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Well Construction and Testing Report

CENTRAL MONTANA REGIONAL WATER AUTHORITY

Production Wells CMRWA 4 & CMRWA 5

April 2025



Client Commitment



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CENTRAL MONTANA REGIONAL WATER AUTHORITY

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1.0 Introduction

1.1 Purpose and Objectives

This report presents the 2024 completion and testing of two (2) deep production wells for the Central Montana Regional Water Authority (CMRWA). Wells CMRWA 4 and CMRWA 5 were constructed in the existing UBet Wellfield, located in the Judith Basin approximately 4 miles south of Buffalo, Montana. **Figure 1** is a location map. This document provides technical data including the drilling, construction, development, hydraulic testing and water quality results for each well, in compliance with the Administrative Rules of Montana (ARM) 36.21.6 and in accordance with the Montana Department of Environmental Quality (DEQ) Circular 1.

1.2 Background and Project Understanding

The CMRWA project is a regional water supply project providing drinking water to municipalities and ranches along the Musselshell drainage eastward and as far as Melstone, MT. Distribution is partially complete at the time of this writing. Other, potential connections may be made in the future.

Two deep, existing production wells (CMRWA 2 and CMRWA 3), completed into the Madison Formation were constructed in 2012 and 2019, respectively, establishing the CMRWA UBet Wellfield (**Figure 2**). The wells were commissioned in 2023 and currently provide groundwater to portions of the CMRWA distribution system.

In 2024, production wells CMRWA 4 and CMRWA 5 were drilled, constructed and tested to be permitted additions to the UBet Wellfield. These wells are also completed into the Madison Formation at depth. The Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) Drillers Logs for the CMRWA UBet Wellfield production wells are included as **Appendix A**.

1.3 Overview of Site Conditions

This section provides a summary of the area surficial topography, subsurface geology/geologic units and the occurrence of groundwater. This information has been summarized from previously published reports (Western Groundwater Services; 2012, 2019) and lithologic logs compiled during drilling of wells CMRWA 4 and CMRWA 5 as detailed in this report

1.3.1 Surface Topography

Figures 1 and 3 illustrate the general topographic features of the Judith Basin and surrounding mountains. The basin is generally defined by the Little Belt Mountains to the south and west; the Moccasin and Judith Mountains to the north and northeast; and the Big Snowy Mountains to the east and southeast. The Judith River is sourced in the Little Belts southwest of Utica and travels eastward and northward across the basin approximately 127 miles where it is tributary to the Missouri River near Judith Landing.

The UBet Wellfield is located on the southern end of the basin at an elevation of approximately 4600 ft above mean sea level (ft amsl), just northwest of the Town of Judith Gap where a topographic break occurs between the Little Belts to the west and the Big Snowies to the east. The Little Belts and Snowies are proximal to the UBet Wellfield and rise to elevations over 8500 ft amsl. The close proximity of these

mountains provides significant groundwater recharge to the CMRWA wells as discussed in the following two sections.

1.3.2 Climate

The climate of the Judith Basin is generally characterized as moderate to hot summers and very cold and snowy winters. Weather conditions are monitored and recorded at the Montana Department of Transportation (MDOT) Road Weather Information System (RWIS) station located on Hwy 191 near the Town of Judith Gap. Since 2017 the station reports a mean annual precipitation of 17.2 inches, with wettest conditions in May (2.55 in) and lowest in January (0.69 in). The mean annual ambient air temperature is reported as 42.7 F, with average low and high temperatures of 18.3 F in February and 67.6 F in July, respectively.

Snowfall in the adjacent Little Belt and Big Snowy Mountains is significant and provides direct recharge to the aquifers of the Judith Basin as described in the following section. The Crystal Lake SNOTEL station in the Big Snowy Mountains recorded a March median snow water equivalent of 12.8 in (1990-2020).

The Judith Basin frequently experiences sustained winds as evidenced by a large wind-power farm located just south of the Judith Gap.

1.3.3 Geologic and Hydrogeologic Setting

The UBet Wellfield is underlain by a thick sequence of late-Mesozoic to late-Paleozoic sedimentary strata consistent with geological mapping of the area (Montana Bureau of Mines and Geology [MBMG], 1971). The UBet production wells encountered this strata to maximum total drilled depths of 3000 ft below ground surface (ft bgs) as chronicled in previous well construction reports for the existing wells CMRWA 2 and CMRWA 3 (Western Groundwater Services, 2012 and 2019) and confirmed in the well CMRWA 4 and CMRWA 5 borehole cuttings (**Appendix B**).

Figure 4 is a generalized stratigraphic cross-section along datum A to A' (see **Figure 1**) inferred by Western Groundwater Services after drilling well CMRWA 2. The lithologic sequence beneath the UBet Wellfield is generally supported by subsequent drilling although unit contact depths and strata thicknesses vary by location.

In the **Figure 4** cross-section, UBet surficial deposits are identified as undifferentiated Cretaceous (Ku) and represented in drilling logs as the Thermopolis Shale, (~70 million years ago [mya]). The Thermopolis is underlain by the Kootenai Formation (Kk); shales and sandstones with a productive water bearing sandstone subunit (Third Cat Creek) in the basal 100 ft. The Kootenai is underlain in turn by Jurassic (~180 mya) sedimentary rocks (siltstones, shales, sandstones and limestones) of the Morrison Formation (Jm). Sandstones of the Swift Formation (Js) unconformably overlie the Pennsylvanian (~300 mya) Amsden Group (PMg) sedimentary strata. The Ellis Group (Je) sandstones are depicted on the cross-section but appear to correspond in the drill logs as the Swift Formation. The Big Snowy Group (Mbs) is collectively identified as the Mississippian-age (300 mya) Heath, Otter and Kibbey Formations (Maughan and Roberts, 1967) consisting of various shales, sandstones, limestones and claystones. The CMRWA wells all terminate in the underlying Madison Group (Mmg), inferred in cross section as 1500 ft of predominantly carbonates consisting sequentially downward as the Charles, Mission Canyon and Lodgepole Formations; each of approximately 500 ft thickness. The CMRWA wells target a productive karst and fractured limestone aquifer in the Charles and potentially Mission Canyon Formations.

The adjacent Little Belts and Big Snowies are structurally related as a broad crustal arch consisting of Pre-Cambrian sedimentary rocks (Belt Supergroup) capped and flanked by Paleozoic and Mesozoic sedimentary strata (Alt and Hyndman, 1986) including in part the sedimentary strata underlying the Judith Basin. **Figure 3** illustrates mapped outcropping locations (from MBMG, 2025) of the Kootenai Formation and Madison Group within and on the flanks of the mountains which serve as regional recharge zones for the underlying Kootenai and Madison aquifers.

Figure 5 is a fence diagram re-constructed from the boring logs of wells CMRWA 2, 3, 4 and 5 along datum B to B' (see **Figure 2**). Stratigraphy generally correlates from well to well. It is seen that although wells CMWRA 4 and CMRWA 5 are of equal surface elevation, the depths of lithologic unit contacts are 75 to 100 ft deeper than in wells CMRWA 2 and 3, which are higher in elevation (150 and 75 ft respectively). This geometry confirms strata dipping significantly to the north and northwest.

2.0 Well Drilling, Construction and Development

This section details the completion of wells CMRWA 4 and CMRWA 5. Both wells were drilled, cased and developed by Hydro Resources (Ft. Lupton, CO) as the general drilling contractor. Drill pads were constructed by C&C Excavation (Havre, MT). Hark Drilling (Salt Lake City, UT) set and cemented 24-inch diameter (OD) conductor casing at both locations using a 30-inch bucket auger to a total depth of 40 ft below ground surface (bgs). In early March 2024, Hydro Resources mobilized a 1980 Challenger 360 two-drum, Kelly-drive drill rig (Rig 10043) and support equipment to the UBet Wellfield and began to rig up and excavate a mud pit. A Great West Engineering (GWE) hydrogeologist routinely and at important junctures provided oversight of the operations and documented adherence to project specifications.

2.1 Well CMRWA 4

Drilling commenced within the conductor casing at well CMRWA 4 on March 13, 2024. **Figure 6** is the As-Built Well Completion Diagram for well CMRWA 4. Drill cuttings were collected at 10-ft intervals for the entire drilled depth of the well. **Appendix B** includes the borehole CMRWA 4 lithologic log. A 17.50-inch tri-cone bit was used to advance a nominal 17-inch borehole to a total depth of 1015 ft bgs using flooded reverse-circulation air drilling. Significant artesian water (100-300 gpm) was encountered near the Kootenai/Morrison contact at 999 ft bgs, and heavy mud was mixed to kill the flow. Intermediate 14-inch diameter (ID) welded steel casing was set to a depth of 1000 ft bgs and the annular space was pressure cemented by KLX (Gillette, WY) from bottom to top by displacement through the casing interior. The cement was allowed to cure for 72 hours prior to continuing to drill.

A 12.50-inch diameter tricone bit was then lowered through the intermediate casing and a nominal 12-inch borehole was advanced from 1000 ft bgs to a total depth of 2300 ft bgs using mud rotary, conventional (direct) drilling methods. A downhole mud motor was initially employed during this drilling stage to facilitate drilling but was ineffective and subsequently removed. Makeup water was sourced from CMRWA Well 3 and tankered approximately 1 mile to the site by Hydro Resources and C Brewer Excavating (Roundup, MT).

Around 1300 ft bgs artesian water was encountered at approximately 150 gpm. The hole was mudded up to kill flow for the remainder of the 12-inch boring until the liner casing was set and cemented. Several loads of drilling fluids were transported to a repository near Roundup, MT. Drilling fluid was recirculated through the mud pit and excess cuttings and drill fluids were routed to a containment pit on site. Excess fluid was diverted to temporary settling ponds constructed in the borrow pit on either side of the access road prior to routing to an unnamed tributary channel of Mud Creek at UBet Road.

Drill cuttings suggested limestones of the target Madison Formation were encountered at a depth of approximately 2230 ft bgs. Wyoming Casing (Casper, WY) facilitated in the installation of 9.875-inch (ID) threaded steel liner casing in the lower borehole. The bottom of the liner casing was fitted with a drillable float shoe, and the top affixed to a hangar tool suspended on the drill stem. The liner casing/hangar tool assembly was then lowered into the lower borehole and set an interval of 930 to 2259 ft bgs by activating the hangar tool. The bottom of the liner casing was calculated to key into the Madison Formation approximately 30 ft.

KLX filled the interior of the liner casing with cement in preparation for pressure cementing of the liner annulus by displacement through the float shoe. However, complications arose when the cementing dart deployed failed to release the sheer pins in the hangar tool, resulting in the interior of the liner casing filling with cement. The partially-cured cement was drilled out of the interior of the liner casing from the hangar tool to near the top of the float shoe using an 8.75-inch diameter tricone bit and indirect-air methods. A Cement Bond Log (CBL) was then performed by KLX to confirm the annular cement seal of

the liner casing. The logs indicated the bottom approximately 610 ft of the annulus had been sufficiently cemented (1660 to 2270 ft bgs). The CBL report is included in **Appendix C**.

KLX was contracted to perform a cement squeeze of the annulus of the liner casing to pressure cement the remaining open annular space. The liner casing was perforated with four (4), 0.5-inch holes at a depth of 1640 ft bgs. Drillable bridge plugs were set at 1663 ft bgs and 1630 ft bgs. The annulus of the liner casing was then pressure cemented through the drill stem. The calculated volume of excess cement returned to the interior of the liner casing atop the upper plug to 1600 ft bgs--along with the lack of water within the casing-- confirmed the successful sealing of the liner casing annulus. The annular cement was allowed to cure for 72 hours before drilling out the bridge plugs, cement plug and float shoe using a combination of tricone and mill bits with conventional air drilling methods.

Drilling then recommenced open-hole into the Madison Formation using an 8.75-inch tricone bit and conventional mud rotary methods--until lost circulation conditions were encountered at 2360 ft bgs and drilling was converted to conventional air methods using a booster compressor. Drilling advanced to a total depth of 2374 bgs. Initial air-lifting of the well indicated a yield of at least 1400 gallons per minute (gpm) and a static water level of approximately 190 ft bgs.

Airlifting/surging development continued at well CMRWA 4 for a period of 41 hours at discharge rates of approximately 1400 gpm. Development water was routed to the borrow pit on the north side of the site access road and reported downstream to the unnamed tributary channel of Mud Creek at UBet Road. Field measurements of electrical conductance (EC) and total dissolved solids (TDS) were elevated but were thought likely to improve with sustained pumping over time.

On May 9, 2024, the drill was rigged down and began to move to the well CMRWA 5 pad, approximately 1 mile east.

Water quality testing performed during subsequent aquifer testing at CMRWA 4 in early June 2024 (detailed in Sections 3.1 and 4.1) confirmed elevated dissolved solids including calcium and sulfate. The analytical laboratory reports are included in **Appendix G**. Based in large part on improved water quality reported in the subsequently deeper-drilled well CMRWA 5, a decision was made to return and deepen well CMRWA 4.

In mid-July 2024, after completion and development of CMRWA 5, the drill rig was mobilized back to well CMRWA 4. On July 23, 2024 conventional air drilling commenced to deepen the lower 8.75-inch open borehole in well CMRWA 4 from 2374 ft bgs to a target depth of potentially 3000 ft bgs. On July 28, 2024, the well was advanced to a new total depth of 3000 ft bgs. Initial airlift development suggested improved water quality and a potential yield of at least 1400 gpm. An additional 30 hours of airlift/surge development was performed on well CMRWA 4 at rates of approximately 1400 gpm. An estimated 1.7 million gallons of water produced during well development water was again discharged to the unnamed tributary channel of Mud Creek. Field measurements of EC and TDS suggested generally acceptable values.

Following development, KLX was contracted to acidify well CMRWA 4 in an effort to increase yield by dissolving mineral deposits in the formation fractures/open spaces and borehole wall. On July 30, 2024, 16,000 gallons (gals) of 20% hydrochloric acid solution (with 0.1% Rodine PFD inhibitor) was tremied into the well at a depth of 2650 ft bgs, displaced by 9000 gals of fresh water and shut in for a period of 24 hours while monitoring wellhead pressure. The well was then air-lifted to remove the spent acid and treated water (purge water). The purge water was temporarily stored onsite in frac tanks and subsequently hauled by tanker to an approved repository near Roundup, MT.

Approximately 59,000 gals of purge water was hauled to the repository before TDS of the purge water was confirmed to be below 1500 ppm, when the subsequent purge water was discharged through the mud pit and reported to the unnamed tributary channel of Mud Creek. An estimated 5.5 million gals of purge water was discharged through the mud pit until the TDS stabilized around 750 ppm. Following completion of the acidification/well development, the rig was torn down and mobilized off the UBet Wellfield in mid-August 2024.

2.2 Well CMRWA 5

Drilling commenced at well CMRWA 5 on May 23, 2024. **Figure 7** is the As-Built Well Completion Diagram for well CMRWA 5. Drill cuttings were collected at 10-ft intervals for the entire drilled depth of the well. **Appendix B** includes the borehole CMWA 5 lithologic log. A 17.5-inch tri-cone bit was used to advance a nominal 17-inch borehole to a total depth of 1015 ft bgs using flooded reverse-circulation air drilling. Intermediate 14-inch diameter (ID) welded steel casing was set to a depth of 1000 ft bgs and the annular space was pressure cemented by KLX (Gillette, WY) from bottom to top by displacement through the casing interior. The cement was allowed to cure for 72 hours prior to continuing to drill.

A 12.5-inch diameter tricone bit was then lowered through the intermediate casing and a nominal 12-inch borehole was advanced from 1000 ft bgs to a total depth of 2310 ft bgs using mud rotary, conventional (direct) drilling methods. Makeup water was sourced from CMRWA Well 3 and tankered approximately 1 mile to the site by Hydro Resources and C Brewer Excavating (Roundup, MT). A downhole mud motor was initially employed during this drilling stage to facilitate drilling but was ineffective and subsequently removed. The drilling contractor used a heavier mud earlier on in drilling-- which may explain why artesian conditions, if encountered in the liner borehole did not result in flowing conditions at the wellhead and require water mitigation efforts.

Drill cuttings suggested limestones of the target Madison Formation were encountered at a depth of approximately 2290 ft bgs, and the borehole was terminated at 2310 ft bgs. Wyoming Casing (Casper, WY) facilitated in the installation of 9.875 inch (ID) threaded steel liner casing in the lower borehole. The bottom of the liner casing was fitted with a drillable float shoe, and the top affixed to a hangar tool suspended on the drill stem. The liner casing/hangar tool assembly was then lowered into the lower borehole and set an interval of 935 to 2300 ft bgs by activating the hangar tool. The bottom of the liner casing was calculated to key into the Madison Formation approximately 10 ft.

KLX filled the interior of the liner casing with cement and pressure grouted the annulus of the intermediate casing through the float shoe by releasing the wiper from the hangar tool and chasing the wiper with potable water through the float shoe and into the annulus. Annular cement was allowed to cure for 72 hours before drilling out the cement and float shoe using a combination of tricone and mill bits with conventional air drilling methods.

Drilling then commenced open-hole into the Madison Formation using an 8.75-inch tricone bit and conventional mud rotary methods--until the well began making water and experienced lost circulation at 2746 ft bgs and drilling was converted to conventional air methods. Additional circulation loss was reported at 2840 ft bgs. The nominal 8-inch borehole was advanced to a total depth of 3000 ft bgs where significant water was reported in the well. Initial air-lifting of the well indicated a yield of perhaps 1500 gallons per minute (gpm) and a static water level of approximately 185 ft bgs.

Airlifting/surging development continued at well CMRWA 5 for a period of 48 hours at discharge rates of approximately 1500 gpm. An estimated 3.2 million gals of water produced development was routed to the unnamed tributary channel of Mud Creek at UBet Road. Field measurements of EC and TDS suggested generally acceptable values.

Following development, KLX was contracted to acidify well CMRWA 5 in an effort to increase yield by dissolving mineral deposits in the formation fractures/open spaces and borehole wall. On July 4, 2024, 16,000 gallons (gals) of 20% hydrochloric acid solution (with 0.1% Rodine PFD inhibitor) was tremied into the well to a depth of 2634 ft bgs, displaced by 8400 gals of fresh water and shut in for a period of 24 hours while monitoring wellhead pressure. The well was then air-lifted at rate of approximately 1000 gpm to remove the spent acid and treated water (purge water). The purge water was temporarily stored onsite in frac tanks and subsequently hauled by tanker to an approved repository near Roundup, MT.

Approximately 52,000 gals of purge water was hauled to the repository before TDS of the purge water was confirmed to be below 1500 ppm, when the subsequent purge water was discharged through the mud pit and reported to the unnamed tributary channel of Mud Creek. Airlifting was slowed to 750 gpm due to the inability of the suction line to evacuate the mud pit to the discharge line. An estimated 4.2 million gals of purge water was discharged through the mud pit until the TDS stabilized around 650 ppm. Following completion of the acidification, in mid-July 2024, the rig was mobilized back to CMRWA 4 to deepen that well as discussed in Section 2.1.

The As-Built Well Completion Diagrams of wells CMRWA 4 and CMRWA 5 are included as **Figures 6 and 7**.

Table 1 provides a comparison of well completion data for the UBet Wellfield production wells.

Table 1 - UBet Production Well Summary Information

Well	GWIC ID	Date	Depth (ft bgs)	Yield (gpm)	Coordinates	Elevation (TOC amsl)
CMRWA 2	269957	2012	2250	550	46.75N 109.83W	4704
CMRWA 3	304761	2019	2850	1280	46.76N 109.83W	4633
CMRWA 4	TBD	2024	3000	1400	46.77N 109.84W	4565
CMRWA 5	TBD	2024	3000	1400	46.77N 109.82W	4563

3.0 Aquifer Testing Methods, Results and Analysis

In accordance with Circular 1 DEQ requirements, following the development of wells CMRWA 4 and CMRWA 5, pumping tests were performed on each of the wells. The aquifer testing included initial step-rate drawdown tests at each well followed by longer-term constant-rate discharge tests. The constant-rate tests included using either new well as an observation well. Existing production well CMRWA 3 was also idled and used as an observation well during the constant-rate testing. Best efforts were made to limit production in distant well CMRWA 2 pumping during the constant rate tests, but system demands required it to be operated sporadically at approximately 550 gpm. However, it does not appear operation of CMRWA 2 was detrimental to aquifer testing results. **Figure 2** illustrates the spatial relationship between the wells in the UBet Wellfield. All discharge water produced was directed approximately 0.5 miles to the unnamed tributary channel of Mud Creek.

Hydro Resources mobilized a 35 ton Smeal pump rig to the UBet Wellfield to conduct aquifer testing. All testing was done using a 600 HP (either Baker-Hughes or Centrilift) submersible pump and motor installed on 8.6-inch diameter pump column (oilfield casing). The pump was powered by a trailer-mounted 1200 kva generator. The wellheads were equipped with an 8-inch totalizing flow meter (McCrometer or Badger), Rossum sand cone, air-relief valve and water-quality sample port.

Hydro Resources recorded water levels in the newly drilled wells CMRWA 4 and 5 using temporary pressure transducers. Discharge was measured and maintained for each step and the constant-rate pumping tests using frequently observed/recorded totalizer readings at the flow meter. Observation well CMRWA 3 was monitored using a dedicated, existing pressure transducer monitored by the UBet Wellfield SCADA system.

The following subsections describe the methodology of the aquifer testing, present results and provide an estimation of sustainable yield from each well, and an estimation of select aquifer parameters derived from the interpretation of the constant-rate discharge tests.

3.1 Well CMRWA 4 Aquifer Testing

On May 28, 2024, Hydro Resources set up for aquifer testing of well CMRWA 4. This initial testing was done prior to the decision being made to drill the well approximately 625 ft deeper to 3000 ft bgs, at which time subsequent aquifer testing was conducted. Therefore, a short description of the initial testing is provided here, and the associated aquifer test data is included in **Appendix D**, however this report will present detail on the pumping test results from the deepened well CMRWA 4 in the next section.

Prior to making the decision to deepen Well 4, an initial step-rate test was performed on June 1 using 2-hour steps at rates of 700, 1000, 1300 and 1500 gpm. Based on the results of the step test, the well was allowed to recover and on June 7 a constant-rate test was run for 72 hours at 1400 gpm. At the end of the 72-hour constant-rate test, drawdown in the well had stabilized at approximately 154 ft for the last 28 hours. It is noted that, based on the 72-hour pumping test results, DEQ verbally agreed to allow a subsequent constant-rate test (once the well was deepened) to be run for a duration of 24 hours. As noted previously, the results of the aquifer test on the pre-deepened Well 4 are included in **Appendix D**.

On August 21, 2024, after completing construction and aquifer testing of well CMRWA 5, Hydro Resources remobilized the pump rig and equipment described above to (deepened) well CMRWA 4 to perform additional aquifer testing. Based on the previous step-rate pumping test results, and the well yield observed during approximately 152 hours of air-lift development at the deepened well CMRWA 4, it was

determined the constant-rate test should be conducted at a rate of 1400 gpm. (It is noted the constant-rate tests at both the original well CMRWA 4 and well CMRWA 5 also were run at a rate of 1400 gpm.)

The static water level in pumping well CMRWA 4 was recorded at 172.34 ft below top of casing (TOC) immediately prior to the second constant-rate test. TOC is approximately 2 ft above ground level. The submersible test pump intake was set at approximately 629 ft below TOC. Pumping began at 09:00 on August 25 and concluded at 09:15 on August 26, for a pumping duration of just over 24 hours as discussed with DEQ. The test was continuously manned during operation. Data collected during the aquifer testing is included in **Appendix D**. The Montana Department of Natural Resources (DNRC)/DEQ 633 Form for the well CMRWA 4 (24-hour) constant-rate test is included in **Appendix E**.

Figures 8a, 8b and 8c are semi-log, time series drawdown/recovery plots of pumping well CMRWA 4 and observation wells CMRWA 5 and CMRWA 3, respectively. The following observations are made:

- Well CMRWA 4 exhibited 43.4 ft of drawdown in response to 24 hours of pumping at a constant rate of 1400 gpm. Conditions had not reached steady state but had slowed to <0.10 ft/hr at the end of the test.
- Recovery in pumping well CMRWA 4 occurred within 1 hour of pump cessation.
- Static water level in observation well CMRWA 5 declined a total of 1.02 ft and fully recovered approximately 6 hours after pumping ceased.
- Static water level in observation well CMRWA 3 declined a total of 0.3 ft and recovered within 3 hours of pumping cessation.
- A total of approximately 8.7 million gals of water was discharged during aquifer testing of well CMRWA 4 including: initial step-rate and constant-rate testing and subsequent constant-rate testing after deepening the well.

3.2 Well CMRWA 5 Aquifer Testing

On August 12, 2024 Hydro Resources set up for aquifer testing including step-rate and 72-hour, constant-rate pumping tests on well CMRWA 5 using the same equipment described in Section 3.0. TOC is approximately 2 ft above ground level and the submersible pump intake was set at 629 ft below TOC.

The step-rate pumping test on well CMRWA 5 was performed on August 15, 2024. Immediately prior to pumping, SWL was recorded at 172.39 ft below TOC. The well was stepped at 2-hour intervals at pumping rates of 800, 1000, 400 and 1600 gpm. **Figure 9** plots drawdown versus time for the step rate test. Based on the results of the step test, a constant rate of 1400 gpm was selected for the 72-hour constant-rate test.

After allowing well CMRWA 5 to recover for approximately 40 hours, the 1400 gpm constant-rate test was initiated at well CMRWA 5. Wells CMRWA 4 and idle production well CMRWA 3 were used as observation wells.

Immediately prior to the constant-rate pumping test, SWL in well CMRWA 5 was recorded at 171.10 ft below TOC. Pumping commenced at 08:00 on August 17 and concluded at 08:10 on August 20; a pumping duration of just over 72 hours. The test was continuously manned during operation. Data

collected during the aquifer testing is included in **Appendix D**. The DNRC/DEQ Form 633 for the well CMRWA 5 constant-rate test is included in **Appendix E**.

Figures 9a, 9b and 9c are semi-log, time series drawdown/recovery plots of pumping well CMRWA 5 and observation wells CMRWA 4 and CMRWA 3, respectively. The following observations are made:

- Well CMRWA 5 exhibited 233.8 ft of drawdown in response to 72 hours of pumping at a constant rate of 1400 gpm. Conditions had stabilized and considered steady-state for the final 48 hours of the test.
- Recovery in pumping well CMRWA 5 occurred within 1 hour of pump cessation.
- Static water level in observation well CMRWA 4 declined a total of 1.10 ft. Recovery was 48% (0.55 ft residual drawdown) 5 hours into recovery when production well CMRWA 3 inadvertently began pumping again at 1295 gpm, effectively ending the recovery data collection (**Figure 9b**).
- The water level in observation well CMRWA 3 had declined a total of 0.48 ft when at approximately 3630 minutes (60.5 hours) into the test, observation well CMRWA 3 again inadvertently began pumping for production at 1295 gpm and continued to run for approximately 4 hours. This effectively interrupted the remaining drawdown and subsequent recovery measurements in the well as annotated in **Figure 9c**.
- The 4-hour, inadvertent pumping event at observation well CMRWA 3 (described in the previous bullet) manifests in the 633 Form record (**Appendix E**) as a brief and relatively minor water level decline in wells CMRWA 4 and 5. It is annotated in **Figures 9b and 9c** but does not register in the scale of the pumping well CMRWA 5 plot (**Figure 9a**). The event is noted but does not materially affect the interpretation of the constant-rate test.
- Approximately 6.6 million gals of water was discharged during the step-rate and constant-rate testing of well CMRWA 5.

3.3 Aquifer Test Analysis and Interpretation

The aquifer test results from the constant-rate tests conducted at both wells CMRWA 4 (24-hour duration) and CMRWA 5 (72 hour duration) were analyzed using *Aqtesolv Pro 4.0* software to estimate aquifer transmissivity (T) and storage (S). The software allows the time series drawdown curves in the pumping and observation wells to be matched against theoretical “type” curves, given assumed inputs. The software typically provides an automatic feature which picks the “best fit” of the time series drawdown data value plotted against theoretical outputs for the given mathematical solution used. Additionally, the time series drawdown curve can be manipulated to visually match with the given type curve.

Aqtesolv includes several potential solution options for various aquifer types and configurations. After exploring some solutions which assume fracture-flow in the aquifer, it became apparent that these solutions were less able to fit the data to the type curves unless significant and unreal manipulations were made to the data output curves. Too little information is available about the orientation, spatial occurrence and geometry of the water bearing fractures/voids. In the end, the best fit for the data (using both the auto-match feature and visual match) was the Theis solution. This may be justified:

- the Madsion aquifer is demonstrated to be confined in this area,
- lost circulation and the return of large cuttings during drilling of the aquifer suggest significant secondary porosity in the form of large fractures/karst dissolution, and

- the aquifer appears to essentially behave as a porous media within the secondary porosity features encountered by the wells.

The aquifer test data from the 24-hour constant rate test at well CMRWA 4 was evaluated using the *Aqtesolv* software and Theis solution. The analysis assumes the wells are fully penetrating (for their completion depths). **Figure 10a** plots an automated best fit of the time series drawdown curves for pumping well CMRWA 4 and observation wells CMRWA 5 and CMRWA 3, against the Theis solution curve. The data fits very reasonably to the type curve for all three wells. Estimated transmissivity (T) values (combined observation wells CWRWA 5 and CMRWA 3) are remarkably but not unexpectedly high at **T = 170,500 ft²/day**. Calculated Storativity (S) is low as would be expected in a confined aquifer at **S = 1.161 e⁻⁴**.

The *Aqtesolv* modeling of the CMRWA 5 pumping test was also run using the Theis solution and assumes the test wells to be fully penetrating. **Figure 11** illustrates the automatch of the time series drawdown for all three wells against the Theis type curves. From the combined observation wells CMRWA 4 and CMRWA 3 analysis, the estimated values are **T = 232,600 ft²/day**, and **S = 1.8 e⁻⁵**.

Appendix D contains the *Aqtesolv* reports for the wells CMRWA 4 and CMRWA 5 constant-rate pumping tests. **Table 2** presents and compares estimated T and S values (combined and individual well) for the constant rate pumping tests performed at both wells CMRWA 4 and CMRWA 5. The automatch results for the combined observation wells at each pumping test are seen to yield similar values of T and S and are considered most reasonable for the calculated range of estimates.

Table 2 - Aqtesolv Estimated Aquifer Parameters

Well	Method	Transmissivity (T) ft ² /day	Storativity
CMRWA 4 Constant Rate			
CMRWA 3	Automatch	795,700	3.004 e ⁻⁵
CMRWA 3	Visual Match	233,000	2.7 e ⁻⁴
CMRWA 5	Automatch	618,000	5.28 e ⁻⁵
CMRWA 5	Visual Match	213,000	3.32e ⁻⁴
Combined 3 and 5	Automatch	170,500	1.161 e⁻⁴
CMRWA 5 Constant Rate			
CMRWA 3	Automatch	233,000	1.18 e ⁻⁴
CMRWA 3	Visual Match	320,000	4.4 e ⁻⁶
CMRWA 4	Automatch	160,000	2.51 e ⁻⁵
CMRWA 4	Visual Match	125,000	5.5 e ⁻⁵
Combined 3 and 4	Automatch	232,600	1.181 e⁻⁴

3.4 Pump Depth Settings

A Technical Memorandum issued by GWE (**Appendix F**) provides rationale for recommended pump depth settings for wells CMRWA 4 and CMRWA 5 at the design rate of 1250 gpm each. The recommendations are based on a number of factors, including:

- observed drawdown in the pumping wells during aquifer testing
- annual, natural fluctuations in static water levels observed in wells CMRWA 2 and 3, and

- historic water level trends recorded in wells CMRWA 2 and 3 since drilled (2012 and 2019, respectively).

The recommended pump depth settings are approximately 410 ft bgs in well CMRWA 4 and 560 ft bgs in well CMRWA 5.

3.5 UBet Wellfield Groundwater Flow

Figure 11 is an approximate potentiometric map for Madison aquifer underlying the UBet Wellfield. Water level elevation contours are based on static water level measurements (depth to water) from surveyed TOC in each of the production wells CMRWA 2 through 5 (**Table 3**). The potentiometric data as measured on August 25, 2024 suggests groundwater flow in the Madison aquifer in the area of the UBet wellfield is generally to the west-northwest at a horizontal gradient of approximately 0.002 ft/ft .

Table 3 - Potentiometric Data Summary (August 25, 2024)

Well	TOC Elevation (ft amsl)	Depth to Water (ft bgs)	Groundwater Elevation (ft amsl)
CMRWA 2	4703.84	299.27	4404.57
CMRWA 3	4632.96	230.97	4401.99
CMRWA 4	4565.07	172.34	4392.73
CMRWA 5	4562.47	161.85	4400.62

4.0 Water Quality

Groundwater samples were collected from wells CMRWA 4 and CMRWA 5 during or near the end of the constant rate pumping test at each well and analyzed by Energy Laboratories, Helena, MT, a state-certified laboratory. The analytical suite at each well included EPA First-Time Safe Drinking Water Standards (SDWS) and Drinking Water Radiologicals, as well as additional Montana State-Wide Waiver parameters.

At each well, water samples were drawn from a sampling port at the temporary wellhead, collected in laboratory-provided containers and preserved in accordance with EPA analytical method requirements. The samples were not field-filtered, but filtered by the analytical laboratory, as appropriate. The samples were labeled, placed in coolers on ice and immediately hand-delivered to Energy Laboratories in Helena for preparation and analyses. A Chain of Custody was maintained for the samples. The complete analytical laboratory reports for all water quality samples are included in **Appendix G**.

4.1 Well CMRWA 4 Water Quality

As mentioned in Section 2.1, the initial well CMRWA 4 water quality results for the sample collected June 9, 2024 reported significantly elevated TDS (1,280 mg/l); due primarily to the presence of calcium (270 mg/l) and sulfate (731 mg/l). The water quality reflects the presence of anhydrite (CaSO₄) in the upper Madison aquifer. It was determined the well should be deepened to potentially improve water quality.

Well CMRWA 4 was subsequently and successfully deepened from a depth of 2274 to 3,000 ft bgs. On August 25, 2024, near the end of a second constant-rate pumping test, another water quality sample was collected from well CMRWA 4 and submitted to Energy Laboratories for chemical analyses as described above. The TDS of the deepened well CMRWA 4 is greatly reduced, specifically with respect to concentrations of calcium and sulfate, in comparison to the original, shallower well completion results. A comparison of select parameters from the pre- and post deepening of the well is provided in **Table 4**.

Table 4 - Water Quality Comparison: Well CMRWA 4 Pre- and Post- Well Deepening

Analyte	Pre-Deepening 6/9/24 (mg/l)	Post-Deepening 8/25/24 (mg/l)	Secondary Standard (mg/l)
TDS	1,280	695	500
Calcium	270	163	NA*
Sulfate	731	286	250
Iron	0.21	0.41	0.30
Fluoride	2.6	1.3	2.0

NA* = Not Applicable

The following is a summary of select reported results from the well CMRWA 4 post-deepening sample:

- The water can generally be described as a calcium-rich alkaline water of neutral pH.
- The water chemistry exceeds no EPA Primary Maximum Contaminant Levels (MCLs) for Drinking Water standards.
- Total dissolved solids (TDS) were reported at 695 mg/l, above the secondary standard of 500 mg/l for this parameter.

- The TDS value reflects elevated concentrations of calcium (163 mg/l), and sulfate (286 mg/l), along with various other constituents.
- Iron (0.41 mg/l) and sulfate (286 mg/l) are reported slightly above the secondary standards of 0.30 mg/l and 250 mg/l, respectively.
- Nitrogen, reported as nitrate+nitrite is 0.07 mg/l, well below the MCL of 10 mg/l. Coliform was reported “Present” in the sample; however the well had not been disinfected prior to sampling. Acceptable results for coliform will need to be demonstrated after equipping the well and prior to commissioning.
- Arsenic and fluoride are known to exceed primary MCLs in the Madison aquifer at other locations but are not reported to be of concern in well CMRWA 4. Arsenic was reported non-detect (ND) at the reporting limit of 0.001 mg/l; fluoride was detected at 1.3 mg/l – below both the primary and secondary MCLs of 4 mg/l and 2 mg/l, respectively.
- No detections were reported for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) pesticides or herbicides.
- All radionuclides including uranium, gross alpha, radium 226 and combined radium 226 + radium 228 were reported well below the regulatory MCLs for drinking water.

The laboratory reports for both the pre- and post-deepening of well CMRWA 4 are included in **Appendix G**.

4.2 Well CMRWA 5 Water Quality

On August 19, 2024, a water quality sample was collected from well CMRWA 5 during a 72-hour constant rate test on the well. The sample collection, handling, submittal and analytical parameters were identical to the well CMRWA 4 samples as described in Section 4.0.

The following is a summary of select reported results from the well CMRWA 5 sample analyses:

- The water can generally be described as a calcium-rich alkaline water of neutral pH.
- The water chemistry exceeds no EPA Primary Maximum Contaminant Levels (MCLs) for Drinking Water standards.
- Total dissolved solids (TDS) were reported at 600 mg/l, above the secondary standard of 500 mg/l for this parameter.
- The TDS value reflects elevated concentrations of calcium (107 mg/l), and sulfate (248 mg/l), along with various other constituents.
- Iron (0.18 mg/l) and sulfate (248 mg/l) are both reported below the secondary standards of 0.30 mg/l and 250 mg/l, respectively.
- Nitrogen, reported as nitrate+nitrite (0.11 mg/l), is well below the MCL of 10 mg/l. Coliform was reported “Present” in the sample; however the well had not been disinfected prior to sampling. Acceptable results for coliform will need to be demonstrated prior to commissioning the well.

- Arsenic and fluoride are known to exceed primary MCLs in the Madison aquifer at other locations but are not reported to be of concern in well CMRWA 5. Arsenic was reported non-detect (ND) at the reporting limit of 0.001 mg/l; fluoride was detected at 1.4 mg/l—below both the primary and secondary MCLs of 4 mg/l and 2 mg/l, respectively.
- No detections were reported for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) pesticides or herbicides.
- All radionuclides including uranium, gross alpha, radium 226 and combined radium 226 + radium 228 were reported well below the regulatory MCLs for drinking water.

The well CMRWA 5 laboratory reports are included in **Appendix G**.

4.3 Water Quality Comparisons

It is useful to compare the results of the newly constructed wells CMRWA 4 and 5 and also compare these results to the existing production wells CMRWA 2 and 3.

A comparison of select water quality parameters from (the deepened) well CMRWA 4 and well CMRWA 5 is provided in **Table 5**. It is observed that well CMRWA 5 is generally less mineralized than well CMRWA 4 with respect to the selected parameters.

Table 5 - Water Quality Comparison: Wells CMRWA 4 and CMRWA 5

Analyte	Well CMRWA 4 (8/25/24) (mg/l)	Well CMRWA 5 (8/19/24) (mg/l)	Secondary Standard (mg/l)
TDS	695	600	500
Alkalinity	200	160	NA
Calcium	163	107	NA
Sulfate	286	248	250
Iron	0.41	0.18	0.30
Fluoride	1.3	1.4	2.0

NA* = Not Applicable

A comparison of select water quality parameters from wells CMRWA 2, 3, 4 and 5 (during aquifer testing of each well) is provided in **Table 6**.

Table 6 - Water Quality Comparison: Wells CMRWA 2, 3, 4 and 5

Analyte	CMRWA 2 (11/19/2012) (mg/l)	CMRWA 3 (11/8/2019) (mg/l)	CMRWA 4 (8/25/2024) (mg/l)	CMRWA 5 (8/19/2024) (mg/l)	Secondary Standard (mg/l)
TDS	440	500	695	600	500
Alkalinity	201	172	200	160	NA*
Calcium	81	104	163	107	NA*
Sulfate	130	162	286	248	250
Iron	0.19	0.29	0.41	0.18	0.30
Fluoride	0.8	1.1	1.3	1.4	2.0

NA* = Not Applicable

4.4 Qualitative Review

The laboratory QA/QC narratives and reports for wells CMRWA 4 and 5 (**Appendix G**) were reviewed for completeness and correctness.

- The *Sample Condition Record* did not identify any issues with sample handling, transport, as-received temperature, trip blanks, or chain-of-custody, etc.
- Analyses were conducted within respective hold times and performed in accordance with the analyte-specific test methods.
- Method blanks (i.e., trip blank) reported no detects.
- The *Quality Control Report* showed that percent recoveries fell within the target ranges for each analyte.

In summary, the qualitative review did not identify any substantive issues with field sampling methods or laboratory handling/analyses which would bring into question the representativeness or validity of the reported results. None of the data were 'qualified' or excluded based on the qualitative data review.

5.0 Summary

- From March through August, 2024, production wells CMRWA 4 and CMRWA 5 were completed to depths of 3000 ft bgs in the existing UBet Wellfield. The wellfield now contains four (4) deep wells completed in the Madison aquifer (CMRWA 2,3 4 and 5).
- The wells were constructed and tested by a Montana- licensed driller in compliance with the Administrative Rules of Montana (ARM) 36.21.6 and in accordance with the Montana Department of Environmental Quality (DEQ) Circular 1.
- Aquifer testing confirmed the sustainable yield of both wells is at least 1400 gpm, with rapid recovery and negligible wellfield interference drawdown observed. The wells meet the DEQ Circular 1 design criteria of 1250 gpm each.
- Water quality samples collected in each well are reported by a state-certified analytical laboratory to meet EPA First-Time Safe Drinking Water Standards (SDWS) and Drinking Water Radiologicals, as well as additional Montana State-Wide Waiver parameters. After installation of submersible pumps and piping, both wells will need to pass bacteriological testing for coliform and E. coli prior to being approved for connection.

6.0 References

- Administrative Rules of Montana, 2019. (ARM) 36.21.60 Construction Standards
- Alt, D. and Hyndman, D., 1991. *Roadside Geology of Montana*, pp. 306-308.
- Maughan, Edwin K. and Roberts, Albert, E., 1967. *Big Snowy and Amsden Groups and the Mississippian-Pennsylvanian Boundary in Montana*, pp B1-B10.
- Montana Bureau of Mines & Geology, 2025. 500k Level Geospatial data.
- Montana Bureau of Mines & Geology, Witkind, I.J., 1971. Geologic map of the Barker quadrangle, Judith Basin and Cascade counties, Montana: United States Geological Survey USGS Geologic Quadrangle 898, 1 sheet, scale 1:24,000.
- Montana Department of Environmental Quality. 2022. *Circular DEQ-1, Standards for Water Works*.
- Montana Department of Transportation, 2025. Judith Gap Road Weather Information (RWIS) Station data.
- U.S. Environmental Protection Agency. 2025. *Drinking Water Regulations and Contaminants*.
- Western Groundwater Services, 2020. *Well Construction Report, Production Well CMRWA #3, Central Montana Regional Water Authority*.
- Western Groundwater Services, 2013. *Well Construction Report, Production Well CMRWA #2, Central Montana Regional Water Authority*.

FIGURES

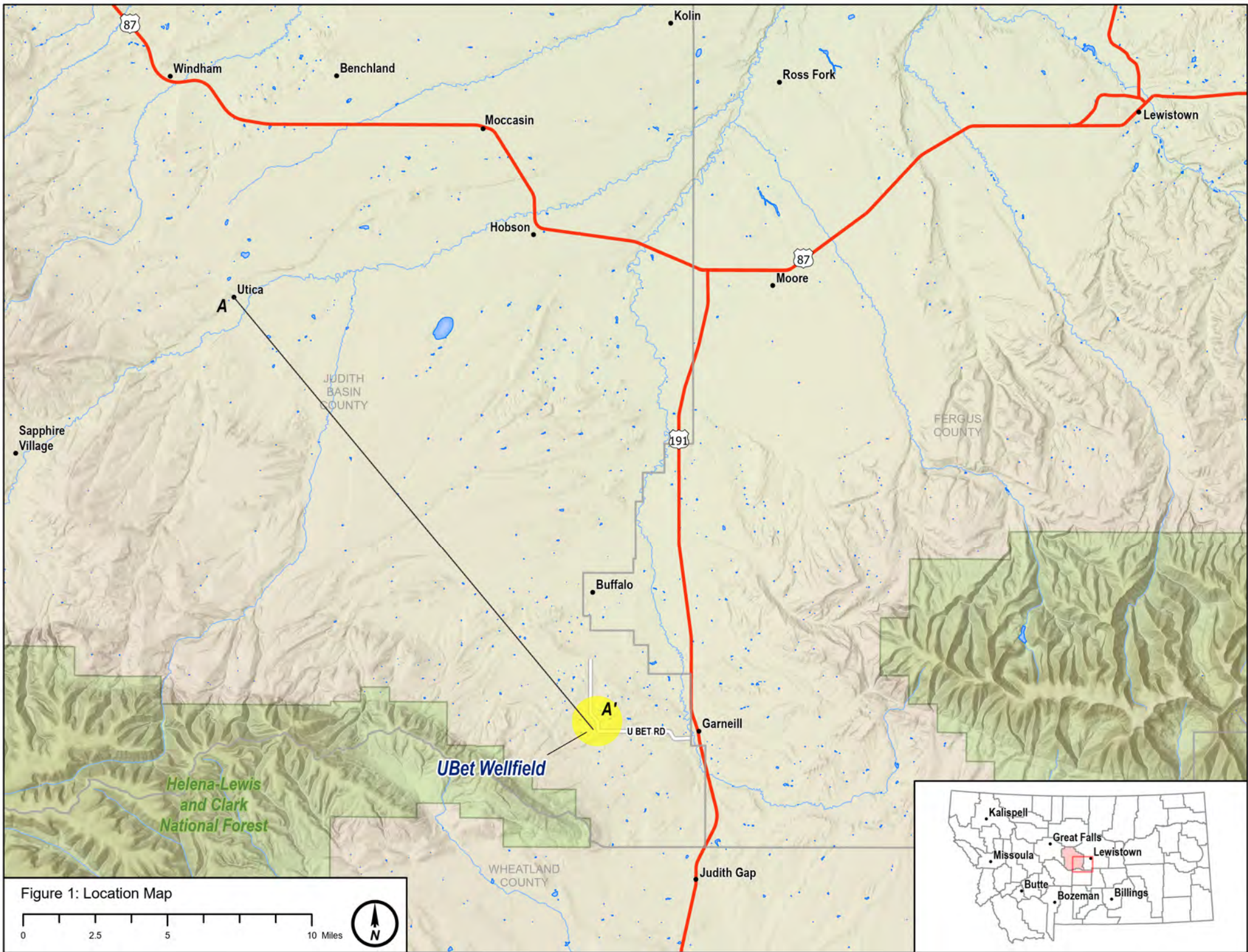


Figure 1: Location Map



Figure 2: U Bet Wellfield Site Map

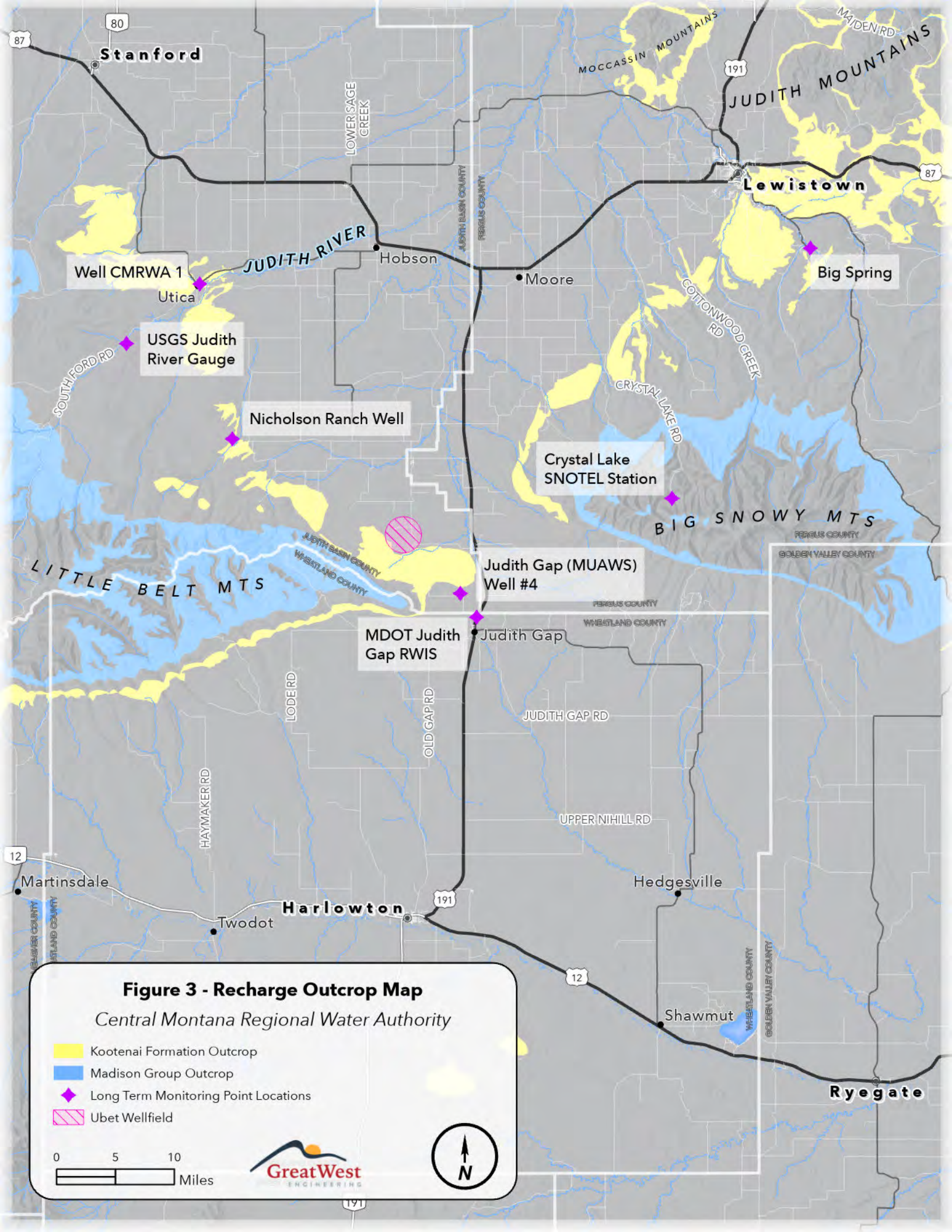


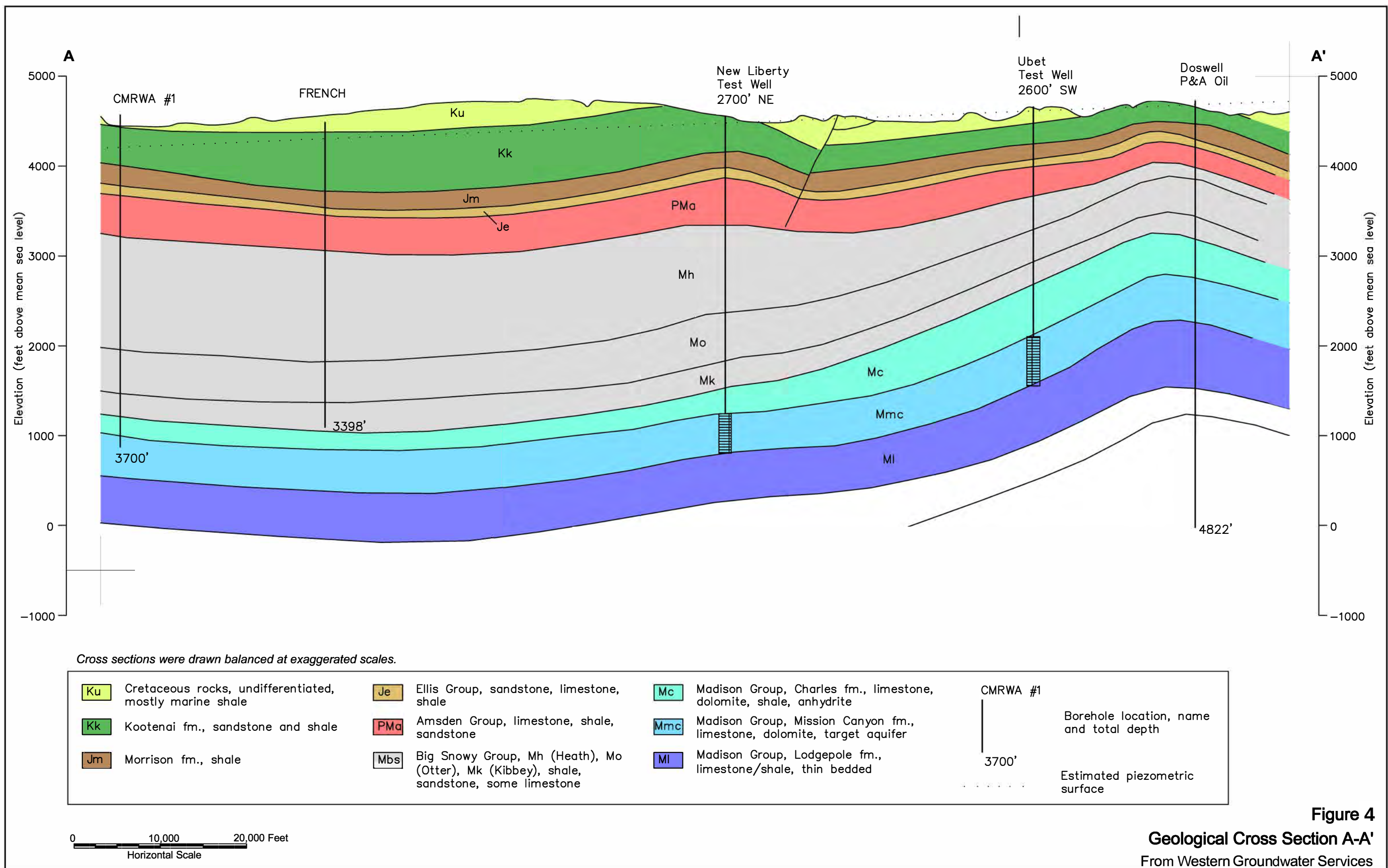
Figure 3 - Recharge Outcrop Map

Central Montana Regional Water Authority

- Kootenai Formation Outcrop
- Madison Group Outcrop
- Long Term Monitoring Point Locations
- Ubet Wellfield

0 5 10
Miles





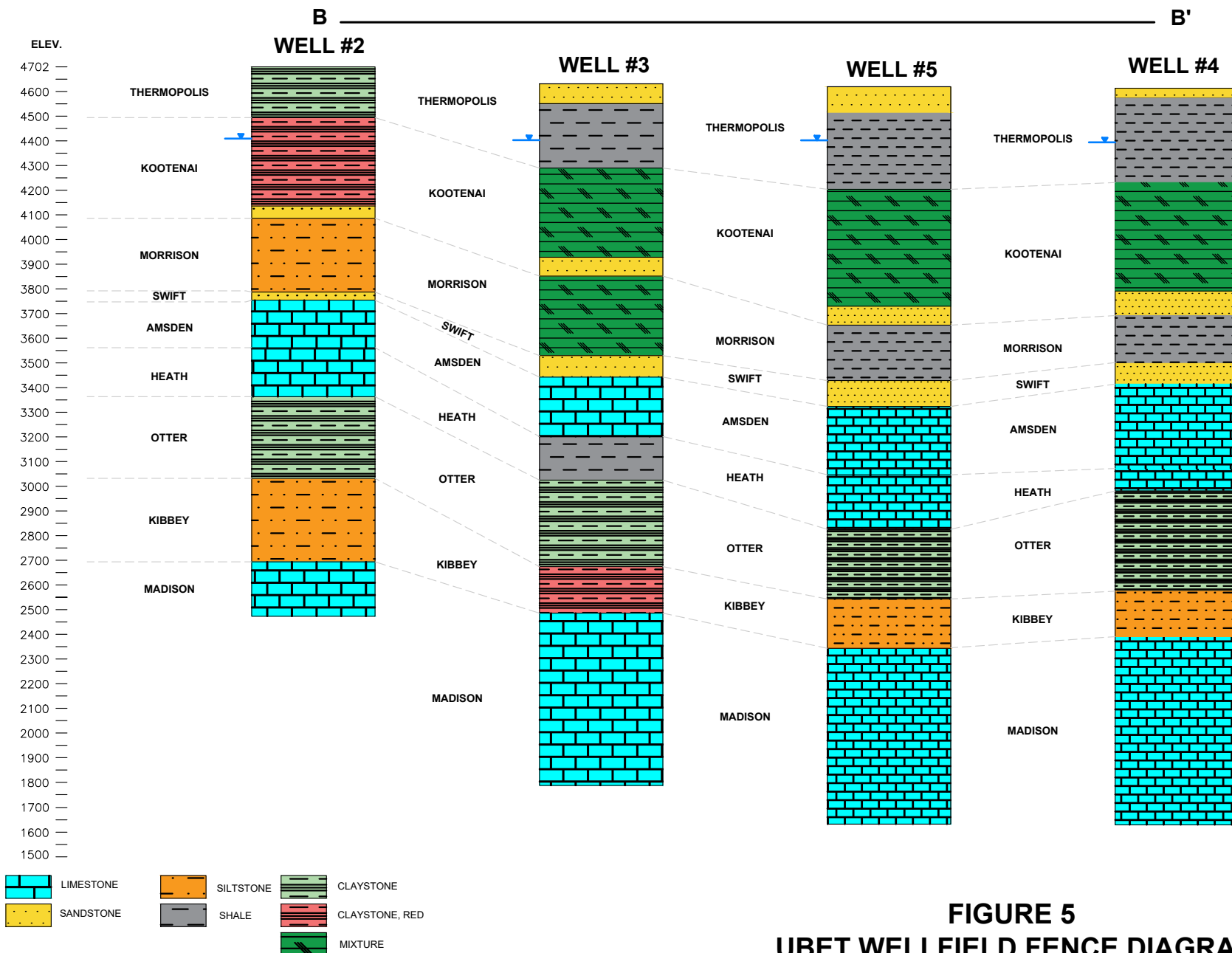
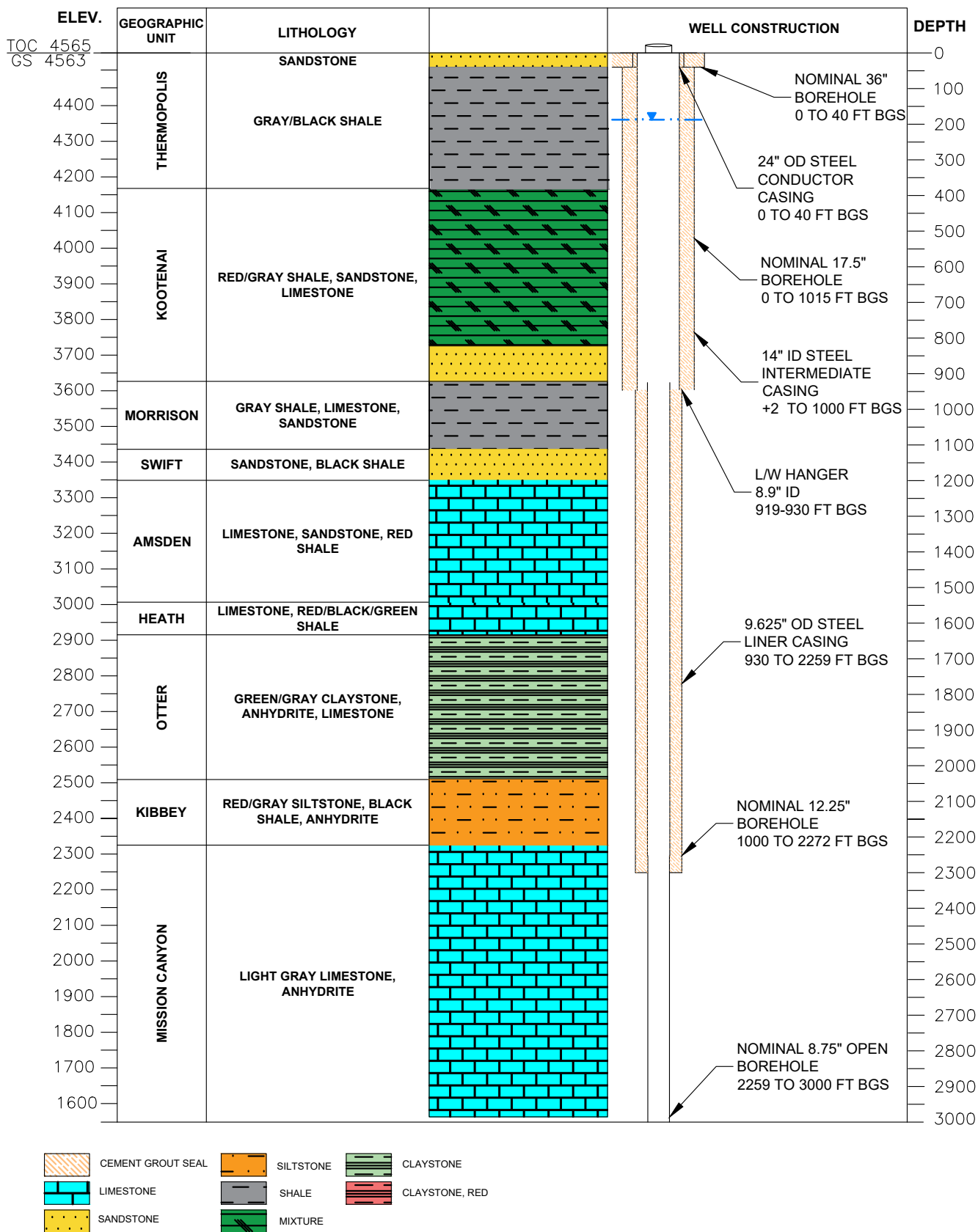


FIGURE 5
UBET WELLFIELD FENCE DIAGRAM
B-B'

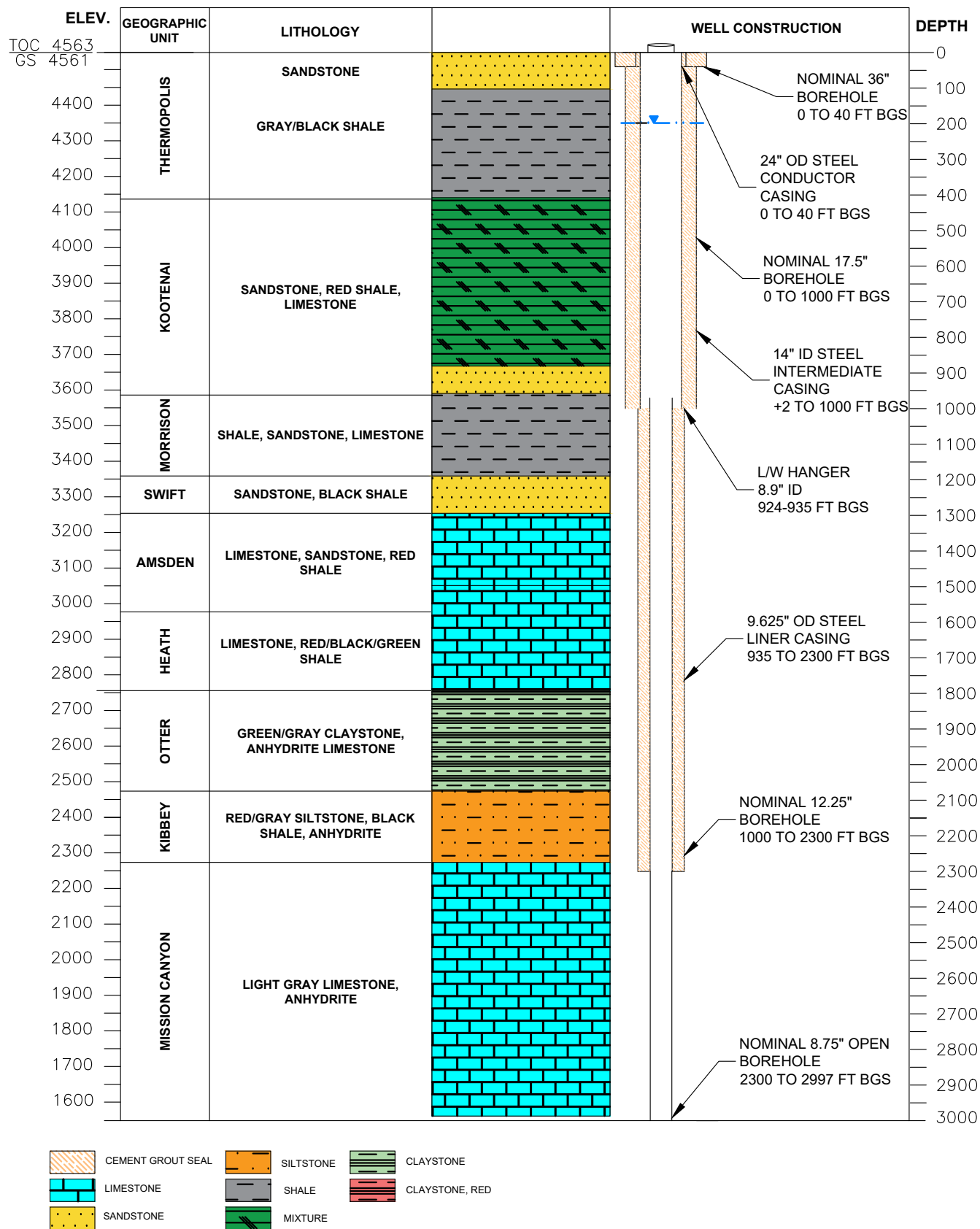
CENTRAL MONTANA REGIONAL WATER AUTHORITY MUSSELSHELL
JUDITH RURAL WATER SYSTEM WELL LITHOLOGY



**FIGURE 6 CMRWA WELL 4
COMPLETION DIAGRAM**

CENTRAL MONTANA REGIONAL WATER AUTHORITY
MUSSELSHELL JUDITH RURAL WATER SYSTEM
WELL DIAGRAM





**FIGURE 7 CMRWA WELL 5
COMPLETION DIAGRAM**

CENTRAL MONTANA REGIONAL WATER AUTHORITY
MUSSELSHELL JUDITH RURAL WATER SYSTEM
WELL DIAGRAM



Figure 9. Well CMRWA 5 Step-Rate

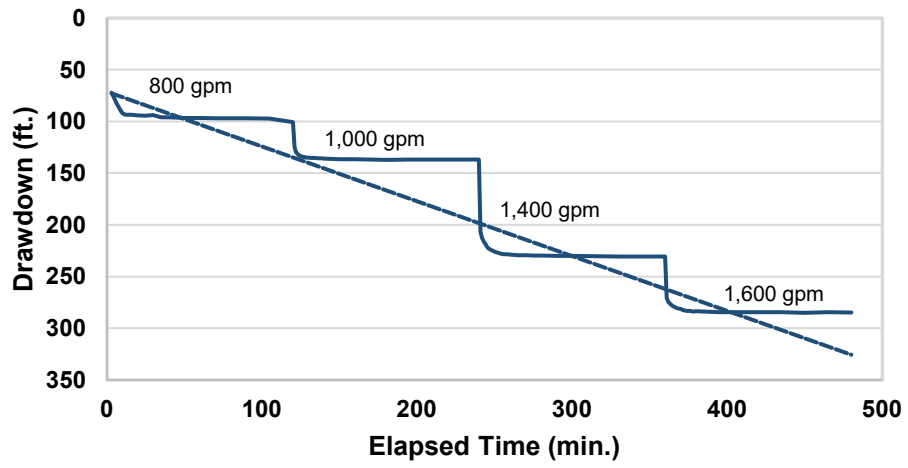


Figure 8a. Pumping Well CMRWA 4
1,400 gpm Constant-Rate

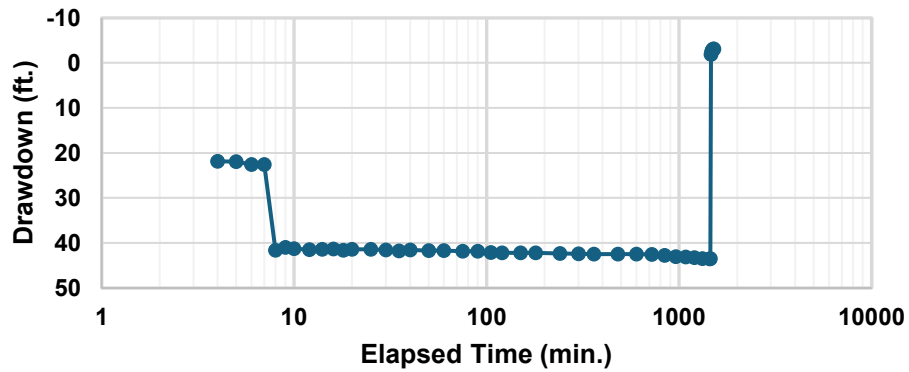


Figure 8b. Observation Well CMRWA 5

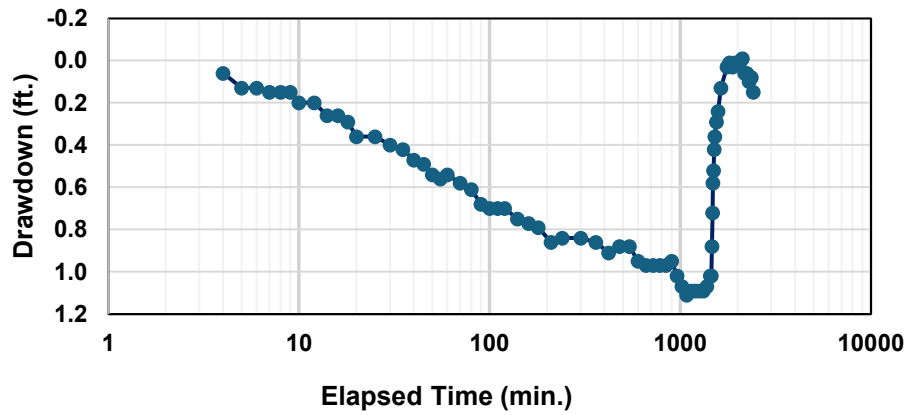
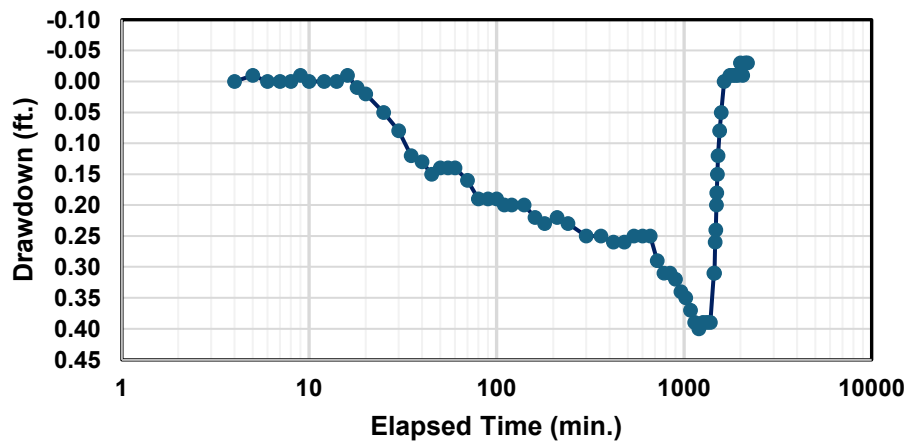


Figure 8c. Observation Well CMRWA 3



**Figure 9a. Pumping Well CMRWA 5
1,400 gpm Constant Rate**

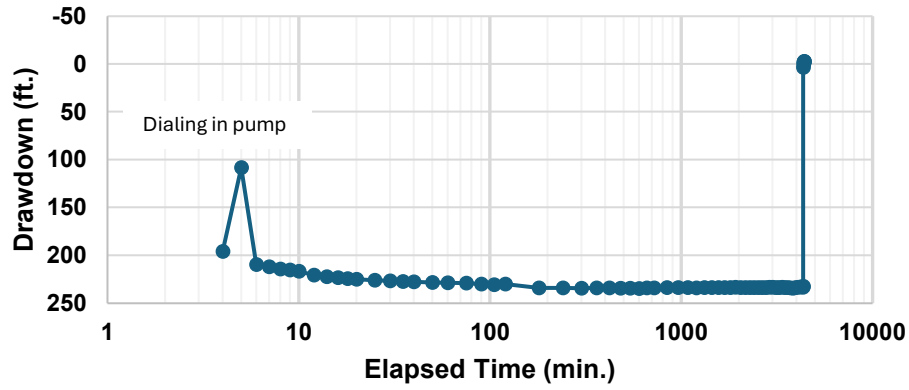


Figure 9b. Observation Well CMRWA 4

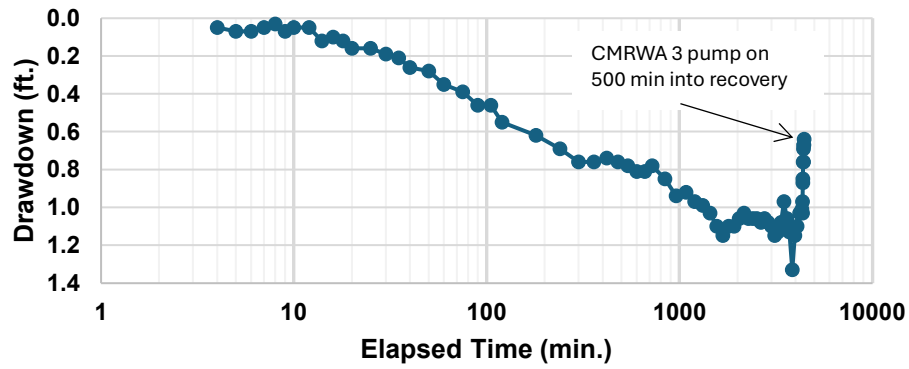


Figure 9c. Observation Well CMRWA 3

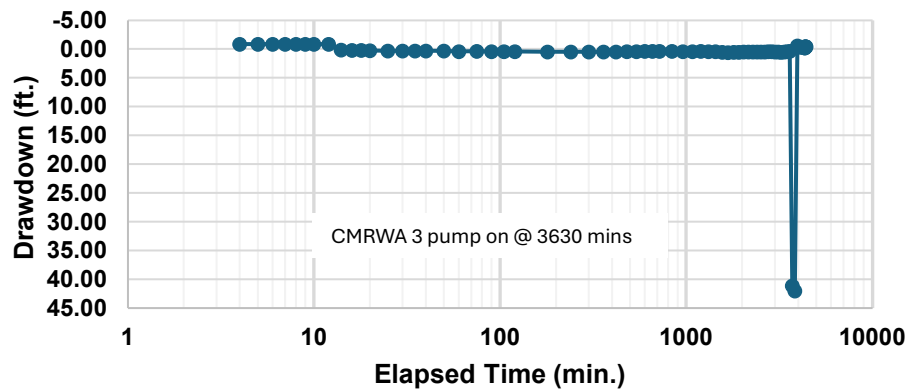


Figure 10a. Well CMRWA 4 Aqtesolv Plot

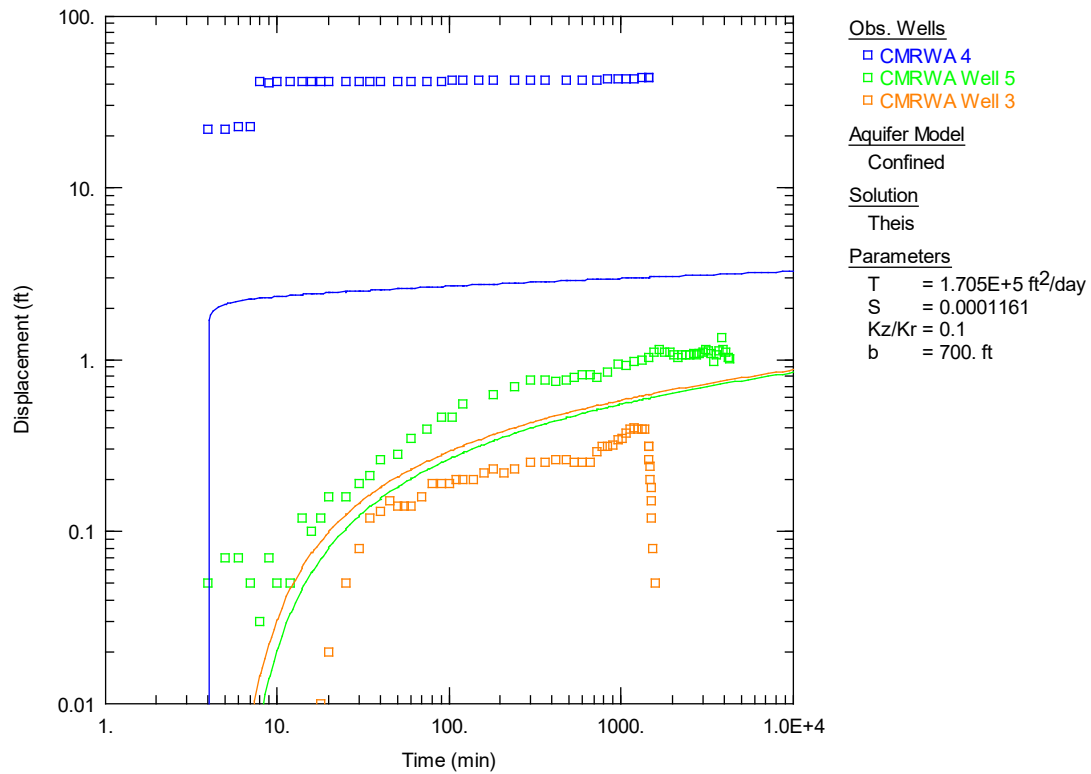
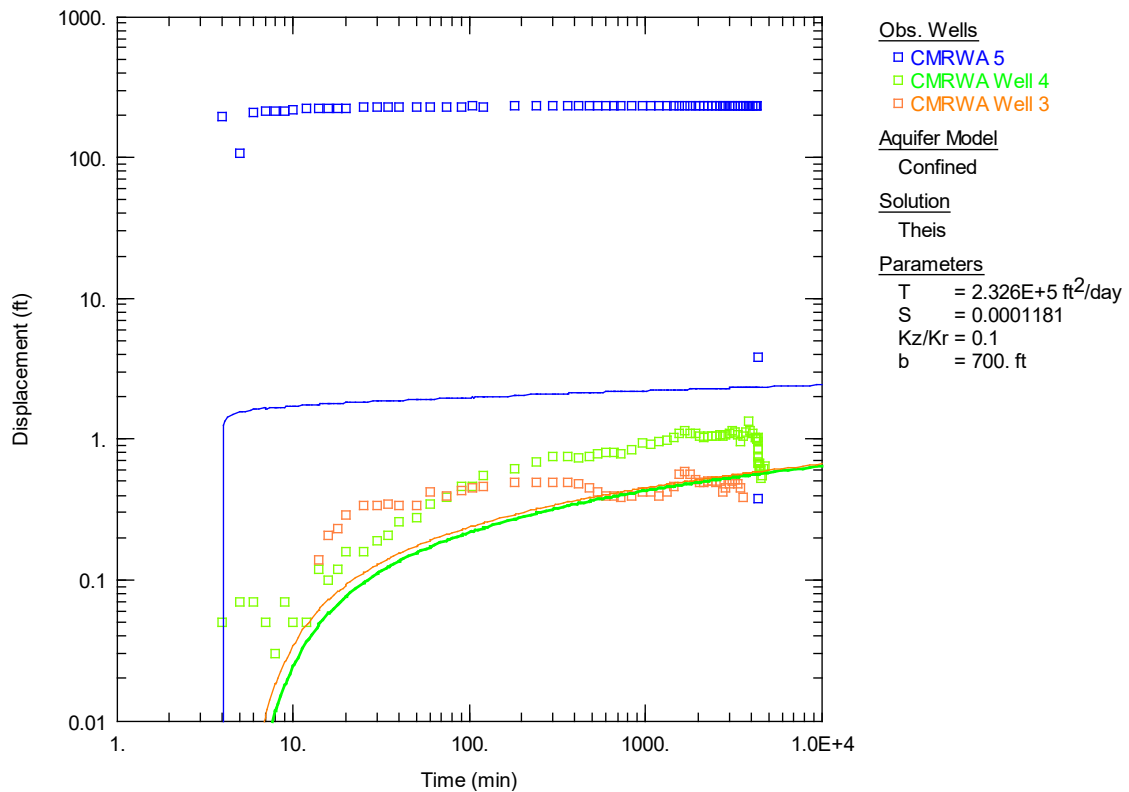


Figure 10b. Well CMRWA 5 Aqtesolv Plot



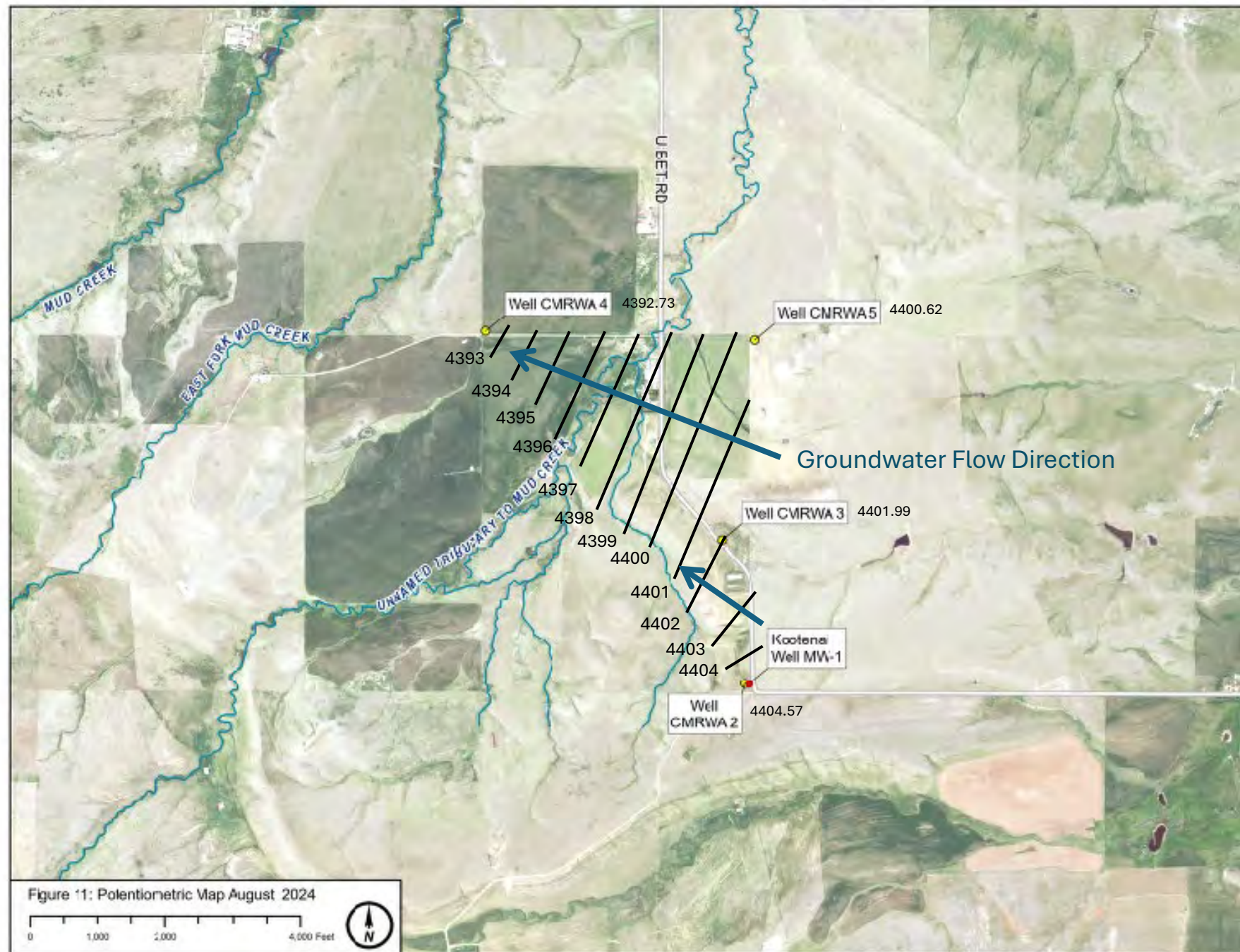


FIGURE 11

APPENDIX A

GWIC Well Logs

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# CMRWA Well #4

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with MBMG within 60 days of completion of the work.** Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Record additional information in the REMARKS section.

[illegible]

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# CMRWA Well #5

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with MBMG within 60 days of completion of the work.** Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Record additional information in the REMARKS section.

[illegible]

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MONTANA WELL LOG REPORT**Other Options**

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

[Return to menu](#)
[Plot this site in State Library Digital Atlas](#)
[Plot this site in Google Maps](#)
[View hydrograph for this site](#)
[View scanned well log \(7/26/2010 4:40:13 PM\)](#)
[View scanned published report \(7/26/2010 4:57:13 PM\)](#)
Site Name: CENTRAL MONTANA REGIONAL WATER
AUTHORITY * SUPPLY WELL 1
GWIC Id: 257040
Section 1: Well Owner(s)

1) CMRWA (MAIL)

N/A

HOBSON MT 59452 [02/01/2006]

Section 2: Location

Township	Range	Section	Quarter Sections
14N	13E	16	SW¼ NW¼ SW¼
County			Geocode

JUDITH BASIN

Latitude	Longitude	Geomethod	Datum
46.973135	-110.092816	DIGITALMAP	WGS84
Ground Surface Altitude	Ground Surface Method	Datum	Date
4586.56	DEM	NAVD88	4/7/2020
Measuring Point Altitude	MP Method	Datum	Date Applies
4586.56	DEM	NAVD88	9/19/2016 6:30:00 PM
Addition	Block	Lot	

Section 7: Well Test Data

Total Depth: 3700

Static Water Level: 391.99

Water Temperature:

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
Section 9: Well Log
Geologic Source

330MDSN - MADISON GROUP OR LIMESTONE

From	To	Description
0	40	BOULDERY TERRACE DEPOSITS; CALICHE AT TOP
40	135	BLACK SHALE; HARD BLACK SHALE BOTTOM 15 FT.
135	310	INTERBEDDED SHALE, SANDSTONE AND MUDSTONE
310	400	SECOND CAT CREEK SAND, SOFT WHITE SANDSTONE
400	495	VERY DARK REDDISH-BROWN MUDSTONE, TRACES OF SANDSTONE
495	556	THIRD CAT CREEK SAND, HARD SANDSTONE WITH SOME CHERTY LAYERS
556	614	SOFT SANDSTONE
614	805	MUDSTONE WITH A FEW INTERBEDS OF LIMESTONE AND SANDSTONE
805	850	SOFT BROWN SANDSTONE AND RED CLAY
850	895	GREENISH GRAY TO GRAY SHALE
895	1115	INTERBEDDED RED/WHITE SILTSTONE, WHITE SANDSTONE, AND GYPSUM
1115	1214	LIMESTONE AND SOFT RED SHALE
1214	1362	SOFT RED SILTSTONE
1362	1850	BLACK SHALE, SOFT, VERY PETROLIFEROUS, TRACE GYPSUM/ANHYDRITE AND LIMESTONE
1860	1880	BLACK SAND, FLOWS WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:

Company:

License No: -

Date Completed: 1/1/2005

Section 3: Proposed Use of Water

DOMESTIC (1)

PUBLIC WATER SUPPLY (2)

Section 4: Type of Work

Drilling Method:

Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Saturday, January 1, 2005

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	42	0
42	839	13.5
817	1500	8.75
1500	3700	6.25

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	42	16				STEEL
0	839	9				STEEL
817	1500	7				STEEL
1477	3565	4				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
3565	3700	4			OPEN HOLE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
807	817	7X9.625 CASING PACKER	

1460	1477	4.5X7 CASING HANGER PACKER	
------	------	----------------------------	--

Site Name: CENTRAL MONTANA REGIONAL WATER AUTHORITY		
GWIC Id: 257040		
Additional Lithology Records		
From	To	Description
1880	1910	WHITE SANDSTONE, HARD, SILICA CEMENT
1925	2615	BLACK SHALE INCLUDED PETROLIFEROUS ZONES
2615	2770	BLACK SHALE
2770	2800	LIMESTONE
2800	3102	BLACK SHALE
3102	3250	WHITE SILTSTONE INTERBEDDED WITH RED SILTSTONE AND ANHYDRITE
3250	3360	REDDISH-BROWN SOFT CLAY SHALE
3360	3398	SHALE WITH 30% ANHYDRITE
3398	3426	ANHYDRITE WITH TRACES OF SHALE
3426	3562	LIMESTON WITH FEW LAYERS OF SOFT CLAY/SHALE AND SHALEY LIMESTONE LAYERS
3562	3700	LIGHT GRAY, SOFT LIMESTONE WITH POROSITY ??? OF SOFT WHITE CLAY AND SOFT SPARRY CELCITE, LIGHT LIMESTONE

MONTANA WELL LOG REPORT

Other Options

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

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Site Name: CENTRAL MONTANA REGIONALWATER
 AUTHORITY
 GWIC Id: 269957

WELL-2

Section 1: Well Owner(s)

1) CENTRAL MONTANA REGIONALWATER AUTHORITY (WELL)
 2501 BELT VIEW DRIVE
 HELENA MT 59604 [10/14/2012]

Section 2: Location

Township	Range	Section	Quarter Sections
12N	15E	34	SE¼ SW¼ SW¼
County			Geocode
JUDITH BASIN			
Latitude	Longitude	Geomethod	Datum
46.7517783726	-109.826077447	TRS-SEC	NAD83
Ground Surface Altitude	Ground Surface Method	Datum	Date
Addition	Block	Lot	

Section 3: Proposed Use of Water

TEST WELL (1)

Section 4: Type of Work

Drilling Method: ROTARY
 Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Sunday, October 14, 2012

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	1000	12.25
1000	2225	8.75
2225	2250	6.125

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	998	9	0.375		THREADED	STEEL
950	2223	7	0.375		THREADED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
2223	2250	7			OPEN HOLE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	2223	NEAT CEMENT	Y

Section 7: Well Test Data

Total Depth: 2223
 Static Water Level: 269.8
 Water Temperature:

Pump Test *

Depth pump set for test 562 feet.
541 gpm pump rate with 20.8 feet of drawdown after 72 hours of pumping.
 Time of recovery _ hours.
 Recovery water level _ feet.
 Pumping water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

PUMP TEST COMPLETED ON 11-28-12

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	35	CLYST, TAN, THN LAM (THERMOPOLIS)
35	65	CLYST, GR & LT TAN, THN LAM
65	95	SH, BLK
95	125	CLYST, GY, THN LAM
125	155	SLTST, GY, ARG, HD, THN LAM
155	185	SLTST, GY, ARG, HD, THN LAM, SG, DK GY
185	215	SLTST, GY, ARG, HD, THN LAM
215	245	SS, LT GY, F, CALC CMT, POS KAO CMT, ANG, MED SRTG (KOOTENAI)
245	275	SH, RED BRN, SLTY, WKLY CALC; SH, GY
275	305	SLTST, RED BRN, GY, HD, ARG
305	335	SS, LT GY, F, ANG, MOD SRTG, CALC CMT
335	365	SS, LT GY, F, ANG, MOD SRTG, CALC CMT (POS SIL CMT), V HD; COAL, RR, BLK, VTR
365	395	CLYST, RES AND LY GY, MOT, SLTY, BENT
395	425	CLYST, LT GY W/ RED CTG, MOT, SLTY
425	455	SS, LT GY, WKLY CALC CMT, POS SIL CMT, HD, SUB ANG TO MD, PRLY SRTD (THIS AND PRIOR SANDSTONES INCLUDE +30% FELDSPAR AND QTZ, AND 10-15% OPAQUES)

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: FRED ROTHHAUGE
 Company: HYDRO RESOURCES
 License No: WWC-670
 Date Completed: 10/14/2012

Site Name: CENTRAL MONTANA REGIONAL WATER AUTHORITY**GWIC Id: 269957****Additional Lithology Records**

From	To	Description
455	485	CLYST, RED
485	515	CLYST, RED AND LT GY, INTR-LAM, POS HD SS LAM/BDS
515	545	SS, LT GY, F, , SLTY, CALC CMT, HD
545	575	LS, WHT; CLYST, RED, (LAVENDER), INTR LAM; SH, BLK, FIS
575	605	SS, LT GY, F, SIL CMT, TR PYR, V HD; RED CLY CTGS ON CHPS GIVES LAV COLR
605	635	SS, LT GY, M, LSE GRNS, SOME CALC CMT CHIPS, QTZ, FLD, CHRT
635	665	SS, GY, M, LSE GRNS, TR PYR, ABNT OP GRNS; RR CHPS PRP, RED, GRN MUDST
665	695	SS, GY, C, LSE GRNS, S&P, PYR AND CALC CMT; ABNT F COAL CHPS
695	725	SS, GY, C, LSE GRNS, S&P, TR PYR
725	755	SLTST, GY, SIL, V HD (MORRISON)
755	785	SLTST, WH, CALC, V HD; CLYST, BRN, SLTY
785	815	SLTST, GY; CLYST, GY BRN; SS, WH, F, W/COAL LAM
815	845	SLTST, GY, ARG
845	875	CLYST, GY, SLTY
875	905	SLTST, LT GRN, ARG
905	935	CLYST, LT GRN GY, SLTY
935	965	CLYST, TAN, SFT; CLYST, LT GRN GY, SLTY; SILTST, CALC, HARD (POS DOL)
965	995	SLTST, LT GRN GY, CALC
995	1025	CLYST, LT GRN GY, TR SLTY
1025	1055	SS, LT GY, VF, SLTY, TR GLAU, CALC CMT (SWIFT)
1055	1085	LS, LT TAN, SPAR, THN LAM; LS, RED, ARG (AMSDEN) SPARRY CALCITE CHPS ARE MOST LIKELY FOSSILS
1085	1115	LS, RED-ORG, WHT, GY, ARG (RED CHP CTNGS) INTERLAMINATED/BEDDED LIMESTONE AND CLYSTONE. CLAYSTONE CHIPS SPARSELY REPRESENTED IN SAMPLES.
1115	1145	LS, LT TAN, SPAR, THN LAM; CLYST, RED-ORG
1145	1175	CLYST, RED; LS, LT TAN, WHT, GY, (RED CHP CTNGS)
1175	1205	LS, LT GY, TR ARG (LT RED CHP CTNGS)
1205	1235	LS, WHT, LT GY, TR ARG, SPAR; CLYST, RED, INTERLAM
1235	1265	LS, GY, LT GY SPAR; RR CLYST, RED (HEATH - MOST REASONABLE BASED ON SAMPLE COLOR)
1265	1295	LS, GY, LT GY SPAR; RR CLYST, RED
1295	1325	LS, GY, ARG; CLYST, RED, CALC
1325	1355	SH, DK GY, CALC, CARB, H2S ODOR IN HCL (ALT; LS, DK GY, CARB)
1355	1385	LS, GY, CARB, SLTY (H2S ODOR IN HCL)
1385	1415	SH, BLK
1415	1445	LS, GY, ARG
1445	1475	LS, LT GRN, ARG (OTTER)
1475	1505	CLYST, LT GRN, CALC
1505	1535	LS, LT GY GRN, ARG
1535	1565	CLYSTN, LT GRN, CALC
1565	1595	SH, GY, CALC
1595	1625	LS, GY, ARG
1625	1655	LS, GY, ARG, HD
1655	1685	ANHY, WHT; INTERLAM/INTERBED WITH LS, DK GY, ARG
1685	1715	CLYST, GY, SL CALC; DOL, GY, CALC; ANHY, WHT, SFT
1715	1745	LS, GY, ARG, TR ANHY
1745	1775	CLYST, GY, ARG, SLTY, CALC, ANHY
1775	1805	SLTST, GY BRN, ARG, CALC/DOL
1805	1835	SLTST, RED BRN, ARG, CALC
1835	1865	SLTST, RED BRN, ARG, ANHY
1865	1890	SLTST, RED BRN, ARG, CALC, ANHY; SH, GY, SFT
1890	1920	SH, OLV GRN; ANHY, WHT, SFT; SH, DK GY
1920	1955	SLTST, RED-BRN, CALC, DOL INTERLAM WITH ANHY, WHT, SFT; LS, DK GY, LAM, ARG
1955	1985	SLTST, RED BRN, CALC

1985	2015	LS, GY, ARG, LAM; CLYST, RED BRN, CALC
2015	2045	LS, WHT, BLKY AND TABLR CHPS (H2S ODOR IN HCL) (CHARLES)
2045	2075	LS, WHT; SH, GY, WHT MIC NODS
2075	2105	LS, TAN; LS, LT GY TO WHT
2105	2135	LS, TAN, FOS
2135	2165	LS, TAN, FOS
2165	2195	LS, TAN, FOS, HD; LS, WHT, SFT; SH, GY
2195	2225	LS, TAN, FOS, HD; LS, WHT, SFT, W/WHT RESID; SH, GY, CALC
2225	2235	LS, WHT, SFT; SH, GY, CALC; LS, TAN, FOS, HD
2235	2250	LOST CIRC. 2241' LS, WHT, TAN, DOL, TR ARG

MONTANA WELL LOG REPORT**Other Options**

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Site Name: CENTRAL REGIONAL WATER AUTHORITY *CM
RWA-3
GWIC Id: 304761
Section 1: Well Owner(s)

1) CENTRAL REGIONAL WATER AUTHORITY (MAIL)
34 3RD AVE WEST
ROUNDUP MT 59072 [11/17/2019]

Section 2: Location

Township	Range	Section	Quarter Sections
12N	15E	34	NE¼ NW¼ SW¼
County			Geocode

JUDITH BASIN

Latitude	Longitude	Geomethod	Datum
46.757719	-109.82585	NAV-GPS	WGS84
Ground Surface Altitude	Ground Surface Method	Datum	Date
4629.49	DIGITALMAP	NAVD88	11/17/2019
Measuring Point Altitude	MP Method	Datum	Date Applies
4629.49	DIGITALMAP	NAVD88	7/2/2020 1:30:00 PM
Addition	Block	Lot	

Section 7: Well Test Data

Total Depth: 2163
Static Water Level: 205
Water Temperature:

Pump Test *

Depth pump set for test 890 feet.
1250 gpm pump rate with 39 feet of drawdown after 72 hours of pumping.
Time of recovery 0.92 hours.
Recovery water level 205 feet.
Pumping water level feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

PWL-246' ON PUMP TEST

Section 9: Well Log**Geologic Source**

330MDSN - MADISON GROUP OR LIMESTONE

From	To	Description
0	340	MUDDY SANDSTONE/THERMOPLIS SHALE. DARK GRAY SHALE. ARGILLACEOUS SANDSTONE OCCURS AT TOP OF INTERVAL TO A DEPTH OF APPROXIMATELY 80 FT.
115	1430	AMSDEN GP. CLEAN, LIGHT TAN LIMESTONE OCCURS IN THE TOP 100 FT OF INTERVAL. LOWER PART IS RED SILTSTONE AND INCLUDES DARK GRAY LIMESTONE NEAR BOTTOM.
340	780	KOOTENAI FM. UPPER PART OF FORMATION TO 700 FT CONSISTS OF INTERBEDDED SANDSTONE, SILTSTONE, CLAYSTONE, AND LIMESTONE
700	780	BASAL SANDSTONE FROM 700-780 FT IS 3RD CAT CREEK EQUIVALENT
780	1100	MORRISON FM. INTERBEDS OF SHALE, SANDSTONE, SILTSTONE, CLAYSTONE, AND LIMESTONE
1100	1185	SWIFT FM. PREDOMINANTLY CLEAN MEDIUM-GRAINED SANDSTONE WITH TRACE GLAUCONITE.
1430	1605	HEATH FM. DARK GRAY SHALE WITH OCCASIONAL LIMESTONE BEDS IN LOWER PART OF UNIT
1605	1965	OTTER FM. COMMON LIGHT GREEN CLAYSTONE, BUT ALSO INCLUDES BEDS OF LIMESTONE AND DARK GRAY SHALE. ANHYDRITE IS COMMON IN LOWER PART OF UNIT.
1965	2145	KIBBEY FM. MIXED LITHOLOGIES OF SANDSTONE, SILTSTONE, AND SHALE IN UPPER PART OF UNIT. LOWER PART OF UNIT IS REDDISH BROWN CLAYSTONE
2145	2850	CHARLES/MISSION CANYON FMS. PREDOMINANTLY LIGHT BROWN, TRANSLUCENT, PURE LIMESTONE WITH OCCURRENCES OF WHITE AND LIGHT PINK LIMESTONE. WATER ENTRY AT 2320-, 2400-, AND BELOW 2500-FT. DRILLING TERMINATED DUE TO PARTIAL CUTTING RETURNS AND CONCERN OF STUCK TOOL CONDITION.

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: CAISSON RIG, MUD ROTARY, AND AIR ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Sunday, November 17, 2019

Section 6: Well Construction Details**Borehole dimensions**

From	To	Diameter
0	40	30
8.75	2165	2850
40	1000	17.5
1000	2165	12.25

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1	40	20	0.375		THREADED	STEEL
-1	1000	14	0.35		WELDED	STEEL
947	2163	9.625	0.35		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
2163	2850	9.625			OPEN HOLE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
525	525	CEMENT SEAL	
947	947	LINER HANGER PACKER	

1550	1550	CEMENT SEAL	
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Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company:
License No: -
Date Completed: 11/17/2019

APPENDIX B

Lithologic Logs

SOIL BORING LOG

PAGE: 1 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: **1-05125 TO 39**

START DATE/TIME: **3/13/2024**

PROJECT NAME: **Central Montana Regional Water Authority**

END DATE/TIME: **7/27/2024**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

LOGGER: **B. Lauerman**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

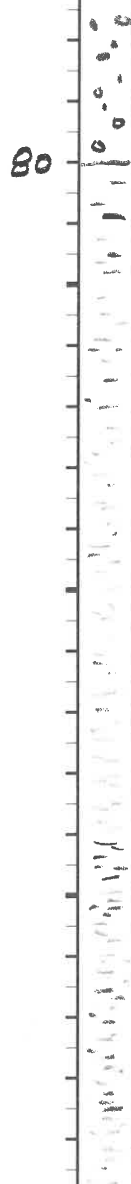
BORING DIAMETER: **17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')**

GROUND ELEVATION: **4,563 ft amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
50		Conductor casing drilled by others to 40' bgs. No sampler collected.		
x 60		SS, gray, cilty/muddy		
x 90		Silt, gray, muddy		
x 120		Silt, gray fissile.		
x 150		SAA		
x 180		SAA		
x 210		SAA, less fissile, weathered		
x 240		SAA, fissile, harder		

Thermopolis
Shale



SOIL BORING LOG

PAGE: 2 OF 12

Boring ID: CMRWA WELL 4

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	x	270		Silt, silty, m. gray fissile		
				soft, weathered		
300	x	300		Silt, fissile, dark gray	Thermopolis Shale	
	x	320		Silt		
350						
	x	360		Silt		
				weathered, clayey		
	x	390		SS, med gray, silty clay		
400						
	x	420		Mudstn, gray, silty		
450	x	450		Silt, dk gray fissile	Kootenai fm	
	x	480		Siltstn, gray, muddy		
500						

SOIL BORING LOG

PAGE: 3 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)		Sample Interval			Lithologic Description	Comments	Graphic Log
	x	510			SLTSTN, red, weathered, clayey		
	x	540			SH, red-gray, friable, hard		
550	x	570			SH, red-gray, weathered, clayey		
	x	600			LS, medium gray, tabular ltcl rxn		
	x	630			SAA		
650	x	660			SS, lt gray/white, hard column cement		
	x	690			SAA		
700	x	720			SAA		
750	x	750			SAA, SS, strong ltcl rxn		

Kootenai
Fm

SOIL BORING LOG

PAGE: 4 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs

SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
	x 775	CLAYSTN, red, hard, no HCl rxn		
		SAA		
800	x 810	SS, lt gray, hard HCl rxn	Kootenai Fm	
		SLTSTN, lt gray/gray, sandy		
		SS, salt and pepper, no HCl rxn		
	x 840	SAA		
850				
	x 870	SAA		
			3rd Cat ck?	
900	x 900	SAA		
		SS, salt and pepper, vigorous HCl rxn		
	x 930	SAA,		
950	x 950			
	x 960	SH, dk gray, fissile		
	x 990	SS, gray, v. hard no HCl rxn		
1000				

SOIL BORING LOG

PAGE: 5 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs

SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	x	1020		SS, gray, v. soft, m. sand, weathered no Hcl rxn		
1050	x	1050		SLTSTN, gray, v. soft, weathered no Hcl rxn	weathered LS?	
	x	1080		SAA	Morrison Fm	
1100	x	1110		SS, gray - med gray, v. soft vigorous Hcl rxn		
	x	1130		SAA		
1150	-		MISS	MISSING sampler	SWIFT Fm?	
	-		MISS			
1200	x	1200		SLTSTN, brn - lt gray, clayey v. soft vigorous Hcl rxn	weathered LS?	
	x	1230		SAA	Amsden GP	
1250					weathered LS?	

SOIL BORING LOG

PAGE: 6 OF 12

Boring ID: **CMRWA WELL 4**PROJECT NUMBER: **1-05125 TO 39**START DATE/TIME: **3/13/2024**PROJECT NAME: **Central Montana Regional Water Authority**END DATE/TIME: **7/27/2024**LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**LOGGER: **B. Lauerman**DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**DRILLING METHOD: **Air or mud conventional and indirect rotary**BORING DIAMETER: **17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')**GROUND ELEVATION: **4,563 ft amsl**TOTAL DEPTH: **3,000 ft bgs** SWL: _____

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	X	1270		SAA SLTSTN, gray, soft LS vig Hcl		
	X	1290		SAA	maybe weathered LS?	
1300						
	X	1320		SLTSTN, red-brown, soft, clayey LS vig Hcl		
	X	1350		SLTSTN LS, lt gray, loose, weathered vig Hcl	Amsden Grp	
1350						
	X	1380		SAA		
1400						
	X	1410		SH, dk gray-blk, vigorous Hcl LS		
	X	1440		SAA		
1450						
	X	1470		SAA		
	X	1500		LS, med - dk gray vigorous Hcl rxn	Weathered LS?	
1500						

SOIL BORING LOG

PAGE: 7 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
1550	x 1530	SN, LS, dk gray, tan/pnk vig Hcl rxn	Amsden Gp	
			1540	
	x 1560	SH, dk gray, vig Hcl rxn	Heath Fm	
	x 1590	SN, med. gray Hcl rxn		
1600				
	x 1620	SH/LS, gray-tan Hcl rxn		
			1630	
1650	x 1650	CLYSTN, lt green-gray, tott Hcl rxn	Offer Fm	
	x 1680	SN, green-tan Hcl rxn		
1700				
	x 1710	SN, green-tan-blk Hcl rxn		
			1720	
1750	x 1740	SLTSTN, green gray Hcl rxn minor SH blk		
			1740	

SOIL BORING LOG

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Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
	x 1770	CLYSTN, green, ltcl rxn		
1800	x 1800	CLYSTN, green w/ slt, blk ltcl rxn	Ottar Fm	
	x 1830	slt, multicolored green, black CLYSTN ltcl rxn		
1850	x 1860	slt, multicolored, ltcl rxn CLYSTN		
	x 1890	SAA		
1900	x 1910	SAA		
	x 1930	SAA, trace ls, tan ltcl rxn trace anhydr.		
1950	x 1950	SAA		
	x 1980	slt, blk, green, trace anhydr. trace CLYSTN green		
2000				

SOIL BORING LOG

PAGE: 9 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
	x 2010	LS, tan, gray, Hcl rxn w/ SH multicolored	Other Fm	
2050	x 2040	SAA, decreasing SH Hcl rxn		
	x 2070	SH, multicolored, trace LS		
2100	x 2100	SAA		
	x 2130	SH, blk, multicolored,	Kibbey Fm	
2150	x 2160	SAA,		
	x 2190	SAA, trace CLYSTN, red	reddening slightly at base of Kibbey	
2200	x 2220	SAA, SH multi, trace CLYSTN red		
	x 2250	LS, lt gray, vigorous Hcl rxn	Madison Fm	
2250				

SOIL BORING LOG

PAGE: 10 OF 12

Boring ID: CMRWA WELL 4

PROJECT NUMBER: 1-05125 TO 39

PROJECT NAME: Central Montana Regional Water Authority

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING METHOD: Air or mud conventional and indirect rotary

GROUND ELEVATION: 4,563 ft amsl

START DATE/TIME: 3/13/2024

END DATE/TIME: 7/27/2024

LOGGER: B. Lauerman

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
2300	x	2280		LS, dk gray HCL rxn vigorous trace anhyd.		
	x	2310		LS, lt gray/white, anhydrite	Madison Fm	
	x	2340		SAA LS w/ anhydrite		
2350	x	2360		SAA LS w/ anhydrite		
	-		miss			
2400	x	2410		LS, lt gray-gray, <u>massive</u>	large cuttings returned 1/4-3/4 in (fractured)	
	x	2430		SAA, <u>fractured</u>	SAA	
2450	x	2460		SAA LS. Trace sh. blk sandy		
	x	2490		LS, gray	smaller cuttings	
2500						

SOIL BORING LOG

PAGE: 11 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)		Sample Interval			Lithologic Description	Comments	Graphic Log
	X	2520			SAA, LS, gray, tan		
2550	X	2550			SAA incl pink LS	Madison Fm	
	X	2580			LS, pink, tan, fine cuttings		
2600	X	2610			SAA, lt gray, pink	larger cuttings	
	X	2640			SAA, gray, tan	large cuttings > 1/2" (fracture)	
2650	X	2670			SAA		
2700	X	2700			SAA		
	X	2730			SAA, tan, gray, pink	decreasing cutting size	
2750							

SOIL BORING LOG

PAGE: 12 OF 12

Boring ID: **CMRWA WELL 4**

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 3/13/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 7/27/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (0-1000'); 12.25" (to 2259') 8.75" (to 3000')

GROUND ELEVATION: 4,563 ft amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
	X 2760	snn LS gray, minor tan, pink		
	X 2790	SAA		
2800	X 2820	SAA		
	X 2850	LS, gray, massive		
	X 2880	SAA, trace pink		
2900	X 2910	LS, gray, sand, brown, fine		
	X 2940	LS, gray		
2950	X 2970	LS, gray, tan		
	X 3000	LS, gray		

Madison Fm

cuttings larger < 3/4"
(fracture)
No sample 2860 - 2870

TD = 3000' bgs 7/27/24

SOIL BORING LOG

PAGE: 1 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT:

Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER:

17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
50	x 60	Conductor casing drilled by others to 40' bgs No sampler collected SS, d gray, silty		
100	x 90	SAA	Thermopolis	
150	x 120	SH, d gray, fissile		
200	x 150	SAA		
250	x 180	more massive SAA, m. gray fissile		
300	x 210	SAA		
350	x 240	SAA, more tubular		

SOIL BORING LOG

PAGE: 2 OF 12

Boring ID: **CMRWA WELL 5**
 PROJECT NUMBER: **1-05125 TO 39**
 PROJECT NAME: **Central Montana Regional Water Authority**
 LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**
 DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**
 DRILLING METHOD: **Air or mud conventional and indirect rotary**
 GROUND ELEVATION: **4,561 amsl**

START DATE/TIME: **5/23/2024**
 END DATE/TIME: **6/29/2024**
 LOGGER: **B. Lauerman**
 DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**
 BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**
 TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	x	270		SH, SH, m. gray fissile, hard		
300	x	300		SAA	Thermopolis shale	
	x	330		SAA, SH, m. gray, fissile		
350						
	x	360		SAA		
	x	390		SAA		
400					400'	
	x	420		SS, m. gray, silty Itcl rxn		
450	x	450		CLYSTN/mudSTN, red Itcl rxn	Kootenai Fm	440
	x	470		SH, lt-m gray fissile		465
				SILTSTN, red-green mottled		480
500						

SOIL BORING LOG

PAGE: 3 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)		Sample Interval			Lithologic Description	Comments	Graphic Log
	x	510			CLYSTN, gray/lt red Itcl rxn		
	x	540			SLTSTN, gray/red mottled		
550							
	x	570			SS, gray, Itcl rxn		
600	x	600			CLYSTN, green, soft		
					SS, lt gray, fine, hard		
	x	630			SLTSTN, red		
650					SS, lt gray, fine, hard		
	x	660			LS, lt gray/white Itcl rxn		
	x	690			MUSSTN, red No Itcl rxn		
700					SS, gray, hard		
	x	720			SLTSTN / CLAYSTN, lt gray/green		
750	x	750			SLTSTN, m gray - red mottled Itcl rxn		

Kootenai
Fm

SOIL BORING LOG

PAGE: 4 OF 12

Boring ID: **CMRWA WELL 5**
 PROJECT NUMBER: **1-05125 TO 39**
 PROJECT NAME: **Central Montana Regional Water Authority**
 LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**
 DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**
 DRILLING METHOD: **Air or mud conventional and indirect rotary**
 GROUND ELEVATION: **4,561 amsl**
 START DATE/TIME: **5/23/2024**
 END DATE/TIME: **6/29/2024**
 LOGGER: **B. Lauerman**
 DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**
 BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**
 TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
780	x	SS, salt and pepper trace coal?		
810	x	LS, gray, massive Hcl rxn		
840	x	SNA	Kootenai Fm	
870	x	CLYSTN - red Hcl rxn SS, salt and pepper		
900	x	SNA	3rd cat ck?	
930	x	SNA		
950		SILTCLN, lt gray		
970	x	SILTCLN, gray, sandy	Morrison Fm	
1000	x	SS, lt gray, hard		

SOIL BORING LOG

PAGE: 5 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

START DATE/TIME: **5/23/2024**

END DATE/TIME: **6/29/2024**

LOGGER: **B. Lauerman**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)		Sample Interval			Lithologic Description	Comments	Graphic Log
	X	1030			SAA, SS, gray, hard		
1050	X	1050			SAA		
	X	1080			SAA		
1100	X	1110			LS, gray, HCL rxn	Morrison Fm	
	X	1140			SAA		
1150	X	1170			SAA LS, gray-red HCL rxn		
1200	X	1200			SS gray-barn.	1190	
	X	1230			SAA	Swift Fm	
1250							

SOIL BORING LOG

PAGE: 6 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL: _____

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	X	1260		SAA	<i>Swift Fm</i>	
	X	1290		SAA		
1300						
	X	1320		LS, gray-tan, Hcl rxn		
1350	X	1350		SAA, lt gray, tan, white Hcl rxn		
	X	1380		CLYSTN - red, calcite traces		
1400					<i>Amesden Group</i>	
	X	1410		LS gray, lt gray Hcl rxn		
	X	1440		CLYSTN, red, calcite traces		
1450						
	X	1470		LS, white, anhydr., HCL rxn		
				LS, Lxr anhydr.		
1500	X	1500		SAA		

SOIL BORING LOG

PAGE: 7 OF 12

Boring ID: CMRWA WELL 5

PROJECT NUMBER: 1-05125 TO 39

START DATE/TIME: 5/23/2024

PROJECT NAME: Central Montana Regional Water Authority

END DATE/TIME: 6/29/2024

LOCATION: CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT

LOGGER: B. Lauerman

DRILLING CONTRACTOR: HydroResources, Ft. Lupton, CO

DRILLING EQUIPMENT: Challenger 360, two-drum Kelly drive rig

DRILLING METHOD: Air or mud conventional and indirect rotary

BORING DIAMETER: 17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')

GROUND ELEVATION: 4,561 amsl

TOTAL DEPTH: 3,000 ft bgs SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
1550	x	1530		SAA LS, anhydrite ItCL rxn	Amsden Group	
	x	1560		SAA		
					1570	
1600	x	1590		SH, gray-green		
	x	1620		SAA	Heath Fm	
1650	x	1650		LS, lt gray, white, anhydr Itcl		
	x	1680		SAA		
					1690	
1700	x	1710		CLYSTN, lt gray-green		
	x	1740		SAA	Oller Fm	
1750						

SOIL BORING LOG

PAGE: 8 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

GROUND ELEVATION: **4,561 amsl**

START DATE/TIME: **5/23/2024**

END DATE/TIME: **6/29/2024**

LOGGER: **B. Lauerman**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

TOTAL DEPTH: **3,000 ft bgs** SWL: _____

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	X	1770		SAA CLYSTN, green		
1800	X	1800		SAA		
	X	1830		SAA		
1850	X	1860		SAA		
	X	1890		SH, lt gray, anhydr.		
1900	X	1920		CLYSTN gray-green, calcite		
1950	X	1950		SAA		
	X	1980		CLYSTN/LS gray-brn, calcite		
2000						

Other
Fm

SOIL BORING LOG

PAGE: 9 OF 12

Boring ID: **CMRWA WELL 5**
 PROJECT NUMBER: **1-05125 TO 39**
 PROJECT NAME: **Central Montana Regional Water Authority**
 LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**
 DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**
 DRILLING METHOD: **Air or mud conventional and indirect rotary**
 GROUND ELEVATION: **4,561 amsl**
 START DATE/TIME: **5/23/2024**
 END DATE/TIME: **6/29/2024**
 LOGGER: **B. Lauerman**
 DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**
 BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**
 TOTAL DEPTH: **3,000 ft bgs** SWL: _____

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	x	2010		LS, lt gray, white anhydr	Oller Fm	
	x	2040		SH, lt gray, green		
2050	x	2070		LS, lt gray-green, anhydr.		
	-	2100	miss		Inferred 2090	
2100	x	2130		SS lt gray, lt brn trace shale blk SLTSTN lt brown calcium cement		
2150	x	2160		SAN SLTSTN, lt brown, tan Sandy calcium cement	Kibbey Fm	
	x	2190		SH, green-blk		
2200	x	2220		CLYSTN, ^{red} brown calcium cement		
2250	x	2250		SAN		

SOIL BORING LOG

PAGE: 10 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)	Sample Interval	Lithologic Description	Comments	Graphic Log
			Kibbey Fm	
	X 2280	SAA, CLYCTN, ^{red} brown calc. cement		
2300			2290	
	X 2310	LS, lt-med gray, anhydr. HCl		
	X 2340	SAA		
2350			Madison Fm	
	X 2370	SAA		
2400	X 2400	SAA, LS lt-med gray, ^{lt} anhydr. HCl		
	X 2430	SAA		
2450				
	X 2460	SAA, LS lt gray, anhydr. HCl		
	X 2490	SAA		
2500				

SOIL BORING LOG

PAGE: 11 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

GROUND ELEVATION: **4,561 amsl**

START DATE/TIME: **5/23/2024**

END DATE/TIME: **6/29/2024**

LOGGER: **B. Lauerman**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

TOTAL DEPTH: **3,000 ft bgs** SWL: _____

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	X	2520		SAA LS, tan, pink Itcl rxn		
2550	X	2550		LS, tan, lt gray Itcl rxn		
	X	2580		LS, lt gray, white anhydr. Itcl	Madison Fm	
2600	X	2610		SAA		
	X	2640		SAA		
2650	X	2670		SAA		
	X	2700		SAA		
2700	X	2730		SAA, LS, pink, lt tan Itcl		
2700						

SOIL BORING LOG

PAGE: 12 OF 12

Boring ID: **CMRWA WELL 5**

PROJECT NUMBER: **1-05125 TO 39**

PROJECT NAME: **Central Montana Regional Water Authority**

LOCATION: **CMRWA U Bet Wellfield, 4 miles south of Buffalo, MT**

DRILLING CONTRACTOR: **HydroResources, Ft. Lupton, CO**

DRILLING EQUIPMENT: **Challenger 360, two-drum Kelly drive rig**

DRILLING METHOD: **Air or mud conventional and indirect rotary**

BORING DIAMETER: **17.5" (to 1000'); 12.25" (to 2300') 8.75" (to 3000')**

GROUND ELEVATION: **4,561 amsl**

TOTAL DEPTH: **3,000 ft bgs** SWL:

Depth (ft)		Sample Interval		Lithologic Description	Comments	Graphic Log
	X	2760		SAN, Ls lt tan, pink Hcl rxn		
	X	2790		SAN, tan-gray Hcl rxn		
2800	X	2810		SAN, trace pink Hcl rxn		
2850	X	2850		SAN, tan-gray Hcl rxn		
	X	2880		SAN		
2900						
	X	2910		SAN		
	X	2940		SAN		
2950						
	X	2970		SAN		
3000	X	3000		SAN		

Madison
Fm

TD = 3000' bgs

APPENDIX C

Well CRMWA 4 CBL Report



Radial Bond Log
with Gamma Ray
CCL/Temp

Company		Hydro Resources		Country USA	
Well		CMRWA #4			
Field		Judith Gap			
County		Wheatland			
State		Montana			
Location:		API # : NA		Other Services	
SEC		NA		TWP	
Log Measured From		Ground Level		NA	
Drilling Measured From		RKB		GL	
Run Number		ONE			
Depth Driller		2235'			
Depth Logger		2235'			
Bottom Logged Interval		2235'			
Top Log Interval		927'			
Open Hole Size		NA			
Type Fluid		H2O			
Density / Viscosity		8.4lb			
Max. Recorded Temp.		72.4°F			
Estimated Cement Top		1660'			
Time Well Ready		12:20			
Time Logger on Bottom		15:00			
Equipment Number		624874			
Location		Gilllette Wy.			
Recorded By		S LeBlanc			
Witnessed By		Jim Hale			
Run Number		Bit		From	
To		Size		Weight	
From		To		From	
To		Bottom			
Casing Record		Size		Mgt/ft	
Surface String					
Prot. String					
Production String					
Liner					

<<< Fold Here >>>

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

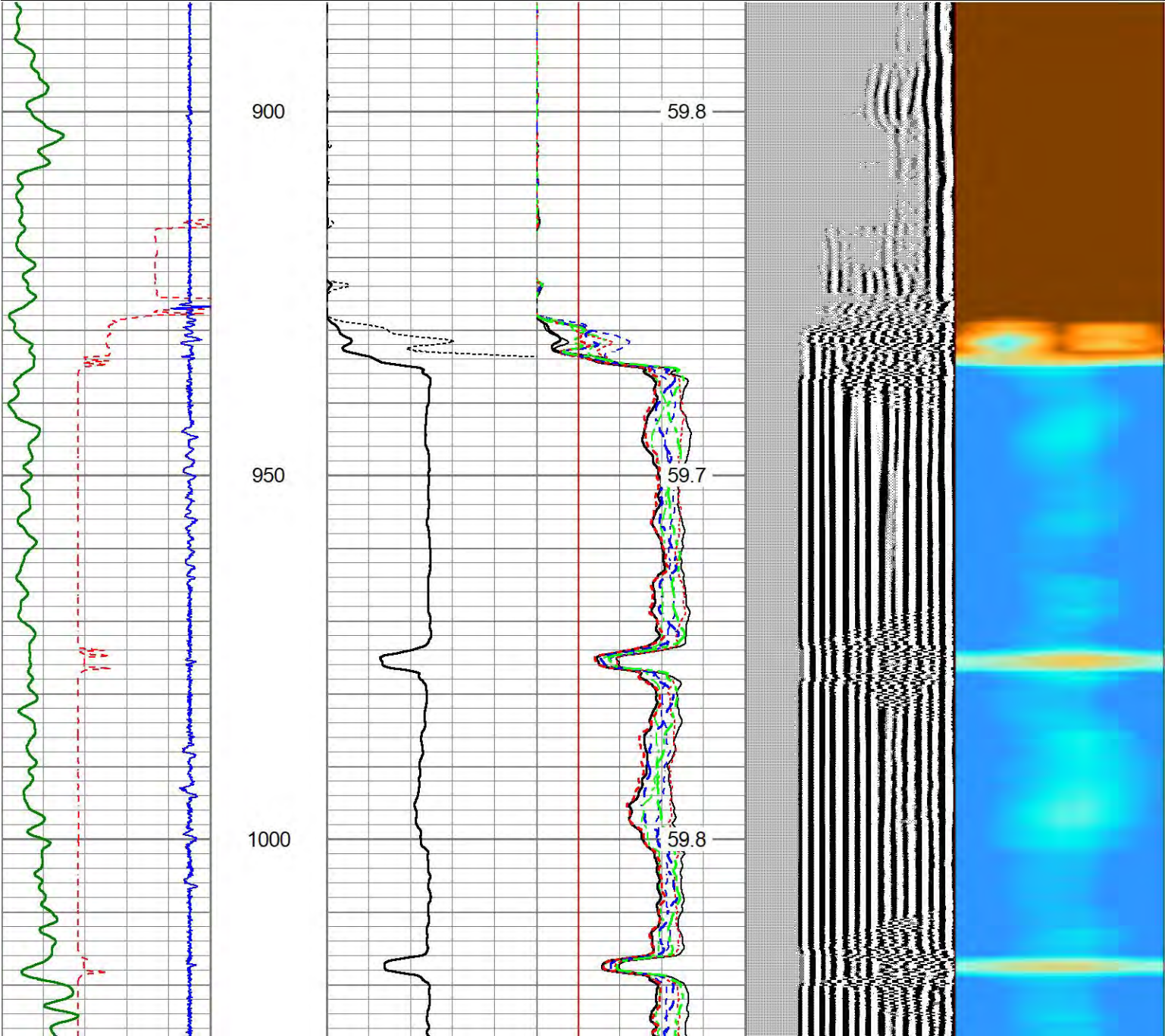
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KLX Energy Services

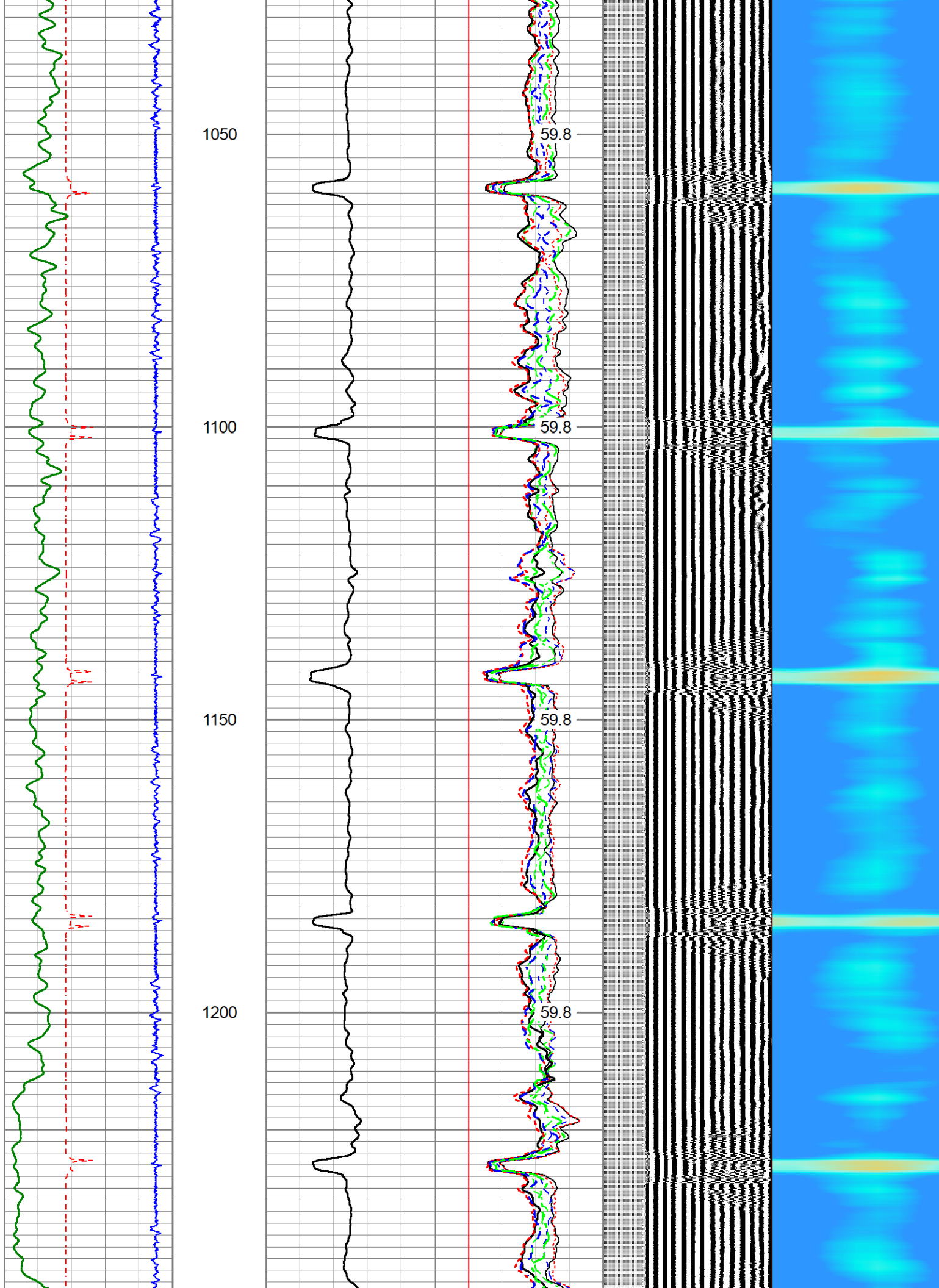


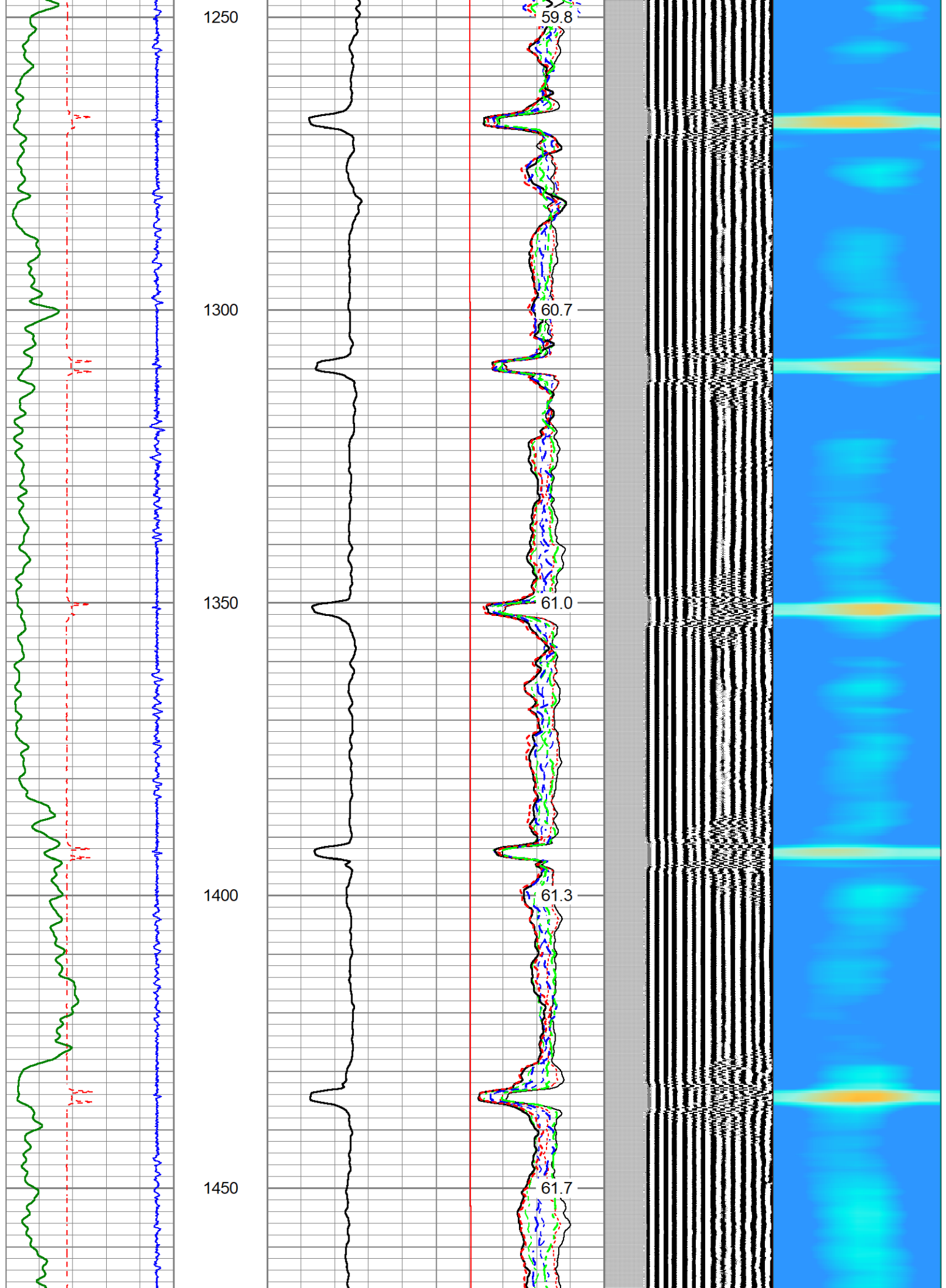
MAIN PASS

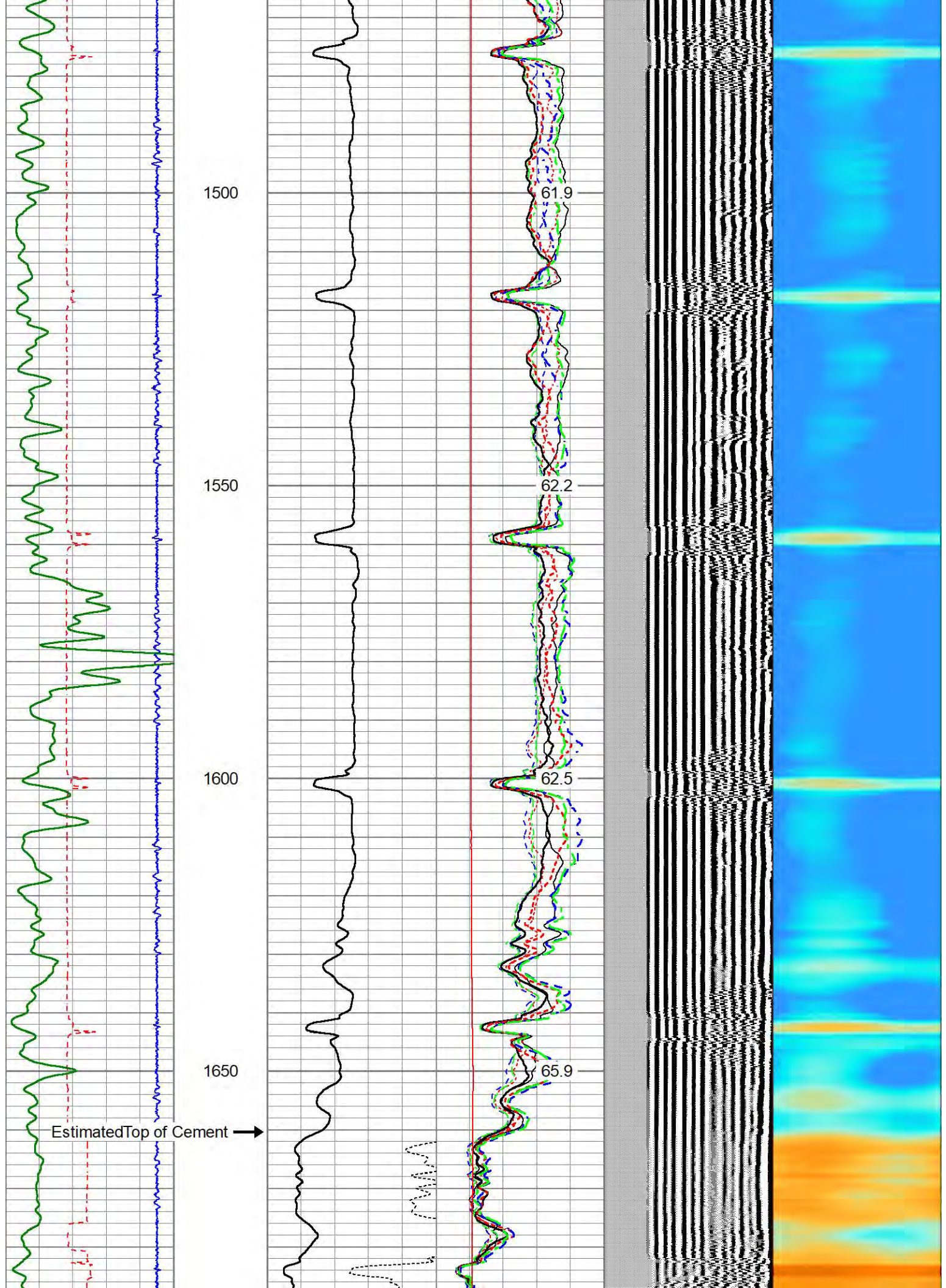
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Presentation Format	prb_rbt8
Dataset Creation	Fri Apr 19 15:08:51 2024
Charted by	Depth in Feet scaled 1:240

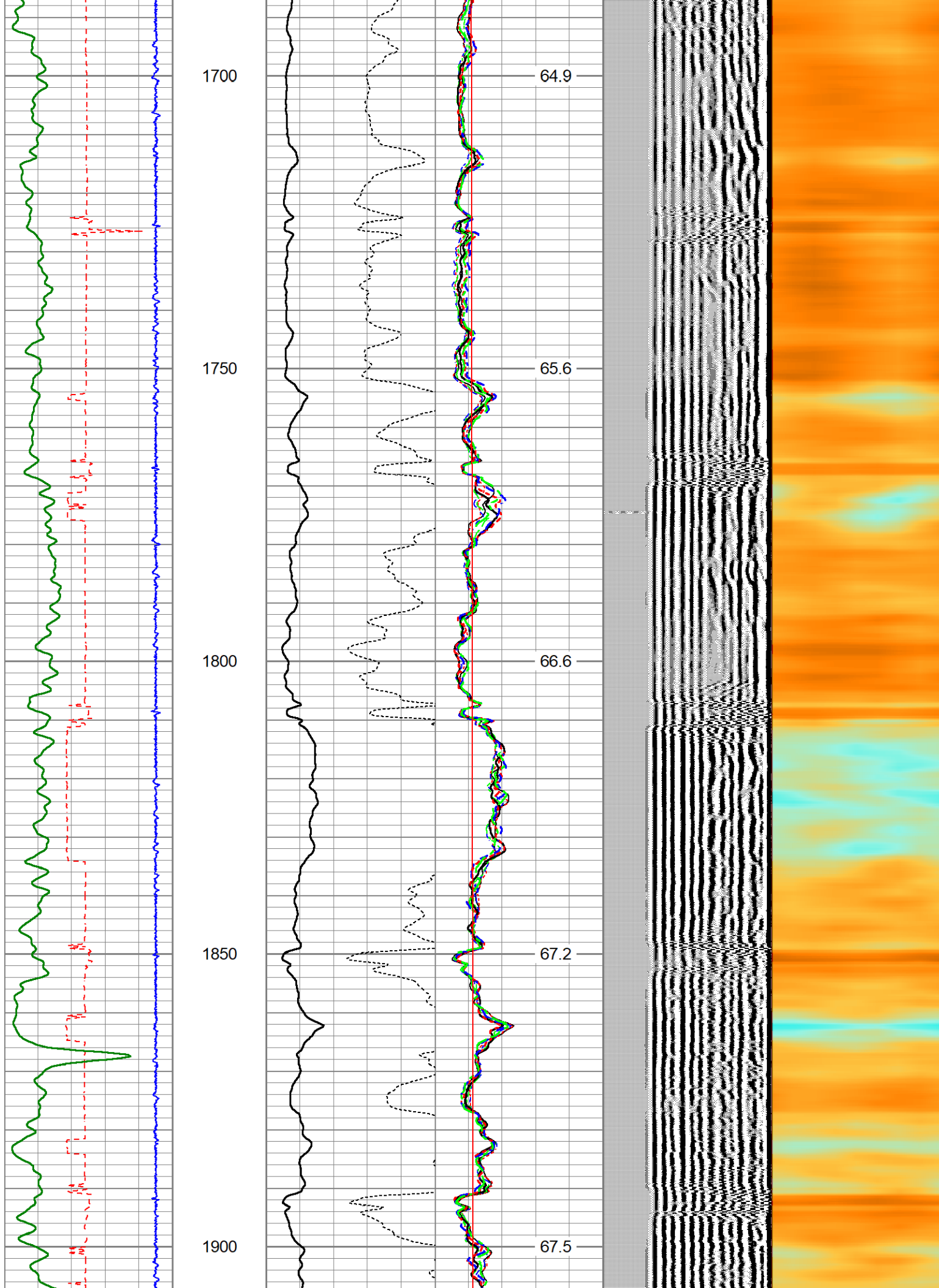
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-9	CCL	1	0	AMPx20 (mV)	20	0	AMPS2	150						
0	GR (GAPI)	200				0	AMPS3	150						
						0	AMPS4	150						
						0	AMPS5	150						
						0	AMPS6	150						
						0	AMPS7	150						
						0	AMPS8	150						
							RBT_Temp							
						0	(degF)	300						
							TEMP							
							(degF)							

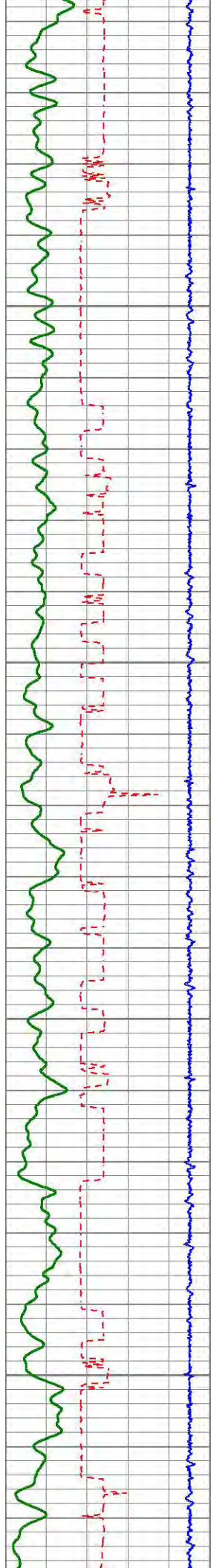










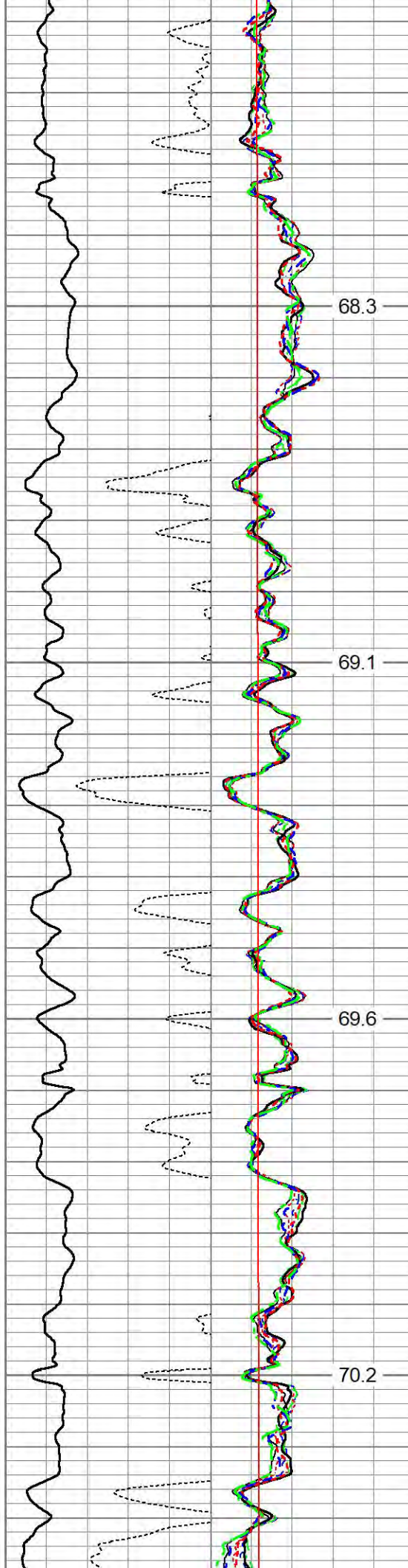


1950

2000

2050

2100

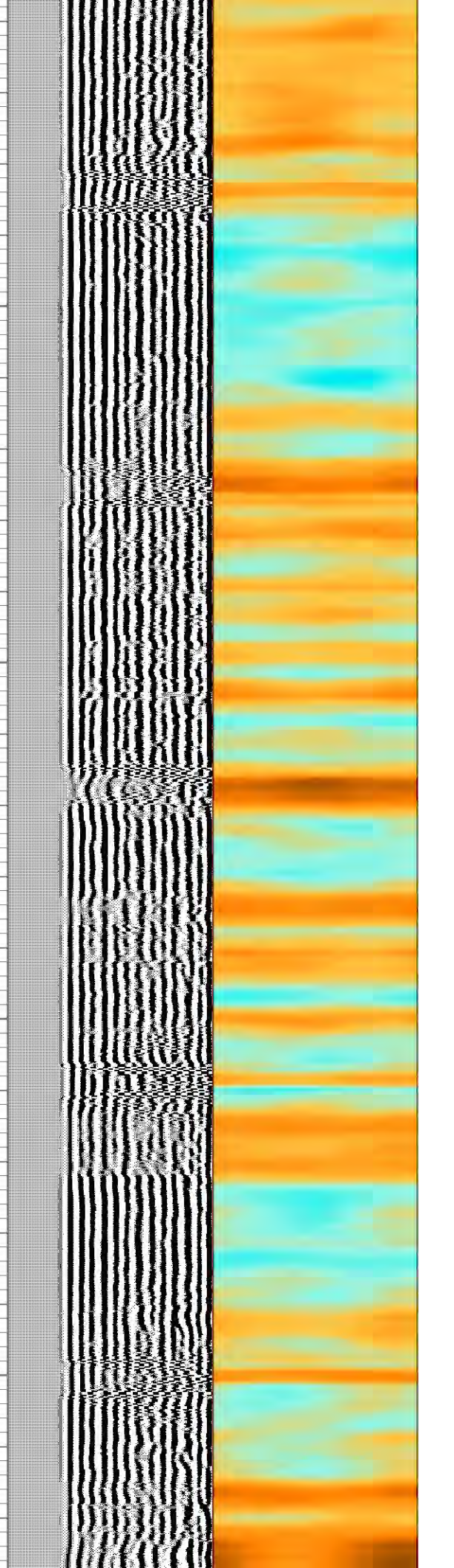


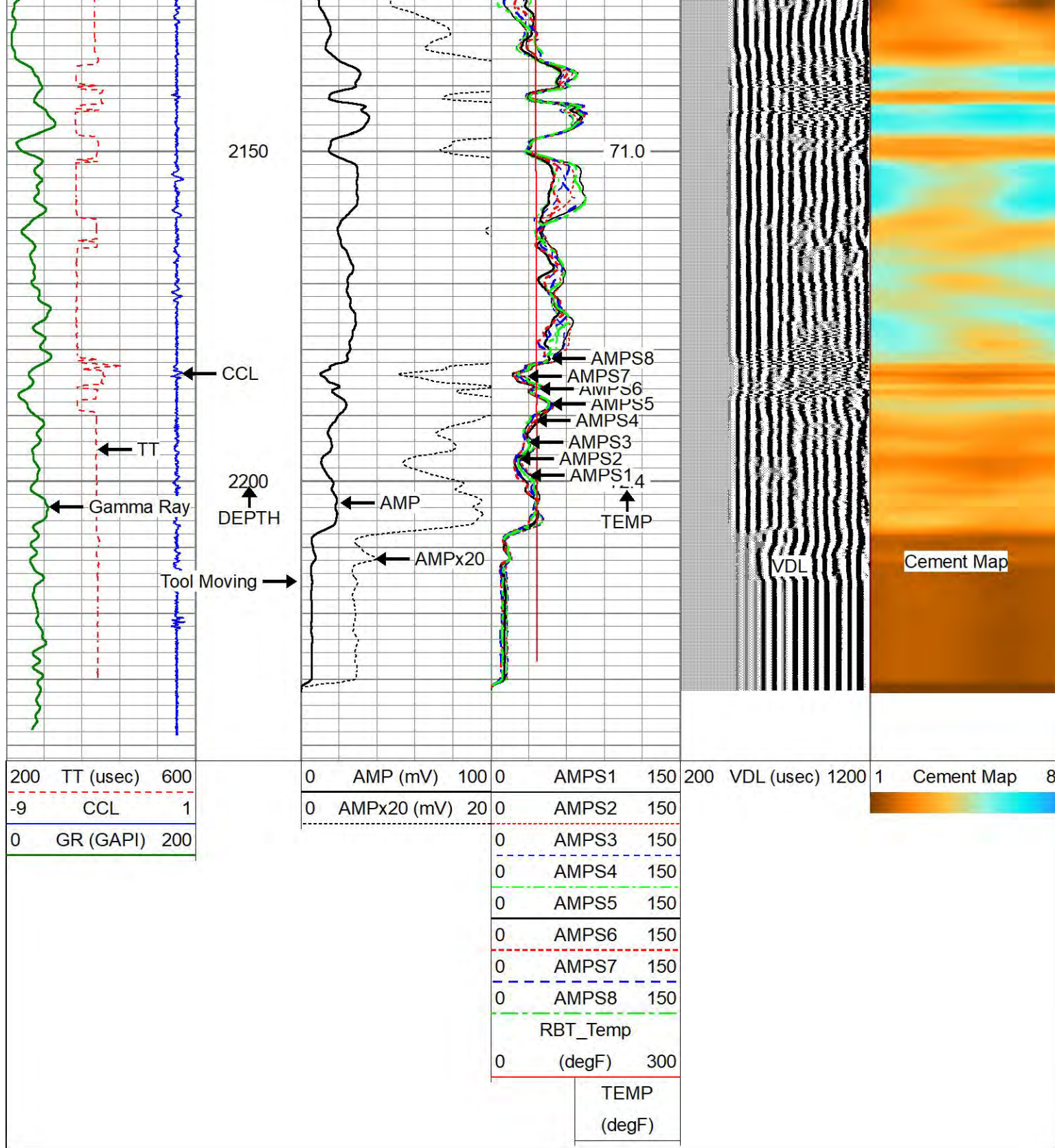
68.3

69.1

69.6

70.2





REPEAT PASS

Database File 4192024hydroresources.db
 Dataset Pathname pass1.9
 Presentation Format prb_rbt8
 Dataset Creation Fri Apr 19 15:29:11 2024
 Charted by Depth in Feet scaled 1:240

200	TT (usec)	600
-9	CCL	1
0	GR (GAPI)	200

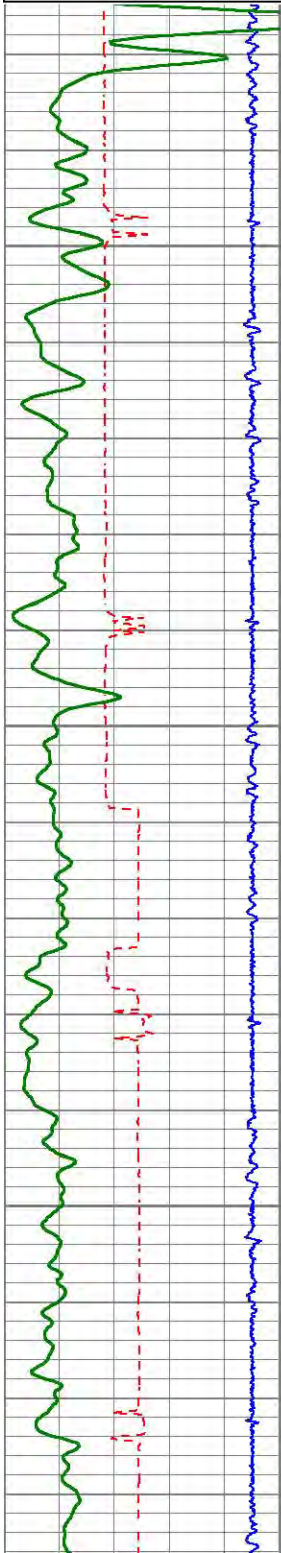
0	AMP (mV)	100
---	----------	-----

0	AMPS1	150
0	AMPS2	150
0	AMPS3	150
0	AMPS4	150
0	AMPS5	150
0	AMPS6	150
0	AMPS7	150
0	AMPS8	150
RBT_Temp		
0	(degF)	300

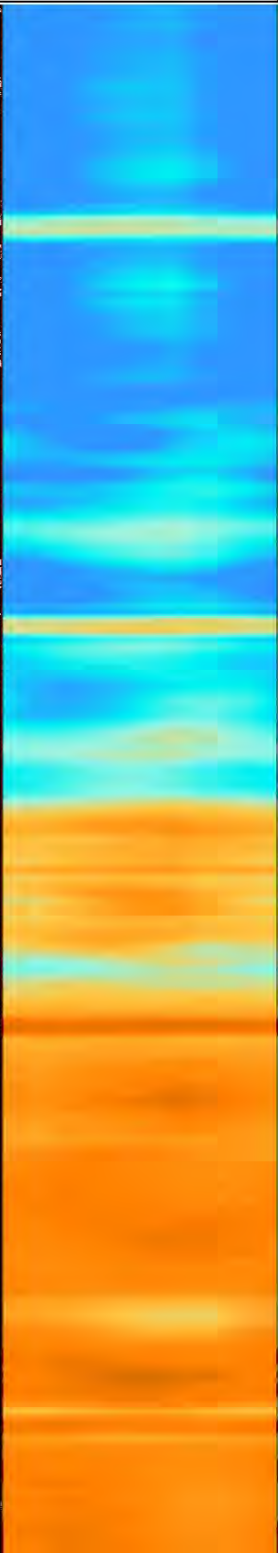
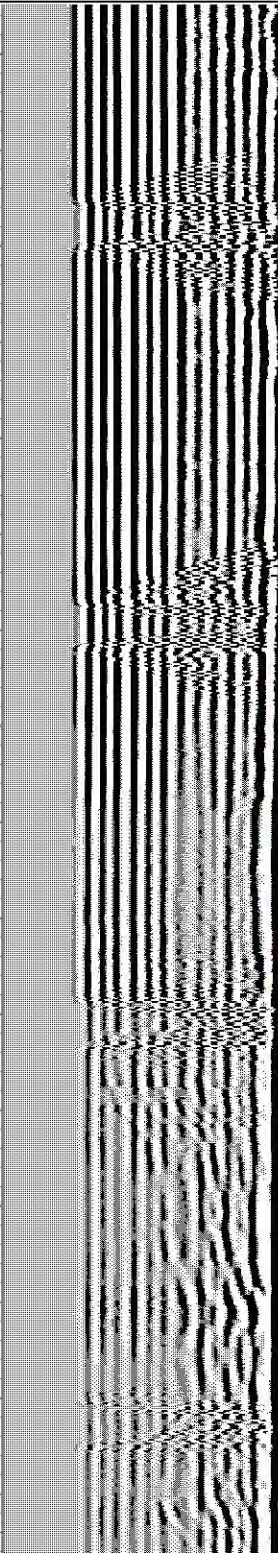
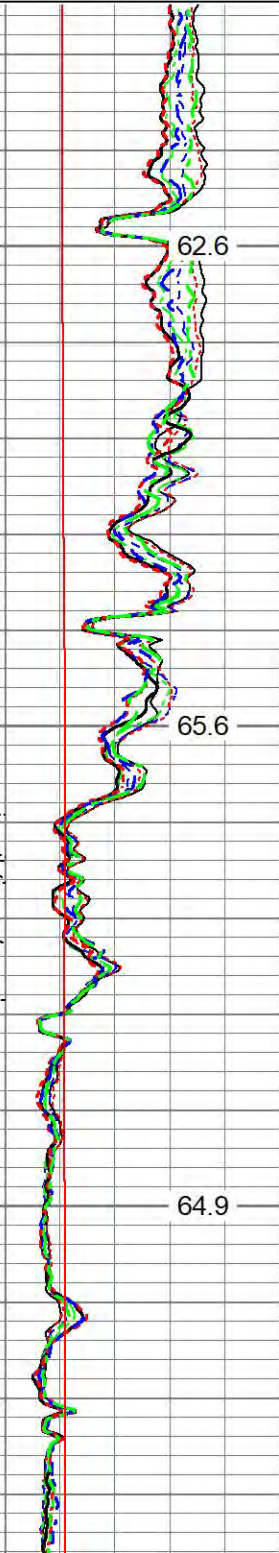
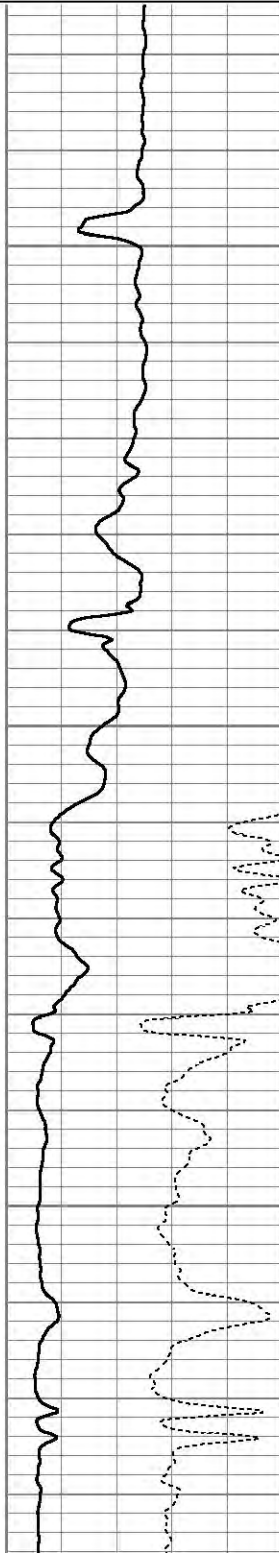
200 VDL (usec) 1200

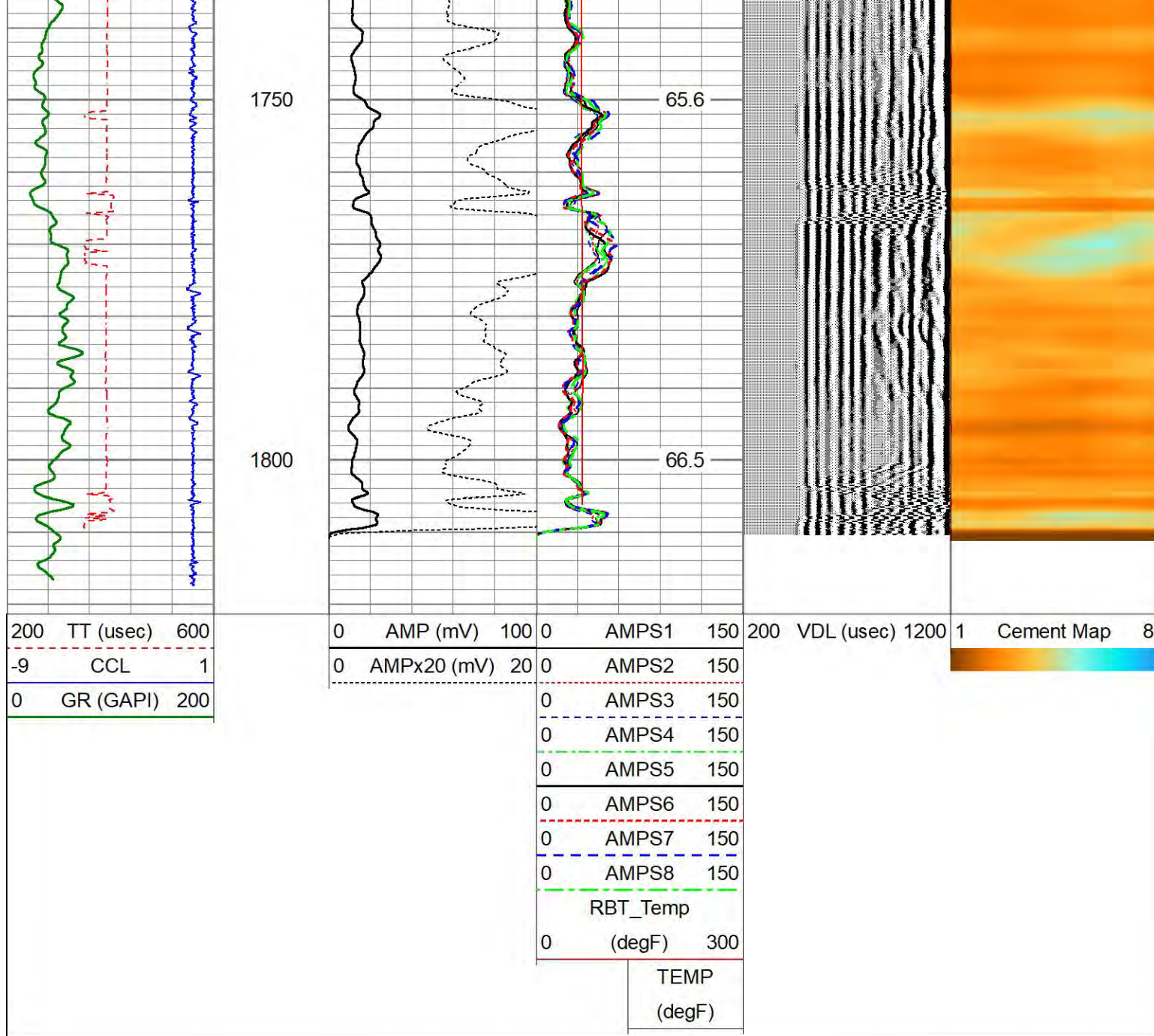
1 Cement Map 8

TEMP
(degF)

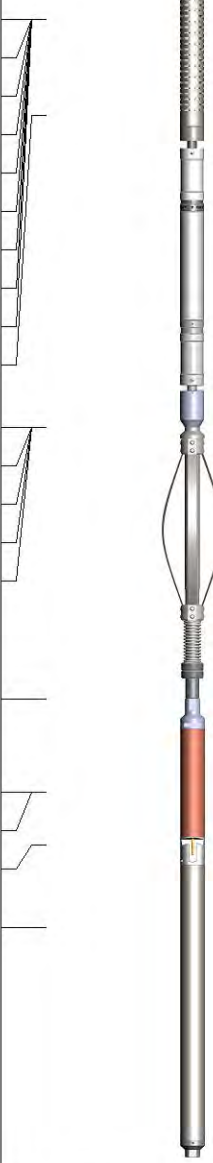
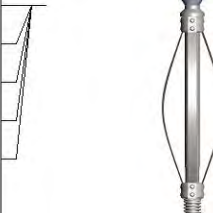
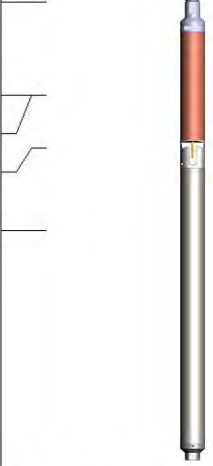


1600
1650
1700





Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
ErrCt	19.64		CENT-BC275-0000 Probe 2.75" Bowspring Centralizer	2.83	2.75	24.00
RBT_HV	16.80					
RBT_Temp TEMP	14.00 14.00					

WVFS8	11.85		RBT8-RADII-275T (RBT275T_Base) Probe 2.75" RADII 8 Sector Bond Tool w/ Temperature	9.20	2.75	
WVFS7	11.85					
WVFS6	11.85					
WVFS5	11.85					
WVFS4	11.85					
WVFS3	11.85					
WVFS2	11.85					
WVFS1	11.85					
WVF3FT	11.85					
WVF5FT	10.85					
RBT_ACCZ	7.60					
RBT_ACCY	7.60					
RBT_ACCX	7.60					
WVFSYNC	7.60		CENT-BC275-0000 Probe 2.75" Bowspring Centralizer	2.83	2.75	24.00
WVFCAL	7.60					
GCT_HV	4.77					
CCL\$2	3.81					
CCL\$1	3.81					
GCT_Temp	3.26					
GR	2.39		GC-GCT275-0000 (GCT275-0000_base) Probe Gamma Ray - CCL w/ Temp	4.77	2.75	55.00
Dataset: 4192024hydroresources.db: field/well/run1/pass1.9						
Total length: 19.64 ft						
Total weight: 104.00 lb						
O.D.: 2.75 in						

Log Variables

DatabaseC:\ProgramData\Warrior\Data\4192024hydroresources.db
Dataset field/well/run1/pass1.9/_vars_

Top - Bottom

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	CASEWGHT	MAXAMPL	MINAMPL
TEMP	in	degF	in	in	lb/ft	mV	mV
	7.875	100	9.625	0.352	36	0	1
MinAPIWall	MINATTN	PPT	SRFTEMP	TDEPTH			
in	db/ft	usec	degF	ft			
0	0.8	0	0	0			

Variable Description

BHTEMP_Src : BHTEMP Input Source Selector
BOREID : Borehole I.D.
BOTTEMP : Bottom Hole Temperature
CASEOD : Casing O.D.

MINAMPL : Minimum Amplitude
MinAPIWall : Perforation Flag
MINATTN : Minimum Attenuation
PPT : Predicted Pipe Time

CASETHCK : Casing Thickness
CASEWGHT : Casing Weight
MAXAMPL : Maximum Amplitude

SRFTEMP : Surface Temperature
TDEPTH : Total Depth

Calibration Report						
Database File	4192024hydroresources.db					
Dataset Pathname	pass1.9					
Dataset Creation	Fri Apr 19 15:29:11 2024					
Gamma Ray Calibration Report						
Serial Number:	GCT275-0000_base					
Tool Model:	GCT275-0000					
Performed:	Wed May 29 10:12:35 2019					
Calibrator Value:	1094.2	GAPI				
Background Reading:	55.7	cps				
Calibrator Reading:	1704.2	cps				
Sensitivity:	0.6638	GAPI/cps				
Segmented Cement Bond Log Calibration Report						
Serial Number:	RBT275T_Base					
Tool Model:	RADII-275T					
Calibration Casing Diameter:	9.625	in				
Calibration Depth:	1548.483	ft				
Master Calibration, performed Fri Apr 19 15:03:13 2024:						
	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3'	0.000	0.357	0.000	51.280	143.535	0.000
CAL	0.000	0.662				
5'	0.000	0.391	0.000	51.280	131.281	0.000
SUM						
S1	0.000	0.381	0.000	100.000	262.573	0.000
S2	0.000	0.413	0.000	100.000	242.417	0.000
S3	0.000	0.403	0.000	100.000	247.979	0.000
S4	0.000	0.365	0.000	100.000	273.943	0.000
S5	0.000	0.328	0.000	100.000	304.751	0.000
S6	0.000	0.314	0.000	100.000	318.557	0.000
S7	0.000	0.317	0.000	100.000	314.992	0.000
S8	0.000	0.354	0.000	100.000	282.171	0.000
Internal Reference Calibration, performed (Not Performed):						
	Raw (v)		Calibrated (v)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
CAL	0.000	0.000	0.000	0.662	1.000	0.000
Air Zero Calibration, performed Fri Apr 19 14:41:39 2024:						
	Raw (v)		Calibrated (v)		Results	
	Zero		Zero		Offset	
3'	0.000		0.000		0.000	

5'	0.000	0.000	0.000
SUM			
S1	0.000	0.000	0.000
S2	0.000	0.000	0.000
S3	0.000	0.000	0.000
S4	0.000	0.000	0.000
S5	0.000	0.000	0.000
S6	0.000	0.000	0.000
S7	0.000	0.000	0.000
S8	0.000	0.000	0.000

Temperature Calibration Report

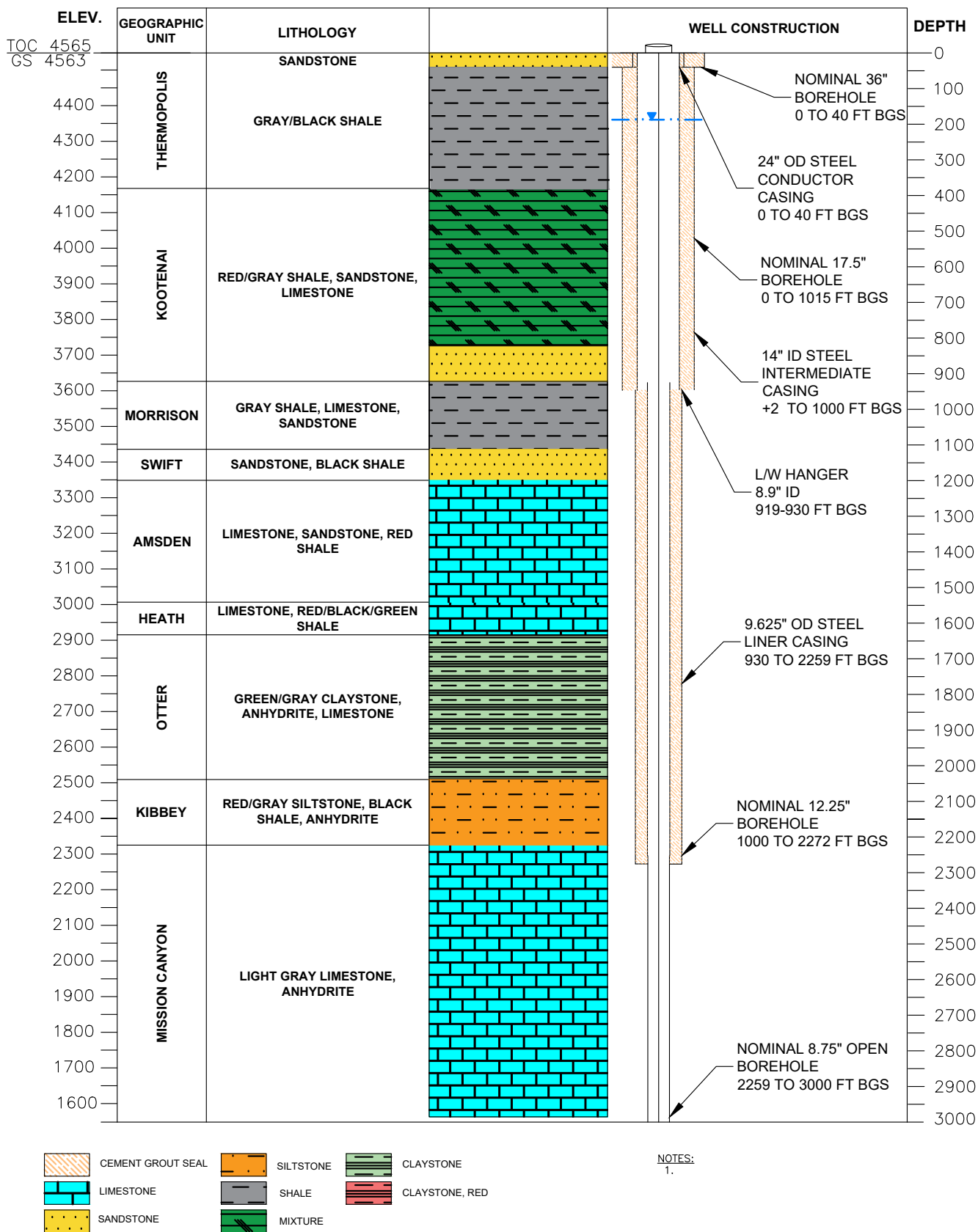
Serial Number:	RBT275T_Base			
Tool Model:	RADII-275T			
Performed:	(Not Performed)			
	Reference		Reading	
Low Reference:	0.00	degF	0.00	degF
High Reference:	1.00	degF	1.00	degF
Gain:	1.00			
Offset:	0.00			
Delta Spacing	1			

Inclinometer Calibration Report

Performed:	(Not Performed)				
	Low Read.	High Read.	Low Ref.	High Ref.	
X Accelerometer	0.00	1.00	0.00	1.00	gee
Y Accelerometer	0.00	1.00	0.00	1.00	gee
Z Accelerometer	0.00	1.00	0.00	1.00	gee

APPENDIX D

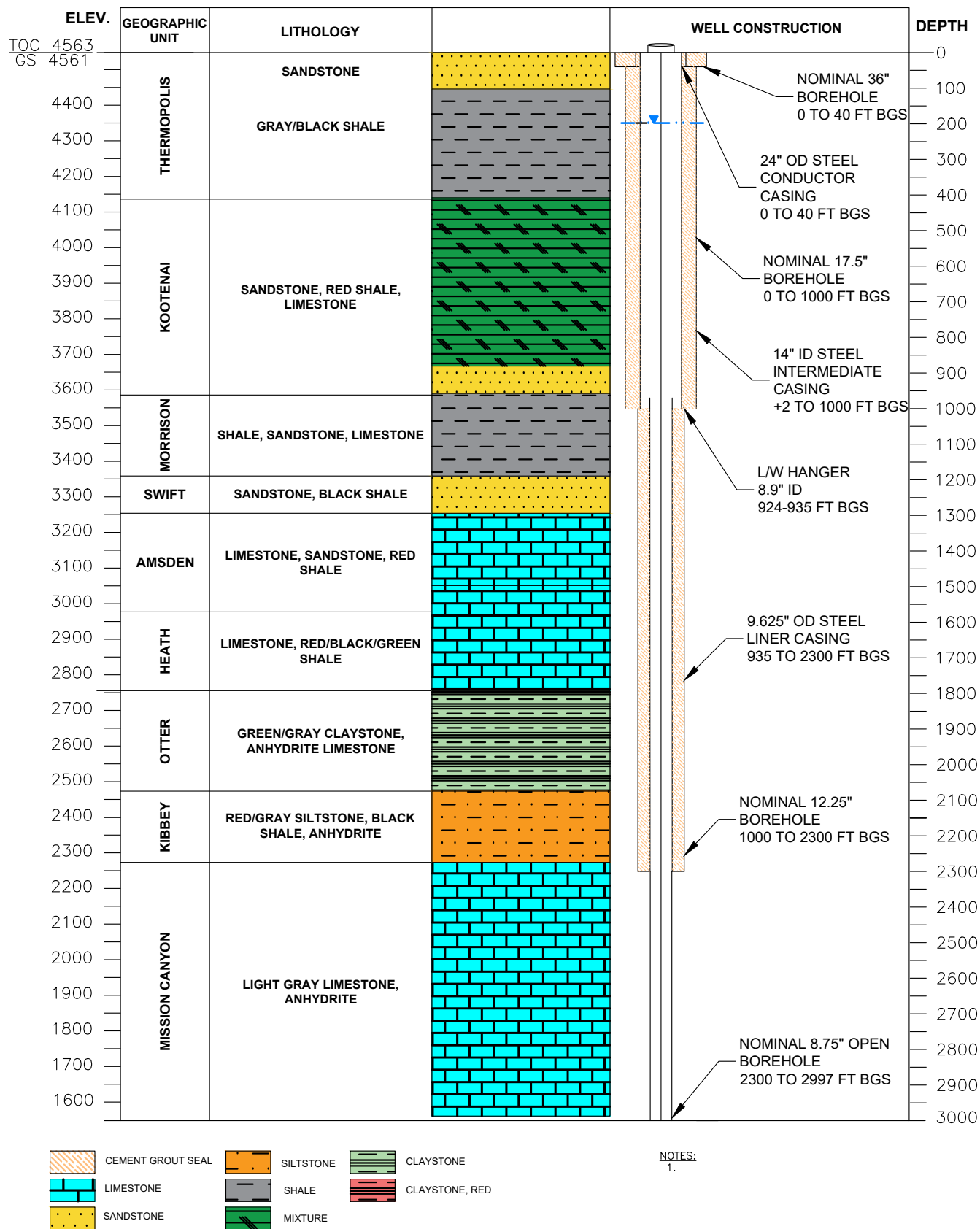
As-Built Well Completion Diagrams



**FIGURE 6 WELL CMRWA 4
COMPLETION DIAGRAM**

CENTRAL MONTANA REGIONAL WATER AUTHORITY
MUSSELSHELL JUDITH RURAL WATER SYSTEM
WELL DIAGRAM





**FIGURE 7 WELL CMRWA 5
COMPLETION DIAGRAM**

CENTRAL MONTANA REGIONAL WATER AUTHORITY
MUSSELSHELL JUDITH RURAL WATER SYSTEM
WELL DIAGRAM



APPENDIX E

Aquifer Test Data

Well 4 & Well 5 CRT Notes

Well Testing Data Record

Job Number

RKY-R-05601

Date

8/25/2024

Page

1

of

Pump Mfg.

Centrlift

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Owner

Musselshells

Well Name

No.

4

Pump Intake Depth

629

ft BTOC

Airline Depth:

611

ft BTOC

Job Name

Testing

Engineer

Great West/ Bruce Lauerman

Tested By:

DH, BG, JO2

Data Logger #:

6

Transducer Depth:

615

ft BTOC

Test Type :

☐ Development

☐ Step Test

☒ 24 Hr Test

☐ Hr Recovery

Flow Meter Make & Size:

Badger 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									VFD	motor						ml	min			
8:50	X	187.9	176.95	442.66	172.34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ENTER STATIC VALUES PRIOR TO STARTING PUMP
9:00	0		#VALUE!	442.66	172.34	0	49				X			#VALUE!			0	#VALUE!	#####	
9:01	1		611		#VALUE!	#####					X			0	34		1	#VALUE!	#####	
9:02	2		611		615	442.66					X			0	34		2	#VALUE!	0	
9:03	3		611		615	442.66					X			0	33		3	#VALUE!	0	
9:04	4	170.5	217.145	420.77	194.23	21.89	49.7	399	483	54	X	1402	5182	5182	33		4	#VALUE!	236.73	
9:05	5	170.3	217.607	420.73	194.27	21.93	49.7				X	1403	6895	1713	33		5	#VALUE!	78.112	
9:06	6	170.1	218.069	420.08	194.92	22.58	49.7				X			-6895	33		6	#VALUE!	-305.4	
9:07	7	170.1	218.069	420.08	194.92	22.58	49.7				X	1400	9868	9868	33		7	#VALUE!	437.02	
9:08	8	169.9	218.531	401.06	213.94	41.6	49.7				X	1401	11215	1347	33		8	#VALUE!	32.38	
9:09	9	169.9	218.531	401.67	213.33	40.99	49.7				X	1401	12201	986	33		9	#VALUE!	24.055	
9:10	10	169.8	218.762	401.37	213.63	41.29	49.7	391.7	480	54.2	X	1397	13554	1353	33	0.1	10	#VALUE!	32.768	
9:12	12	169.7	218.993	401.21	213.79	41.45	49.7				X	1402	16083	1264.5	33	0.1	12	0	30.507	
9:14	14	169.7	218.993	401.26	213.74	41.4	49.7				X	1402	19094	1505.5	33	0.1	14	0	36.365	
9:16	16	169.6	219.224	401.33	213.67	41.33	49.7				X	1401	21984	1445	33	0.2	16	26.415	34.962	
9:18	18	169.5	219.455	401.03	213.97	41.63	49.7				X	1400	24741	1378.5	33	0.2	18	0	33.113	
9:20	20	169.4	219.686	401.26	213.74	41.4	49.7	391.6	477	53.9	X	1400	27540	1399.5	33	0.2	20	0	33.804	
9:25	25	169.3	219.917	401.28	213.72	41.38	49.7				X	1397	34664	1424.8	33	0.2	25	0	34.432	
9:30	30	169.2	220.148	401.08	213.92	41.58	49.7	391.8	477	53.8	X	1396	41526	1372.4	33	0.2	30	0	33.006	
9:35	35	169.2	220.148	400.89	214.11	41.77	49.7				X	1400	48688	1432.4	33	0.2	35	0	34.293	
9:40	40	169.1	220.379	401.14	213.86	41.52	49.7	391.5	474	54.8	X	1400	55599	1382.2	33	0.2	40	0	33.29	
9:50	50	169.1	220.379	400.98	214.02	41.68	49.7	391.6	472	53.9	X	1398	69618	1401.9	33	0.2	50	0	33.635	
10:00	60	169	220.61	400.96	214.04	41.7	49.7	391.9	472	53.8	X	1397	83551	1393.3	33	0.2	60	0	33.412	
10:15	75	168.9	220.841	400.83	214.17	41.83	49.7	391.6	474	53.8	X	1399	104495	1396.267	33	0.2	75	0	33.38	
10:30	90	168.9	220.841	400.85	214.15	41.81	49.7	391.7	475	53.8	X	1399	125569	1404.933	33	0.2	90	0	33.603	
10:45	105	168.8	221.072	400.53	214.47	42.13	49.7	391.5	477	53.8	X	1399	146454	1392.333	33	0.2	105	0	33.049	
11:00	120	168.8	221.072	400.48	214.52	42.18	49.7	391.7	472	54.2	X	1399	167543	1405.933	33	0.25	120	1.761	33.332	
11:30	150	168.8	221.072	400.46	214.54	42.2	49.7	391.7	472	53.6	X	1400	209337	1393.133	33	0.25	150	0	33.013	
12:00	180	168.7	221.303	400.5	214.5	42.16	49.7	391.7	474	53.9	X	1397	251338	1400.033	33	0.3	180	0.8805	33.208	

Well Testing Data Record

Owner

Musselshells

Well Name

No.

4

Job Name

Testing

Engineer

Great West/ Bruce Lauerma

Tested By:

DH, BG, JO2

Date

45529

Page

2

of

Pump Mfg.

Centrlift

Mod

WJJ1000

Pump Intake Depth

629

ft BTOC

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Airline Depth:

611

ft BTOC

Transducer Depth:

615

ft BTOC

Data Logger #:

6

Flow Meter Make & Size:

Badger 8"

Test Type

:

☐ Development

☐ Step Test

☒ 24 Hr Test

☐ Hr Recovery

Job Number

RKY-R-05601

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									VFD	motor						ml	min			
13:00	240	168.6	221.534	400.34	214.66	42.32	49.7	391.5	472	54.2	X	1399	335273	1398.917	33	0.3	240	0	33.056	
14:00	300	168.7	221.303	400.23	214.77	42.43	49.7	391.5	475	54.2	X	1399	419128	1397.583	33	0.35	300	0.44025	32.939	
15:00	360	168.3	222.227	400.18	214.82	42.48	49.7	391.6	475	53.9	X	1397	503301	1402.883	33	0.35	360	0	33.025	
17:00	480	168.1	222.689	400.21	214.79	42.45	49.7	391.7	469	53.8	X	1399	671306	1400.042	33	0.35	480	0	32.981	
19:00	600	168	222.92	400.21	214.79	42.45	49.7	391.7	475	53.6	X	1400	842070	1423.033	33	0.4	600	0.220125	33.523	
21:00	720	167.8	223.382	400.09	214.91	42.57	49.7	391.6	474	53.8	X	1398	1006760	1372.417	33	0.4	720	0	32.239	
23:00	840	167.6	223.844	399.93	215.07	42.73	49.7	391.6	475	53.9	X	1400	1174975	1401.792	33	0.4	840	0	32.806	
1:00	960	167.8	223.382	399.59	215.41	43.07	49.7	391.6	472	53.6	X	1396	1342218	1393.692	33	0.4	960	0	32.359	8/26/2024
3:00	1080	167.5	224.075	399.54	215.46	43.12	49.7	391.9	477	54.1	X	1399	1510080	1398.85	33	0.4	1080	0	32.441	
5:00	1200	167.7	223.613	399.38	215.62	43.28	49.7	391.5	472	53.6	X	142	1677910	1398.583	33	0.4	1200	0	32.315	
7:00	1320	167.4	224.306	399.22	215.78	43.44	49.7	391.6	472	53.6	X	1398	1845750	1398.667	33	0.4	1320	0	32.198	
9:00	1440	167.3	224.537	399.15	215.85	43.51	49.7	391	473	53.8	X	1400	2013550	1398.333	33	0.5	1440	0.44025	32.138	1398.2 avg gpm for 1440 min
9:15	1455	167.1	224.999	399.22	215.78	43.44	X	X	X	X	X	1400	2034866	1421.067	33	0.5		0	32.713	
Stop	Pump																			
9:25	10	187.7	177.413	444.54	170.46	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9:35	20	187.8	177.182	445.16	169.84	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9:45	30	187.8	177.182	445.43	169.57	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9:55	40	188.3	176.027	445.57	169.43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10:05	50	188.4	175.796	445.73	169.27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10:15	60	188.4	175.796	445.75	169.25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Well Testing Data Record

Owner

Musselshells

Well Name

Madison

No.

4

Job Name

testing

Engineer

Great West/ Bruce Lauerman

Date

6/7/2024

Page

1

of

Test Type

: () Development () Step Test (X) 72

Hr Test

()

Hr Recovery

Job Number

Pump Mfg.

Baker Hughes

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Pump Intake Depth

757

ft BTOC

Airline Depth:

739.5

ft BTOC

Tested By:

DH, BG, JO2

Data Logger #:

5

Transducer Depth:

745

ft BTOC

Flow Meter Make & Size:

McCrometer 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									A	B	C					ml	min			
7:20	X	240.4	184.17	568.67	176.33	0	0	0	0	0	0	0	41358297	0	0	0	0	0	0	ENTER STATIC VALUES PRIOR TO STARTING PUMP
8:00	0	240.4	184.176	586.61	158.39	-17.94								#VALUE!		0	0	#DIV/0!	#####	
8:01	1	223.4	223.446	527.14	217.86	41.53	50							0	58		1	#VALUE!	0	
8:02	2	215.4	241.926	512.03	232.97	56.64						1409	41360750	41360750	68		2	#VALUE!	730239	
8:03	3	211	252.09	499.56	245.44	69.11						1409	41362207	1457	68		3	#VALUE!	21.082	
8:04	4	208.1	258.789	493.56	251.44	75.11						1402	41364532	2325	68		4	#VALUE!	30.955	
8:05	5	205.6	264.564	486.66	258.34	82.01						1394	41365059	527	68		5	#VALUE!	6.426	
8:06	6	202.6	271.494	480.15	264.85	88.52						1390	41366331	1272	67		6	#VALUE!	14.37	
8:07	7	200.4	276.576	474.74	270.26	93.93						1386	41367710	1379	67		7	#VALUE!	14.681	
8:08	8	198.4	281.196	470.43	274.57	98.24						1388	41369128	1418	63		8	#VALUE!	14.434	
8:09	9	196.7	285.123	460.35	284.65	108.32						1397	41370588	1460	63		9	#VALUE!	13.479	
8:10	10	195.4	288.126	462.79	282.21	105.88						1381	41371909	1321	63	0.1	10	5.283	12.476	
8:12	12	192.6	294.594	456.47	288.53	112.2	50.3					1382	41373545	818	60	0.1	12	4.4025	7.2906	
8:14	14	188.5	304.065	451.06	293.94	117.61						1398	41377468	1961.5	57	0.1	14	3.773571	16.678	
8:16	16	188.5	304.065	447.23	297.77	121.44						1401	41380263	1397.5	54	0.1	16	3.301875	11.508	
8:18	18	187.1	307.299	444.18	300.82	124.49						1402	41383067	1402	53	0.1	18	2.935	11.262	
8:20	20	186	309.84	440.86	304.14	127.81						1399	41385895	1414	53	0.1	20	2.6415	11.063	
8:25	25	183.7	315.153	436.11	308.89	132.56						1399	41392807	1382.4	52	0.1	25	2.1132	10.428	
8:30	30	182	319.08	432.44	312.56	136.23						1396	41399815	1401.6	51	0.1	30	1.761	10.288	
8:35	35	180.9	321.621	430.49	314.51	138.18	50.3	396.6	501.1	56.9		1396	41406920	1421	51	0.1	35	1.509429	10.284	
8:40	40	179.9	323.931	428.04	316.96	140.63	50.3	396.5	51	56.7		1406	41413786	1373.2	43	0.1	40	1.32075	9.7646	
8:50	50	178	328.32	429.95	315.05	138.72	50.3	396.7	501	56.9		1403	41427850	1406.4	42	0.1	50	1.0566	10.138	
9:00	60	176.9	330.861	422.86	322.14	145.81	50.3	396.6	503	57.1		1403	41441879	1402.9	42	0.2	60	1.761	9.6214	
9:15	75	175.6	333.864	421.19	323.81	147.48	50.3	396.4	504	57.2		1401	41462837	1397.2	42	0.2	75	1.4088	9.4738	
9:30	90	174.1	337.329	420.36	324.64	148.31	50.3	396.3	506	57.4		1399	41484081	1416.267	42	0.2	90	1.174	9.5494	transferred to front gen. only.
9:45	105	172.8	340.332	419.38	325.62	149.29	50.3	396.3	507	57.9		1398	41504991	1394	42	0.2	105	1.006286	9.3375	
10:00	120	171.6	343.104	418.8	326.2	149.87	50.3	396.6	501	57.1		1399	41525937	1396.4	42	0.2	120	0.8805	9.3174	
10:30	150	169.1	348.879	417.07	327.93	151.6	50.3	396.3	501	56.2		1399	41567850	1397.1	42	0.2	150	0.7044	9.2157	
11:00	180	166.7	354.423	417.5	327.5	151.17	50.3	396.4	501	56.2		1398	41609165	1377.167	42	0.2	180	0.587	9.1101	

Well Testing Data Record

Owner

Musselshells

Well Name

Madison

No.

4

Job Name

testing

Engineer

Great West/ Bruce Lauerman

Date

45450

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of

Job Number

Pump Mfg.

Baker Hughes

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Pump Intake Depth

757

ft

BTOC

Airline Depth:

739.5

ft

BTOC

Tested By:

DH, BG, JO2

Data Logger #:

5

Transducer Depth:

745

ft

BTOC

Test Type :

() Development

() Step Test

(X) 72

Hr Test

()

Hr Recovery

Flow Meter Make & Size:

McCrometer 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									A	B	C					ml	min			
11:30	210	164.4	359.736	417.11	327.89	151.56	50.3	396.9	504	57.1		1395	41651862	1423.233	42	0.2	210	0.503143	9.3906	
12:00	240	162.2	364.818	416.69	328.31	151.98	50.3	396.6	500	56.7		1394	41693554	1389.733	42	0.2	240	0.44025	9.1442	12:30- Judith Gap Oil filled both tanks. Transferred to rear gen, fuel gauge for front is inop.
13:00	300	157.7	375.213	416.42	328.58	152.25	50.3	396.6	506	57.2		1392	41777259	1395.083	42	0.3	300	0.5283	9.1631	fuel: 101% 477 gal
14:00	360	153	386.07	415.9	329.1	152.77	50.4	396.6	506	57.2		1399	41861040	1396.35	31	0.3	360	0.44025	9.1402	fuel: 460gal
15:00	420	148.8	395.772	413.6	331.4	155.07	50.4	396.6	506	57.2		1396	41944964	1398.733	31	0.3	420	0.377357	9.02	fuel: 460gal
16:00	480	144.7	405.243	413.5	331.5	155.17	50.4	397.2	501	56.9		1397	42028694	1395.5	31	0.3	480	0.330188	8.9934	fuel: 436
17:00	540	140.6	414.714	413.49	331.51	155.18	50.4	397	503	57.5		1399	42112603	1398.483	31	0.3	540	0.2935	9.012	fuel: 420gal
18:00	600	136.6	423.954	413.46	331.54	155.21	50.4	397.5	500	57.2		1400	42196734	1402.183	31	0.3	600	0.26415	9.0341	fuel: 394gal
20:00	720	128.6	442.434	413.58	331.42	155.09	50.4	397.2	503	57.1		1404	42366041	1410.892	31	0.4	720	0.2935	9.0972	fuel: 378gal.
22:00	840	121.1	459.759	413.69	331.31	154.98	50.4	397.3	507	56.9		1411	42534381	1402.833	31	0.4	840	0.251571	9.0517	fuel: 345gal
0:00	960	172.3	341.487	413.37	331.63	155.3	50.4	397	501	56.9		1411	42703648	1410.558	31	0.4	960	0.220125	9.0828	fuel: 295gal. Started purging airline 5 min prior to recording info.
2:00	1080	172.5	341.025	413.51	331.49	155.16	50.4	397.3	498	56.5		1409	42872489	1407.008	31	0.4	1080	0.195667	9.0681	
4:00	1204	172.2	341.718	413.39	331.61	155.28	50.4	397.4	504	57.2		1410	43047485	1411.258	31	0.5	1204	0.219394	9.0885	
6:00	1320	171.9	342.411	413.58	331.42	155.09	50.4	397.4	509	57.2		1410	43211344	1412.578	31	0.5	1320	0.200114	9.1081	fuel: 147gal
8:00	1440	173.8	338.022	413.67	331.33	155	50.4	397.4	501	56.9		1404	43380437	1409.108	31	0.5	1440	0.183438	9.091	07:00: fuel; 205gal after adding 58 gal from slip tank
10:00	1560	172.9	340.101	413.67	331.33	155	50.4	397	503	57.1		1404	43549002	1404.708	31	0.5	1560	0.169327	9.0626	fuel: 114gal, flashing warning, switched over to front generator with no apparent issues.
12:00	1680	174	337.56	413.49	331.51	155.18	50.4	397.5	506	57.4		1405	43716448	1395.383	31	0.5	1680	0.157232	8.992	fuel gauge not working for front generator, math worked out on rear gen to safely run for 22 hours, with ~5hr "buffer"
14:00	1800	174.2	337.098	413.81	331.19	154.86	50.4	397.1	506	57.4		1399	43884208	1398	31	0.5	1800	0.14675	9.0275	
16:00	1920	173.9	337.791	413.67	331.33	155	50.4	397.2	504	57.2		1401	44052382	1401.45	31	0.6	1920	0.165094	9.0416	
18:00	2040	174	337.56	414.04	330.96	154.63	50.4	397.1	498	56.4		1403	44220840	1403.817	31	0.6	2040	0.155382	9.0786	
20:00	2160	174.2	337.098	413.92	331.08	154.75	50.4	397.1	503	57.1		1401	44388781	1399.508	31	0.6	2160	0.14675	9.0437	
22:00	2280	174.3	336.867	413.92	331.08	154.75	50.4	397.2	498	56.5		1410	44557970	1409.908	31	0.6	2280	0.139026	9.1109	
0:00	2400	172.5	341.025	413.9	331.1	154.77	50.4	397.3	503	57.1		1410	44727125	1409.625	31	0.6	2400	0.132075	9.1079	
2:00	2520	172	342.18	414.2	330.8	154.47	50.4	397.2	503	57.1		1409	44896383	1410.483	31	0.6	2520	0.125786	9.1311	
4:00	2640	174.3	336.867	414.22	330.78	154.45	50.4	397.1	497	56.4		1410	45065638	1410.458	32	0.6	2640	0.120068	9.1321	
6:00	2760	174.4	336.636	414.29	330.71	154.38	50.4	397.2	498	56.5		1410	45234628	1408.25	32	0.6	2760	0.114848	9.122	
8:00	2880	174.4	336.636	414.52	330.48	154.15	50.4	397.1	504	57.2		1407	45403654	1408.55	32	0.6	2880	0.110063	9.1375	
10:00	3000	174.2	337.098	414.15	330.85	154.52	51.4	397.1	504	57.2		1403	45572178	1404.367	31	0.7	3000	0.12327	9.0886	
12:00	3120	167	353.73	414.38	330.62	154.29	52.4	397.1	506	57.4		1399	45742110	1416.1	31	0.7	3120	0.118529	9.1782	switched back to rear generator.

Well Testing Data Record

Owner

Musselshells

Well Name

No.

5

Job Name

Testing

Engineer

Great West/ Bruce Lauerman

Tested By:

DH, BG, JO2

Date

8/15/2024

Page

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of

4

Job Number

Pump Mfg.

Centrlift

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Pump Intake Depth

629

ft BTOC

Airline Depth:

611

ft BTOC

Transducer Depth:

615

ft BTOC

Test Type :

☐ Development

☒ Step Test

☐ Hr Test

☐ Hr Recovery

Flow Meter Make & Size:

Badger 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									A	B	C					ml	min			
7:45	X	188.1	176.49	442.61	172.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ENTER STATIC VALUES PRIOR TO STARTING PUMP
8:00	0		#VALUE!		#VALUE!	#####	34							#VALUE!		0	0	#DIV/0!	#####	Target 800gpm.
8:01	1		611		#VALUE!	#####							627	627		0	1	0	#####	
8:02	2		611		615	442.61							1457	830		0	2	0	1.8752	
8:03	3		611		615	442.61							2167	710		0	3	0	1.6041	
8:04	4		611		615	442.61							3086	919		0.1	4	52.83	2.0763	
8:05	5		611		615	442.61	34	268	324	37		792	3751	665		0.1	5	0	1.5025	
8:06	6		611		615	442.61							4544	793		0.1	6	0	1.7916	
8:07	7		611		615	442.61							5336	792		0.1	7	0	1.7894	
8:08	8		611		615	442.61							6136	800		0.1	8	0	1.8075	
8:09	9		611		615	442.61							6935	799		0.1	9	0	1.8052	
8:10	10	148.6	267.734	350.6	264.4	92.01							7732	797		0.1	10	0	8.6621	
8:12	12		611		615	442.61							9419	843.5		0.1	12	0	1.9057	
8:14	14	148	269.12	349.16	265.84	93.45						795	10919	750	38	0.2	14	26.415	8.0257	
8:16	16	147.9	269.351	348.93	266.07	93.68						795	12602	841.5	38	0.2	16	0	8.9827	
8:18	18	147.9	269.351	348.7	266.3	93.91						795	14088	743	38	0.2	18	0	7.9118	
8:20	20	147.7	269.813	348.54	266.46	94.07						795	15770	841	38	0.2	20	0	8.9402	
8:25	25	147.5	270.275	348.22	266.78	94.39						793	19688	783.6	38	0.2	25	0	8.3017	8:27; open valve to 32psi back press. 802gpm
8:30	30	146.8	271.892	346.71	268.29	95.9	34	268.1	315	35.7		800	23635	789.4	34	0.2	30	0	8.2315	
8:35	35	146.7	272.123	346.53	268.47	96.08						801	27644	801.8	34	0.2	35	0	8.3451	
8:40	40	146.5	272.585	346.43	268.57	96.18	34	268	313	35.2		799	31648	800.8	34	0.2	40	0	8.3261	
8:50	50	146.4	272.816	346.11	268.89	96.5	34	268	313	35.2		800	39658	801	38	0.2	50	0	8.3005	
9:00	60	146.3	273.047	345.84	269.16	96.77	34	268	313	35.2		799	47638	798	33	0.2	60	0	8.2464	
9:10	70	146.2	273.278	345.68	269.32	96.93	34	268	310	35.2		800	55643	800.5	33	0.2	70	0	8.2585	
9:15	75	146.2	273.278	345.65	269.35	96.96	34	268	310	35.2		800	59656	802.6	33	0.2	75	0	8.2776	
9:30	90	146.2	273.278	345.63	269.37	96.98	34	268	312	35.4		800	71631	798.3333	32	0.2	90	0	8.2319	
9:45	105	146	273.74	345.36	269.64	97.25	34	268	314	35.6		798	83630	799.9333	32	0.2	105	0	8.2255	
10:00	120	146	273.74	341.87	273.13	100.74	34	268	316	35.8		800	95601	798.0667	32	0.2	120	0	7.922	
			611		615	442.61							95601	0			0	#VALUE!	0	

Well Testing Data Record

Owner

Musselshells

Well Name

No.

5

Job Name

Testing

Engineer

Great West/ Bruce Lauerma

Date

45519

Page

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of

4

Pump Mfg.

Centrlift

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Pump Intake Depth

629

ft BTOC

Airline Depth:

611

ft BTOC

Tested By:

DH, BG, JO2

Data Logger #:

6

Transducer Depth:

615

ft BTOC

Test Type :

☐ Development

☒ Step Test

☐ Hr Test

☐ Hr Recovery

Flow Meter Make & Size:

Badger 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									A	B	C					ml	min			
10:00	120	146	273.74	341.87	273.13	100.74							95601	0		0.2	120	#VALUE!	0	
10:01	121	135	299.15	317.84	297.16	124.77							96676	1075		0.2	121	0	8.6159	
10:02	122	132.7	304.463	313.28	301.72	129.33							97693	1017		0.2	122	0	7.8636	
10:03	123	131.5	307.235	311.24	303.76	131.37							98641	948		0.2	123	0	7.2163	
10:04	124	131	308.39	309.8	305.2	132.81							99575	934		0.2	124	0	7.0326	
10:05	125	130.6	309.314	309.11	305.89	133.5							100591	1016		0.2	125	0	7.6105	
10:06	126	130.4	309.776	308.52	306.48	134.09							101722	1131		0.2	126	0	8.4346	
10:07	127	130.2	310.238	308.17	306.83	134.44							102589	867		0.2	127	0	6.449	
10:08	128	130.1	310.469	307.85	307.15	134.76							103570	981		0.2	128	0	7.2796	
10:09	129	129.9	310.931	307.74	307.26	134.87							104567	997		0.2	129	0	7.3923	
10:10	130	129.9	310.931	307.58	307.42	135.03						997	105567	1000	58	0.2	130	0	7.4058	
10:12	132	129.9	310.931	307.23	307.77	135.38						995	107560	996.5	58	0.2	132	0	7.3608	
10:14	134	129.8	311.162	307.27	307.73	135.34						994	109588	1014	58	0.2	134	0	7.4922	
10:16	136	129.8	311.162	307.1	307.9	135.51						995	111534	973	58	0.2	136	0	7.1803	
10:18	138	129.7	311.393	307	308	135.61						996	113525	995.5	58	0.2	138	0	7.3409	
10:20	140	129.5	311.855	306.58	308.42	136.03	41	323	368	44		999	115522	998.5	58	0.2	140	0	7.3403	
10:25	145	129.4	312.086	306.27	308.73	136.34						998	120548	1005.2	57	0.2	145	0	7.3727	
10:30	150	129.4	312.086	306.06	308.94	136.55	41	323	390	44.2		997	125494	989.2	57	0.2	150	0	7.2442	
10:35	155	129.3	312.317	306.16	308.84	136.45						998	130689	1039	57	0.2	155	0	7.6145	
10:40	160	129.3	312.317	306.04	308.96	136.57	41	323	388	44		996	135478	957.8	57	0.2	160	0	7.0133	
10:50	170	129.2	312.548	305.79	309.21	136.82	41	323.2	387	43.9		999	145695	1021.7	56	0.2	170	0	7.4675	
11:00	180	129.2	312.548	305.51	309.49	137.1	41	323.2	387	43.9		998	155442	974.7	56	0.2	180	0	7.1094	
11:15	195	129.1	312.779	305.58	309.42	137.03	41	323.1	385	43.7		998	170430	999.2	56	0.2	195	0	7.2918	
11:30	210	129.2	312.548	305.58	309.42	137.03	41	323.3	385	43.7		1000	185402	998.1333	56	0.2	210	0	7.284	
11:45	225	129.2	312.548	305.63	309.37	136.98							200412	1000.667	56	0.2	225	0	7.3052	
12:00	240		611		615	442.61							215720	1020.533			240	#VALUE!	2.3057	
			611		615	442.61								898.8333			0	#VALUE!	2.0308	
			611		615	442.61								#DIV/0!			0	#VALUE!	#####	
			611		615	442.61							215720	#DIV/0!			0	#VALUE!	#####	

Well Testing Data Record

Job Number

RKY-R-05601

Date

8/17/2024

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of

Pump Mfg.

Centrlift

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Owner

Musselshells

Well Name

No.

5

Pump Intake Depth

629

ft BTOC

Airline Depth:

611

ft BTOC

Job Name

Testing

Engineer

Great West/ Bruce Lauerman

Tested By:

DH, BG, JO2

Data Logger #:

6

Transducer Depth:

615

ft BTOC

Test Type

:

()

Development

Step Test

X

72

Hr Test

()

Hr Recovery

Flow Meter Make & Size:

Badger 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									VFD	motor						ml	min			
7:57	X	188.4	175.79	443.9	171.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ENTER STATIC VALUES PRIOR TO STARTING PUMP
8:00	0	188.3	176.027	443.3	171.7	0.6	X	X	X	X	X	X	start pump	X	X	0	0	X	#####	data logger #5 in well 4.
8:01	1	X	X	X	X	X	50	X	X	X	X	1394	X	X	X	0	1	0	#####	
8:02	2	X	X	X	X	X	X	X	X	X	X	1400	X	#VALUE!	X	0	2	0	#####	
8:03	3	102	375.38	248	367	195.9	51.5	X	X	X	X	1385	3710	#VALUE!	24	0	3	0	#####	
8:04	4	X	X	X	X	X	X	X	X	X	X	1396	6261	2551	24	0	4	0	#####	
8:05	5	100.1	379.769	235.59	379.41	208.31	X	X	X	X	X	1398	6714	453	24	0	5	0	2.1746	
8:06	6	99.1	382.079	234.29	380.71	209.61	X	X	X	X	X	1400	7969	1255	24	0	6	0	5.9873	
8:07	7	98.1	384.389	231.9	383.1	212	X	X	X	X	X	1389	9451	1482	24	0	7	0	6.9906	
8:08	8	97.1	386.699	229.4	385.6	214.5	X	X	X	X	X	1387	10779	1328	24	0	8	0	6.1911	
8:09	9	96.3	388.547	228.37	386.63	215.53	X	X	X	X	X	1386	12052	1273	24	0	9	0	5.9064	
8:10	10	95.9	389.471	227.25	387.75	216.65	51.5	406.9	517	58.7	X	1394	13537	1485	24	0	10	0	6.8544	
8:12	12	94.5	392.705	223.2	391.8	220.7	52	X	530	60	X	1394	16823	1643	24	0	12	0	7.4445	
8:14	14	93.3	395.477	221.55	393.45	222.35	X	X	X	X	X	1399	19044	1110.5	24	0	14	0	4.9944	
8:16	16	92.8	396.632	220.4	394.6	223.5	X	X	X	X	X	1400	21846	1401	24	0	16	0	6.2685	
8:18	18	92.5	397.325	219.53	395.47	224.37	X	X	X	X	X	1399	24645	1399.5	24	0	18	0	6.2375	
8:20	20	92.1	398.249	218.6	396.4	225.3	52	409.8	529	60	X	1400	27449	1402	24	0	20	0	6.2228	
8:25	25	91.6	399.404	217.63	397.37	226.27	X	X	X	X	X	1400	34733	1456.8	24	0	25	0	6.4383	
8:30	30	91.2	400.328	217.13	397.87	226.77	51.5	409.6	517	58.7	X	1396	41399	1333.2	24	0	30	0	5.8791	
8:35	35	91	400.79	216.58	398.42	227.32	X	X	X	X	X	1398	48464	1413	24	0	35	0	6.2159	
8:40	40	90.8	401.252	216	399	227.9	51.9	409	524	54.5	X	1397	55409	1389	24	0	40	0	6.0948	
8:50	50	90.4	402.176	215.45	399.55	228.45	51.9	410	517	58.7	X	1397	69322	1391.3	24	0	50	0	6.0902	
9:00	60	90.3	402.407	215.11	399.89	228.79	51.9	409.8	523	59.4	X	1397	83233	1391.1	24	0	60	0	6.0802	
9:15	75	90	403.1	214.72	400.28	229.18	51.9	410	518	58.9	X	1396	97321	939.2	24	0	75	0	4.0981	
9:30	90	89.9	403.331	213.99	401.01	229.91	51.9	409.9	527	58.8	X	1396	118621	1420	24	0	90	0	6.1763	
9:45	105	89.7	403.793	213.17	401.83	230.73	51.9	409.8	518	60.5	X	1394	146226	1840.333	24	0	105	0	7.9761	
10:00	120	89.7	403.793	213.83	401.17	230.07	52.4	410	529	60	X	1391	167089	1390.867	24	0	120	0	6.0454	
10:30	150	88	407.72	210.09	404.91	233.81	52.4	413.9	529	60	X	1408	209300	1407.033	24	0	150	0	6.0178	
11:00	180	88.1	407.489	209.82	405.18	234.08	52.4	413.7	533	60.5	X	1409	251710	1413.667	24	0	180	0	6.0392	

Well Testing Data Record

Job Number

RKY-R-05601

Date

8/17/2024

Page

2

of

Pump Mfg.

Centrlift

Mod

WJJ1000

Stgs

10

HP

600

Volts

4160

Max Amps

754/87

Owner

Musselshells

Well Name

No.

5

Pump Intake Depth

629

ft BTOC

Airline Depth:

611

ft BTOC

Job Name

Testing

Engineer

Great West/ Bruce Lauerman

Tested By:

DH, BG, JO2

Data Logger #:

6

Transducer Depth:

615

ft BTOC

Test Type

:

Development

0 Step Test

X

72

Hr Test

Hr Recovery

Flow Meter Make & Size:

Badger 8"

Clock Time	Elapsed Time	Airline PSI	Airline PWL	Hermit ft.above	Hermit PWL	Draw Down	HZ	Volts	Amps			GPM	Total Gallons Pumped	AVG GPM	PSI	Sand		Sand ppm	Spec Cap	Comments & additional Data
									VFD	motor						ml	min			
11:30	210	87.9	407.951	209.63	405.37	234.27	52.4	413.6	535	60.7	X	1410	293972	1408.733	24	0.1	210	0.251571	6.0133	
12:00	240	87.9	407.951	209.71	405.29	234.19	52.4	413	535	60.7	X	1411	336200	1407.6	24	0.1	240	0.220125	6.0105	
13:00	300	88	407.72	209.38	405.62	234.52	52.4	413	532	60.4	X	1410	420808	1410.133	24	0.1	300	0.1761	6.0128	
14:00	360	88	407.72	209.63	405.37	234.27	52.4	413.4	532	60.4	X	1409	505348	1409	24	0.1	360	0.14675	6.0144	
15:00	420	88	407.72	209.7	405.3	234.2	52.4	413.4	532	60.4	X	1411	589991	1410.717	24	0.1	420	0.125786	6.0236	
16:00	480	88	407.72	209.45	405.55	234.45	52.4	413.4	532	60.4	X	1410	674432	1407.35	24	0.1	480	0.110063	6.0028	
17:00	540	88	407.72	209.54	405.46	234.36	52.4	413.8	527	59.8	X	1410	759211	1412.983	24	0.1	540	0.097833	6.0291	Judith Gap fuel on site, topped off gen. 17.5 hr run
18:00	600	88	407.72	209.23	405.77	234.67	52.4	413.8	535	60.4	X	1410	843666	1407.583	24	0.1	600	0.08805	5.9981	time so far, 320 gal= 18 gal/hr
19:00	660	89.8	403.562	209.86	405.14	234.04	52.4	413.6	535	60.7	X	1408	928291	1410.417	24	0.1	660	0.080045	6.0264	
20:00	720	87	410.03	209.63	405.37	234.27	52.4	413	530	60.1	X	1404	1012742	1407.517	24	0.15	720	0.110063	6.0081	
22:00	840	87.4	409.106	209.91	405.09	233.99	52.4	413.4	533	60.5	X	1408	1181206	1403.867	24	0.15	840	0.094339	5.9997	
0:00	960	87.3	409.337	209.91	405.09	233.99	52.4	413.7	530	60.1	X	1408	1350899	1414.108	24	0.15	960	0.082547	6.0435	8/18/2024
2:00	1080	87.3	409.337	209.98	405.02	233.92	52.4	413.5	532	60.4	X	1410	1520008	1409.242	24	0.2	1080	0.097833	6.0245	
4:00	1200	87.3	409.337	209.89	405.11	234.01	52.4	414	530	60.1	X	1412	1689140	1409.433	24	0.2	1200	0.08805	6.023	
6:00	1320	87.3	409.337	209.95	405.05	233.95	52.4	414	535	60.7	X	1409	1858306	1409.717	24	0.2	1320	0.080045	6.0257	
8:00	1440	87.4	409.106	210.14	404.86	233.76	52.4	413.8	533	60.5	X	1410	2027388	1409.017	24	0.2	1440	0.073375	6.0276	1407.9 avg. gpm. at 1440 min.
10:00	1560	87.6	408.644	210.14	404.86	233.76	52.4	414.2	533	60.5	X	1408	2196436	1408.733	24	0.2	1560	0.067731	6.0264	
12:00	1680	87.7	408.413	210.09	404.91	233.81	52.4	413.8	533	60.5	X	1408	2365547	1409.258	24	0.2	1680	0.062893	6.0274	well 4- m-scope: 164.59, transducer: 333.83
14:00	1800	87.4	409.106	210.09	404.91	233.81	52.4	413.8	538	60.4	X	1409	2534517	1408.083	24	0.2	1800	0.0587	6.0223	
16:00	1920	86.8	410.492	210.27	404.73	233.63	52.4	413.4	532	60.4	X	1405	2703571	1408.783	24	0.25	1920	0.068789	6.03	
18:00	2040	86.1	412.109	210.1	404.9	233.8	52.4	413.8	533	60.5	X	1410	2872640	1408.908	24	0.3	2040	0.077691	6.0261	
20:00	2160	85.1	414.419	210.14	404.86	233.76	52.4	413.6	529	60.9	X	1410	3041859	1410.158	24	0.3	2160	0.073375	6.0325	
22:00	2280	84.6	415.574	210.23	404.77	233.67	52.4	413.9	537	60.9	X	1409	3210858	1408.325	24	0.3	2280	0.069513	6.027	well 4- m-scope: 164.58, transducer: 333.88
0:00	2400	84.2	416.498	210.16	404.84	233.74	52.4	413.6	537	60.9	X	407	3379982	1409.367	24	0.3	2400	0.066038	6.0296	8/19/2024
2:00	2520	83.5	418.115	210.07	404.93	233.83	52.4	413.9	530	60.1	X	1407	3549053	1408.925	24	0.3	2520	0.062893	6.0254	
4:00	2640	83	419.27	209.95	405.05	233.95	52.4	413.4	533	60.5	X	1406	3718067	1408.45	24	0.3	2640	0.060034	6.0203	
6:00	2760	82.6	420.194	210.21	404.79	233.69	52.4	414.2	532	60.4	X	1408	3887214	1409.558	24	0.3	2760	0.057424	6.0317	
8:00	2880	82.3	420.887	210.37	404.63	233.53	52.4	413.9	532	60.1	X	1408.9	4056279	1408.875	24	0.35	2880	0.064203	6.033	1408.43 avg. gpm at 2880 min
10:00	3000	81.9	421.811	210.37	404.63	233.53	52.4	413.8	529	60	X	1411	4225417	1409.483	24	0.35	3000	0.061635	6.0356	08:43: WELL 4- 164.52, 333.76. log may show a change, pulled transducer up to check operation after recording.

Well 4 & Well 5 Aqtesolv

Data Set: C:\Users\william.craig\Desktop\GWE\CM\cmrwa well 4 pump.aqt
Date: 02/14/25
Time: 14:59:36

PROJECT INFORMATION

Company: GWE
Client: CMRWA
Location: UVet Well Field
Test Date: 8/25/2024
Test Well: CMRWA Well 5

AQUIFER DATA

Saturated Thickness: 700. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: CMRWA 4

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.4 ft
Well Radius: 0.365 ft

Fully Penetrating Well

No. of pumping periods: 38

Pumping Period Data			
Time (min)	Rate (gal/min)	Time (min)	Rate (gal/min)
0.	0.	75.	1399.
0.	0.	90.	1399.
4.	1402.	105.	1399.
5.	1403.	120.	1399.
7.	1400.	150.	1400.
8.	1401.	180.	1397.
9.	1401.	240.	1399.
10.	1397.	300.	1399.
12.	1402.	360.	1397.
14.	1402.	480.	1399.
16.	1401.	600.	1400.
18.	1400.	720.	1398.
20.	1400.	840.	1400.
25.	1397.	960.	1396.
30.	1396.	1080.	1399.
35.	1400.	1200.	1402.
40.	1400.	1320.	1398.
50.	1398.	1440.	1400.
60.	1397.	1455.	1400.

OBSERVATION WELL DATA

No. of observation wells: 3

Observation Well No. 1: CMRWA 4

X Location: 0. ft
Y Location: 0. ft

Radial distance from CMRWA 4: 0. ft

Fully Penetrating Well

No. of Observations: 43

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
4.	21.89	150.	42.2
5.	21.93	180.	42.16
6.	22.58	240.	42.32
7.	22.58	300.	42.43
8.	41.6	360.	42.48
9.	40.99	480.	42.45
10.	41.29	600.	42.45
12.	41.45	720.	42.57
14.	41.4	840.	42.73
16.	41.33	960.	43.07
18.	41.63	1080.	43.12
20.	41.4	1200.	43.28
25.	41.38	1320.	43.44
30.	41.58	1440.	43.51
35.	41.77	1455.	43.44
40.	41.52	1465.	-1.88
50.	41.68	1475.	-2.5
60.	41.7	1485.	-2.77
75.	41.83	1495.	-2.91
90.	41.81	1505.	-3.07
105.	42.13	1515.	-3.09
120.	42.18		

Observation Well No. 2: CMRWA Well 5

X Location: -5400. ft

Y Location: 0. ft

Radial distance from CMRWA 4: 5400. ft

Fully Penetrating Well

No. of Observations: 62

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
4.	0.05	720.	0.78
5.	0.07	840.	0.85
6.	0.07	960.	0.94
7.	0.05	1080.	0.92
8.	0.03	1200.	0.97
9.	0.07	1320.	0.99
10.	0.05	1440.	1.03
12.	0.05	1560.	1.1
14.	0.12	1680.	1.15
16.	0.1	1800.	1.1
18.	0.12	1920.	1.1
20.	0.16	2040.	1.06
25.	0.16	2160.	1.03
30.	0.19	2280.	1.06
35.	0.21	2400.	1.06
40.	0.26	2520.	1.06
50.	0.28	2640.	1.08
60.	0.35	2760.	1.06
75.	0.39	2880.	1.08
90.	0.46	3000.	1.1
105.	0.46	3120.	1.15
120.	0.55	3240.	1.13
180.	0.62	3360.	1.08
240.	0.69	3480.	0.97
300.	0.76	3600.	1.06
360.	0.76	3720.	1.13

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
420.	0.74	3840.	1.33
480.	0.76	3960.	1.15
540.	0.78	4080.	1.1
600.	0.81	4200.	1.03
660.	0.81	4320.	1.01

Observation Well No. 3: CMRWA Well 3

X Location: -4164. ft

Y Location: -2404. ft

Radial distance from CMRWA 4: 4808.129782 ft

Fully Penetrating Well

No. of Observations: 69

<u>Observation Data</u>			
<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
4.	0.	540.	0.25
5.	-0.01	600.	0.25
6.	0.	660.	0.25
7.	0.	720.	0.29
8.	0.	780.	0.31
9.	-0.01	840.	0.31
10.	0.	900.	0.32
12.	0.	960.	0.34
14.	0.	1020.	0.35
16.	-0.01	1080.	0.37
18.	0.01	1140.	0.39
20.	0.02	1200.	0.4
25.	0.05	1260.	0.39
30.	0.08	1320.	0.39
35.	0.12	1380.	0.39
40.	0.13	1440.	0.31
45.	0.15	1455.	0.31
50.	0.14	1465.	0.26
55.	0.14	1475.	0.24
60.	0.14	1485.	0.2
70.	0.16	1495.	0.18
80.	0.19	1505.	0.15
90.	0.19	1515.	0.12
100.	0.19	1545.	0.08
110.	0.2	1575.	0.05
120.	0.2	1635.	0.
140.	0.2	1755.	-0.01
160.	0.22	1815.	-0.01
180.	0.23	1875.	-0.01
210.	0.22	1935.	-0.01
240.	0.23	1995.	-0.03
300.	0.25	2055.	-0.01
360.	0.25	2115.	-0.03
420.	0.26	2175.	-0.03
480.	0.26		

SOLUTION

Pumping Test

Aquifer Model: Confined

Solution Method: Theis

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
------------------	-----------------

T	2.333E+5	ft ² /day
S	0.0002785	
Kz/Kr	0.1	
b	700.	ft

$K = T/b = 333.2 \text{ ft/day}$ (0.1176 cm/sec)

$S_s = S/b = 3.979\text{E-}7 \text{ 1/ft}$

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
T	1.13E+5	3349.8	+/- 6699.6	33.73	ft ² /day
S	5.28E-5	5.968E-6	+/- 1.194E-5	8.847	
Kz/Kr	0.1	not estimated			
b	700.	not estimated			ft

C.I. is approximate 95% confidence interval for parameter

t-ratio = estimate/std. error

No estimation window

$K = T/b = 161.4 \text{ ft/day}$ (0.05694 cm/sec)

$S_s = S/b = 7.542\text{E-}8 \text{ 1/ft}$

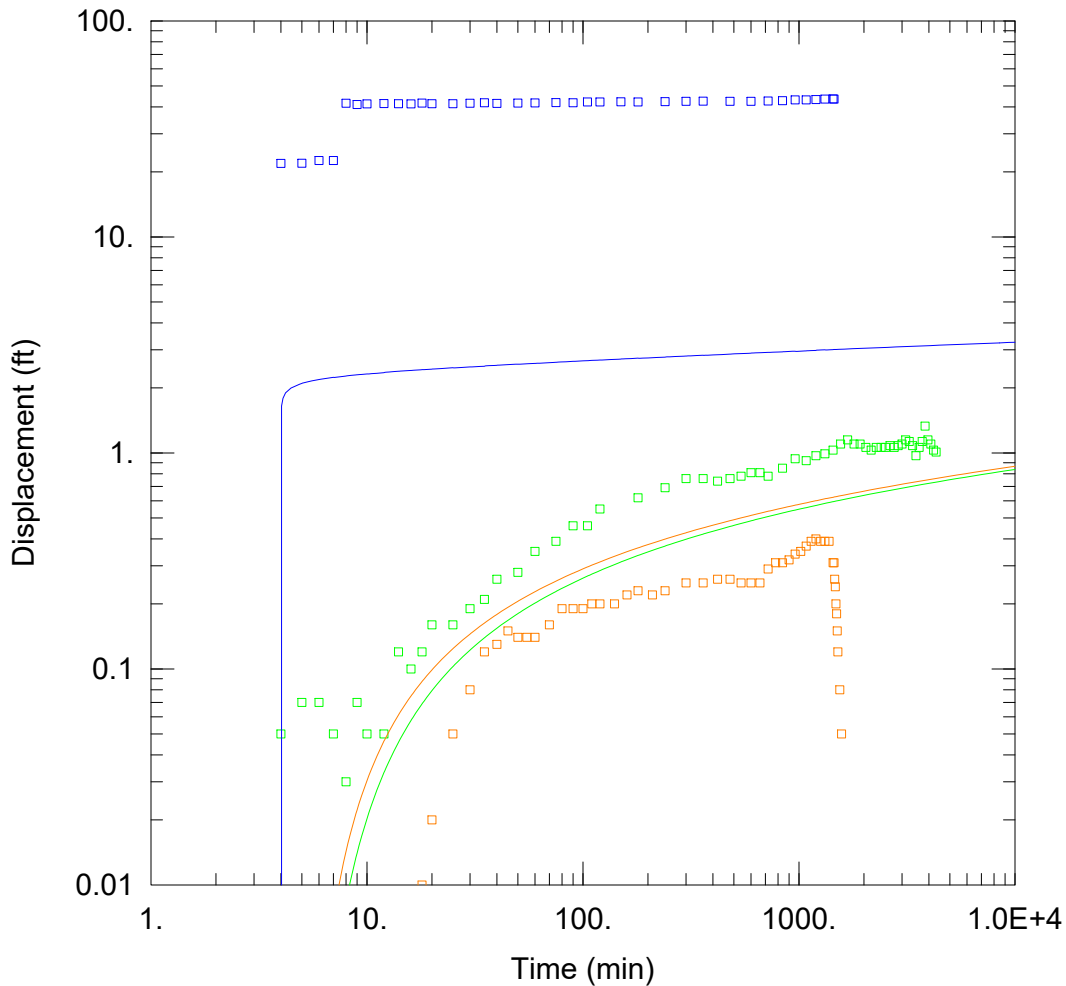
Parameter Correlations

	T	S
T	1.00	-0.91
S	-0.91	1.00

Residual Statistics

for weighted residuals

Sum of Squares	0.2376 ft ²
Variance	0.003959 ft ²
Std. Deviation	0.06292 ft
Mean	0.002496 ft
No. of Residuals	62
No. of Estimates	2



WELL TEST ANALYSIS

Data Set: C:\Users\william.craig\Desktop\GWE\CM\cmrwa well 4 pump.aqt

Date: 02/14/25

Time: 15:06:49

PROJECT INFORMATION

Company: GWE

Client: CMRWA

Location: UVet Well Field

Test Well: CMRWA Well 4

Test Date: 8/25/2024

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
CMRWA 4	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
CMRWA 4	0	0
CMRWA Well 5	-5400	0
CMRWA Well 3	-4164	-2404

SOLUTION

Aquifer Model: Confined

Solution Method: Theis

$T = 1.705E+5 \text{ ft}^2/\text{day}$

$S = 0.0001161$

$Kz/Kr = 0.1$

$b = 700. \text{ ft}$

Data Set: C:\Users\william.craig\Desktop\GWE\CM\cmrwa well 5 pump.aqt
Date: 02/14/25
Time: 11:39:11

PROJECT INFORMATION

Company: GWE
Client: CMRWA
Location: UVet Well Field
Test Date: 8/25/2024
Test Well: CMRWA Well 5

AQUIFER DATA

Saturated Thickness: 700. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: CMRWA 5

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.4 ft
Well Radius: 0.365 ft

Fully Penetrating Well

No. of pumping periods: 63

Pumping Period Data			
Time (min)	Rate (gal/min)	Time (min)	Rate (gal/min)
0.	0.	720.	1404.
4.	1396.	840.	1408.
5.	1398.	960.	1408.
6.	1400.	1080.	1410.
7.	1389.	1200.	1412.
8.	1387.	1320.	1409.
9.	1386.	1440.	1410.
10.	1394.	1560.	1408.
12.	1394.	1680.	1408.
14.	1399.	1800.	1409.
16.	1400.	1920.	1405.
18.	1399.	2040.	1410.
20.	1400.	2160.	1410.
25.	1400.	2280.	1409.
30.	1396.	2400.	1407.
35.	1398.	2520.	1407.
40.	1397.	2640.	1406.
50.	1397.	2760.	1408.
60.	1397.	2880.	1409.
75.	1396.	3000.	1411.
90.	1396.	3120.	1410.
105.	1394.	3240.	1408.
120.	1391.	3360.	1409.
180.	1409.	3480.	1409.
240.	1411.	3600.	1410.
300.	1410.	3720.	1407.
360.	1409.	3840.	1413.
420.	1411.	3960.	1409.
480.	1410.	4080.	1409.
540.	1410.	4200.	1409.
600.	1410.	4320.	1410.
660.	1408.		

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: CMRWA Well 4

X Location: -5400. ft

Y Location: 0. ft

Radial distance from CMRWA 5: 5400. ft

Fully Penetrating Well

No. of Observations: 62

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
4.	0.05	720.	0.78
5.	0.07	840.	0.85
6.	0.07	960.	0.94
7.	0.05	1080.	0.92
8.	0.03	1200.	0.97
9.	0.07	1320.	0.99
10.	0.05	1440.	1.03
12.	0.05	1560.	1.1
14.	0.12	1680.	1.15
16.	0.1	1800.	1.1
18.	0.12	1920.	1.1
20.	0.16	2040.	1.06
25.	0.16	2160.	1.03
30.	0.19	2280.	1.06
35.	0.21	2400.	1.06
40.	0.26	2520.	1.06
50.	0.28	2640.	1.08
60.	0.35	2760.	1.06
75.	0.39	2880.	1.08
90.	0.46	3000.	1.1
105.	0.46	3120.	1.15
120.	0.55	3240.	1.13
180.	0.62	3360.	1.08
240.	0.69	3480.	0.97
300.	0.76	3600.	1.06
360.	0.76	3720.	1.13
420.	0.74	3840.	1.33
480.	0.76	3960.	1.15
540.	0.78	4080.	1.1
600.	0.81	4200.	1.03
660.	0.81	4320.	1.01

SOLUTION

Pumping Test

Aquifer Model: Confined

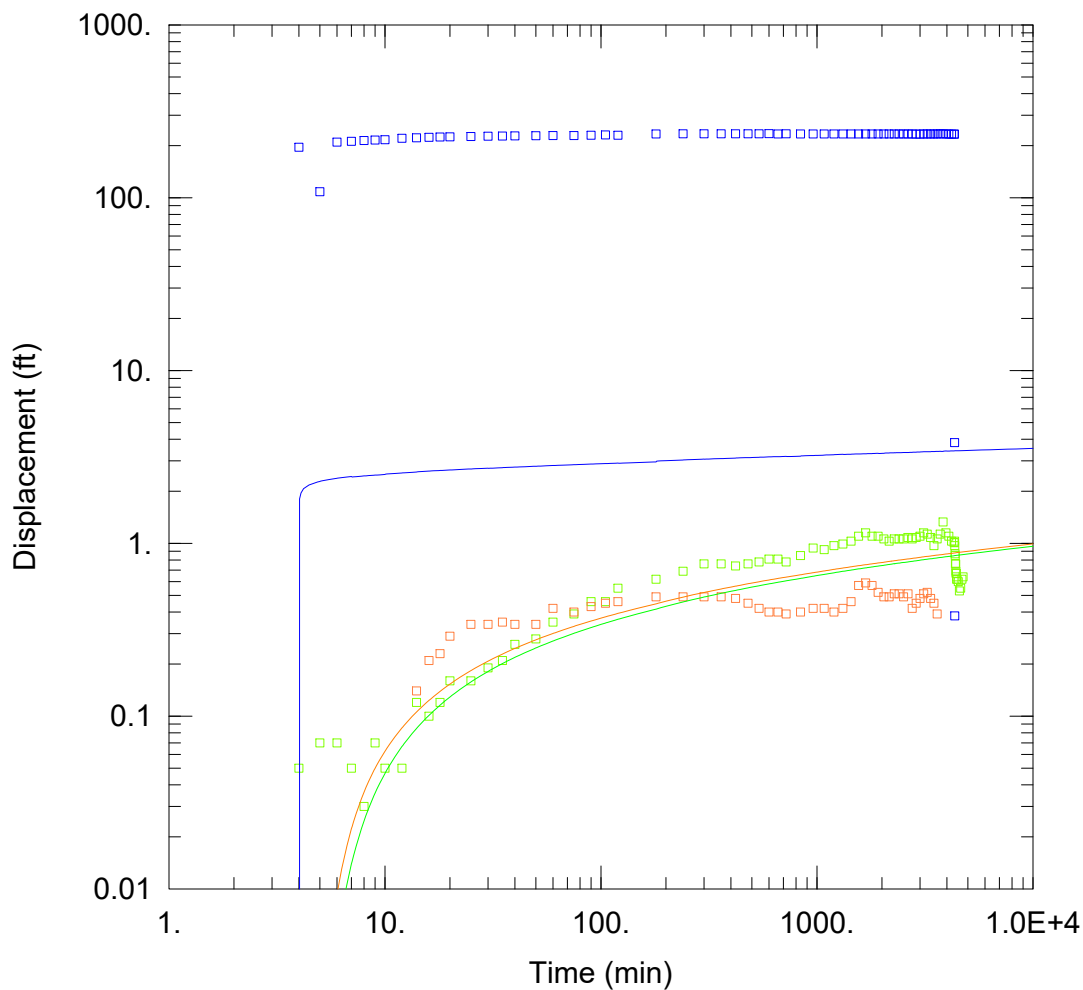
Solution Method: Theis

VISUAL ESTIMATION RESULTSEstimated Parameters

Parameter	Estimate	
T	1.121E+5	ft ² /day
S	5.133E-5	
Kz/Kr	0.1	
b	700.	ft

 $K = T/b = 160.2 \text{ ft/day (0.0565 cm/sec)}$

$S_s = S/b = 7.333\text{E-}8 \text{ 1/ft}$



WELL TEST ANALYSIS

Data Set: C:\Users\william.craig\Desktop\GWE\CM\cmrwa well 5 pump.aqt

Date: 02/14/25

Time: 15:12:19

PROJECT INFORMATION

Company: GWE

Client: CMRWA

Location: UVet Well Field

Test Well: CMRWA Well 5

Test Date: 8/25/2024

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
CMRWA 5	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
CMRWA 5	0	0
CMRWA Well 4	-5400	0
CMRWA Well 3	-4164	-2404

SOLUTION

Aquifer Model: Confined

Solution Method: Theis

$T = 1.607E+5 \text{ ft}^2/\text{day}$

$S = 6.746E-5$

$Kz/Kr = 0.1$

$b = 700. \text{ ft}$

APPENDIX F

DNRC 633 Forms

Well 4 633 Form

AQUIFER TEST DATA

Shaded Cells Require User Input

Water-Right Applicant:	CMRWA			DNRC Applic. #		DEQ Applic. #	
Address:	PO BOX 660 Roundup, MT 59072			County:	Judith Basin		
Test Site Location:	SE 1/4	SE 1/4	Section:	28	Twtnshp (N/S):	14N	Range (E/W): 15E
Date Test Conducted:	8/25/2024	Person and Company Conducting Test:			B. Lauerman- Great West Engineering		
Type of Test:	Constant Rate Discharge Test						
Pumping Well ID:	CMRWA 4			Pumping Rates (gpm):			
Pumping Well GWIC ID #:	NA	Depth (feet):	3000	Diameter (inches):	14/10/8	Perf. Zone(s):	open hole 2,259-3,000'
Pumping Well GPS Coordinates:	Select Datum of NAD 27 or 83:		Latitude:	46.766197 N	Longitude:	109.83944 W	
Author of Technical Report:	B. Lauerman						

Observation Well ID(s)	GWIC ID#	GPS Coordinates		Depth (feet)	Diameter (inches)	Perforated Zone(s) (feet)	Distance from Test Well (feet)	Bearing from Test Well (degrees)
		Latitude	Longitude					
CMRWA 5	NA	46.765639 N	109.823958 W	3,000	14/10/8	2,300-3,000	5,400	90
CMRWA 3	304761	46.757719 N	109.82585 W	2,850	14/10/9	2,163-2,850	4,600	135
3)								
4)								
5)								
6)								

Specify Water-Level Monitoring Equipment: Pressure transducers

Production Well Water-Level Data

Static Water Level (swl) to 0.01 ft: 172.34

Date/Time Measured: 8/25/2024 8:50

How swl Measured: XD

Measuring Point ID: TOC

Measuring Point Elevation (mp) (feet): 4565

How mp Measured: Survey

Time Data
 Pump On: Date 8/25/2024
 Time 9:00

 Pump Off: Date 8/26/2024
 Time 9:15

 Recovery End: Date 8/26/2024
 Time 10:15

 Aquifer-Test Duration:
 Pumping (hrs): 24.25
 Recovery (hrs): 1
Discharge Data

Discharge to be measured several times per hour during the first 3 hours of pumping and thereafter several times per hour if discharge fluctuates and requires frequent adjustment; otherwise, hourly measurements if discharge remains constant and requires little or no adjustment.

Discharge must be reported in gallons per minute (gpm) if using flow meter; in cumulative gallons if using totalizing meter; or 0.01 foot if using flume/weir.

Specify Discharge Measurement Equipment:

Badger 8" flow meter

Background Water Levels	
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
35	36
37	38
39	40
41	42
43	44
45	46
47	48
49	50
51	52
53	54
55	56
57	58
59	60
61	62
63	64
65	66
67	68
69	70
71	72
73	74
75	76
77	78
79	80
81	82
83	84
85	86
87	88
89	90
91	92
93	94
95	96
97	98
99	100

Production Well CMRWA 4

Date	Clock Time	Elapsed Time (minutes)	Depth to Water from m.p. (to 0.01 foot)
8/25/2024	0		172.64
	30		172.64
	100		172.59
	130		172.62
	200		172.59
	230		172.62
	300		172.57
	330		172.64
	400		172.59
	430		172.62
	500		172.59
	530		172.59
	600		172.57
	630		172.55
	700		172.50
	730		172.50
	800		172.50
	830		172.41

Observation Well CMRWA 5

Date	Clock Time	Elapsed Time (minutes)	Depth to Water from m.p. (to 0.01 foot)
8/25/2025	0	162.15	
	30	162.15	
	100	162.13	
	130	162.1	
	200	162.1	
	230	162.13	
	300	162.08	
	330	162.15	
	400	162.1	
	430	162.13	
	500	162.1	
	530	162.08	
	600	162.08	
	630	162.06	
	700	162.04	
	730	162.01	
	800	162.01	
	830	161.92	

Observation Well CMRWA 3

Date	Clock Time	Elapsed Time (minutes)	Depth to Water from m.p. (to 0.01 foot)
8/25/2024	0	231.09	
	30	231.09	
	100	231.09	
	130	231.11	
	200	231.09	
	230	231.11	
	300	231.11	
	330	231.11	
	400	231.09	
	430	231.11	
	500	231.05	
	530	231.03	
	600	231.03	
	630	231.02	
	700	231.00	
	730	231.00	
	800	230.99	
	830	230.97	

Measured Discharge

Date	Clock Time	Elapsed Time (minutes)	Measured Discharge (gallons per minute)	Comments
8/25/2024	850	0	0	
	900	0	0	Well CMRWA 4 Pump On
	904	4	1402	
	905	5	1403	
	907	7	1400	
	908	8	1401	
	909	9	1401	
	910	10	1397	
	912	12	1402	
	914	14	1402	
	916	16	1401	
	918	18	1400	
	920	20	1400	
	925	25	1397	
	930	30	1396	
	935	35	1400	
	940	40	1400	
	950	50	1398	
	1000	60	1397	
	1015	75	1399	
	1030	90	1399	
	1045	105	1399	
	1100	120	1399	
	1130	150	1400	
	1200	180	1397	
	1300	240	1399	
	1400	300	1399	
	1500	360	1397	
	1700	480	1399	
	1900	600	1400	
	2100	720	1398	
	2300	840	1400	
8/26/2024	100	960	1396	
	300	1080	1399	
	500	1200	1402	
	700	1320	1398	
	900	1440	1400	
	915	1455	1400	Well CMRWA 4 Pump Off

Drawdown Phase of Aquifer Test						
Production Well CMRWA 4 Static Water Level (swl) to 0.01 ft: Date/Time Measured: How swl Measured: Measuring Point ID: Measuring Point (mp) Elevation (feet): How mp Measured:			172.34 0850 8/25/24 XD TOC 4565 Survey	Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown values are		
Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Discharge Measurement (when applicable)	Test Comments
8/25/2024	900	0	172.34	0	0	Well CMRWA 4 Pump On
	904	4	194.23	21.89	1402	
	905	5	194.27	21.93	1403	
	906	6	194.92	22.58		
	907	7	194.92	22.58	1400	
	908	8	213.94	41.6	1401	
	909	9	213.33	40.99	1401	
	910	10	213.63	41.29	1397	
	912	12	213.79	41.45	1402	
	914	14	213.74	41.4	1402	
	916	16	213.67	41.33	1401	
	918	18	213.97	41.63	1400	
	920	20	213.74	41.4	1400	
	925	25	213.72	41.38	1397	
	930	30	213.92	41.58	1396	
	935	35	214.11	41.77	1400	
	940	40	213.86	41.52	1400	
	950	50	214.02	41.68	1398	
	1000	60	214.04	41.7	1397	
	1015	75	214.17	41.83	1399	
	1030	90	214.15	41.81	1399	
	1045	105	214.47	42.13	1399	
	1100	120	214.52	42.18	1399	
	1130	150	214.54	42.2	1400	
	1200	180	214.5	42.16	1397	
	1300	240	214.66	42.32	1399	
	1400	300	214.77	42.43	1399	
	1500	360	214.82	42.48	1397	
	1700	480	214.79	42.45	1399	
	1900	600	214.79	42.45	1400	
	2100	720	214.91	42.57	1398	
	2300	840	215.07	42.73	1400	
8/26/2024	100	960	215.41	43.07	1396	
	300	1080	215.46	43.12	1399	
	500	1200	215.62	43.28	1402	
	700	1320	215.78	43.44	1398	
	900	1440	215.85	43.51	1400	
	915	1455	215.78	43.44	1400	Well CMRWA 4 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Production Well CMRWA 4

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/26/2024	915	1455	0	0	215.78	43.44	CMRWA Well 4 Pump off 0915
	925	1465	10	146.5	170.46	-1.88	
	935	1475	20	73.75	169.84	-2.5	
	945	1485	30	49.5	169.57	-2.77	
	955	1495	40	37.375	169.43	-2.91	
	1005	1505	50	30.1	169.27	-3.07	
	1015	1515	60	25.25	169.25	-3.09	

Drawdown Phase of Aquifer Test

Observation Well 5 Water-Level Data

Static Water Level (swl) to 0.01 ft:

Date/Time Measured:

How swl Measured:

Measuring Point ID:

Measuring Point (mp) Elevation (feet):

How mp Measured:

161.85
8/25/2024 8:54
XD
TOC
4563
Survey

Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown values are reported as positive numbers unless the pumping water level rises above the initial static water level.

Drawdown Data for Observation Well CMRWA 5

Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Test Comments
8/25/2024	900	0	161.85	0	Well CMRWA 4 Pump On
	904	4	161.91	0.06	
	905	5	161.98	0.13	
	906	6	161.98	0.13	
	907	7	162.00	0.15	
	908	8	162.00	0.15	
	909	9	162.00	0.15	
	910	10	162.05	0.20	
	912	12	162.05	0.20	
	914	14	162.11	0.26	
	916	16	162.11	0.26	
	918	18	162.14	0.29	
	920	20	162.21	0.36	
	925	25	162.21	0.36	
	930	30	162.25	0.40	
	935	35	162.27	0.42	
	940	40	162.32	0.47	
	945	45	162.34	0.49	
	950	50	162.39	0.54	
	955	55	162.41	0.56	
	10	60	162.39	0.54	
	1010	70	162.43	0.58	
	1020	80	162.46	0.61	
	1030	90	162.53	0.68	
	1040	100	162.55	0.70	
	1050	110	162.55	0.70	
	1100	120	162.55	0.70	
	1120	140	162.60	0.75	
	1140	160	162.62	0.77	
	1200	180	162.64	0.79	
	1230	210	162.71	0.86	
	1300	240	162.69	0.84	
	1400	300	162.69	0.84	
	1500	360	162.71	0.86	
	1600	420	162.76	0.91	
	1700	480	162.73	0.88	
	1800	540	162.73	0.88	
	1900	600	162.80	0.95	
	2000	660	162.82	0.97	
	2100	720	162.82	0.97	
	2200	780	162.82	0.97	
	2300	840	162.82	0.97	
8/26/2024	0	900	162.80	0.95	
	100	960	162.87	1.02	
	200	1020	162.92	1.07	
	300	1080	162.96	1.11	
	400	1140	162.94	1.09	
	500	1200	162.94	1.09	
	600	1260	162.94	1.09	
	700	1320	162.94	1.09	
	800	1380	162.92	1.07	
	900	1440	162.87	1.02	
	915	1455	162.87	1.02	Well CMRWA 4 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Observation Well CMRWA 5

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/26/2024	925	1465	10	146.50	162.73	0.88	
	935	1475	20	73.75	162.57	0.72	
	945	1485	30	49.50	162.43	0.58	
	955	1495	40	37.38	162.37	0.52	
	1005	1505	50	30.10	162.27	0.42	
	1015	1515	60	25.25	162.21	0.36	
	1045	1545	90	17.17	162.14	0.29	
	1115	1575	120	13.13	162.09	0.24	
	1215	1635	180	9.08	161.98	0.13	
	1415	1755	300	5.85	161.88	0.03	
	1515	1815	360	5.04	161.86	0.01	
	1615	1875	420	4.46	161.88	0.03	
	1715	1935	480	4.03	161.86	0.01	
	1815	1995	540	3.69	161.86	0.01	
	1915	2055	600	3.43	161.86	0.01	
	2015	2115	660	3.20	161.84	-0.01	
	2115	2175	720	3.02	161.91	0.06	
	2215	2235	780	2.87	161.91	0.06	
	2315	2295	840	2.73	161.95	0.1	
8/27/2024	15	2355	900	2.62	161.93	0.08	
	115	2415	960	2.52	162.00	0.15	

Drawdown Phase of Aquifer Test

Observation Well CMRWA 3

Static Water Level (swl) to 0.01 ft:

230.97

Date/Time Measured:

8/25/24 0845

How swl Measured:

XD

Measuring Point ID:

TOC

Measuring Point (mp) Elevation (feet):

4633

How mp Measured:

Survey

Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown values are reported as positive numbers unless the pumping water level rises above the initial static water level.

Drawdown Data for Observation Well CMRWA 3

Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Test Comments
8/25/2024	900	0	230.97	0	Well CMRWA 4 Pump On
	904	4	230.97	0	
	905	5	230.96	-0.01	
	906	6	230.97	0	
	907	7	230.97	0	
	908	8	230.97	0	
	909	9	230.96	-0.01	
	910	10	230.97	0	
	912	12	230.97	0	
	914	14	230.97	0	
	916	16	230.96	-0.01	
	918	18	230.98	0.01	
	920	20	230.99	0.02	
	925	25	231.02	0.05	
	930	30	231.05	0.08	
	935	35	231.09	0.12	
	940	40	231.1	0.13	
	945	45	231.12	0.15	
	950	50	231.11	0.14	
	955	55	231.11	0.14	
	10	60	231.11	0.14	
	1010	70	231.13	0.16	
	1020	80	231.16	0.19	
	1030	90	231.16	0.19	
	1040	100	231.16	0.19	
	1050	110	231.17	0.2	
	1100	120	231.17	0.2	
	1120	140	231.17	0.2	
	1140	160	231.19	0.22	
	1200	180	231.2	0.23	
	1230	210	231.19	0.22	
	1300	240	231.2	0.23	
	1400	300	231.22	0.25	
	1500	360	231.22	0.25	
	1600	420	231.23	0.26	
	1700	480	231.23	0.26	
	1800	540	231.22	0.25	
	1900	600	231.22	0.25	
	2000	660	231.22	0.25	
	2100	720	231.26	0.29	
	2200	780	231.28	0.31	
	2300	840	231.28	0.31	
8/26/2024	0	900	231.29	0.32	
	100	960	231.31	0.34	
	200	1020	231.32	0.35	
	300	1080	231.34	0.37	
	400	1140	231.36	0.39	
	500	1200	231.37	0.4	
	600	1260	231.36	0.39	
	700	1320	231.36	0.39	
	800	1380	231.36	0.39	
	900	1440	231.28	0.31	
	915	1455	231.28	0.31	Well CMRWA 4 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Observation Well CMRWA 3

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/26/2024	925	1465	10	146.50	231.23	0.26	
	935	1475	20	73.75	231.21	0.24	
	945	1485	30	49.50	231.17	0.2	
	955	1495	40	37.38	231.15	0.18	
	1005	1505	50	30.10	231.12	0.15	
	1015	1515	60	25.25	231.09	0.12	
	1045	1545	90	17.17	231.05	0.08	
	1115	1575	120	13.13	231.02	0.05	
	1215	1635	180	9.08	230.97	0	
	1415	1755	300	5.85	230.96	-0.01	
	1515	1815	360	5.04	230.96	-0.01	
	1615	1875	420	4.46	230.96	-0.01	
	1715	1935	480	4.03	230.96	-0.01	
	1815	1995	540	3.69	230.94	-0.03	
	1915	2055	600	3.43	230.96	-0.01	
	2015	2115	660	3.20	230.94	-0.03	
	2115	2175	720	3.02	230.94	-0.03	

Well 5 633 Form

AQUIFER TEST DATA

Shaded Cells Require User Input

Water-Right Applicant:	CMRWA			DNRC Applic. #		DEQ Applic. #		
Address:	PO BOX 660 Roundup, MT 59072			County:	Judith Basin			
Test Site Location:	SE 1/4	SE 1/4	Section:	29	Township (N/S):	14N	Range (E/W):	15E
Date Test Conducted:	8/17/2024		Person and Company Conducting Test: B. Lauerma- Great West Engineering					
Type of Test:	Constant Rate Discharge Test							
Pumping Well ID:	CMRWA 5		Pumping Rates (gpm):					
Pumping Well GWIC ID #:	NA	Depth (feet):	3000	Diameter (inches):	14/10/8	Perf. Zone(s):	open hole 2,300-3,000'	
Pumping Well GPS Coordinates:	Select Datum of NAD 27 or 83:			Latitude:	46.765639 N	Longitude:	109.823958 W	
Author of Technical Report:	B. Lauerma							

Observation Well ID(s)	GWIC ID#	GPS Coordinates		Depth (feet)	Diameter (inches)	Perforated Zone(s) (feet)	Distance from Test Well (feet)	Bearing from Test Well (degrees)
		Latitude	Longitude					
CMRWA 4	NA	46.765639 N	109.823958 W	3,000	14/10/8	2,300-3,000	5,400	270
CMRWA 3	304761	46.757719 N	109.82585 W	2,850	14/10/9	2,163-2,850	3,400	225
3)								
4)								
5)								
6)								

Specify Water-Level Monitoring Equipment: Pressure transducers

Production Well Water-Level Data

Static Water Level (swl) to 0.01 ft: 171.1

Date/Time Measured: 8/17/2024 7:57

How swl Measured: XD

Measuring Point ID: TOC

Measuring Point Elevation (mp) (feet): 4563

How mp Measured: Survey

Time Data

Pump On: Date 8/17/2024
Time 8:00

Pump Off: Date 8/20/2024
Time 8:10

Recovery End: Date 8/20/2024
Time 9:10

Aquifer-Test Duration:

Pumping (hrs): 72

Recovery (hrs): 1

Discharge Data

Discharge to be measured several times per hour during the first 3 hours of pumping and thereafter several times per hour if discharge fluctuates and requires frequent adjustment; otherwise, hourly measurements if discharge remains constant and requires little or no adjustment.

Discharge must be reported in gallons per minute (gpm) if using flow meter; in cumulative gallons if using totalizing meter; or 0.01 foot if using flume/weir.

Specify Discharge Measurement Equipment:

Badger 8" flow meter

Background Water Levels

[illegible][illegible][illegible]

Measured Discharge

Date	Clock Time	Elapsed Time (minutes)	Measured Discharge (gallons per minute)	Comments
8/17/2024	800	0	0	Well CMRWA 5 Pump On
	804	4	1396	
	805	5	1398	
	806	6	1400	
	807	7	1389	
	808	8	1387	
	809	9	1386	
	810	10	1394	
	812	12	1394	
	814	14	1399	
	816	16	1400	
	818	18	1399	
	820	20	1400	
	825	25	1400	
	830	30	1396	
	835	35	1398	
	840	40	1397	
	850	50	1397	
	900	60	1397	
	915	75	1396	
	930	90	1396	
	945	105	1394	
	1000	120	1391	
	1100	180	1409	
	1200	240	1411	
	1300	300	1410	
	1400	360	1409	
	1500	420	1411	
	1600	480	1410	
	1700	540	1410	
	1800	600	1410	
	1900	660	1408	
	2000	720	1404	
	2200	840	1408	
8/18/2024	0	960	1408	
	200	1080	1410	
	400	1200	1412	
	600	1320	1409	
	800	1440	1410	
	1000	1560	1408	
	1200	1680	1408	
	1400	1800	1409	

	1600	1920	1405	
	1800	2040	1410	
	2000	2160	1410	
	2200	2280	1409	
8/19/2024	0	2400	1407	
	200	2520	1407	
	400	2640	1406	
	600	2760	1408	
	800	2880	1409	
	1000	3000	1411	
	1200	3120	1410	
	1400	3240	1408	
	1600	3360	1409	
	1800	3480	1409	
	2000	3600	1410	
	2200	3720	1407	
8/20/2024	0	3840	1413	
	200	3960	1409	
	400	4080	1409	
	600	4200	1409	
	800	4320	1410	
	810	4330		Well CMRWA 5 Pump Off

Drawdown Phase of Aquifer Test						
Production Well CMRWA 5 Static Water Level (swl) to 0.01 ft:			171.10	Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown		
Date/Time Measured:			8/17/2024 7:57			
How swl Measured:			XD			
Measuring Point ID:			TOC			
Measuring Point (mp) Elevation (feet):			4563			
How mp Measured:			Survey			
Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Discharge Measurement (when applicable)	Test Comments
8/17/2024	800	0	171.1	0	0	Well CMRWA 5 Pump On
	804	4	367	195.9	1396	
	805	5	279.41	108.31	1398	
	806	6	380.71	209.61	1400	
	807	7	383.1	212	1389	
	808	8	385.6	214.5	1387	
	809	9	386.63	215.53	1386	
	810	10	387.75	216.65	1394	
	812	12	391.8	220.7	1394	
	814	14	393.45	222.35	1399	
	816	16	394.6	223.5	1400	
	818	18	395.47	224.37	1399	
	820	20	396.4	225.3	1400	
	825	25	397.37	226.27	1400	
	830	30	397.87	226.77	1396	
	835	35	398.42	227.32	1398	
	840	40	399	227.9	1397	
	850	50	399.55	228.45	1397	
	900	60	399.89	228.79	1397	
	915	75	400.28	229.18	1396	
	930	90	401.1	230	1396	
	945	105	401.83	230.73	1394	
	1000	120	401.17	230.07	1391	
	1100	180	405.18	234.08	1409	
	1200	240	405.29	234.19	1411	
	1300	300	405.62	234.52	1410	
	1400	360	405.37	234.27	1409	
	1500	420	405.3	234.2	1411	
	1600	480	405.55	234.45	1410	
	1700	540	405.46	234.36	1410	
	1800	600	405.77	234.67	1410	
	1900	660	405.14	234.04	1408	
	2000	720	405.37	234.27	1404	
	2200	840	405.09	233.99	1408	
8/18/2024	0	960	405.09	233.99	1408	
	200	1080	405.02	233.92	1410	
	400	1200	405.11	234.01	1412	
	600	1320	405.05	233.95	1409	
	800	1440	404.86	233.76	1410	
	1000	1560	404.86	233.76	1408	
	1200	1680	404.91	233.81	1408	
	1400	1800	404.91	233.81	1409	
	1600	1920	404.73	233.63	1405	
	1800	2040	404.9	233.8	1410	
	2000	2160	404.86	233.76	1410	
	2200	2280	404.77	233.67	1409	
8/19/2024	0	2400	404.84	233.74	1407	
	200	2520	404.93	233.83	1407	
	400	2640	405.05	233.95	1406	
	600	2760	404.79	233.69	1408	
	800	2880	404.63	233.53	1409	
	1000	3000	404.63	233.53	1411	
	1200	3120	404.93	233.83	1410	
	1400	3240	404.84	233.74	1408	
	1600	3360	404.75	233.65	1409	
	1800	3480	404.77	233.67	1409	
	2000	3600	404.95	233.85	1410	
	2200	3720	405.25	234.15	1407	Well CMRWA 3 operating @ 1280 gpm 8/19 20:30 to 8/20 00:45
8/20/2024	0	3840	405.48	234.38	1413	
	200	3960	404.91	233.81	1409	
	400	4080	404.54	233.44	1409	
	600	4200	404.43	233.33	1409	
	800	4320	404.68	233.58	1410	
	810	4330				Well CMRWA 5 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Production Well CMRWA 5

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/20/2024	820	4340	10	434.00	176.17	3.83	
	830	4350	20	217.50	172.72	0.38	
	840	4360	30	145.33	171.22	-1.12	
	850	4370	40	109.25	170.44	-1.9	
	900	4380	50	87.60	169.98	-2.36	
	910	4390	60	73.17	169.8	-2.54	

Drawdown Phase of Aquifer Test

Observation Well 4 Water-Level Data

Static Water Level (swl) to 0.01 ft:

Date/Time Measured:

How swl Measured:

Measuring Point ID:

Measuring Point (mp) Elevation (feet):

How mp Measured:

163.76

8/17/2024 7:45

XD

TOC

4565

Survey

Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown values are reported as positive numbers unless the pumping water level rises above the initial static water level.

Drawdown Data for Observation Well CMRWA 4

Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Test Comments
8/17/2024	800	0	163.76	0	Well CMRWA 5 Pump On
	804	4	163.81	0.05	
	805	5	163.83	0.07	
	806	6	163.83	0.07	
	807	7	163.81	0.05	
	808	8	163.79	0.03	
	809	9	163.83	0.07	
	810	10	163.81	0.05	
	812	12	163.81	0.05	
	814	14	163.88	0.12	
	816	16	163.86	0.10	
	818	18	163.88	0.12	
	820	20	163.92	0.16	
	825	25	163.92	0.16	
	830	30	163.95	0.19	
	835	35	163.97	0.21	
	840	40	164.02	0.26	
	850	50	164.04	0.28	
	900	60	164.11	0.35	
	915	75	164.15	0.39	
	930	90	164.22	0.46	
	945	105	164.22	0.46	
	1000	120	164.31	0.55	
	1100	180	164.38	0.62	
	1200	240	164.45	0.69	
	1300	300	164.52	0.76	
	1400	360	164.52	0.76	
	1500	420	164.50	0.74	
	1600	480	164.52	0.76	
	1700	540	164.54	0.78	
	1800	600	164.57	0.81	
	1900	660	164.57	0.81	
	2000	720	164.54	0.78	
	2200	840	164.61	0.85	
8/18/2024	0	960	164.70	0.94	
	200	1080	164.68	0.92	
	400	1200	164.73	0.97	
	600	1320	164.75	0.99	
	800	1440	164.79	1.03	
	1000	1560	164.86	1.10	
	1200	1680	164.91	1.15	
	1400	1800	164.86	1.10	
	1600	1920	164.86	1.10	
	1800	2040	164.82	1.06	
	2000	2160	164.79	1.03	
	2200	2280	164.82	1.06	
8/19/2024	0	2400	164.82	1.06	
	200	2520	164.82	1.06	
	400	2640	164.84	1.08	
	600	2760	164.82	1.06	
	800	2880	164.84	1.08	
	1000	3000	164.86	1.10	
	1200	3120	164.91	1.15	
	1400	3240	164.89	1.13	
	1600	3360	164.84	1.08	
	1800	3480	164.73	0.97	
	2000	3600	164.82	1.06	
	2200	3720	164.89	1.13	
8/20/2024	0	3840	165.09	1.33	
	200	3960	164.91	1.15	
	400	4080	164.86	1.10	
	600	4200	164.79	1.03	
	800	4320	164.77	1.01	
	810	4440			Well CMRWA 5 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Observation Well CMRWA 4

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/20/2024	820	4340	10	434.00	164.79	1.03	
	830	4350	20	217.50	164.73	0.97	
	840	4360	30	145.33	164.63	0.87	
	850	4370	40	109.25	164.61	0.85	
	900	4380	50	87.60	164.52	0.76	
	910	4390	60	73.17	164.52	0.76	
	920	4400	70	62.86	164.45	0.69	
	930	4410	80	55.13	164.43	0.67	
	940	4420	90	49.11	164.43	0.67	
	950	4430	100	44.30	164.40	0.64	
	1000	4440	110	40.36	164.38	0.62	
	1010	4450	120	37.08	164.38	0.62	
	1110	4510	180	25.06	164.36	0.6	
	1210	4570	240	19.04	164.29	0.53	
	1310	4630	300	15.43	164.31	0.55	
	1410	4690	360	13.03	164.38	0.62	Well CMRWA 3 resumes pumping 1295 gpm at 14:00
	1510	4750	420	11.31	164.40	0.64	

Drawdown Phase of Aquifer Test

Observation Well CMRWA 3

Static Water Level (swl) to 0.01 ft:

231.09

Date/Time Measured:

8/17/24 0745

How swl Measured:

XD

Measuring Point ID:

TOC

Measuring Point (mp) Elevation (feet):

4633

How mp Measured:

Survey

Note: Drawdown is the difference between the pumping water level at a specified time after pumping starts and the static water level observed at time = 0. Drawdown values are reported as positive numbers unless the pumping water level rises above the initial static water level.

Drawdown Data for Observation Well CMRWA 3

Date	Clock Time	Time since Pump Started (minutes)	Depth to Water from m.p. (to 0.01 foot)	Drawdown (to 0.01 foot)	Test Comments
8/17/2024	800	0	231.09	0	Well CMRWA 5 Pump On
	804	4	230.1	-0.87	
	805	5	230.1	-0.87	
	806	6	230.1	-0.87	
	807	7	230.1	-0.87	
	808	8	230.1	-0.87	
	809	9	230.1	-0.87	
	810	10	230.1	-0.87	
	812	12	230.1	-0.87	
	814	14	231.11	0.14	
	816	16	231.18	0.21	
	818	18	231.2	0.23	
	820	20	231.26	0.29	
	825	25	231.31	0.34	
	830	30	231.31	0.34	
	835	35	231.32	0.35	
	840	40	231.31	0.34	
	850	50	231.31	0.34	
	900	60	231.39	0.42	
	915	75	231.37	0.4	
	930	90	231.4	0.43	
	945	105	231.42	0.45	
	1000	120	231.43	0.46	
	1100	180	231.46	0.49	
	1200	240	231.46	0.49	
	1300	300	231.46	0.49	
	1400	360	231.46	0.49	
	1500	420	231.45	0.48	
	1600	480	231.42	0.45	
	1700	540	231.39	0.42	
	1800	600	231.37	0.4	
	1900	660	231.37	0.4	
	2000	720	231.36	0.39	
	2200	840	231.37	0.4	
8/18/2024	0	960	231.39	0.42	
	200	1080	231.39	0.42	
	400	1200	231.37	0.4	
	600	1320	231.39	0.42	
	800	1440	231.43	0.46	
	1000	1560	231.54	0.57	
	1200	1680	231.56	0.59	
	1400	1800	231.54	0.57	
	1600	1920	231.49	0.52	
	1800	2040	231.46	0.49	
	2000	2160	231.46	0.49	
	2200	2280	231.48	0.51	
8/19/2024	0	2400	231.48	0.51	
	200	2520	231.46	0.49	
	400	2640	231.48	0.51	
	600	2760	231.39	0.42	
	800	2880	231.42	0.45	
	1000	3000	231.45	0.48	
	1200	3120	231.48	0.51	
	1400	3240	231.49	0.52	
	1600	3360	231.45	0.48	
	1800	3480	231.42	0.45	
	2000	3600	231.45	0.48	
	2200	3720	272.1	41.13	Well CMRWA 3 operating @ 1280 gpm 8/19 20:30 to 8/20 00:45
8/20/2024	0	3840	272.97	42	
	200	3960	230.42	-0.55	
	400	4080	230.62	-0.35	
	600	4200	230.62	-0.35	
	800	4320	230.73	-0.24	
	810	4330			Well CMRWA 5 Pump Off

Recovery Phase of Aquifer Test

Note: Residual drawdown is the difference between the recovering water level at a specified time after pumping stopped and the static water level prior to pumping at time = 0. Residual drawdown values are reported as positive numbers.

Recovery Data for Observation Well CMRWA 3

Date	Clock Time	Time (t) since Pump Started (minutes)	Time (t') since Pump Stopped (minutes)	t/t'	Depth to Water from m.p. (to 0.01 foot)	Residual Drawdown (to 0.01 foot)	Test Comments
8/20/2024	820	4340	10	434.00	230.86	-0.23	
	830	4350	20	217.50	230.85	-0.24	
	840	4360	30	145.33	230.71	-0.38	
	850	4370	40	109.25	230.7	-0.39	
	900	4380	50	87.60	230.69	-0.4	
	910	4390	60	73.17	230.68	-0.41	
	920	4400	80	55.00	230.68	-0.41	
	930	4410	90	49.00	230.68	-0.41	
	940	4420	100	44.20	230.68	-0.41	
	950	4430	110	40.27	230.69	-0.4	
	1000	4440	120	37.00	230.69	-0.4	
	1010	4450	180	24.72	230.69	-0.4	
	1110	4510	240	18.79	230.71	-0.38	
	1210	4570	300	15.23	230.74	-0.35	
	1310	4630	360	12.86	230.77	-0.32	
	1410	4690	420	11.17	272.28	41.19	Well CMRWA 3 resumes pumping 1295 gpm at 14:00
	1510	4750	480	9.90	273.7	42.61	

APPENDIX G

Pump Set Tech Memo



CMRWA Well 4 and 5 Projected Design Rate Pumping Water Levels

PREPARED FOR: Bob Church, PE
PREPARED BY: Bruce Lauerman, PG/LHG
REVIEWED BY: Bob Church, PE; Amy Deitchler, PE
DATE: September 18, 2024
PROJECT NUMBER: 1-05125 TO 39
REVISION NO.: DRAFT v1
APPROVED BY:

This technical memorandum (TM) presents projections for pumping water levels (PWLs) in CMRWA Wells 4 and 5 at the design rate of 1,250 gpm for each well. Information is also provided regarding observed static water level trends in the aquifer. A number of assumptions were made in this analysis to conservatively inform selection of pump depth settings in each well.

Background

CMRWA Wells 4 and 5 were constructed in 2024 to provide an additional and redundant water supply. Both wells were drilled and constructed similarly to a depth of 3,000 ft below ground surface (bgs) in the upper Madison Limestone. Existing CMRWA production Wells 2 and 3 also target the upper Madison. The wells are all located within an approximate one-mile radius and are collectively termed the U Bet Wellfield.

Analysis

In estimating design rate PWLs and recommending pump depth settings, consideration should be given to static water level (SWL) trends in the aquifer--both historical and annual/cyclical patterns. Long-term monitoring data collected in existing CMRWA Wells 2 and 3 *prior to production in these wells* suggests:

- SWLs experienced a net decline of approximately 50 feet from 2019 to 2022, then recovered roughly 15 feet since that time and leveled off.
- SWLs are observed to fluctuate on the order of 30-40 feet per year.
- The highest SWLs occur in Q4 of the calendar year.

To address impacts of seasonal fluctuations in SWLs, at each well two design rate PWLs are estimated: an *Upper PWL* correlating with higher SWLs, and a *Lower PWL* corresponding to lower SWLs.

A conservative approach is used for this analysis to ensure expected natural and cyclical annual water level fluctuations are considered:

TECHNICAL MEMORANDUM



- The natural, annual fluctuation in SWL is assumed to be 50 feet in elevation (approximately 20% greater than observed).
- Also, while the pumping tests at Wells 4 and 5 were conducted in August 2024--corresponding temporally to the rising limb of the hydrograph-- it is assumed the August SWLs represent the Upper SWLs in the aquifer, effectively overestimating the depth of Lower SWLs expected in Q1 of the calendar year.

The projections for Well 4 were developed using the constant rate test performed after deepening the well. The Well 5 projections were made using the step rate test results. The attached **Table 1** summarizes observed pumping-induced drawdowns and corresponding specific capacity values for each well. Calculation of Lower SWL and Lower PWL values account for 50 ft of natural annual water level fluctuation in the aquifer. These data are then used to approximate Upper and Lower PWLs at the design rate 1,250 gpm production.

It is notable that while Wells 4 and 5 are located only a mile apart and are both completed into fractures in the upper Madison Limestone, Well 5 is much less efficient in terms of water production; Well 5 has a calculated specific capacity at 1,400 gpm of 5.9 gpm/ft, approximately 80% less than Well 4 at 31.8 gpm/ft. Because the wells are drilled open hole into the limestone, and not equipped with screens, this significant difference in specific capacity is attributed to variations in secondary porosity (fractures and fissures) intercepted by each borehole. The aquifer yields water more readily to Well 4 and thus results in lesser drawdown per gallon produced.

For each well, the Lower PWL is more relevant when proposing sustainable pump set depths. Accounting for an annual SWL fluctuation of 50 feet in the aquifer, at the design rate of 1,250 gpm Well 4 has an estimated Lower PWL of 261 ft bgs and Well 5 an estimated Lower PWL of 411 ft bgs.

With regards to pump depth settings, it could be recommended that pump intakes be set a minimum of 100 ft below the Lower PWL in each well. However, in addition to annual cyclical fluctuations included in the projected Lower PWLs, some consideration should be given to the observed decline and recent recovery in SWLs observed over the past several years. The Madison aquifer is very prolific, and while the observed downward trend from 2020 to 2022 occurred before pumping of the U BET wells commenced, and a recovering trend has been more recently observed, it is recommended an additional 50 ft available drawdown be factored in to proposed pump set depths to account for natural variations in long term aquifer levels. The recommendation for this additional 150 ft of available drawdown in pump depth settings is **not** included in the **Table 1** values.

Summary

Aquifer test results at both CMRWA Well 4 and 5 were used to project expected Upper and Lower PWLs in both wells at the individual design rate of 1,250 gpm, inclusive of assumed natural, annual fluctuations in SWLs of 50 ft. The projected Lower PWL in Well 4 is 261 ft bgs. The Lower PWL in Well 5 is projected to be 411 ft bgs.

These projections along with longer term trends in observed SWLs in the aquifer at CMRWA Wells 2 and 3 should be considered when selecting pump intake depths settings in Wells 4 and 5.

Table 1. Aquifer Test Results and Projected PWLs

WELL 4

Q (gpm)	Drawdown (ft)	Upper SWL	Lower SWL*	Upper PWL	Lower PWL*	SC (gpm/ft)
		(ft bgs)		(ft bgs)		
1250	39	172	222	211	261	32.1
1400	44	172	222	216	266	31.8

WELL 5

Q (gpm)	Drawdown (ft)	Upper SWL	Lower SWL*	Upper PWL	Lower PWL*	SC (gpm/ft)
		(ft bgs)		(ft bgs)		
800	97	172	222	269	319	8.2
1000	137	172	222	309	359	7.3
1250	189	172	222	361	411	6.6
1400	238	172	222	410	460	5.9

Q = Discharge

SWL = Static water level

PWL = Pumping water level

SC = Specific Capacity

Note:

Well 4 constant rate test conducted August 25, 2024

Well 5 step rate test conducted Aug 15, 2024

*Lower SWL and Lower PWL values assume natural annual SWL fluctuation of 50 ft

Q = 1250 gpm data inferred

APPENDIX H

Analytical Lab Reports



ANALYTICAL SUMMARY REPORT

June 21, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24060249 Quote ID: H16431

Project Name: CMRWA Well 4 1-05125 Task 39

Energy Laboratories Inc Helena MT received the following 2 samples for Great West Engineering on 6/10/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24060249-001	CMRWA WELL	06/09/24 15:00	06/10/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Alkalinity to pH 4.5 Bacteria, Public Water Supply Cyanide, SDWA Mercury, Drinking Water 515.4-Herbicides, Chlorinated SDWA 547-Herbicides, Glyphosate SDWA Anions by Ion Chromatography Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate pH Metals Digestion by E200.2 Herbicide Liquid-Liquid Microextraction E515.4 Mercury Digestion by E245.1 504.1 Microextraction 504-Microextraction VOCs, EDB and DBCP SDWA 531-Pesticides, Carbamates SDWA LSE for 549.2 549-Pesticides, Diquat SDWA Solids, Total Dissolved Semi-Volatile Organic Compounds E525.2 Extraction 525-Semi-Volatile Organic Compounds, SDWA Endothall E548.1 Extraction 548-Endothall 524-Purgeable Organics, SDWA
H24060249-002	Trip Blank	06/09/24 15:00	06/10/24	Trip Blank	524-Purgeable Organics, SDWA

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.



CLIENT: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Work Order: H24060249

Report Date: 06/21/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Client Sample ID: CMRWA WELL
PWS ID: **Facility ID:** **Sample Point ID:**
Facility Name:
Lab ID: H24060249-001H

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Received Date: 06/10/24 08:10
Matrix: Drinking Water
Sampled By: Bruce Lauerman

Compliance Sample: NO

Sample Type:

Res Cl Type: Unspecified

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
3100 Coliform, Total	Absent	per 100ml	SAFE		A9223 B	06/10/24 15:45 / kmh
3014 Coliform, E-Coli	Absent	per 100ml			A9223 B	06/10/24 15:45 / kmh

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.

The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Qualifiers:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-001
Client Sample ID: CMRWA WELL

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	06/10/24 16:17 / eer
pH Measurement Temp	18.5	°C				A4500-H B	06/10/24 16:17 / eer
Solids, Total Dissolved TDS @ 180 C	1280	mg/L		20		A2540 C	06/10/24 15:22 / eer
INORGANICS							
Alkalinity, Total as CaCO ₃	150	mg/L		4		A2320 B	06/13/24 19:25 / eer
Chloride	1	mg/L		1		E300.0	06/12/24 22:42 / eer
Sulfate	731	mg/L		1		E300.0	06/12/24 22:42 / eer
Fluoride	2.4	mg/L		0.1		E300.0	06/12/24 22:42 / eer
Cyanide, Total	ND	mg/L		0.005	0.2	Kelada-01	06/11/24 15:42 / eli-b
NUTRIENTS							
Nitrogen, Nitrate as N	0.07	mg/L		0.01		E353.2	06/20/24 16:30 / JCS
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.01	10	E353.2	06/18/24 19:13 / JAR
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	06/10/24 15:05 / JAR
METALS, TOTAL (CONTRACT LAB MT00945)							
Antimony	ND	mg/L		0.001	0.006	E200.8	06/13/24 11:55 / dck
Arsenic	0.002	mg/L		0.001	0.01	E200.8	06/13/24 11:55 / dck
Barium	ND	mg/L		0.05	2	E200.8	06/13/24 11:55 / dck
Beryllium	ND	mg/L		0.001	0.004	E200.8	06/13/24 11:55 / dck
Cadmium	ND	mg/L		0.001	0.005	E200.8	06/13/24 11:55 / dck
Calcium	270	mg/L		1		E200.7	06/13/24 10:47 / slj
Chromium	ND	mg/L		0.005	0.1	E200.8	06/13/24 11:55 / dck
Copper	ND	mg/L		0.005	1.3	E200.8	06/13/24 11:55 / dck
Iron	0.21	mg/L		0.02		E200.7	06/13/24 10:47 / slj
Lead	ND	mg/L		0.001	0.015	E200.8	06/13/24 11:55 / dck
Magnesium	66	mg/L		1		E200.7	06/13/24 10:47 / slj
Manganese	0.006	mg/L		0.001		E200.8	06/13/24 11:55 / dck
Nickel	0.014	mg/L		0.005		E200.8	06/13/24 11:55 / dck
Potassium	2	mg/L		1		E200.7	06/19/24 10:44 / slj
Selenium	0.011	mg/L		0.001	0.05	E200.8	06/13/24 11:55 / dck
Sodium	4	mg/L		1		E200.7	06/19/24 10:44 / slj
Thallium	ND	mg/L		0.0005	0.002	E200.8	06/13/24 11:55 / dck
DRINKING WATER METALS ANALYSES							
Mercury	ND	mg/L		0.0001	0.002	E245.1	06/13/24 16:14 / kjb
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Bromobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Bromochloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Bromodichloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Bromoform	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
H - Analysis performed past the method holding time

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-001
Client Sample ID: CMRWA WELL

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Bromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
n-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
sec-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
tert-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Chlorobenzene	ND	ug/L		0.50	100	E524.2	06/11/24 13:29 / tmj
Chlorodibromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Chloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Chloroform	0.16	ug/L	J	0.50		E524.2	06/11/24 13:29 / tmj
Chloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
2-Chlorotoluene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
4-Chlorotoluene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Dibromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	06/11/24 13:29 / tmj
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	06/11/24 13:29 / tmj
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	06/11/24 13:29 / tmj
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	06/11/24 13:29 / tmj
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	06/11/24 13:29 / tmj
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Ethylbenzene	ND	ug/L		0.50	700	E524.2	06/11/24 13:29 / tmj
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Isopropylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Methylene chloride	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Naphthalene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
n-Propylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Styrene	ND	ug/L		0.50	100	E524.2	06/11/24 13:29 / tmj
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Toluene	ND	ug/L		0.50	1000	E524.2	06/11/24 13:29 / tmj
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	06/11/24 13:29 / tmj

Report Definitions:
 RL - Analyte Reporting Limit
 QCL - Quality Control Limit
 J - Estimated value - analyte was present but less than the Reporting Limit (RL)

MCL - Maximum Contaminant Level
 ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-001
Client Sample ID: CMRWA WELL

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	06/11/24 13:29 / tmj
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Trichloroethene	ND	ug/L		0.50	5	E524.2	06/11/24 13:29 / tmj
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Vinyl chloride	ND	ug/L		0.50	2	E524.2	06/11/24 13:29 / tmj
m+p-Xylenes	ND	ug/L		1.0		E524.2	06/11/24 13:29 / tmj
o-Xylene	ND	ug/L		0.50		E524.2	06/11/24 13:29 / tmj
Trihalomethanes, Total	0.16	ug/L	J	0.50	80	E524.2	06/11/24 13:29 / tmj
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	06/11/24 13:29 / tmj
Surr: p-Bromofluorobenzene	108	%REC		70-130		E524.2	06/11/24 13:29 / tmj
Surr: 1,2-Dichloroethane-d4	105	%REC		70-130		E524.2	06/11/24 13:29 / tmj
Surr: Toluene-d8	109	%REC		70-130		E524.2	06/11/24 13:29 / tmj
SEMI-VOLATILE ORGANIC COMPOUNDS							
Alachlor	ND	ug/L		0.10	2	E525.2	06/19/24 14:52 / eli-b
Aldrin	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Aroclor 1016	ND	ug/L		0.080		E525.2	06/19/24 14:52 / eli-b
Aroclor 1221	ND	ug/L		2.0		E525.2	06/19/24 14:52 / eli-b
Aroclor 1232	ND	ug/L		0.50		E525.2	06/19/24 14:52 / eli-b
Aroclor 1242	ND	ug/L		0.30		E525.2	06/19/24 14:52 / eli-b
Aroclor 1248	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Aroclor 1254	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Aroclor 1260	ND	ug/L		0.20		E525.2	06/19/24 14:52 / eli-b
Atrazine	ND	ug/L		0.10	3	E525.2	06/19/24 14:52 / eli-b
Benzo(a)pyrene	ND	ug/L		0.10	0.2	E525.2	06/19/24 14:52 / eli-b
bis(2-ethylhexyl)Adipate	ND	ug/L		0.50	400	E525.2	06/19/24 14:52 / eli-b
bis(2-ethylhexyl)Phthalate	ND	ug/L		0.60	6	E525.2	06/19/24 14:52 / eli-b
Butachlor	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Chlordane	ND	ug/L		1.0	2	E525.2	06/19/24 14:52 / eli-b
Dieldrin	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Endrin	ND	ug/L		0.10	2	E525.2	06/19/24 14:52 / eli-b
gamma-BHC (Lindane)	ND	ug/L		0.10	0.2	E525.2	06/19/24 14:52 / eli-b
Heptachlor	ND	ug/L		0.10	0.4	E525.2	06/19/24 14:52 / eli-b
Heptachlor epoxide	ND	ug/L		0.10	0.2	E525.2	06/19/24 14:52 / eli-b
Hexachlorobenzene	ND	ug/L		0.10	1	E525.2	06/19/24 14:52 / eli-b
Hexachlorocyclopentadiene	ND	ug/L		0.10	50	E525.2	06/19/24 14:52 / eli-b
Methoxychlor	ND	ug/L		0.10	40	E525.2	06/19/24 14:52 / eli-b
Metolachlor	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Metribuzin	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b
Propachlor	ND	ug/L		0.10		E525.2	06/19/24 14:52 / eli-b

Report Definitions:
 RL - Analyte Reporting Limit
 QCL - Quality Control Limit
 J - Estimated value - analyte was present but less than the Reporting Limit (RL)

MCL - Maximum Contaminant Level
 ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-001
Client Sample ID: CMRWA WELL

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
DateReceived: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SEMI-VOLATILE ORGANIC COMPOUNDS							
Simazine	ND	ug/L		0.10	4	E525.2	06/19/24 14:52 / eli-b
Toxaphene	ND	ug/L		2.0	3	E525.2	06/19/24 14:52 / eli-b
PCBs, Total	ND	ug/L		0.50	0.5	E525.2	06/19/24 14:52 / eli-b
Surr: 1,3-Dimethyl-2-nitrobenzene	98.0	%REC		70-130		E525.2	06/19/24 14:52 / eli-b
Surr: Perylene-d12	93.0	%REC		70-130		E525.2	06/19/24 14:52 / eli-b
Surr: Pyrene-d10	99.0	%REC		70-130		E525.2	06/19/24 14:52 / eli-b
Surr: Triphenylphosphate	106	%REC		70-130		E525.2	06/19/24 14:52 / eli-b
- Note: The federal MCL for total PCB's is 0.5 ug/L as Decachlorobiphenyl (DCB). PCB screening at the reporting limits given for the individual Aroclors meets or exceeds federal and state requirements for "Total PCB" monitoring if Aroclors are not detected.							
SEMI-VOLATILE ORGANIC COMPOUNDS							
Endothall	ND	ug/L		8.0	100	E548.1	06/19/24 15:05 / eli-b
Surr: 2,4-Dichlorophenylacetic acid	87.0	%REC		70-130		E548.1	06/19/24 15:05 / eli-b
PESTICIDES, BY HPLC							
Aldicarb	ND	ug/L		1.0	3	E531.1	06/13/24 15:48 / eli-ca
Aldicarb sulfone	ND	ug/L		1.0	2	E531.1	06/13/24 15:48 / eli-ca
Aldicarb sulfoxide	ND	ug/L		1.0	4	E531.1	06/13/24 15:48 / eli-ca
Carbaryl	ND	ug/L		1.0		E531.1	06/13/24 15:48 / eli-ca
3-Hydroxycarbofuran	ND	ug/L		1.0		E531.1	06/13/24 15:48 / eli-ca
Carbofuran	ND	ug/L		1.0	40	E531.1	06/13/24 15:48 / eli-ca
Methiocarb	ND	ug/L		1.0		E531.1	06/13/24 15:48 / eli-ca
Methomyl	ND	ug/L		1.0		E531.1	06/13/24 15:48 / eli-ca
Oxamyl	ND	ug/L		1.0	200	E531.1	06/13/24 15:48 / eli-ca
Baygon	ND	ug/L		1.0		E531.1	06/13/24 15:48 / eli-ca
Surr: BDMC	97.0	%REC		70-130		E531.1	06/13/24 15:48 / eli-ca
VOCS BY MICROEXTRACTION-ECD							
1,2-Dibromo-3-chloropropane	ND	ug/L		0.020	0.2	E504.1	06/17/24 21:29 / eli-b
1,2-Dibromoethane	ND	ug/L		0.010	0.05	E504.1	06/17/24 21:29 / eli-b
Surr: 1,1,1,2-Tetrachloroethane	91.0	%REC		70-130		E504.1	06/17/24 21:29 / eli-b
HERBICIDES, BY HPLC							
Glyphosate	ND	ug/L	D	25	700	E547	06/13/24 15:01 / eli-ca
PESTICIDES							
Diquat	ND	ug/L		0.40	20	E549.2	06/18/24 13:23 / ADW
HERBICIDES							
2,4,5-TP (Silvex)	ND	ug/L		0.25	50	E515.4	06/13/24 09:16 / eli-b12
2,4-D	ND	ug/L		1.0	70	E515.4	06/13/24 09:16 / eli-b12
2,4-DB	ND	ug/L		1.0		E515.4	06/13/24 09:16 / eli-b12
Dalapon	ND	ug/L		2.5	200	E515.4	06/13/24 09:16 / eli-b12
Dicamba	ND	ug/L		1.0		E515.4	06/13/24 09:16 / eli-b12
Dichlorprop	ND	ug/L		1.0		E515.4	06/13/24 09:16 / eli-b12

Report RL - Analyte Reporting Limit

Definitions: QCL - Quality Control Limit

D - Reporting Limit (RL) increased due to sample matrix

MCL - Maximum Contaminant Level

ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-001
Client Sample ID: CMRWA WELL

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
HERBICIDES							
Dinoseb	ND	ug/L		1.0	7	E515.4	06/13/24 09:16 / eli-b12
Pentachlorophenol	ND	ug/L		0.10	1	E515.4	06/13/24 09:16 / eli-b12
Picloram	ND	ug/L		0.50	500	E515.4	06/13/24 09:16 / eli-b12
Surr: 2,4-Dichlorophenylacetic acid	107	%REC		70-130		E515.4	06/13/24 09:16 / eli-b12

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-002
Client Sample ID: Trip Blank

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Bromobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Bromochloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Bromodichloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Bromoform	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Bromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
n-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
sec-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
tert-Butylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Chlorobenzene	ND	ug/L		0.50	100	E524.2	06/11/24 13:59 / tmj
Chlorodibromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Chloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Chloroform	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Chloromethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
2-Chlorotoluene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
4-Chlorotoluene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Dibromomethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	06/11/24 13:59 / tmj
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	06/11/24 13:59 / tmj
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	06/11/24 13:59 / tmj
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	06/11/24 13:59 / tmj
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	06/11/24 13:59 / tmj
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Ethylbenzene	ND	ug/L		0.50	700	E524.2	06/11/24 13:59 / tmj
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Isopropylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Methylene chloride	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Naphthalene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
n-Propylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Styrene	ND	ug/L		0.50	100	E524.2	06/11/24 13:59 / tmj
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060249-002
Client Sample ID: Trip Blank

Report Date: 06/21/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Toluene	ND	ug/L		0.50	1000	E524.2	06/11/24 13:59 / tmj
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	06/11/24 13:59 / tmj
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	06/11/24 13:59 / tmj
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Trichloroethene	ND	ug/L		0.50	5	E524.2	06/11/24 13:59 / tmj
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Vinyl chloride	ND	ug/L		0.50	2	E524.2	06/11/24 13:59 / tmj
m+p-Xylenes	ND	ug/L		1.0		E524.2	06/11/24 13:59 / tmj
o-Xylene	ND	ug/L		0.50		E524.2	06/11/24 13:59 / tmj
Trihalomethanes, Total	ND	ug/L		0.50	80	E524.2	06/11/24 13:59 / tmj
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	06/11/24 13:59 / tmj
Surr: p-Bromofluorobenzene	105	%REC		70-130		E524.2	06/11/24 13:59 / tmj
Surr: 1,2-Dichloroethane-d4	105	%REC		70-130		E524.2	06/11/24 13:59 / tmj
Surr: Toluene-d8	106	%REC		70-130		E524.2	06/11/24 13:59 / tmj

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R195709
Lab ID: MBLK		Method Blank					Run: PHSC_101-H_240613A			06/13/24 17:48
Alkalinity, Total as CaCO ₃		ND	mg/L	2						
Lab ID: LCS										06/13/24 17:53
Laboratory Control Sample							Run: PHSC_101-H_240613A			
Alkalinity, Total as CaCO ₃		600	mg/L	4.0	100	90	110			
Lab ID: H24060246-001ADUP										06/13/24 18:09
Sample Duplicate							Run: PHSC_101-H_240613A			
Alkalinity, Total as CaCO ₃		82	mg/L	4.0				0.7	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS20240610A
Lab ID: LCS_20240610-1		Laboratory Control Sample					Run: Accu-124 (14410200)_240610		06/10/24 15:04	
Solids, Total Dissolved TDS @ 180 C		2010	mg/L	50	100	90	110			
Lab ID: MBLK_20240610-2		Method Blank					Run: Accu-124 (14410200)_240610		06/10/24 15:14	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	7						
Lab ID: LCS_20240610-2		Laboratory Control Sample					Run: Accu-124 (14410200)_240610		06/10/24 15:15	
Solids, Total Dissolved TDS @ 180 C		1980	mg/L	50	99	90	110			
Lab ID: H24060254-001BDUP		Sample Duplicate					Run: Accu-124 (14410200)_240610		06/10/24 15:23	
Solids, Total Dissolved TDS @ 180 C		157	mg/L	25				4.4	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B							Analytical Run: PHSC_101-H_240610A			
Lab ID: pH 7	2	Initial Calibration Verification Standard								06/10/24 08:46
pH		7.0	s.u.	0.1	100	98	102			
pH Measurement Temp		21.1	°C			0	0			
Lab ID: CCV - pH 7	2	Continuing Calibration Verification Standard								06/10/24 15:36
pH		7.0	s.u.	0.1	101	98	102			
pH Measurement Temp		19.3	°C			0	0			
Method: A4500-H B							Batch: R195602			
Lab ID: H24060248-034ADUP	2	Sample Duplicate								06/10/24 16:31
pH		7.3	s.u.	0.1				0.0	3	H
pH Measurement Temp		17.5	°C							

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

H - Analysis performed past the method holding time

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Analytical Run: ICP2-HE_240613A
Lab ID: ICV	3	Initial Calibration Verification Standard								06/13/24 09:27
Calcium		41.4	mg/L	1.0	104	95	105			
Iron		3.95	mg/L	0.020	99	95	105			
Magnesium		40.2	mg/L	1.0	100	95	105			
Lab ID: CCV-1	3	Continuing Calibration Verification Standard								06/13/24 09:30
Calcium		25.7	mg/L	1.0	103	95	105			
Iron		2.44	mg/L	0.020	98	95	105			
Magnesium		25.0	mg/L	1.0	100	95	105			
Lab ID: ICSA	3	Interference Check Sample A								06/13/24 09:44
Calcium		505	mg/L	1.0	101	80	120			
Iron		175	mg/L	0.020	88	80	120			
Magnesium		538	mg/L	1.0	108	80	120			
Lab ID: ICSAB	3	Interference Check Sample AB								06/13/24 09:48
Calcium		462	mg/L	1.0	92	80	120			
Iron		160	mg/L	0.020	80	80	120			
Magnesium		492	mg/L	1.0	98	80	120			
Lab ID: CCV	3	Continuing Calibration Verification Standard								06/13/24 10:03
Calcium		26.4	mg/L	1.0	105	90	110			
Iron		2.43	mg/L	0.020	97	90	110			
Magnesium		24.8	mg/L	1.0	99	90	110			
Method: E200.7										Batch: R195725
Lab ID: MB	3	Method Blank								Run: ICP2-HE_240613A 06/13/24 09:55
Calcium		ND	mg/L	0.2						
Iron		ND	mg/L	0.008						
Magnesium		ND	mg/L	0.05						
Lab ID: LFB	3	Laboratory Fortified Blank								Run: ICP2-HE_240613A 06/13/24 09:59
Calcium		49.9	mg/L	1.0	100	85	115			
Iron		4.62	mg/L	0.020	92	85	115			
Magnesium		47.7	mg/L	1.0	95	85	115			
Lab ID: H24060188-001ADIL	3	Serial Dilution								Run: ICP2-HE_240613A 06/13/24 10:16
Calcium		100	mg/L	1.0		0	0	1.6	10	
Iron		0.180	mg/L	0.092		0	0		10	N
Magnesium		15.0	mg/L	1.1		0	0	0.7	10	
Lab ID: H24060188-001AMS2	3	Sample Matrix Spike								Run: ICP2-HE_240613A 06/13/24 10:20
Calcium		147	mg/L	1.0	90	70	130			
Iron		4.86	mg/L	0.020	94	70	130			
Magnesium		62.6	mg/L	1.0	95	70	130			
Lab ID: H24060188-001AMSD2	3	Sample Matrix Spike Duplicate								Run: ICP2-HE_240613A 06/13/24 10:24
Calcium		146	mg/L	1.0	88	70	130	0.4	20	
Iron		4.90	mg/L	0.020	95	70	130	0.8	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

N - Analyte concentration was not sufficiently high to calculate a Relative Percent Difference (RPD) for the serial dilution test

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: R195725
Lab ID: H24060188-001AMSD2	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_240613A				06/13/24 10:24
Magnesium		62.5	mg/L	1.0	95	70	130	0.2	20	
Method: E200.7										Analytical Run: ICP2-HE_240619A
Lab ID: ICV	2	Initial Calibration Verification Standard								06/19/24 09:56
Potassium		40.1	mg/L	1.0	100	95	105			
Sodium		40.0	mg/L	1.0	100	95	105			
Lab ID: CCV-1	2	Continuing Calibration Verification Standard								06/19/24 09:59
Potassium		24.5	mg/L	1.0	98	95	105			
Sodium		24.3	mg/L	1.0	97	95	105			
Lab ID: ICSA	2	Interference Check Sample A								06/19/24 10:12
Potassium		ND	mg/L	1.0		0	0			
Sodium		ND	mg/L	1.0		0	0			
Lab ID: ICSAB	2	Interference Check Sample AB								06/19/24 10:16
Potassium		20.5	mg/L	1.0	103	80	120			
Sodium		20.6	mg/L	1.0	103	80	120			
Lab ID: CCV	2	Continuing Calibration Verification Standard								06/19/24 10:32
Potassium		24.6	mg/L	1.0	98	90	110			
Sodium		24.4	mg/L	1.0	98	90	110			
Method: E200.7										Batch: R195897
Lab ID: MB	2	Method Blank				Run: ICP2-HE_240619A				06/19/24 10:24
Potassium		0.07	mg/L	0.06						
Sodium		0.05	mg/L	0.03						
Lab ID: LFB	2	Laboratory Fortified Blank				Run: ICP2-HE_240619A				06/19/24 10:28
Potassium		49.7	mg/L	1.0	99	85	115			
Sodium		49.6	mg/L	1.0	99	85	115			
Lab ID: H24060249-001BDIL	2	Serial Dilution				Run: ICP2-HE_240619A				06/19/24 10:48
Potassium		1.93	mg/L	1.0		0	0		10	N
Sodium		4.41	mg/L	1.0		0	0	2.9	10	
Lab ID: H24060249-001BMS2	2	Sample Matrix Spike				Run: ICP2-HE_240619A				06/19/24 10:52
Potassium		52.7	mg/L	1.0	102	70	130			
Sodium		55.2	mg/L	1.0	102	70	130			
Lab ID: H24060249-001BMUSD2	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_240619A				06/19/24 10:55
Potassium		53.2	mg/L	1.0	103	70	130	1.1	20	
Sodium		55.7	mg/L	1.0	103	70	130	1.0	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

N - Analyte concentration was not sufficiently high to calculate a Relative Percent Difference (RPD) for the serial dilution test

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8		Analytical Run: ICPMS205-H_240613A								
Lab ID: ICV	12 Initial Calibration Verification Standard									06/13/24 11:24
Antimony		0.0593	mg/L	0.0030	99	90	110			
Arsenic		0.0614	mg/L	0.0050	102	90	110			
Barium		0.0592	mg/L	0.10	99	90	110			
Beryllium		0.0302	mg/L	0.0010	101	90	110			
Cadmium		0.0312	mg/L	0.0010	104	90	110			
Chromium		0.0607	mg/L	0.010	101	90	110			
Copper		0.0626	mg/L	0.010	104	90	110			
Lead		0.0622	mg/L	0.0010	104	90	110			
Manganese		0.298	mg/L	0.010	99	90	110			
Nickel		0.0627	mg/L	0.010	105	90	110			
Selenium		0.0613	mg/L	0.0050	102	90	110			
Thallium		0.0615	mg/L	0.0010	103	90	110			
Lab ID: ICSA	12 Interference Check Sample A									06/13/24 11:29
Antimony		ND	mg/L	0.0030						
Arsenic		ND	mg/L	0.0050						
Barium		ND	mg/L	0.10						
Beryllium		ND	mg/L	0.0010						
Cadmium		ND	mg/L	0.0010						
Chromium		ND	mg/L	0.010						
Copper		ND	mg/L	0.010						
Lead		ND	mg/L	0.0010						
Manganese		ND	mg/L	0.010						
Nickel		ND	mg/L	0.010						
Selenium		ND	mg/L	0.0050						
Thallium		ND	mg/L	0.0010						
Lab ID: ICSAB	12 Interference Check Sample AB									06/13/24 11:34
Antimony		ND	mg/L	0.0030		0	0			
Arsenic		0.00971	mg/L	0.0050	97	70	130			
Barium		ND	mg/L	0.10		0	0			
Beryllium		ND	mg/L	0.0010		0	0			
Cadmium		0.0102	mg/L	0.0010	102	70	130			
Chromium		0.0197	mg/L	0.010	98	70	130			
Copper		0.0192	mg/L	0.010	96	70	130			
Lead		ND	mg/L	0.0010		0	0			
Manganese		0.0186	mg/L	0.010	93	70	130			
Nickel		0.0199	mg/L	0.010	100	70	130			
Selenium		0.00909	mg/L	0.0050	91	70	130			
Thallium		ND	mg/L	0.0010		0	0			
Lab ID: CCV	12 Continuing Calibration Verification Standard									06/13/24 11:40
Antimony		0.0502	mg/L	0.0030	100	90	110			
Arsenic		0.0509	mg/L	0.0050	102	90	110			
Barium		0.0506	mg/L	0.10	101	90	110			
Beryllium		0.0514	mg/L	0.0010	103	90	110			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8		Analytical Run: ICPMS205-H_240613A								
Lab ID: CCV	12 Continuing Calibration Verification Standard		06/13/24 11:40							
Cadmium		0.0515	mg/L	0.0010	103	90	110			
Chromium		0.0501	mg/L	0.010	100	90	110			
Copper		0.0506	mg/L	0.010	101	90	110			
Lead		0.0524	mg/L	0.0010	105	90	110			
Manganese		0.0479	mg/L	0.010	96	90	110			
Nickel		0.0506	mg/L	0.010	101	90	110			
Selenium		0.0503	mg/L	0.0050	101	90	110			
Thallium		0.0532	mg/L	0.0010	106	90	110			
Method: E200.8		Batch: R195733								
Lab ID: LRB	12 Method Blank		Run: ICPMS205-H_240613A 06/13/24 11:45							
Antimony		ND	mg/L	0.0001						
Arsenic		ND	mg/L	0.0004						
Barium		ND	mg/L	0.0005						
Beryllium		ND	mg/L	0.00008						
Cadmium		ND	mg/L	0.0002						
Chromium		ND	mg/L	0.0008						
Copper		ND	mg/L	0.003						
Lead		ND	mg/L	0.0002						
Manganese		ND	mg/L	0.0007						
Nickel		ND	mg/L	0.001						
Selenium		ND	mg/L	0.0005						
Thallium		ND	mg/L	0.0001						
Lab ID: LFB	12 Laboratory Fortified Blank		Run: ICPMS205-H_240613A 06/13/24 11:47							
Antimony		0.0463	mg/L	0.0030	93	85	115			
Arsenic		0.0506	mg/L	0.0050	101	85	115			
Barium		0.0500	mg/L	0.10	100	85	115			
Beryllium		0.0520	mg/L	0.0010	104	85	115			
Cadmium		0.0512	mg/L	0.0010	102	85	115			
Chromium		0.0500	mg/L	0.010	100	85	115			
Copper		0.0518	mg/L	0.010	104	85	115			
Lead		0.0513	mg/L	0.0010	103	85	115			
Manganese		0.0499	mg/L	0.010	100	85	115			
Nickel		0.0521	mg/L	0.010	104	85	115			
Selenium		0.0498	mg/L	0.0050	100	85	115			
Thallium		0.0518	mg/L	0.0010	103	85	115			
Lab ID: H24060225-001AMS	12 Sample Matrix Spike		Run: ICPMS205-H_240613A 06/13/24 12:00							
Antimony		0.0464	mg/L	0.0010	93	70	130			
Arsenic		0.0522	mg/L	0.0010	103	70	130			
Barium		0.0502	mg/L	0.050	100	70	130			
Beryllium		0.0522	mg/L	0.0010	104	70	130			
Cadmium		0.0507	mg/L	0.0010	101	70	130			
Chromium		0.0496	mg/L	0.0050	99	70	130			
Copper		0.0556	mg/L	0.0050	102	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R195733
Lab ID: H24060225-001AMS	12	Sample Matrix Spike		Run: ICPMS205-H_240613A				06/13/24 12:00		
Lead		0.0547	mg/L	0.0010	109	70	130			
Manganese		0.0489	mg/L	0.0010	98	70	130			
Nickel		0.0503	mg/L	0.0050	101	70	130			
Selenium		0.0522	mg/L	0.0010	104	70	130			
Thallium		0.0554	mg/L	0.00050	111	70	130			
Lab ID: H24060225-001AMSD	12	Sample Matrix Spike Duplicate		Run: ICPMS205-H_240613A				06/13/24 12:03		
Antimony		0.0481	mg/L	0.0010	96	70	130	3.6	20	
Arsenic		0.0534	mg/L	0.0010	106	70	130	2.2	20	
Barium		0.0507	mg/L	0.050	101	70	130	1.1	20	
Beryllium		0.0519	mg/L	0.0010	104	70	130	0.5	20	
Cadmium		0.0500	mg/L	0.0010	100	70	130	1.4	20	
Chromium		0.0505	mg/L	0.0050	101	70	130	1.8	20	
Copper		0.0571	mg/L	0.0050	104	70	130	2.6	20	
Lead		0.0559	mg/L	0.0010	112	70	130	2.1	20	
Manganese		0.0499	mg/L	0.0010	100	70	130	2.0	20	
Nickel		0.0511	mg/L	0.0050	102	70	130	1.7	20	
Selenium		0.0536	mg/L	0.0010	107	70	130	2.7	20	
Thallium		0.0568	mg/L	0.00050	114	70	130	2.5	20	

Qualifiers:

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ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										
Analytical Run: HGCV205-H_240613A										
Lab ID: ICV	Initial Calibration Verification Standard									
Mercury		0.000952	mg/L	0.00010	95	90	110			06/13/24 15:58
Lab ID: CCV1	Continuing Calibration Verification Standard									
Mercury		0.00253	mg/L	0.00010	101	95	105			06/13/24 16:00
Method: E245.1										
Batch: 72282										
Lab ID: MB-72282	Method Blank									
Mercury		ND	mg/L	0.00005						Run: HGCV205-H_240613A 06/13/24 16:04
Lab ID: LCS-72282	Laboratory Control Sample									
Mercury		0.000524	mg/L	0.00010	105	85	115			Run: HGCV205-H_240613A 06/13/24 16:06
Lab ID: H24060211-001BMS	Sample Matrix Spike									
Mercury		0.000510	mg/L	0.00010	102	70	130			Run: HGCV205-H_240613A 06/13/24 16:10
Lab ID: H24060211-001BMSD	Sample Matrix Spike Duplicate									
Mercury		0.000507	mg/L	0.00010	101	70	130	0.5	20	Run: HGCV205-H_240613A 06/13/24 16:12

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0		Analytical Run: IC METROHM_240611A								
Lab ID: ICV	3	Initial Calibration Verification Standard								06/11/24 12:44
Chloride		98.8	mg/L	1.0	99	90	110			
Sulfate		381	mg/L	1.0	95	90	110			
Fluoride		5.40	mg/L	0.10	108	90	110			
Lab ID: CCV	3	Continuing Calibration Verification Standard								06/12/24 21:16
Chloride		50.4	mg/L	1.0	101	90	110			
Sulfate		199	mg/L	1.0	100	90	110			
Fluoride		2.43	mg/L	0.10	97	90	110			
Method: E300.0		Batch: R195679								
Lab ID: ICB	3	Method Blank								Run: IC METROHM_240611A 06/11/24 12:30
Chloride		ND	mg/L	0.02						
Sulfate		ND	mg/L	0.03						
Fluoride		ND	mg/L	0.01						
Lab ID: LFB	3	Laboratory Fortified Blank								Run: IC METROHM_240611A 06/11/24 12:59
Chloride		23.8	mg/L	1.0	95	90	110			
Sulfate		97.5	mg/L	1.0	97	90	110			
Fluoride		1.23	mg/L	0.10	98	90	110			
Lab ID: H24060254-004AMS	3	Sample Matrix Spike								Run: IC METROHM_240611A 06/13/24 00:08
Chloride		37.6	mg/L	1.0	100	90	110			
Sulfate		252	mg/L	1.0	94	90	110			
Fluoride		1.69	mg/L	0.10	94	90	110			
Lab ID: H24060254-004AMSD	3	Sample Matrix Spike Duplicate								Run: IC METROHM_240611A 06/13/24 00:23
Chloride		37.4	mg/L	1.0	99	90	110	0.5	20	
Sulfate		253	mg/L	1.0	94	90	110	0.1	20	
Fluoride		1.67	mg/L	0.10	92	90	110	1.6	20	

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Analytical Run: FIA203-HE_240610B
Lab ID: ICV	Initial Calibration Verification Standard									
Nitrogen, Nitrite as N		1.04	mg/L	0.010	104	90	110			06/10/24 15:01
Method: E353.2										Batch: R195625
Lab ID: MBLK	Method Blank									
Nitrogen, Nitrite as N		ND	mg/L	0.009						Run: FIA203-HE_240610B 06/10/24 15:02
Lab ID: LFB	Laboratory Fortified Blank									
Nitrogen, Nitrite as N		0.999	mg/L	0.011	100	90	110			Run: FIA203-HE_240610B 06/10/24 15:04
Lab ID: H24060249-001ADUP	Sample Duplicate									
Nitrogen, Nitrite as N		ND	mg/L	0.010						Run: FIA203-HE_240610B 06/10/24 15:06 10
Lab ID: H24060249-001AMS	Sample Matrix Spike									
Nitrogen, Nitrite as N		1.01	mg/L	0.011	101	90	110			Run: FIA203-HE_240610B 06/10/24 15:07
Lab ID: H24060249-001AMSD	Sample Matrix Spike Duplicate									
Nitrogen, Nitrite as N		1.01	mg/L	0.011	101	90	110	0.7	10	Run: FIA203-HE_240610B 06/10/24 15:08
Method: E353.2										Analytical Run: SEAL AA500_240618B
Lab ID: ICV	Initial Calibration Verification Standard									
Nitrogen, Nitrate+Nitrite as N		0.982	mg/L	0.010	98	90	110			06/18/24 17:41
Lab ID: CCV	Continuing Calibration Verification Standard									
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.010	102	90	110			06/18/24 19:00
Method: E353.2										Batch: R195893
Lab ID: ICB	Method Blank									
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.01						Run: SEAL AA500_240618B 06/18/24 17:38
Lab ID: LFB	Laboratory Fortified Blank									
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.011	101	90	110			Run: SEAL AA500_240618B 06/18/24 17:42
Lab ID: H24060230-002CMS	Sample Matrix Spike									
Nitrogen, Nitrate+Nitrite as N		0.990	mg/L	0.011	99	90	110			Run: SEAL AA500_240618B 06/18/24 19:06
Lab ID: H24060230-002CMSD	Sample Matrix Spike Duplicate									
Nitrogen, Nitrate+Nitrite as N		0.970	mg/L	0.011	97	90	110	1.9	10	Run: SEAL AA500_240618B 06/18/24 19:07

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E504.1										Analytical Run: B_190477
Lab ID: CAL2-190477	3	Continuing Calibration Verification Standard								06/17/24 19:11
1,2-Dibromo-3-chloropropane		0.0466	ug/L	0.020	93	70	130			
1,2-Dibromoethane		0.0532	ug/L	0.010	106	70	130			
Surr: 1,1,1,2-Tetrachloroethane				0.020	91	70	130			
Lab ID: CAL4-190477	3	Continuing Calibration Verification Standard								06/18/24 03:26
1,2-Dibromo-3-chloropropane		0.204	ug/L	0.020	102	70	130			
1,2-Dibromoethane		0.192	ug/L	0.010	96	70	130			
Surr: 1,1,1,2-Tetrachloroethane				0.020	96	70	130			
Method: E504.1										Batch: B_190477
Lab ID: LCS-190477	3	Laboratory Control Sample				Run: SUB-B423140			06/17/24 19:50	
1,2-Dibromo-3-chloropropane		0.220	ug/L	0.020	88	70	130			
1,2-Dibromoethane		0.217	ug/L	0.010	87	70	130			
Surr: 1,1,1,2-Tetrachloroethane				0.020	92	70	130			
Lab ID: LCSD-190477	3	Laboratory Control Sample Duplicate				Run: SUB-B423140			06/17/24 20:10	
1,2-Dibromo-3-chloropropane		0.237	ug/L	0.020	95	70	130	7.5	20	
1,2-Dibromoethane		0.214	ug/L	0.010	86	70	130	1.3	20	
Surr: 1,1,1,2-Tetrachloroethane				0.020	90	70	130			
Lab ID: MB-190477	3	Method Blank				Run: SUB-B423140			06/17/24 20:30	
1,2-Dibromo-3-chloropropane		ND	ug/L	0.020						
1,2-Dibromoethane		ND	ug/L	0.010						
Surr: 1,1,1,2-Tetrachloroethane				0.020	89	70	130			
Lab ID: B24061383-001OMS	3	Sample Matrix Spike				Run: SUB-B423140			06/18/24 02:46	
1,2-Dibromo-3-chloropropane		0.227	ug/L	0.020	93	65	135			
1,2-Dibromoethane		0.219	ug/L	0.010	89	65	135			
Surr: 1,1,1,2-Tetrachloroethane				0.020	92	65	135			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Analytical Run: B_190341
Lab ID: CAL1-190341	10 Continuing Calibration Verification Standard									06/13/24 01:10
2,4,5-TP (Silvex)		0.285	ug/L	0.25	114	50	150			
2,4-D		1.05	ug/L	1.0	105	50	150			
2,4-DB		1.11	ug/L	1.0	111	50	150			
Dalapon		1.03	ug/L	2.5	103	50	150			
Dicamba		0.526	ug/L	1.0	105	50	150			
Dichlorprop		1.11	ug/L	1.0	111	50	150			
Dinoseb		1.09	ug/L	1.0	109	50	150			
Pentachlorophenol		0.0968	ug/L	0.10	97	50	150			
Picloram		0.537	ug/L	0.50	107	50	150			
Surr: 2,4-Dichlorophenylacetic acid					105	70	130			
Lab ID: CAL3-190341	10 Continuing Calibration Verification Standard									06/13/24 06:47
2,4,5-TP (Silvex)		0.808	ug/L	0.25	108	70	130			
2,4-D		3.36	ug/L	1.0	112	70	130			
2,4-DB		3.43	ug/L	1.0	114	70	130			
Dalapon		3.13	ug/L	2.5	104	70	130			
Dicamba		1.56	ug/L	1.0	104	70	130			
Dichlorprop		3.40	ug/L	1.0	113	70	130			
Dinoseb		3.17	ug/L	1.0	106	70	130			
Pentachlorophenol		0.293	ug/L	0.10	98	70	130			
Picloram		1.61	ug/L	0.50	108	70	130			
Surr: 2,4-Dichlorophenylacetic acid					102	70	130			
Lab ID: CAL5-190341	10 Continuing Calibration Verification Standard									06/13/24 12:19
2,4,5-TP (Silvex)		1.77	ug/L	0.25	101	70	130			
2,4-D		7.40	ug/L	1.0	106	70	130			
2,4-DB		7.00	ug/L	1.0	100	70	130			
Dalapon		6.58	ug/L	2.5	94	70	130			
Dicamba		3.37	ug/L	1.0	96	70	130			
Dichlorprop		7.24	ug/L	1.0	103	70	130			
Dinoseb		7.19	ug/L	1.0	103	70	130			
Pentachlorophenol		0.661	ug/L	0.10	94	70	130			
Picloram		3.68	ug/L	0.50	105	70	130			
Surr: 2,4-Dichlorophenylacetic acid					102	70	130			
Method: E515.4										Batch: B_190341
Lab ID: LCS-190341	10 Laboratory Control Sample									06/13/24 01:48
					Run: SUB-B423093					
2,4,5-TP (Silvex)		1.40	ug/L	0.25	112	70	130			
2,4-D		4.59	ug/L	1.0	92	70	130			
2,4-DB		4.75	ug/L	1.0	95	70	130			
Dalapon		4.66	ug/L	2.5	93	70	130			
Dicamba		2.47	ug/L	1.0	99	70	130			
Dichlorprop		5.15	ug/L	1.0	103	70	130			
Dinoseb		4.95	ug/L	1.0	99	70	130			
Pentachlorophenol		0.443	ug/L	0.10	89	70	130			
Picloram		2.47	ug/L	0.50	99	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Batch: B_190341
Lab ID: LCS-190341	10	Laboratory Control Sample				Run: SUB-B423093				06/13/24 01:48
Surr: 2,4-Dichlorophenylacetic acid					105	70	130			
Lab ID: MB-190341	10	Method Blank				Run: SUB-B423093				06/13/24 02:26
2,4,5-TP (Silvex)		ND	ug/L	0.25						
2,4-D		ND	ug/L	1.0						
2,4-DB		ND	ug/L	1.0						
Dalapon		ND	ug/L	2.5						
Dicamba		ND	ug/L	1.0						
Dichlorprop		ND	ug/L	1.0						
Dinoseb		ND	ug/L	1.0						
Pentachlorophenol		ND	ug/L	0.10						
Picloram		ND	ug/L	0.50						
Surr: 2,4-Dichlorophenylacetic acid					106	70	130			
Lab ID: B24060949-004AMS	10	Sample Matrix Spike				Run: SUB-B423093				06/13/24 03:40
2,4,5-TP (Silvex)		1.36	ug/L	0.25	109	70	130			
2,4-D		4.59	ug/L	1.0	92	70	130			
2,4-DB		4.60	ug/L	1.0	92	70	130			
Dalapon		4.63	ug/L	2.5	93	70	130			
Dicamba		2.36	ug/L	1.0	94	70	130			
Dichlorprop		5.35	ug/L	1.0	107	70	130			
Dinoseb		4.49	ug/L	1.0	90	70	130			
Pentachlorophenol		0.427	ug/L	0.10	85	70	130			
Picloram		2.57	ug/L	0.50	103	70	130			
Surr: 2,4-Dichlorophenylacetic acid					107	70	130			
Lab ID: B24060949-004AMSD	10	Sample Matrix Spike Duplicate				Run: SUB-B423093				06/13/24 04:18
2,4,5-TP (Silvex)		1.35	ug/L	0.25	108	70	130	0.8	30	
2,4-D		4.52	ug/L	1.0	90	70	130	1.6	30	
2,4-DB		4.57	ug/L	1.0	91	70	130	0.5	30	
Dalapon		4.54	ug/L	2.5	91	70	130	2.0	30	
Dicamba		2.36	ug/L	1.0	94	70	130	0	30	
Dichlorprop		5.34	ug/L	1.0	107	70	130	0.1	30	
Dinoseb		4.47	ug/L	1.0	89	70	130	0.5	30	
Pentachlorophenol		0.434	ug/L	0.10	87	70	130	1.6	30	
Picloram		2.48	ug/L	0.50	99	70	130	3.7	30	
Surr: 2,4-Dichlorophenylacetic acid					107	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2		Analytical Run: R195644								
Lab ID: 11-Jun-24_CCV_2	63	Continuing Calibration Verification Standard								06/11/24 10:19
Benzene		5.90	ug/L	0.50	118	70	130			
Bromobenzene		5.72	ug/L	0.50	114	70	130			
Bromochloromethane		6.47	ug/L	0.50	129	70	130			
Bromodichloromethane		5.83	ug/L	0.50	117	70	130			
Bromoform		5.58	ug/L	0.50	112	70	130			
Bromomethane		5.37	ug/L	0.50	107	70	130			
n-Butylbenzene		6.08	ug/L	0.50	122	70	130			
sec-Butylbenzene		6.04	ug/L	0.50	121	70	130			
tert-Butylbenzene		5.93	ug/L	0.50	119	70	130			
Carbon tetrachloride		6.22	ug/L	0.50	124	70	130			
Chlorobenzene		6.10	ug/L	0.50	122	70	130			
Chlorodibromomethane		5.71	ug/L	0.50	114	70	130			
Chloroethane		5.22	ug/L	0.50	104	70	130			
Chloroform		6.44	ug/L	0.50	129	70	130			
Chloromethane		5.33	ug/L	0.50	107	70	130			
2-Chlorotoluene		5.92	ug/L	0.50	118	70	130			
4-Chlorotoluene		6.04	ug/L	0.50	121	70	130			
Dibromomethane		5.57	ug/L	0.50	111	70	130			
1,2-Dichlorobenzene		5.82	ug/L	0.50	116	70	130			
1,3-Dichlorobenzene		5.84	ug/L	0.50	117	70	130			
1,4-Dichlorobenzene		5.89	ug/L	0.50	118	70	130			
Dichlorodifluoromethane		5.06	ug/L	0.50	101	70	130			
1,1-Dichloroethane		6.38	ug/L	0.50	128	70	130			
1,2-Dichloroethane		5.80	ug/L	0.50	116	70	130			
1,1-Dichloroethene		6.32	ug/L	0.50	126	70	130			
cis-1,2-Dichloroethene		6.38	ug/L	0.50	128	70	130			
trans-1,2-Dichloroethene		6.43	ug/L	0.50	129	70	130			
1,2-Dichloropropane		5.93	ug/L	0.50	119	70	130			
1,3-Dichloropropane		5.63	ug/L	0.50	113	70	130			
2,2-Dichloropropane		6.81	ug/L	0.50	136	70	130			S
1,1-Dichloropropene		5.98	ug/L	0.50	120	70	130			
cis-1,3-Dichloropropene		5.75	ug/L	0.50	115	70	130			
trans-1,3-Dichloropropene		5.72	ug/L	0.50	114	70	130			
Ethylbenzene		6.11	ug/L	0.50	122	70	130			
Hexachlorobutadiene		6.86	ug/L	0.50	137	70	130			S
Isopropylbenzene		6.17	ug/L	0.50	123	70	130			
p-Isopropyltoluene		6.22	ug/L	0.50	124	70	130			
Methyl tert-butyl ether (MTBE)		5.95	ug/L	0.50	119	70	130			
Methylene chloride		5.83	ug/L	0.50	117	70	130			
Naphthalene		5.72	ug/L	0.50	114	70	130			
n-Propylbenzene		6.06	ug/L	0.50	121	70	130			
Styrene		5.79	ug/L	0.50	116	70	130			
1,1,1,2-Tetrachloroethane		5.89	ug/L	0.50	118	70	130			
1,1,2,2-Tetrachloroethane		6.20	ug/L	0.50	124	70	130			
Tetrachloroethene		6.04	ug/L	0.50	121	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Analytical Run: R195644
Lab ID: 11-Jun-24_CCV_2	63	Continuing Calibration Verification Standard								06/11/24 10:19
Toluene		6.06	ug/L	0.50	121	70	130			
1,2,3-Trichlorobenzene		6.25	ug/L	0.50	125	70	130			
1,2,4-Trichlorobenzene		5.99	ug/L	0.50	120	70	130			
1,1,1-Trichloroethane		6.14	ug/L	0.50	123	70	130			
1,1,2-Trichloroethane		5.64	ug/L	0.50	113	70	130			
Trichloroethene		6.48	ug/L	0.50	130	70	130			
Trichlorofluoromethane		5.31	ug/L	0.50	106	70	130			
1,2,3-Trichloropropane		5.87	ug/L	0.50	117	70	130			
1,2,4-Trimethylbenzene		5.93	ug/L	0.50	119	70	130			
1,3,5-Trimethylbenzene		6.01	ug/L	0.50	120	70	130			
Vinyl chloride		5.14	ug/L	0.20	103	70	130			
m+p-Xylenes		12.1	ug/L	0.50	121	70	130			
o-Xylene		5.80	ug/L	0.50	116	70	130			
Trihalomethanes, Total		23.6	ug/L	0.50	118	70	130			
Xylenes, Total		17.9	ug/L	0.50	119	70	130			
Surr: p-Bromofluorobenzene				0.50	102	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	96	70	130			
Surr: Toluene-d8				0.50	110	70	130			
Lab ID: 11-Jun-24_CCV1_4	8	Continuing Calibration Verification Standard								06/11/24 12:00
Bromodichloromethane		0.590	ug/L	0.50	118	50	150			
Bromoform		0.630	ug/L	0.50	126	50	150			
Chlorodibromomethane		0.741	ug/L	0.50	148	50	150			
Chloroform		0.537	ug/L	0.50	107	50	150			
Trihalomethanes, Total		2.50	ug/L	0.50	125	50	150			
Surr: 1,2-Dichloroethane-d4				0.50	97	70	130			
Surr: p-Bromofluorobenzene				0.50	110	70	130			
Surr: Toluene-d8				0.50	115	70	130			
Method: E524.2										Batch: R195644
Lab ID: 11-Jun-24_LCS_3	63	Laboratory Control Sample								06/11/24 11:13
Benzene		4.98	ug/L	0.50	100	70	130			
Bromobenzene		4.87	ug/L	0.50	97	70	130			
Bromochloromethane		5.31	ug/L	0.50	106	70	130			
Bromodichloromethane		4.75	ug/L	0.50	95	70	130			
Bromoform		4.86	ug/L	0.50	97	70	130			
Bromomethane		6.44	ug/L	0.50	129	70	130			
n-Butylbenzene		5.32	ug/L	0.50	106	70	130			
sec-Butylbenzene		4.80	ug/L	0.50	96	70	130			
tert-Butylbenzene		4.95	ug/L	0.50	99	70	130			
Carbon tetrachloride		5.04	ug/L	0.50	101	70	130			
Chlorobenzene		4.97	ug/L	0.50	99	70	130			
Chlorodibromomethane		4.81	ug/L	0.50	96	70	130			
Chloroethane		6.02	ug/L	0.50	120	70	130			
Chloroform		5.50	ug/L	0.50	110	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R195644
Lab ID: 11-Jun-24_LCS_3	63	Laboratory Control Sample			Run: 5973MSD_240611A			06/11/24 11:13		
Chloromethane		5.82	ug/L	0.50	116	70	130			
2-Chlorotoluene		5.05	ug/L	0.50	101	70	130			
4-Chlorotoluene		5.05	ug/L	0.50	101	70	130			
Dibromomethane		4.70	ug/L	0.50	94	70	130			
1,2-Dichlorobenzene		4.91	ug/L	0.50	98	70	130			
1,3-Dichlorobenzene		4.89	ug/L	0.50	98	70	130			
1,4-Dichlorobenzene		5.07	ug/L	0.50	101	70	130			
Dichlorodifluoromethane		4.80	ug/L	0.50	96	70	130			
1,1-Dichloroethane		5.41	ug/L	0.50	108	70	130			
1,2-Dichloroethane		4.92	ug/L	0.50	98	70	130			
1,1-Dichloroethene		5.34	ug/L	0.50	107	70	130			
cis-1,2-Dichloroethene		5.26	ug/L	0.50	105	70	130			
trans-1,2-Dichloroethene		5.50	ug/L	0.50	110	70	130			
1,2-Dichloropropane		4.88	ug/L	0.50	98	70	130			
1,3-Dichloropropane		4.85	ug/L	0.50	97	70	130			
2,2-Dichloropropane		5.71	ug/L	0.50	114	70	130			
1,1-Dichloropropene		4.85	ug/L	0.50	97	70	130			
cis-1,3-Dichloropropene		4.64	ug/L	0.50	93	70	130			
trans-1,3-Dichloropropene		4.28	ug/L	0.50	86	70	130			
Ethylbenzene		4.96	ug/L	0.50	99	70	130			
Hexachlorobutadiene		5.89	ug/L	0.50	118	70	130			
Isopropylbenzene		5.10	ug/L	0.50	102	70	130			
p-Isopropyltoluene		5.01	ug/L	0.50	100	70	130			
Methyl tert-butyl ether (MTBE)		5.34	ug/L	0.50	107	70	130			
Methylene chloride		4.97	ug/L	0.50	99	70	130			
Naphthalene		5.11	ug/L	0.50	102	70	130			
n-Propylbenzene		5.10	ug/L	0.50	102	70	130			
Styrene		4.88	ug/L	0.50	98	70	130			
1,1,1,2-Tetrachloroethane		4.93	ug/L	0.50	99	70	130			
1,1,2,2-Tetrachloroethane		5.39	ug/L	0.50	108	70	130			
Tetrachloroethene		5.03	ug/L	0.50	101	70	130			
Toluene		5.05	ug/L	0.50	101	70	130			
1,2,3-Trichlorobenzene		5.51	ug/L	0.50	110	70	130			
1,2,4-Trichlorobenzene		5.19	ug/L	0.50	104	70	130			
1,1,1-Trichloroethane		5.08	ug/L	0.50	102	70	130			
1,1,2-Trichloroethane		4.82	ug/L	0.50	96	70	130			
Trichloroethene		5.29	ug/L	0.50	106	70	130			
Trichlorofluoromethane		6.31	ug/L	0.50	126	70	130			
1,2,3-Trichloropropane		4.84	ug/L	0.50	97	70	130			
1,2,4-Trimethylbenzene		5.12	ug/L	0.50	102	70	130			
1,3,5-Trimethylbenzene		5.01	ug/L	0.50	100	70	130			
Vinyl chloride		5.96	ug/L	0.20	119	70	130			
m+p-Xylenes		10.1	ug/L	0.50	101	70	130			
o-Xylene		4.76	ug/L	0.50	95	70	130			
Trihalomethanes, Total		19.9	ug/L	0.50	100	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R195644
Lab ID: 11-Jun-24_LCS_3	63	Laboratory Control Sample			Run: 5973MSD_240611A				06/11/24 11:13	
Xylenes, Total		14.8	ug/L	0.50	99	70	130			
Surr: p-Bromofluorobenzene				0.50	103	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	99	70	130			
Surr: Toluene-d8				0.50	108	70	130			
Lab ID: 11-Jun-24_MBLK_5	63	Method Blank			Run: 5973MSD_240611A				06/11/24 12:31	
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methylene chloride		ND	ug/L	0.50						

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R195644
Lab ID: 11-Jun-24_MBLK_5	63	Method Blank		Run: 5973MSD_240611A				06/11/24 12:31		
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl chloride		ND	ug/L	0.20						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Trihalomethanes, Total		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: p-Bromofluorobenzene				0.50	109	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	108	70	130			
Surr: Toluene-d8				0.50	106	70	130			
Lab ID: H24060119-001DDUP	63	Sample Duplicate		Run: 5973MSD_240611A				06/13/24 23:00		
Benzene		ND	ug/L	0.50					20	J
Bromobenzene		ND	ug/L	0.50					20	
Bromochloromethane		ND	ug/L	0.50					20	
Bromodichloromethane		8.72	ug/L	0.50				14	20	
Bromoform		ND	ug/L	0.50					20	J
Bromomethane		ND	ug/L	0.50					20	
n-Butylbenzene		ND	ug/L	0.50					20	
sec-Butylbenzene		ND	ug/L	0.50					20	
tert-Butylbenzene		ND	ug/L	0.50					20	
Carbon tetrachloride		ND	ug/L	0.50					20	
1,2-Dichloroethane		ND	ug/L	0.50					20	
Chlorobenzene		ND	ug/L	0.50					20	J
Chlorodibromomethane		2.11	ug/L	0.50				5.4	20	
Chloroethane		ND	ug/L	0.50					20	
Chloroform		36.0	ug/L	0.50				7.7	20	
Chloromethane		ND	ug/L	0.50					20	J
2-Chlorotoluene		ND	ug/L	0.50					20	
4-Chlorotoluene		ND	ug/L	0.50					20	
Dibromomethane		ND	ug/L	0.50					20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

J - Estimated value - analyte was present but less than the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R195644
Lab ID: H24060119-001DDUP	63	Sample Duplicate		Run: 5973MSD_240611A				06/13/24 23:00		
1,2-Dichlorobenzene		ND	ug/L	0.50					20	
1,3-Dichlorobenzene		ND	ug/L	0.50					20	
1,4-Dichlorobenzene		ND	ug/L	0.50					20	
Dichlorodifluoromethane		ND	ug/L	0.50					20	
1,1-Dichloroethane		ND	ug/L	0.50					20	
1,1-Dichloroethene		ND	ug/L	0.50					20	
cis-1,2-Dichloroethene		ND	ug/L	0.50					20	
trans-1,2-Dichloroethene		ND	ug/L	0.50					20	
1,2-Dichloropropane		ND	ug/L	0.50					20	
1,3-Dichloropropane		ND	ug/L	0.50					20	
2,2-Dichloropropane		ND	ug/L	0.50					20	
1,1-Dichloropropene		ND	ug/L	0.50					20	
cis-1,3-Dichloropropene		ND	ug/L	0.50					20	
trans-1,3-Dichloropropene		ND	ug/L	0.50					20	
Ethylbenzene		ND	ug/L	0.50					20	J
Hexachlorobutadiene		ND	ug/L	0.50					20	
Isopropylbenzene		ND	ug/L	0.50					20	
p-Isopropyltoluene		ND	ug/L	0.50					20	
Methyl tert-butyl ether (MTBE)	1.39	ug/L	0.50					6.0	20	
Methylene chloride		ND	ug/L	0.50					20	
Naphthalene		ND	ug/L	0.50					20	
n-Propylbenzene		ND	ug/L	0.50					20	
Styrene		ND	ug/L	0.50					20	J
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50					20	
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50					20	
Tetrachloroethene		ND	ug/L	0.50					20	
Toluene		ND	ug/L	0.50					20	J
1,2,3-Trichlorobenzene		ND	ug/L	0.50					20	
1,2,4-Trichlorobenzene		ND	ug/L	0.50					20	
1,1,1-Trichloroethane		ND	ug/L	0.50					20	
1,1,2-Trichloroethane		ND	ug/L	0.50					20	
Trichloroethene		ND	ug/L	0.50					20	
Trichlorofluoromethane		ND	ug/L	0.50					20	
1,2,3-Trichloropropane		ND	ug/L	0.50					20	
1,2,4-Trimethylbenzene		ND	ug/L	0.50					20	
1,3,5-Trimethylbenzene		ND	ug/L	0.50					20	
Vinyl chloride		ND	ug/L	0.50					20	
m+p-Xylenes		ND	ug/L	1.0					20	J
o-Xylene		ND	ug/L	0.50					20	J
Trihalomethanes, Total	47.1	ug/L	0.50					9.3	20	
Xylenes, Total	0.683	ug/L	0.50					3.3	20	
Surr: p-Bromofluorobenzene				0.50	103	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	110	70	130			
Surr: Toluene-d8				0.50	111	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

J - Estimated value - analyte was present but less than the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_190483
Lab ID: MB-190483	32	Method Blank		Run: SUB-B423163			06/19/24 11:24			
Alachlor		ND	ug/L	0.10						
Aldrin		ND	ug/L	0.10						
Aroclor 1016		ND	ug/L	0.080						
Aroclor 1221		ND	ug/L	2.0						
Aroclor 1232		ND	ug/L	0.50						
Aroclor 1242		ND	ug/L	0.30						
Aroclor 1248		ND	ug/L	0.10						
Aroclor 1254		ND	ug/L	0.10						
Aroclor 1260		ND	ug/L	0.20						
Atrazine		ND	ug/L	0.10						
Benzo(a)pyrene		ND	ug/L	0.10						
bis(2-ethylhexyl)Adipate		ND	ug/L	0.50						
bis(2-ethylhexyl)Phthalate		ND	ug/L	0.60						
Butachlor		ND	ug/L	0.10						
Chlordane		ND	ug/L	1.0						
Dieldrin		ND	ug/L	0.10						
Endrin		ND	ug/L	0.10						
gamma-BHC (Lindane)		ND	ug/L	0.10						
Heptachlor		ND	ug/L	0.10						
Heptachlor epoxide		ND	ug/L	0.10						
Hexachlorobenzene		ND	ug/L	0.10						
Hexachlorocyclopentadiene		ND	ug/L	0.10						
Methoxychlor		ND	ug/L	0.10						
Metolachlor		ND	ug/L	0.10						
Metribuzin		ND	ug/L	0.10						
Propachlor		ND	ug/L	0.10						
Simazine		ND	ug/L	0.10						
Toxaphene		ND	ug/L	2.0						
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	96	70	130			
Surr: Perylene-d12				0.10	93	70	130			
Surr: Pyrene-d10				0.10	103	70	130			
Surr: Triphenylphosphate				0.10	104	70	130			
Lab ID: Ar1242-190483	5	Laboratory Control Sample		Run: SUB-B423163			06/19/24 12:16			
Aroclor 1242		5.70	ug/L	0.30	95	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	91	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	106	70	130			
Lab ID: LCS-190483	23	Laboratory Control Sample		Run: SUB-B423163			06/19/24 12:42			
Alachlor		2.20	ug/L	0.10	110	70	130			
Aldrin		1.97	ug/L	0.10	98	70	130			
Atrazine		2.11	ug/L	0.10	106	70	130			
Benzo(a)pyrene		1.88	ug/L	0.10	94	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										
Batch: B_190483										
Lab ID: LCS-190483	23	Laboratory Control Sample			Run: SUB-B423163			06/19/24 12:42		
bis(2-ethylhexyl)Adipate		2.11	ug/L	0.50	105	70	130			
bis(2-ethylhexyl)Phthalate		2.19	ug/L	0.60	110	70	130			
Butachlor		2.10	ug/L	0.10	105	70	130			
Dieldrin		2.10	ug/L	0.10	105	70	130			
Endrin		2.08	ug/L	0.10	104	70	130			
gamma-BHC (Lindane)		2.18	ug/L	0.10	109	70	130			
Heptachlor		2.00	ug/L	0.10	100	70	130			
Heptachlor epoxide		2.16	ug/L	0.10	108	70	130			
Hexachlorobenzene		1.70	ug/L	0.10	85	70	130			
Hexachlorocyclopentadiene		1.62	ug/L	0.10	81	70	130			
Methoxychlor		2.21	ug/L	0.10	110	70	130			
Metolachlor		2.00	ug/L	0.10	100	70	130			
Metribuzin		1.79	ug/L	0.10	89	70	130			
Propachlor		2.09	ug/L	0.10	105	70	130			
Simazine		1.95	ug/L	0.10	97	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	96	70	130			
Surr: Perylene-d12				0.10	97	70	130			
Surr: Pyrene-d10				0.10	98	70	130			
Surr: Triphenylphosphate				0.10	109	70	130			
Lab ID: LCSD-190483	23	Laboratory Control Sample Duplicate			Run: SUB-B423163			06/19/24 13:08		
Alachlor		2.27	ug/L	0.10	113	70	130	3.1	40	
Aldrin		1.96	ug/L	0.10	98	70	130	0.6	40	
Atrazine		2.19	ug/L	0.10	109	70	130	3.5	40	
Benzo(a)pyrene		1.91	ug/L	0.10	96	70	130	1.3	40	
bis(2-ethylhexyl)Adipate		2.19	ug/L	0.50	110	70	130	3.9	40	
bis(2-ethylhexyl)Phthalate		2.27	ug/L	0.60	113	70	130	3.3	40	
Butachlor		2.23	ug/L	0.10	111	70	130	5.9	40	
Dieldrin		2.08	ug/L	0.10	104	70	130	0.8	40	
Endrin		2.16	ug/L	0.10	108	70	130	3.9	40	
gamma-BHC (Lindane)		2.19	ug/L	0.10	109	70	130	0.1	40	
Heptachlor		2.08	ug/L	0.10	104	70	130	4.0	40	
Heptachlor epoxide		2.14	ug/L	0.10	107	70	130	0.5	40	
Hexachlorobenzene		1.72	ug/L	0.10	86	70	130	0.9	40	
Hexachlorocyclopentadiene		1.76	ug/L	0.10	88	70	130	8.2	40	
Methoxychlor		2.25	ug/L	0.10	112	70	130	1.8	40	
Metolachlor		2.11	ug/L	0.10	105	70	130	5.2	40	
Metribuzin		1.85	ug/L	0.10	92	70	130	3.2	40	
Propachlor		2.18	ug/L	0.10	109	70	130	4.1	40	
Simazine		1.94	ug/L	0.10	97	70	130	0.1	40	
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	95	70	130			
Surr: Perylene-d12				0.10	97	70	130			
Surr: Pyrene-d10				0.10	100	70	130			
Surr: Triphenylphosphate				0.10	112	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_190483
Lab ID: TOX-190483	5	Laboratory Control Sample			Run: SUB-B423163			06/19/24 14:00		
Toxaphene		40.8	ug/L	2.0	102	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	96	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	106	70	130			
Lab ID: B24060751-001AMS	23	Sample Matrix Spike			Run: SUB-B423163			06/19/24 13:34		
Alachlor		2.25	ug/L	0.10	113	70	130			
Aldrin		2.09	ug/L	0.10	105	70	130			
Atrazine		2.14	ug/L	0.10	107	70	130			
Benzo(a)pyrene		2.25	ug/L	0.10	113	70	130			
bis(2-ethylhexyl)Adipate		2.28	ug/L	0.50	114	70	130			
bis(2-ethylhexyl)Phthalate		2.39	ug/L	0.60	120	70	130			
Butachlor		2.27	ug/L	0.10	114	70	130			
Dieldrin		2.11	ug/L	0.10	106	70	130			
Endrin		2.31	ug/L	0.10	116	70	130			
gamma-BHC (Lindane)		2.15	ug/L	0.10	108	70	130			
Heptachlor		2.23	ug/L	0.10	112	70	130			
Heptachlor epoxide		2.25	ug/L	0.10	112	70	130			
Hexachlorobenzene		1.90	ug/L	0.10	95	70	130			
Hexachlorocyclopentadiene		1.97	ug/L	0.10	98	70	130			
Methoxychlor		2.38	ug/L	0.10	119	70	130			
Metolachlor		2.05	ug/L	0.10	103	70	130			
Metribuzin		1.66	ug/L	0.10	83	70	130			
Propachlor		2.12	ug/L	0.10	106	70	130			
Simazine		1.80	ug/L	0.10	90	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	97	70	130			
Surr: Perylene-d12				0.10	100	70	130			
Surr: Pyrene-d10				0.10	98	70	130			
Surr: Triphenylphosphate				0.10	111	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2								Analytical Run: B_R423163		
Lab ID: 525_CCV_5	23	Continuing Calibration Verification Standard							06/19/24 08:49	
Alachlor		2.00	ug/L	0.10	100	70	130			
Aldrin		2.06	ug/L	0.10	103	70	130			
Atrazine		1.98	ug/L	0.10	99	70	130			
Benzo(a)pyrene		1.92	ug/L	0.10	96	70	130			
bis(2-ethylhexyl)Adipate		2.18	ug/L	0.50	109	70	130			
bis(2-ethylhexyl)Phthalate		2.20	ug/L	0.60	110	70	130			
Butachlor		2.08	ug/L	0.10	104	70	130			
Dieldrin		2.32	ug/L	0.10	116	70	130			
Endrin		2.14	ug/L	0.10	107	70	130			
gamma-BHC (Lindane)		2.12	ug/L	0.10	106	70	130			
Heptachlor		1.95	ug/L	0.10	97	70	130			
Heptachlor epoxide		2.02	ug/L	0.10	101	70	130			
Hexachlorobenzene		1.99	ug/L	0.10	99	70	130			
Hexachlorocyclopentadiene		1.94	ug/L	0.10	97	70	130			
Methoxychlor		2.20	ug/L	0.10	110	70	130			
Metolachlor		2.02	ug/L	0.10	101	70	130			
Metribuzin		2.09	ug/L	0.10	105	70	130			
Propachlor		2.00	ug/L	0.10	100	70	130			
Simazine		1.91	ug/L	0.10	95	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	96	70	130			
Surr: Pyrene-d10				0.10	96	70	130			
Surr: Triphenylphosphate				0.10	109	70	130			
Lab ID: Ar1242_CCV_5	5	Continuing Calibration Verification Standard							06/19/24 09:41	
Aroclor 1242		6.30	ug/L	0.30	105	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	101	70	130			
Surr: Perylene-d12				0.10	91	70	130			
Surr: Pyrene-d10				0.10	96	70	130			
Surr: Triphenylphosphate				0.10	94	70	130			
Lab ID: CLD_CCV_5	5	Continuing Calibration Verification Standard							06/19/24 10:06	
Chlordane		20.5	ug/L	1.0	103	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	89	70	130			
Surr: Pyrene-d10				0.10	96	70	130			
Surr: Triphenylphosphate				0.10	101	70	130			
Lab ID: TOX_CCV_5	5	Continuing Calibration Verification Standard							06/19/24 10:32	
Toxaphene		43.2	ug/L	2.0	108	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	100	70	130			
Surr: Perylene-d12				0.10	92	70	130			
Surr: Pyrene-d10				0.10	97	70	130			
Surr: Triphenylphosphate				0.10	99	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Analytical Run: C_R307292
Lab ID: CCV	11	Continuing Calibration Verification Standard							06/13/24 15:08	
Aldicarb		10.4	ug/L	1.0	104	80	120			
Aldicarb sulfone		10.4	ug/L	1.0	103	80	120			
Aldicarb sulfoxide		10.3	ug/L	1.0	103	80	120			
Carbaryl		10.4	ug/L	1.0	104	80	120			
3-Hydroxycarbofuran		10.4	ug/L	1.0	104	80	120			
Carbofuran		10.4	ug/L	1.0	104	80	120			
Methiocarb		10.4	ug/L	1.0	104	80	120			
Methomyl		10.4	ug/L	1.0	104	80	120			
Oxamyl		10.4	ug/L	1.0	104	80	120			
Baygon		10.4	ug/L	1.0	104	80	120			
Surr: BDMC				1.0	104	70	130			
Method: E531.1										Batch: C_R307292
Lab ID: MBLK	11	Method Blank							Run: SUB-C307292	
Aldicarb		ND	ug/L	1.0						06/13/24 13:47
Aldicarb sulfone		ND	ug/L	1.0						
Aldicarb sulfoxide		ND	ug/L	1.0						
Carbaryl		ND	ug/L	1.0						
3-Hydroxycarbofuran		ND	ug/L	1.0						
Carbofuran		ND	ug/L	1.0						
Methiocarb		ND	ug/L	1.0						
Methomyl		ND	ug/L	1.0						
Oxamyl		ND	ug/L	1.0						
Baygon		ND	ug/L	1.0						
Surr: BDMC				1.0	102	70	130			
Lab ID: LCS	11	Laboratory Control Sample							Run: SUB-C307292	
Aldicarb		8.1	ug/L	1.0	101	80	120			06/13/24 14:27
Aldicarb sulfone		8.0	ug/L	1.0	100	80	120			
Aldicarb sulfoxide		8.8	ug/L	1.0	109	80	120			
Carbaryl		8.4	ug/L	1.0	105	80	120			
3-Hydroxycarbofuran		8.5	ug/L	1.0	107	80	120			
Carbofuran		8.6	ug/L	1.0	108	80	120			
Methiocarb		8.5	ug/L	1.0	107	80	120			
Methomyl		8.8	ug/L	1.0	110	80	120			
Oxamyl		8.8	ug/L	1.0	110	80	120			
Baygon		8.6	ug/L	1.0	108	80	120			
Surr: BDMC				1.0	106	70	130			
Lab ID: H24060249-001GMS	11	Sample Matrix Spike							Run: SUB-C307292	
Aldicarb		7.4	ug/L	1.0	93	65	135			06/13/24 16:29
Aldicarb sulfone		7.3	ug/L	1.0	91	65	135			
Aldicarb sulfoxide		7.9	ug/L	1.0	99	65	135			
Carbaryl		7.6	ug/L	1.0	95	65	135			
3-Hydroxycarbofuran		7.8	ug/L	1.0	98	65	135			
Carbofuran		7.9	ug/L	1.0	98	65	135			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Batch: C_R307292
Lab ID: H24060249-001GMS	11	Sample Matrix Spike				Run: SUB-C307292				06/13/24 16:29
Methiocarb		7.6	ug/L	1.0	95	65	135			
Methomyl		8.0	ug/L	1.0	100	65	135			
Oxamyl		8.1	ug/L	1.0	101	65	135			
Baygon		7.8	ug/L	1.0	98	65	135			
Surr: BDMC				1.0	93	70	130			
Lab ID: H24060249-001GMSD	11	Sample Matrix Spike Duplicate				Run: SUB-C307292				06/13/24 17:10
Aldicarb		7.7	ug/L	1.0	96	65	135	3.5	20	
Aldicarb sulfone		7.6	ug/L	1.0	95	65	135	3.8	20	
Aldicarb sulfoxide		8.2	ug/L	1.0	103	65	135	3.8	20	
Carbaryl		7.9	ug/L	1.0	99	65	135	4.8	20	
3-Hydroxycarbofuran		8.2	ug/L	1.0	102	65	135	4.6	20	
Carbofuran		8.1	ug/L	1.0	102	65	135	3.7	20	
Methiocarb		8.0	ug/L	1.0	100	65	135	4.7	20	
Methomyl		8.4	ug/L	1.0	104	65	135	4.3	20	
Oxamyl		8.4	ug/L	1.0	105	65	135	3.4	20	
Baygon		8.3	ug/L	1.0	103	65	135	5.2	20	
Surr: BDMC				1.0	101	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E547										Analytical Run: C_R307291
Lab ID: ICV										
Initial Calibration Verification Standard										
06/13/24 11:27										
Glyphosate	22	ug/L	5.0	88	80	120				
Lab ID: CCV										
Continuing Calibration Verification Standard										
06/13/24 11:45										
Glyphosate	19	ug/L	5.0	97	80	120				
Method: E547										Batch: C_R307291
Lab ID: MBLK										
Method Blank										
Run: SUB-C307291										
06/13/24 11:59										
Glyphosate	ND	ug/L	5.0							
Lab ID: C24060423-001JMS										
Sample Matrix Spike										
Run: SUB-C307291										
06/13/24 12:28										
Glyphosate	22	ug/L	5.0	87	70	130				
Lab ID: C24060423-001JMSD										
Sample Matrix Spike Duplicate										
Run: SUB-C307291										
06/13/24 12:43										
Glyphosate	23	ug/L	5.0	93	70	130	6.7	20		

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E548.1										Analytical Run: B_190377
Lab ID: CCV-4-190377	2	Continuing Calibration Verification Standard								06/19/24 12:16
Endothall		27.2	ug/L	8.0	109	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	89	70	130			
Method: E548.1										Batch: B_190377
Lab ID: MB-190377	2	Method Blank								06/19/24 13:06
Endothall		ND	ug/L	8.0						
Surr: 2,4-Dichlorophenylacetic acid				10	103	70	130			
Lab ID: LCS-190377	2	Sample Matrix Spike								06/19/24 13:25
Endothall		10.0	ug/L	8.0	100	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	90	70	130			
Lab ID: B24060726-001GMS	2	Sample Matrix Spike								06/19/24 14:05
Endothall		104	ug/L	8.0	104	70	130			
Surr: 2,4-Dichlorophenylacetic acid				100	98	70	130			
Lab ID: B24060726-001GMSD	2	Sample Matrix Spike Duplicate								06/19/24 14:25
Endothall		108	ug/L	8.0	108	70	130	3.5	30	
Surr: 2,4-Dichlorophenylacetic acid				100	98	70	130			
Lab ID: B24061049-001KMS	2	Sample Matrix Spike								06/19/24 18:04
Endothall		65.3	ug/L	8.0	65	70	130			S
Surr: 2,4-Dichlorophenylacetic acid				100	88	70	130			
Lab ID: B24061049-001KMSD	2	Sample Matrix Spike Duplicate								06/19/24 18:25
Endothall		97.5	ug/L	8.0	97	70	130	40	30	R
Surr: 2,4-Dichlorophenylacetic acid				100	99	70	130			

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E549.2										Batch: C_74307
Lab ID: MB-74307		Method Blank					Run: SUB-C307404			06/18/24 12:43
Diquat		ND	ug/L	0.40						
Lab ID: LCS-74307		Laboratory Control Sample					Run: SUB-C307404			06/18/24 12:50
Diquat		4.69	ug/L	0.40	94	70	130			
Lab ID: LCSD-74307		Laboratory Control Sample Duplicate					Run: SUB-C307404			06/18/24 12:56
Diquat		4.71	ug/L	0.40	94	70	130	0.4	30	
Lab ID: C24060251-001HMS		Sample Matrix Spike					Run: SUB-C307404			06/18/24 13:09
Diquat		4.81	ug/L	0.40	96	70	130			
Method: E549.2										Analytical Run: C_R307404
Lab ID: ICV		Initial Calibration Verification Standard								06/18/24 12:30
Diquat		172	ug/L	0.40	115	80	120			
Lab ID: CCV		Continuing Calibration Verification Standard								06/18/24 12:36
Diquat		107	ug/L	0.40	107	80	120			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060249

Report Date: 06/21/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Kelada-01								Analytical Run: SUB-B422673		
Lab ID: ICB	Initial Calibration Verification Standard								06/11/24 11:00	
Cyanide, Total		0.102	mg/L	0.0050	102	90	110			
Lab ID: CCV								06/11/24 15:07		
Cyanide, Total		0.102	mg/L	0.0050	102	90	110			
Method: Kelada-01								Batch: B_R422673		
Lab ID: ICB	Method Blank					Run: SUB-B422673			06/11/24 11:02	
Cyanide, Total		ND	mg/L	0.001						
Lab ID: LFB								06/11/24 11:05		
Cyanide, Total		0.104	mg/L	0.0061	104	90	110			
Lab ID: LCS1-K4Fe(CN)6								06/11/24 11:07		
Cyanide, Total		0.212	mg/L	0.0050	106	90	110			
Lab ID: H24060249-001MMS								06/11/24 15:45		
Cyanide, Total		0.0962	mg/L	0.0050	96	90	110			
Lab ID: H24060249-001MMSD								06/11/24 15:47		
Cyanide, Total		0.0993	mg/L	0.0050	99	90	110	3.2	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



Work Order Receipt Checklist

Great West Engineering

H24060249

Login completed by: Rebecca A. Tooke

Date Received: 6/10/2024

Reviewed by: wjohnson

Received by: RAT

Reviewed Date: 6/11/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☐	No ☒	
Chain of custody agrees with sample labels?	Yes ☐	No ☒	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.0°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☒	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

Per submitted bottle order, dioxins were not included.
Second page of COC was not signed by client at relinquishment.



Work Order Receipt Checklist - Continued

Great West Engineering

H24060249

1 of the 3 VOA vials for volatile organics analysis for sample CMRWA WELL 4 was received containing headspace gas bubbles greater than 1/4 inch in diameter. There is sufficient volume to continue with analysis using the remaining vials. One of two VOAs for MRWA WELL 4 was no labeled. Proceeded with the sample identification indicated on other containers.
6/10/24 rt



www.energylab.com

Chain of Custody (COC) & Analytical Request Record

Lab Workorder #: **A24060749**

Project Information

Client: Great West Engineering
Project: CMRWA Well 4 I-05125 Task 39
Purchase Order:
Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 16431 v.4 *
BO#: 48214
EE#: 9788
Turn-Around Time: Standard

Critical Hold Time: 30 Hours
of Samples: 3
Matrix: Drinking Water



Comments:

Please confirm boxes are properly checked for Row 3.
0.0073 only for this handoff
Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

Hold Time (Days)	# of Containers	Matrix	RUSH TAT	14	28	2	Fid	7	180	28	28	N/A	14	14	14	28	1.25
				Alkalinity to pH 4.5 (A2320 B)	X	X	X	Chromatography (E300.0)	Nitrogen, Nitrite (E353.2)	pH (A4500-H B)	Solids, Total Dissolved (A2540 G)	Metals by ICP/CPMS, Drinking Water (E200.7 B)	Mercury, Drinking Water (E245.1)	Nitrogen, Nitrate + Nitrite (E353.2)	Nitrogen, Nitrate (E353.2)	SDWA (E531.1)	Bacteria, Public Water Supply (A9223 B)
1	12	DW															
2	2	DW															
3	9	DW															
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	

Lab provided preservatives were used ☒ Yes ☐ No

Sampler Name (if different than Relinquished by):

Sampler Phone: 406 461-7072

Custody Record MUST be signed

Relinquished by (print): B. Lauerman

Signature: [Signature]

Date/Time: 6/9/24 19:19

Relinquished by (print): Amy Decker

Signature: [Signature]

Date/Time: 6/10/24 8:10

Relinquished by (print): Amy Decker

Signature: [Signature]

Date/Time: 6-10-24 8:10

Date Printed: 05/31/2024

EE: HE - 9788

COC: Page 1 of 2



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Chain of Custody (COC) & Analytical Request Record

Client: Great West Engineering
CMRWA Well 4 1-05125 Task 39

Lab Workorder #: 24060249

Project Information

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Purchase Order:
Contact/Phone: Bruce Lauerma (406) 495-6181 / M: (406) 451-7072

Laboratory Use

Quote: 16431 v.4 *
BO#: 48214
EE#: 9788
Turn-Around Time: Standard



Critical Hold Time: 30 Hours
of Samples: 3
Matrix: Drinking Water

Comments:

0.0" TB on ice no fuel head del

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

0.0° TB once no fuel hand del	Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.	Sample Identification																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Phum May 6-10-24 8:10



Trust our People. Trust our Data.
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Billings, MT 406.252.5325 • Casper, WY 307.235.0515 • Gillette, WY 307.686.7175 • Helena, MT 406.442.0711

BOTTLE ORDER 48214 EE x 9788

48214

SHIPPED TO: Great West Engineering

To report an issue with this order, view Safety Data Sheets, or let us know how we are doing, scan here or go to energylab.com/contact-us



Contact: Bruce Lauerma
2501 Belt View Dr

Helena MT 59604
Phone: (406) 495-6181

Project: Cascade Madison Well 3

Order Created by: Wanda J. Johnson
Shipped From: Helena, MT

Ship Date: 5/31/2024
VIA: Ground
Quote Used: 16431

Bottle Size/Type	Bottles Per Samp	Method	Tests	Critical Hold Time	Preservative	Notes	Num of Samp
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First Time SDWS

1 Liter Plastic	1	A2320 B E300.0 E353.2 A4500-H B A2540 C	Alkalinity to pH 4.5 Anions by Ion Chromatography Nitrogen, Nitrite pH Solids, Total Dissolved	48.00 hrs 0.25 hrs			1
250 mL Plastic	1	E200.7_8 E245.1 E200.2 E245.1	Metals by ICP/ICPMS, Drinking Water Mercury, Drinking Water Metals Digestion by E200.2 Mercury Digestion by E245.1		HNO3		1
250 mL Plastic	1	E353.2 E353.2	Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate		H2SO4		1
250 mL Amber Glass	1	E515.4 E515.4	515.4-Herbicides, Chlorinated SDWA Herbicide Liquid-Liquid Microextraction E515.4		NASO3	Do Not Rinse - Container is pre-preserved.	1

BO#: 48214

1 of 3

1 Liter Amber Glass Narrow Mouth	2	E525.2 E525.2	Semi-Volatile Organic Compounds E525.2 Extraction 525-Semi-Volatile Organic Compounds, SDWA		NASO3 HCL	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA	3	E524.2	524-Purgeable Organics, SDWA		HCL	Zero headspace	1
40 mL Clear Glass VOA	2	E531.1	531-Pesticides, Carbamates SDWA		NATHIO-MCA-PP	Do Not Rinse - Container is pre-preserved.	1
100 mL Plastic Sterile	1	A9223 B	Bacteria, Public Water Supply	30.00 hrs			1

Drinking Water Rads

250 mL Plastic	1	E200.7_8 E200.2	Metals by ICP/ICPMS, Drinking Water Metals Digestion by E200.2		HNO3		1
1 Gallon Plastic	1	E900.0 E900.0 A7500-RA E903.0 RA-05	Gross Alpha Calculated Gross Alpha, Gross Beta, Total Radium 226 + Radium 228 Radium 226, Total Radium 228, Total		HNO3		1

State Wide Waiver

1 Liter Plastic	1	E549.2 E549.2	LSE for 549.2 549-Pesticides, Diquat SDWA		NATHIO	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA, NATHIO	2	E547	547-Herbicides, Glyphosate SDWA		NATHIO-PP	Do Not Rinse - Container is pre-preserved. Zero headspace	1
1 Liter Narrow Mouth Amber Glass	1	E548.1 E548.1	Endothall E548.1 Extraction 548-Endothall		NATHIO	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA, NATHIO	2	E504.1 E504.1	504.1 Microextraction 504-Microextraction VOCs, EDB and DBCP SDWA		NATHIO-PP	Do Not Rinse - Container is pre-preserved. Zero headspace	1
500 mL Amber Plastic	1	Kelada-01	Cyanide, SDWA		NaOH		1
1 Liter Amber Glass Narrow Mouth	2	E1613 B	Dioxin				1

Comments

 HNO3 - Nitric Acid
  H2SO4 - Sulfuric Acid
  NaOH - Sodium Hydroxide

BO#: 48214

2 of 3

☒ ZnAc - Zinc Acetate ☒ HCl - Hydrochloric Acid ☐ H3PO4 - Phosphoric Acid **We strongly suggest that the samples are shipped the same day as they are collected.**

Material Safety Data Sheets(MSDS) Available @ EnergyLab.com ->Services -> MSDS Sheets

Corrosive Chemicals: Nitric, Sulfuric, Phosphoric, Hydrochloric Acids and Sodium Hydroxide. Zinc Acetate is a skin irritant.

Subcontracting of sample analyses to an outside laboratory may be required. If so, Energy Laboratories will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BO#: 48214



ANALYTICAL SUMMARY REPORT

July 19, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24060250 Quote ID: H16431

Project Name: CMRWA Well 4 1-05125 Task 39

Energy Laboratories Inc Helena MT received the following 1 sample for Great West Engineering on 6/10/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24060250-001	CMRWA Well 4	06/09/24 15:00	06/10/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Metals Digestion by E200.2 Gross Alpha Calculated Gross Alpha, Gross Beta, Total Radium 226 + Radium 228 Radium 226, Total Radium 228, Total

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.



CLIENT: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Work Order: H24060250

Report Date: 07/19/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Lab ID: H24060250-001
Client Sample ID: CMRWA Well 4

Report Date: 07/19/24
Collection Date: 06/09/24 15:00
Date Received: 06/10/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL (CONTRACT LAB MT00945)							
Uranium	0.0007	mg/L		0.0003	0.03	E200.8	06/20/24 13:37 / dck
RADIONUCLIDES - TOTAL							
Gross Alpha	1.5	pCi/L	U			E900.0	07/13/24 05:34 / eli-ca
Gross Alpha precision (±)	3.6	pCi/L				E900.0	07/13/24 05:34 / eli-ca
Gross Alpha MDC	2.8	pCi/L				E900.0	07/13/24 05:34 / eli-ca
Gross Alpha - Adjusted	1.5	pCi/L	U		15	E900.0	07/16/24 12:00 / eli-c
Gross Alpha - Adjusted precision (±)	3.6	pCi/L				E900.0	07/16/24 12:00 / eli-c
Gross Alpha - Adjusted MDC	2.8	pCi/L				E900.0	07/16/24 12:00 / eli-c
Radium 226	1.8	pCi/L			5	E903.0	07/03/24 11:19 / eli-c
Radium 226 precision (±)	0.6	pCi/L				E903.0	07/03/24 11:19 / eli-c
Radium 226 MDC	0.2	pCi/L				E903.0	07/03/24 11:19 / eli-c
Radium 228	1.3	pCi/L			5	RA-05	07/08/24 13:32 / eli-c
Radium 228 precision (±)	0.6	pCi/L				RA-05	07/08/24 13:32 / eli-c
Radium 228 MDC	0.5	pCi/L				RA-05	07/08/24 13:32 / eli-c
Radium 226 + Radium 228	3.0	pCi/L				A7500-RA	07/09/24 11:24 / eli-c
Radium 226 + Radium 228 precision (±)	0.9	pCi/L				A7500-RA	07/09/24 11:24 / eli-c
Radium 226 + Radium 228 MDC	0.6	pCi/L				A7500-RA	07/09/24 11:24 / eli-c

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
U - Not detected at Minimum Detectable Concentration (MDC)

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060250

Report Date: 07/19/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Analytical Run: ICPMS205-H_240619B
Lab ID: ICV	Initial Calibration Verification Standard									
Uranium		0.0607	mg/L	0.0010	101	90	110			06/19/24 21:34
Lab ID: CCV										Continuing Calibration Verification Standard
Uranium		0.0507	mg/L	0.0010	101	90	110			06/20/24 13:17
Method: E200.8										Batch: R195965
Lab ID: LRB	Method Blank									
Uranium		ND	mg/L	0.00004						Run: ICPMS205-H_240619B 06/20/24 11:39
Lab ID: LFB	Laboratory Fortified Blank									
Uranium		0.0481	mg/L	0.0010	96	85	115			Run: ICPMS205-H_240619B 06/20/24 11:42
Lab ID: H24060229-001AMS	Sample Matrix Spike									
Uranium		0.0653	mg/L	0.00030	110	70	130			Run: ICPMS205-H_240619B 06/20/24 13:46
Lab ID: H24060229-001AMSD	Sample Matrix Spike Duplicate									
Uranium		0.0658	mg/L	0.00030	111	70	130	0.8	20	Run: ICPMS205-H_240619B 06/20/24 13:49

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060250

Report Date: 07/19/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E900.0								Batch: C_GrDW-2076		
Lab ID: Th230-GrDW-2076	3	Laboratory Control Sample				Run: SUB-C308344		07/13/24 05:34		
Gross Alpha		97	pCi/L		97	80	120			
Gross Alpha precision (±)		14	pCi/L							
Gross Alpha MDC		0.44	pCi/L							
Lab ID: MB-GrDW-2076	3	Method Blank				Run: SUB-C308344		07/13/24 05:34		
Gross Alpha		-2	pCi/L							U
Gross Alpha precision (±)		0.5	pCi/L							
Gross Alpha MDC		0.6	pCi/L							
Lab ID: C24051039-001BDUP	3	Sample Duplicate				Run: SUB-C308344		07/13/24 05:34		
Gross Alpha		8.6	pCi/L					30	20	R
Gross Alpha precision (±)		3.9	pCi/L							
Gross Alpha MDC		2.7	pCi/L							
- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 0.8.										
Lab ID: C24060466-001AMS	3	Sample Matrix Spike				Run: SUB-C308344		07/13/24 05:34		
Gross Alpha		96	pCi/L		94	70	130			
Gross Alpha precision (±)		15	pCi/L							
Gross Alpha MDC		1.2	pCi/L							
Lab ID: C24060466-001AMSD	3	Sample Matrix Spike Duplicate				Run: SUB-C308344		07/13/24 05:34		
Gross Alpha		83	pCi/L		81	70	130	15	20	
Gross Alpha precision (±)		13	pCi/L							
Gross Alpha MDC		1.3	pCi/L							
- The RER result is 1.3.										

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060250

Report Date: 07/19/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0								Batch: C_RA226DW-1057		
Lab ID: LCS-RA226DW-1057	3	Laboratory Control Sample				Run: SUB-C308042			07/03/24 11:19	
Radium 226		21	pCi/L	105		90	110			
Radium 226 precision (±)		3.5	pCi/L							
Radium 226 MDC		0.37	pCi/L							
Lab ID: MB-RA226DW-1057	3	Method Blank				Run: SUB-C308042			07/03/24 11:19	
Radium 226		0.1	pCi/L							U
Radium 226 precision (±)		0.3	pCi/L							
Radium 226 MDC		0.3	pCi/L							
Lab ID: H24060422-001BDUP	3	Sample Duplicate				Run: SUB-C308042			07/03/24 11:19	
Radium 226		0.23	pCi/L					21	20	UR
Radium 226 precision (±)		0.31	pCi/L							
Radium 226 MDC		0.32	pCi/L							
- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 0.3										
Lab ID: H24060250-001BDUP	3	Sample Duplicate				Run: SUB-C308042			07/03/24 11:19	
Radium 226		1.1	pCi/L					43	20	R
Radium 226 precision (±)		0.48	pCi/L							
Radium 226 MDC		0.33	pCi/L							
- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 1.6										

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24060250

Report Date: 07/19/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05								Batch: C_RA228DW-1010		
Lab ID: LCS-228-RA228DW-10	3	Laboratory Control Sample				Run: SUB-C308113			07/08/24 13:32	
Radium 228		9.5	pCi/L		92	80	120			
Radium 228 precision (±)		2.0	pCi/L							
Radium 228 MDC		0.52	pCi/L							
Lab ID: MB-228-RA228DW-101	3	Method Blank				Run: SUB-C308113			07/08/24 13:32	
Radium 228		-0.07	pCi/L							U
Radium 228 precision (±)		0.5	pCi/L							
Radium 228 MDC		0.5	pCi/L							
Lab ID: C24060885-001ADUP	3	Sample Duplicate				Run: SUB-C308113			07/08/24 13:32	
Radium 228		3.9	pCi/L					39	20	R
Radium 228 precision (±)		1.0	pCi/L							
Radium 228 MDC		0.54	pCi/L							

- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 2.

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



Work Order Receipt Checklist

Great West Engineering

H24060250

Login completed by: Rebecca A. Tooke

Date Received: 6/10/2024

Reviewed by: tjones

Received by: RAT

Reviewed Date: 6/13/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☐	No ☒	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.0°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☒
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

No relinquishment second page of COC. 6/10/24 rt



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Chain of Custody (COC) & Analytical Request Record

1124060250

Lab Workorder #: 1124060249

24

Project Information

Client: Great West Engineering
 Project: CMRWA Well 4 1-05125 Task 39
 Purchase Order:
 Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Quote: 16431 v.4 *
 BO#: 48214
 EE#: 9788
 Turn-Around Time: Standard

Critical Hold Time: 30 Hours
 # of Samples: 3
 Matrix: Drinking Water



Laboratory Use

Comments:

Please confirm boxes are properly checked for ROW 3.
 O.00TB on ice to the handover
 Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

Hold Time (Days)	14	28	2	Fld	7	180	28	28	N/A	14	14	14	28	1.25
# of Containers														
Matrix														
RUSH TAT														
Alkalinity to pH 4.5 (A2320 B)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Anions by Ion Chromatography (E300.0)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitrogen, Nitrite (E353.2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
pH (A4500-H B)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Solids, Total Dissolved (A2540 G)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Metals by ICP/ICPMS, Drinking Water (E200.7.8)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mercury, Drinking Water (E245.1)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitrogen, Nitrate + Nitrite (E353.2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitrogen, Nitrate (E353.2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
515.4-Herbicides, Chlorinated SDWA (E515.4)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
525-Semi-Volatile Organic Compounds, SDWA (E525.2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
524-Purgeable Organics, SDWA (E524.2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
531-Pesticides, Carbamates SDWA (E531.1)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bacteria, Public Water Supply (A9223 B)	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Back only 6-10-2

Custody Record MUST be signed	Lab provided preservatives were used ☒ Yes ☐ No		Sampler Name (if different than Relinquished by): B. Lauerman		Sampler Phone: 406 441-7072	
	Relinquished by (print) B. Lauerman	Date/Time 6/9/24 19:19	Signature <i>B. Lauerman</i>	Relinquished by (print) A. Deitler	Date/Time 6/9/24 19:19	Signature <i>Amy Deitler</i>
	Relinquished by (print) Amy Deitler	Date/Time 6/10/24 8:10	Signature <i>Amy Deitler</i>	Relinquished by (print) B. Lauerman	Date/Time 6-10-24 8:10	Signature <i>B. Lauerman</i>

Date Printed: 05/31/2024

EE: HE - 9788

COC: Page 1 of 2



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Chain of Custody (COC) & Analytical Request Record

Client: Great West Engineering
CMRWA Well 4 1-05125 Task 39

Lab Workorder #: 24060249

Project Information

Client: Great West Engineering
Project: CMRWA Well 4 1-05125 Task 39
Purchase Order:
Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 16431 v.4 *
BO#: 48214
EE#: 9788
Turn-Around Time: Standard

Critical Hold Time: 30 Hours
of Samples: 3
Matrix: Drinking Water



Comments:

C.O. TB only no fuel tank add

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

0.0° TB once w/o fuel heat shd	Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.	Sample Identification		# of Containers			Matrix			RUSH TAT			N/A	180	Gross Alpha, Gross Beta, Total (E900.0)	Radium 226 + Radium 228 (A7500-RA)	N/A	180	Radium 226, Total (E903.0)	180	Radium 228, Total (RA-05)	549-Pesticides, Diquat SDWA (E549.2)	7	547-Herbicides, Glyphosate SDWA (E547)	14	548-Endothall (E548.1)	504-Microextraction VOCs, EDB and DBCP SDWA (E504.1)	14	Cyanide, SDWA (Kelada-01)	14	Dioxin (E1613 B)	365				
			1	12	DW																															
		2	2	DW																																
		3	9	DW																																
		4																																		
		5																																		
		6																																		
		7																																		
		8																																		
		9																																		
		10																																		
11																																				

Pharmology 6-10-24 8:10



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Billings, MT 406.252.6325 • Casper, WY 307.235.0515 • Gillette, WY 307.686.7175 • Helena, MT 406.442.0711

BOTTLE ORDER 48214 EEx 9788

48214

SHIPPED TO: Great West Engineering

To report an issue with this order, view Safety Data Sheets, or let us know how we are doing, scan here or go to energylab.com/contact-us



Contact: Bruce Lauerman
2501 Belt View Dr

Helena MT 59604
Phone: (406) 495-6181

Project: Cascade Madison Well 3

Order Created by: Wanda J. Johnson
Shipped From: Helena, MT

Ship Date: 5/31/2024
VIA: Ground
Quote Used: 16431

Bottle Size/Type	Bottles Per Samp	Method	Tests	Critical Hold Time	Preservative	Notes	Num of Samp
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First Time SDWS

1 Liter Plastic	1	A2320 B E300.0 E353.2 A4500-H B A2540 C	Alkalinity to pH 4.5 Anions by Ion Chromatography Nitrogen, Nitrite pH Solids, Total Dissolved	48.00 hrs 0.25 hrs			1
250 mL Plastic	1	E200.7_8 E245.1 E200.2 E245.1	Metals by ICP/ICPMS, Drinking Water Mercury, Drinking Water Metals Digestion by E200.2 Mercury Digestion by E245.1		HNO3		1
250 mL Plastic	1	E353.2 E353.2	Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate		H2SO4		1
250 mL Amber Glass	1	E515.4 E515.4	515.4-Herbicides, Chlorinated SDWA Herbicide Liquid-Liquid Microextraction E515.4		NASO3	Do Not Rinse - Container is pre-preserved.	1

BO#: 48214

1 of 3

1 Liter Amber Glass Narrow Mouth	2	E525.2 E525.2	Semi-Volatile Organic Compounds E525.2 Extraction 525-Semi-Volatile Organic Compounds, SDWA		NASO3 HCL	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA	3	E524.2	524-Purgeable Organics, SDWA		HCL	Zero headspace	1
40 mL Clear Glass VOA	2	E531.1	531-Pesticides, Carbamates SDWA		NATHIO-MCA-PP	Do Not Rinse - Container is pre-preserved.	1
100 mL Plastic Sterile	1	A9223 B	Bacteria, Public Water Supply	30.00 hrs			1

Drinking Water Rads

250 mL Plastic	1	E200.7_8 E200.2	Metals by ICP/ICPMS, Drinking Water Metals Digestion by E200.2		HNO3		1
1 Gallon Plastic	1	E900.0 E900.0 A7500-RA E903.0 RA-05	Gross Alpha Calculated Gross Alpha, Gross Beta, Total Radium 226 + Radium 228 Radium 226, Total Radium 228, Total		HNO3		1

State Wide Waiver

1 Liter Plastic	1	E549.2 E549.2	LSE for 549.2 549-Pesticides, Diquat SDWA		NATHIO	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA, NATHIO	2	E547	547-Herbicides, Glyphosate SDWA		NATHIO-PP	Do Not Rinse - Container is pre-preserved. Zero headspace	1
1 Liter Narrow Mouth Amber Glass	1	E548.1 E548.1	Endothall E548.1 Extraction 548-Endothall		NATHIO	Do Not Rinse - Container is pre-preserved.	1
40 mL Clear Glass VOA, NATHIO	2	E504.1 E504.1	504.1 Microextraction 504-Microextraction VOCs, EDB and DBCP SDWA		NATHIO-PP	Do Not Rinse - Container is pre-preserved. Zero headspace	1
500 mL Amber Plastic	1	Kelada-01	Cyanide, SDWA		NaOH		1
1 Liter Amber Glass Narrow Mouth	2	E1613 B	Dioxin				1

Comments

 HNO3 - Nitric Acid
  H2SO4 - Sulfuric Acid
  NaOH - Sodium Hydroxide

BO#: 48214

☒ ZnAc - Zinc Acetate	☒ HCl - Hydrochloric Acid	☐ H3PO4 - Phosphoric Acid	We strongly suggest that the samples are shipped the same day as they are collected.
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Material Safety Data Sheets(MSDS) Available @ EnergyLab.com ->Services -> MSDS Sheets

Corrosive Chemicals: Nitric, Sulfuric, Phosphoric, Hydrochloric Acids and Sodium Hydroxide. Zinc Acetate is a skin irritant.

Subcontracting of sample analyses to an outside laboratory may be required. If so, Energy Laboratories will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.



ANALYTICAL SUMMARY REPORT

September 12, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24080883 Quote ID: H17561

Project Name: Judith Basin

Energy Laboratories Inc Helena MT received the following 2 samples for Great West Engineering on 8/26/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24080883-001	CMRWA Well 4	08/25/24 14:30	08/26/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Alkalinity to pH 4.5 Bacteria, Public Water Supply Cyanide, SDWA Mercury, Drinking Water 515.4-Herbicides, Chlorinated SDWA 547-Herbicides, Glyphosate SDWA Anions by Ion Chromatography Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate pH Metals Digestion by E200.2 Herbicide Liquid-Liquid Microextraction E515.4 Mercury Digestion by E245.1 504.1 Microextraction 504-Microextraction VOCs, EDB and DBCP SDWA 531-Pesticides, Carbamates SDWA LSE for 549.2 549-Pesticides, Diquat SDWA Solids, Total Dissolved Semi-Volatile Organic Compounds E525.2 Extraction 525-Semi-Volatile Organic Compounds, SDWA Endothall E548.1 Extraction 548-Endothall 524-Purgeable Organics, SDWA
H24080883-002	Trip Blank	08/25/24 14:30	08/26/24	Trip Blank	524-Purgeable Organics, SDWA

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.

CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080883

Report Date: 09/12/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.

This analysis confirmed the presence of coliform bacteria. Such bacterial growth indicates the water supply is or was being contaminated by some outside source. If E-Coli bacteria was found in your water sample, their presence will be indicated as "present" on your analytical report. E-Coli contamination indicates your water supply is or has been in contact with human or animal sewage.

There are many probable reasons why a water supply becomes contaminated. Perhaps you have done work on the pump or repaired a line. Surface drainage has perhaps influenced a shallow well. In any case, the water system should be disinfected to eliminate all bacterial growth.

DISINFECTION PROCEDURE

STEP 1: Calculate the depth of water in the well by subtracting the non-pumping (static) water level in the well from the depth of the well.

STEP 2: Using the table below, mix the amount given with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water, to achieve the proper chlorine concentration in the well (approximately 100 mg/L). A high concentration of chlorine may void the warranty on the pump. Check with your supplier if concerned.

Depth of water in Well* (ft)	4"casing	6"casing	8"casing
10 ft	1 cup	1 cup	1 1/2 cups
20 ft	1 cup	1 cup	1 1/2 cups
30 ft	1 cup	2 cups	4 cups
40 ft	1 1/2 cups	2 cups	1 quart
60 ft	2 cups	4 cups	2 quarts
80 ft	2 cups	1 quart	2 quarts
100 ft	3 cups	1 1/2 qts	2 1/2 qts
150 ft	4 cups	2 1/2 qts	4 quarts

*Note: Depth of water in well is measured from the static water level to the bottom of the well.

STEP 3: Remove the well cap. Carefully pour the 5 to 10 gallon chlorine solution down the well. If available, attach a hose to an outside spigot and run the hose into the well casing and begin to circulate the water back down the well. Continue to recycle the water down the well until you can smell chlorinated water from the hose. This will ensure the chlorine solution has been thoroughly mixed in the well.

STEP 4: Once the well is disinfected, you may begin to disinfect the remainder of the system. Start at the farthest tap from the well. Turn on the COLD water tap only. (This process may be used to disinfect the HOT water as well; however, it may require multiple additions of chlorinated water to the well in order to achieve the quantity of chlorinated water required to disinfect the hot water tank). Once you can smell chlorinated water coming from the tap, you may shut it off. Follow this procedure will all cold water taps as you move back towards the well.

STEP 5: Leave the chlorine in the well and pipes for at least 24 hours to allow it to come into contact with the bacteria. **DO NOT USE THE WATER DURING THIS PERIOD!**

STEP 6: After 12-24 hours, turn on an outside faucet (avoid discharging large volumes of chlorinated water into your septic system) and flush the chlorinated water from the system until the chlorine smell is no longer present. Chlorinated water may be discharged to the ground surface but it must not be allowed to make its way into a surface water.

STEP 7: 72 hours after you are no longer able to detect chlorine in your system, collect a water sample to test for coliform bacteria. This sample should be taken to determine if the disinfection process was effective. If coliform bacteria sample tests prove that the water is still unsatisfactory after disinfection, the disinfection process should be repeated until satisfactory results are obtained. If you are unable to resolve the unsatisfactory samples with a few disinfection efforts, it may indicate that there is a problem that needs to be identified and corrected, i.e. a cracked well casing or a cross



CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080883

Report Date: 09/12/24

CASE NARRATIVE

connection to the system. Contact a well professional or the Montana Dept. of Environmental Quality @ 406-444-4400 or visit their website: <http://www.deq.state.mt.us/wqinfo/swp/index.asp>

REFERENCE: Montana Department of Environmental Quality, Public Water and Subdivisions Bureau Compliance Section



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering

Project: Judith Basin

Client Sample ID: CMRWA Well 4

PWS ID: **Facility ID:** **Sample Point ID:**

Facility Name:

Lab ID: H24080883-001H

Report Date: 09/12/24

Collection Date: 08/25/24 14:30

Received Date: 08/26/24 10:05

Matrix: Drinking Water

Sampled By: Bruce Lauerman

Compliance Sample: NO

Sample Type:

Res Cl Type: Unspecified

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
3100 Coliform, Total	Present	per 100ml	UNSAFE		A9223 B	08/26/24 16:18 / tmj
3014 Coliform, E-Coli	Absent	per 100ml			A9223 B	08/26/24 16:18 / tmj

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.

The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Qualifiers:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-001
Client Sample ID: CMRWA Well 4

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
DateReceived: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.3	s.u.	H	0.1		A4500-H B	08/26/24 11:18 / dpw
pH Measurement Temp	13.7	°C				A4500-H B	08/26/24 11:18 / dpw
Solids, Total Dissolved TDS @ 180 C	695	mg/L		20		A2540 C	08/27/24 14:40 / dpw
INORGANICS							
Alkalinity, Total as CaCO3	200	mg/L		4		A2320 B	08/27/24 10:45 / eer
Chloride	43	mg/L		1		E300.0	08/27/24 17:09 / eer
Sulfate	286	mg/L		1		E300.0	08/27/24 17:09 / eer
Fluoride	1.3	mg/L		0.1		E300.0	08/27/24 17:09 / eer
Cyanide, Total	ND	mg/L		0.005	0.2	Kelada-01	08/28/24 12:56 / eli-b
NUTRIENTS							
Nitrogen, Nitrate as N	0.07	mg/L		0.01		E353.2	09/11/24 08:39 / JCS
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.01	10	E353.2	09/09/24 18:06 / JAR
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	08/27/24 12:22 / JAR
METALS, TOTAL (CONTRACT LAB MT00945)							
Antimony	ND	mg/L		0.001	0.006	E200.8	08/30/24 14:11 / slj
Arsenic	ND	mg/L		0.001	0.01	E200.8	08/30/24 14:11 / slj
Barium	ND	mg/L		0.05	2	E200.8	08/30/24 14:11 / slj
Beryllium	ND	mg/L		0.001	0.004	E200.8	09/06/24 17:06 / dck
Cadmium	ND	mg/L		0.001	0.005	E200.8	08/30/24 14:11 / slj
Calcium	163	mg/L		1		E200.7	08/30/24 10:49 / kjb
Chromium	ND	mg/L		0.005	0.1	E200.8	08/30/24 14:11 / slj
Copper	ND	mg/L		0.005	1.3	E200.8	08/30/24 14:11 / slj
Iron	0.41	mg/L		0.02		E200.7	08/30/24 10:49 / kjb
Lead	ND	mg/L		0.001	0.015	E200.8	08/30/24 14:11 / slj
Magnesium	39	mg/L		1		E200.7	08/30/24 10:49 / kjb
Manganese	0.029	mg/L		0.001		E200.8	08/30/24 14:11 / slj
Nickel	0.044	mg/L		0.005		E200.8	08/30/24 14:11 / slj
Potassium	2	mg/L		1		E200.7	09/04/24 17:06 / kjb
Selenium	0.014	mg/L		0.001	0.05	E200.8	08/30/24 14:11 / slj
Sodium	4	mg/L		1		E200.7	08/30/24 10:49 / kjb
Thallium	ND	mg/L		0.0005	0.002	E200.8	08/30/24 14:11 / slj
DRINKING WATER METALS ANALYSES							
Mercury	ND	mg/L		0.0001	0.002	E245.1	08/28/24 15:09 / kjb
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Bromobenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Bromochloromethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Bromodichloromethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Bromoform	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
H - Analysis performed past the method holding time

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-001
Client Sample ID: CMRWA Well 4

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
DateReceived: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Bromomethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
n-Butylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
sec-Butylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
tert-Butylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Chlorobenzene	ND	ug/L		0.50	100	E524.2	08/30/24 23:44 / kmh
Chlorodibromomethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Chloroethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Chloroform	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Chloromethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
2-Chlorotoluene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
4-Chlorotoluene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Dibromomethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	08/30/24 23:44 / kmh
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	08/30/24 23:44 / kmh
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	08/30/24 23:44 / kmh
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	08/30/24 23:44 / kmh
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	08/30/24 23:44 / kmh
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Ethylbenzene	ND	ug/L		0.50	700	E524.2	08/30/24 23:44 / kmh
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Isopropylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Methylene chloride	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Naphthalene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
n-Propylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Styrene	ND	ug/L		0.50	100	E524.2	08/30/24 23:44 / kmh
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Toluene	ND	ug/L		0.50	1000	E524.2	08/30/24 23:44 / kmh
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	08/30/24 23:44 / kmh

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-001
Client Sample ID: CMRWA Well 4

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
DateReceived: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	08/30/24 23:44 / kmh
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Trichloroethene	ND	ug/L		0.50	5	E524.2	08/30/24 23:44 / kmh
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Vinyl chloride	ND	ug/L		0.50	2	E524.2	08/30/24 23:44 / kmh
m+p-Xylenes	ND	ug/L		1.0		E524.2	08/30/24 23:44 / kmh
o-Xylene	ND	ug/L		0.50		E524.2	08/30/24 23:44 / kmh
Trihalomethanes, Total	ND	ug/L		0.50	80	E524.2	08/30/24 23:44 / kmh
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	08/30/24 23:44 / kmh
Surr: p-Bromofluorobenzene	123	%REC		70-130		E524.2	08/30/24 23:44 / kmh
Surr: 1,2-Dichloroethane-d4	94.0	%REC		70-130		E524.2	08/30/24 23:44 / kmh
Surr: Toluene-d8	113	%REC		70-130		E524.2	08/30/24 23:44 / kmh
SEMI-VOLATILE ORGANIC COMPOUNDS							
Alachlor	ND	ug/L		0.10	2	E525.2	08/29/24 01:11 / eli-b
Aldrin	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Aroclor 1016	ND	ug/L		0.080		E525.2	08/29/24 01:11 / eli-b
Aroclor 1221	ND	ug/L		2.0		E525.2	08/29/24 01:11 / eli-b
Aroclor 1232	ND	ug/L		0.50		E525.2	08/29/24 01:11 / eli-b
Aroclor 1242	ND	ug/L		0.30		E525.2	08/29/24 01:11 / eli-b
Aroclor 1248	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Aroclor 1254	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Aroclor 1260	ND	ug/L		0.20		E525.2	08/29/24 01:11 / eli-b
Atrazine	ND	ug/L		0.10	3	E525.2	08/29/24 01:11 / eli-b
Benzo(a)pyrene	ND	ug/L		0.10	0.2	E525.2	08/29/24 01:11 / eli-b
bis(2-ethylhexyl)Adipate	ND	ug/L		0.50	400	E525.2	08/29/24 01:11 / eli-b
bis(2-ethylhexyl)Phthalate	ND	ug/L		0.60	6	E525.2	08/29/24 01:11 / eli-b
Butachlor	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Chlordane	ND	ug/L		1.0	2	E525.2	08/29/24 01:11 / eli-b
Dieldrin	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Endrin	ND	ug/L		0.10	2	E525.2	08/29/24 01:11 / eli-b
gamma-BHC (Lindane)	ND	ug/L		0.10	0.2	E525.2	08/29/24 01:11 / eli-b
Heptachlor	ND	ug/L		0.10	0.4	E525.2	08/29/24 01:11 / eli-b
Heptachlor epoxide	ND	ug/L		0.10	0.2	E525.2	08/29/24 01:11 / eli-b
Hexachlorobenzene	ND	ug/L		0.10	1	E525.2	08/29/24 01:11 / eli-b
Hexachlorocyclopentadiene	ND	ug/L		0.10	50	E525.2	08/29/24 01:11 / eli-b
Methoxychlor	ND	ug/L		0.10	40	E525.2	08/29/24 01:11 / eli-b
Metolachlor	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Metribuzin	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b
Propachlor	ND	ug/L		0.10		E525.2	08/29/24 01:11 / eli-b

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-001
Client Sample ID: CMRWA Well 4

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
Date Received: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SEMI-VOLATILE ORGANIC COMPOUNDS							
Simazine	ND	ug/L		0.10	4	E525.2	08/29/24 01:11 / eli-b
Toxaphene	ND	ug/L		2.0	3	E525.2	08/29/24 01:11 / eli-b
PCBs, Total	ND	ug/L		0.50	0.5	E525.2	08/29/24 01:11 / eli-b
Surr: 1,3-Dimethyl-2-nitrobenzene	99.0	%REC		70-130		E525.2	08/29/24 01:11 / eli-b
Surr: Perylene-d12	90.0	%REC		70-130		E525.2	08/29/24 01:11 / eli-b
Surr: Pyrene-d10	101	%REC		70-130		E525.2	08/29/24 01:11 / eli-b
Surr: Triphenylphosphate	97.0	%REC		70-130		E525.2	08/29/24 01:11 / eli-b
- Note: The federal MCL for total PCB's is 0.5 ug/L as Decachlorobiphenyl (DCB). PCB screening at the reporting limits given for the individual Aroclors meets or exceeds federal and state requirements for "Total PCB" monitoring if Aroclors are not detected.							
SEMI-VOLATILE ORGANIC COMPOUNDS							
Endothall	ND	ug/L		8.0	100	E548.1	08/29/24 17:06 / eli-b
Surr: 2,4-Dichlorophenylacetic acid	104	%REC		70-130		E548.1	08/29/24 17:06 / eli-b
PESTICIDES, BY HPLC							
Aldicarb	ND	ug/L		1.0	3	E531.1	08/29/24 04:28 / eli-ca
Aldicarb sulfone	ND	ug/L		1.0	2	E531.1	08/29/24 04:28 / eli-ca
Aldicarb sulfoxide	ND	ug/L		1.0	4	E531.1	08/29/24 04:28 / eli-ca
Carbaryl	ND	ug/L		1.0		E531.1	08/29/24 04:28 / eli-ca
3-Hydroxycarbofuran	ND	ug/L		1.0		E531.1	08/29/24 04:28 / eli-ca
Carbofuran	ND	ug/L		1.0	40	E531.1	08/29/24 04:28 / eli-ca
Methiocarb	ND	ug/L		1.0		E531.1	08/29/24 04:28 / eli-ca
Methomyl	ND	ug/L		1.0		E531.1	08/29/24 04:28 / eli-ca
Oxamyl	ND	ug/L		1.0	200	E531.1	08/29/24 04:28 / eli-ca
Baygon	ND	ug/L		1.0		E531.1	08/29/24 04:28 / eli-ca
Surr: BDMC	105	%REC		70-130		E531.1	08/29/24 04:28 / eli-ca
VOCS BY MICROEXTRACTION-ECD							
1,2-Dibromo-3-chloropropane	ND	ug/L		0.020	0.2	E504.1	08/28/24 18:59 / eli-b
1,2-Dibromoethane	ND	ug/L		0.010	0.05	E504.1	08/28/24 18:59 / eli-b
HERBICIDES, BY HPLC							
Glyphosate	ND	ug/L		5.0	700	E547	08/28/24 17:14 / eli-ca
PESTICIDES							
Diquat	ND	ug/L		0.40	20	E549.2	09/06/24 13:05 / ADW
HERBICIDES							
2,4,5-TP (Silvex)	ND	ug/L		0.25	50	E515.4	08/30/24 20:56 / eli-b12
2,4-D	ND	ug/L		1.0	70	E515.4	08/30/24 20:56 / eli-b12
2,4-DB	ND	ug/L		1.0		E515.4	08/30/24 20:56 / eli-b12
Dalapon	ND	ug/L		2.5	200	E515.4	08/30/24 20:56 / eli-b12
Dicamba	ND	ug/L		1.0		E515.4	08/30/24 20:56 / eli-b12
Dichlorprop	ND	ug/L		1.0		E515.4	08/30/24 20:56 / eli-b12
Dinoseb	ND	ug/L		1.0	7	E515.4	08/30/24 20:56 / eli-b12

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-001
Client Sample ID: CMRWA Well 4

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
Date Received: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
HERBICIDES							
Pentachlorophenol	ND	ug/L		0.10	1	E515.4	08/30/24 20:56 / eli-b12
Picloram	ND	ug/L		0.50	500	E515.4	08/30/24 20:56 / eli-b12
Surr: 2,4-Dichlorophenylacetic acid	102	%REC		70-130		E515.4	08/30/24 20:56 / eli-b12

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-002
Client Sample ID: Trip Blank

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
DateReceived: 08/26/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Bromobenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Bromochloromethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Bromodichloromethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Bromoform	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Bromomethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
n-Butylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
sec-Butylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
tert-Butylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Chlorobenzene	ND	ug/L		0.50	100	E524.2	08/31/24 00:16 / kmh
Chlorodibromomethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Chloroethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Chloroform	0.24	ug/L	J	0.50		E524.2	08/31/24 00:16 / kmh
Chloromethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
2-Chlorotoluene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
4-Chlorotoluene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Dibromomethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	08/31/24 00:16 / kmh
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	08/31/24 00:16 / kmh
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	08/31/24 00:16 / kmh
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	08/31/24 00:16 / kmh
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	08/31/24 00:16 / kmh
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Ethylbenzene	ND	ug/L		0.50	700	E524.2	08/31/24 00:16 / kmh
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Isopropylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Methylene chloride	1.0	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Naphthalene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
n-Propylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Styrene	ND	ug/L		0.50	100	E524.2	08/31/24 00:16 / kmh
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh

Report Definitions:
 RL - Analyte Reporting Limit
 QCL - Quality Control Limit
 J - Estimated value - analyte was present but less than the Reporting Limit (RL)

MCL - Maximum Contaminant Level
 ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080883-002
Client Sample ID: Trip Blank

Report Date: 09/12/24
Collection Date: 08/25/24 14:30
DateReceived: 08/26/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Toluene	ND	ug/L		0.50	1000	E524.2	08/31/24 00:16 / kmh
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	08/31/24 00:16 / kmh
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	08/31/24 00:16 / kmh
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Trichloroethene	ND	ug/L		0.50	5	E524.2	08/31/24 00:16 / kmh
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Vinyl chloride	ND	ug/L		0.50	2	E524.2	08/31/24 00:16 / kmh
m+p-Xylenes	ND	ug/L		1.0		E524.2	08/31/24 00:16 / kmh
o-Xylene	ND	ug/L		0.50		E524.2	08/31/24 00:16 / kmh
Trihalomethanes, Total	0.24	ug/L	J	0.50	80	E524.2	08/31/24 00:16 / kmh
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	08/31/24 00:16 / kmh
Surr: p-Bromofluorobenzene	122	%REC		70-130		E524.2	08/31/24 00:16 / kmh
Surr: 1,2-Dichloroethane-d4	92.0	%REC		70-130		E524.2	08/31/24 00:16 / kmh
Surr: Toluene-d8	113	%REC		70-130		E524.2	08/31/24 00:16 / kmh

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R197917
Lab ID: MBLK		Method Blank					Run: PHSC_101-H_240827A			08/27/24 10:10
Alkalinity, Total as CaCO ₃		ND	mg/L	2						
Lab ID: LCS										08/27/24 10:24
Laboratory Control Sample							Run: PHSC_101-H_240827A			
Alkalinity, Total as CaCO ₃		610	mg/L	4.0	102	90	110			
Lab ID: H24080883-001ADUP										08/27/24 10:54
Sample Duplicate							Run: PHSC_101-H_240827A			
Alkalinity, Total as CaCO ₃		200	mg/L	4.0				0.2	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS20240827A
Lab ID: MBLK_20240827-3		Method Blank						Run: Sartorius-BCA124-1S_240827		08/27/24 14:40
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	1						
Lab ID: LCS_20240827-2		Laboratory Control Sample						Run: Sartorius-BCA124-1S_240827		08/27/24 14:40
Solids, Total Dissolved TDS @ 180 C		1960	mg/L	50	98	90	110			
Lab ID: H24080883-001ADUP		Sample Duplicate						Run: Sartorius-BCA124-1S_240827		08/27/24 14:41
Solids, Total Dissolved TDS @ 180 C		703	mg/L	25				1.1	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B							Analytical Run: PHSC_101-H_240826A			
Lab ID: pH 7		2 Initial Calibration Verification Standard							08/26/24 09:05	
pH		7.0	s.u.	0.1	100	98	102			
pH Measurement Temp		21.3	°C			0	0			
Method: A4500-H B							Batch: R197865			
Lab ID: H24080883-001ADUP		2 Sample Duplicate							Run: PHSC_101-H_240826A	
pH		7.3	s.u.	0.1				0.4	3	H
pH Measurement Temp		13.7	°C							

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

H - Analysis performed past the method holding time



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7		Analytical Run: ICP2-HE_240830A								
Lab ID: ICV	4	Initial Calibration Verification Standard							08/30/24 09:57	
Calcium		38.5	mg/L	1.0	96	95	105			
Iron		3.87	mg/L	0.020	97	95	105			
Magnesium		38.4	mg/L	1.0	96	95	105			
Sodium		39.0	mg/L	1.0	97	95	105			
Lab ID: CCV-1	4	Continuing Calibration Verification Standard							08/30/24 10:01	
Calcium		24.5	mg/L	1.0	98	95	105			
Iron		2.47	mg/L	0.020	99	95	105			
Magnesium		24.5	mg/L	1.0	98	95	105			
Sodium		25.8	mg/L	1.0	103	95	105			
Lab ID: CCV	4	Continuing Calibration Verification Standard							08/30/24 10:32	
Calcium		25.2	mg/L	1.0	101	90	110			
Iron		2.49	mg/L	0.020	100	90	110			
Magnesium		25.1	mg/L	1.0	100	90	110			
Sodium		24.9	mg/L	1.0	100	90	110			
Method: E200.7		Batch: R198113								
Lab ID: MB	4	Method Blank					Run: ICP2-HE_240830A		08/30/24 10:24	
Calcium		ND	mg/L	0.2						
Iron		ND	mg/L	0.008						
Magnesium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.03						
Lab ID: LFB	4	Laboratory Fortified Blank					Run: ICP2-HE_240830A		08/30/24 10:28	
Calcium		49.3	mg/L	1.0	99	85	115			
Iron		4.94	mg/L	0.020	99	85	115			
Magnesium		49.2	mg/L	1.0	98	85	115			
Sodium		52.5	mg/L	1.0	105	85	115			
Lab ID: H24080927-011CMS3	4	Sample Matrix Spike					Run: ICP2-HE_240830A		08/30/24 12:39	
Calcium		146	mg/L	1.0		70	130			A
Iron		2.74	mg/L	0.020	103	70	130			
Magnesium		69.8	mg/L	1.0	112	70	130			
Sodium		66.5	mg/L	1.0	107	70	130			
Lab ID: H24080927-011CMSD3	4	Sample Matrix Spike Duplicate					Run: ICP2-HE_240830A		08/30/24 12:42	
Calcium		143	mg/L	1.0		70	130	2.1	20	A
Iron		2.66	mg/L	0.020	100	70	130	3.0	20	
Magnesium		69.0	mg/L	1.0	108	70	130	1.2	20	
Sodium		65.2	mg/L	1.0	101	70	130	2.0	20	

Qualifiers:

RL - Analyte Reporting Limit

A - Analyte level was greater than four times the spike level - in accordance with the method, percent recovery is not calculated

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP2-HE_240904A		
Lab ID: ICV	Initial Calibration Verification Standard									
Potassium		38.4	mg/L	1.0	96	95	105			09/04/24 10:23
Lab ID: CCV-1	Continuing Calibration Verification Standard									
Potassium		24.7	mg/L	1.0	99	95	105			09/04/24 10:27
Lab ID: CCV	Continuing Calibration Verification Standard									
Potassium		24.6	mg/L	1.0	98	90	110			09/04/24 16:47
Method: E200.7								Batch: R198186		
Lab ID: MB	Method Blank									
Potassium		0.09	mg/L	0.06				Run: ICP2-HE_240904A		09/04/24 10:51
Lab ID: LFB	Laboratory Fortified Blank									
Potassium		50.8	mg/L	1.0	102	85	115	Run: ICP2-HE_240904A		09/04/24 10:55

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8		Analytical Run: ICPMS205-H_240830A								
Lab ID: ICV	11	Initial Calibration Verification Standard							08/30/24 10:35	
Antimony		0.0597	mg/L	0.0030	100	90	110			
Arsenic		0.0621	mg/L	0.0050	104	90	110			
Barium		0.0594	mg/L	0.10	99	90	110			
Cadmium		0.0312	mg/L	0.0010	104	90	110			
Chromium		0.0595	mg/L	0.010	99	90	110			
Copper		0.0628	mg/L	0.010	105	90	110			
Lead		0.0605	mg/L	0.0010	101	90	110			
Manganese		0.304	mg/L	0.010	101	90	110			
Nickel		0.0645	mg/L	0.010	108	90	110			
Selenium		0.0632	mg/L	0.0050	105	90	110			
Thallium		0.0599	mg/L	0.0010	100	90	110			
Lab ID: CCV	11	Continuing Calibration Verification Standard							08/30/24 13:56	
Antimony		0.0508	mg/L	0.0030	102	90	110			
Arsenic		0.0510	mg/L	0.0050	102	90	110			
Barium		0.0505	mg/L	0.10	101	90	110			
Cadmium		0.0509	mg/L	0.0010	102	90	110			
Chromium		0.0490	mg/L	0.010	98	90	110			
Copper		0.0495	mg/L	0.010	99	90	110			
Lead		0.0512	mg/L	0.0010	102	90	110			
Manganese		0.0473	mg/L	0.010	95	90	110			
Nickel		0.0501	mg/L	0.010	100	90	110			
Selenium		0.0518	mg/L	0.0050	104	90	110			
Thallium		0.0530	mg/L	0.0010	106	90	110			
Method: E200.8		Batch: R198066								
Lab ID: LRB	11	Method Blank							Run: ICPMS205-H_240830A 08/30/24 11:16	
Antimony		ND	mg/L	0.0001						
Arsenic		ND	mg/L	0.0004						
Barium		ND	mg/L	0.0005						
Cadmium		ND	mg/L	0.0002						
Chromium		ND	mg/L	0.0008						
Copper		ND	mg/L	0.003						
Lead		ND	mg/L	0.0002						
Manganese		ND	mg/L	0.0007						
Nickel		ND	mg/L	0.001						
Selenium		ND	mg/L	0.0005						
Thallium		ND	mg/L	0.0001						
Lab ID: LFB	11	Laboratory Fortified Blank							Run: ICPMS205-H_240830A 08/30/24 11:19	
Antimony		0.0513	mg/L	0.0030	103	85	115			
Arsenic		0.0536	mg/L	0.0050	107	85	115			
Barium		0.0520	mg/L	0.10	104	85	115			
Cadmium		0.0527	mg/L	0.0010	105	85	115			
Chromium		0.0533	mg/L	0.010	107	85	115			
Copper		0.0547	mg/L	0.010	109	85	115			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R198066
Lab ID: LFB	11	Laboratory Fortified Blank			Run: ICPMS205-H_240830A			08/30/24 11:19		
Lead		0.0508	mg/L	0.0010	102	85	115			
Manganese		0.0548	mg/L	0.010	110	85	115			
Nickel		0.0561	mg/L	0.010	112	85	115			
Selenium		0.0540	mg/L	0.0050	108	85	115			
Thallium		0.0553	mg/L	0.0010	111	85	115			
Lab ID: H24080830-020AMS	11	Sample Matrix Spike			Run: ICPMS205-H_240830A			08/30/24 14:22		
Antimony		0.0571	mg/L	0.0010	113	70	130			
Arsenic		0.0597	mg/L	0.0010	112	70	130			
Barium		0.110	mg/L	0.050	117	70	130			
Cadmium		0.0566	mg/L	0.0010	113	70	130			
Chromium		0.0497	mg/L	0.0050	99	70	130			
Copper		0.0931	mg/L	0.0050	96	70	130			
Lead		0.0572	mg/L	0.0010	114	70	130			
Manganese		0.0512	mg/L	0.0010	101	70	130			
Nickel		0.0529	mg/L	0.0050	106	70	130			
Selenium		0.0595	mg/L	0.0010	117	70	130			
Thallium		0.0569	mg/L	0.00050	114	70	130			
Lab ID: H24080830-020AMSD	11	Sample Matrix Spike Duplicate			Run: ICPMS205-H_240830A			08/30/24 14:24		
Antimony		0.0536	mg/L	0.0010	106	70	130	6.3	20	
Arsenic		0.0585	mg/L	0.0010	109	70	130	2.0	20	
Barium		0.104	mg/L	0.050	105	70	130	5.6	20	
Cadmium		0.0527	mg/L	0.0010	105	70	130	7.0	20	
Chromium		0.0486	mg/L	0.0050	97	70	130	2.3	20	
Copper		0.0932	mg/L	0.0050	96	70	130	0.1	20	
Lead		0.0563	mg/L	0.0010	112	70	130	1.6	20	
Manganese		0.0518	mg/L	0.0010	102	70	130	1.2	20	
Nickel		0.0515	mg/L	0.0050	103	70	130	2.7	20	
Selenium		0.0581	mg/L	0.0010	114	70	130	2.3	20	
Thallium		0.0556	mg/L	0.00050	111	70	130	2.4	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	E200.8							Analytical Run: ICPMS205-H_240906B		
Lab ID:	ICV	Initial Calibration Verification Standard							09/06/24 16:02	
Beryllium		0.0308	mg/L	0.0010	103	90	110			
Lab ID:	CCV	Continuing Calibration Verification Standard							09/06/24 16:31	
Beryllium		0.0486	mg/L	0.0010	97	90	110			
Method:	E200.8							Batch: R198261		
Lab ID:	LRB	Method Blank			Run: ICPMS205-H_240906B				09/06/24 16:48	
Beryllium		ND	mg/L	0.00008						
Lab ID:	LFB	Laboratory Fortified Blank			Run: ICPMS205-H_240906B				09/06/24 16:51	
Beryllium		0.0527	mg/L	0.0010	105	85	115			
Lab ID:	H24081064-001AMS	Sample Matrix Spike			Run: ICPMS205-H_240906B				09/06/24 16:58	
Beryllium		0.0528	mg/L	0.0010	106	70	130			
Lab ID:	H24081064-001AMSD	Sample Matrix Spike Duplicate			Run: ICPMS205-H_240906B				09/06/24 17:01	
Beryllium		0.0532	mg/L	0.0010	106	70	130	0.7	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										
Analytical Run: HGCV205-H_240828A										
Lab ID: ICV		Initial Calibration Verification Standard								08/28/24 14:57
Mercury		0.000972	mg/L	0.00010	97	90	110			
Lab ID: CCV1		Continuing Calibration Verification Standard								08/28/24 14:59
Mercury		0.00252	mg/L	0.00010	101	95	105			
Method: E245.1										
Batch: 73607										
Lab ID: MB-73607		Method Blank								08/28/24 15:05
Mercury		ND	mg/L	0.00005						
Lab ID: LCS-73607		Laboratory Control Sample								08/28/24 15:07
Mercury		0.000484	mg/L	0.00010	97	85	115			
Lab ID: H24080883-001BMS		Sample Matrix Spike								08/28/24 15:10
Mercury		0.000469	mg/L	0.00010	94	70	130			
Lab ID: H24080883-001BMSD		Sample Matrix Spike Duplicate								08/28/24 15:12
Mercury		0.000461	mg/L	0.00010	92	70	130	1.6	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0										Analytical Run: IC METROHM_240827A
Lab ID: ICV	3	Initial Calibration Verification Standard								08/27/24 13:19
Chloride		99.2	mg/L	1.0	99	90	110			
Sulfate		397	mg/L	1.0	99	90	110			
Fluoride		5.17	mg/L	0.10	103	90	110			
Lab ID: CCV	3	Continuing Calibration Verification Standard								08/27/24 15:14
Chloride		49.1	mg/L	1.0	98	90	110			
Sulfate		196	mg/L	1.0	98	90	110			
Fluoride		2.58	mg/L	0.10	103	90	110			
Method: E300.0										Batch: R197986
Lab ID: ICB	3	Method Blank								Run: IC METROHM_240827A 08/27/24 13:47
Chloride		ND	mg/L	0.02						
Sulfate		ND	mg/L	0.03						
Fluoride		ND	mg/L	0.01						
Lab ID: LFB	3	Laboratory Fortified Blank								Run: IC METROHM_240827A 08/27/24 14:02
Chloride		24.1	mg/L	1.0	97	90	110			
Sulfate		97.3	mg/L	1.0	97	90	110			
Fluoride		1.21	mg/L	0.10	96	90	110			
Lab ID: H24080850-002AMS	3	Sample Matrix Spike								Run: IC METROHM_240827A 08/27/24 17:52
Chloride		37.9	mg/L	1.0	104	90	110			
Sulfate		113	mg/L	1.0	103	90	110			
Fluoride		1.34	mg/L	0.10	100	90	110			
Lab ID: H24080850-002AMSD	3	Sample Matrix Spike Duplicate								Run: IC METROHM_240827A 08/27/24 18:06
Chloride		37.7	mg/L	1.0	103	90	110	0.4	20	
Sulfate		113	mg/L	1.0	104	90	110	0.1	20	
Fluoride		1.33	mg/L	0.10	100	90	110	0.5	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2								Analytical Run: FIA203-HE_240827C		
Lab ID: ICV	Initial Calibration Verification Standard							08/27/24 12:18		
Nitrogen, Nitrite as N		0.910	mg/L	0.010	91	90	110			
Method: E353.2								Batch: R198165		
Lab ID: MBLK	Method Blank						Run: FIA203-HE_240827C	08/27/24 12:19		
Nitrogen, Nitrite as N		ND	mg/L	0.009						
Lab ID: LFB	Laboratory Fortified Blank						Run: FIA203-HE_240827C	08/27/24 12:20		
Nitrogen, Nitrite as N		0.975	mg/L	0.011	98	90	110			
Lab ID: H24080883-001ADUP	Sample Duplicate						Run: FIA203-HE_240827C	08/27/24 12:23		
Nitrogen, Nitrite as N		ND	mg/L	0.010						10
Lab ID: H24080883-001AMS	Sample Matrix Spike						Run: FIA203-HE_240827C	08/27/24 12:24		
Nitrogen, Nitrite as N		0.989	mg/L	0.011	99	90	110			
Lab ID: H24080883-001AMSD	Sample Matrix Spike Duplicate						Run: FIA203-HE_240827C	08/27/24 12:25		
Nitrogen, Nitrite as N		1.00	mg/L	0.011	100	90	110	1.2	10	
Method: E353.2								Analytical Run: SEAL AA500_240909A		
Lab ID: ICV	Initial Calibration Verification Standard							09/09/24 17:07		
Nitrogen, Nitrate+Nitrite as N		1.10	mg/L	0.010	110	90	110			
Lab ID: CCV	Continuing Calibration Verification Standard							09/09/24 17:59		
Nitrogen, Nitrate+Nitrite as N		0.992	mg/L	0.010	99	90	110			
Method: E353.2								Batch: R198301		
Lab ID: ICB	Method Blank						Run: SEAL AA500_240909A	09/09/24 17:05		
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.01						
Lab ID: LFB	Laboratory Fortified Blank						Run: SEAL AA500_240909A	09/09/24 17:08		
Nitrogen, Nitrate+Nitrite as N		0.986	mg/L	0.011	99	90	110			
Lab ID: H24080862-001AMS	Sample Matrix Spike						Run: SEAL AA500_240909A	09/09/24 18:03		
Nitrogen, Nitrate+Nitrite as N		1.14	mg/L	0.011	100	90	110			
Lab ID: H24080862-001AMSD	Sample Matrix Spike Duplicate						Run: SEAL AA500_240909A	09/09/24 18:04		
Nitrogen, Nitrate+Nitrite as N		1.14	mg/L	0.011	100	90	110	0	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E504.1										Analytical Run: B_192605
Lab ID: CK4-192605	2	Continuing Calibration Verification Standard								08/28/24 16:33
1,2-Dibromo-3-chloropropane		0.191	ug/L	0.020	96	70	130			
1,2-Dibromoethane		0.195	ug/L	0.010	97	70	130			
Lab ID: CK2-192605	2	Continuing Calibration Verification Standard								08/28/24 20:42
1,2-Dibromo-3-chloropropane		0.0521	ug/L	0.020	104	70	130			
1,2-Dibromoethane		0.0488	ug/L	0.010	98	70	130			
Method: E504.1										Batch: B_192605
Lab ID: LCS-192605	2	Laboratory Control Sample				Run: SUB-B428020				08/28/24 17:35
1,2-Dibromo-3-chloropropane		0.253	ug/L	0.020	101	70	130			
1,2-Dibromoethane		0.235	ug/L	0.010	94	70	130			
Lab ID: LCSD-192605	2	Laboratory Control Sample Duplicate				Run: SUB-B428020				08/28/24 17:56
1,2-Dibromo-3-chloropropane		0.260	ug/L	0.020	104	70	130	2.7	20	
1,2-Dibromoethane		0.235	ug/L	0.010	94	70	130	0.2	20	
Lab ID: MB-192605	2	Method Blank				Run: SUB-B428020				08/28/24 18:17
1,2-Dibromo-3-chloropropane		ND	ug/L	0.020						
1,2-Dibromoethane		ND	ug/L	0.010						
Lab ID: B24082451-001HMS	2	Sample Matrix Spike				Run: SUB-B428020				08/28/24 20:00
1,2-Dibromo-3-chloropropane		0.257	ug/L	0.020	104	65	135			
1,2-Dibromoethane		0.230	ug/L	0.010	93	65	135			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Analytical Run: B_192687
Lab ID: CAL1-192687	10	Continuing Calibration Verification Standard								08/30/24 15:19
2,4,5-TP (Silvex)		0.255	ug/L	0.25	102	50	150			
2,4-D		1.01	ug/L	1.0	101	50	150			
2,4-DB		0.885	ug/L	1.0	88	50	150			
Dalapon		0.879	ug/L	2.5	88	50	150			
Dicamba		0.501	ug/L	1.0	100	50	150			
Dichlorprop		1.06	ug/L	1.0	106	50	150			
Dinoseb		1.14	ug/L	1.0	114	50	150			
Pentachlorophenol		0.105	ug/L	0.10	105	50	150			
Picloram		0.513	ug/L	0.50	103	50	150			
Surr: 2,4-Dichlorophenylacetic acid					99	70	130			
Lab ID: CAL3-192687	10	Continuing Calibration Verification Standard								08/30/24 19:04
2,4,5-TP (Silvex)		0.767	ug/L	0.25	102	70	130			
2,4-D		3.18	ug/L	1.0	106	70	130			
2,4-DB		3.25	ug/L	1.0	108	70	130			
Dalapon		3.09	ug/L	2.5	103	70	130			
Dicamba		1.65	ug/L	1.0	110	70	130			
Dichlorprop		3.21	ug/L	1.0	107	70	130			
Dinoseb		3.00	ug/L	1.0	100	70	130			
Pentachlorophenol		0.296	ug/L	0.10	99	70	130			
Picloram		1.58	ug/L	0.50	106	70	130			
Surr: 2,4-Dichlorophenylacetic acid					103	70	130			
Lab ID: CAL5-192687	10	Continuing Calibration Verification Standard								08/31/24 00:39
2,4,5-TP (Silvex)		1.83	ug/L	0.25	105	70	130			
2,4-D		7.18	ug/L	1.0	103	70	130			
2,4-DB		6.84	ug/L	1.0	98	70	130			
Dalapon		7.70	ug/L	2.5	110	70	130			
Dicamba		3.49	ug/L	1.0	100	70	130			
Dichlorprop		7.18	ug/L	1.0	103	70	130			
Dinoseb		6.37	ug/L	1.0	91	70	130			
Pentachlorophenol		0.661	ug/L	0.10	94	70	130			
Picloram		3.55	ug/L	0.50	101	70	130			
Surr: 2,4-Dichlorophenylacetic acid					100	70	130			
Method: E515.4										Batch: B_192687
Lab ID: LCS-192687	10	Laboratory Control Sample								08/30/24 15:57
					Run: SUB-B428272					
2,4,5-TP (Silvex)		1.31	ug/L	0.25	105	70	130			
2,4-D		4.69	ug/L	1.0	94	70	130			
2,4-DB		4.23	ug/L	1.0	85	70	130			
Dalapon		4.50	ug/L	2.5	90	70	130			
Dicamba		2.47	ug/L	1.0	99	70	130			
Dichlorprop		4.79	ug/L	1.0	96	70	130			
Dinoseb		4.58	ug/L	1.0	92	70	130			
Pentachlorophenol		0.437	ug/L	0.10	87	70	130			
Picloram		2.34	ug/L	0.50	93	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Batch: B_192687
Lab ID: LCS-192687	10	Laboratory Control Sample				Run: SUB-B428272				08/30/24 15:57
Surr: 2,4-Dichlorophenylacetic acid					97	70	130			
Lab ID: MB-192687	10	Method Blank				Run: SUB-B428272				08/30/24 16:34
2,4,5-TP (Silvex)		ND	ug/L	0.25						
2,4-D		ND	ug/L	1.0						
2,4-DB		ND	ug/L	1.0						
Dalapon		ND	ug/L	2.5						
Dicamba		ND	ug/L	1.0						
Dichlorprop		ND	ug/L	1.0						
Dinoseb		ND	ug/L	1.0						
Pentachlorophenol		ND	ug/L	0.10						
Picloram		ND	ug/L	0.50						
Surr: 2,4-Dichlorophenylacetic acid					94	70	130			
Lab ID: B24082682-001DMS	10	Sample Matrix Spike				Run: SUB-B428272				08/30/24 17:49
2,4,5-TP (Silvex)		1.45	ug/L	0.25	116	70	130			
2,4-D		4.96	ug/L	1.0	99	70	130			
2,4-DB		4.87	ug/L	1.0	97	70	130			
Dalapon		5.77	ug/L	2.5	115	70	130			
Dicamba		2.57	ug/L	1.0	103	70	130			
Dichlorprop		5.04	ug/L	1.0	101	70	130			
Dinoseb		4.81	ug/L	1.0	96	70	130			
Pentachlorophenol		0.463	ug/L	0.10	93	70	130			
Picloram		2.52	ug/L	0.50	101	70	130			
Surr: 2,4-Dichlorophenylacetic acid					99	70	130			
Lab ID: B24082682-001DMSD	10	Sample Matrix Spike Duplicate				Run: SUB-B428272				08/30/24 18:27
2,4,5-TP (Silvex)		1.45	ug/L	0.25	116	70	130	0.1	30	
2,4-D		4.98	ug/L	1.0	100	70	130	0.4	30	
2,4-DB		5.13	ug/L	1.0	103	70	130	5.2	30	
Dalapon		5.49	ug/L	2.5	110	70	130	5.0	30	
Dicamba		2.57	ug/L	1.0	103	70	130	0.2	30	
Dichlorprop		5.06	ug/L	1.0	101	70	130	0.5	30	
Dinoseb		4.73	ug/L	1.0	95	70	130	1.8	30	
Pentachlorophenol		0.470	ug/L	0.10	94	70	130	1.6	30	
Picloram		2.55	ug/L	0.50	102	70	130	1.2	30	
Surr: 2,4-Dichlorophenylacetic acid					106	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Analytical Run: R198101
Lab ID: 30-Aug-24_CCV_8	63	Continuing Calibration Verification Standard								08/30/24 14:50
Benzene		5.01	ug/L	0.50	100	70	130			
Bromobenzene		4.76	ug/L	0.50	95	70	130			
Bromochloromethane		4.96	ug/L	0.50	99	70	130			
Bromodichloromethane		4.87	ug/L	0.50	97	70	130			
Bromoform		5.11	ug/L	0.50	102	70	130			
Bromomethane		6.11	ug/L	0.50	122	70	130			
n-Butylbenzene		6.55	ug/L	0.50	131	70	130			S
sec-Butylbenzene		5.80	ug/L	0.50	116	70	130			
tert-Butylbenzene		5.00	ug/L	0.50	100	70	130			
Carbon tetrachloride		4.53	ug/L	0.50	91	70	130			
Chlorobenzene		5.13	ug/L	0.50	103	70	130			
Chlorodibromomethane		4.93	ug/L	0.50	99	70	130			
Chloroethane		5.03	ug/L	0.50	101	70	130			
Chloroform		4.80	ug/L	0.50	96	70	130			
Chloromethane		6.15	ug/L	0.50	123	70	130			
2-Chlorotoluene		5.60	ug/L	0.50	112	70	130			
4-Chlorotoluene		5.96	ug/L	0.50	119	70	130			
Dibromomethane		5.82	ug/L	0.50	116	70	130			
1,2-Dichlorobenzene		5.20	ug/L	0.50	104	70	130			
1,3-Dichlorobenzene		5.07	ug/L	0.50	101	70	130			
1,4-Dichlorobenzene		5.24	ug/L	0.50	105	70	130			
Dichlorodifluoromethane		4.45	ug/L	0.50	89	70	130			
1,1-Dichloroethane		4.61	ug/L	0.50	92	70	130			
1,2-Dichloroethane		4.62	ug/L	0.50	92	70	130			
1,1-Dichloroethene		5.01	ug/L	0.50	100	70	130			
cis-1,2-Dichloroethene		5.01	ug/L	0.50	100	70	130			
trans-1,2-Dichloroethene		4.98	ug/L	0.50	100	70	130			
1,2-Dichloropropane		5.48	ug/L	0.50	110	70	130			
1,3-Dichloropropane		5.08	ug/L	0.50	102	70	130			
2,2-Dichloropropane		4.96	ug/L	0.50	99	70	130			
1,1-Dichloropropene		4.55	ug/L	0.50	91	70	130			
cis-1,3-Dichloropropene		5.39	ug/L	0.50	108	70	130			
trans-1,3-Dichloropropene		5.42	ug/L	0.50	108	70	130			
Ethylbenzene		5.15	ug/L	0.50	103	70	130			
Hexachlorobutadiene		5.02	ug/L	0.50	100	70	130			
Isopropylbenzene		5.43	ug/L	0.50	109	70	130			
p-Isopropyltoluene		5.43	ug/L	0.50	109	70	130			
Methyl tert-butyl ether (MTBE)		4.89	ug/L	0.50	98	70	130			
Methylene chloride		5.50	ug/L	0.50	110	70	130			
Naphthalene		8.09	ug/L	0.50	162	70	130			S
n-Propylbenzene		5.37	ug/L	0.50	107	70	130			
Styrene		5.08	ug/L	0.50	102	70	130			
1,1,1,2-Tetrachloroethane		4.92	ug/L	0.50	98	70	130			
1,1,2,2-Tetrachloroethane		6.47	ug/L	0.50	129	70	130			
Tetrachloroethene		3.61	ug/L	0.50	72	70	130			

Qualifiers:

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S - Spike recovery outside of advisory limits

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Analytical Run: R198101
Lab ID: 30-Aug-24_CCV_8	63	Continuing Calibration Verification Standard								08/30/24 14:50
Toluene		5.38	ug/L	0.50	108	70	130			
1,2,3-Trichlorobenzene		6.25	ug/L	0.50	125	70	130			
1,2,4-Trichlorobenzene		5.25	ug/L	0.50	105	70	130			
1,1,1-Trichloroethane		4.39	ug/L	0.50	88	70	130			
1,1,2-Trichloroethane		5.82	ug/L	0.50	116	70	130			
Trichloroethene		5.00	ug/L	0.50	100	70	130			
Trichlorofluoromethane		5.11	ug/L	0.50	102	70	130			
1,2,3-Trichloropropane		6.10	ug/L	0.50	122	70	130			
1,2,4-Trimethylbenzene		5.83	ug/L	0.50	117	70	130			
1,3,5-Trimethylbenzene		5.61	ug/L	0.50	112	70	130			
Vinyl chloride		5.16	ug/L	0.20	103	70	130			
m+p-Xylenes		10.4	ug/L	0.50	104	70	130			
o-Xylene		5.24	ug/L	0.50	105	70	130			
Trihalomethanes, Total		19.7	ug/L	0.50	99	70	130			
Xylenes, Total		15.7	ug/L	0.50	104	70	130			
Surr: p-Bromofluorobenzene				0.50	119	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	94	70	130			
Surr: Toluene-d8				0.50	112	70	130			
Lab ID: 30-Aug-24_CCV1_10	8	Continuing Calibration Verification Standard								08/30/24 16:06
Bromodichloromethane		0.652	ug/L	0.50	130	50	150			
Bromoform		0.751	ug/L	0.50	150	50	150			
Chlorodibromomethane		0.667	ug/L	0.50	133	50	150			
Chloroform		0.617	ug/L	0.50	123	50	150			
Trihalomethanes, Total		2.69	ug/L	0.50	134	50	150			
Surr: 1,2-Dichloroethane-d4				0.50	96	70	130			
Surr: p-Bromofluorobenzene				0.50	124	70	130			
Surr: Toluene-d8				0.50	111	70	130			
Method: E524.2										Batch: R198101
Lab ID: 30-Aug-24_LCS_9	63	Laboratory Control Sample								08/30/24 15:34
					Run: 5973MSD2_240830A					
Benzene		4.97	ug/L	0.50	99	70	130			
Bromobenzene		4.61	ug/L	0.50	92	70	130			
Bromochloromethane		4.83	ug/L	0.50	97	70	130			
Bromodichloromethane		4.81	ug/L	0.50	96	70	130			
Bromoform		5.06	ug/L	0.50	101	70	130			
Bromomethane		7.60	ug/L	0.50	152	70	130			S
n-Butylbenzene		6.76	ug/L	0.50	135	70	130			S
sec-Butylbenzene		5.18	ug/L	0.50	104	70	130			
tert-Butylbenzene		4.75	ug/L	0.50	95	70	130			
Carbon tetrachloride		4.49	ug/L	0.50	90	70	130			
Chlorobenzene		5.03	ug/L	0.50	101	70	130			
Chlorodibromomethane		4.96	ug/L	0.50	99	70	130			
Chloroethane		5.46	ug/L	0.50	109	70	130			
Chloroform		4.92	ug/L	0.50	98	70	130			

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QA/QC Summary Report

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Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R198101
Lab ID: 30-Aug-24_LCS_9	63	Laboratory Control Sample				Run: 5973MSD2_240830A				08/30/24 15:34
Chloromethane		6.41	ug/L	0.50	128	70	130			
2-Chlorotoluene		5.38	ug/L	0.50	108	70	130			
4-Chlorotoluene		5.83	ug/L	0.50	117	70	130			
Dibromomethane		5.63	ug/L	0.50	113	70	130			
1,2-Dichlorobenzene		4.95	ug/L	0.50	99	70	130			
1,3-Dichlorobenzene		4.97	ug/L	0.50	99	70	130			
1,4-Dichlorobenzene		5.04	ug/L	0.50	101	70	130			
Dichlorodifluoromethane		4.25	ug/L	0.50	85	70	130			
1,1-Dichloroethane		4.55	ug/L	0.50	91	70	130			
1,2-Dichloroethane		4.62	ug/L	0.50	92	70	130			
1,1-Dichloroethene		4.90	ug/L	0.50	98	70	130			
cis-1,2-Dichloroethene		5.01	ug/L	0.50	100	70	130			
trans-1,2-Dichloroethene		4.94	ug/L	0.50	99	70	130			
1,2-Dichloropropane		5.53	ug/L	0.50	111	70	130			
1,3-Dichloropropane		5.22	ug/L	0.50	104	70	130			
2,2-Dichloropropane		5.07	ug/L	0.50	101	70	130			
1,1-Dichloropropene		4.66	ug/L	0.50	93	70	130			
cis-1,3-Dichloropropene		5.29	ug/L	0.50	106	70	130			
trans-1,3-Dichloropropene		4.95	ug/L	0.50	99	70	130			
Ethylbenzene		5.24	ug/L	0.50	105	70	130			
Hexachlorobutadiene		4.88	ug/L	0.50	98	70	130			
Isopropylbenzene		5.38	ug/L	0.50	108	70	130			
p-Isopropyltoluene		5.22	ug/L	0.50	104	70	130			
Methyl tert-butyl ether (MTBE)		4.95	ug/L	0.50	99	70	130			
Methylene chloride		5.35	ug/L	0.50	107	70	130			
Naphthalene		7.60	ug/L	0.50	152	70	130			S
n-Propylbenzene		5.28	ug/L	0.50	106	70	130			
Styrene		5.18	ug/L	0.50	104	70	130			
1,1,1,2-Tetrachloroethane		4.78	ug/L	0.50	96	70	130			
1,1,2,2-Tetrachloroethane		6.42	ug/L	0.50	128	70	130			
Tetrachloroethene		3.81	ug/L	0.50	76	70	130			
Toluene		5.32	ug/L	0.50	106	70	130			
1,2,3-Trichlorobenzene		5.32	ug/L	0.50	106	70	130			
1,2,4-Trichlorobenzene		5.23	ug/L	0.50	105	70	130			
1,1,1-Trichloroethane		4.58	ug/L	0.50	92	70	130			
1,1,2-Trichloroethane		5.75	ug/L	0.50	115	70	130			
Trichloroethene		5.06	ug/L	0.50	101	70	130			
Trichlorofluoromethane		5.66	ug/L	0.50	113	70	130			
1,2,3-Trichloropropane		5.99	ug/L	0.50	120	70	130			
1,2,4-Trimethylbenzene		5.96	ug/L	0.50	119	70	130			
1,3,5-Trimethylbenzene		5.60	ug/L	0.50	112	70	130			
Vinyl chloride		5.59	ug/L	0.20	112	70	130			
m+p-Xylenes		10.5	ug/L	0.50	105	70	130			
o-Xylene		5.10	ug/L	0.50	102	70	130			
Trihalomethanes, Total		19.7	ug/L	0.50	99	70	130			

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QA/QC Summary Report

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Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R198101
Lab ID: 30-Aug-24_LCS_9	63	Laboratory Control Sample			Run: 5973MSD2_240830A				08/30/24 15:34	
Xylenes, Total		15.6	ug/L	0.50	104	70	130			
Surr: p-Bromofluorobenzene				0.50	115	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	91	70	130			
Surr: Toluene-d8				0.50	113	70	130			
Lab ID: 30-Aug-24_MBLK_11	63	Method Blank			Run: 5973MSD2_240830A				08/30/24 16:38	
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methylene chloride		ND	ug/L	0.50						

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Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R198101
Lab ID: 30-Aug-24_MBLK_11	63	Method Blank				Run: 5973MSD2_240830A				08/30/24 16:38
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl chloride		ND	ug/L	0.20						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Trihalomethanes, Total		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: p-Bromofluorobenzene				0.50	125	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	94	70	130			
Surr: Toluene-d8				0.50	112	70	130			
Lab ID: H24080761-001FDUP	63	Sample Duplicate				Run: 5973MSD2_240830A				09/01/24 14:23
Benzene		ND	ug/L	0.50						20
Bromobenzene		ND	ug/L	0.50						20
Bromochloromethane		ND	ug/L	0.50						20
Bromodichloromethane		ND	ug/L	0.50						20
Bromoform		ND	ug/L	0.50						20
Bromomethane		ND	ug/L	0.50						20
n-Butylbenzene		ND	ug/L	0.50						20
sec-Butylbenzene		ND	ug/L	0.50						20
tert-Butylbenzene		ND	ug/L	0.50						20
Carbon tetrachloride		ND	ug/L	0.50						20
1,2-Dichloroethane		ND	ug/L	0.50						20
Chlorobenzene		ND	ug/L	0.50						20
Chlorodibromomethane		ND	ug/L	0.50						20
Chloroethane		ND	ug/L	0.50						20
Chloroform		ND	ug/L	0.50						20
Chloromethane		ND	ug/L	0.50						20
2-Chlorotoluene		ND	ug/L	0.50						20
4-Chlorotoluene		ND	ug/L	0.50						20
Dibromomethane		ND	ug/L	0.50						20

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R198101
Lab ID: H24080761-001FDUP	63	Sample Duplicate		Run: 5973MSD2_240830A				09/01/24 14:23		
1,2-Dichlorobenzene		ND	ug/L	0.50						20
1,3-Dichlorobenzene		ND	ug/L	0.50						20
1,4-Dichlorobenzene		ND	ug/L	0.50						20
Dichlorodifluoromethane		ND	ug/L	0.50						20
1,1-Dichloroethane		ND	ug/L	0.50						20
1,1-Dichloroethene		ND	ug/L	0.50						20
cis-1,2-Dichloroethene		ND	ug/L	0.50						20
trans-1,2-Dichloroethene		ND	ug/L	0.50						20
1,2-Dichloropropane		ND	ug/L	0.50						20
1,3-Dichloropropane		ND	ug/L	0.50						20
2,2-Dichloropropane		ND	ug/L	0.50						20
1,1-Dichloropropene		ND	ug/L	0.50						20
cis-1,3-Dichloropropene		ND	ug/L	0.50						20
trans-1,3-Dichloropropene		ND	ug/L	0.50						20
Ethylbenzene		ND	ug/L	0.50						20
Hexachlorobutadiene		ND	ug/L	0.50						20
Isopropylbenzene		ND	ug/L	0.50						20
p-Isopropyltoluene		ND	ug/L	0.50						20
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						20
Methylene chloride		ND	ug/L	0.50						20
Naphthalene		ND	ug/L	0.50						20
n-Propylbenzene		ND	ug/L	0.50						20
Styrene		ND	ug/L	0.50						20
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						20
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						20
Tetrachloroethene		ND	ug/L	0.50						20
Toluene	9.54	ug/L	0.50					11		20
1,2,3-Trichlorobenzene		ND	ug/L	0.50						20
1,2,4-Trichlorobenzene		ND	ug/L	0.50						20
1,1,1-Trichloroethane		ND	ug/L	0.50						20
1,1,2-Trichloroethane		ND	ug/L	0.50						20
Trichloroethene		ND	ug/L	0.50						20
Trichlorofluoromethane		ND	ug/L	0.50						20
1,2,3-Trichloropropane		ND	ug/L	0.50						20
1,2,4-Trimethylbenzene		ND	ug/L	0.50						20
1,3,5-Trimethylbenzene		ND	ug/L	0.50						20
Vinyl chloride		ND	ug/L	0.50						20
m+p-Xylenes		ND	ug/L	1.0						20
o-Xylene		ND	ug/L	0.50						20
Trihalomethanes, Total		ND	ug/L	0.50						20
Xylenes, Total		ND	ug/L	0.50						20
Surr: p-Bromofluorobenzene				0.50	110	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	109	70	130			
Surr: Toluene-d8				0.50	97	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192628
Lab ID: MB-192628	32	Method Blank		Run: SUB-B427928				08/28/24 16:32		
Alachlor		ND	ug/L	0.10						
Aldrin		ND	ug/L	0.10						
Aroclor 1016		ND	ug/L	0.080						
Aroclor 1221		ND	ug/L	2.0						
Aroclor 1232		ND	ug/L	0.50						
Aroclor 1242		ND	ug/L	0.30						
Aroclor 1248		ND	ug/L	0.10						
Aroclor 1254		ND	ug/L	0.10						
Aroclor 1260		ND	ug/L	0.20						
Atrazine		ND	ug/L	0.10						
Benzo(a)pyrene		ND	ug/L	0.10						
bis(2-ethylhexyl)Adipate		ND	ug/L	0.50						
bis(2-ethylhexyl)Phthalate		ND	ug/L	0.60						
Butachlor		ND	ug/L	0.10						
Chlordane		ND	ug/L	1.0						
Dieldrin		ND	ug/L	0.10						
Endrin		ND	ug/L	0.10						
gamma-BHC (Lindane)		ND	ug/L	0.10						
Heptachlor		ND	ug/L	0.10						
Heptachlor epoxide		ND	ug/L	0.10						
Hexachlorobenzene		ND	ug/L	0.10						
Hexachlorocyclopentadiene		ND	ug/L	0.10						
Methoxychlor		ND	ug/L	0.10						
Metolachlor		ND	ug/L	0.10						
Metribuzin		ND	ug/L	0.10						
Propachlor		ND	ug/L	0.10						
Simazine		ND	ug/L	0.10						
Toxaphene		ND	ug/L	2.0						
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	96	70	130			
Surr: Perylene-d12				0.10	82	70	130			
Surr: Pyrene-d10				0.10	97	70	130			
Surr: Triphenylphosphate				0.10	98	70	130			
Lab ID: Ar1660-192628	6	Laboratory Control Sample		Run: SUB-B427928				08/28/24 16:58		
Aroclor 1016		2.16	ug/L	0.080	108	70	130			
Aroclor 1260		2.01	ug/L	0.20	100	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	95	70	130			
Surr: Perylene-d12				0.10	86	70	130			
Surr: Pyrene-d10				0.10	99	70	130			
Surr: Triphenylphosphate				0.10	98	70	130			
Lab ID: LCS-192628	23	Laboratory Control Sample		Run: SUB-B427928				08/28/24 17:24		
Alachlor		2.37	ug/L	0.10	119	70	130			
Aldrin		2.06	ug/L	0.10	103	70	130			
Atrazine		2.35	ug/L	0.10	117	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192628
Lab ID: LCS-192628	23	Laboratory Control Sample			Run: SUB-B427928			08/28/24 17:24		
Benzo(a)pyrene		1.72	ug/L	0.10	86	70	130			
bis(2-ethylhexyl)Adipate		1.81	ug/L	0.50	91	70	130			
bis(2-ethylhexyl)Phthalate		1.90	ug/L	0.60	95	70	130			
Butachlor		2.15	ug/L	0.10	107	70	130			
Dieldrin		1.78	ug/L	0.10	89	70	130			
Endrin		2.06	ug/L	0.10	103	70	130			
gamma-BHC (Lindane)		2.38	ug/L	0.10	119	70	130			
Heptachlor		2.34	ug/L	0.10	117	70	130			
Heptachlor epoxide		2.42	ug/L	0.10	121	70	130			
Hexachlorobenzene		1.93	ug/L	0.10	96	70	130			
Hexachlorocyclopentadiene		2.18	ug/L	0.10	109	70	130			
Methoxychlor		2.20	ug/L	0.10	110	70	130			
Metolachlor		2.04	ug/L	0.10	102	70	130			
Metribuzin		1.60	ug/L	0.10	80	70	130			
Propachlor		2.18	ug/L	0.10	109	70	130			
Simazine		1.90	ug/L	0.10	95	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	91	70	130			
Surr: Pyrene-d10				0.10	100	70	130			
Surr: Triphenylphosphate				0.10	101	70	130			
Lab ID: LCSD-192628	23	Laboratory Control Sample Duplicate			Run: SUB-B427928			08/28/24 17:50		
Alachlor		2.34	ug/L	0.10	117	70	130	1.5	40	
Aldrin		2.09	ug/L	0.10	104	70	130	1.4	40	
Atrazine		2.29	ug/L	0.10	115	70	130	2.3	40	
Benzo(a)pyrene		1.67	ug/L	0.10	83	70	130	3.2	40	
bis(2-ethylhexyl)Adipate		1.85	ug/L	0.50	92	70	130	1.9	40	
bis(2-ethylhexyl)Phthalate		1.93	ug/L	0.60	96	70	130	1.4	40	
Butachlor		2.16	ug/L	0.10	108	70	130	0.4	40	
Dieldrin		1.83	ug/L	0.10	91	70	130	2.8	40	
Endrin		2.19	ug/L	0.10	109	70	130	6.3	40	
gamma-BHC (Lindane)		2.35	ug/L	0.10	117	70	130	1.3	40	
Heptachlor		2.33	ug/L	0.10	117	70	130	0.2	40	
Heptachlor epoxide		2.34	ug/L	0.10	117	70	130	3.2	40	
Hexachlorobenzene		1.97	ug/L	0.10	98	70	130	2.0	40	
Hexachlorocyclopentadiene		2.16	ug/L	0.10	108	70	130	0.8	40	
Methoxychlor		2.20	ug/L	0.10	110	70	130	0.1	40	
Metolachlor		2.03	ug/L	0.10	101	70	130	0.6	40	
Metribuzin		1.68	ug/L	0.10	84	70	130	5.0	40	
Propachlor		2.14	ug/L	0.10	107	70	130	1.7	40	
Simazine		2.02	ug/L	0.10	101	70	130	6.4	40	
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	95	70	130			
Surr: Perylene-d12				0.10	88	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	106	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192628
Lab ID: TOX-192628	5	Laboratory Control Sample			Run: SUB-B427928			08/28/24 18:42		
Toxaphene		48.6	ug/L	2.0	122	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	86	70	130			
Surr: Pyrene-d10				0.10	98	70	130			
Surr: Triphenylphosphate				0.10	105	70	130			
Lab ID: B24082287-001BMS	23	Sample Matrix Spike			Run: SUB-B427928			08/28/24 18:16		
Alachlor		2.19	ug/L	0.10	110	70	130			
Aldrin		2.14	ug/L	0.10	107	70	130			
Atrazine		2.18	ug/L	0.10	109	70	130			
Benzo(a)pyrene		1.88	ug/L	0.10	94	70	130			
bis(2-ethylhexyl)Adipate		1.92	ug/L	0.50	96	70	130			
bis(2-ethylhexyl)Phthalate		2.02	ug/L	0.60	101	70	130			
Butachlor		2.00	ug/L	0.10	100	70	130			
Dieldrin		1.64	ug/L	0.10	82	70	130			
Endrin		1.63	ug/L	0.10	81	70	130			
gamma-BHC (Lindane)		2.37	ug/L	0.10	119	70	130			
Heptachlor		2.53	ug/L	0.10	126	70	130			
Heptachlor epoxide		2.34	ug/L	0.10	117	70	130			
Hexachlorobenzene		2.10	ug/L	0.10	105	70	130			
Hexachlorocyclopentadiene		2.32	ug/L	0.10	116	70	130			
Methoxychlor		2.31	ug/L	0.10	115	70	130			
Metolachlor		1.91	ug/L	0.10	95	70	130			
Metribuzin		1.42	ug/L	0.10	71	70	130			
Propachlor		2.03	ug/L	0.10	102	70	130			
Simazine		1.80	ug/L	0.10	90	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	96	70	130			
Surr: Perylene-d12				0.10	93	70	130			
Surr: Pyrene-d10				0.10	100	70	130			
Surr: Triphenylphosphate				0.10	103	70	130			
Lab ID: H24080761-001E-dup	5	Sample Duplicate			Run: SUB-B428369			09/04/24 19:17		
bis(2-ethylhexyl)Phthalate		1.07	ug/L	0.60				26	40	
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	96	70	130			
Surr: Perylene-d12				0.10	96	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	104	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2								Analytical Run: B_R427928		
Lab ID: 525_CCV_5	23	Continuing Calibration Verification Standard							08/28/24 14:22	
Alachlor		2.07	ug/L	0.10	103	70	130			
Aldrin		2.09	ug/L	0.10	104	70	130			
Atrazine		2.00	ug/L	0.10	100	70	130			
Benzo(a)pyrene		1.81	ug/L	0.10	90	70	130			
bis(2-ethylhexyl)Adipate		1.81	ug/L	0.50	91	70	130			
bis(2-ethylhexyl)Phthalate		1.84	ug/L	0.60	92	70	130			
Butachlor		2.03	ug/L	0.10	102	70	130			
Dieldrin		2.06	ug/L	0.10	103	70	130			
Endrin		2.17	ug/L	0.10	109	70	130			
gamma-BHC (Lindane)		2.15	ug/L	0.10	108	70	130			
Heptachlor		2.21	ug/L	0.10	111	70	130			
Heptachlor epoxide		2.14	ug/L	0.10	107	70	130			
Hexachlorobenzene		2.08	ug/L	0.10	104	70	130			
Hexachlorocyclopentadiene		1.97	ug/L	0.10	99	70	130			
Methoxychlor		2.10	ug/L	0.10	105	70	130			
Metolachlor		1.97	ug/L	0.10	98	70	130			
Metribuzin		2.01	ug/L	0.10	100	70	130			
Propachlor		1.95	ug/L	0.10	98	70	130			
Simazine		1.79	ug/L	0.10	90	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	102	70	130			
Surr: Perylene-d12				0.10	93	70	130			
Surr: Pyrene-d10				0.10	100	70	130			
Surr: Triphenylphosphate				0.10	102	70	130			
Lab ID: Ar1660_CCV_5	6	Continuing Calibration Verification Standard							08/28/24 14:48	
Aroclor 1016		1.44	ug/L	0.080	90	70	130			
Aroclor 1260		3.77	ug/L	0.20	94	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	87	70	130			
Surr: Pyrene-d10				0.10	98	70	130			
Surr: Triphenylphosphate				0.10	89	70	130			
Lab ID: CLD_CCV_5	5	Continuing Calibration Verification Standard							08/28/24 15:14	
Chlordane		23.1	ug/L	1.0	116	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	102	70	130			
Surr: Perylene-d12				0.10	95	70	130			
Surr: Pyrene-d10				0.10	102	70	130			
Surr: Triphenylphosphate				0.10	95	70	130			
Lab ID: TOX_CCV_5	5	Continuing Calibration Verification Standard							08/28/24 15:40	
Toxaphene		45.6	ug/L	2.0	114	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	102	70	130			
Surr: Perylene-d12				0.10	95	70	130			
Surr: Pyrene-d10				0.10	102	70	130			
Surr: Triphenylphosphate				0.10	100	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Analytical Run: C_R309790
Lab ID: CCV	11	Continuing Calibration Verification Standard							08/28/24 19:00	
Aldicarb		9.6	ug/L	1.0	96	80	120			
Aldicarb sulfone		9.5	ug/L	1.0	95	80	120			
Aldicarb sulfoxide		9.5	ug/L	1.0	95	80	120			
Carbaryl		9.5	ug/L	1.0	95	80	120			
3-Hydroxycarbofuran		9.5	ug/L	1.0	95	80	120			
Carbofuran		9.5	ug/L	1.0	95	80	120			
Methiocarb		9.4	ug/L	1.0	94	80	120			
Methomyl		9.6	ug/L	1.0	96	80	120			
Oxamyl		9.5	ug/L	1.0	95	80	120			
Baygon		9.6	ug/L	1.0	96	80	120			
Surr: BDMC				1.0	94	70	130			
Method: E531.1										Batch: C_R309790
Lab ID: MBLK	11	Method Blank							Run: SUB-C309790	
									08/28/24 17:38	
Aldicarb		ND	ug/L	1.0						
Aldicarb sulfone		ND	ug/L	1.0						
Aldicarb sulfoxide		ND	ug/L	1.0						
Carbaryl		ND	ug/L	1.0						
3-Hydroxycarbofuran		ND	ug/L	1.0						
Carbofuran		ND	ug/L	1.0						
Methiocarb		ND	ug/L	1.0						
Methomyl		ND	ug/L	1.0						
Oxamyl		ND	ug/L	1.0						
Baygon		ND	ug/L	1.0						
Surr: BDMC				1.0	105	70	130			
Lab ID: LCS	11	Laboratory Control Sample							Run: SUB-C309790	
									08/28/24 18:19	
Aldicarb		8.2	ug/L	1.0	102	80	120			
Aldicarb sulfone		7.8	ug/L	1.0	97	80	120			
Aldicarb sulfoxide		8.3	ug/L	1.0	103	80	120			
Carbaryl		8.1	ug/L	1.0	102	80	120			
3-Hydroxycarbofuran		8.3	ug/L	1.0	104	80	120			
Carbofuran		8.4	ug/L	1.0	105	80	120			
Methiocarb		8.2	ug/L	1.0	103	80	120			
Methomyl		8.5	ug/L	1.0	107	80	120			
Oxamyl		8.6	ug/L	1.0	107	80	120			
Baygon		8.4	ug/L	1.0	105	80	120			
Surr: BDMC				1.0	98	70	130			
Lab ID: C24080957-001BMS	11	Sample Matrix Spike							Run: SUB-C309790	
									08/28/24 20:21	
Aldicarb		7.8	ug/L	1.0	98	65	135			
Aldicarb sulfone		7.5	ug/L	1.0	94	65	135			
Aldicarb sulfoxide		7.9	ug/L	1.0	99	65	135			
Carbaryl		7.8	ug/L	1.0	98	65	135			
3-Hydroxycarbofuran		8.0	ug/L	1.0	100	65	135			
Carbofuran		8.1	ug/L	1.0	101	65	135			

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ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Batch: C_R309790
Lab ID: C24080957-001BMS	11	Sample Matrix Spike		Run: SUB-C309790				08/28/24 20:21		
Methiocarb		7.9	ug/L	1.0	99	65	135			
Methomyl		8.2	ug/L	1.0	102	65	135			
Oxamyl		8.3	ug/L	1.0	103	65	135			
Baygon		8.1	ug/L	1.0	102	65	135			
Surr: BDMC				1.0	94	70	130			
Lab ID: C24080957-001BMSD	11	Sample Matrix Spike Duplicate		Run: SUB-C309790				08/28/24 21:01		
Aldicarb		7.9	ug/L	1.0	98	65	135	0.1	20	
Aldicarb sulfone		7.5	ug/L	1.0	94	65	135	0.0	20	
Aldicarb sulfoxide		7.9	ug/L	1.0	99	65	135	0	20	
Carbaryl		7.8	ug/L	1.0	98	65	135	0.1	20	
3-Hydroxycarbofuran		8.0	ug/L	1.0	100	65	135	0.2	20	
Carbofuran		8.1	ug/L	1.0	101	65	135	0.1	20	
Methiocarb		7.9	ug/L	1.0	99	65	135	0.1	20	
Methomyl		8.2	ug/L	1.0	102	65	135	0	20	
Oxamyl		8.3	ug/L	1.0	103	65	135	0.2	20	
Baygon		8.1	ug/L	1.0	102	65	135	0	20	
Surr: BDMC				1.0	95	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E547										Analytical Run: C_R309792
Lab ID: ICV										
Initial Calibration Verification Standard										
08/28/24 13:02										
Glyphosate	26	ug/L	5.0	103	80	120				
Lab ID: CCV										
Continuing Calibration Verification Standard										
08/28/24 13:16										
Glyphosate	24	ug/L	5.0	118	80	120				
Method: E547										Batch: C_R309792
Lab ID: MBLK										
Method Blank										
Run: SUB-C309792										
08/28/24 13:28										
Glyphosate	ND	ug/L	5.0							
Lab ID: C24080978-001LMS										
Sample Matrix Spike										
Run: SUB-C309792										
08/28/24 14:06										
Glyphosate	28	ug/L	5.0	110	70	130				
Lab ID: C24080978-001LMSD										
Sample Matrix Spike Duplicate										
Run: SUB-C309792										
08/28/24 14:31										
Glyphosate	27	ug/L	5.0	108	70	130	2.0	20		

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E548.1										Analytical Run: B_192541
Lab ID: ICAL-4-192541	2	Continuing Calibration Verification Standard								08/29/24 15:12
Endothall		25.8	ug/L	8.0	103	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	98	70	130			
Method: E548.1										Batch: B_192674
Lab ID: MB-192674	2	Method Blank								08/29/24 16:33
Endothall		ND	ug/L	8.0						
Surr: 2,4-Dichlorophenylacetic acid				10	97	70	130			
Lab ID: LCS-192674	2	Laboratory Control Sample								08/29/24 16:49
Endothall		8.53	ug/L	8.0	85	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	107	70	130			
Lab ID: H24080883-001KMS	2	Sample Matrix Spike								08/29/24 17:22
Endothall		90.3	ug/L	8.0	90	70	130			
Surr: 2,4-Dichlorophenylacetic acid				100	101	70	130			
Lab ID: H24080883-001KMSD	2	Sample Matrix Spike Duplicate								08/29/24 17:38
Endothall		88.1	ug/L	8.0	88	70	130	2.4	30	
Surr: 2,4-Dichlorophenylacetic acid				100	104	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E549.2										Batch: C_75186
Lab ID: MB-75186		Method Blank					Run: SUB-C310036			09/06/24 12:45
Diquat		ND	ug/L	0.40						
Lab ID: LCS-75186		Laboratory Control Sample					Run: SUB-C310036			09/06/24 12:51
Diquat		4.38	ug/L	0.40	88	70	130			
Lab ID: LCSD-75186		Laboratory Control Sample Duplicate					Run: SUB-C310036			09/06/24 12:58
Diquat		4.39	ug/L	0.40	88	70	130	0.3	30	
Lab ID: H24080883-001IMS		Sample Matrix Spike					Run: SUB-C310036			09/06/24 13:11
Diquat		4.26	ug/L	0.40	85	70	130			
Method: E549.2										Analytical Run: C_R310036
Lab ID: ICV		Initial Calibration Verification Standard								09/06/24 12:31
Diquat		148	ug/L	0.40	99	80	120			
Lab ID: CCV		Continuing Calibration Verification Standard								09/06/24 12:38
Diquat		101	ug/L	0.40	101	80	120			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080883

Report Date: 09/12/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Kelada-01								Analytical Run: SUB-B427888		
Lab ID: ICV	Initial Calibration Verification Standard								08/28/24 12:35	
Cyanide, Total		0.0946	mg/L	0.0050	95	90	110			
Method: Kelada-01								Batch: B_R427888		
Lab ID: ICB	Method Blank					Run: SUB-B427888			08/28/24 12:38	
Cyanide, Total		ND	mg/L	0.001						
Lab ID: LFB	Laboratory Fortified Blank					Run: SUB-B427888			08/28/24 12:41	
Cyanide, Total		0.0972	mg/L	0.0050	97	90	110			
Lab ID: LCS1-K4Fe(CN)6	Laboratory Control Sample					Run: SUB-B427888			08/28/24 12:43	
Cyanide, Total		0.203	mg/L	0.0050	102	90	110			
Lab ID: H24080883-001MMS	Sample Matrix Spike					Run: SUB-B427888			08/28/24 12:59	
Cyanide, Total		0.0988	mg/L	0.0050	99	90	110			
Lab ID: H24080883-001MMSD	Sample Matrix Spike Duplicate					Run: SUB-B427888			08/28/24 13:02	
Cyanide, Total		0.0965	mg/L	0.0050	96	90	110	2.4	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



Work Order Receipt Checklist

Great West Engineering

H24080883

Login completed by: Rebecca A. Tooke

Date Received: 8/26/2024

Reviewed by: cjohnson

Received by: RAT

Reviewed Date: 9/3/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.2°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☒	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

None



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Chain of Custody (COC) & Analytical Request Record

Lab Workorder #: 1724080883

Project Information

Client: Great West Engineering
 Project: Judith Basin
 Purchase Order: 1-05125
 Contact/Phone: Bruce Lauerman (406) 495-6181/W: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
 BO#: 48948
 EE#: 13114
 Turn-Around Time: Standard
 Critical Hold Time: 30 Hours
 # of Samples: 3
 Matrix: Drinking Water



Comments:

hand del
 0.20 TB bric w sand

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

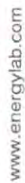
	Sample Identification	Collection Date/Time	# of C	Matrix	RUSH	Alkalinity	Anions Chrom	Nitrogen	pH (A4	Solids, C)	Metals Drinking	Mercur (E245,	Nitrogen (E353.2,	Nitrogen	515.4-H SDWA	525-Semi Compos	524-Pu SDWA	531-Pe SDWA	Bacteri Supply
1	CMRWA Well 4	8/25/24 1430	12	DW		X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	CMRWA Well 4	7	2	DW							X								
3	CMRWA Well 4		7	DW															
4	trip blank																		
5																			
6																			
7																			
8																			
9																			
10																			
11																			

Custody Record MUST be signed	Lab provided preservatives were used ☒ Yes ☐ No		Sampler Name (if different than Relinquished by):		Sampler Phone: 461-7072	
	Relinquished by (print) B Lauerman	Date/Time 8/26/24 1004	Signature <i>[Signature]</i>	Received by (print) Roberta Paha	Date/Time 8-26-24 1005	Signature <i>[Signature]</i>
	Relinquished by (print)	Date/Time	Signature	Received by laboratory (print)	Date/Time	Signature

Date Printed: 08/12/2024

EE: HE - 13114

COC: Page 1 of 2



Client: Great West Engineering
Judith Basin

Laboratory Use

Client: Great West Engineering

Purchase Order: 1-05125

(406) 495-6181/M: (406) 461-7072

EE#: 13114

Turn-Around Time: Standard

of Samples: 3

Matrix: Drinking Water



Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

EE: HE - 13114

COC: Page 2 of 2



ANALYTICAL SUMMARY REPORT

September 30, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24080884 Quote ID: H17561

Project Name: Judith Basin

Energy Laboratories Inc Helena MT received the following 1 sample for Great West Engineering on 8/26/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24080884-001	CMRWA Well 4	08/25/24 14:30	08/26/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Metals Digestion by E200.2 Gross Alpha Calculated Gross Alpha, Gross Beta, Total Radium 226 + Radium 228 Radium 226, Total Radium 228, Total

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.



CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080884

Report Date: 09/30/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080884-001
Client Sample ID: CMRWA Well 4

Report Date: 09/30/24
Collection Date: 08/25/24 14:30
Date Received: 08/26/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL (CONTRACT LAB MT00945)							
Uranium	0.0067	mg/L		0.0003	0.03	E200.8	08/30/24 14:14 / slj
RADIONUCLIDES - TOTAL							
Gross Alpha	4.8	pCi/L				E900.0	09/10/24 07:48 / eli-ca
Gross Alpha precision (±)	1.6	pCi/L				E900.0	09/10/24 07:48 / eli-ca
Gross Alpha MDC	0.9	pCi/L				E900.0	09/10/24 07:48 / eli-ca
Gross Alpha - Adjusted	0.34	pCi/L	U		15	E900.0	09/10/24 10:23 / eli-c
Gross Alpha - Adjusted precision (±)	1.6	pCi/L				E900.0	09/10/24 10:23 / eli-c
Gross Alpha - Adjusted MDC	0.94	pCi/L				E900.0	09/10/24 10:23 / eli-c
Radium 226	1.0	pCi/L			5	E903.0	09/30/24 08:59 / eli-c
Radium 226 precision (±)	0.4	pCi/L				E903.0	09/30/24 08:59 / eli-c
Radium 226 MDC	0.3	pCi/L				E903.0	09/30/24 08:59 / eli-c
Radium 228	0.3	pCi/L	U		5	RA-05	09/03/24 16:09 / eli-c
Radium 228 precision (±)	0.6	pCi/L				RA-05	09/03/24 16:09 / eli-c
Radium 228 MDC	0.6	pCi/L				RA-05	09/03/24 16:09 / eli-c
Radium 226 + Radium 228	1.3	pCi/L				A7500-RA	09/30/24 11:09 / eli-c
Radium 226 + Radium 228 precision (±)	0.7	pCi/L				A7500-RA	09/30/24 11:09 / eli-c
Radium 226 + Radium 228 MDC	0.7	pCi/L				A7500-RA	09/30/24 11:09 / eli-c

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
U - Not detected at Minimum Detectable Concentration (MDC)

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080884

Report Date: 09/30/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										
Analytical Run: ICPMS205-H_240830A										
Lab ID: ICV	Initial Calibration Verification Standard									
Uranium		0.0577	mg/L	0.0010	96	90	110			08/30/24 10:35
Lab ID: CCV	Continuing Calibration Verification Standard									
Uranium		0.0542	mg/L	0.0010	108	90	110			08/30/24 13:56
Method: E200.8										
Batch: R198066										
Lab ID: LRB	Method Blank									
Uranium		ND	mg/L	0.00004						08/30/24 11:16
Lab ID: LFB	Laboratory Fortified Blank									
Uranium		0.0509	mg/L	0.0010	102	85	115			08/30/24 11:19
Lab ID: H24080830-020AMS	Sample Matrix Spike									
Uranium		0.0585	mg/L	0.00030	114	70	130			08/30/24 14:22
Lab ID: H24080830-020AMSD	Sample Matrix Spike Duplicate									
Uranium		0.0549	mg/L	0.00030	107	70	130	6.3	20	08/30/24 14:24

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080884

Report Date: 09/30/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E900.0										Batch: C_GrDW-2094
Lab ID: Th230-GrDW-2094	3	Laboratory Control Sample				Run: SUB-C310132				09/10/24 07:48
Gross Alpha		93	pCi/L		93	80	120			
Gross Alpha precision ($\pm$)		14	pCi/L							
Gross Alpha MDC		0.78	pCi/L							
Lab ID: MB-GrDW-2094	3	Method Blank				Run: SUB-C310132				09/10/24 07:48
Gross Alpha		0.9	pCi/L							
Gross Alpha precision ($\pm$)		0.7	pCi/L							
Gross Alpha MDC		0.7	pCi/L							
Lab ID: C24081229-001BMS	3	Sample Matrix Spike				Run: SUB-C310132				09/10/24 08:17
Gross Alpha		74	pCi/L		67	70	130			S
Gross Alpha precision ($\pm$)		11	pCi/L							
Gross Alpha MDC		1.2	pCi/L							
Lab ID: C24081229-001BMSD	3	Sample Matrix Spike Duplicate				Run: SUB-C310132				09/10/24 08:17
Gross Alpha		82	pCi/L		74	70	130	9.1	20	
Gross Alpha precision ($\pm$)		12	pCi/L							
Gross Alpha MDC		1.3	pCi/L							
- The RER result is 0.8.										

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080884

Report Date: 09/30/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0								Batch: C_RA226DW-1074		
Lab ID: LCS-RA226DW-1074	3	Laboratory Control Sample			Run: SUB-C310750			09/30/24 10:03		
Radium 226		20	pCi/L	101		90	110			
Radium 226 precision (±)		3.5	pCi/L							
Radium 226 MDC		0.28	pCi/L							
Lab ID: MB-RA226DW-1074	3	Method Blank			Run: SUB-C310750			09/30/24 08:59		
Radium 226		-0.01	pCi/L							U
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.3	pCi/L							
Lab ID: C24090120-001ADUP	3	Sample Duplicate			Run: SUB-C310750			09/30/24 08:59		
Radium 226		0.97	pCi/L					60	20	R
Radium 226 precision (±)		0.48	pCi/L							
Radium 226 MDC		0.41	pCi/L							

- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 2.

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080884

Report Date: 09/30/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05								Batch: C_RA228DW-1022		
Lab ID: LCS-228-RA228DW-10	3	Laboratory Control Sample			Run: SUB-C309922			09/03/24 14:57		
Radium 228		8.4	pCi/L	82		80	120			
Radium 228 precision (±)		1.8	pCi/L							
Radium 228 MDC		0.60	pCi/L							
Lab ID: MB-228-RA228DW-102	3	Method Blank			Run: SUB-C309922			09/03/24 14:57		
Radium 228		0.3	pCi/L							U
Radium 228 precision (±)		0.6	pCi/L							
Radium 228 MDC		0.6	pCi/L							
Lab ID: C24080382-001ADUP	3	Sample Duplicate			Run: SUB-C309922			09/03/24 14:57		
Radium 228		2.8	pCi/L					12	20	
Radium 228 precision (±)		0.82	pCi/L							
Radium 228 MDC		0.58	pCi/L							
- The RER result is 0.5.										

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



Work Order Receipt Checklist

Great West Engineering

H24080884

Login completed by: Rebecca A. Tooke

Date Received: 8/26/2024

Reviewed by: tjones

Received by: RAT

Reviewed Date: 9/3/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.2°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☒
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

None



www.energylab.com

Chain of Custody (COC) & Analytical Request Record

Lab Workorder #: **H-24080884**

Project Information

Client: Great West Engineering
 Project: Judith Basin
 Purchase Order: **1-05125**
 Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
 BO#: 48948
 EE#: 13114
 Turn-Around Time: Standard

Critical Hold Time: 30 Hours
 # of Samples: 3
 Matrix: Drinking Water



Comments:

hand del
0.20 TB on ice no seal
 Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

hand del 0.20TB on ice no seal																				
Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.																				
	Sample Identification		Collection Date/Time																	
1	CMRWA Well 4		8/25/24 1430		12	DW												X	Bacteria, Public Water Supply (A9223 B)	1.25
2	CMRWA Well 4		2 7		2	DW												X	531-Pesticides, Carbamates SDWA (E531.1)	28
3	CMRWA Well 4				7	DW												X	524-Purgeable Organics, SDWA (E524.2)	14
4	trip blank																	X	525-Semi-Volatile Organic Compounds, SDWA (E525.2)	14
5																		X	515.4-Herbicides, Chlorinated SDWA (E515.4)	14
6																		X	Nitrogen, Nitrate (E353.2)	N/A
7																		X	Nitrogen, Nitrate + Nitrite (E353.2)	28
8																		X	Mercury, Drinking Water (E245.1)	28
9																		X	Metals by ICP/ICPMS, Drinking Water (E200.7.8)	180
10																		X	Solids, Total Dissolved (A2540 C)	7
11																		X	pH (A4500-H B)	Fid
																		X	Nitrogen, Nitrite (E353.2)	2
																		X	Anions by Ion Chromatography (E300.0)	28
																		X	Alkalinity to pH 4.5 (A2320 B)	14
																			RUSH TAT	
																			Matrix	
																			# of Containers	

Custody Record MUST be signed	Lab provided preservatives were used ☒ Yes ☐ No		Sampler Name (if different than Relinquished by):		Sampler Phone: 406-1-7072	
	Relinquished by (print) B Lauerman	Date/Time 8/26/24 10:04	Signature <i>[Signature]</i>		Date/Time 8-26-24 10:05	Signature <i>[Signature]</i>
	Relinquished by (print)	Date/Time	Received by (print)		Date/Time	Signature
			Received by (Laboratory print) Rebecca Peltz		Date/Time	Signature

Date Printed: 08/12/2024

EE: HE - 13114

COC: Page 1 of 2



Chain of Custody (COC) & Analytical Request Record

Client: Great West Engineering
Judith Basin

www.energylab.com

Lab Workorder #: 4240884

Project Information

Client: Great West Engineering
Project: Judith Basin
Purchase Order: 1-05125
Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
BO#: 48948
EE#: 13114
Turn-Around Time: Standard

Critical Hold Time: 30 Hours



of Samples: 3
Matrix: Drinking Water

Comments:

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.

Sample Identification	Hold Time (Days)			Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.									
	# of Containers	Matrix	RUSH TAT	N/A	180	N/A	180	180	180	180	7	14	14
1 CMRWA Well 4	12	DW											
2 CMRWA Well 4	2	DW											
3 CMRWA Well 4	7	DW											
4													
5													
6													
7													
8													
9													
10													
11													

Date Printed: 08/12/2024

EE: HE - 13114

COC: Page 2 of 2



ANALYTICAL SUMMARY REPORT

September 05, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24080650 Quote ID: H17561

Project Name: Judith Basin

Energy Laboratories Inc Helena MT received the following 2 samples for Great West Engineering on 8/19/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24080650-001	CMRWA Well 5	08/19/24 8:30	08/19/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Alkalinity to pH 4.5 Bacteria, Public Water Supply Cyanide, SDWA Mercury, Drinking Water 515.4-Herbicides, Chlorinated SDWA 547-Herbicides, Glyphosate SDWA Anions by Ion Chromatography Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate pH Metals Digestion by E200.2 Herbicide Liquid-Liquid Microextraction E515.4 Mercury Digestion by E245.1 504.1 Microextraction 504-Microextraction VOCs, EDB and DBCP SDWA 531-Pesticides, Carbamates SDWA LSE for 549.2 549-Pesticides, Diquat SDWA Solids, Total Dissolved Semi-Volatile Organic Compounds E525.2 Extraction 525-Semi-Volatile Organic Compounds, SDWA Endothall E548.1 Extraction 548-Endothall 524-Purgeable Organics, SDWA
H24080650-002	Trip Blank	08/19/24 8:30	08/19/24	Trip Blank	524-Purgeable Organics, SDWA

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.

CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080650

Report Date: 09/05/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.

This analysis confirmed the presence of coliform bacteria. Such bacterial growth indicates the water supply is or was being contaminated by some outside source. If E-Coli bacteria was found in your water sample, their presence will be indicated as "present" on your analytical report. E-Coli contamination indicates your water supply is or has been in contact with human or animal sewage.

There are many probable reasons why a water supply becomes contaminated. Perhaps you have done work on the pump or repaired a line. Surface drainage has perhaps influenced a shallow well. In any case, the water system should be disinfected to eliminate all bacterial growth.

DISINFECTION PROCEDURE

STEP 1: Calculate the depth of water in the well by subtracting the non-pumping (static) water level in the well from the depth of the well.

STEP 2: Using the table below, mix the amount given with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water, to achieve the proper chlorine concentration in the well (approximately 100 mg/L). A high concentration of chlorine may void the warranty on the pump. Check with your supplier if concerned.

Depth of water in Well* (ft)	4"casing	6"casing	8"casing
10 ft	1 cup	1 cup	1 1/2 cups
20 ft	1 cup	1 cup	1 1/2 cups
30 ft	1 cup	2 cups	4 cups
40 ft	1 1/2 cups	2 cups	1 quart
60 ft	2 cups	4 cups	2 quarts
80 ft	2 cups	1 quart	2 quarts
100 ft	3 cups	1 1/2 qts	2 1/2 qts
150 ft	4 cups	2 1/2 qts	4 quarts

*Note: Depth of water in well is measured from the static water level to the bottom of the well.

STEP 3: Remove the well cap. Carefully pour the 5 to 10 gallon chlorine solution down the well. If available, attach a hose to an outside spigot and run the hose into the well casing and begin to circulate the water back down the well. Continue to recycle the water down the well until you can smell chlorinated water from the hose. This will ensure the chlorine solution has been thoroughly mixed in the well.

STEP 4: Once the well is disinfected, you may begin to disinfect the remainder of the system. Start at the farthest tap from the well. Turn on the COLD water tap only. (This process may be used to disinfect the HOT water as well; however, it may require multiple additions of chlorinated water to the well in order to achieve the quantity of chlorinated water required to disinfect the hot water tank). Once you can smell chlorinated water coming from the tap, you may shut it off. Follow this procedure will all cold water taps as you move back towards the well.

STEP 5: Leave the chlorine in the well and pipes for at least 24 hours to allow it to come into contact with the bacteria. **DO NOT USE THE WATER DURING THIS PERIOD!**

STEP 6: After 12-24 hours, turn on an outside faucet (avoid discharging large volumes of chlorinated water into your septic system) and flush the chlorinated water from the system until the chlorine smell is no longer present. Chlorinated water may be discharged to the ground surface but it must not be allowed to make its way into a surface water.

STEP 7: 72 hours after you are no longer able to detect chlorine in your system, collect a water sample to test for coliform bacteria. This sample should be taken to determine if the disinfection process was effective. If coliform bacteria sample tests prove that the water is still unsatisfactory after disinfection, the disinfection process should be repeated until satisfactory results are obtained. If you are unable to resolve the unsatisfactory samples with a few disinfection efforts, it



CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080650

Report Date: 09/05/24

CASE NARRATIVE

may indicate that there is a problem that needs to be identified and corrected, i.e. a cracked well casing or a cross connection to the system. Contact a well professional or the Montana Dept. of Environmental Quality @ 406-444-4400 or visit their website: <http://www.deq.state.mt.us/wqinfo/swp/index.asp>

REFERENCE: Montana Department of Environmental Quality, Public Water and Subdivisions Bureau Compliance Section
Comments imported for SUBBED Workorder: C24080950
Prep Comments for Sample H24080650-001I, Test PST-549-PRP: The prep hold time was exceeded by 0.204 days.
End of comments imported for SUBBED Workorder: C24080950



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering

Project: Judith Basin

Client Sample ID: CMRWA Well 5

PWS ID: **Facility ID:** **Sample Point ID:**

Facility Name:

Lab ID: H24080650-001H

Report Date: 09/05/24

Collection Date: 08/19/24 08:30

Received Date: 08/19/24 15:46

Matrix: Drinking Water

Sampled By: Bruce Lauerman

Compliance Sample: NO

Sample Type:

Res Cl Type: Unspecified

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
3100 Coliform, Total	Present	per 100ml	UNSAFE		A9223 B	08/19/24 16:29 / tmj
3014 Coliform, E-Coli	Absent	per 100ml			A9223 B	08/19/24 16:29 / tmj

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.

The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Qualifiers:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-001
Client Sample ID: CMRWA Well 5

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
Date Received: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	08/20/24 12:13 / eer
pH Measurement Temp	14.5	°C				A4500-H B	08/20/24 12:13 / eer
Solids, Total Dissolved TDS @ 180 C	600	mg/L		20		A2540 C	08/20/24 14:05 / eer
INORGANICS							
Alkalinity, Total as CaCO ₃	160	mg/L		4		A2320 B	08/22/24 11:33 / eer
Chloride	20	mg/L		1		E300.0	08/21/24 03:13 / eer
Sulfate	248	mg/L		1		E300.0	08/21/24 03:13 / eer
Fluoride	1.4	mg/L		0.1		E300.0	08/21/24 03:13 / eer
Cyanide, Total	ND	mg/L		0.005	0.2	Kelada-01	08/23/24 13:55 / eli-b
NUTRIENTS							
Nitrogen, Nitrate as N	0.11	mg/L		0.01		E353.2	09/03/24 08:34 / abc
Nitrogen, Nitrate+Nitrite as N	0.11	mg/L		0.01	10	E353.2	09/01/24 16:02 / JAR
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	08/20/24 16:09 / JAR
METALS, TOTAL (CONTRACT LAB MT00945)							
Antimony	ND	mg/L		0.001	0.006	E200.8	08/21/24 15:29 / dck
Arsenic	ND	mg/L		0.001	0.01	E200.8	08/21/24 15:29 / dck
Barium	ND	mg/L		0.05	2	E200.8	08/21/24 15:29 / dck
Beryllium	ND	mg/L		0.001	0.004	E200.8	08/21/24 15:29 / dck
Cadmium	ND	mg/L		0.001	0.005	E200.8	08/21/24 15:29 / dck
Calcium	107	mg/L		1		E200.7	08/22/24 13:43 / kjb
Chromium	ND	mg/L		0.005	0.1	E200.8	08/21/24 15:29 / dck
Copper	0.013	mg/L		0.005	1.3	E200.8	08/21/24 15:29 / dck
Iron	0.18	mg/L		0.02		E200.7	08/22/24 13:43 / kjb
Lead	ND	mg/L		0.001	0.015	E200.8	08/21/24 15:29 / dck
Magnesium	37	mg/L		1		E200.7	08/22/24 13:43 / kjb
Manganese	0.006	mg/L		0.001		E200.8	08/21/24 15:29 / dck
Nickel	ND	mg/L		0.005		E200.8	08/21/24 15:29 / dck
Potassium	2	mg/L		1		E200.7	08/22/24 13:43 / kjb
Selenium	0.001	mg/L		0.001	0.05	E200.8	08/21/24 15:29 / dck
Sodium	6	mg/L		1		E200.7	08/22/24 13:43 / kjb
Thallium	ND	mg/L		0.0005	0.002	E200.8	08/21/24 15:29 / dck
DRINKING WATER METALS ANALYSES							
Mercury	ND	mg/L		0.0001	0.002	E245.1	08/27/24 14:46 / eli-b
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Bromobenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Bromochloromethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Bromodichloromethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Bromoform	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
H - Analysis performed past the method holding time

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-001
Client Sample ID: CMRWA Well 5

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
DateReceived: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Bromomethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
n-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
sec-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
tert-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Chlorobenzene	ND	ug/L		0.50	100	E524.2	08/22/24 18:02 / kmh
Chlorodibromomethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Chloroethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Chloroform	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Chloromethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
2-Chlorotoluene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
4-Chlorotoluene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Dibromomethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	08/22/24 18:02 / kmh
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	08/22/24 18:02 / kmh
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	08/22/24 18:02 / kmh
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	08/22/24 18:02 / kmh
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	08/22/24 18:02 / kmh
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Ethylbenzene	ND	ug/L		0.50	700	E524.2	08/22/24 18:02 / kmh
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Isopropylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Methylene chloride	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Naphthalene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
n-Propylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Styrene	ND	ug/L		0.50	100	E524.2	08/22/24 18:02 / kmh
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Toluene	ND	ug/L		0.50	1000	E524.2	08/22/24 18:02 / kmh
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	08/22/24 18:02 / kmh

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-001
Client Sample ID: CMRWA Well 5

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
DateReceived: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	08/22/24 18:02 / kmh
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Trichloroethene	ND	ug/L		0.50	5	E524.2	08/22/24 18:02 / kmh
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Vinyl chloride	ND	ug/L		0.50	2	E524.2	08/22/24 18:02 / kmh
m+p-Xylenes	ND	ug/L		1.0		E524.2	08/22/24 18:02 / kmh
o-Xylene	ND	ug/L		0.50		E524.2	08/22/24 18:02 / kmh
Trihalomethanes, Total	ND	ug/L		0.50	80	E524.2	08/22/24 18:02 / kmh
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	08/22/24 18:02 / kmh
Surr: p-Bromofluorobenzene	99.0	%REC		70-130		E524.2	08/22/24 18:02 / kmh
Surr: 1,2-Dichloroethane-d4	116	%REC		70-130		E524.2	08/22/24 18:02 / kmh
Surr: Toluene-d8	100	%REC		70-130		E524.2	08/22/24 18:02 / kmh
SEMI-VOLATILE ORGANIC COMPOUNDS							
Alachlor	ND	ug/L		0.10	2	E525.2	08/22/24 01:37 / eli-b
Aldrin	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Aroclor 1016	ND	ug/L		0.080		E525.2	08/22/24 01:37 / eli-b
Aroclor 1221	ND	ug/L		2.0		E525.2	08/22/24 01:37 / eli-b
Aroclor 1232	ND	ug/L		0.50		E525.2	08/22/24 01:37 / eli-b
Aroclor 1242	ND	ug/L		0.30		E525.2	08/22/24 01:37 / eli-b
Aroclor 1248	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Aroclor 1254	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Aroclor 1260	ND	ug/L		0.20		E525.2	08/22/24 01:37 / eli-b
Atrazine	ND	ug/L		0.10	3	E525.2	08/22/24 01:37 / eli-b
Benzo(a)pyrene	ND	ug/L		0.10	0.2	E525.2	08/22/24 01:37 / eli-b
bis(2-ethylhexyl)Adipate	ND	ug/L		0.50	400	E525.2	08/22/24 01:37 / eli-b
bis(2-ethylhexyl)Phthalate	ND	ug/L		0.60	6	E525.2	08/22/24 01:37 / eli-b
Butachlor	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Chlordane	ND	ug/L		1.0	2	E525.2	08/22/24 01:37 / eli-b
Dieldrin	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Endrin	ND	ug/L		0.10	2	E525.2	08/22/24 01:37 / eli-b
gamma-BHC (Lindane)	ND	ug/L		0.10	0.2	E525.2	08/22/24 01:37 / eli-b
Heptachlor	ND	ug/L		0.10	0.4	E525.2	08/22/24 01:37 / eli-b
Heptachlor epoxide	ND	ug/L		0.10	0.2	E525.2	08/22/24 01:37 / eli-b
Hexachlorobenzene	ND	ug/L		0.10	1	E525.2	08/22/24 01:37 / eli-b
Hexachlorocyclopentadiene	ND	ug/L		0.10	50	E525.2	08/22/24 01:37 / eli-b
Methoxychlor	ND	ug/L		0.10	40	E525.2	08/22/24 01:37 / eli-b
Metolachlor	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Metribuzin	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b
Propachlor	ND	ug/L		0.10		E525.2	08/22/24 01:37 / eli-b

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-001
Client Sample ID: CMRWA Well 5

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
DateReceived: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SEMI-VOLATILE ORGANIC COMPOUNDS							
Simazine	ND	ug/L		0.10	4	E525.2	08/22/24 01:37 / eli-b
Toxaphene	ND	ug/L		2.0	3	E525.2	08/22/24 01:37 / eli-b
PCBs, Total	ND	ug/L		0.50	0.5	E525.2	08/22/24 01:37 / eli-b
Surr: 1,3-Dimethyl-2-nitrobenzene	97.0	%REC		70-130		E525.2	08/22/24 01:37 / eli-b
Surr: Perylene-d12	88.0	%REC		70-130		E525.2	08/22/24 01:37 / eli-b
Surr: Pyrene-d10	105	%REC		70-130		E525.2	08/22/24 01:37 / eli-b
Surr: Triphenylphosphate	100	%REC		70-130		E525.2	08/22/24 01:37 / eli-b
- Note: The federal MCL for total PCB's is 0.5 ug/L as Decachlorobiphenyl (DCB). PCB screening at the reporting limits given for the individual Aroclors meets or exceeds federal and state requirements for "Total PCB" monitoring if Aroclors are not detected.							
SEMI-VOLATILE ORGANIC COMPOUNDS							
Endothall	ND	ug/L		8.0	100	E548.1	08/26/24 20:57 / eli-b
Surr: 2,4-Dichlorophenylacetic acid	108	%REC		70-130		E548.1	08/26/24 20:57 / eli-b
PESTICIDES, BY HPLC							
Aldicarb	ND	ug/L		1.0	3	E531.1	08/26/24 22:59 / eli-ca
Aldicarb sulfone	ND	ug/L		1.0	2	E531.1	08/26/24 22:59 / eli-ca
Aldicarb sulfoxide	ND	ug/L		1.0	4	E531.1	08/26/24 22:59 / eli-ca
Carbaryl	ND	ug/L		1.0		E531.1	08/26/24 22:59 / eli-ca
3-Hydroxycarbofuran	ND	ug/L		1.0		E531.1	08/26/24 22:59 / eli-ca
Carbofuran	ND	ug/L		1.0	40	E531.1	08/26/24 22:59 / eli-ca
Methiocarb	ND	ug/L		1.0		E531.1	08/26/24 22:59 / eli-ca
Methomyl	ND	ug/L		1.0		E531.1	08/26/24 22:59 / eli-ca
Oxamyl	ND	ug/L		1.0	200	E531.1	08/26/24 22:59 / eli-ca
Baygon	ND	ug/L		1.0		E531.1	08/26/24 22:59 / eli-ca
Surr: BDMC	104	%REC		70-130		E531.1	08/26/24 22:59 / eli-ca
VOCS BY MICROEXTRACTION-ECD							
1,2-Dibromo-3-chloropropane	ND	ug/L		0.020	0.2	E504.1	08/22/24 02:30 / eli-b
1,2-Dibromoethane	ND	ug/L		0.010	0.05	E504.1	08/22/24 02:30 / eli-b
HERBICIDES, BY HPLC							
Glyphosate	ND	ug/L		5.0	700	E547	08/30/24 15:15 / eli-ca
PESTICIDES							
Diquat	ND	ug/L		0.40	20	E549.2	08/29/24 14:54 / ADW
HERBICIDES							
2,4,5-TP (Silvex)	ND	ug/L		0.25	50	E515.4	08/28/24 03:13 / eli-b12
2,4-D	ND	ug/L		1.0	70	E515.4	08/28/24 03:13 / eli-b12
2,4-DB	ND	ug/L		1.0		E515.4	08/28/24 03:13 / eli-b12
Dalapon	ND	ug/L		2.5	200	E515.4	08/28/24 03:13 / eli-b12
Dicamba	ND	ug/L		1.0		E515.4	08/28/24 03:13 / eli-b12
Dichlorprop	ND	ug/L		1.0		E515.4	08/28/24 03:13 / eli-b12
Dinoseb	ND	ug/L		1.0	7	E515.4	08/28/24 03:13 / eli-b12

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-001
Client Sample ID: CMRWA Well 5

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
Date Received: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
HERBICIDES							
Pentachlorophenol	ND	ug/L		0.10	1	E515.4	08/28/24 03:13 / eli-b12
Picloram	ND	ug/L		0.50	500	E515.4	08/28/24 03:13 / eli-b12
Surr: 2,4-Dichlorophenylacetic acid	98.0	%REC		70-130		E515.4	08/28/24 03:13 / eli-b12

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-002
Client Sample ID: Trip Blank

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
DateReceived: 08/19/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Bromobenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Bromochloromethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Bromodichloromethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Bromoform	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Bromomethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
n-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
sec-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
tert-Butylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Carbon tetrachloride	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
1,2-Dichloroethane	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Chlorobenzene	ND	ug/L		0.50	100	E524.2	08/22/24 14:58 / kmh
Chlorodibromomethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Chloroethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Chloroform	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Chloromethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
2-Chlorotoluene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
4-Chlorotoluene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Dibromomethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,2-Dichlorobenzene	ND	ug/L		0.50	600	E524.2	08/22/24 14:58 / kmh
1,3-Dichlorobenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,4-Dichlorobenzene	ND	ug/L		0.50	75	E524.2	08/22/24 14:58 / kmh
Dichlorodifluoromethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,1-Dichloroethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,1-Dichloroethene	ND	ug/L		0.50	7	E524.2	08/22/24 14:58 / kmh
cis-1,2-Dichloroethene	ND	ug/L		0.50	70	E524.2	08/22/24 14:58 / kmh
trans-1,2-Dichloroethene	ND	ug/L		0.50	100	E524.2	08/22/24 14:58 / kmh
1,2-Dichloropropane	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
1,3-Dichloropropane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
2,2-Dichloropropane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,1-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
cis-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
trans-1,3-Dichloropropene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Ethylbenzene	ND	ug/L		0.50	700	E524.2	08/22/24 14:58 / kmh
Hexachlorobutadiene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Isopropylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
p-Isopropyltoluene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Methyl tert-butyl ether (MTBE)	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Methylene chloride	0.99	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Naphthalene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
n-Propylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Styrene	ND	ug/L		0.50	100	E524.2	08/22/24 14:58 / kmh
1,1,1,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080650-002
Client Sample ID: Trip Blank

Report Date: 09/05/24
Collection Date: 08/19/24 08:30
DateReceived: 08/19/24
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2,2-Tetrachloroethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Tetrachloroethene	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Toluene	ND	ug/L		0.50	1000	E524.2	08/22/24 14:58 / kmh
1,2,3-Trichlorobenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,2,4-Trichlorobenzene	ND	ug/L		0.50	70	E524.2	08/22/24 14:58 / kmh
1,1,1-Trichloroethane	ND	ug/L		0.50	200	E524.2	08/22/24 14:58 / kmh
1,1,2-Trichloroethane	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Trichloroethene	ND	ug/L		0.50	5	E524.2	08/22/24 14:58 / kmh
Trichlorofluoromethane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,2,3-Trichloropropane	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,2,4-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
1,3,5-Trimethylbenzene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Vinyl chloride	ND	ug/L		0.50	2	E524.2	08/22/24 14:58 / kmh
m+p-Xylenes	ND	ug/L		1.0		E524.2	08/22/24 14:58 / kmh
o-Xylene	ND	ug/L		0.50		E524.2	08/22/24 14:58 / kmh
Trihalomethanes, Total	ND	ug/L		0.50	80	E524.2	08/22/24 14:58 / kmh
Xylenes, Total	ND	ug/L		0.50	10000	E524.2	08/22/24 14:58 / kmh
Surr: p-Bromofluorobenzene	100	%REC		70-130		E524.2	08/22/24 14:58 / kmh
Surr: 1,2-Dichloroethane-d4	112	%REC		70-130		E524.2	08/22/24 14:58 / kmh
Surr: Toluene-d8	104	%REC		70-130		E524.2	08/22/24 14:58 / kmh

Report RL - Analyte Reporting Limit
Definitions: QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R197792
Lab ID: MBLK		Method Blank					Run: PHSC_101-H_240822A			08/22/24 08:18
Alkalinity, Total as CaCO ₃		ND	mg/L	2						
Lab ID: LCS										08/22/24 08:23
Laboratory Control Sample							Run: PHSC_101-H_240822A			
Alkalinity, Total as CaCO ₃		610	mg/L	4.0	102	90	110			
Lab ID: H24080754-001BDUP										08/22/24 11:51
Sample Duplicate							Run: PHSC_101-H_240822A			
Alkalinity, Total as CaCO ₃		110	mg/L	4.0				0.5	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C								Batch: TDS20240820A		
Lab ID: MBLK_20240820-2	Method Blank					Run: Sartorius-BCA124-1S_240820		08/20/24 14:05		
Solids, Total Dissolved TDS @ 180 C		4	mg/L	1						
Lab ID: LCS_20240820-2	Laboratory Control Sample					Run: Sartorius-BCA124-1S_240820		08/20/24 14:05		
Solids, Total Dissolved TDS @ 180 C		1980	mg/L	50	99	90	110			
Lab ID: H24080650-001ADUP	Sample Duplicate					Run: Sartorius-BCA124-1S_240820		08/20/24 14:06		
Solids, Total Dissolved TDS @ 180 C		583	mg/L	25				2.9	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PHSC_101-H_240820A		
Lab ID: pH 7	2	Initial Calibration Verification Standard						08/20/24 09:08		
pH		7.0	s.u.	0.1	100	98	102			
pH Measurement Temp		21.4	°C			0	0			
Method: A4500-H B								Batch: R197722		
Lab ID: H24080650-001ADUP	2	Sample Duplicate				Run: PHSC_101-H_240820A			08/20/24 12:15	
pH		7.5	s.u.	0.1				0.1	3	H
pH Measurement Temp		14.0	°C							

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

H - Analysis performed past the method holding time

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7		Analytical Run: ICP2-HE_240822A								
Lab ID: ICV	5	Initial Calibration Verification Standard							08/22/24 10:46	
Calcium		39.7	mg/L	1.0	99	95	105			
Iron		3.97	mg/L	0.020	99	95	105			
Magnesium		39.9	mg/L	1.0	100	95	105			
Potassium		39.4	mg/L	1.0	99	95	105			
Sodium		39.4	mg/L	1.0	99	95	105			
Lab ID: CCV-1	5	Continuing Calibration Verification Standard							08/22/24 10:50	
Calcium		24.8	mg/L	1.0	99	95	105			
Iron		2.47	mg/L	0.020	99	95	105			
Magnesium		24.7	mg/L	1.0	99	95	105			
Potassium		24.2	mg/L	1.0	97	95	105			
Sodium		23.9	mg/L	1.0	96	95	105			
Lab ID: CCV	5	Continuing Calibration Verification Standard							08/22/24 13:13	
Calcium		23.6	mg/L	1.0	95	90	110			
Iron		2.40	mg/L	0.020	96	90	110			
Magnesium		24.3	mg/L	1.0	97	90	110			
Potassium		25.6	mg/L	1.0	102	90	110			
Sodium		25.5	mg/L	1.0	102	90	110			
Method: E200.7		Batch: R197845								
Lab ID: MB	5	Method Blank					Run: ICP2-HE_240822A		08/22/24 11:13	
Calcium		ND	mg/L	0.2						
Iron		ND	mg/L	0.008						
Magnesium		ND	mg/L	0.05						
Potassium		ND	mg/L	0.06						
Sodium		0.04	mg/L	0.03						
Lab ID: LFB	5	Laboratory Fortified Blank					Run: ICP2-HE_240822A		08/22/24 11:17	
Calcium		47.9	mg/L	1.0	96	85	115			
Iron		4.88	mg/L	0.020	98	85	115			
Magnesium		49.1	mg/L	1.0	98	85	115			
Potassium		51.2	mg/L	1.0	102	85	115			
Sodium		51.5	mg/L	1.0	103	85	115			
Lab ID: H24080650-001BMS2	5	Sample Matrix Spike					Run: ICP2-HE_240822A		08/22/24 13:51	
Calcium		153	mg/L	1.0	93	70	130			
Iron		5.09	mg/L	0.020	98	70	130			
Magnesium		86.4	mg/L	1.0	98	70	130			
Potassium		54.2	mg/L	1.0	105	70	130			
Sodium		59.3	mg/L	1.0	106	70	130			
Lab ID: H24080650-001BMSD2	5	Sample Matrix Spike Duplicate					Run: ICP2-HE_240822A		08/22/24 13:55	
Calcium		151	mg/L	1.0	87	70	130	1.8	20	
Iron		5.09	mg/L	0.020	98	70	130	0.1	20	
Magnesium		84.9	mg/L	1.0	95	70	130	1.8	20	
Potassium		52.7	mg/L	1.0	102	70	130	2.9	20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering Work Order: H24080650 Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: R197845
Lab ID: H24080650-001BMSD2 5 Sample Matrix Spike Duplicate										
Sodium										Run: ICP2-HE_240822A 08/22/24 13:55
		57.6	mg/L	1.0	102	70	130	2.9	20	

Qualifiers:

RL - Analyte Reporting Limit ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8		Analytical Run: ICPMS205-H_240820C								
Lab ID: ICV	12 Initial Calibration Verification Standard									08/21/24 14:22
Antimony		0.0606	mg/L	0.0030	101	90	110			
Arsenic		0.0589	mg/L	0.0050	98	90	110			
Barium		0.0606	mg/L	0.10	101	90	110			
Beryllium		0.0312	mg/L	0.0010	104	90	110			
Cadmium		0.0318	mg/L	0.0010	106	90	110			
Chromium		0.0596	mg/L	0.010	99	90	110			
Copper		0.0620	mg/L	0.010	103	90	110			
Lead		0.0606	mg/L	0.0010	101	90	110			
Manganese		0.297	mg/L	0.010	99	90	110			
Nickel		0.0608	mg/L	0.010	101	90	110			
Selenium		0.0612	mg/L	0.0050	102	90	110			
Thallium		0.0591	mg/L	0.0010	98	90	110			
Lab ID: CCV	12 Continuing Calibration Verification Standard									08/21/24 15:16
Antimony		0.0468	mg/L	0.0030	94	90	110			
Arsenic		0.0503	mg/L	0.0050	101	90	110			
Barium		0.0476	mg/L	0.10	95	90	110			
Beryllium		0.0509	mg/L	0.0010	102	90	110			
Cadmium		0.0477	mg/L	0.0010	95	90	110			
Chromium		0.0508	mg/L	0.010	102	90	110			
Copper		0.0512	mg/L	0.010	102	90	110			
Lead		0.0489	mg/L	0.0010	98	90	110			
Manganese		0.0494	mg/L	0.010	99	90	110			
Nickel		0.0518	mg/L	0.010	103	90	110			
Selenium		0.0501	mg/L	0.0050	100	90	110			
Thallium		0.0471	mg/L	0.0010	94	90	110			
Method: E200.8		Batch: R197805								
Lab ID: LRB	12 Method Blank									Run: ICPMS205-H_240820C 08/21/24 14:43
Antimony		ND	mg/L	0.0001						
Arsenic		ND	mg/L	0.0004						
Barium		ND	mg/L	0.0005						
Beryllium		ND	mg/L	0.00008						
Cadmium		ND	mg/L	0.0002						
Chromium		ND	mg/L	0.0008						
Copper		ND	mg/L	0.003						
Lead		ND	mg/L	0.0002						
Manganese		ND	mg/L	0.0007						
Nickel		ND	mg/L	0.001						
Selenium		ND	mg/L	0.0005						
Thallium		ND	mg/L	0.0001						
Lab ID: LFB	12 Laboratory Fortified Blank									Run: ICPMS205-H_240820C 08/21/24 14:45
Antimony		0.0472	mg/L	0.0030	94	85	115			
Arsenic		0.0508	mg/L	0.0050	102	85	115			
Barium		0.0485	mg/L	0.10	97	85	115			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R197805
Lab ID: LFB	12	Laboratory Fortified Blank		Run: ICPMS205-H_240820C				08/21/24 14:45		
Beryllium		0.0495	mg/L	0.0010	99	85	115			
Cadmium		0.0490	mg/L	0.0010	98	85	115			
Chromium		0.0499	mg/L	0.010	100	85	115			
Copper		0.0537	mg/L	0.010	107	85	115			
Lead		0.0502	mg/L	0.0010	100	85	115			
Manganese		0.0513	mg/L	0.010	103	85	115			
Nickel		0.0536	mg/L	0.010	107	85	115			
Selenium		0.0511	mg/L	0.0050	102	85	115			
Thallium		0.0510	mg/L	0.0010	102	85	115			
Lab ID: H24080651-001AMS	12	Sample Matrix Spike		Run: ICPMS205-H_240820C				08/21/24 15:34		
Antimony		0.0515	mg/L	0.0010	103	70	130			
Arsenic		0.0524	mg/L	0.0010	103	70	130			
Barium		0.0709	mg/L	0.050	103	70	130			
Beryllium		0.0505	mg/L	0.0010	101	70	130			
Cadmium		0.0504	mg/L	0.0010	101	70	130			
Chromium		0.0514	mg/L	0.0050	103	70	130			
Copper		0.0607	mg/L	0.0050	99	70	130			
Lead		0.0525	mg/L	0.0010	105	70	130			
Manganese		0.0542	mg/L	0.0010	96	70	130			
Nickel		0.0525	mg/L	0.0050	98	70	130			
Selenium		0.0535	mg/L	0.0010	104	70	130			
Thallium		0.0530	mg/L	0.00050	106	70	130			
Lab ID: H24080651-001AMSD	12	Sample Matrix Spike Duplicate		Run: ICPMS205-H_240820C				08/21/24 15:37		
Antimony		0.0502	mg/L	0.0010	100	70	130	2.6	20	
Arsenic		0.0536	mg/L	0.0010	105	70	130	2.4	20	
Barium		0.0698	mg/L	0.050	101	70	130	1.6	20	
Beryllium		0.0532	mg/L	0.0010	106	70	130	5.2	20	
Cadmium		0.0496	mg/L	0.0010	99	70	130	1.5	20	
Chromium		0.0496	mg/L	0.0050	99	70	130	3.4	20	
Copper		0.0619	mg/L	0.0050	102	70	130	1.9	20	
Lead		0.0549	mg/L	0.0010	110	70	130	4.5	20	
Manganese		0.0550	mg/L	0.0010	98	70	130	1.6	20	
Nickel		0.0538	mg/L	0.0050	101	70	130	2.5	20	
Selenium		0.0548	mg/L	0.0010	107	70	130	2.3	20	
Thallium		0.0537	mg/L	0.00050	107	70	130	1.3	20	

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										Analytical Run: SUB-B427831
Lab ID: ICV-192576		Initial Calibration Verification Standard								08/27/24 14:13
Mercury		0.00193	mg/L	0.00010	96	90	110			
Lab ID: CCV										08/27/24 14:33
		Continuing Calibration Verification Standard								
Mercury		0.00248	mg/L	0.00010	99	90	110			
Method: E245.1										Batch: B_192576
Lab ID: MB-192576		Method Blank								08/27/24 14:16
Mercury		ND	mg/L	0.00006						
Lab ID: LCS-192576										08/27/24 14:17
		Laboratory Control Sample								
Mercury		0.00189	mg/L	0.00010	94	85	115			
Lab ID: B24081626-001BMS										08/27/24 14:22
		Sample Matrix Spike								
Mercury		0.00184	mg/L	0.00010	92	70	130			
Lab ID: B24081626-001BMSD										08/27/24 14:23
		Sample Matrix Spike Duplicate								
Mercury		0.00186	mg/L	0.00010	93	70	130	0.8	30	
Lab ID: B24082215-005CMS										08/27/24 14:41
		Sample Matrix Spike								
Mercury		0.00197	mg/L	0.00010	98	70	130			
Lab ID: B24082215-005CMSD										08/27/24 14:42
		Sample Matrix Spike Duplicate								
Mercury		0.00196	mg/L	0.00010	98	70	130	0.6	30	

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	E300.0	Analytical Run: IC METROHM_240820A								
Lab ID:	ICV	3	Initial Calibration Verification Standard						08/20/24 10:07	
Chloride			96.6	mg/L	1.0	97	90	110		
Sulfate			379	mg/L	1.0	95	90	110		
Fluoride			5.25	mg/L	0.10	105	90	110		
Lab ID:	CCV	3	Continuing Calibration Verification Standard						08/21/24 01:46	
Chloride			48.2	mg/L	1.0	96	90	110		
Sulfate			196	mg/L	1.0	98	90	110		
Fluoride			2.35	mg/L	0.10	94	90	110		
Method:	E300.0									Batch: R197784
Lab ID:	ICB	3	Method Blank				Run: IC METROHM_240820A		08/20/24 09:53	
Chloride			ND	mg/L	0.02					
Sulfate			ND	mg/L	0.03					
Fluoride			ND	mg/L	0.01					
Lab ID:	LFB	3	Laboratory Fortified Blank				Run: IC METROHM_240820A		08/20/24 10:36	
Chloride			23.4	mg/L	1.0	94	90	110		
Sulfate			94.7	mg/L	1.0	95	90	110		
Fluoride			1.20	mg/L	0.10	96	90	110		
Lab ID:	H24080619-014AMS	3	Sample Matrix Spike				Run: IC METROHM_240820A		08/21/24 01:18	
Chloride			86.3	mg/L	1.0	99	90	110		
Sulfate			344	mg/L	1.0	98	90	110		
Fluoride			2.50	mg/L	0.10	92	90	110		
Lab ID:	H24080619-014AMSD	3	Sample Matrix Spike Duplicate				Run: IC METROHM_240820A		08/21/24 01:32	
Chloride			88.8	mg/L	1.0	104	90	110	2.8	20
Sulfate			356	mg/L	1.0	105	90	110	3.5	20
Fluoride			2.59	mg/L	0.10	96	90	110	3.5	20

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Analytical Run: FIA203-HE_240820B
Lab ID: ICV	Initial Calibration Verification Standard									08/20/24 16:06
Nitrogen, Nitrite as N		0.950	mg/L	0.010	95	90	110			
Method: E353.2										Batch: R197936
Lab ID: MBLK	Method Blank									08/20/24 16:07
Nitrogen, Nitrite as N		ND	mg/L	0.009						
Lab ID: LFB	Laboratory Fortified Blank									08/20/24 16:08
Nitrogen, Nitrite as N		1.00	mg/L	0.011	100	90	110			
Lab ID: H24080650-001ADUP	Sample Duplicate									08/20/24 16:11
Nitrogen, Nitrite as N		ND	mg/L	0.010						10
Lab ID: H24080650-001AMS	Sample Matrix Spike									08/20/24 16:12
Nitrogen, Nitrite as N		1.02	mg/L	0.011	102	90	110			
Lab ID: H24080650-001AMSD	Sample Matrix Spike Duplicate									08/20/24 16:13
Nitrogen, Nitrite as N		1.02	mg/L	0.011	102	90	110	0.6	10	
Method: E353.2										Analytical Run: SEAL AA500_240901A
Lab ID: ICV	Initial Calibration Verification Standard									09/01/24 13:50
Nitrogen, Nitrate+Nitrite as N		1.00	mg/L	0.010	100	90	110			
Lab ID: CCV	Continuing Calibration Verification Standard									09/01/24 15:58
Nitrogen, Nitrate+Nitrite as N		0.972	mg/L	0.010	97	90	110			
Method: E353.2										Batch: R198109
Lab ID: ICB	Method Blank									09/01/24 13:48
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.01						
Lab ID: LFB	Laboratory Fortified Blank									09/01/24 13:51
Nitrogen, Nitrate+Nitrite as N		0.995	mg/L	0.011	100	90	110			
Lab ID: H24080650-001CMS	Sample Matrix Spike									09/01/24 16:03
Nitrogen, Nitrate+Nitrite as N		1.08	mg/L	0.011	97	90	110			
Lab ID: H24080650-001CMSD	Sample Matrix Spike Duplicate									09/01/24 16:04
Nitrogen, Nitrate+Nitrite as N		1.09	mg/L	0.011	97	90	110	0.2	10	

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E504.1										Analytical Run: B_192433
Lab ID: CAL2-192433	2	Continuing Calibration Verification Standard								08/21/24 21:20
1,2-Dibromo-3-chloropropane		0.0493	ug/L	0.020	99	70	130			
1,2-Dibromoethane		0.0455	ug/L	0.010	91	70	130			
Lab ID: CAL4-192433	2	Continuing Calibration Verification Standard								08/22/24 03:33
1,2-Dibromo-3-chloropropane		0.215	ug/L	0.020	108	70	130			
1,2-Dibromoethane		0.206	ug/L	0.010	103	70	130			
Method: E504.1										Batch: B_192433
Lab ID: LCS-192433	2	Laboratory Control Sample				Run: SUB-B427704				08/21/24 22:22
1,2-Dibromo-3-chloropropane		0.260	ug/L	0.020	104	70	130			
1,2-Dibromoethane		0.232	ug/L	0.010	93	70	130			
Lab ID: LCSD-192433	2	Laboratory Control Sample Duplicate				Run: SUB-B427704				08/21/24 22:43
1,2-Dibromo-3-chloropropane		0.266	ug/L	0.020	106	70	130	2.1	20	
1,2-Dibromoethane		0.247	ug/L	0.010	99	70	130	6.2	20	
Lab ID: MB-192433	2	Method Blank				Run: SUB-B427704				08/21/24 23:03
1,2-Dibromo-3-chloropropane		ND	ug/L	0.020						
1,2-Dibromoethane		ND	ug/L	0.010						
Lab ID: B24081382-001GMS	2	Sample Matrix Spike				Run: SUB-B427704				08/22/24 02:51
1,2-Dibromo-3-chloropropane		0.260	ug/L	0.020	104	65	135			
1,2-Dibromoethane		0.235	ug/L	0.010	94	65	135			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Analytical Run: B_192560
Lab ID: CAL1-192560	10	Continuing Calibration Verification Standard								08/27/24 18:28
2,4,5-TP (Silvex)		0.271	ug/L	0.25	108	50	150			
2,4-D		1.10	ug/L	1.0	110	50	150			
2,4-DB		1.07	ug/L	1.0	107	50	150			
Dalapon		0.987	ug/L	2.5	99	50	150			
Dicamba		0.489	ug/L	1.0	98	50	150			
Dichlorprop		1.01	ug/L	1.0	101	50	150			
Dinoseb		1.03	ug/L	1.0	103	50	150			
Pentachlorophenol		0.101	ug/L	0.10	101	50	150			
Picloram		0.512	ug/L	0.50	102	50	150			
Surr: 2,4-Dichlorophenylacetic acid					100	70	130			
Lab ID: CAL5-192560	10	Continuing Calibration Verification Standard								08/28/24 01:21
2,4,5-TP (Silvex)		1.91	ug/L	0.25	109	70	130			
2,4-D		7.43	ug/L	1.0	106	70	130			
2,4-DB		7.55	ug/L	1.0	108	70	130			
Dalapon		7.83	ug/L	2.5	112	70	130			
Dicamba		3.90	ug/L	1.0	112	70	130			
Dichlorprop		7.26	ug/L	1.0	104	70	130			
Dinoseb		8.29	ug/L	1.0	118	70	130			
Pentachlorophenol		0.793	ug/L	0.10	113	70	130			
Picloram		3.97	ug/L	0.50	113	70	130			
Surr: 2,4-Dichlorophenylacetic acid					110	70	130			
Lab ID: CAL3-192560	10	Continuing Calibration Verification Standard								08/28/24 06:21
2,4,5-TP (Silvex)		0.744	ug/L	0.25	99	70	130			
2,4-D		3.21	ug/L	1.0	107	70	130			
2,4-DB		3.05	ug/L	1.0	102	70	130			
Dalapon		3.05	ug/L	2.5	102	70	130			
Dicamba		1.52	ug/L	1.0	101	70	130			
Dichlorprop		3.04	ug/L	1.0	101	70	130			
Dinoseb		3.23	ug/L	1.0	108	70	130			
Pentachlorophenol		0.303	ug/L	0.10	101	70	130			
Picloram		1.59	ug/L	0.50	106	70	130			
Surr: 2,4-Dichlorophenylacetic acid					103	70	130			
Method: E515.4										Batch: B_192560
Lab ID: LCS-192560	10	Laboratory Control Sample				Run: SUB-B427981				08/27/24 19:05
2,4,5-TP (Silvex)		1.45	ug/L	0.25	116	70	130			
2,4-D		5.01	ug/L	1.0	100	70	130			
2,4-DB		4.78	ug/L	1.0	96	70	130			
Dalapon		4.91	ug/L	2.5	98	70	130			
Dicamba		2.64	ug/L	1.0	105	70	130			
Dichlorprop		5.30	ug/L	1.0	106	70	130			
Dinoseb		5.23	ug/L	1.0	105	70	130			
Pentachlorophenol		0.480	ug/L	0.10	96	70	130			
Picloram		2.61	ug/L	0.50	104	70	130			

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E515.4										Batch: B_192560
Lab ID: LCS-192560	10	Laboratory Control Sample				Run: SUB-B427981				08/27/24 19:05
Surr: 2,4-Dichlorophenylacetic acid					102	70	130			
Lab ID: MB-192560	10	Method Blank				Run: SUB-B427981				08/27/24 19:43
2,4,5-TP (Silvex)		ND	ug/L	0.25						
2,4-D		ND	ug/L	1.0						
2,4-DB		ND	ug/L	1.0						
Dalapon		ND	ug/L	2.5						
Dicamba		ND	ug/L	1.0						
Dichlorprop		ND	ug/L	1.0						
Dinoseb		ND	ug/L	1.0						
Pentachlorophenol		ND	ug/L	0.10						
Picloram		ND	ug/L	0.50						
Surr: 2,4-Dichlorophenylacetic acid					104	70	130			
Lab ID: B24081801-001AMS	10	Sample Matrix Spike				Run: SUB-B427981				08/27/24 21:36
2,4,5-TP (Silvex)		1.43	ug/L	0.25	115	70	130			
2,4-D		4.72	ug/L	1.0	94	70	130			
2,4-DB		4.77	ug/L	1.0	95	70	130			
Dalapon		5.07	ug/L	2.5	101	70	130			
Dicamba		2.58	ug/L	1.0	103	70	130			
Dichlorprop		5.64	ug/L	1.0	113	70	130			
Dinoseb		5.00	ug/L	1.0	100	70	130			
Pentachlorophenol		0.460	ug/L	0.10	92	70	130			
Picloram		2.59	ug/L	0.50	104	70	130			
Surr: 2,4-Dichlorophenylacetic acid					103	70	130			
Lab ID: B24081801-001AMSD	10	Sample Matrix Spike Duplicate				Run: SUB-B427981				08/27/24 22:14
2,4,5-TP (Silvex)		1.41	ug/L	0.25	112	70	130	2.0	30	
2,4-D		4.64	ug/L	1.0	93	70	130	1.8	30	
2,4-DB		4.53	ug/L	1.0	91	70	130	5.0	30	
Dalapon		5.05	ug/L	2.5	101	70	130	0.3	30	
Dicamba		2.54	ug/L	1.0	101	70	130	1.5	30	
Dichlorprop		5.68	ug/L	1.0	114	70	130	0.6	30	
Dinoseb		4.92	ug/L	1.0	98	70	130	1.8	30	
Pentachlorophenol		0.450	ug/L	0.10	90	70	130	2.3	30	
Picloram		2.56	ug/L	0.50	103	70	130	1.1	30	
Surr: 2,4-Dichlorophenylacetic acid					102	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2								Analytical Run: R197818		
Lab ID: 22-Aug-24_CCV_Pres_ 63 Continuing Calibration Verification Standard								08/22/24 12:02		
Benzene		6.08	ug/L	0.50	122	70	130			
Bromobenzene		4.79	ug/L	0.50	96	70	130			
Bromochloromethane		6.07	ug/L	0.50	121	70	130			
Bromodichloromethane		4.94	ug/L	0.50	99	70	130			
Bromoform		4.92	ug/L	0.50	98	70	130			
Bromomethane		4.54	ug/L	0.50	91	70	130			
n-Butylbenzene		3.86	ug/L	0.50	77	70	130			
sec-Butylbenzene		4.31	ug/L	0.50	86	70	130			
tert-Butylbenzene		4.12	ug/L	0.50	82	70	130			
Carbon tetrachloride		5.27	ug/L	0.50	105	70	130			
Chlorobenzene		5.00	ug/L	0.50	100	70	130			
Chlorodibromomethane		4.93	ug/L	0.50	99	70	130			
Chloroethane		5.27	ug/L	0.50	105	70	130			
Chloroform		6.06	ug/L	0.50	121	70	130			
Chloromethane		4.84	ug/L	0.50	97	70	130			
2-Chlorotoluene		4.52	ug/L	0.50	90	70	130			
4-Chlorotoluene		4.77	ug/L	0.50	95	70	130			
Dibromomethane		5.61	ug/L	0.50	112	70	130			
1,2-Dichlorobenzene		4.93	ug/L	0.50	99	70	130			
1,3-Dichlorobenzene		4.75	ug/L	0.50	95	70	130			
1,4-Dichlorobenzene		5.02	ug/L	0.50	100	70	130			
Dichlorodifluoromethane		4.09	ug/L	0.50	82	70	130			
1,1-Dichloroethane		6.16	ug/L	0.50	123	70	130			
1,2-Dichloroethane		5.65	ug/L	0.50	113	70	130			
1,1-Dichloroethene		6.12	ug/L	0.50	122	70	130			
cis-1,2-Dichloroethene		5.90	ug/L	0.50	118	70	130			
trans-1,2-Dichloroethene		6.12	ug/L	0.50	122	70	130			
1,2-Dichloropropane		5.35	ug/L	0.50	107	70	130			
1,3-Dichloropropane		4.87	ug/L	0.50	97	70	130			
2,2-Dichloropropane		6.35	ug/L	0.50	127	70	130			
1,1-Dichloropropene		4.76	ug/L	0.50	95	70	130			
cis-1,3-Dichloropropene		4.35	ug/L	0.50	87	70	130			
trans-1,3-Dichloropropene		4.58	ug/L	0.50	92	70	130			
Ethylbenzene		4.70	ug/L	0.50	94	70	130			
Hexachlorobutadiene		5.58	ug/L	0.50	112	70	130			
Isopropylbenzene		4.23	ug/L	0.50	85	70	130			
p-Isopropyltoluene		4.38	ug/L	0.50	88	70	130			
Methyl tert-butyl ether (MTBE)		5.55	ug/L	0.50	111	70	130			
Methylene chloride		5.77	ug/L	0.50	115	70	130			
Naphthalene		3.55	ug/L	0.50	71	70	130			
n-Propylbenzene		4.28	ug/L	0.50	86	70	130			
Styrene		4.72	ug/L	0.50	94	70	130			
1,1,1,2-Tetrachloroethane		4.97	ug/L	0.50	99	70	130			
1,1,2,2-Tetrachloroethane		5.40	ug/L	0.50	108	70	130			
Tetrachloroethene		4.90	ug/L	0.50	98	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Analytical Run: R197818
Lab ID: 22-Aug-24_CCV_Pres_	63	Continuing Calibration Verification Standard								08/22/24 12:02
Toluene		5.15	ug/L	0.50	103	70	130			
1,2,3-Trichlorobenzene		4.46	ug/L	0.50	89	70	130			
1,2,4-Trichlorobenzene		3.89	ug/L	0.50	78	70	130			
1,1,1-Trichloroethane		5.30	ug/L	0.50	106	70	130			
1,1,2-Trichloroethane		5.14	ug/L	0.50	103	70	130			
Trichloroethene		5.47	ug/L	0.50	109	70	130			
Trichlorofluoromethane		5.17	ug/L	0.50	103	70	130			
1,2,3-Trichloropropane		5.24	ug/L	0.50	105	70	130			
1,2,4-Trimethylbenzene		4.54	ug/L	0.50	91	70	130			
1,3,5-Trimethylbenzene		4.50	ug/L	0.50	90	70	130			
Vinyl chloride		4.95	ug/L	0.22	99	70	130			
m+p-Xylenes		9.74	ug/L	0.50	97	70	130			
o-Xylene		4.53	ug/L	0.50	91	70	130			
Trihalomethanes, Total		20.8	ug/L	0.50	104	70	130			
Xylenes, Total		14.3	ug/L	0.50	95	70	130			
Surr: p-Bromofluorobenzene				0.50	100	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	107	70	130			
Surr: Toluene-d8				0.50	109	70	130			
Lab ID: 22-Aug-24_CCV1_6	8	Continuing Calibration Verification Standard								08/22/24 13:20
Bromodichloromethane		0.589	ug/L	0.50	118	50	150			
Bromoform		0.628	ug/L	0.50	126	50	150			
Chlorodibromomethane		0.699	ug/L	0.50	140	50	150			
Chloroform		0.589	ug/L	0.50	118	50	150			
Trihalomethanes, Total		2.51	ug/L	0.50	125	50	150			
Surr: 1,2-Dichloroethane-d4				0.50	114	70	130			
Surr: p-Bromofluorobenzene				0.50	98	70	130			
Surr: Toluene-d8				0.50	101	70	130			
Method: E524.2										Batch: R197818
Lab ID: 22-Aug-24_LCS_5	63	Laboratory Control Sample								08/22/24 12:50
Benzene		5.45	ug/L	0.50	109	70	130			
Bromobenzene		4.31	ug/L	0.50	86	70	130			
Bromochloromethane		5.55	ug/L	0.50	111	70	130			
Bromodichloromethane		4.37	ug/L	0.50	87	70	130			
Bromoform		4.54	ug/L	0.50	91	70	130			
Bromomethane		5.75	ug/L	0.50	115	70	130			
n-Butylbenzene		3.80	ug/L	0.50	76	70	130			
sec-Butylbenzene		3.66	ug/L	0.50	73	70	130			
tert-Butylbenzene		3.81	ug/L	0.50	76	70	130			
Carbon tetrachloride		4.60	ug/L	0.50	92	70	130			
Chlorobenzene		4.49	ug/L	0.50	90	70	130			
Chlorodibromomethane		4.50	ug/L	0.50	90	70	130			
Chloroethane		5.83	ug/L	0.50	117	70	130			
Chloroform		5.47	ug/L	0.50	109	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R197818
Lab ID: 22-Aug-24_LCS_5	63	Laboratory Control Sample				Run: 5973MSD_240822A				08/22/24 12:50
Chloromethane		5.21	ug/L	0.50	104	70	130			
2-Chlorotoluene		4.15	ug/L	0.50	83	70	130			
4-Chlorotoluene		4.35	ug/L	0.50	87	70	130			
Dibromomethane		4.93	ug/L	0.50	99	70	130			
1,2-Dichlorobenzene		4.53	ug/L	0.50	91	70	130			
1,3-Dichlorobenzene		4.30	ug/L	0.50	86	70	130			
1,4-Dichlorobenzene		4.57	ug/L	0.50	91	70	130			
Dichlorodifluoromethane		3.81	ug/L	0.50	76	70	130			
1,1-Dichloroethane		5.41	ug/L	0.50	108	70	130			
1,2-Dichloroethane		5.18	ug/L	0.50	104	70	130			
1,1-Dichloroethene		5.49	ug/L	0.50	110	70	130			
cis-1,2-Dichloroethene		5.12	ug/L	0.50	102	70	130			
trans-1,2-Dichloroethene		5.52	ug/L	0.50	110	70	130			
1,2-Dichloropropane		4.80	ug/L	0.50	96	70	130			
1,3-Dichloropropane		4.50	ug/L	0.50	90	70	130			
2,2-Dichloropropane		5.40	ug/L	0.50	108	70	130			
1,1-Dichloropropene		4.28	ug/L	0.50	86	70	130			
cis-1,3-Dichloropropene		3.84	ug/L	0.50	77	70	130			
trans-1,3-Dichloropropene		3.81	ug/L	0.50	76	70	130			
Ethylbenzene		4.23	ug/L	0.50	85	70	130			
Hexachlorobutadiene		4.49	ug/L	0.50	90	70	130			
Isopropylbenzene		3.89	ug/L	0.50	78	70	130			
p-Isopropyltoluene		3.93	ug/L	0.50	79	70	130			
Methyl tert-butyl ether (MTBE)		5.18	ug/L	0.50	104	70	130			
Methylene chloride		5.19	ug/L	0.50	104	70	130			
Naphthalene		3.50	ug/L	0.50	70	70	130			
n-Propylbenzene		4.01	ug/L	0.50	80	70	130			
Styrene		4.43	ug/L	0.50	89	70	130			
1,1,1,2-Tetrachloroethane		4.45	ug/L	0.50	89	70	130			
1,1,2,2-Tetrachloroethane		5.10	ug/L	0.50	102	70	130			
Tetrachloroethene		4.33	ug/L	0.50	87	70	130			
Toluene		4.57	ug/L	0.50	91	70	130			
1,2,3-Trichlorobenzene		4.15	ug/L	0.50	83	70	130			
1,2,4-Trichlorobenzene		3.74	ug/L	0.50	75	70	130			
1,1,1-Trichloroethane		4.75	ug/L	0.50	95	70	130			
1,1,2-Trichloroethane		4.67	ug/L	0.50	93	70	130			
Trichloroethene		4.84	ug/L	0.50	97	70	130			
Trichlorofluoromethane		6.06	ug/L	0.50	121	70	130			
1,2,3-Trichloropropane		4.48	ug/L	0.50	90	70	130			
1,2,4-Trimethylbenzene		4.20	ug/L	0.50	84	70	130			
1,3,5-Trimethylbenzene		4.08	ug/L	0.50	82	70	130			
Vinyl chloride		5.48	ug/L	0.22	110	70	130			
m+p-Xylenes		8.84	ug/L	0.50	88	70	130			
o-Xylene		4.02	ug/L	0.50	80	70	130			
Trihalomethanes, Total		18.9	ug/L	0.50	94	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R197818
Lab ID: 22-Aug-24_LCS_5	63	Laboratory Control Sample			Run: 5973MSD_240822A				08/22/24 12:50	
Xylenes, Total		12.9	ug/L	0.50	86	70	130			
Surr: p-Bromofluorobenzene				0.50	100	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	108	70	130			
Surr: Toluene-d8				0.50	107	70	130			
Lab ID: 22-Aug-24_MBLK_7	63	Method Blank			Run: 5973MSD_240822A				08/22/24 13:51	
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methylene chloride		ND	ug/L	0.50						

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R197818
Lab ID: 22-Aug-24_MBLK_7	63	Method Blank		Run: 5973MSD_240822A				08/22/24 13:51		
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl chloride		ND	ug/L	0.22						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Trihalomethanes, Total		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: p-Bromofluorobenzene				0.50	98	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	111	70	130			
Surr: Toluene-d8				0.50	101	70	130			
Lab ID: H24080747-001DDUP	63	Sample Duplicate		Run: 5973MSD_240822A				08/23/24 14:40		
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		2.41	ug/L	0.50				4.0	20	
Bromoform		0.975	ug/L	0.50				9.8	20	
Bromomethane		0.41	ug/L	0.50					20	J
n-Butylbenzene		ND	ug/L	0.50					20	
sec-Butylbenzene		ND	ug/L	0.50					20	
tert-Butylbenzene		ND	ug/L	0.50					20	
Carbon tetrachloride		ND	ug/L	0.50					20	
1,2-Dichloroethane		ND	ug/L	0.50					20	
Chlorobenzene		ND	ug/L	0.50					20	
Chlorodibromomethane		2.90	ug/L	0.50				2.3	20	
Chloroethane		ND	ug/L	0.50					20	
Chloroform		1.78	ug/L	0.50				0.6	20	
Chloromethane		2.57	ug/L	0.50				0.6	20	
2-Chlorotoluene		ND	ug/L	0.50					20	
4-Chlorotoluene		ND	ug/L	0.50					20	
Dibromomethane		ND	ug/L	0.50					20	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

J - Estimated value - analyte was present but less than the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E524.2										Batch: R197818
Lab ID: H24080747-001DDUP	63	Sample Duplicate		Run: 5973MSD_240822A				08/23/24 14:40		
1,2-Dichlorobenzene		ND	ug/L	0.50						20
1,3-Dichlorobenzene		ND	ug/L	0.50						20
1,4-Dichlorobenzene		ND	ug/L	0.50						20
Dichlorodifluoromethane		ND	ug/L	0.50						20
1,1-Dichloroethane		ND	ug/L	0.50						20
1,1-Dichloroethene		ND	ug/L	0.50						20
cis-1,2-Dichloroethene		ND	ug/L	0.50						20
trans-1,2-Dichloroethene		ND	ug/L	0.50						20
1,2-Dichloropropane		ND	ug/L	0.50						20
1,3-Dichloropropane		ND	ug/L	0.50						20
2,2-Dichloropropane		ND	ug/L	0.50						20
1,1-Dichloropropene		ND	ug/L	0.50						20
cis-1,3-Dichloropropene		ND	ug/L	0.50						20
trans-1,3-Dichloropropene		ND	ug/L	0.50						20
Ethylbenzene		ND	ug/L	0.50						20
Hexachlorobutadiene		ND	ug/L	0.50						20
Isopropylbenzene		ND	ug/L	0.50						20
p-Isopropyltoluene		ND	ug/L	0.50						20
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						20
Methylene chloride		ND	ug/L	0.50						20
Naphthalene		ND	ug/L	0.50						20
n-Propylbenzene		ND	ug/L	0.50						20
Styrene		ND	ug/L	0.50						20
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						20
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						20
Tetrachloroethene		ND	ug/L	0.50						20
Toluene		ND	ug/L	0.50						20
1,2,3-Trichlorobenzene		ND	ug/L	0.50						20
1,2,4-Trichlorobenzene		ND	ug/L	0.50						20
1,1,1-Trichloroethane		ND	ug/L	0.50						20
1,1,2-Trichloroethane		ND	ug/L	0.50						20
Trichloroethene		ND	ug/L	0.50						20
Trichlorofluoromethane		ND	ug/L	0.50						20
1,2,3-Trichloropropane		ND	ug/L	0.50						20
1,2,4-Trimethylbenzene		ND	ug/L	0.50						20
1,3,5-Trimethylbenzene		ND	ug/L	0.50						20
Vinyl chloride		ND	ug/L	0.50						20
m+p-Xylenes		ND	ug/L	1.0						20
o-Xylene		ND	ug/L	0.50						20
Trihalomethanes, Total		8.06	ug/L	0.50				3.3		20
Xylenes, Total		ND	ug/L	0.50						20
Surr: p-Bromofluorobenzene				0.50	102	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	112	70	130			
Surr: Toluene-d8				0.50	101	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192417
Lab ID: MB-192417	32	Method Blank		Run: SUB-B427544				08/21/24 16:58		
Alachlor		ND	ug/L	0.10						
Aldrin		ND	ug/L	0.10						
Aroclor 1016		ND	ug/L	0.080						
Aroclor 1221		ND	ug/L	2.0						
Aroclor 1232		ND	ug/L	0.50						
Aroclor 1242		ND	ug/L	0.30						
Aroclor 1248		ND	ug/L	0.10						
Aroclor 1254		ND	ug/L	0.10						
Aroclor 1260		ND	ug/L	0.20						
Atrazine		ND	ug/L	0.10						
Benzo(a)pyrene		ND	ug/L	0.10						
bis(2-ethylhexyl)Adipate		ND	ug/L	0.50						
bis(2-ethylhexyl)Phthalate		ND	ug/L	0.60						
Butachlor		ND	ug/L	0.10						
Chlordane		ND	ug/L	1.0						
Dieldrin		ND	ug/L	0.10						
Endrin		ND	ug/L	0.10						
gamma-BHC (Lindane)		ND	ug/L	0.10						
Heptachlor		ND	ug/L	0.10						
Heptachlor epoxide		ND	ug/L	0.10						
Hexachlorobenzene		ND	ug/L	0.10						
Hexachlorocyclopentadiene		ND	ug/L	0.10						
Methoxychlor		ND	ug/L	0.10						
Metolachlor		ND	ug/L	0.10						
Metribuzin		ND	ug/L	0.10						
Propachlor		ND	ug/L	0.10						
Simazine		ND	ug/L	0.10						
Toxaphene		ND	ug/L	2.0						
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	97	70	130			
Surr: Perylene-d12				0.10	95	70	130			
Surr: Pyrene-d10				0.10	108	70	130			
Surr: Triphenylphosphate				0.10	97	70	130			
Lab ID: Ar1248-192417	5	Laboratory Control Sample		Run: SUB-B427544				08/21/24 17:24		
Aroclor 1248		2.31	ug/L	0.10	115	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	98	70	130			
Surr: Perylene-d12				0.10	92	70	130			
Surr: Pyrene-d10				0.10	105	70	130			
Surr: Triphenylphosphate				0.10	96	70	130			
Lab ID: LCS-192417	23	Laboratory Control Sample		Run: SUB-B427544				08/21/24 17:50		
Alachlor		2.23	ug/L	0.10	112	70	130			
Aldrin		1.95	ug/L	0.10	98	70	130			
Atrazine		2.21	ug/L	0.10	111	70	130			
Benzo(a)pyrene		1.75	ug/L	0.10	88	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192417
Lab ID: LCS-192417	23	Laboratory Control Sample			Run: SUB-B427544			08/21/24 17:50		
bis(2-ethylhexyl)Adipate		1.67	ug/L	0.50	84	70	130			
bis(2-ethylhexyl)Phthalate		1.78	ug/L	0.60	89	70	130			
Butachlor		2.07	ug/L	0.10	104	70	130			
Dieldrin		1.60	ug/L	0.10	80	70	130			
Endrin		1.85	ug/L	0.10	92	70	130			
gamma-BHC (Lindane)		2.21	ug/L	0.10	111	70	130			
Heptachlor		2.23	ug/L	0.10	111	70	130			
Heptachlor epoxide		2.22	ug/L	0.10	111	70	130			
Hexachlorobenzene		1.82	ug/L	0.10	91	70	130			
Hexachlorocyclopentadiene		2.46	ug/L	0.10	123	70	130			
Methoxychlor		2.12	ug/L	0.10	106	70	130			
Metolachlor		1.92	ug/L	0.10	96	70	130			
Metribuzin		1.61	ug/L	0.10	80	70	130			
Propachlor		2.06	ug/L	0.10	103	70	130			
Simazine		1.86	ug/L	0.10	93	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	97	70	130			
Surr: Perylene-d12				0.10	99	70	130			
Surr: Pyrene-d10				0.10	106	70	130			
Surr: Triphenylphosphate				0.10	102	70	130			
Lab ID: LCSD-192417	23	Laboratory Control Sample Duplicate			Run: SUB-B427544			08/21/24 18:16		
Alachlor		2.28	ug/L	0.10	114	70	130	2.3	40	
Aldrin		1.89	ug/L	0.10	94	70	130	3.3	40	
Atrazine		2.30	ug/L	0.10	115	70	130	3.9	40	
Benzo(a)pyrene		1.63	ug/L	0.10	82	70	130	7.0	40	
bis(2-ethylhexyl)Adipate		1.64	ug/L	0.50	82	70	130	1.8	40	
bis(2-ethylhexyl)Phthalate		1.69	ug/L	0.60	85	70	130	5.2	40	
Butachlor		2.12	ug/L	0.10	106	70	130	2.1	40	
Dieldrin		1.57	ug/L	0.10	79	70	130	1.9	40	
Endrin		1.74	ug/L	0.10	87	70	130	6.2	40	
gamma-BHC (Lindane)		2.27	ug/L	0.10	113	70	130	2.5	40	
Heptachlor		2.13	ug/L	0.10	106	70	130	4.4	40	
Heptachlor epoxide		2.15	ug/L	0.10	108	70	130	3.2	40	
Hexachlorobenzene		1.78	ug/L	0.10	89	70	130	2.2	40	
Hexachlorocyclopentadiene		2.46	ug/L	0.10	123	70	130	0.4	40	
Methoxychlor		2.00	ug/L	0.10	100	70	130	5.7	40	
Metolachlor		1.97	ug/L	0.10	99	70	130	2.7	40	
Metribuzin		1.77	ug/L	0.10	88	70	130	9.3	40	
Propachlor		2.12	ug/L	0.10	106	70	130	2.7	40	
Simazine		1.89	ug/L	0.10	94	70	130	1.6	40	
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	95	70	130			
Surr: Perylene-d12				0.10	97	70	130			
Surr: Pyrene-d10				0.10	107	70	130			
Surr: Triphenylphosphate				0.10	101	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2										Batch: B_192417
Lab ID: CLD-192417	5	Laboratory Control Sample				Run: SUB-B427544			08/21/24 19:08	
Chlordane		22.5	ug/L	1.0	112	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	100	70	130			
Surr: Perylene-d12				0.10	91	70	130			
Surr: Pyrene-d10				0.10	106	70	130			
Surr: Triphenylphosphate				0.10	95	70	130			
Lab ID: B24081589-001BMS	23	Sample Matrix Spike				Run: SUB-B427544			08/21/24 18:42	
Alachlor		2.27	ug/L	0.10	113	70	130			
Aldrin		2.15	ug/L	0.10	108	70	130			
Atrazine		2.23	ug/L	0.10	112	70	130			
Benzo(a)pyrene		2.01	ug/L	0.10	101	70	130			
bis(2-ethylhexyl)Adipate		1.83	ug/L	0.50	91	70	130			
bis(2-ethylhexyl)Phthalate		1.94	ug/L	0.60	97	70	130			
Butachlor		2.06	ug/L	0.10	103	70	130			
Dieldrin		1.72	ug/L	0.10	86	70	130			
Endrin		1.90	ug/L	0.10	95	70	130			
gamma-BHC (Lindane)		2.20	ug/L	0.10	110	70	130			
Heptachlor		2.42	ug/L	0.10	121	70	130			
Heptachlor epoxide		2.24	ug/L	0.10	112	70	130			
Hexachlorobenzene		2.02	ug/L	0.10	101	70	130			
Hexachlorocyclopentadiene		2.68	ug/L	0.10	134	70	130			S
Methoxychlor		2.30	ug/L	0.10	115	70	130			
Metolachlor		1.98	ug/L	0.10	99	70	130			
Metribuzin		1.58	ug/L	0.10	79	70	130			
Propachlor		2.09	ug/L	0.10	104	70	130			
Simazine		1.82	ug/L	0.10	91	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	100	70	130			
Surr: Perylene-d12				0.10	101	70	130			
Surr: Pyrene-d10				0.10	106	70	130			
Surr: Triphenylphosphate				0.10	103	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E525.2								Analytical Run: B_R427544		
Lab ID: 525_CCV_5	23	Continuing Calibration Verification Standard							08/21/24 14:47	
Alachlor		2.04	ug/L	0.10	102	70	130			
Aldrin		2.01	ug/L	0.10	101	70	130			
Atrazine		1.98	ug/L	0.10	99	70	130			
Benzo(a)pyrene		1.75	ug/L	0.10	87	70	130			
bis(2-ethylhexyl)Adipate		1.77	ug/L	0.50	89	70	130			
bis(2-ethylhexyl)Phthalate		1.72	ug/L	0.60	86	70	130			
Butachlor		1.99	ug/L	0.10	99	70	130			
Dieldrin		2.01	ug/L	0.10	100	70	130			
Endrin		2.01	ug/L	0.10	100	70	130			
gamma-BHC (Lindane)		2.11	ug/L	0.10	105	70	130			
Heptachlor		2.25	ug/L	0.10	112	70	130			
Heptachlor epoxide		2.07	ug/L	0.10	104	70	130			
Hexachlorobenzene		2.13	ug/L	0.10	106	70	130			
Hexachlorocyclopentadiene		2.82	ug/L	0.10	141	70	130			S
Methoxychlor		2.09	ug/L	0.10	104	70	130			
Metolachlor		1.94	ug/L	0.10	97	70	130			
Metribuzin		2.00	ug/L	0.10	100	70	130			
Propachlor		1.94	ug/L	0.10	97	70	130			
Simazine		1.87	ug/L	0.10	93	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	101	70	130			
Surr: Perylene-d12				0.10	94	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	99	70	130			
Lab ID: Ar1248_CCV_5	5	Continuing Calibration Verification Standard							08/21/24 15:13	
Aroclor 1248		2.21	ug/L	0.10	111	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	102	70	130			
Surr: Perylene-d12				0.10	84	70	130			
Surr: Pyrene-d10				0.10	96	70	130			
Surr: Triphenylphosphate				0.10	81	70	130			
Lab ID: CLD_CCV_5	5	Continuing Calibration Verification Standard							08/21/24 15:39	
Chlordane		21.8	ug/L	1.0	109	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	101	70	130			
Surr: Perylene-d12				0.10	93	70	130			
Surr: Pyrene-d10				0.10	101	70	130			
Surr: Triphenylphosphate				0.10	90	70	130			
Lab ID: TOX_CCV_5	5	Continuing Calibration Verification Standard							08/21/24 16:06	
Toxaphene		42.4	ug/L	2.0	106	70	130			
Surr: 1,3-Dimethyl-2-nitrobenzene				0.10	103	70	130			
Surr: Perylene-d12				0.10	94	70	130			
Surr: Pyrene-d10				0.10	104	70	130			
Surr: Triphenylphosphate				0.10	93	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Analytical Run: C_R309750
Lab ID: CCV	11	Continuing Calibration Verification Standard							08/26/24 18:15	
Aldicarb		10.7	ug/L	1.0	107	80	120			
Aldicarb sulfone		10.5	ug/L	1.0	105	80	120			
Aldicarb sulfoxide		10.5	ug/L	1.0	105	80	120			
Carbaryl		10.5	ug/L	1.0	105	80	120			
3-Hydroxycarbofuran		10.5	ug/L	1.0	105	80	120			
Carbofuran		10.6	ug/L	1.0	106	80	120			
Methiocarb		10.3	ug/L	1.0	103	80	120			
Methomyl		10.5	ug/L	1.0	105	80	120			
Oxamyl		10.6	ug/L	1.0	106	80	120			
Baygon		10.5	ug/L	1.0	105	80	120			
Surr: BDMC				1.0	103	70	130			
Method: E531.1										Batch: C_R309750
Lab ID: MBLK	11	Method Blank							Run: SUB-C309750	
									08/26/24 16:54	
Aldicarb		ND	ug/L	1.0						
Aldicarb sulfone		ND	ug/L	1.0						
Aldicarb sulfoxide		ND	ug/L	1.0						
Carbaryl		ND	ug/L	1.0						
3-Hydroxycarbofuran		ND	ug/L	1.0						
Carbofuran		ND	ug/L	1.0						
Methiocarb		ND	ug/L	1.0						
Methomyl		ND	ug/L	1.0						
Oxamyl		ND	ug/L	1.0						
Baygon		ND	ug/L	1.0						
Surr: BDMC				1.0	111	70	130			
Lab ID: LCS	11	Laboratory Control Sample							Run: SUB-C309750	
									08/26/24 17:35	
Aldicarb		8.5	ug/L	1.0	107	80	120			
Aldicarb sulfone		8.3	ug/L	1.0	104	80	120			
Aldicarb sulfoxide		8.9	ug/L	1.0	112	80	120			
Carbaryl		8.6	ug/L	1.0	107	80	120			
3-Hydroxycarbofuran		8.8	ug/L	1.0	110	80	120			
Carbofuran		8.9	ug/L	1.0	111	80	120			
Methiocarb		8.5	ug/L	1.0	107	80	120			
Methomyl		9.1	ug/L	1.0	114	80	120			
Oxamyl		9.2	ug/L	1.0	115	80	120			
Baygon		8.9	ug/L	1.0	112	80	120			
Surr: BDMC				1.0	102	70	130			
Lab ID: C24080837-001CMS	11	Sample Matrix Spike							Run: SUB-C309750	
									08/26/24 19:36	
Aldicarb		8.0	ug/L	1.0	100	65	135			
Aldicarb sulfone		8.2	ug/L	1.0	102	65	135			
Aldicarb sulfoxide		8.9	ug/L	1.0	111	65	135			
Carbaryl		7.9	ug/L	1.0	98	65	135			
3-Hydroxycarbofuran		8.8	ug/L	1.0	110	65	135			
Carbofuran		8.7	ug/L	1.0	108	65	135			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E531.1										Batch: C_R309750
Lab ID: C24080837-001CMS	11	Sample Matrix Spike		Run: SUB-C309750				08/26/24 19:36		
Methiocarb		8.0	ug/L	1.0	101	65	135			
Methomyl		8.9	ug/L	1.0	112	65	135			
Oxamyl		9.1	ug/L	1.0	114	65	135			
Baygon		8.7	ug/L	1.0	108	65	135			
Surr: BDMC				1.0	96	70	130			
Lab ID: C24080837-001CMSD	11	Sample Matrix Spike Duplicate		Run: SUB-C309750				08/26/24 20:17		
Aldicarb		8.2	ug/L	1.0	102	65	135	1.4	20	
Aldicarb sulfone		7.9	ug/L	1.0	99	65	135	3.9	20	
Aldicarb sulfoxide		8.4	ug/L	1.0	105	65	135	5.0	20	
Carbaryl		8.2	ug/L	1.0	102	65	135	4.1	20	
3-Hydroxycarbofuran		8.5	ug/L	1.0	106	65	135	3.9	20	
Carbofuran		8.6	ug/L	1.0	107	65	135	1.5	20	
Methiocarb		8.2	ug/L	1.0	102	65	135	1.7	20	
Methomyl		8.7	ug/L	1.0	109	65	135	3.0	20	
Oxamyl		8.7	ug/L	1.0	109	65	135	4.7	20	
Baygon		8.6	ug/L	1.0	107	65	135	0.9	20	
Surr: BDMC				1.0	98	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E547										Analytical Run: C_R309866
Lab ID: ICV										
Initial Calibration Verification Standard										
08/30/24 12:32										
Glyphosate	24	ug/L	5.0	94	80	120				
Lab ID: CCV										
Continuing Calibration Verification Standard										
08/30/24 12:45										
Glyphosate	19	ug/L	5.0	95	80	120				
Method: E547										Batch: C_R309866
Lab ID: MBLK										
Method Blank										
Run: SUB-C309866										
08/30/24 12:57										
Glyphosate	ND	ug/L	5.0							
Lab ID: C24081183-001JMS										
Sample Matrix Spike										
Run: SUB-C309866										
08/30/24 13:35										
Glyphosate	23	ug/L	5.0	91	70	130				
Lab ID: C24081183-001JMSD										
Sample Matrix Spike Duplicate										
Run: SUB-C309866										
08/30/24 14:00										
Glyphosate	23	ug/L	5.0	91	70	130	0.1	20		

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E548.1										Analytical Run: B_192541
Lab ID: ICAL-4-192541	2	Continuing Calibration Verification Standard								08/26/24 17:01
Endothall		24.4	ug/L	8.0	98	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	97	70	130			
Method: E548.1										Batch: B_192556
Lab ID: MB-192556	2	Method Blank								08/26/24 18:20
Endothall		ND	ug/L	8.0						
Surr: 2,4-Dichlorophenylacetic acid				10	98	70	130			
Lab ID: LCS-192556	2	Laboratory Control Sample								08/26/24 18:36
Endothall		12.7	ug/L	8.0	127	70	130			
Surr: 2,4-Dichlorophenylacetic acid				10	103	70	130			
Lab ID: B24081906-001IMS	2	Sample Matrix Spike								08/26/24 19:07
Endothall		104	ug/L	8.0	104	70	130			
Surr: 2,4-Dichlorophenylacetic acid				100	93	70	130			
Lab ID: B24081906-001IMSD	2	Sample Matrix Spike Duplicate								08/26/24 19:23
Endothall		127	ug/L	8.0	127	70	130	20	30	
Surr: 2,4-Dichlorophenylacetic acid				100	106	70	130			
Lab ID: B24082451-002FMS	2	Sample Matrix Spike								08/27/24 15:06
Endothall		102	ug/L	8.0	102	70	130			
Surr: 2,4-Dichlorophenylacetic acid				100	109	70	130			
Lab ID: B24082451-002FMSD	2	Sample Matrix Spike Duplicate								08/27/24 15:22
Endothall		111	ug/L	8.0	111	70	130	8.7	30	
Surr: 2,4-Dichlorophenylacetic acid				100	112	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E549.2										Batch: C_75123
Lab ID: MB-75123		Method Blank					Run: SUB-C309852			08/29/24 14:08
Diquat		ND	ug/L	0.40						
Lab ID: LCS-75123		Laboratory Control Sample					Run: SUB-C309852			08/29/24 14:15
Diquat		4.28	ug/L	0.40	86	70	130			
Lab ID: LCSD-75123		Laboratory Control Sample Duplicate					Run: SUB-C309852			08/29/24 14:21
Diquat		4.32	ug/L	0.40	86	70	130	1.0	30	
Lab ID: C24080885-001GMS		Sample Matrix Spike					Run: SUB-C309852			08/29/24 14:35
Diquat		3.88	ug/L	0.40	78	70	130			
Method: E549.2										Analytical Run: C_R309852
Lab ID: ICV		Initial Calibration Verification Standard								08/29/24 13:02
Diquat		169	ug/L	0.40	113	80	120			
Lab ID: CCV		Continuing Calibration Verification Standard								08/29/24 13:08
Diquat		109	ug/L	0.40	109	80	120			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080650

Report Date: 09/05/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Kelada-01								Analytical Run: SUB-B427673		
Lab ID: ICV	Initial Calibration Verification Standard							08/23/24 12:01		
Cyanide, Total		0.0996	mg/L	0.0050	100	90	110			
Lab ID: CCV	Continuing Calibration Verification Standard							08/23/24 13:31		
Cyanide, Total		0.102	mg/L	0.0050	101	90	110			
Method: Kelada-01								Batch: B_R427673		
Lab ID: ICB	Method Blank					Run: SUB-B427673		08/23/24 12:03		
Cyanide, Total		ND	mg/L	0.001						
Lab ID: LFB	Laboratory Fortified Blank					Run: SUB-B427673		08/23/24 12:06		
Cyanide, Total		0.103	mg/L	0.0050	103	90	110			
Lab ID: LCS1-K4Fe(CN)6	Laboratory Control Sample					Run: SUB-B427673		08/23/24 12:09		
Cyanide, Total		0.209	mg/L	0.0050	105	90	110			
Lab ID: B24082009-001EMS	Sample Matrix Spike					Run: SUB-B427673		08/23/24 13:45		
Cyanide, Total		0.0975	mg/L	0.0050	97	90	110			
Lab ID: B24082009-001EMSD	Sample Matrix Spike Duplicate					Run: SUB-B427673		08/23/24 13:47		
Cyanide, Total		0.0989	mg/L	0.0050	99	90	110	1.4	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



Work Order Receipt Checklist

Great West Engineering

H24080650

Login completed by: Wanda J. Johnson

Date Received: 8/19/2024

Reviewed by: rtooke

Received by: WJJ

Reviewed Date: 8/21/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.0°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☒	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

None



www.energylab.com

Chain of Custody (COC) & Analytical Request Record

Client: Great West Engineering
Judith Basin

Lab Workorder #: H24080650

Project Information

Client: Great West Engineering
Project: Judith Basin
Purchase Order:
Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
BO#: 48949
EE#: 13115
Turn-Around Time: Standard
Critical Hold Time: 30 Hours
of Samples: 3
Matrix: Drinking Water



Comments:

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.														
Sample Identification	# of Containers	Hold Time (Days)		180	28	14	28	1.25	N/A	180	N/A	180	180	180
		Matrix		Metals by ICP/ICPMS, Drinking Water (E200.7.B)	Mercury, Drinking Water (E245.1)	SDWA (E524.2)	SDWA (E531.1)	Bacteria, Public Water Supply (A9223.B)	Gross Alpha Calculated (E900.0)	Gross Alpha, Gross Beta, Total (E900.0)	Radium 226 + Radium 228 (A7500-RA)	Radium 226, Total (E903.0)	Radium 228, Total (RA-05)	
1 CMRWA Well 5	7	DW												
2 CMRWA Well 5	12	DW												
3 CMRWA Well 5	2	DW												
4														
5														
6														
7														
8														
9														
10														
11														

Comments :

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

8/19/24 0830

2

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ANALYTICAL SUMMARY REPORT

September 16, 2024

Great West Engineering
PO Box 4817
Helena, MT 59604-4817

Work Order: H24080651 Quote ID: H17561

Project Name: Judith Basin

Energy Laboratories Inc Helena MT received the following 1 sample for Great West Engineering on 8/19/2024 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H24080651-001	CMRWA Well 5	08/19/24 8:30	08/19/24	Drinking Water	Metals by ICP/ICPMS, Drinking Water Metals Digestion by E200.2 Gross Alpha Calculated Gross Alpha, Gross Beta, Total Radium 226 + Radium 228 Radium 226, Total Radium 228, Total

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

Energy Laboratories, Inc. verifies the reported results for the analysis has been technically reviewed and approved for release.

If you have any questions regarding these test results, please contact your Project Manager.



CLIENT: Great West Engineering
Project: Judith Basin
Work Order: H24080651

Report Date: 09/16/24

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Great West Engineering
Project: Judith Basin
Lab ID: H24080651-001
Client Sample ID: CMRWA Well 5

Report Date: 09/16/24
Collection Date: 08/19/24 08:30
Date Received: 08/19/24
Matrix: Drinking Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL (CONTRACT LAB MT00945)							
Uranium	0.0007	mg/L		0.0003	0.03	E200.8	08/21/24 15:31 / dck
RADIONUCLIDES - TOTAL							
Gross Alpha	3.3	pCi/L				E900.0	09/04/24 09:28 / eli-ca
Gross Alpha precision (±)	1.5	pCi/L				E900.0	09/04/24 09:28 / eli-ca
Gross Alpha MDC	1.1	pCi/L				E900.0	09/04/24 09:28 / eli-ca
Gross Alpha - Adjusted	3.3	pCi/L			15	E900.0	09/05/24 13:22 / eli-c
Gross Alpha - Adjusted precision (±)	1.5	pCi/L				E900.0	09/05/24 13:22 / eli-c
Gross Alpha - Adjusted MDC	1.1	pCi/L				E900.0	09/05/24 13:22 / eli-c
Radium 226	1.6	pCi/L			5	E903.0	09/10/24 10:31 / eli-c
Radium 226 precision (±)	0.5	pCi/L				E903.0	09/10/24 10:31 / eli-c
Radium 226 MDC	0.3	pCi/L				E903.0	09/10/24 10:31 / eli-c
Radium 228	0.7	pCi/L			5	RA-05	09/04/24 11:34 / eli-c
Radium 228 precision (±)	0.6	pCi/L				RA-05	09/04/24 11:34 / eli-c
Radium 228 MDC	0.6	pCi/L				RA-05	09/04/24 11:34 / eli-c
Radium 226 + Radium 228	2.3	pCi/L				A7500-RA	09/10/24 16:17 / eli-c
Radium 226 + Radium 228 precision (±)	0.8	pCi/L				A7500-RA	09/10/24 16:17 / eli-c
Radium 226 + Radium 228 MDC	0.7	pCi/L				A7500-RA	09/10/24 16:17 / eli-c

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Great West Engineering

Work Order: H24080651

Report Date: 09/11/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E900.0										Batch: GrDW-2092
Lab ID: Th230-GrDW-2092	3	Laboratory Control Sample				Run: TENNELEC-4_240827B				09/04/24 09:28
Gross Alpha		88	pCi/L	88		80	120			
Gross Alpha precision (±)		13	pCi/L							
Gross Alpha MDC		0.46	pCi/L							
Lab ID: MB-GrDW-2092	3	Method Blank				Run: TENNELEC-4_240827B				09/04/24 09:28
Gross Alpha		0.3	pCi/L							U
Gross Alpha precision (±)		0.4	pCi/L							
Gross Alpha MDC		0.4	pCi/L							
Lab ID: C24081060-001BMS	3	Sample Matrix Spike				Run: TENNELEC-4_240827B				09/05/24 08:53
Gross Alpha		92	pCi/L	90		70	130			
Gross Alpha precision (±)		14	pCi/L							
Gross Alpha MDC		0.75	pCi/L							
Lab ID: C24081060-001BMSD	3	Sample Matrix Spike Duplicate				Run: TENNELEC-4_240827B				09/05/24 08:53
Gross Alpha		83	pCi/L	81		70	130	10	20	
Gross Alpha precision (±)		12	pCi/L							
Gross Alpha MDC		0.76	pCi/L							
- The RER result is 0.9.										

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Great West Engineering

Work Order: H24080651

Report Date: 09/11/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: RA226DW-1070
Lab ID: MB-RA226DW-1070	3	Method Blank				Run: TENNELEC-4_240827F				09/10/24 10:31
Radium 226		0.07	pCi/L							U
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Lab ID: C24080979-001QDUP	3	Sample Duplicate				Run: TENNELEC-4_240827F				09/10/24 11:36
Radium 226		0.099	pCi/L					35	20	UR
Radium 226 precision (±)		0.22	pCi/L							
Radium 226 MDC		0.24	pCi/L							
- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 0.3.										
Lab ID: LCS-RA226DW-1070	3	Laboratory Control Sample				Run: TENNELEC-4_240827F				09/10/24 12:57
Radium 226		20	pCi/L		99	90	110			
Radium 226 precision (±)		3.3	pCi/L							
Radium 226 MDC		0.21	pCi/L							

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Great West Engineering

Work Order: H24080651

Report Date: 09/11/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05										Batch: RA228DW-1021
Lab ID: LCS-228-RA228DW-10	3	Laboratory Control Sample			Run: TENNELEC-3_240826A			09/04/24 11:34		
Radium 228		10	pCi/L	99		80	120			
Radium 228 precision (±)		2.1	pCi/L							
Radium 228 MDC		0.62	pCi/L							
Lab ID: MB-228-RA228DW-102	3	Method Blank			Run: TENNELEC-3_240826A			09/04/24 11:34		
Radium 228		0.9	pCi/L							
Radium 228 precision (±)		0.7	pCi/L							
Radium 228 MDC		0.7	pCi/L							
Lab ID: C24080848-001BDUP	3	Sample Duplicate			Run: TENNELEC-3_240826A			09/04/24 13:09		
Radium 228		1.8	pCi/L					56	20	R
Radium 228 precision (±)		1.3	pCi/L							
Radium 228 MDC		0.83	pCi/L							

- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than or equal to the limit of 2, the RER result is 0.9.

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

R - Relative Percent Difference (RPD) exceeds advisory limit



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Great West Engineering

Work Order: H24080651

Report Date: 09/16/24

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										
Analytical Run: ICPMS205-H_240820C										
Lab ID: ICV	Initial Calibration Verification Standard									
Uranium		0.0582	mg/L	0.0010	97	90	110			08/21/24 14:22
Lab ID: CCV	Continuing Calibration Verification Standard									
Uranium		0.0468	mg/L	0.0010	94	90	110			08/21/24 15:16
Method: E200.8										
Batch: R197805										
Lab ID: LRB	Method Blank									
Uranium		ND	mg/L	0.00004						Run: ICPMS205-H_240820C 08/21/24 14:43
Lab ID: LFB	Laboratory Fortified Blank									
Uranium		0.0469	mg/L	0.0010	94	85	115			Run: ICPMS205-H_240820C 08/21/24 14:45
Lab ID: H24080651-001AMS	Sample Matrix Spike									
Uranium		0.0507	mg/L	0.00030	100	70	130			Run: ICPMS205-H_240820C 08/21/24 15:34
Lab ID: H24080651-001AMSD	Sample Matrix Spike Duplicate									
Uranium		0.0514	mg/L	0.00030	101	70	130	1.3	20	Run: ICPMS205-H_240820C 08/21/24 15:37

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



Work Order Receipt Checklist

Great West Engineering

H24080651

Login completed by: Wanda J. Johnson

Date Received: 8/19/2024

Reviewed by: cjohnson

Received by: WJJ

Reviewed Date: 8/26/2024

Carrier name: Hand Deliver

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☒
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☒	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☒	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.0°C On Ice - From Field		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☒
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

For methods that require zero headspace or require preservation check at the time of analysis due to potential interference, the pH is verified at analysis. Nonconforming sample pH is documented as part of the analysis and included in the sample analysis comments.

Trip Blanks and/or Blind Duplicate samples are assigned the earliest collection time for the associated requested analysis in order to evaluate the holding time unless specifically indicated.

Contact and Corrective Action Comments:

None



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Chain of Custody (COC) & Analytical Request Record

Lab Workorder #: **H24080651**

Project Information

Client: Great West Engineering
 Project: Judith Basin
 Purchase Order: **1-05125 TO 39**
 Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
 BO#: 48949
 EE#: 13115
 Turn-Around Time: Standard
 Critical Hold Time: 30 Hours
 # of Samples: 3
 Matrix: Drinking Water



Comments: **O.O DTB, hand del.**

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.															
Hold Time (Days)		7	14	7	14	14	14	28	2	Fld	7	28	N/A	14	14
Matrix	# of Containers	549-Pesticides, Diquat SDWA (E549.2)	547-Herbicides, Glyphosate SDWA (E547)	548-Endothal (E548.1)	504-Microextraction VOCs, EDB and DBCP SDWA (E504.1)	Cyanide, SDWA (Kelada-01)	Alkalinity to pH 4.5 (A2320 B)	Anions by Ion Chromatography (E300.0)	Nitrogen, Nitrite (E353.2)	pH (A4500-H B)	Solids, Total Dissolved (A2540 C)	Nitrogen, Nitrate + Nitrite (E353.2)	Nitrogen, Nitrate (E353.2)	515.4-Herbicides, Chlorinated SDWA (E515.4)	525-Semi-Volatile Organic Compounds, SDWA (E525.2)
		RUSH TAT	547-Herbicides, Glyphosate SDWA (E547)	548-Endothal (E548.1)	504-Microextraction VOCs, EDB and DBCP SDWA (E504.1)	Cyanide, SDWA (Kelada-01)	Alkalinity to pH 4.5 (A2320 B)	Anions by Ion Chromatography (E300.0)	Nitrogen, Nitrite (E353.2)	pH (A4500-H B)	Solids, Total Dissolved (A2540 C)	Nitrogen, Nitrate + Nitrite (E353.2)	Nitrogen, Nitrate (E353.2)	515.4-Herbicides, Chlorinated SDWA (E515.4)	525-Semi-Volatile Organic Compounds, SDWA (E525.2)
		7 DW				X				X	X	X	X	X	X
		12 DW													
		2 DW													
		1													
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															

Custody Record MUST be signed	Lab provided preservatives were used ☐ Yes ☐ No		Sampler Name (if different than Relinquished by):		Sampler Phone: 461-7072	
	Relinquished by (print) B. Lauerman	Signature <i>B. Lauerman</i>	Date/Time 8/19/24 1546	Relinquished by (print) Ward	Signature <i>Ward</i>	Date/Time 8-19-24 1546

Date Printed: 08/12/2024

EE: HE - 13115

COC: Page 1 of 2



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Chain of Custody (COC) & Analytical Request Record

Client: Great West Engineering
Judith Basin

Lab Workorder #: 424080657

Project Information

Client: Great West Engineering
Project: Judith Basin
Purchase Order:
Contact/Phone: Bruce Lauerman (406) 495-6181/M: (406) 461-7072

Laboratory Use

Quote: 17561 v.1 *
BO#: 48949
EE#: 13115
Turn-Around Time: Standard

Critical Hold Time: 30 Hours
of Samples: 3
Matrix: Drinking Water



Comments:

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Analysis Requested * Schedule(s) and tests will be taken and priced from the current quote version.															
Sample Identification	# of Containers	Matrix	RUSH TAT	Hold Time (Days)											
				180	28	14	28	1.25	N/A	180	180	N/A	180	180	
1 CMRWA Well 5	7	DW		Metals by ICP/ICPMS, Drinking Water (E200.7_8)											
2 CMRWA Well 5	12	DW		Mercury, Drinking Water (E245.1)											
3 CMRWA Well 5	2	DW		524-Purgeable Organics, SDWA (E524.2)											
4				531-Pesticides, Carbamates SDWA (E531.1)											
5				Bacteria, Public Water Supply (A9223 B)											
6				Gross Alpha Calculated (E900.0)											
7				Gross Alpha, Gross Beta, Total (E900.0)											
8				Radium 226 + Radium 228 (A7500-RA)											
9				Radium 226, Total (E903.0)											
10				Radium 228, Total (RA-05)											
11															

Comments :

Contact ELI prior to RUSH sample submittal for charges, availability & scheduling. Samples submitted may be subcontracted to other laboratories to complete the test(s) requested; this will be clearly noted on the analytical report.

8/19/24 0830

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Date Printed: 08/12/2024

EE: HE - 13115

COC: Page 2 of 2