GCC Energy

"Safety as a Value"

Telephone: 970.385.4528
Facsimile: 970.385.4638

GCC Energy, LLC
6473 County Road 120
Hesperus, CO 81326

December 31, 2018

State of Colorado
Division of Reclamation, Mining & Safety
1313 Sherman St.

Attn: Brock Bowles, Environmental Protection Specialist

Re: Permit #C-1981-035, King II Mine
Annual Hydrology Report 2018

Dear Mr. Bowles,

Please find enclosed "2018 King I & II Mines Annual Hydrology Report to the Colorado Division of Reclamation, Mining & Safety", for water year 2018, prepared by Resource Hydrogeologic Services, Inc. of Durango, Colorado.

Please contact Tom Bird at 970.385.4528 x 6503, or Sarah Vance at 505.286.6026, with questions or comments.

Sincerely,

Tom Bird

Manager of Coal Services
GCC Energy, LLC

2018 King I & II Mines Annual Hydrology Report to the Colorado Division of Reclamation, Mining & Safety

Submitted to:
GCC Energy, LLC

Date:
December 30, 2018

Resource Hydrogeologic Services, Inc.
101 W. 11th St. #103
Durango, CO 81301
Tel: (970) 764-4920
Email info@resourcehydrogeologic.com

RESOURCE HYDROGEOLOGIC SERVICES

RESOURCE HYDROGEOLOGIC SERVICES

TABLE OF CONTENTS

INTRODUCTION **3**
HYDROLOGIC MONITORING **3**
HYDROLOGIC MONITORING LOCATIONS 3
HYDROLOGIC MONITORING DATA COLLECTION 3
HYDROLOGIC MONITORING DATA ANALYSIS **4**
SURFACE WATER 5
ALLUVIAL GROUNDWATER 6
BEDROCK GROUNDWATER 7
TRACE CONSTITUENTS 8
Arsenic (Drinking water standard 0.01 mg/L) *8*
Copper (Drinking water standard 1.3 mg/L) *9*
Iron (No drinking water standard) *9*
Manganese (No drinking water standard) *9*
Molybdenum (Drinking water health advisory level 0.08 mg/L) *10*
Selenium (Drinking water standard 0.05 mg/L) *10*
Uranium (Drinking water standard 0.03 mg/L) *10*
Zinc (Secondary drinking water standard 5 mg/L) *10*
Silica (No water standards) *10*
Nitrate/Nitrite (Drinking water standard 10 mg/L) *11*
Total organic carbon (TOC) (No general TOC standard for water) *11*
RECOMMENDATIONS **11**
TABLES **14**
FIGURES **20**
ATTACHMENT - GCC HYDROLOGIC MONITORING DATA SUMMARY TABLES **42**

INTRODUCTION

The Annual Hydrology Report is completed at the conclusion of each year to compile and interpret hydrologic data related to GCC Energy's King I and II Mine operations. This satisfies a requirement of the Colorado Department of Reclamation, Mining and Safety (CDRMS) Mining Permit C-1981-035. To best support these efforts, GCC Energy (GCC) maintains a quality assurance/quality control (QA/QC) program to:

- Conduct GCC compliance staff training on water quality sampling for all GCC monitoring locations, equipment and methodologies, with detailed written procedures for each monitoring location provided.
- Collect all water quality field data with an industry-standard multi-parameter device with electronic data deliverable (EDD) output for all field and calibration data.
- Enter and document all water quality field monitoring data by mobile (digital/paperless) field sampling logs specific to surface water, groundwater and spring/seep sampling locations which are automatically distributed to a third party, Resource Hydrogeologic Services (RHS) for same-day review following sampling.
- Implement industry-standard, 10% random QA/QC lab sample submittals for duplicate and field blank water quality samples.
- Utilize EDDs produced by the contract environmental analytical laboratory for all data analyses.
- Compile and manage all water quality data in a geo-referenced Microsoft Access database.

HYDROLOGIC MONITORING

HYDROLOGIC MONITORING LOCATIONS

GCC monitored eighteen (18) hydrologic compliance locations in 2018. These locations are comprised of two types of water sources: surface and groundwater. Groundwater is monitored through dedicated monitoring wells and surface water is monitored by grab samples at designated locations.

Table 1 lists and **Figure 1** shows the eighteen (18) 2018 compliance hydrologic monitoring locations and their relation to the King I and II Mines.

HYDROLOGIC MONITORING DATA COLLECTION

Hydrologic monitoring data collection was expanded in 2017 in number of locations as indicated in the previous section and continued through 2018. Protocols for establishing new hydrologic monitoring locations, as initiated in 2016, were continued for these locations. The frequency of field parameter monitoring for new locations is monthly for a one-year period, following the CDRMS "Guidelines for the Collection of Baseline Water Quality and Overburden Geochemistry Data" (1984). The initial monthly field parameter monitoring schedule is intended to more fully characterize any potential seasonal variation in the hydrologic system. Field parameters are collected with an In-Situ SmarTROLL multi-

parameter sonde at all location types, utilizing an industry-standard low-flow cell system for the monitoring wells. The specific field parameters monitored during each event are given in **Tables 2, 3 and 4.** The purpose of the expanded analytical suite was to collect water quality data in line with the CDRMS "Guidelines for the Collection of Baseline Water Quality and Overburden Geochemistry Data" (1984), which were adopted in the Mining Permit Technical Revision-26. Water samples are collected quarterly at compliance monitoring locations for laboratory analysis. Depth to water measurements are also documented for wells, whereas flow rates are measured as applicable for surface water monitoring locations. This baseline data collection period is intended to characterize the pre-mining environmental conditions in order to shape the long-term monitoring plan appropriately to evaluate potential mining effects on the hydrologic system. As such, this is intended as a one-year, four-quarter period to evaluate seasonal changes that may occur over a typical year. These laboratory analytical suites are approved by CDRMS in TR-26 and are presented as **Tables 2, 3 and 4,** by water source type. When reviewing the parameter lists, it is important to note the red highlighted parameters, which were added to the pre-2016 compliance list as part of the one-year baseline period for these monitoring locations.

All wet bedrock cluster monitoring wells are instrumented with industry-standard low-flow bladder pump groundwater sampling systems. The pumps are set to the approximate depth of the well screen mid-points for the A and MI wells, and set to near bottom of the C wells to allow for micro-purge sampling methodology. The dry bedrock cluster wells (MW-2-C, MW-2-A, MW-2-MI) are not instrumented with any groundwater sampling pumps and are monitored for water level only. MW-1-MI is currently instrumented with a bladder pump, however after the initial several sample events this well dried up. If this well remains dry into 2019 the pump system will be removed to make the well easier to access as a water level-only monitoring location.

HYDROLOGIC MONITORING DATA ANALYSIS

This report provides a more comprehensive analysis of area water quality than has been previously possible. Earlier hydrologic characterization reports included domestic bedrock wells that were sampled over a wide area. While these data indicated general aquifer water quality characteristics, there were problems with a number of these wells (such as completions over multiple formations). Now that almost three years of data have been obtained from monitoring wells installed specifically for GCC's operations, the analysis of water quality is limited to that network.

Analytical data from all 2016-2018 sampling is presented in summary tables in the **Attachment**. Full laboratory reports are not included here as they have been submitted to CDRMS quarterly following each sampling event. Analytical data summary tables are available at:

http://www.gccenergy.net/water_monitoring_results.php

A graphical analysis of water quality samples from surface water, alluvial aquifer, and bedrock groundwater monitoring stations, is provided below in trilinear and stacked bar formats for major ions and

distribution plots for trace constituents. Natural variability of water quality in bedrock and surface water units is demonstrated in these plots, and seep water quality is compared to presumed sources.

Water quality is presented in multiple formats, including trilinear plots and stacked bar graphs. Trilinear plots of ratios of major cations and anions (Piper diagrams) are traditional in environmental chemistry but do not indicate either time trends in data or total solute concentrations, which stacked bar time plots do. Both graphical formats presented in this report use concentration in milli-equivalents per liter (meq/L).

Although the King Mines have operated for some time, the monitoring data presented within this report are believed to represent natural "baseline" water. There are no exceedances of inorganic water quality criteria except for secondary criteria for sulfate in some alluvial wells, and there are no apparent departures from patterns observed in any well, with one exception: there has been a detection of an organic anomaly in one bedrock well, which is discussed separately at the end of this section. Some impacts to ditch water quality from La Plata County road building and re-alignment construction are observed.

SURFACE WATER

The Hay Gulch Ditch is a year-round diversion from the La Plata River to the north of approximately 0.5 to 1.5 cubic feet per second into the gulch, which is otherwise an intermittent drainage that would flow only during storms or major thaw events. Water infiltrates from spreader dikes and infiltrates the alluvium, and return flows in the ditch are collected in Mormon Reservoir approximately nine miles downstream of the King II Mine, and near the confluence with the lower La Plata River. The Huntington Ditch and Pipeline also divert water from the upper La Plata River to a collection point in Hay Gulch for use by the King II Mine, which water is consumed by the mine principally for underground dust control with no waste or return flow (this water has been accounted for entirely as moisture in ventilation air). A stormwater pond designed to capture runoff from the mine facilities is understood to have been empty over the operating life of the King II mine.

Hay Gulch ditch water flows over and through the alluvium and accumulates dissolved solids from extended contact with soils along flow paths. County road work in Hay Gulch during 2017 and some ditch maintenance in 2018 have apparently affected ditch samples during this period, such that suspended solids have increased up to 100 mg/L in the upgradient monitoring location and 50 mg/L in the lower point downgradient of the King II portal. Although suspended and total dissolved solids are not directly correlated, the former indicate disturbances which are likely to have affected both parameters.

Figure 2 compares water quality analyses in all samples collected for GCC in the Hay Gulch ditch upstream (upgradient) and downstream (downgradient) of the King I and II Mine facilities. Note that all concentrations are given in meq/L, and the graphs have the same vertical (concentration) scale. The sample collection locations are shown in **Figure 1**.

Generally, the concentrations are greater in the downgradient sample locations, which is expected from irrigation return flows. However, this is seen to not be the case between September of 2017 and March of 2018. Ditch water in all samples contains calcium and magnesium, and sulfate-and bicarbonate in approximately equal proportions.

Measured pH of the ditch water indicates slightly alkaline to alkaline (pH 7.8 to 8.7) conditions, with concentrations of nitrate, total organic carbon (TOC), and trace metals all below the applicable drinking water standards.

ALLUVIAL GROUNDWATER

Four alluvial wells in Hay Gulch monitor the quality of groundwater in the alluvial aquifer. The Wiltse well, near the King I portal and waste rock site, has been in existence for about thirty-five years, and was once used for water supply in the King I Mine; Well#1 Upgradient was a former water well for a Ute Mountain Ute Tribe homestead of unknown installation date. The other two wells were installed by GCC for King II operational monitoring. Wells #1 Upgradient and #2 Downgradient are above and below the tributary where the King II portal is located, and MW-HGA-4 is adjacent to the upstream ditch sampling point, as shown in **Figure 1**.

Figure 3 shows the major ions concentrations in these four alluvial wells since 2016. As has been shown previously, total solutes in the Wiltse well have ranged cyclically between 1,000 and 2,000 mg/L, and sulfate from 500 to 1,000 mg/L (roughly 10 to 20 meq/L). Total dissolved solids and sulfate are considerably greater in the Wiltse well than the others.

The newest alluvial well, MW-HGA-4, located near the ditch upgradient sampling point, has about half the total solids of the Wiltse well, and is predominantly a calcium-magnesium, bicarbonate type water, which is similar to Well#2 Downgradient in Hay Gulch. In contrast, Well#1 Upgradient shows cations dominated by sodium rather than calcium-magnesium. **Figure 4** shows a trilinear plot of the major ion concentrations of the alluvial wells.

As greater concentrations of constituents in the Wiltse well have been apparent, with cyclic variability, since before deposition of waste rock in the area, and the dominant major ion chemistry in the other wells has been stable since installation, it is suspected that the range in water types reflects the variability in the entire Hay Gulch alluvial aquifer. Factors influencing the alluvial groundwater chemistry likely include variable alluvium matrix materials (sand-silt-coal fines with coarser channel fill stringers), proximity of coal, and uneven application of irrigation.

Groundwater levels at the four alluvial monitoring wells were measured and documented per CDRMS compliance requirements at the time of each sampling event. The groundwater hydrograph for these wells over the entire period of historical record in **Figure 5** shows fairly substantial seasonal variability at all four wells over time which is not only related to variability in precipitation but also subject to the variability in

flood irrigation cycles of Hay Gulch irrigated pasture. Water levels generally declined in the alluvial aquifer through 2017 and 2018. The water table rose through that winter from snowmelt, and during irrigation in the Well#2 Downgradient, but overall the drought of the last two years is evident. An observed decrease in the water table level may also be a factor in long term changes in water quality.

BEDROCK GROUNDWATER

Several monitoring sites with wells completed in the mined "A" coal seam, the overlying Cliff House Sandstone, and the immediately underlying strata of the Menefee Formation to which the coal belongs, were drilled in 2017 to provide baseline and operational water quality information for the mine expansion of the King II mine. The locations of these wells are shown in **Figure 1**. These wells were named with suffixes "C" for Cliff House, "A" for mined "A" seam coal, and "MI" for Menefee Interburden (denoting the floor rock to the "A" coal seam and interburden between the sometimes present "B" coal seam approximately 90 feet below the "A" seam). Several of these wells were dry, because groundwater flow in these formations is driven by low infiltration rates on ridges between gulches, and the formations have long been eroded from those gulches. The formations are also intrinsically of low permeability. Thus, the mine workings have been largely dry, except where large joints have allowed minor draining of perched lenses of water in the roof. It is precisely this lack of groundwater in the higher coal and overlying strata that led domestic water well drillers to over-drill wells into deeper strata in the surrounding area. And it is precisely the carbonate cement supporting the sandstone cliffs that host the Anasazi cliff houses in Mesa Verde that reduce the permeability and cause pockets of low quality "old" water in shallower wells.

"C" wells completed in the Cliff House Formation show the greatest concentrations and most variation in major ion makeup. MW-1-C is dominated by calcium-magnesium and sulfate, MW-2-C is dry, MW-3-C is dominated by sodium and bicarbonate-chloride, MW-4-C by sodium bicarbonate. This variability and the elevated concentrations in the Cliff House wells indicate slow-moving (long residence) water, and some water with dissolved oxygen leading to non-uniform oxidation of pyrite in some rock types. **Figures 5 and 6** show the major ion concentrations in stacked-bar and trilinear formats, respectively.

"A" wells completed in the mined "A" coal seam show dominant sodium or magnesium, and sulfate with lesser bicarbonate. Calcium is replaced by sodium and magnesium through cation exchange on clay minerals in shales. Total dissolved concentrations in "A" wells are less than half those in overlying Cliff House wells. **Figure 7** shows the major ion concentrations in stacked-bar format while **Figure 9** shows the combined Menefee trilinear plot of major ion concentrations.

"MI" wells completed in the "A" seam floor strata have total dissolved solids concentrations that are less than in the "A" coal seam, and are dominated by sodium and bicarbonate. This suggests that either the lower Menefee is recharged in different areas, or that sulfate is reduced and calcium and magnesium are exchanged for sodium along the flow path. The most likely mechanism for the reduction of sulfate is microbial metabolism of sulfate and coal methane, which can yield hydrogen sulfide and also precipitate calcium carbonate. Hydrogen sulfide was commonly observed in regional domestic wells. Major ion

concentrations of the Menefee Interburden wells are shown as stacked-bar plots in **Figure 8**, and again, trilinear plots for all Menefee wells are shown as **Figure 9**.

TRACE CONSTITUENTS

This annual hydrologic review is the first report containing adequate analytical data to assess trace constituent occurrence in site monitoring data. Previous sampling has shown no exceedances of water quality criteria. However, the distributions of concentrations of constituents and identification of outliers require multiple samples, especially when concentrations are close to analytical method detection limits or less.

The trace constituents discussed in this section occur in all natural waters, typically at low concentrations and often with large numbers of samples reported as “non-detects”, meaning the concentrations are lower than laboratory method detection limits. Some sense of concentration distributions for such constituents may be found through depicting data sets in distribution curves of data in cumulative numbers of samples less than selected concentration values. In this way, the number of samples less than a particular detection limit, together with some actual concentrations reported above the detection limits, can indicate the general distribution of concentrations in the specific medium, and anomalies, and even multiple modes where such might occur (as in a solute plume or ditch water invading an alluvial aquifer).

In the following graphical analysis, each of the trace constituents in the GCC baseline analysis suites are presented for each well, and individual well (or sample point) curves are grouped in surface water, alluvial and bedrock categories. Concentrations are given in mg/L, in contrast to major ions (meq/L), because drinking water standards are specified in those units, and ionic equivalence is not an issue for trace constituents as it is for major ions. The value on the Y-axis of each plot represents the number of samples with concentrations reported at or below the X-axis concentration, so that each line plot is a log cumulative frequency distribution. Many dissolved trace constituents have concentrations approximating log-normal, which give a sloping S curve, often truncated in the lower end by non-detects. Departures from “smooth” curves suggest complexities such as sources or sinks, mixing of waters, or chemical or biochemical reactions. This gives both characterization of native water quality and a baseline against which outliers can be evaluated.

In previous annual hydrologic reports, the trace constituents focus was on those (copper, iron and manganese) with some values approaching drinking water standards. In this analysis, a dozen trace metals and two other constituents (silica and nitrate/nitrite) are plotted. In future analyses the graphical analysis may be abbreviated, although complete numerical data will continue to be presented in attachment(s).

Arsenic (Drinking water standard 0.01 mg/L)

Figure 10. Arsenic in the Hay Gulch ditch is similar upgradient and downgradient of the King II mine head facilities, and has been reported between 0.0001 and 0.001 mg/L in all samples. Note that the first points

on up- and downgradient lines are at 5 and 7 samples, meaning that those 12 samples were reported at less than 0.005 detection limit. It may be expected that these levels are ambient in the La Plata River, from which the ditch is diverted.

Some alluvial groundwater has similar arsenic concentrations to the Hay Gulch ditch, while Well#1 Upgradient and MW-HGA-4 have greater concentrations. Those greater concentrations may be due to seepage from bedrock in valley floors; most Menefee Interburden (MI) and Cliff House (C) wells show arsenic up to 20 times greater than alluvial water (and some exceeding the drinking water standard MCL). All “A” seam coal wells (A) show very low arsenic concentrations.

Arsenic in sedimentary strata is typically associated with sulfide minerals (such as pyrite, FeS_2), and it is suspected that there is some correlation between arsenic and other trace elements released by pyrite oxidation (weathering) such as manganese and molybdenum. Iron concentrations do not directly correlate because pyrite oxidation typically yields very insoluble ferric iron oxides.

Copper (Drinking water standard 1.3 mg/L)

Figure 11. The concentration distributions for copper resemble those for arsenic. Copper concentrations in alluvial well MW-HGA-4 are low relative to arsenic concentrations, suggesting copper that is released by oxidation is scavenged by iron oxides.

In bedrock wells, copper is greater in Cliff House (C) wells than in Menefee wells (A and MI).

Iron (No drinking water standard)

Figure 12. The detection limit for iron is relatively high (0.05 mg/L, typically), and no detections have been made in the Hay Gulch ditch water, or in many of the bedrock wells (no interburden Menefee wells). Some detections up to 1 mg/L of iron, which is near the maximum solubility of ferric iron (Fe III), are reported in some Cliff House and “A” seam coal (A) wells. This indicates that infiltration of water with some dissolved oxygen reaches groundwater in C and A wells (which also show some sulfate from pyrite oxidation).

Manganese (No drinking water standard)

Figure 13. Manganese behaves like iron in general, but differs in that reaction kinetics are slow, so that it may persist far downstream of an origin. Its detection limit is lower than for iron.

Some manganese is reported in the Hay Gulch ditch water, however if the detection limit were the same as iron it would have been reported just twice in the downgradient ditch samples. Those two samples, which show as a departure from the rest of the manganese data, were collected following ditch maintenance construction, and several other constituents were elevated after this activity.

Manganese concentrations in the alluvial groundwater resemble those of arsenic, in that they are greatest in the upgradient well MW-HGA-4, and decrease down Hay Gulch. This likely represents the slow rate for manganese to precipitate.

In bedrock wells, manganese has greater concentrations reported in Cliff House (C) wells and Menefee Interburden (MI) wells. Concentrations in the latter wells are about a tenth of the iron concentrations.

Molybdenum (Drinking water health advisory level 0.08 mg/L)

Figure 14. No water analyses from the monitoring area approach lifetime health advisory limits except in the Cliff House well MW-4-C. Molybdenum is slightly elevated in the Hay Gulch ditch water in November 2017, after ditch maintenance.

Molybdenum is another sulfide forming element that occurs in low concentrations in pyrite, and its distribution resemble that of arsenic and manganese.

Selenium (Drinking water standard 0.05 mg/L)

Figure 15. Selenium concentrations are everywhere less than drinking water standards in monitoring data.

Selenium is another sulfide forming element which may occur in low concentrations in pyrite. The greatest dissolved concentrations are reported in Cliff House wells.

Uranium (Drinking water standard 0.03 mg/L)

Figure 16. No uranium exceedances of drinking water standards are reported, except in two Cliff House wells.

Zinc (Secondary drinking water standard 5 mg/L)

Figure 17. No exceedances of the secondary drinking water criterion for zinc are reported.

Zinc concentration distributions varied in bedrock wells. Zinc in bedrock wells has decreased over time.

Silica (No water standards)

Figure 18. Silica is typically reported as SiO_2, the dioxide, rather than Si, the element.

SiO_2 in alluvial groundwater has narrow distribution ranges (steep lines), like ditch water, but the concentration is about twice as high in the most upgradient well MW-HGA-4 as in the ditch, and decreases down Hay Gulch. This indicates alluvial groundwater in the headwaters is sourced primarily by bedrock seepage, and is diluted by valley floor precipitation and irrigation as it flows down gulch.

Coal and Menefee (A and MI) wells typically show less SiO_2 than alluvial wells, but Cliff House wells have higher SiO_2 (the Cliff House is predominantly quartz sandstone).

Nitrate/Nitrite (Drinking water standard 10 mg/L)

Figure 19. Nitrate and nitrite are typically analyzed and reported as equivalent nitrogen, *N,* to which the drinking water standard applies. No exceedances of the drinking water standard have been reported in monitoring data.

No nitrate/nitrite *N* is reported above detection limits in any bedrock well. Wide concentration ranges are shown in the Hay Gulch upstream station (but not the downstream station) and the Wiltse well. Concentrations have increased over time in the Wiltse well. Possible sources of this N are applied fertilizer and animal waste. Cattle frequent the pastures that the Hay Gulch ditch runs through and which all of the alluvial wells are located.

Total organic carbon (TOC) (No general TOC standard for water)

Figure 20. TOC measures carbon compounds which are typically biologic organics from soils in natural environments, or contaminants. TOC is less than 10 mg/L in most alluvial groundwater (except for one sample result in Well #2 Downgradient) and in bedrock water. The latter anomaly likely is a lab reporting error. One similar, single-sample anomaly is seen in MW-4-C. This trace constituent analysis has indicated that the MW-3-C lab-reported TOC values are elevated significantly higher than any other GCC monitoring locations for the life of the well (2017Q1). This requires further evaluation to determine the source, most likely either naturally occurring or a potential contaminant inadvertently introduced during well construction.

RECOMMENDATIONS

With comprehensive review of the expanded baseline parameter list results and increased frequency of monitoring for the nearly three-year period during 2016-2018 for the existing compliance Hay Gulch ditch locations and alluvial wells, no trace metals or minor constituents to be significant with respect to water quality have been observed with exception to the outliers discussed above. This considers drinking water standards, although naturally occurring major ion concentrations (specifically TDS, sulfate) disqualify the Hay Gulch alluvial aquifer as a primary drinking water source. Given the spatial variation in water quality does not suggest any contamination of the alluvial or bedrock aquifers by mining activity; it is proposed that revised hydrologic monitoring parameters and frequency be adopted for these locations already subjected to the expanded baseline monitoring protocol.

RHS recommends a reduction in monitored parameters subjected to analytical laboratory testing, while keeping the field parameter list the same as the baseline suites. The proposed long-term compliance water quality parameter lists are given as **Table 5**. To summarize the parameter revision for the three lists:

GCC GW Compliance

- Remove Silica (SiO_2) – Comparison of TDS vs. sum of ions has been accomplished and this parameter is no longer of interest with respect to monitoring for potential hydrologic impacts from GCC or other historic mining impacts.
- Remove Mercury (Hg) –All quarterly sample analyses for all wells have shown non-detect results so baseline characterization has been accomplished.
- Remove Total Nitrogen as Nitrate-Nitrite – This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations. Four quarterly sample analyses for all wells have established baseline total nitrogen as nitrate-nitrite.
- Remove Ammonia (NH_3) – This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations.
- Remove Phosphate (PO_4 as P) - This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish possible impacts of general agriculture use versus fertilizer use for vegetation reclamation at surface coal mines. King II is an underground mine and GCC has not used nor plans to use any significant phosphate products.

GCC S&S Compliance

- Remove Silica (SiO_2) – Comparison of TDS vs. sum of ions has been accomplished and this parameter is no longer of interest with respect to monitoring for potential hydrologic impacts from GCC or other historic mining impacts.
- Remove Mercury (Hg) – All quarterly sample analyses for seeps have shown non-detect results so baseline characterization has been accomplished.
- Remove Total Nitrogen as Nitrate-Nitrite – This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations. Four quarterly sample analyses for Seep-1 have established baseline total nitrogen as nitrate-nitrite, which is interpreted to be a result of wildlife activity.
- Remove Ammonia (NH_3) – This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations.
- Remove Phosphate (PO_4 as P) - This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish possible impacts of general agriculture use versus fertilizer use for vegetation reclamation at surface coal mines. King II is an underground mine and GCC has not used nor plans to use any significant phosphate products.

GCC SW Compliance

- Remove Silica (SiO_2) – Comparison of TDS vs. sum of ions has been accomplished and this parameter is no longer of interest with respect to monitoring for potential hydrologic impacts from GCC or other historic mining impacts.
- Remove Mercury (Hg) – All quarterly sample analyses for the two Hay Gulch Ditch sites have shown non-detect results so baseline characterization has been accomplished.
- Remove Total Nitrogen as Nitrate-Nitrite – This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations. Four quarterly sample analyses for the two Hay Gulch Ditch sites have established baseline total nitrogen as nitrate-nitrite.
- Remove Ammonia (NH_3) – This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish agricultural impacts from blasting explosive impacts to groundwater in surface coal mining operations. King II is an underground mine and GCC has not used nor plans to use explosives in their operations.
- Remove Phosphate (PO_4 as P) - This parameter was only intended for one-time collection during the baseline period to establish absence. This parameter is useful to interpret and distinguish possible impacts of general agriculture use versus fertilizer use for vegetation reclamation at surface coal mines. King II is an underground mine and GCC has not used nor plans to use any significant phosphate products.
- Remove Oil and Grease – All quarterly sample analyses for the two Hay Gulch Ditch sites have shown non-detect results so baseline characterization has been accomplished.

RHS recommends continuing water sample collection and analysis of the GCC GW Baseline suite for any future established compliance monitoring wells, until four quarters have been assessed. Provided that silica, mercury, nitrate/nitrite, ammonia and phosphate are insignificant through that four quarters of monitoring, the analytical suite for samples from these locations shall henceforth convert to the proposed long-term compliance water quality parameter list as given in **Table 5**.

TABLES

Table 1. GCC Hydrologic Monitoring Locations

Monitoring Location ID	Water Resource Monitored	UTM NAD 83 Zone 13N Easting (meters)	UTM NAD 83 Zone 13N Northing (meters)	Elevation (ft amsl)
Wiltse Well	Groundwater - Alluvial Hay Gulch	224881.1085	4127522.433	7372.0
Well #1 Upgradient	Groundwater - Alluvial Hay Gulch	223365.0376	4127021.179	7254.0
Well # 2 Downgradient	Groundwater - Alluvial Hay Gulch	221974.4696	4126036.488	7174.8
MW-HGA-4	Groundwater - Alluvial Hay Gulch	225528.7047	4127986.997	7410.5
MW-1-C	Groundwater - Bedrock Cliff House overburden	225804.6071	4131561.698	8519.8
MW-1-A	Groundwater - Bedrock "A" coal seam	225808.2341	4131566.735	8520.4
MW-1-MI	Groundwater - Bedrock Menefee interburden	225811.7943	4131571.83	8520.8
MW-2-C	Groundwater - Bedrock Cliff House overburden	222975.0867	4127471.487	7711.7
MW-2-A	Groundwater - Bedrock "A" coal seam	222978.3944	4127476.307	7713.0
MW-2-MI	Groundwater - Bedrock Menefee interburden	222982.6444	4127481.106	7713.5
MW-3-C	Groundwater - Bedrock Cliff House overburden	220038.4949	4125292.061	7416.6
MW-3-A	Groundwater - Bedrock "A" coal seam	220042.4727	4125296.639	7416.6
MW-3-MI	Groundwater - Bedrock Menefee interburden	220046.7102	4125301.143	7416.3
MW-4-C	Groundwater - Bedrock Cliff House overburden	219880.4541	4126517.998	7568.8
MW-4-A	Groundwater - Bedrock "A" coal seam	219883.9563	4126522.613	7569.5
MW-4-MI	Groundwater - Bedrock Menefee interburden	219887.6418	4126527.65	7569.7
Hay Gulch Ditch Downgradient	Surface Water - Irrigation ditch	222153.4227	4126367.714	7210.0
Hay Gulch Ditch Upgradient	Surface Water - Irrigation ditch	225533.7154	4128140.803	7430.0

Table 2.

GCC Surface Water Baseline Water Quality Parameter Suite (GCC SW Baseline)

Parameter	Units	Justification for Addition	Comments
Potassium (K)	***mg/L***	***Rounding out major ion constituents with K, Cl will allow for better interpretation with trilinear plotting***	
Chloride (Cl^-)	***mg/L***		
Calcium (Ca^{+2})	mg/L		
Magnesium (Mg^{+2})	mg/L		
Sodium (Na^+)	mg/L		
Sulfate (SO_4)	mg/L		
Alkalinity, as $CaCO_3$	mg/L		
Silica (SiO_2)	***mg/L***	***Allows comparison of TDS vs. sum of major ions***	
Manganese (Mn)	mg/L		
Fluoride (F)	***mg/L***	***Secondary ion that has been identified with minor potential nuisance value***	
Iron (Fe)	mg/L		
Aluminum (Al)	***mg/L***	***Trace metals commonly associated with coal mining impacts***	
Arsenic (As)			
Cadmium (Cd)			
Copper (Cu)			
Lead (Pb)			
Mercury (Hg)			
Molybdenum (Mo)			
Selenium (Se)			
Zinc (Zn)			
Uranium (U)	***mg/L***	***DRMS request via HGCAP***	
Hardness, as $CaCO_3$	mg/L		
Bicarbonate, as $CaCO_3$	mg/L		
Carbonate, as $CaCO_3$	mg/L		
Hydroxide, as $CaCO_3$	mg/L		
Total Nitrogen as Nitrate-Nitrite	***mg/L***	***Distinguish fertilizer and/or stock impacts***	
Ammonia (NH_3)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only with field kit to establish absence, SW and Alluvial GW only in 2016Q4***
Phosphate (PO_4 as P)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only to establish absence, SW and Alluvial GW only in 2016Q4***
Sodium Adsorption Ratio (SAR)	***mg/L***	***Measure of suitability for agricultural irrigation***	
Oil & Grease	***mg/L***	***Indication of background/upstream impacts***	
pH (lab)	SU		
Total Dissolved Solids (TDS)	mg/L		
Total Suspended Solids (TSS)	***mg/L***	***Provides mass of particulates causing turbidity***	
Total Organic Carbon (TOC)	***mg/L***	***Surrogate parameter for coal mining impacts***	
Temperature (field)	°C		
pH (field)	***SU***	***Allows comparison of field vs. lab measurements, key for proper Bicarb, Carb, Hydroxide calculations***	
Specific Conductivity (field)	mS/cm		
Oxygen Reduction Potential (ORP) (field)	***mV***	***To predict states of chemical speciation of water, i.e. dissolved metals***	
Dissolved Oxygen (DO) (field)	***mg/L***	***General water quality parameter to document available oxygen***	
Flow Rate (field, ditch only)	cfs		

Notes:

New analytes in bold, italicized red text
mg/L = milligrams per liter
SU = standard units
mS/cm millisiemens per centimeter
cfs = cubic feet per second
mV = milivolt

Table 3.

GCC Groundwater Baseline Water Quality Parameter Suite (GCC GW Baseline)

Parameter	Units	Justification for Addition	Comments
Potassium (K)	***mg/L***	***Rounding out major ion constituents with K, Cl will allow for better interpretation with trilinear plotting***	
Chloride (Cl^-)	***mg/L***		
Calcium (Ca^{+2})	mg/L		
Magnesium (Mg^{+2})	mg/L		
Sodium (Na^+)	mg/L		
Sulfate (SO_4)	mg/L		
Alkalinity, as $CaCO_3$	mg/L		
Silica (SiO_2)	***mg/L***	***Allows comparison of TDS vs. sum of major ions***	
Manganese (Mn)	mg/L		
Fluoride (F)	***mg/L***	***Secondary ion that has been identified with minor potential nuisance value***	
Iron (Fe)	mg/L		
Aluminum (Al)	***mg/L***	***Trace metals commonly associated with coal mining impacts***	
Arsenic (As)			
Cadmium (Cd)			
Copper (Cu)			
Lead (Pb)			
Mercury (Hg)			
Molybdenum (Mo)			
Selenium (Se)			
Zinc (Zn)			
Uranium (U)	***mg/L***	***DRMS request via HGCAP***	
Hardness, as $CaCO_3$	mg/L		
Bicarbonate, as $CaCO_3$	mg/L		
Carbonate, as $CaCO_3$	mg/L		
Hydroxide, as $CaCO_3$	mg/L		
Total Nitrogen as Nitrate-Nitrite	***mg/L***	***Distinguish fertilizer and/or stock impacts***	
Ammonia (NH_3)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only to establish absence, SW and Alluvial GW only in 2016Q4***
Phosphate (PO_4 as P)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only to establish absence, SW and Alluvial GW only in 2016Q4***
pH (lab)	SU		
Total Dissolved Solids (TDS)	mg/L		
Total Organic Carbon (TOC)	***mg/L***	***Surrogate parameter for coal mining impacts***	
Temperature (field)	°C		
pH (field)	***SU***	***Allows comparison of field vs. lab measurements, key for proper Bicarb, Carb, Hydroxide calculations***	
Specific Conductivity (field)	mS/cm		
Oxygen Reduction Potential (ORP) (field)	***mV***	***To predict states of chemical speciation of water, i.e. dissolved metals***	
Depth to Water (field, wells only)	ft		

Notes:

New analytes in bold, italicized red text
mg/L = milligrams per liter
SU = standard units
mS/cm millisiemens per centimeter
ft = feet
mV = milivolt

Table 4.

GCC Spring & Seep Baseline Water Quality Parameter Suite (GCC S&S Baseline)

Parameter	Units	Justification for Addition	Comments
Potassium (K)	***mg/L***	***Rounding out major ion constituents with K, Cl will allow for better interpretation with trilinear plotting***	
Chloride (Cl^-)	***mg/L***		
Calcium (Ca^{+2})	mg/L		
Magnesium (Mg^{+2})	mg/L		
Sodium (Na^+)	mg/L		
Sulfate (SO_4)	mg/L		
Alkalinity, as $CaCO_3$	mg/L		
Silica (SiO_2)	***mg/L***	***Allows comparison of TDS vs. sum of major ions***	
Manganese (Mn)	mg/L		
Fluoride (F)	***mg/L***	***Secondary ion that has been identified with minor potential nuisance value***	
Iron (Fe)	mg/L		
Aluminum (Al)	***mg/L***	***Trace metals commonly associated with coal mining impacts***	
Arsenic (As)			
Cadmium (Cd)			
Copper (Cu)			
Lead (Pb)			
Mercury (Hg)			
Molybdenum (Mo)			
Selenium (Se)			
Zinc (Zn)			
Uranium (U)	***mg/L***	***DRMS request via HGCAP***	
Hardness, as $CaCO_3$	mg/L		
Bicarbonate, as $CaCO_3$	mg/L		
Carbonate, as $CaCO_3$	mg/L		
Hydroxide, as $CaCO_3$	mg/L		
Total Nitrogen as Nitrate-Nitrite	***mg/L***	***Distinguish fertilizer and/or stock impacts***	
Ammonia (NH_3)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only with field kit to establish absence, SW and Alluvial GW only in 2016Q4***
Phosphate (PO_4 as P)	***mg/L***	***Distinguish fertilizer and/or stock impacts***	***1-time only to establish absence, SW and Alluvial GW only in 2016Q4***
Sodium Adsorption Ratio (SAR)	***mg/L***	***Measure of suitability for agricultural irrigation***	
pH (lab)	SU		
Total Dissolved Solids (TDS)	mg/L		
Total Organic Carbon (TOC)	***mg/L***	***Surrogate parameter for coal mining impacts***	
Temperature (field)	°C		
pH (field)	***SU***	***Allows comparison of field vs. lab measurements, key for proper Bicarb, Carb, Hydroxide calculations***	
Specific Conductivity (field)	mS/cm		
Oxygen Reduction Potential (ORP) (field)	***mV***	***To predict states of chemical speciation of water, i.e. dissolved metals***	
Flow Rate (field, spring/seep only)	gpm		

Notes:

New analytes in bold, italicized red text

mg/L = milligrams per liter

SU = standard units

mS/cm millisiemens per centimeter

gpm = gallons per minute

mV = milivolt

Table 5. Proposed long-term compliance water quality parameter suites (Groundwater, Spring & Seep, Surface Water)

GCC Groundwater Compliance Water Quality Parameter Suite (GCC GW Compliance)

Parameter	Units
Potassium (K)	mg/L
Chloride (Cl^-)	mg/L
Calcium (Ca^{+2})	mg/L
Magnesium (Mg^{+2})	mg/L
Sodium (Na^+)	mg/L
Sulfate (SO_4)	mg/L
Alkalinity, as $CaCO_3$	mg/L
Manganese (Mn)	mg/L
Fluoride (F)	mg/L
Iron (Fe)	mg/L
Aluminum (Al)	mg/L
Arsenic (As)	mg/L
Cadmium (Cd)	mg/L
Copper (Cu)	mg/L
Lead (Pb)	mg/L
Molybdenum (Mo)	mg/L
Selenium (Se)	mg/L
Zinc (Zn)	mg/L
Uranium (U)	mg/L
Hardness, as $CaCO_3$	mg/L
Bicarbonate, as $CaCO_3$	mg/L
Carbonate, as $CaCO_3$	mg/L
Hydroxide, as $CaCO_3$	mg/L
pH (lab)	SU
Total Dissolved Solids (TDS)	mg/L
Total Organic Carbon (TOC)	mg/L
Temperature (field)	°C
pH (field)	SU
Specific Conductivity (field)	mS/cm
Oxygen Reduction Potential (ORP) (field)	mV
Depth to Water (field, wells only)	ft

Notes:
New analytes in bold, italicized red text
mg/L = milligrams per liter
SU = standard units
mS/cm millisiemens per centimeter
ft = feet
mV = milivolt

GCC Spring & Seep Compliance Water Quality Parameter Suite (GCC S&S Compliance)

Parameter	Units
Potassium (K)	mg/L
Chloride (Cl^-)	mg/L
Calcium (Ca^{+2})	mg/L
Magnesium (Mg^{+2})	mg/L
Sodium (Na^+)	mg/L
Sulfate (SO_4)	mg/L
Alkalinity, as $CaCO_3$	mg/L
Manganese (Mn)	mg/L
Fluoride (F)	mg/L
Iron (Fe)	mg/L
Aluminum (Al)	mg/L
Arsenic (As)	mg/L
Cadmium (Cd)	mg/L
Copper (Cu)	mg/L
Lead (Pb)	mg/L
Molybdenum (Mo)	mg/L
Selenium (Se)	mg/L
Zinc (Zn)	mg/L
Uranium (U)	mg/L
Hardness, as $CaCO_3$	mg/L
Bicarbonate, as $CaCO_3$	mg/L
Carbonate, as $CaCO_3$	mg/L
Hydroxide, as $CaCO_3$	mg/L
Sodium Adsorption Ratio (SAR)	mg/L
pH (lab)	SU
Total Dissolved Solids (TDS)	mg/L
Total Organic Carbon (TOC)	mg/L
Temperature (field)	°C
pH (field)	SU
Specific Conductivity (field)	mS/cm
Oxygen Reduction Potential (ORP) (field)	mV
Flow Rate (field, spring/seep only)	gpm

Notes:
New analytes in bold, italicized red text
mg/L = milligrams per liter
SU = standard units
mS/cm millisiemens per centimeter
gpm = gallons per minute
mV = milivolt

GCC Surface Water Compliance Water Quality Parameter Suite (GCC SW Compliance)

Parameter	Units
Potassium (K)	mg/L
Chloride (Cl^-)	mg/L
Calcium (Ca^{+2})	mg/L
Magnesium (Mg^{+2})	mg/L
Sodium (Na^+)	mg/L
Sulfate (SO_4)	mg/L
Alkalinity, as $CaCO_3$	mg/L
Manganese (Mn)	mg/L
Fluoride (F)	mg/L
Iron (Fe)	mg/L
Aluminum (Al)	mg/L
Arsenic (As)	mg/L
Cadmium (Cd)	mg/L
Copper (Cu)	mg/L
Lead (Pb)	mg/L
Molybdenum (Mo)	mg/L
Selenium (Se)	mg/L
Zinc (Zn)	mg/L
Uranium (U)	mg/L
Hardness, as $CaCO_3$	mg/L
Bicarbonate, as $CaCO_3$	mg/L
Carbonate, as $CaCO_3$	mg/L
Hydroxide, as $CaCO_3$	mg/L
Sodium Adsorption Ratio (SAR)	mg/L
pH (lab)	SU
Total Dissolved Solids (TDS)	mg/L
Total Suspended Solids (TSS)	mg/L
Total Organic Carbon (TOC)	mg/L
Temperature (field)	°C
pH (field)	SU
Specific Conductivity (field)	mS/cm
Oxygen Reduction Potential (ORP) (field)	mV
Dissolved Oxygen (DO) (field)	mg/L
Flow Rate (field, ditch only)	cfs

Notes:
New analytes in bold, italicized red text
mg/L = milligrams per liter
SU = standard units
mS/cm millisiemens per centimeter
cfs = cubic feet per second
mV = milivolt

FIGURES

Figure 1. GCC 2018 hydrologic monitoring locations

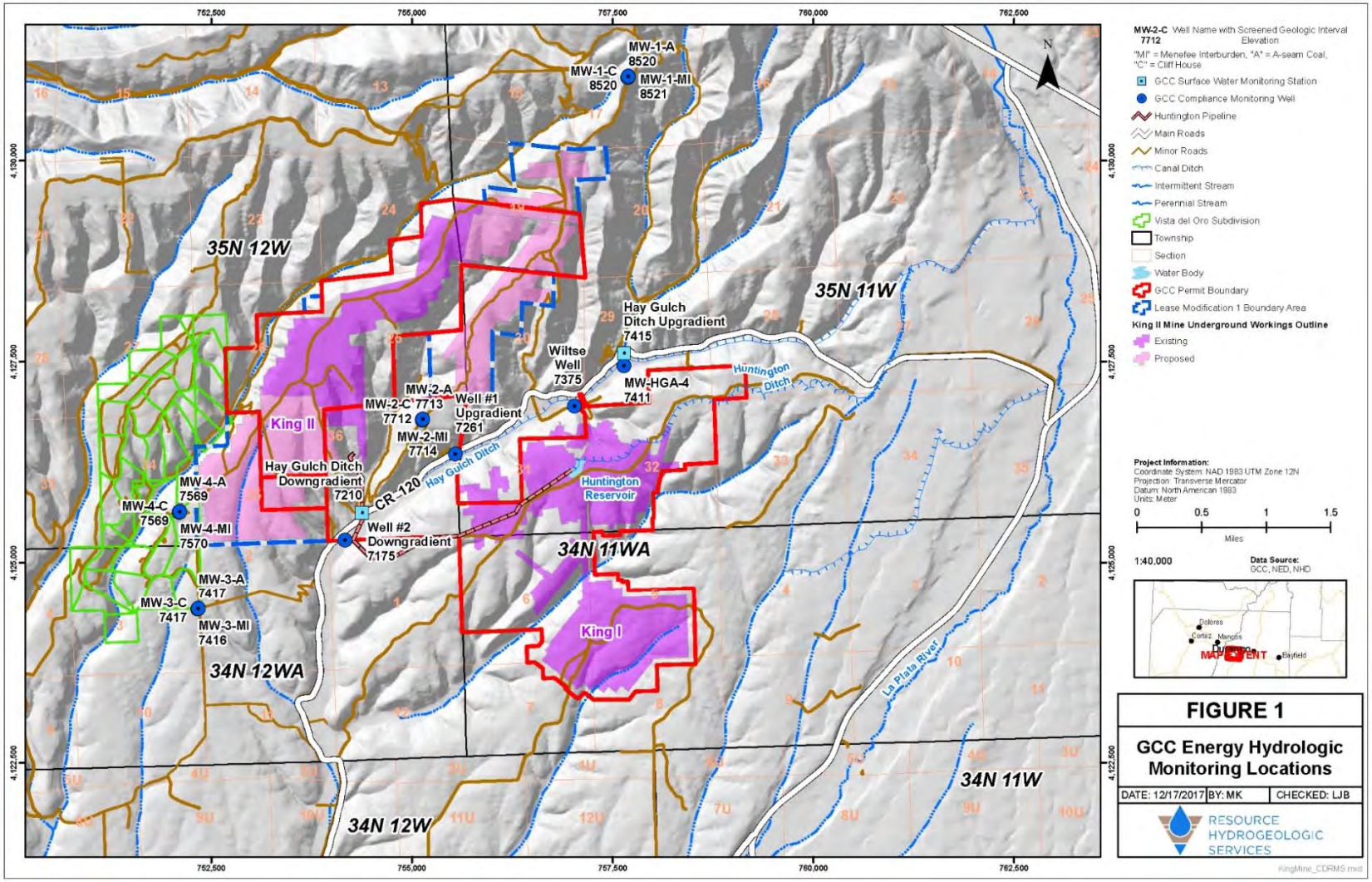


Figure 2. Comparison of major ions (milli-equivalents/Liter) in water analyses in Hay Gulch Ditch samples collected upstream and downstream of King I & II Mines 2016 through 2018

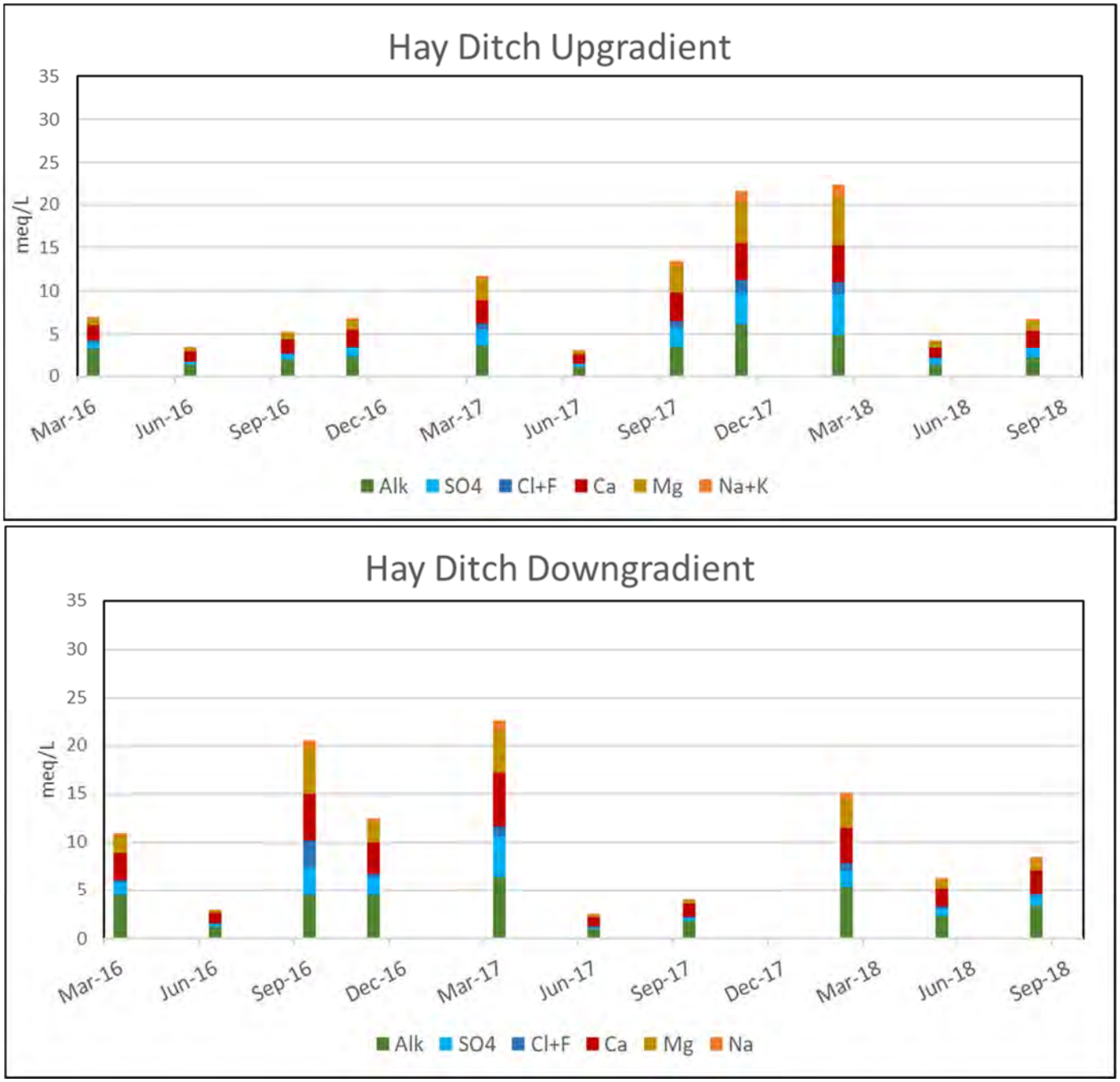


Figure 3. Comparison of major ion concentrations in alluvial monitoring wells in Hay Gulch

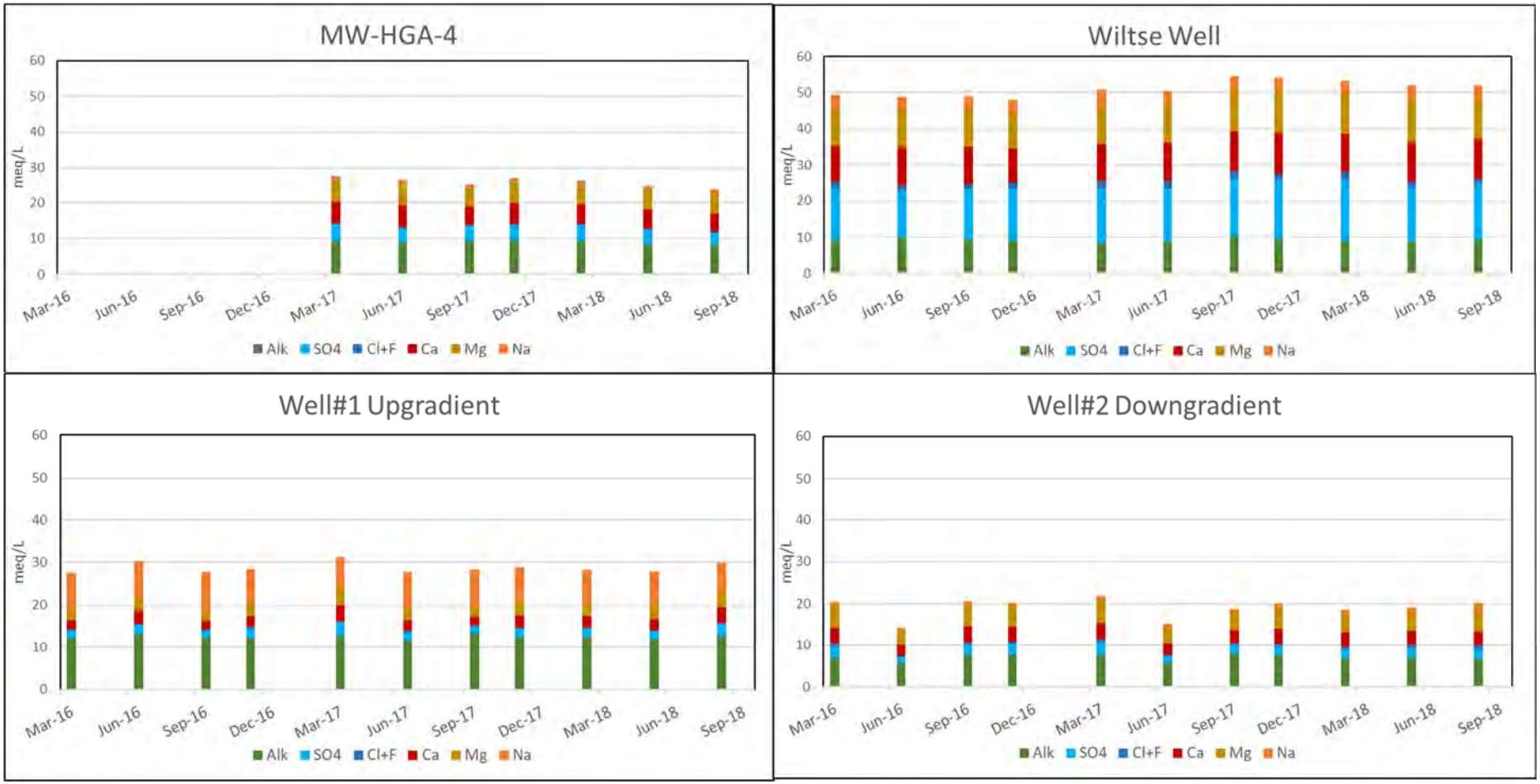


Figure 4. Trilinear plot of major ion concentrations in alluvial monitoring wells in Hay Gulch

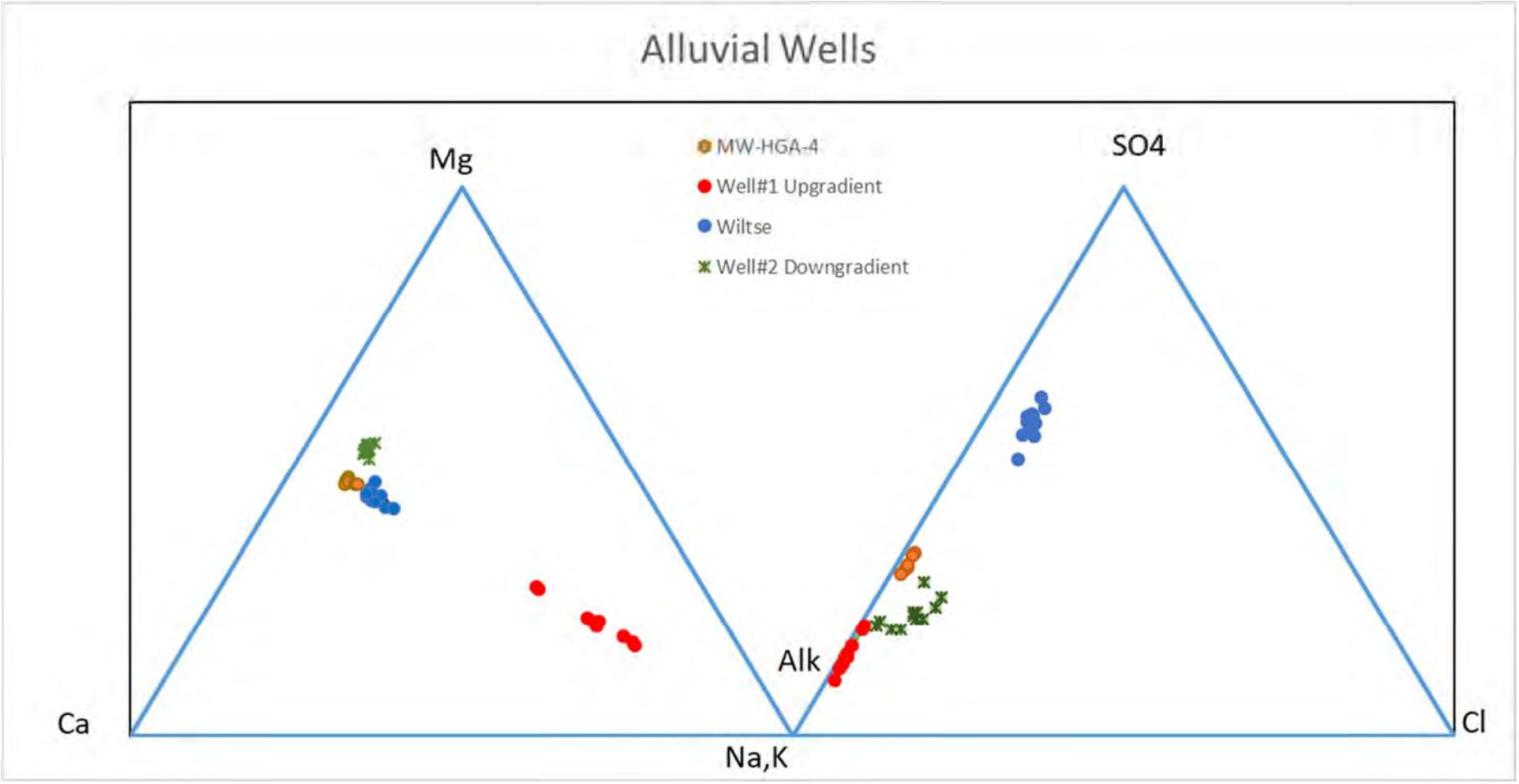


Figure 5. Hay Gulch Alluvial Groundwater Hydrograph

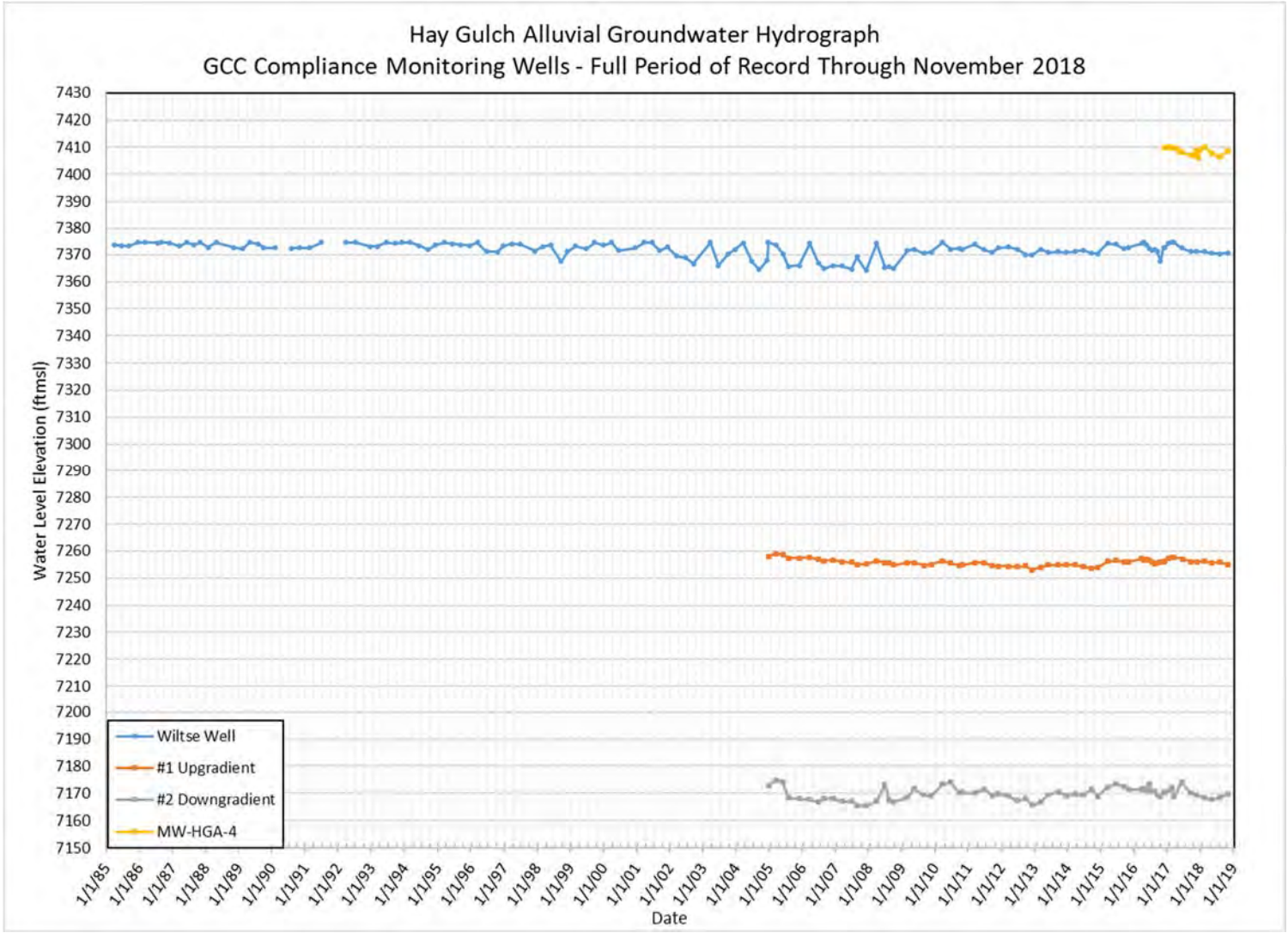


Figure 5. Comparison of major ion concentrations in Cliff House ("A" seam overburden) bedrock monitoring wells

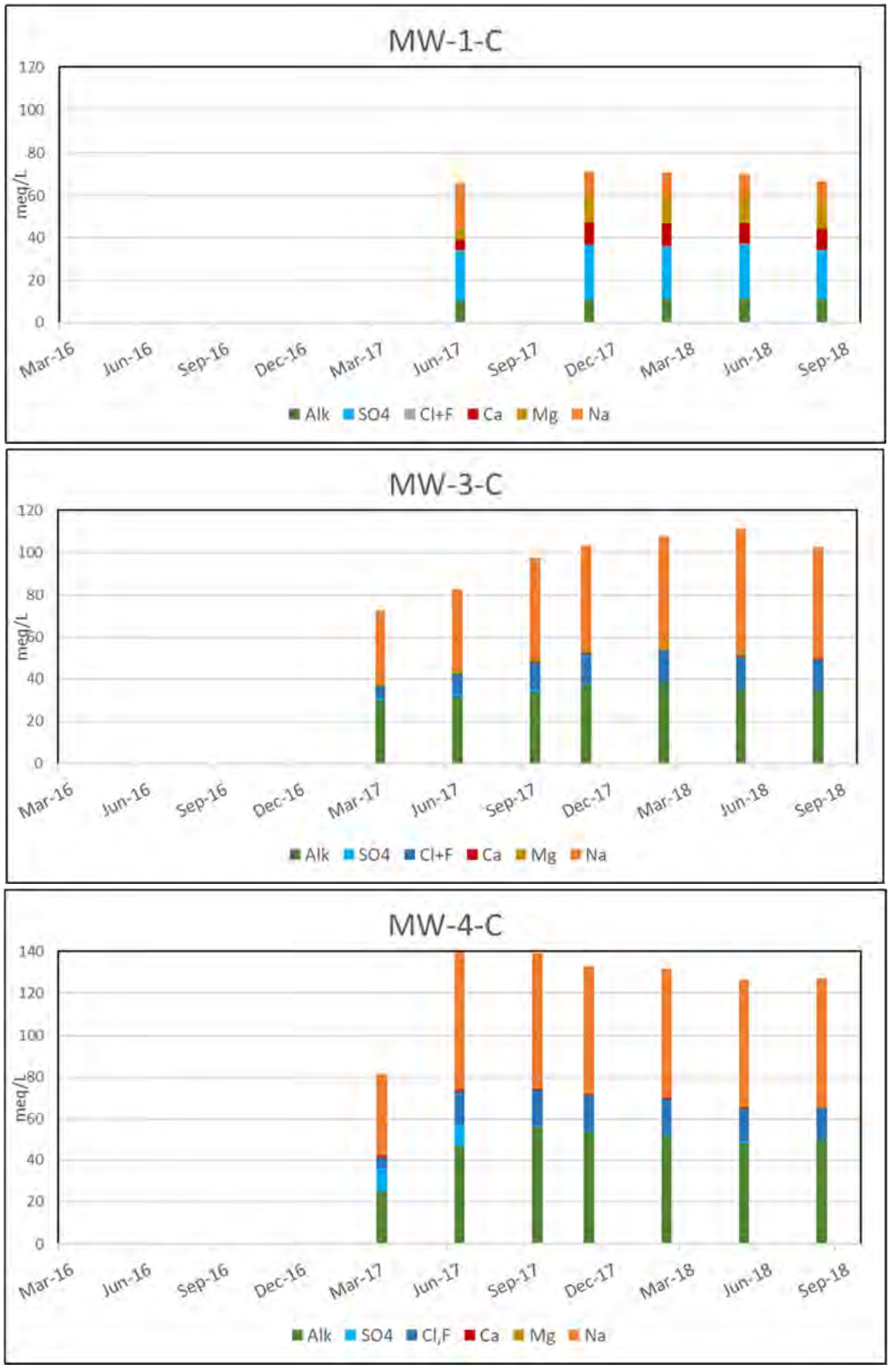


Figure 6. Trilinear plot of major ion concentrations in Cliff House monitoring wells

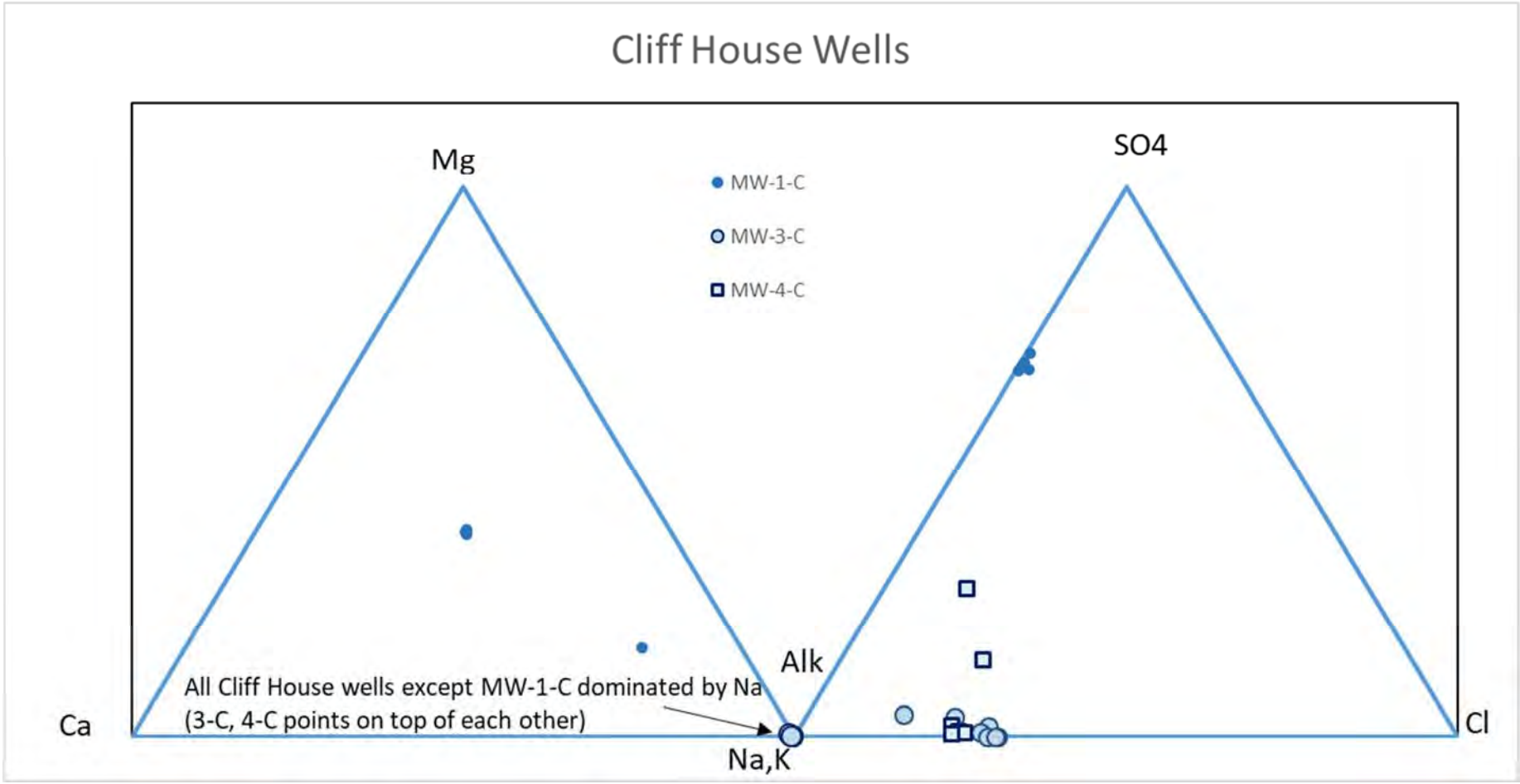


Figure 7. Comparison of major ion concentrations in "A" coal seam bedrock monitoring wells

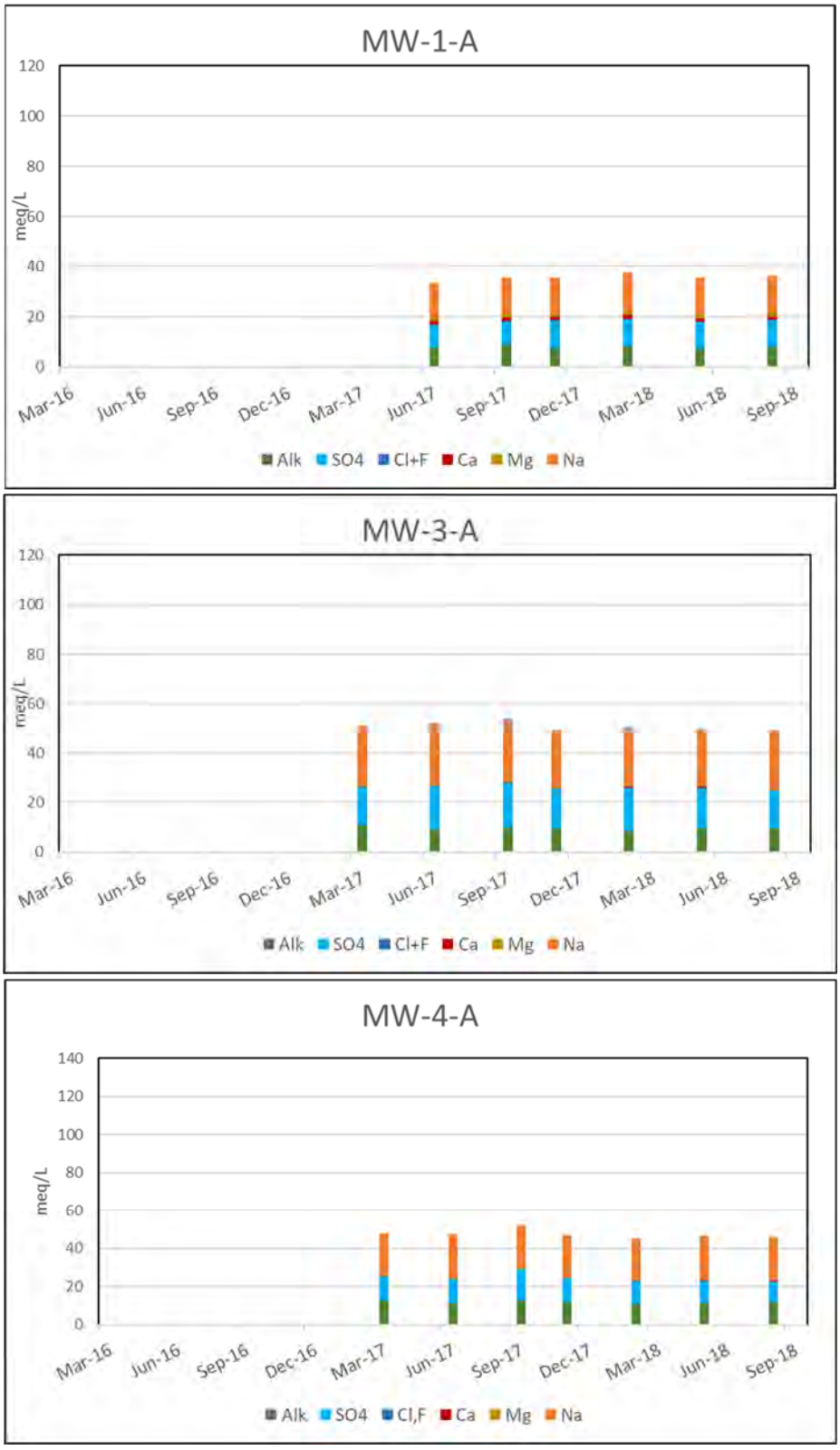


Figure 8. Comparison of major ion concentrations in Menefee Interburden ("A" seam underburden) bedrock monitoring wells

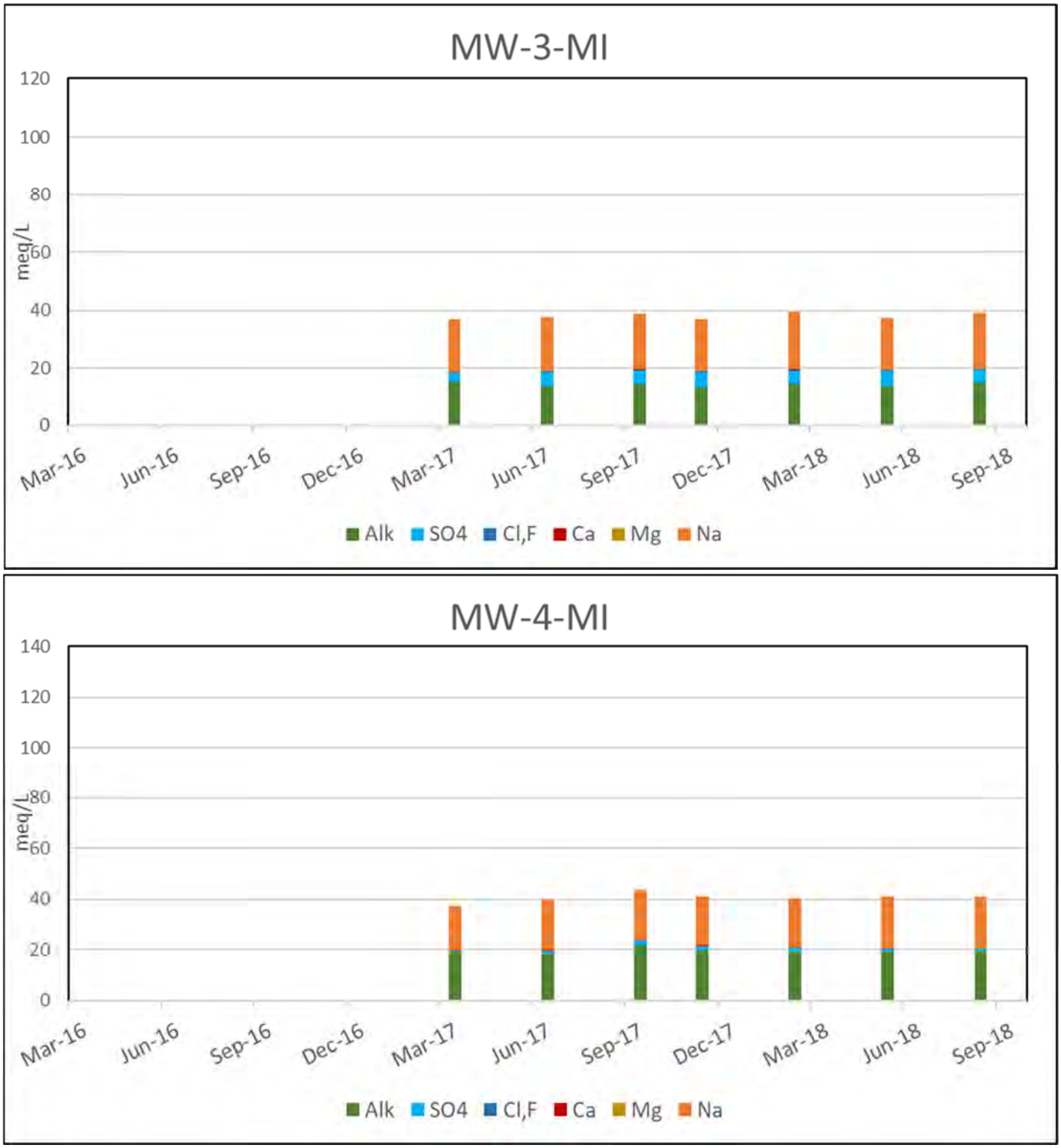


Figure 9. Trilinear plot of major ion concentrations in Menefee monitoring wells which include the "A" seam coal and under/interburden

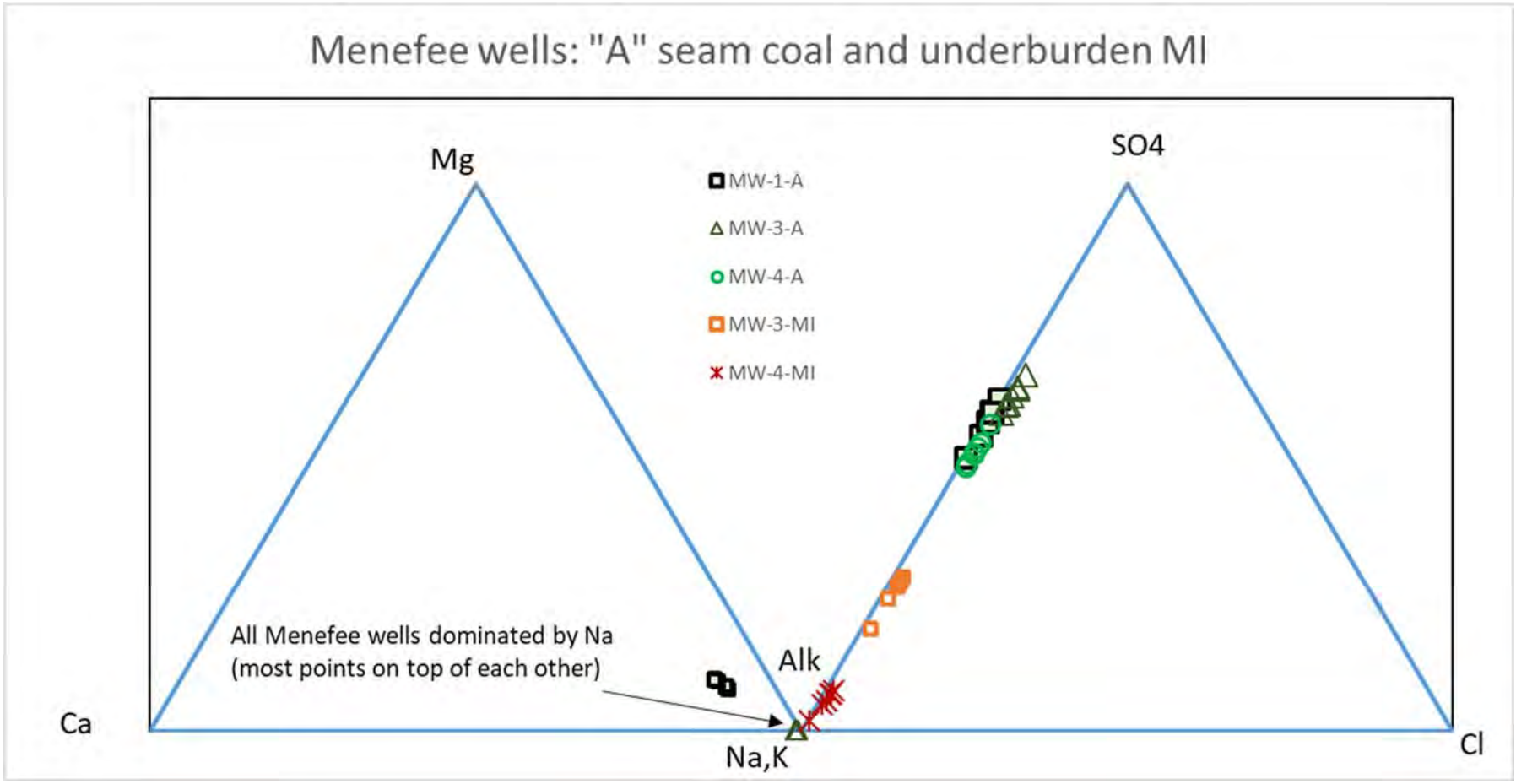


Figure 10. Arsenic Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

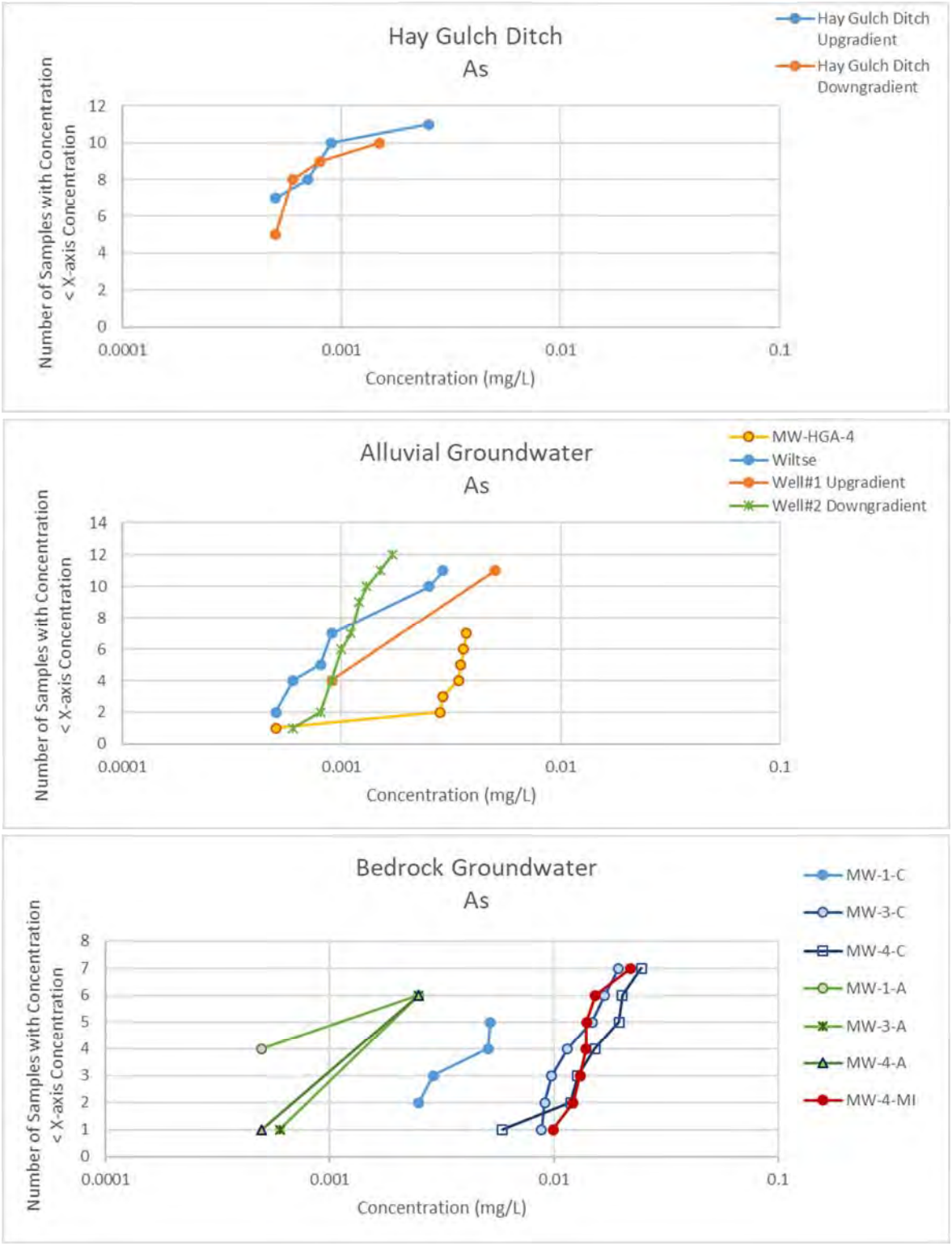


Figure 11. Copper Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

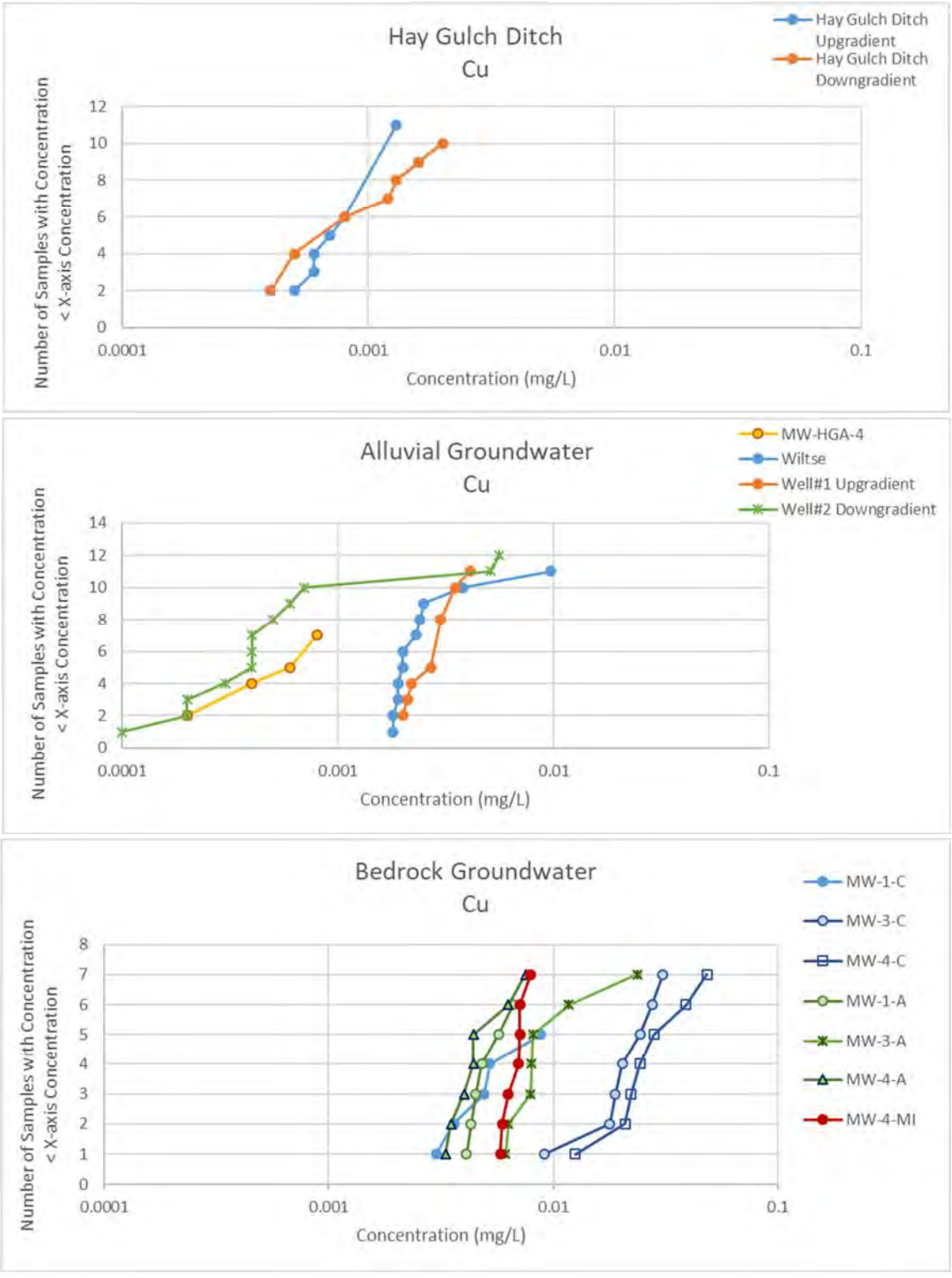
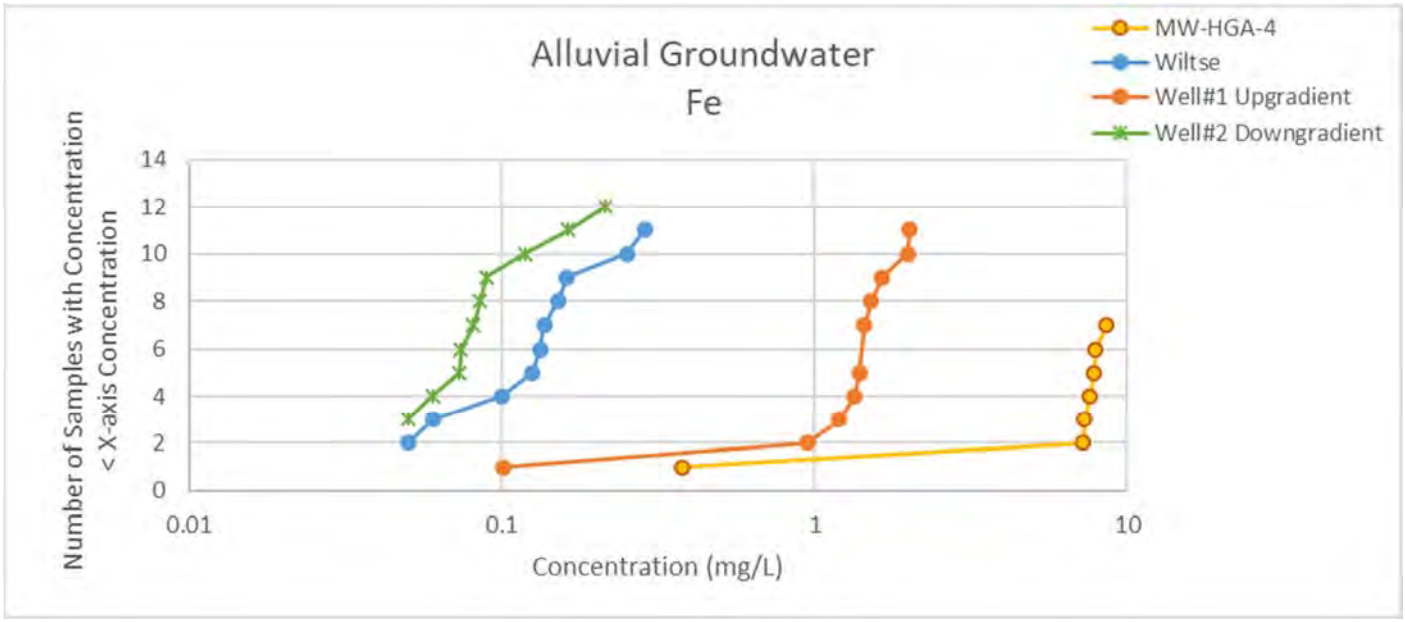


Figure 12. Iron Concentrations for Hay Gulch Alluvium and Bedrock



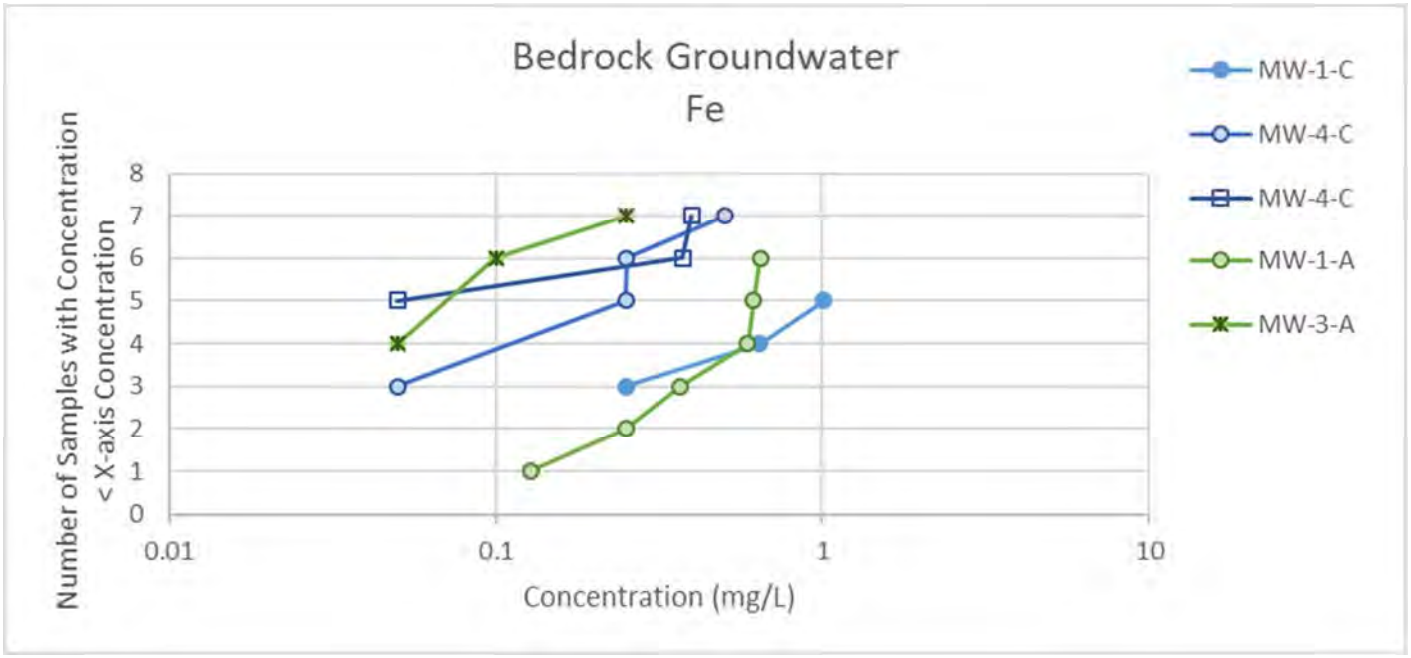


Figure 13. Manganese Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

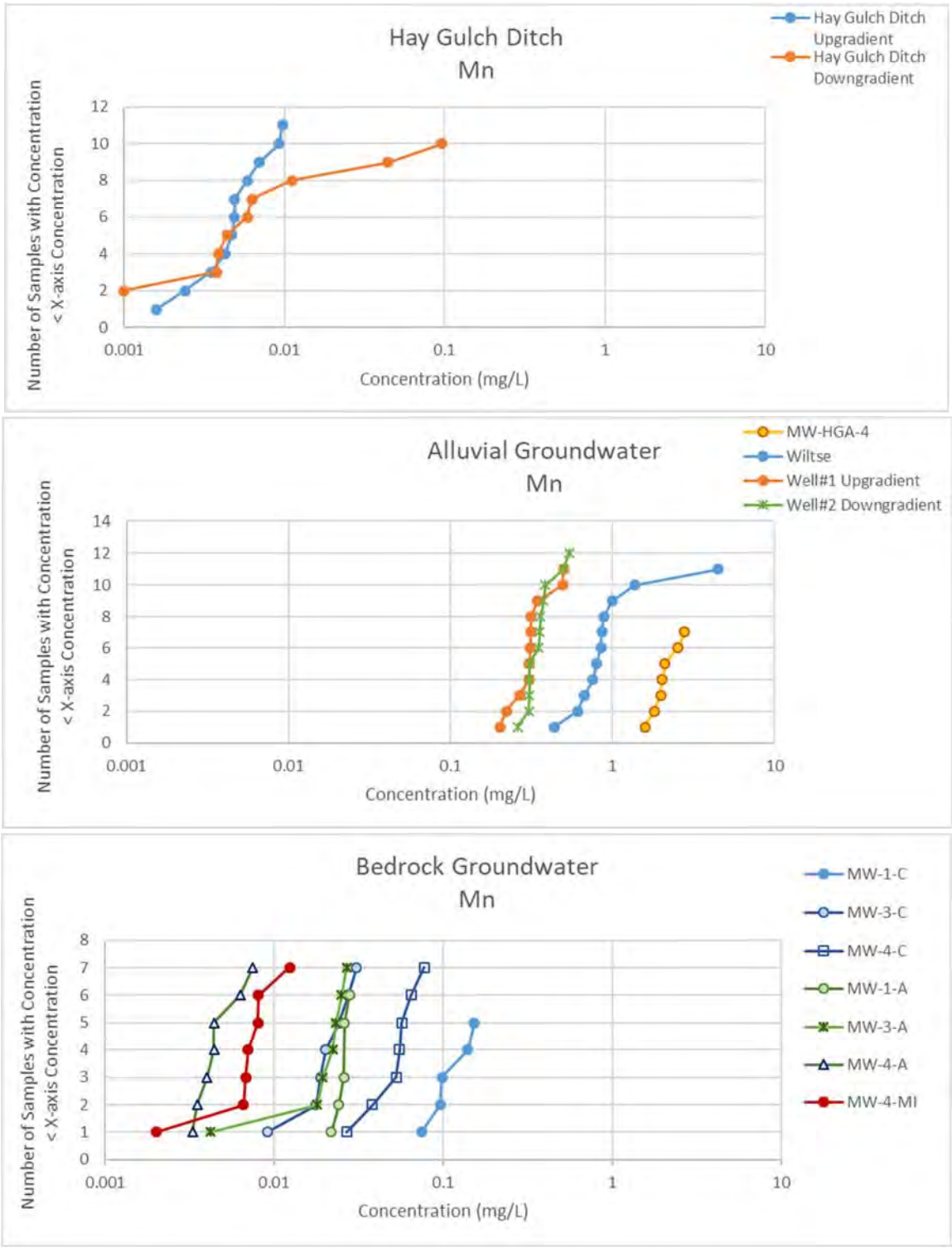


Figure 14. Molybdenum Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

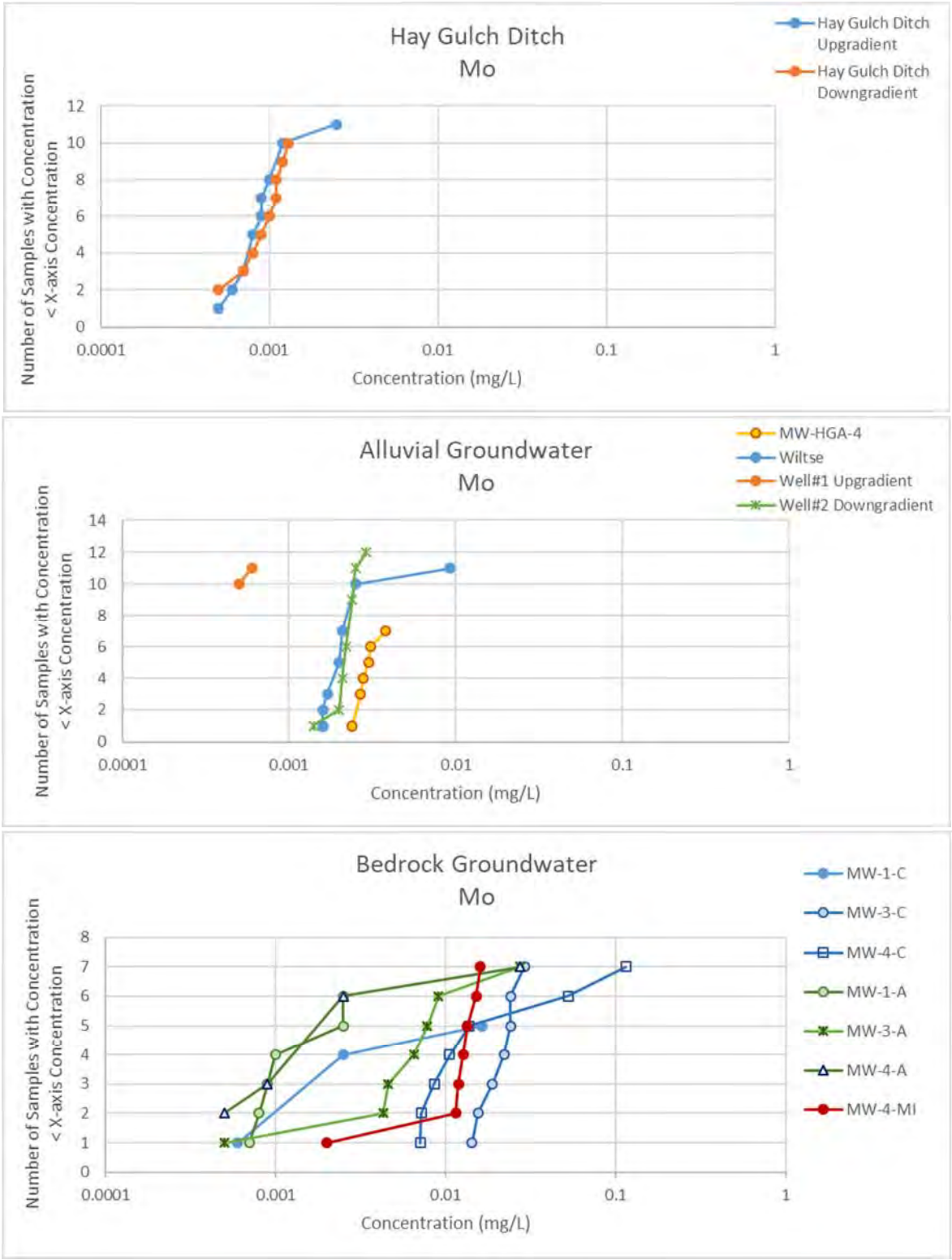


Figure 15. Selenium Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

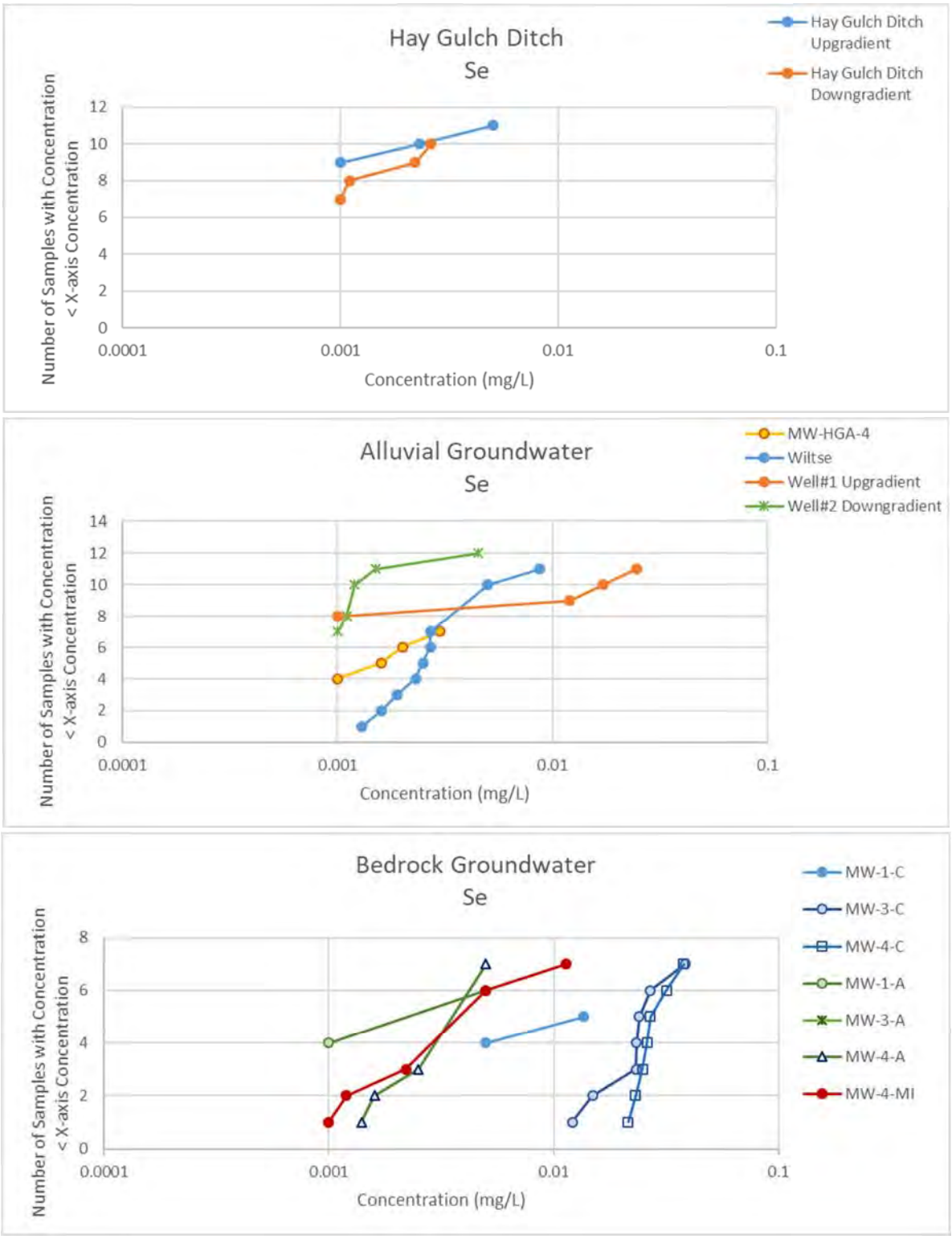
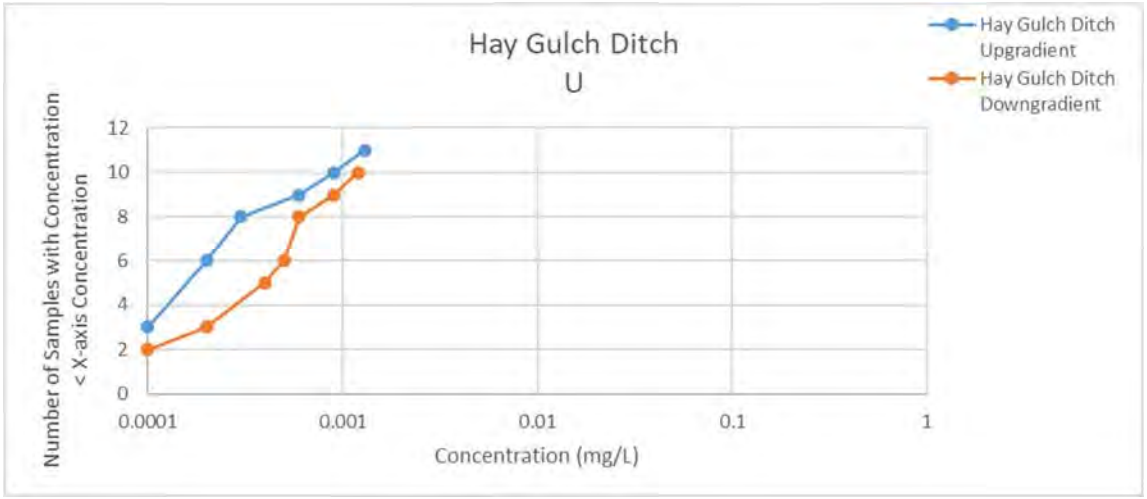
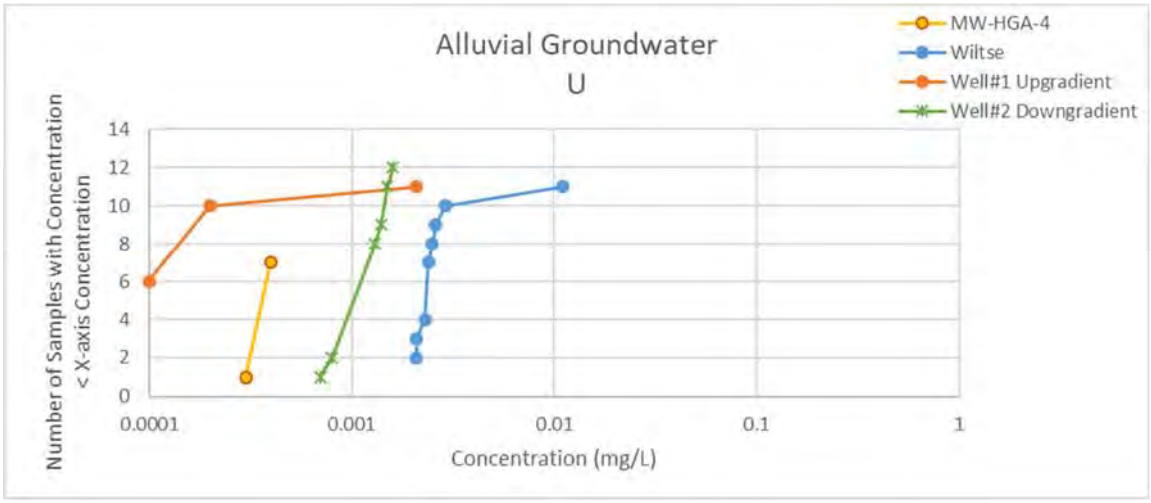


Figure 16. Uranium Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock





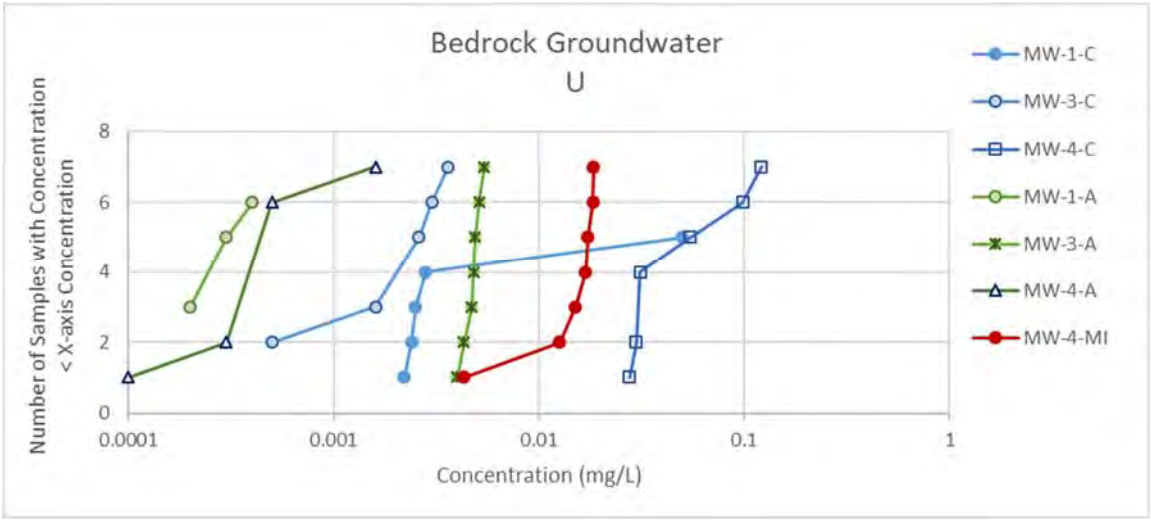


Figure 17. Zinc Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

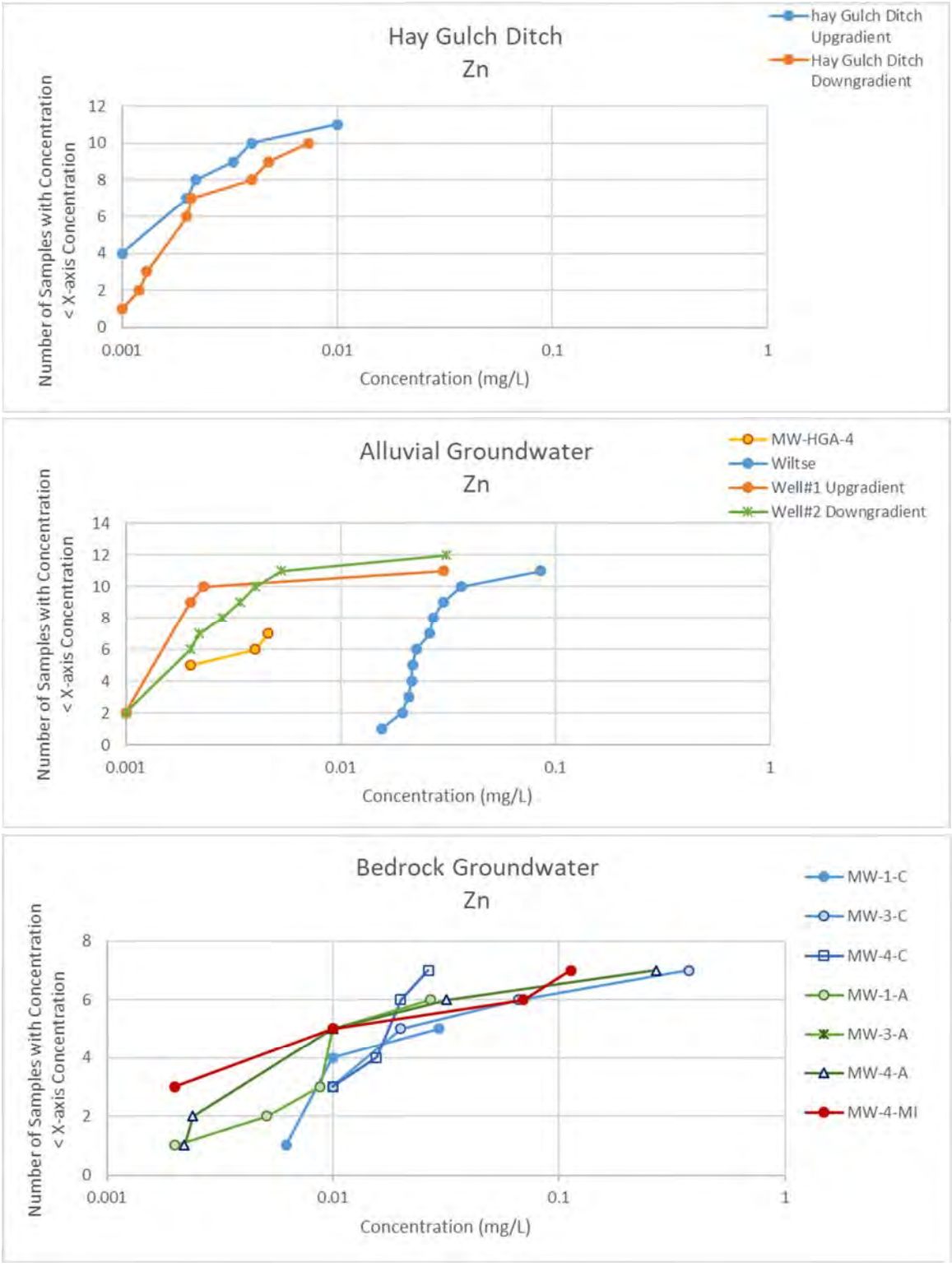


Figure 18. Silica Concentrations for Hay Gulch Ditch, Hay Gulch Alluvium and Bedrock

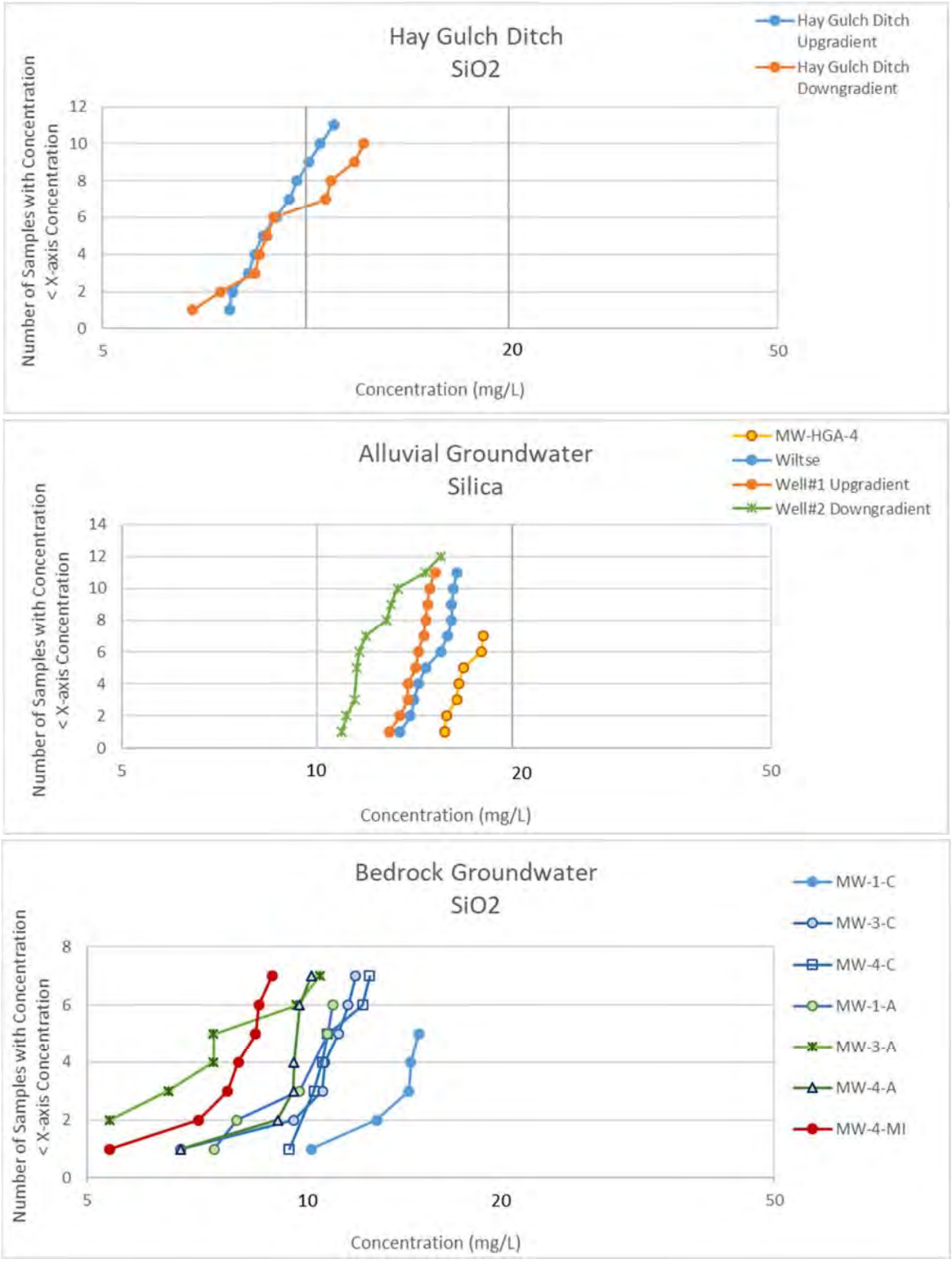
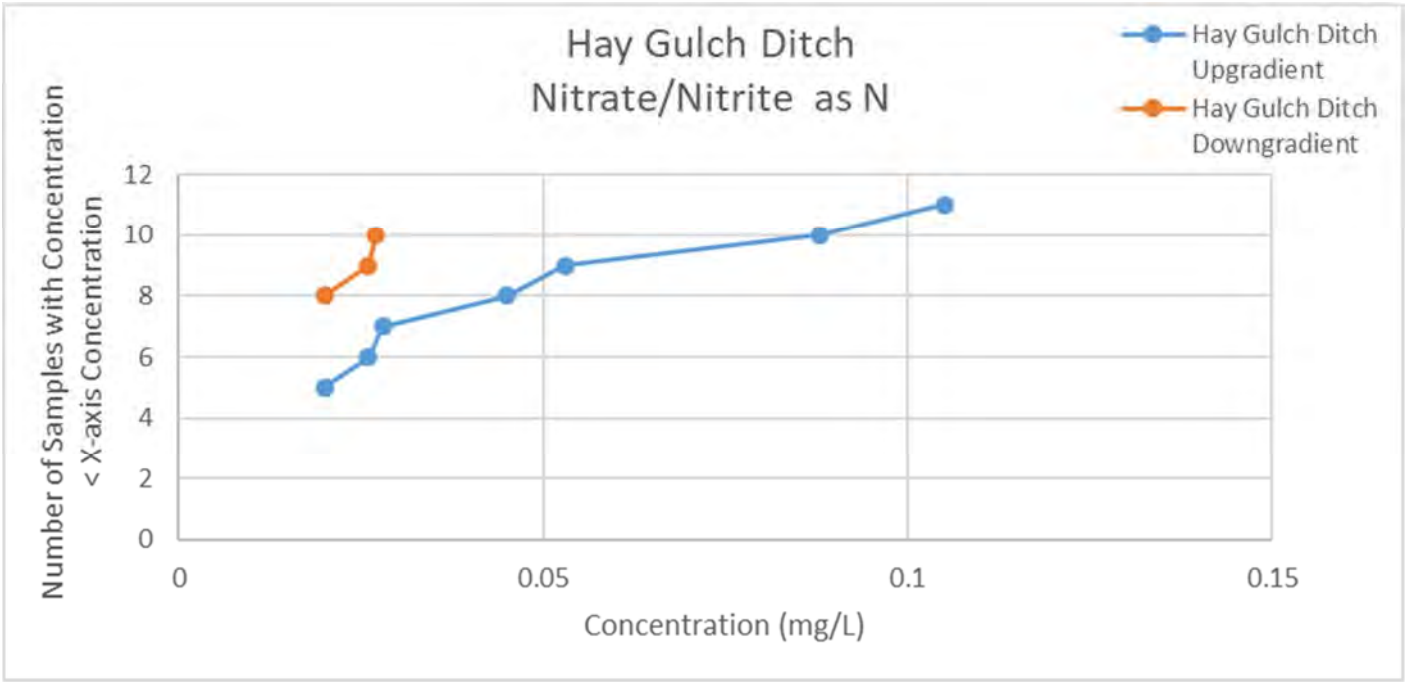


Figure 19. Nitrate/Nitrite Concentrations for Hay Gulch Ditch and Hay Gulch Alluvium



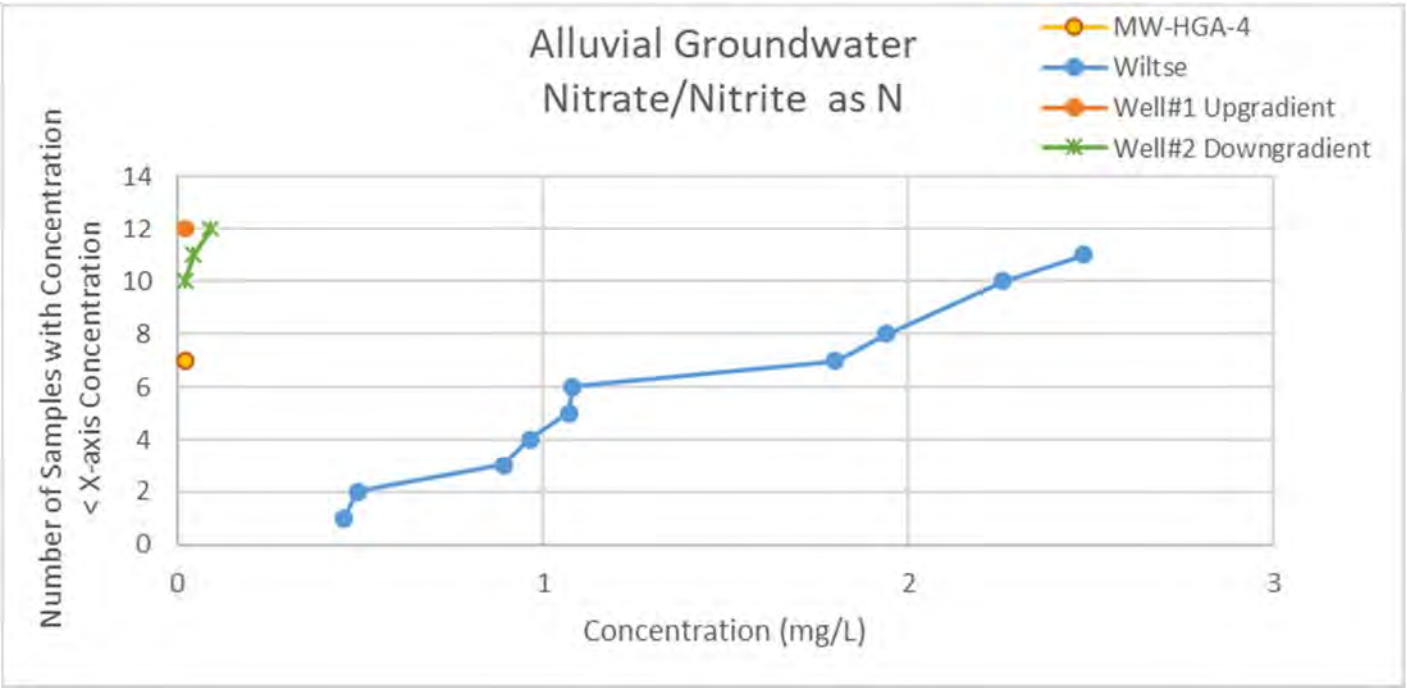
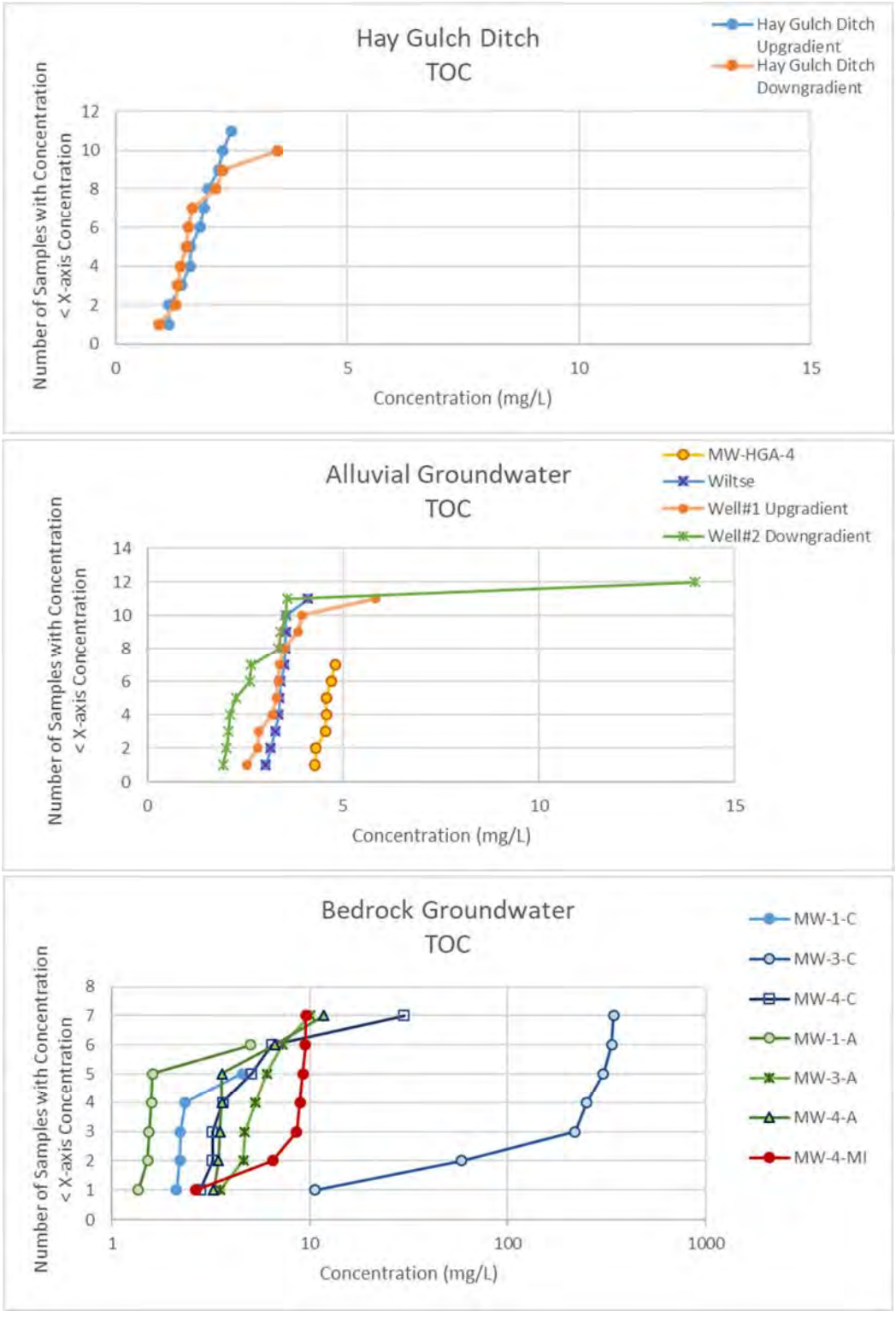


Figure 20. TOC Concentrations for Hay Gulch Ditch and Hay Gulch Alluvium



ATTACHMENT - GCC Hydrologic Monitoring Data Summary Tables

Hay Gulch Ditch Upgradient																					
Year		2016										2017						2018			
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11
Sample Date		3/31	4/22	5/26	6/23	7/20	8/25	9/21	10/19	11/29	12/13	1/26	2/27	3/22	6/28	9/21	11/28	2/22	5/14	8/9	11/8
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Field Parameters:																					
Flow Rate	cfs	0.7	1.0	1.2	1.6	1.0	1.0	1.1	1.0	NM	1.0	NM	0.8	0.3	2.7	NM	NM	NM	0.6	0.7	0.7
Temperature	deg C	9.8	20.9	11.3	21.1	20.8	16.8	14.9	16.4	5.9	7.0	1.5	4.7	10.7	20.2	19.7	8.8	4.7	11.3	22.1	1.1
pH	SU	7.75	8.27	7.95	8.15	8.24	8.26	8.47	8.19	8.79	8.58	8.2	8.69	8.77	8.88	8.39	7.60	7.9	7.58	9.07	7.16
Specific Conductance	µS/cm	247	323	197	141	189	207	233	210	258	234	687	455	454	106	549	868	1041	304	307	307
Oxygen Reduction Potential	mV	76.4	114.7	97.2	51.6	53.6	82.8	72.5	105.9	92.4	116.3	66.3	-12	-10.6	23.8	86.1	95.10	-164.1	111.4	-181.3	13.9
Dissolved Oxygen	mg/L	8.1	6.4	8.0	6.0	6.5	6.9	7.2	4.7	6.7	6.1	10.6	9.0	6.9	4.8	6.7	9.3	9.4	8.5	6.4	10.2
Lab Analytical Results:																					
Hardness as CaCO3	mg/L	128			80.9			119		152				257	69.2	316	456	489	101	153	149
pH (Lab)	SU	8.17			8.04			8.16		8.19				8.06	8.06	8.22	8.31	8.39	7.99	9.07	7.86
Total Dissolved Solids (Lab)	mg/L	170			75			165		180				285	65.0	390	650	700	140	215	175
Total Suspended Solids	mg/L	30.0			117			17.0		4.8				2.50	63.5	2.00	5.75	6.01	106	6.25	14.8
Calcium	mg/L	33.5			24			33.0		38.4				53.6	20.8	64.9	86.6	87.3	26.3	39.1	40.3
Magnesium	mg/L	10.9			5.08			9.01		13.7				29.8	4.21	37.5	58.3	65.9	8.61	13.5	11.9
Sodium	mg/L	4.46			2.19			3.90		6				10.9	1.97	13.8	27.1	34.6	3.31	5.33	5.00
Potassium	mg/L	<1			<1			1.35		<1.00				<1.00	1.75	2.15	3.05	3.52	1.18	1.24	<1.00
Alkalinity, Total	mg/L	160			65			98.0		118				185	55.0	177	305	244	67	111	120
Alkalinity, Bicarbonate	mg/L	160			65			94.0		118				185	55.0	161	285	244	67	107	120
Alkalinity, Carbonate	mg/L	<10			<10			<10		<10.0				<10.0	<10.0	16.0	20.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0				<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	5.77			2.07			4.32		7.92				22.7	1.76	30.8	48.2	46.7	3.12	6.70	5.58
Fluoride	mg/L	0.213			0.208			0.223		0.208				0.215	0.195	0.265	0.283	0.285	0.224	0.272	0.224
Sulfate as SO4	mg/L	42.1			17.7			29.0		45.3				87.7	15.0	99.0	179	229	34	49.7	45.0
Total Organic Carbon (TOC)	mg/L	1.41			1.6			2.21		1.14				2.49	1.15	1.90	1.99	1.81	2.31	1.61	1.09
Oil & Grease	mg/L	<5			<5			<5		<5.00				<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Nitrate/Nitrite as N	mg/L	<0.02			0.028			<0.020		<0.020				0.053	<0.020	0.045	0.088	0.105	0.026	<0.020	<0.020
Sodium Adsorption Ratio (SAR)	no unit	0.17			0.1			0.16		0.21				0.30	0.10	0.34	0.55	0.68	0.14	0.18	0.16
Aluminum	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L	<0.0005			<0.0005			<0.0005		<0.0005				0.0005	<0.0005	0.0009	0.0007	<0.0025	<0.0005	0.0009	<0.0005
Cadmium	mg/L	<0.0001			<0.0001			<0.0001		<0.0001				<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0006			0.0011			0.0011		0.0005				0.0008	0.0013	0.0006	0.0005	0.0007	0.0011	0.0011	0.0013
Iron	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05
Lead	mg/L	<0.0005			<0.0005			<0.0005		<0.0005				<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	<0.0005	<0.0005	<0.0005
Manganese	mg/L	0.0059			0.0035			0.0043		0.0047				0.0070	0.0024	0.0098	0.0049	0.0049	0.0093	0.0016	0.0043
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.0005			0.0009			0.0007		0.0008				0.0006	0.0009	0.0012	0.0008	<0.0025	0.001	0.0012	0.0009
Selenium	mg/L	<0.001			<0.001			<0.001		<0.0010				0.0023	<0.0010	<0.0010	0.0010	<0.0050	<0.001	<0.001	<0.001
Silica (Si02)	mg/L	7.78			8.23			10.5		9.71				9.04	7.71	9.45	10.1	11.0	8.4	8.64	8.31
Silicon	mg/L	3.64			3.85			4.89		4.54				4.23	3.60	4.42	4.71	5.14	3.93	4.04	3.88
Uranium	mg/L	0.0002			0.0001			0.0002		0.0003				0.0003	0.0001	0.0006	0.0009	0.0013	0.0001	0.0002	0.0003
Zinc	mg/L	<0.001			<0.001			<0.001		<0.0010				0.0022	<0.0020	<0.0040	<0.0020	<0.0100	<0.002	0.0033	<0.002
Radium 226	pCi/L	<0.4			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	pCi/L	<0.8			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

Notes & Definitions:

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

f

Hay Gulch Ditch Downgradient																					
Year		2016										2017						2018			
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11
Sample Date		3/31	4/22	5/26	6/23	7/20	8/25	9/21	10/19	11/29	12/13	1/26	2/27	3/22	6/28	9/21	11/28	2/22	5/7	8/9	11/7
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	N	Y	Y	Y	Y
Field Parameters:																					
Flow Rate	cfs	1.1	1.2	1.1	NM	1.1	1.1	NM	0.8	NM	NM	NM	0.8	0.3	0.3	NM	dry	NM	NM	NM	0.5
Temperature	deg C	11.8	17.6	10.9	21.9	21.3	18.8	16.1	11.8	7.0	6.6	7.2	5.0	12.7	17.6	18.7		6.3	11.3	20.6	4.7
pH	SU	8.57	8.55	8.14	8.14	8.55	8.37	8.3	8.36	8.64	8.06	7.28	8.06	9.00	8.53	8.66		8.33	7.58	7.43	7.48
Specific Conductance	µS/cm	429	530	297	116	308	257	1183	420	421	728	678	987	17	114	164		742	304	356	309
Oxygen Reduction Potential	mV	57.5	105.9	33.2	32.5	68.6	38.4	18.7	88.6	117.5	155.2	147.6	-15.5	137.8	185.3	48		51.6	111.4	-10	-88.9
Dissolved Oxygen	mg/L	7.9	7.7	8.7	6.0	6.7	5.6	6.8	7.1	6.5	7.2	7.6	9.8	5.6	6.4	7.1		9.8	8.5	6.3	9.1
Lab Analytical Results:																					
Hardness as CaCO3	mg/L	226			67.8			480		267				503	59.1	91.4		329	140	182	167
pH (Lab)	SU	8.42			8.13			8.25		8.24				8.15	7.98	7.98		8.17	8.05	8.09	7.95
Total Dissolved Solids (Lab)	mg/L	270			55			630		320				615	65.0	80.0		420	220	260	185
Total Suspended Solids	mg/L	27.3			18			4.20		12.4				12.7	3.00	<0.500		49.5	<2	5.67	4.40
Calcium	mg/L	55.5			21.9			94.7		65.5				112	19.0	29.5		75.4	37.5	49.0	44.7
Magnesium	mg/L	21.1			3.15			59.1		25.2				54.6	2.86	4.31		34.2	11.2	14.4	13.4
Sodium	mg/L	8.69			1.57			16.8		10.7				22.5	1.49	2.37		18.1	5.42	6.49	5.15
Potassium	mg/L	1.49			<1			4.48		1.46				2.33	<1.00	<1.00		2.84	1.14	1.58	1.34
Alkalinity, Total	mg/L	220			59			220		225				320	47.0	85.0		265	112	170	140
Alkalinity, Bicarbonate	mg/L	220			59			140		155				320	47.0	85.0		259	104	170	140
Alkalinity, Carbonate	mg/L	<10			<10			80.0		70				<10.0	<10.0	<10.0		<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0				<10.0	<10.0	<10.0		<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	9.40			1.26			97.9		12				31.9	<1.00	1.54		23.1	7.54	7.47	5.69
Fluoride	mg/L	0.244			0.195			0.244		0.227				0.224	0.290	0.227		0.308	0.228	0.295	0.228
Sulfate as SO4	mg/L	68.1			13.5			144		89.5				204	11.3	17.9		86.5	40.2	46.8	45.0
Total Organic Carbon (TOC)	mg/L	1.53			1.4			3.48		1.65				2.31	2.16	0.932		1.56	1.28	1.33	1.76
Oil & Grease	mg/L	<5			<5			<5		<5.00				<5.00	<5.00	<5.00		<5.00	<5.00	<5.00	<5.00
Nitrate/Nitrite as N	mg/L	<0.02			0.026			0.027		<0.020				<0.020	<0.020	<0.020		<0.020	<0.020	<0.020	<0.020
Sodium Adsorption Ratio (SAR)	no unit	0.25			0.03			0.33		0.28				0.44	0.08	0.11		0.43	0.2	0.20	0.17
Aluminum	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.050	<0.050		<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L	0.0005			<0.0005			0.0015		0.0006				0.0006	0.0005	0.0006		0.0005	0.0005	0.0008	<0.0005
Cadmium	mg/L	<0.0001			<0.0001			<0.0001		<0.0001				<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0004			0.0016			0.0012		0.0005				0.0004	0.0020	0.0013		0.0005	0.0008	0.0008	0.0008
Iron	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.050	<0.050		<0.050	<0.050	<0.050	<0.05
Lead	mg/L	<0.0005			<0.0005			<0.0005		<0.0005				<0.0005	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005
Manganese	mg/L	0.0039			0.0044			0.0059		0.0063				0.0112	0.0009	0.0010		0.0962	0.0038	0.0445	0.0102
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002				<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.0005			0.0008			0.0013		0.0007				<0.0005	0.0009	0.0011		0.0010	0.0011	0.0012	0.0010
Selenium	mg/L	<0.001			<0.001			0.0026		<0.0010				0.0022	<0.0010	<0.0010		0.0011	<0.0010	<0.0010	<0.001
Silica (Si02)	mg/L	8.96			7.48			11.8		10.9				12.2	6.80	8.53		10.7	8.41	8.77	8.66
Silicon	mg/L	4.19			3.5			5.51		5.11				5.70	3.18	3.99		5.01	3.93	4.10	4.05
Uranium	mg/L	0.0004			0.0001			0.0006		0.0006				0.0009	0.0001	0.0002		0.0012	0.0004	0.0005	0.0003
Zinc	mg/L	<0.001			0.0021			0.0013		0.0012				<0.0020	<0.0020	<0.0040		<0.0020	0.0074	0.0048	0.0035
Radium 226	pCi/L	<0.4			NA			NA		NA				NA	NA	NA		NA	NA	NA	NA
Radium 228	pCi/L	<0.8			NA			NA		NA				NA	NA	NA		NA	NA	NA	NA

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

Well #1 Upgradient																				
Year		2016										2017						2018			
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11
Sample Date		3/30	4/27	5/26	6/23	7/19	8/24	9/21	10/24	11/30	12/14	1/18	2/27	3/22	6/28	9/28	11/29	2/22	5/14	8/9	11/7
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Field Parameters:																					
Purge Flow Rate	gpm	1.5	7.9	7.1	5.8	7.1	7.4	6.8	7.5	9.3	7.5	7.7	7.5	8.2	7.0	7.1	7.5	7.2	7.2	10	7.2
Total Purged	gal	306	522	870	297	280	284	288	300	280	295	298	297	291	286	259	287	268	280	267	305
Depth to Water	ft bgs	4.40	5.07	4.60	4.95	5.55	6.30	6.03	5.73	5.69	5.08	4.30	3.80	3.82	4.50	5.51	5.50	5.40	5.77	5.65	6.50
Temperature	deg C	8.8	13.1	11.9	14.2	14.1	12.7	12.5	12.6	10.6	11.3	10.9	10.4	11.2	11.9	11.8	11.6	11.5	11.7	12.0	12.5
pH	SU	7.77	7.57	7.46	7.6	7.69	7.59	7.67	7.77	7.72	7.68	7.6	7.67	7.67	7.59	7.6	7.58	7.56	7.49	7.35	7.34
Specific Conductance	µS/cm	1224	1199	1284	1246	1226	1143	1176	1223	1280	1305	1392	1415	1351	1159	1162	1241	1278	1218	1289	1204
Oxygen Reduction Potential	mV	-123.1	-162.2	-142.5	-185.4	-156.6	-196.8	-140.6	-148.9	-152.9	-141.0	-143.6	-125.6	-132.2	-201	-176.9	-213.20	-185.3	-219.3	-251.6	-273.0
Lab Analytical Results:																					
Hardness as CaCO3	mg/L	230			306			216		271				391	277	215	280	274	275	369	287
pH (Lab)	SU	7.73			7.57			7.58		7.59				7.46	7.74	7.66	7.56	7.75	7.95	7.48	7.50
Total Dissolved Solids (Lab)	mg/L	760			745			735		725				775	725	705	790	745	770	835	730
Calcium	mg/L	44.0			59.7			42.4		51.7				75.7	54.0	41.6	55.6	53.4	53.8	71.5	56.7
Magnesium	mg/L	29.1			38.2			26.7		34.5				49.1	34.6	27.1	34.4	34.2	34.1	46.4	35.4
Sodium	mg/L	199			196			210		189				167	189	203	195	183	191	154	212
Potassium	mg/L	3.00			3.15			3.01		3.01				3.30	3.00	3.09	2.99	3.09	3.03	3.16	3.15
Alkalinity, Total	mg/L	610			660			620		615				640	585	670	625	620	595	630	640
Alkalinity, Bicarbonate	mg/L	570			660			620		615				640	585	670	625	620	595	630	640
Alkalinity, Carbonate	mg/L	40.0			<10			<10		<10.0				<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0				<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	4.33			6.12			4.30		4.44				4.53	4.32	6.21	4.39	4.30	4.35	4.34	4.23
Fluoride	mg/L	0.347			<0.5			0.353		0.337				0.337	0.362	<0.500	0.358	0.354	0.335	0.390	0.359
Sulfate as SO4	mg/L	90.1			108			83.8		117				156	97.4	74.0	101	106	97.2	147	89.9
Total Organic Carbon (TOC)	mg/L	2.54			3.3			2.8		3.18				3.84	5.82	2.84	3.33	3.37	3.5	3.94	3.35
Nitrate/Nitrite as N	mg/L	<0.02			<0.02			<0.02		<0.200				<0.020	<0.400	<0.400	<0.020	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L	<0.0005			<0.0005			<0.0005		<0.0005				0.0009	<0.0005	<0.0005	<0.0005	0.0005	0.0005	0.0005	<0.0005
Cadmium	mg/L	<0.0001			<0.0001			<0.0001		<0.0001				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0035			0.003			0.0021		0.0041				0.0020	0.0020	0.0030	0.0027	0.0035	0.003	0.0022	0.0025
Iron	mg/L	1.20			1.51			0.946		1.64				2.01	1.34	0.101	1.44	1.44	1.39	1.98	1.52
Lead	mg/L	<0.0005			<0.0005			<0.0005		<0.0005				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese	mg/L	0.267			0.344			0.221		0.312				0.491	0.315	0.202	0.311	0.307	0.306	0.498	0.286
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.0005			<0.0005			<0.0005		0.0005				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005
Selenium	mg/L	<0.001			<0.001			<0.001		<0.0010				0.0245	<0.0010	<0.0010	<0.0010	<0.0010	0.0171	0.0120	0.0022
Silica (Si02)	mg/L	13.8			15.2			14.8		12.9				14.2	14.9	14.3	14.7	13.4	14.6	13.8	13.7
Silicon	mg/L	6.45			7.12			6.94		6.05				6.64	6.94	6.68	6.86	6.27	6.81	6.45	6.41
Uranium	mg/L	<0.0001			0.0021			<0.0001		0.0002				0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002
Zinc	mg/L	<0.001			<0.001			0.0023		0.0301				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	<0.002	<0.002
Radium 226	pCi/L	<0.4			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	pCi/L	<0.8			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

Well #2 Downgradient																						
Year		2016										2017						2018				
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q4
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	8	11
Sample Date		3/30	4/21	5/25	6/23	7/19	8/24	9/20	10/19	11/30	12/14	1/26	2/27	3/22	6/13	9/21	11/28	2/22	5/7	8/8	8/9	11/7
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Field Parameters:																						
Purge Flow Rate	gpm	0.5	0.5	0.5	0.5	0.5	0.5	0.5	NM	7.2	2	NM	NM	NM	NM	NM	NM	0.1	1	0.1	1	0.5
Total Purged	gal	7	6	7	7	6	6	6	6	6	6	8	8	6	8	8	6	6	11	2	6.5	7.5
Depth to Water	ft bgs	3.69	3.17	4.25	1.42	4.17	4.17	5.5	6.4	4.7	5	3.95	2.74	6.35	0.95	4.85	5.68	6.68	7.4	6.65	6.59	5.17
Temperature	deg C	6.3	10.1	13.5	18.4	19.8	14	14.1	13.3	10.4	12.4	7.0	4.4	8.4	17.1	12.1	11.7	9.8	8.9	14.0	11.1	11.9
pH	SU	7.58	7.6	7.6	7.64	7.68	7.73	7.53	7.66	7.66	7.71	7.57	7.68	7.78	7.56	7.66	7.52	7.59	7.48	7.84	7.20	7.15
Specific Conductance	µS/cm	899	867	804	600	369	815	877	881	904	872	908	1193	921	633	852	879	887	847	828	895	955
Oxygen Reduction Potential	mV	-9.4	-13.7	-35.7	-66.9	-112.1	-76.3	-88.3	-82	-72.7	-81.1	-66.8	-55.7	-67	-54.3	-53.7	-63.70	-44.9	-34	-75.6	-127	-91.9
Lab Analytical Results:																						
Hardness as CaCO3	mg/L	444			314			452		432				485	352	378	449	412	415	422	415	465
pH (Lab)	SU	7.63			7.66			7.48		7.55				7.72	7.6	7.51	7.51	7.62	7.6	7.61	7.45	7.50
Total Dissolved Solids (Lab)	mg/L	685			470			525		495				635	415	525	540	515	545	545	575	550
Calcium	mg/L	72.2			54.9			75.9		72.7				81.0	60.9	64.8	78.0	70.1	70.2	72.7	70.4	78.7
Magnesium	mg/L	63.9			43.1			63.8		60.8				68.7	48.5	52.6	61.8	57.4	58.2	58.4	58.2	65.2
Sodium	mg/L	22.2			16.5			19.8		20.7				21.8	16.1	17.0	20.1	19.4	19.2	19.6	19.1	21.3
Potassium	mg/L	2.04			2.1			2.16		2.05				1.94	2.22	1.64	2.19	1.76	1.68	2.00	1.82	2.08
Alkalinity, Total	mg/L	342			280			380		380				375	285	395	375	333	350	380	328	340
Alkalinity, Bicarbonate	mg/L	338			280			380		380				375	285	395	375	333	350	380	328	340
Alkalinity, Carbonate	mg/L	<10			<10			<10		<10.0				<10.0	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0				<10.0	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	35.8			6.8			27.4		26.2				23.3	7.11	19.0	23.4	24.7	27.2	34.5	34.1	39.3
Fluoride	mg/L	0.230			0.298			0.272		0.256				0.228	0.313	0.263	0.246	0.244	0.224	0.259	0.281	0.263
Sulfate as SO4	mg/L	129			70			114		117				153	75.2	98.4	94.7	104	102	112	111	137
Total Organic Carbon (TOC)	mg/L	3.34			14			2.64		3.4				3.52	3.56	2.61	2.25	2.10	2.02	2.06	1.93	2.08
Nitrate/Nitrite as N	mg/L	0.042			<0.02			<0.02		0.089				<0.020	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	0.156			<0.05			<0.05		<0.050				<0.050	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L	0.0008			0.0015			0.0010		0.0013				0.0009	0.0017	0.0006	0.0011	0.0010	0.0009	0.0012	0.0012	0.0010
Cadmium	mg/L	<0.0001			<0.0001			<0.0001		<0.0001				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0004			0.0005			0.0003		0.0051				0.0007	0.0002	0.0004	0.0001	0.0056	0.0002	0.0006	0.0004	0.0003
Iron	mg/L	0.081			0.085			0.118		<0.050				0.213	<0.05	<0.050	0.074	0.060	0.073	0.089	0.163	0.082
Lead	mg/L	<0.0005			<0.0005			<0.0005		0.0078				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese	mg/L	0.497			0.54			0.354		0.359				0.384	0.259	0.307	0.309	0.304	0.306	0.349	0.375	0.320
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0014			0.0022			0.0024		0.0025				0.0021	0.0025	0.0021	0.0020	0.0024	0.0022	0.0024	0.0029	0.0024
Selenium	mg/L	<0.001			<0.001			<0.001		0.0011				0.0045	<0.001	<0.0010	<0.0010	0.0012	<0.001	0.0012	0.0015	0.0013
Silica (Si02)	mg/L	11.6			14.7			12.8		11.9				10.9	15.5	13.0	13.3	11.1	11.5	11.4	11.5	11.0
Silicon	mg/L	5.42			6.89			5.97		5.55				5.12	7.23	6.08	6.20	5.19	5.39	5.34	5.38	5.15
Uranium	mg/L	0.0013			0.0007			0.0015		0.0016				0.0014	0.0008	0.0013	0.0013	0.0013	0.0013	0.0013	0.0015	0.0014
Zinc	mg/L	0.0034			<0.001			0.0010		0.0311				<0.0020	<0.002	<0.0040	<0.0020	0.0053	0.0022	0.0028	<0.0020	<0.0020
Radium 226	pCi/L	<0.4			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	pCi/L	<0.8			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

Wiltse Well																					
Year		2016										2017						2018			
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11
Sample Date		3/31	4/27	5/25	6/23	7/19	8/24	9/20	10/24	11/29	12/13	1/18	2/27	3/21	6/13	9/28	11/28	2/22	5/16	8/9	11/8
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Field Parameters:																					
Purge Flow Rate	gpm	150	38.5	23.4	18.6	19.9	17.3	15.8	17.0	10.6	18.1	39.5	39.6	39.6	NM	18.3	23.5	11.9	12.0	18.5	12.3
Total Purged	gal	5850	4228	4229	3686	2844	2979	2637	2724	2992	2916	3595	3580	3560	2980	2712	2423	2700	2890	2783	2747
Depth to Water	ft bgs	0.35	0.00	0.85	2.15	2.99	2.60	3.32	6.85	1.90	1.95	0.30	0.00	0.00	2.05	3.40	3.40	3.35	3.93	4.13	3.78
Temperature	deg C	6.7	8.8	10.4	10.7	11.5	12.1	11.5	11.0	9.1	8.8	7.6	7.2	7.5	10.3	11.3	9.7	8.0	10.2	11.7	10.4
pH	SU	7.22	7.32	7.34	7.26	7.26	7.24	7.22	7.22	7.32	7.29	7.2	7.17	7.12	7.41	7.27	7.30	7.26	7.13	7.04	7.07
Specific Conductance	µS/cm	2043	1633	1805	1768	1478	1602	1941	1937	2014	2036	2262	2276	2085	1869	2074	2190	2232	2144	2072	2167
Oxygen Reduction Potential	mV	105.6	17.9	20.1	38.5	26.9	20.0	28.6	21.6	13.7	20.9	3.2	18.3	6.0	13.3	19.5	19.2	14.3	29.9	-52.7	-18.8
Lab Analytical Results:																					
pH (Lab)	SU	7.22			7.34			7.29		7.36				7.22	7.46	7.30	7.33	7.70	8.35	7.22	7.42
Total Dissolved Solids (Lab)	mg/L	1580			1480			1520		1520				1480	1510	1680	1740	1740	1740	1750	1720
Calcium	mg/L	197			208			206		186				205	211	219	226	211	216	221	230
Magnesium	mg/L	121			128			126		121				128	129	143	142	136	150	139	147
Sodium	mg/L	95.9			75.2			80.7		82.4				110	87.5	80.7	83.4	80.4	82.3	79.1	81.2
Potassium	mg/L	4.64			4.56			4.90		4.42				4.61	4.79	4.62	<5.00	4.73	4.98	5.01	5.00
Alkalinity, Total	mg/L	460			500			470		450				410	445	510	475	445	435	463	505
Alkalinity, Bicarbonate	mg/L	440			500			470		450				410	445	510	475	445	435	463	505
Alkalinity, Carbonate	mg/L	20.0			<10			<10		<10.0				<10.0	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0				<10.0	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	81.0			76.3			62.3		70.1				72.5	72.5	68.7	68.9	66.7	60	57.2	57.5
Fluoride	mg/L	0.285			<0.5			<0.5		0.3				<0.500	0.332	<0.500	<0.500	<0.500	<0.500	<0.500	0.298
Sulfate as SO4	mg/L	671			595			656		676				731	702	779	772	832	714	733	741
Total Organic Carbon (TOC)	mg/L	3.54			4.1			3.15		3.02				3.40	3.54	3.34	3.26	3.37	3.5	3.51	3.63
Nitrate/Nitrite as N	mg/L	0.456			0.891			1.08		0.965				0.492	1.07	1.80	1.94	2.26	2.48	2.26	1.99
Aluminum	mg/L	<0.05			<0.05			<0.05		<0.050				<0.050	<0.1	<0.050	<0.250	<0.100	<0.05	<0.05	<0.100
Arsenic	mg/L	<0.0025			<0.0025			0.0005		0.0008				0.0009	0.0006	0.0005	0.0029	0.0009	0.0006	<0.0025	<0.001
Cadmium	mg/L	<0.0005			<0.0005			<0.0005		<0.0001				<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0002
Copper	mg/L	0.0018			0.0024			0.0020		0.0038				0.0023	0.0019	0.0025	0.0097	0.0020	0.0019	0.0018	0.0030
Iron	mg/L	0.100			<0.05			0.060		0.136				0.286	0.161	<0.050	<0.250	0.132	0.151	0.125	0.121
Lead	mg/L	<0.0025			<0.0025			<0.0025		<0.0005				<0.0005	<0.0005	<0.0005	<0.0025	<0.0005	<0.0005	<0.0005	<0.001
Manganese	mg/L	0.673			0.857			0.756		0.608				0.440	0.797	0.881	4.50	0.845	0.997	1.37	1.08
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	<0.0025			<0.0025			0.0017		0.0016				0.0016	0.0021	0.0021	0.0093	0.0020	0.002	0.002	0.0019
Selenium	mg/L	<0.005			<0.005			0.0013		0.0023				0.0027	0.0019	0.0016	0.0087	0.0027	0.0025	0.0025	<0.002
Silica (Si02)	mg/L	13.9			16.1			16.4		14.3				14.7	15.5	16.1	13.4	14.1	15.9	16.2	15.9
Silicon	mg/L	6.51			7.53			7.67		6.69				6.85	7.22	7.54	6.29	6.58	7.42	7.58	7.44
Uranium	mg/L	0.0029			0.0021			0.0023		0.0026				0.0024	0.0021	0.0021	0.0110	0.0025	0.0024	0.0024	0.0032
Zinc	mg/L	0.0156			0.0364			0.0301		0.0269				0.0194	0.026	0.0208	0.0855	0.0216	0.0225	0.0214	0.0172
Radium 226	pCi/L	0.7 +/- 0.1			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	pCi/L	<0.8			NA			NA		NA				NA	NA	NA	NA	NA	NA	NA	NA

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

Notes & Definitions:

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-HGA-4																			
Year		2016	2017												2018				
Quarter		Q4	Q1			Q2			Q3			Q4			Q1		Q2	Q3	Q4
Month		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	5	8	11
Sample Date		12/12	1/26	2/28	3/22	4/27	5/31	6/13	7/27	8/16	9/21	10/27	11/28	12/12	1/3	2/22	5/15	8/9	11/8
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	N	Y	N	Y	N	N	Y	Y	Y	Y
Field Parameters:																			
Purge Flow Rate	gpm	0.5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	9.4	NM	0.1	1.5	2	1
Total Purged	gal	21	21	21	21	21	21	19.5	20	20	21	21	21	24	19	21	21	19	21
Depth to Water	ft bgs	0.73	0.57	0.60	0.83	0.94	2.06	2.53	3.25	2.65	3.31	3.31	1.76	4.31	1.37	0.55	2.60	3.98	1.90
Temperature	deg C	7.3	4.8	6.4	8.1	7.2	9.9	8.4	8.6	8.8	9.0	9.2	9.0	9.3	8.8	7.8	8.1	8.7	8.8
pH	SU	7.29	7.36	7.40	7.41	7.33	7.36	7.40	7.36	7.35	7.33	7.31	7.27	7.27	7.33	7.30	7.18	7.27	7.05
Specific Conductance	µS/cm	1284	1257	1201	1155	1153	1113	1055	1099	1050	1124	1072	1171	1160	1141	1154	1098	1057	1167
Oxygen Reduction Potential	mV	-72.1	-86.6	-105.1	-104.4	-74.5	-91.3	-134.7	-137.6	-131.0	-139.5	-77.3	-157.9	-70.1	-96.6	-157.3	-130.9	-230.8	-190.9
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	724			611			616			522		595			561	555	524	625
pH (Lab)	SU	7.30			7.17			7.31			7.25		7.21			7.58	8.15	7.33	7.12
Total Dissolved Solids (Lab)	mg/L	855			710			715			750		775			740	730	695	770
Calcium	mg/L	147			118			121			102		118			110	108	102	124
Magnesium	mg/L	86.7			76.7			76.6			64.9		72.8			69.3	69	65.4	76.5
Sodium	mg/L	19.5			27.4			28.6			24.9		27.2			26.5	30.4	29.9	27.6
Potassium	mg/L	2.02			2.13			2.11			1.75		2.21			2.17	2.22	2.33	2.13
Alkalinity, Total	mg/L	545			465			415			465		475			460	425	410	460
Alkalinity, Bicarbonate	mg/L	545			465			415			465		475			460	425	410	460
Alkalinity, Carbonate	mg/L	ND			<10.0			<10			<10.0		<10.0			<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	ND			<10.0			<10			<10.0		<10.0			<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	10.9			8.75			7.95			8.96		8.74			8.43	7.57	6.47	9.40
Fluoride	mg/L	0.577			0.485			0.506			0.517		0.495			0.496	0.459	0.482	0.487
Sulfate as SO4	mg/L	240			229			192			205		204			222	190	169	201
Total Organic Carbon (TOC)	mg/L				4.54			4.35			4.69		4.79			4.56	4.57	4.30	4.72
Nitrate/Nitrite as N	mg/L	ND			<0.020			<0.02			<0.020		<0.100			<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	0.423			<0.050			<0.05			<0.050		<0.050			<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L	0.0030			0.0029			0.0028			<0.0005		0.0035			0.0037	0.0034	0.0036	0.0032
Cadmium	mg/L	ND			<0.0001			<0.0001			<0.0001		<0.0001			<0.0001	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0006			0.0008			0.0002			0.0004		0.0002			0.0006	0.0008	0.0004	0.0008
Iron	mg/L	3.71			7.29			7.32			0.378		7.84			7.60	7.92	8.55	8.44
Lead	mg/L	ND			<0.0005			<0.0005			<0.0005		<0.0005			<0.0005	<0.0005	<0.0005	<0.0005
Manganese	mg/L	4.07			2.78			2.37			2.03		2.11			1.99	1.81	1.58	2.13
Mercury	mg/L	ND			<0.0002			<0.0002			<0.0002		<0.0002			<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0013			0.0024			0.0027			0.0028		0.0027			0.0030	0.0031	0.0038	0.0029
Selenium	mg/L	ND			0.0030			<0.001			<0.0010		<0.0010			<0.0010	0.002	0.0016	<0.001
Silica (Si02)	mg/L	22.3			16.8			18			16.5		17.9			15.8	16.4	15.7	17.3
Silicon	mg/L	10.4			7.86			8.41			7.72		8.35			7.37	7.67	7.34	8.10
Uranium	mg/L	0.0010			0.0004			0.0004			0.0004		0.0004			0.0004	0.0004	0.0003	0.0005
Zinc	mg/L	0.0039			0.0046			<0.002			<0.0040		<0.0020			<0.002	<0.002	<0.002	<0.002

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-1-A																			
Year		2017								2018									
Quarter		Q2	Q3				Q4			Q1			Q2			Q3			Q4
Month		6	7	8	9	9	10	11	12	1	2	3	4	5	6	7	8	11	
Sample Date		6/7	7/18	8/23	9/7	9/26	10/26	11/16	12/5	1/2	2/9	3/22	4/11	5/10	–	7/23	8/7	11/1	
Lab Analysis (Y/N)		Y	N	N	N	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	Y	
Field Parameters:																			
Purge Flow Rate	gpm	NM	NM*	NM*	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1		0.1	0.1	0.1	
Total Purged	gal	12.8	NM*	NM*	NM	NM	2	2	1	1.5	2	1.5	1	1.3		1.5	1.5	1.6	
Depth to Water	ft bgs	215.42	NM*	215.92	215.54	216.33	216.31	216.47	216.58	216.21	216.47	216.47	216.54	216.54		216.63	216.63	216.65	
Temperature	deg C	17.7	NM*	NM*	10.7	9.7	9.1	9.1	8.7	9.5	9.0	8.7	9.6	9.2	***	9.9	10.0	8.9	
pH	SU	7.78	NM*	NM*	7.35	7.38	7.29	7.28	7.25	7.19	7.37	7.28	6.8	6.97		6.99	7.05	7.01	
Specific Conductance	µS/cm	1362	NM*	NM*	1555	1563	1616	1650	1693	1700	1723	1735	1647	1761		1734	1815	1781	
Oxygen Reduction Potential	mV	-34.6	NM*	NM*	-54.7	-46.5	-50	-48.3	-49.6	-44.6	-52.8	-37.5	142.4	0.4		-26.4	-33.2	101.4	
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	124				133		130			159			156			160	174	
pH (Lab)	SU	7.74				7.35		7.33			7.22			7.45			7.17	7.27	
Total Dissolved Solids (Lab)	mg/L	975				1080		1120			1100			1150			1040	1130	
Calcium	mg/L	24.7				25.8		24.9			30.5			29.7			30.9	34.0	
Magnesium	mg/L	15.1				16.7		16.6			20.1			19.9			20.1	21.5	
Sodium	mg/L	324				329		325			348			327			333	358	
Potassium	mg/L	1.98				2.02		<5.00			<5.00			2.12			2.23	2.47	
Alkalinity, Total	mg/L	375				450		380			415			353			385	395	
Alkalinity, Bicarbonate	mg/L	375				450		380			415			353			385	395	
Alkalinity, Carbonate	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10	
Alkalinity, Hydroxide	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10	
Chloride	mg/L	2.75				2.16		<5.00			2.19			<5			2.12	2.20	
Fluoride	mg/L	0.268				0.245		<0.500			0.240			<0.5			0.260	0.240	
Sulfate as SO4	mg/L	427				432		511			518			522			515	511	
Total Organic Carbon (TOC)	mg/L	5.03				1.36		1.58			1.51			1.54			1.60	1.75	
Nitrate/Nitrite as N	mg/L	<0.200				<0.400		<0.100			<0.020			<0.02			<0.02	0.028	
Aluminum	mg/L	<0.050				<0.050		<0.250			<0.250			<0.05			<0.05	<0.1	
Arsenic	mg/L	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	
Cadmium	mg/L	<0.0001				<0.0001		<0.0005			<0.0005			<0.0001			<0.0001	<0.0001	
Copper	mg/L	0.0043				0.0057		0.0045			0.0066			0.0041			0.0048	0.0048	
Iron	mg/L	0.128				0.367		<0.250			0.590			0.614			0.644	0.647	
Lead	mg/L	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	
Manganese	mg/L	0.0260				0.0218		0.0259			0.0279			0.026			0.0242	0.0282	
Mercury	mg/L	<0.0002				<0.0002		<0.0002			<0.0002			<0.0002			<0.0002	<0.0002	
Molybdenum	mg/L	0.0007				0.0010		<0.0025			<0.0025			0.0009			0.0008	0.0007	
Selenium	mg/L	<0.0010				<0.0010		<0.0050			<0.0050			<0.001			<0.001	<0.001	
Silica (Si02)	mg/L	12.3				11.9		8.27			11.2			11.2			11.4	12.0	
Silicon	mg/L	5.74				5.56		3.87			5.24			5.25			5.31	5.62	
Uranium	mg/L	0.0004				0.0002		<0.0005			<0.0005			0.0003			0.0002	0.0003	
Zinc	mg/L	0.0270				0.0088		<0.0100			<0.0100			0.0051			<0.0100	<0.002	

Notes & Definitions:

*** *La Plata County stage 3 fire restrictions prevented sampling activity*

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-1-MI																		
Year		2017							2018									
Quarter		Q2	Q3			Q4			Q1			Q2		Q3			Q4	
Month		6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	11	
Sample Date		6/7	7/18	8/23	9/26	10/26	11/16	12/5	1/2	2/9	3/22	4/11	5/10	--	7/23	8/7	11/1	
Lab Analysis (Y/N)		Y	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	
Field Parameters:																		
Purge Flow Rate	gpm	NM	NM*	NM	NM	dry	dry	dry	dry	dry	dry	dry	dry	***	dry	dry	dry	
Total Purged	gal	19.5	NM*	<0.5	NM													
Depth to Water	ft bgs	259.99	NM*	258.29	258.34													
Temperature	deg C	15.8	NM*	11.8	21.7													
pH	SU	8	NM*	7.94	7.86													
Specific Conductance	µS/cm	2032	NM*	2137	2119													
Oxygen Reduction Potential	mV	160.5	NM*	65.7	61.4													
Lab Analytical Results:																		
Hardness as CaCO3	mg/L	231																
pH (Lab)	SU	8.14																
Total Dissolved Solids (Lab)	mg/L	1520																
Calcium	mg/L	46.7																
Magnesium	mg/L	27.9																
Sodium	mg/L	470																
Potassium	mg/L	2.55																
Alkalinity, Total	mg/L	600																
Alkalinity, Bicarbonate	mg/L	600																
Alkalinity, Carbonate	mg/L	<10.0																
Alkalinity, Hydroxide	mg/L	<10.0																
Chloride	mg/L	7.69																
Fluoride	mg/L	1.14																
Sulfate as SO4	mg/L	739																
Total Organic Carbon (TOC)	mg/L	5.14																
Nitrate/Nitrite as N	mg/L	0.103																
Aluminum	mg/L	<0.050																
Arsenic	mg/L	0.0029																
Cadmium	mg/L	<0.0001																
Copper	mg/L	0.0067																
Iron	mg/L	<0.050																
Lead	mg/L	0.0010																
Manganese	mg/L	0.0445																
Mercury	mg/L	<0.0002																
Molybdenum	mg/L	0.0796																
Selenium	mg/L	0.0028																
Silica (Si02)	mg/L	11.6																
Silicon	mg/L	5.44																
Uranium	mg/L	0.0505																
Zinc	mg/L	1.52																

Notes & Definitions:

*** La Plata County stage 3 fire restrictions prevented sampling activity

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. "<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.

2. Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.

3. Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.

MW-1-C																			
Year		2017								2018									
Quarter		Q2	Q3				Q4			Q1			Q2		Q3			Q4	
Month		6	7	8	9	9	10	11	12	1	2	3	4	5	6	7	8	11	
Sample Date		6/7	7/18	8/23	9/7	9/26	10/26	11/16	12/5	1/2	2/9	3/22	4/11	5/10	–	7/23	8/7	11/18	
Lab Analysis (Y/N)		Y	N	N	N	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	Y	
Field Parameters:																			
Purge Flow Rate	gpm	NM	NM*	NM*	NM	NM	NM	NM	NM	MM	0.1	NM	0.1	0.1	***	0.05	0.1	0.1	
Total Purged	gal	5	NM*	NM*	NM	NM	1.00	1	1	1	1	1	1	1.25		1	1	1.1	
Depth to Water	ft bgs	216.5	NM*	216.91	216.95	216.59	216.52	216.48	216.52	216.38	216.38	216.37	216.35	216.41		216.41	216.05	216.04	
Temperature	deg C	16.0	NM*	NM*	NM	12.9	11.7	10.6	7.0	9.7	9.6	6.7	9.2	10.5		20.0	14.1	9.7	
pH	SU	7.52	NM*	NM*	NM	7.17	7.16	7.15	7.17	7.11	7.19	7.32	7.03	7.05		6.91	6.97	6.93	
Specific Conductance	µS/cm	2446	NM*	NM*	NM	2725	2738	2739	2778	2778	2738	2751	2700	2749		2693	2675	2751	
Oxygen Reduction Potential	mV	74.3	NM*	NM*	NM	77.4	31.7	23.9	13.0	6.2	-4.3	-29.6	-15.3	-42.3		-41.8	-32.5	-110.0	
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	498				1290		1180			1190			1130			1120	1180	
pH (Lab)	SU	8.35				7.36		7.34			7.22			7.2			7.20	7.02	
Total Dissolved Solids (Lab)	mg/L	2020				2440		2360			2360			2340			2170	2200	
Calcium	mg/L	96.0				234		216			219			203			203	219	
Magnesium	mg/L	62.8				172		155			156			150			148	154	
Sodium	mg/L	506				242		253			260			239			239	255	
Potassium	mg/L	11.4				3.81		<5.00			<5.00			3.07			3.04	2.65	
Alkalinity, Total	mg/L	530				700		540			570			580			560	410	
Alkalinity, Bicarbonate	mg/L	530				700		540			570			580			560	410	
Alkalinity, Carbonate	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10.0	
Alkalinity, Hydroxide	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10.0	
Chloride	mg/L	24.2				6.97		8.03			7.78			7.75			5.97	6.22	
Fluoride	mg/L	1.59				0.864		0.955			1.03			0.96			0.888	0.924	
Sulfate as SO4	mg/L	1090				1350		1230			1160			1210			1090	1080	
Total Organic Carbon (TOC)	mg/L	4.56				2.84		2.12			2.21			2.2			2.35	2.37	
Nitrate/Nitrite as N	mg/L	<2.00				<0.400		<0.100			<0.020			<0.02			0.036	<0.02	
Aluminum	mg/L	<0.050				<0.050		<0.250			<0.250			<0.05			<0.05	<0.10	
Arsenic	mg/L	0.0029				0.0016		<0.0025			<0.0025			0.0051			0.0052	0.0035	
Cadmium	mg/L	<0.0001				<0.0001		<0.0005			<0.0005			<0.0001			<0.0001	<0.0001	
Copper	mg/L	0.0088				0.0085		0.0036			0.0052			0.003			0.0049	0.0033	
Iron	mg/L	<0.050				<0.050		<0.250			<0.250			0.643			1.01	1.12	
Lead	mg/L	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	
Manganese	mg/L	0.0744				0.0853		0.0959			0.0989			0.153			0.140	0.106	
Mercury	mg/L	<0.0002				<0.0002		<0.0002			<0.0002			<0.0002			<0.0002	<0.0002	
Molybdenum	mg/L	0.0164				0.0049		<0.0025			<0.0025			0.0006			<0.0025	<0.0005	
Selenium	mg/L	0.0136				0.0012		<0.0050			<0.0050			<0.001			<0.0050	0.0011	
Silica (Si02)	mg/L	10.6				16.6		13.2			14.8			15.2			14.7	14.5	
Silicon	mg/L	4.94				7.77		6.16			6.94			7.09			6.87	6.78	
Uranium	mg/L	0.0500				0.0044		0.0028			0.0024			0.0025			0.0022	0.0021	
Zinc	mg/L	0.0293				0.0294		<0.0100			<0.0100			0.0062			<0.0100	0.0055	

Notes & Definitions:

*** La Plata County stage 3 fire restrictions prevented sampling activity

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. "<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.
2. Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.
3. Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.

MW-2-A																
Year		2017							2018							
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4	
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11	
Sample Date		3/30	6/7	7/18	8/23	10/30	11/16	12/5	1/2	2/9	3/22	4/11	5/10	8/7	11/1	
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Field Parameters:																
Purge Flow Rate	gpm	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	
Total Purged	gal															
Depth to Water	ft bgs															
Temperature	deg C															
pH	SU															
Specific Conductance	µS/cm															
Oxygen Reduction Potential	mV															
Lab Analytical Results:																
Hardness as CaCO3	mg/L															
pH (Lab)	SU															
Total Dissolved Solids (Lab)	mg/L															
Calcium	mg/L															
Magnesium	mg/L															
Sodium	mg/L															
Potassium	mg/L															
Alkalinity, Total	mg/L															
Alkalinity, Bicarbonate	mg/L															
Alkalinity, Carbonate	mg/L															
Alkalinity, Hydroxide	mg/L															
Chloride	mg/L															
Fluoride	mg/L															
Sulfate as SO4	mg/L															
Total Organic Carbon (TOC)	mg/L															
Nitrate/Nitrite as N	mg/L															
Aluminum	mg/L															
Arsenic	mg/L															
Cadmium	mg/L															
Copper	mg/L															
Iron	mg/L															
Lead	mg/L															
Manganese	mg/L															
Mercury	mg/L															
Molybdenum	mg/L															
Selenium	mg/L															
Silica (Si02)	mg/L															
Silicon	mg/L															
Uranium	mg/L															
Zinc	mg/L															

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-2-MI																
Year		2017							2018							
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4	
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11	
Sample Date		3/30	6/7	7/18	8/23	10/30	11/16	12/5	1/2	2/9	3/22	4/11	5/10	8/7	11/1	
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N	
Field Parameters:																
Purge Flow Rate	gpm	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	
Total Purged	gal															
Depth to Water	ft bgs															
Temperature	deg C															
pH	SU															
Specific Conductance	µS/cm															
Oxygen Reduction Potential	mV															
Lab Analytical Results:																
Hardness as CaCO3	mg/L															
pH (Lab)	SU															
Total Dissolved Solids (Lab)	mg/L															
Calcium	mg/L															
Magnesium	mg/L															
Sodium	mg/L															
Potassium	mg/L															
Alkalinity, Total	mg/L															
Alkalinity, Bicarbonate	mg/L															
Alkalinity, Carbonate	mg/L															
Alkalinity, Hydroxide	mg/L															
Chloride	mg/L															
Fluoride	mg/L															
Sulfate as SO4	mg/L															
Total Organic Carbon (TOC)	mg/L															
Nitrate/Nitrite as N	mg/L															
Aluminum	mg/L															
Arsenic	mg/L															
Cadmium	mg/L															
Copper	mg/L															
Iron	mg/L															
Lead	mg/L															
Manganese	mg/L															
Mercury	mg/L															
Molybdenum	mg/L															
Selenium	mg/L															
Silica (Si02)	mg/L															
Silicon	mg/L															
Uranium	mg/L															
Zinc	mg/L															

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-2-C															
Year		2017							2018						
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11
Sample Date		3/30	6/7	7/18	8/23	10/30	11/16	12/5	1/2	2/9	3/22	4/11	5/10	8/7	11/1
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Field Parameters:															
Purge Flow Rate	gpm	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
Total Purged	gal														
Depth to Water	ft bgs														
Temperature	deg C														
pH	SU														
Specific Conductance	µS/cm														
Oxygen Reduction Potential	mV														
Lab Analytical Results:															
Hardness as CaCO3	mg/L														
pH (Lab)	SU														
Total Dissolved Solids (Lab)	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Sodium	mg/L														
Potassium	mg/L														
Alkalinity, Total	mg/L														
Alkalinity, Bicarbonate	mg/L														
Alkalinity, Carbonate	mg/L														
Alkalinity, Hydroxide	mg/L														
Chloride	mg/L														
Fluoride	mg/L														
Sulfate as SO4	mg/L														
Total Organic Carbon (TOC)	mg/L														
Nitrate/Nitrite as N	mg/L														
Aluminum	mg/L														
Arsenic	mg/L														
Cadmium	mg/L														
Copper	mg/L														
Iron	mg/L														
Lead	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Selenium	mg/L														
Silica (Si02)	mg/L														
Silicon	mg/L														
Uranium	mg/L														
Zinc	mg/L														

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-3-A																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/27	6/30	7/18	8/24	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/7	8/8	11/6
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	0.5	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.1
Total Purged	gal	30	2	NM	NM	NM	1	1	1	1.3	1.5	1.5	1	1.25	1	1.1
Depth to Water	ft bgs	297.35	298.24	297.45	298.24	298.11	298.12	298.01	298.05	298.37	298.04	297.86	297.76	298.17	298.55	298.27
Temperature	deg C	11.7	13.2	19.5	12.6	12.3	12.5	11.7	12.0	11.8	11.7	12.2	11.9	13.5	13.5	11.9
pH	SU	8.82	8.75	8.56	8.67	8.72	8.64	8.61	8.57	8.54	8.52	8.61	8.21	8.38	8.30	8.31
Specific Conductance	µS/cm	2535	2446	2115	2524	2470	2430	2483	2494	2528	2506	2458	2415	2253	2336	2391
Oxygen Reduction Potential	mV	-269.0	-101.5	-55.3	-87.4	-142.3	-124.5	-125.6	-146.8	-120.3	-125.2	-181.6	-135.8	-138.2	-155.8	-164.6
Lab Analytical Results:																
Hardness as CaCO3	mg/L	7.53	12.6			12.6		10.4			11.5			11.2	12.6	14.1
pH (Lab)	SU	8.63	8.69			8.53		8.29			8.45			8.36	8.37	8.24
Total Dissolved Solids (Lab)	mg/L	1630	1670			1630		1690			1680			1670	1600	1540
Calcium	mg/L	2.00	3.67			3.63		3.27			3.33			3.2	3.71	4.15
Magnesium	mg/L	0.616	0.823			0.859		0.550			0.776			0.774	0.811	0.913
Sodium	mg/L	566	585			589		551			562			542	562	605
Potassium	mg/L	1.72	2.02			2.04		<5.00			<2.00			1.8	<2.00	2.17
Alkalinity, Total	mg/L	530	470			500		490			430			480	480	475
Alkalinity, Bicarbonate	mg/L	380	470			440		460			360			480	420	385
Alkalinity, Carbonate	mg/L	150	<10.0			60.0		30.0			70.0			<10.0	60.0	90.0
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0
Chloride	mg/L	16.1	17.4			18.5		16.9			16.4			16.1	15.1	16.0
Fluoride	mg/L	0.464	0.488			0.535		<0.500			<0.500			<0.5	NA	0.383
Sulfate as SO4	mg/L	729	802			840		730			812			756	706	682
Total Organic Carbon (TOC)	mg/L	3.52	10.0			7.26		6.07			5.32			4.7	4.62	4.52
Nitrate/Nitrite as N	mg/L	<0.100	<0.100			<0.020		<0.020			<0.020			<0.02	<0.02	<0.02
Aluminum	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.10
Arsenic	mg/L	0.0025	<0.0025			<0.0025		<0.0025			<0.0025			0.0006	<0.0025	<0.0010
Cadmium	mg/L	<0.0001	<0.0005			<0.0005		<0.0005			<0.0005			<0.0001	<0.0001	<0.0002
Copper	mg/L	0.0061	0.0081			0.0080		0.0079			0.0236			0.0063	0.0117	0.0086
Iron	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100
Lead	mg/L	<0.0005	<0.0025			<0.0025		<0.0025			<0.0025			<0.0005	<0.0005	<0.0010
Manganese	mg/L	0.0042	0.0251			0.0194		0.0269			0.0232			0.018	0.0222	0.0187
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0005	0.0274			0.0091		0.0078			0.0065			0.0046	0.0043	0.0033
Selenium	mg/L	0.0577	<0.0050			<0.0050		<0.0050			<0.0050			0.0109	<0.0050	0.0028
Silica (Si02)	mg/L	10.1	10.9			11.6		7.66			11.1			11	12.0	12.8
Silicon	mg/L	4.70	5.10			5.41		3.58			5.18			5.17	5.62	5.97
Uranium	mg/L	0.0002	0.0040			0.0051		0.0036			0.0030			0.0026	0.0026	0.0027
Zinc	mg/L	0.0031	<0.0100			<0.0100		<0.0100			<0.0100			<0.002	<0.002	<0.0040

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-3-MI																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/27	6/30	7/18	8/16	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/7	8/8	11/6
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	0.5	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.1
Total Purged	gal	19	2	NM	NM	NM	1	1	1	1.3	1.5	1.5	1	1.3	1	1.1
Depth to Water	ft bgs	304.49	241.15	240.46	240.53	240.46	240.44	240.44	240.58	240.73	240.55	240.65	240.84	241.04	241.97	242.13
Temperature	deg C	10.0	12.6	22.0	12.9	11.0	12.1	11.7	11.7	11.9	11.3	11.9	11.8	12.6	13.0	12.4
pH	SU	9.34	8.94	8.46	8.9	8.74	8.9	8.86	8.86	8.84	8.83	8.84	8.51	8.48	8.49	8.46
Specific Conductance	µS/cm	1907	1699	1402	1598	1737	1729	1745	1786	1790	1810	1771	1772	1727	1709	1746
Oxygen Reduction Potential	mV	-87	-54.5	-26.4	-108.2	-107.3	-113.8	-124.2	-163.1	-136	-131.4	-160.7	-99.9	-103.9	-127.8	-176.5
Lab Analytical Results:																
Hardness as CaCO3	mg/L	4.85	8.73			9.02		7.75			9.92			8.65	8.63	8.88
pH (Lab)	SU	8.95	8.75			8.72		8.72			8.66			8.56	8.58	8.34
Total Dissolved Solids (Lab)	mg/L	1550	1120			1140		1080			1170			1210	1110	1120
Calcium	mg/L	1.32	2.32			2.34		2.06			2.22			1.91	1.95	2.03
Magnesium	mg/L	0.374	0.714			0.775		0.632			1.07			0.945	0.911	0.926
Sodium	mg/L	420	430			440		411			459			417	446	476
Potassium	mg/L	2.15	2.21			1.93		<5.00			<2.00			1.63	<2.00	<2
Alkalinity, Total	mg/L	740	675			700		660			700			680	730	720
Alkalinity, Bicarbonate	mg/L	510	555			600		570			600			500	630	610
Alkalinity, Carbonate	mg/L	230	120			100		90.0			100			180	100	110
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0
Chloride	mg/L	8.66	10.1			10.7		10.6			10.7			10.7	8.54	8.83
Fluoride	mg/L	0.952	1.34			1.26		1.26			1.30			1.2	1.16	1.19
Sulfate as SO4	mg/L	165	241			247		254			245			250	226	230
Total Organic Carbon (TOC)	mg/L	8.34	14.8			10.9		10.3			9.24			8.67	7.83	7.28
Nitrate/Nitrite as N	mg/L	<0.020	<0.020			<0.020		<0.020			<0.020			<0.02	<0.02	<0.02
Aluminum	mg/L	<0.050	0.102			<0.050		<0.250			<0.100			<0.05	<0.05	<0.10
Arsenic	mg/L	0.0134	0.0167			0.0131		0.0135			0.0160			0.0152	0.0127	0.0104
Cadmium	mg/L	<0.0001	<0.0005			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002
Copper	mg/L	0.0055	0.0058			0.0065		0.0059			0.0122			0.0048	0.0071	0.0073
Iron	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.05	<0.1
Lead	mg/L	0.0024	<0.0025			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.001
Manganese	mg/L	0.0022	0.0058			0.0033		0.0045			0.0049			0.006	0.0054	0.0072
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0061	0.0211			0.0148		0.0152			0.0170			0.016	0.0149	0.0158
Selenium	mg/L	0.0013	<0.0050			<0.0050		<0.0050			0.0010			0.0019	<0.0050	<0.002
Silica (Si02)	mg/L	7.97	8.18			9.05		5.35			9.33			8.83	9.49	10.2
Silicon	mg/L	3.73	3.82			4.23		2.50			4.36			4.13	4.44	4.76
Uranium	mg/L	0.0049	0.0084			0.0140		0.0124			0.0125			0.0126	0.0111	0.0110
Zinc	mg/L	0.0405	<0.0100			<0.0100		<0.0100			<0.0020			0.0023	0.0023	<0.0040

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-3-C																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/27	6/30	7/27	8/24	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/7	8/8	11/6
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	0.5	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.1
Total Purged	gal	20	2	NM	NM	NM	1	1	1	1.5	1.5	1.5	1	1.3	1.3	1.1
Depth to Water	ft bgs	304.21	296.3	296.93	296.87	297.43	297.46	297.43	297.35	297.01	296.66	296.57	296.62	296.78	297.12	296.8
Temperature	deg C	10.5	12.9	13.1	12.5	11.8	12.7	11.5	11.7	11.7	11.4	11.6	12.2	13.0	13.3	11.5
pH	SU	8.61	8.57	8.51	8.46	8.44	8.48	8.41	8.48	8.43	8.43	8.45	8.25	8.28	8.26	8.17
Specific Conductance	µS/cm	3549	3588	3815	4112	4351	4412	4659	4596	4923	4864	5063	5019	4916	4953	5127
Oxygen Reduction Potential	mV	-129.0	-87.2	-137.5	-128.8	-149.9	-198.3	-200.7	-222.2	-187.9	-183.5	-155.4	-154.7	-161.4	-180.5	-217.6
Lab Analytical Results:																
Hardness as CaCO3	mg/L	14.4	11.8			15.1		14.9			16.1			40.3	17.9	21.7
pH (Lab)	SU	8.5	8.48			8.35		8.28			8.35			8.34	8.31	8.24
Total Dissolved Solids (Lab)	mg/L	2130	2360			3070		3310			3540			3610	3520	3360
Calcium	mg/L	3.60	2.87			3.50		3.58			3.81			7.28	4.01	4.70
Magnesium	mg/L	1.31	1.12			1.55		1.44			1.59			5.38	1.92	2.41
Sodium	mg/L	796	890			1100		1130			1200			1350	1220	1460
Potassium	mg/L	3.47	3.24			4.01		<5.00			<10.0			<5	<5	<5
Alkalinity, Total	mg/L	1490	1570			1690		1880			1910			1760	1730	2050
Alkalinity, Bicarbonate	mg/L	1360	1480			1650		1830			1810			1600	1670	1900
Alkalinity, Carbonate	mg/L	130	90.0			40.0		50.0			100			160	60.0	150
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10	NA	<10.0
Chloride	mg/L	182	330			477		506			549			544	524	561
Fluoride	mg/L	4.89	4.94			4.52		4.34			4.15			3.52	3.84	4.04
Sulfate as SO4	mg/L	73.4	73.5			46.4		24.5			<10.0			<5	<5	<5
Total Organic Carbon (TOC)	mg/L	10.6	58.5			219		251			337			343	306	141
Nitrate/Nitrite as N	mg/L	<0.020	<0.400			<0.400		<0.020			<0.020			<0.02	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.100			<0.050		<0.250			<0.500			1.47	<0.500	<0.250
Arsenic	mg/L	0.0115	0.0088			0.0098		0.0091			0.0194			0.0168	0.0148	0.0155
Cadmium	mg/L	<0.0001	<0.0010			<0.0010		<0.0005			<0.0005			<0.0005	<0.0005	<0.0005
Copper	mg/L	0.0109	0.0147			0.0174		0.0160			0.0409			0.0183	0.0257	0.0227
Iron	mg/L	<0.050	<0.050			<0.050		<0.250			<0.500			0.252	<0.500	<0.250
Lead	mg/L	0.0085	<0.0050			<0.0050		<0.0025			<0.0025			<0.0025	<0.0025	<0.0025
Manganese	mg/L	0.0091	0.0188			0.0178		0.0202			0.0307			0.0275	0.0243	0.0252
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0143	0.0291			0.0241		0.0241			0.0221			0.0189	0.0155	0.0140
Selenium	mg/L	0.0233	0.0121			0.0149		0.0240			0.0383			0.0268	0.0232	0.0261
Silica (Si02)	mg/L	7.82	8.86			9.16		6.01			<10.7			9.69	8.68	10.7
Silicon	mg/L	3.66	4.14			4.28		2.81			<5.00			4.53	4.06	5.01
Uranium	mg/L	0.0091	0.0102			0.0137		0.0100			0.0091			0.0087	0.0089	0.0113
Zinc	mg/L	0.375	<0.0200			<0.0200		<0.0100			<0.0100			<0.01	0.0664	0.0814

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-4-A																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/29	6/30	7/19	8/23	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/14	8/8	11/5
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.1
Total Purged	gal	19	2	1.5	0.5	1	1	1	1	1.3	1.5	1.5	1	1.5	1.5	1.1
Depth to Water	ft bgs	338.6	334.96	335.59	334.79	334.81	334.86	332.29	334.09	334.31	334.73	334.81	335.07	335.58	336.06	336.73
Temperature	deg C	15.6	16.8	25.5	17.6	11.9	11.6	10.8	10.1	10.9	9.8	11.4	10.9	17.8	12.9	11.6
pH	SU	8.61	8.29	8.55	7.98	8.41	8.32	8.38	8.32	8.33	8.37	8.41	8.19	8.2	8.1	8.12
Specific Conductance	µS/cm	2163	2053	1876	2096	2180	2165	2186	2261	2259	2267	2207	2214	2183	2192	2246
Oxygen Reduction Potential	mV	28.6	54	60.2	61.7	-8.6	-27	-12.3	-51.8	-35.2	-75.9	-117.3	-77.9	-81.8	-137.5	-157.6
Lab Analytical Results:																
Hardness as CaCO3	mg/L	9.16	9.85			7.77		7.11			7.73			7.84	7.69	8.81
pH (Lab)	SU	8.2	8.40			8.36		8.40			8.28			8.31	8.21	8.24
Total Dissolved Solids (Lab)	mg/L	1470	1470			1450		1500			1490			1470	1430	1350
Calcium	mg/L	2.23	2.43			1.76		1.87			1.81			1.75	1.71	1.92
Magnesium	mg/L	0.871	0.916			0.823		0.591			0.778			0.846	0.832	0.973
Sodium	mg/L	515	537			513		511			507			528	531	568
Potassium	mg/L	1.57	1.75			1.63		<5.00			<2.00			1.5	<2.00	<2.00
Alkalinity, Total	mg/L	635	560			630		590			530			560	575	575
Alkalinity, Bicarbonate	mg/L	635	560			590		560			490			560	555	575
Alkalinity, Carbonate	mg/L	<10.0	<10.0			40.0		30.0			40.0			<10.0	20.0	<10.0
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0
Chloride	mg/L	9.56	9.66			10.3		10.3			10.0			9.94	9.55	8.60
Fluoride	mg/L	<0.400	<0.400			<0.500		<0.500			<0.500			<0.5	<0.5	0.143
Sulfate as SO4	mg/L	594	588			783		594			579			561	522	450
Total Organic Carbon (TOC)	mg/L	6.63	11.7			3.52		3.27			3.46			3.59	3.60	3.59
Nitrate/Nitrite as N	mg/L	0.035	<0.020			<0.020		<0.020			<0.020			<0.02	<0.02	<0.020
Aluminum	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100
Arsenic	mg/L	0.0016	<0.0025			<0.0025		<0.0025			0.0019			0.0005	<0.0025	<0.0010
Cadmium	mg/L	<0.0001	<0.0005			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002
Copper	mg/L	0.0053	0.0093			0.0076		0.0073			0.0124			0.0077	0.0105	0.0084
Iron	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100
Lead	mg/L	0.0014	<0.0025			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.0010
Manganese	mg/L	0.0044	0.0063			0.0044		0.0040			0.0035			0.0033	<0.0075	0.0034
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0009	0.0275			<0.0025		<0.0025			0.0005			<0.0005	<0.0005	<0.0010
Selenium	mg/L	0.0016	<0.0050			<0.0050		<0.0050			0.0014			0.0025	<0.0050	<0.0020
Silica (Si02)	mg/L	10.2	10.6			9.99		6.85			9.47			10	10.2	11.2
Silicon	mg/L	4.75	4.97			4.67		3.20			4.43			4.7	4.77	5.22
Uranium	mg/L	0.0016	<0.0005			<0.0005		0.0005			0.0003			<0.0001	<0.0005	<0.0002
Zinc	mg/L	0.269	0.0319			<0.0100		<0.0100			0.0022			0.0024	<0.0100	<0.0040

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-4-MI																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/30	6/16	7/27	8/23	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/14	8/8	11/5
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.1
Total Purged	gal	0.5	6.5	NM	NM	1	1	1	1	1.3	1.5	1.5	1	1.3	1.8	1.6
Depth to Water	ft bgs	378.2	330.15	330.94	330.85	330.81	330.80	330.74	330.67	330.52	330.42	330.53	330.5	329.62	331.1	336.57
Temperature	deg C	15.0	14.6	12.9	12.5	11.4	10.7	11.3	11.4	11.2	11.0	10.5	10.9	10.1	11.8	11.3
pH	SU	9.08	8.91	8.78	8.79	8.76	8.76	8.73	8.67	8.62	8.48	8.53	8.01	8.5	8.14	8.25
Specific Conductance	µS/cm	1581	1668	1731	1708	1784	1794	1804	1833	1848	1856	1841	1816	1739	1756	1808
Oxygen Reduction Potential	mV	155.2	64.7	9.8	35.2	-29.6	-37.3	-111.5	-89.2	-112.5	-151.3	-145.7	-117.7	-130	-178.2	-202.3
Lab Analytical Results:																
Hardness as CaCO3	mg/L	5.43	8.71			7.07		4.20			6.01			5.88	6.06	6.39
pH (Lab)	SU	8.83	8.59			8.63		8.51			8.47			8.48	8.31	8.47
Total Dissolved Solids (Lab)	mg/L	1160	1170			1180		1180			1220			1140	1120	1100
Calcium	mg/L	1.53	2.32			1.88		1.68			1.64			1.55	1.56	1.60
Magnesium	mg/L	0.392	0.707			0.579		<0.500			0.465			0.49	0.524	0.580
Sodium	mg/L	408	458			449		452			447			471	470	500
Potassium	mg/L	1.46	<2.00			1.73		<5.00			<2.00			1.39	<2.00	<2.00
Alkalinity, Total	mg/L	965	915			1100		985			965			955	968	995
Alkalinity, Bicarbonate	mg/L	775	825			880		885			875			865	896	885
Alkalinity, Carbonate	mg/L	190	90.0			220		100			90.0			90	72.0	110
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0
Chloride	mg/L	2.18	7.50			8.78		9.11			8.74			7.99	5.68	5.38
Fluoride	mg/L	4.72	5.02			5.09		5.10			5.02			4.82	4.84	4.94
Sulfate as SO4	mg/L	17.4	64.7			76.6		77.5			68.6			54.4	48.3	47.6
Total Organic Carbon (TOC)	mg/L	2.64	6.49			8.58		9.53			9.54			9.25	8.94	8.48
Nitrate/Nitrite as N	mg/L	<0.020	<0.020			<0.020		<0.020			<0.020			<0.02	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.100	<0.100
Arsenic	mg/L	0.0099	0.0220			0.0131		0.0122			0.0139			0.0153	0.014	0.0119
Cadmium	mg/L	<0.0001	<0.0001			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002
Copper	mg/L	0.0059	0.0058			0.0071		0.0070			0.0079			0.0063	0.0071	0.0078
Iron	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.100	<0.100
Lead	mg/L	0.0010	<0.0005			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.0010
Manganese	mg/L	0.0020	0.0066			0.0081		0.0124			0.0080			0.007	0.0068	0.0084
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0020	0.0160			0.0127		0.0134			0.0151			0.0119	0.0115	0.0129
Selenium	mg/L	<0.0010	0.0012			<0.0050		<0.0050			<0.0010			0.0022	0.0113	<0.0020
Silica (Si02)	mg/L	7.27	8.01			8.80		<5.35			8.30			8.9	9.29	10.3
Silicon	mg/L	3.40	3.75			4.11		2.50			3.88			4.16	4.34	4.81
Uranium	mg/L	0.0043	0.0126			0.0184		0.0169			0.0183			0.0173	0.0151	0.0191
Zinc	mg/L	0.113	0.0697			<0.0100		<0.0100			<0.0020			<0.002	<0.002	<0.0040

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*
2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*
3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*

MW-4-C																
Year		2017								2018						
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11
Sample Date		3/30	6/16	7/27	8/23	9/28	10/27	11/17	12/7	1/3	2/21	3/23	4/12	5/14	8/8	11/5
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y
Field Parameters:																
Purge Flow Rate	gpm	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.1	NM	0.1	0.1	0.1	0.2
Total Purged	gal	7	1.5	NM	NM	1	1	1	1	1.5	1.5	1.5	1	1.5	1	1.3
Depth to Water	ft bgs	328.33	314.05	309.87	306.86	303.96	303.80	302.47	304.80	282.35	281.3	303.3	304.05	NM	302.55	302.17
Temperature	deg C	13.3	17.4	12.7	12.0	13.9	11.8	11.2	11.0	11.7	10.8	12.5	11.4	12.4	12.9	11.5
pH	SU	8.33	7.62	7.68	7.7	7.69	7.75	7.72	7.79	7.8	7.88	7.94	7.75	7.79	7.76	7.79
Specific Conductance	µS/cm	3792	5944	5997	5885	5813	5721	5782	5604	5834	5903	5628	5792	5592	5583	5775
Oxygen Reduction Potential	mV	57.3	20.3	-101.5	-111.2	-103.7	-117.4	-109.0	-120.1	-123.8	-154.3	-131.3	-134.9	-129.3	-157.6	-209.0
Lab Analytical Results:																
Hardness as CaCO3	mg/L	46.3	55.9			38.9		30.0			26.5			26.2	25.9	28.6
pH (Lab)	SU	7.61	7.77			7.79		7.98			7.84			7.97	7.96	8.27
Total Dissolved Solids (Lab)	mg/L	3230	4050			3750		3780			3730			3660	3650	3590
Calcium	mg/L	13.6	13.7			9.15		7.45			6.32			6.15	5.90	6.60
Magnesium	mg/L	2.99	5.26			3.90		2.76			2.61			2.62	2.72	2.94
Sodium	mg/L	908	1510			1490		1400			1410			1400	1410	1590
Potassium	mg/L	4.38	5.71			6.07		<10.0			<10.0			<5	<5	5.36
Alkalinity, Total	mg/L	1250	2360			2780		2680			2600			2410	2480	2450
Alkalinity, Bicarbonate	mg/L	1250	2360			2780		2640			2600			2330	2480	2450
Alkalinity, Carbonate	mg/L	<10.0	<10.0			<10.0		40.0			<10.0			80	<10.0	<10.0
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0
Chloride	mg/L	181	550			587		608			592			573	533	590
Fluoride	mg/L	1.29	2.04			2.17		2.43			2.53			2.52	2.48	2.54
Sulfate as SO4	mg/L	534	487			70.2		26.0			34.5			27	18.7	11.2
Total Organic Carbon (TOC)	mg/L	30	6.42			5.08		3.64			3.23			3.23	2.80	3.46
Nitrate/Nitrite as N	mg/L	<2.00	<0.500			<0.400		<0.100			<0.020			<0.02	<0.02	<0.020
Aluminum	mg/L	<0.050	<0.050			<0.050		<0.500			<0.500			<0.25	<0.25	<0.250
Arsenic	mg/L	0.0059	0.0119			0.0128		0.0152			0.0246			0.0195	0.0202	0.0164
Cadmium	mg/L	<0.0001	<0.0010			<0.0010		<0.0010			<0.0005			<0.0005	<0.0005	<0.0005
Copper	mg/L	0.0125	0.0243			0.0221		0.0208			0.0482			0.0389	0.0280	0.0230
Iron	mg/L	<0.050	<0.050			<0.050		<0.500			<0.500			0.373	0.397	0.474
Lead	mg/L	<0.0005	<0.0050			<0.0050		<0.0050			<0.0025			<0.0025	<0.0025	<0.0025
Manganese	mg/L	0.0269	0.0772			0.0554		0.0571			0.0647			0.0529	0.0381	0.0283
Mercury	mg/L	<0.0002	<0.0002			<0.0002		<0.0002			<0.0002			<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.0526	0.115			0.0138		0.0106			0.0086			0.0072	0.0071	0.0057
Selenium	mg/L	0.0248	0.0231			0.0214		0.0269			0.0378			0.0317	0.0260	0.0211
Silica (Si02)	mg/L	9.85	12.6			12.9		<10.7			<10.7			11	11.2	12.8
Silicon	mg/L	4.61	5.88			6.02		<5.00			<5.00			5.16	5.24	6.00
Uranium	mg/L	0.0297	0.121			0.0984		0.0545			0.0311			0.0311	0.0277	0.0246
Zinc	mg/L	0.0156	0.0265			<0.0200		<0.0200			<0.0100			<0.01	<0.01	<0.0100

Notes & Definitions:

Y/N	yes or no
gpm	gallons per minute
deg C	degrees Celsius
SU	standard pH units
µS/cm	microsiemens per centimeter
mV	millivolts
mg/L	milligram per liter
pCi/L	picocuries per liter
NM	not measured (field)
NA	not analyzed (lab)
*	Anomalous value under review

1. *"<" values denote that the quantification of that analyte is below the reporting level for the analytical laboratory, acceptable by environmental water quality laboratory industry standards.*

2. *Total alkalinity is measured by titration with hydrochloric acid to a set pH point, reporting this value as an equivalent amount of calcium carbonate. This value is then partitioned into bicarbonate, carbonate and hydroxide depending on the initial pH of the sample solution, each components reported as equivalent CaCO3.*

3. *Industry standard Quality Assurance/Quality Control (QA/QC) protocol are followed for this hydrologic monitoring program by both GCC Energy and the contracted environmental water quality analytical laboratories. QA/QC results are not shown in this table.*