the equivalent for each constituent in each well, based on the "intra-well" approach. As discussed above, the compliance status for each constituent in a well is determined based on current concentrations of that constituent in that well compared to the historic concentrations for that constituent in that well, rather than compared to the concentrations of the same constituent in other monitoring wells. The GWCLs for MW-37 became effective on January 19, 2018.

Figure 1B is a site map showing perched well and piezometer locations, second quarter ("Q2") 2023 perched groundwater elevations, and other relevant site features, such as the locations of formerly used (unlined) wildlife ponds, the historical pond, and the boundaries of two shallow groundwater plumes (the nitrate/chloride plume and the chloroform plume) which are under active remediation by pumping. Specifically, Figure 1B shows the commingled nitrate and chloride components of the nitrate/chloride plume.

Figure 1C shows the same features as Figure 1B, except that water levels and plume boundaries are as they existed just prior to cessation of water delivery to the wildlife ponds in the first quarter ("Q1") of 2012. As shown in Figures 1B and 1C, perched groundwater flows generally to the southwest across the site, and the nitrate/chloride plume extends more than 1,000 feet upgradient of the Tailings Management System ("TMS") indicating an upgradient source. As discussed in HGC (2018), the chloroform plume originated from disposal of laboratory wastes to two former sanitary leach fields that were used prior to Mill construction and operation. Both Figures 1B and 1C show that MW-11 is located immediately downgradient of the nitrate/chloride plume. Figure 1D, which shows increasing nitrate and chloride over time at MW-11, indicates that, while MW-11 is not yet within the nitrate/chloride plume, it is under the influence of the leading edge of the plume.

Groundwater quality at individual wells is impacted by transient conditions at the site. Currently the perched groundwater system that is monitored at the site does not approach steady state over much of the monitored area. A large part of the site perched water system is in a transient state and affected by long-term changes in water levels due to past and current activities unrelated to the disposal of materials to the TMS. Changes in water levels have historically been related to seepage from the unlined wildlife ponds; however past impacts related to the historical pond, and to a lesser extent formerly used sanitary leach fields, have also influenced water levels, as discussed in HGC (2018). Water levels have decreased at some locations due to chloroform and nitrate pumping and reduced recharge from the wildlife ponds.

Figure 2 is a plot of groundwater elevations over time at MW-11 and MW-37. Groundwater levels have increased by approximately 19 feet at MW-11 since the well was installed, and by approximately 17 feet since 1990; and groundwater elevations at MW-37 have increased by more than 6 feet since installation. As discussed above, water level increases are attributable to former wildlife pond recharge.

1.1 Source Assessment Report Organization

Analyses of SAR parameters and indicator parameters in MW-11 and MW-37 were performed. A description of the approach used for analysis is provided in Section 2.0, and the results of the analyses are presented in Section 3.0. The calculation of GWCLs is discussed in Section 4.0, and conclusions and recommendations are reviewed in Section 5.0. Section 6.0 provides signature and certification of this document, and Section 7.0 provides a list of references cited in this SAR.

The appendices comprise the analyses performed for this SAR and are organized in the following manner: **Appendix A** contains the statistical analysis performed on selenium in MW-11 and field pH in MW-37. **Appendix B** contains the indicator parameter analysis performed on MW-11 and MW-37. **Appendix C** summarizes the mass balance analysis. **Appendix D** contains the Groundwater Data Preparation and Statistical Process Flow for Calculating Groundwater Protection Standards, White Mesa Mill Site, San Juan County, Utah ("Flowsheet") that was developed based on the United States Environmental Protection Agency's ("USEPA") Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (USEPA, 2009), which was approved by DWMRC prior to completion of the Background Reports. **Appendix E** is included on the compact disc that accompanies this SAR and contains the electronic input and output files used for statistical analysis.

Statistical analysis was performed using the software package "R." R is a free statistical package that allows the analyst to perform statistical analysis and format and output graphs more effectively than the Statistica software package used in the past. Input and output files included in **Appendix E** can be imported into either R or Statistica to replicate the results presented in this SAR.

2.0 CATEGORIES AND APPROACHES FOR ANALYSIS

Previously EFRI has categorized wells and constituents in five categories as follows:

1. Constituents Potentially Impacted by Decreasing pH Trends Across the Site
2. Newly Installed Wells with Interim GWCLs
3. Constituents in Wells with Previously Identified Rising Trends
4. Pumping Wells
5. Other Constituents

This SAR addresses selenium in MW-11 and field pH in MW-37, which both fall into category five; Other Constituents. Given the varied background groundwater quality at the site, it cannot be assumed that consecutive exceedances of a constituent in a monitoring well means that contamination has been introduced to groundwater in that well.

The location of MW-11 is important when determining potential sources of contamination. MW-11 is directly downgradient of the nitrate/chloride plume. Nitrate concentrations at MW-5 (adjacent to MW-11) and MW-11 have historically been relatively low (non-detect to approximately 1 mg/L). Relatively low nitrate concentrations at MW-11 are consistent with the relative stability of the downgradient margin of the nitrate plume. However, since mid-2019, low but detectable nitrate at MW-11 (up to a maximum of approximately 3.5 mg/L), and increases in chloride, have been observed. Although MW-11 is not within the nitrate/chloride plume (because nitrate and chloride concentrations are below 10 mg/L and 100 mg/L, respectively), these increasing trends are consistent with ongoing downgradient migration of the plume toward MW-11.

The relative stability of the downgradient (southern) margin of the nitrate component of the nitrate/chloride plume, evidenced by relatively stable nitrate concentrations at MW-30 and MW-31 (located in the downgradient toe of the plume as shown in Figure 1B), implies a degradation mechanism that affects nitrate but not chloride (which is increasing at MW-30 and MW-31). The most likely mechanism is degradation (reduction) of nitrate by naturally-occurring pyrite in the formations hosting perched groundwater at the site.

The consecutive exceedances of field pH in MW-37 are likely due to background influences and a small and unrepresentative background data set used to calculate the GWCLs at the time of the Background Report. Given the recent analyses and investigations at the site, there is no indication that the exceedances of field pH in MW-37 are due to Mill-related impacts or to any potential TMS seepage.

2.1 Approach for Analysis

The first step in the analysis is to assess the potential sources for the exceedances to determine whether they are due to background influences or Mill activities. If the exceedances are determined to be within natural variability or due to site-wide influences, then it is not necessary to perform further evaluations on the extent and potential dispersion of the contamination or to perform an evaluation of potential remedial actions. Monitoring will continue and, where appropriate, revised GWCLs are proposed to reflect changes in background conditions.

The analysis performed in this SAR considers all available data to date to evaluate the behavior of the constituents in the wells. Analysis will determine if there have been any changes in the behavior of potential TMS seepage indicator parameters (e.g., chloride, sulfate, fluoride, and uranium) since the date of the Background Reports that may suggest a change in the behavior of the groundwater in MW-11 and MW-37.

2.1.1 MW-11

As discussed in the Background Reports (INTERA, 2007a, 2007b, 2008), indicator parameters of potential TMS seepage include chloride, sulfate, fluoride, and uranium. Chloride is typically the best indicator of potential TMS seepage; however, chloride is problematic as an indicator parameter for groundwater monitoring wells at the Mill impacted by the nitrate/chloride plume which originates upgradient of the TMS (Figures 1B and 1C) (HGC, 2018). Although MW-11 is not within the nitrate/chloride plume, it is immediately downgradient of the plume and is now affected by elevated concentrations of chloride and nitrate at the leading edge of the plume.

Sulfate and fluoride are useful indicator parameters when the geochemical conditions allow these constituents to behave conservatively (i.e., are non-reactive). However, because sulfate has displayed a long-term increasing trend in MW-11 that was present at the time that the Hurst and Solomon isotopic investigation (Hurst and Solomon, 2008; discussed in Section 2.3) concluded there were no impacts to groundwater from the TMS, it is also not a useful indicator parameter at MW-11. In addition, although uranium may be the most mobile metal under some conditions, its behavior ranges from conservative to non-conservative, and is likely to behave relatively non-conservatively due to relatively strong sorption expected at the near-neutral pH of MW-11 (see Section 3.3 for further discussion). Therefore, fluoride is the best indicator parameter at MW-11.

Although any potential seepage from the TMS would be expected to cause increasing concentrations of chloride, sulfate, fluoride, and uranium, as discussed above, sulfate and chloride are not useful indicators at MW-11, and uranium is expected to be strongly retarded compared to fluoride at MW-11 due to sorption and precipitation, and would not show increases in groundwater until sometime after fluoride concentrations had begun to increase. However, as shown in Figure 3, while chloride is increasing due to the influence of the nitrate/chloride plume, fluoride is decreasing, indicating that there are no impacts from the TMS. As noted in Section 12.0 of INTERA (2007a), while the absence of a rising trend in chloride concentration would demonstrate that there has been no impact from the TMS, a rising trend in chloride concentration as well as in other indicator parameters can be due to natural influences unrelated to potential seepage from the disposal of materials in the TMS.

The evaluation of SAR and indicator parameters in MW-11 was supported by a statistical analysis that followed the process outlined in the Flowsheet (INTERA, 2007a), a copy of which is attached as **Appendix D.** The Flowsheet was designed based on USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009), and was approved by DWMRC prior to completion of the Background Reports.

2.1.2 MW-37

The consecutive exceedances of field pH in MW-37 are likely due to background influences and a small and unrepresentative background data set used to calculate the GWCLs at the time of the Background Report. Given the recent analyses and investigations at the site, there is no indication that the exceedances of field pH in MW-37 are due to Mill-related impacts or to any potential TMS seepage.

Indicator parameter analysis demonstrates that there are no significant increasing trends in chloride, fluoride, sulfate or uranium concentrations; rather these parameters are stable to decreasing as shown in **Appendix B-7**.

As with MW-11, the evaluation of pH and indicator parameters in MW-37 was supported by a statistical analysis that followed the process outlined in the Flowsheet (INTERA, 2007a), a copy of which is attached as **Appendix D.** The Flowsheet was designed based on USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009), and was approved by DWMRC prior to completion of the Background Reports.

2.2 Approach for Setting Revised GWCLs

If the preceding approach resulted in the conclusion that the analysis in the Background Reports has not changed, or that the increasing concentrations of selenium in MW-11; or decreasing field pH in MW-37; are due to natural, background variability (or changes) in groundwater; geochemical changes caused by the downgradient migration of the nitrate/chloride plume; or site-wide influences such as the oxidation of pyrite; then a new GWCL may be proposed. In proposing revised GWCLs, the DWMRC-approved Flowsheet approach was adopted, including the last decision of the process that directs the analyst to consider a modified approach to determining a GWCL if an increasing trend is present (or decreasing trend in the case of pH).

Appendix A-1 summarizes the geochemical analysis for selenium in MW-11 and field pH in MW-37 and presents the revised GWCLs for those constituents, based on the Flowsheet. A modified approach for selenium is being proposed to address issues with revising GWCLs in constituents with significantly increasing trends and to minimize unwarranted out-of-compliance situations.

2.3 University of Utah Study

At the request of the DWMRC, T. Grant Hurst and D. Kip Solomon of the Department of Geology and Geophysics of the University of Utah performed a groundwater study (the "University of Utah Study") at the Mill site in July 2007 (Hurst and Solomon, 2008). The purpose of this study was to characterize groundwater flow, chemical composition, noble gas composition, and age to evaluate whether the increasing and elevated trace metal concentrations in monitoring wells at the Mill, all of which were identified in the Background Reports, may indicate that potential seepage from the TMS is occurring.

To evaluate sources of solute concentrations at the Mill, low-flow groundwater sampling was used as a method for collecting groundwater quality samples from 15 monitoring wells, including MW-11. In addition, surface water samples were collected from TMS cells 1, 3, and 4A, and two wildlife ponds. Passive diffusion samplers were also deployed and collected to characterize the dissolved gas composition of groundwater at different depths within the wells. Samples were collected and analyzed for the following constituents: tritium, nitrate, sulfate, deuterium and oxygen-18 of water, sulfur-34 and oxygen-18 of sulfate, trace metals (uranium, manganese, and selenium), and chlorofluorocarbons ("CFCs").

Hurst and Solomon (2008, page iii) concluded generally that,

> *[t]he data show that groundwater at the Mill is largely older than 50 years, based on apparent recharge dates from chlorofluorocarbons and tritium concentrations. Wells exhibiting groundwater that has recharged within the last 50 years appears to be a result of recharge from wildlife ponds near the site. Stable isotope fingerprints do not suggest contamination of groundwater by tailings cell leakage, evidence that is corroborated by trace metal concentrations similar to historically-observed observations.*

Hurst and Solomon (2008) conclude that,

> *[i]n general, the data collected in this study do not provide evidence that tailings cell leakage is leading to contamination of groundwater in the area around the White Mesa Mill. Evidence of old water in the majority of wells, and significantly different isotopic fingerprints between wells with the highest concentrations of trace metals and surface water sites, supports this conclusion. The only evidence linking surface waters to recharging groundwater is seen in MW-27 and MW-19. Measurable tritium and CFC concentrations indicate relatively young water, with low concentrations of selenium, manganese, and uranium. Furthermore, stable isotope fingerprints of ðD and $ð^{18}O$ suggest mixing between wildlife pond recharge and older groundwater in MW-19 and MW-27. $D^{34}S\text{-}SO_4$ and $ð^{18}O\text{-}SO_4$ fingerprints closely relate MW-27 to wildlife pond water, while the exceptionally low concentration of sulfate in MW-27, the only groundwater site to exhibit sulfate levels below 100 mg/L, suggest no leachate from the tailings cells has reached the well.*

It should be further noted that, subsequent to the University of Utah Study, EFRI submitted a *Contaminant Investigation Report, White Mesa Uranium Mill Site, Blanding Utah*, dated December 30, 2009 (INTERA, 2009) ("CIR"), in connection with the nitrate/chloride plume at the Mill site. The CIR discusses the presence of a historical pond that existed for many years at a location upgradient from MW-27 (Figures 1B and 1C), which was much closer to MW-27 than the wildlife ponds. This historical pond was a contributor of surface water to MW-27.

MW-37 was not in existence at the time of the University of Utah study and therefore no assessment was completed for that well.

3.0 RESULTS OF ANALYSIS

This section describes the geochemical influences on groundwater in MW-11 and MW-37 and results of the analyses, summaries of which are provided in **Appendix A-1,** and **Appendix B-1** and discussed further below.

3.1 Site-Wide pH Changes

As discussed below, pH in nearly all MW-series monitoring wells, including MW-11 and MW-37, was decreasing prior to about 2016. This has resulted in mobilization of pH-sensitive metals and increases in concentrations of these metals in groundwater. However, since about 2016, the site-wide decreasing pH trend has reversed in nearly all MW-series monitoring wells (including MW-11 and MW-37), and pH is now generally stable to increasing.

3.1.1 pH Decrease Prior to 2016

As has been documented in INTERA (2012), a decreasing trend in pH was observed in almost every groundwater monitoring well across the site, including upgradient and far cross- and downgradient monitoring wells; and decreasing pH is one of the most important contributors to increasing concentrations of many naturally-occurring parameters.

Hydro Geo Chem, Inc. (["HGC"], 2012a) ("The Pyrite Report") attributed the decline in pH across the Mill site to the site-wide existence and oxidation of pyrite in the perched groundwater monitored at the site. Based on HGC (2012a) pyrite has been noted in approximately $^{2}/_{3}$ of the lithologic logs for wells installed at the site since 1999, and verified by laboratory analysis in core and cuttings from at least 25 monitoring wells. Whereas the lithologic log for MW-37 notes the existence of visible pyrite near the base of the Burro Canyon Formation, the presence or absence of pyrite at MW-11 is unknown as detailed lithologic logs are not available. However, as discussed in HGC (2012), pyrite is essentially ubiquitous at the site and is therefore likely present in the Burro Canyon Formation in the vicinity of MW-11.

Pyrite will oxidize according to the following reaction (Williamson and Rimstidt, 1994):

$$FeS_{2(s)} + 7/2O_{2(g)} + H_2O \rightarrow Fe^{2+}_{(aq)} + 2SO_4^{2-}{}_{(aq)} + 2H^+ \quad \text{(Reaction 1)}$$

Reaction 1 will increase hydrogen ion (acid) concentrations, which results in decreasing pH. Oxidation of pyrite and the resulting decrease in pH enables subsequent pH-dependent reactions to occur, including the mobilization of naturally-occurring metals and metalloids (such as uranium) in the formation (McClean and Bledsoe, 1992). In addition, pyrite typically contains many contaminants including selenium (Curti, 2013; Deditius et al, 2011; Diener et al 2012; Grant et al, 2021; Keith, 2018) that are released upon pyrite oxidation. Furthermore, naturally occurring uranium reduced by and sorbed onto pyrite (Descotes et al 2010; Glizaud, 2006) makes it available for release upon oxidation. As discussed in EFRI (2021), bottle-roll tests using 'generic' pyrite resulted in bottle-roll solutions initially consisting of laboratory-grade deionized ("DI") water generating between 25 micrograms per liter ("µg/L") and 3,420 µg/L uranium. Bottle-roll tests using pyrite-bearing core from the formation hosting perched groundwater at the site yielded bottle-roll solutions having as much as 6,700 µg/L uranium. In addition, bottle-roll test solutions generated as much as 64.9 µg/L selenium from the 'generic' pyrite sample; and as much as 303 µg/L selenium from a pyritic core sample.

The causes for site-wide oxidation of pyrite include processes that increase oxygen transport to groundwater. Monitoring well casings themselves provide direct conduits for oxygen to impact groundwater in the immediate vicinities of the wells. Additional factors that increase oxygen transport to groundwater include: (1) infiltration of oxidized water from the wildlife ponds upgradient of the Mill site; (2) changing water levels and incorporation of oxygen in air-filled pore spaces into groundwater; (3) the introduction of oxygen during pumping related treatment of the nitrate/chloride plume; and (4) the introduction of oxygen during increased sampling of monitoring wells (INTERA, 2012). Many of these mechanisms, in particular changing water levels, are impacting MW-11. Water levels at many site wells increased due to former seepage from the northern wildlife ponds located upgradient of the TMS. As shown in Figure 2, as a result of former wildlife pond seepage and expansion of the resulting perched groundwater mound, water levels at MW-11 increased by approximately 19 feet since installation; and by approximately 17 feet since 1990; and water levels at MW-37 have increased by more than 6 feet since installation.

Although MW-11 is influenced by the downgradient migration of the nitrate/chloride plume, MW-11 is not within the nitrate plume because the plume is defined in the Corrective Action Plan ("CAP") as nitrate concentrations greater than 10 mg/L. As discussed above, the nitrate/chloride plume originates more than 1,000 feet upgradient of the TMS.

Pyrite is oxidized by nitrate by the following mechanisms as discussed in HGC (2018) The pathway most commonly applied in geochemical studies (Kolle *et al.*, 1983, 1985; Postma *et al.*, 1991; Korom, 1992; Robertson *et al.*, 1996; Pauwels *et al.*, 1998; Hartog *et al.*, 2001, 2004; Spiteri *et al.*, 2008) is a bacteria-mediated reaction that yields ferrous iron, sulfate, water, and nitrogen gas as follows:

$$5FeS_2 + 14NO_3^- + 4H^+ = 7N_2 + 10SO_4^{2-} + 5Fe^{2+} + 2H_2O \text{ (Reaction 2).}$$

By Reaction 2, five moles of pyrite reduce 14 moles of nitrate, consuming four moles of acid. Reaction 2 is considered applicable when pyrite concentrations exceed nitrate concentrations (van Beek, 1999). Where nitrate concentrations exceed pyrite concentrations, Reaction 3 is a more likely mechanism (Kolle *et al.*, 1987; van Beek, 1999; Schlippers and Jorgensen, 2002):

$$2FeS_2 + 6NO_3^- + 4H_2O = 3N_2 + 4SO_4^{2-} + 2Fe(OH)_3 + 2H^+ \text{ (Reaction 3).}$$

By Reaction 3, two moles of pyrite reduce six moles of nitrate, yielding iron hydroxide, sulfate, acid, and nitrogen gas. Therefore, when nitrate concentrations exceed pyrite concentrations (Reaction 3), denitrification by pyrite is more efficient than when pyrite is in excess (Reaction 2). Additionally, Reaction 3 produces acid, while Reaction 2 consumes acid, indicating that the impact of denitrification by pyrite on aquifer geochemistry is controlled by the relative abundance of pyrite and nitrate.

Reaction 3 is an overall reaction that combines Reaction 2 and a second step whereby ferrous iron is oxidized by nitrate. This second step is more likely to occur when excess nitrate is present and available to oxidize ferrous iron (Kolle *et al.*, 1987; Rivett *et al.*, 2008; Zhang, 2012).

3.1.2 pH Increase Post-2016

As shown in Figures 4A and 4B, pH at MW-11 and MW-37 generally decreased until about 2016, then became stable to increasing. The post-2016 increase in pH is inconsistent with a TMS source as TMS solutions have a low pH, and mixing of potential seepage of TMS solution with groundwater would cause a decrease (rather than increase) in pH. The increasing pH shows that MW-11 and MW-37 are unimpacted by the TMS, consistent with the decreasing fluoride shown in Figure 3 and stable indicator parameters in MW-37 (Figures 5A through 5C and **Appendix B**). Recently increasing chloride in MW-11, which correlates with increasing nitrate (Figure 1D), is the result of downgradient migration of the nitrate/chloride plume toward MW-11, as will be discussed in Section 3.3.

3.2 Changes in Groundwater

As discussed in Section 1, Figure 1B shows water levels and chloroform, nitrate and chloride plume boundaries for the second quarter of 2023. Figure 1C shows the same features as Figure 1B, except that water levels and plume boundaries are as they existed just prior to cessation of water delivery to the wildlife ponds. A comparison between Figure 1B and Figure 1C shows the substantial changes in water levels that have occurred in about 11 years due cessation of water delivery to the wildlife ponds. Currently, although water levels have declined substantially in the center of the perched groundwater mound associated with the northern wildlife ponds, water levels have not returned to pre-pond seepage conditions, and consequently the groundwater mound is still expanding.

The transient status of a large portion of the perched water system, manifested in long-term changes in saturated thicknesses and rates of groundwater flow, results in trends in pH and in the concentrations of many dissolved constituents that are unrelated to site operations. Changes in saturated thicknesses and rates of groundwater flow can result in changes in concentrations of dissolved constituents (or pH) for many reasons. For example, as discussed in HGC (2012), groundwater rising into a vadose zone having a different chemistry than the saturated zone will result in changes in pH and groundwater constituent concentrations. If the rise in groundwater represents a long-term trend, long-term changes in groundwater constituent concentrations (or pH) result.

3.2.1 MW-11

Statistical analysis of selenium in MW-11 was performed for the complete historical data set and for a more recent post-inflection data set containing data from July 2019 – present. Data used in the analysis are presented in **Appendix B-5**. Both data sets exhibit non-parametric distribution with statistically significant increasing concentrations (**Appendix A-1**). The trend of increasing selenium concentrations in MW-11 correlates with increasing nitrate concentrations (Figure 6) and is likely to result from mobilization from natural sources within the Burro Canyon Formation hosting perched groundwater at the site. Sources include naturally-occurring pyrite in the formation.

Selenium mobilization by nitrate is discussed in Mills et al (2016); Bailey et al (2012); Mast (2014); Potoroff et al (2005); and Wright (1999). In addition, selenium is a common contaminant in pyrite as discussed in Curti (2013); Deditius et al (2011); Diener et al (2012); Grant et al (2021); and Keith (2018). Selenium mobilization by nitrate may result in whole or in part by oxidation of naturally-occurring pyrite by nitrate.

Prior to about 2016, pH at MW-11 was decreasing significantly (Figure 4A); however, chloride was stable and nitrate was generally not detected as shown in Figure 1D, indicating that the nitrate/chloride plume had not yet impacted MW-11. The previous lack of impact by the nitrate/chloride plume is also consistent with stable to slightly increasing ammonia prior to 2016 as shown in Figure 7. Beginning in 2017 ammonia stabilized; and then began to decrease at about the same time that nitrate began to increase (Figure 7), consistent with the influence of the nitrate/chloride plume. The post-2018 decrease in ammonia and increase in nitrate not only indicate the increasing influence of the nitrate/chloride plume but are also consistent with increasingly oxidizing conditions which are favorable for mobilization of selenium.

3.2.2 MW-37

An examination of pH at MW-37 shows that a decreasing trend was present prior to about 2016; however, post-2016, pH began to rise, as shown in Figure 4B. The pre-2016 decreasing trend may have resulted from pyrite oxidation, as visible pyrite was noted in the drilling log; however, the post-2016 stable to increasing trend, which is reflected in most of the MW-series wells at the site, cannot result from TMS seepage mixing into groundwater as the TMS solutions have a very low pH.

Statistical evaluation of field pH in MW-37 was performed for the complete data set (N=42) and is presented in **Appendix B**. Field pH exhibits a non-parametric distribution and does not exhibit a statistically significant increasing trend. Data used in the analysis are presented in **Appendix A-5**.

3.3 Indicator Parameter Analysis

A summary of statistical analysis of indicator parameters for MW-11 and MW-37 is included in **Appendix B**. The complete data set, indicated as "All 2023 SAR Data," and the post-inflection data sets for MW-11 were evaluated for each indicator parameter and are summarized in **Appendix B-1**. **Appendix B-2** presents a descriptive statistics comparison for MW-11 indicator parameters from the Existing Wells Background Report (INTERA, 2007a), the 2012 SAR (INTERA, 2012a), the 2019 SAR (INTERA, 2019), the 2022 SAR (EFRI, 2022) and this SAR. Similarly, **Appendix B-2** presents a descriptive statistics comparison for MW-37 indicator parameters from the 2014 MW-35, MW-36, and MW-37 Background Report (EFRI, 2014) and this SAR. Data used in the indicator parameter analysis are presented in **Appendix B-3**. The distribution and identification of outliers and extreme outliers in indicator parameter concentration datasets are demonstrated in the box plots included in **Appendix B-5**. Histograms and time series plots are included in **Appendix B-6** and **B-7**, respectively.

3.3.1 MW-11

Complete data sets for MW-11 indicator parameters chloride, sulfate and uranium exhibit significantly increasing trends; whereas fluoride exhibits a significantly decreasing trend (**Appendix B-1**). Post-July 2019 inflection data sets for MW-11 indicator parameters exhibit significant trends for chloride and uranium, while sulfate concentrations exhibit no trend. The decreasing trend in fluoride concentrations indicates that MW-11 is not impacted by potential seepage from the TMS. The increase in chloride correlates to an increase in nitrate and is due to the migration of the nitrate/chloride plume towards MW-11.

The increase in sulfate concentrations in the complete data set is more gradual (**Appendix B-7**) than the increase in chloride and uranium concentrations (**Appendix B-7**). Sulfate has been increasing since the time of the Existing Wells Background Report (INTERA, 2007a); and was increasing at the time of the Hurst and Solomon isotopic investigation report (Hurst and Solomon, 2008). Because the isotopic analysis concluded that there were no impacts to groundwater from the TMS, the trend in sulfate is indicative of background conditions unrelated to the disposal of materials to the TMS. Furthermore, isotopic measurements indicated that MW-11 contained the largest component of water that predated the TMS (Hurst and Solomon, 2008), additional demonstration of the lack of a TMS impact. Although sulfate concentrations in MW-11 have been increasing since the time of the Background Report, post-July 2019 data are not increasing significantly and concentrations remain within the sitewide range of sulfate concentrations at the Mill as summarized in EFRI (2022). As described in Section 3.2, sulfate is naturally occurring in groundwater and is released into solution as a result of pyrite oxidation.

The recent increase in uranium corresponds to nearly simultaneous increases in chloride and nitrate (Figures 1D and 8). However, chloride and nitrate are anions that do not sorb onto aquifer materials and are not retarded with respect to groundwater flow. In contrast, uranium is expected to have a mobility that is orders of magnitude lower than chloride or nitrate at the near-neutral pH conditions at MW-11.

USEPA (2007) provides soil-water equilibrium distribution coefficients (Kd) for uranium. The higher the Kd, the less mobile uranium is expected to be; and the lower the Kd, the more mobile uranium is expected to be. As indicated in USEPA (2007), Kd values for uranium are pH-dependent, with the highest Kd associated with near-neutral to slightly acidic pH). The *minimum* Kd values reported for uranium increase from 0.4 mL/g at pH 4 to 100 mL/g at pH 6; drop to 63 mL/g at pH 7; then drop to 0.4 mL/g at pH 8. The actual Kd values for uranium at the site are expected to be higher than these minimum values due to the fine-grained nature of the formations hosting perched groundwater at the site (USEPA, 1999). USEPA (2007) provides maximum Kd for uranium that increase from 5,000 mL/g at pH 4; to 1,000,000 mL/g at pH 6; drop to 630,000 mL/g at pH 7; then drop to 250,000 mg/L at pH 8. The actual uranium Kd values for the Mill are expected to lie within the ranges of minimum and maximum Kd specified in USEPA (2007). Conversely, Kd for anions such as chloride and nitrate are expected to be negligible.

In order to impact groundwater at MW-11, any solution seeping from the TMS would have to penetrate more than 60 feet of vadose materials, then migrate within perched groundwater toward MW-11. Because, as discussed above, the expected Kd for uranium is at least one or more orders of magnitude higher than the expected (negligible) Kd for chloride and nitrate, the substantial retardation of uranium with respect to chloride and nitrate that would occur would prevent the nearly simultaneous increases in all three constituents that have been measured. The only condition that would allow simultaneous increases in constituents with substantially different Kd would be a 'fast pathway' that could conduct TMS solution directly to the immediate vicinity of MW-11 without sorption or any other significant attenuation process. However, if such a 'fast pathway' existed, then nearly simultaneous increases in *all* TMS constituents would occur, rather than just a few. In particular, iron, which typically has the highest measured concentrations in the TMS, would be expected to increase substantially; yet, as shown in

Figure 9, iron at MW-11 has *decreased* in concentration since the first quarter of 2012 and has not been detected since the third quarter of 2018.

Recent increases in uranium are attributable to mobilization of naturally-occurring uranium by nitrate (Asta et al, 2020; Senko et al, 2002; and Senko et al, 2005) and to oxidation of pyrite by nitrate (Section 3.1.1). Similar to selenium, and as discussed above, uranium can exist as a contaminant in pyrite (Descotes et al 2010; Glizaud, 2006). As discussed above and in EFRI (2021), bottle-roll test solutions initially consisting of laboratory-grade DI water generated between 25 µg/L and 3,420 µg/L uranium from 'generic' pyrite samples. Bottle-roll tests using pyrite-bearing core from the formation hosting perched groundwater at the site yielded bottle-roll solutions having as much as 6,700 µg/L uranium. Because nitrate oxidation of pyrite can proceed by a pathway that consumes rather than produces acid, and there is sufficient nitrate to produce the measured uranium, recently increasing uranium at MW-11 can result from pyrite oxidation with stable to increasing pH. In addition, as discussed in Section 3.1.1, bottle-roll test solutions generated as much as 64.9 µg/L selenium from the 'generic' pyrite sample; and as much as 303 µg/L selenium from a pyritic core sample.

3.3.2 MW-37

Mann-Kendall test results show that no significant trends exist for MW-37 indicator parameters (Figures 5A through 5C) (**Appendix B-1**). Linear regression test results for normally distributed constituents, chloride and uranium show a decreasing trend in chloride and a significantly decreasing trend in uranium, indicating that there has been no impact to MW-37 from potential TMS seepage (**Appendix B-1**; **Appendix B-7**).

3.4 Mass Balance Analyses

3.4.1 MW-11

Since 1990, water levels at MW-11 have risen by more than 17 feet, and the saturated thickness has increased from approximately 29.8 to 47.1 feet. TMS solutions contain chloride, a conservative solute, at an average concentration exceeding 28,000 mg/L. If the water level changes at MW-11 were due to potential TMS seepage, and resulted in a mixture containing approximately 37% TMS solution, chloride concentrations at MW-11 would exceed 10,000 mg/L, rather than the second quarter, 2023 value of approximately 69 mg/L. Similarly, based on the average concentrations (since 2003) in TMS solutions, the fluoride concentration would exceed 1,200 mg/L (rather than the second quarter, 2023 value of approximately 0.28 mg/L); the sulfate concentration would exceed 67,000 mg/L (rather than the second quarter, 2023 value of approximately 1,340 mg/L); the uranium concentration would exceed 143,000 µg/L (rather than the second quarter, 2023 value of approximately 2.6 µg/L); and the selenium concentration would exceed 3,400 µg/L rather than the second quarter, 2023 value of 15.3 µg/L). These calculations (summarized in Table C.1 of **Appendix C**) demonstrate that the observed increases in water levels at MW-11 do not result from potential TMS seepage.

In addition, as discussed above, fluoride concentrations at MW-11 are decreasing (Figure 3 and **Appendix C**). Because fluoride is a relatively mobile anion, and, after chloride, is the next most useful indicator parameter, the decreasing trend demonstrates that MW-11 cannot be impacted by potential TMS seepage. Overall, the mass balance analyses and geochemical considerations demonstrate that potential TMS seepage is not a contributor to the groundwater chemistry at MW-11.

3.4.2 MW-37

Based on the average water level over the first four quarters after installation (approximately 5486.6 ft amsl) and the average water level over the last four quarters (approximately 5493 ft amsl), the water level at MW-37 has increased by more than six feet and the saturated thickness has approximately doubled. If the water level increase were the result of TMS seepage, the chloride concentration (currently 45 mg/L) would exceed 14,000 mg/L; the fluoride concentration (currently about 0.2 mg/L) would exceed 1,700 mg/L; the sulfate concentration (currently 2,580 mg/L) would exceed 91,000 mg/L; and the uranium concentration (currently 11.7 µg/L) would exceed 194,000 µg/L. These calculations are summarized in Table C.2 of **Appendix C**. As the actual concentrations are orders of magnitude smaller than the concentrations expected if the water level increase resulted from TMS seepage, the water level increase cannot be the result of potential TMS seepage.

In addition, as shown in Figures 5A through 5C and **Appendix B**, indicator parameters chloride, fluoride, sulfate and uranium at MW-37 are stable to decreasing, indicating no impact from TMS solutions.

3.5 Summary of Results

As will be discussed below, increases in selenium at MW-11; and changes in pH at MW-37; are the result of background conditions unrelated to disposal of materials to the TMS.

3.5.1 Selenium at MW-11

As discussed above, analysis of indicator parameters shows that MW-11 is un-impacted by TMS solutions and that increases in selenium result from factors unrelated to disposal of materials in the TMS. Increases in indicator parameter chloride are attributable to migration of the nitrate/chloride plume, which originates approximately 1,000 feet upgradient of the TMS. Likewise increases in indicator parameter uranium are attributable to mobilization by nitrate supplied by migration of the nitrate/chloride plume.

In addition, indicator parameter sulfate (Figure 10) was increasing in MW-11 at the time of the Hurst and Solomon (2008) isotopic investigation which included MW-11 in its analysis and concluded that there were no impacts to groundwater from the TMS; therefore, increases in sulfate are the result of background conditions unrelated to disposal of materials to the TMS. Decreasing fluoride (Figure 3) and stable to increasing pH since 2016 (Figure 4A) also indicate that MW-11 groundwater is unimpacted by the TMS.

As with uranium, increasing selenium is attributable to mobilization of naturally-occurring selenium in the Burro Canyon formation by nitrate, including release of selenium present as a contaminant in naturally-occurring pyrite. In addition, as discussed in Section 3.1.2, oxidation of pyrite by nitrate can occur via a mechanism that consumes rather than produces acid, thus releasing selenium without a corresponding pH decrease.

3.5.1.1 Summary of Factors Demonstrating no Impact to MW-11 From the TMS

The following factors indicate that changes in constituent concentrations at MW-11 do not result from potential TMS seepage:

1. Key indicator parameter fluoride is decreasing.
2. pH has been stable to increasing since 2016.
3. Iron (which is the constituent having the highest concentration in the TMS) has been decreasing since the first quarter of 2012.
4. A statistically significant increasing trend in indicator parameter sulfate was present in MW-11 at the time of the Hurst and Solomon (2008) isotopic investigation report which included MW-11 in its analysis and that concluded there were no impacts to groundwater from the TMS, indicating that this trend is not the result of potential TMS seepage. In addition, while the complete data set for MW-11 sulfate exhibits a significantly increasing trend, the post-inflection (post-July 2019) data set for MW-11 sulfate exhibits no significant trend.
5. Although not within the plume, concurrently increasing chloride and nitrate at MW-11 since 2018 result from the increasing influence of the nitrate/chloride plume. The increasing influence of the nitrate/chloride plume, which originates approximately 1,000 feet upgradient of the TMS, results from continued downgradient migration of the plume towards MW-11. One consequence of the

increasing nitrate is mobilization of naturally-occurring uranium (and selenium) at MW-11.

6. Because uranium is substantially less mobile than nitrate or chloride at the near-neutral pH conditions at MW-11, concurrently increasing uranium, nitrate, chloride (and selenium) indicate geochemical changes in the immediate vicinity of MW-11 (caused in part by the increasing influence of the nitrate/chloride plume) rather than transport from a remote source such as the TMS.
7. Increasing water levels are expected to impact the MW-11 groundwater chemistry and contribute to trends in dissolved constituents.
8. Mass balance analysis indicates that water level increases at MW-11 do not result from potential TMS seepage.

Because increasing concentrations of selenium in MW-11 are not the result of potential TMS seepage, a revised GWCL for selenium is proposed. Section 4 presents the methods used to calculate a GWCL using a modified approach for trending constituents, in accordance with the Flowsheet.

3.5.2 Field pH in MW-37

As discussed above, evaluation of field pH and indicator parameters demonstrate that the behavior of MW-37 has not varied significantly since the time of the background report. Data that have been collected and appended to the dataset result in a more representative dataset that accounts for natural variability of concentrations.

3.5.2.1 Summary of Factors Demonstrating no Impact to MW-37 From the TMS

The following factors indicate that changes in pH at MW-37 do not result from potential TMS seepage:

1. Key indicator parameters chloride, fluoride, sulfate and uranium are stable to decreasing.
2. pH has been stable to increasing since 2016.
3. Increasing water levels are expected to impact the MW-37 groundwater chemistry and contribute to trends in dissolved constituents.
4. Mass balance analysis indicates that water level increases at MW-37 do not result from potential TMS seepage.

Because changes in field pH in MW-37 are not the result of potential TMS seepage, a revised GWCL for pH is proposed. Section 4.0 presents the methods used to calculate a GWCL in accordance with the Flowsheet.

4.0 CALCULATIONS OF GROUNDWATER COMPLIANCE LIMITS

Because selenium in MW-11 is increasing significantly (**Appendix A-1**, and **A-10**), the Flowsheet (**Appendix D**) dictates that a modified approach should be used to calculate a GWCL. Section 4.1 describes the rationale used to select a modified approach for calculating a GWCL for selenium in MW-11. Since pH in MW-37 does not exhibit a significantly decreasing trend, the revised GWCL was calculated in accordance with the Flowsheet as described in Section 4.2.

4.1 Modified Approach to Calculation of GWCLs for Trending Constituents

According to the DWMRC-approved Flowsheet, if an increasing trend is present, a modified approach should be considered for determining GWCLs. The modified approach used for selenium in MW-11 includes calculating a revised GWCL by selecting the greater of (1) mean + 2σ, (2) highest historical value, or (3) mean x 1.25 using a complete dataset or subset of the data defined by a point of inflection to determine representative and appropriate GWCLs for trending constituents.

As discussed in Section 3.2, selenium in MW-11 exhibits a significantly increasing trend that can be attributed to sitewide conditions that are mobilizing naturally occurring selenium. The mobility of selenium in groundwater is sensitive to increases in nitrate concentrations as discussed in Section 3.2.1. Nitrate concentrations were typically below the laboratory reporting limit of 0.1 mg/L until the July 2019 sampling event where a steady increase in nitrate concentrations thereafter is observed. July 1, 2019, serves as the point of inflection used to define a recent subset of representative data that can be used to calculate a revised GWCL for selenium. Although the complete data set and the post-July 2019 data set were evaluated, the modified approach for the proposed GWCL for selenium is based on the mean + 2σ of the post-July 2019 data set.

Concentrations of selenium and other parameters associated with nitrate oxidation of naturally occurring pyrite (i.e. sulfate and uranium) are likely to continue to increase and regular evaluation and revision of GWCLs will be necessary to minimize unwarranted out-of-compliance status.

Calculation of GWCLs using a modified approach decreases the likelihood of false positives (exceedances) associated with increasing trends related to natural background conditions including site-wide oxidation of pyrite. The proposed GWCL maintains the intra-well approach that has been established for compliance at the Mill, combining elements from the Flowsheet and from previously approved GWCLs calculated using a modified approach. The flowsheet calculations and the proposed GWCLs using the modified approach, are presented in **Appendix A-1** and Table 1, respectively.

4.2 Flowsheet Approach to Calculating a Revised GWCL for Field pH in MW-37

Field pH in MW-37 does not exhibit a significant decreasing trend and is not normally distributed. The flowsheet (**Appendix D**) dictates that the greater (lower in the case of pH) of the fraction approach or the highest historic value (lowest historical value in the case of pH) is selected for the proposed GWCL in these circumstances. Because field pH is measured on a logarithmic scale, the fractional approach results in a value that is unnecessarily low (**Appendix B-1**). Therefore, the proposed GWCL for field pH in MW-37 is based on the lowest historical value.

4.3 Proposed Revised GWCLs

GWCLs determined according to the Flowsheet are presented in Table 1.

Table 1
Proposed Revised GWCLs for MW-11 and MW-37

Well	Parameter (units)	Current GWCL	Proposed GWCL	Rationale
MW-11	Selenium (µg/L)	12.5	20.49	Modified Approach mean + 2σ using post July 1, 2019 data set
MW-37	pH (s.u.)	6.61-8.5	6.05	Lowest Historical Value

5.0 CONCLUSIONS AND RECOMENDATIONS

The Mill site was thoroughly studied in the Background Reports (INTERA, 2007a, 2007b, 2008, 2014), in various SARs, and in the University of Utah Study (Hurst and Solomon, 2008). The Background Reports and the University of Utah Study concluded that groundwater at the Mill site, including in MW-11, has not been impacted by Mill operations. Both of those studies also acknowledged that there are natural influences at play at the Mill site that have given rise to increasing trends and general variability of background groundwater quality at the Mill site.

The focus of this SAR was, therefore, to identify any changes in the circumstances identified in those studies. Evaluation of SAR parameters and indicator parameters in MW-11 were performed in accordance with the DWMRC-approved Flowsheet (**Appendix D**).

With regard to MW-11, although indicator parameters chloride, sulfate and uranium exhibit significantly increasing trends, fluoride is significantly decreasing. Nearly simultaneous increases in chloride and nitrate are caused by migration of the nitrate/chloride plume (which extends approximately 1,000 feet upgradient of the TMS) toward MW-11. Stable to increasing pH (since 2016) and decreasing fluoride indicate that MW-11 is unimpacted by the TMS.

In addition, indicator parameter sulfate (which has not been significantly increasing since July 2019) was already increasing in MW-11 at the time that the University of Utah study which included MW-11 in its analysis, concluded that there were no impacts to groundwater from the TMS; and iron, the metal that exists at the highest concentrations in the TMS solutions, has been decreasing since the first quarter of 2012. Both factors indicate there are no impacts from the TMS. Furthermore, mass balance analysis indicates that increases in water levels at MW-11 do not result from potential seepage from the TMS and analysis demonstrates that the currently increasing trend in uranium in MW-11 is due to pyrite oxidation with stable to increasing pH, and not to potential TMS seepage.

With regard to MW-37, indicator parameters chloride, fluoride, sulfate and uranium are stable to decreasing; and pH has been stable to increasing since 2016, indicating no impacts from the TMS. In addition, mass balance analysis indicates that water level increases at MW-37 do not result from potential TMS seepage.

EFRI recommends adopting the revised GWCLs for MW-11 and MW-37 in accordance with the Flowsheet. Regular revisions to GWCLs are consistent with the USEPA Unified Guidance (USEPA, 2009). Such revisions account for variability in larger datasets and minimize unwarranted out-of-compliance status.

6.0 SIGNATURE AND CERTIFICATION

This document was prepared by Energy Fuels Resources (USA) Inc.

Energy Fuels Resources (USA) Inc.

By:

Scott A. Bakken
Vice President, Regulatory Affairs

9/27/23
Date

Certification:

I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Scott A. Bakken
Vice President, Regulatory Affairs
Energy Fuels Resources (USA) Inc.

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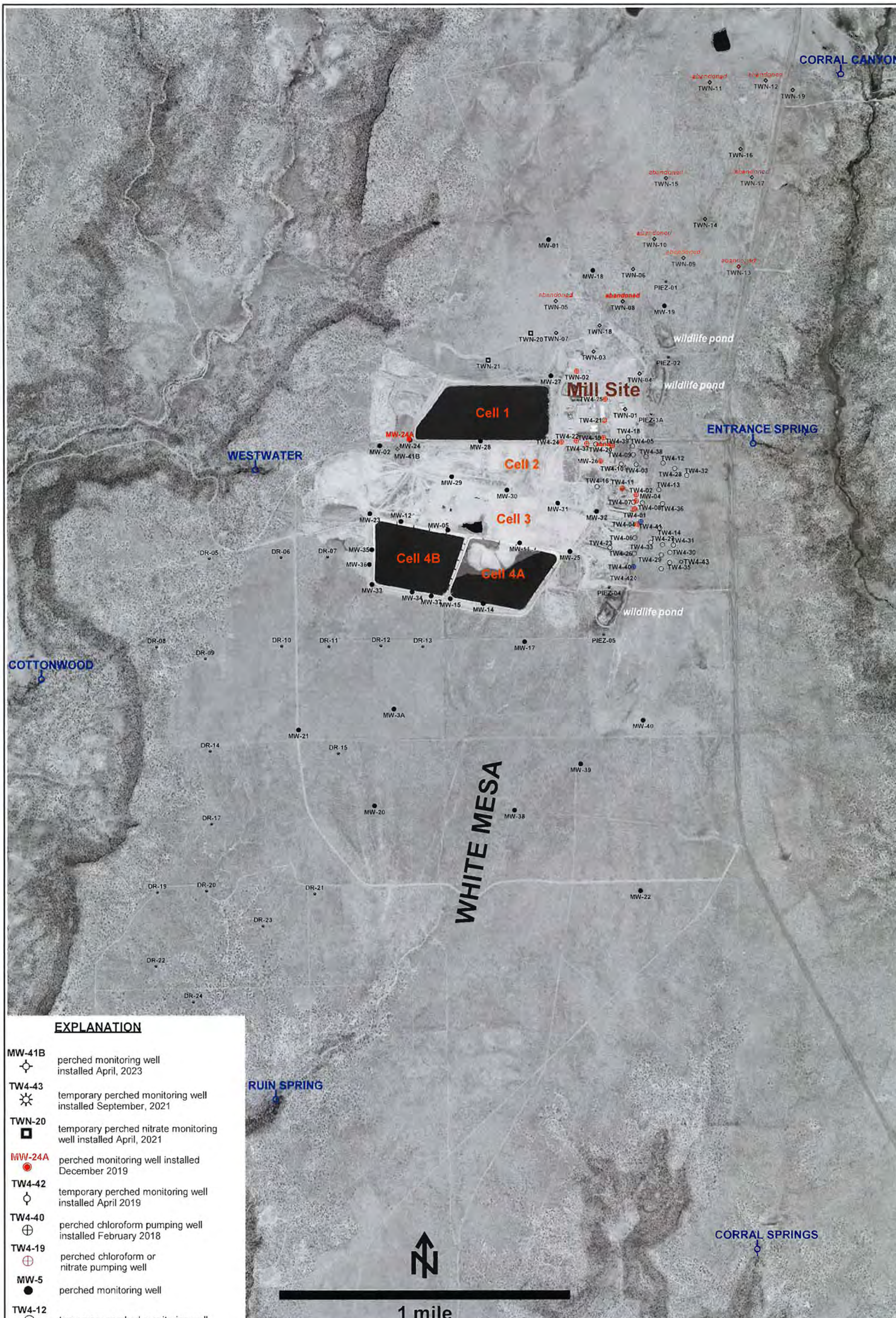
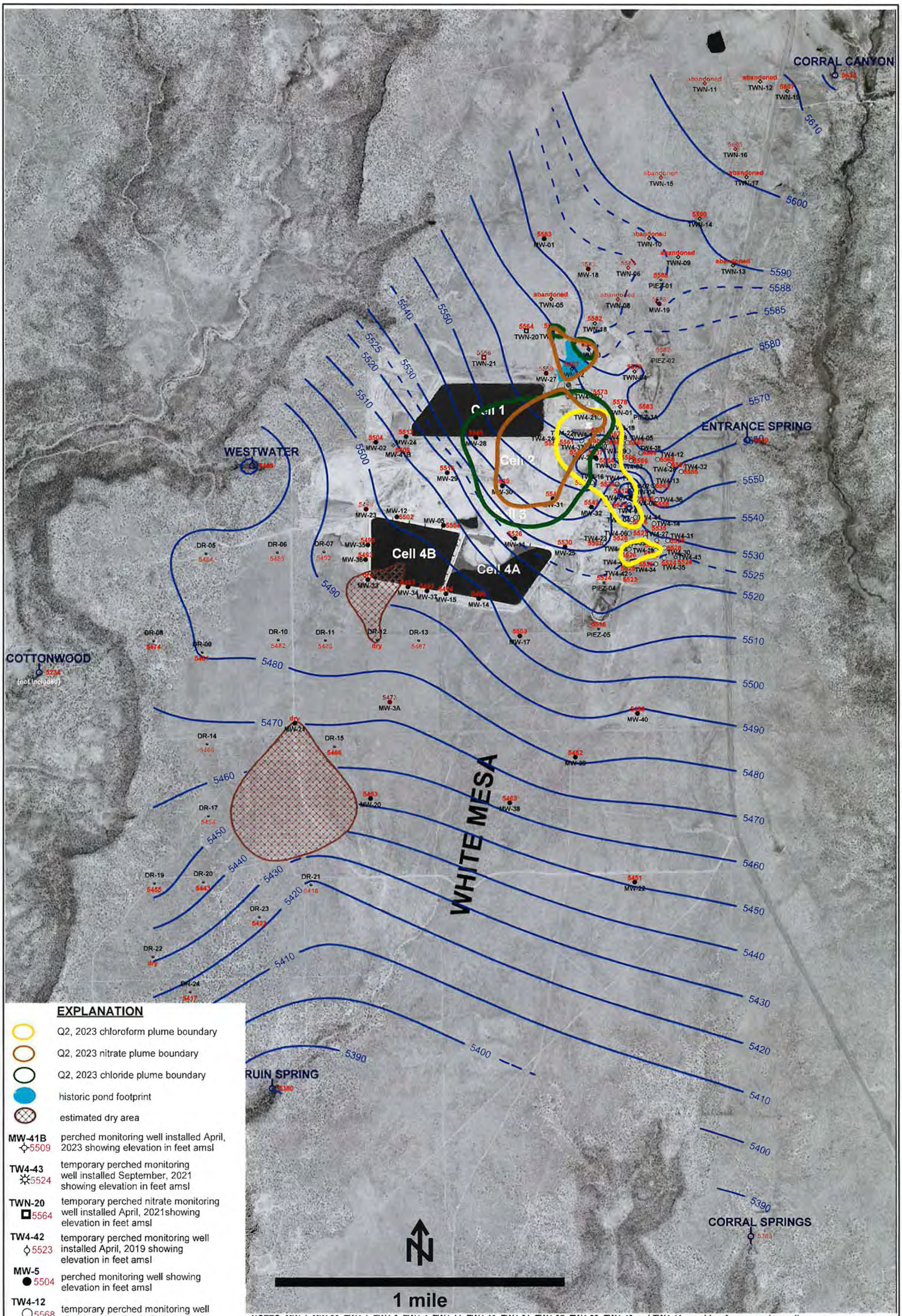
FIGURES



HYDRO GEO CHEM, INC.

WHITE MESA SITE PLAN SHOWING LOCATIONS OF PERCHED WELLS AND PIEZOMETERS

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/MW11_37/MW11_37_SAR_2023/figures/Uwelloc0623.srf	1A

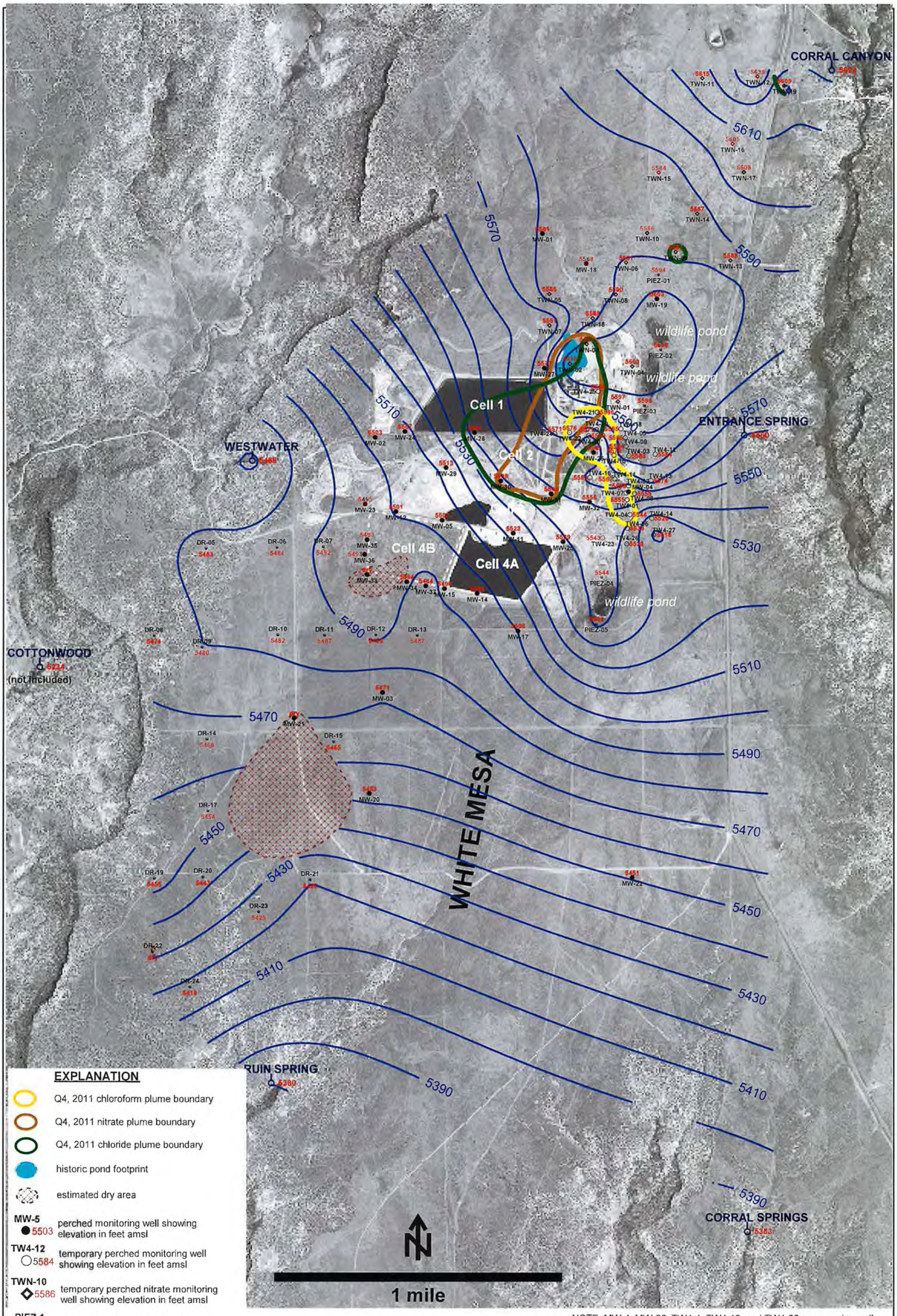


NOTES: MW-4, MW-26, TW4-1, TW4-2, TW4-4, TW4-11, TW4-19, TW4-21, TW4-37, TW4-39, TW4-40 and TW4-41 are chloroform pumping wells; TW4-22, TW4-24, TW4-25 and TWN-2 are nitrate pumping wells; TW4-1, TW4-2 and TW4-11 water levels are below the base of the Burro Canyon Formation

HYDRO GEO CHEM, INC.

KRIGED 2nd QUARTER, 2023 WATER LEVELS AND PLUME BOUNDARIES WHITE MESA SITE

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/MW11_37/MW11_37_SAR_2023/figures/UwlPlumes2Q23.srf	1B



EXPLANATION

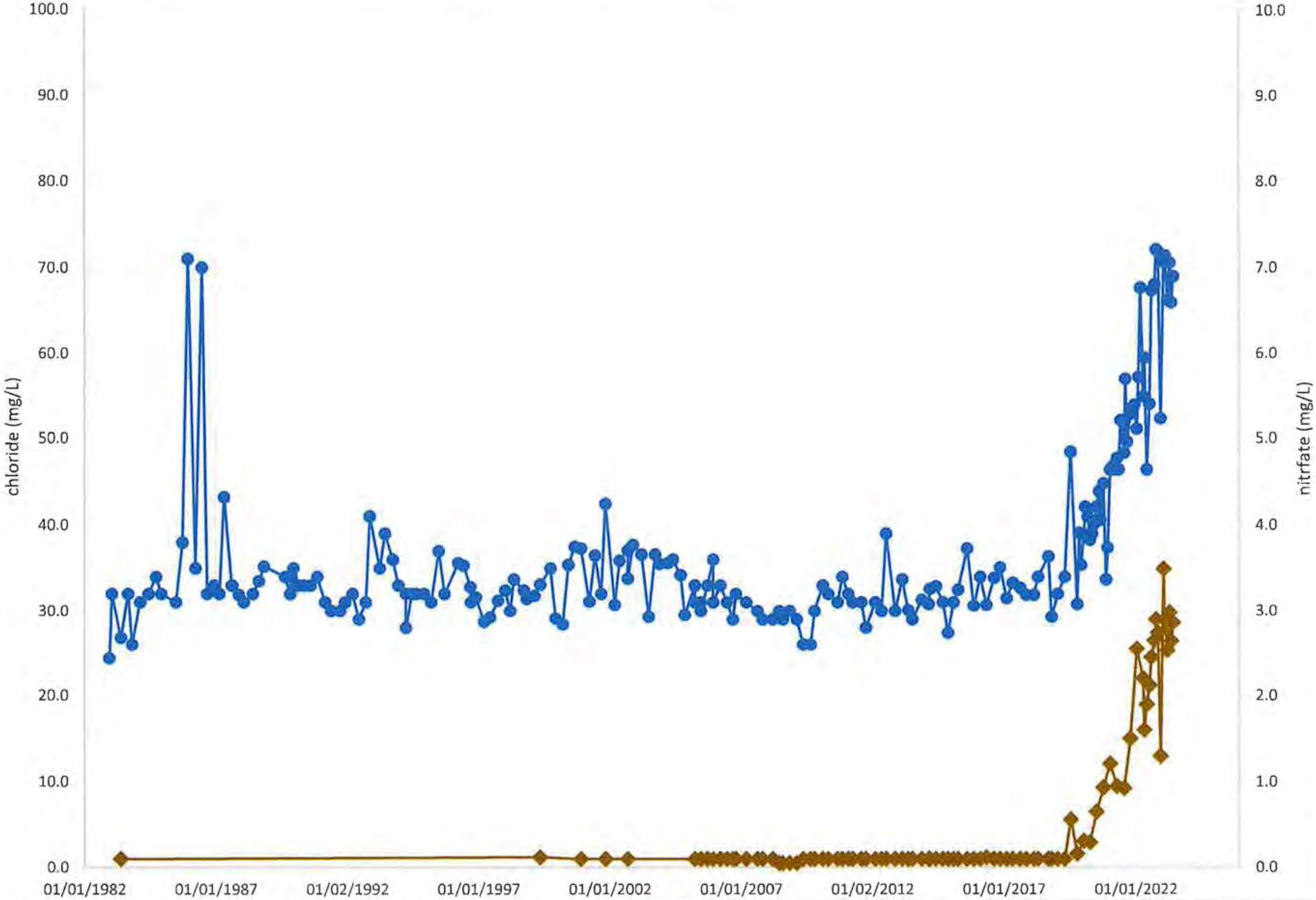
- Q4, 2011 chloroform plume boundary
- Q4, 2011 nitrate plume boundary
- Q4, 2011 chloride plume boundary
- historic pond footprint
- estimated dry area
- MW-5 5503 — perched monitoring well showing elevation in feet amsl
- TW4-12 5584 — temporary perched monitoring well showing elevation in feet amsl
- TWN-10 5586 — temporary perched nitrate monitoring well showing elevation in feet amsl
- PIEZ-1 5594 — perched piezometer showing elevation in feet amsl
- TW4-27 5518 — temporary perched monitoring well installed October, 2011 showing elevation in feet amsl
- RUIN SPRING 5380 — seep or spring showing elevation in feet amsl

NOTE: MW-4, MW-26, TW4-4, TW4-19, and TW4-20 are pumping wells

HYDRO GEO CHEM, INC.

KRIGED 4th QUARTER, 2011 WATER LEVELS AND PLUME BOUNDARIES WHITE MESA SITE

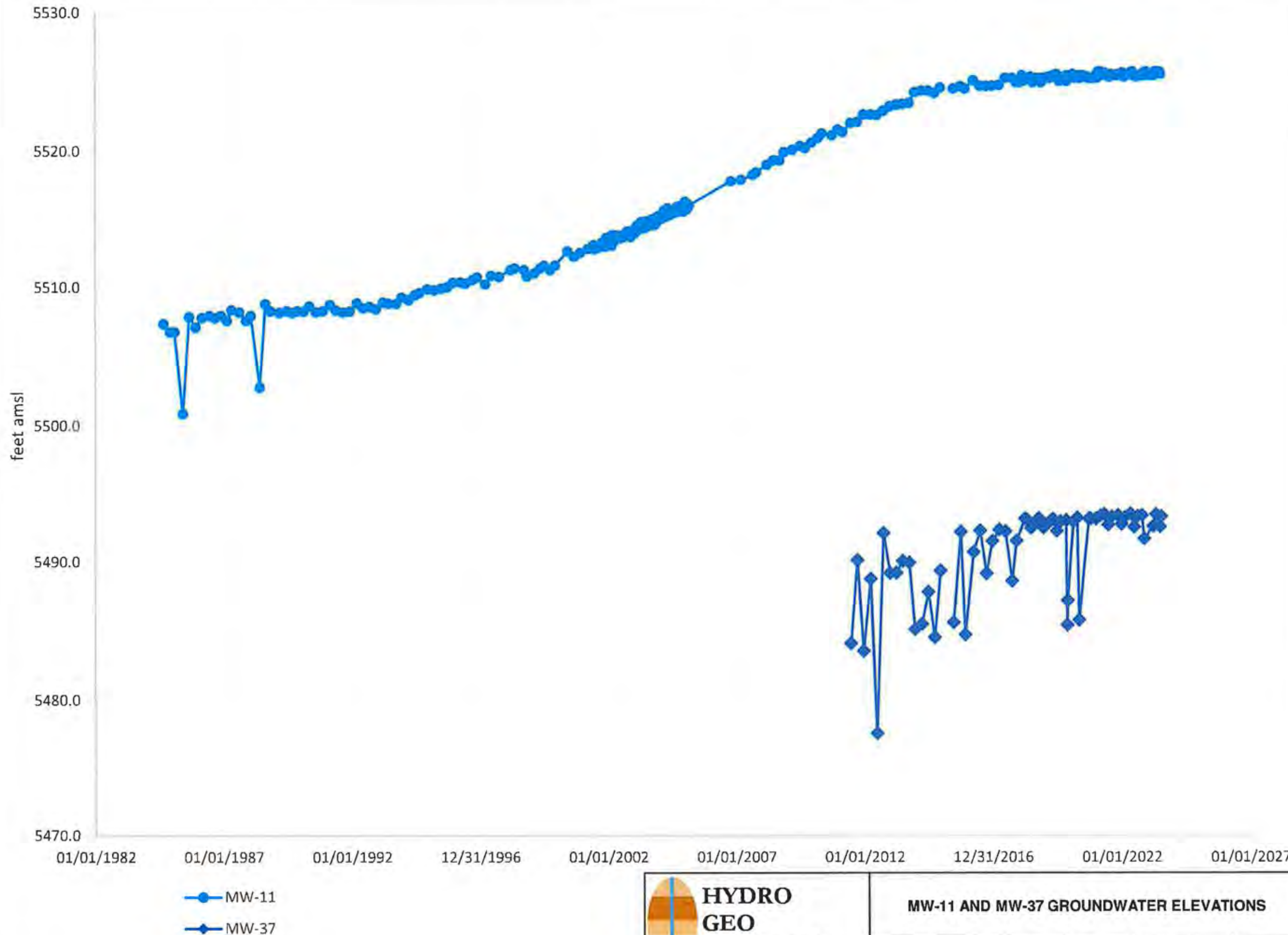
APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/MW11_37/ MW11_37_SAR_2022/Figures/UwlPlumes4Q11.srf	1C



HYDRO GEO CHEM, INC.

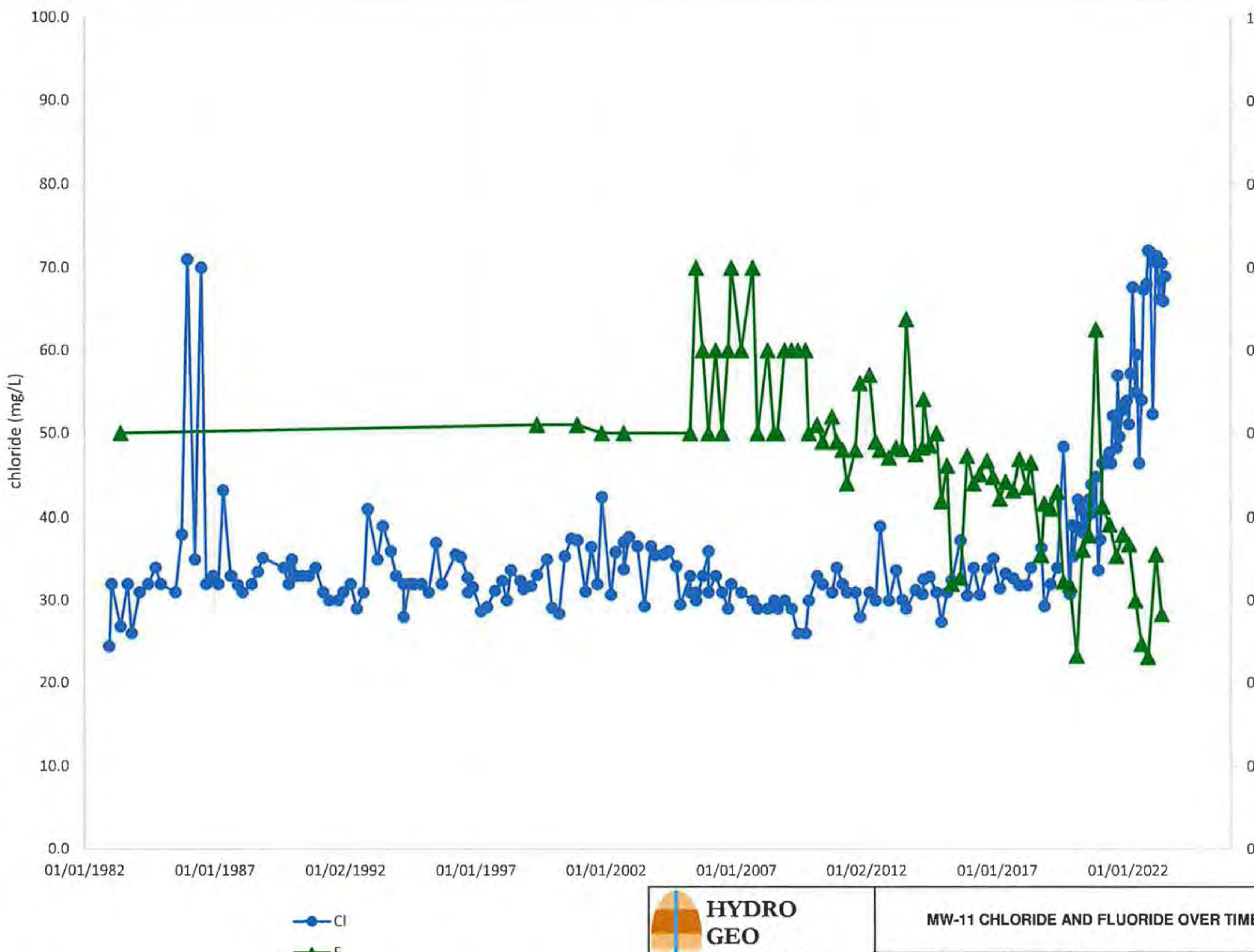
MW-11 CHLORIDE AND NITRATE OVER TIME					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW-11 Cl and NO3	Figure 1.D

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F1d MW-11 Cl and NO3



HYDRO GEO CHEM, INC.	MW-11 AND MW-37 GROUNDWATER ELEVATIONS					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW11 and MW37 WL	Figure 2	

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_WL_072423.xlsx: F2 MW11 and MW37 WL

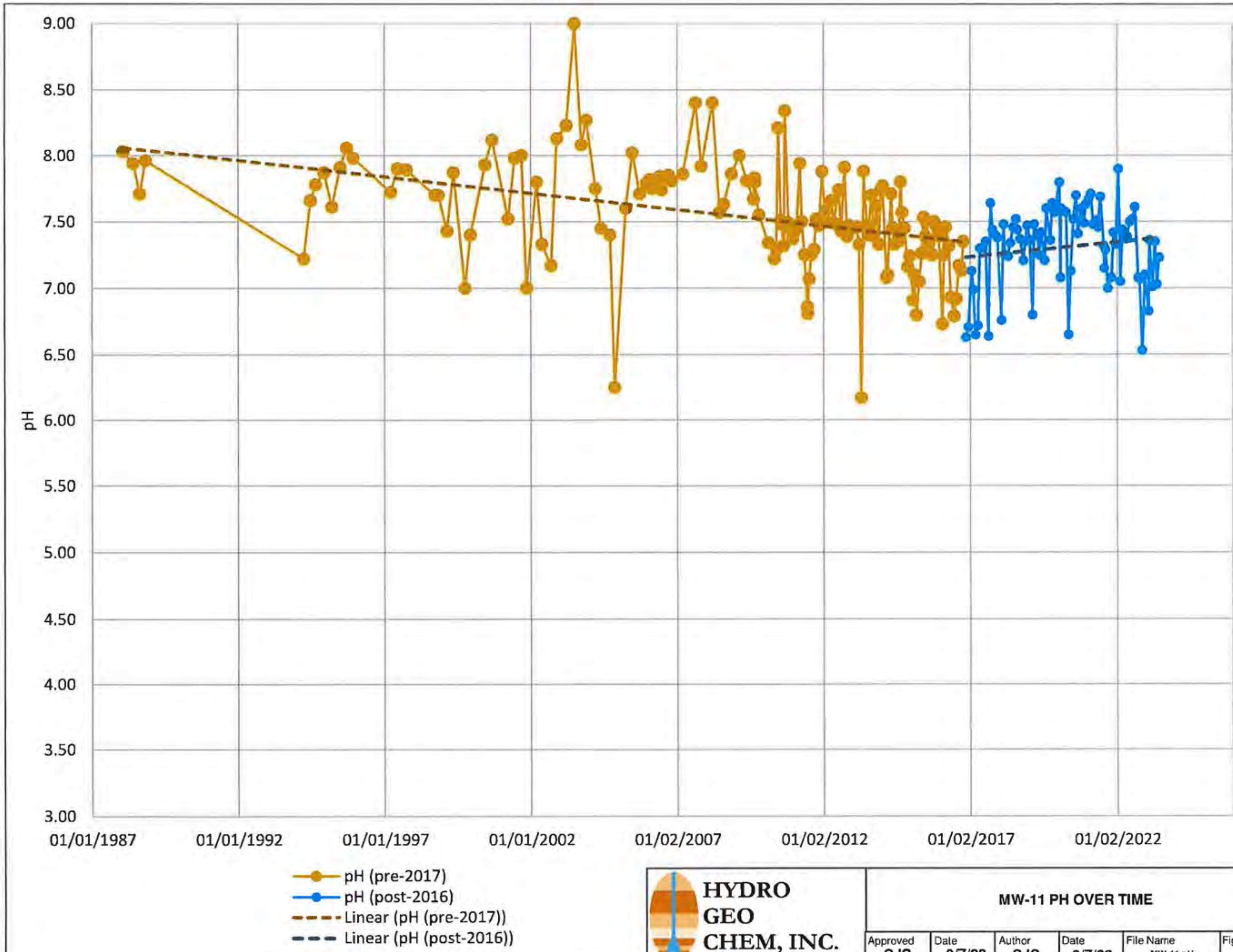


HYDRO GEO CHEM, INC.

MW-11 CHLORIDE AND FLUORIDE OVER TIME

Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW-11 Cl and F	3

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F3 MW-11 Cl and F



HYDRO GEO CHEM, INC.

MW-11 PH OVER TIME					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW-11 pH	Figure 4.A

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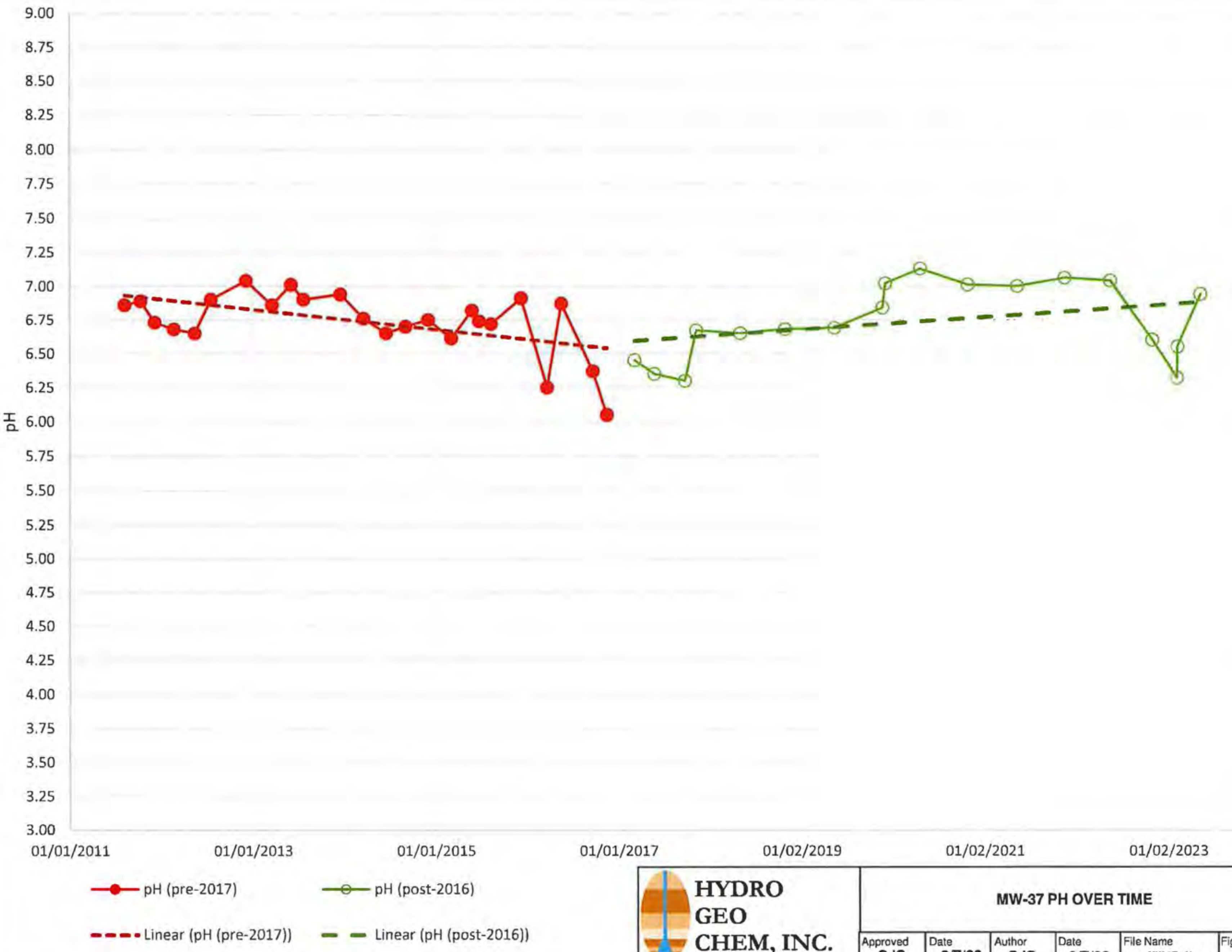
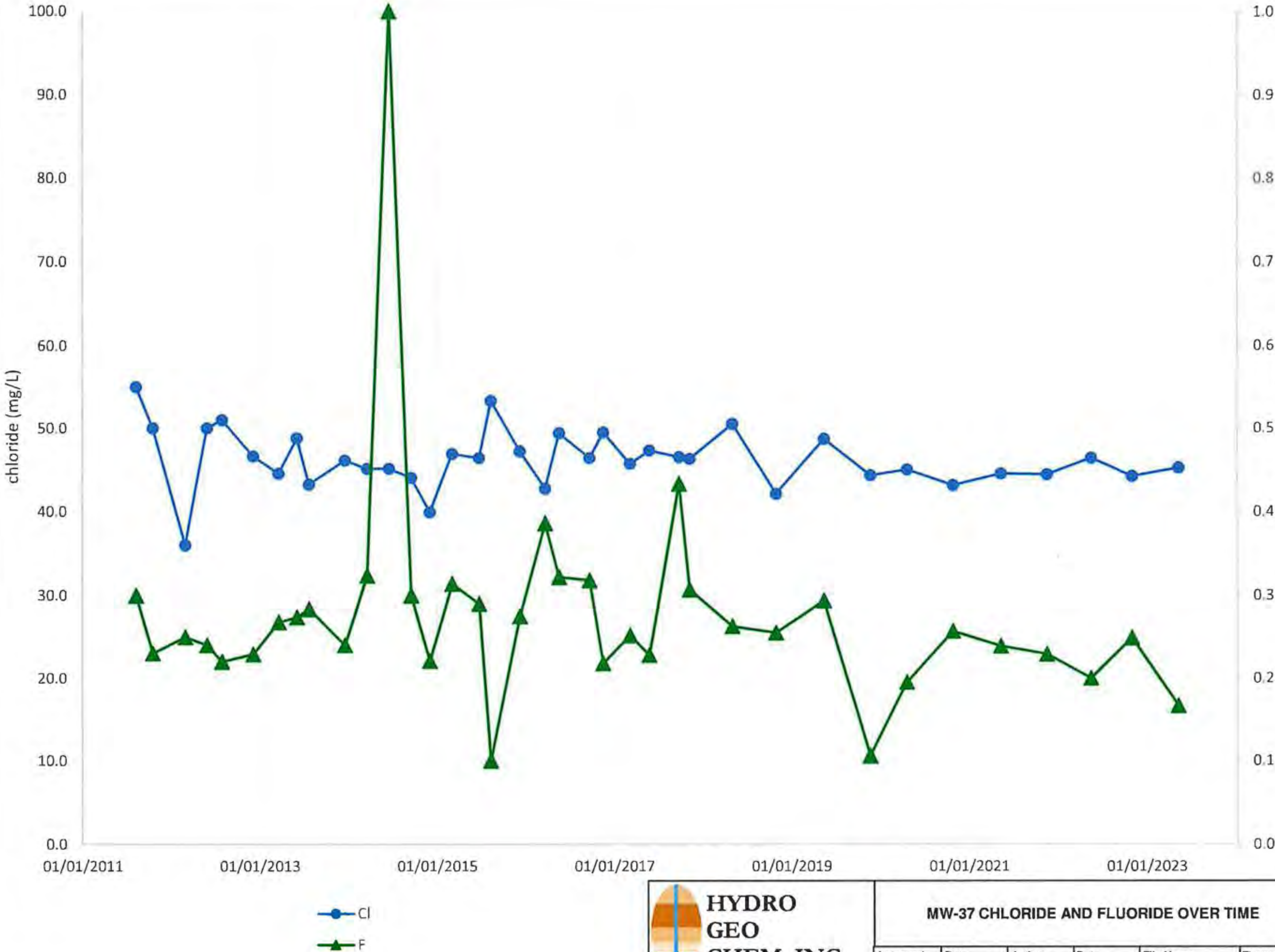


HYDRO GEO CHEM, INC.

MW-37 PH OVER TIME

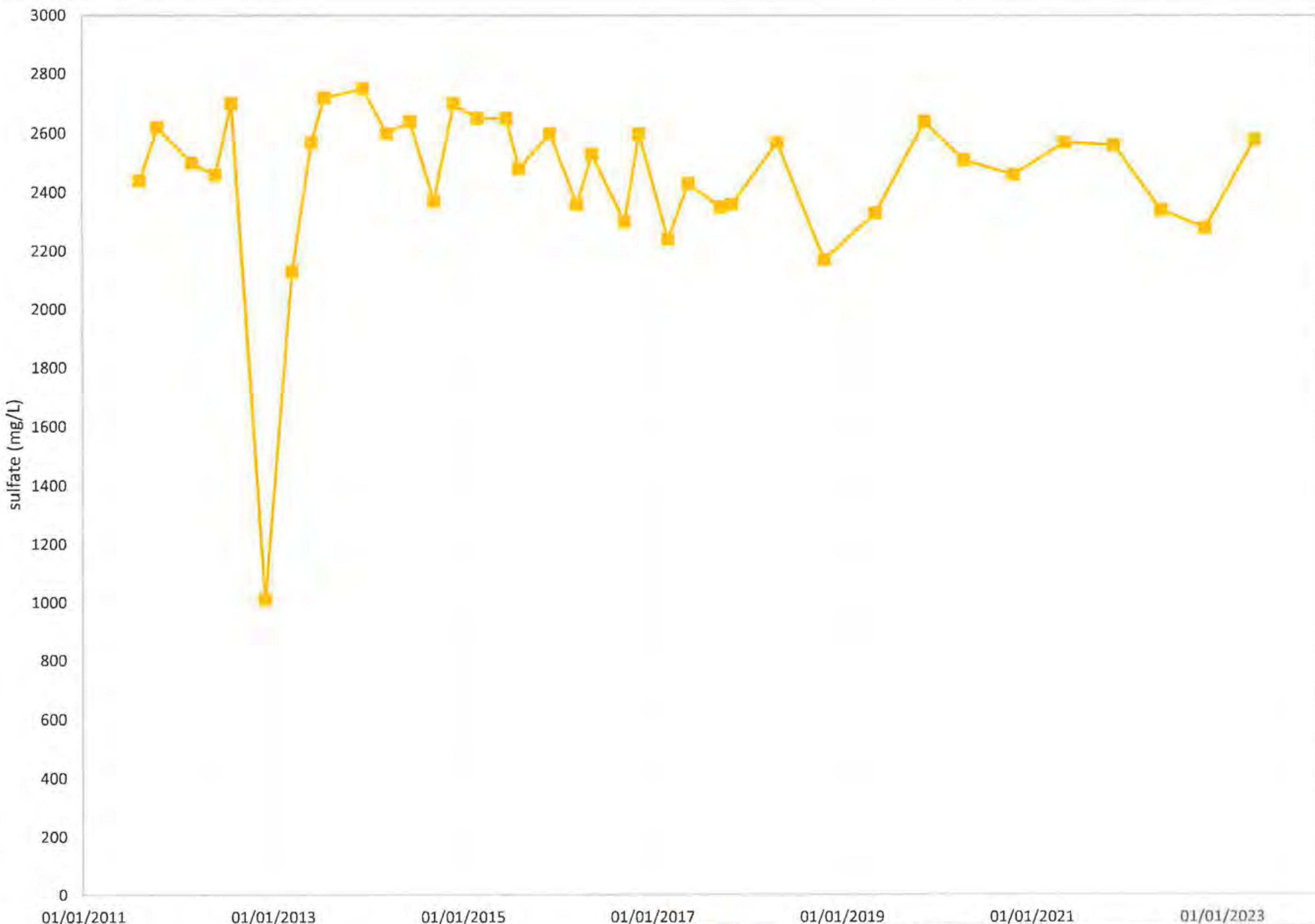
Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW-37 pH	4.B

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Field_071823.xlsx: F4b MW-37 pH



HYDRO GEO CHEM, INC.	MW-37 CHLORIDE AND FLUORIDE OVER TIME					
	Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW-37 Cl and F	Figure 5.A

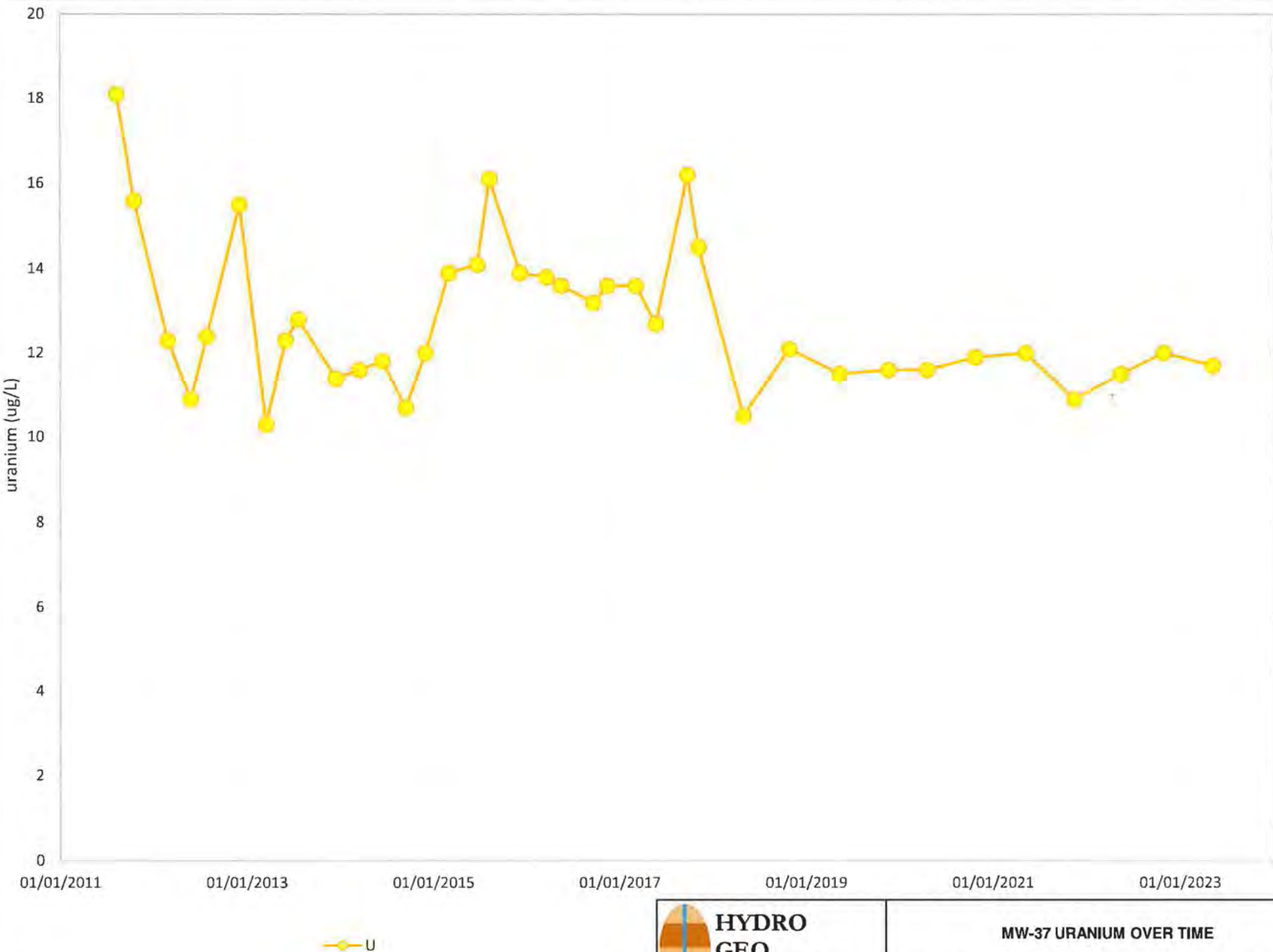
https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F5a MW-37 Cl and F



HYDRO GEO CHEM, INC.

MW-37 SULFATE OVER TIME					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW-37 SO4	Figure 5.B

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: f5b MW-37 SO4

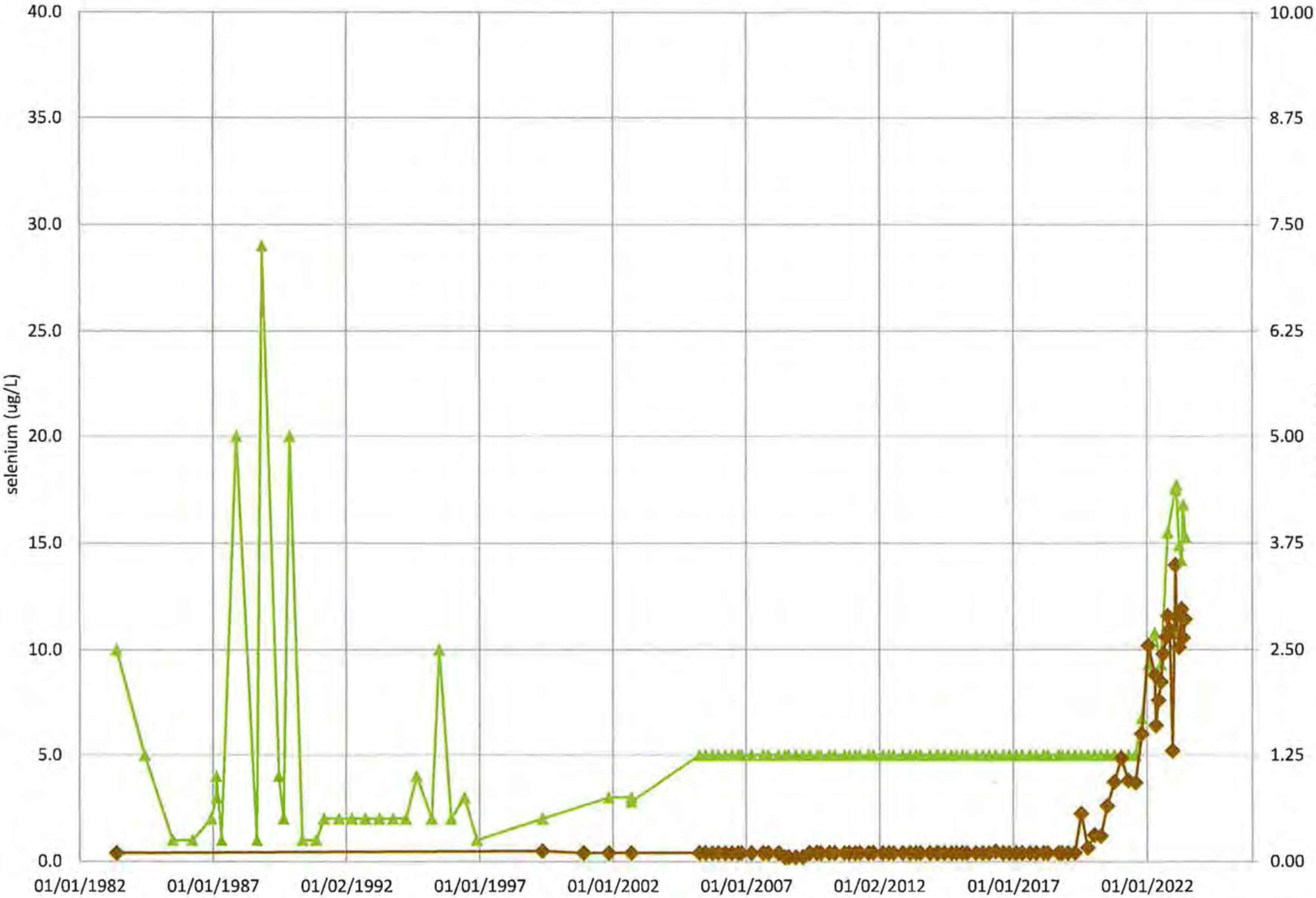


HYDRO GEO CHEM, INC.

MW-37 URANIUM OVER TIME

Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW-37 U	5.C

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: f5c MW-37 U

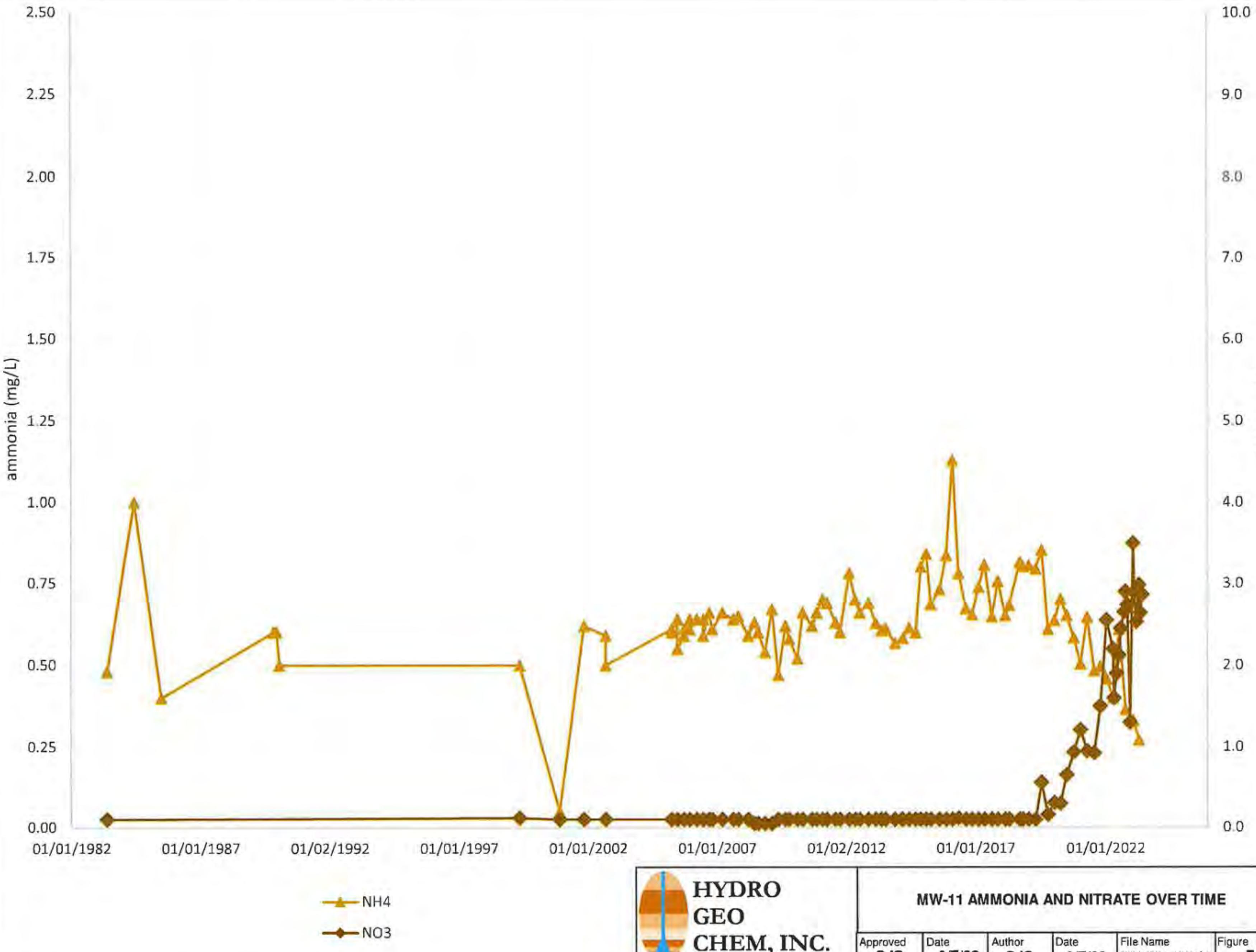


HYDRO GEO CHEM, INC.

MW-11 SELENIUM AND NITRATE OVER TIME

Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW11 Se and NO3	6

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F6 MW11 Se and NO3

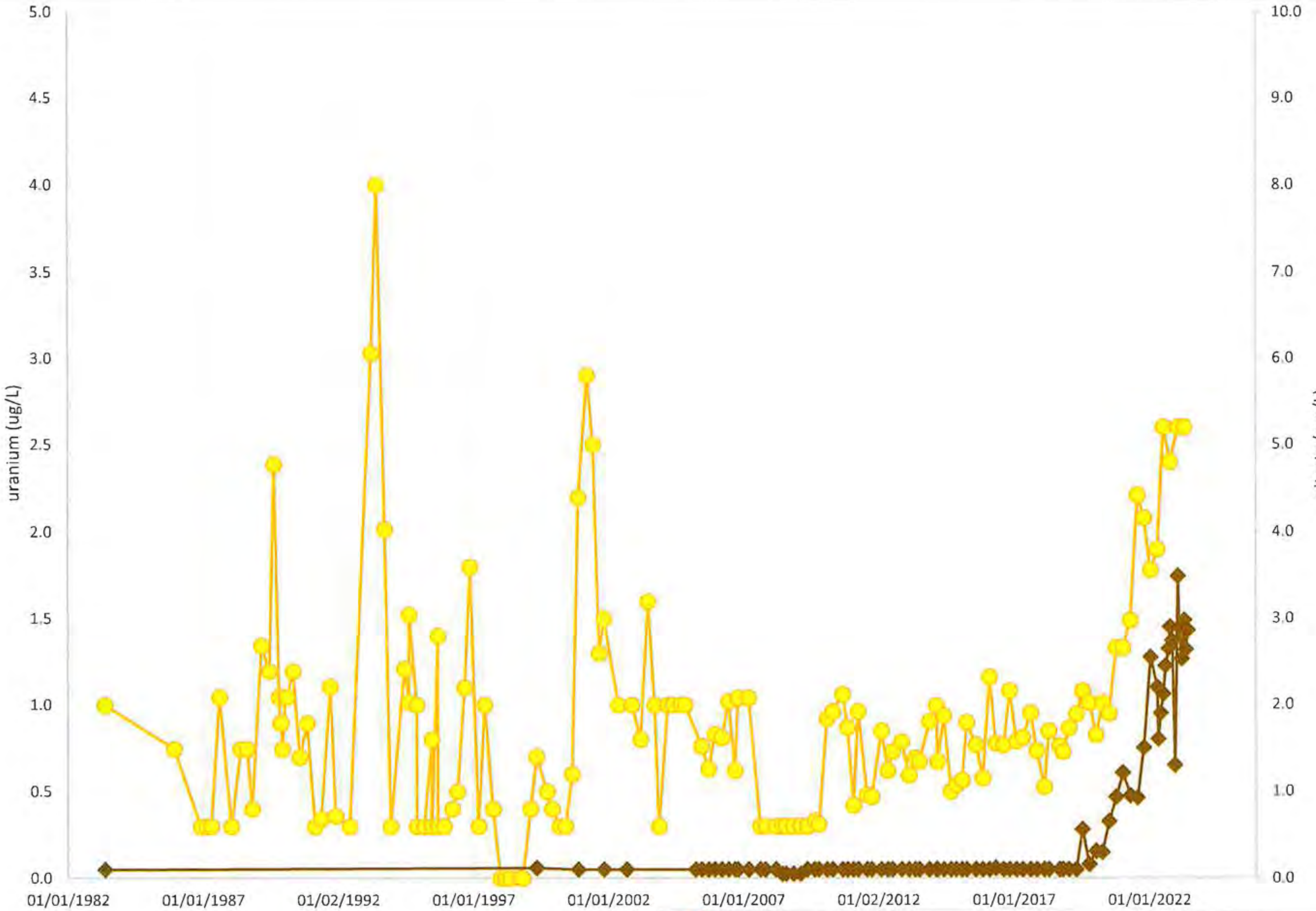


HYDRO GEO CHEM, INC.

MW-11 AMMONIA AND NITRATE OVER TIME

Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW-11 NH4 and NO3 plot	7

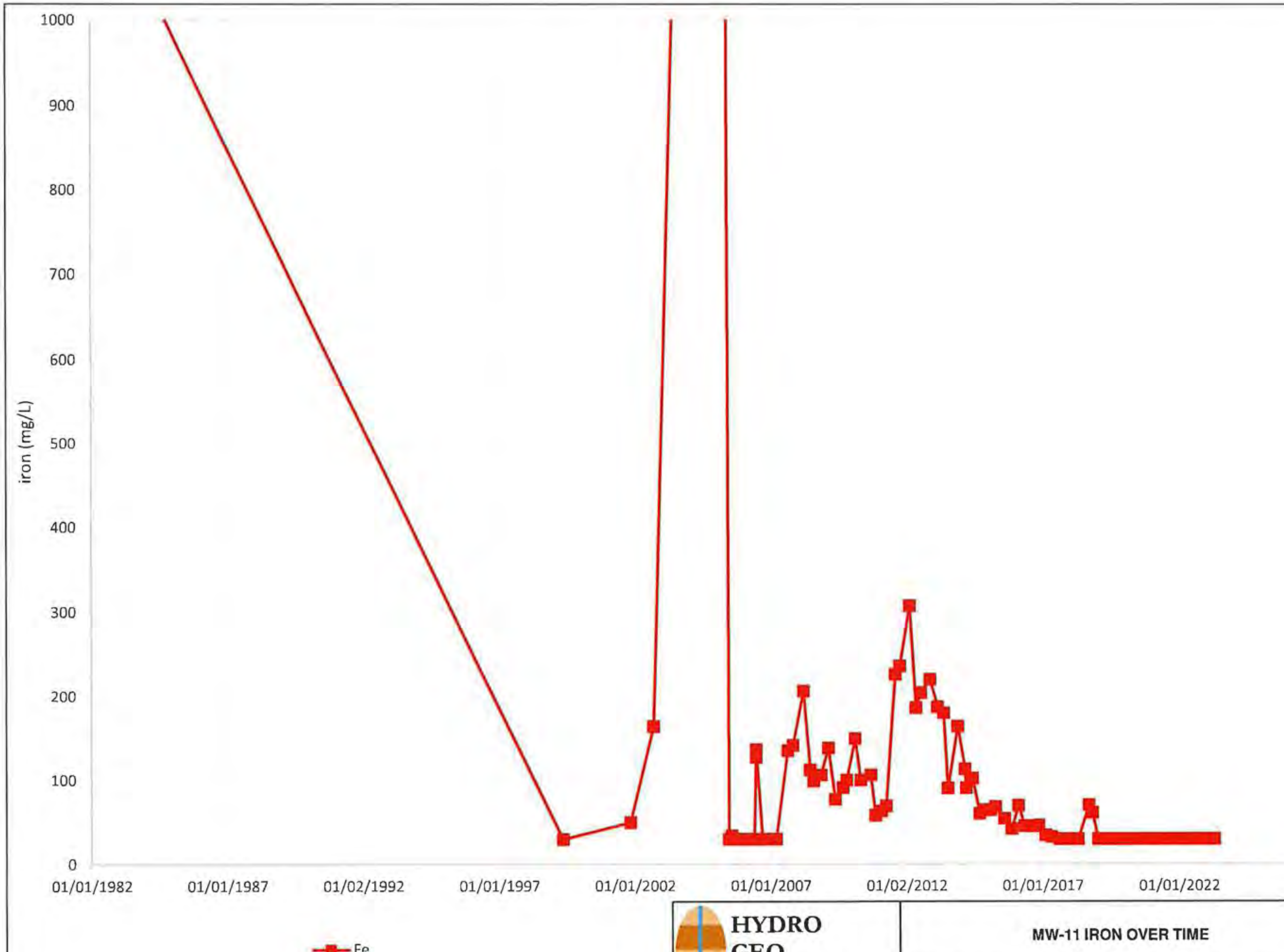
https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F7 MW-11 NH4 and NO3 plot



HYDRO GEO CHEM, INC.

MW-11 URANIUM AND NITRATE OVER TIME					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW11 U and NO3	Figure 8

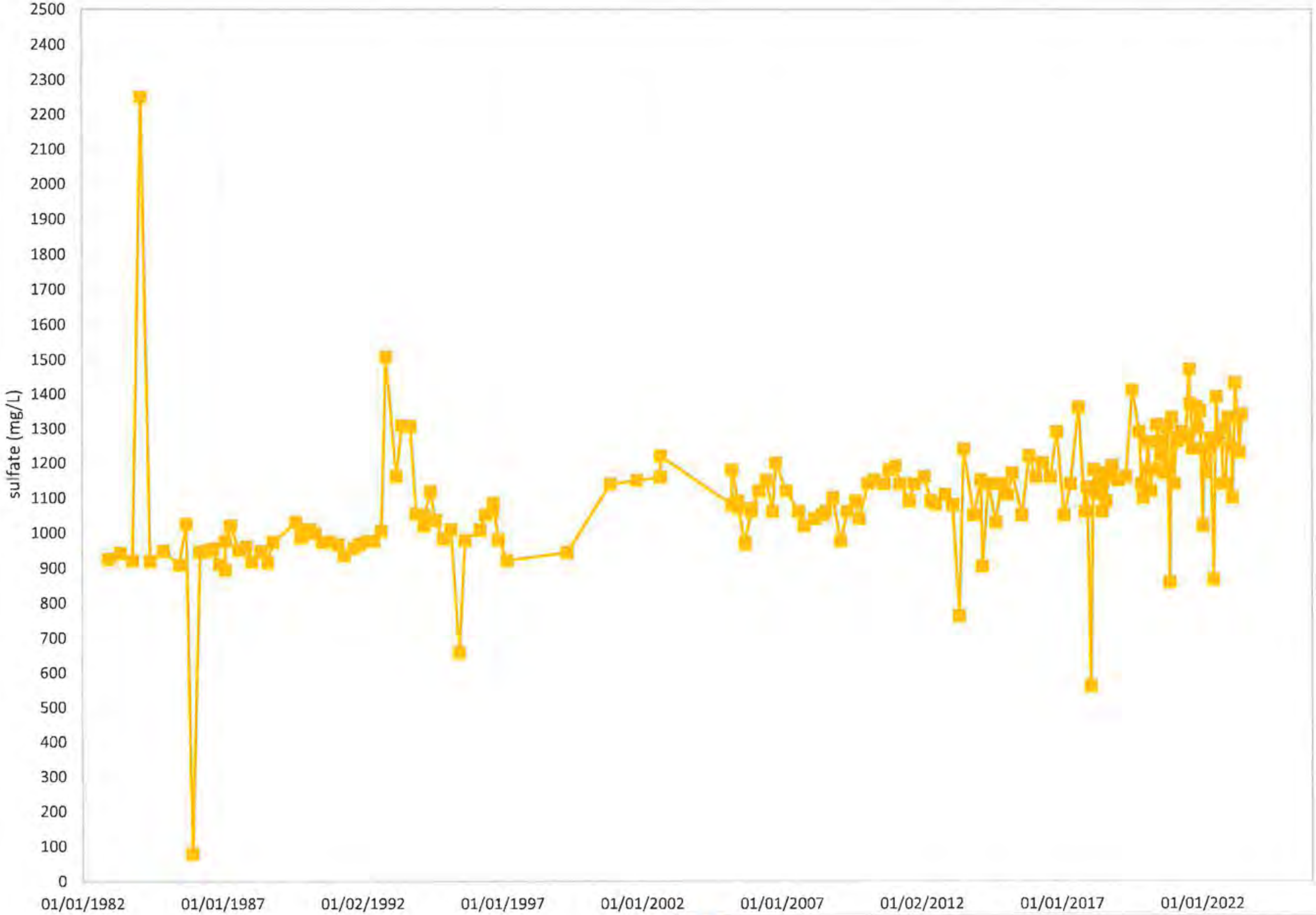
https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: F8 MW11 U and NO3



HYDRO GEO CHEM, INC.

MW-11 IRON OVER TIME					
Approved SJS	Date 9/7/23	Author SJS	Date 9/7/23	File Name MW11 Fe	Figure 9

https://hgcinc.sharepoint.com/VOL4/718000/MW11_37/MW11_37_SAR_2023/Figures/MW11_37_Cl_F_SO4_TrM+_071823.xlsx: f9 MW11 Fe



HYDRO GEO CHEM, INC.

MW-11 SULFATE OVER TIME

Approved	Date	Author	Date	File Name	Figure
SJS	9/7/23	SJS	9/7/23	MW11 SO4	10

APPENDICES

APPENDIX A

Appendix A-1: Summary of Statistical Analysis for Out of Compliance Constituents in MW-11 and MW-37

Well	Data Set	Constituent	Units	N	% Non-Detected Values	Mean	Standard Deviation	Shapiro-Wilk Test for Normality		Normally or Lognormally distributed?	Mann Kendall Trend Analysis		Linear Trend Analysis		Significant Trend	Previously Identified Increasing Trend?	Current GWCL[a]	Mean + 2σ (MW-11) Mean - 2σ (MW-37)	Mean x 1.25 (MW-11) Mean x 0.5 (MW-37)	MW-11 Highest Historical Value (HHV) MW-37 Lowest Historical Value (LHV)	Fractional Approach GWCL	Flowsheet GWCL	Rationale	Modified GWCL	Rationale
								W	p		S	p	r^2	p											
MW-11	ALL 2023 SAR Data	Selenium	µg/L	119	76.5	5.89	4.69	0.83	1.89E-10	Not normal	3007	0	NA	NA	Increasing	No	12.5	15.28	7.36	29.0	12.5	29.00	HHV	29.00	HHV
MW-11	GWCL Subset Post 2019	Selenium	µg/L	21	42.8	10.01	5.24	0.79	3.94E-04	Not normal	142	4E-06	NA	NA	Increasing	No	12.5	20.49	12.51	17.7	12.5	17.7	HHV	20.49	Mean + 2σ
MW-37	ALL 2023 SAR Data with FDs Removed	pH	pH Units	42	0%	6.74	0.25	0.94	2.20E-02	Not normal	-40	0.3362	NA	NA	No Trend	No Trend	6.61 - 8.5	6.24	3.37	6.05	NA	6.05	LHV	-	-

Notes:

σ = sigma
µg/L = micrograms per liter
N = number of valid data points
FD = field duplicate

p = probability
W = Shapiro Wilk test value
S = Mann-Kendall statistic

r^2 = The measure of how well the trendline fits the data where r2=1 represents a perfect fit.
FA= Fraction of GWQS as defined in UAC R317-6
NA= Not Applicable

Distribution = Distribution as determined by the Shapiro-Wilk distribution test for constituents with % Detect > 50% and N>8
Mean = The arithmatic mean as determined for normally or log-normally distributed constituents with % Detect > 50%
Standard Deviation = The standard deviation as determined for normally or log-normally distributed constituents with % Detect > 85%
HHV = Highest Historical Value. The highest observed value for constituents with % Detect < 50%
LHV = Lowest Historical Value, pH only. The lowest observed value for constituents with % Detect < 50%
GWCL Subset Post 2019 = All data post July 1, 2019

Appendix A-2: Comparison of Calculated and Measured TDS in MW-11 and MW-37

Well	Date Sampled	Alkalinity (mg/L as HCO_3)	Calcium (mg/L)	Chloride (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	Measured TDS (mg/L)	Calculated TDS (mg/L)	Ratio
MW-11	12/16/1982	399	36	24.4	5.7	8.8	550	926	1812	1950	108%
MW-11	5/24/1983	363	31	26.8	4.7	7.7	530	943	1728	1906	110%
MW-11	10/26/1983	402	28	26	5.0	6.7	540	922	1697	1930	114%
MW-11	6/12/1984	330	29	32	5.0	7	530	920	1700	1853	109%
MW-11	11/27/2000	382	94	37.3	7.6	30.6	487	1140	2130	2179	102%
MW-11	11/6/2001	375	82.9	42.4	7.9	25.4	574	1150	2100	2258	108%
MW-11	9/10/2002	372	90.8	33.8	7.4	30	540	1160	1850	2234	121%
MW-11	6/21/2005	364	58.7	31	6.3	18.2	544	1090	1950	2112	108%
MW-11	9/22/2005	378	50.7	33	6.3	15.3	551	968	1930	2002	104%
MW-11	12/13/2005	375	61.2	36	6.8	19.3	544	1070	1930	2112	109%
MW-11	3/21/2006	381	55.2	33	6.2	16.8	551	1120	1920	2163	113%
MW-11	6/20/2006	374	62.1	31	7.3	20.1	554	1150	2000	2199	110%
MW-11	9/13/2006	380	51.1	29	6.7	14.9	558	1060	1910	2100	110%
MW-11	10/25/2006	378	67.9	32	7.2	21.7	559	1200	1860	2266	122%
MW-11	3/15/2007	375	69.2	31	7.6	22.1	571	1120	2040	2196	108%
MW-11	8/21/2007	383	39.2	30	6.2	10.9	668	1060	1800	2197	122%
MW-11	10/30/2007	378	40.3	29	7.5	11.1	580	1020	1770	2066	117%
MW-11	3/18/2008	380	38.1	29	6.0	10	606	1040	1750	2109	121%
MW-11	6/16/2008	356	40.8	30	6.1	10.7	632	1050	1790	2126	119%
MW-11	8/5/2008	380	40.6	29	6.0	10.6	631	1060	1780	2157	121%
MW-11	11/10/2008	351	42.4	30	6.2	11	655	1100	1830	2196	120%
MW-11	2/16/2009	356	44.4	29	6.3	12.4	581	977	1910	2006	105%
MW-11	5/17/2009	366	36	26	5.9	10	548	1060	1850	2052	111%
MW-11	8/31/2009	374	41.9	26	6.1	11.2	602	1090	1840	2151	117%
MW-11	10/19/2009	389	41.8	30	6.0	11.4	641	1040	1830	2159	118%
MW-11	2/10/2010	410	67	33	6.8	19.7	567	1140	2040	2244	110%
MW-11	4/28/2010	387	75.9	32	7.1	23.1	642	1150	2040	2317	114%
MW-11	9/8/2010	410	70	31	7.0	20.9	614	1140	1960	2293	117%
MW-11	11/11/2010	387	68	34	6.9	20.1	573	1180	2020	2269	112%
MW-11	2/2/2011	385	70.6	32	6.8	21.2	601	1190	1980	2307	116%
MW-11	4/4/2011	387	78.2	31	7.3	23.4	622	1140	2070	2289	111%
MW-11	8/3/2011	347	59.4	31	6.6	17.3	628	1090	1940	2179	112%
MW-11	10/4/2011	363	59.4	28	6.5	17.3	580	1140	1930	2194	114%
MW-11	2/13/2012	360	75	31	6.9	22.9	626	1160	2090	2282	109%
MW-11	5/8/2012	376	63.7	30	7.0	19.3	517	1090	2040	2103	103%
MW-11	7/11/2012	374	66.5	39	7.4	19.6	618	1080	2020	2205	109%
MW-11	11/12/2012	372.1	69.3	30	7.0	21.4	562	1110	2050	2172	106%
MW-11	2/20/2013	380.64	66.1	33.7	7.2	19.6	578	1080	1970	2165	110%
MW-11	5/14/2013	409.92	59.6	30.1	6.5	18.3	563	763	1820	1850	102%
MW-11	7/10/2013	401.38	61.9	29	6.6	20.1	538	1240	2010	2297	114%
MW-11	11/19/2013	373.32	69.5	31.3	6.3	21.2	547	1050	1980	2099	106%
MW-11	3/11/2014	367.22	66.5	32.6	6.7	21.7	540	904	1940	1939	100%
MW-11	6/3/2014	417.24	79.5	32.9	6.7	24.9	580	1140	1990	2281	115%
MW-11	9/8/2014	475.8	36.8	31	6.0	10.9	542	1030	1930	2133	110%
MW-11	11/17/2014	323.3	60.4	27.4	6.2	18	643	1140	1840	2218	121%
MW-11	2/3/2015	373.32	61	31	6.8	19.9	576	1110	1880	2178	116%
MW-11	4/8/2015	384.3	81.7	32.5	7.0	26.3	621	1170	2010	2323	116%
MW-11	8/10/2015	402.6	69.7	37.3	6.8	21	554	1050	1960	2141	109%
MW-11	11/11/2015	378.2	60.9	30.6	5.9	18.3	554	1220	1790	2268	127%
MW-11	2/8/2016	390.4	100	34	7.0	31.8	582	1160	2090	2305	110%
MW-11	5/3/2016	369.66	75.6	30.7	7.0	23.8	613	1200	2000	2320	116%
MW-11	8/16/2016	363.56	70.5	33.9	7.1	22.2	608	1160	2070	2265	109%
MW-11	11/7/2016	375.76	92.7	35.1	7.1	29.2	537	1290	2100	2367	113%
MW-11	2/8/2017	367.22	71.9	31.5	7.6	22.9	608	1050	1920	2159	112%
MW-11	5/2/2017	363.56	74.6	33.3	6.9	25.1	568	1140	1970	2211	112%
MW-11	8/15/2017	373.32	81.6	32.7	7.0	26	595	1360	1990	2476	124%
MW-11	11/7/2017	380.64	73.5	31.9	6.7	23.1	575	1060	2020	2151	106%
MW-11	2/20/2018	381.86	61.7	31.9	6.5	18.1	583	1120	1880	2203	117%
MW-11	4/18/2018	373.32	80	34	7.2	26.3	567	1110	1980	2198	111%

Appendix A-2: Comparison of Calculated and Measured TDS in MW-11 and MW-37

Well	Date Sampled	Alkalinity (mg/L as HCO_3)	Calcium (mg/L)	Chloride (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	Measured TDS (mg/L)	Calculated TDS (mg/L)	Ratio
MW-11	9/11/2018	373.32	85.5	36.4	7.1	27	665	1160	1960	2354	120%
MW-11	10/25/2018	424.56	90.2	29.3	7.2	26.9	670	1190	1880	2438	130%
MW-11	1/15/2019	392.84	97.9	32	7.3	30.1	658	1150	2040	2368	116%
MW-11	4/24/2019	385.52	83.4	34	7.3	27.1	608	1160	1890	2305	122%
MW-11	7/16/2019	375.76	113	48.4	8.0	38	641	1410	1890	2634	139%
MW-11	10/15/2019	458.72	87.9	30.8	8.0	27.2	525	1290	2100	2428	116%
MW-11	1/15/2020	378.2	85.6	38.9	7.8	28.2	572	1180	1920	2291	119%
MW-11	4/8/2020	341.6	101	38.3	8.8	32.9	639	1180	1920	2342	122%
MW-11	7/7/2020	319.64	95.8	42.1	7.7	30.7	666	1260	2590	2422	94%
MW-11	10/12/2020	358.68	104	44.8	7.1	34.1	555	1300	992	2404	242%
MW-11	1/12/2021	346.48	102	46.4	7.6	33.4	562	1140	2010	2238	111%
MW-11	4/20/2021	375.76	118	47.7	7.9	38.1	579	1290	2110	2456	116%
MW-11	7/27/2021	390.4	178	48.3	10.6	62.1	520	1470	2680	2679	100%
MW-11	10/20/2021	451.4	149	52.8	10.7	49.8	508	1360	2200	2582	117%
MW-11	1/18/2022	331.84	109	51.1	9.3	34.8	513	1020	2050	2069	101%
MW-11	4/18/2022	325.74	106	54.9	7.0	37.5	451	1240	2060	2222	108%
MW-11	7/12/2022	337.94	152	54	7.3	55.1	440	1390	2520	2436	97%
MW-11	10/10/2022	330.62	150	72.1	7.8	51	500	1140	2570	2252	88%
MW-11	1/25/2023	302.56	133	70.7	7.3	44.5	467	1240	2390	2265	95%
MW-11	4/17/2023	331.84	155	70.6	7.9	53.6	464	1330	2450	2413	98%
MW-37	8/11/2011	291	457	55	13.9	129	556	2440	3820	3942	103%
MW-37	10/19/2011	261	481	50	14.2	133	556	2620	3980	4115	103%
MW-37	2/29/2012	297	482	36	15.2	132	554	2500	3900	4016	103%
MW-37	5/29/2012	264	479	50	16.3	140	595	2460	4000	4004	100%
MW-37	7/30/2012	265	486	51	15.1	133	575	2700	4090	4225	103%
MW-37	12/5/2012	282	454	46.6	14.2	131	514	1010	3830	2452	64%
MW-37	3/20/2013	256	487	44.5	14.7	139	546	2130	3770	3617	96%
MW-37	6/3/2013	261	492	48.8	15.2	137	522	2570	3700	4046	109%
MW-37	7/23/2013	257	467	43.2	14.4	123	478	2720	3890	4103	105%
MW-37	12/18/2013	235	475	46.1	14.6	132	512	2750	3950	4165	105%
MW-37	3/20/2014	254	445	45.1	14.3	130	476	2600	4000	3964	99%
MW-37	6/18/2014	266	468	45.1	16.3	141	527	2640	3860	4103	106%
MW-37	9/17/2014	296	403	44	14.3	121	493	2370	3850	3742	97%
MW-37	12/3/2014	273	438	39.9	16.0	128	461	2700	3880	4056	105%
MW-37	3/5/2015	163	469	46.9	16.6	124	502	2650	3870	3972	103%
MW-37	6/24/2015	267	453	46.4	15.8	131	536	2650	3920	4099	105%
MW-37	8/11/2015	239	482	53.3	16.1	128	507	2480	3770	3906	104%
MW-37	12/9/2015	239	489	47.2	14.6	130	497	2600	3910	4017	103%
MW-37	3/22/2016	121	498	42.7	15.1	129	538	2360	3880	3704	95%
MW-37	5/18/2016	189	439	49.4	15.7	120	468	2530	3630	3811	105%
MW-37	9/21/2016	227	467	46.4	16.1	135	527	2300	4000	3718	93%
MW-37	11/16/2016	224	470	49.5	17.8	134	528	2600	3730	4024	108%
MW-37	3/7/2017	205	468	45.7	16.4	131	513	2240	3830	3619	94%
MW-37	5/25/2017	234	434	47.3	15.2	123	470	2430	3860	3754	97%
MW-37	9/25/2017	155	425	46.5	17.7	123	473	2350	3850	3590	93%
MW-37	11/8/2017	218	460	46.3	16.3	132	490	2360	3680	3723	101%
MW-37	5/3/2018	235	485	50.5	15.4	132	523	2570	3100	4011	129%
MW-37	10/30/2018	234	515	42.1	17.9	142	571	2170	3470	3692	106%
MW-37	5/15/2019	283	527	48.7	17.4	146	567	2330	3890	3919	101%
MW-37	11/22/2019	287	467	44.3	16.2	131	506	2640	3680	4091	111%
MW-37	4/21/2020	259	508	45	16.0	145	565	2510	3880	4048	104%
MW-37	10/27/2020	249	454	43.1	15.0	125	523	2460	3950	3869	98%
MW-37	5/12/2021	256	458	44.5	17.5	127	484	2570	4250	3957	93%
MW-37	11/17/2021	244	479	44.4	18.8	129	502	2560	4040	3977	98%
MW-37	5/17/2022	212	476	46.4	15.5	135	521	2340	3660	3746	102%
MW-37	11/1/2022	215	466	44.2	14.8	132	482	2280	4000	3634	91%
MW-37	5/11/2023	204	436	45.2	14.6	121	442	2580	3940	3843	98%

Appendix A-3: Charge Balance Calculations for Major Cations and Anions in MW-11 and MW-37

Well	Date	Calcium (meq/L)	Sodium (meq/L)	Magnesium (meq/L)	Potassium (meq/L)	Total Cation Charge (meq/L)	HCO_3 (meq/L)	Chloride (meq/L)	SO_4 (meq/L)	Total Anion Charge (meq/L)	Charge Balance Error
MW-11	12/16/1982	1.80	23.92	0.72	0.15	**26.59**	-6.54	-0.69	-19.28	**-26.51**	0.16%
MW-11	5/24/1983	1.55	23.05	0.63	0.12	**25.35**	-5.95	-0.76	-19.63	**-26.34**	-1.90%
MW-11	10/26/1983	1.40	23.49	0.55	0.13	**25.56**	-6.59	-0.73	-19.20	**-26.52**	-1.83%
MW-11	6/12/1984	1.45	23.05	0.58	0.13	**25.20**	-5.41	-0.90	-19.15	**-25.47**	-0.52%
MW-11	11/27/2000	4.69	21.18	2.52	0.19	**28.59**	-6.26	-1.05	-23.74	**-31.05**	-4.13%
MW-11	11/6/2001	4.14	24.97	2.09	0.20	**31.40**	-6.15	-1.20	-23.94	**-31.28**	0.18%
MW-11	9/10/2002	4.53	23.49	2.47	0.19	**30.68**	-6.10	-0.95	-24.15	**-31.20**	-0.85%
MW-11	6/21/2005	2.93	23.66	1.50	0.16	**28.25**	-5.97	-0.87	-22.69	**-29.53**	-2.22%
MW-11	9/22/2005	2.53	23.97	1.26	0.16	**27.92**	-6.19	-0.93	-20.15	**-27.28**	1.15%
MW-11	12/13/2005	3.05	23.66	1.59	0.17	**28.48**	-6.15	-1.02	-22.28	**-29.44**	-1.66%
MW-11	3/21/2006	2.75	23.97	1.38	0.16	**28.26**	-6.24	-0.93	-23.32	**-30.49**	-3.80%
MW-11	6/20/2006	3.10	24.10	1.65	0.19	**29.04**	-6.13	-0.87	-23.94	**-30.95**	-3.18%
MW-11	9/13/2006	2.55	24.27	1.23	0.17	**28.22**	-6.23	-0.82	-22.07	**-29.12**	-1.56%
MW-11	10/25/2006	3.39	24.31	1.79	0.18	**29.67**	-6.19	-0.90	-24.98	**-32.08**	-3.90%
MW-11	3/15/2007	3.45	24.84	1.82	0.19	**30.30**	-6.15	-0.87	-23.32	**-30.34**	-0.06%
MW-11	8/21/2007	1.96	29.06	0.90	0.16	**32.07**	-6.28	-0.85	-22.07	**-29.19**	4.69%
MW-11	10/30/2007	2.01	25.23	0.91	0.19	**28.34**	-6.19	-0.82	-21.24	**-28.25**	0.17%
MW-11	3/18/2008	1.90	26.36	0.82	0.15	**29.24**	-6.23	-0.82	-21.65	**-28.70**	0.93%
MW-11	6/16/2008	2.04	27.49	0.88	0.16	**30.56**	-5.83	-0.85	-21.86	**-28.54**	3.42%
MW-11	8/5/2008	2.03	27.45	0.87	0.15	**30.50**	-6.23	-0.82	-22.07	**-29.12**	2.32%
MW-11	11/10/2008	2.12	28.49	0.90	0.16	**31.67**	-5.75	-0.85	-22.90	**-29.50**	3.55%
MW-11	2/16/2009	2.22	25.27	1.02	0.16	**28.67**	-5.83	-0.82	-20.34	**-26.99**	3.01%
MW-11	5/17/2009	1.80	23.84	0.82	0.15	**26.61**	-6.00	-0.73	-22.07	**-28.80**	-3.96%
MW-11	8/31/2009	2.09	26.19	0.92	0.16	**29.35**	-6.13	-0.73	-22.69	**-29.56**	-0.34%
MW-11	10/19/2009	2.09	27.88	0.94	0.15	**31.06**	-6.37	-0.85	-21.65	**-28.87**	3.64%
MW-11	2/10/2010	3.34	24.66	1.62	0.17	**29.80**	-6.72	-0.93	-23.74	**-31.39**	-2.59%
MW-11	4/28/2010	3.79	27.93	1.90	0.18	**33.80**	-6.34	-0.90	-23.94	**-31.19**	4.01%
MW-11	9/8/2010	3.49	26.71	1.72	0.18	**32.10**	-6.72	-0.87	-23.74	**-31.33**	1.21%
MW-11	11/11/2010	3.39	24.92	1.65	0.18	**30.15**	-6.34	-0.96	-24.57	**-31.87**	-2.78%
MW-11	2/2/2011	3.52	26.14	1.74	0.17	**31.58**	-6.31	-0.90	-24.78	**-31.99**	-0.64%
MW-11	4/4/2011	3.90	27.06	1.93	0.19	**33.07**	-6.34	-0.87	-23.74	**-30.95**	3.31%
MW-11	8/3/2011	2.96	27.32	1.42	0.17	**31.87**	-5.69	-0.87	-22.69	**-29.26**	4.28%
MW-11	10/4/2011	2.96	25.23	1.42	0.17	**29.78**	-5.95	-0.79	-23.74	**-30.47**	-1.15%
MW-11	2/13/2012	3.74	27.23	1.88	0.18	**33.03**	-5.90	-0.87	-24.15	**-30.93**	3.29%
MW-11	5/8/2012	3.18	22.49	1.59	0.18	**27.43**	-6.16	-0.85	-22.69	**-29.70**	-3.97%
MW-11	7/11/2012	3.32	26.88	1.61	0.19	**32.00**	-6.13	-1.10	-22.49	**-29.72**	3.70%
MW-11	11/12/2012	3.46	24.45	1.76	0.18	**29.84**	-6.10	-0.85	-23.11	**-30.05**	-0.35%
MW-11	2/20/2013	3.30	25.14	1.61	0.18	**30.24**	-6.24	-0.95	-22.49	**-29.67**	0.94%
MW-11	5/14/2013	2.97	24.49	1.51	0.17	**29.14**	-6.72	-0.85	-15.89	**-23.45**	10.81%
MW-11	7/10/2013	3.09	23.40	1.65	0.17	**28.31**	-6.58	-0.82	-25.82	**-33.21**	-7.97%
MW-11	11/19/2013	3.47	23.79	1.74	0.16	**29.17**	-6.12	-0.88	-21.86	**-28.86**	0.52%
MW-11	3/11/2014	3.32	23.49	1.79	0.17	**28.76**	-6.02	-0.92	-18.82	**-25.76**	5.51%
MW-11	6/3/2014	3.97	25.23	2.05	0.17	**31.42**	-6.84	-0.93	-23.74	**-31.50**	-0.14%
MW-11	9/8/2014	1.84	23.58	0.90	0.15	**26.46**	-7.80	-0.87	-21.44	**-30.12**	-6.46%
MW-11	11/17/2014	3.01	27.97	1.48	0.16	**32.62**	-5.30	-0.77	-23.74	**-29.81**	4.51%
MW-11	2/3/2015	3.04	25.05	1.64	0.17	**29.91**	-6.12	-0.87	-23.11	**-30.10**	-0.32%
MW-11	4/8/2015	4.08	27.01	2.16	0.18	**33.43**	-6.30	-0.92	-24.36	**-31.57**	2.86%

Appendix A-3: Charge Balance Calculations for Major Cations and Anions in MW-11 and MW-37

Well	Date	Calcium (meq/L)	Sodium (meq/L)	Magnesium (meq/L)	Potassium (meq/L)	Total Cation Charge (meq/L)	HCO_3 (meq/L)	Chloride (meq/L)	SO_4 (meq/L)	Total Anion Charge (meq/L)	Charge Balance Error
MW-11	8/10/2015	3.48	24.10	1.73	0.17	**29.48**	-6.60	-1.05	-21.86	**-29.51**	-0.06%
MW-11	11/11/2015	3.04	24.10	1.51	0.15	**28.79**	-6.20	-0.86	-25.40	**-32.46**	-5.99%
MW-11	2/8/2016	4.99	25.32	2.62	0.18	**33.10**	-6.40	-0.96	-24.15	**-31.51**	2.46%
MW-11	5/3/2016	3.77	26.66	1.96	0.18	**32.57**	-6.06	-0.87	-24.98	**-31.91**	1.03%
MW-11	8/16/2016	3.52	26.45	1.83	0.18	**31.97**	-5.96	-0.96	-24.15	**-31.07**	1.44%
MW-11	11/7/2016	4.63	23.36	2.40	0.18	**30.57**	-6.16	-0.99	-26.86	**-34.01**	-5.32%
MW-11	2/8/2017	3.59	26.45	1.88	0.19	**32.11**	-6.02	-0.89	-21.86	**-28.77**	5.49%
MW-11	5/2/2017	3.72	24.71	2.06	0.18	**30.67**	-5.96	-0.94	-23.74	**-30.63**	0.06%
MW-11	8/15/2017	4.07	25.88	2.14	0.18	**32.27**	-6.12	-0.92	-28.32	**-35.36**	-4.56%
MW-11	11/7/2017	3.67	25.01	1.90	0.17	**30.75**	-6.24	-0.90	-22.07	**-29.21**	2.57%
MW-11	2/20/2018	3.08	25.36	1.49	0.17	**30.09**	-6.26	-0.90	-23.32	**-30.48**	-0.63%
MW-11	4/18/2018	3.99	24.66	2.16	0.18	**31.00**	-6.12	-0.96	-23.11	**-30.19**	1.33%
MW-11	9/11/2018	4.27	28.93	2.22	0.18	**35.59**	-6.12	-1.03	-24.15	**-31.30**	6.43%
MW-11	10/25/2018	4.50	29.14	2.21	0.18	**36.04**	-6.96	-0.83	-24.78	**-32.56**	5.07%
MW-11	1/15/2019	4.89	28.62	2.48	0.19	**36.17**	-6.44	-0.90	-23.94	**-31.28**	7.24%
MW-11	4/24/2019	4.16	26.45	2.23	0.19	**33.02**	-6.32	-0.96	-24.15	**-31.43**	2.47%
MW-11	7/16/2019	5.64	27.88	3.13	0.21	**36.85**	-6.16	-1.37	-29.36	**-36.88**	-0.04%
MW-11	10/15/2019	4.39	22.84	2.24	0.20	**29.66**	-7.52	-0.87	-26.86	**-35.24**	-8.60%
MW-11	1/15/2020	4.27	24.88	2.32	0.20	**31.67**	-6.20	-1.10	-24.57	**-31.86**	-0.30%
MW-11	4/8/2020	5.04	27.79	2.71	0.23	**35.77**	-5.60	-1.08	-24.57	**-31.25**	6.75%
MW-11	7/7/2020	4.78	28.97	2.53	0.20	**36.47**	-5.24	-1.19	-26.23	**-32.66**	5.52%
MW-11	10/12/2020	5.19	24.14	2.81	0.18	**32.32**	-5.88	-1.26	-27.07	**-34.21**	-2.84%
MW-11	1/12/2021	5.09	24.45	2.75	0.19	**32.48**	-5.68	-1.31	-23.74	**-30.72**	2.78%
MW-11	4/20/2021	5.89	25.18	3.13	0.20	**34.41**	-6.16	-1.35	-26.86	**-34.36**	0.07%
MW-11	7/27/2021	8.88	22.62	5.11	0.27	**36.88**	-6.40	-1.36	-30.61	**-38.37**	-1.97%
MW-11	10/20/2021	7.44	22.10	4.10	0.27	**33.90**	-7.40	-1.49	-28.32	**-37.20**	-4.64%
MW-11	1/18/2022	5.44	22.31	2.86	0.24	**30.85**	-5.44	-1.44	-21.24	**-28.12**	4.64%
MW-11	4/18/2022	5.29	19.62	3.09	0.18	**28.17**	-5.34	-1.55	-25.82	**-32.70**	-7.45%
MW-11	7/12/2022	7.58	19.14	4.53	0.19	**31.44**	-5.54	-1.52	-28.94	**-36.00**	-6.76%
MW-11	10/10/2022	7.49	21.75	4.20	0.20	**33.63**	-5.42	-2.03	-23.74	**-31.19**	3.77%
MW-11	1/25/2023	6.64	20.31	3.66	0.19	**30.80**	-4.96	-1.99	-25.82	**-32.77**	-3.10%
MW-11	4/17/2023	7.73	20.18	4.41	0.20	**32.53**	-5.44	-1.99	-27.69	**-35.12**	-3.83%
MW-37	8/11/2011	22.80	24.18	10.61	0.36	**57.96**	-4.77	-1.55	-50.80	**-57.12**	0.73%
MW-37	10/19/2011	24.00	24.18	10.94	0.36	**59.49**	-4.28	-1.41	-54.55	**-60.24**	-0.62%
MW-37	2/29/2012	24.05	24.10	10.86	0.39	**59.40**	-4.87	-1.02	-52.05	**-57.93**	1.25%
MW-37	5/29/2012	23.90	25.88	11.52	0.42	**61.72**	-4.33	-1.41	-51.22	**-56.95**	4.01%
MW-37	7/30/2012	24.25	25.01	10.94	0.39	**60.59**	-4.34	-1.44	-56.21	**-62.00**	-1.15%
MW-37	12/5/2012	22.65	22.36	10.78	0.36	**56.15**	-4.62	-1.31	-21.03	**-26.96**	35.12%
MW-37	3/20/2013	24.30	23.75	11.44	0.38	**59.86**	-4.20	-1.26	-44.35	**-49.80**	9.17%
MW-37	6/3/2013	24.55	22.71	11.27	0.39	**58.92**	-4.28	-1.38	-53.51	**-59.16**	-0.21%
MW-37	7/23/2013	23.30	20.79	10.12	0.37	**54.58**	-4.22	-1.22	-56.63	**-62.07**	-6.42%
MW-37	12/18/2013	23.70	22.27	10.86	0.37	**57.21**	-3.86	-1.30	-57.26	**-62.42**	-4.35%
MW-37	3/20/2014	22.21	20.70	10.70	0.37	**53.97**	-4.16	-1.27	-54.13	**-59.56**	-4.93%
MW-37	6/18/2014	23.35	22.92	11.60	0.42	**58.29**	-4.36	-1.27	-54.97	**-60.60**	-1.94%
MW-37	9/17/2014	20.11	21.44	9.95	0.37	**51.87**	-4.86	-1.24	-49.34	**-55.44**	-3.33%
MW-37	12/3/2014	21.86	20.05	10.53	0.41	**52.85**	-4.48	-1.13	-56.21	**-61.82**	-7.82%
MW-37	3/5/2015	23.40	21.84	10.20	0.42	**55.86**	-2.68	-1.32	-55.17	**-59.18**	-2.88%

Appendix A-3: Charge Balance Calculations for Major Cations and Anions in MW-11 and MW-37

Well	Date	Calcium (meq/L)	Sodium (meq/L)	Magnesium (meq/L)	Potassium (meq/L)	Total Cation Charge (meq/L)	HCO_3 (meq/L)	Chloride (meq/L)	SO_4 (meq/L)	Total Anion Charge (meq/L)	Charge Balance Error
MW-37	6/24/2015	22.60	23.31	10.78	0.40	**57.10**	-4.38	-1.31	-55.17	**-60.86**	-3.19%
MW-37	8/11/2015	24.05	22.05	10.53	0.41	**57.05**	-3.92	-1.50	-51.63	**-57.06**	-0.01%
MW-37	12/9/2015	24.40	21.62	10.70	0.37	**57.09**	-3.92	-1.33	-54.13	**-59.38**	-1.97%
MW-37	3/22/2016	24.85	23.40	10.61	0.39	**59.25**	-1.98	-1.20	-49.14	**-52.32**	6.21%
MW-37	5/18/2016	21.91	20.36	9.87	0.40	**52.54**	-3.10	-1.39	-52.68	**-57.17**	-4.22%
MW-37	9/21/2016	23.30	22.92	11.11	0.41	**57.74**	-3.72	-1.31	-47.89	**-52.91**	4.37%
MW-37	11/16/2016	23.45	22.97	11.02	0.46	**57.90**	-3.68	-1.40	-54.13	**-59.21**	-1.12%
MW-37	3/7/2017	23.35	22.31	10.78	0.42	**56.86**	-3.36	-1.29	-46.64	**-51.29**	5.16%
MW-37	5/25/2017	21.66	20.44	10.12	0.39	**52.61**	-3.84	-1.33	-50.59	**-55.77**	-2.91%
MW-37	9/25/2017	21.21	20.57	10.12	0.45	**52.35**	-2.54	-1.31	-48.93	**-52.78**	-0.40%
MW-37	11/8/2017	22.95	21.31	10.86	0.42	**55.54**	-3.58	-1.31	-49.14	**-54.02**	1.39%
MW-37	5/3/2018	24.20	22.75	10.86	0.39	**58.20**	-3.86	-1.42	-53.51	**-58.79**	-0.50%
MW-37	10/30/2018	25.70	24.84	11.68	0.46	**62.68**	-3.84	-1.19	-45.18	**-50.21**	11.05%
MW-37	5/15/2019	26.30	24.66	12.01	0.45	**63.42**	-4.64	-1.37	-48.51	**-54.52**	7.54%
MW-37	11/22/2019	23.30	22.01	10.78	0.41	**56.50**	-4.70	-1.25	-54.97	**-60.91**	-3.75%
MW-37	4/21/2020	25.35	24.58	11.93	0.41	**62.26**	-4.24	-1.27	-52.26	**-57.77**	3.75%
MW-37	10/27/2020	22.65	22.75	10.28	0.38	**56.07**	-4.08	-1.22	-51.22	**-56.51**	-0.39%
MW-37	5/12/2021	22.85	21.05	10.45	0.45	**54.80**	-4.20	-1.26	-53.51	**-58.96**	-3.66%
MW-37	11/17/2021	23.90	21.84	10.61	0.48	**56.83**	-4.00	-1.25	-53.30	**-58.55**	-1.49%
MW-37	5/17/2022	23.75	22.66	11.11	0.40	**57.92**	-3.48	-1.31	-48.72	**-53.51**	3.96%
MW-37	11/1/2022	23.25	20.97	10.86	0.38	**55.46**	-3.52	-1.25	-47.47	**-52.24**	2.99%
MW-37	5/11/2023	21.76	19.23	9.95	0.37	**51.31**	-3.34	-1.28	-53.72	**-58.33**	-6.40%

meq/L= milliequivalent per liter

HCO_3 = Bicarbonate

SO_4 = Sulfate

Appendix A-4: Descriptive Statistics for Out of Compliance Constituents in MW-11 and MW-37

Data Set	Well	Analyte	Units	% Non-Detects	N	Distribution	Mean	Min. Conc.	Max. Conc.	Std. Dev.	Range	Geometric Mean	Skewness	Q25	Median	Q75
2007 Background Report	MW-11	Selenium	µg/L	72	46	Not tested	3.2	0.5	29.0	5.5	28.5	1.7	3.61	1.0	2.0	2.8
2019 SAR	MW-11	Selenium	µg/L	86	90	Not normal	4.8	1.0	29.0	3.9	28.0	4.0	4.13	3.0	5.0	5.0
2022 SAR	MW-11	Selenium	µg/L	86	101	Not normal	4.9	1.0	29.0	3.6	28.0	4.1	4.32	4.0	5.0	5.0
2023 SAR ALL	MW-11	Selenium	µg/L	76.5	119	Not normal	5.9	1.0	29.0	4.7	28.0	4.7	2.47	5.0	5.0	5.0
GWCL Subset Post 2019	MW-11	Selenium	µg/L	42.9	21	Not normal	10.0	5.0	17.7	5.2	12.7	8.7	0.34	5.0	9.3	15.3
2014 Background Report	MW-37	pH	pH Units	0	11	Normal	6.86	6.65	7.04	0.13	0.39	6.86	-0.45	6.73	6.89	6.9
2023 SAR ALL	MW-37	pH	pH Units	0	42	Not normal	6.74	6.05	7.13	0.25	1.08	6.73	-0.78	6.65	6.745	6.9

GWCL Subset Post 2019 = All data post July 1, 2019

µg/L = micrograms per liter

N = number of valid data points

Appendix A-5: MW-11 and MW-37 Data Used for Analysis

Well	Date Sampled	Parameter Name	Report Result	Report Units	Qualifier
MW-11	5/24/1983	Selenium	10.0	ug/l	U
MW-11	6/12/1984	Selenium	5.0	ug/l	U
MW-11	6/28/1985	Selenium	1.0	ug/l	U
MW-11	3/27/1986	Selenium	1.0	ug/l	U
MW-11	12/10/1986	Selenium	2.0	ug/l	U
MW-11	2/20/1987	Selenium	3.0	ug/l	
MW-11	2/20/1987	Selenium	4.0	ug/l	
MW-11	4/29/1987	Selenium	1.0	ug/l	U
MW-11	11/20/1987	Selenium	20.0	ug/l	
MW-11	8/24/1988	Selenium	1.0	ug/l	
MW-11	11/2/1988	Selenium	29.0	ug/l	
MW-11	6/22/1989	Selenium	4.0	ug/l	
MW-11	8/25/1989	Selenium	2.0	ug/l	U
MW-11	11/17/1989	Selenium	20.0	ug/l	
MW-11	5/8/1990	Selenium	1.0	ug/l	U
MW-11	11/13/1990	Selenium	1.0	ug/l	U
MW-11	2/28/1991	Selenium	2.0	ug/l	U
MW-11	9/24/1991	Selenium	2.0	ug/l	U
MW-11	3/17/1992	Selenium	2.0	ug/l	U
MW-11	9/15/1992	Selenium	2.0	ug/l	U
MW-11	3/30/1993	Selenium	2.0	ug/l	U
MW-11	9/29/1993	Selenium	2.0	ug/l	U
MW-11	3/30/1994	Selenium	2.0	ug/l	U
MW-11	3/30/1994	Selenium	2.0	ug/l	U
MW-11	8/23/1994	Selenium	4.0	ug/l	
MW-11	3/14/1995	Selenium	2.0	ug/l	U
MW-11	6/27/1995	Selenium	10.0	ug/l	U
MW-11	12/7/1995	Selenium	2.0	ug/l	U
MW-11	6/6/1996	Selenium	3.0	ug/l	
MW-11	11/22/1996	Selenium	1.0	ug/l	U
MW-11	5/11/1999	Selenium	2.0	ug/l	
MW-11	11/6/2001	Selenium	3.0	ug/l	
MW-11	9/10/2002	Selenium	3.0	ug/l	
MW-11	9/10/2002	Selenium	2.8	ug/l	
MW-11	3/30/2005	Selenium	5.0	ug/l	J
MW-11	3/30/2005	Selenium	5.0	ug/l	J
MW-11	6/21/2005	Selenium	5.0	ug/l	U
MW-11	6/21/2005	Selenium	5.0	ug/l	U
MW-11	9/22/2005	Selenium	5.0	ug/l	U
MW-11	9/22/2005	Selenium	5.0	ug/l	U
MW-11	12/13/2005	Selenium	5.0	ug/l	U
MW-11	12/13/2005	Selenium	5.0	ug/l	U
MW-11	3/21/2006	Selenium	5.0	ug/l	U
MW-11	6/20/2006	Selenium	5.0	ug/l	U
MW-11	6/20/2006	Selenium	5.0	ug/l	U

Appendix A-5: MW-11 and MW-37 Data Used for Analysis

Well	Date Sampled	Parameter Name	Report Result	Report Units	Qualifier
MW-11	9/13/2006	Selenium	5.0	ug/l	U
MW-11	10/25/2006	Selenium	5.0	ug/l	U
MW-11	3/15/2007	Selenium	5.0	ug/l	U
MW-11	8/21/2007	Selenium	5.0	ug/l	U
MW-11	10/30/2007	Selenium	5.0	ug/l	U
MW-11	3/18/2008	Selenium	5.0	ug/l	U
MW-11	6/16/2008	Selenium	5.0	ug/l	U
MW-11	8/5/2008	Selenium	5.0	ug/l	U
MW-11	11/10/2008	Selenium	5.0	ug/l	U
MW-11	2/16/2009	Selenium	5.0	ug/l	U
MW-11	5/17/2009	Selenium	5.0	ug/l	U
MW-11	8/31/2009	Selenium	5.0	ug/l	U
MW-11	10/19/2009	Selenium	5.0	ug/l	U
MW-11	2/10/2010	Selenium	5.0	ug/l	U
MW-11	4/28/2010	Selenium	5.0	ug/l	U
MW-11	9/8/2010	Selenium	5.0	ug/l	U
MW-11	11/11/2010	Selenium	5.0	ug/l	U
MW-11	2/2/2011	Selenium	5.0	ug/l	U
MW-11	4/4/2011	Selenium	5.0	ug/l	U
MW-11	8/3/2011	Selenium	5.0	ug/l	U
MW-11	10/4/2011	Selenium	5.0	ug/l	U
MW-11	2/13/2012	Selenium	5.0	ug/l	U
MW-11	5/8/2012	Selenium	5.0	ug/l	U
MW-11	7/11/2012	Selenium	5.0	ug/l	U
MW-11	11/12/2012	Selenium	5.0	ug/l	U
MW-11	2/20/2013	Selenium	5.0	ug/l	U
MW-11	5/14/2013	Selenium	5.0	ug/l	U
MW-11	7/10/2013	Selenium	5.0	ug/l	U
MW-11	11/19/2013	Selenium	5.0	ug/l	U
MW-11	2/24/2014	Selenium	5.0	ug/l	U
MW-11	3/11/2014	Selenium	5.0	ug/l	U
MW-11	6/3/2014	Selenium	5.0	ug/l	U
MW-11	9/8/2014	Selenium	5.0	ug/l	U
MW-11	11/17/2014	Selenium	5.0	ug/l	U
MW-11	2/3/2015	Selenium	5.0	ug/l	U
MW-11	4/8/2015	Selenium	5.0	ug/l	U
MW-11	8/10/2015	Selenium	5.0	ug/l	U
MW-11	11/11/2015	Selenium	5.0	ug/l	U
MW-11	2/8/2016	Selenium	5.0	ug/l	U
MW-11	5/3/2016	Selenium	5.0	ug/l	U
MW-11	8/16/2016	Selenium	5.0	ug/l	U
MW-11	11/7/2016	Selenium	5.0	ug/l	U
MW-11	2/8/2017	Selenium	5.0	ug/l	U
MW-11	5/2/2017	Selenium	5.0	ug/l	U
MW-11	8/15/2017	Selenium	5.0	ug/l	U

Appendix A-5: MW-11 and MW-37 Data Used for Analysis

Well	Date Sampled	Parameter Name	Report Result	Report Units	Qualifier
MW-11	11/7/2017	Selenium	5.0	ug/l	U
MW-11	2/20/2018	Selenium	5.0	ug/l	U
MW-11	4/18/2018	Selenium	5.0	ug/l	U
MW-11	9/11/2018	Selenium	5.0	ug/l	U
MW-11	10/25/2018	Selenium	5.0	ug/l	U
MW-11	1/15/2019	Selenium	5.0	ug/l	U
MW-11	4/24/2019	Selenium	5.0	ug/l	U
MW-11	7/16/2019	Selenium	5.0	ug/l	U
MW-11	10/15/2019	Selenium	5.0	ug/l	U
MW-11	1/15/2020	Selenium	5.0	ug/l	U
MW-11	4/8/2020	Selenium	5.0	ug/l	U
MW-11	7/7/2020	Selenium	5.0	ug/l	U
MW-11	10/12/2020	Selenium	5.0	ug/l	U
MW-11	1/12/2021	Selenium	5.0	ug/l	U
MW-11	4/20/2021	Selenium	5.0	ug/l	U
MW-11	7/27/2021	Selenium	5.0	ug/l	U
MW-11	10/20/2021	Selenium	6.8	ug/l	
MW-11	1/18/2022	Selenium	9.3	ug/l	
MW-11	4/18/2022	Selenium	10.8	ug/l	
MW-11	7/12/2022	Selenium	9.3	ug/l	
MW-11	10/10/2022	Selenium	15.5	ug/l	
MW-11	1/25/2023	Selenium	17.5	ug/l	
MW-11	2/8/2023	Selenium	17.7	ug/l	
MW-11	3/14/2023	Selenium	14.9	ug/l	
MW-11	4/17/2023	Selenium	14.2	ug/l	
MW-11	5/9/2023	Selenium	16.8	ug/l	
MW-11	6/5/2023	Selenium	15.3	ug/l	
MW-11	7/11/2023	Selenium	17.1	ug/l	
MW-11	8/2/2023	Selenium	22.0	ug/l	
MW-37	8/9/2011	pH	6.86	pH Units	
MW-37	10/12/2011	pH	6.89	pH Units	
MW-37	12/8/2011	pH	6.73	pH Units	
MW-37	2/22/2012	pH	6.68	pH Units	
MW-37	5/15/2012	pH	6.65	pH Units	
MW-37	7/19/2012	pH	6.9	pH Units	
MW-37	12/5/2012	pH	7.04	pH Units	
MW-37	3/20/2013	pH	6.86	pH Units	
MW-37	6/3/2013	pH	7.01	pH Units	
MW-37	7/23/2013	pH	6.9	pH Units	
MW-37	12/18/2013	pH	6.94	pH Units	
MW-37	3/20/2014	pH	6.76	pH Units	
MW-37	6/18/2014	pH	6.65	pH Units	
MW-37	9/4/2014	pH	6.7	pH Units	
MW-37	12/3/2014	pH	6.75	pH Units	
MW-37	3/5/2015	pH	6.61	pH Units	
MW-37	5/27/2015	pH	6.82	pH Units	

Appendix A-5: MW-11 and MW-37 Data Used for Analysis

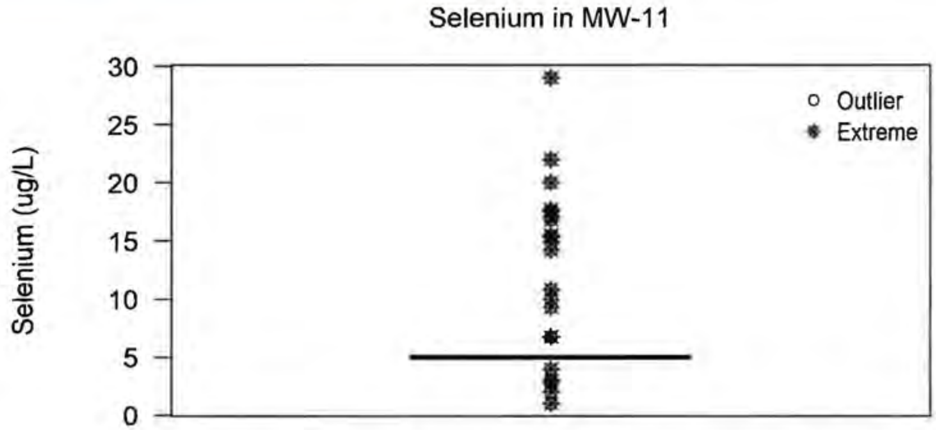
Well	Date Sampled	Parameter Name	Report Result	Report Units	Qualifier
MW-37	6/24/2015	pH	6.74	pH Units	
MW-37	8/11/2015	pH	6.72	pH Units	
MW-37	12/9/2015	pH	6.91	pH Units	
MW-37	3/22/2016	pH	6.25	pH Units	
MW-37	5/18/2016	pH	6.87	pH Units	
MW-37	9/21/2016	pH	6.37	pH Units	
MW-37	11/16/2016	pH	6.05	pH Units	
MW-37	3/7/2017	pH	6.45	pH Units	
MW-37	5/25/2017	pH	6.35	pH Units	
MW-37	9/25/2017	pH	6.3	pH Units	
MW-37	11/8/2017	pH	6.67	pH Units	
MW-37	5/3/2018	pH	6.65	pH Units	
MW-37	10/30/2018	pH	6.68	pH Units	
MW-37	5/15/2019	pH	6.69	pH Units	
MW-37	11/22/2019	pH	6.84	pH Units	
MW-37	12/4/2019	pH	7.02	pH Units	
MW-37	4/21/2020	pH	7.13	pH Units	
MW-37	10/27/2020	pH	7.01	pH Units	
MW-37	5/12/2021	pH	7.00	pH Units	
MW-37	11/17/2021	pH	7.06	pH Units	
MW-37	5/17/2022	pH	7.04	pH Units	
MW-37	11/1/2022	pH	6.6	pH Units	
MW-37	2/7/2023	pH	6.32	pH Units	
MW-37	2/9/2023	pH	6.55	pH Units	
MW-37	5/11/2023	pH	6.94	pH Units	

Appendix A-6: Extreme Outliers Removed from Analysis

Reason	Location ID	Date Sampled	Parameter Name	Report Result	Report Units
Removed					
No extreme outliers for SAR parameters removed from analysis					

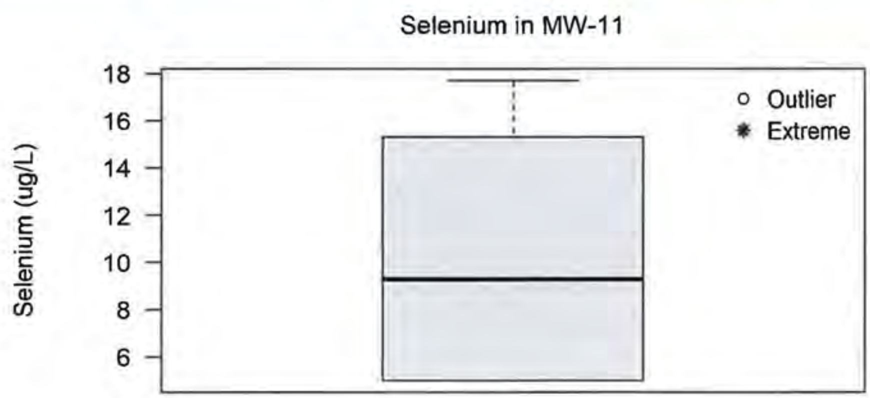
Appendix A-7: Box Plots of MW-11 and MW-37

Selenium in MW-11 for All Data



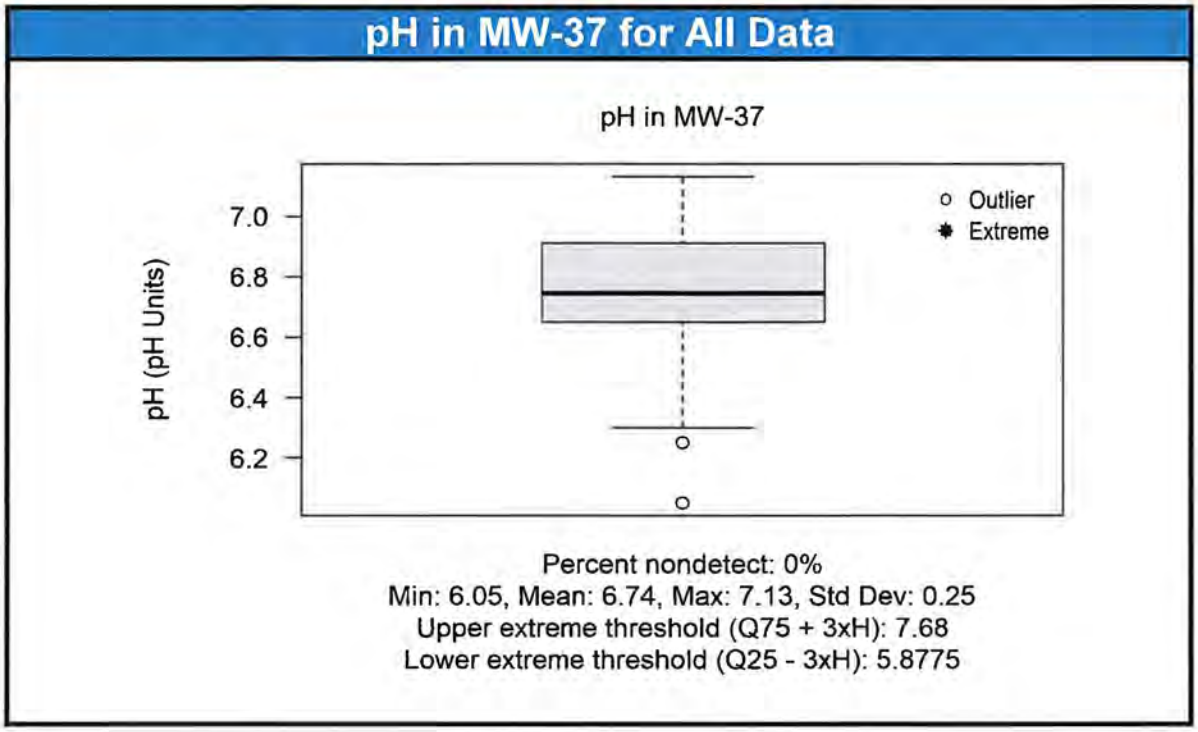
Percent nondetect: 76%
Min: 1, Mean: 5.89, Max: 29, Std Dev: 4.69
Upper extreme threshold (Q75 + 3xH): 5
Lower extreme threshold (Q25 - 3xH): 5

Selenium in MW-11 Post July, 2019

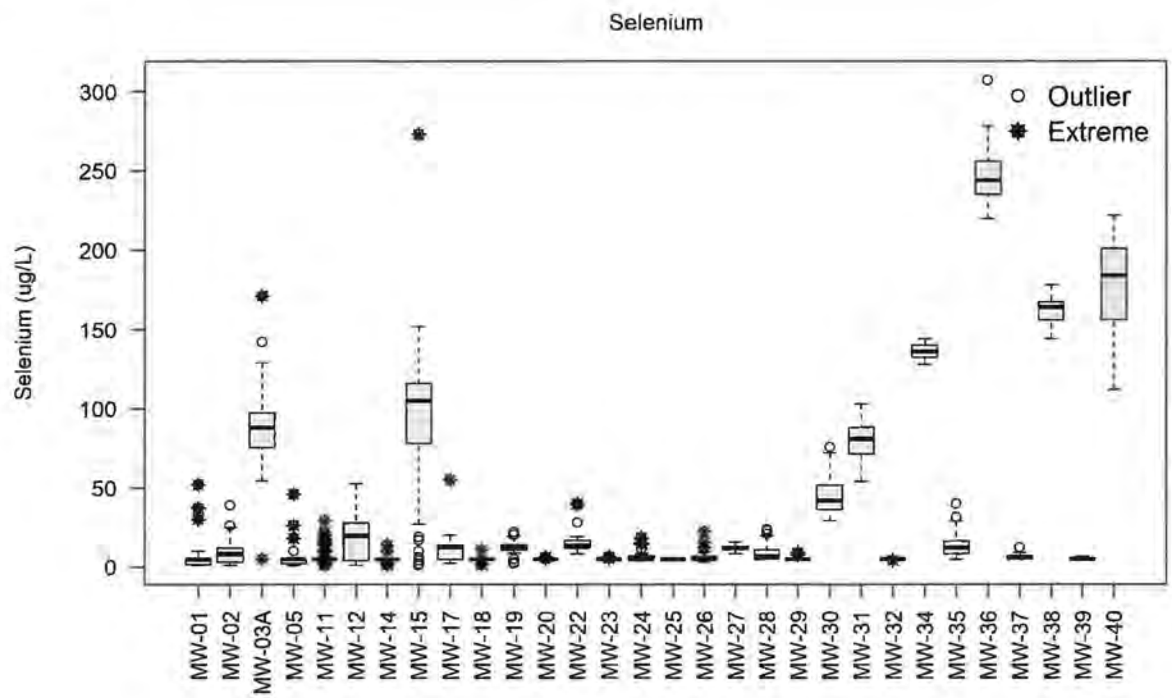


Percent nondetect: 43%
Min: 5, Mean: 10.01, Max: 17.7, Std Dev: 5.24
Upper extreme threshold (Q75 + 3xH): 46.2
Lower extreme threshold (Q25 - 3xH): -25.9

Appendix A-7: Box Plots of MW-11 and MW-37



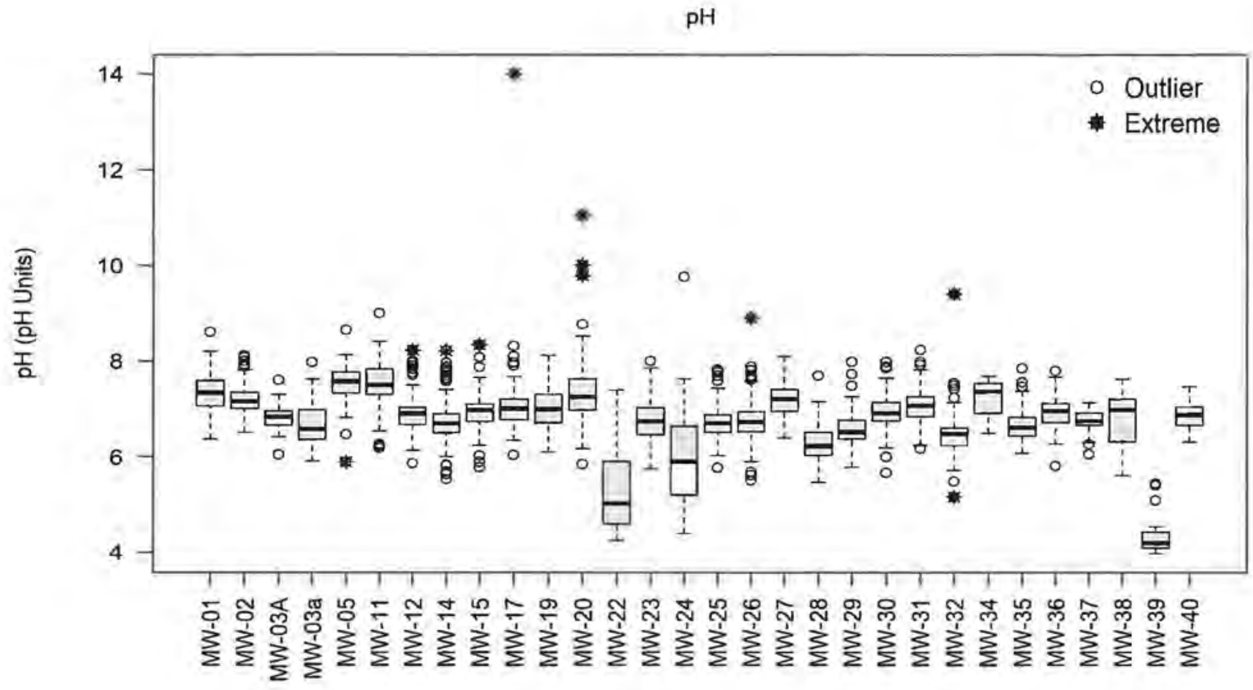
Appendix A-8: Box Plots for SAR Parameters in Groundwater Monitoring Wells



Notes

All available data used in box plots

Appendix A-8: Box Plots for SAR Parameters in Groundwater Monitoring Wells

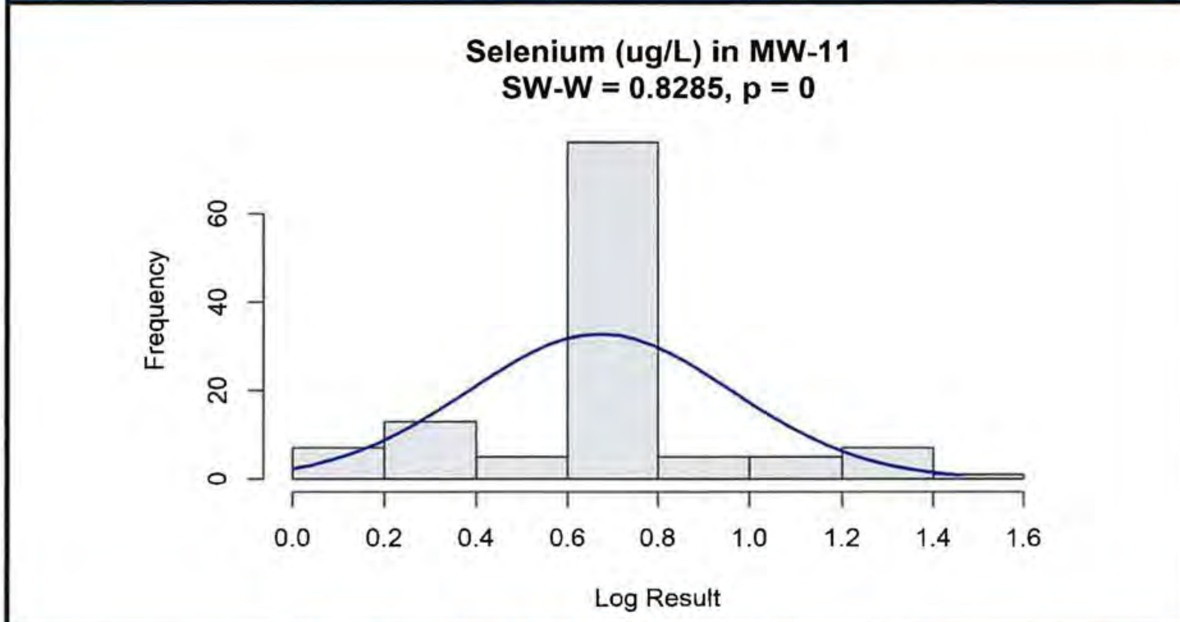


Notes

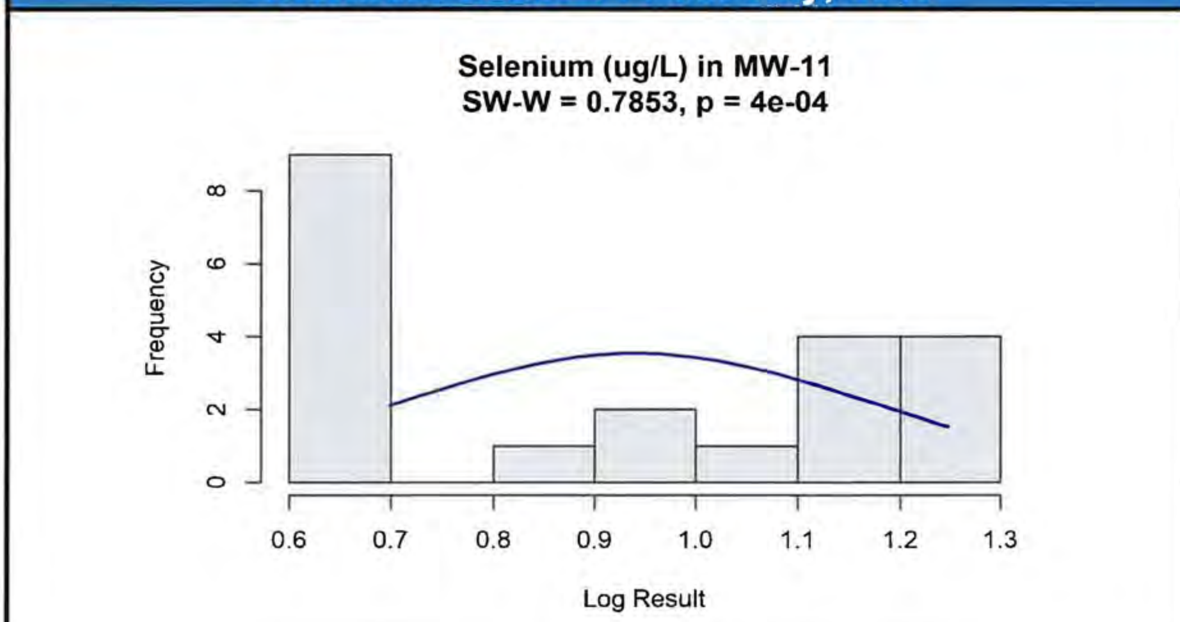
All available data with field duplicates removed used in box plots

Appendix A-9: Histograms of MW-11 and MW-37

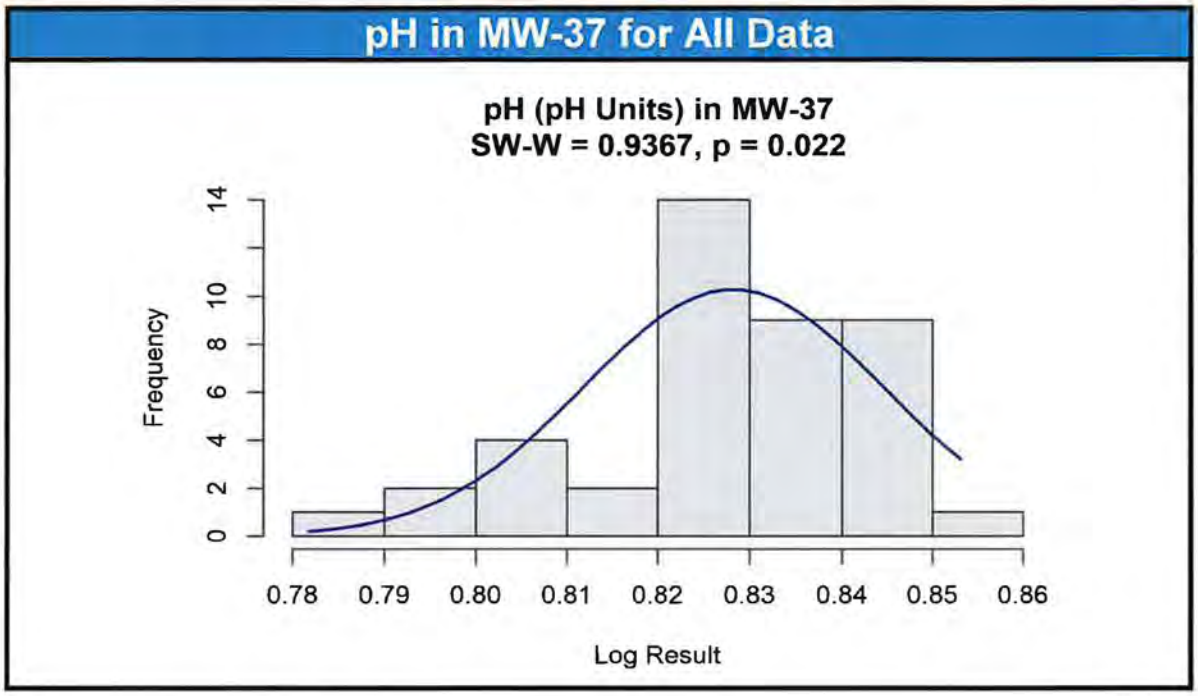
Selenium in MW-11 for All Data



Selenium in MW-11 Post July, 2019

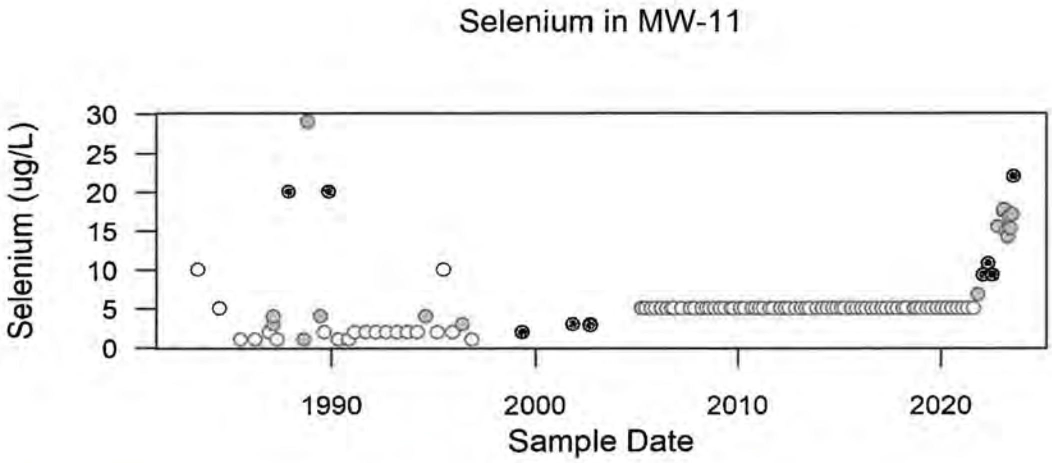


Appendix A-9: Histograms of MW-11 and MW-37

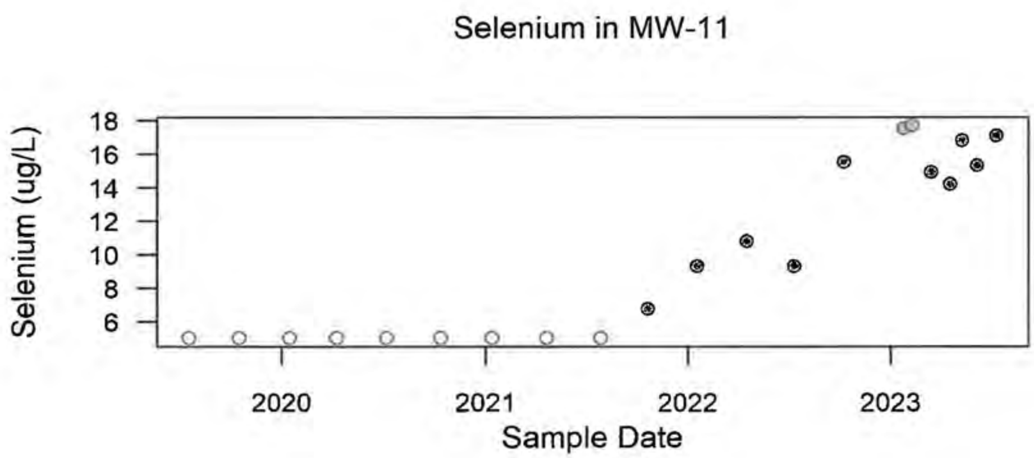


Appendix A-10: Timeseries Plots of MW-11 and MW-37

Selenium in MW-11 for All Data

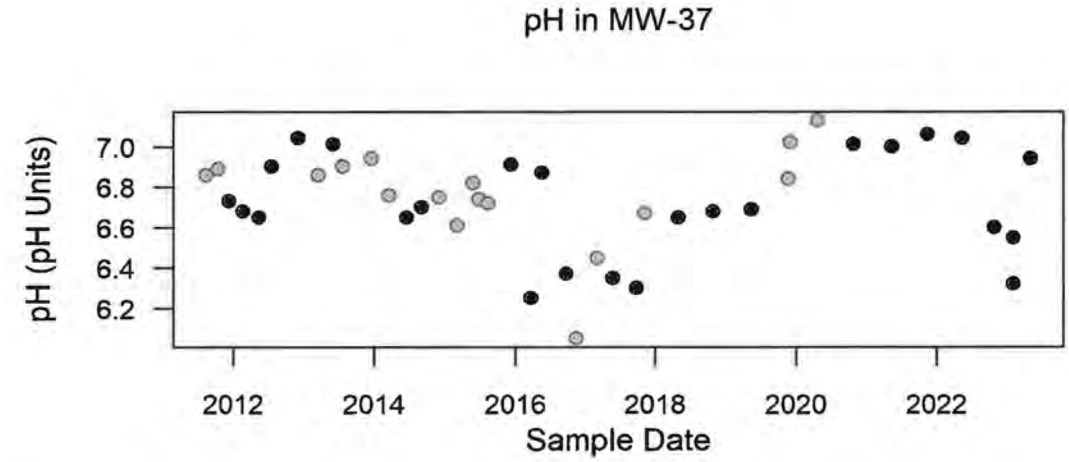


Selenium in MW-11 Post July, 2019



Appendix A-10: Timeseries Plots of MW-11 and MW-37

pH in MW-37 for All Data



APPENDIX B

Appendix B-1: Summary of Statistical Analysis for Indicator Parameters in MW-11 and MW-37

Well	Data Set	Constituent	N	% Non-Detected Values	Mean	Standard Deviation	Shapiro-Wilk Test for Normality		Normally or Lognormally distributed?	Least Squares Regression Trend Analysis[a]		Mann-Kendall Trend Analysis[b]		Background Report Significant Trend?	2023 Significant Trend
							W	p		r^2	p	S	p		
MW-11	ALL 2023 SAR Data	Chloride (mg/L)	204	0.5	37.6	11.5	0.833	5.03E-14	Not normal	NA	NA	6427	0.00	None	Increasing
	GWCL Subset Post 2019	Chloride (mg/L)	47	0	52.1	12.3	0.963	1.45E-01	Normal	0.79	5.6E-17	792	0.00	None	Increasing
	ALL 2023 SAR Data	Fluoride (mg/L)	81	0	0.47	0.1	0.932	3.40E-04	Not normal	NA	NA	-2078	0.00	None	Decreasing
	GWCL Subset Post 2019	Fluoride (mg/L)	17	0	0.34	0.1	0.930	2.21E-01	Normal	0.08	2.6E-01	-34	0.09	None	No Trend
	ALL 2023 SAR Data	Sulfate (mg/L)	181	0	1107.6	184.6	0.542	1.38E-21	Not normal	NA	NA	8710	0.00	Upward	Increasing
	GWCL Subset Post 2019	Sulfate (mg/L)	47	0	1240.7	124.3	0.878	1.49E-04	Not normal	NA	NA	147	0.09	Upward	No Trend
	ALL 2023 SAR Data	Uranium (µg/L)	150	19.3	0.9	0.7	0.580	5.97E-19	Not normal	NA	NA	1856	0.00	Upward	Increasing
	GWCL Subset Post 2019	Uranium (µg/L)	17	0	1.8	0.7	0.911	1.05E-01	Normal	0.90	8.5E-09	105	0.00	Upward	Increasing
MW-37	ALL 2023 SAR Data	Chloride (mg/L)	37	0	46.3	3.5	0.956	1.48E-01	Normal	0.04	2.2E-01	-124	0.05	None	No Trend
	ALL 2023 SAR Data	Fluoride (mg/L)	37	5.4	0.3	0.1	0.786	6.79E-06	Not normal	NA	NA	-97	0.10	None	No Trend
	ALL 2023 SAR Data	Sulfate (mg/L)	37	0	2453.2	290.2	0.511	6.09E-10	Not normal	NA	NA	-117	0.06	None	No Trend
	ALL 2023 SAR Data	Uranium (µg/L)	37	0	12.8	1.8	0.947	7.86E-02	Normal	0.11	5.0E-02	-119	0.06	None	No Trend

Notes:

σ = sigma
%ND = percent of non-detected values
µg/L = micrograms per liter
mg/L = milligrams per liter

N = number of valid data points
p = probability
W = Shapiro-Wilk test value
r^2 = The measure of how well the trendline fits the data where r2=1 represents a perfect fit.

S = Mann-Kendall statistic
FD = field duplicate

a = A regression test was performed on data that was determined to have normal or log-normal distribution
b = The Mann-Kendall test was performed on data that are not normally or lognormally distributed

GWCL Subset Post 2019 = All data post July 1, 2019

Appendix B-2: Descriptive Statistics for Indicator Parameters in MW-11 and MW-37

Data Set	MW-11 2007 Background Report				MW-11 2012 SAR			
Analyte	Chloride	Fluoride	Sulfate	Uranium	Chloride	Fluoride	Sulfate	Uranium
Units	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	ug/L
% Non-Detects	0.0	0.0	0.0	23.3				
N	104	14	71	86	120	35	87	104
Normally or Lognormally Distributed?	Lognormal	Not Normal or Lognormal	Not Normal or Lognormal	Not Normal or Lognormal	Not Normal or Lognormal	Not Normal or Lognormal	Not Normal or Lognormal	Not Normal or Lognormal
Mean	32.9	0.6	1014.3	0.9	32.4	0.5	90.8	0.6
Min. Conc.	24.4	0.5	659	0.0	24.4	0.4	895	0.0
Max. Conc.	43.2	0.7	1309	4.0	43.2	0.7	1309	3.0
Std. Dev.	3.1	0.07	99.12	0.7	3.18	0.06	90.78	0.59
Range	18.8	0.2	650	4.0	18.80	0.27	414.00	3.03
Geometric Mean	32.8	0.554	1009.6	0.431	32.22	0.54	1035.17	0.48
Skewness	0.5	0.978	0.397	1.72	0.56	1.36	0.70	1.56
25th Quartile	31.0	0.5	951	0.34	30.85	0.50	968.00	0.30
Median	32.4	0.51	1000	0.75	32.00	0.54	1023.00	0.75
75th Quartile	35.0	0.6	1060	1.04	34.0	0.6	1090	1.0

Data Set	MW-11 2019 SAR				MW-11 2022 SAR				MW-11 2023 SAR			
Analyte	Chloride	Fluoride	Sulfate	Uranium	Chloride	Fluoride	Sulfate	Uranium	Chloride	Fluoride	Sulfate	Uranium
Units	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	ug/L
% Non-Detects	0.7	0.0	0.0	22.00	0.6	0.0	0.0	21	0.5	0.0	0.0	19
N	146	63	125	130	176	73	153	140	204	85	181	150
Normally or Lognormally Distributed?	Not Normal	Not Normal	Not Normal	Not Normal	Not normal	Not normal	Not normal	Not normal	Not normal	Not normal	Not normal	Not normal
Mean	32.37	0.50	1057.90	0.76	34.37	0.48	1092.46	0.80	37.6	0.5	1107.6	0.9
Min. Conc.	24.40	0.32	561.00	0.00	24.40	0.23	561.00	0.00	24.40	0.23	79.00	0.00
Max. Conc.	42.40	0.71	1507.00	2.50	57.00	0.71	1507.00	2.50	87.20	0.70	2250.00	4.00
Std. Dev.	2.92	0.07	122.57	0.45	5.77	0.09	141.61	0.47	11.54	0.11	184.55	0.67
Range	18.00	0.39	946.00	2.50	32.60	0.47	946.00	2.50	62.80	0.47	2171.00	4.00
Geometric Mean	32.24	0.50	1050.41	0.52	33.95	0.48	1082.94	0.55	36.32	0.46	1085.56	0.61
Skewness	0.41	0.39	-0.24	1.17	1.65	-0.05	-0.06	1.09	2.03	-0.10	0.31	1.71
25th Quartile	31.00	0.46	976.00	0.37	31.00	0.44	986.00	0.40	31.00	0.42	1005.00	0.41
Median	32.00	0.49	1060.00	0.75	32.75	0.48	1090.00	0.78	33.00	0.48	1110.00	0.81
75th Quartile	34.00	0.54	1140.00	1.00	36.00	0.54	1170.00	1.00	38.45	0.51	1190.00	1.04

Data Set	MW-37 2014 Background Report				MW-37 2023 SAR			
Analyte	Chloride	Fluoride	Sulfate	Uranium	Chloride	Fluoride	Sulfate	Uranium
Units	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	ug/L
% Non-Detects	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0
N	10	10	9	10	37	37	37	37
Normally or Lognormally Distributed?	Normal or Lognormal	Not Normal or Lognormal	Normal or Lognormal	Normal or Lognormal	Normal	Not normal	Not normal	Normal
Mean	47.12	0.25	2543.33	13.16	46.3	0.28	2453	12.8
Min. Conc.	36.00	0.22	2130.00	10.30	36.0	0.10	1010	10.3
Max. Conc.	55.00	0.30	2750.00	18.10	55.0	1.00	2750	18.1
Std. Dev.	5.20	0.03	192.16	2.46	3.5	0.14	290	1.8
Range	19.00	0.08	620.00	7.80	19.0	0.90	1740	7.8
Geometric Mean	46.84	0.25	2536.52	12.97	46.1	0.26	2428	12.7
Skewness	-0.84	0.52	-1.22	0.99	-0.1	4.15	-4	1.1
25th Quartile	44.50	0.23	2460.00	11.40	44.4	0.23	2360	11.6
Median	47.70	0.25	2570.00	12.35	46.3	0.26	2510	12.3
75th Quartile	50.00	0.27	2700.00	15.50	48.7	0.30	2600	13.8

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	12/16/1982	Chloride	24.4	mg/L	
MW-11	01/19/1983	Chloride	32.0	mg/L	
MW-11	05/24/1983	Chloride	26.8	mg/L	
MW-11	09/01/1983	Chloride	32.0	mg/L	
MW-11	10/26/1983	Chloride	26.0	mg/L	
MW-11	02/15/1984	Chloride	31.0	mg/L	
MW-11	06/12/1984	Chloride	32.0	mg/L	
MW-11	09/25/1984	Chloride	34.0	mg/L	
MW-11	12/04/1984	Chloride	32.0	mg/L	
MW-11	06/28/1985	Chloride	31.0	mg/L	
MW-11	09/27/1985	Chloride	38.0	mg/L	
MW-11	12/15/1985	Chloride	71.0	mg/L	
MW-11	03/27/1986	Chloride	35.0	mg/L	
MW-11	06/26/1986	Chloride	70.0	mg/L	
MW-11	09/04/1986	Chloride	32.0	mg/L	
MW-11	12/10/1986	Chloride	33.0	mg/L	
MW-11	02/20/1987	Chloride	32.0	mg/L	
MW-11	02/20/1987	Chloride	32.0	mg/L	
MW-11	04/28/1987	Chloride	43.2	mg/L	
MW-11	04/29/1987	Chloride	43.2	mg/L	
MW-11	08/14/1987	Chloride	33.0	mg/L	
MW-11	08/19/1987	Chloride	33.0	mg/L	
MW-11	11/20/1987	Chloride	31.9	mg/L	
MW-11	01/27/1988	Chloride	31.0	mg/L	
MW-11	06/01/1988	Chloride	32.0	mg/L	
MW-11	08/24/1988	Chloride	33.5	mg/L	
MW-11	11/02/1988	Chloride	35.2	mg/L	
MW-11	08/25/1989	Chloride	34.0	mg/L	
MW-11	11/01/1989	Chloride	32.0	mg/L	
MW-11	11/17/1989	Chloride	34.0	mg/L	
MW-11	12/15/1989	Chloride	35.0	mg/L	
MW-11	02/20/1990	Chloride	33.0	mg/L	
MW-11	05/08/1990	Chloride	33.0	mg/L	
MW-11	08/07/1990	Chloride	33.0	mg/L	
MW-11	11/13/1990	Chloride	34.0	mg/L	
MW-11	02/28/1991	Chloride	31.0	mg/L	
MW-11	05/22/1991	Chloride	30.0	mg/L	
MW-11	09/24/1991	Chloride	30.0	mg/L	
MW-11	12/04/1991	Chloride	31.0	mg/L	
MW-11	03/17/1992	Chloride	32.0	mg/L	
MW-11	06/12/1992	Chloride	29.0	mg/L	
MW-11	09/15/1992	Chloride	31.0	mg/L	
MW-11	11/12/1992	Chloride	41.0	mg/L	
MW-11	03/30/1993	Chloride	35.0	mg/L	
MW-11	06/10/1993	Chloride	39.0	mg/L	
MW-11	09/29/1993	Chloride	36.0	mg/L	
MW-11	12/15/1993	Chloride	33.0	mg/L	
MW-11	03/30/1994	Chloride	32.0	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	03/30/1994	Chloride	28.0	mg/L	
MW-11	06/20/1994	Chloride	32.0	mg/L	
MW-11	08/23/1994	Chloride	32.0	mg/L	
MW-11	12/07/1994	Chloride	32.0	mg/L	
MW-11	03/14/1995	Chloride	31.0	mg/L	
MW-11	06/27/1995	Chloride	37.0	mg/L	
MW-11	09/15/1995	Chloride	32.0	mg/L	
MW-11	03/27/1996	Chloride	35.6	mg/L	
MW-11	06/06/1996	Chloride	35.3	mg/L	
MW-11	09/12/1996	Chloride	32.8	mg/L	
MW-11	09/17/1996	Chloride	31.0	mg/L	
MW-11	11/22/1996	Chloride	31.6	mg/L	
MW-11	03/19/1997	Chloride	28.7	mg/L	
MW-11	06/11/1997	Chloride	29.2	mg/L	U
MW-11	09/30/1997	Chloride	31.2	mg/L	
MW-11	01/08/1998	Chloride	32.4	mg/L	
MW-11	03/16/1998	Chloride	30.0	mg/L	
MW-11	05/12/1998	Chloride	33.7	mg/L	
MW-11	09/24/1998	Chloride	32.4	mg/L	
MW-11	11/03/1998	Chloride	31.4	mg/L	
MW-11	02/18/1999	Chloride	31.8	mg/L	
MW-11	05/11/1999	Chloride	33.1	mg/L	
MW-11	09/30/1999	Chloride	35.0	mg/L	
MW-11	12/09/1999	Chloride	29.1	mg/L	
MW-11	03/17/2000	Chloride	28.4	mg/L	
MW-11	06/06/2000	Chloride	35.4	mg/L	
MW-11	09/03/2000	Chloride	37.5	mg/L	
MW-11	11/27/2000	Chloride	37.3	mg/L	
MW-11	03/23/2001	Chloride	31.1	mg/L	
MW-11	06/12/2001	Chloride	36.5	mg/L	
MW-11	09/04/2001	Chloride	32.0	mg/L	
MW-11	11/06/2001	Chloride	42.4	mg/L	
MW-11	03/14/2002	Chloride	30.7	mg/L	
MW-11	05/20/2002	Chloride	35.9	mg/L	
MW-11	09/10/2002	Chloride	37.1	mg/L	
MW-11	09/10/2002	Chloride	33.8	mg/L	
MW-11	11/21/2002	Chloride	37.7	mg/L	
MW-11	03/20/2003	Chloride	36.6	mg/L	
MW-11	06/27/2003	Chloride	29.3	mg/L	
MW-11	09/24/2003	Chloride	36.6	mg/L	
MW-11	11/24/2003	Chloride	35.5	mg/L	
MW-11	03/19/2004	Chloride	35.6	mg/L	
MW-11	05/27/2004	Chloride	36.0	mg/L	
MW-11	09/14/2004	Chloride	34.2	mg/L	
MW-11	11/09/2004	Chloride	29.5	mg/L	
MW-11	03/30/2005	Chloride	33.0	mg/L	
MW-11	03/30/2005	Chloride	31.0	mg/L	
MW-11	06/21/2005	Chloride	31.0	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	06/21/2005	Chloride	30.0	mg/L	
MW-11	09/22/2005	Chloride	33.0	mg/L	
MW-11	09/22/2005	Chloride	33.0	mg/L	
MW-11	12/13/2005	Chloride	36.0	mg/L	
MW-11	12/13/2005	Chloride	31.0	mg/L	
MW-11	03/21/2006	Chloride	33.0	mg/L	
MW-11	06/20/2006	Chloride	31.0	mg/L	
MW-11	06/20/2006	Chloride	31.0	mg/L	
MW-11	09/13/2006	Chloride	29.0	mg/L	
MW-11	10/25/2006	Chloride	32.0	mg/L	
MW-11	03/15/2007	Chloride	31.0	mg/L	
MW-11	08/21/2007	Chloride	30.0	mg/L	
MW-11	10/30/2007	Chloride	29.0	mg/L	
MW-11	03/18/2008	Chloride	29.0	mg/L	
MW-11	06/16/2008	Chloride	30.0	mg/L	
MW-11	08/05/2008	Chloride	29.0	mg/L	
MW-11	11/10/2008	Chloride	30.0	mg/L	
MW-11	02/16/2009	Chloride	29.0	mg/L	
MW-11	05/17/2009	Chloride	26.0	mg/L	
MW-11	08/31/2009	Chloride	26.0	mg/L	
MW-11	10/19/2009	Chloride	30.0	mg/L	
MW-11	02/10/2010	Chloride	33.0	mg/L	
MW-11	04/28/2010	Chloride	32.0	mg/L	
MW-11	09/08/2010	Chloride	31.0	mg/L	
MW-11	11/11/2010	Chloride	34.0	mg/L	
MW-11	02/02/2011	Chloride	32.0	mg/L	
MW-11	04/04/2011	Chloride	31.0	mg/L	
MW-11	08/03/2011	Chloride	31.0	mg/L	
MW-11	10/04/2011	Chloride	28.0	mg/L	
MW-11	02/13/2012	Chloride	31.0	mg/L	
MW-11	05/08/2012	Chloride	30.0	mg/L	
MW-11	07/11/2012	Chloride	39.0	mg/L	
MW-11	11/12/2012	Chloride	30.0	mg/L	
MW-11	02/20/2013	Chloride	33.7	mg/L	
MW-11	05/14/2013	Chloride	30.1	mg/L	
MW-11	07/10/2013	Chloride	29.0	mg/L	
MW-11	11/19/2013	Chloride	31.3	mg/L	
MW-11	02/24/2014	Chloride	30.8	mg/L	
MW-11	03/11/2014	Chloride	32.6	mg/L	
MW-11	06/03/2014	Chloride	32.9	mg/L	
MW-11	09/08/2014	Chloride	31.0	mg/L	
MW-11	11/17/2014	Chloride	27.4	mg/L	
MW-11	02/03/2015	Chloride	31.0	mg/L	
MW-11	04/08/2015	Chloride	32.5	mg/L	
MW-11	08/10/2015	Chloride	37.3	mg/L	
MW-11	11/11/2015	Chloride	30.6	mg/L	
MW-11	02/08/2016	Chloride	34.0	mg/L	
MW-11	05/03/2016	Chloride	30.7	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	08/16/2016	Chloride	33.9	mg/L	
MW-11	11/07/2016	Chloride	35.1	mg/L	
MW-11	02/08/2017	Chloride	31.5	mg/L	
MW-11	05/02/2017	Chloride	33.3	mg/L	
MW-11	08/15/2017	Chloride	32.7	mg/L	
MW-11	11/07/2017	Chloride	31.9	mg/L	
MW-11	02/20/2018	Chloride	31.9	mg/L	
MW-11	04/18/2018	Chloride	34.0	mg/L	
MW-11	09/11/2018	Chloride	36.4	mg/L	
MW-11	10/25/2018	Chloride	29.3	mg/L	
MW-11	01/15/2019	Chloride	32.0	mg/L	
MW-11	04/24/2019	Chloride	34.0	mg/L	
MW-11	07/16/2019	Chloride	48.4	mg/L	
MW-11	10/15/2019	Chloride	30.8	mg/L	
MW-11	11/12/2019	Chloride	39.1	mg/L	
MW-11	12/03/2019	Chloride	35.4	mg/L	
MW-11	01/15/2020	Chloride	38.9	mg/L	
MW-11	02/04/2020	Chloride	42.1	mg/L	
MW-11	03/10/2020	Chloride	41.0	mg/L	
MW-11	04/08/2020	Chloride	38.3	mg/L	
MW-11	05/05/2020	Chloride	39.0	mg/L	
MW-11	06/02/2020	Chloride	40.1	mg/L	
MW-11	07/07/2020	Chloride	42.1	mg/L	
MW-11	08/11/2020	Chloride	43.9	mg/L	
MW-11	09/02/2020	Chloride	40.6	mg/L	
MW-11	10/12/2020	Chloride	44.8	mg/L	
MW-11	11/16/2020	Chloride	33.7	mg/L	
MW-11	12/07/2020	Chloride	37.4	mg/L	
MW-11	01/12/2021	Chloride	46.4	mg/L	
MW-11	02/09/2021	Chloride	46.4	mg/L	
MW-11	03/08/2021	Chloride	46.9	mg/L	
MW-11	04/20/2021	Chloride	47.7	mg/L	
MW-11	05/10/2021	Chloride	46.4	mg/L	
MW-11	06/08/2021	Chloride	52.1	mg/L	
MW-11	07/27/2021	Chloride	48.3	mg/L	
MW-11	08/10/2021	Chloride	57.0	mg/L	
MW-11	09/07/2021	Chloride	49.6	mg/L	
MW-11	10/20/2021	Chloride	52.8	mg/L	
MW-11	11/16/2021	Chloride	53.6	mg/L	
MW-11	12/13/2021	Chloride	53.9	mg/L	
MW-11	01/18/2022	Chloride	51.1	mg/L	
MW-11	02/08/2022	Chloride	57.2	mg/L	
MW-11	03/08/2022	Chloride	67.7	mg/L	
MW-11	04/18/2022	Chloride	54.9	mg/L	
MW-11	05/04/2022	Chloride	59.5	mg/L	
MW-11	06/06/2022	Chloride	46.4	mg/L	
MW-11	07/12/2022	Chloride	54.0	mg/L	
MW-11	08/08/2022	Chloride	67.4	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	09/21/2022	Chloride	68.1	mg/L	
MW-11	10/10/2022	Chloride	72.1	mg/L	
MW-11	11/08/2022	Chloride	71.9	mg/L	
MW-11	12/14/2022	Chloride	52.3	mg/L	
MW-11	01/25/2023	Chloride	70.7	mg/L	
MW-11	02/08/2023	Chloride	71.4	mg/L	
MW-11	03/14/2023	Chloride	66.3	mg/L	
MW-11	04/17/2023	Chloride	70.6	mg/L	
MW-11	05/09/2023	Chloride	66.0	mg/L	
MW-11	06/05/2023	Chloride	69.0	mg/L	
MW-11	07/11/2023	Chloride	77.1	mg/L	
MW-11	08/02/2023	Chloride	87.2	mg/L	
MW-11	05/24/1983	Fluoride	0.5	mg/L	
MW-11	05/11/1999	Fluoride	0.51	mg/L	
MW-11	11/27/2000	Fluoride	0.5	mg/L	
MW-11	11/06/2001	Fluoride	0.5	mg/L	
MW-11	09/10/2002	Fluoride	0.5	mg/L	
MW-11	04/01/2005	Fluoride	0.49	mg/L	
MW-11	06/23/2005	Fluoride	0.7	mg/L	
MW-11	09/27/2005	Fluoride	0.58	mg/L	
MW-11	12/15/2005	Fluoride	0.54	mg/L	
MW-11	03/23/2006	Fluoride	0.56	mg/L	
MW-11	06/23/2006	Fluoride	0.52	mg/L	
MW-11	09/14/2006	Fluoride	0.60	mg/L	
MW-11	10/27/2006	Fluoride	0.71	mg/L	
MW-11	03/20/2007	Fluoride	0.56	mg/L	
MW-11	08/24/2007	Fluoride	0.67	mg/L	
MW-11	11/02/2007	Fluoride	0.54	mg/L	
MW-11	03/21/2008	Fluoride	0.57	mg/L	
MW-11	06/20/2008	Fluoride	0.53	mg/L	
MW-11	08/08/2008	Fluoride	0.54	mg/L	
MW-11	11/14/2008	Fluoride	0.56	mg/L	
MW-11	02/18/2009	Fluoride	0.56	mg/L	
MW-11	05/19/2009	Fluoride	0.55	mg/L	
MW-11	09/01/2009	Fluoride	0.55	mg/L	
MW-11	10/22/2009	Fluoride	0.54	mg/L	
MW-11	02/10/2010	Fluoride	0.51	mg/L	
MW-11	02/16/2010	Fluoride	0.51	mg/L	
MW-11	04/28/2010	Fluoride	0.49	mg/L	
MW-11	09/08/2010	Fluoride	0.52	mg/L	
MW-11	11/11/2010	Fluoride	0.49	mg/L	
MW-11	02/02/2011	Fluoride	0.48	mg/L	
MW-11	04/04/2011	Fluoride	0.44	mg/L	
MW-11	08/03/2011	Fluoride	0.48	mg/L	
MW-11	10/04/2011	Fluoride	0.56	mg/L	
MW-11	02/13/2012	Fluoride	0.57	mg/L	
MW-11	05/08/2012	Fluoride	0.49	mg/L	
MW-11	07/11/2012	Fluoride	0.48	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	11/12/2012	Fluoride	0.47	mg/L	
MW-11	02/20/2013	Fluoride	0.48	mg/L	
MW-11	05/14/2013	Fluoride	0.48	mg/L	
MW-11	07/10/2013	Fluoride	0.64	mg/L	
MW-11	11/19/2013	Fluoride	0.48	mg/L	
MW-11	02/24/2014	Fluoride	0.48	mg/L	
MW-11	03/11/2014	Fluoride	0.54	mg/L	
MW-11	06/03/2014	Fluoride	0.49	mg/L	
MW-11	09/08/2014	Fluoride	0.50	mg/L	
MW-11	11/17/2014	Fluoride	0.42	mg/L	
MW-11	02/03/2015	Fluoride	0.46	mg/L	
MW-11	04/08/2015	Fluoride	0.32	mg/L	
MW-11	08/10/2015	Fluoride	0.33	mg/L	
MW-11	11/11/2015	Fluoride	0.47	mg/L	
MW-11	02/08/2016	Fluoride	0.44	mg/L	
MW-11	05/03/2016	Fluoride	0.45	mg/L	
MW-11	08/16/2016	Fluoride	0.47	mg/L	
MW-11	11/07/2016	Fluoride	0.45	mg/L	
MW-11	02/08/2017	Fluoride	0.42	mg/L	
MW-11	05/02/2017	Fluoride	0.44	mg/L	
MW-11	08/15/2017	Fluoride	0.43	mg/L	
MW-11	11/07/2017	Fluoride	0.47	mg/L	
MW-11	02/20/2018	Fluoride	0.44	mg/L	
MW-11	04/18/2018	Fluoride	0.47	mg/L	
MW-11	09/11/2018	Fluoride	0.36	mg/L	
MW-11	10/25/2018	Fluoride	0.42	mg/L	
MW-11	01/15/2019	Fluoride	0.41	mg/L	
MW-11	04/24/2019	Fluoride	0.43	mg/L	
MW-11	07/16/2019	Fluoride	0.32	mg/L	
MW-11	07/16/2019	Fluoride	0.32	mg/L	
MW-11	10/15/2019	Fluoride	0.23	mg/L	
MW-11	01/15/2020	Fluoride	0.36	mg/L	
MW-11	04/08/2020	Fluoride	0.38	mg/L	
MW-11	10/12/2020	Fluoride	0.63	mg/L	
MW-11	01/12/2021	Fluoride	0.41	mg/L	
MW-11	04/20/2021	Fluoride	0.39	mg/L	
MW-11	07/27/2021	Fluoride	0.35	mg/L	
MW-11	10/20/2021	Fluoride	0.38	mg/L	
MW-11	01/18/2022	Fluoride	0.37	mg/L	
MW-11	04/18/2022	Fluoride	0.30	mg/L	
MW-11	07/12/2022	Fluoride	0.25	mg/L	
MW-11	10/10/2022	Fluoride	0.23	mg/L	
MW-11	01/25/2023	Fluoride	0.36	mg/L	
MW-11	04/17/2023	Fluoride	0.28	mg/L	
MW-11	07/11/2023	Fluoride	0.27	mg/L	
MW-11	12/16/1982	Sulfate	926	mg/L	
MW-11	05/24/1983	Sulfate	943	mg/L	
MW-11	10/26/1983	Sulfate	922	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	02/15/1984	Sulfate	2250	mg/L	
MW-11	06/12/1984	Sulfate	920	mg/L	
MW-11	12/04/1984	Sulfate	949	mg/L	
MW-11	06/28/1985	Sulfate	909	mg/L	
MW-11	09/27/1985	Sulfate	1025	mg/L	
MW-11	12/15/1985	Sulfate	79	mg/L	
MW-11	03/27/1986	Sulfate	946	mg/L	
MW-11	06/26/1986	Sulfate	949	mg/L	
MW-11	09/04/1986	Sulfate	956	mg/L	
MW-11	12/10/1986	Sulfate	911	mg/L	
MW-11	02/20/1987	Sulfate	895	mg/L	
MW-11	02/20/1987	Sulfate	977	mg/L	
MW-11	04/28/1987	Sulfate	1020	mg/L	
MW-11	04/29/1987	Sulfate	1020	mg/L	
MW-11	08/14/1987	Sulfate	951	mg/L	
MW-11	08/19/1987	Sulfate	951	mg/L	
MW-11	11/20/1987	Sulfate	961	mg/L	
MW-11	01/27/1988	Sulfate	919	mg/L	
MW-11	06/01/1988	Sulfate	947	mg/L	
MW-11	08/24/1988	Sulfate	915	mg/L	
MW-11	11/02/1988	Sulfate	974	mg/L	
MW-11	08/25/1989	Sulfate	1030	mg/L	
MW-11	11/01/1989	Sulfate	986	mg/L	
MW-11	11/17/1989	Sulfate	993	mg/L	
MW-11	12/15/1989	Sulfate	1010	mg/L	
MW-11	02/20/1990	Sulfate	1010	mg/L	
MW-11	05/08/1990	Sulfate	1000	mg/L	
MW-11	08/07/1990	Sulfate	973	mg/L	
MW-11	11/13/1990	Sulfate	975	mg/L	
MW-11	02/28/1991	Sulfate	967	mg/L	
MW-11	05/22/1991	Sulfate	936	mg/L	
MW-11	09/24/1991	Sulfate	956	mg/L	
MW-11	12/04/1991	Sulfate	968	mg/L	
MW-11	03/17/1992	Sulfate	976	mg/L	
MW-11	06/12/1992	Sulfate	976	mg/L	
MW-11	09/15/1992	Sulfate	1005	mg/L	
MW-11	11/12/1992	Sulfate	1507	mg/L	
MW-11	03/30/1993	Sulfate	1162	mg/L	
MW-11	06/10/1993	Sulfate	1309	mg/L	
MW-11	09/29/1993	Sulfate	1307	mg/L	
MW-11	12/15/1993	Sulfate	1054	mg/L	
MW-11	03/30/1994	Sulfate	1020	mg/L	
MW-11	03/30/1994	Sulfate	1050	mg/L	
MW-11	06/20/1994	Sulfate	1118	mg/L	
MW-11	08/23/1994	Sulfate	1035	mg/L	
MW-11	12/07/1994	Sulfate	983	mg/L	
MW-11	03/14/1995	Sulfate	1010	mg/L	
MW-11	06/27/1995	Sulfate	659	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	09/15/1995	Sulfate	978	mg/L	
MW-11	03/27/1996	Sulfate	1008	mg/L	
MW-11	06/06/1996	Sulfate	1051	mg/L	
MW-11	09/12/1996	Sulfate	1061	mg/L	
MW-11	09/17/1996	Sulfate	1085	mg/L	
MW-11	11/22/1996	Sulfate	981	mg/L	
MW-11	03/19/1997	Sulfate	922	mg/L	
MW-11	05/11/1999	Sulfate	945	mg/L	
MW-11	11/27/2000	Sulfate	1140	mg/L	
MW-11	11/06/2001	Sulfate	1150	mg/L	
MW-11	09/10/2002	Sulfate	1160	mg/L	
MW-11	09/10/2002	Sulfate	1220	mg/L	
MW-11	03/30/2005	Sulfate	1080	mg/L	D
MW-11	03/30/2005	Sulfate	1180	mg/L	D
MW-11	06/21/2005	Sulfate	1090	mg/L	
MW-11	06/21/2005	Sulfate	1070	mg/L	
MW-11	09/22/2005	Sulfate	968	mg/L	
MW-11	09/22/2005	Sulfate	973	mg/L	
MW-11	12/13/2005	Sulfate	1070	mg/L	D
MW-11	12/13/2005	Sulfate	1060	mg/L	D
MW-11	03/21/2006	Sulfate	1120	mg/L	D
MW-11	06/20/2006	Sulfate	1150	mg/L	D
MW-11	06/20/2006	Sulfate	1150	mg/L	D
MW-11	09/13/2006	Sulfate	1060	mg/L	D
MW-11	10/25/2006	Sulfate	1200	mg/L	D
MW-11	03/15/2007	Sulfate	1120	mg/L	D
MW-11	08/21/2007	Sulfate	1060	mg/L	D
MW-11	10/30/2007	Sulfate	1020	mg/L	D
MW-11	03/18/2008	Sulfate	1040	mg/L	D
MW-11	06/16/2008	Sulfate	1050	mg/L	D
MW-11	08/05/2008	Sulfate	1060	mg/L	D
MW-11	11/10/2008	Sulfate	1100	mg/L	D
MW-11	02/16/2009	Sulfate	977	mg/L	D
MW-11	05/17/2009	Sulfate	1060	mg/L	D
MW-11	08/31/2009	Sulfate	1090	mg/L	D
MW-11	10/19/2009	Sulfate	1040	mg/L	D
MW-11	02/10/2010	Sulfate	1140	mg/L	D
MW-11	04/28/2010	Sulfate	1150	mg/L	D
MW-11	09/08/2010	Sulfate	1140	mg/L	D
MW-11	11/11/2010	Sulfate	1180	mg/L	D
MW-11	02/02/2011	Sulfate	1190	mg/L	D
MW-11	04/04/2011	Sulfate	1140	mg/L	D
MW-11	08/03/2011	Sulfate	1090	mg/L	D
MW-11	10/04/2011	Sulfate	1140	mg/L	D
MW-11	02/13/2012	Sulfate	1160	mg/L	D
MW-11	05/08/2012	Sulfate	1090	mg/L	D
MW-11	07/11/2012	Sulfate	1080	mg/L	D
MW-11	11/12/2012	Sulfate	1110	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	02/20/2013	Sulfate	1080	mg/L	
MW-11	05/14/2013	Sulfate	763	mg/L	
MW-11	07/10/2013	Sulfate	1240	mg/L	
MW-11	11/19/2013	Sulfate	1050	mg/L	
MW-11	02/24/2014	Sulfate	1150	mg/L	
MW-11	03/11/2014	Sulfate	904	mg/L	
MW-11	06/03/2014	Sulfate	1140	mg/L	
MW-11	09/08/2014	Sulfate	1030	mg/L	
MW-11	11/17/2014	Sulfate	1140	mg/L	
MW-11	02/03/2015	Sulfate	1110	mg/L	
MW-11	04/08/2015	Sulfate	1170	mg/L	
MW-11	08/10/2015	Sulfate	1050	mg/L	
MW-11	11/11/2015	Sulfate	1220	mg/L	
MW-11	02/08/2016	Sulfate	1160	mg/L	
MW-11	05/03/2016	Sulfate	1200	mg/L	
MW-11	08/16/2016	Sulfate	1160	mg/L	
MW-11	11/07/2016	Sulfate	1290	mg/L	
MW-11	02/08/2017	Sulfate	1050	mg/L	
MW-11	05/02/2017	Sulfate	1140	mg/L	
MW-11	08/15/2017	Sulfate	1360	mg/L	
MW-11	11/07/2017	Sulfate	1060	mg/L	
MW-11	12/05/2017	Sulfate	1130	mg/L	
MW-11	01/24/2018	Sulfate	561	mg/L	
MW-11	02/20/2018	Sulfate	1120	mg/L	
MW-11	03/06/2018	Sulfate	1180	mg/L	
MW-11	04/18/2018	Sulfate	1110	mg/L	
MW-11	05/15/2018	Sulfate	1140	mg/L	
MW-11	06/19/2018	Sulfate	1060	mg/L	
MW-11	07/24/2018	Sulfate	1170	mg/L	
MW-11	08/09/2018	Sulfate	1090	mg/L	
MW-11	09/11/2018	Sulfate	1160	mg/L	
MW-11	10/25/2018	Sulfate	1190	mg/L	
MW-11	01/15/2019	Sulfate	1150	mg/L	
MW-11	04/24/2019	Sulfate	1160	mg/L	
MW-11	07/16/2019	Sulfate	1410	mg/L	
MW-11	10/15/2019	Sulfate	1290	mg/L	
MW-11	11/12/2019	Sulfate	1140	mg/L	
MW-11	12/03/2019	Sulfate	1100	mg/L	
MW-11	01/15/2020	Sulfate	1180	mg/L	
MW-11	02/04/2020	Sulfate	1260	mg/L	
MW-11	03/10/2020	Sulfate	1120	mg/L	
MW-11	04/08/2020	Sulfate	1180	mg/L	
MW-11	05/05/2020	Sulfate	1180	mg/L	
MW-11	06/02/2020	Sulfate	1310	mg/L	
MW-11	07/07/2020	Sulfate	1260	mg/L	
MW-11	08/11/2020	Sulfate	1220	mg/L	
MW-11	09/02/2020	Sulfate	1170	mg/L	
MW-11	10/12/2020	Sulfate	1300	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	11/16/2020	Sulfate	858	mg/L	
MW-11	12/07/2020	Sulfate	1330	mg/L	
MW-11	01/12/2021	Sulfate	1140	mg/L	
MW-11	02/09/2021	Sulfate	1260	mg/L	
MW-11	03/08/2021	Sulfate	1270	mg/L	
MW-11	04/20/2021	Sulfate	1290	mg/L	
MW-11	05/10/2021	Sulfate	1280	mg/L	
MW-11	06/08/2021	Sulfate	1270	mg/L	
MW-11	07/27/2021	Sulfate	1470	mg/L	
MW-11	08/10/2021	Sulfate	1370	mg/L	
MW-11	09/07/2021	Sulfate	1240	mg/L	
MW-11	10/20/2021	Sulfate	1360	mg/L	
MW-11	11/16/2021	Sulfate	1300	mg/L	
MW-11	12/13/2021	Sulfate	1350	mg/L	
MW-11	01/18/2022	Sulfate	1020	mg/L	
MW-11	02/08/2022	Sulfate	1240	mg/L	
MW-11	03/08/2022	Sulfate	1170	mg/L	
MW-11	04/18/2022	Sulfate	1240	mg/L	
MW-11	05/04/2022	Sulfate	1270	mg/L	
MW-11	06/06/2022	Sulfate	866	mg/L	
MW-11	07/12/2022	Sulfate	1390	mg/L	
MW-11	08/08/2022	Sulfate	1260	mg/L	
MW-11	09/21/2022	Sulfate	1300	mg/L	
MW-11	10/10/2022	Sulfate	1140	mg/L	
MW-11	11/08/2022	Sulfate	1140	mg/L	
MW-11	12/14/2022	Sulfate	1330	mg/L	
MW-11	01/25/2023	Sulfate	1240	mg/L	
MW-11	02/08/2023	Sulfate	1100	mg/L	
MW-11	03/14/2023	Sulfate	1430	mg/L	
MW-11	04/17/2023	Sulfate	1330	mg/L	
MW-11	05/09/2023	Sulfate	1230	mg/L	
MW-11	06/05/2023	Sulfate	1340	mg/L	
MW-11	07/11/2023	Sulfate	1370	mg/L	
MW-11	08/02/2023	Sulfate	1190	mg/L	
MW-11	05/24/1983	Uranium	1.00	ug/L	U
MW-11	12/15/1985	Uranium	0.75	ug/L	
MW-11	12/10/1986	Uranium	0.30	ug/L	U
MW-11	02/20/1987	Uranium	0.30	ug/L	U
MW-11	04/29/1987	Uranium	0.30	ug/L	
MW-11	08/19/1987	Uranium	1.04	ug/L	
MW-11	01/27/1988	Uranium	0.30	ug/L	U
MW-11	06/01/1988	Uranium	0.75	ug/L	
MW-11	08/24/1988	Uranium	0.75	ug/L	
MW-11	11/02/1988	Uranium	0.40	ug/L	
MW-11	03/09/1989	Uranium	1.34	ug/L	
MW-11	06/22/1989	Uranium	1.19	ug/L	
MW-11	08/25/1989	Uranium	2.39	ug/L	
MW-11	10/31/1989	Uranium	1.04	ug/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	11/17/1989	Uranium	0.90	ug/L	
MW-11	11/29/1989	Uranium	0.90	ug/L	
MW-11	12/15/1989	Uranium	0.75	ug/L	
MW-11	01/24/1990	Uranium	1.04	ug/L	
MW-11	02/20/1990	Uranium	1.04	ug/L	
MW-11	05/08/1990	Uranium	1.19	ug/L	
MW-11	08/07/1990	Uranium	0.70	ug/L	
MW-11	11/13/1990	Uranium	0.90	ug/L	
MW-11	02/28/1991	Uranium	0.30	ug/L	U
MW-11	05/22/1991	Uranium	0.34	ug/L	
MW-11	09/24/1991	Uranium	1.10	ug/L	
MW-11	12/04/1991	Uranium	0.36	ug/L	
MW-11	06/12/1992	Uranium	0.30	ug/L	U
MW-11	03/30/1993	Uranium	3.03	ug/L	
MW-11	06/10/1993	Uranium	4.00	ug/L	
MW-11	09/29/1993	Uranium	2.01	ug/L	
MW-11	12/15/1993	Uranium	0.30	ug/L	U
MW-11	06/20/1994	Uranium	1.21	ug/L	
MW-11	08/23/1994	Uranium	1.01	ug/L	
MW-11	08/23/1994	Uranium	1.52	ug/L	
MW-11	12/07/1994	Uranium	1.00	ug/L	
MW-11	12/07/1994	Uranium	0.30	ug/L	U
MW-11	03/14/1995	Uranium	0.30	ug/L	U
MW-11	06/27/1995	Uranium	0.80	ug/L	
MW-11	06/27/1995	Uranium	0.30	ug/L	U
MW-11	09/15/1995	Uranium	1.40	ug/L	
MW-11	09/15/1995	Uranium	0.30	ug/L	U
MW-11	12/07/1995	Uranium	0.30	ug/L	U
MW-11	03/27/1996	Uranium	0.40	ug/L	
MW-11	06/06/1996	Uranium	0.50	ug/L	
MW-11	09/12/1996	Uranium	1.10	ug/L	
MW-11	11/22/1996	Uranium	1.80	ug/L	
MW-11	03/19/1997	Uranium	0.30	ug/L	U
MW-11	06/11/1997	Uranium	1.00	ug/L	
MW-11	09/30/1997	Uranium	0.40	ug/L	
MW-11	01/08/1998	Uranium	0.00	ug/L	U
MW-11	03/16/1998	Uranium	0.00	ug/L	
MW-11	05/12/1998	Uranium	0.00	ug/L	
MW-11	09/24/1998	Uranium	0.00	ug/L	
MW-11	11/03/1998	Uranium	0.00	ug/L	U
MW-11	02/18/1999	Uranium	0.40	ug/L	
MW-11	05/11/1999	Uranium	0.70	ug/L	
MW-11	09/30/1999	Uranium	0.50	ug/L	
MW-11	12/09/1999	Uranium	0.40	ug/L	
MW-11	03/17/2000	Uranium	0.30	ug/L	
MW-11	06/06/2000	Uranium	0.30	ug/L	U
MW-11	09/03/2000	Uranium	0.60	ug/L	
MW-11	11/27/2000	Uranium	2.20	ug/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	03/23/2001	Uranium	2.90	ug/L	
MW-11	06/12/2001	Uranium	2.50	ug/L	
MW-11	09/04/2001	Uranium	1.30	ug/L	
MW-11	11/06/2001	Uranium	1.50	ug/L	
MW-11	05/20/2002	Uranium	1.00	ug/L	
MW-11	11/21/2002	Uranium	1.00	ug/L	
MW-11	03/20/2003	Uranium	0.80	ug/L	
MW-11	06/27/2003	Uranium	1.60	ug/L	
MW-11	09/24/2003	Uranium	1.00	ug/L	
MW-11	11/24/2003	Uranium	0.30	ug/L	U
MW-11	03/19/2004	Uranium	1.00	ug/L	
MW-11	05/27/2004	Uranium	1.00	ug/L	U
MW-11	09/14/2004	Uranium	1.00	ug/L	U
MW-11	11/09/2004	Uranium	1.00	ug/L	U
MW-11	06/21/2005	Uranium	0.76	ug/L	
MW-11	09/22/2005	Uranium	0.63	ug/L	
MW-11	12/13/2005	Uranium	0.83	ug/L	
MW-11	03/21/2006	Uranium	0.81	ug/L	
MW-11	06/20/2006	Uranium	1.02	ug/L	
MW-11	09/13/2006	Uranium	0.62	ug/L	
MW-11	10/25/2006	Uranium	1.04	ug/L	
MW-11	03/15/2007	Uranium	1.04	ug/L	
MW-11	08/21/2007	Uranium	0.30	ug/L	U
MW-11	10/30/2007	Uranium	0.30	ug/L	U
MW-11	03/18/2008	Uranium	0.30	ug/L	U
MW-11	06/16/2008	Uranium	0.30	ug/L	U
MW-11	08/05/2008	Uranium	0.30	ug/L	U
MW-11	11/10/2008	Uranium	0.30	ug/L	U
MW-11	02/16/2009	Uranium	0.30	ug/L	U
MW-11	05/17/2009	Uranium	0.30	ug/L	U
MW-11	08/31/2009	Uranium	0.33	ug/L	
MW-11	10/19/2009	Uranium	0.31	ug/L	
MW-11	02/10/2010	Uranium	0.92	ug/L	
MW-11	04/28/2010	Uranium	0.96	ug/L	
MW-11	09/08/2010	Uranium	1.06	ug/L	
MW-11	11/11/2010	Uranium	0.87	ug/L	
MW-11	02/02/2011	Uranium	0.42	ug/L	
MW-11	04/04/2011	Uranium	0.96	ug/L	
MW-11	08/03/2011	Uranium	0.48	ug/L	
MW-11	10/04/2011	Uranium	0.47	ug/L	
MW-11	02/13/2012	Uranium	0.85	ug/L	
MW-11	05/08/2012	Uranium	0.62	ug/L	
MW-11	07/11/2012	Uranium	0.73	ug/L	
MW-11	11/12/2012	Uranium	0.79	ug/L	
MW-11	02/20/2013	Uranium	0.59	ug/L	
MW-11	05/14/2013	Uranium	0.69	ug/L	
MW-11	07/10/2013	Uranium	0.67	ug/L	
MW-11	11/19/2013	Uranium	0.90	ug/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-11	02/24/2014	Uranium	1.00	ug/L	
MW-11	03/11/2014	Uranium	0.67	ug/L	
MW-11	06/03/2014	Uranium	0.94	ug/L	
MW-11	09/08/2014	Uranium	0.50	ug/L	U
MW-11	11/17/2014	Uranium	0.54	ug/L	
MW-11	02/03/2015	Uranium	0.56	ug/L	
MW-11	04/08/2015	Uranium	0.90	ug/L	
MW-11	08/10/2015	Uranium	0.77	ug/L	
MW-11	11/11/2015	Uranium	0.58	ug/L	
MW-11	02/08/2016	Uranium	1.16	ug/L	
MW-11	05/03/2016	Uranium	0.78	ug/L	
MW-11	08/16/2016	Uranium	0.77	ug/L	
MW-11	11/07/2016	Uranium	1.08	ug/L	
MW-11	02/08/2017	Uranium	0.79	ug/L	
MW-11	05/02/2017	Uranium	0.81	ug/L	
MW-11	08/15/2017	Uranium	0.95	ug/L	
MW-11	11/07/2017	Uranium	0.73	ug/L	
MW-11	02/20/2018	Uranium	0.53	ug/L	
MW-11	04/18/2018	Uranium	0.85	ug/L	
MW-11	09/11/2018	Uranium	0.76	ug/L	
MW-11	10/25/2018	Uranium	0.73	ug/L	
MW-11	01/15/2019	Uranium	0.86	ug/L	
MW-11	04/24/2019	Uranium	0.94	ug/L	
MW-11	07/16/2019	Uranium	1.08	ug/L	
MW-11	10/15/2019	Uranium	1.01	ug/L	
MW-11	01/15/2020	Uranium	0.82	ug/L	
MW-11	04/08/2020	Uranium	1.01	ug/L	
MW-11	07/07/2020	Uranium	0.95	ug/L	
MW-11	10/12/2020	Uranium	1.33	ug/L	
MW-11	01/12/2021	Uranium	1.33	ug/L	
MW-11	04/20/2021	Uranium	1.49	ug/L	
MW-11	07/27/2021	Uranium	2.21	ug/L	
MW-11	10/20/2021	Uranium	2.08	ug/L	
MW-11	01/18/2022	Uranium	1.78	ug/L	
MW-11	04/18/2022	Uranium	1.90	ug/L	
MW-11	07/12/2022	Uranium	2.60	ug/L	
MW-11	10/10/2022	Uranium	2.40	ug/L	
MW-11	01/25/2023	Uranium	2.60	ug/L	
MW-11	04/17/2023	Uranium	2.60	ug/L	
MW-11	07/11/2023	Uranium	2.80	ug/L	
MW-37	08/11/2011	Chloride	55.0	mg/L	
MW-37	10/19/2011	Chloride	50.0	mg/L	
MW-37	02/29/2012	Chloride	36.0	mg/L	
MW-37	05/29/2012	Chloride	50.0	mg/L	
MW-37	07/30/2012	Chloride	51.0	mg/L	D
MW-37	12/05/2012	Chloride	46.6	mg/L	
MW-37	03/20/2013	Chloride	44.5	mg/L	
MW-37	06/03/2013	Chloride	48.8	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-37	07/23/2013	Chloride	43.2	mg/L	
MW-37	12/18/2013	Chloride	46.1	mg/L	
MW-37	03/20/2014	Chloride	45.1	mg/L	
MW-37	06/18/2014	Chloride	45.1	mg/L	
MW-37	09/17/2014	Chloride	44.0	mg/L	
MW-37	12/03/2014	Chloride	39.9	mg/L	
MW-37	03/05/2015	Chloride	46.9	mg/L	
MW-37	06/24/2015	Chloride	46.4	mg/L	
MW-37	08/11/2015	Chloride	53.3	mg/L	
MW-37	12/09/2015	Chloride	47.2	mg/L	
MW-37	03/22/2016	Chloride	42.7	mg/L	
MW-37	05/18/2016	Chloride	49.4	mg/L	
MW-37	09/21/2016	Chloride	46.4	mg/L	
MW-37	11/16/2016	Chloride	49.5	mg/L	
MW-37	03/07/2017	Chloride	45.7	mg/L	
MW-37	05/25/2017	Chloride	47.3	mg/L	
MW-37	09/25/2017	Chloride	46.5	mg/L	
MW-37	11/08/2017	Chloride	46.3	mg/L	
MW-37	05/03/2018	Chloride	50.5	mg/L	
MW-37	10/30/2018	Chloride	42.1	mg/L	
MW-37	05/15/2019	Chloride	48.7	mg/L	
MW-37	11/22/2019	Chloride	44.3	mg/L	
MW-37	04/21/2020	Chloride	45.0	mg/L	
MW-37	10/27/2020	Chloride	43.1	mg/L	
MW-37	05/12/2021	Chloride	44.5	mg/L	
MW-37	11/17/2021	Chloride	44.4	mg/L	
MW-37	05/17/2022	Chloride	46.4	mg/L	
MW-37	11/01/2022	Chloride	44.2	mg/L	
MW-37	05/11/2023	Chloride	45.2	mg/L	
MW-37	08/11/2011	Fluoride	0.300	mg/L	
MW-37	10/19/2011	Fluoride	0.230	mg/L	
MW-37	02/29/2012	Fluoride	0.250	mg/L	
MW-37	05/29/2012	Fluoride	0.240	mg/L	
MW-37	07/30/2012	Fluoride	0.220	mg/L	
MW-37	12/05/2012	Fluoride	0.229	mg/L	
MW-37	03/20/2013	Fluoride	0.268	mg/L	
MW-37	06/03/2013	Fluoride	0.274	mg/L	
MW-37	07/23/2013	Fluoride	0.284	mg/L	
MW-37	12/18/2013	Fluoride	0.240	mg/L	
MW-37	03/20/2014	Fluoride	0.324	mg/L	
MW-37	06/18/2014	Fluoride	1.000	mg/L	U
MW-37	09/17/2014	Fluoride	0.300	mg/L	
MW-37	12/03/2014	Fluoride	0.221	mg/L	
MW-37	03/05/2015	Fluoride	0.314	mg/L	
MW-37	06/24/2015	Fluoride	0.290	mg/L	
MW-37	08/11/2015	Fluoride	0.100	mg/L	U
MW-37	12/09/2015	Fluoride	0.275	mg/L	
MW-37	03/22/2016	Fluoride	0.386	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

Well	Sample Date	Parameter	Result	Units	Qualifier
MW-37	05/18/2016	Fluoride	0.322	mg/L	
MW-37	09/21/2016	Fluoride	0.318	mg/L	
MW-37	11/16/2016	Fluoride	0.218	mg/L	
MW-37	03/07/2017	Fluoride	0.252	mg/L	
MW-37	05/25/2017	Fluoride	0.228	mg/L	
MW-37	09/25/2017	Fluoride	0.433	mg/L	
MW-37	11/08/2017	Fluoride	0.307	mg/L	
MW-37	05/03/2018	Fluoride	0.263	mg/L	
MW-37	10/30/2018	Fluoride	0.255	mg/L	
MW-37	05/15/2019	Fluoride	0.294	mg/L	
MW-37	11/22/2019	Fluoride	0.106	mg/L	
MW-37	04/21/2020	Fluoride	0.195	mg/L	
MW-37	10/27/2020	Fluoride	0.257	mg/L	
MW-37	05/12/2021	Fluoride	0.239	mg/L	
MW-37	11/17/2021	Fluoride	0.229	mg/L	
MW-37	05/17/2022	Fluoride	0.200	mg/L	
MW-37	11/01/2022	Fluoride	0.249	mg/L	
MW-37	05/11/2023	Fluoride	0.166	mg/L	
MW-37	08/11/2011	Sulfate	2440	mg/L	D
MW-37	10/19/2011	Sulfate	2620	mg/L	D
MW-37	02/29/2012	Sulfate	2500	mg/L	D
MW-37	05/29/2012	Sulfate	2460	mg/L	D
MW-37	07/30/2012	Sulfate	2700	mg/L	D
MW-37	12/05/2012	Sulfate	1010	mg/L	
MW-37	03/20/2013	Sulfate	2130	mg/L	
MW-37	06/03/2013	Sulfate	2570	mg/L	
MW-37	07/23/2013	Sulfate	2720	mg/L	
MW-37	12/18/2013	Sulfate	2750	mg/L	
MW-37	03/20/2014	Sulfate	2600	mg/L	
MW-37	06/18/2014	Sulfate	2640	mg/L	
MW-37	09/17/2014	Sulfate	2370	mg/L	
MW-37	12/03/2014	Sulfate	2700	mg/L	
MW-37	03/05/2015	Sulfate	2650	mg/L	
MW-37	06/24/2015	Sulfate	2650	mg/L	
MW-37	08/11/2015	Sulfate	2480	mg/L	
MW-37	12/09/2015	Sulfate	2600	mg/L	
MW-37	03/22/2016	Sulfate	2360	mg/L	
MW-37	05/18/2016	Sulfate	2530	mg/L	
MW-37	09/21/2016	Sulfate	2300	mg/L	
MW-37	11/16/2016	Sulfate	2600	mg/L	
MW-37	03/07/2017	Sulfate	2240	mg/L	
MW-37	05/25/2017	Sulfate	2430	mg/L	
MW-37	09/25/2017	Sulfate	2350	mg/L	
MW-37	11/08/2017	Sulfate	2360	mg/L	
MW-37	05/03/2018	Sulfate	2570	mg/L	
MW-37	10/30/2018	Sulfate	2170	mg/L	
MW-37	05/15/2019	Sulfate	2330	mg/L	
MW-37	11/22/2019	Sulfate	2640	mg/L	

Appendix B-3: MW-11 and MW-37 Indicator Parameter Data Used for Analysis

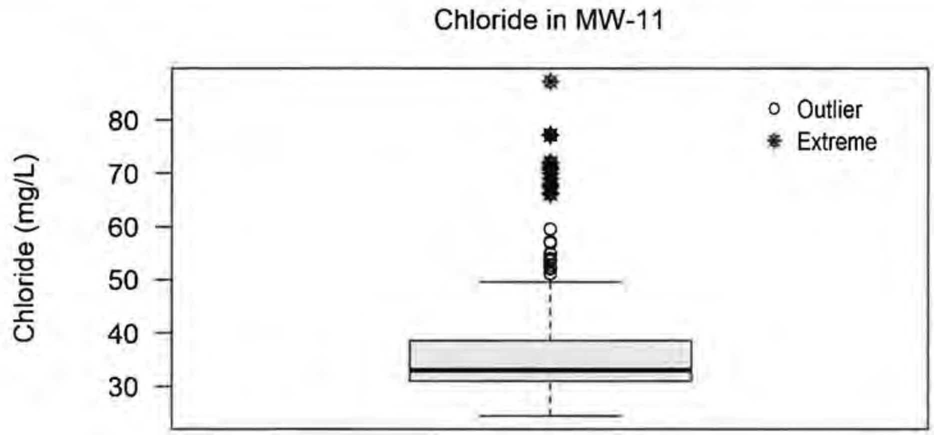
Well	Sample Date	Parameter	Result	Units	Qualifier
MW-37	04/21/2020	Sulfate	2510	mg/L	
MW-37	10/27/2020	Sulfate	2460	mg/L	
MW-37	05/12/2021	Sulfate	2570	mg/L	
MW-37	11/17/2021	Sulfate	2560	mg/L	
MW-37	05/17/2022	Sulfate	2340	mg/L	
MW-37	11/01/2022	Sulfate	2280	mg/L	
MW-37	05/11/2023	Sulfate	2580	mg/L	
MW-37	08/11/2011	Uranium	18.1	ug/L	
MW-37	10/19/2011	Uranium	15.6	ug/L	
MW-37	02/29/2012	Uranium	12.3	ug/L	
MW-37	05/29/2012	Uranium	10.9	ug/L	
MW-37	07/30/2012	Uranium	12.4	ug/L	
MW-37	12/05/2012	Uranium	15.5	ug/L	
MW-37	03/20/2013	Uranium	10.3	ug/L	
MW-37	06/03/2013	Uranium	12.3	ug/L	
MW-37	07/23/2013	Uranium	12.8	ug/L	
MW-37	12/18/2013	Uranium	11.4	ug/L	
MW-37	03/20/2014	Uranium	11.6	ug/L	
MW-37	06/18/2014	Uranium	11.8	ug/L	
MW-37	09/17/2014	Uranium	10.7	ug/L	
MW-37	12/03/2014	Uranium	12.0	ug/L	
MW-37	03/05/2015	Uranium	13.9	ug/L	
MW-37	06/24/2015	Uranium	14.1	ug/L	
MW-37	08/11/2015	Uranium	16.1	ug/L	
MW-37	12/09/2015	Uranium	13.9	ug/L	
MW-37	03/22/2016	Uranium	13.8	ug/L	
MW-37	05/18/2016	Uranium	13.6	ug/L	
MW-37	09/21/2016	Uranium	13.2	ug/L	
MW-37	11/16/2016	Uranium	13.6	ug/L	
MW-37	03/07/2017	Uranium	13.6	ug/L	
MW-37	05/25/2017	Uranium	12.7	ug/L	
MW-37	09/25/2017	Uranium	16.2	ug/L	
MW-37	11/08/2017	Uranium	14.5	ug/L	
MW-37	05/03/2018	Uranium	10.5	ug/L	
MW-37	10/30/2018	Uranium	12.1	ug/L	
MW-37	05/15/2019	Uranium	11.5	ug/L	
MW-37	11/22/2019	Uranium	11.6	ug/L	
MW-37	04/21/2020	Uranium	11.6	ug/L	
MW-37	10/27/2020	Uranium	11.9	ug/L	
MW-37	05/12/2021	Uranium	12.0	ug/L	
MW-37	11/17/2021	Uranium	10.9	ug/L	
MW-37	05/17/2022	Uranium	11.5	ug/L	
MW-37	11/01/2022	Uranium	12.0	ug/L	
MW-37	05/11/2023	Uranium	11.7	ug/L	

Appendix B-4: Indicator Parameter Data Removed from Analysis

Reason	Location ID	Date Sampled	Parameter Name	Report Result	Report Units
Removed					
NA	NA	NA	NA	NA	NA

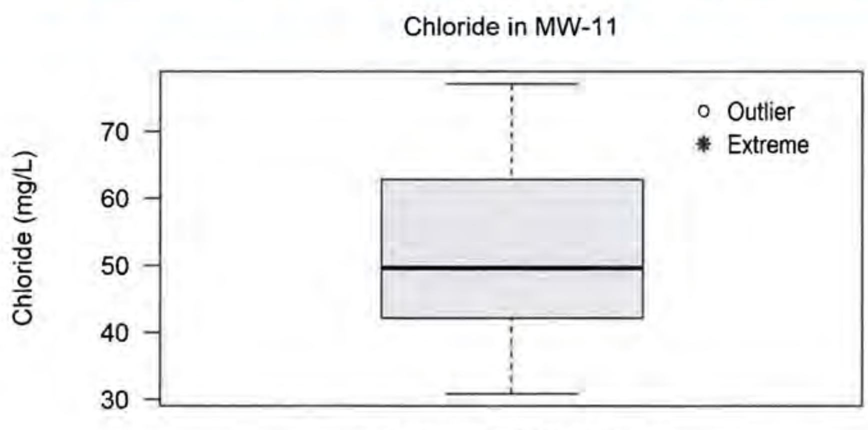
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Chloride in MW-11 for All Data



Percent nondetect: 0%
Min: 24.4, Mean: 37.64, Max: 87.2, Std Dev: 11.54
Upper extreme threshold (Q75 + 3xH): 60.8
Lower extreme threshold (Q25 - 3xH): 8.65000000000001

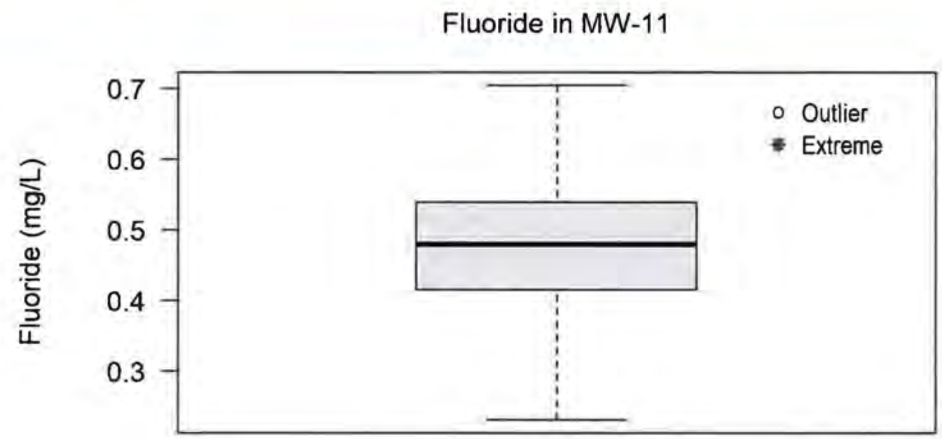
Chloride in MW-11 Post July, 2019



Percent nondetect: 0%
Min: 30.8, Mean: 52.14, Max: 77.1, Std Dev: 12.28
Upper extreme threshold (Q75 + 3xH): 124.7
Lower extreme threshold (Q25 - 3xH): -19.85

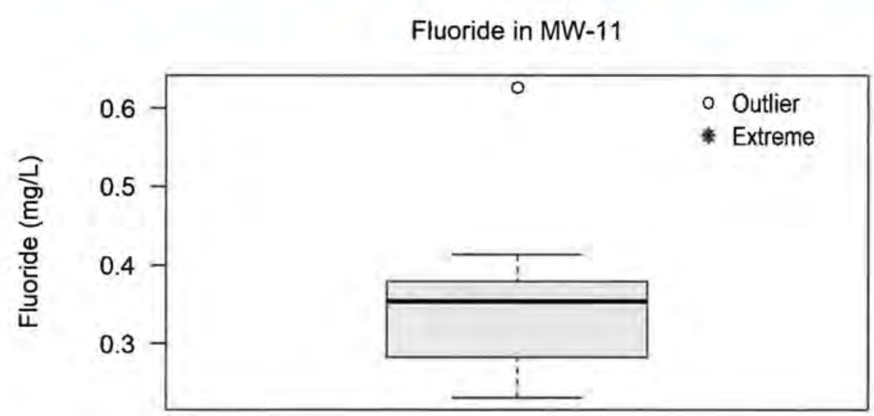
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Fluoride in MW-11 for All Data



Percent nondetect: 0%
Min: 0.231, Mean: 0.47, Max: 0.705059075537998, Std Dev: 0.1
Upper extreme threshold (Q75 + 3xH): 0.912
Lower extreme threshold (Q25 - 3xH): 0.0439999999999998

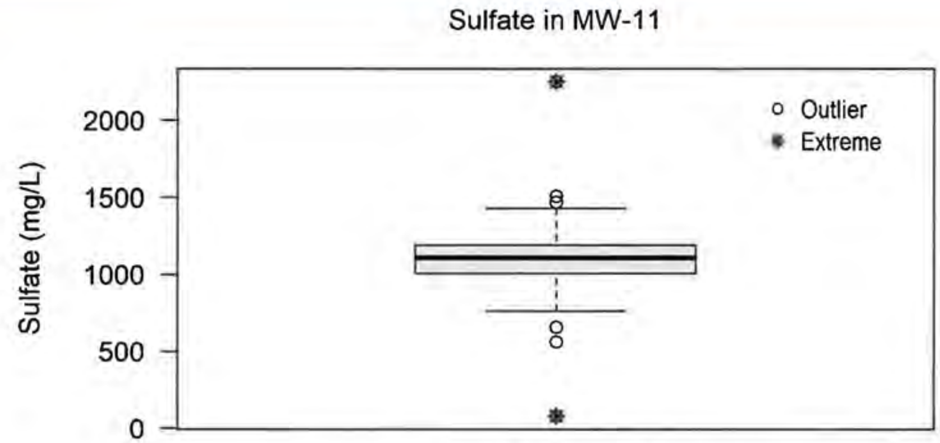
Fluoride in MW-11 Post July, 2019



Percent nondetect: 0%
Min: 0.231, Mean: 0.34, Max: 0.626, Std Dev: 0.09
Upper extreme threshold (Q75 + 3xH): 0.667
Lower extreme threshold (Q25 - 3xH): -0.00500000000000012

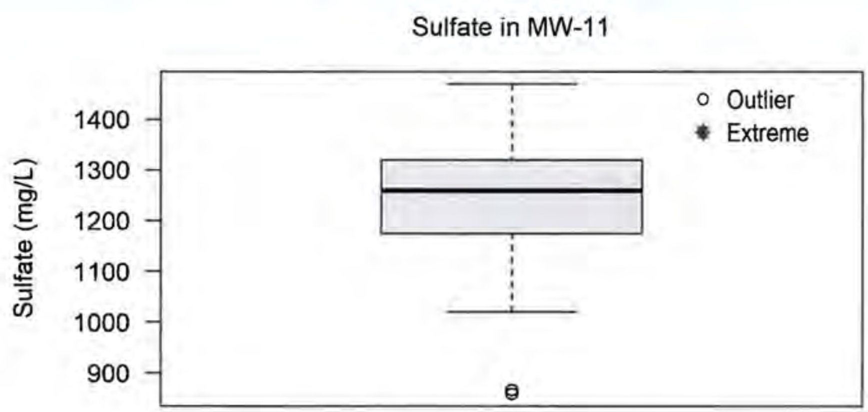
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Sulfate in MW-11 for All Data



Percent nondetect: 0%
Min: 79, Mean: 1107.63, Max: 2250, Std Dev: 184.55
Upper extreme threshold (Q75 + 3xH): 1745
Lower extreme threshold (Q25 - 3xH): 450

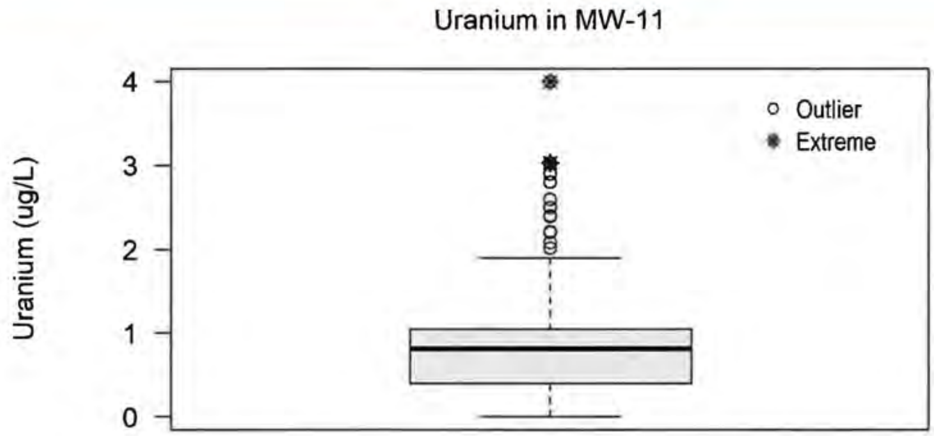
Sulfate in MW-11 Post July, 2019



Percent nondetect: 0%
Min: 858, Mean: 1240.72, Max: 1470, Std Dev: 124.28
Upper extreme threshold (Q75 + 3xH): 1755
Lower extreme threshold (Q25 - 3xH): 740

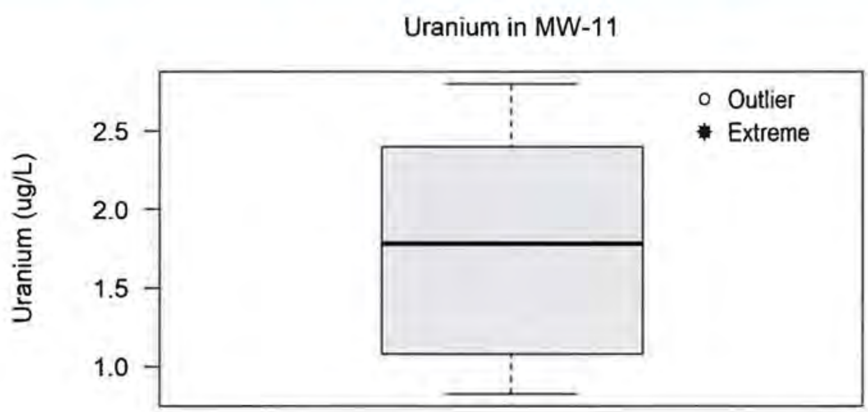
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Uranium in MW-11 for All Data



Percent nondetect: 19%
Min: 3e-04, Mean: 0.92, Max: 4, Std Dev: 0.67
Upper extreme threshold (Q75 + 3xH): 2.9641044776
Lower extreme threshold (Q25 - 3xH): -1.5143283582

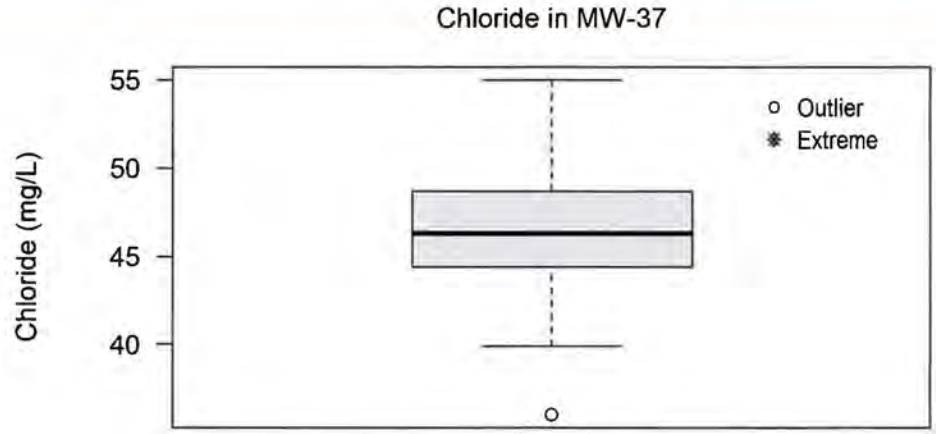
Uranium in MW-11 Post July, 2019



Percent nondetect: 0%
Min: 0.824, Mean: 1.76, Max: 2.8, Std Dev: 0.68
Upper extreme threshold (Q75 + 3xH): 6.36
Lower extreme threshold (Q25 - 3xH): -2.88

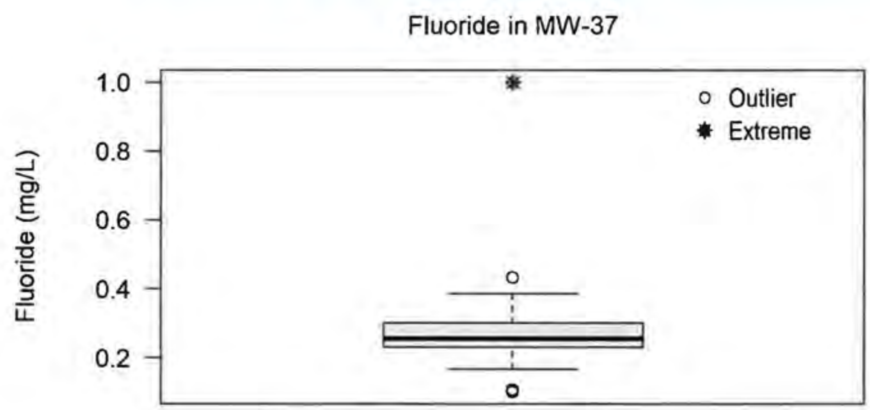
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Chloride in MW-37 for All Data



Percent nondetect: 0%
Min: 36, Mean: 46.25, Max: 55, Std Dev: 3.55
Upper extreme threshold (Q75 + 3xH): 61.6
Lower extreme threshold (Q25 - 3xH): 31.5

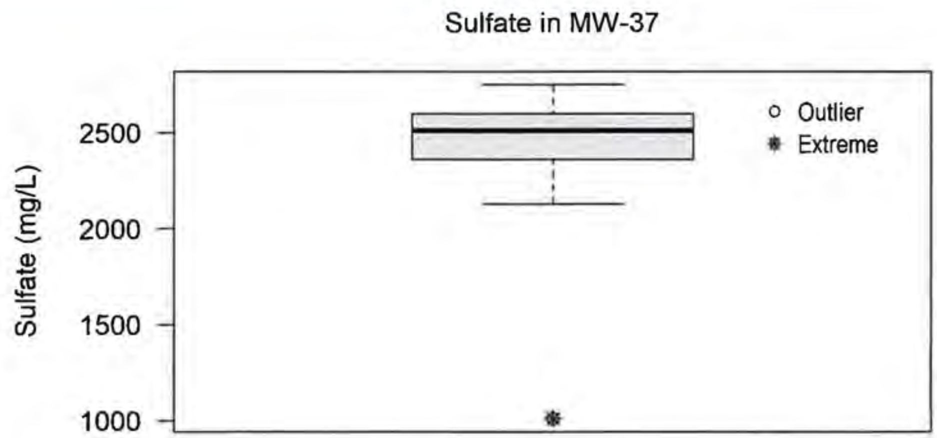
Fluoride in MW-37 for All Data



Percent nondetect: 5%
Min: 0.1, Mean: 0.28, Max: 1, Std Dev: 0.14
Upper extreme threshold (Q75 + 3xH): 0.513
Lower extreme threshold (Q25 - 3xH): 0.0160000000000001

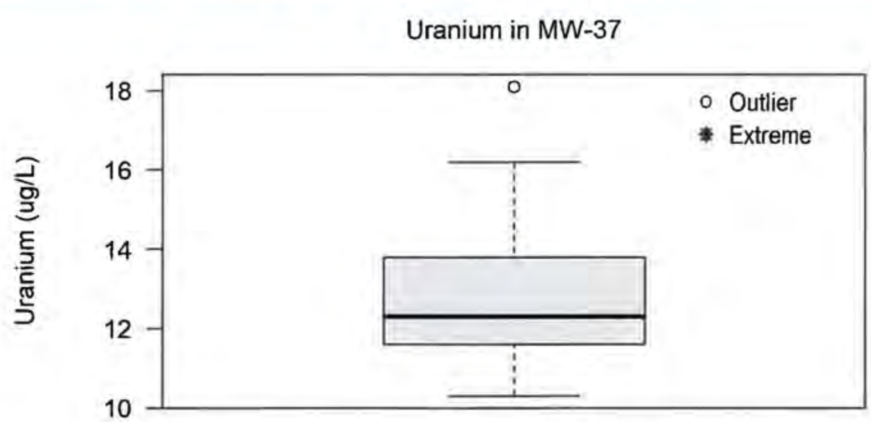
Appendix B-5: Box Plots for Indicator Parameters in MW-11 and MW-37

Sulfate in MW-37 for All Data



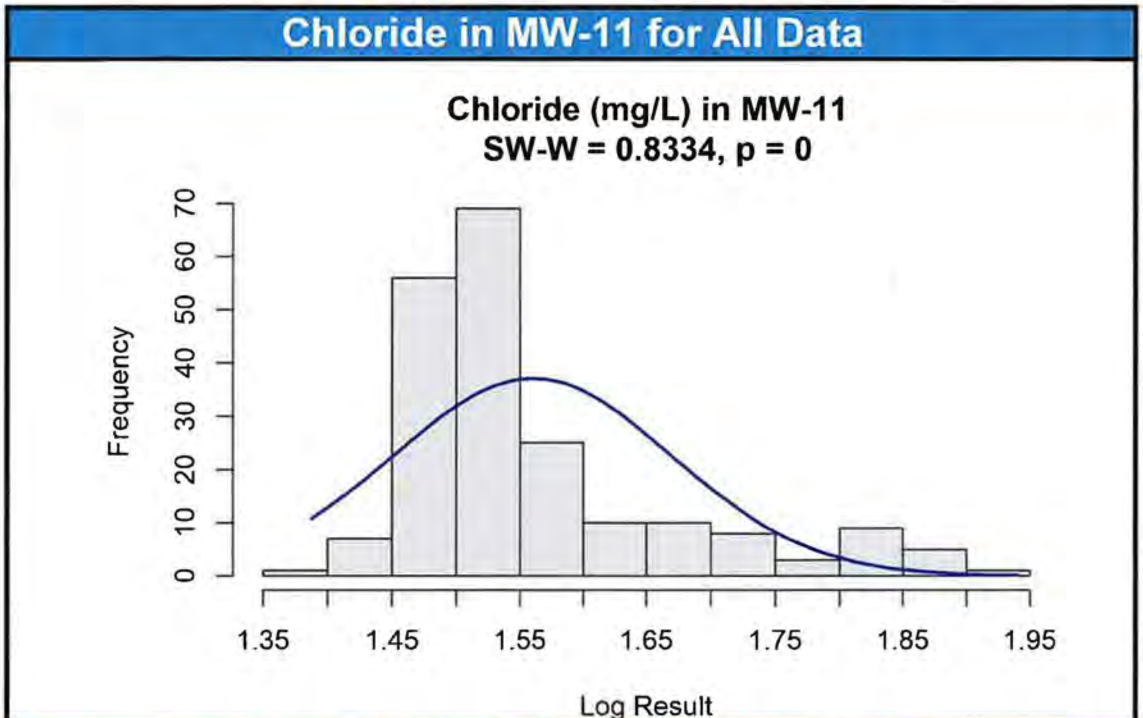
Percent nondetect: 0%
Min: 1010, Mean: 2453.24, Max: 2750, Std Dev: 290.18
Upper extreme threshold (Q75 + 3xH): 3320
Lower extreme threshold (Q25 - 3xH): 1640

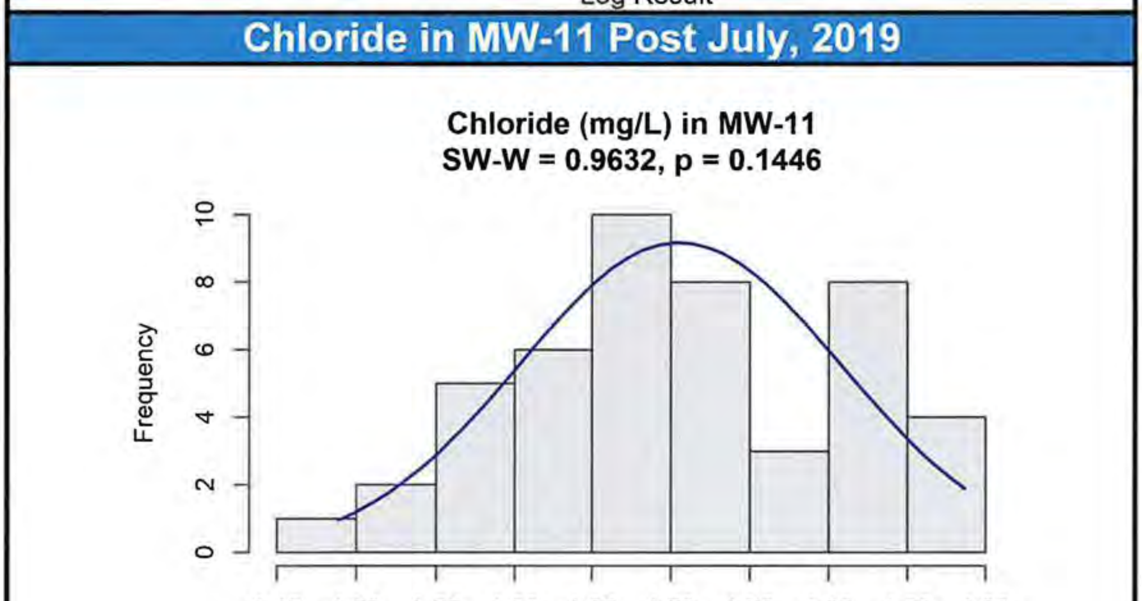
Uranium in MW-37 for All Data



Percent nondetect: 0%
Min: 10.3, Mean: 12.82, Max: 18.1, Std Dev: 1.78
Upper extreme threshold (Q75 + 3xH): 20.4
Lower extreme threshold (Q25 - 3xH): 5

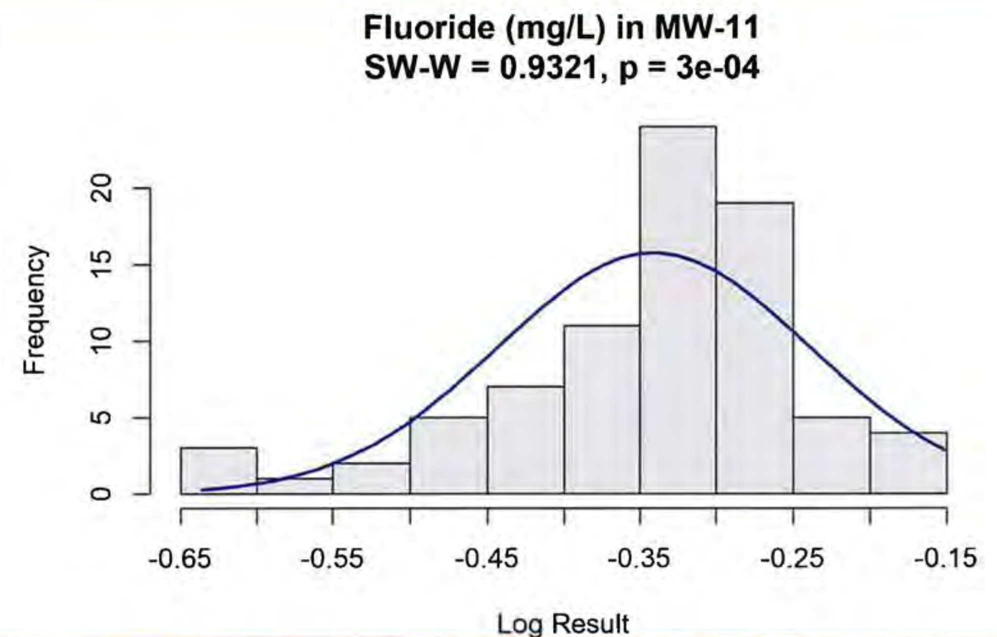
Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37



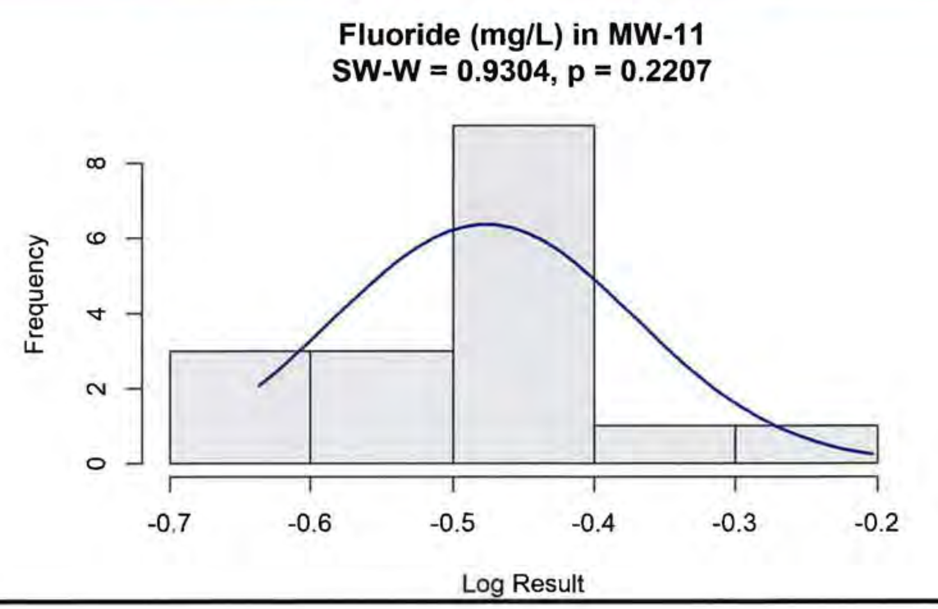


Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37

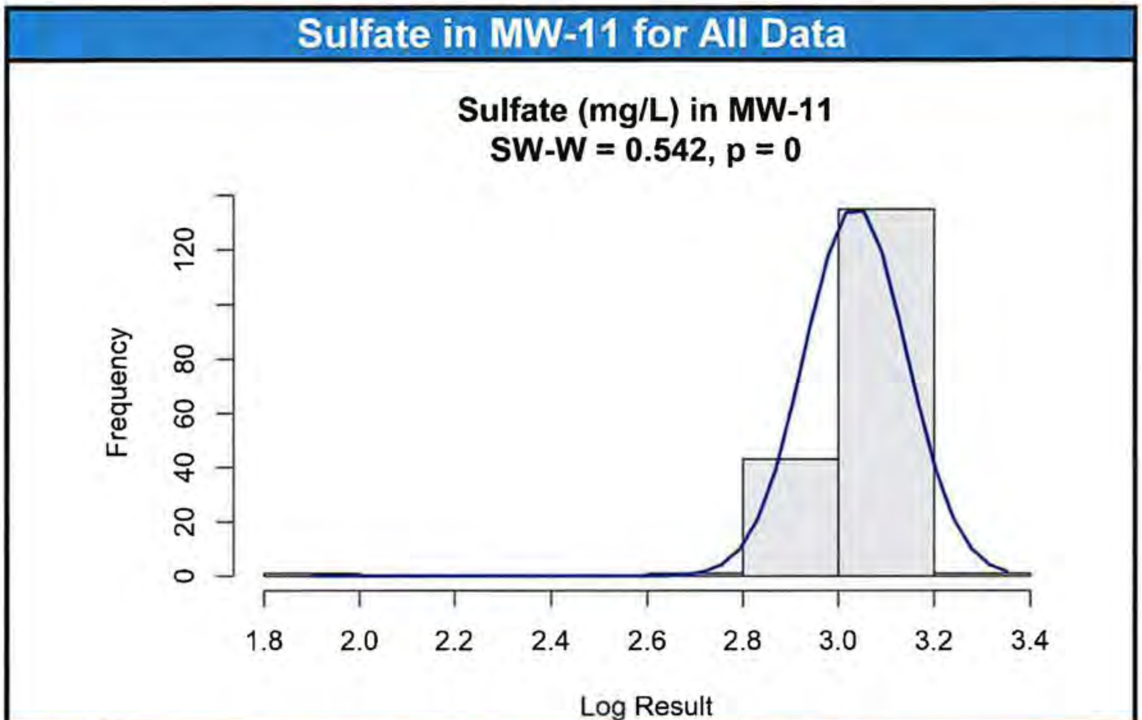
Fluoride in MW-11 for All Data

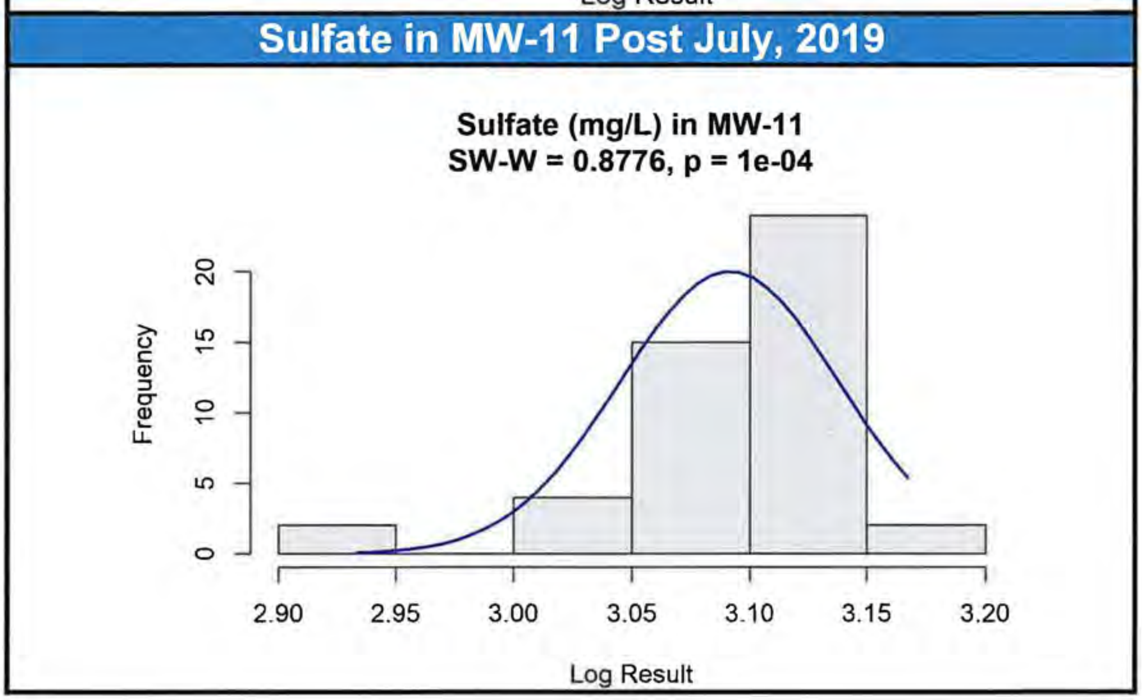


Fluoride in MW-11 Post July, 2019



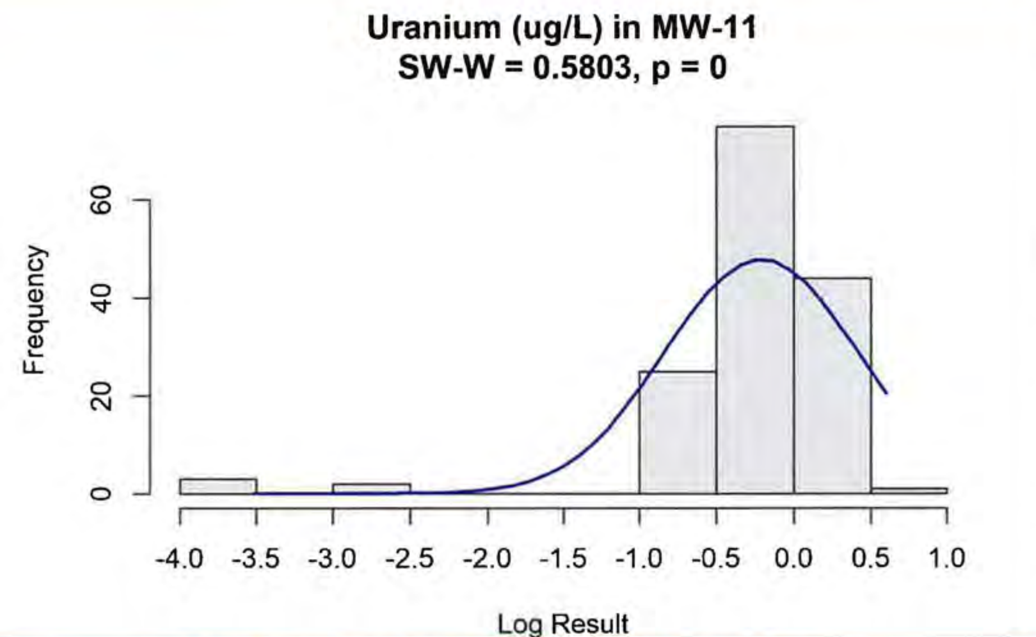
Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37



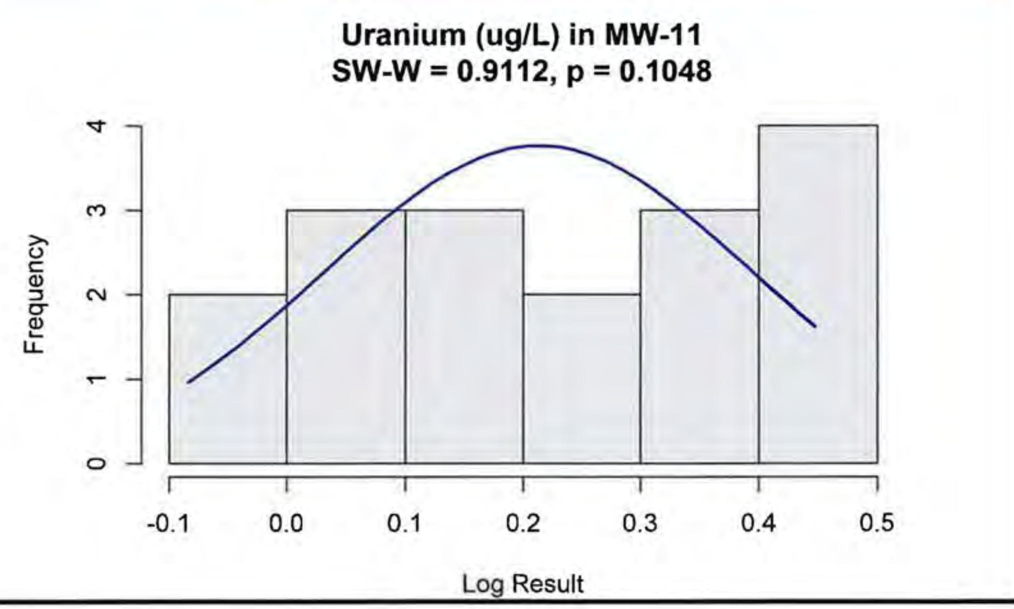


Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37

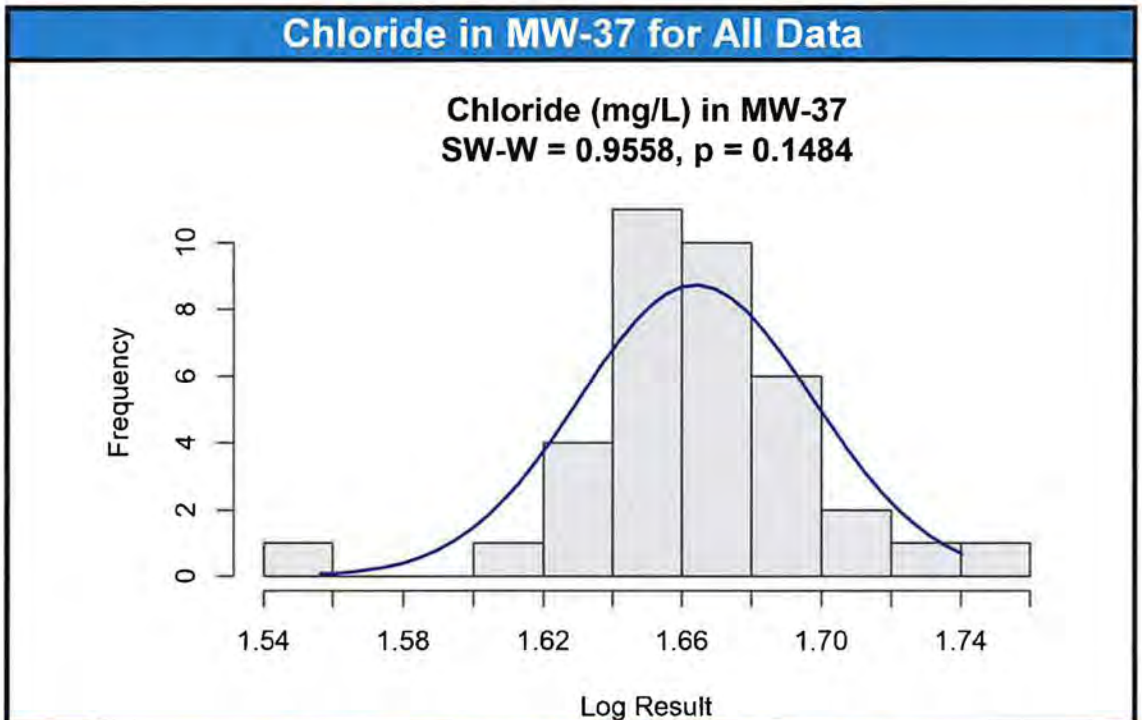
Uranium in MW-11 for All Data

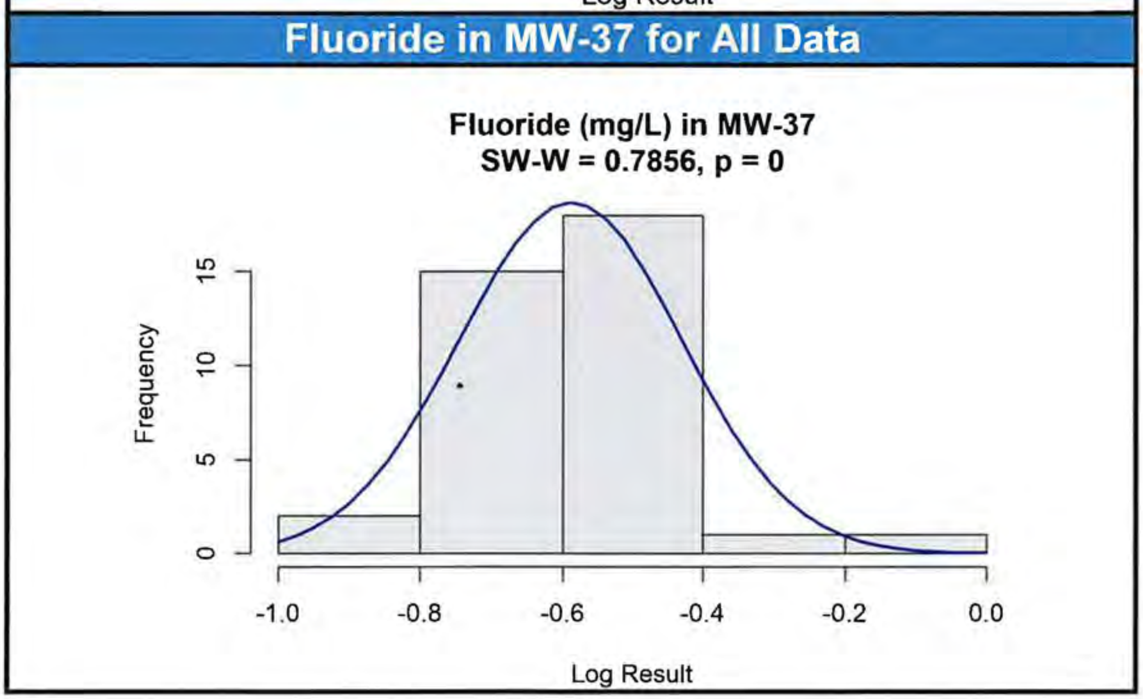


Uranium in MW-11 Post July, 2019

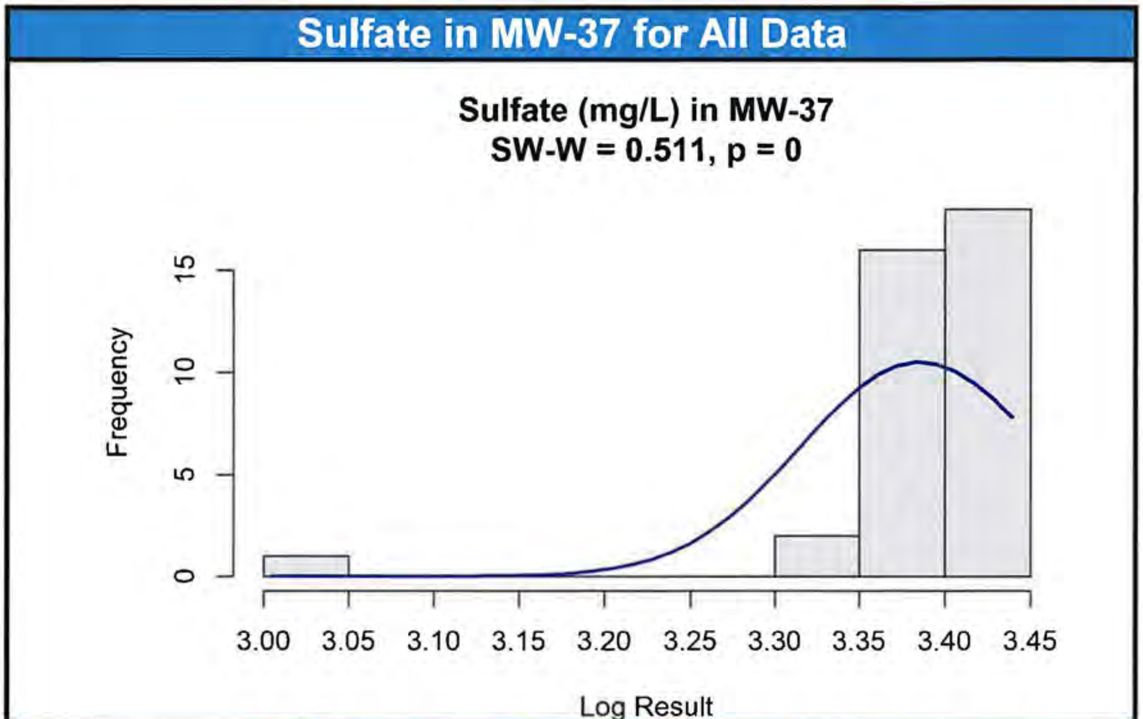


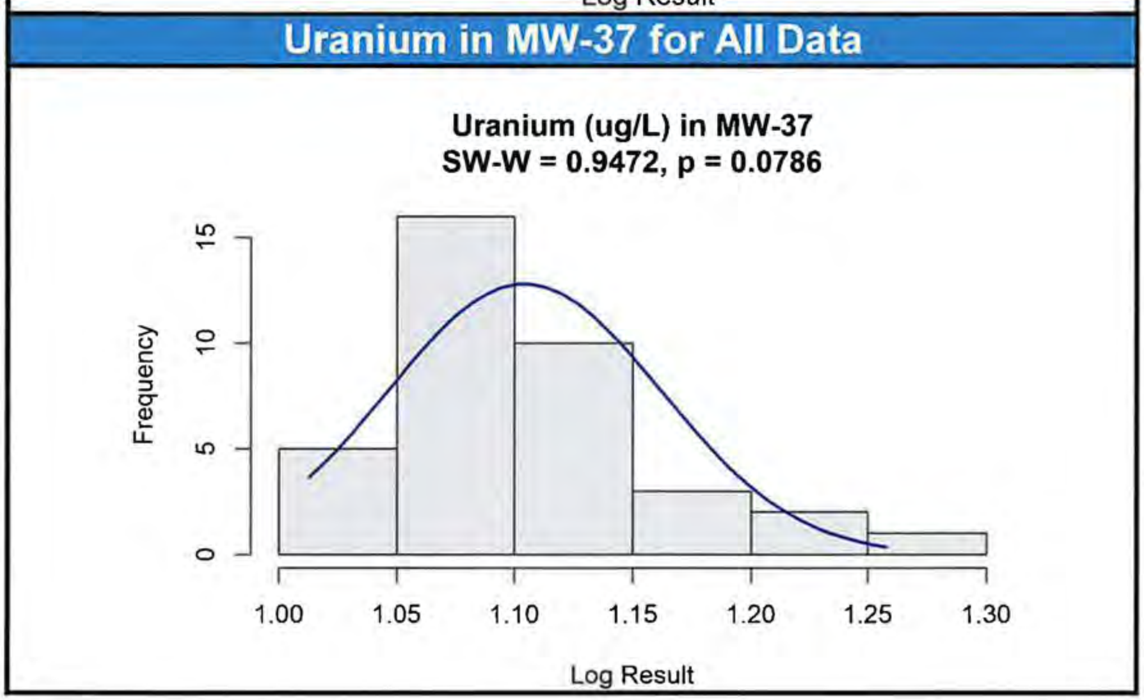
Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37





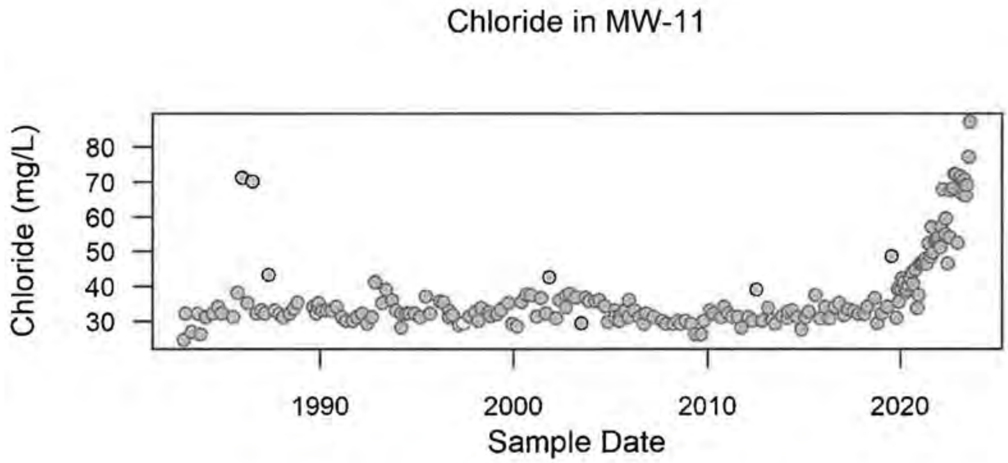
Appendix B-6: Histograms for Indicator Parameters in MW-11 and MW-37



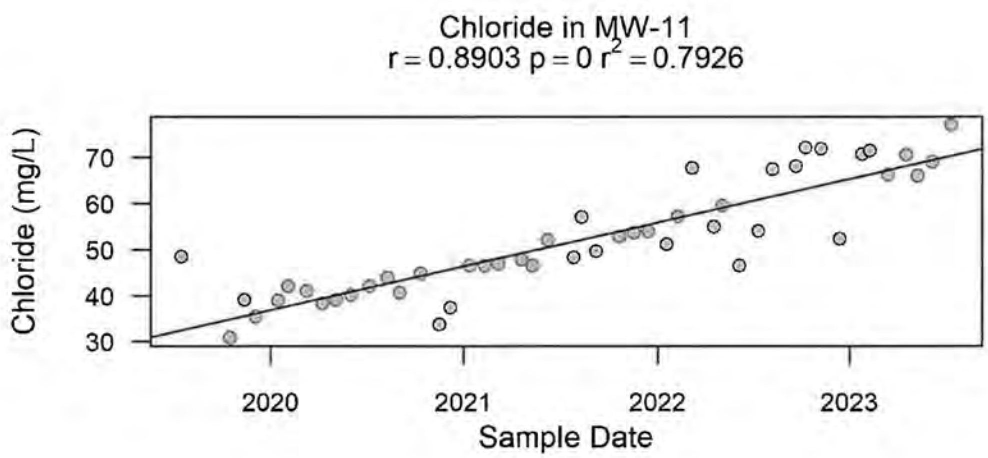


Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Chloride in MW-11 for All Data

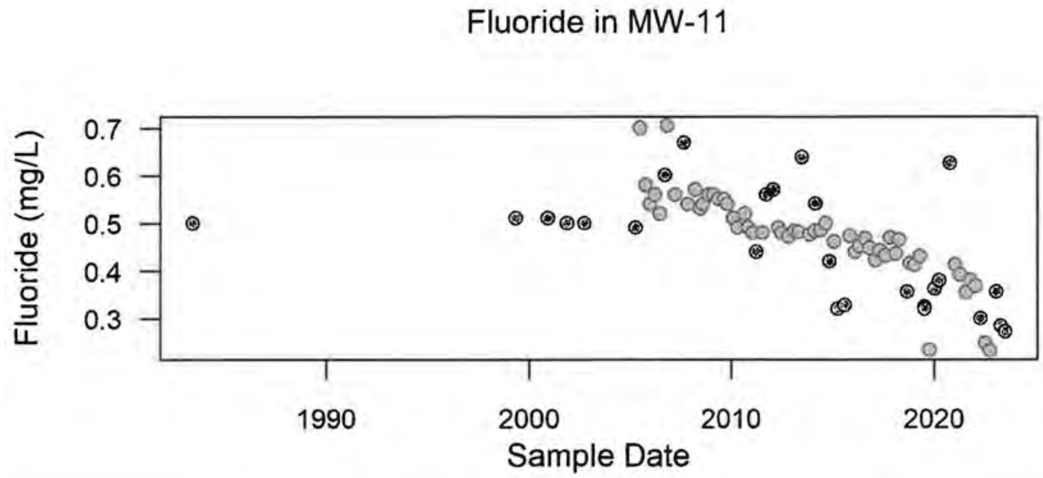


Chloride in MW-11 Post July, 2019

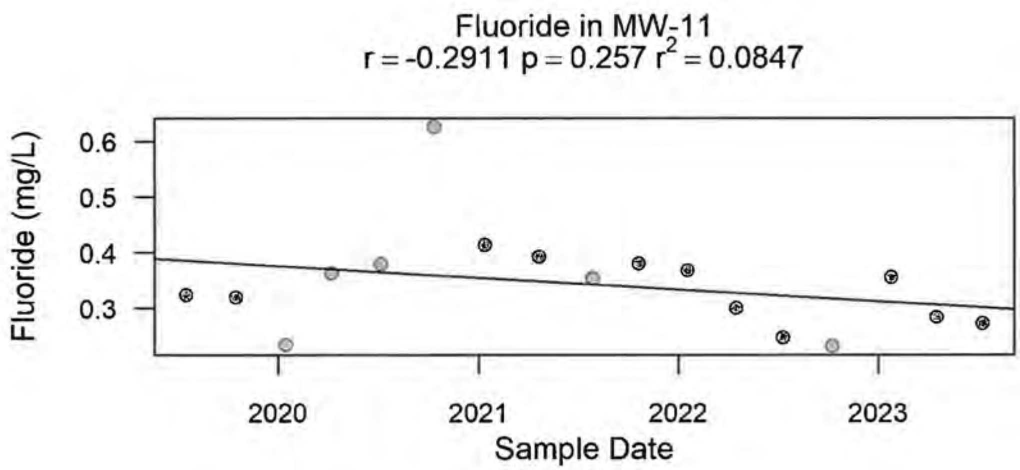


Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Fluoride in MW-11 for All Data

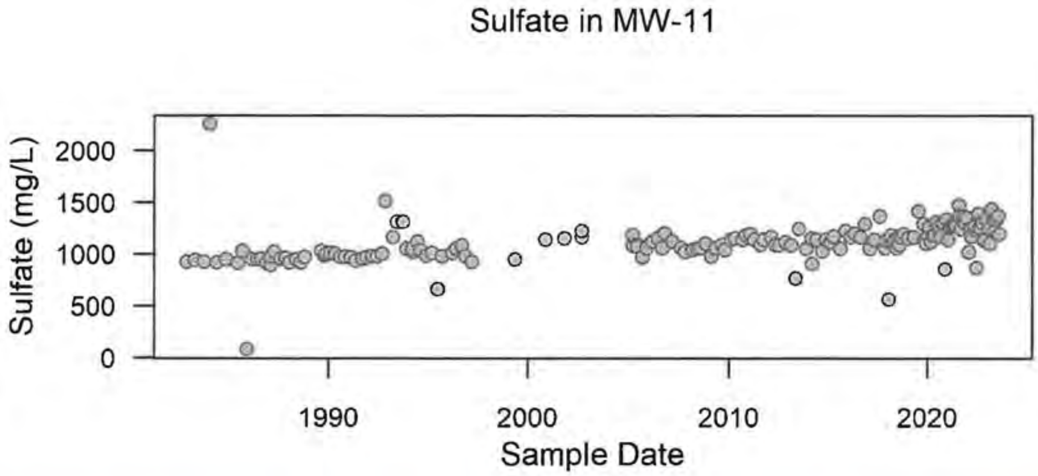


Fluoride in MW-11 Post July, 2019

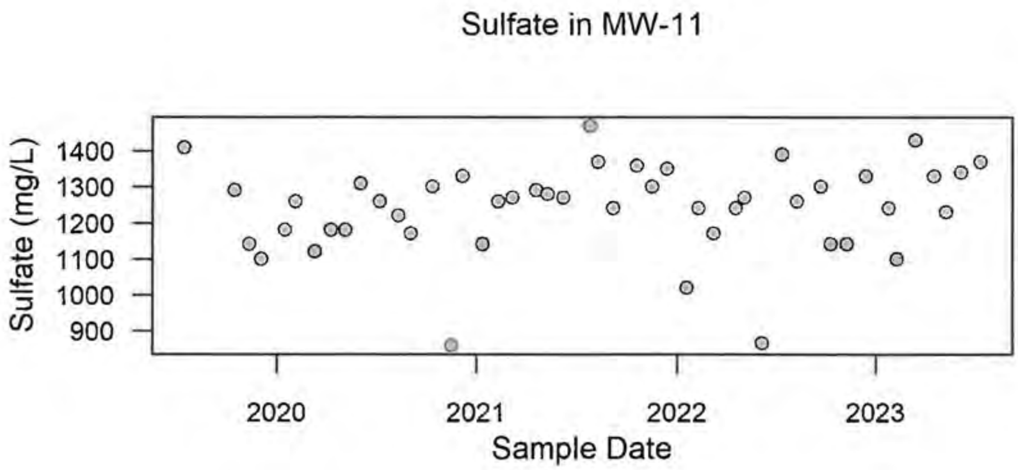


Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Sulfate in MW-11 for All Data

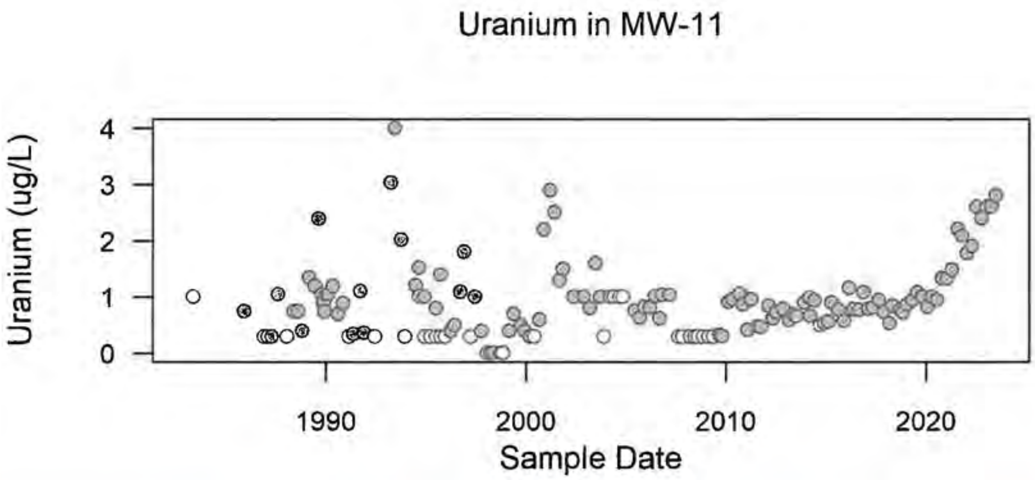


Sulfate in MW-11 Post July, 2019

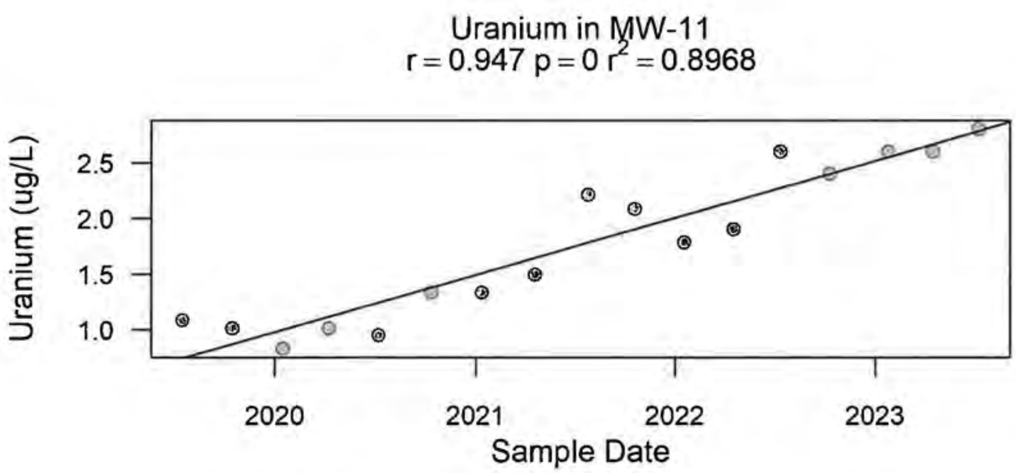


Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Uranium in MW-11 for All Data



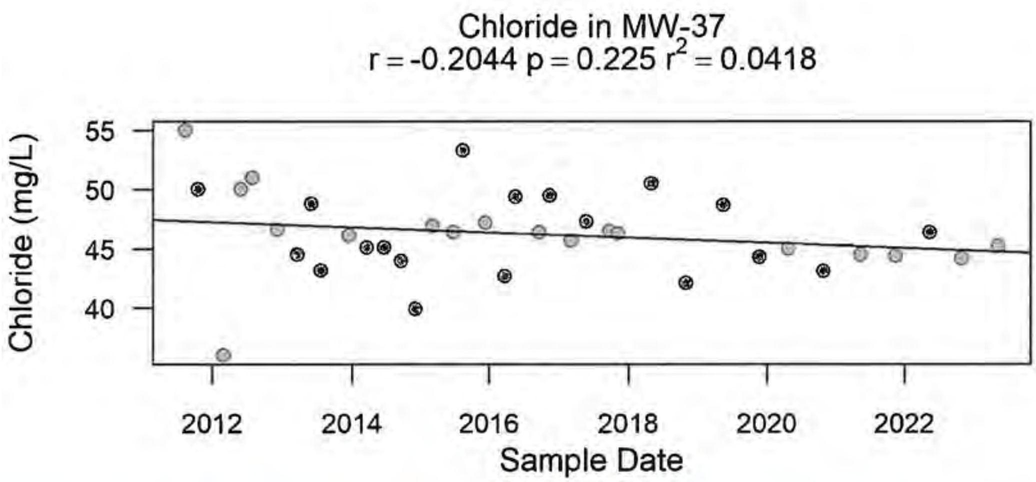
Uranium in MW-11 Post July, 2019



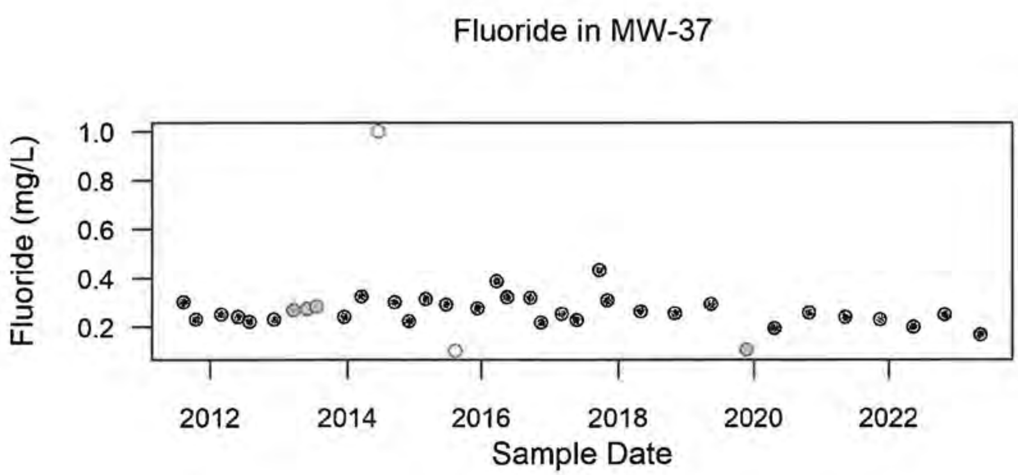
INTERA

Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Chloride in MW-37 for All Data

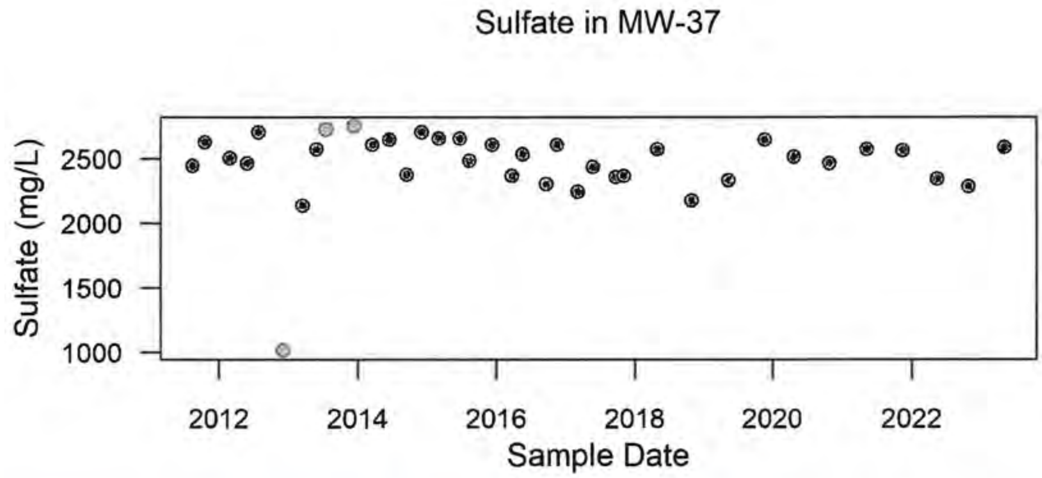


Fluoride in MW-37 for All Data

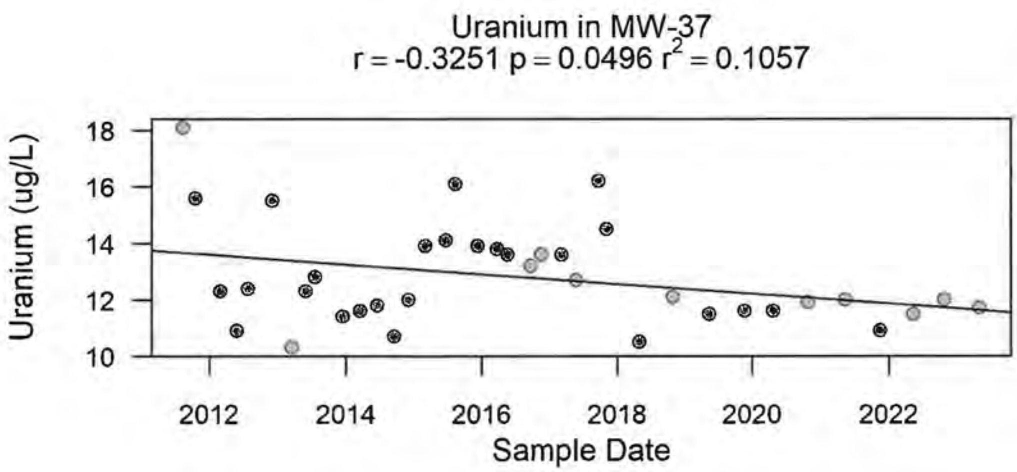


Appendix B-7: Timeseries Plots for Indicator Parameters in MW-11 and MW-37

Sulfate in MW-37 for All Data



Uranium in MW-37 for All Data



INTERA

APPENDIX C

Table C.1
Predicted MW-11 Concentrations Based on a Mass Balance Assuming a TMS Impact[1]

constituent	average constituent concentration in TMS	[2]predicted concentration in MW-11 assuming TMS impact	Q2, 2023 measured concentration in MW-11
chloride (mg/L)	28,108	10,443	69
fluoride (mg/L)	3,419	1,265	0.28
sulfate (mg/L)	179,486	67,254	1,340
uranium (ug/L)	388,419	143,717	2.6
selenium (ug/L)	9,296	3,449	15.3

[1] *assumes water level increase at MW-11 due to TMS impact*
[2] *assumes conservative behavior (no sorption, hydrodynamic dispersion or degradation)*
mg/L = milligrams per liter
ug/L = micrograms per liter

Table C.2
Predicted MW-37 Concentrations Based on a Mass Balance Assuming a TMS Impact[1]

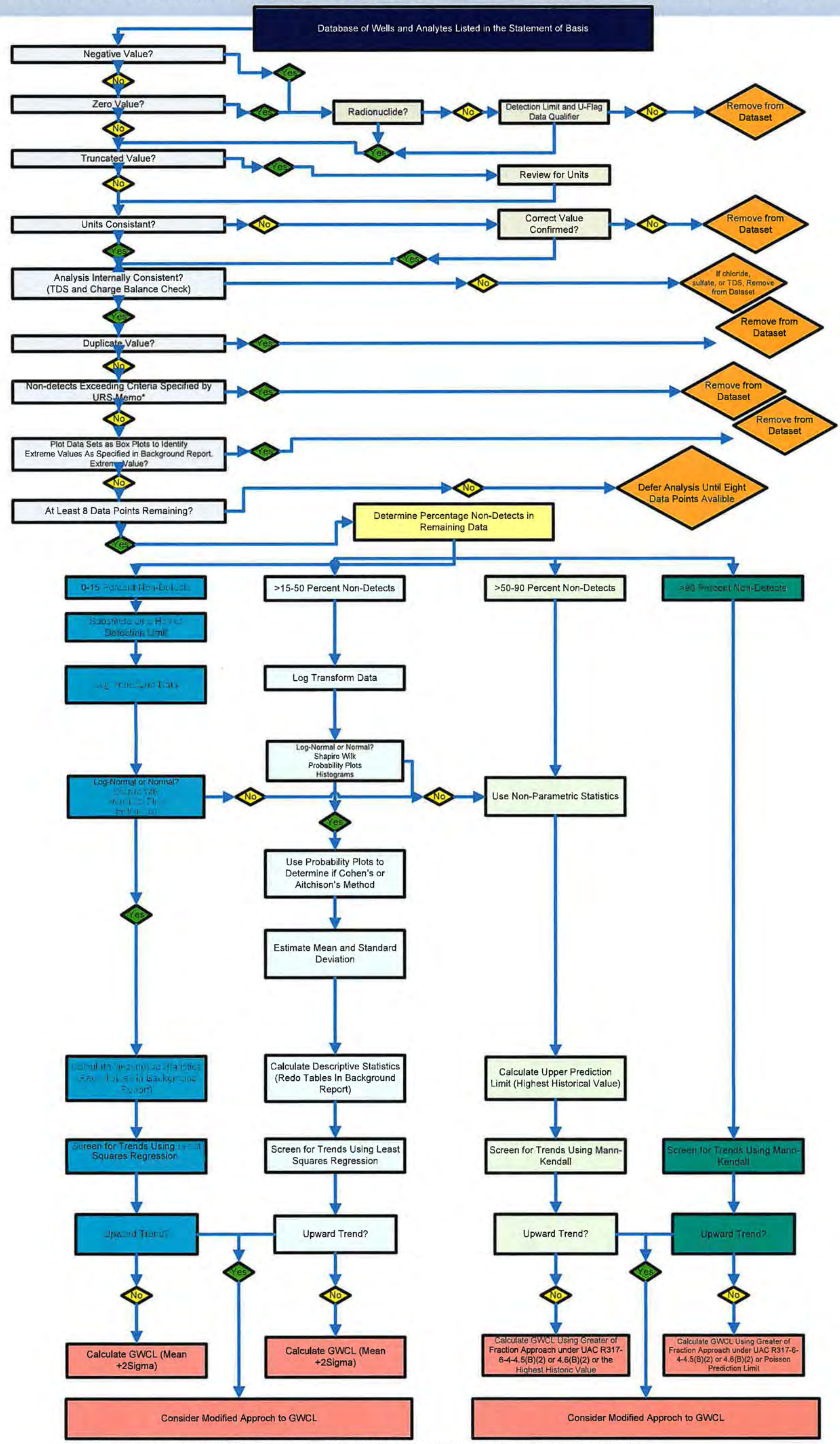
constituent	average constituent concentration in TMS	[2]predicted concentration in MW-37 assuming TMS impact	Q2, 2023 measured concentration in MW-37
chloride (mg/L)	28,108	14,077	45
fluoride (mg/L)	3,419	1,710	0.17
sulfate (mg/L)	179,486	91,033	2,580
uranium (ug/L)	388,419	194,215	11.7

[1] *assumes water level increase at MW-37 due to TMS impact*
[2] *assumes conservative behavior (no sorption, hydrodynamic dispersion or degradation)*
mg/L = milligrams per liter
ug/L = micrograms per liter

APPENDIX D

Appendix D. Flowsheet

Groundwater Data Preparation and Statistical Process Flow for Calculating Groundwater Protection Standards, White Mesa Mill Site, San Juan County, Utah



*A non-detect considered "insensitive" will be the maximum reporting limit in a dataset and will exceed other non-detects by, for example, an order of magnitude (e.g., <10 versus <1.0 μg/L). In some cases, insensitive non-detects may also exceed detectable values in a dataset (e.g., <10 versus 3.5 μg/L).

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APPENDIX E

Input and Output Files (Electronic Only)