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December 26, 2019

State of Colorado
Division of Reclamation, Mining & Safety
1313 Sherman St.
Denver, CO 80203

Attn: Janet Binns, Environmental Protection Specialist III

Re: Permit #C-1981-035, King II Mine
Annual Hydrology Report 2019

Dear Ms. Binns,

Please find enclosed "2019 King I & II Mines Annual Hydrology Report to the Colorado Division of Reclamation, Mining & Safety", for water year 2019, prepared by Resource Hydrogeologic Services, Inc. of Durango, Colorado.

Please contact Tom Bird at 970.769.1160, or Sarah Vance at 505.286.6026, with questions or comments.

Sincerely,

Tom Bird

Manager of Coal Services
GCC Energy, LLC

2019 King I & II Mines Annual Hydrology Report to the Colorado Division of Reclamation, Mining & Safety

Submitted to:

GCC Energy, LLC

Date:

December 24, 2019

Resource Hydrogeologic Services, Inc.

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RESOURCE HYDROGEOLOGIC SERVICES

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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 thirty (30) hydrologic compliance locations in 2019. These locations are represented by two types of water sources: surface and groundwater. Groundwater is monitored through sample collection from dedicated monitoring wells and surface water is monitored by grab samples at designated locations.

Table 1 lists and **Figure 1** shows the thirty (30) 2019 compliance hydrologic monitoring locations and their spatial relation to the King I and II Mines.

HYDROLOGIC MONITORING DATA COLLECTION

Hydrologic monitoring data collection was expanded in December 2018 in number of locations and continued through 2019. Protocols for establishment of 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 listed 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. This is intended as a one-year, four-quarter period to evaluate seasonal changes that may occur over a typical year; however, the baseline laboratory analytical suite analyses have continued through 2019 for all compliance monitoring locations. These laboratory analytical suites are approved by CDRMS in TR-26 and are presented in **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.

Most wet bedrock cluster monitoring wells are instrumented with dedicated 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, MI, LM and PL wells, and set to near bottom of the C wells to allow for micro-purge sampling methodology. The exception is for wells MW-8-MI, MW-8-LM, which have relatively high static and pumping water levels, allowing use of dedicated stainless steel 12-volt electric submersible pumps with the pump or extended pump intake set to the approximate depth of well screen mid-points. The dry bedrock cluster wells (MW-2-C, MW-2-A, MW-2-MI, MW-6-C) are not instrumented with any groundwater sampling pumps and are monitored for water level only. MW-1-MI is instrumented with a bladder pump, however after the initial several sample events this well dried up and remained dry (or effectively dry for purposes of obtaining a water sample) for two years. Prior to the 2019 quarter four monitoring event the pump system was removed to make the well easier to access as a water level-only monitoring location.

HYDROLOGIC MONITORING DATA ANALYSIS

Analytical data from all 2016-2019 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. The quarterly-updated analytical summary tables found in the Attachment are also available in PDF format 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 stacked bar formats for major ions and in distribution plots for trace constituents. The natural variability of water quality in bedrock and surface water units is demonstrated in these plots. Although the King Mines have operated for many years, the monitoring data presented within this report are believed to represent natural "baseline" water.

Figures 2 through 4 and 8 through 12 show major ion concentrations through sampling history by monitoring site. Concentrations are given in milli-equivalents (milligrams of solute mass divided by ionic weight and multiplied by ionic charge) per liter so the ionic balance between positive and negative ions can be seen in each analysis. Many bedrock wells have poor yields and have been slow to purge to steady compositions, and some have even gone dry. In the plots, magnesium and calcium are added together (Mg+Ca) since magnesium is usually a minor fraction of the divalent cations, and potassium is added to sodium (Na+K).

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 (cfs) 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, 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 above Hay Gulch for use by the King II Mine, from 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. (CDS Environmental Services LLC, 2014, Water Balance Study for 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. The water type is generally calcium, bicarbonate-sulfate type with low concentrations which vary seasonally, typically greater during winter months and lesser during spring runoff. Concentrations differ in the upgradient sample point from the downgradient location below valley irrigation, because of return flows.

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**.

Measured pH of the ditch water indicates slightly alkaline to alkaline (pH 7.3 to 9.1) conditions, with concentrations of nitrate, total organic carbon (TOC), and trace metals all below the applicable drinking water standards.

ALLUVIAL GROUNDWATER

Alluvial groundwater monitoring, previously limited to Hay Gulch, was expanded to include East Alkali Gulch in quarter four of 2018. The purpose of this expansion is for baseline data collection upgradient (MW-7-EAA) and downgradient (MW-8-EAA) of the proposed low cover crossing which would allow access from the existing King II Mine underground workings to the coal reserves within the proposed Dunn Ranch lease extension on the west side of East Alkali Gulch.

Four alluvial wells in Hay Gulch monitor the level and quality of groundwater in the alluvial aquifer. The Wiltse well, near the King I portal and waste rock site, has been monitored for over 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**.

Alluvial Groundwater Quality

Figure 3 shows the major ion concentrations in the four Hay Gulch 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.

MW-HGA-4, located near the Hay Gulch 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 the major ion concentrations of the two East Alkali Gulch alluvial wells, MW-7-EAA and MW-8-EAA. The concentration axes on all alluvial well plots have the same scale, so that total salinity is readily compared. The three Hay Gulch wells likely to be impacted by ditch infiltration have lower total dissolved salts, whereas the Wiltse well and East Alkali Gulch wells have higher total dissolved solids concentrations, and higher concentrations of sulfate. East Alkali Gulch is not irrigated upgradient or in the vicinity of these wells.

As discussed in previous Annual Hydrology Reports for the King Mines, greater concentrations of constituents in the Wiltse well have been apparent, with cyclic variability, since before deposition of waste rock in the area. Since the dominant major ion chemistry in the other alluvial monitoring wells has been fairly 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.

Alluvial Groundwater Level

Groundwater levels at all alluvial monitoring wells were measured and documented per CDRMS compliance requirements at the time of each sampling event. The groundwater hydrograph for the Hay Gulch 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 show distinct increase with the extreme precipitation of the winter of 2018-2019 with peak levels near ground surface in the spring of 2019. The groundwater hydrograph for East Alkali Gulch in **Figure 6** represents the first year of monitoring; the fluctuation of the water table measured in both MW-7-EAA and MW-8-EAA was within one foot. Based on this limited monitoring period, this indicates that East Alkali Gulch does not appear to be subject to the same magnitude of seasonal water table fluctuation as Hay Gulch. This may be an artifact of the additional monthly measurements at the East Alkali Gulch wells versus the quarterly measurements in Hay Gulch, however it must be reiterated that Hay Gulch is subject to fluctuating, but year-round ditch irrigation water importation and subsequent infiltration to the alluvium.

A water table elevation contour map for the alluvium in the vicinity of the King Mines is presented as **Figure 7**. This figure compiles water levels reported on CDWR Well Construction and Test Reports, converted to elevation for the associated water wells. Some of these measurements are several decades in the past, with a subset of the wells utilized in a 1983 USGS Level Survey. A significant portion of these data points are in a separate but adjacent La Plata River watershed, however several alluvial wells in the more relevant Hay Gulch and Alkali Gulch watersheds provide general water table elevation infill data to compliment the GCC compliance wells in these watersheds. The GCC monitoring well level data utilized in this figure is from 2019. As **Figures 5** demonstrates with the long record of the Wiltse well, the Hay Gulch alluvial aquifer does not show long-term sustained decrease or increase in level, only seasonal fluctuation. As previously discussed, Hay Gulch is subject to fairly consistent irrigation water infiltration, which may buffer longer-term drought effects. These values also suggest that the decades-old water level measurements may still be useful for the purpose of estimating alluvial groundwater flow gradient. Continued observations in East Alkali Gulch alluvial GCC monitoring wells will build the water table elevation data set to determine if this non-irrigated alluvial aquifer water table level trends differently than the irrigated Hay Gulch alluvium over time.

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 “A” coal seam belongs, have been maintained by GCC to provide baseline and compliance water quality information for the operation and extension of the King II mine since 2017 . In quarter four of 2018 bedrock monitoring was extended in hydrostratigraphic depth to include the next two deeper water-bearing intervals, the lower Menefee Formation and the underlying Point Lookout Formation. The locations of these wells are shown in **Figure 1**. These wells were named with suffixes as follows:

- “C” for Cliff House
- “A” for mined “A” seam coal
- “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)
- “LM” for the Lower Menefee which includes water-bearing lesser coal seams including the “B” coal seam where present
- “PL” for the Point Lookout Formation, specifically the uppermost approximate 25 feet.

Several of these wells are 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 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.

The Lower Menefee and Point Lookout hydrostratigraphic intervals were targeted for baseline monitoring in the 2018 monitoring well installation program as these are intervals included in domestic water wells in and around the Vista de Oro subdivision downgradient from the proposed King II Mine Dunn Ranch lease area. Of specific interest is the characterization of the East Alkali Gulch alluvial groundwater recharge to the underlying Menefee bedrock, as this is likely the most significant recharge area for the neighboring water wells. The MW-8 location is approximately 400 feet directly downgradient from the proposed low cover crossing in the bottom of East Alkali Gulch to monitor groundwater level and quality in all significant water-bearing intervals from surface (alluvium) to 310 feet depth (upper Point Lookout) for potential effects of King II Mine operations.

Bedrock Groundwater Quality – Major Ions

“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 time) water, and some water with variable dissolved oxygen content, leading to the non-uniform oxidation of pyrite in some rock types. In the MW-3-C and MW-4-C wells the sodium, sulfate and chloride may be residual solutes from the marine barrier sand bars in a tightly cemented, low permeability formation. **Figure 8** shows the major ion concentrations in stacked-bar formats demonstrating the differing Cliff House groundwater regimes between the MW-1 location in the northeast and MW-3/MW-4 locations in the southwest. While there may be differences in the Cliff House rock geochemistry that contribute to these observed water type difference, it is also likely to be related to recharge of a different source or at least a significant difference in distance from the source. It may be that saturated alluvium in the upper reach of East Alkali Gulch is directly overlying and recharging the Cliff House formation in the vicinity of the MW-1 location.

“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 9** shows the major ion concentrations in stacked-bar format. The MW-1 location at the north end of the ridge overlying the King II workings has a Cliff House and a coal well with some limited water, and a dry sub-coal Menefee Interburden well. The “C” and “A” wells have similar chemical makeup with calcium, sulfate-bicarbonate type, but the “A” well concentrations vary widely, indicating recharge by local infiltration. As noted on the **Figure 9** time plot for MW-6-A there is an apparent lab transcription error in the reported sulfate concentration of the first sample, and the plot value is an interpolation to match TDS and make cations and anions balance.

“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 is commonly observed in regional domestic water wells. Major ion concentrations of the Menefee Interburden wells are shown as stacked-bar plots in **Figure 10**. Of the newest “MI” wells, MW-6-MI drilled dry through the Menefee Interburden section and water only came in over the following couple days, the majority of which was likely produced from the exposed “A” coal seam before the well was completed. MW-8-MI is completed in East Alkali Gulch just downgradient from significant alluvial recharge; the well is screened across the first bedrock water encountered. This interval flow tested at 24 gallons per minute (gpm) at total depth borehole of 102 feet, with cemented steel casing sealing off all alluvium 73 feet to ground surface. This is in stark contrast to every other “MI” well that drilled dry and then either remained dry to date (MW-2-MI), wetted and then dried up (MW-1-MI, MW-6-MI) or wetted but demonstrates very low yield (MW-3-MI, MW-4-MI).

“LM” wells completed in the lower Menefee are limited to MW-6-LM on a ridge top above and cross-gradient of East Alkali Gulch, while MW-8-LM is completed in East Alkali Gulch. These wells yield little water and total salinity has dropped and major ions shifted in successive sampling events. Sulfate and chloride have also decreased in successive samples. Cation ratios (sodium and calcium) are also variable in these low-yielding wells, illustrating the chemical discontinuity in these low permeability groundwater lenses located in minor coal seams and minor fractured intervals. The major ion concentration comparison plots are presented as **Figure 11**.

The single "PL" well completed in the upper Point Lookout is at MW-8-PL in East Alkali Gulch. As with the "LM" wells, total salinity has also been generally decreasing in successive sampling events during the first year of monitoring. Major ions concentrations of the four samples collected from the Point Lookout to date are found in **Figure 12**.

Bedrock Groundwater Quality – Trace Elements

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. Trace constituent data are presented as distribution curves where cumulative values are compared to the number samples less than a given concentration. The number of samples less than a given detection limit for a particular constituent, together with observed concentrations reported above the detection limits, can indicate the general distribution of concentrations in each rock type and identify anomalies or more complex reaction pathways, such as a solute plume or ditch water invading an alluvial aquifer).

Trace constituent (metals and fluoride) concentration distributions are illustrated in **Figures 13-22**. These are cumulative frequency plots, representing the number of samples less than or equal to any X-axis concentration, including samples with below detection results. Drinking water standards are shown where applicable. The distribution of each constituent is shown for Hay Gulch Ditch surface water, and pumped samples from "A" seam coal, Menefee and Cliff House Formation wells. The values shown above the distribution curve likely represent the oxidative weathering of bedrock where iron sulfides are present.

IRON, MANGANESE (NO DRINKING WATER STANDARD)

Figure 13. Iron and manganese common trace metals observed in the regional rock types near the site. Iron is commonly sourced from pyrite in the Mesa Verde strata which oxidizes in the weathering zone. Generally, the oxidized iron will precipitate in the oxidation zone and dissolved concentrations of trace constituents under neutral pH conditions are low. Four "A" seam coal well samples exceeded 1 mg/L, all from MW-6-A, which shows unusual calcium-sulfate water presumably derived from pyrite oxidation with little exposure to clay for cation exchange (which tends to take up calcium and release sodium). There have been 23 "A" seam coal well samples collected with iron less than the secondary standard (0.3 mg/L), most of which were also below detection limits.

In Cliff House wells, iron exceeded the secondary standard in 16 of 39 samples collected, with a maximum of 2.5 mg/L. In Menefee Interburden and Lower Menefee wells, no sample concentrations exceeded the secondary standard, and most were below detection limits. In all alluvial wells the maximum iron concentration reported was 8 mg/L, and 48 of 288 samples exceeded the secondary standard.

Manganese is typically derived from similar processes of pyrite oxidation as a minor constituent. The few higher concentrations shown in the distribution in coal wells are also from the well MW-6-A, which also had elevated iron. Most “A” seam coal well manganese sample concentrations were reported less than the secondary standard of 0.05 mg/L. Approximately half of the Cliff House samples had manganese reported higher than the standard, as did 9 of 53 samples in the Menefee Interburden and Lower Menefee wells. Minor exceedances of the standard were noted in a few alluvial well samples.

ARSENIC (DRINKING WATER STANDARD 0.01 MG/L)

Figure 14. Arsenic is present a minor constituent in bedrock and is sometimes associated with pyrite. during pyrite oxidation, arsenic is typically absorbed, at least in part, and immobilized with iron hydroxy-oxide precipitation. As shown in in **Figure 14**, arsenic in “A” seam coal wells and alluvial wells is at very low concentrations. However, a majority of the Lower Menefee and Menefee Interburden wells show arsenic exceeding the MCL; the reported concentrations in each well show no significant increase or decrease over time. The widespread occurrence of arsenic in these wells may suggest it is dispersed in the Menefee more than just derived from pyrite oxidation.

A standard for arsenic in water for cattle and poultry is 0.2 mg/L, or 20 times the human MCL. No samples concentrations exceeded 0.025 mg/L.

COPPER (DRINKING WATER STANDARD 1.3 MG/L)

Figure 15. Copper is likely to be present as a trace constituent and is sometimes associated with pyrite in bedrock. Concentrations of copper are low in “A” seam coal and alluvial well samples, but considerably higher in Lower Menefee and Menefee Interburden wells. The highest concentrations are reported from the Cliff House Formation wells, but are less than the drinking water standard.

FLUORIDE (NO DRINKING WATER STANDARD)

Figure 16. Fluoride has a health-based secondary standard because high concentrations can damage teeth. Fluoride is reported at low concentrations in “A” seam coal and alluvial wells, but exceeds the drinking water secondary standard in almost half the Lower Menefee and Menefee Interburden wells. In this environment, F is possibly derived from clay minerals in the Menefee shales.

MOLYBDENUM (DRINKING WATER HEALTH ADVISORY LEVEL 0.08 MG/L)

Figure 17. There is no drinking water MCL for molybdenum, although the EPA has set a health-based advisory limit of 0.04 mg/L. Molybdenum distributions resemble those of selenium, and a few Cliff House and Menefee samples exceed this limit. 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 18. Selenium exceeds the MCL in a few Menefee and Cliff House Formation wells. Selenium is likely associated with sulfides, and in particular with the oxidation of pyrite in Mesa Verde strata.

URANIUM (DRINKING WATER STANDARD 0.03 MG/L)

Figures 19-20. Uranium is present in most natural water at concentrations between 0.0001 and 0.01 mg/L (Hem, 1985, USGS Water Supply Paper 2254). As with the trace elements discussed above, uranium is reported in this range in “A” seam coal and alluvial wells in the study area as seen in **Figure 19**, but has in the past exceeded the MCL in one well (it has declined to less than the MCL). The particular well with reported U higher than MCL is a Cliff House well, MW-4-C; samples between 0.03 and 0.1 mg/L U are from MW-3-C, which is within a mile of MW-4-C.

Natural uranium deposits in the Four Corners area are common where groundwater flowing from uplifted volcanic and Precambrian outcrop areas met reducing conditions in the form of accumulated plant material in fluvial strata, and this is likely the cause of the slightly elevated concentrations in these two wells. It can be seen in **Figure 20** that the concentration of U in MW-4-C was higher initially when oxidation potential (ORP) was elevated, perhaps due to aeration of the well in purging, and that subsequently both U concentration and ORP have declined. This correlation is not as evident for MW-3-C, which has lower concentrations.

ZINC (SECONDARY DRINKING WATER STANDARD 5 MG/L)

Figure 21. Zinc concentrations resemble those of manganese, and again it may be surmised that zinc was scavenged by pyrite and released by oxidation of sulfides in Menefee strata in weathering. Zinc has always been observed below the secondary standard in the area.

ORGANICS (TOC NO DRINKING WATER STANDARD, BENZENE 0.005 MG/L, TOLUENE 1 MG/L, ETHYLBENZENE 0.7 MG/L, XYLENES (TOTAL) 10 MG/L DRINKING WATER STANDARD)

Figure 22. MW-3-C showed elevated organic carbon in initial samples, and aromatic hydrocarbons were analyzed in 2019 as part of MR-48, the minor revision to the permit to investigate elevated levels of total organic compounds in monitoring wells. The MR-48 MW-3-C investigation is in progress and will be discussed under separate cover, to be reported in 2020. Concentrations of these constituents are shown in **Figure 22**. Note the plot has a logarithmic concentration scale. “TOC” represents total organic carbon, and the “BTEX” suite represents

volatile aromatics typically associated with petroleum sources, namely benzene, toluene, ethylbenzene, and xylenes.

TOC concentration was reported near 10 mg/L in the first sample, and climbed to as much as thirty times that in 2018, declining somewhat through 2018. BTEX concentrations declined from the May sample to November. Although two samples do not validate a trend, benzene in this well declined 62% in four months. The most recent benzene concentration (0.024 mg/L) is the only one exceeding the EPA's MCL or health-based criterion (0.005 mg/L).

This anomaly might suggest contamination of the well during drilling and installation, although these wells are installed under environmental protocols. The other possibility is a natural source, for which there are precedents in the region. Igneous dikes and sills intruding the Mesa Verde strata, as well as the uplift of the La Plata Mountains commonly metamorphosed and/or pyrolyzed coals (which gives the "A" seam its relatively high grade) and BTEX is widely reported in monitoring wells in the San Juan Basin. Since installation, MW-3-C has always off-gassed to read a nuisance 10% lower explosive limit (LEL) when measured directly at the wellhead. Despite the lack of coals observed during the drilling of this Cliff House well, the methane present at MW-3-C is presumed natural. While no such observations of hydrocarbons or specifically BTEX in water wells have yet been confirmed in the Hay Gulch-Hesperus area, this is being explored as part of the MR-48 MW-3-C investigation.

Bedrock Groundwater Level

Groundwater potentiometric surface contour maps have been prepared for each monitored hydrostratigraphic interval and are presented as **Figures 23-27**. Contouring is only possible for intervals that include three or more monitoring locations, so the "LM" and "PL" figures do not include contours to indicate groundwater flow direction or gradient. Regardless, it is expected that regional flow direction in these intervals is south-southwest in the direction of strata dip, as documented in the overlying three hydrostratigraphic intervals. Groundwater flow gradient appears to be approximately 100 feet per mile (1.89% or 1.09°) for all intervals, which is about 1/3 to 1/2 of the strata dip. The King II Mine permit area is an excellent demonstration of the formation of a multiple bedrock aquifer system in an arid basin. Dry unsaturated (vadose) rock is present at the upland outcrop basin margin areas; water infiltration must pass through initially unconfined fractured networks filling fractures and pore space while displacing gases, and then finally into fully confined conditions with depth towards the central part of the basin. When the head pressure observed at any given point in the aquifer is greater than the equivalent distance from ground surface to the top of that aquifer then the aquifer is defined as confined. Significant recharge areas, inferred by buried bedrock exposure to saturated alluvium, are also displayed in these figures.

Groundwater levels, as measured from wellheads during routine compliance monitoring, are given in the GCC Hydrologic Monitoring Summary Tables, provided in this report as the Attachment.

RECOMMENDATIONS

With comprehensive review of the expanded baseline parameter list results and increased frequency of monitoring for the nearly four-year period during 2016-2019 for the existing compliance Hay Gulch ditch locations and alluvial wells, no trace metals or minor constituent concentrations were found to be significant with respect to water quality standard have been observed, with the exception of the outliers discussed above. This evaluation considers drinking water standards and 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.

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.

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 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, as has just occurred with the latest monitoring wells installed in late 2018. Provided that silica, mercury, and nitrate/nitrite 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)	Surface Elevation (ft amsl)
Wiltse Well	Groundwater - Alluvial Hay Gulch	757024.673	4126948.393	7372.0
Well #1 Upgradient	Groundwater - Alluvial Hay Gulch	755543.611	4126352.130	7254.0
Well # 2 Downgradient	Groundwater - Alluvial Hay Gulch	754164.863	4125282.984	7174.8
MW-HGA-4	Groundwater - Alluvial Hay Gulch	757641.447	4127453.016	7410.5
MW-1-C	Groundwater - Bedrock Cliff House overburden	757690.096	4131037.627	8519.8
MW-1-A	Groundwater - Bedrock "A" coal seam	757693.395	4131042.883	8520.4
MW-1-MI	Groundwater - Bedrock Menefee interburden	757696.625	4131048.193	8520.8
MW-2-C	Groundwater - Bedrock Cliff House overburden	755125.962	4126776.758	7711.7
MW-2-A	Groundwater - Bedrock "A" coal seam	755128.957	4126781.777	7713.0
MW-2-MI	Groundwater - Bedrock Menefee interburden	755132.894	4126786.834	7713.5
MW-3-C	Groundwater - Bedrock Cliff House overburden	752333.836	4124416.003	7416.6
MW-3-A	Groundwater - Bedrock "A" coal seam	752337.515	4124420.823	7416.6
MW-3-MI	Groundwater - Bedrock Menefee interburden	752341.458	4124425.586	7416.3
MW-4-C	Groundwater - Bedrock Cliff House overburden	752098.476	4125629.241	7568.8
MW-4-A	Groundwater - Bedrock "A" coal seam	752101.678	4125634.068	7569.5
MW-4-MI	Groundwater - Bedrock Menefee interburden	752105.037	4125639.328	7569.7
MW-6-C	Groundwater - Bedrock Cliff House overburden	752322.705	4127770.537	7879.0
MW-6-A	Groundwater - Bedrock "A" coal seam	752319.364	4127765.472	7879.0
MW-6-MI	Groundwater - Bedrock Menefee interburden	752315.858	4127760.196	7878.0
MW-6-LM	Groundwater - Bedrock Lower Menefee	752312.834	4127755.333	7878.0
MW-7-EAA	Groundwater - Alluvial East Alkali Gulch	753001.888	4127319.951	7460.0
MW-8-EAA	Groundwater - Alluvial East Alkali Gulch	752916.895	4127107.544	7440.0
MW-8-MI	Groundwater - Bedrock Menefee interburden	752912.969	4127110.290	7447.0
MW-8-LM	Groundwater - Bedrock Lower Menefee	752908.636	4127106.081	7446.0
MW-8-PL	Groundwater - Bedrock Point Lookout	752904.413	4127101.783	7445.0
Hay Gulch Ditch Downgradient	Surface Water - Irrigation ditch	754376.015	4125623.299	7210.0
Hay Gulch Ditch Upgradient	Surface Water - Irrigation ditch	757636.698	4127606.813	7430.0

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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 2019 compliance hydrologic monitoring locations

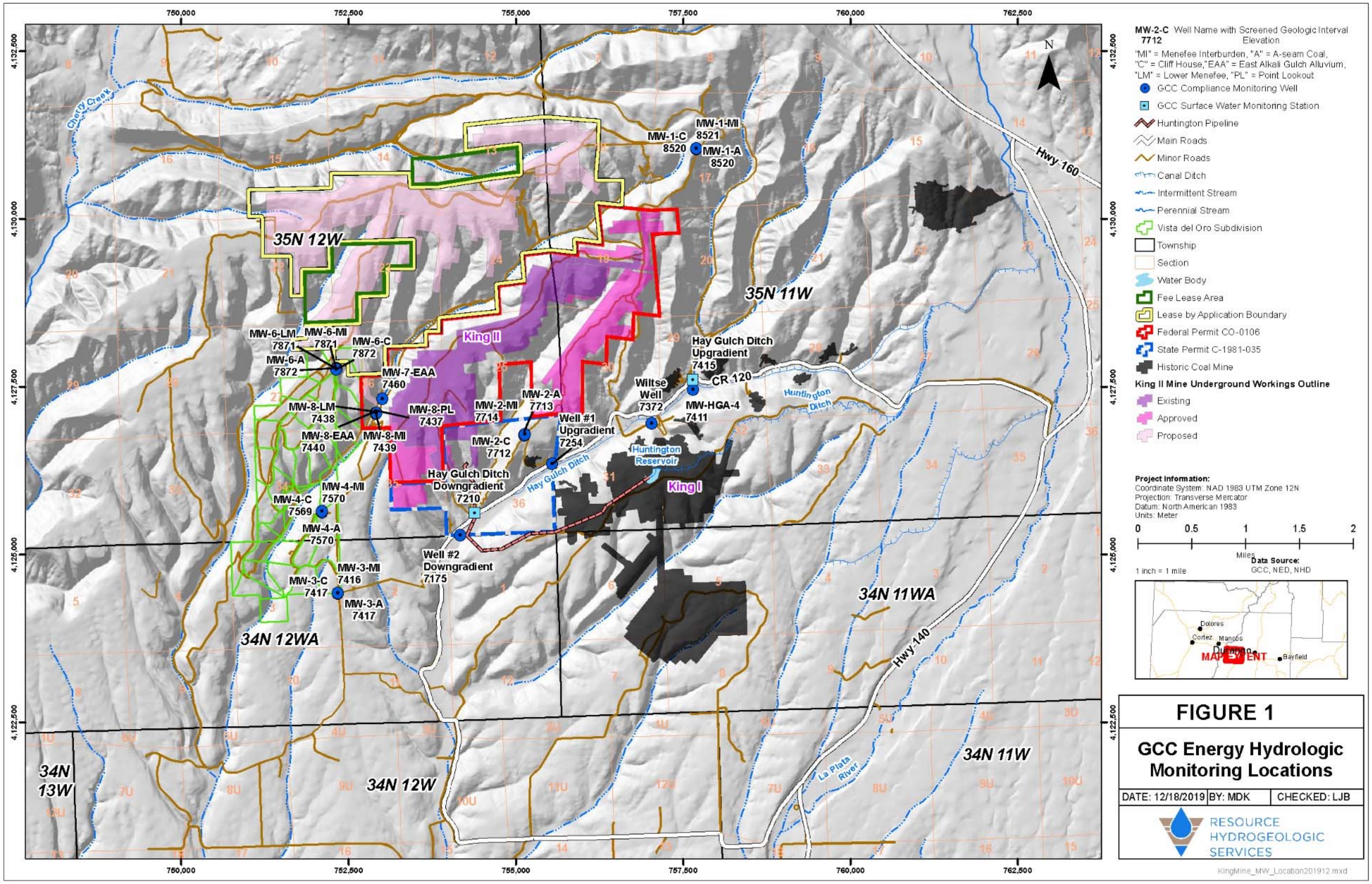
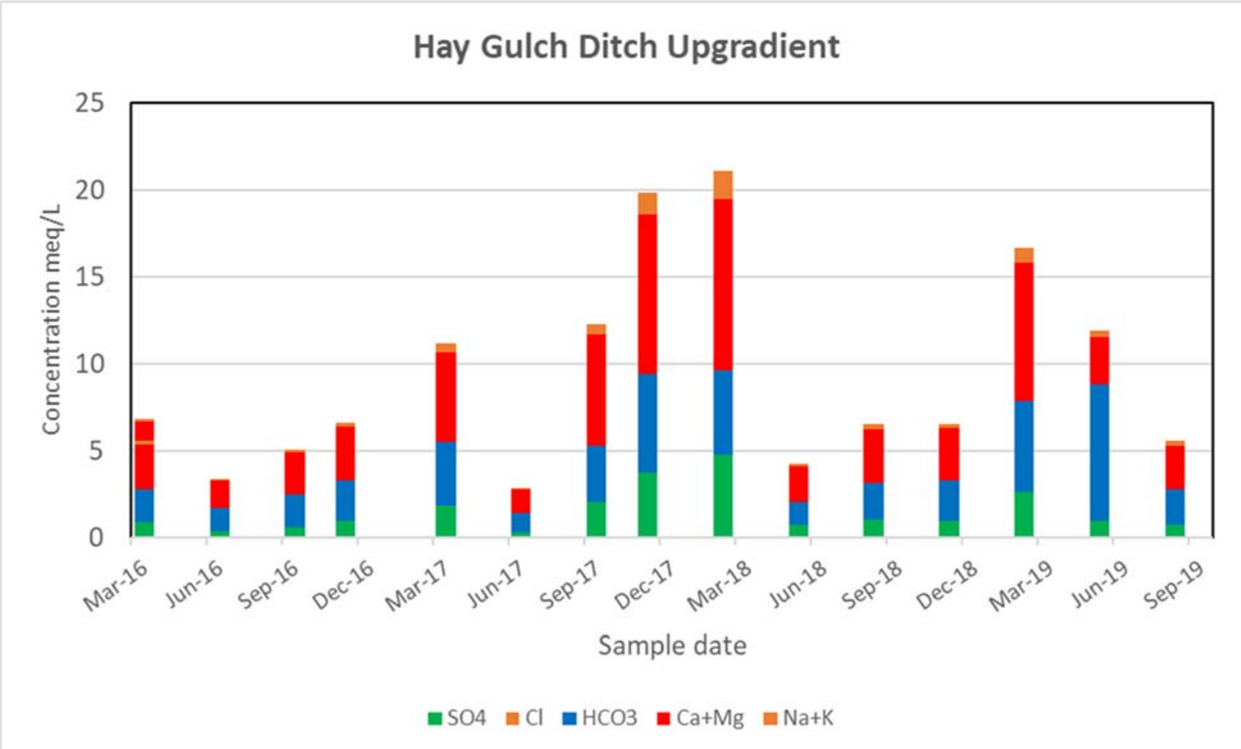


Figure 2. Comparison of major ions (milli-equivalents/Liter) in water analyses in Hay Gulch Ditch samples collected upstream and downstream of King I & II Mines 2016 through 2019



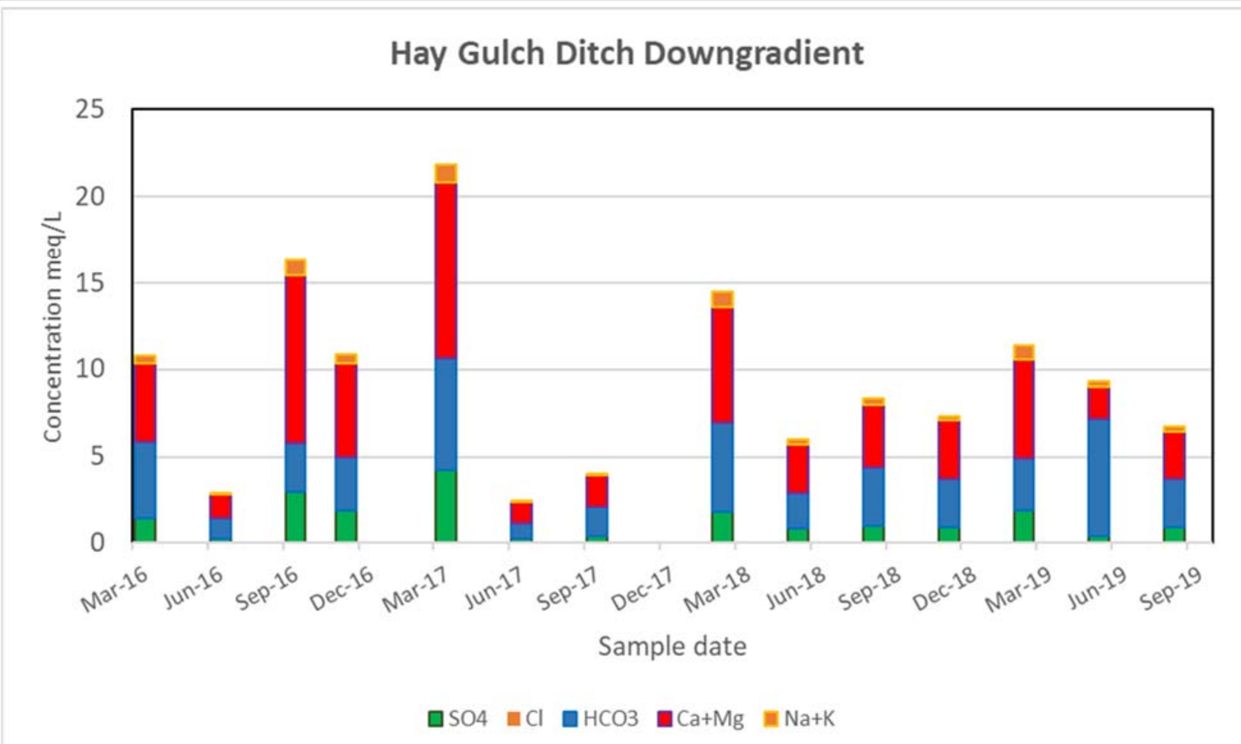


Figure 3. Comparison of major ion concentrations in alluvial monitoring wells in Hay Gulch Alluvium

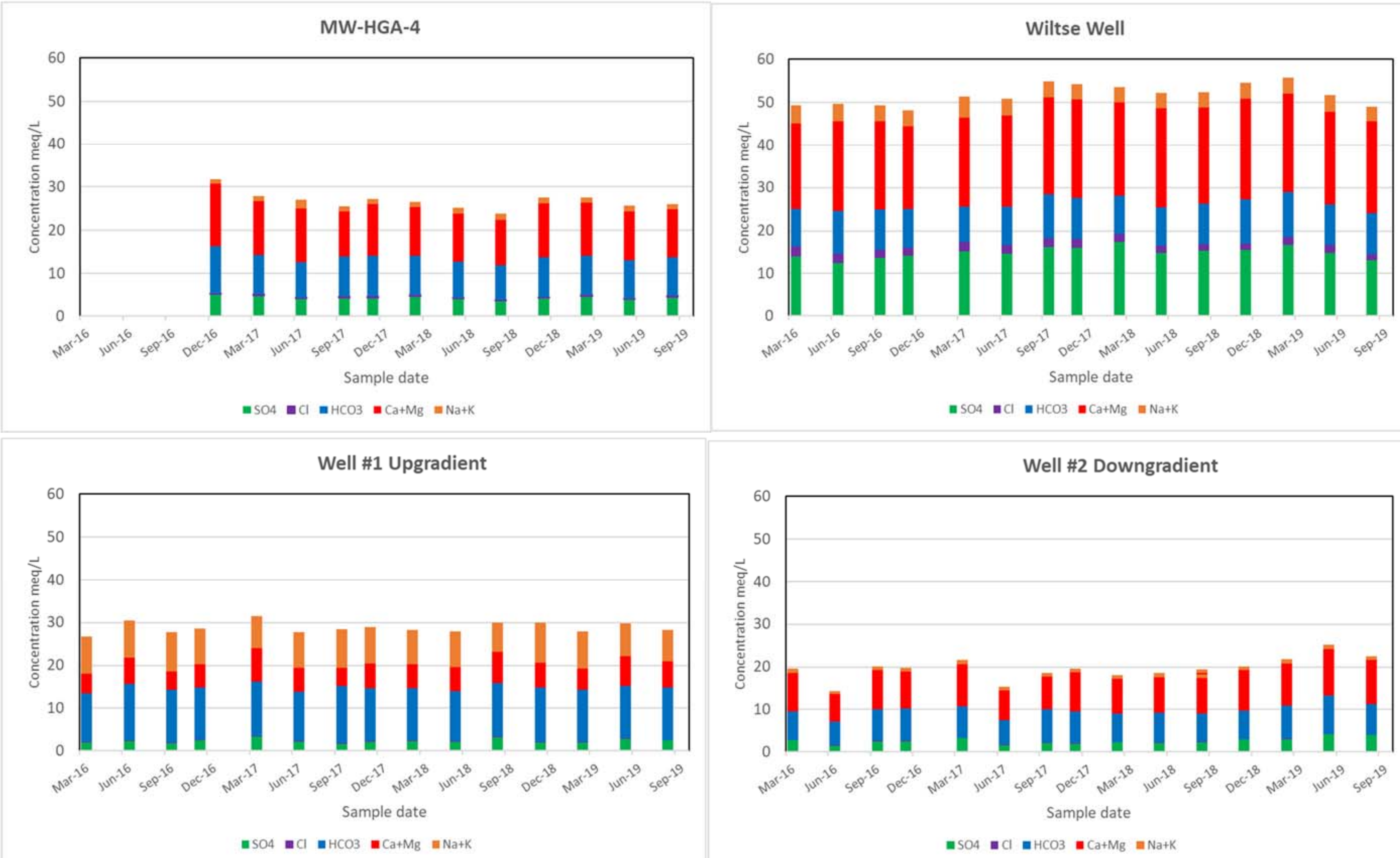
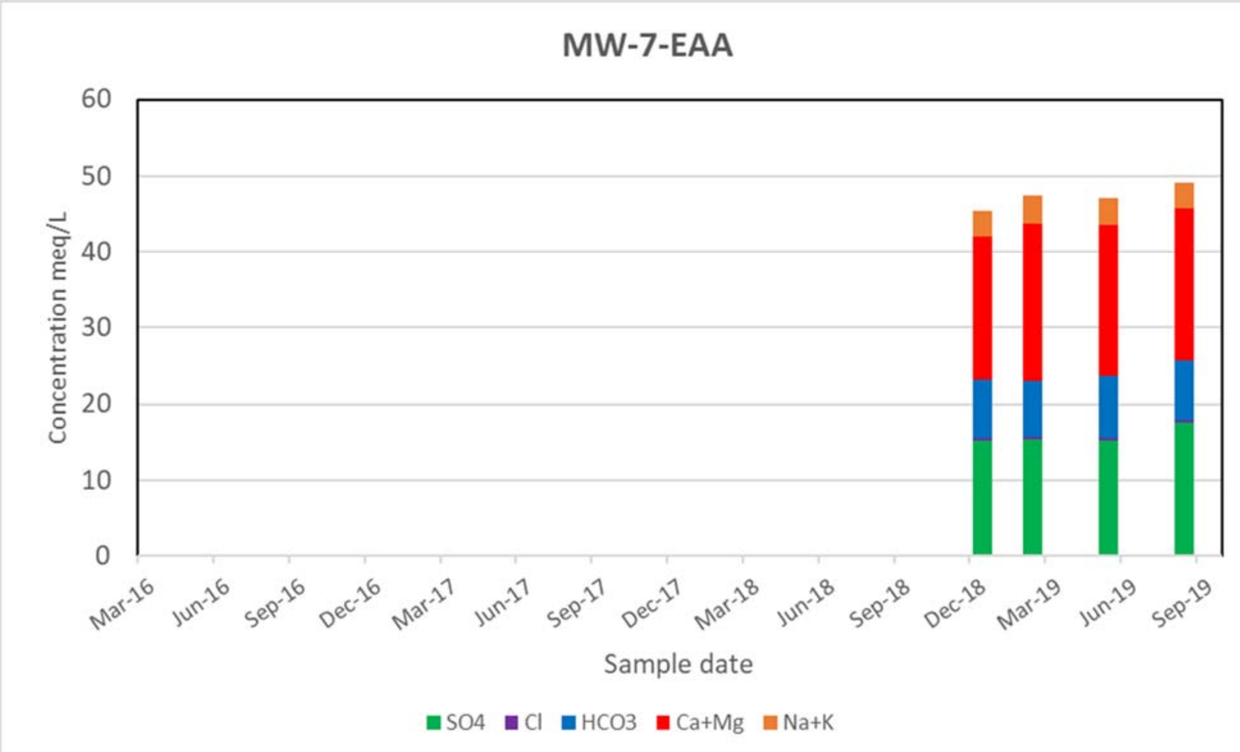


Figure 4. Comparison of major ion concentrations in alluvial monitoring wells in East Alkali Gulch Alluvium



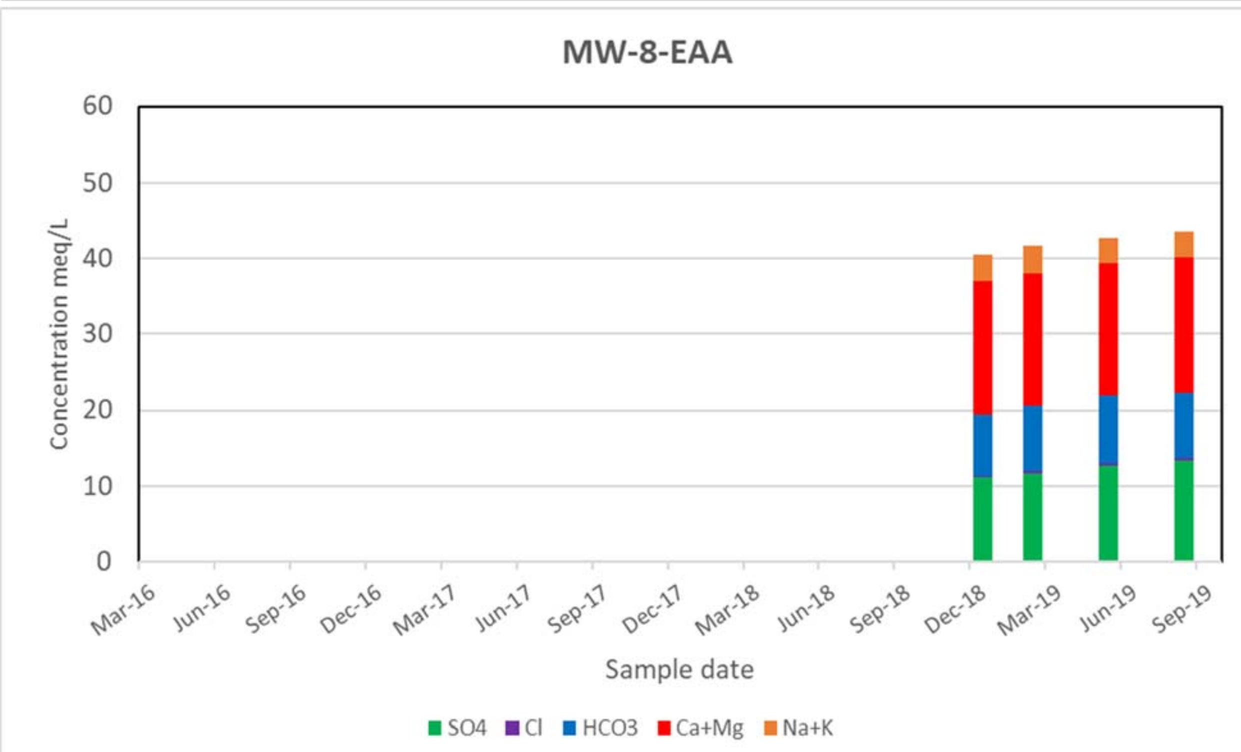


Figure 5. Hay Gulch Alluvial Groundwater Hydrograph

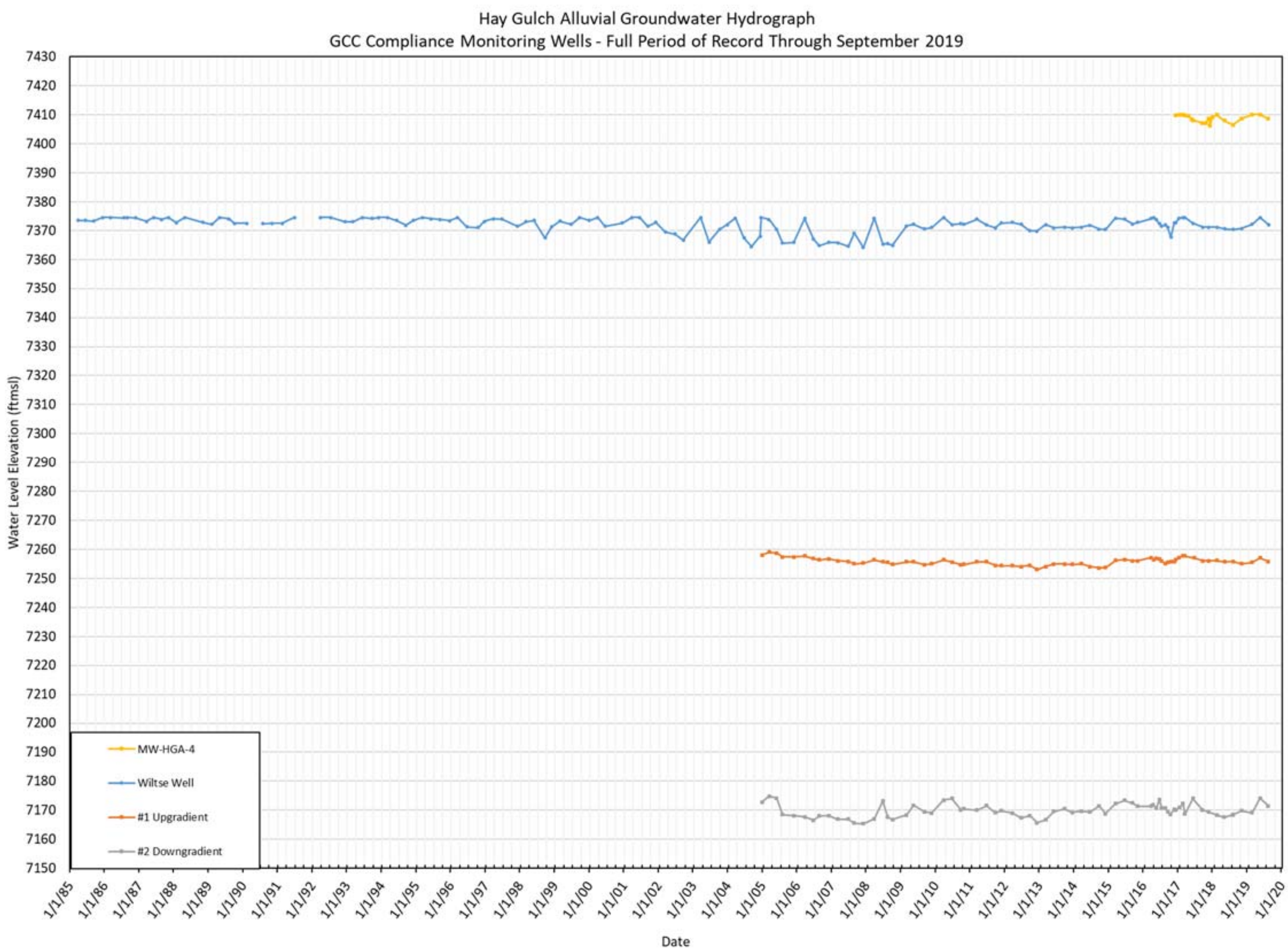


Figure 6. East Alkali Gulch Alluvial Groundwater Hydrograph

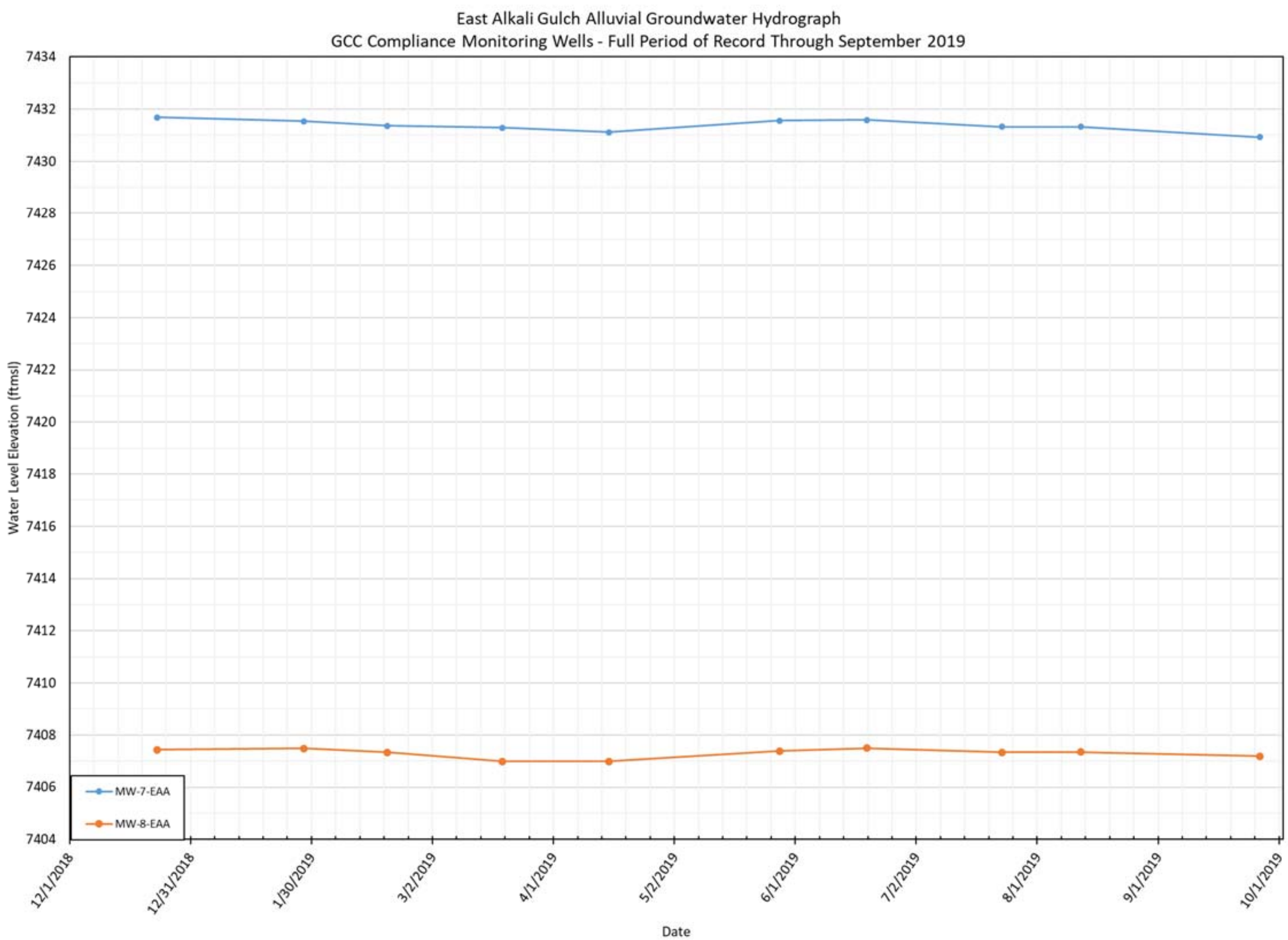


Figure 7. Alluvial Groundwater Table Contour Map

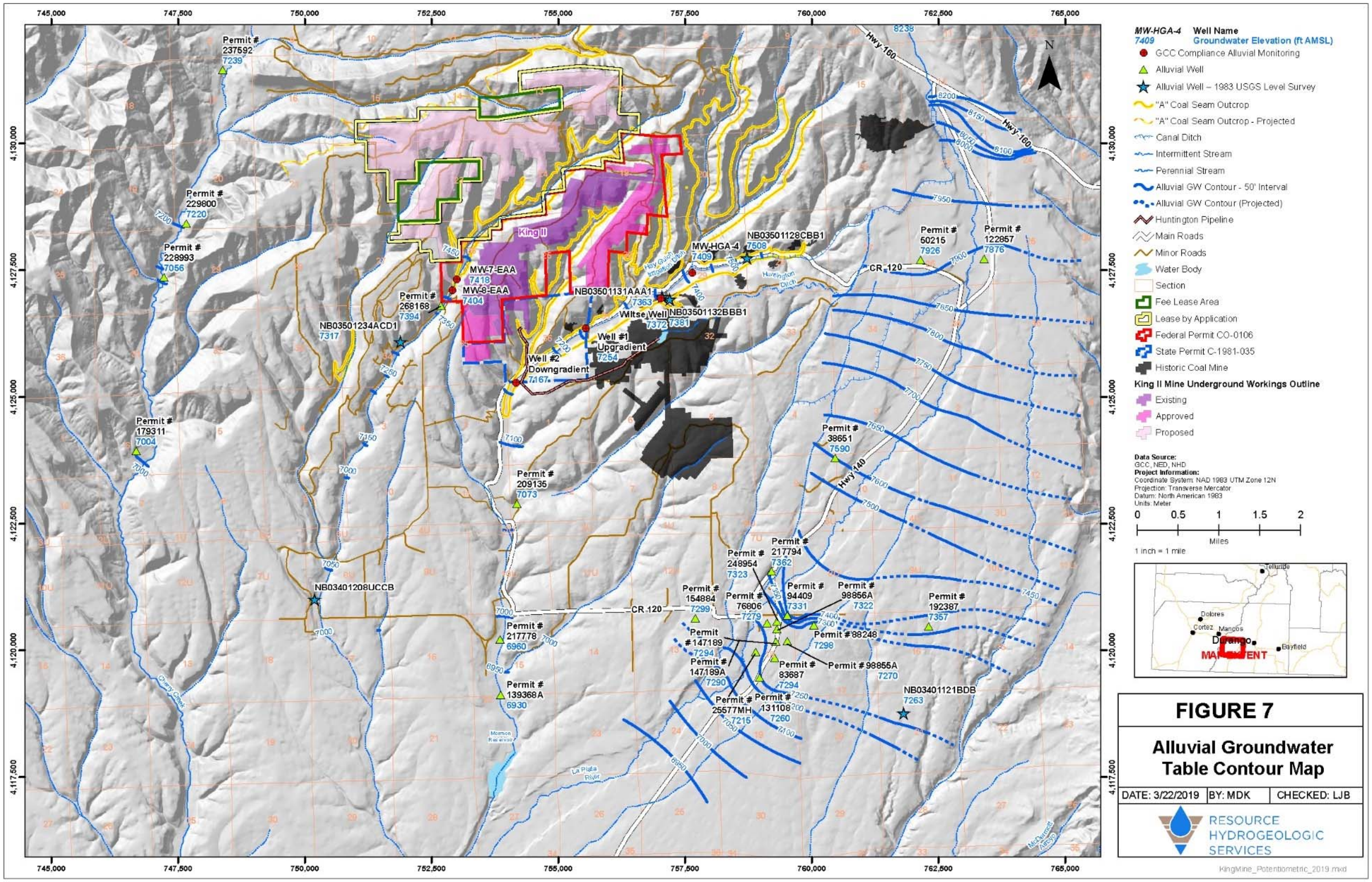
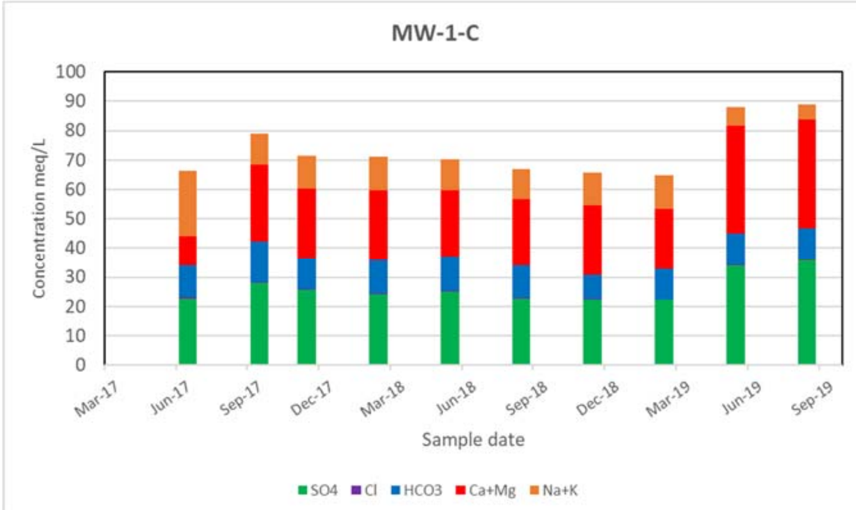
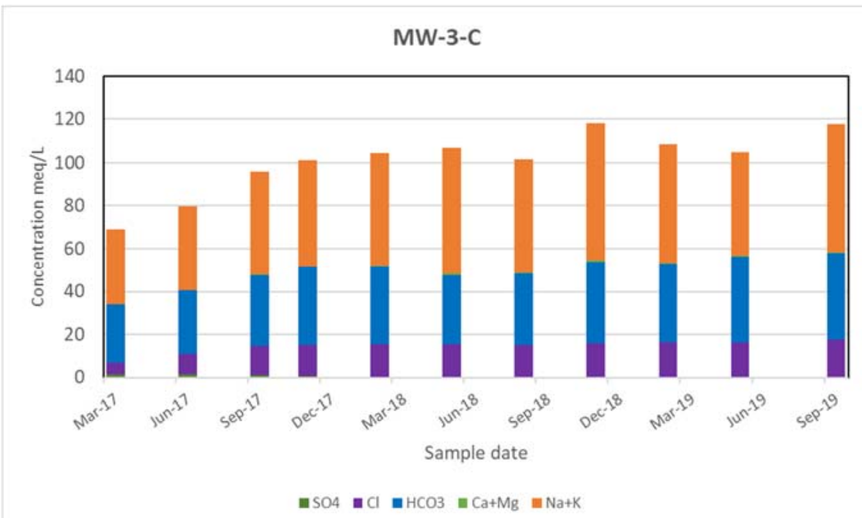


Figure 8. Comparison of major ion concentrations in Cliff House ("A" seam overburden) bedrock monitoring wells





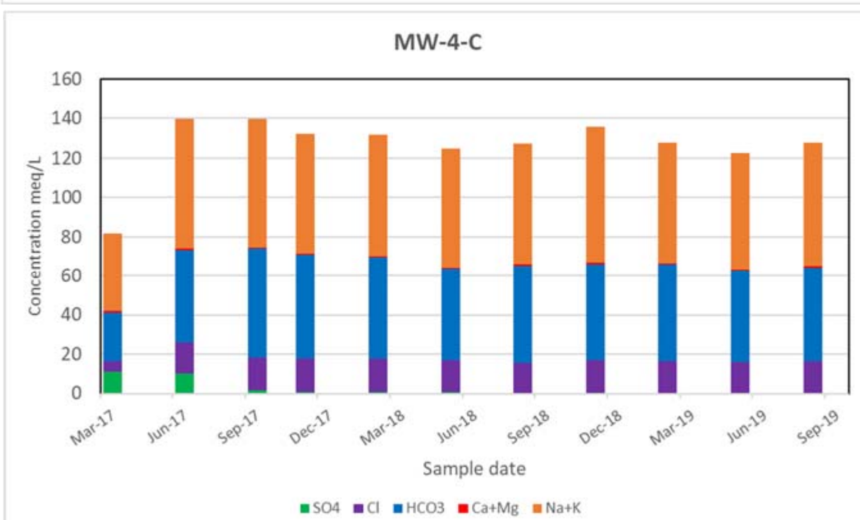


Figure 9. Comparison of major ion concentrations in "A" coal seam bedrock monitoring wells

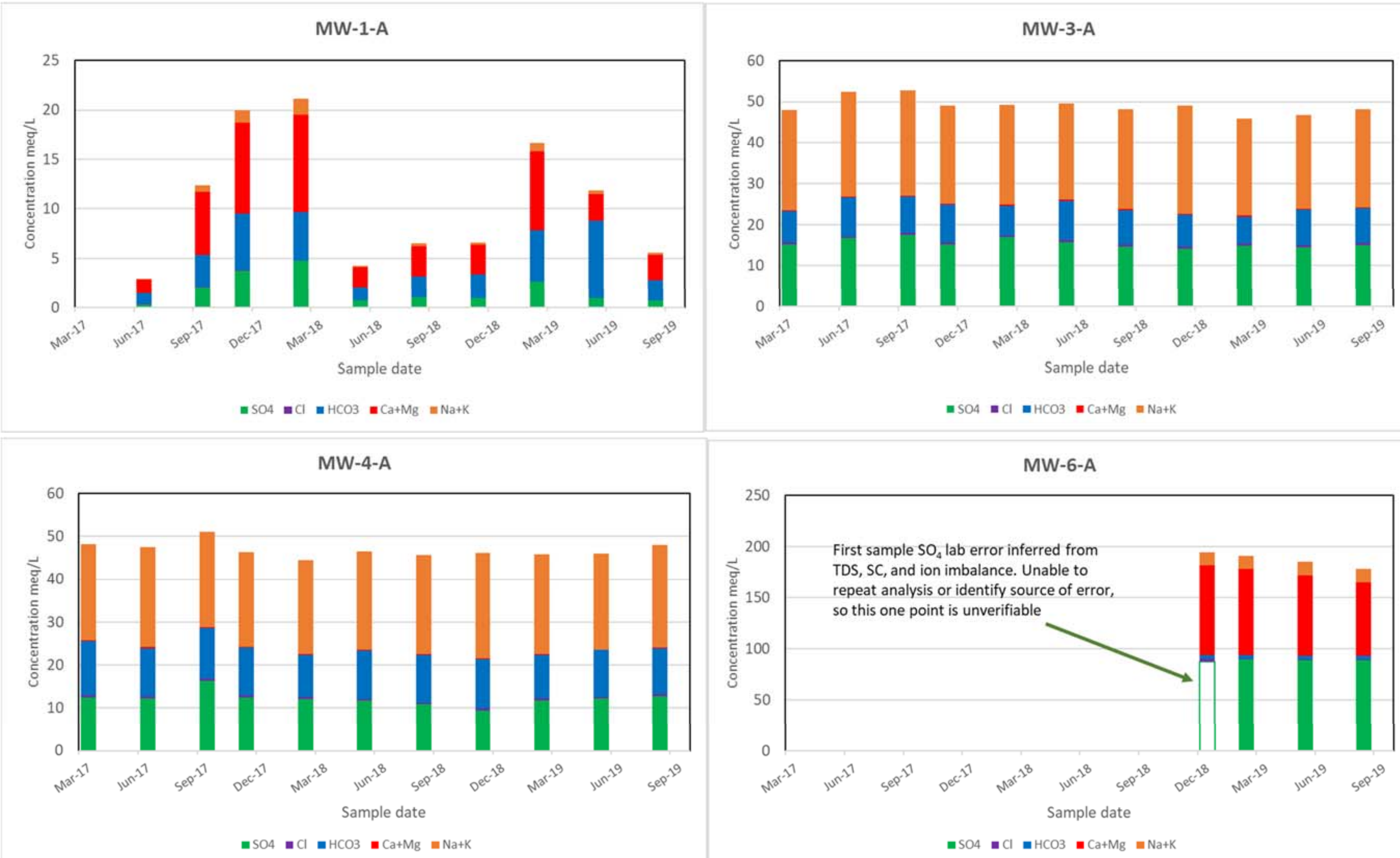


Figure 10. Comparison of major ion concentrations in Menefee Interburden ("A" seam underburden) bedrock monitoring wells

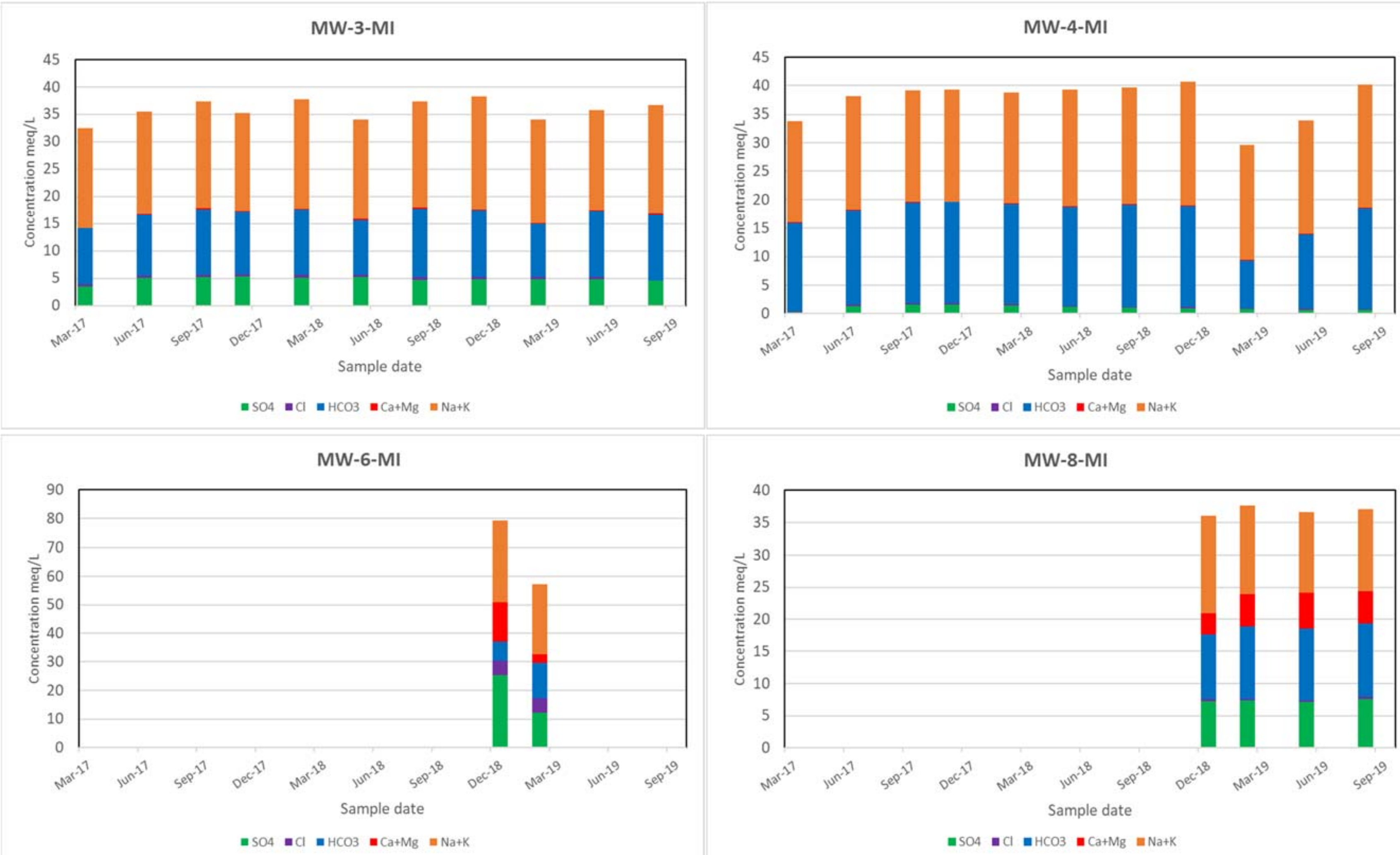
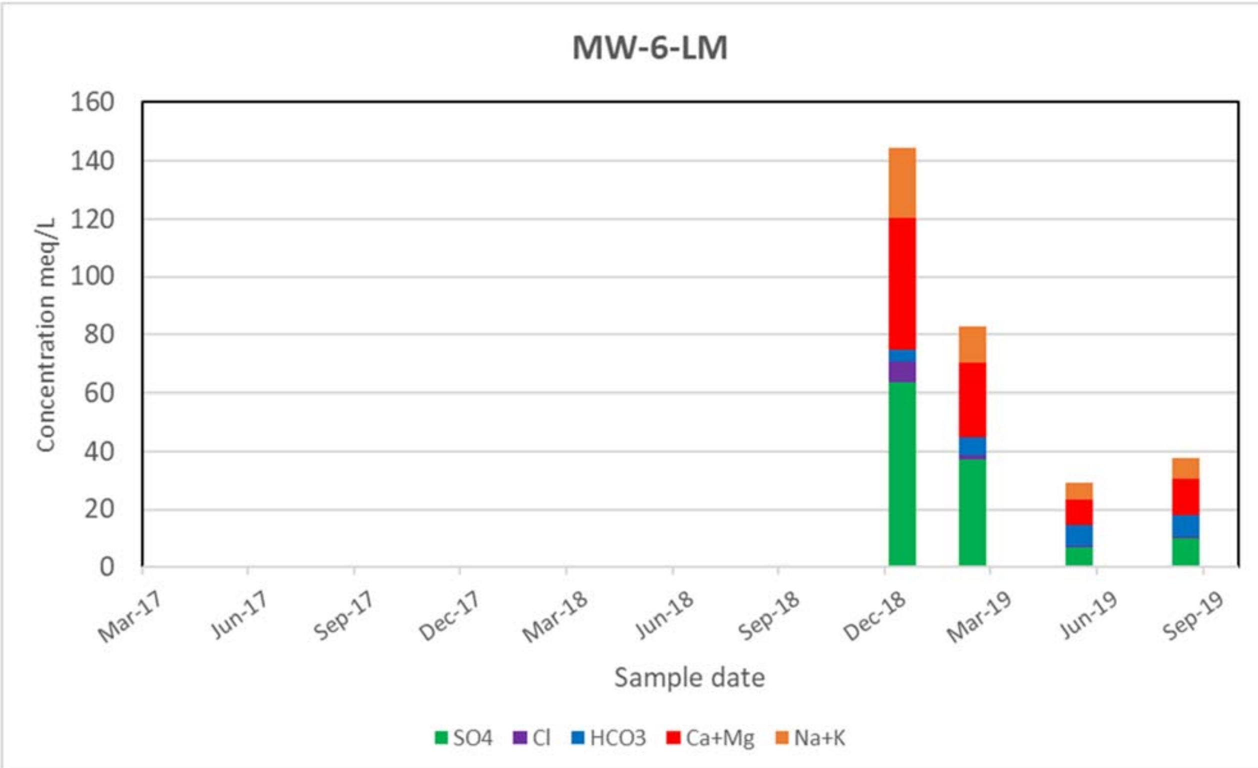


Figure 11. Comparison of major ion concentrations in Lower Menefee bedrock monitoring wells



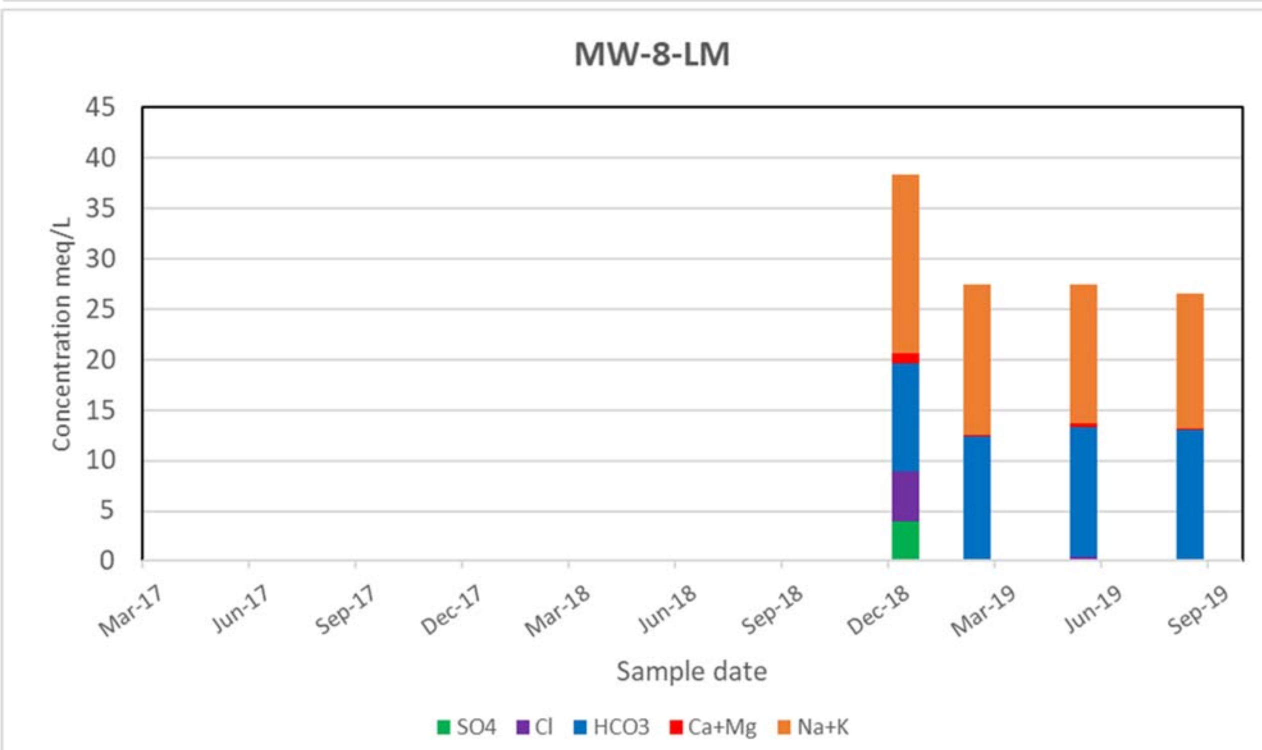


Figure 12. Major ion concentrations in the Point Lookout bedrock monitoring well.

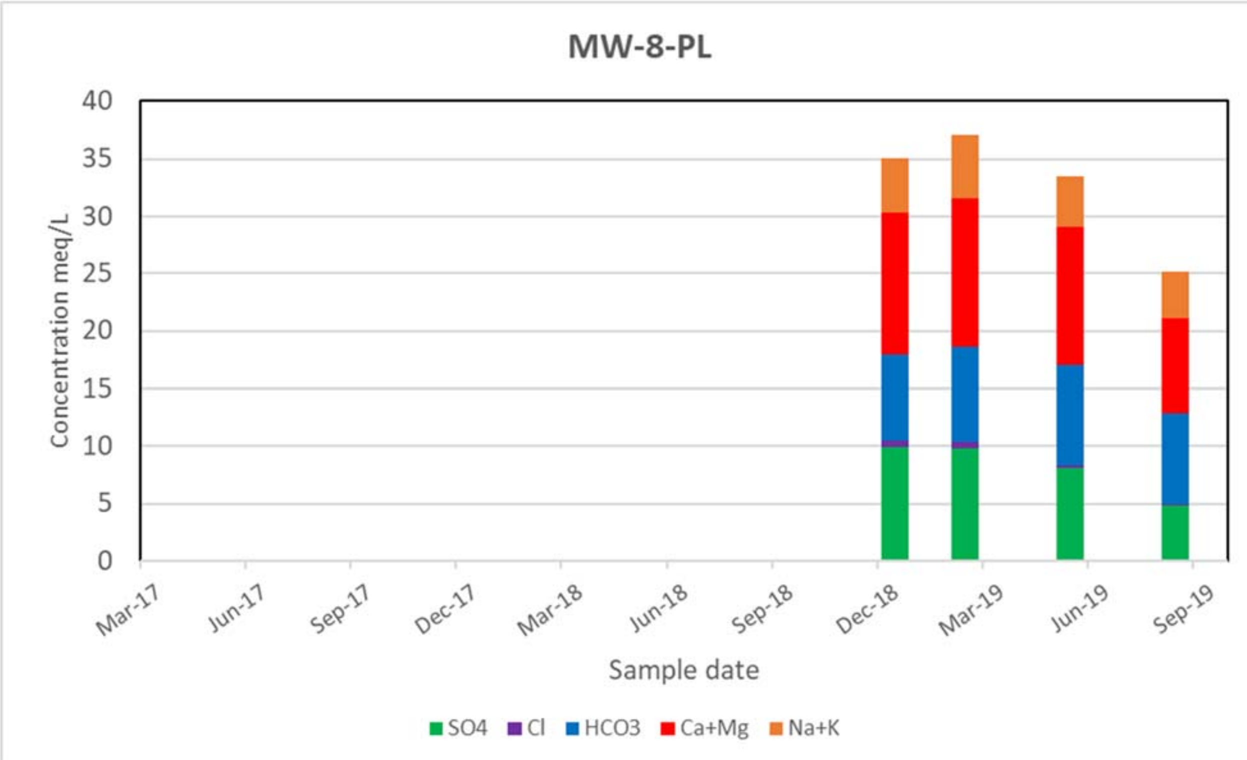
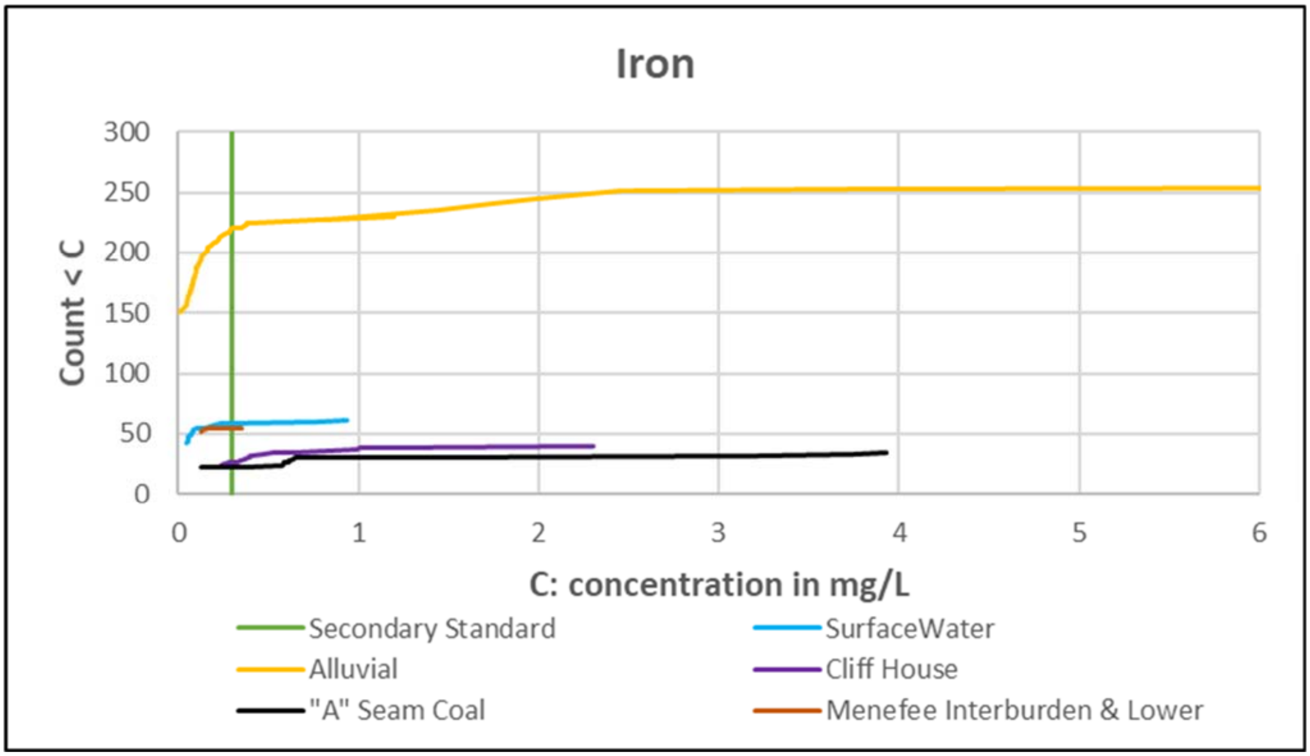


Figure 13. Iron and manganese concentration distribution cumulative frequency plots.



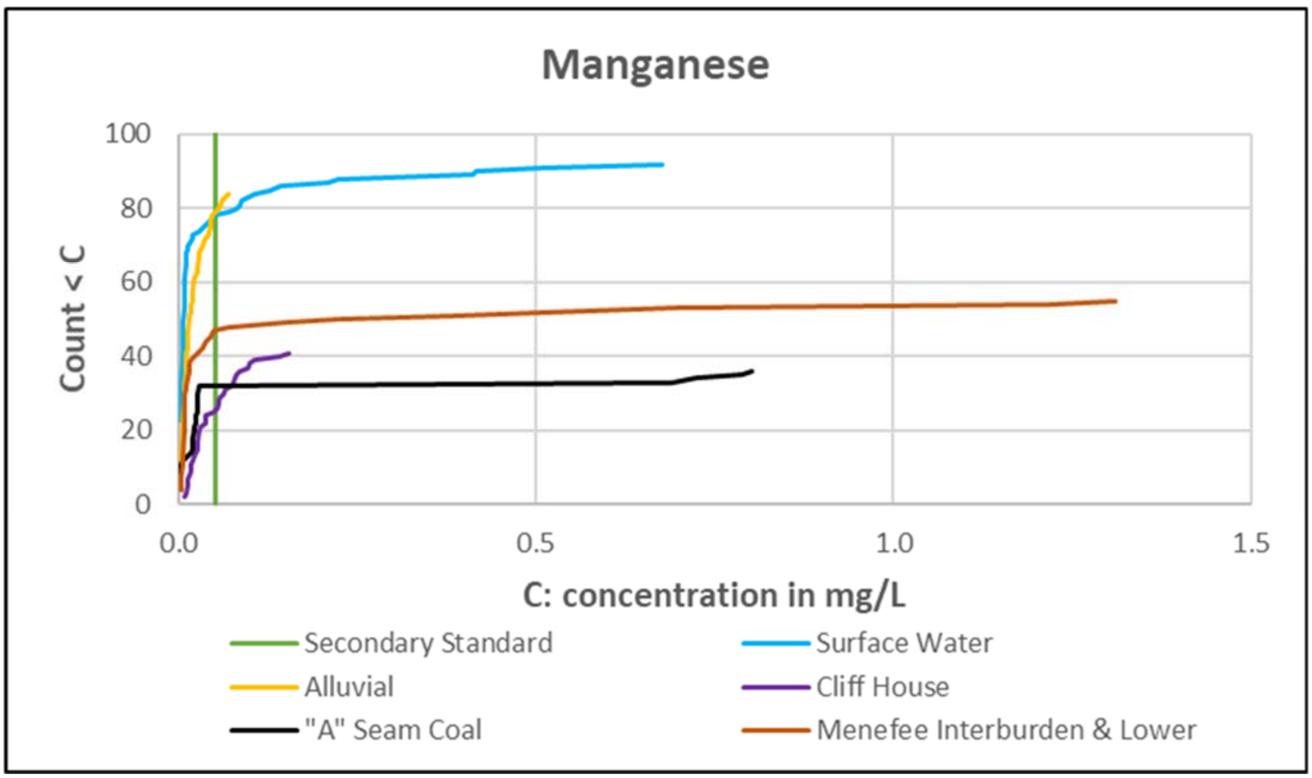


Figure 14. Arsenic concentration distribution cumulative frequency plots.

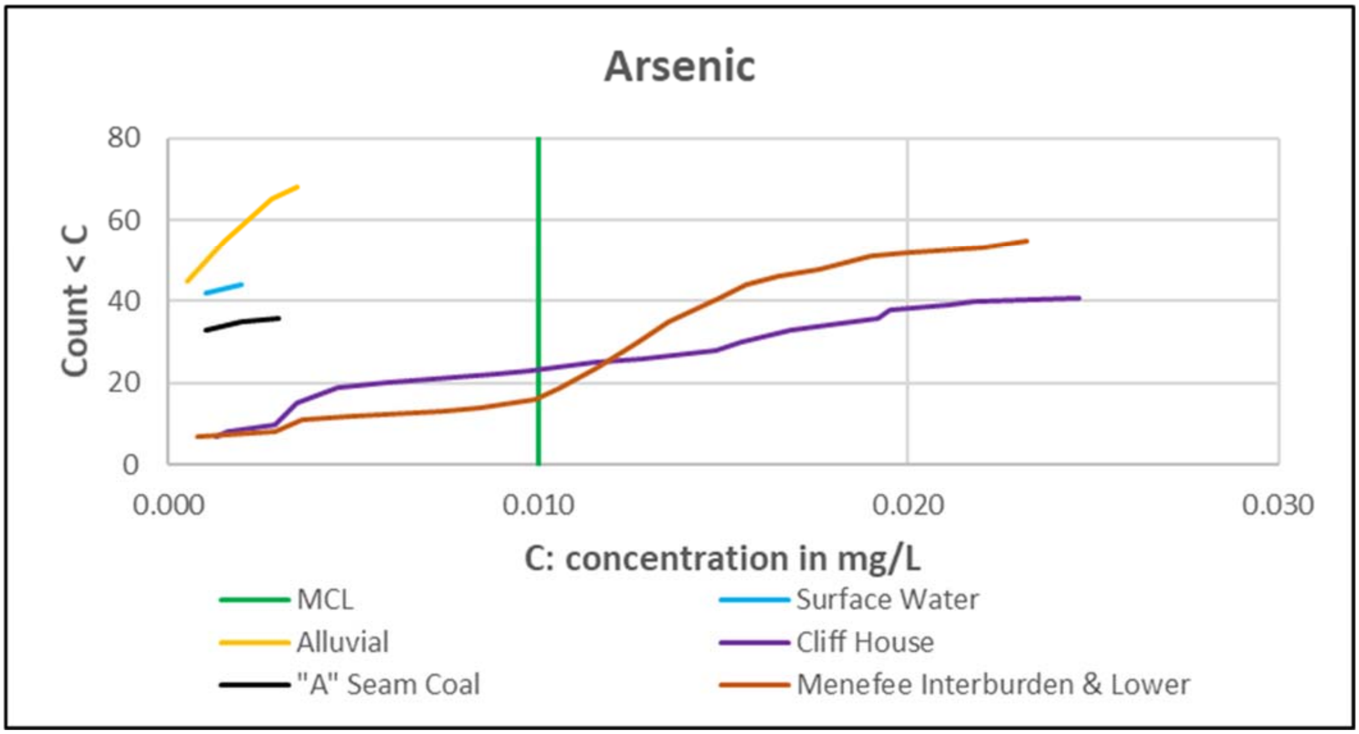


Figure 15. Copper concentration distribution cumulative frequency plots.

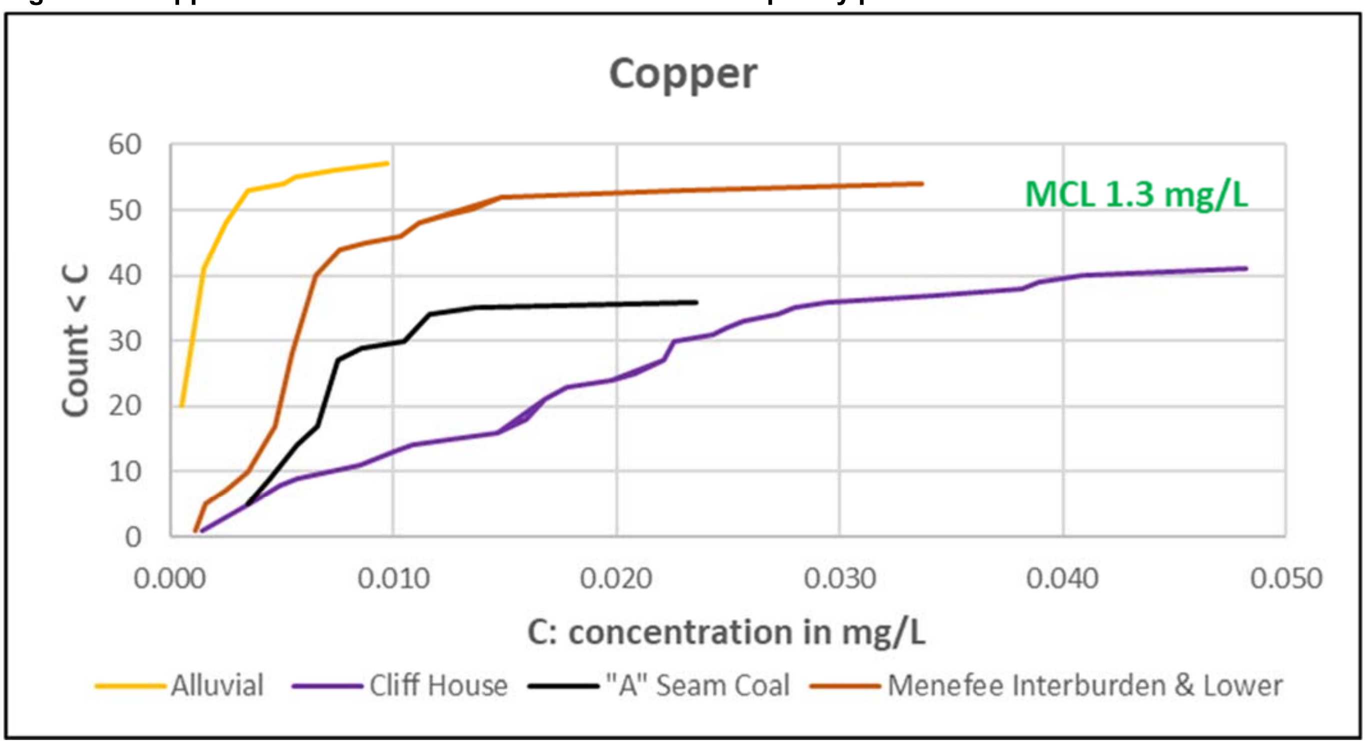


Figure 16. Fluoride concentration distribution cumulative frequency plots.

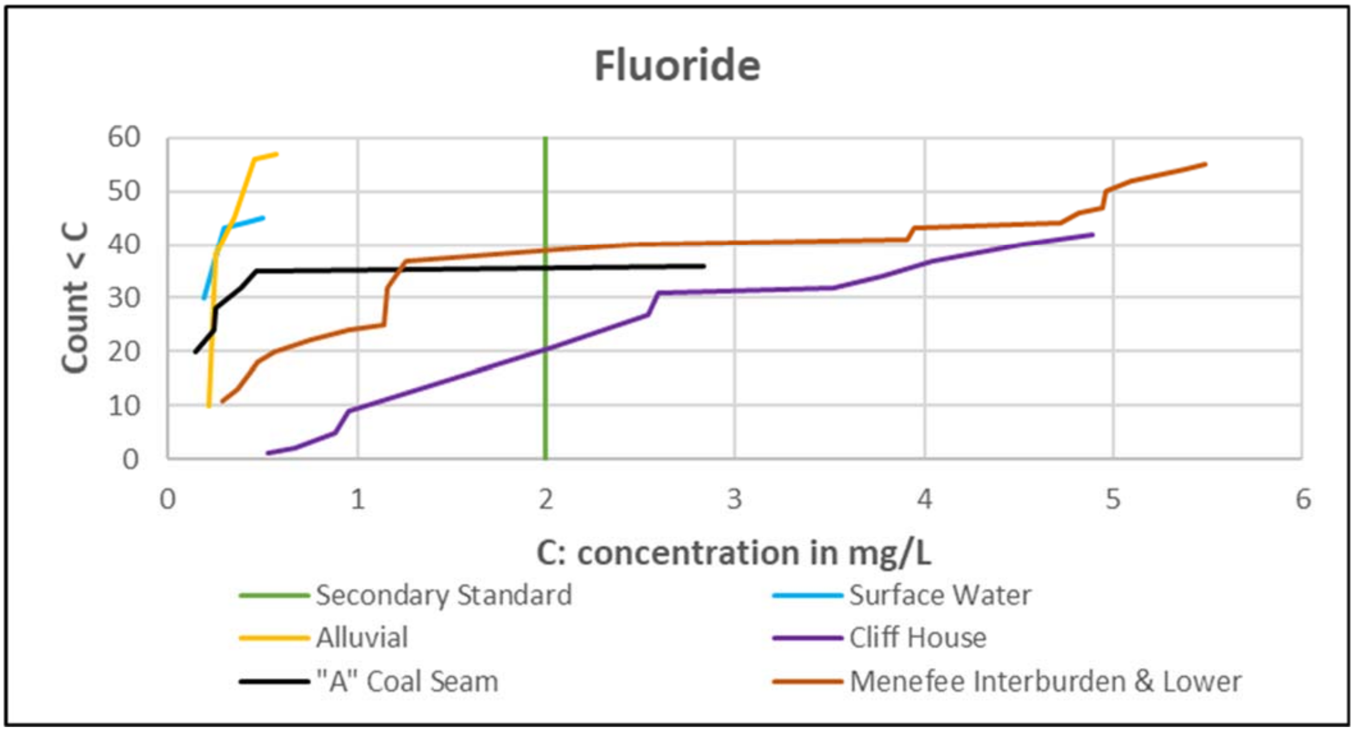


Figure 17. Molybdenum concentration distribution cumulative frequency plots.

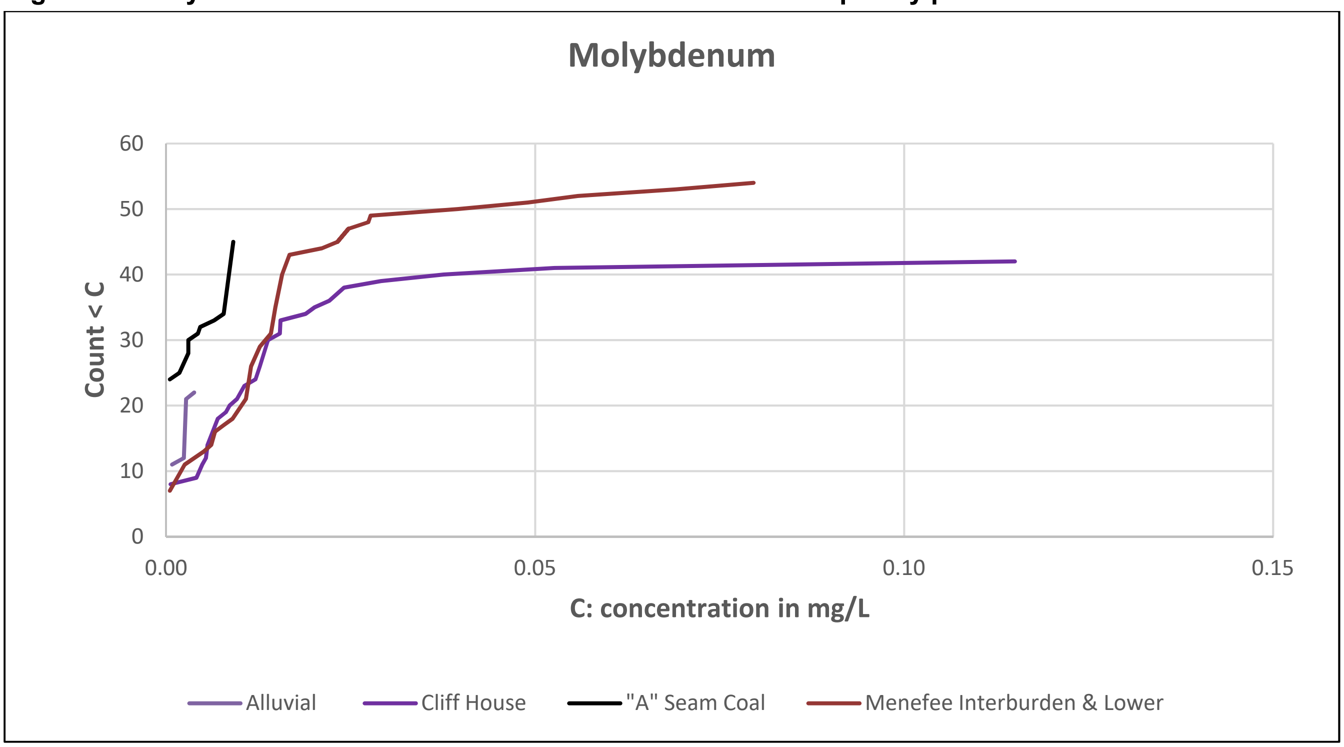


Figure 18. Selenium concentration distribution cumulative frequency plots.

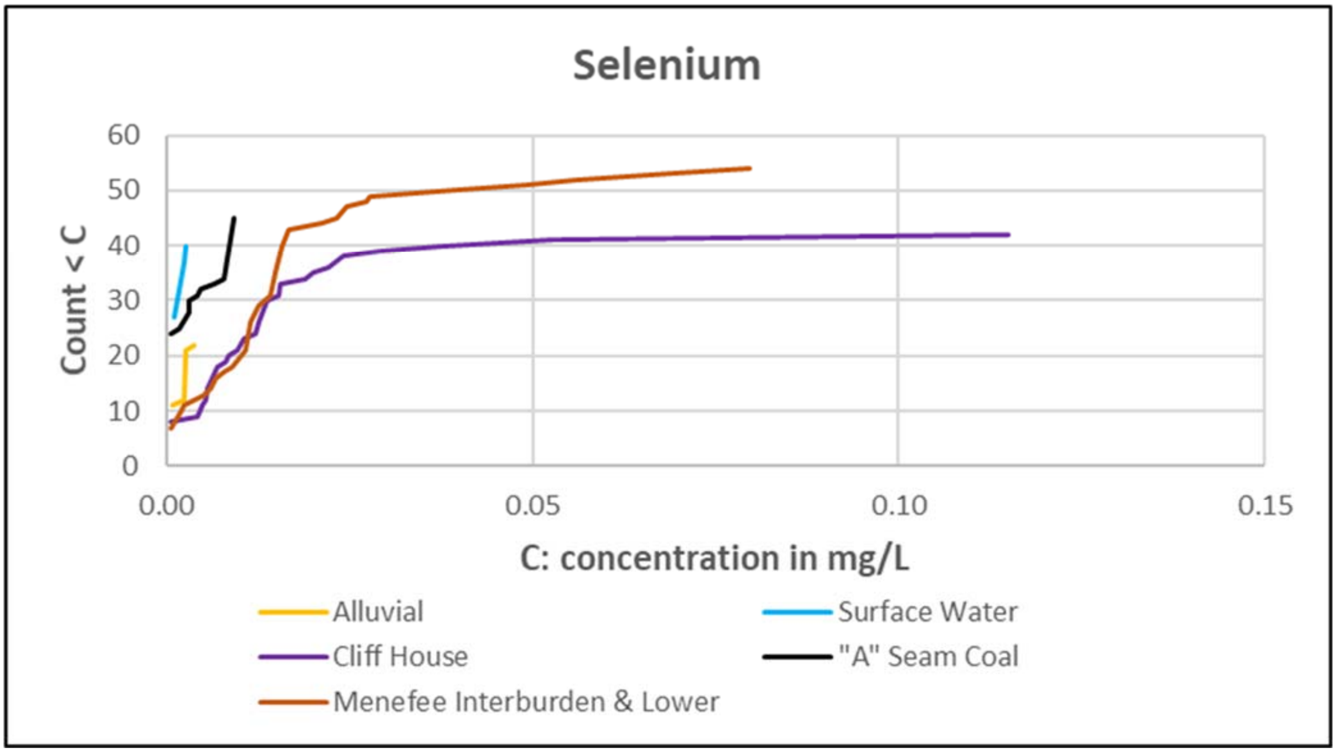


Figure 19. Uranium concentration distribution cumulative frequency plots.

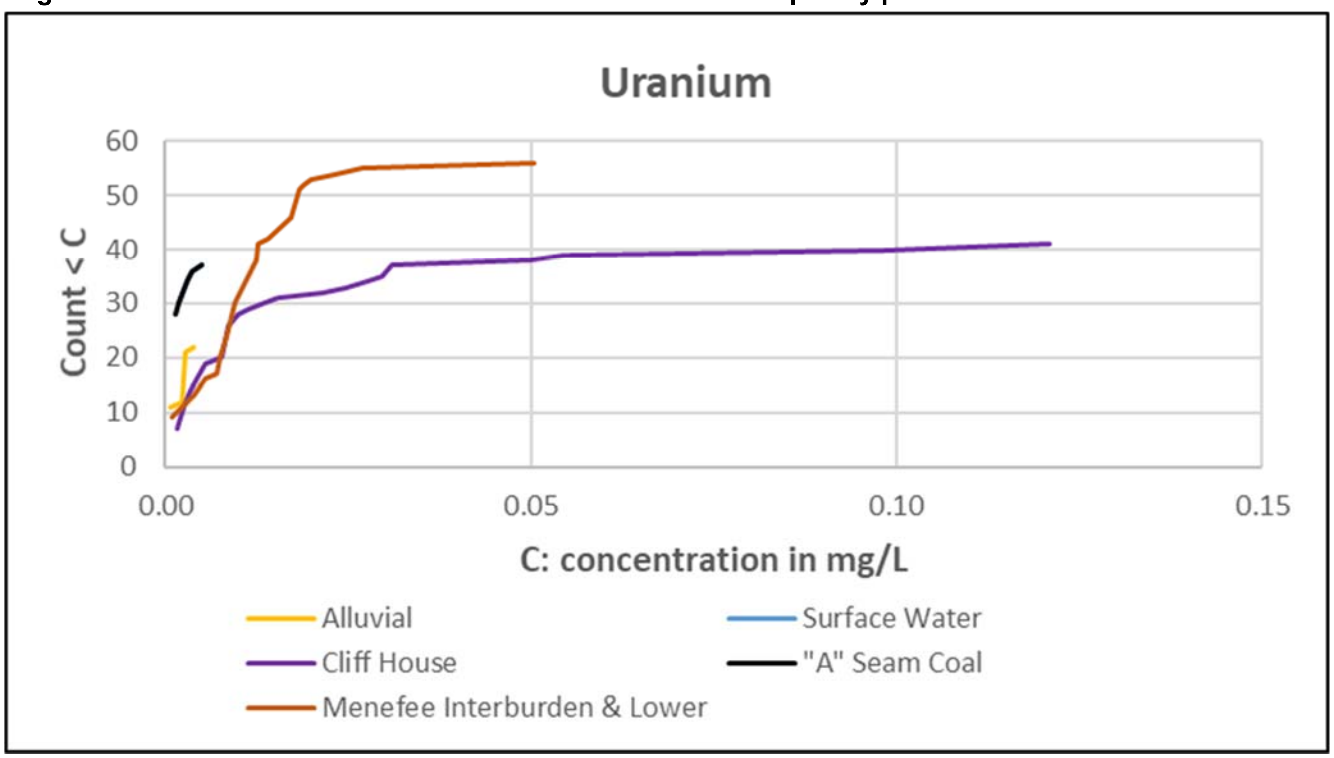


Figure 20. Uranium concentration and field-measured oxygen reduction potential (ORP) versus time at MW-4-C.

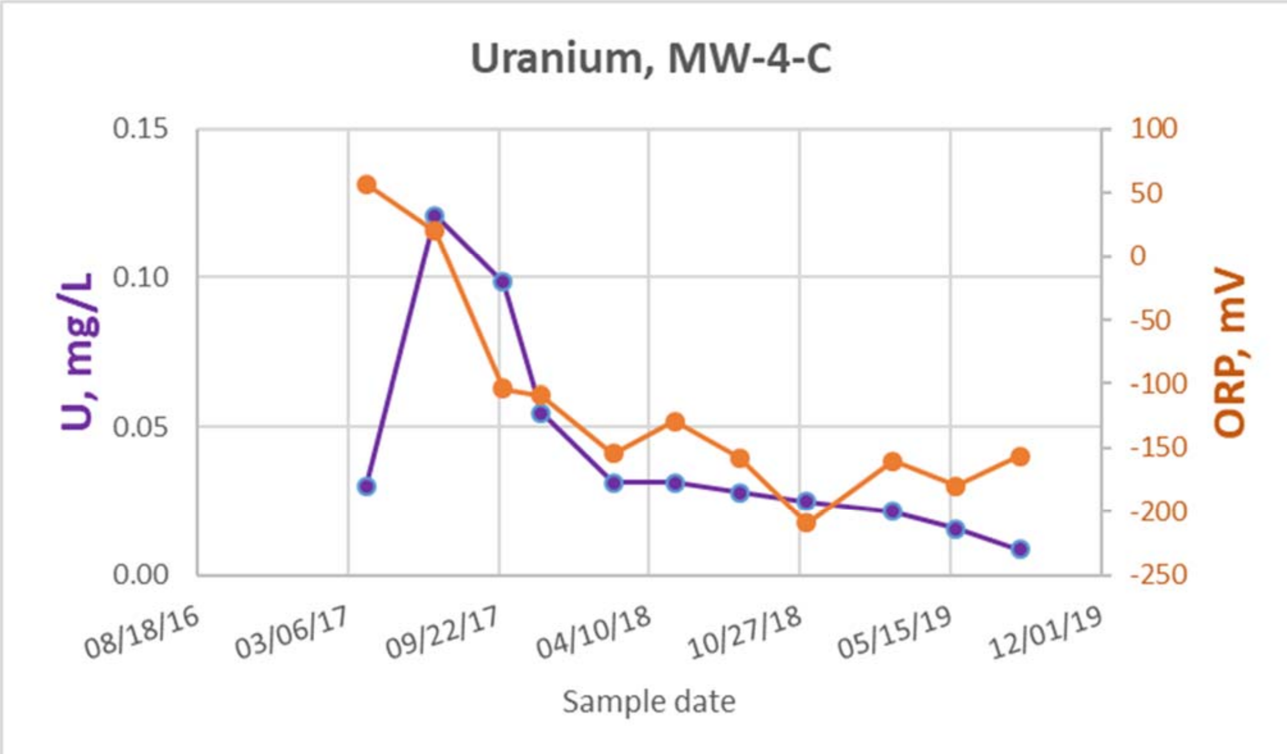


Figure 21. Zinc concentration distribution cumulative frequency plot.

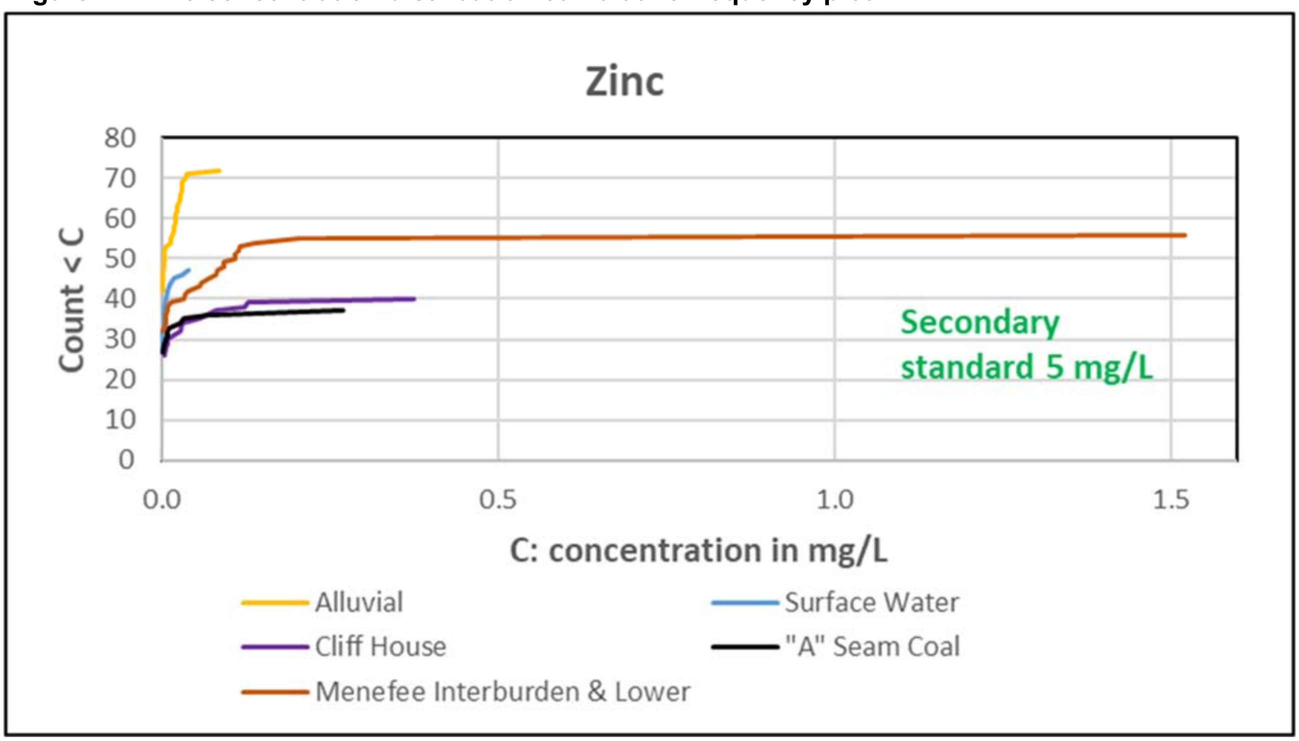


Figure 22. Cliff House groundwater potentiometric map August 2019.

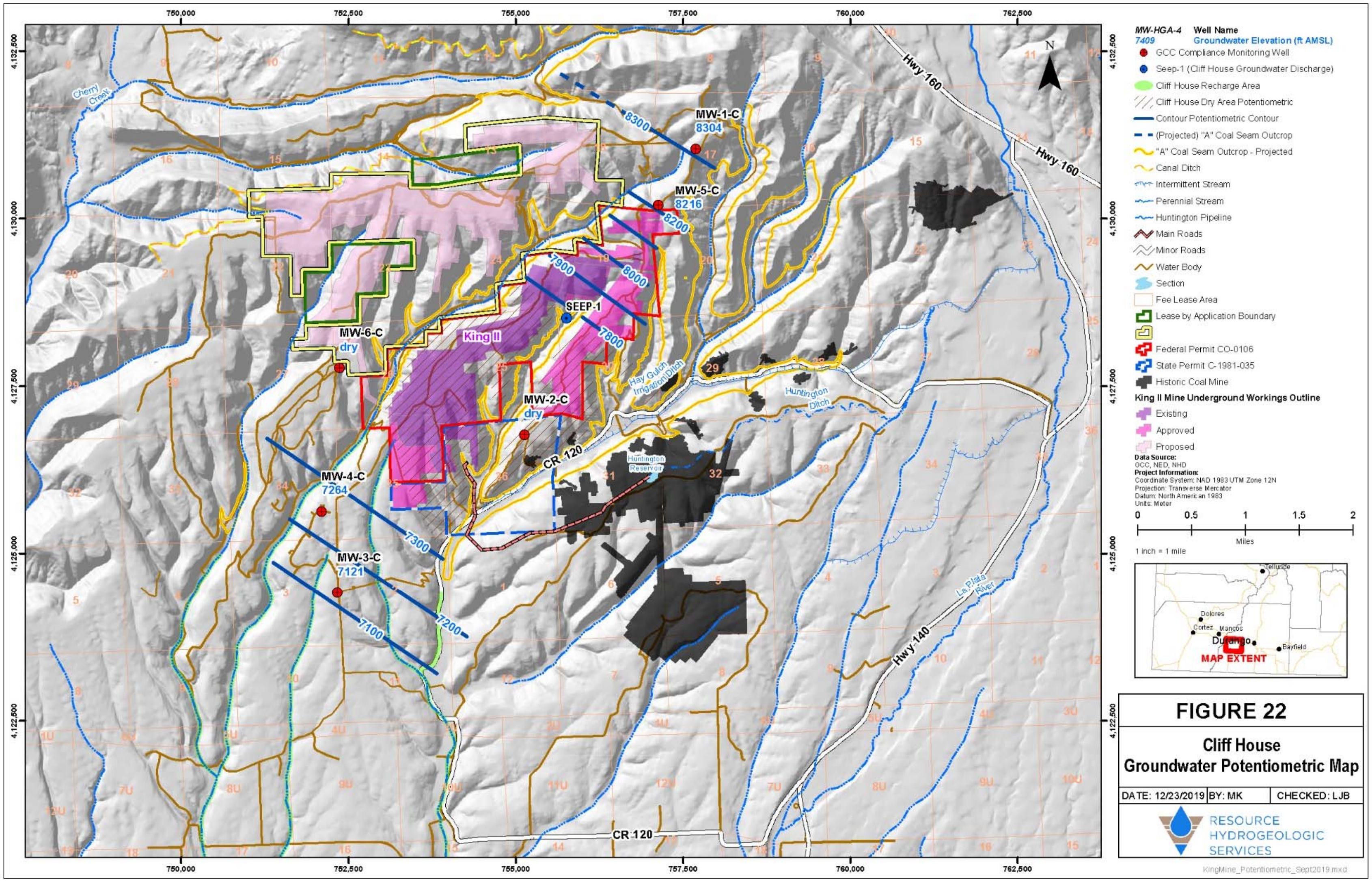


Figure 23. “A” seam coal groundwater potentiometric map August 2019.

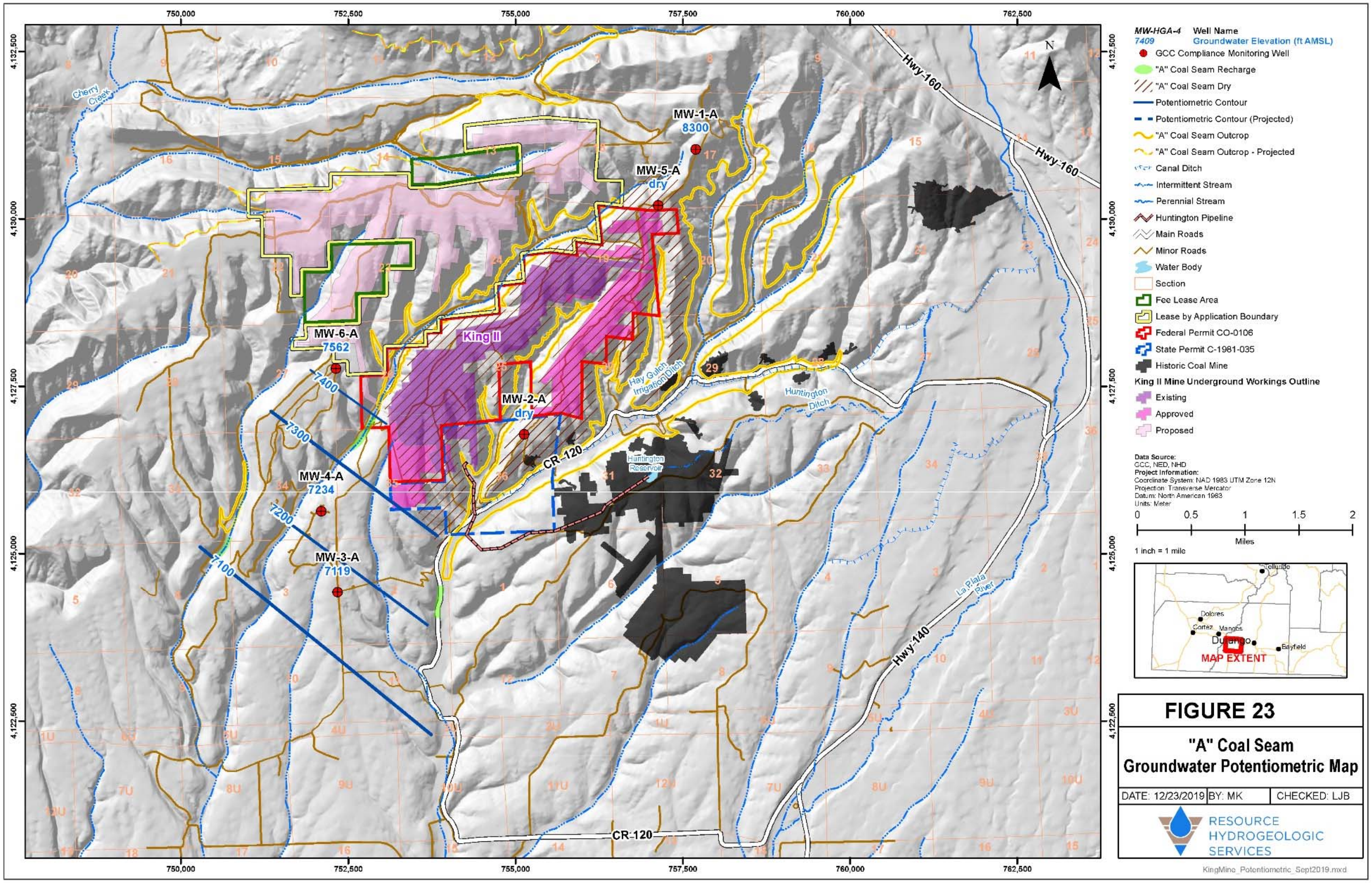


Figure 24. Menefee Interburden groundwater potentiometric map August 2019.

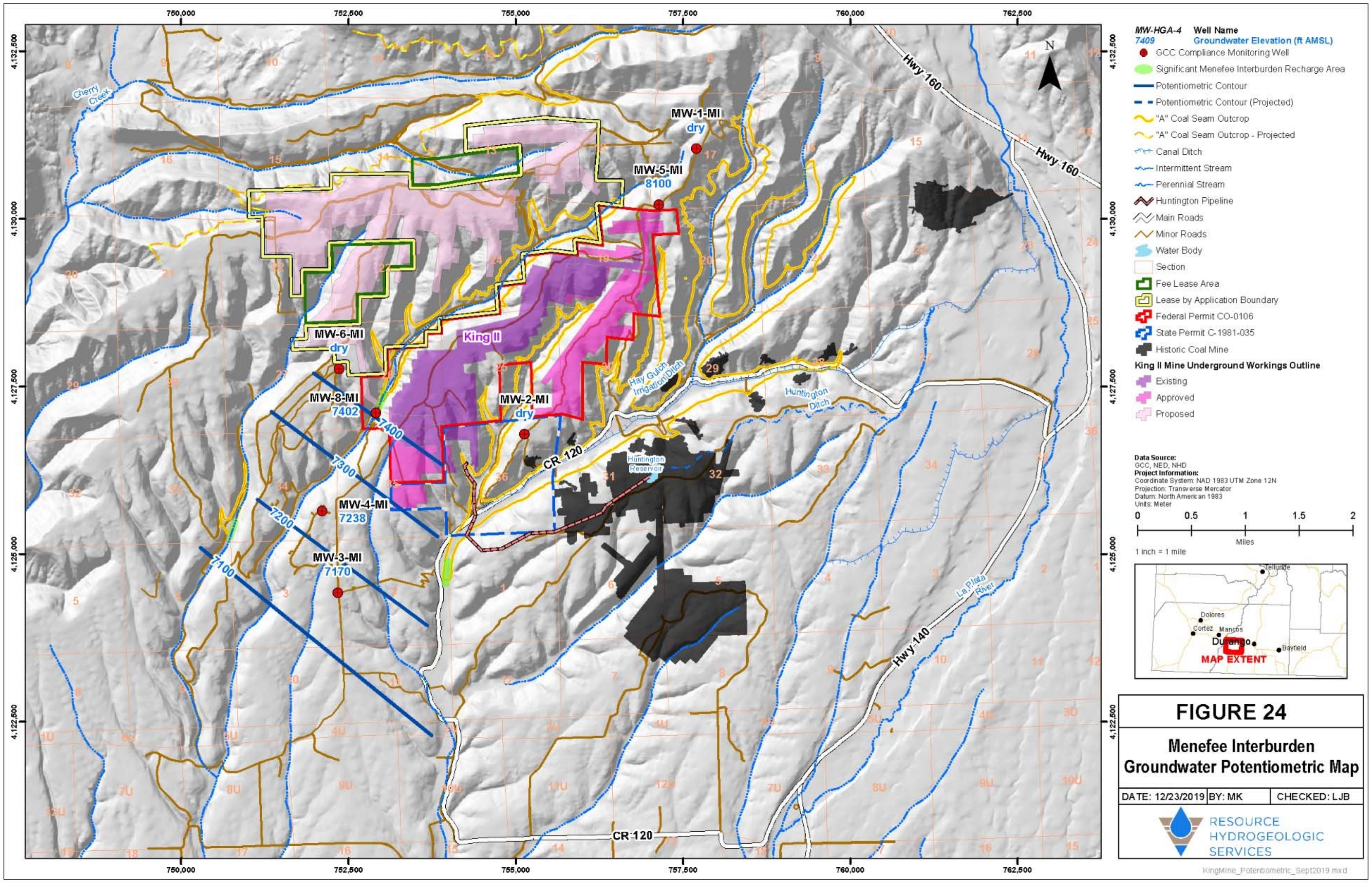


Figure 25. Lower Menefee groundwater potentiometric map August 2019.

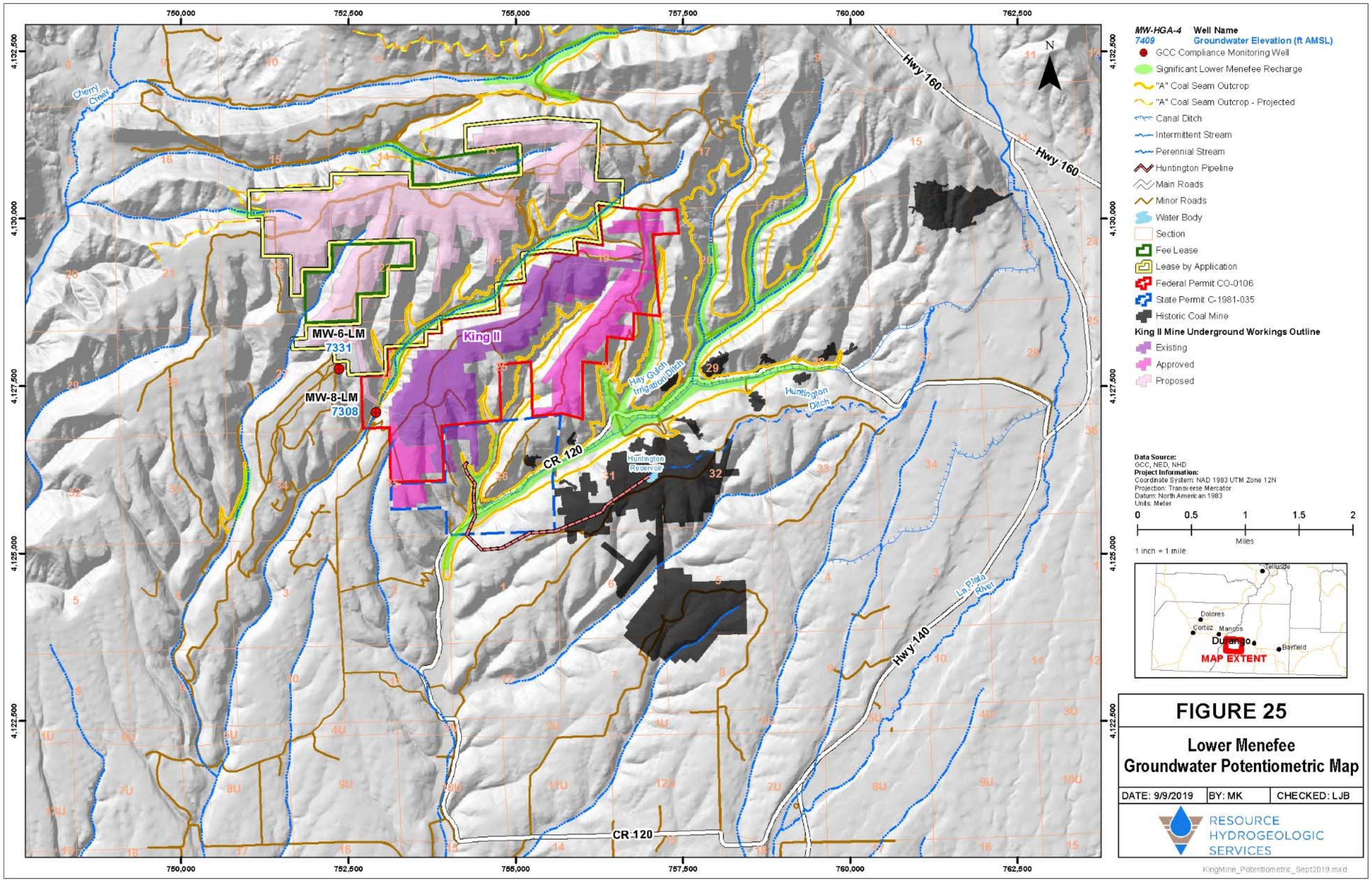
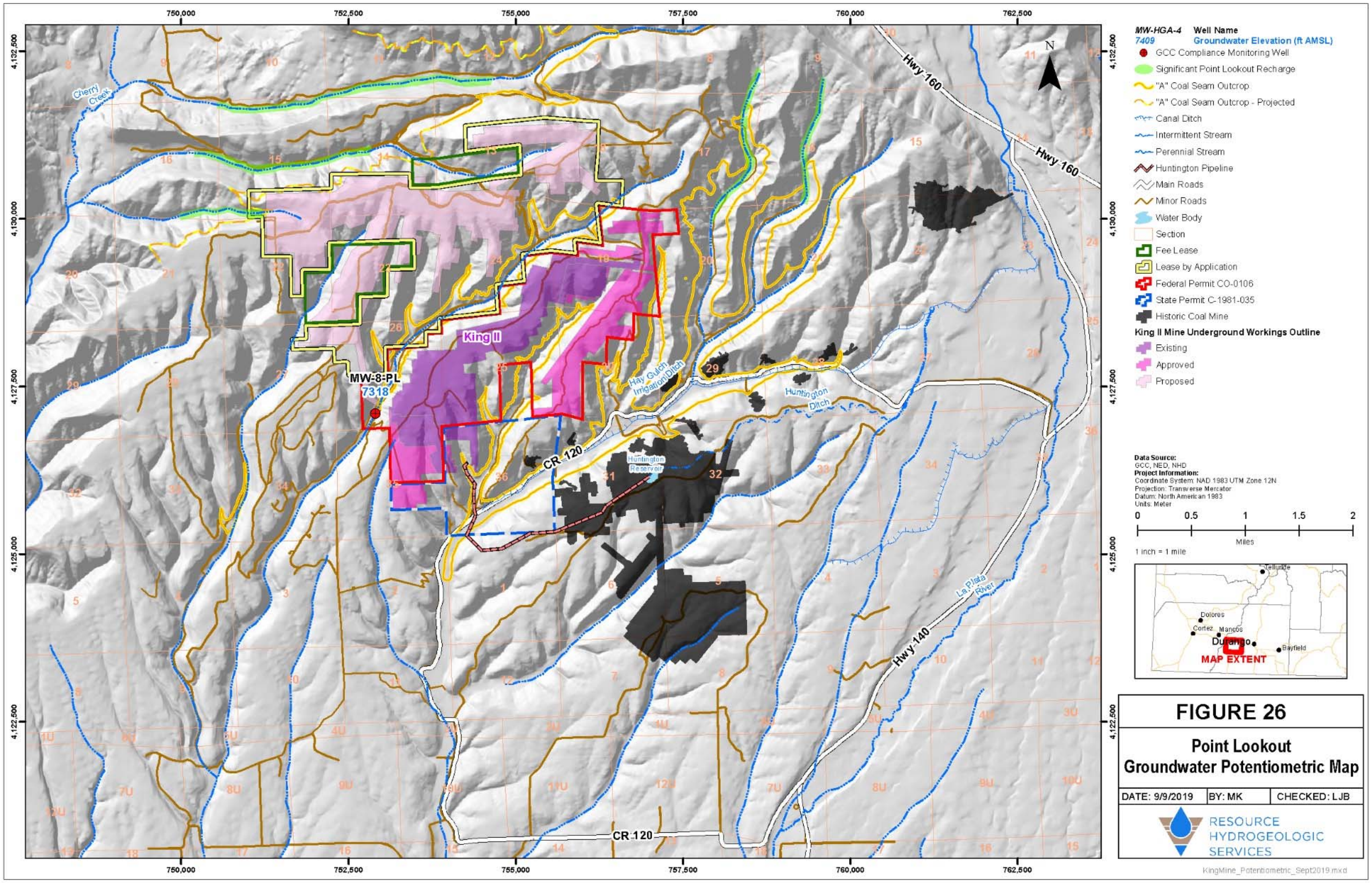


Figure 26. Point Lookout groundwater potentiometric map August 2019.



ATTACHMENT - GCC Hydrologic Monitoring Data Summary Tables

GCC Energy Hydrologic Monitoring Data

Hay Gulch Ditch Upgradient																								
Year		2016										2017						2018				2019		
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11	2	5	8
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	2/28	5/23	8/16
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	Y	Y	N	N	N	Y	Y	Y	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	0.3	3.6	1.2
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	5.9	5.9	16.9
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	6.4	7.53	8.03
Specific Conductance	µS/cm	247	323	197	141	189	207	233	210	258	234	687	455	454	106	549	868	1041	304	307	307	752	306	275
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	103.7	-24.0	24.4
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	8.0	8.9	7.8
Lab Analytical Results:																								
Hardness as CaCO3	mg/L	128			80.9			119		152				257	69.2	316	456	489	101	153	149	393	136	125
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	7.45	7.69	7.83
Total Dissolved Solids (Lab)	mg/L	170			75			165		180				285	65.0	390	650	700	140	215	175	535	205	225
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	22.0	113	20.0
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	79.8	34.6	32.4
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	47.0	12.1	10.8
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	19.1	7.24	5.81
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	3.89	1.57	1.07
Alkalinity, Total	mg/L	160			65			98.0		118				185	55.0	177	305	244	67	111	120	260	390	103
Alkalinity, Bicarbonate	mg/L	160			65			94.0		118				185	55.0	161	285	244	67	107	120	260	390	103
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	<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	<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	48.1	7.75	6.04
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	0.252	0.208	0.214
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	128	47.2	35.6
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	4.94	3.08	1.84
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	<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	0.263	0.050	0.072
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	0.42	0.26	0.22
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	<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	0.0007	0.0006	0.0007
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	<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	0.0026	0.0013	0.0012
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	0.255	0.055	<0.050
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	<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	0.127	0.0349	0.0096
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	<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	0.0011	0.0009	0.0011
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	0.0017	<0.0010	<0.0010
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	11.3	8.55	9.17
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	5.29	3.99	4.29
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	0.0009	0.0003	0.0004
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	0.0044	<0.0020	<0.0020
Radium 226	pCi/L	<0.4			NA			NA		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	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.*

RESOURCE HYDROGEOLOGIC SERVICES

GCC Energy Hydrologic Monitoring Data

Hay Gulch Ditch Downgradient

Year		2016										2017						2018				2019		
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11	2	5	8
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	2/28	5/23	8/16
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	N	Y	Y	Y	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	0.25	0.3	1.05
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	6.88	8.23	15.15
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	6.42	7.77	7.61
Specific Conductance	µS/cm	429	530	297	116	308	257	1183	420	421	728	678	987	17	114	164		742	304	356	309	576.8	201.7	295.3
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	125.6	50.6	111.6
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	7.6	8.8	7.2
Lab Analytical Results:																								
Hardness as CaCO3	mg/L	226			67.8			480		267				503	59.1	91.4		329	140	182	167	281	91.9	137
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	7.84	7.68	7.73
Total Dissolved Solids (Lab)	mg/L	270			55			630		320				615	65.0	80.0		420	220	260	185	390	185	195
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	18.4	153	22.5
Calcium	mg/L	55.5			21.9			94.7		65.5				112	19.0	29.5		75.4	37.5	49.0	44.7	61.6	26.0	34.5
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	31	6.54	12.3
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	16.5	5.03	6.62
Potassium	mg/L	1.49			<1			4.48		1.46				2.33	<1.00	<1.00		2.84	1.14	1.58	1.34	3.13	1.31	1.27
Alkalinity, Total	mg/L	220			59			220		225				320	47.0	85.0		265	112	170	140	150	340	140
Alkalinity, Bicarbonate	mg/L	220			59			140		155				320	47.0	85.0		259	104	170	140	150	340	140
Alkalinity, Carbonate	mg/L	<10			<10			80.0		70				<10.0	<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	<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	40.2	16.9	7.65
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	0.232	0.205	0.218
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	91.4	18.5	42.7
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	2.9	2.37	2.10
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	<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	0.17	0.146	0.090
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	0.43	0.22	0.24
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	<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	0.0006	0.0006	0.0006
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	<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	<0.0010	0.0021	0.0009
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	<0.050	<0.050	<0.050
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	<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	0.048	0.0125	0.0033
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	<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	0.001	0.0011	0.0012
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	0.0012	<0.0010	<0.0010
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	8.46	5.70	8.86
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	3.95	2.67	4.14
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	0.0009	0.0002	0.0004
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	0.0022	<0.0020	<0.0020
Radium 226	pCi/L	<0.4			NA			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	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.*

GCC Energy Hydrologic Monitoring Data

Well #2 Downgradient																									
Year		2016										2017						2018					2019		
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q4	Q1	Q2	Q3
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	8	11	2	5	8
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	2/27	5/22	8/16
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	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	0.3	0.5	0.3
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	13	10	9
Depth to Water	ft bgs	3.69	3.17	4.25	1.42	4.17	4.17	5.50	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	5.85	0.92	3.60
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	9.14	8.14	10.54
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	7.41	7.34	7.23
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	960	1091	1051
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	48.4	-57.8	-30.1
Lab Analytical Results:																									
Hardness as CaCO3	mg/L	444			314			452		432				485	352	378	449	412	415	422	415	465	488	537	513
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	7.5	7.4	7.04
Total Dissolved Solids (Lab)	mg/L	685			470			525		495				635	415	525	540	515	545	545	575	550	575	695	655
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	81.3	87.1	83.3
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	69.2	77.6	74.0
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	22.1	23.4	21.4
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	1.97	1.94	2.06
Alkalinity, Total	mg/L	342			280			380		380				375	285	395	375	333	350	380	328	340	395	460	365
Alkalinity, Bicarbonate	mg/L	338			280			380		380				375	285	395	375	333	350	380	328	340	395	460	365
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	<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	<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	40.1	42.9	45.2
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	0.244	0.246	0.221
Sulfate as SO4	mg/L	129			70			114		117				153	75.2	98.4	94.7	104	102	112	111	137	138	196	189
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	1.87	2.69	2.28
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	<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	<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	0.0012	0.0011	0.0012
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	<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	0.001	0.0016	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	0.062	0.116	0.105
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	<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	0.423	0.504	0.404
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	<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	0.0029	0.0026	0.0019
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	0.0021	0.001	0.0011
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	11.2	10.5	11.6
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	5.26	4.93	5.44
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	0.0019	0.0016	0.0012
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	0.0025	<0.002	<0.0020
Radium 226	pCi/L	<0.4			NA			NA		NA				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	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.*

RESOURCE
HYDROGEOLOGIC
SERVICES

GCC Energy Hydrologic Monitoring Data

Well #1 Upgradient

Year		2016									
Quarter		Q1	Q2			Q3			Q4		
Month		3	4	5	6	7	8	9	10	11	12
Sample Date		3/30	4/27	5/26	6/23	7/19	8/24	9/21	10/24	11/30	12/14
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	Y	N
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
Total Purged	gal	306	522	870	297	280	284	288	300	280	295
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
Temperature	deg C	8.8	13.1	11.9	14.2	14.1	12.7	12.5	12.6	10.6	11.3
pH	SU	7.77	7.57	7.46	7.6	7.69	7.59	7.67	7.77	7.72	7.68
Specific Conductance	µS/cm	1224	1199	1284	1246	1226	1143	1176	1223	1280	1305
Oxygen Reduction Potential	mV	-123.1	-162.2	-142.5	-185.4	-156.6	-196.8	-140.6	-148.9	-152.9	-141.0
Lab Analytical Results:											
Hardness as CaCO3	mg/L	230			306			216		271	
pH (Lab)	SU	7.73			7.57			7.58		7.59	
Total Dissolved Solids (Lab)	mg/L	760			745			735		725	
Calcium	mg/L	44.0			59.7			42.4		51.7	
Magnesium	mg/L	29.1			38.2			26.7		34.5	
Sodium	mg/L	199			196			210		189	
Potassium	mg/L	3.00			3.15			3.01		3.01	
Alkalinity, Total	mg/L	610			660			620		615	
Alkalinity, Bicarbonate	mg/L	570			660			620		615	
Alkalinity, Carbonate	mg/L	40.0			<10			<10		<10.0	
Alkalinity, Hydroxide	mg/L	<10			<10			<10		<10.0	
Chloride	mg/L	4.33			6.12			4.30		4.44	
Fluoride	mg/L	0.347			<0.5			0.353		0.337	
Sulfate as SO4	mg/L	90.1			108			83.8		117	
Total Organic Carbon (TOC)	mg/L	2.54			3.3			2.8		3.18	
Nitrate/Nitrite as N	mg/L	<0.02			<0.02			<0.02		<0.200	
Aluminum	mg/L	<0.05			<0.05			<0.05		<0.050	
Arsenic	mg/L	<0.0005			<0.0005			<0.0005		<0.0005	
Cadmium	mg/L	<0.0001			<0.0001			<0.0001		<0.0001	
Copper	mg/L	0.0035			0.003			0.0021		0.0041	
Iron	mg/L	1.20			1.51			0.946		1.64	
Lead	mg/L	<0.0005			<0.0005			<0.0005		<0.0005	
Manganese	mg/L	0.267			0.344			0.221		0.312	
Mercury	mg/L	<0.0002			<0.0002			<0.0002		<0.0002	
Molybdenum	mg/L	<0.0005			<0.0005			<0.0005		0.0005	
Selenium	mg/L	<0.001			<0.001			<0.001		<0.0010	
Silica (Si02)	mg/L	13.8			15.2			14.8		12.9	
Silicon	mg/L	6.45			7.12			6.94		6.05	
Uranium	mg/L	<0.0001			0.0021			<0.0001		0.0002	
Zinc	mg/L	<0.001			<0.001			0.0023		0.0301	
Radium 226	pCi/L	<0.4			NA			NA		NA	
Radium 228	pCi/L	<0.8			NA			NA		NA	

Year		2017						2018				2019		
Quarter		Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Month		1	2	3	6	9	11	2	5	8	11	2	5	8
Sample Date		1/18	2/27	3/22	6/28	9/28	11/29	2/22	5/14	8/9	11/7	2/25	5/23	8/16
Lab Analysis (Y/N)		N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Field Parameters:														
Purge Flow Rate	gpm	7.7	7.5	8.2	7.0	7.1	7.5	7.2	7.2	10	7.2	10.0	8.3	11.0
Total Purged	gal	298	297	291	286	259	287	268	280	267	305	300	321	327
Depth to Water	ft bgs	4.30	3.80	3.82	4.50	5.51	5.50	5.40	5.77	5.65	6.50	5.98	4.50	5.68
Temperature	deg C	10.9	10.4	11.2	11.9	11.8	11.6	11.5	11.7	12.0	12.5	11.7	11.47	11.81
pH	SU	7.6	7.67	7.67	7.59	7.6	7.58	7.56	7.49	7.35	7.34	7.44	7.39	7.37
Specific Conductance	µS/cm	1392	1415	1351	1159	1162	1241	1278	1218	1289	1204	1234.7	1307.5	1253
Oxygen Reduction Potential	mV	-143.6	-125.6	-132.2	-201	-176.9	-213.20	-185.3	-219.3	-251.6	-273.0	-232.0	-194.0	-192.0
Lab Analytical Results:														
Hardness as CaCO3	mg/L			391	277	215	280	274	275	369	287	252	350	303
pH (Lab)	SU			7.46	7.74	7.66	7.56	7.75	7.95	7.48	7.50	7.77	7.56	7.23
Total Dissolved Solids (Lab)	mg/L			775	725	705	790	745	770	835	730	735	860	780
Calcium	mg/L			75.7	54.0	41.6	55.6	53.4	53.8	71.5	56.7	49.1	67.8	58.2
Magnesium	mg/L			49.1	34.6	27.1	34.4	34.2	34.1	46.4	35.4	31.4	43.8	38.3
Sodium	mg/L			167	189	203	195	183	191	154	212	196	172	167
Potassium	mg/L			3.30	3.00	3.09	2.99	3.09	3.03	3.16	3.15	3.01	3.32	3.01
Alkalinity, Total	mg/L			640	585	670	625	620	595	630	640	610	615	615
Alkalinity, Bicarbonate	mg/L			640	585	670	625	620	595	630	640	610	615	615
Alkalinity, Carbonate	mg/L			<10.0	<10.0	<10.0	<10.0	<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	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L			4.53	4.32	6.21	4.39	4.30	4.35	4.34	4.23	4.35	4.59	4.36
Fluoride	mg/L			0.337	0.362	<0.500	0.358	0.354	0.335	0.390	0.359	0.355	0.349	0.335
Sulfate as SO4	mg/L			156	97.4	74.0	101	106	97.2	147	89.9	91.4	131	112
Total Organic Carbon (TOC)	mg/L			3.84	5.82	2.84	3.33	3.37	3.5	3.94	3.35	3.31	3.70	3.53
Nitrate/Nitrite as N	mg/L			<0.020	<0.400	<0.400	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic	mg/L			0.0009	<0.0005	<0.0005	<0.0005	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
Copper	mg/L			0.0020	0.0020	0.0030	0.0027	0.0035	0.003	0.0022	0.0025	0.0042	0.0015	0.0019
Iron	mg/L			2.01	1.34	0.101	1.44	1.44	1.39	1.98	1.52	1.26	1.74	1.58
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			0.491	0.315	0.202	0.311	0.307	0.306	0.498	0.286	0.355	0.439	0.428
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	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	0.0005	<0.0005	<0.0005
Selenium	mg/L			0.0245	<0.0010	<0.0010	<0.0010	<0.0010	0.0171	0.0120	0.0022	0.0032	0.0024	<0.0010
Silica (Si02)	mg/L			14.2	14.9	14.3	14.7	13.4	14.6	13.8	13.7	13.5	13.1	13.1
Silicon	mg/L			6.64	6.94	6.68	6.86	6.27	6.81	6.45	6.41	6.3	6.13	6.11
Uranium	mg/L			0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Zinc	mg/L			<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020
Radium 226	pCi/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium 228	pCi/L			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.*

RESOURCE
HYDROGEOLOGIC
SERVICES

GCC Energy Hydrologic Monitoring Data

Wiltse Well																								
Year		2016										2017						2018				2019		
Quarter		Q1	Q2			Q3			Q4			Q1			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	6	9	11	2	5	8	11	2	5	8
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	2/28	5/23	8/19
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	Y	y
Field Parameters:																								
Purge Flow Rate	gpm	150.0	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	28.0	38.0	18.0
Total Purged	gal	5850	4228	4229	3686	2844	2979	2637	2724	2992	2916	3595	3580	3560	2980	2712	2423	2700	2890	2783	2747	3017	3200	3010
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	2.40	0.05	2.47
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	8.0	9.3	10.7
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	7.17	7.08	7.09
Specific Conductance	µS/cm	2043	1633	1805	1768	1478	1602	1941	1937	2014	2036	2262	2276	2085	1869	2074	2190	2232	2144	2072	2167	2170	2151	1964
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	22.7	-10.6	-23.7
Lab Analytical Results:																								
Hardness as CaCO3	mg/L	990			1050			1030		963				1040	1060	1140	1150	1090	1160	1130	1180	1150	1080	1080
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	7.38	7.35	7.11
Total Dissolved Solids (Lab)	mg/L	1580			1480			1520		1520				1480	1510	1680	1740	1740	1740	1750	1720	1710	1670	1520
Calcium	mg/L	197			208			206		186				205	211	219	226	211	216	221	230	226	214	214
Magnesium	mg/L	121			128			126		121				128	129	143	142	136	150	139	147	143	132	132
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	83.2	89.4	72.4
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	5.01	4.77	4.92
Alkalinity, Total	mg/L	460			500			470		450				410	445	510	475	445	435	463	505	515	469	474
Alkalinity, Bicarbonate	mg/L	440			500			470		450				410	445	510	475	445	435	463	505	515	469	474
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	<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	<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	67.2	67.8	49.9
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	0.324	0.306	<0.500
Sulfate as SO4	mg/L	671			595			656		676				731	702	779	772	832	714	733	741	801	709	627
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	3.82	4.87	4.27
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	1.95	0.651	0.896
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	<0.100	<0.100	<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	<0.0010	0.0006	<0.0010
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	<0.0002	<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	0.002	0.0021	0.0021
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	0.151	0.379	0.287
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	<0.0010	<0.0005	<0.0010
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	0.937	0.357	0.902
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	<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	0.0017	0.0014	0.0020
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	0.0025	0.0016	<0.0020
Silica (SiO2)	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	14.1	13.2	15.4
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	6.6	6.19	7.20
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	0.0036	0.0044	0.0029
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	0.0175	0.0128	0.0138
Radium 226	pCi/L	0.7 +/- 0.1			NA			NA		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	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.*

GCC Energy Hydrologic Monitoring Data

MW-HGA-4																						
Year		2016	2017												2018					2019		
Quarter		Q4	Q1			Q2			Q3			Q4			Q1		Q2	Q3	Q4	Q1	Q2	Q3
Month		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	5	8	11	2	5	8
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	2/28	5/23	8/16
Lab Analysis (Y/N)		Y	N	N	Y	N	N	Y	N	N	Y	N	Y	N	N	Y	Y	Y	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	2.0	1.0	1.1	1.0	1.0
Total Purged	gal	21	21	21	21	21	21	19.5	20	20	21	21	21	24	19	21	21	19	21	24	22	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	0.49	0.42	1.95
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	7.6	7.7	8.5
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	7.15	7.18	7.16
Specific Conductance	µS/cm	1284	1257	1201	1155	1153	1113	1055	1099	1050	1124	1072	1171	1160	1141	1154	1098	1057	1167	1183	1102	1083
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	-128.3	-140.7	-130.9
Lab Analytical Results:																						
Hardness as CaCO3	mg/L	724			611			616			522		595			561	555	524	625	613	563	544
pH (Lab)	SU	7.30			7.17			7.31			7.25		7.21			7.58	8.15	7.33	7.12	7.2	8.17	6.95
Total Dissolved Solids (Lab)	mg/L	855			710			715			750		775			740	730	695	770	795	695	695
Calcium	mg/L	147			118			121			102		118			110	108	102	124	122	110	106
Magnesium	mg/L	86.7			76.7			76.6			64.9		72.8			69.3	69	65.4	76.5	74.7	70.3	67.9
Sodium	mg/L	19.5			27.4			28.6			24.9		27.2			26.5	30.4	29.9	27.6	27	28.6	28.3
Potassium	mg/L	2.02			2.13			2.11			1.75		2.21			2.17	2.22	2.33	2.13	2.16	2.00	2.10
Alkalinity, Total	mg/L	545			465			415			465		475			460	425	410	460	455	445	455
Alkalinity, Bicarbonate	mg/L	545			465			415			465		475			460	425	410	460	455	445	455
Alkalinity, Carbonate	mg/L	ND			<10.0			<10			<10.0		<10.0			<10.0	<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	<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	10.5	8.06	8.44
Fluoride	mg/L	0.577			0.485			0.506			0.517		0.495			0.496	0.459	0.482	0.487	0.484	0.456	0.443
Sulfate as SO4	mg/L	240			229			192			205		204			222	190	169	201	221	186	212
Total Organic Carbon (TOC)	mg/L	NA			4.54			4.35			4.69		4.79			4.56	4.57	4.30	4.72	4.82	4.45	4.58
Nitrate/Nitrite as N	mg/L	<0.020			<0.020			<0.02			<0.020		<0.100			<0.020	<0.020	<0.020	<0.020	0.173	<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	<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	0.0031	0.0029	0.0028
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	0.0006			0.0008			0.0002			0.0004		0.0002			0.0006	0.0008	0.0004	0.0008	<0.0010	0.0003	0.0004
Iron	mg/L	3.71			7.29			7.32			0.378		7.84			7.60	7.92	8.55	8.44	8.35	7.98	8.38
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	4.07			2.78			2.37			2.03		2.11			1.99	1.81	1.58	2.13	2.56	2.12	1.84
Mercury	mg/L	ND			<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	0.0013			0.0024			0.0027			0.0028		0.0027			0.0030	0.0031	0.0038	0.0029	0.0026	0.0027	0.0029
Selenium	mg/L	<0.001			0.0030			<0.001			<0.0010		<0.0010			<0.0010	0.002	0.0016	<0.001	0.001	<0.0010	<0.0010
Silica (Si02)	mg/L	22.3			16.8			18			16.5		17.9			15.8	16.4	15.7	17.3	15.9	14.9	14.9
Silicon	mg/L	10.4			7.86			8.41			7.72		8.35			7.37	7.67	7.34	8.10	7.46	6.96	6.96
Uranium	mg/L	0.0010			0.0004			0.0004			0.0004		0.0004			0.0004	0.0004	0.0003	0.0005	0.0005	0.0004	0.0004
Zinc	mg/L	0.0039			0.0046			<0.002			<0.0040		<0.0020			<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020

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)

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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.*

GCC Energy Hydrologic Monitoring Data

MW-1-A																					
Year		2017								2018									2019		
Quarter		Q2	Q3				Q4			Q1			Q2		Q3			Q4	Q1	Q2	Q3
Month		6	7	8	9	9	10	11	12	1	2	3	4	5	6	7	8	11	2	5	8
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	2/20	5/30	8/14
Lab Analysis (Y/N)		Y	N	N	N	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	Y	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	0.1	0.12	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	1.0	1.5	1.12
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	216.55	216.43	216.33
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	7.5	10.3	9.6
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	7.13	6.96	7.05
Specific Conductance	µS/cm	1362	NM*	NM*	1555	1563	1616	1650	1693	1700	1723	1735	1647	1761		1734	1815	1781	1776	1681	1757
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	-11.8	25.4	-18.71
Lab Analytical Results:																					
Hardness as CaCO3	mg/L	124				133		130			159			156			160	174	159	153	148
pH (Lab)	SU	7.74				7.35		7.33			7.22			7.45			7.17	7.27	7.13	7.03	7.14
Total Dissolved Solids (Lab)	mg/L	975				1080		1120			1100			1150			1040	1130	1160	1150	1150
Calcium	mg/L	24.7				25.8		24.9			30.5			29.7			30.9	34.0	31.2	29.8	27.9
Magnesium	mg/L	15.1				16.7		16.6			20.1			19.9			20.1	21.5	19.7	19.1	18.9
Sodium	mg/L	324				329		325			348			327			333	358	357	319	348
Potassium	mg/L	1.98				2.02		<5.00			<5.00			2.12			2.23	2.47	2.34	2.18	2.29
Alkalinity, Total	mg/L	375				450		380			415			353			385	395	375	355	368
Alkalinity, Bicarbonate	mg/L	375				450		380			415			353			385	395	375	355	368
Alkalinity, Carbonate	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10	<10.0	<10	<10.0
Alkalinity, Hydroxide	mg/L	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10	<10.0	<10	<10.0
Chloride	mg/L	2.75				2.16		<5.00			2.19			<5			2.12	2.20	2.74	2.33	2.72
Fluoride	mg/L	0.268				0.245		<0.500			0.240			<0.5			0.260	0.240	0.266	0.242	0.252
Sulfate as SO4	mg/L	427				432		511			518			522			515	511	508	494	537
Total Organic Carbon (TOC)	mg/L	5.03				1.36		1.58			1.51			1.54			1.60	1.75	1.61	1.67	1.59
Nitrate/Nitrite as N	mg/L	<0.200				<0.400		<0.100			<0.020			<0.02			<0.02	0.028	<0.020	<0.02	<0.020
Aluminum	mg/L	<0.050				<0.050		<0.250			<0.250			<0.05			<0.05	<0.1	<0.100	<0.05	<0.050
Arsenic	mg/L	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	<0.0010	<0.0005	<0.0005
Cadmium	mg/L	<0.0001				<0.0001		<0.0005			<0.0005			<0.0001			<0.0001	<0.0001	<0.0002	<0.0001	<0.0001
Copper	mg/L	0.0043				0.0057		0.0045			0.0066			0.0041			0.0048	0.0048	0.0075	0.0064	0.0040
Iron	mg/L	0.128				0.367		<0.250			0.590			0.614			0.644	0.647	0.581	0.589	0.613
Lead	mg/L	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	<0.0010	<0.0005	<0.0005
Manganese	mg/L	0.0260				0.0218		0.0259			0.0279			0.026			0.0242	0.0282	0.0281	0.0235	0.0270
Mercury	mg/L	<0.0002				<0.0002		<0.0002			<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	<0.0010	<0.0005	<0.0005
Selenium	mg/L	<0.0010				<0.0010		<0.0050			<0.0050			<0.001			<0.001	<0.001	<0.0020	<0.001	<0.0010
Silica (SiO2)	mg/L	12.3				11.9		8.27			11.2			11.2			11.4	12.0	11.1	11.2	11.6
Silicon	mg/L	5.74				5.56		3.87			5.24			5.25			5.31	5.62	5.2	5.23	5.43
Uranium	mg/L	0.0004				0.0002		<0.0005			<0.0005			0.0003			0.0002	0.0003	0.0002	0.0001	0.0001
Zinc	mg/L	0.0270				0.0088		<0.0100			<0.0100			0.0051			<0.0100	<0.002	<0.0040	0.0022	<0.0040

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)

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GCC Energy Hydrologic Monitoring Data

MW-1-MI																				
	Year	2017							2018									2019		
	Quarter	Q2	Q3			Q4			Q1			Q2		Q3			Q4	Q1	Q2	Q3
	Month	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	11	2	5	8
	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	2/20	5/30	8/14
	Lab Analysis (Y/N)	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
Field Parameters:																				
Purge Flow Rate	gpm	NM	NM*	NM	NM															
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	dry	dry	dry	dry	dry	dry	dry	dry	***	dry	dry	dry	dry	dry	dry
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.*

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RESOURCE
HYDROGEOLOGIC
SERVICES

GCC Energy Hydrologic Monitoring Data

MW-1-C																					
	Year	2017								2018									2019		
	Quarter	Q2	Q3				Q4			Q1			Q2			Q3		Q4	Q1	Q2	Q3
	Month	6	7	8	9	9	10	11	12	1	2	3	4	5	6	7	8	11	2	5	8
	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	2/20	5/30	8/14
	Lab Analysis (Y/N)	Y	N	N	N	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.06	0.015	0.03
Total Purged	*gal*	5	NM*	NM*	NM	NM	1.00	1	1	1	1	1	1	1.25		1	1	1.1	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	216.41	216.20	216.02
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	5.4	9.8	10.4
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	7.09	6.80	6.65
Specific Conductance	*µS/cm*	2446	NM*	NM*	NM	2725	2738	2739	2778	2778	2738	2751	2700	2749		2693	2675	2751	2621	3139	3172
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	-23.4	27.6	10.5
Lab Analytical Results:																					
Hardness as CaCO3	*mg/L*	498				1290		1180			1190			1130			1120	1180	1010	1820	1840
pH (Lab)	*SU*	8.35				7.36		7.34			7.22			7.2			7.20	7.02	7.24	6.93	6.67
Total Dissolved Solids (Lab)	*mg/L*	2020				2440		2360			2360			2340			2170	2200	1960	2880	2890
Calcium	*mg/L*	96.0				234		216			219			203			203	219	188	340	342
Magnesium	*mg/L*	62.8				172		155			156			150			148	154	131	237	240
Sodium	*mg/L*	506				242		253			260			239			239	255	265	146	119
Potassium	*mg/L*	11.4				3.81		<5.00			<5.00			3.07			3.04	2.65	3.13	<5	<5.00
Alkalinity, Total	*mg/L*	530				700		540			570			580			560	410	525	530	518
Alkalinity, Bicarbonate	*mg/L*	530				700		540			570			580			560	410	525	530	518
Alkalinity, Carbonate	*mg/L*	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10.0	<10.0	<10	<10.0
Alkalinity, Hydroxide	*mg/L*	<10.0				<10.0		<10.0			<10.0			<10.0			<10.0	<10.0	<10.0	<10	<10.0
Chloride	*mg/L*	24.2				6.97		8.03			7.78			7.75			5.97	6.22	6.36	10.2	9.31
Fluoride	*mg/L*	1.59				0.864		0.955			1.03			0.96			0.888	0.924	0.975	0.67	0.525
Sulfate as SO4	*mg/L*	1090				1350		1230			1160			1210			1090	1080	1070	1630	1730
Total Organic Carbon (TOC)	*mg/L*	4.56				2.84		2.12			2.21			2.2			2.35	2.37	2.32	2.62	2.52
Nitrate/Nitrite as N	*mg/L*	<2.00				<0.400		<0.100			<0.020			<0.02			0.036	<0.02	<0.020	<0.02	<0.020
Aluminum	*mg/L*	<0.050				<0.050		<0.250			<0.250			<0.05			<0.05	<0.10	<0.100	<0.25	<0.250
Arsenic	*mg/L*	0.0029				0.0016		<0.0025			<0.0025			0.0051			0.0052	0.0035	0.0038	0.0048	0.0034
Cadmium	*mg/L*	<0.0001				<0.0001		<0.0005			<0.0005			<0.0001			<0.0001	<0.0001	<0.0002	<0.0001	<0.0002
Copper	*mg/L*	0.0088				0.0085		0.0036			0.0052			0.003			0.0049	0.0033	0.0054	0.0057	0.0014
Iron	*mg/L*	<0.050				<0.050		<0.250			<0.250			0.643			1.01	1.12	0.988	2.3	0.819
Lead	*mg/L*	<0.0005				<0.0005		<0.0025			<0.0025			<0.0005			<0.0005	<0.0005	<0.0010	<0.0005	<0.0010
Manganese	*mg/L*	0.0744				0.0853		0.0959			0.0989			0.153			0.140	0.106	0.0807	0.075	0.0562
Mercury	*mg/L*	<0.0002				<0.0002		<0.0002			<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	<0.0010	<0.0005	<0.0010
Selenium	*mg/L*	0.0136				0.0012		<0.0050			<0.0050			<0.001			<0.0050	0.0011	<0.0020	0.0016	0.0023
Silica (Si02)	*mg/L*	10.6				16.6		13.2			14.8			15.2			14.7	14.5	14	16.6	17.3
Silicon	*mg/L*	4.94				7.77		6.16			6.94			7.09			6.87	6.78	6.55	7.75	8.07
Uranium	*mg/L*	0.0500				0.0044		0.0028			0.0024			0.0025			0.0022	0.0021	0.0016	0.002	0.0025
Zinc	*mg/L*	0.0293				0.0294		<0.0100			<0.0100			0.0062			<0.0100	0.0055	<0.0040	0.0085	0.0077

Notes & Definitions:

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- 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
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GCC Energy Hydrologic Monitoring Data

MW-2-A																		
Year		2017							2018							2019		
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/20	5/29	8/14
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Field Parameters:																		
Purge Flow Rate	gpm																	
Total Purged	gal																	
Depth to Water	ft bgs																	
Temperature	deg C	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
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
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GCC Energy Hydrologic Monitoring Data

MW-2-MI																		
Year		2017							2018							2019		
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/20	5/29	8/14
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Field Parameters:																		
Purge Flow Rate	gpm																	
Total Purged	gal																	
Depth to Water	ft bgs																	
Temperature	deg C	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
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
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GCC Energy Hydrologic Monitoring Data

MW-2-C																		
Year		2017							2018							2019		
Quarter		Q1	Q2	Q3		Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/20	5/29	8/14
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Field Parameters:																		
Purge Flow Rate	gpm																	
Total Purged	gal																	
Depth to Water	ft bgs																	
Temperature	deg C	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
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.*

GCC Energy Hydrologic Monitoring Data

MW-3-A																			
	Year	2017								2018							2019		
	Quarter	Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
	Month	3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	8
	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	2/27	5/21	8/14
	Lab Analysis (Y/N)	Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.1	0.2	0.1
Total Purged	*gal*	30	2.0	NM	NM	NM	1.0	1.0	1.0	1.3	1.5	1.5	1	1.25	1	1.1	1.5	1.3	1.3
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	297.85	296.79	297.27
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	11.8	12.1	NM
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	8.28	8.31	8.13
Specific Conductance	*µS/cm*	2535	2446	2115	2524	2470	2430	2483	2494	2528	2506	2458	2415	2253	2336	2391	2355	2309	NM
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	-145.9	-132.3	-138.6
Lab Analytical Results:																			
Hardness as CaCO3	*mg/L*	7.53	12.6			12.6		10.4			11.5			11.2	12.6	14.1	11.9	10.7	10.4
pH (Lab)	*SU*	8.63	8.69			8.53		8.29			8.45			8.36	8.37	8.24	8.28	8.29	8.27
Total Dissolved Solids (Lab)	*mg/L*	1630	1670			1630		1690			1680			1670	1600	1540	1500	1530	1520
Calcium	*mg/L*	2.00	3.67			3.63		3.27			3.33			3.2	3.71	4.15	3.55	3.16	3.08
Magnesium	*mg/L*	0.616	0.823			0.859		0.550			0.776			0.774	0.811	0.913	0.739	0.692	0.655
Sodium	*mg/L*	566	585			589		551			562			542	562	605	543	525	553
Potassium	*mg/L*	1.72	2.02			2.04		<5.00			<2.00			1.8	<2.00	2.17	<2.00	1.92	<2.00
Alkalinity, Total	*mg/L*	530	470			500		490			430			480	480	475	540	450	459
Alkalinity, Bicarbonate	*mg/L*	380	470			440		460			360			480	420	385	330	430	423
Alkalinity, Carbonate	*mg/L*	150	<10.0			60.0		30.0			70.0			<10.0	60.0	90.0	210	20	36.0
Alkalinity, Hydroxide	*mg/L*	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0	<10.0	<10	<10.0
Chloride	*mg/L*	16.1	17.4			18.5		16.9			16.4			16.1	15.1	16.0	15.2	15	15.0
Fluoride	*mg/L*	0.464	0.488			0.535		<0.500			<0.500			<0.5	NA	0.383	0.406	0.404	0.396
Sulfate as SO4	*mg/L*	729	802			840		730			812			756	706	682	716	699	724
Total Organic Carbon (TOC)	*mg/L*	3.52	10.0			7.26		6.07			5.32			4.7	4.62	4.52	4.15	4.1	3.84
Nitrate/Nitrite as N	*mg/L*	<0.100	<0.100			<0.020		<0.020			<0.020			<0.02	<0.02	<0.02	0.266	<0.02	<0.020
Aluminum	*mg/L*	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.10	<0.100	<0.05	<0.100
Arsenic	*mg/L*	0.0025	<0.0025			<0.0025		<0.0025			<0.0025			0.0006	<0.0025	<0.0010	<0.0010	<0.0025	<0.0010
Cadmium	*mg/L*	<0.0001	<0.0005			<0.0005		<0.0005			<0.0005			<0.0001	<0.0001	<0.0002	<0.0002	<0.0005	<0.0002
Copper	*mg/L*	0.0061	0.0081			0.0080		0.0079			0.0236			0.0063	0.0117	0.0086	0.0137	0.0078	0.0067
Iron	*mg/L*	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100	<0.100	<0.05	<0.100
Lead	*mg/L*	<0.0005	<0.0025			<0.0025		<0.0025			<0.0025			<0.0005	<0.0005	<0.0010	<0.0010	<0.0025	<0.0010
Manganese	*mg/L*	0.0042	0.0251			0.0194		0.0269			0.0232			0.018	0.0222	0.0187	0.0172	0.0185	0.0166
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	0.0274			0.0091		0.0078			0.0065			0.0046	0.0043	0.0033	0.003	0.003	0.0018
Selenium	*mg/L*	0.0577	<0.0050			<0.0050		<0.0050			<0.0050			0.0109	<0.0050	0.0028	0.0039	<0.005	0.0020
Silica (Si02)	*mg/L*	10.1	10.9			11.6		7.66			11.1			11	12.0	12.8	11.7	11	12.7
Silicon	*mg/L*	4.70	5.10			5.41		3.58			5.18			5.17	5.62	5.97	5.46	5.16	5.95
Uranium	*mg/L*	0.0002	0.0040			0.0051		0.0036			0.0030			0.0026	0.0026	0.0027	0.0018	0.0014	0.0012
Zinc	*mg/L*	0.0031	<0.0100			<0.0100		<0.0100			<0.0100			<0.002	<0.002	<0.0040	<0.0040	<0.01	<0.0080

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.*

GCC Energy Hydrologic Monitoring Data

MW-3-MI																			
Year		2017								2018							2019		
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/27	5/21	8/21
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.12	0.12	0.06
Total Purged	gal	19	2	NM	NM	NM	1	1	1	1.3	1.5	1.5	1	1.3	1	1.1	1.5	1.25	2.0
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	242.15	242.32	246.55
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	11.6	11.3	13.2
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	8.51	8.55	8.71
Specific Conductance	µS/cm	1907	1699	1402	1598	1737	1729	1745	1786	1790	1810	1771	1772	1727	1709	1746	1753	1739	1691
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	-113	-84.5	43.87
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	4.85	8.73			9.02		7.75			9.92			8.65	8.63	8.88	7.63	6.84	7.98
pH (Lab)	SU	8.95	8.75			8.72		8.72			8.66			8.56	8.58	8.34	8.5	8.45	8.58
Total Dissolved Solids (Lab)	mg/L	1550	1120			1140		1080			1170			1210	1110	1120	1120	1170	1010
Calcium	mg/L	1.32	2.32			2.34		2.06			2.22			1.91	1.95	2.03	1.87	1.7	2.04
Magnesium	mg/L	0.374	0.714			0.775		0.632			1.07			0.945	0.911	0.926	0.715	0.629	0.703
Sodium	mg/L	420	430			440		411			459			417	446	476	434	419	454
Potassium	mg/L	2.15	2.21			1.93		<5.00			<2.00			1.63	<2.00	<2.00	1.39	1.65	<2.00
Alkalinity, Total	mg/L	740	675			700		660			700			680	730	720	685	755	720
Alkalinity, Bicarbonate	mg/L	510	555			600		570			600			500	630	610	485	605	590
Alkalinity, Carbonate	mg/L	230	120			100		90.0			100			180	100	110	200	150	130
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<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	9.21	9.25	10.2
Fluoride	mg/L	0.952	1.34			1.26		1.26			1.30			1.2	1.16	1.19	1.21	1.22	1.19
Sulfate as SO4	mg/L	165	241			247		254			245			250	226	230	232	229	236
Total Organic Carbon (TOC)	mg/L	8.34	14.8			10.9		10.3			9.24			8.67	7.83	7.28	6.73	6.56	6.17
Nitrate/Nitrite as N	mg/L	<0.020	<0.020			<0.020		<0.020			<0.020			<0.02	<0.02	<0.02	<0.020	<0.020	<0.020
Aluminum	mg/L	<0.050	0.102			<0.050		<0.250			<0.100			<0.05	<0.05	<0.10	<0.050	<0.050	0.167
Arsenic	mg/L	0.0134	0.0167			0.0131		0.0135			0.0160			0.0152	0.0127	0.0104	0.0149	0.0107	0.0142
Cadmium	mg/L	<0.0001	<0.0005			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002	<0.0001	<0.0005	<0.0001
Copper	mg/L	0.0055	0.0058			0.0065		0.0059			0.0122			0.0048	0.0071	0.0073	0.0068	0.0063	0.0049
Iron	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.05	<0.1	<0.050	<0.050	<0.100
Lead	mg/L	0.0024	<0.0025			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.001	<0.0005	<0.0025	<0.0005
Manganese	mg/L	0.0022	0.0058			0.0033		0.0045			0.0049			0.006	0.0054	0.0072	0.0078	0.0082	0.0079
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	0.0061	0.0211			0.0148		0.0152			0.0170			0.016	0.0149	0.0158	0.0157	0.0167	0.0277
Selenium	mg/L	0.0013	<0.0050			<0.0050		<0.0050			0.0010			0.0019	<0.0050	<0.002	0.0034	<0.005	<0.0010
Silica (Si02)	mg/L	7.97	8.18			9.05		5.35			9.33			8.83	9.49	10.2	8.95	8.85	9.73
Silicon	mg/L	3.73	3.82			4.23		2.50			4.36			4.13	4.44	4.76	4.18	4.14	4.55
Uranium	mg/L	0.0049	0.0084			0.0140		0.0124			0.0125			0.0126	0.0111	0.0110	0.011	0.0085	0.0080
Zinc	mg/L	0.0405	<0.0100			<0.0100		<0.0100			<0.0020			0.0023	0.0023	<0.0040	0.0028	<0.01	0.0070

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.*

GCC Energy Hydrologic Monitoring Data

MW-3-C																			
Year		2017								2018							2019		
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	9
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	2/27	5/21	9/17
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.06	0.06	0.13
Total Purged	gal	20	2	NM	NM	NM	1	1	1	1.5	1.5	1.5	1	1.3	1.3	1.1	1.25	1.5	10
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	296.39	295.56	295.7
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	11.0	11.4	13.5
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	8.28	8.29	8.31
Specific Conductance	µS/cm	3549	3588	3815	4112	4351	4412	4659	4596	4923	4864	5063	5019	4916	4953	5127	5155	5184	5144
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	-185.4	-188.5	-151.8
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	14.4	11.8			15.1		14.9			16.1			40.3	17.9	21.7	17.3	16.8	18.6
pH (Lab)	SU	8.5	8.48			8.35		8.28			8.35			8.34	8.31	8.24	8.2	8.23	8.23
Total Dissolved Solids (Lab)	mg/L	2130	2360			3070		3310			3540			3610	3520	3360	3300	3440	3500
Calcium	mg/L	3.60	2.87			3.50		3.58			3.81			7.28	4.01	4.70	4.05	3.74	4.30
Magnesium	mg/L	1.31	1.12			1.55		1.44			1.59			5.38	1.92	2.41	1.75	1.8	1.91
Sodium	mg/L	796	890			1100		1130			1200			1350	1220	1460	1270	1100	1360
Potassium	mg/L	3.47	3.24			4.01		<5.00			<10.0			<5.00	<5.00	<5.00	<5.00	5.24	<5.00
Alkalinity, Total	mg/L	1490	1570			1690		1880			1910			1760	1730	2050	2000	2110	2190
Alkalinity, Bicarbonate	mg/L	1360	1480			1650		1830			1810			1600	1670	1900	1830	2000	2020
Alkalinity, Carbonate	mg/L	130	90.0			40.0		50.0			100			160	60.0	150	170	110	170
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10	NA	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	182	330			477		506			549			544	524	561	577	575	620
Fluoride	mg/L	4.89	4.94			4.52		4.34			4.15			3.52	3.84	4.04	4.04	3.91	3.78
Sulfate as SO4	mg/L	73.4	73.5			46.4		24.5			<10.0			<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Total Organic Carbon (TOC)	mg/L	10.6	58.5			219		251			337			343	306	141	122	129	132
Nitrate/Nitrite as N	mg/L	<0.020	<0.400			<0.400		<0.020			<0.020			<0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.100			<0.050		<0.250			<0.500			1.47	<0.500	<0.250	<0.250	<0.500	<0.250
Arsenic	mg/L	0.0115	0.0088			0.0098		0.0091			0.0194			0.0168	0.0148	0.0155	0.0218	0.0171	0.0192
Cadmium	mg/L	<0.0001	<0.0010			<0.0010		<0.0005			<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005
Copper	mg/L	0.0109	0.0147			0.0174		0.0160			0.0409			0.0183	0.0257	0.0227	0.0223	0.0168	0.0102
Iron	mg/L	<0.050	<0.050			<0.050		<0.250			<0.500			0.252	<0.500	<0.250	<0.250	0.344	0.328
Lead	mg/L	0.0085	<0.0050			<0.0050		<0.0025			<0.0025			<0.0025	<0.0025	<0.0025	<0.0025	<0.005	<0.0025
Manganese	mg/L	0.0091	0.0188			0.0178		0.0202			0.0307			0.0275	0.0243	0.0252	0.0483	0.063	0.0378
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	0.0143	0.0291			0.0241		0.0241			0.0221			0.0189	0.0155	0.0140	0.0134	0.0121	0.0081
Selenium	mg/L	0.0233	0.0121			0.0149		0.0240			0.0383			0.0268	0.0232	0.0261	0.0464	0.0203	0.0203
Silica (Si02)	mg/L	7.82	8.86			9.16		6.01			<10.7			9.69	8.68	10.7	8.24	8.35	9.06
Silicon	mg/L	3.66	4.14			4.28		2.81			<5.00			4.53	4.06	5.01	3.85	3.9	4.24
Uranium	mg/L	0.0091	0.0102			0.0137		0.0100			0.0091			0.0087	0.0089	0.0113	0.0077	0.0046	0.0053
Zinc	mg/L	0.375	<0.0200			<0.0200		<0.0100			<0.0100			<0.01	0.0664	0.0814	0.123	0.128	0.0567

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.*

RESOURCE HYDROGEOLOGIC SERVICES

GCC Energy Hydrologic Monitoring Data

MW-4-A																			
Year		2017								2018							2019		
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/27	5/22	8/15
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.06	0.06	0.06
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	1.5	1.25	1.125
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	335.6	335.07	335.21
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	11.1	10.4	13.6
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	8.15	8.08	8.02
Specific Conductance	µS/cm	2163	2053	1876	2096	2180	2165	2186	2261	2259	2267	2207	2214	2183	2192	2246	2205	2237	2201
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	-92.3	-89.3	-54.33
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	9.16	9.85			7.77		7.11			7.73			7.84	7.69	8.81	7.76	7.31	8.62
pH (Lab)	SU	8.2	8.40			8.36		8.40			8.28			8.31	8.21	8.24	8.05	8.08	8.15
Total Dissolved Solids (Lab)	mg/L	1470	1470			1450		1500			1490			1470	1430	1350	1450	1410	1540
Calcium	mg/L	2.23	2.43			1.76		1.87			1.81			1.75	1.71	1.92	1.77	1.68	1.94
Magnesium	mg/L	0.871	0.916			0.823		0.591			0.778			0.846	0.832	0.973	0.809	0.756	0.914
Sodium	mg/L	515	537			513		511			507			528	531	568	535	515	548
Potassium	mg/L	1.57	1.75			1.63		<5.00			<2.00			1.5	<2.00	<2.00	<2.00	<2.00	4.75
Alkalinity, Total	mg/L	635	560			630		590			530			560	575	575	545	565	575
Alkalinity, Bicarbonate	mg/L	635	560			590		560			490			560	555	575	505	544	535
Alkalinity, Carbonate	mg/L	<10.0	<10.0			40.0		30.0			40.0			<10.0	20.0	<10.0	40	32	40.0
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<10.0			<10.0			<10.0	<10.0	<10.0	<10.0	<10	<10.0
Chloride	mg/L	9.56	9.66			10.3		10.3			10.0			9.94	9.55	8.60	8.93	8.99	8.91
Fluoride	mg/L	<0.400	<0.400			<0.500		<0.500			<0.500			<0.5	<0.5	0.143	<0.200	<0.2	<0.200
Sulfate as SO4	mg/L	594	588			783		594			579			561	522	450	567	584	615
Total Organic Carbon (TOC)	mg/L	6.63	11.7			3.52		3.27			3.46			3.59	3.60	3.59	3.47	3.4	3.33
Nitrate/Nitrite as N	mg/L	0.035	<0.020			<0.020		<0.020			<0.020			<0.02	<0.02	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100	<0.100	<0.100	<0.100
Arsenic	mg/L	0.0016	<0.0025			<0.0025		<0.0025			0.0019			0.0005	<0.0025	<0.0010	<0.0010	<0.0005	<0.0005
Cadmium	mg/L	<0.0001	<0.0005			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0002
Copper	mg/L	0.0053	0.0093			0.0076		0.0073			0.0124			0.0077	0.0105	0.0084	0.0081	0.0061	0.0120
Iron	mg/L	<0.050	<0.050			<0.050		<0.250			<0.100			<0.05	<0.05	<0.100	<0.100	<0.100	<0.100
Lead	mg/L	0.0014	<0.0025			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.0010	<0.0010	<0.0005	<0.0010
Manganese	mg/L	0.0044	0.0063			0.0044		0.0040			0.0035			0.0033	<0.0075	0.0034	0.0032	0.0031	0.0026
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	0.0009	0.0275			<0.0025		<0.0025			0.0005			<0.0005	<0.0005	<0.0010	<0.0010	<0.0005	<0.0005
Selenium	mg/L	0.0016	<0.0050			<0.0050		<0.0050			0.0014			0.0025	<0.0050	<0.0020	0.0036	<0.001	<0.0010
Silica (Si02)	mg/L	10.2	10.6			9.99		6.85			9.47			10	10.2	11.2	9.65	9.81	11.0
Silicon	mg/L	4.75	4.97			4.67		3.20			4.43			4.7	4.77	5.22	4.51	4.59	5.14
Uranium	mg/L	0.0016	<0.0005			<0.0005		0.0005			0.0003			<0.0001	<0.0005	<0.0002	<0.0002	<0.0001	<0.0002
Zinc	mg/L	0.269	0.0319			<0.0100		<0.0100			0.0022			0.0024	<0.0100	<0.0040	<0.0040	0.0033	<0.0020

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.*

GCC Energy Hydrologic Monitoring Data

MW-4-MI																			
Year		2017								2018							2019		
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/27	5/22	8/15
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.06	0.06	0.125
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	2	1.25	1.125
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	331.10	331.06	331.92
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	11.1	10.8	13.3
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	8.38	8.23	8.14
Specific Conductance	µS/cm	1581	1668	1731	1708	1784	1794	1804	1833	1848	1856	1841	1816	1739	1756	1808	1716	1800	1830
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	-140.4	-154.7	-127.32
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	5.43	8.71			7.07		4.20			6.01			5.88	6.06	6.39	5.35	4.93	5.65
pH (Lab)	SU	8.83	8.59			8.63		8.51			8.47			8.48	8.31	8.47	8.35	8.3	8.44
Total Dissolved Solids (Lab)	mg/L	1160	1170			1180		1180			1220			1140	1120	1100	1130	1130	1140
Calcium	mg/L	1.53	2.32			1.88		1.68			1.64			1.55	1.56	1.60	1.44	1.3	1.51
Magnesium	mg/L	0.392	0.707			0.579		<0.500			0.465			0.49	0.524	0.580	0.428	0.408	0.458
Sodium	mg/L	408	458			449		452			447			471	470	500	462	458	496
Potassium	mg/L	1.46	<2.00			1.73		<5.00			<2.00			1.39	<2.00	<2.00	1.43	1.77	2.03
Alkalinity, Total	mg/L	965	915			1100		985			965			955	968	995	510	890	970
Alkalinity, Bicarbonate	mg/L	775	825			880		885			875			865	896	885	420	650	880
Alkalinity, Carbonate	mg/L	190	90.0			220		100			90.0			90	72.0	110	90	240	90.0
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<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	5.98	5.98	5.83
Fluoride	mg/L	4.72	5.02			5.09		5.10			5.02			4.82	4.84	4.94	5.49	5.44	5.38
Sulfate as SO4	mg/L	17.4	64.7			76.6		77.5			68.6			54.4	48.3	47.6	38.7	34.4	31.9
Total Organic Carbon (TOC)	mg/L	2.64	6.49			8.58		9.53			9.54			9.25	8.94	8.48	8.37	8.25	7.81
Nitrate/Nitrite as N	mg/L	<0.020	<0.020			<0.020		<0.020			<0.020			<0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.100	<0.100	<0.050	<0.050	<0.100
Arsenic	mg/L	0.0099	0.0220			0.0131		0.0122			0.0139			0.0153	0.014	0.0119	0.0164	0.0111	0.0116
Cadmium	mg/L	<0.0001	<0.0001			<0.0005		<0.0005			<0.0001			<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001
Copper	mg/L	0.0059	0.0058			0.0071		0.0070			0.0079			0.0063	0.0071	0.0078	0.0087	0.0153	0.0051
Iron	mg/L	<0.050	<0.100			<0.050		<0.250			<0.100			<0.05	<0.100	<0.100	<0.050	<0.050	<0.100
Lead	mg/L	0.0010	<0.0005			<0.0025		<0.0025			<0.0005			<0.0005	<0.0005	<0.0010	<0.0005	<0.0005	<0.0005
Manganese	mg/L	0.0020	0.0066			0.0081		0.0124			0.0080			0.007	0.0068	0.0084	0.0091	0.0084	0.0084
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	0.0020	0.0160			0.0127		0.0134			0.0151			0.0119	0.0115	0.0129	0.0121	0.0119	0.0108
Selenium	mg/L	<0.0010	0.0012			<0.0050		<0.0050			<0.0010			0.0022	0.0113	<0.0020	0.002	<0.001	<0.0010
Silica (Si02)	mg/L	7.27	8.01			8.80		<5.35			8.30			8.9	9.29	10.3	8.86	9.06	10.2
Silicon	mg/L	3.40	3.75			4.11		2.50			3.88			4.16	4.34	4.81	4.14	4.24	4.76
Uranium	mg/L	0.0043	0.0126			0.0184		0.0169			0.0183			0.0173	0.0151	0.0191	0.0269	0.0176	0.0168
Zinc	mg/L	0.113	0.0697			<0.0100		<0.0100			<0.0020			<0.002	<0.002	<0.0040	<0.0020	<0.002	<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)

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.*

GCC Energy Hydrologic Monitoring Data

MW-4-C																			
Year		2017								2018							2019		
Quarter		Q1	Q2	Q3			Q4			Q1			Q2		Q3	Q4	Q1	Q2	Q3
Month		3	6	7	8	9	10	11	12	1	2	3	4	5	8	11	2	5	8
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	2/27	5/22	8/15
Lab Analysis (Y/N)		Y	Y	N	N	Y	N	Y	N	N	Y	N	N	Y	Y	Y	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	0.12	0.06	0.125
Total Purged	gal	7	1.5	NM	NM	1	1	1	1	1.5	1.5	1.5	1	1.5	1	1.3	1.5	1.25	1.125
Depth to Water	ft bgs	328.33	314.05	309.87	306.86	303.96	303.80	302.47	304.80	282.35	281.30	303.30	304.05	NM	302.55	302.17	302.45	303.93	304.93
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	11.3	11.2	12.5
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	7.87	7.86	7.81
Specific Conductance	µS/cm	3792	5944	5997	5885	5813	5721	5782	5604	5834	5903	5628	5792	5592	5583	5775	5710	5712	5930
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	-160.1	-180.1	-156.8
Lab Analytical Results:																			
Hardness as CaCO3	mg/L	46.3	55.9			38.9		30.0			26.5			26.2	25.9	28.6	23.6	22.5	25.2
pH (Lab)	SU	7.61	7.77			7.79		7.98			7.84			7.97	7.96	8.27	7.9	7.92	7.95
Total Dissolved Solids (Lab)	mg/L	3230	4050			3750		3780			3730			3660	3650	3590	3580	3590	3610
Calcium	mg/L	13.6	13.7			9.15		7.45			6.32			6.15	5.90	6.60	5.5	5.21	5.83
Magnesium	mg/L	2.99	5.26			3.90		2.76			2.61			2.62	2.72	2.94	2.39	2.3	2.57
Sodium	mg/L	908	1510			1490		1400			1410			1400	1410	1590	1410	1370	1440
Potassium	mg/L	4.38	5.71			6.07		<10.0			<10.0			<5	<5	5.36	<5.00	<5.00	5.42
Alkalinity, Total	mg/L	1250	2360			2780		2680			2600			2410	2480	2450	2470	2550	2500
Alkalinity, Bicarbonate	mg/L	1250	2360			2780		2640			2600			2330	2480	2450	2470	2350	2390
Alkalinity, Carbonate	mg/L	<10.0	<10.0			<10.0		40.0			<10.0			80	<10.0	<10.0	<10.0	200	110
Alkalinity, Hydroxide	mg/L	<10.0	<10.0			<10.0		<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	575	554	580
Fluoride	mg/L	1.29	2.04			2.17		2.43			2.53			2.52	2.48	2.54	2.64	2.62	2.59
Sulfate as SO4	mg/L	534	487			70.2		26.0			34.5			27	18.7	11.2	5.07	<5.00	<5.00
Total Organic Carbon (TOC)	mg/L	30	6.42			5.08		3.64			3.23			3.23	2.80	3.46	3.24	2.62	2.63
Nitrate/Nitrite as N	mg/L	<2.00	<0.500			<0.400		<0.100			<0.020			<0.02	<0.02	<0.020	0.061	<0.020	<0.020
Aluminum	mg/L	<0.050	<0.050			<0.050		<0.500			<0.500			<0.25	<0.25	<0.250	<0.250	<0.250	<0.250
Arsenic	mg/L	0.0059	0.0119			0.0128		0.0152			0.0246			0.0195	0.0202	0.0164	0.0211	0.0171	0.0178
Cadmium	mg/L	<0.0001	<0.0010			<0.0010		<0.0010			<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0005
Copper	mg/L	0.0125	0.0243			0.0221		0.0208			0.0482			0.0389	0.0280	0.0230	0.0249	0.0382	0.0198
Iron	mg/L	<0.050	<0.050			<0.050		<0.500			<0.500			0.373	0.397	0.474	0.279	0.391	0.522
Lead	mg/L	<0.0005	<0.0050			<0.0050		<0.0050			<0.0025			<0.0025	<0.0025	<0.0025	<0.0025	<0.0005	<0.0025
Manganese	mg/L	0.0269	0.0772			0.0554		0.0571			0.0647			0.0529	0.0381	0.0283	0.0268	0.0174	0.0162
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	0.0526	0.115			0.0138		0.0106			0.0086			0.0072	0.0071	0.0057	0.0074	0.007	0.0056
Selenium	mg/L	0.0248	0.0231			0.0214		0.0269			0.0378			0.0317	0.0260	0.0211	0.0339	0.0195	0.0195
Silica (Si02)	mg/L	9.85	12.6			12.9		<10.7			<10.7			11	11.2	12.8	10.1	10.5	11.3
Silicon	mg/L	4.61	5.88			6.02		<5.00			<5.00			5.16	5.24	6.00	4.7	4.89	5.29
Uranium	mg/L	0.0297	0.121			0.0984		0.0545			0.0311			0.0311	0.0277	0.0246	0.0215	0.0154	0.0086
Zinc	mg/L	0.0156	0.0265			<0.0200		<0.0200			<0.0100			<0.01	<0.01	<0.0100	<0.0100	0.0038	<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.*

GCC Energy Hydrologic Monitoring Data

MW-6-A										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/28	1/31	2/21	3/21	4/23	5/20	6/19	7/23	8/15
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	NM	NM	0.10	2.00	0.03	0.03	0.03	0.06	0.03
Total Purged	gal	36.3	0.5	0.5	2.0	2.0	1.3	1.0	1.3	1.1
Depth to Water	ft bgs	304.33	306.41	307.40	309.60	311.05	312.50	314.20	315.75	316.43
Temperature	deg C	7.4	10.7	8.1	7.5	9.6	7.3	12.5	12.3	11.9
pH	SU	7.32	6.64	6.66	6.74	6.65	6.73	6.76	6.751	6.76
Specific Conductance	µS/cm	6573	6053	6072	6107	6012	6057	5725	5598	5562
Oxygen Reduction Potential	mV	-22.8	19.4	24.6	12.6	11.8	34.8	86.6	25.8	6.5
Lab Analytical Results:										
Hardness as CaCO3	mg/L	4360		4190			3920			3540
pH (Lab)	SU	7.10		6.85			6.77			6.85
Total Dissolved Solids (Lab)	mg/L	6520		6520			120			6080
Calcium	mg/L	615		559			553			492
Magnesium	mg/L	687		678			617			560
Sodium	mg/L	294		283			296			304
Potassium	mg/L	15.0		14.4			12.4			12.8
Alkalinity, Total	mg/L	160		160			143			183
Alkalinity, Bicarbonate	mg/L	160		160			143			183
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	97.4		28.6			27.3			29.9
Fluoride	mg/L	2.83		<0.500			<0.500			<0.500
Sulfate as SO4	mg/L	205		4300			4280			4260
Total Organic Carbon (TOC)	mg/L	3.45		3.08			2.91			3.57
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.500		<0.250			<0.250			<0.250
Arsenic	mg/L	<0.0025		<0.0025			0.0009			<0.0025
Cadmium	mg/L	<0.0005		<0.0005			0.0001			<0.0005
Copper	mg/L	0.0116		0.0081			0.0035			0.0039
Iron	mg/L	1.37		3.75			3.93			3.22
Lead	mg/L	<0.0025		<0.0025			<0.0005			<0.0025
Manganese	mg/L	0.788		0.802			0.724			0.690
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	<0.0025		<0.0025			<0.0005			<0.0025
Selenium	mg/L	<0.0050		<0.0050			0.0028			<0.0050
Silica (Si02)	mg/L	12.3		11.9			14.3			13.4
Silicon	mg/L	5.77		5.57			6.69			6.28
Uranium	mg/L	<0.0005		<0.0005			<0.0001			<0.0005
Zinc	mg/L	0.0689		<0.0100			0.0082			0.0108

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.*

GCC Energy Hydrologic Monitoring Data

MW-6-C										
Year		2018	2019							
Quarter		Q4		Q1			Q2			Q3
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/24	1/30	2/21	3/21	4/23	5/20	6/19	7/23	8/15
Lab Analysis (Y/N)		N	N	N	N	N	N	N	N	N
Field Parameters:										
Purge Flow Rate	gpm									
Total Purged	gal									
Depth to Water	ft bgs									
Temperature	deg C	dry	dry	dry	dry	dry	dry	dry	dry	dry
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)
- * 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.

RESOURCE HYDROGEOLOGIC SERVICES

GCC Energy Hydrologic Monitoring Data

MW-6-MI											
Year		2018	2019								
Quarter		Q4	Q1			Q2				Q3	
Month		12	1	2	3	4	5	5	6	7	8
Sample Date		12/29	1/31	2/25	3/21	4/19	5/20	5/30	6/19	7/23	8/15
Lab Analysis (Y/N)		Y	N	Y	N	N	N#	N	N	N	N
Field Parameters:											
Purge Flow Rate	gpm	NM	NM	NM	0.5	0.1	0.015				
Total Purged	gal	11.3	0.5	1.5	0.5	1.0	0.9				
Depth to Water	ft bgs	374.49	368.09	367.92	370.49	369.50	371.00				
Temperature	deg C	14.3	13.6	10.8	9.7	16.7	3.9	dry	dry	dry	dry
pH	SU	8.26	7.43	7.21	7.55	7.97	7.84				
Specific Conductance	µS/cm	3390	3620	3132	2619	2202	2527				
Oxygen Reduction Potential	mV	103.0	-80.2	77.6	59.8	38.3	64.9				
Lab Analytical Results:											
Hardness as CaCO3	mg/L	679		147							
pH (Lab)	SU	8.18		8.35							
Total Dissolved Solids (Lab)	mg/L	2480		1880							
Calcium	mg/L	104		23.4							
Magnesium	mg/L	102		21.6							
Sodium	mg/L	646		565							
Potassium	mg/L	12.0		5.30							
Alkalinity, Total	mg/L	395		615							
Alkalinity, Bicarbonate	mg/L	345		615							
Alkalinity, Carbonate	mg/L	50.0		<10.0							
Alkalinity, Hydroxide	mg/L	<10.0		<10.0							
Chloride	mg/L	175		178							
Fluoride	mg/L	2.06		2.46							
Sulfate as SO4	mg/L	1210		585							
Total Organic Carbon (TOC)	mg/L	3.63		4.55							
Nitrate/Nitrite as N	mg/L	0.023		<0.020							
Aluminum	mg/L	<0.100		<0.100							
Arsenic	mg/L	0.0084		0.0144							
Cadmium	mg/L	<0.0001		<0.0002							
Copper	mg/L	0.0113		0.0112							
Iron	mg/L	<0.100		<0.100							
Lead	mg/L	<0.0005		<0.0010							
Manganese	mg/L	0.0500		0.0224							
Mercury	mg/L	<0.0002		<0.0002							
Molybdenum	mg/L	0.0558		0.0690							
Selenium	mg/L	0.0098		0.0127							
Silica (Si02)	mg/L	9.93		9.05							
Silicon	mg/L	4.64		4.23							
Uranium	mg/L	0.0200		0.0118							
Zinc	mg/L	0.0092		0.0143							

Notes & Definitions:

\# No sample collected, due to low yield, insufficient volume for lab sample after field parameters we measured

- 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.*

GCC Energy Hydrologic Monitoring Data

MW-6-LM										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/30	1/31	2/25	3/21	4/23	5/20	6/19	7/23	8/15
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	NM	NM	0.06	2.00	0.03	0.03	0.10	0.06	0.03
Total Purged	gal	0.5	0.5	1.5	2.0	2.0	2.3	1.3	1.3	1.8
Depth to Water	ft bgs	535.72	538.73	539.34	540.64	539.98	537.58	540.00	540.35	540.24
Temperature	deg C	7.9	14.3	7.8	8.1	9.1	9.3	11.7	14.0	13.4
pH	SU	7.64	7.38	7.51	7.54	7.49	7.54	7.67	7.8	7.65
Specific Conductance	µS/cm	6011	3784	3503	1461	1164	1296	1400	1272	1532
Oxygen Reduction Potential	mV	185.3	10.7	40.9	-32.8	-35.8	-111.0	-194.5	-163.6	-67.2
Lab Analytical Results:										
Hardness as CaCO3	mg/L	2260		1270			431			621
pH (Lab)	SU	7.60		7.52			7.47			7.59
Total Dissolved Solids (Lab)	mg/L	5100		2840			875			1150
Calcium	mg/L	367		216			75.9			103
Magnesium	mg/L	325		177			58.7			88.3
Sodium	mg/L	459		248			129			153
Potassium	mg/L	173		64.5			14.0			13.7
Alkalinity, Total	mg/L	205		315			371			381
Alkalinity, Bicarbonate	mg/L	205		315			371			381
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	256		43.7			5.73			8.70
Fluoride	mg/L	0.530		<0.500			0.324			<0.500
Sulfate as SO4	mg/L	3050		1790			338			492
Total Organic Carbon (TOC)	mg/L	3.46		2.61			1.57			1.78
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.250		<0.250			<0.050			<0.050
Arsenic	mg/L	0.0039		0.0049			0.0036			0.0038
Cadmium	mg/L	<0.0005		<0.0005			<0.0001			<0.0001
Copper	mg/L	0.0135		0.0064			0.0017			0.0018
Iron	mg/L	<0.250		<0.250			<0.050			<0.050
Lead	mg/L	<0.0025		<0.0025			<0.0005			<0.0005
Manganese	mg/L	0.383		0.223			0.0692			0.148
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0490		0.0169			0.0037			0.0025
Selenium	mg/L	0.0080		<0.0050			<0.0010			<0.0010
Silica (Si02)	mg/L	10.5		13.5			17.0			17.4
Silicon	mg/L	4.91		6.29			7.96			8.12
Uranium	mg/L	0.0230		0.0075			0.0039			0.0054
Zinc	mg/L	0.0323		<0.0100			<0.0020			<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)
- ***** Anomalous value under review

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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.*

GCC Energy Hydrologic Monitoring Data

MW-7-EAA

Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/23	1/29	2/19	3/20	4/16	5/29	6/20	7/24	8/13
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	1.10	1.10	1.00	3.00	1.00	1.00	1.00	1.00	1.00
Total Purged	gal	15.0	18.0	15.0	3.0	15.0	16.0	15.3	15.3	17.0
Depth to Water	ft bgs	36.13	36.27	36.45	36.52	36.70	36.25	36.22	36.48	36.49
Temperature	deg C	10.0	10.0	10.0	9.9	10.1	10.4	10.4	10.6	10.5
pH	SU	6.99	7.01	7.04	6.93	7.00	7.06	7.07	6.28	6.95
Specific Conductance	µS/cm	2001	1910	1910	1926	1912	1767	1836	1885	1890
Oxygen Reduction Potential	mV	-68.0	-36.7	-41.4	-38.1	-48.8	14.1	-13.8	-33.9	-37.8
Lab Analytical Results:										
Hardness as CaCO3	mg/L	936		1030			982			997
pH (Lab)	SU	7.2		7.37			7.17			7.09
Total Dissolved Solids (Lab)	mg/L	1460		1480			1490			1480
Calcium	mg/L	170		179			171			173
Magnesium	mg/L	124		142			135			137
Sodium	mg/L	75.3		81.3			75.0			75.2
Potassium	mg/L	3.87		3.9			<5.00			3.74
Alkalinity, Total	mg/L	380		367			405			392
Alkalinity, Bicarbonate	mg/L	380		367			405			392
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	11.9		10.7			10.8			10.9
Fluoride	mg/L	<0.500		0.332			0.322			0.322
Sulfate as SO4	mg/L	732		736			733			844
Total Organic Carbon (TOC)	mg/L	3.72		3.57			3.73			3.70
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.050		<0.100			<0.250			<0.100
Arsenic	mg/L	0.0014		0.0015			0.0013			0.0016
Cadmium	mg/L	<0.0001		<0.0002			<0.0001			<0.0001
Copper	mg/L	0.0003		0.0018			0.0011			0.0008
Iron	mg/L	1.82		1.95			1.81			2.12
Lead	mg/L	<0.0005		<0.0010			<0.0005			<0.0005
Manganese	mg/L	3.72		4.49			4.01			4.22
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0008		0.0011			0.0007			0.0009
Selenium	mg/L	<0.0020		<0.0020			<0.0010			0.0011
Silica (Si02)	mg/L	16.6		16.1			16.1			16.9
Silicon	mg/L	7.75		7.52			7.55			7.90
Uranium	mg/L	0.0021		0.0018			0.0017			0.0018
Zinc	mg/L	<0.0050		<0.0040			0.0021			0.0020

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

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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.*

GCC Energy Hydrologic Monitoring Data

MW-8-EAA										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/23	1/29	2/19	3/20	4/16	5/29	6/20	7/24	8/13
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	0.85	1.10	0.50	3.00	0.50	0.75	1.00	1.00	0.75
Total Purged	gal	18.0	14.0	15.0	3.0	15.0	17.0	15.3	15.3	18.0
Depth to Water	ft bgs	40.00	39.95	40.10	43.45	40.44	40.05	39.94	40.10	40.08
Temperature	deg C	10.3	10.2	10.0	9.9	10.3	10.5	10.6	10.5	10.6
pH	SU	7.12	7.09	7.13	7.17	7.09	7.02	7.17	7.09	7.05
Specific Conductance	µS/cm	1781	1696	1720	1725	1729	1628	1676	1699	172
Oxygen Reduction Potential	mV	-65	-52.8	-51.8	-53.0	-59.7	11.0	-29.5	-46.6	-44.8
Lab Analytical Results:										
Hardness as CaCO3	mg/L	870		861			864			883
pH (Lab)	SU	7.28		7.36			7.13			7.05
Total Dissolved Solids (Lab)	mg/L	1220		1290			1240			1280
Calcium	mg/L	152		151			148			154
Magnesium	mg/L	119		118			120			121
Sodium	mg/L	81.7		82.6			77.2			78.6
Potassium	mg/L	3.80		3.27			3.55			3.18
Alkalinity, Total	mg/L	400		435			450			431
Alkalinity, Bicarbonate	mg/L	400		435			450			431
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	9.83		10.5			10.3			11.1
Fluoride	mg/L	0.380		0.370			0.338			0.342
Sulfate as SO4	mg/L	533		559			606			643
Total Organic Carbon (TOC)	mg/L	3.77		3.59			3.77			3.68
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.100		<0.100			<0.050			<0.100
Arsenic	mg/L	0.0020		0.0018			0.0018			0.0021
Cadmium	mg/L	<0.0001		<0.0002			<0.0001			<0.0001
Copper	mg/L	0.0004		0.0024			0.0023			0.0008
Iron	mg/L	2.12		2.13			2.42			2.46
Lead	mg/L	<0.0005		<0.0010			<0.0005			<0.0005
Manganese	mg/L	3.17		3.52			3.06			3.37
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0009		0.0011			0.0008			0.0011
Selenium	mg/L	<0.0020		<0.0020			0.0010			0.0013
Silica (SiO2)	mg/L	16.3		15.3			15.7			16.1
Silicon	mg/L	7.63		7.15			7.32			7.52
Uranium	mg/L	0.0021		0.0017			0.0016			0.0018
Zinc	mg/L	<0.0050		<0.0040			<0.0020			<0.0020

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)
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*	Anomalous value under review

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RESOURCE
HYDROGEOLOGIC
SERVICES

GCC Energy Hydrologic Monitoring Data

MW-8-MI										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/23	1/29	2/19	3/20	4/16	5/29	6/20	7/24	8/13
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	1.10	1.00	0.50	3.00	0.50	0.50	0.25	0.50	0.75
Total Purged	gal	27.5	18.0	1.0	3.0	1.5	2.5	2.5	2.3	3.0
Depth to Water	ft bgs	45.75	43.48	43.50	44.30	44.47	44.10	44.24	44.45	44.59
Temperature	deg C	10.8	10.8	10.6	11.2	10.4	11.1	11.4	11.0	11.4
pH	SU	7.57	7.5	7.48	7.47	7.34	7.31	7.48	7.42	7.382
Specific Conductance	µS/cm	1786	1667	1651	1658	1643	1595	1639	1645	1658
Oxygen Reduction Potential	mV	-84.4	-177.1	-122.1	-113.3	-87.2	-54.4	-97.1	-116.4	-119.4
Lab Analytical Results:										
Hardness as CaCO3	mg/L	167		249			273			253
pH (Lab)	SU	7.73		7.54			7.24			7.46
Total Dissolved Solids (Lab)	mg/L	1050		1030			1100			1110
Calcium	mg/L	34.0		48.5			52.4			49.7
Magnesium	mg/L	19.9		31.0			34.5			31.4
Sodium	mg/L	344		312			289			289
Potassium	mg/L	4.47		5.25			<5.00			4.55
Alkalinity, Total	mg/L	500		565			560			573
Alkalinity, Bicarbonate	mg/L	500		565			560			573
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	12.7		10.0			9.33			9.06
Fluoride	mg/L	<0.500		<0.200			<0.200			<0.200
Sulfate as SO4	mg/L	347		353			343			366
Total Organic Carbon (TOC)	mg/L	2.73		2.83			2.81			2.74
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.050		<0.100			<0.250			<0.100
Arsenic	mg/L	0.0008		<0.0010			0.0006			0.0005
Cadmium	mg/L	<0.0001		<0.0002			<0.0001			<0.0001
Copper	mg/L	0.0031		0.0066			0.0036			0.0035
Iron	mg/L	0.137		0.162			<0.250			0.129
Lead	mg/L	<0.0005		<0.0010			<0.0005			<0.0005
Manganese	mg/L	0.0495		0.0383			0.0327			0.0351
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0005		<0.0010			<0.0005			<0.0005
Selenium	mg/L	<0.0020		<0.0020			0.0010			0.0010
Silica (Si02)	mg/L	12.1		12.4			12.8			12.5
Silicon	mg/L	5.65		5.78			5.99			5.83
Uranium	mg/L	0.0002		0.0002			0.0002			0.0001
Zinc	mg/L	<0.0050		<0.0040			<0.0020			<0.0020

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)
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*	Anomalous value under review

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GCC Energy Hydrologic Monitoring Data

MW-8-LM										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/28	1/29	2/19	3/21	4/16	5/29	6/18	7/24	8/13
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	NM	1.00	0.25	1.00	0.50	0.10	0.25	0.25	0.50
Total Purged	gal	30	4.0	1.5	1.0	2.0	1.3	6.8	2.0	2.0
Depth to Water	ft bgs	136.39	130.52	134.30	144.03	140.03	137.48	142.23	144.15	138.06
Temperature	deg C	4.1	13.9	13.2	8.7	13.6	13.9	12.8	13.7	13.4
pH	SU	8.37	8.7	8.71	8.41	8.7	8.5	8.66	8.64	8.58
Specific Conductance	µS/cm	2306	1274	1265	1310	1262	1234	1264	1226	1269
Oxygen Reduction Potential	mV	37.5	-114.3	112.8	77.0	-36.2	33.2	-63.9	-93.5	-103.0
Lab Analytical Results:										
Hardness as CaCO3	mg/L	45.0		7.29			16.9			6.67
pH (Lab)	SU	8.57		8.63			8.02			8.56
Total Dissolved Solids (Lab)	mg/L	1420		770			780			785
Calcium	mg/L	10.8		1.93			3.84			1.78
Magnesium	mg/L	4.39		0.600			1.77			0.541
Sodium	mg/L	382		341			317			306
Potassium	mg/L	45.7		3.49			<5.00			2.27
Alkalinity, Total	mg/L	615		720			745			731
Alkalinity, Bicarbonate	mg/L	535		610			645			645
Alkalinity, Carbonate	mg/L	80.0		110			100			86.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	175		5.11			6.80			2.63
Fluoride	mg/L	2.06		3.91			3.95			3.97
Sulfate as SO4	mg/L	190		3.79			9.58			1.02
Total Organic Carbon (TOC)	mg/L	2.80		1.80			3.33			1.94
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.050		<0.100			<0.250			<0.050
Arsenic	mg/L	0.0106		<0.0010			0.0006			0.0007
Cadmium	mg/L	<0.0001		<0.0002			<0.0001			<0.0001
Copper	mg/L	0.0337		0.0077			0.0047			0.0041
Iron	mg/L	<0.050		<0.100			<0.250			<0.050
Lead	mg/L	<0.0005		<0.0010			<0.0005			<0.0005
Manganese	mg/L	0.0258		0.0038			0.0150			0.0020
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0142		<0.0010			0.0009			<0.0005
Selenium	mg/L	0.0020		<0.0020			<0.0010			<0.0010
Silica (Si02)	mg/L	9.09		8.45			8.68			8.28
Silicon	mg/L	4.25		3.95			4.06			3.87
Uranium	mg/L	0.0044		<0.0002			0.0001			0.0001
Zinc	mg/L	0.0080		<0.0040			0.0023			<0.0020

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)
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GCC Energy Hydrologic Monitoring Data

MW-8-PL										
Year		2018	2019							
Quarter		Q4	Q1			Q2			Q3	
Month		12	1	2	3	4	5	6	7	8
Sample Date		12/27	1/29	2/19	3/20	4/16	5/29	6/20	7/24	8/13
Lab Analysis (Y/N)		Y	N	Y	N	N	Y	N	N	Y
Field Parameters:										
Purge Flow Rate	gpm	0.25	1.00	0.50	3.00	0.50	0.25	0.50	1.00	0.50
Total Purged	gal	20.0	5.0	2.0	3.0	2.0	3.0	2.5	2.3	2.5
Depth to Water	ft bgs	125.97	126.29	126.40	127.10	126.98	126.70	126.82	127.25	127.38
Temperature	deg C	10.3	14.2	13.4	12.9	13.2	14.2	14.8	14.7	14.9
pH	SU	7.50	7.30	7.49	7.30	7.29	7.31	7.57	7.56	7.52
Specific Conductance	µS/cm	1690	1531	1571	1558	1554	1411	1326	1165	1083
Oxygen Reduction Potential	mV	30.2	-116.5	97.9	-108.7	-110.6	34.2	-57.6	-74.0	-79.5
Lab Analytical Results:										
Hardness as CaCO3	mg/L	617		644			596			411
pH (Lab)	SU	7.28		7.40			7.26			7.22
Total Dissolved Solids (Lab)	mg/L	1150		1090			995			705
Calcium	mg/L	112		120			105			73.1
Magnesium	mg/L	82.1		83.8			81.4			55.4
Sodium	mg/L	106		124			102			91.7
Potassium	mg/L	5.14		5.62			<5.00			2.80
Alkalinity, Total	mg/L	370		415			435			393
Alkalinity, Bicarbonate	mg/L	370		415			435			393
Alkalinity, Carbonate	mg/L	<10.0		<10.0			<10.0			<10.0
Alkalinity, Hydroxide	mg/L	<10.0		<10.0			<10.0			<10.0
Chloride	mg/L	18.8		18.5			9.03			5.61
Fluoride	mg/L	0.505		0.474			0.290			0.291
Sulfate as SO4	mg/L	478		471			390			232
Total Organic Carbon (TOC)	mg/L	4.17		4.02			2.92			2.21
Nitrate/Nitrite as N	mg/L	<0.020		<0.020			<0.020			<0.020
Aluminum	mg/L	<0.050		<0.100			<0.250			<0.050
Arsenic	mg/L	0.0074		0.0124			0.0190			0.0156
Cadmium	mg/L	<0.0001		<0.0002			<0.0001			<0.0001
Copper	mg/L	0.0016		0.0025			0.0017			0.0011
Iron	mg/L	<0.050		0.352			<0.250			0.129
Lead	mg/L	<0.0005		<0.0010			<0.0005			<0.0005
Manganese	mg/L	1.31		1.22			0.697			0.505
Mercury	mg/L	<0.0002		<0.0002			<0.0002			<0.0002
Molybdenum	mg/L	0.0090		0.0068			0.0020			0.0021
Selenium	mg/L	0.0012		<0.0020			<0.0010			<0.0010
Silica (Si02)	mg/L	14.1		16.3			17.7			18.5
Silicon	mg/L	6.58		7.64			8.28			8.67
Uranium	mg/L	0.0052		0.0040			0.0010			0.0009
Zinc	mg/L	0.0344		<0.0040			<0.0020			<0.0080

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
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