Characterization of the San Andres-Glorieta Aquifer

AT HOMESTAKE MINING COMPANY SUPERFUND SITE

Grants, New Mexico

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CHARACTERIZATION OF THE SAN ANDRES-GLORETA AQUIFER AT HOMESTAKE MINING COMPANY SUPERFUND SITE GRANTS, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

ABI	Acoustic Televiewer
AGI	Advanced Geosciences Inc.
CEC	Cation Exchange Capacity
COPC	Chemical of Potential Concern
CSM	Conceptual Site Model
CPS	counts per second
DEM	Digital Elevation Model
DO	Dissolved Oxygen
EC	Electrical Conductivity
EPA	Environmental Protection Agency
ER	electrical resistivity
ERT	Electrical Resistivity Tomography
FRes	Fluid Resistivity
FTemp	Fluid Temperature
FS	Feasibility Study
gpd/ft	gallons per day per foot
GPS	global positioning system
HDR	HDR Engineering, Inc.
HMC	Homestake Mining Company of California
HPFM	Heat-pulse flowmeter
LTP	Large Tailing Pile
msl	mean sea level
NMOSE	New Mexico Office of the State Engineer

NRC	Nuclear Regulatory Commission
OBI	Optical Televiewer
ORP	Oxygen Reduction Potential
QC	Quality Control
RPD	relative percent difference
SAG	San Andres-Glorieta
SMC	San Mateo Creek
STP	Small Tailing Pile
TDS	Total dissolved solids
TI	Technical Impracticability
TIER	Technical Impracticability Evaluation Report
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
USNRC	U.S. Nuclear Regulatory Commission
XRD	X-ray Diffraction

1 INTRODUCTION

1.1 Background

This summary report describes the physical and geochemical characteristics of the San Andres-Glorieta (SAG) Aquifer in the area where it subcrops at the base of the alluvial aquifer hydraulically downgradient the Homestake Mining Company Superfund Site (Site), Near Milan, New Mexico. The scope of work is summarized in a Workplan submitted to and approved by the United States Environmental Protection Agency (USEPA) (HDR, 2020b). This information will be used to update the Conceptual Site Model (CSM) and the groundwater flow and solute transport model.

The Site is located approximately 5.5 miles north of Milan, in Cibola County, New Mexico. Homestake Mining Company of California (HMC) opened and began operating the mill facility in 1958 under two partnerships. Beginning in 1981, HMC became both the sole owner and operator. In 2001, HMC merged with Barrick Gold Corporation. Currently, HMC is a wholly owned indirect subsidiary of Barrick Gold Corporation and owns the Homestake Facility.

The Site is a former uranium mill located in the San Mateo Creek Basin in Cibola County, New Mexico. The mill operated from 1958 to 1990. Milling operations produced two on-Site tailing piles: the Small Tailing Pile (STP) and the Large Tailing Pile (LTP). Both tailing piles have influenced groundwater quality in the alluvial aquifer and shallow bedrock aquifer units immediately below and downgradient from the Site. The Site was placed on USEPA's Superfund National Priorities List in September 1983 at the request of the State of New Mexico due to elevated selenium concentrations in the alluvial aquifer near the Site. HMC has been conducting active groundwater remediation at the Site since 1977.

Groundwater impacted by contaminants of potential concern (COPCs), including uranium, selenium, and molybdenum, by milling operations at the Site has been documented with groundwater sampling to have migrated to the west through the San Mateo alluvial aquifer. Initial groundwater flow and solute transport modeling included in the Technical Impracticability Evaluation Report (TIER) and the Feasibility Study (FS) show uranium in groundwater in the San Mateo aquifer will merge with groundwater in the Rio San Jose alluvial aquifer which flows to the south (HDR, 2020a). Regional geologic mapping shows the San Andres-Glorieta (SAG) aquifer directly underlies the Rio San Jose alluvial aquifer roughly 3 miles west of the Site. Initial groundwater flow and solute transport modeling presented in the TIER also shows groundwater from the alluvium could enter the SAG aquifer where the SAG is in direct contact with the alluvial aquifer.

1.2 Purpose

The purpose of this work is to characterize the physical and geochemical properties of the SAG aquifer and to further evaluate the hydraulic connection between the SAG and the alluvial aquifer. This information will be used to update the CSM and the groundwater flow and solute transport model.

2 SITE CHARACTORISTICS

2.1 Geology

The Site is in the southeastern portion of the Colorado Plateau physiographic province, on the south flank of the San Juan Basin. **Figure 2-1** presents a portion of the geologic map of the Grants quadrangle (Dillinger 1990). The region experienced structural deformation (regional folding and block uplift) associated with the Zuni Uplift from the Late Cretaceous through the Eocene during the Laramide Orogeny (Cooley et al. 1969). This uplift formed the Zuni Mountains, which consist of a northwest-trending monoclinal fold approximately 75 miles long and 30 miles wide to the southwest of Grants composed of Precambrian crystalline basement rocks overlain by Permian to Jurassic sedimentary rocks (Langman et al. 2012).

2.1.1 Alluvium

Quaternary alluvium consists of fluvial deposits (e.g. meandering stream and flood over bank deposits) eroded from localized andesite and basalt flows and surrounding bedrock; some of which were ore-bearing rock. As a result, the alluvium contains naturally occurring uranium, as well as selenium and molybdenum, which are typically present in uranium deposits (HMC 2012).

The lithology types and stratigraphic placement observed in the borehole logs (primarily clays and sands with varying silt and/or gravel) are consistent with a fluvial depositional environment (e.g. meandering stream and flood over bank deposits). Sand beds generally range from five to 20 feet thick. Clay and silt beds typically range from two to 10 feet thick. Clasts range from rounded to sub-angular grains, though the majority are sub-rounded, indicating that sediments were transported a moderate distance from their source (Novak-Szabo et al. 2018). This type of depositional environment results in the presence of a higher permeability channel and channel lag deposits positioned directly adjacent to fine-grained, low permeability over bank deposits.

2.1.2 Bedrock

Bedrock at the Site consist of the Chinle Formation (Late Triassic), San Andres Limestone (Early Permian), and Glorieta Sandstone (Early Permian). The Chinle Formation is composed of laterally continuous sandstone units separated by thick sections of low permeability shale. The Site is located on the eastern flank of a fold, where bedrock dips approximately three to 10 degrees to the north-northeast into the San Juan Basin (Kelley 1967).

More recent faulting associated with the Rio Grande Rift resulted in the large northeast-striking San Mateo normal fault located northeast of the Site and two small-scale normal faults southwest of the Site referred to as the West Fault and the East Fault **Figure 2-2**. The dip of these two faults is nearly vertical and the offset in the Chinle Formation results in the juxtaposition of permeable sandstones with impermeable mudstones and siltstones across the two faults near the Site. Displacement along the East Fault is minimal immediately south of the Felice Acres subdivision and sandstone units are not vertically offset (HMC and Hydro-Engineering 2010).

During the Tertiary (Neogene) volcanic activity associated with the Mount Taylor volcanic field resulted in widely scattered andesite and basalt flows (Kelley 1967). An erosional period followed the volcanism and created the valley forms observed in the San Mateo Creek (SMC) Basin, eroding the surface up to 150 to 200 feet below the current land surface (Langman et al. 2012). This erosional period exposed Cretaceous, Jurassic, Triassic, and Permian bedrock formations, which outcrop in progressively older (northeast to southwest) trending bands to the west and southwest of the milling operations and tailings piles. Erosion of the dipping formations produced a pronounced angular unconformity between bedrock strata and Quaternary valley fill, resulting in sedimentary units within the underlying Chinle and San Andres Formations abruptly truncating at the base of the alluvium.

2.2 Hydrogeology

The hydrogeological framework at the Site consists of a hydraulically unconfined, buried valley alluvial aquifer overlying and in hydraulic connection with discrete bedrock aquifer units within the Chinle Formation and the San Andres and Glorieta Formations.

Though the Chinle Formation is largely comprised of shale, there are three water-bearing units within the Chinle, referred to as the Upper, Middle and Lower Chinle aquifers. The Upper and Middle Chinle aquifers are both largely composed of sandstone, and the Lower Chinle aquifer, which consists of a zone of enhanced water yield within the shale formation. The Chinle aquifers are under semi-confined conditions where they subcrop beneath the alluvial aquifer and confined conditions further downdip.

Groundwater is hydraulically connected between the San Andres and Glorieta Formations forming the San Andres - Glorieta Aquifer (SAG). This aquifer predominantly consists of limestone with sandstone and shale layers.

2.2.1 Alluvial Aquifer System

The unconfined alluvial aquifer at the Site is laterally bound by areas of higher bedrock elevation. The extent of the aquifer is shown on **Figure 2-3**. As a result of these bedrock highs, the alluvial aquifer has been subdivided into three distinct but connected alluvial systems, referred to as the San Mateo, Rio Lobo, and Rio San Jose alluvial systems. The San Mateo alluvial system covers the majority of the Site area, extending northeast, south and southwest of the Site, eventually joining with the Rio Lobo and more extensive Rio San Jose alluvial systems.

2.2.1.1 San Mateo Aquifer

The San Mateo aquifer occurs as a north-south trending buried valley aquifer extending through the Site. Groundwater flow in the San Mateo aquifer is generally north to the south, upgradient of the LTP, and to the southwest in the area of the LTP. An artificial hydraulic barrier that is part of the current remediation system creates a zone on the southern and western sides of the LTP area where the natural gradient is artificially interrupted by a combination of collection and injection operations.

An area of high bedrock southwest and downgradient of the LTP results in a splitting of the San Mateo alluvial aquifer downgradient of the LTP. The portion to the west of the LTP

confluences with the Rio San Jose aquifer. The portion to the south of the LTP confluences with the Rio Lobo aquifer and eventually confluences with the Rio San Jose aquifer. This is shown on **Figure 2-3**.

The San Mateo aquifer generally behaves as an unconfined aquifer with specific yields ranging from 0.038 to 0.28. A specific yield of 0.1 represents the alluvial aquifer at the Site (HMC 2019d). Hydraulic conductivity values are relatively high, ranging from approximately 10 to more than 200 ft/day **Figure 2-4**. The water table ranges between from 40 to 60 feet below the ground surface, with elevations ranging from 6,428 to 6,550 feet above msl during the fall 2019 monitoring event.

2.2.1.2 Rio Lobo Aquifer

The Rio Lobo aquifer is typically a sandy material with minor clay and silt layers. Based on a 1995 investigation, it was determined that saturated portions of the Rio Lobo aquifer were likely confined to narrow sections where the alluvium was deposited within incised channels, or that a subcrop of bedrock drained the Rio Lobo aquifer upgradient of the confluence with the San Mateo Aquifer. Water quality differences between well ND and borehole BK3 and other background wells indicated that the confluence of the Rio Lobo and San Mateo aquifers may be in the vicinity of well ND (HMC 2019b). Groundwater flow direction is shown on **Figure 2-3**.

2.2.1.3 Rio San Jose Aquifer

Rio San Jose aquifer is generally composed of sand and gravel with a wide range of transmissivity. Groundwater in the Rio San Jose aquifer flows southeast from the Bluewater site and merges with San Mateo aquifer. The combined flow continues southeast toward Milan (DOE 2014). Groundwater flow direction is shown on **Figure 2-3.**

2.2.1.4 Alluvium Geochemistry and Minerology

Geochemical and mineralogical investigations of the alluvium from 2018 and 2019 showed arkosic sandstone markers of eroded upstream materials (Arcadis 2018). These were transported through fluvial processes during gradational channel filling during the Quaternary period and deposited on the eroded Chinle Formation bedrock surface. The 2018 and 2019 studies showed significant local heterogeneity in lithology, soil chemistry, and mineralogy associated with the variable fine- and coarse-grained alluvial sediments. The highest uranium concentration encountered in the 2018 and 2019 investigations was in the unsaturated zone, indicating that uranium in alluvial soils is naturally occurring due to transport and deposition of naturally uranium-rich materials throughout geologic time, not from uranium-bearing groundwater.

Gradual declines in dissolved uranium were observed from west to east in the wells installed during the 2018 and 2019 investigation, consistent with observed changes in major ion and trace element chemistry. Groundwater is more oxidizing in the west, producing conditions favorable for uranium mobilization. Groundwater is more reducing in the east due to lower transmissivity and high organic carbon content producing conditions less favorable for uranium mobilization. Uranium leaching analyses yielded soluble uranium from all sediment samples collected during the 2018 and 2019 investigation (Arcadis 2018). EPA believes that

potential off- site sources of groundwater contamination are the mine-water discharges in the alluvial aquifer upgradient of the LTP.

2.2.2 Bedrock Aquifers

2.2.2.1 Chinle Aquifers

The Chinle aquifer system is made up of three water bearing zones within the Chinle Formation, referred to as the Upper, Middle and Lower aquifers. The aquifers subcrop beneath the alluvial aquifers providing hydraulic connection between the units.

2.2.2.1.1 Upper Chinle Aquifer

The Upper Chinle aquifer is a northeast-dipping, confined aquifer composed of a laterally continuous sandstone. Structural elevation contours of the top of the Upper Chinle aquifer indicate minor variations in the steepness of the northeasterly dip, particularly in the area immediately south of the LTP. The aquifer is hydraulically bounded from other Chinle aquifers by competent overlying and underlying shale that has been structurally offset by the West and East Faults. The average thickness of the sandstone is approximately 35 feet (HMC 2012).

The Upper Chinle aquifer subcrops at the base of the alluvium on both sides of the East Fault, most notably at the base of the western side of the LTP (**Figure 4-5** and **Figure 4-6**). However, the sandstone subcrop does not occur west of the West Fault.

The water quality of the Upper Chinle aquifer is influenced by the water quality of the San Mateo aquifer as a result of the alluvial aquifers discharging to the Upper Chinle east of the East Fault and in the vicinity near and north of the LTP (HMC 2012).

Aquifer properties vary significantly within the Upper Chinle aquifer due to the variability of fracturing of the sandstone related to faulting. As a result, a narrow band (several hundred feet wide) of elevated transmissivity exists on both sides of the East Fault. The transmissivity to the west of the East Fault exceeds 10,000 gallons per day per foot (gpd/ft). The transmissivity to the east of the East Fault exceeds 2,000 gpd/ft, but generally ranges between approximately 100 to 2,000 gpd/ft (HMC and Hydro-Engineering, 2010). In contrast, the transmissivity is much lower between the West and East Faults, where the aquifer is not as highly fractured. **Figure 2-5** provides a plan view showing Upper Chinle aquifer transmissivities. The hydraulic conductivity of the Upper Chinle ranges from less than 0.1 ft/day to more than 100 ft/day (HMC and Hydro-Engineering 2010). The saturated thickness of the aquifer ranges from 15 to 65 feet thick with an average thickness of approximately 35 feet near the Site.

Groundwater flow in the Upper Chinle aquifer is greatly influenced by remedial action involving the injection of water into the Upper Chinle and collection of groundwater from a series of extraction wells (**Figure 2-6**). Groundwater at the Site generally flows from areas mounding near the injection wells toward collection wells.

2.2.2.1.2 Middle Chinle Aquifer

The Middle Chinle aquifer is an east to northeast-dipping, confined aquifer composed of laterally continuous sandstone. The Middle Chinle aquifer is similar to the Upper Chinle aquifer and is hydraulically disconnected from other Chinle aquifers by competent overlying and underlying shale. The Middle Chinle aquifer is generally the thickest of the Chinle aquifers with a saturated thickness ranging from 10 to 80 feet and an average thickness of approximately 44 feet near the Site (HMC 2012).

The Middle Chinle aquifer subcrops at the base of the alluvium. The Middle Chinle is hydraulic connected to the overlying San Mateo aquifer on the west side of the West Fault and between the West and East Faults at an isolated location in an alluvial channel south of the Felice Acres subdivision (HMC 2012).

Transmissivity of the Middle Chinle aquifer varies significantly (HMC and Hydro-Engineering 2010). East of the East Fault, the transmissivity ranges from 100 to 500 gpd/ft. Between the East and West Fault and west of the West fault, the transmissivity can be as high as 5,000 gpd/ft (**Figure 2-7**).

Middle Chinle hydraulic head in areas outside of the two faults is significantly different from the head between the two faults, which demonstrates that the groundwater is not hydraulically connected across fault boundaries (**Figure 2-8**). The West Fault represents a significant barrier to groundwater flow within the Middle Chinle aquifer, with up to 110 feet of hydraulic head difference across the fault in the area west of the LTP.

Pumping of Middle Chinle South Collection wells near the south end of South Felice Acres developed a depression in the Middle Chinle potentiometric surface that extends nearly 500 feet to the northeast and southwest of well Y7 and intercepting much of the groundwater flow beneath Broadview Acres and South Felice Acres.

Groundwater between the East and West Fault and Groundwater east of the East Fault is recharged by the San Mateo aquifer. The injection of fresh water into wells CW14 (north of Broadview Acres) and CW30 (west of Felice Acres) has created groundwater mounds. These mounds cause the ground water to flow both north and south from these two wells.

2.2.2.1.3 Lower Chinle Aquifer

The Lower Chinle aquifer is the deepest water bearing unit within the Chinle Formation and is generally located approximately 200 feet above the geologic contact with the SAG. The Lower Chinle aquifer is hydraulically isolated from the overlying Middle Chinle aquifer and underlying SAG regional aquifer. In contrast with the overlying Chinle aquifers, the Lower Chinle aquifer is composed of shale (HMC and Hydro-Engineering 2010).

The Lower Chinle aquifer subcrops at the base of the San Mateo aquifer on either side of the West Fault. Direct hydraulic connectivity with the overlying San Mateo aquifer exists in the area between the West and East Faults southwest of the Felice Acres subdivision and immediately west of the Valley Verde and Pleasant Valley subdivisions on the west side of the West Fault.

The hydraulic properties of the Lower Chinle aquifer are highly variable and largely depend on secondary permeability within the shale. The ability of the Lower Chinle aquifer to

produce water is much lower and less consistent than overlying Upper and Middle Chinle aquifers. Hydraulic conductivity ranges from 0.1 to more than 50 ft/day (HMC and Hydro-Engineering 2010). The transmissivity of the aquifer is generally higher than 100 gpd/ft (750 ft^2/day) near subcrop locations (HMC and Hydro-Engineering 2010). However, selected areas near subcrop locations exceed 1,000 gpd/ft (**Figure 2-9**).

Groundwater flow in the Lower Chinle is shown on **Figure 2-10**. Groundwater elevations for the aquifer ranged from 6,420 to 6,488 feet above msl during the fall 2019 annual monitoring event (HMC and Hydro-Engineering 2019). Groundwater flow west of the West Fault in the Lower Chinle is mainly to the northeast. Groundwater flow between the two faults is to the northeast in the area of the tailings. Groundwater flow is to the northwest in the southern portion of the Lower Chinle aquifer between the faults. The northwesterly flow direction in this area indicates that the Lower Chinle water moves across the West Fault in the area west of Broadview Acres.

2.2.2.2 San Andres-Glorieta Aquifer

The SAG aquifer consists of the San Andres Limestone and Glorieta Sandstone with a total thickness that exceeds 200 feet (HMC and Hydro-Engineering, 2010). Similar to the Chinle aquifers, the aquifer is mildly folded and dips to the east and northeast as a result of regional tectonic deformation. A plan view map of the Site showing well locations, groundwater elevations and inferred contours from 2019 measurements is provided on **Figure 2-11**. The aquifer has been used by HMC as the source of unimpacted clean water for hydraulic containment of the San Mateo and Chinle aquifers.

Groundwater elevations near the Site ranged from 6,416.4 to 6,420 feet above msl during 2019. Flow direction is to the east-southeast. The water level elevations measured during 2014 show a very flat (0.00086 ft/ft) piezometric surface. The U.S. Geological Survey (USGS) suggested an average transmissivity of 374,000 gpd/ft, or 50,000 ft^2/d (Frenzel 1992).

3 FIELD INVESTIGATION

3.1 Alluvial Aquifer

3.1.1 Drilling and Lithologic Sampling

Cascade Drilling, LP (Cascade) of Phoenix, Arizona (licensed in the State of New Mexico) drilled three boreholes through the alluvial formation using a truck mounted roto-sonic drill rig (**Figure 3-1**). Boreholes were drilled as close as possible to planned locations with slight adjustments to site conditions within tens of feet during rig set up. Locations were marked by HMC and confirmed with global positioning system (GPS) unit by the HDR geologist. The upper five feet of each borehole was hand cleared to confirm the absence of underground utilities.

Cascade collected alluvial samples continuously from each borehole, contained them in plastic liners, and labeled them for examination and characterization by an HDR geologist. HDR characterized the material using the Unified Soil Classification System (USCS) generally using terms described in ASTM D2488-09a: Standard Practice for Description and

Identification of Soils (Visual-Manual Procedure), where applicable. HDR identified material colors using the Munsell Color System.

The material collected from each borehole included an upper layer of silts and sands, a basalt layer, and a lower layer of silts, sands, and clays. Each alluvial borehole was terminated in bedrock. A contour map of the bedrock alluvium interface is provided on **Figure 3-1**.The bedrock formations were identified based on the color of the material, the structure of the material, and its reactivity to hydrochloric acid. Boring logs are located in **Appendix A**.

3.1.2 Piezometer Installation

Cascade installed a 4-inch PVC piezometer (OB-1, OB-2, and OB-3) in each borehole to monitor water levels within the Rio San Jose aquifer. The screen intervals were placed based on the location of saturated alluvial sand (i.e., well screens were not placed in saturated silts and clays) in each borehole.

OB-1 was screened in light colored sandy material immediately beneath a deep clay layer but above bedrock. During the drilling of SAG-2, the field team noticed that the color of the sandy material below the clay was red which is consistent with the color of the underlying Chinle Formation. Following this discovery, the light-colored sandy material collected from OB-1 was tested with hydrochloric acid. The acid test showed the light-colored sandy material reacted to the acid indicating it is carbonate based and is likely derived from the San Andres Limestone. Therefore, OB-1 was screened in the weathered unconsolidated portion of the San Andres Limestone.

OB-2 and OB-3 were initially located on private property to the east of OB-1; however, access to the property was not obtained during the rig mobilization. OB-2 and OB-3 were re-located to the south of OB-1 to characterize the groundwater flow direction in the Rio San Jose aquifer. OB-2 and OB-3 were drilled at the locations shown on **Figure 3-1**. OB-2 and OB-3 were screened in saturated alluvial sand below basalt. Soil samples collected from this layer and cuttings from drilling 5 feet into bedrock were tested with acid to confirm screen placement in the alluvium (Rio San Jose aquifer). Well construction and boring logs are located in **Appendix B**.

3.2 Bedrock/SAG Aquifer

3.2.1 Bedrock Casing Installation

SAG-1 and SAG-2 (**Figure 3-2**) are considered artesian wells by the New Mexico Office of the State Engineer (NMOSE). SAG-1 and SAG-2 were subject to conditions of approval set by NMOSE, including installation of an artesian well casing because they are located within the Bluewater Underground Water Basin. HDR and HMC provided NMOSE with photographs of the 6-inch black steel well casing for their inspection prior to well construction activities.

Cascade drilled and reamed each borehole to 10 inches in diameter; four inches greater than the diameter of the surface casing. Cascade set the 6-inch diameter black steel surface casings into competent rock. Surface casings were set roughly 10 feet into competent

bedrock. Because of the undulating surface of bedrock, this equates to a depth of 135 feet at SAG-1 and to 161 feet at SAG-2.

The annular space was filled and sealed using Type II Portland cement grout with a density between 15.4 and 15.5 pounds per gallon as approved by NMOSE. Cascade ensured that the cement grout was within the range specified using a standard calibrated mud balance. NMOSE permitted Adam Arguello to act as an authorized representative to witness the grouting process. The density of each batch of cement grout was documented and approved by Mr. Arguello. Cascade placed the cement grout into the annular space via tremie pipe.

The surface casing seal and compressive strength of the cement grout sealant were tested at SAG-1 and SAG-2 following the its installation. Bentonite was temporarily added to the bottom of each casing to seal it to the formation. Each casing was sealed and pressurized with 300 PSI of water; the casings held the pressure for 15 minutes as required by NMOSE. The bentonite was removed during subsequent coring.

3.2.2 Bedrock Coring

Cascade cored bedrock at SAG-1 and SAG-2 using a track mounted LF 70 core drill. The rig used a dual tube PQ core-barrel producing a 3.375-inch core and 4.875-inch diameter borehole. Cascade cored the boreholes continuously from the bottom of the surface casing, through the SAG to the final depth of 500 feet below ground surface each.

Core samples were placed in cardboard core boxes and labeled for examination and characterization by an HDR geologist. HDR characterized bedrock material using terminology generally provided in ASTM D2113 - 14: Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration. HDR identified material colors using the Munsell Color System. Items including material descriptions, recovery lengths, rock quality designation lengths, and run times were recorded. Boring logs are in **Appendix A**. Core photos are located in **Appendix C**. Several challenges were experienced during the completion of SAG-1 and SAG-2. Most of the challenges were related to obstructions or collapsing boreholes. SAG-1 and SAG-2 were completed as per below:

SAG-1

- Cored to 500 feet bgs;
- An obstruction was detected at 204 during the borehole geophysics;
- Cascade mobilized back to Site to clear the borehole several times to 500 ft bgs;
- The borehole continued to be obstructed at 215 ft bgs;
- 5-inch black steel casing was hung to 260 ft bgs and secured (welded to 6-inch casing) at the surface in consultation with the NMOSE;
  - 5-inch black steel casing not grouted inside the 6-inch steel casing
- Borehole geophysics was completed through the 5-inch casing to the bottom of the borehole.
- FLUTe™ transmissivity profile was completed through the 5-inch casing to the bottom of the borehole; and
- FLUTe™ multi-port well was installed to 484 ft bgs.

SAG-2

- Cored to 500 feet bgs;
- An obstruction was detected in the Glorieta at 440 ft bgs during the borehole geophysics;
- An additional obstruction was detected at during the FLUTe™ transmissivity profile at 377 ft bgs, just above the contact between the Glorieta and San Andres;
- FLUTe™ transmissivity profile was completed to 377 ft bgs;
- The FLUTe™ liner was removed;
- Cascade mobilized back to Site and cleared the borehole several times to 500 ft bgs;
- After clearing, the borehole initially stayed open to 500 feet, bgs;
- During the re-installation of the FLUTe™ liner the well was obstructed at 377 ft bgs;
- FLUTe™ multi-port well was installed to 377 ft bgs.

Borehole geophysics, FLUTe™ transmissivity profiling, and FLUTe™ multi-port well installation are described in Section 3.2.3 below.

3.2.2.1 Rock Core Physical Property Analyses

Twenty rock core samples (10 from each borehole) were collected and analyzed of physical properties including porosity, bulk density, percent moisture, and specific gravity by Golder Associates. Five samples were co-located with geochemical samples (five samples each from SAG-1 and SAG-2) and five additional sample biased to the SAG were collected from each borehole spatially distributed throughout the SAG.

Physical property samples were collected at the same time geochemical samples were collected. Samples were wrapped in foil, plastic wrap, and sealed in zipper lock bags to limit moisture loss. The rock core physical property samples were shipped under Chain of Custody to Golder Associates lab in Mississauga, Ontario. The lab split each sample (20 samples), analyzing two samples from each sample shipped, for a total of 40 analyses. A sample and results summary of the aquifer materials collected for physical property analyses is presented in **Table 3-1.** The physical property analytical reporting is found in **Appendix D**.

One of the key parameters for the CSM is the (primary) porosity of the bedrock. A summary of the porosity values are provided below.

- The porosity of the Chinle ranged from 7 to 11 percent. The geometric mean of two samples is 9 percent.
- The porosity of the San Andres Limestone ranged from 3 to 34 percent. The geometric mean of 10 samples is 13 percent.
- The porosity of the Glorieta Sandstone ranged from 11 to 15 percent. The geometric mean of eight samples is 13 percent.

3.2.3 FLUTe™ Transmissivity Profiling

The FLUTe™ blank flexible liner is driven down the borehole of SAG-1 and SAG-2 by the excess head of water inside the liner above the water table in the formation. That driving head inside the liner is the driving pressure forcing the water from the hole. The driving pressure beneath the liner is uniform throughout the borehole and maintained relatively constant during the measurement.

The data recorded during the liner installation include liner depth, time, driving head, and tension on the liner. The liner tension is also controlled to be relatively constant as is the driving head inside the liner. The liner velocity per unit driving head as a function of the liner depth in the hole is calculated from the data.

As a liner is everted into the borehole, the liner descends like a perfectly fitting piston and forces the water from the borehole into the formation. When the liner starts down the hole, all the flow paths in the borehole are available for the displacement of the water. The entire transmissivity of the borehole is available for the acceptance of the water displaced by the liner.

The liner velocity down the borehole is controlled by the transmissivity of the borehole beneath the liner and the excess head in the liner. As the liner starts its descent in the borehole, the velocity is relatively high and then the velocity quickly reduces to a moderate rate equal to the flow of the water from the hole. Thereafter, there is a relatively constant driving pressure in the borehole and a steady state radial outward flow of the water from the hole as the liner descends.

However, as the liner descends, it sequentially covers and seals the flow paths in the borehole from the top down. Each time a flow path is sealed by the descending everting liner, the remaining transmissivity of the borehole is decreased by the sealed flow paths. The drop in transmissivity causes a drop in the liner velocity as each flow path is sealed. The drop in velocity provides a direct measurement of the flow that was stopped when the flow path was sealed.

Hence, a step change in velocity occurs at the location of the flow path, and the magnitude of the step change is a direct measure of the flow capacity of that sealed flow path. As the liner passes through an extended region of flow (e.g., a highly fractured region) the velocity graph shows a relatively continuous decline in velocity. A transmissivity profile is calculated from the velocity profile.

The change in liner velocity, dv, multiplied by the cross section of the borehole, Az, is defined as the flow, Qr, that was terminated when the interval of the borehole, dz, was sealed by the liner. Assuming a 1D radial flow into the borehole wall at a flow rate, Qr, over the interval, dz, and a hole wall area, Ar = 2 π ro dz, we get:

$$Q_r = dv\ Az = \frac{2\ \pi\ dz\ C\ dH}{\ln\ (r/r_o)}$$

Where: C = conductivity of the interval (feet/day),

dH = driving head in the borehole (feet),

dz = depth interval (feet),

r_o = hole radius (feet), and

r =range to the ambient pressure in the formation or radius of influence of the test (feet).

Since ln(r/ r_o) is such a slowly varying function with r, even if r is not known, it is usually assumed to be a constant. From this equation, the transmissivity, T= dz C, is calculated or the conductivity C for the interval dz. Both are relevant to the interval dz over which the velocity change occurs. Since the velocity change is calculated for each time step, typically every 2 seconds, the length dz is the distance traversed by the liner descent in that time step. Therefore, when the liner is traveling fast the spatial resolution is less than when the liner is traveling slowly **(Appendix E)**.

3.2.3.1 FLUTe™ Transmissivity Profile Results

The results of the FLUTe™ transmissivity profile for SAG-1 and SAG-2 are presented as **Figures 3-3 and 3-4**. The transmissivity has been measured to range from 800 to 1,200 ft2/day. These values are considerably lower than the 50,000 ft2/day report by the USGS as described in Section 2.2.2.2 of this report. This may be due to horizontal or vertical spatial variability of the hydraulic properties of the SAG. The FLUTe™ transmissivity profile for SAG-1 shows three high transmissivity zones below 350 feet bgs. These groundwater flow zones are in the Glorieta Formation. There may also be some lower transmissive zone above 350 feet bgs. These high transmissive zones likely create a moderate level of uncertainty with respect to the accuracy of the measured transmissive values in these high transmissive zones and likely masked the methods ability to detect lower transmissive zones.

The FLUTe™ transmissivity profile for SAG-2 shows high transmissive zones above 150 feet bgs and below 350 feet bgs. The FLUTe™ transmissivity profile for SAG-2 also shows a few lower transmissive zones from 200 to 300 feet bgs. Similar to SAG-1, the high transmissive zones in SAG-2 likely create some uncertainty with respect to the accuracy of the measured transmissive values in these high transmissive zones and likely masked the methods ability to see and accurately measure the transmissivity of any potential lower transmissive zones.

3.2.3.2 Fracture Aperture, Hydraulic Conductivity, and Porosity

The transmissivity of a fracture can be calculated using the Cubic Law if the flow is assumed to be laminar and one adopts the analogy of parallel planar plates to represent the fracture surfaces (Witherspoon et al, 1979). This equation can also be used to calculate the aperture of a fracture with a measured transmissivity.

$$T_f = K_f (2b) = \frac{\rho g (2b)^3}{12\mu}$$

or

$$(2b)^3 = \frac{12\ \mu\ T_f}{\rho g}$$

Where: ρ = fluid density (kg/m^3)

g = accelerate of gravity (m/sec^2)

b = aperture half width (m);

μ = dynamic viscosity (kg/m/s)

The FLUTe™ transmissivity profile data was used to calculate the aperture of each fracture detected during the FLUTe™ hydraulic conductivity profile. These results are shown on **Figures 3-5 and 3-6** and summarized below.

SAG-1

The aperture calculations from the FLUTe™ transmissivity profile show there are numerous transmissive fractures from 358 to 437 ft bgs in the SAG-1 borehole. The physical size of the transmissive fractures ranges from 19 to 504 microns with a geometric mean of 58 microns. The total length (sum of all apertures) of apertures in SAG-1 is 36,698 microns or 0.12 feet. The transmissivity (sum of individual fractures) of the borehole is approximately 9,000 gpd/ft, or 1,200 ft^2/d , with a bulk hydraulic conductivity of 5 ft/day (total transmissivity divided by total length of borehole). The bedrock has a fracture porosity of roughly 0.0005 or 0.05%. The fracture porosity is calculated by dividing the linear length of borehole by the total length of fractures.

SAG-2

The aperture calculations from the FLUTe™ transmissivity profile show there are numerous transmissive fractures from 141 to 374 ft bgs in the SAG-2 borehole. The physical size of the transmissive fractures ranges from 13 to 780 microns with a geometric mean of 152 microns. The transmissivity of the borehole is approximately 5,700 gpd/ft with a bulk hydraulic conductivity of 3.7 ft/day. The bedrock has an average fracture porosity of roughly 0.0003 or 0.03%.

3.2.4 Borehole Geophysical Logging

Borehole geophysical logging was completed on SAG-2 on January 8th and SAG-1 on January, 13th and 27th, 2021 to assist in determining bedrock lithological boundaries, depth of discrete water-bearing fractures, the strike and dip of joints, fractures and bedding features, the flow within the borehole, and to provide information for the installation of multi-port wells. Borehole geophysical logging was completed by Jet West Geophysical Services of Farmington, New Mexico.

The suite of borehole geophysical techniques used at each borehole include; fluid temperature (FTemp), fluid resistivity (FRes), three arm mechanical caliper (caliper), natural gamma ray (gamma), heat-pulse flowmeter (HPFM), acoustic televiewer (ABI), and optical televiewer (OBI). Log depths were referenced to ground surface adjacent to the boreholes

steel casing. The geophysical logging winch contains an optical depth encoder, to maintain depth measurements accurate within approximately + 0.2 feet throughout a borehole. Borehole logging of SAG-1 was combined as one log but was completed during two mobilizations because borehole wall calving prevented logging below 204 feet on January 13th. The second log on January 27th was completed after 5-inch steel casing was installed to stabilize the borehole to 260 feet bgs. Geophysical logs are described below and presented in **Appendix F**.

3.2.4.1 Gamma Log

The gamma log provides a measurement recorded in counts per second (CPS), that is proportional to the natural radioactivity of the formation. Actual counts depend upon the detector size and efficiency but are often normalized in API units. The borehole wall penetration depth of investigation for the gamma log is typically 10 to 12 inches. This log is used principally for lithologic identification and stratigraphic correlation. The gamma-emitting radioisotopes that naturally occur in geologic materials are Potassium 40 and nuclides in the Uranium 238 and Thorium 232 decay series. Potassium 40 occurs with all potassium minerals, including potassium feldspars. Uranium 238 is typically associated with dark shales and uranium mineralization. Thorium 232 is typically associated with biotite, sphene, zircon and other heavy minerals.

Gamma log shows higher levels of natural radioactivity from the bottom of the surface casing to 230 feet bgs than the portion below 230 feet bgs in SAG-1. Lower natural radioactivity was recorded from 230 to roughly 400 feet bgs where the natural radioactivity increases from 400 to 484 feet bgs. Gamma log shows higher levels of natural radioactivity from the bottom of the surface casing to 230 feet bgs than the portion below 230 feet bgs in SAG-2. Lower natural radioactivity was recorded from 230 to roughly 440 feet bgs. Gamma log shows relatively consistent levels of baseline natural radioactivity with local increases corresponding with fractures shown on the caliper log potentially due to fractures partially filled with clay.

3.2.4.2 Fluid Temperature and Fluid Resistivity

Fluid temperature, fluid resistivity, caliper, and gamma were completed on SAG-1 on January 8th. The HPFM was not conducted in SAG-1 on January 8th after it was determined the borehole was obstructed and unstable. After the borehole obstruction was cleared and borehole stabilized by Cascade, HPFM data was obtained on January 27th. These logs have been combined into one log. The geophysical logs for SAG-1 and SAG-2 are provided in **Appendix F.**

Fluid temperature and fluid resistivity data were recorded while lowering the probe at approximately three to five feet per minute. Geothermal gradients in the near surface earth are usually dominated by conduction and are generally linear increasing with depth due to the relative constancy of the thermal conductivity of earth materials. Convective heat flow within the borehole fluid is caused by formation fluid entering or leaving the borehole at some permeable interval. Therefore, deviations from the linear thermal gradient can be attributed to fluid movement. Slope changes in both the temperature and fluid resistivity logs may be indicative of fluid flow between the formation and the borehole.

Temperature log from SAG-1 shows a constant increase in temperature to the bottom of the borehole not indicative of effects from individual fractures. Temperature log from SAG-2 shows a constant increase in temperature to 380 feet bgs not indicative of effects from individual fractures. The temperature significantly increases from 380 to 484 feet bgs. Large inflections at the very bottom of a borehole may represent only accumulated sediments with temperature or electrical properties that contrast with the water column.

Fluid resistivity log from SAG-1 shows moderate values from 140 to 310 feet bgs indicative of low groundwater flow and then higher values from 310 to 400 feet bgs indicative of potentially higher flows from 310 to 400 feet bgs. The fluid resistivity values reduce from 400 to 484 feet bgs indicative of low groundwater flow. Fluid resistivity log from SAG-2 shows higher values from 160 to 380 feet bgs indicative of potentially higher flows. The fluid resistivity values reduce from 380 to 484 feet bgs indicative of low groundwater flow.

3.2.4.3 Heat-Pulse Flow Meter Logs

Heat-pulse flowmeter data were obtained at specific depths inferred from field plots of the caliper, fluid temperature, fluid resistivity, and acoustic televiewer logs. Flowmeter data were recorded under ambient conditions in both down and up runs within each borehole. Subsequent attempts to repeat the logging under pumping induced conditions with a Grundfos Redi-Flo2 were not successful because induced pumping was unable overcome the ambient flow conditions within the boreholes.

Heat Pulse flow meter data for SAG-1 shows moderate flow in or out of the borehole from 140 to 300 feet bgs and higher flow in or out of the borehole from 300 to 400 feet bgs and then moderate flow in or out of the borehole from 400 to 484 feet bgs. Heat Pulse flow meter data for SAG-2 shows high flow in or out of the borehole from 160 to 240 feet bgs, moderate flows in or out of the borehole from 240 to 380 feet bgs, and lower flow in or out of the borehole from 380 to 484 feet bgs. Heat-Pulse Flow Meter Logs for SAG-1 and SAG-2 are provided in **Appendix F.**

3.2.4.4 Caliper Log

The caliper log represents the average borehole diameter determined by the extension of spring-loaded arms of a three-arm caliper probe. One important application of the caliper measurement is to identify intervals where rough borehole walls or washouts have the potential to introduced errors or other measurements where log response is affected by borehole enlargement or "rugosity". Caliper logs may show diameter increases in cavities and, depending on drilling techniques used, in weathered zones. The caliper log is often a useful indicator of fracturing. However, the log anomalies do not directly represent the true in-situ fracture size or geometry. Instead, they represent areas of borehole wall breakage associated with the mechanical weakening at the borehole-fracture intersection. Caliper logs for SAG-1 and SAG-2 are provided in **Appendix F.**

Inflections to the right in the caliper log show borehole enlargements, for example where the drill bit passed through a bedrock fracture. SAG-1 caliper log shows large enlargements at 300, 335, and 480 feet bgs. SAG-2 caliper log shows large enlargements from 320 to 335 feet bgs and 430 to 440 feet bgs.

3.2.4.5 Acoustic and Optical Televiewer

Borehole televiewer logging was used to obtain oriented images of borehole walls. Optical televiewer (OBI) imaging was performed by recording magnetically oriented images at 0.007-foot depth increments, with pixels at one-degree arc segments for each 360-degree scan around the borehole wall, while logging downward at a speed of approximately 3.5 to 4 feet per minute. ABI images were recorded at 0.01-foot depth intervals, with one pixel for each 1.25-degree arc-segment around the borehole wall, at a logging speed of approximately three feet per minute. Analysis of the OBI and ABI logs allow void and joint data to be presented in terms of depth, aperture, direction of dip (with respect to North), dip angle, and strike.

These televiewer-interpretations are observed planar-feature depths, down-dip compass direction for each planar feature (note that these are perpendicular to the strike direction, and are referenced to magnetic north), dip angles with respect to horizontal, and estimated feature aperture.

Acoustic televiewer data are presented via two columns (ABI40 “travel time" and “amplitude"), where each column represents a cylindrical image sliced down the north edge and laid flat on the printed page. Magnetic north is at the left edge of each column, and the images progress through east, south, west, and back to north at the right-hand edge.

Optical televiewer images are presented in a similar manner, in a single column labeled “OBI40 image". Magnetic north is also at the left edge of this image column, and the image progresses through east, south, west, and back to north at the right edge.

Acoustic televiewer logs were evaluated using WellCAD’s image-processing module, to measure planar-feature dip angles and down-dip azimuths. All interpreted down-dip azimuths are referenced to magnetic north. The tadpole plots graphically display the depth, orientation, and category of the bedrock structures interpreted from the televiewer images. The orientations of bedrock structures are graphically displayed on the tadpole plots by a tadpole consisting of a circle, the head, and a line, the tail. The position of the head, left to right on the tadpole plot, gives the dip angle of the bedrock structure. The left side of the track indicates a dip angle of 0º and the right side of the track indicates a dip angle of 90º from horizontal. The position of the tail gives the dip azimuth of the fracture and can be read like a compass. The tail pointing directly up is 0º, north. We note that dip azimuth is perpendicular to strike as the term commonly used by geologists. Features that are clearly represented on both the ABI travel-time and amplitude plots are and visible on the OBI image plots are considered “open". Features represented only (or mostly) on the ABI amplitude plots are likely to have smaller apertures (or possibly represent bedding planes, or tight or mineral-filled joints), and are therefore judged relatively “less open”.

Red tadpoles and corresponding red sine-curve lines superimposed on the ABI plots designate features with dip azimuths within 45º of north, purple tadpoles and corresponding purple sine-curve lines superimposed on the ABI plots designate features with dip azimuths within 45º of east, blue tadpoles and corresponding blue sine-curve lines superimposed on the ABI plots designate features with dip azimuths within 45º of south, and green tadpoles and corresponding green sine-curve lines superimposed on the ABI plots designate features with dip azimuths within 45º of west. Geophysical tadpole plots identifying fracture

orientation are provided in **Appendix F**. The transmissive nature of the features identified on the ABI and OBI plots cannot be determined from these televiewer methods however discrete fracture transmissivities were discernable with the FLUTe™ liner tests, discussed in Section 3.2.3.

3.2.5 FLUTe™ Multi-Port Well Design

Each FLUTe™ multi-port well was designed using the FLUTe™ transmissivity profile and the borehole geophysics data. The following rationale was used to select the FLUTe™ port locations and depths.

SAG 1

- Port No 1 was selected to be from 258 to 263 feet bgs targeting a weathered and fractured zone just below the 5-inch steel sleeve casing.
- Port No. 2 was selected to be from 310 to 315 feet bgs targeting a few fractures at the midpoint of the San Andres Formation.
- Port No. 3 was selected to be from 362 to 367 feet bgs targeting a weathered and fractured zone at the contact between the San Andres and Glorieta Formations.
- Port No. 4 was selected to be from 392 to 397 feet bgs targeting a transmissive fracture zone in the top half of the Glorieta Formation.
- Port No. 5 was selected to be from 415 to 420 feet bgs targeting a transmissive fracture zone at the midpoint of the Glorieta.

SAG 2

- Port No. 1 was selected to be from 164 to 169 feet bgs targeting a weathered and fractured zone within the Chinle just below the steel surface casing.
- Port No. 2 was selected to be from 205 to 210 feet bgs targeting a transmissive fracture zone in the top of San Andres containing limestone.
- Port No. 3 was selected to be from 260 to 265 feet bgs targeting a transmissive fracture zone near the midpoint of the San Andres containing sandstone.
- Port No. 4 was selected to be from 315 to 320 feet bgs fracture zone targeting the midpoint of the San Andres containing dolostone.
- Port No. 5 was selected to be from 370 to 375 feet bgs targeting a transmissive weathered and fractured zone at the contact between the San Andres and Glorieta Formations.

3.3 Synoptic Water Levels

3.3.1 SAG Aquifer

Three rounds of water levels were measured from the two newly installed FLUTe™ multiport monitoring wells, SAG-1 and SAG-2. Depths to water were measured from the top of the FLUTe™ multi-port well, fitting by FLUTe™ personnel on February 18, 2021 and by Homestake personnel on February 26 and April 52021. These three rounds of depth to

water measurements and corresponding groundwater elevations can be found on **Table 3-2**.

Water levels measured on February 18, 2021 at SAG-1 show a slight upward vertical gradient of 0.002 feet/ft within the San Andres between the top of Port 1 and bottom of Port 3 (258-367 ft bgs) and slight downward gradient of 0.004 feet/ft between top of Port 3 in the San Andres and bottom of Port 5 (262-420 ft bgs) in the Glorieta. While water levels measured at SAG-2 show a slight downward vertical gradient of 0.007 feet/ft between the top of Port 1 in the Chinle and bottom of Port 2 in the San Andres (164-210 ft bgs) there is a fairly significant downward gradient of 0.431 feet/ft within the upper San Andres between the top Port 2 and bottom Port 3 (205-265 ft bgs), a slightly less but still significant downward gradient of 0.154 feet/ft within the lower San Andres between the top Port 3 and bottom Port 4 (260-320 ft bgs) and a very slight upward gradient of 0.002 feet/ft between the top of Port 4 in the San Andres and the bottom of Port 5 at the transition between the San Andres and Glorieta.

Water levels measured on February 26, 2021 at SAG-1 show a slight steady downward gradient of 0.002 feet/ft throughout the San Andres and Glorieta from the top of Port 1 to the bottom of Port 5 (258-420 ft bgs). While water levels measured at SAG-2 show a significant downward gradient of 0.576 feet/ft between the top of Port 1 in the Chinle and the and bottom of Port 2 (164-210 ft bgs) in the San Andres, continuing with less of a downward gradient of 0.119 feet/ft within the upper San Andres between the top Port 2 and bottom Port 3 (205-265 ft bgs), a slight upward gradient of 0.002 feet/ft in the lower San Andres between the top Port 3 and bottom Port 4 (260-320 ft bgs) and a very slight downward of 0.001 feet/ft between the top of Port 4 in the San Andres and the bottom of Port 5 at the transition between the San Andres and Glorieta.

Water levels measured on April 5, 2021 at SAG-1 show a slight steady downward gradient of 0.001 feet/ft throughout the San Andres and Glorieta from the top of Port 1 to the bottom of Port 5 (258-420 ft bgs). While water levels measured at SAG-2 show a significant downward gradient of 0.552 feet/ft between the top of Port 1 in the Chinle and the and bottom of Port 2 (164-210 ft bgs) in the San Andres, continuing with less of a downward gradient of 0.127 feet/ft within the upper San Andres between the top Port 2 and bottom Port 3 (205-265 ft bgs),a slight upward gradient of 0.001 feet/ft in the lower San Andres between the top Port 3 and bottom Port 4 (260-320 ft bgs) and an extremely slight downward gradient of 0.0002 feet/ft between the top of Port 4 in the San Andres and the bottom of Port 5 at the transition between the San Andres and Glorieta.

Groundwater elevations measured in 2021 from the newly installed SAG multi-port wells (Table 3-2) were compared to water level elevations measured and mapped in 2019 (Figure 2-11. A comparison of the data on Table 3-2 to the data on Figure 2-11 shows the water level elevations measured on February 26th and April 5th, 2021 in the bottom three ports range from 6422.49 to 6423.04 and are roughly 3 feet higher in elevation than the 6419 and 6420 contour lines on Figure 2.11 at the general location of the SAG multi-port wells. Given the above, the following should be kept in mind when comparing water levels from the SAG multi-port wells and the water levels depicted in Figure 2-11.

- The water levels were measured roughly two years apart;

- The water levels were measured in different seasons (Spring and Fall);
- The water levels measured in multi-port wells are depth discrete intervals (i.e., 5 feet) and the water levels measured in the wells used on Figure 2.11 are wells with open hole intervals greater than 100 feet that therefore, represent the effect that depth-integrated/flow-weighted averages can have on hydraulic head measurements.

3.3.2 Alluvial Aquifer

One round of groundwater levels was measured in the three newly installed piezometers (OB-1, OB-2, and OB-3) and several existing alluvial wells in the SAG investigation area by Homestake personnel on May 12, 2021. Depths to groundwater were measured from the top of well casing. Coordinates and elevations for the top of well casings at each of the new wells and piezometers were surveyed by a licensed land surveyor (**Table 3-3**). Alluvial water level elevations were calculated (**Table 3-4**) and used to map the potentiometric surface of the alluvial aquifer (**Figure 3-7**). These data show a groundwater low (sink) in the area around OB-2 with an inward hydraulic gradient between:

- Wells 657, 647, 658 and OB-2;
- Wells 553, 554 and OB-2; and
- Well OB-3 and OB-2;

This groundwater low likely displays the effects of the vertical groundwater movement from the alluvial aquifer to the underlying SAG aquifer in this area. This data is constant with the groundwater level elevations measured in this area in 2012 (HMC, 2012, and Daniel B. Stevens & Associates, 2012) (**Table 3-4 and Figure 3-8**)

Similar to the data comparison of water elevations measured in the new SAG wells in 2021 to 2019 water elevations in the SAG, a comparison of the new alluvial well (OB1, OB2, and OB3) water elevation in the alluvium was made to the data on Figure 2-11. Water level elevations measured in May 2021 range from 6425.62 at OB2 to 6434.08 at OB3 and are roughly 7 to 15 feet higher in elevation than the 6419 and 6420 SAG contour lines on Figure 2.11 at the general location of the new OB alluvial wells. Given the above, the following should be kept in mind when comparing water levels from the new OB alluvial wells and the water levels depicted in Figure 2-11.

- The water levels were measured roughly two years apart;
- The water levels were measured in different seasons (Spring and Fall);
- The water levels measured in the new alluvial water table wells represent the shallow groundwater table in a partially submerged 15 to 20 foot screened interval whereas the water levels measured in the SAG wells used on Figure 2.11 are wells with open hole intervals greater than 100 feet that therefore, represent the effect that depth-integrated/flow-weighted averages can have on hydraulic head measurements.

3.4 Geochemical, Mineralogical, and Water Quality Assessments

Select samples of aquifer solids from the Chinle Shale, San Andres Limestone, and Glorieta Sandstone were characterized for their major mineralogical and geochemical characteristics. In addition, groundwater samples were collected from wells installed in the SAG-1 and SAG-2 borings. This information provides a baseline assessment of geochemical conditions within the aquifer and will be used to support future chemical transport assessments for the SAG aquifer.

3.4.1 Aquifer Solids Characterization

Characterization methods for the aquifer solids were based on basic understanding of the aquifer mineralogy as described in previous reports (Gordon, 1961; USGS, 1972; Brown and Caldwell, 2018). These methods (**Table 3-5**) provide complete geochemical and mineralogical characterization of the various lithologies, while also evaluating chemical conditions within the aquifer as related to constituent transport, and were developed in accordance with USNRC guidelines for subsurface geochemical characterization at Title II Former Uranium Milling Sites (USNRC, 2003). Geochemical testing was conducted by ACZ Laboratories, Inc. (Steamboat Springs, CO) **(Appendix G)** and mineralogical testing by DCM Science Laboratory (Wheat Ridge, CO) **(Appendix H)**. Regional geological and site-specific sample descriptions (**Table 3-6**) are discussed below with respect to characterization objectives and testing procedures for the Chinle Shale, San Andres Limestone, and Glorieta Sandstone samples:

Chinle Shale: The Chinle Formation overlying the San Andres Limestone was targeted for sampling and has been reported as friable and calcareous mudstone containing clayey and silty sandstone lenses, with weak to strong cementation and ranging in color from grayish-red to light-green and gray (Gordon, 1961). The Chinle Shale intervals selected for analysis from SAG-1 and SAG-2 were described as a weathered, reddish-brown to gray, soft, thinly-bedded, and fractured siltstone (**Table 3-6**). Two samples of Chinle Shale (one per boring) were characterized for total metals, sulfur plus carbon forms, and cation exchange capacity (CEC) (**Table 3-7**).

San Andres Limestone: The San Andres Limestone is comprised of an upper limestone unit (60 to 100 ft thick), a middle calcareous sandstone unit (15 to 30 ft thick), and a lower dolomitic limestone unit (20 to 40 ft thick) (Gordon, 1961). The San Andres Limestone intervals selected for analysis from SAG-1 and SAG-2 were classified as moderately fractured and weathered sandstone, dolomite, or limestone (**Table 3-6**). Four samples of San Andres Limestone (two from each boring) were analyzed for total metals and sulfur plus carbon forms. Two samples (one per boring) were analyzed for mineralogical composition using X-ray diffraction (XRD) and a single sample was examined using optical mineralogy (**Table 3-7**). Because cation exchange would not be expected to operate as a significant control on chemical properties or constituent transport in a predominantly carbonate (limestone) aquifer, the San Andres Limestone samples were not characterized for CEC.

Glorieta Sandstone: The Glorieta Sandstone has been described as a well-sorted, medium-grained sandstone, white to light gray in color with limonite (Gordon, 1961). The upper strata

tends to be cemented with silica while the lower strata is soft and friable. Calcite cementation may also be present. Vertical fractures are filled with calcite and quartz, often with pyrite. The Glorieta Sandstone intervals selected for analysis from SAG-1 and SAG-2 are classified as a weathered, fractured, and fine-grained sandstone (**Table 3-6**). Four samples of Glorieta Sandstone (two from each boring) were analyzed for total metals, sulfur plus carbon forms, and CEC. Two samples (one per boring) were analyzed for mineralogical composition using XRD and a single sample was evaluated using optical mineralogy (**Table 3-7**).

3.4.1.6 Mineralogical Results

Bulk XRD analysis was conducted on two samples from the San Andres Limestone and two samples from the Glorieta Sandstone (**Tables 3-7 and 3-8**). Samples from the San Andres Limestone consisted primarily of calcite and/or dolomite (97%), with a small amount of quartz (1%) and < 5% unaccounted. Samples from the Glorieta Sandstone contained much lower carbonate mineral content (6 to 16%) and consisted primarily of quartz (62 to 82%) with lesser amounts of kaolinite and potassium feldspar. Optical microscopy results for these sample were very consistent with respect to major mineral constituents, but also revealed the presence of minor constituents which could not be detected using XRD. These include pyrite in association with relatively minor Fe oxides in both the San Andres Limestone and Glorieta Sandstone (**Table 3-9**).

3.4.1.7 Major Trace Element Concentrations

The total metals results for all lithologies (**Table 3-10**) indicate the elemental compositions are dominated by Aluminum (Al), Iron (Fe), Magnesium (Mg), Manganese (Mn), Calcium (Ca), Potassium (K), Sodium (Na), and Silica (Si). The relative abundance of these eight elements are shown on **Figure 3-9**. Because Method 3050B does not result in complete dissolution of all silicates (primarily quartz), the Si content was taken from the XRD quartz content for the San Andres Limestone and Glorieta Sandstone samples, and from the average Si content of shale (Fleischer and Parker, 1967) for the Chinle Shale samples. The Chinle Shale contains the highest proportion of Fe, Al, and K and with high Si content (**Figure 3-9**), consistent with silts and clays containing iron oxides as observed to occur in the form of reddish-colored, oxidized and weathered siltstone at SAG-1 and SAG-2 (**Table 3-6**). The concentrations of major elements (Ca, Mg, Na, K, Fe, and Al, **Table 3-10**) are generally low in the Chinle Shale compared to typical clays and shales (**Table 3-11**). The San Andres Limestone is dominated by Ca and Mg (**Figure 3-9**) due to the predominant limestone and dolomite mineralogy (**Table 3-8**). The Glorieta Sandstone samples were also enriched in Ca and Mg, but with relatively higher proportions Al, Fe, K, and Si (**Figure 3-9**) as would be expected for a sandstone lithology containing quartz, aluminosilicates, and Fe oxides (**Table 3-8**). Major element concentrations in the Glorieta Sandstone (**Table 3-10**) are generally lower compared to typical sandstones (**Table 3-11**).

Trace element concentrations (e.g., Uranium (U), Vanadium (V), Selenium (Se), Molybdenum (Mo), Boron (B)) were variable both within and across rock types, although generally higher concentrations of U, V, and B occur in both the Chinle Shale and San Andres Limestone compared to the underlying Glorieta Sandstone (**Figure 3-10**). Molybdenum concentrations were reported as <2 mg/kg in all rock types, consistent with

typical values for these rock types (**Tables 3-12 and 3-13**). Measurable B was only present in the Chinle Shale samples (**Table 3-8**); higher B concentrations are expected for clays and shales compared to other rock types, although the B concentrations are lower overall compared to typical values (**Table 3-11**). Both U and Se concentrations were lower in the Chinle Shale relative to typical clays and shales, but those in the remaining samples were consistent with those for a carbonate-rich sandstone or carbonate rock (**Tables 3-10 and 3-11**). Vanadium concentration trends are consistent with those for typical rocks, but with overall lower concentrations (**Figure 3-10 and Table 3-13**).

3.4.1.8 Carbon, Sulfur, and Cation Exchange Capacity

Total carbon and sulfur content provide an overall indication of inorganic carbonate, detrital organic matter, and/or sulfide minerals (e.g. pyrite). The relative abundance of organic carbon and sulfur forms can also be used to infer whether conditions are relatively oxidizing or reducing, which are important aspects related to transport of dissolved constituents. The total carbon contents (**Table 3-12**) are comprised primarily of inorganic carbon (carbonate), with only minor organic carbon, and are highest in the San Andres Limestone samples as would be expected for carbonate rocks. However, due to the more weathered nature of the overlying Chinle Shale, both their total carbon and total sulfur contents were below detection. The total sulfur content of the San Andres Limestone samples consisted of either sulfate-sulfur or sulfide-sulfur (pyrite), while the sulfur content of the Glorieta Sandstone is largely dominated by sulfide-sulfur (**Table 3-12**). The presence of organic carbon and pyrite in a number of samples may tend to impart reducing conditions within the San Andres Limestone and Glorieta Sandstone aquifers, depending of the relative rates of oxygen depletion versus oxygen replenishment from surface recharge.

The CEC of the aquifer materials provides a baseline indication of the potential reactivity of clay minerals with groundwater (**Table 3-12**). The CEC values for the Chinle Shale and Glorieta Sandstone samples are low (1.46 to 7.4 meq/100 g) and would be equivalent to a typical sandy soil containing clay with a low intrinsic CEC, such as kaolinite. Therefore, cation exchange would not be expected to exert significant controls on groundwater chemistry, nor expected to play a major role in attenuation of dissolved constituents with transport through the aquifers.

3.4.2 Groundwater Quality Characterization

Groundwater samples were collected from Wells SAG-1 and SAG-2 in February and April of 2021 using FLUTe™ groundwater sampling procedures **(Appendix E)** in conjunction with a flow cell to obtain representative samples. Five samples were collected from each well at various depths. Field parameters included temperature, pH, dissolved oxygen (DO), electrical conductivity (EC), oxidation-reduction potential (ORP) expressed as Eh, and ferrous iron. All samples were appropriately filtered and preserved in the field and analyzed for a complete suite of major cations, major anions, nutrients, metals, and radionuclides by ACZ Laboratories, Inc. (Steamboat Springs, CO) **(Appendix I)**.

All groundwater results are reported in **Table 3-13** (February 2021) **and Table 3-14** (April 2021) which includes the sampling depths, field parameters and laboratory parameters for SAG-1 and SAG-2. The field QA/QC results indicate all constituents were below detection

in the field blank in February, but that low concentrations of alkalinity and chloride were detected in the field blank in April. For both sampling events, the relative percent difference (RPD) between the primary and duplicate samples were below 20% for all analytes except for the radionuclides, which were detectable at low concentrations and with large ranges in precision. The major ion results indicate that the groundwater is a calcium-sulfate type water (**Figure 3-11**, only February 2021 results presented for clarity) with a tendency toward higher proportions of calcium relative to sodium, and sulfate relative to bicarbonate, with increasing depth in the aquifer. The total dissolved solids (TDS) concentrations ranged from 820 to 1,980 mg/L with the highest TDS concentrations measured at lower depths (**Tables 3-13 and 3-14**). Depth trends for the primary TDS constituents (calcium and sulfate) are shown on **Figure 3-12** where notable increases in both calcium and sulfate occur below a groundwater elevation of 6250 ft amsl.

A notable observation at both SAG-1 and SAG-2 is the presence of a redox profile, where conditions become more reducing with depth. More shallow groundwater at SAG-2 tends to have higher DO and redox potential values (**Figure 3-13**) compared deeper groundwater. Ferrous Fe concentrations were also generally higher at depth (**Tables 3-13 and 3-14**) and increase with decreasing redox potential (**Figure 3-14a**). The relationships are generally consistent with the expected redox behavior in groundwater where measurable ferrous Fe is only present under reducing conditions when DO is low or absent (Langmuir, 1997) (**Figure 3-14b**). Similar trends were observed for nitrogen in the groundwater, where detectable ammonia-N only occurs under reducing conditions when nitrate-N (oxidized form) is low or absent (**Figure 3-15a**). Reducing conditions in groundwater can occur when the rate of oxygen consumption exceeds the rate of oxygen replenishment, as driven by the presence of dissolved organic carbon (DOC). A temperate climate groundwater will usually become oxygen-depleted when it contains ≥ 4 mg/L of DOC (Langmuir, 1997). This is consistent with observations from the SAG Aquifer where relatively lower Eh values (≤ 150 mV) occur above a DOC concentration of 4 mg/L (**Figure 3-15b**), with resulting DO concentrations ≤ 0.5 mg/L (**Figure 3-13b**).

These finding indicate that the SAG Aquifer is generally more reducing as described for the overlying Alluvial Aquifer. The redox classification of the Alluvial Aquifer has been described as Oxic due to the presence of >1 mg/L DO and where Fe oxides are present (WME, 2020). The redox properties of the SAG groundwater have characteristics of both a Suboxic environment where low DO is measurable in the presence of Fe and Mn oxides, and an Anoxic environment where DO is largely absent in the presence of pyrite and rhodochrosite ($MnCO_3$) (Langmuir, 1997).

A number of different factors could be responsible for the variation in constituent concentrations that have been observed with depth. These include the effects of surface recharge, changes in redox conditions and pressure, and differences in groundwater residence times. Increasing concentrations with depth were observed for the major constituents calcium, sulfate, and TDS. The higher concentrations of major dissolved constituents at depth could be the result of longer groundwater residence times and isolation from surface water influences (Chilton, 1996), and/or the effects of higher pressure on mineral solubility at depth (Palmer and Cherry, 1984). More reducing conditions at depth cause iron and manganese concentrations to increase due to the instability of the metal

oxides, along with an increase in the reduced forms of nitrogen (ammonia) and sulfur (hydrogen sulfide). Dissolved oxygen, nitrate, selenium, and uranium are relatively unstable under reducing conditions (Langmuir, 1997) and therefore displayed decreasing concentrations with depth.

Higher concentrations of the radionuclides radium-226+228 and thorium-230 were measured at depth when compared to some shallower locations in the SAG groundwater, although all concentrations were below their respective groundwater standards. Radium-226 is a decay product of naturally-occurring uranium-238 in the SALS, where the measured uranium concentrations ranged from 0.52 to 2.51 mg/kg (Section 3.4.1.7). Radium-228 is a decay product of naturally-occurring thorium-232. Although thorium contents were not measured in the SAL samples, thorium concentrations average 1.7 mg/kg in carbonate rocks (Fleischer and Parker, 1967). The resulting combined radium-226+228 concentrations in groundwater can therefore be highly variable, not only due to localized irregularities in bedrock mineralogy, but also due to changes in redox conditions and/or residence times of groundwater at different depths.

3.5 Geophysical Survey

HDR mobilized a crew and equipment to the site and completed the Electrical Resistivity Tomography (ERT) survey between December 10 and December 18, 2020. Three ERT transect lines were completed, collecting data over approximately 15,550 linear feet. The ERT lines were aligned roughly parallel and perpendicular to bedrock strike of the SAG and co-located with existing and recently drilled borings/wells. The ERT transect lines and boring/well locations are shown on **Figure 3-16**. A Trimble Catalyst with RTX correction service was used to record the ERT lines and borings/wells with an accuracy of approximately 4-inches. The ERT surveys were conducted according to proposed methodologies; however, a slight change to the line locations and lengths were made due to site access and a third line was added N-S, approximately in-line with several historic wells.

3.5.1 ERT Data Acquisition and Processing

An Advanced Geoscienses Inc. (AGI) SuperSting 112 electrode resistivity system was used to complete the ERT survey. Electrodes were places at 20-foot intervals along each line segment to allow for a total length per segment of approximately 2,220 feet. This length provided sufficient depth penetration of the ERT signal to characterize the geology to approximately 400-feet below land surface. Several line segments were needed to produce these long lines as shown in **Figure 3-16**. Each line segment was overlapped more than 250-ft to ensure continuous data recording without large gaps at depth. Equipment checks were run including a contact resistance check between each electrode as part of each line's setup. This resistance check is key in producing quality data by checking for electrodes with poor soil coupling and/or electrode contact. In dry areas with rocky and sandy soils, it is often necessary to add water around electrodes to help improve electrical continuity between the electrode and the soil. A suitable layer of surface soil was present for most of the electrode locations along the survey lines and in areas crossing rocky terrain (including basalt outcrops) water or salt water-soaked cloth was used to improve high contact

resistances. Contact resistances were able to reach acceptable levels in all cases by adjusting or adding water to the electrodes.

Data were processed using AGI's Earth Imager2D software specialized for resistivity tomography processing. Data collection included use of the dipole-dipole and strong gradient arrays and therefor combining the two array types was a key element of the processing workflow. The general processing workflow included:

1. Extracting (X,Y,Z) coordinates and elevation from collected GPS data at each electrode location;
2. removal of data spikes;
3. inversion modeling settings with a max number of iterations;
4. applying a damping factor, and then;
5. final smoothing of plotted, parameters set to match previous ERT data processing at the mill site.

The number of model iterations varied based on data convergence, and in general were less than six iterations. As part of the processing data quality control (QC), the RMS error percentage is calculated for each ERT segment. Between the eight segments that make up the 3 lines, the lowest RMS was 7.8% and the highest model was 15.2%. These are very good error percentages and these data represent consistent and well-fitting models for this arid environment. Final models were produced using a contour software package from Golden Software, Surfer16. The final data plots were further smoothed by using a linear variogram and typical resistivity logarithmic scales. The cell sizes used during the final model gridding were 10-ft horizontally and 1-ft vertically to better enhance the horizontal nature of the lithology. Then a Gaussian filter of 41 by 5, horizontal/vertical cells was applied to the combined line segments that make up the final longer line plots. This filter removed high frequency noise associated with overlapping data zones, the horizontal biased nature of the filter helps image the natural stratification of the subsurface while removing near vertical distortions often found in resistivity data. **Figures 3-17 through 3-19** present the final processed ERT profiles for the three transects shown on **Figure 3-16**. Initial data inversions of individual line segments are included in **Appendix J**.

3.5.2 ERT Data Interpretation and Boring Correlation

Data plots for each of the three ERT lines are presented on **Figures 3-17 through 3-19** with generalized boring logs overlaid on the data. The basic geologic sequence found in the deeper borings show:

- Alluvium (silty, sandy, some clay and gravels);
- Basalt;
- Alluvium (silty, sandy, some clay and gravels);
- Chinle Formation; and
- San Andres/Glorieta Formation.

Typically, these rock types would be more resistive than silty/clayey soils and the ERT profiles would exhibit resistivities that are increasing with depth without the presence of water. Water was observed in the two deeper borings at or less than 130-feet below ground surface.

The resistivity data reinforces the interpretation of the SAG aquifer since the values are lower than expected for these same formations, implying the presence of water. To further evaluate the resistivity interpretation, the ERT data can be compared to the geophysical well logging performed at SAG-1 and SAG-2. The long and short normal geophysical logs match very closely to the values seen in the ERT model and show a similar relatively low resistances throughout the SAG depth imaged in the resistivity profiles.

The following is a list of general resistivity ranges for the more prominent geologic layers:

1. Alluvium near surface soils – 20 to 500 ohm-m
2. Basalt – 300 to 30,000 ohm-m
3. Chinle – 50 to 2,000 ohm-m
4. Top of the SAG – 50 to 500 ohm-m
5. Lower SAG – mostly 1 to 250 ohm-m with isolated areas as high as 600 ohm-m

The resistivity lines were collected in relatively straight profiles to improved data quality. Therefore, many of the borings are located some distance off the lines including a few that are more than a hundred feet away from the lines. This offset may have some bearing on the resistivity ranges noted above. Furthermore, the interpretation lines shown to represent the breaks in geology noted in the borings often cross contour lines. However, the overall shape and trends of the contours were used to guide the interpreted top of the Chinle and the top of the SAG (for example). In the interpretation more weight was given to connecting lithology from the boring logs as well as remaining in a reasonable range of resistivities for the geology. See dashed interpreted formation contacts include on **Figures 3-17 through 3-19**.

3.5.3 ERT Survey Results

Figures 3-17 through 3-19 present the interpreted ERT data profiles. The horizontal axis on these plots are distance along the lines in feet. The vertical axis is elevation above mean sea level in feet and were taken from a digital elevation model (DEM) and GPS positions. Data is plotted with a four times vertical exaggeration. The color scale represents a logarithmic scale of resistivity values in ohm-meters. The boring logs are shown at projected positions along the ERT lines and the offset and approximate offset direction is noted in parenthesis. Also, noted near the top of the profiles are the approximate crossing line locations.

Figure 3-17 shows the ERT data profile and interpretation for ERT Line 1. This line is roughly oriented S-N and has a short data break and zone where overlap was not possible due to crossing a paved road. One full line segment was used to extend data coverage to the south from the road. This segment was added near the end of the field survey once access to the adjacent property was obtained. The data plot shown on this figure, therefore, shows negative distance along the bottom axis representing the extension of this line further south past the original start of the line.

Line 1 was oriented to pass near some of the historic wells located on the site **(Figure 3-16)**. The logs for these are limited to drillers observations and do not reach the SAG aquifer. Most note termination into a shale that most likely corelates to the contact with the lower Chinle (noted siltstone or mudstone on the current boring logs). The interpreted basalt layer boundaries are show as black lines with ticks and the interpreted contact between the

alluvium and Chinle as dashed black lines and interpreted top of the SAG is shown as dashed red lines. This interpretation of the SAG uses information from the other ERT lines as well as boring SAG-1, shown on this figure. This boring is the only boring along this line that reaches the aquifer. One challenge in the interpretation of the top of the Chinle and SAG is the occurrence of what appears to be a variable boundary of higher and lower resistivities, producing a peak and valley affect in the resistivity data. Both the Chinle and SAG underly unconformities; therefore, it is possible that the variable boundary of higher and lower ERT resistivities is due to infilled erosional features such as paleo-stream channels. Another notable feature along this line is the interpreted crossing of the "West Fault" that is known to trend SW to NE in this area. The interpreted fault crossing is shown on this line as a red shaded box near the projected location of boring OB-3. Further evidence of this fault is present in the lack of the Chinle in boring OB-2 and an apparent elevation change in the interpreted top of the SAG.

Figure 3-18 shows the ERT profile for ERT Line 2. This line is roughly oriented NW to SE and crosses Line 1 near the SAG-1 boring. The line connects between the two deeper boring conducted as part of this study (Borings SAG-1 and SAG-2). However, the resistivity values at the top of the SAG near boring SAG-1 correlates to a higher resistivity than what is observed on the other ERT lines and seen at boring SAG-2. It is possible the higher values seen here as the apparent trough of higher resistivity values that extend down from the basalt layer are out of plane effects from adjacent variations in the Chinle. Another noteworthy observation is the apparent weakening of the continuity of the higher resistance basalt layer, starting at about 2,400-ft distance along the line. At approximately the same location of this change in this layer we also see a deeper more resistive boundary extending nearly vertically in the data, between approximately 2,500 to 3,400 feet along the line. As an overall observation from the interpretation of the top of the SAG appears to have very little dip across the line, indicating this line is aligned along strike of the formation.

Figure 3-19 shows the ERT profile for ERT Line 3. This line is roughly oriented W to E and crosses Line 1 and 2 near the SAG-1 boring. The line was collected starting near the property boundary to the west then extending near boring SAG-1 and continuing east for a total length of over 6500-feet. Similar to Line 2 and just offset from the SAG-1 boring there is an apparent trough of higher resistivity values dipping into the interpreted top of the SAG aquifer. Three of these troughs of higher resistivity values are observed near 2,200, 3,000, and 4,500 feet distances along this line. Again, these features could be related to out of plane effects or possible area of lower water content in the Chinle and top of the San Andres formations. Overall, the interpreted top of the SAG is slightly lower to the east and we see lower resistivity values within the SAG east of the boring SAG-1.

4 REVISED CSM

The data generated during this SAG Investigation were used to revise the CSM. Based on this data, there are four revisions to the CSM. They include:

4.1 Further Refine the Area Where the SAG was in Direct Contact with Alluvium;

The borings drilled during the SAG investigation and the surface geophysics were used to show the area where the SAG directly underlies the alluvium. The surface geophysics were used to show the type of bedrock in contact with the alluvium based on the surface geophysics. These data were used in conjunction with the boring data to show the area where the SAG was in direct contact with the alluvium. The results are shown on **Figure 4-1**. **Figure 4-1** also shows the SAG/Alluvium contact area and the newly revised SAG/Alluvium contact area.

4.2 Assess if the Alluvium is Dry Above the SAG Contact;

Five borings were drilled through the alluvium. Three borings (OB-1, OB-2, and OB-3) were drilled through the alluvium to the top of bedrock for the installation of alluvial wells. Two borings (SAG-1 and SAG-2) were drilled through the alluvium to install a surface casing into bedrock and then the bedrock was cored through to 440 and 480 feet bgs. The boring logs (**Appendix A**) show the alluvium in each boring was saturated below the basalt. These data show the alluvium is not dry above the contact with the SAG in this portion of the alluvium.

The depth to groundwater was measured in each newly installed wells (OB-1, OB-2, and OB-3) and nearby alluvial wells. These data were converted to water level elevations and contoured to show groundwater flow directions (**Figure 3-7**). These data show groundwater flows from north to south down the Rio San Jose, north of the SAG investigation area. These data also show the groundwater elevation near Well OB-2 is lower than surrounding wells, including wells to the south of Well OB-2. Groundwater elevations measured north, east and southeast of Well OB-2 are higher in elevation showing groundwater is flowing radially towards Well OB-2. These data show the area around Well OB-2 is likely a groundwater sink or groundwater is collecting in this area and migrating vertically through the alluvium to the underlying bedrock.

These data show a slight adjustment to the CSM whereas the past CSM characterized the Alluvium as dry and all of the groundwater migrating down the alluvium from the north was migrating vertically into the SAG. The CSM remains the same with respect to the alluvial groundwater entering the SAG; however, the CSM adjustment is that the alluvium remains saturated and the rate of groundwater movement is likely a function of the vertical hydraulic conductivity of the fine-grained material between the saturated coarse-grained alluvium and the underlying SAG.

4.3 Characterize the Physical and Water Transmitting Properties of the SAG;

Two borings (SAG-1 and SAG-2) were drilled 440 and 480 feet bgs into the SAG. A FLUTe^{TM} transmissivity profile was completed in each well to characterize the physical properties of the SAG. A summary of the physical properties of the SAG are shown on **Figures 3-3 through 3-6**.

A summary of the physical and water transmitting properties is provided below:

Item	SAG-1	SAG-2
Transmissivity (gpd/ft)	9,000	5,700
Rock Thickness (ft)	240	214
Bulk Hydraulic Conductivity (ft/day)	5.0	3.7
Number of Fractures per Borehole	483	124
Aperture Maximum (microns)	504	780
Aperture Minimum (microns)	19	13
Aperture Mean (microns)	58	152
Fracture Porosity (percent)	0.05%	0.03%

FLUTeTM multi-port wells were installed in each boring. Groundwater levels were measured in port and were used to characterize the vertical movement of groundwater in the SAG. The data shows the vertical water levels and gradients vary. Groundwater level measurements show a downward head between all ports in SAG-1. Groundwater level measurements show a downward head between the top three ports (164 to 265 feet bgs) in SAG-2 and a small variable head between the bottom two ports. Downward head observed from Port 2 to Port 4 at SAG-2 in February 2021 was two orders of magnitude higher that that at SAG-1.

4.4 Characterize the Mineralogy and Groundwater Geochemistry of the SAG.

Trace element concentrations (e.g., U, V, Se, Mo, B) were variable both within and across rock types although generally higher concentrations of U, V, and B occur in both the Chinle Shale and San Andres Limestone compared to the underlying Glorieta Sandstone. Molybdenum concentrations were reported as <2 mg/kg in all rock types, consistent with typical values for these rock types. Both U and Se concentrations were lower in the Chinle Shale relative to typical clays and shales, but those in the remaining samples were consistent with those for a carbonate-rich sandstone or carbonate rock. Vanadium concentration trends are consistent with those for typical rocks, but with overall lower concentrations.

The groundwater sample results show groundwater is a calcium-sulfate type water with higher proportions of calcium and sulfate relative to magnesium and bicarbonate with depth. The results also show the groundwater to be more anoxic or reducing with depth. The cation exchange capacity (CEC) of the Chinle Shale and Glorieta Sandstone samples are low (1.46 to 7.4 meq/100 g). Therefore, cation exchange would not be expected to exert

significant controls on groundwater chemistry, nor expected to play a major role in attenuation of dissolved constituents with transport through the aquifers. These data will be used with the solute transport modeling to better understand the potential movement of COPCs in the SAG.

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Tables

Table 3-1 Sampling and Analysis Summary for Aquifer Materials Physical Properties

Formation	Borehole Number	Depth, feet	Sample No.	Specific Gravity, measured	Porosity	Water Content %, measured	Wet Density, g/cm³	Dry Density, g/cm³
Chinle	SAG-1	189	1	2.78	0.111	3.40	2.555	2.471
			2	2.78	0.115	3.20	2.539	2.460
	SAG-2	163	1	2.68	0.073	1.40	2.519	2.484
			2	2.68	0.079	1.40	2.502	2.467
San Andres	SAG-1	202	1	2.67	0.065	1.30	2.528	2.496
			2	2.67	0.066	1.40	2.528	2.493
		216	1	2.68	0.049	0.20	2.553	2.547
			2	2.68	0.048	0.20	2.556	2.551
		235.5	1	2.83	0.174	2.40	2.393	2.337
			2	2.83	0.217	2.20	2.263	2.215
		283	1	2.87	0.343	10.30	2.080	1.886
			2	2.87	0.313	13.60	2.240	1.972
	SAG-2	194	1	2.72	0.045	0.80	2.619	2.598
			2	2.72	0.054	1.00	2.600	2.574
		215	1	2.68	0.037	0.20	2.585	2.580
			2	2.68	0.043	1.00	2.590	2.565
		244	1	2.87	0.239	6.70	2.331	2.185
			2	2.87	0.225	7.60	2.394	2.225
		283	1	2.86	0.264	8.40	2.283	2.106
			2	2.86	0.286	10.40	2.255	2.043
		310	1	2.86	0.197	5.50	2.424	2.298
			2	2.86	0.194	4.60	2.410	2.304
		354	1	2.88	0.210	6.20	2.417	2.276
			2	2.88	0.214	6.40	2.407	2.263
Glorieta	SAG-1	318	1	2.65	0.139	3.80	2.367	2.280
			2	2.65	0.143	2.80	2.335	2.271
		354.5	1	2.65	0.126	3.10	2.389	2.317
			2	2.65	0.140	3.40	2.356	2.278
		402	1	2.68	0.146	4.20	2.386	2.289
			2	2.68	0.136	3.00	2.384	2.315
		426	1	2.66	0.116	1.80	2.394	2.352
			2	2.66	0.120	1.30	2.370	2.340
		464	1	2.68	0.117	1.70	2.405	2.365
			2	2.68	0.118	2.00	2.411	2.363
	SAG-2	396	1	2.66	0.157	3.70	2.324	2.241
			2	2.66	0.163	4.00	2.315	2.226
		439.5	1	2.70	0.120	2.00	2.424	2.376
			2	2.70	0.114	2.40	2.450	2.392
		463	1	2.69	0.143	3.00	2.375	2.306
			2	2.69	0.141	3.50	2.392	2.311

Two trials were performed per core specimen.

Water contents determined from tested specimens.

Density and porosity determinations of irregular shape samples - rock; ASTM D 7263 Method A.

Water Content %; ASTM D2216. Analysis by Golder Associates Ltd. Mississauga ON, Canada.

Table 3-2 FLUTe™ multi-level well depth to water measurements

Multiport Well Port	Port Interval	Feb. 18, 2021		Feb. 26, 2021		April 5, 2021	
		Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation
SAG1: Port 1	258-263	129.44	6421.38	128.20	6422.62	127.88	6422.94
SAG1: Port 2	310-315	129.20	6421.62	128.33	6422.49	127.89	6422.93
SAG1: Port 3	362-367	129.13	6421.69	128.37	6422.45	127.91	6422.91
SAG1: Port 4	392-397	129.29	6421.53	128.46	6422.36	128.03	6422.79
SAG1: Port 5	415-420	129.37	6421.45	128.57	6422.25	128.12	6422.70
SAG2: Port 1	164-169	99.17	6456.03	99.07	6456.13	99.20	6456.00
SAG2: Port 2	205-210	98.85	6456.35	125.57	6429.63	124.57	6430.63
SAG2: Port 3	260-265	123.41	6431.79	132.71	6422.49	132.19	6423.01
SAG2: Port 4	315-320	132.66	6422.54	132.61	6422.59	132.16	6423.04
SAG2: Port 5	370-375	132.55	6422.65	132.66	6422.54	132.17	6423.03

NGVD29

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Table 3-3 Surveyed Coordinates and Elevations for SAG1, SAG2, OB1, OB2 and OB3

Well ID	Northing (ft)	Easting (ft)	MP Elevation (ft)
SAG1	1537605.58	2701306.41	6550.82
SAG2	1539084.51	2700199.98	6555.20
OB1	1537410.63	2698585.50	6560.63
OB2	1534833.43	2701222.75	6550.17
OB3	1534124.72	2702462.77	6547.19

Coordinates are referenced to the N.M. State Plane West Zone Grid NAD88
Elevations are NVGD29

Table 3-4 Alluvial Aquifer Groundwater Elevations 2012 and 2021

Well ID	2012[1]		May 2021	
	WLE	Comment	WLE	Comment
551	6447.5		6447.79	
553	6443.02		6443.06	
554	6440.65		6440.88	
555	6511.36		-	
556	6507.76		-	
631	6450.28		6457.71	
632	6450.51		6457.26	
644	6468.99		-	
646	6462.91		-	
647	6446.08		6446.46	
648	6427.79	Dry	6427.69	Dry
649	6440.24		6440.31	
650	6463.53		6465.01	
652	6451.71		6453.68	
657	6450.46		6450.86	
658	6441.99		6442.73	
685	-		6458.55	
687	-		6459.05	
689	>6458.47	Dry	6458.52	Dry
846	6503.9		-	
851			6464.11	
855	6451.34		-	
869	6471.85		-	
876	6471.37		-	
879	6475.33		-	
905	>6443	Dry	6442.6	Dry
906	>6443	Dry	6461.5	Dry
909	6446.95		-	
996	-		6449.8	
MW-2	6434.23		-	
MW-4	6429.91		-	
OB1	-		6429.13	Dry
OB2	-		6425.62	
OB3	-		6434.08	

WLE – water level elevation

[1] Data Source: 2012 Annual Performance Report for Homestake's Grants Project Pursuant to NRC License SUA1471 and Discharge Plan DP-200, HMC 2012; Phase II Site Characterization, Milan Farm, Millan New Mexico, Daniel B. Stephens & Associates 2012

Table 3-5 Summary of Geochemical and Mineralogical Characterization Methods.

Parameter	Method	Supporting Detail & Objectives
Bulk Plus Clay Mineralogy[1]	X-ray Diffraction	Rapid and semi-quantitative assessment of a wide variety of crystalline mineral constituents to identify the predominant mineral assemblage.
Optical Mineralogy [1]	Petrographic Analysis	Non-destructive technique utilizing thin sections to identify crystalline and amorphous substances within the native textural framework. Provides high spatial resolution of trace minerals to supplement XRD results.
Total Metals[2]	EPA M3050B with M6020B	Provides baseline COC concentrations and quantitative elemental composition of the aquifer materials to complement mineralogical results.
Sulfur Forms[2]	EPA 600/2-78-054 3.2.4 (Sobek)	Determines various forms of sulfur (total-S, sulfate-S, sulfide-S, organic-S) through selective chemical removal of non-sulfide and/or targeted sulfide minerals followed by IR sulfur analysis.
Total Carbonate as $CaCO_3$[2]	ASA No. 9 29-2,2,4	Supplements the total metals analysis to provide quantitative measurement of the mineral carbonate component (requires analysis of total C and total organic C).
Total Organic Carbon[2]	ASA No. 9 29-2,2,4	Organic C may be present as an impurity in geologic materials and in association with trace elements and can create reducing conditions in an aquifer.
Cation Exchange Capacity[2]	USDA No. 60 (19)	Measures the total capacity for retention of positively-charged ions by clay minerals.

[1]DCM Science Laboratory, Inc. (Wheat Ridge, CO). [2]ACZ Laboratories, Inc. (Steamboat Springs, CO). Total metals include Al, B, Ba, Ca, Fe, Mg, Na, K, Li, Mn, Mo, P, Se, Si, Sr, Ti, U, V.

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Table 3-6 Field Lithologic Descriptions for Selected Intervals.

Formation	Boring	Depth (ft bgs)	Field Lithologic Description
Chinle Shale	SAG-1	189-190	SILTSTONE: silt; very thinly bedded; reddish brown (2.5yr 4/3); slightly weathered; moderately soft; moderately fractured to intensely fractured; ~20° dips, trace vertical fractures; spacing: 3-6"; open; clean to very thin infilling; moderately weathered to intensely weathered fracturing; slightly rough. Sample collected from 189-190 ft.
	SAG-2	163-164	SILTSTONE: dark reddish gray (10r 4/1); fresh; moderately soft; slightly fractured; little to no dip; tight to slightly open; clean infilling; not healed; stepped. Sample collected from 163-164 ft.
San Andres LS	SAG-1	235.5-236.5	LIMESTONE: fine sand; variegated, very pale brown (10yr 7/3), white (10yr 8/1), light brownish gray (10yr 6/2); moderately weathered to intensely weathered; intensely fractured; wide; not healed; rough. Sample collected from 235.5-236.5 ft.
		283-284	DOLOSTONE: white; moderately weathered; moderately fractured; ~20° dips; tight; very thin infilling; infilling: calcite; not healed; bivalve fossils. Sample collected from 283-284 ft.
	SAG-2	215-216	LIMESTONE: gray; slightly weathered; moderately soft; intensely fractured; little to no dip; slightly open; clean infilling; rough. Sample collected from 215-216 ft.
		244-245	DOLOSTONE: very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured; mostly no dip; moderately open to open; clean to very thin infilling; not healed; moderately rough. Sample collected from 244-245 ft.
Glorieta SS	SAG-1	426-427	SANDSTONE: fine sand; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; crossbedding. Sample collected from 426-427 ft.
		464-465	SANDSTONE: fine sand; laminated; light bluish gray (10b 8/1); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough. Sample collected from 464-465 ft.
	SAG-2	439.5-440.5	SANDSTONE: fine sand; thinly bedded to very thinly bedded; gray (N6); slightly weathered; hard; slightly fractured; little to no dip; tight; clean infilling; fresh fracturing; not healed; slightly rough. Sample collected from 439.5-440.5 ft.
		463-464	SANDSTONE: fine sand; thinly bedded to very thinly bedded; white (5yr 8/1); slightly weathered; hard; moderately fractured; no vertical fractures; tight; clean infilling; fresh fracturing; partly healed; slightly rough. Sample collected from 463-464 ft.

Table 3-7 Sampling and Analysis Summary for the Aquifer Materials Characterization[1].

Formation	Boring	Depth (ft bgs)	XRD Analysis	Optical Mineralogy	Total Metals	Sulfur Forms	Total, Inorganic & Organic Carbon	CEC
Chinle Shale	SAG-1	189-190	----	----	X	X	X	X
	SAG-2	163-164	----	----	X	X	X	X
San Andres LS	SAG-1	235.5-236.5	X	X	X	X	X	----
		283-284	----	----	X	X	X	----
	SAG-2	215-216	----	----	X	X	X	----
		244-245	X	----	X	X	X	----
Glorieta SS	SAG-1	426-427	----	----	X	X	X	X
		464-465	X	X	X	X	X	X
	SAG-2	439.5-440.5	X	----	X	X	X	X
		463-464	----	----	X	X	X	X

[1] Detailed methods descriptions are provided in Table 3-3.

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Table 3-8 XRD Mineralogy Results (% By Weight) for the SALS and GSS Samples.

Boring	SAG-1	SAG-2	SAG-1	SAG-2
Formation	**San Andres LS**	**San Andres LS**	**Glorieta SS**	**Glorieta SS**
Lithology	**Limestone**	**Dolostone**	**Sandstone**	**Sandstone**
Interval (ft)	**235.5-236.5**	**244-245**	**464-465**	**439.5-440.5**
Sample ID	**SAG1-SALS-235.5-236.5**	**SAG2-SALS-244-245**	**SAG1-GSS-464-465**	**SAG2-GSS-439.5-440.5**
ACZ ID	**L63831-02**	**L63799-03**	**L63831-05**	**L63799-04**
Calcite	79	<2[1]	6	3
Dolomite	18	97	10	3
Illite	-----	-----	<2[1]	<2[1]
Kaolinite	-----	-----	12	4
K-Feldspar	-----	-----	8	6
Quartz	1	1	62	82
Pyrite	-----	-----	-----	<2[1]
Unaccounted	<5	<5	-----	<5

[1] May be present.

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Table 3-9 Thin Section Optical Mineralogy Results.

Boring	**SAG-1**	**SAG-1**
Formation	**San Andres LS**	**Glorieta SS**
Lithology	**Limestone**	**Sandstone**
Interval (ft)	**235.5-236.5**	**464-465**
Sample ID	**SAG1-SALS-235.5-236.5**	**SAG1-GSS-464-465**
ACZ ID	**L63831-02**	**L63831-05**
Major Mineralogy	Calcite – 81% Dolomite – 18% Quartz – 1%	Quartz – 63% Kaolinite – 12% Dolomite – 10% K-Spar – 8% Calcite – 6% Illite – 6%
Trace Mineralogy	Pyrite, Goethite/Hematite, Mn Oxide, Organic Material	Zircon, Rutile, Apatite, Pyrite, Tourmaline, Iron Oxide, Plagioclase
Petrographic Description	Tan colored limestone primarily containing fine to coarse grained sparry calcite with a grain size that varies from 1 µm to 250 µm. Intermixed with calcite is rhomb shaped grains of dolomite up to 50 µm. Quartz is present in low amounts and occurs as liberated angular fragments and small pockets of fibrous chalcedony up to 275 µm in size. Crosscutting larger fragments of sparry calcite are thin seams of dark brown organic material. The organics commonly carry small pyrite framboids up to 15 µm. Iron oxide is present in trace amounts and occurs as small masses and as pseudomorphs after pyrite. Iron oxide is sometimes seen with black opaque patches of Mn oxide.	Carbonate cemented sandstone primarily containing quartz as angular to well rounded grains with measurements that vary significantly from 1 µm up to 300 µm. Plagioclase and potassium feldspar are present in low amounts and occur as angular grains up to 150 µm. XRD indicates low levels of clay in the form of kaolinite and illite, however, clay is not discernible in thin section by light microscopy. Dolomite and calcite occur as fine liberated grains in the size range of 1 µm to 75 µm. Pyrite is present as a trace and occurs as liberated fragments and cubes up to 75 µm with no apparent oxidation. Accessory minerals include zircon, honey colored rutile, brown tourmaline, colorless apatite and iron oxide.

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Table 3-10 Total Metals Concentrations for the Various Lithologies.

Boring	SAG-1	SAG-2	SAG-1	SAG-1	SAG-2	SAG-2	SAG-1	SAG-1	SAG-2	SAG-2
Formation	Chinle Shale	Chinle Shale	San Andres LS	San Andres LS	San Andres LS	San Andres LS	Glorieta SS	Glorieta SS	Glorieta SS	Glorieta SS
Lithology	Siltstone	Siltstone	Limestone	Dolostone	Limestone	Dolostone	Sandstone	Sandstone	Sandstone	Sandstone
Interval (ft)	189-190	163-164	235.5-236.5	283-284	215-216	244-245	426-427	464-465	439.5-440.5	463-464
Sample ID	SAG1-CS-189-190	SAG2-CS-163-164	SAG1-SALS-235.5-236.5	SAG1-SALS-283-284	SAG2-SALS-215-216	SAG2-SALS-244-245	SAG1-GSS-426-427	SAG1-GSS-464-465	SAG2-GSS-439.5-440.5	SAG2-GSS-463-464
ACZ ID	L63831-01	L63799-01	L63831-02	L63831-03	L63799-02	L63799-03	L63831-04	L63831-05	L63799-04	L63799-05
Aluminum (%)	1.8	0.498	0.0545	0.0119	0.248	0.046	0.256	0.639	0.298	0.418
Barium	191	130	101	38.7	53.7	22.9	288	95.2	60.7	1070
Boron	14.3	6.46	<20	<2	<2	<19.8	<2	<2	<2	<2
Calcium (%)	0.240	0.0592	35.5	13.9	9.81	21.9	2.72	2.70	1.24	1.25
Iron (%)	3.74	0.22	0.413	0.0934	0.4070	0.172	0.169	0.294	0.370	0.296
Lithium	24.1	1.66	5.68	2.33	1.56	4.35	<0.8	2.02	<0.8	1.1
Magnesium (%)	0.604	0.0479	2.64	8.07	0.042	12.6	0.0441	0.746	0.134	0.515
Manganese	187	57.7	561	168	264	406	63.3	181	62.8	99.5
Molybdenum	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Phosphorus	642	<10	243	188	126	275	50.1	208	122	145
Potassium (%)	0.0512	0.197	0.0179	0.0028	0.0616	0.0197	0.0810	0.242	0.0981	0.153
Selenium	0.169	0.0632	0.421	0.277	0.133	0.102	<0.05	0.188	0.247	0.0975
Silicon	1,030	1,020	359	245	743	371	781	2,040	519	995
Sodium (%)	0.0112	0.00388	0.00987	0.0172	<0.002	0.0227	<0.002	0.00307	<0.002	0.00206
Strontium	32	10.4	128	63.9	27.7	73.1	13.8	16.7	9	30.8
Titanium	232	286	15.6	7.35	6.27	14.4	8.48	27.7	9.41	9.06
Uranium	0.449	0.819	0.52	0.675	1.01	2.51	0.125	0.26	1.16	0.173
Vanadium	14.6	20.5	12.5	3.14	3.27	12.7	1.72	4.55	1.82	3.23

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Table 3-11 Selected Elemental Abundance for Various Rock Types[1].

Element	Clays & Shales	Shales	Sandstone	Carbonate Rocks
MAJOR ELEMENTS (weight %)				
Aluminum	10.45	8.0	2.5	0.42
Calcium	2.53	2.21	3.91	30.23
Iron	3.33	4.72	0.98	0.38
Magnesium	1.34	1.5	0.7	4.7
Potassium	2.28	2.66	1.07	0.27
Sodium	0.66	0.96	0.33	0.04
MINOR ELEMENTS (mg/kg)				
Uranium	3.2	3.7	0.45	2.2
Molybdenum	2	2.6	0.2	0.4
Selenium	0.6	0.6	0.05	0.08
Boron	100	100	35	20
Vanadium	130	130	20	20

[1] Fleischer and Parker, 1967.

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Table 3-12 Carbon (%), Sulfur (%), and CEC Contents for the Various Lithologies.

Boring	SAG-1	SAG-2	SAG-1	SAG-1	SAG-2	SAG-2	SAG-1	SAG-1	SAG-2	SAG-2
Formation	Chinle Shale	Chinle Shale	San Andres LS	San Andres LS	San Andres LS	San Andres LS	Glorieta SS	Glorieta SS	Glorieta SS	Glorieta SS
Lithology	Siltstone	Siltstone	Limestone	Dolostone	Limestone	Dolostone	Sandstone	Sandstone	Sandstone	Sandstone
Interval (ft)	189-190	163-164	235.5-236.5	283-284	215-216	244-245	426-427	464-465	439.5-440.5	463-464
Sample ID	SAG1-CS-189-190	SAG2-CS-163-164	SAG1-SALS-235.5-236.5	SAG1-SALS-283-284	SAG2-SALS-215-216	SAG2-SALS-244-245	SAG1-GSS-426-427	SAG1-GSS-464-465	SAG2-GSS-439.5-440.5	SAG2-GSS-463-464
ACZ ID	L63831-01	L63799-01	L63831-02	L63831-03	L63799-02	L63799-03	L63831-04	L63831-05	L63799-04	L63799-05
Total Carbon	<0.1	<0.1	12.9	8.8	3.1	14.1	0.8	1.2	0.4	0.6
Total Inorganic Carbon	<0.1	<0.1	12.9	8.7	3.0	14.0	0.8	1	0.4	0.6
Total Organic Carbon	0.1	0.1	<0.1	0.1	0.1	0.1	<0.1	0.2	<0.1	<0.1
Total-Sulfur	<0.01	<0.01	0.03	0.01	0.37	0.02	0.01	0.08	0.37	0.13
Sulfide-Sulfur	<0.01	<0.01	<0.01	<0.01	0.28	<0.01	<0.01	0.07	0.20	0.09
Sulfate-Sulfur	<0.01	<0.01	0.03	0.01	0.07	0.02	0.01	0.01	0.17	0.04
CEC (meq/100g)	7.4	2.76	NM	NM	NM	NM	1.46	3.19	1.51	1.98

Table 3-13 Complete Water Quality Results from Wells SAG-1 and SAG-2 (February, 2021).

SAMPLE ID	SAG1-1	SAG1-2	SAG1-3	SAG1-4	SAG1-5	SAG2-1	SAG2-2	SAG2-3	SAG2-4	SAG2-5	0943M	0951R	Field Blank	0999 [1]	RPD
Date	2/22/21	2/23/21	2/23/21	2/25/21	2/25/21	2/26/21	2/26/21	2/26/21	2/26/21	2/26/21	3/23/21	3/23/21	2/25/21	2/26/21	-------
Depth (ft)	260.5	312.5	364.5	394.5	417.5	166.5	207.5	262.5	317.5	372.5	770	470	--------	--------	--------
Elevation (ft amsl)	6299.5	6247.5	6195.5	6165.5	6142.5	6399.5	6358.5	6303.5	6248.5	6193.5	5783.8	6105.8	--------	--------	--------
Dissolved O_2 (mg/L)	0.15	0.12	0.16	0.11	0.11	2.79	2.2	0.08	0.07	0.14	0.27	0.47	--------	--------	--------
Eh (mV)	25.4	110.2	98.9	51.7	96.0	291.8	326.1	152.5	44.9	84.7	85.8	255	--------	--------	--------
EC (uS/cm)	1238	1390	1488	1817	2011	1220	1216	1228	1234	1351	1930	1822	--------	--------	--------
pH (s.u.)	7.43	7.59	7.63	7.48	7.44	7.21	7.26	7.25	7.56	7.49	7.07	6.98	--------	--------	--------
Temperature (°C)	13.0	13.7	13.8	12.7	12.9	13.1	12.4	12.4	12.9	13.2	15.4	15.2	--------	--------	--------
Calcium (mg/L)	135	144	170	332	402	176	172	176	153	195	201	185	<0.1	175	0.57
Iron (mg/L)	14.9	0.924	1.03	3.46	1.94	<0.06	<0.06	1.2	3.8	2.7	4.25	<0.06	<0.06	<0.06	-------
Fe^{2+} (mg/L)	3.29	0.89	1.0	2.71	1.84	0.16	0.010	1.0	3.26	2.12	4.6	<0.02	--------	--------	--------
Fe^{3+} (calc.) (mg/L) [2]	11.61	0.03	0.03	0.75	0.10	**0.06**	0.05	0.20	0.54	0.58	**0.06**	<0.04	--------	--------	--------
Magnesium (mg/L)	45.5	47.4	50.5	61.3	63.1	46	45.6	46.5	48.2	48.6	62.5	60.6	<0.2	45.7	0.65
Manganese (mg/L)	0.821	4.33	7.61	2.13	3.66	0.046	0.053	0.837	1.91	4.48	0.029	<0.01	<0.01	0.045	2.20
Molybdenum (mg/L)	0.0409	0.0292	0.0351	0.00866	0.0112	0.00211	0.00276	0.0107	0.0175	0.0137	0.00079	0.00181	<0.0002	0.00194	8.40
Potassium (mg/L)	3.99	4.82	4.87	3.64	3.19	4.1	4.01	4.14	4.43	4.13	8.34	8.32	<0.2	4.07	0.73
Selenium (mg/L)	0.00023	0.00021	0.00037	0.0002	0.00018	0.00613	0.00582	0.00364	0.0001	0.00015	0.00782	0.00796	<0.0001	0.0063	2.74
Sodium (mg/L)	95.7	123	123	74.5	72.8	65.3	63.6	67.8	82.8	66.5	172	167	<0.2	64	2.01
Uranium (mg/L)	0.00175	0.00703	0.00537	0.00201	0.00196	0.00705	0.00703	0.0079	0.00486	0.000582	0.00678	0.0255	<0.0001	0.00705	0.00
Vanadium (mg/L)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00092	<0.0005	<0.0005	-------
Total Alkalinity (mg CaCO3/L)	205	201	174	148	152	261	266	275	237	214	341	317	<2	267	2.27
Bicarbonate Alkalinity (mg CaCO3/L)	205	201	174	148	152	261	266	275	237	214	341	317	<2	267	2.27
Carbonate Alkalinity (mg CaCO3/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-------
Dissolved Organic Carbon (mg/L)	24.2	9.4	11.8	7.1	12.7	2.2	3.2	32.1	12.5	7.3	<1	<1	<1	1.9	14.6
Chloride (mg/L)	72.6	94.3	91.4	40.3	40	54	55.6	56.7	61.7	55.6	151	141	<0.5	57.3	5.93
Hardness (mg CaCO3/L)	524	555	632	1080	1260	629	617	631	581	687	759	711	<0.2	625	0.64
Nitrate+Nitrite-N (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	2.31	2.18	0.025	<0.02	<0.02	3.71	3.78	<0.02	2.35	1.72
Ammonia-N (mg/L)	0.259	0.739	0.579	0.159	0.191	<0.05	<0.05	0.099	0.786	0.216	<0.05	<0.05	<0.05	<0.05	-------
Total Dissolved Solids (mg/L)	860	1120	1140	1670	1960	978	984	970	930	1130	1480	1400	<20	988	1.02
Sulfate (mg/L)	399	461	629	1070	1220	408	410	411	436	593	603	556	<1	411	0.73
Sulfide (mg S/L)	<0.02	<0.02	<0.02	<0.02	0.026	<0.02	<0.02	<0.02	0.026	<0.02	<0.02	<0.02	<0.02	<0.02	-------
Radium-226 (pCi/L)	1 ±0.22	0.17 ±0.24	2.2 ±0.31	0.82 ±0.21	0.44 ±0.19	0.44 ±0.23	0.22 ±0.13	0.3 ±0.17	4.2 ±0.48	1.3	NM	NM	-0.01 ±0.11	0.36 ±0.11	20.0
Radium-228 (pCi/L)	0.33 ±1	0.87 ±0.86	0.62 ±1.1	0.41 ±0.89	-0.2 ±0.84	0.78 ±0.81	0.55 ±0.57	0.44 ±0.99	-0.25 ±0.9	0.67	NM	NM	-0.13 ±0.77	1.4 ±1.1	56.9
Radium-226+228	1.33	1.04	2.82	1.23	0.44	1.22	0.77	0.74	4.2	1.97	NM	NM	-------	1.76	36.2
Thorium-230 (pCi/L)	1.55 ±1.1	0.751 ±2.4	1.34 ±2.1	4.01 ±2.4	4.75 ±3.6	1.01 ±0.59	0.55 ±0.55	3.8 ±3.6	2.55 ±2.4	2.81	NM	NM	1.97 ±1.9	0.183 ±0.26	139

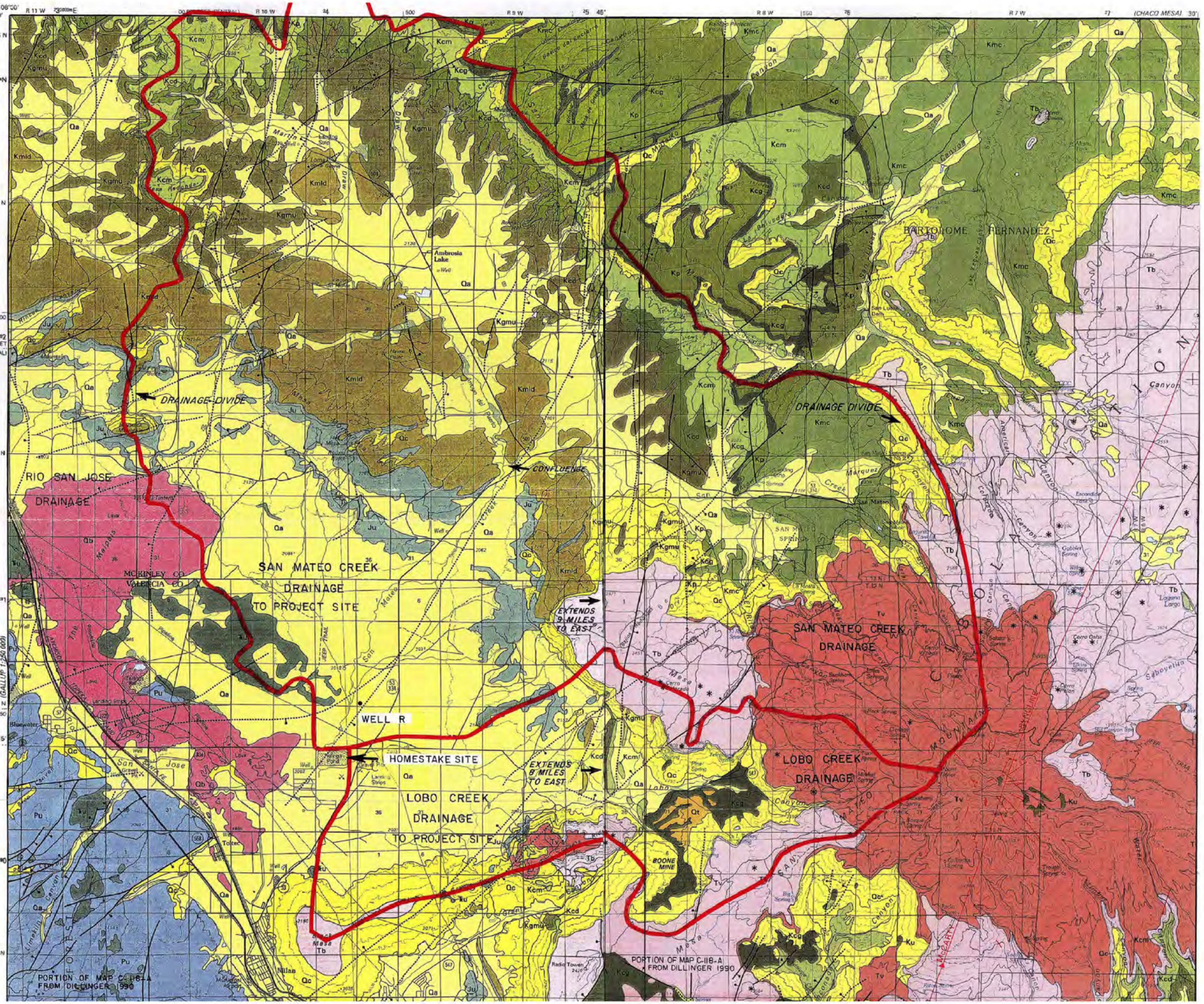
[1] SAG2-1 duplicate. [2] Ferric Fe calculated by difference. Bold value indicates a negative value was obtained and the detection limit (0.06 mg/L) was substituted.

Table 3-14 Complete Water Quality Results from Wells SAG-1 and SAG-2 (April, 2021).

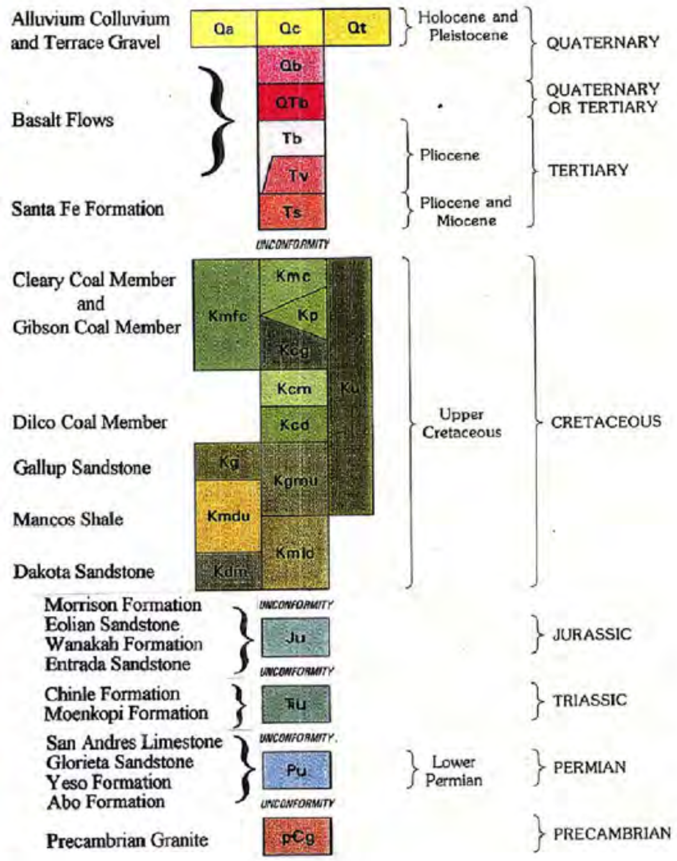
SAMPLE ID	SAG1-1	SAG1-2	SAG1-3	SAG1-4	SAG1-5	SAG2-1	SAG2-2	SAG2-3	SAG2-4	SAG2-5	Field Blank	0999 [1]	RPD
Date	4/5/21	4/5/21	4/5/21	4/5/21	4/5/21	4/2/21	4/2/21	4/2/21	4/1/21	4/1/21	4/2/21	4/5/21	-------
Depth (ft)	260.5	312.5	364.5	394.5	417.5	166.5	207.5	262.5	317.5	372.5	-------	-------	-------
Elevation (ft amsl)	6299.5	6247.5	6195.5	6165.5	6142.5	6399.5	6358.5	6303.5	6248.5	6193.5	-------	-------	-------
Dissolved O_2 (mg/L)	0.20	0.19	0.22	0.21	0.19	3.49	2.38	0.53	0.28	0.18	-------	-------	-------
Eh (mV)	29.4	125.4	110.1	77.5	80.6	318.2	308.8	56.7	39.7	56.0	-------	-------	-------
EC (uS/cm)	1389	1405	1543	1879	2119	1256	1250	1221	1265	1556	-------	-------	-------
pH (s.u.)	7.57	7.76	7.65	7.53	7.45	7.35	7.38	7.44	7.75	7.69	-------	-------	-------
Temperature (°C)	14.2	13.9	13.9	13.9	13.2	13.9	13.6	13.7	13.6	13.8	-------	-------	-------
Calcium (mg/L)	131	151	184	345	428	179	177	162	145	236	<0.1	150	0.66
Iron (mg/L)	12.8	0.873	1.02	3.46	1.92	<0.06	<0.06	3.23	4.69	3.04	<0.06	0.858	1.73
Fe^{2+} (mg/L) [2]	4.8	0.95	1.11	2.21	1.91	0.04	0.07	2.97	4.6	2.98	-------	-------	-------
Fe^{3+} (calc.) (mg/L)	8.00	**0.06**	**0.06**	1.25	0.01	0.02	**0.06**	0.26	0.09	0.06	-------	-------	-------
Magnesium (mg/L)	45.7	49.6	53.1	63.8	65.3	47.2	47.2	46.7	48.4	56.4	<0.2	49	1.22
Manganese (mg/L)	0.738	4.2	6.13	2.01	2.99	0.027	0.03	0.874	2.11	6.5	<0.01	4.14	1.44
Molybdenum (mg/L)	0.02740	0.01940	0.02190	0.00620	0.00806	0.00200	0.00293	0.01000	0.01660	0.01730	<0.0002	0.01930	0.52
Potassium (mg/L)	4.04	4.81	4.89	3.71	2.99	4.17	4.04	4.36	4.32	4.61	<0.2	4.82	-0.21
Selenium (mg/L)	0.00012	<0.0001	0.00013	<0.0001	0.00013	0.00636	0.00567	0.00051	<0.0001	0.00014	<0.0001	<0.0001	-------
Sodium (mg/L)	98.1	122	125	76.7	69.3	66.4	66	70.8	88.8	74.1	<0.2	121	0.82
Uranium (mg/L)	0.00120	0.00662	0.00440	0.00138	0.00143	0.00715	0.00719	0.00623	0.00370	0.00303	<0.0001	0.00669	-1.05
Vanadium (mg/L)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-------
Total Alkalinity (mg CaCO3/L)	209	229	180	149	159	295	292	249	250	137	3.6	232	-1.30
Bicarbonate Alkalinity (mg CaCO3/L)	209	229	180	149	159	295	292	249	250	137	3.6	232	-1.30
Carbonate Alkalinity (mg CaCO3/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-------
Dissolved Organic Carbon (mg/L)	18.3	5.2	6.7	4.5	11.4	1.8	1.5	17.6	10.8	10.6	<1	5.2	0.00
Chloride (mg/L)	72	86.4	88.7	34.9	29.2	53.5	54	56.9	66.2	46	0.68	86.1	0.35
Hardness (mg CaCO3/L)	515	581	678	1120	1340	641	636	597	561	822	<0.2	576	0.86
Nitrate+Nitrite-N (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	2.39	2.23	<0.02	<0.02	<0.02	<0.02	<0.02	-------
Ammonia-N (mg/L)	0.281	0.786	0.548	0.109	0.152	<0.05	<0.05	0.379	0.836	0.243	<0.05	0.783	0.38
Total Dissolved Solids (mg/L)	880	1000	1120	1680	1980	980	974	820	840	1180	1.3	980	2.02
Sulfate (mg/L)	446	474	613	1040	1290	394	381	397	426	769	<1	491	-3.52
Sulfide (mg S/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.064	<0.02	<0.02	<0.02	<0.02	-------
Radium-226 (pCi/L)	0.22 ±0.09	0.29 ±0.13	1.1 ±0.17	0.62 ±0.14	0.3 ±0.1	0.36 ±0.13	0.17 ±0.08	0.24 ±0.19	1.3 ±0.25	1.2 ±0.29	0.11 ±0.14	0.17 ±0.07	52.17
Radium-228 (pCi/L)	0.1 ±1.2	0.43 ±1.2	0.47 ±1	-0.73 ±1.2	0.28 ±1.2	0.22 ±0.87	0.28 ±1.1	0.68 ±1.1	0.44 ±1	-0.43 ±0.95	-0.22 ±0.77	-0.51 ±1	-2350
Radium-226+228	0.32	0.72	1.57	0.62	0.58	0.58	0.45	0.92	1.74	1.2	0.11	0.17	124.0
Thorium-230 (pCi/L)	0.407 ±0.3	0.406 ±0.4	0.604 ±0.37	0.208 ±0.32	0.425 ±0.32	0.189 ±0.28	0.393 ±0.31	0.372 ±0.24	0.428 ±0.3	0.424 ±0.26	0.439 ±0.31	0.413 ±0.26	-1.71

[1] SAG1-2 duplicate. [2] Ferric Fe calculated by difference. Bold value indicates a negative value was obtained and the detection limit (0.06 mg/L) was substituted.

Figures



LEGENDS: Correlation of Map Units



Source:
Dillinger, J.K., 1990, Geologic map of the Grants 30' x 60' quadrangle, west-central New Mexico: U.S. Geological Survey, Coal Investigation Map C-118-A, scale 1:100,000.

Adopted from:
Grants Reclamation Project Updated Corrective Action Program, HMC, 2012

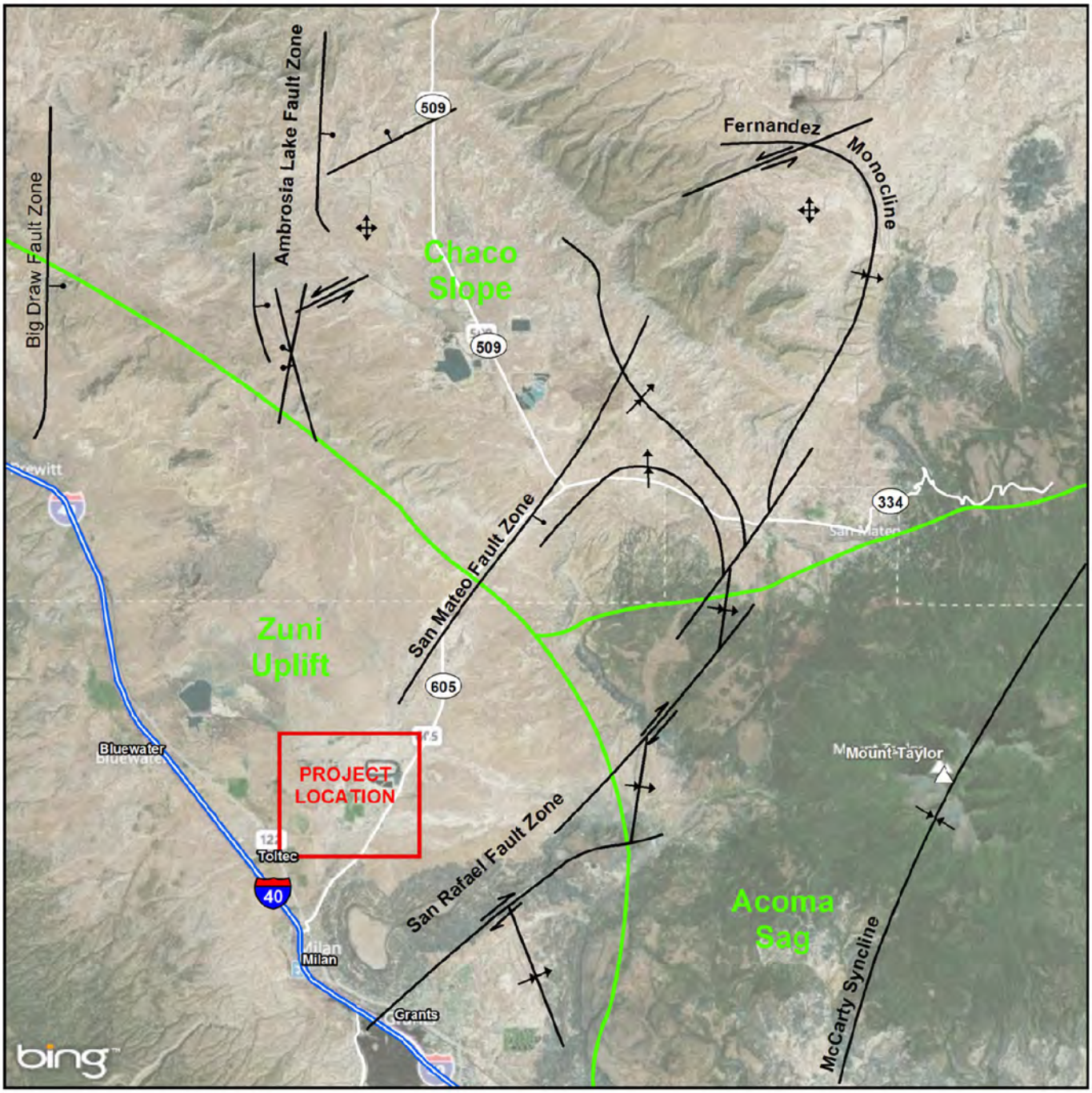
HOMESTAKE

BEDROCK GEOLOGY

OVERVIEW MAP

FIGURE 2-1

PATH: Z:\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMINING\MAP_DOCS\FINAL\SAG_CHAR_REPORT\BARRICK_FIG2_1_LANDSCAPE11X17.MXD - USER: HROSADO - DATE: 4/15/2021



LEGEND:

- Normal Fault
- Strike-Slip (Left-Lateral)
- Strike-Slip (Right-Lateral)
- Monocline
- Syncline
- Dome
- Structural Feature Boundary

N

0 3 6 Miles

Aerial: Bing Maps Hybrid - © 2010 Microsoft Corporation and its data suppliers

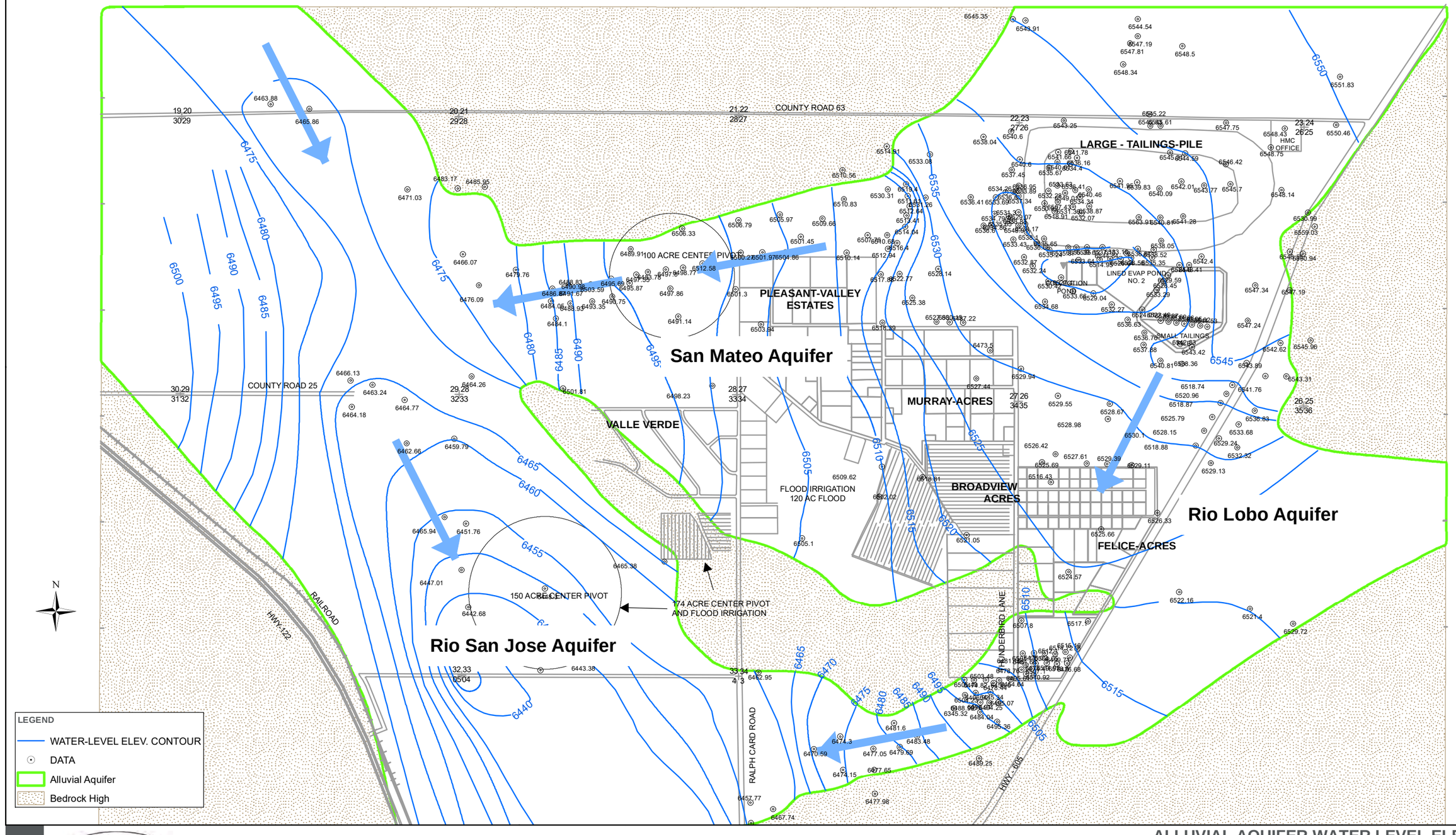
Source: Grants Reclamation Project Updated Corrective Action Program, HMC, 2012

Adopted from: Grants Reclamation Project Updated Corrective Action Program, HMC, 2012

PATH: Z:\PROJECTS\PROPOSALS\10\071518_BARRICK_RIF_HOMESTAKEMININGMAP_DOCS\FINAL\SAG_CHAR_REPORT\BARRICK_FIG2_2_PORTRAIT8X11.MXD - USER: HROSADO - DATE: 4/15/2021

REGIONAL STRUCTURAL FEATURES

FIGURE 2-2



Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

0 1,800 Feet

ALLUVIAL AQUIFER WATER LEVEL ELEVATIONS

FIGURE 2-3

COUNTY ROAD 63

COUNTY ROAD 25

LARGE - TAILINGS-PILE

HMC OFFICE

100 ACRE CENTER PIVOT

PLEASANT-VALLEY ESTATES

LINED EVAP POND NO. 2

COLLECTION POND

SMALL TAILINGS PILE

MURRAY-ACRES

VALLE VERDE

FLOOD IRRIGATION 120 AC FLOOD

BROADVIEW ACRES

FELICE-ACRES

150 ACRE CENTER PIVOT

174 ACRE CENTER PIVOT AND FLOOD IRRIGATION

RAILROAD

HWY-122

RALPH CARD ROAD

THUNDERBIRD LANE

HWY-605

N

LEGEND

PermeabilityFt_Day

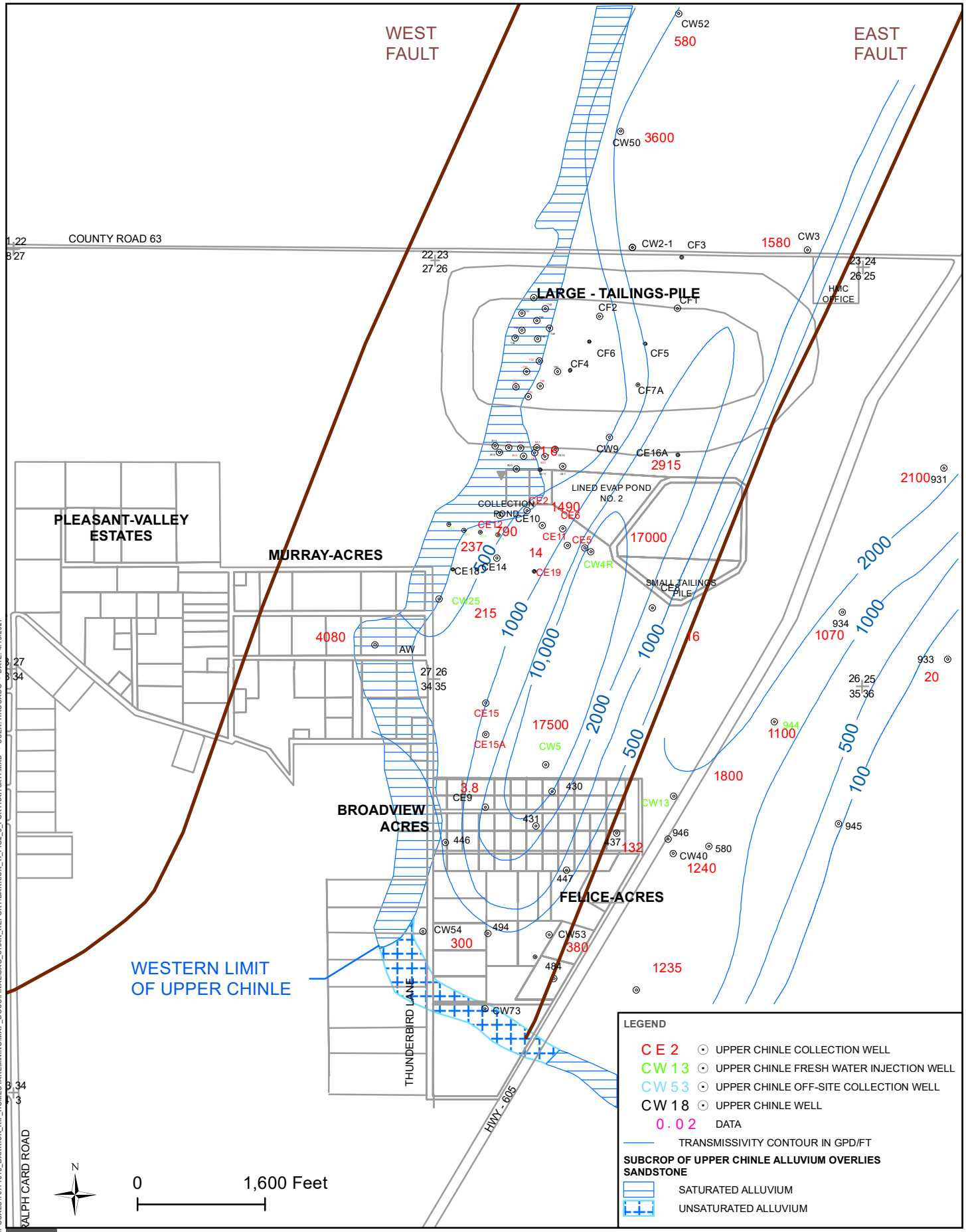
S4 Location and Value

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

0 1,500 Feet

HYDRAULIC CONDUCTIVITY FOR THE ALLUVIAL AQUIFER, FT/DAY

FIGURE 2-4



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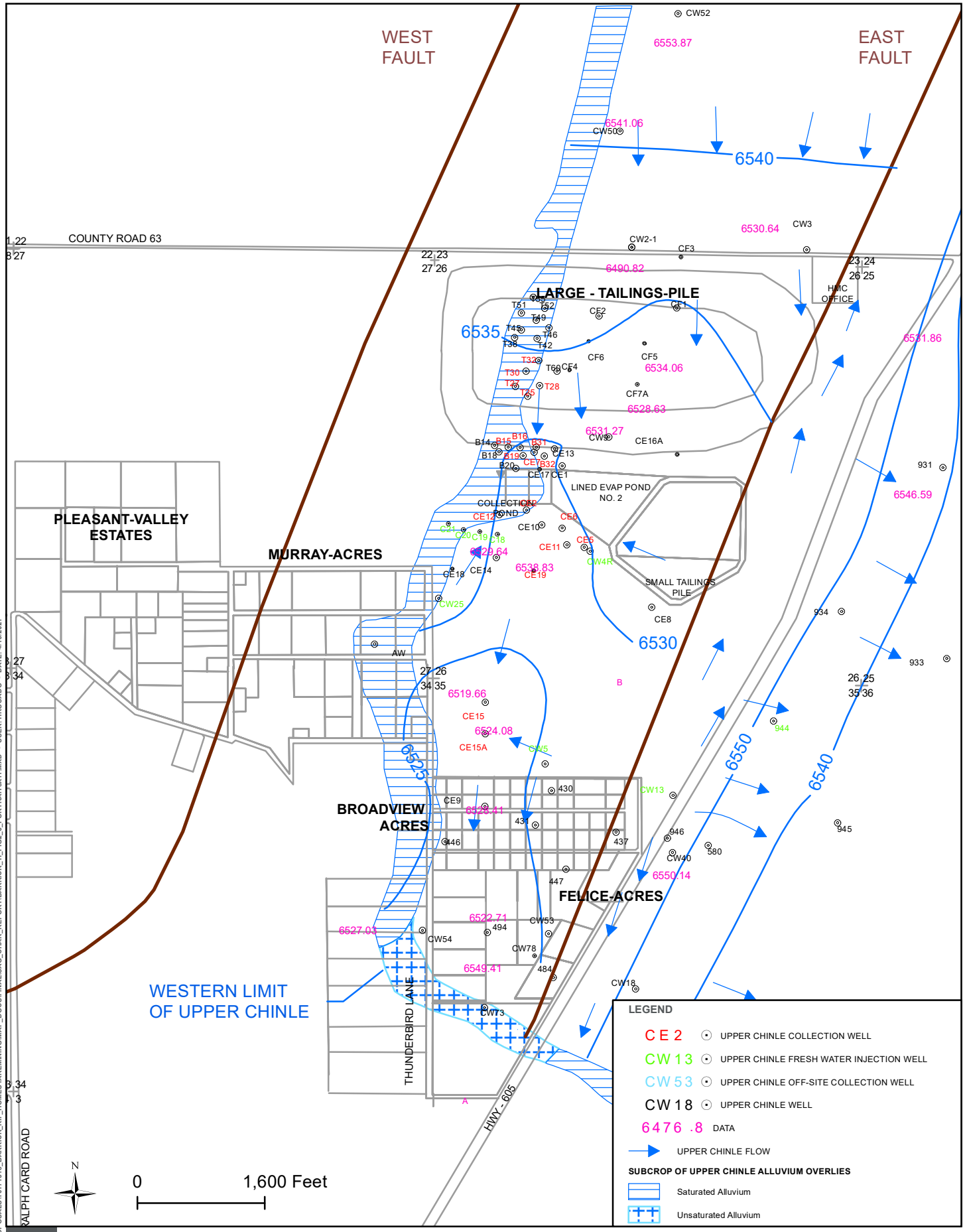
UPPER CHINLE AQUIFER TRANSMISSIVITY

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

FIGURE 2-5



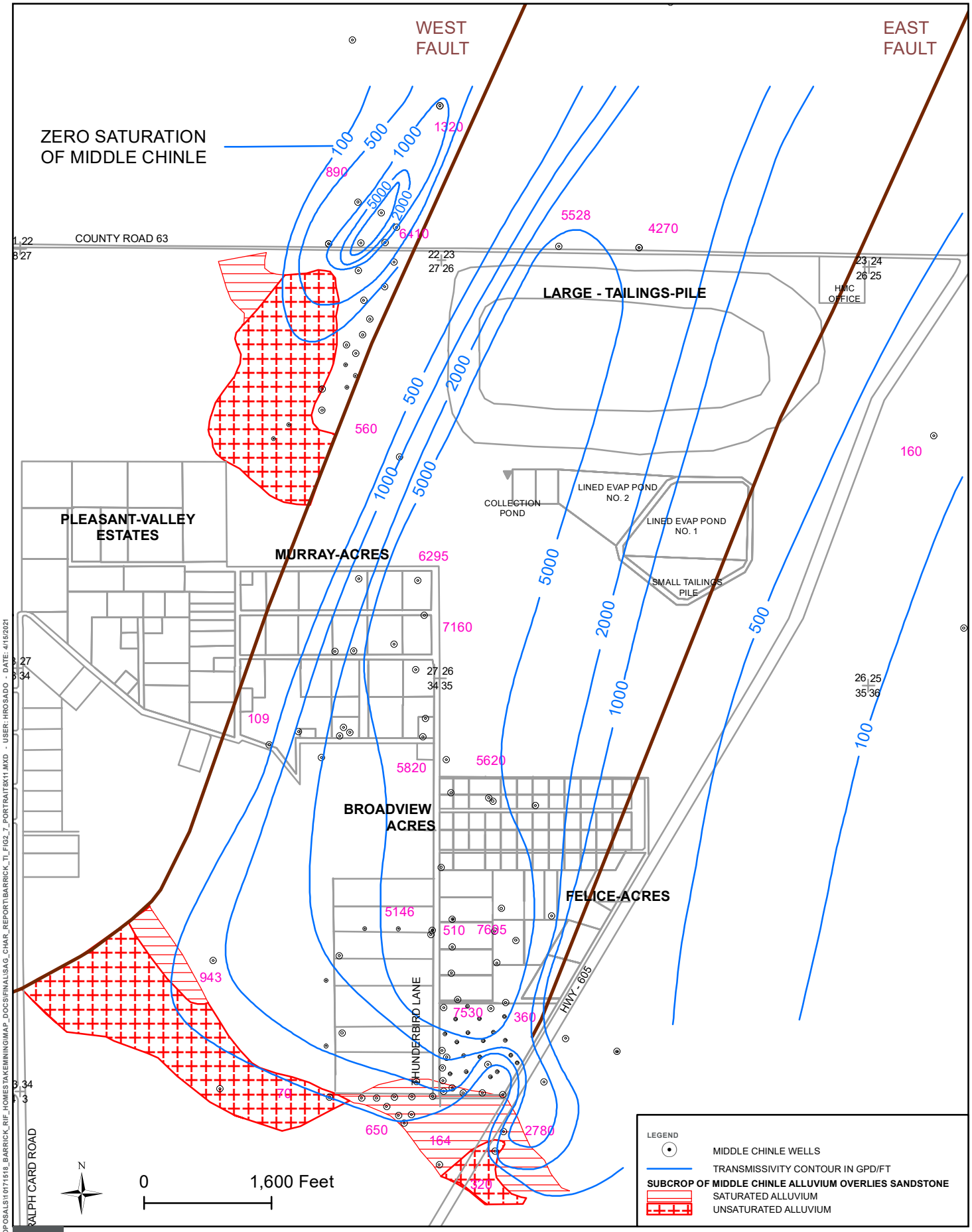
PATH: Z:\PROJECTS\PROPOSALS\10071518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINAL\SAG_CHAR_REPORT\BARRICK_TI_FIG2_6_PORTRAIT8X11.MXD - USER: HROSADO - DATE: 4/15/2021

UPPER CHINLE WATER ELEVATION & FLOW DIRECTION

FALL 2019

FIGURE 2-6

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019



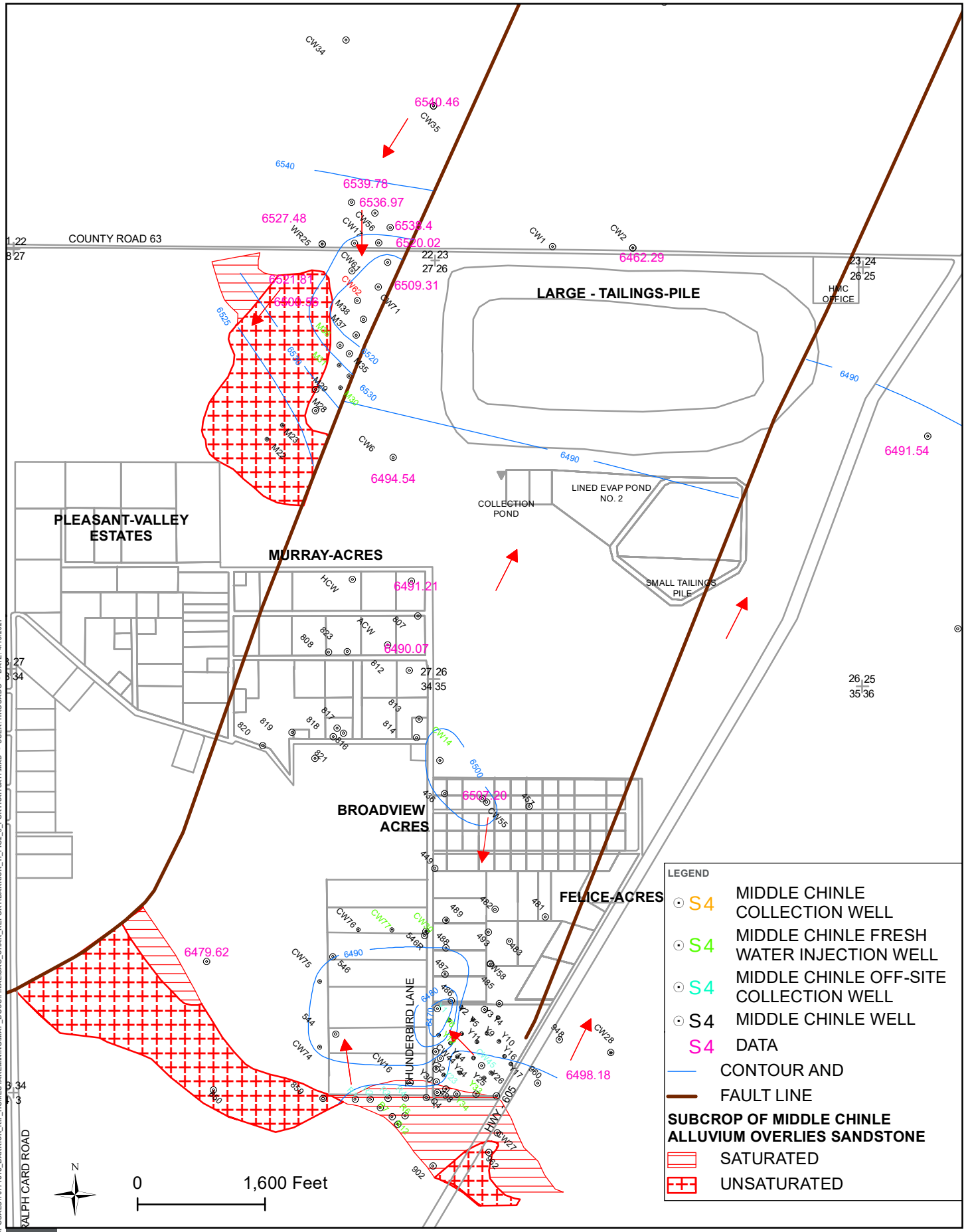
PATH: Z:\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALISAG_CHAR_REPORT\BARRICK_TI_FIG2_7_PORTRAIT8X11.MXD - USER: HROSADO - DATE: 4/15/2021

HOMESTAKE

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

MIDDLE CHINLE TRANSMISSIVITY

FIGURE 2-7



MIDDLE CHINLE WATER ELEVATION AND FLOW DIRECTION MAP

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

FALLS 2019

FIGURE 2-8

PATH: Z:\PROJECTS\PROPOSALS\1\0171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALS\SAG_CHAR_REPORT\BARRICK_TI_FIG2_8_PORTRAIT8X11.MXD - USER: HROSADO - DATE: 4/15/2021

WEST FAULT

EAST FAULT

COUNTY ROAD 63

19 20 / 30 29

20 21 / 29 28

21 22 / 28 27

22 23 / 27 26

23 24 / 26 25

HMC OFFICE

LARGE - TAILINGS-PILE

COLLECTION POND

LINED EVAP POND NO. 2

SMALL TAILINGS PILE

100

20

21

840

PLEASANT-VALLEY ESTATES

104

50

655

COUNTY ROAD 25

30 29 / 31 32

29 28 / 32 33

28 27 / 33 34

27 26 / 34 35

26 25 / 35 36

MURRAY-ACRES

VALLE VERDE

BROADVIEW ACRES

1000

14500

32

1590

20

FELICE-ACRES

RAILROAD

HWY-122

THUNDERBIRD LANE

32 33 / 05 04

33 34 / 4 3

162

1170

CW29

100

1000

131

CW26

RALPH CARD ROAD

2300

1200

CW41

HWY 605

238

853

N

LEGEND

- Lower Chinle Wells
- Transmissivity Contour in GPD/FT
- Fault Line
- Saturated Alluvium
- Unsaturated Alluvium
- Lower Chinle

HOMESTAKE

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

0 1,500 Feet

LOWER CHINLE TRANSMISIVITY

FIGURE 2-9

WEST FAULT

EAST FAULT

COUNTY ROAD 63

COUNTY ROAD 25

19 20 / 30 29

20 21 / 29 28

21 22 / 28 27

22 23 / 27 26

23 24 / 26 25

30 29 / 31 32

29 28 / 32 33

26 25 / 35 36

27 26 / 34 35

32 33 / 05 04

33 34 / 4 3

HMC OFFICE

LARGE - TAILINGS-PILE

COLLECTION POND

LINED EVAP POND NO. 2

SMALL TAILINGS PILE

PLEASANT-VALLEY ESTATES

VALLE VERDE

MURRAY-ACRES

BROADVIEW ACRES

FELICE-ACRES

THUNDERBIRD LANE

RALPH CARD ROAD

RAILROAD

HWY-122

HWY - 605

SOS MAP, SEE FIGURE 7.2-1A

1520'

CW32 6419.64

CW33 6468.75

CW31 6474.74

CW36 6474.05

CW38

CW43 6480.08

CW39

CW37 6488.87

CW29

CW26

CW41

900

837

530

832

988

990

908

954

853

903

6465

6470

6475

6480

6485

6490

6450

6460

6455

6460

6470

6475

6480

6470

N

LEGEND

- Lower Chinle Wells
- S4 Data
- Lower Chinle Flow
- Contour
- Fault Line
- Saturated Alluvium
- Unsaturated Alluvium

HOMESTAKE

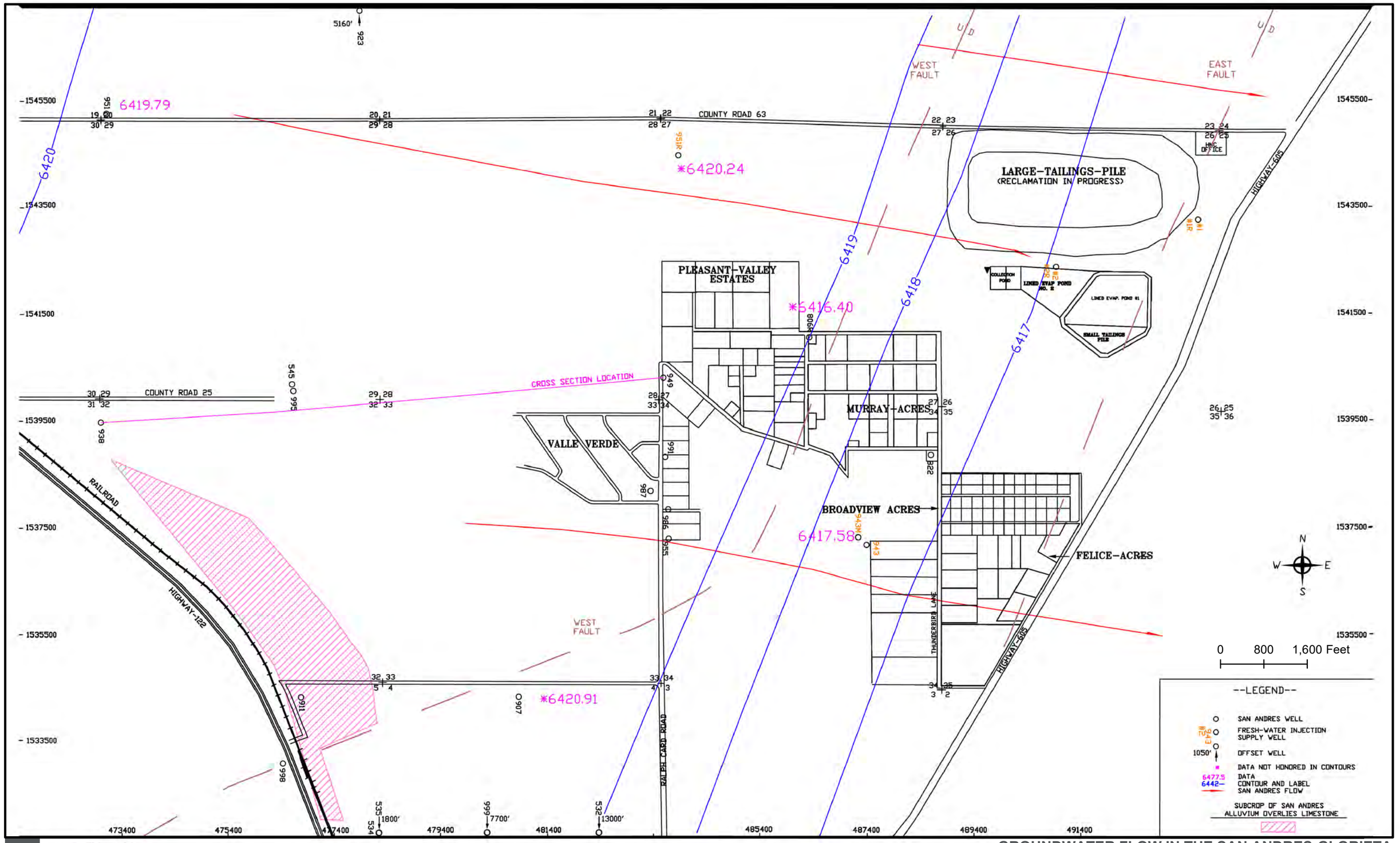
Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

0 1,500 Feet

LOWER CHINLE WATER ELEVATION AND FLOW DIRECTION

FALL 2019

FIGURE 2-10

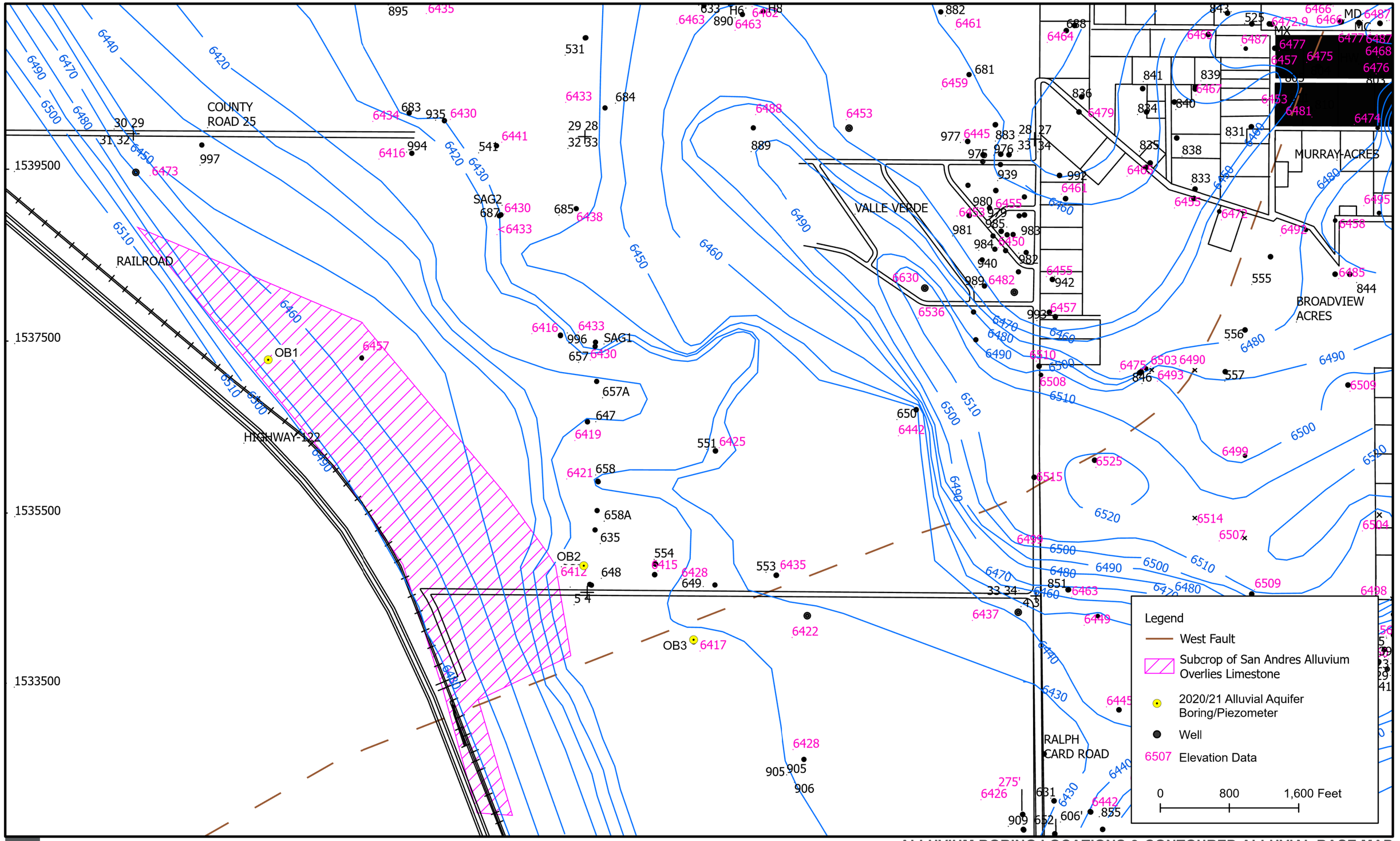


Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

GROUNDWATER FLOW IN THE SAN ANDRES-GLORIETA

FALL 2019

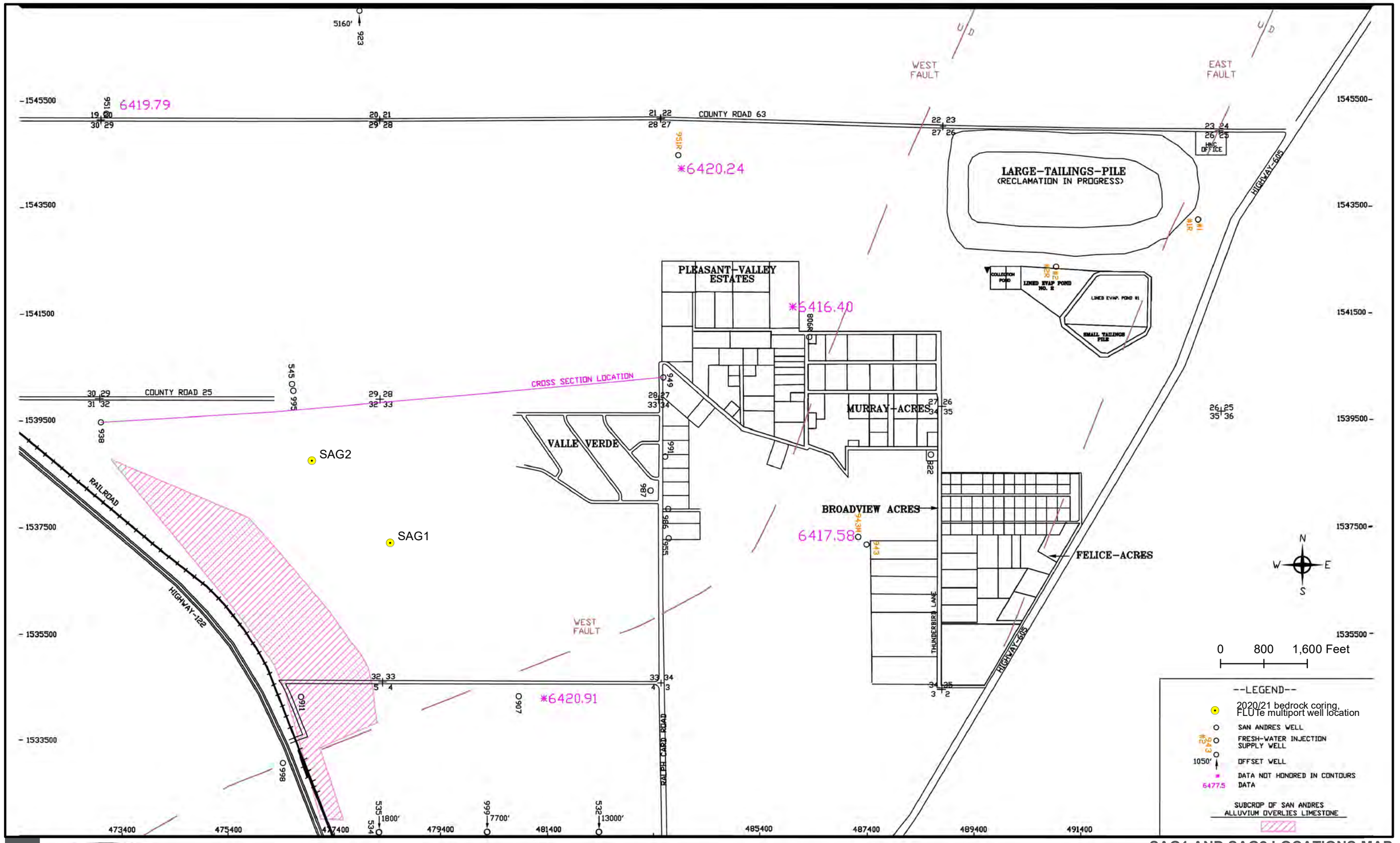
FIGURE 2-11



Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

ALLUVIUM BORING LOCATIONS & CONTOURED ALLUVIAL BASE MAP

FIGURE 3.1



SAG1 AND SAG2 LOCATIONS MAP

Source: 2018 Annual Monitoring Report/Performance Review, for Homestake's Grants Project Pursuant to NRC License, SUA1471 and Discharge Plan DP-200, HMC 2019

FIGURE 3-2

Results of FLUTe profiling for hole
no. SAG1 for *HDR, Millan, NM*

Water Table depth	127	ft BGS
Hole depth	484.166	ft BGS
liner length	500	ft BGS
casing depth	260	ft BGS
hole diameter	5	inches
liner diameter	5.6	inches
date of measurement	2/1/2021	

The profile was measured to a depth of 482.46 ft
The flow rate per unit driving pressure was 0.036604 **gal/min/ft**
The transmissivity for the remainder of the hole is: 0.0757977 cm sq./sec
The average conductivity for the remaining 1.70585 ft of the hole is 1.46E-03 cm/sec
Total borehole transmissivity is 13.00448 cm2/s

Comments:

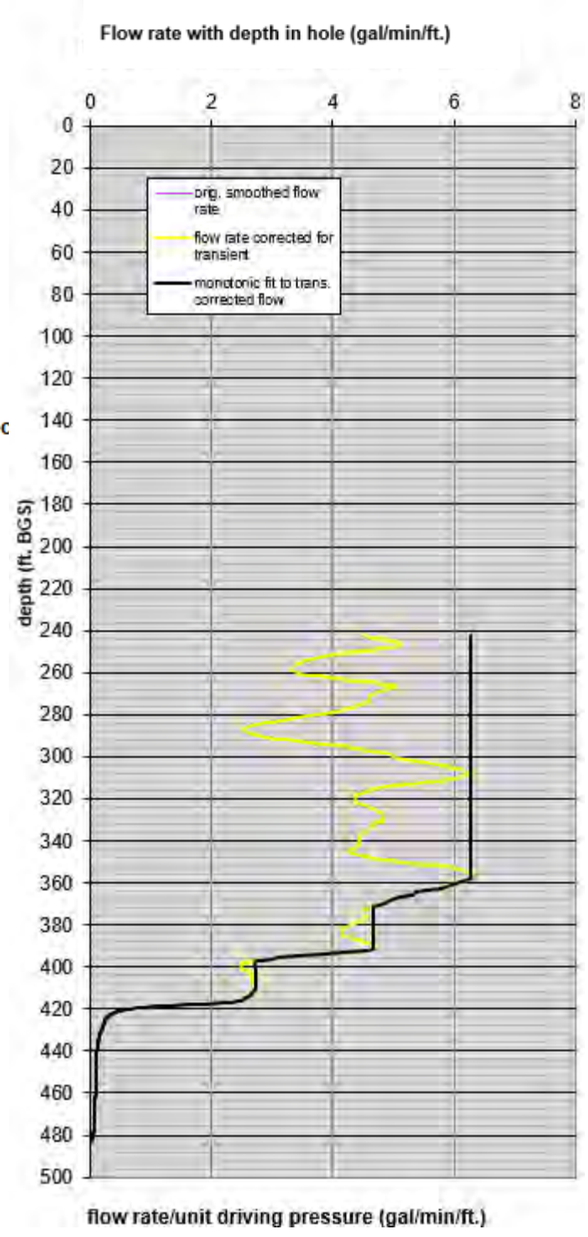
may be some inflow at 300 ft and 273 ft.
Extremely high flow at bottom portion of hole reduces the resolution to 360 ft
and the water addition rate exceeds the current pump capacity.
liner average velocity to 420 ft at 60 ft/min. (~60 gal/min.)

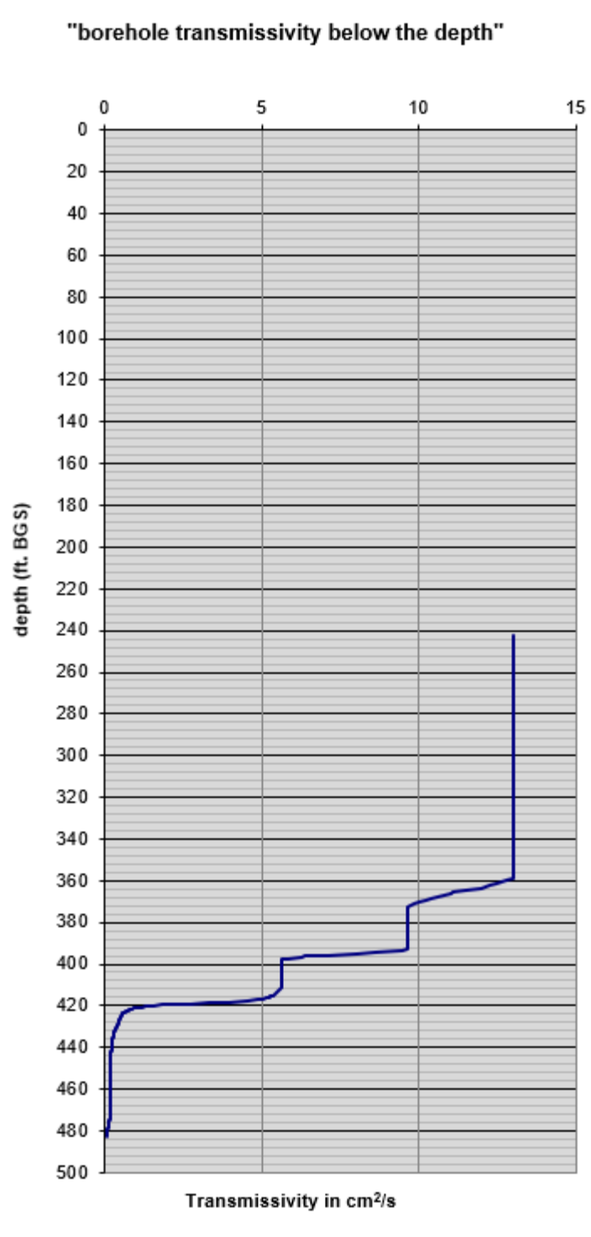
Contact for questions about data or reduction
carl Keller
Phone: 505-455-1300

Note: the flow rate curve is the liner velocity multiplied by the borehole cross section

A drop in flow rate is usually associated with loss into the hole wall.
The magnitude of the drop in velocity is a direct measure of the loss into the hole wall.
The agreement between the black monotonic fit and the yellow smoothed flow/velocity curve of the first graph is an indication of the data reliability.
The transmissivity curve of the second graph is calculated from the monotonic flow rate curve.

Monotonic curve (black over yellow) is corrected for the transient





Results of FLUTe profiling for hole

no. SAG-2 for ***HDR, Grants, NM***

Water Table depth	131	ft BGS
Hole depth	376.25	ft BGS
liner length	500	ft BGS
casing depth	161	ft BGS
hole diameter	5	inches
liner diameter	5.6	inches
date of measurement	1/12/2021	

The profile was measured to a depth of 374.106 ft

The flow rate per unit driving pressure was 0.502606 **gal/min/ft**

The transmissivity for the remainder of the hole is: 1.0407572 cm sq./sec

The average conductivity for the remaining 2.14363 ft of the hole is 1.59E-02 cm/sec

Total borehole transmissivity is 16.8662 cm2/s

Comments:

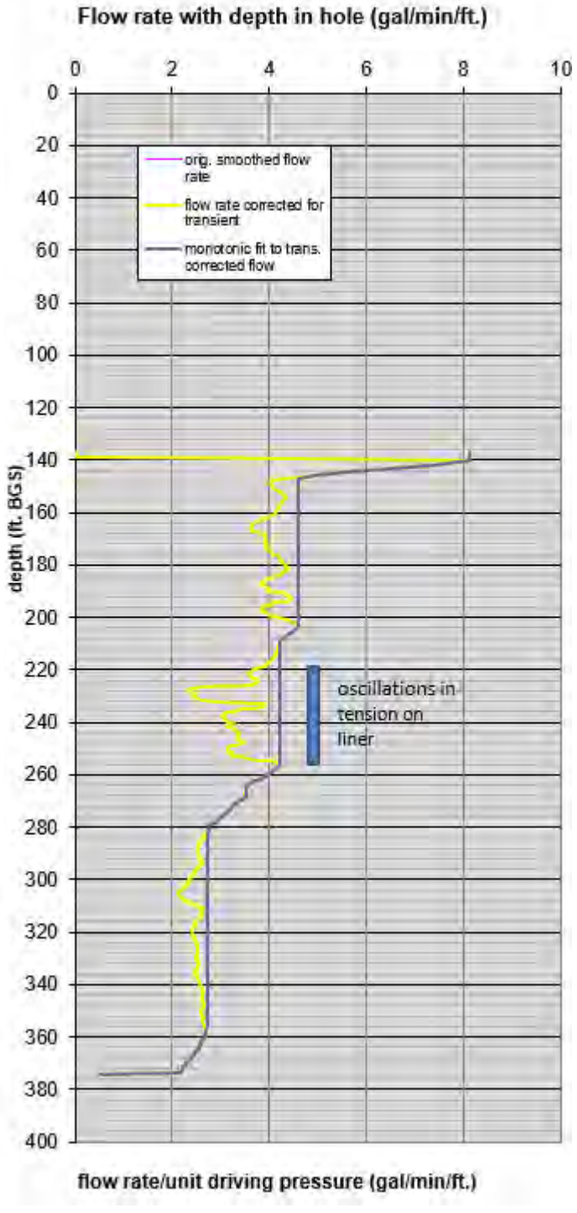
Extremely fast flowing hole 120-60 gal/min.
Water table at the bottom of the borehole same at the beginning as when sealed to 377 ft. Suggesting head at and below 377 ft is dominant in the borehole with associated very high transmissivity
Highest head in the formation is at 98ft bgs as determined from changing of the water level in the liner until stable.
The lowest head in the formation may be lower, but of low transmissivity.
Reverse head profile yet to be reduced but dominated by head of 131 ft bgs.

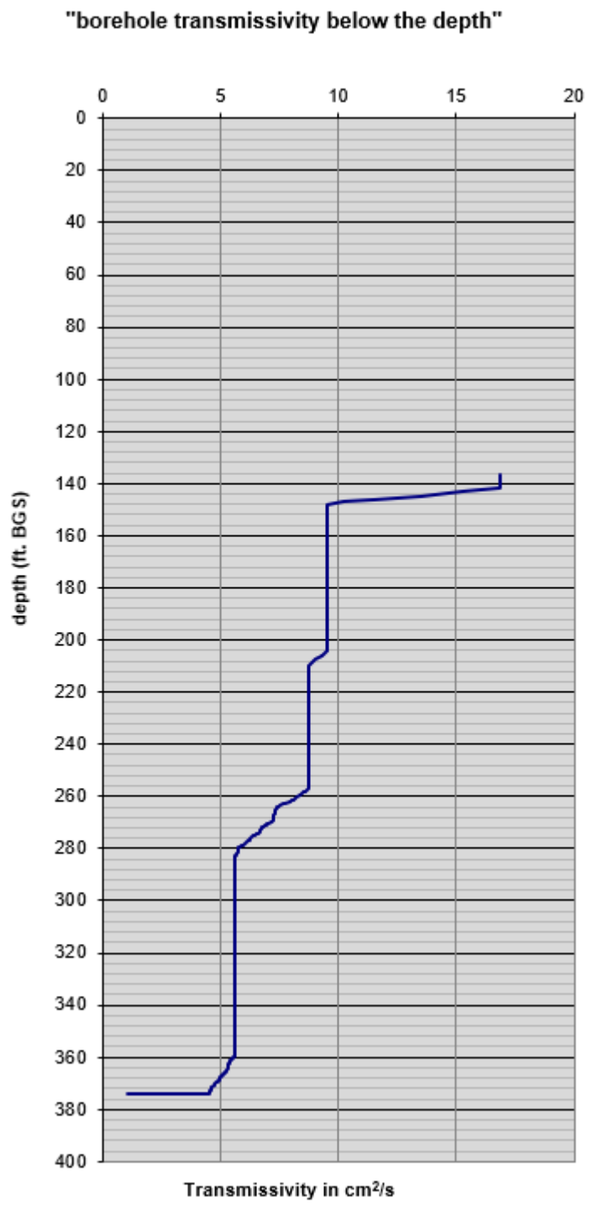
Contact for questions about data or reduction
carl Keller
Phone: 505-455-1300

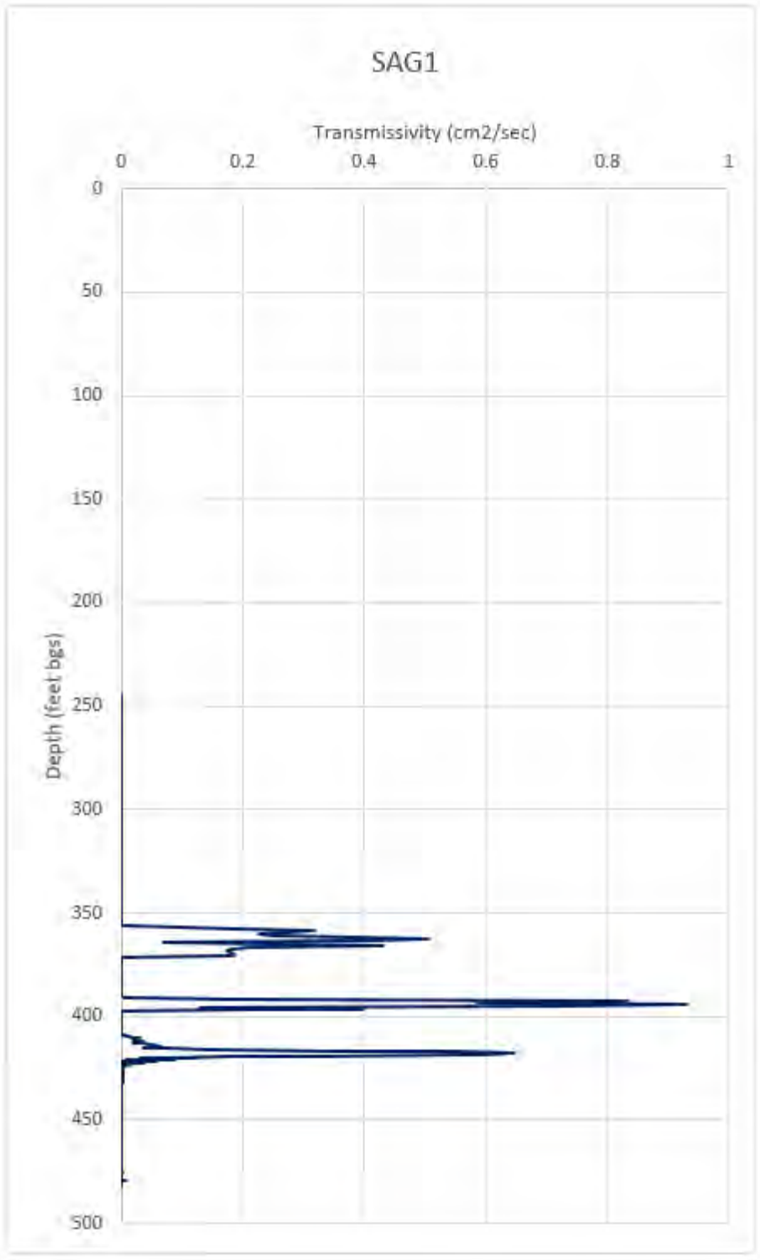
Note: the flow rate curve is the liner velocity multiplied by the borehole cross section

A drop in flow rate is usually associated with loss into the hole wall.
The magnitude of the drop in velocity is a direct measure of the loss into the hole wall.
The agreement between the black monotonic fit and the yellow smoothed flow/velocity curve of the first graph is an indication of the data reliability.
The transmissivity curve of the second graph is calculated from the monotonic flow rate curve.

Monotonic curve (black over yellow) is corrected for the transient



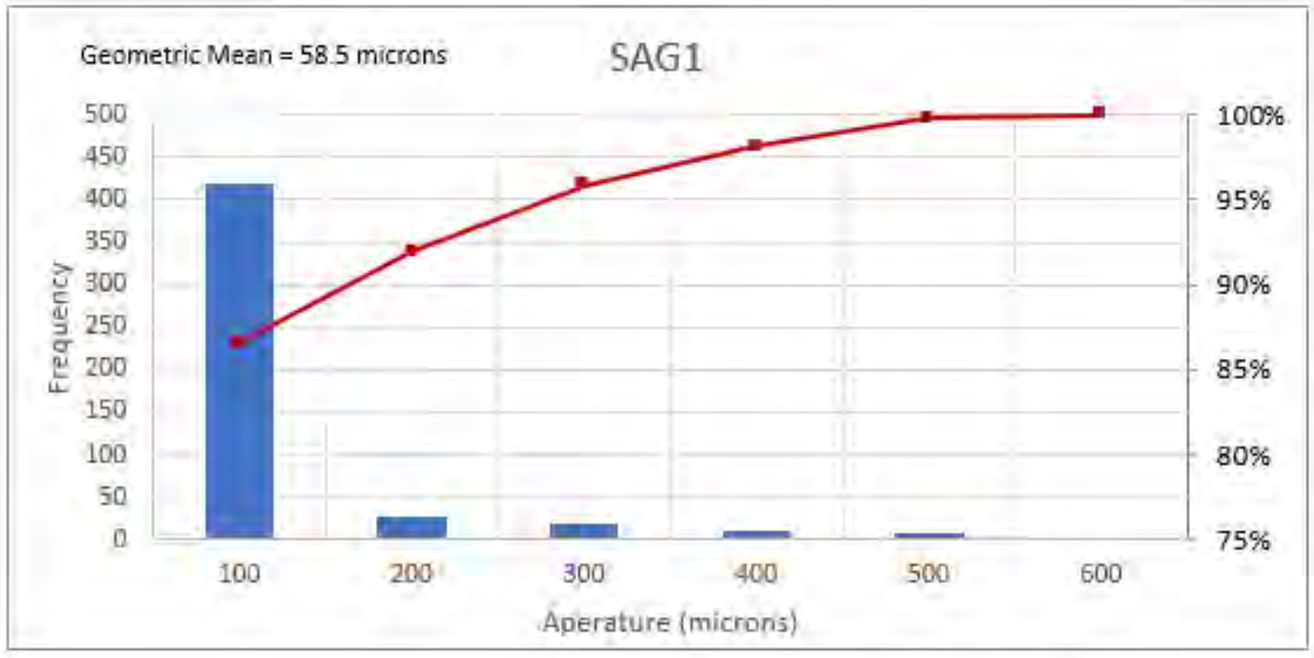


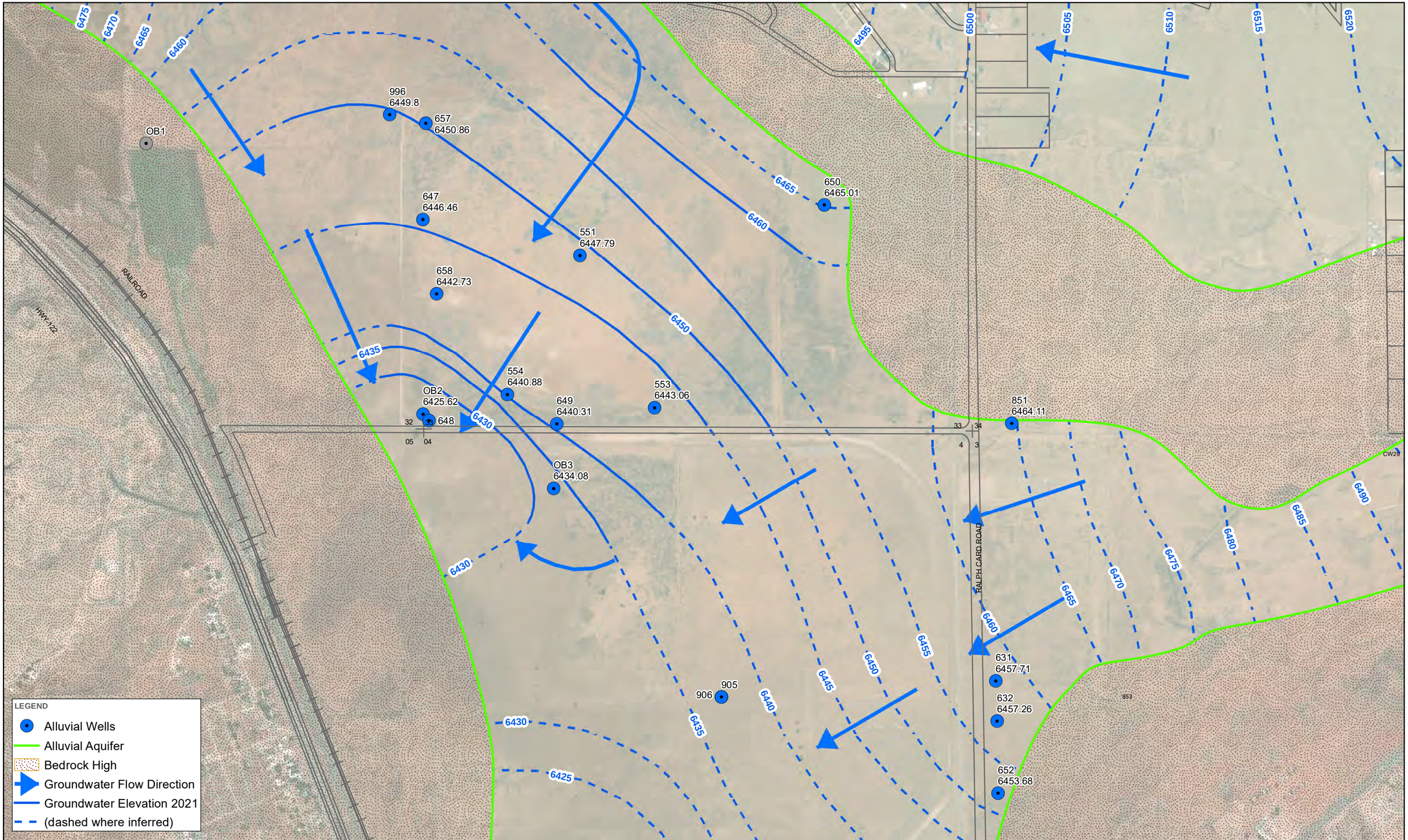


Constants			
Fluid Density	ρ	1000	kg/m3
Gravity	g	9.81	m/s2
Viscosity	μ	1.124E-03	kg/m s

Apature Frequency			
Range	Range	(number)	percent
1	100	418	87%
100	200	26	92%
200	300	19	96%
301	400	11	98%
401	500	8	100%
501	600	1	100%
	total	483	

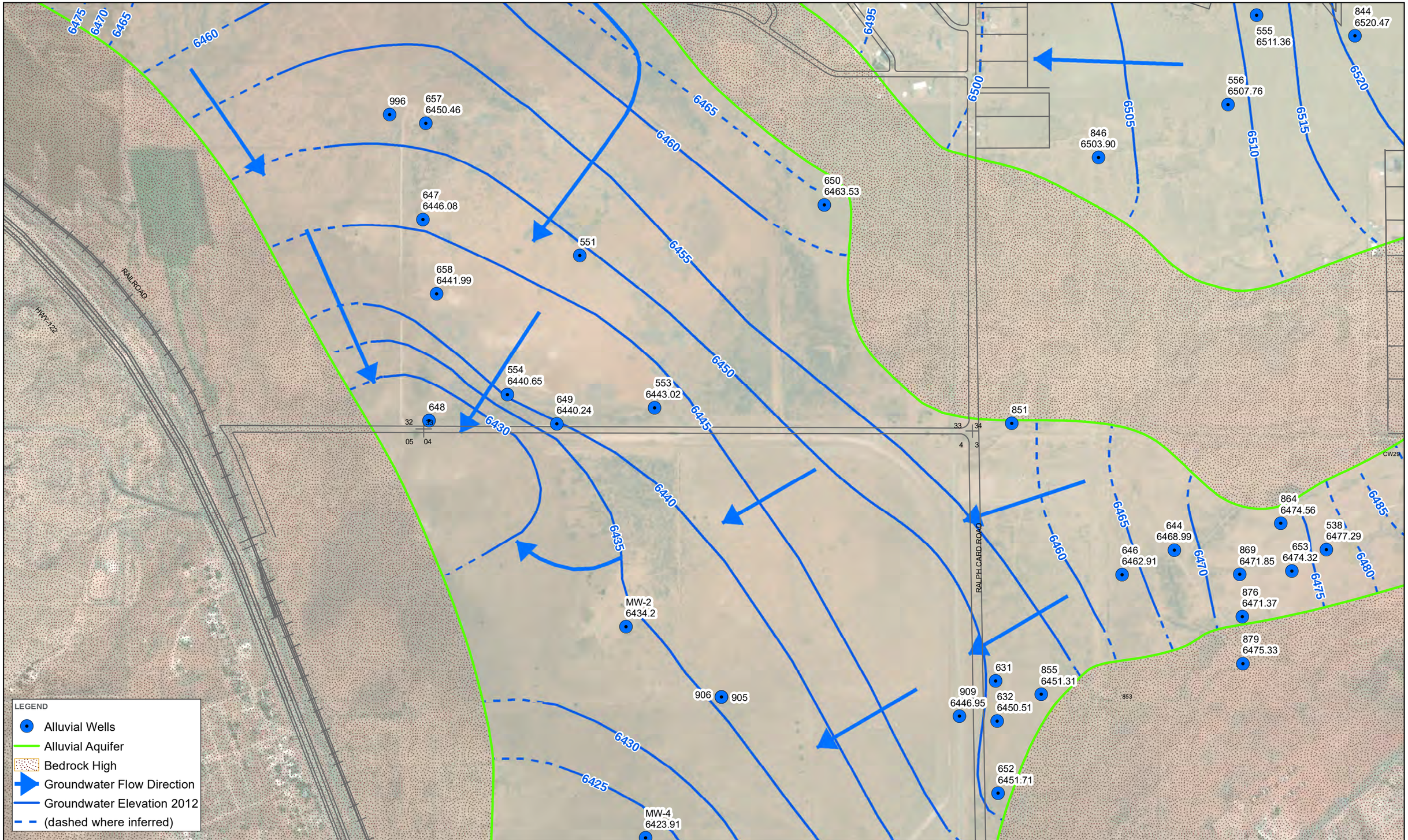
Aperture Staistics		
max	504.1	microns
min	19.0	microns
geomean	58.5	microns
geomean	1.92E-04	feet
stdev	81.4	
Aperature (total)	36698	microns
Aperature (total)	0.1204	feet
Transmissivity (sum)	12.93	cm2/sec
Transmissivity (sum)	0.00129	m2/sec
Rock Thickness	240	feet
Rock Thickness	73.2	meters
Bulk K	1.77E-05	m/sec
Bulk K	5.01E+00	ft/day
#/fractures in borehole	483	
#/fractures/ft of borehole	2.0	
Fracture Porosity	0.00050	
Fracture Porosity	0.05%	





ALLUVIAL AQUIFER POTENTIOMETRIC SURFACE, 2021

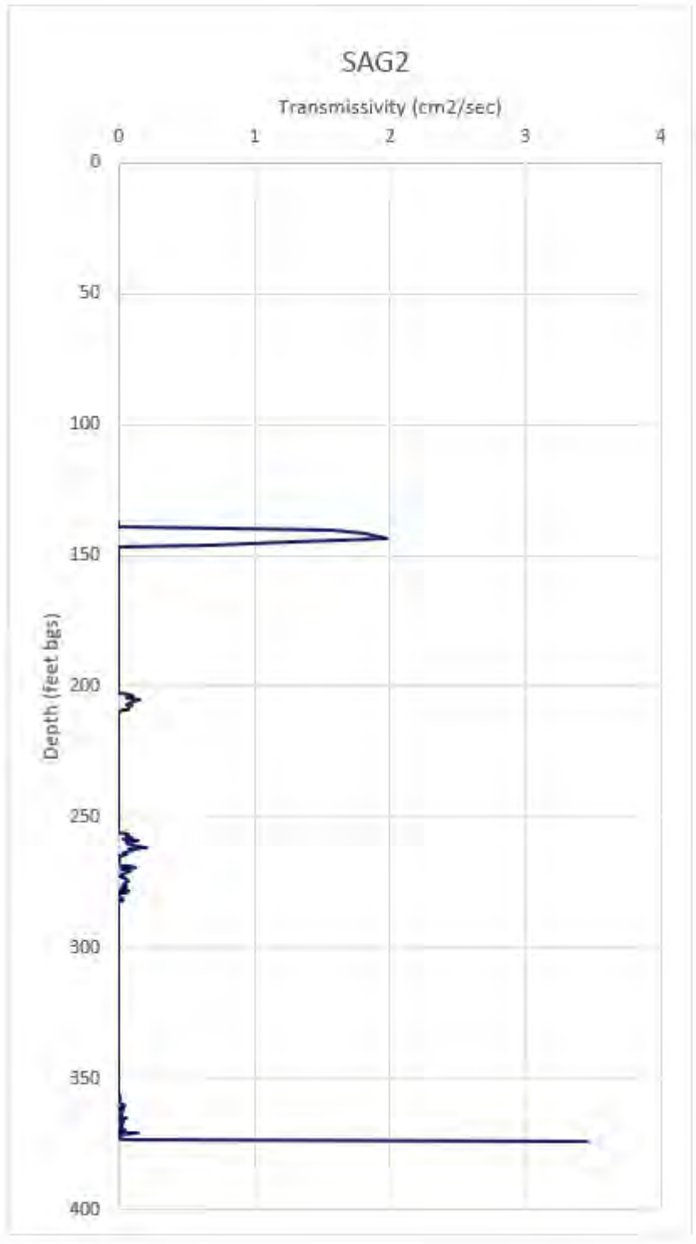
FIGURE 3-7



Data Source: 2012 Annual Performance Report for Homestake's Grants Project Pursuant to NRC License SUA1471 and Discharge PlanDP-200, HMC 2012; Phase II Site Characterization, Milan Farm, Millan New Mexico, Daniel B. Stephens & Associates 2012.

ALLUVIAL AQUIFER POTENTIOMETRIC SURFACE, 2012

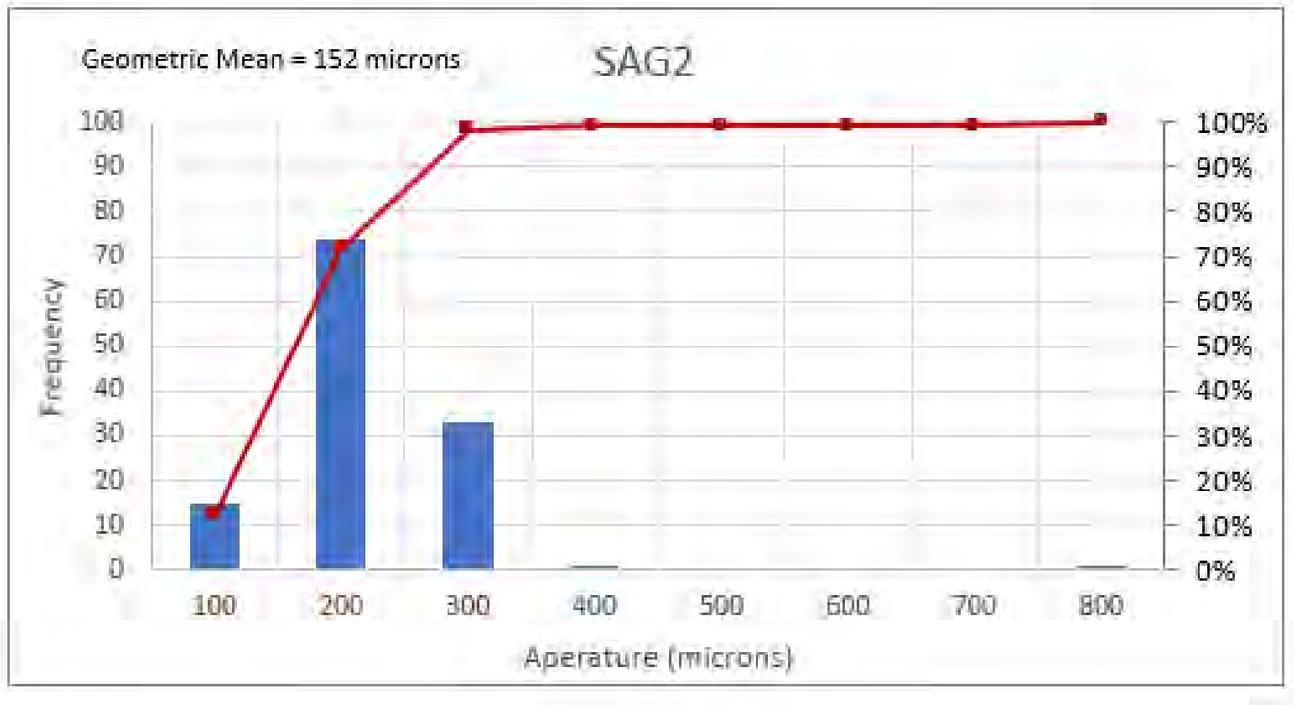
FIGURE 3-8



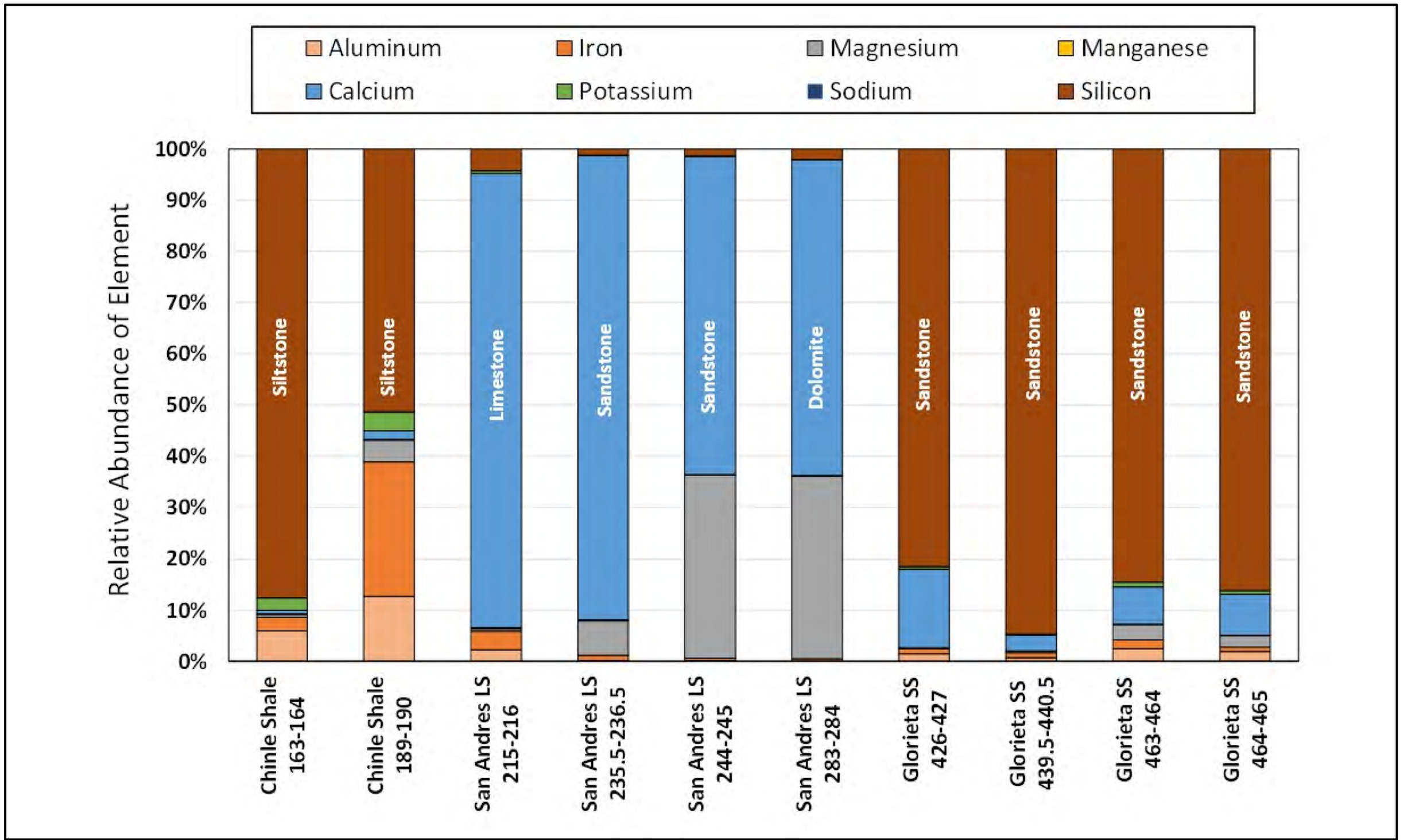
Constants			
Fluid Density	ρ	1000	kg/m3
Gravity	g	9.81	m/s2
Viscosity	μ	1.124E-03	kg/m s

Apature Frequency			
Range	Range	(number)	percent
1	100	15	12%
100	200	74	72%
200	300	33	98%
301	400	1	99%
401	500	0	99%
501	600	0	99%
601	700	0	99%
701	800	1	100%
801	900	0	100%
total		124	

Aperture Staistics		
max	779.7	microns
min	12.7	microns
geomean	152.0	microns
geomean	4.99E-04	feet
stdev	77.4	
Aperature (total)	20695	microns
Aperature (total)	0.0679	feet
Transmissivity (sum)	8.50	cm2/sec
Transmissivity (sum)	0.00085	m2/sec
Rock Thickness	214	feet
Rock Thickness	65.1	meters
Bulk K	1.31E-05	m/sec
Bulk K	3.70E+00	ft/day
#/fractures in borehole	124	
#/fractures/ft of borehole	0.58	
Fracture Porosity	0.00032	
Fracture Porosity	0.03%	

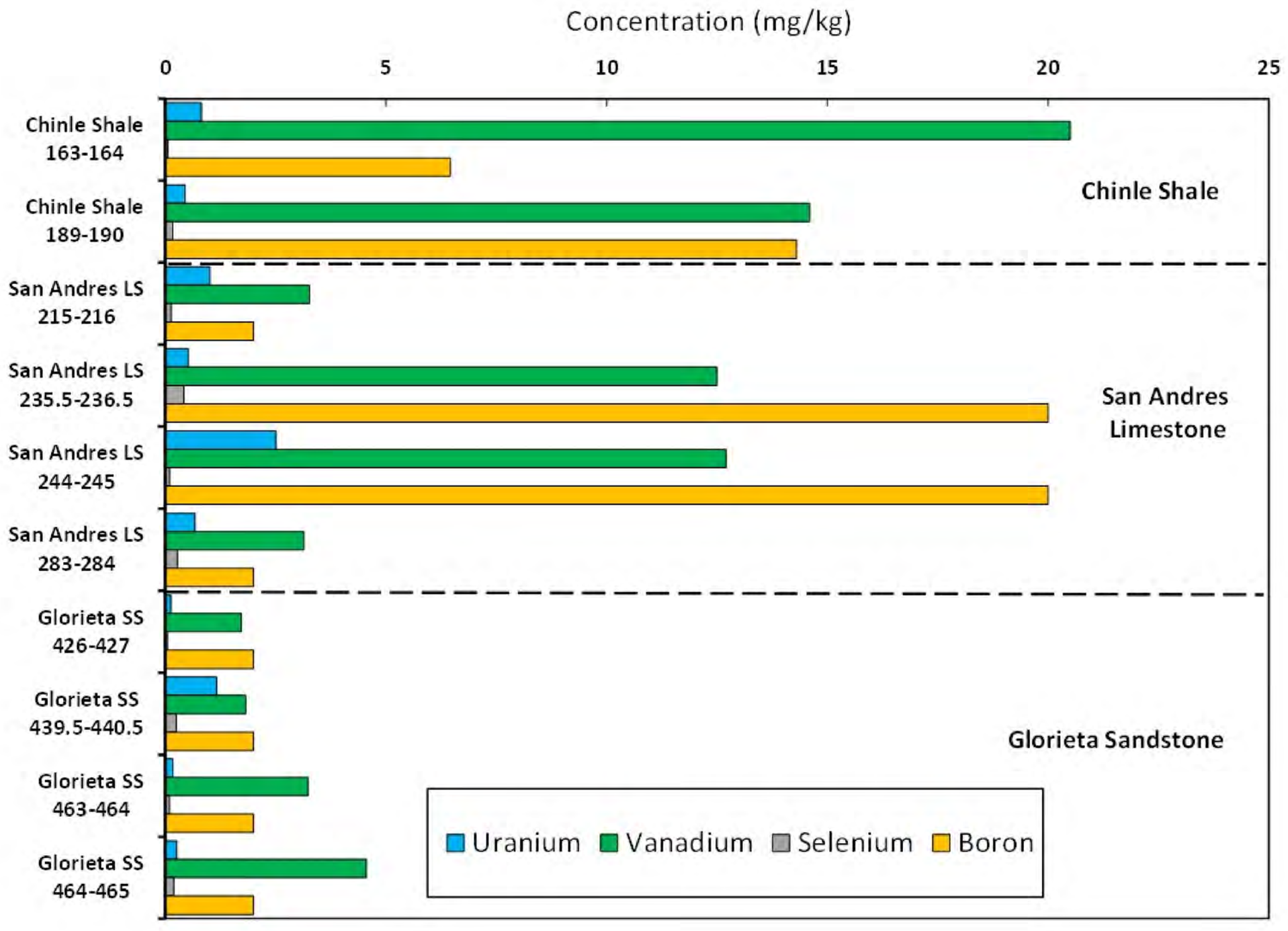


SAG2 FLUTe™ APERTURE AND TRANSMISSIVITY STATISTICS



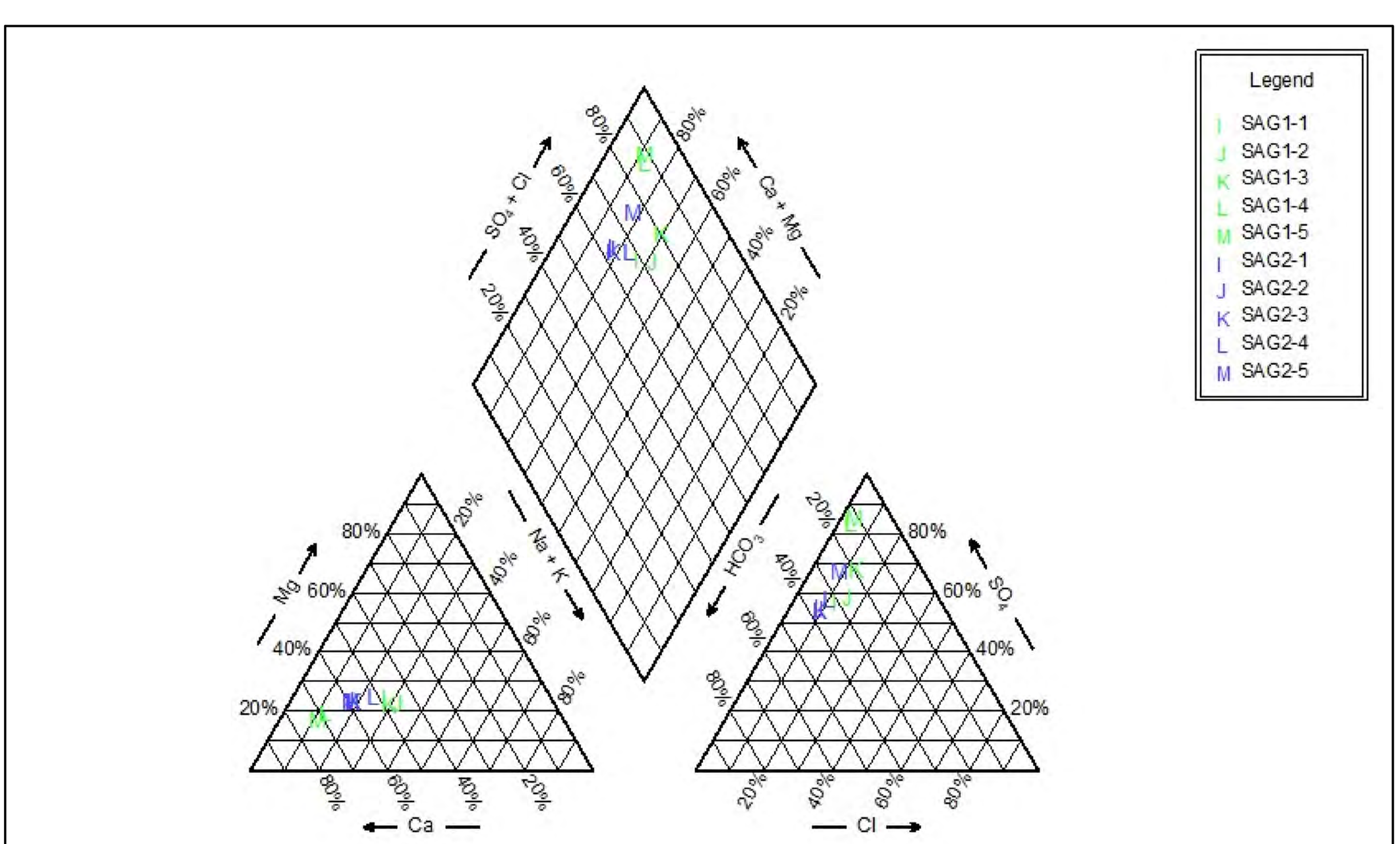
RELATIVE ABUNDANCE OF MAJOR ELEMENTS FOR THE VARIOUS LITHOLOGIES

FIGURE 3-9



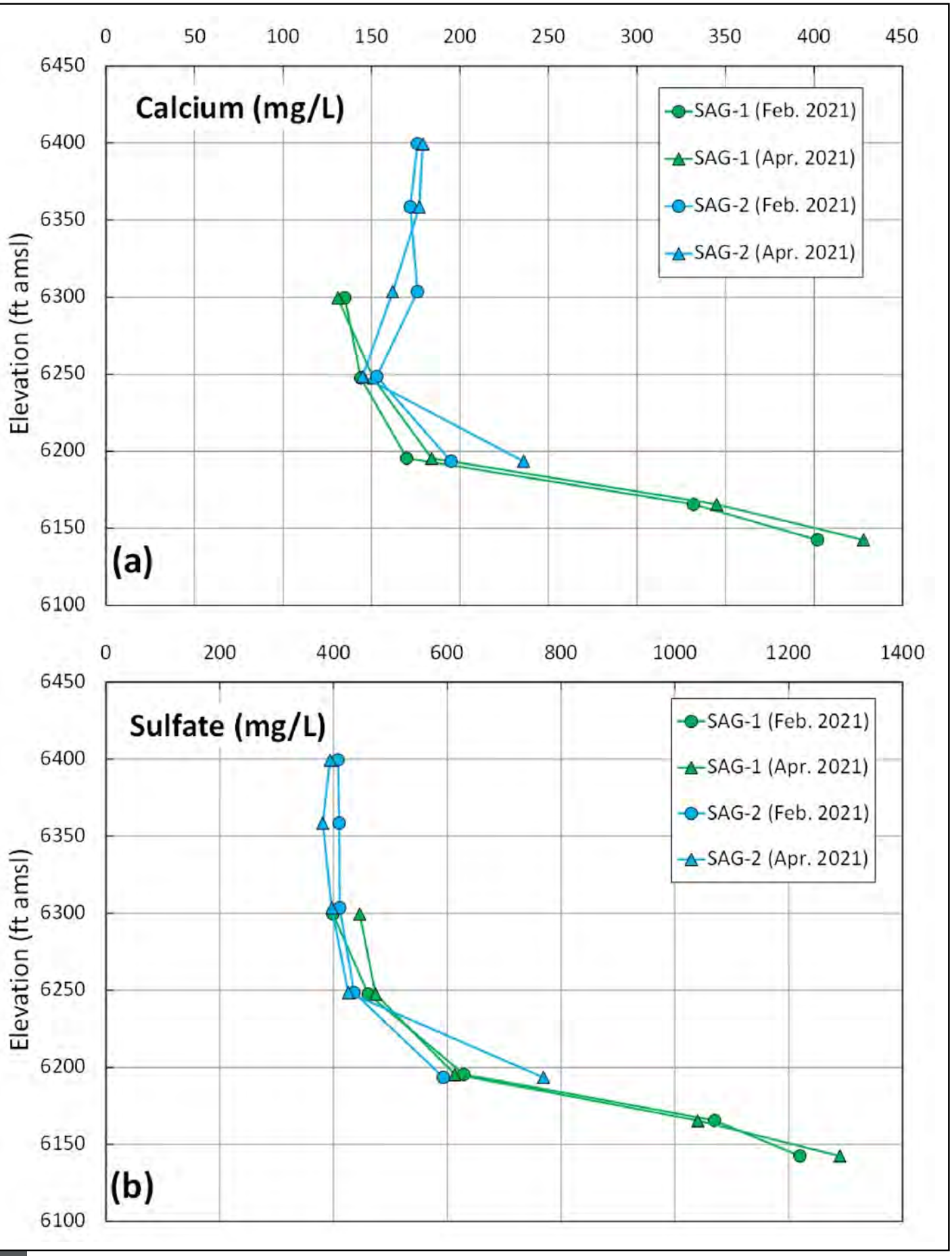
SELECTED TRACE ELEMENT CONCENTRATIONS FOR THE VARIOUS LITHOLOGIES

FIGURE 3-10



TRILINEAR DIAGRAM FOR THE SAG-1 AND SAG-2 GROUNDWATER SAMPLES

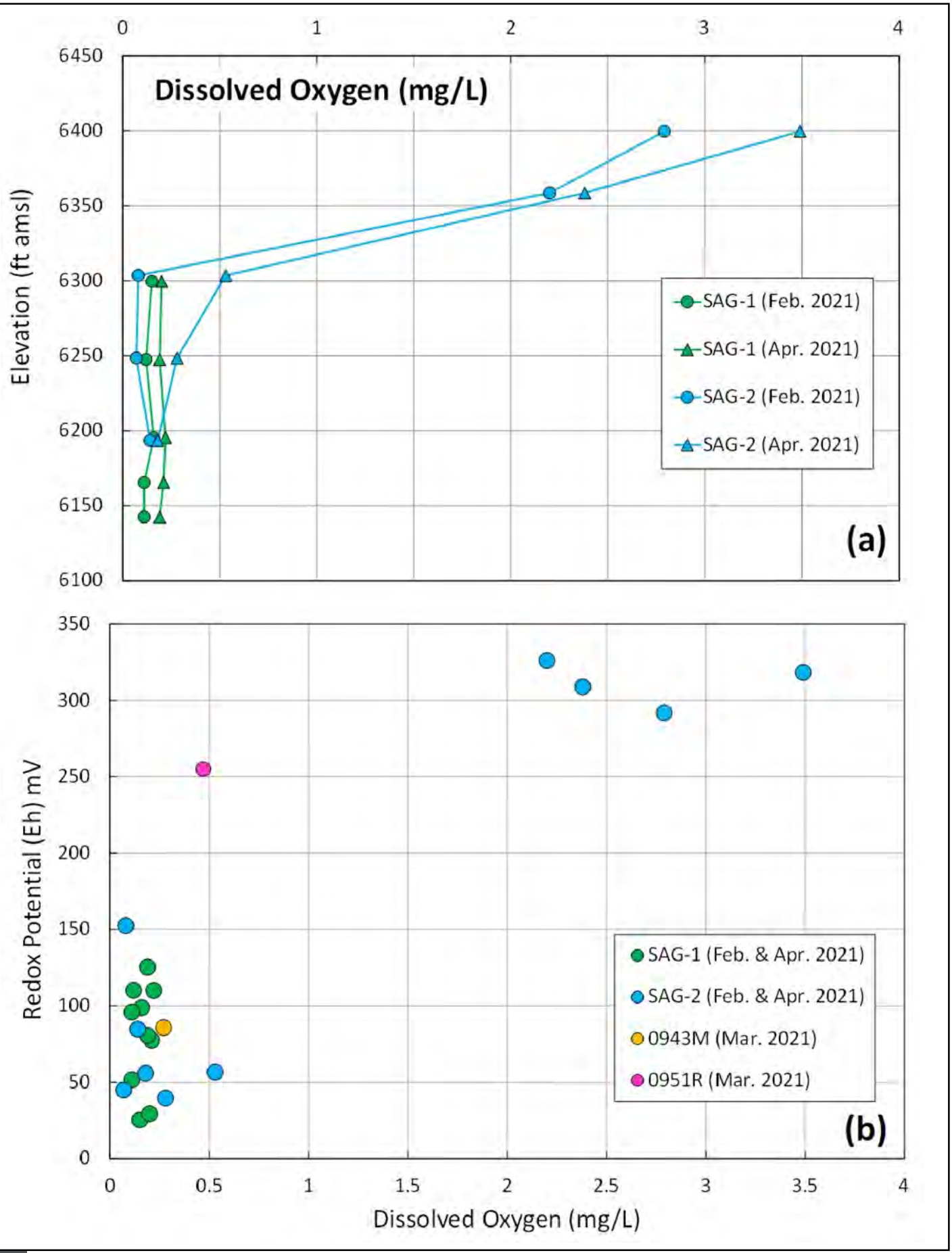
FIGURE 3-11



TRENDS IN CALCIUM (A) AND SULFATE (B) WITH DEPTH AT SAG-1 AND SAG-2

FIGURE 3-12

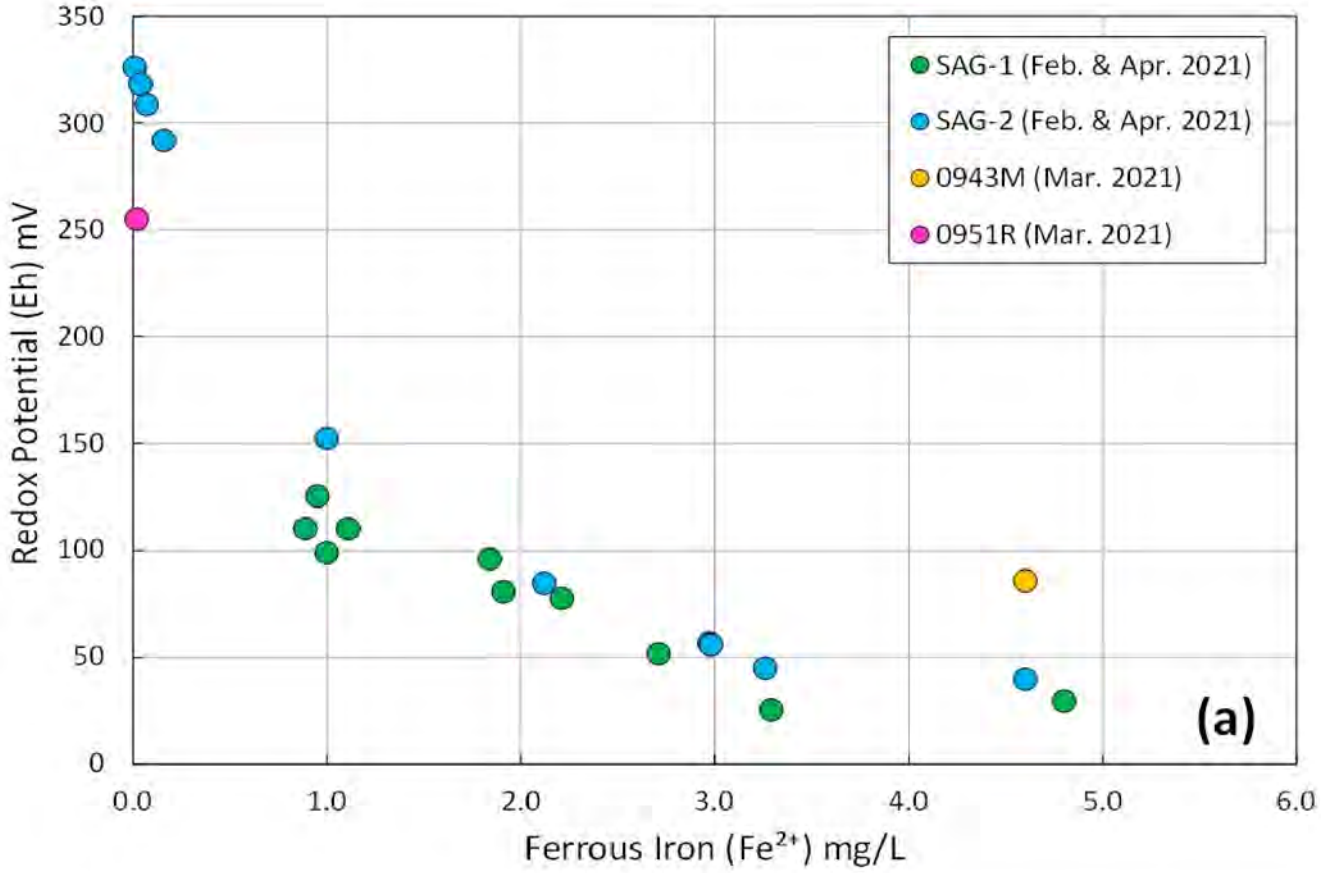
PATH: \\OMEGIS-NEW\PROJECTS\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALISAG_CHAR_REPORT\BARRICK_TI_FIG3.12_PORTRAITRX11.MXD - USER: HROSADO - DATE: 5/24/2021

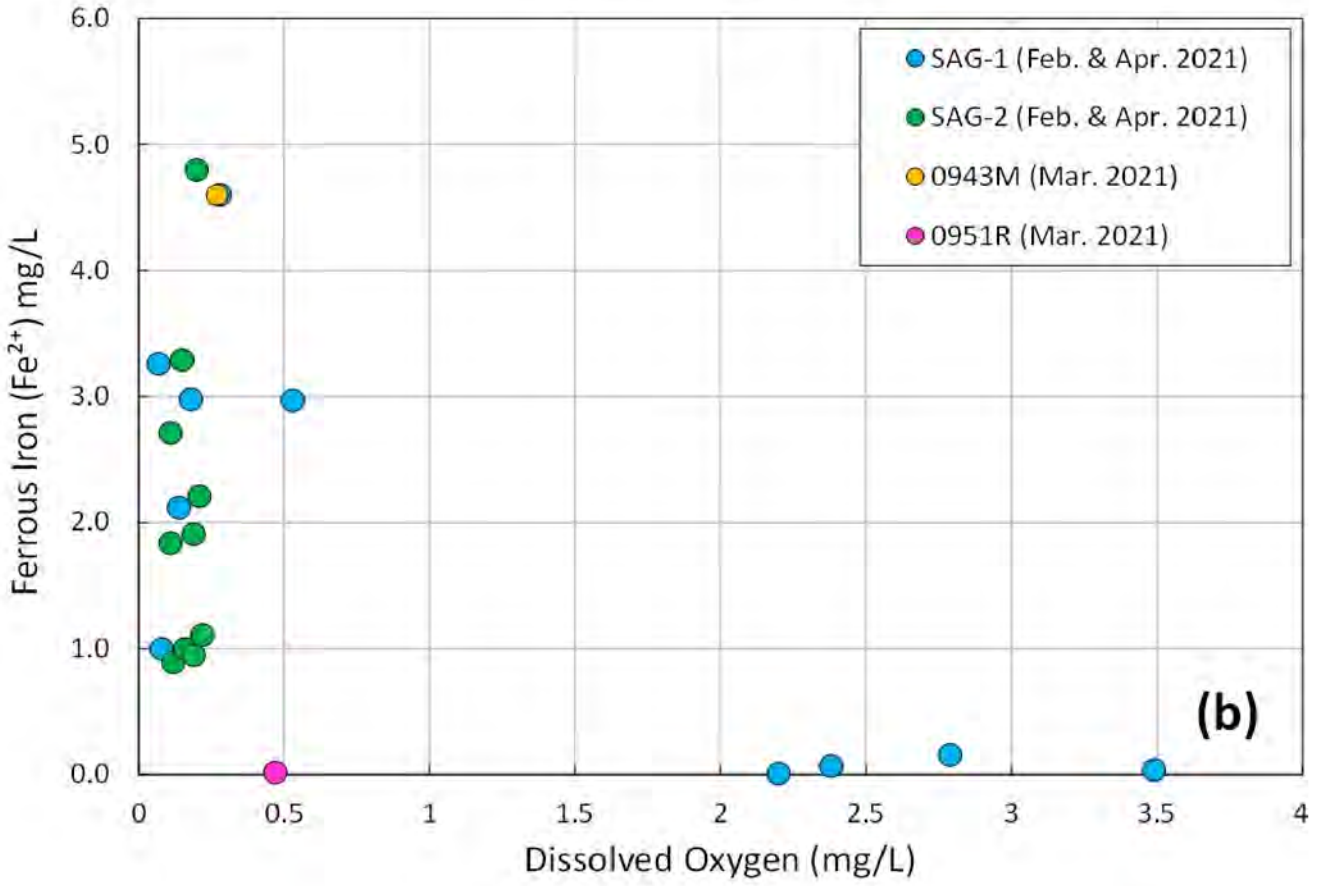


DISSOLVED OXYGEN WITH DEPTH (A) AND AS RELATED TO REDOX POTENTIAL (B)

FIGURE 3-13

PATH: \\OMEGIS-NEW\PROJECTS\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALISAG_CHAR_REPORT\BARRICK_TI_FIG3.13_PORTRAITRX11.MXD - USER: HROSADO - DATE: 5/24/2021

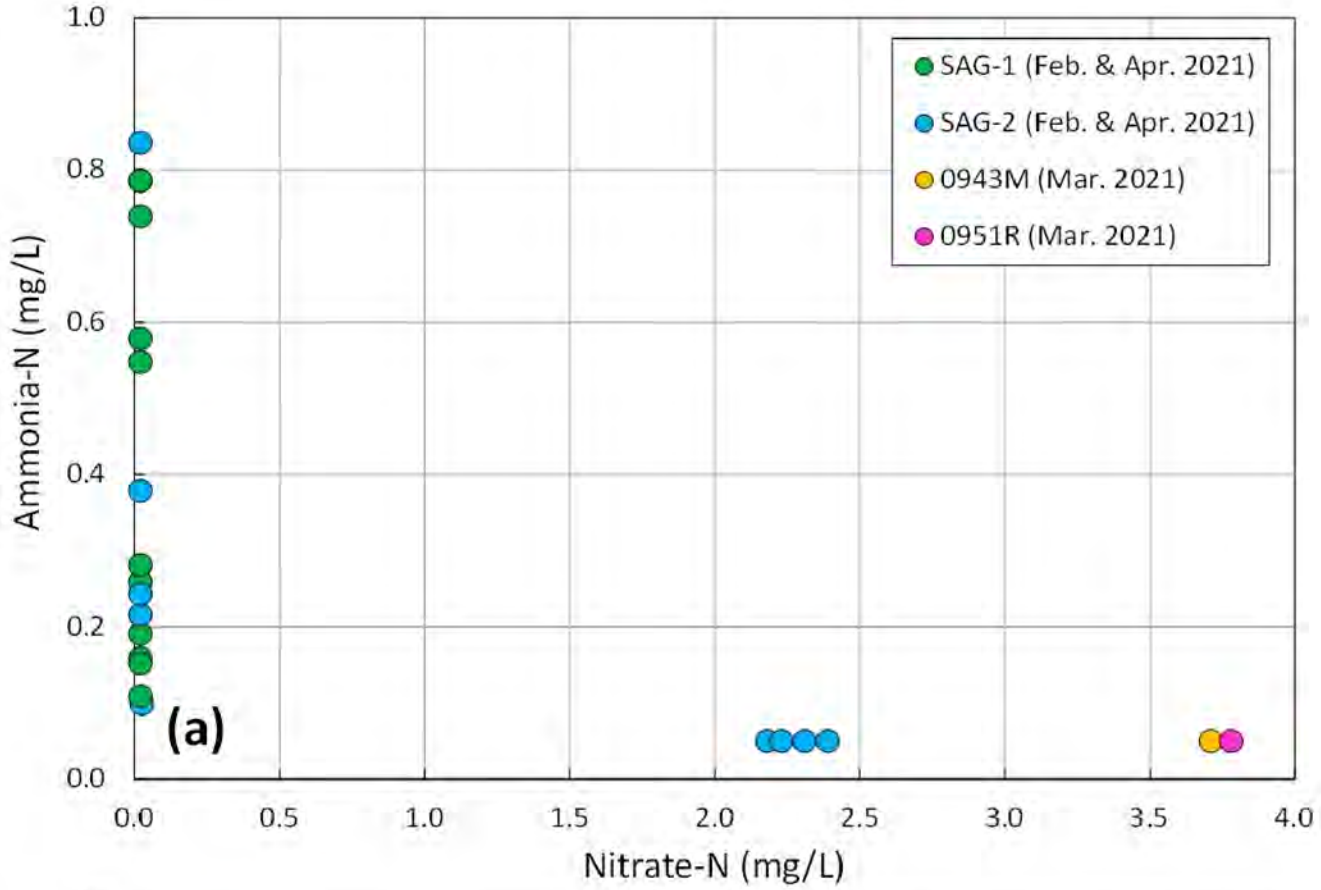


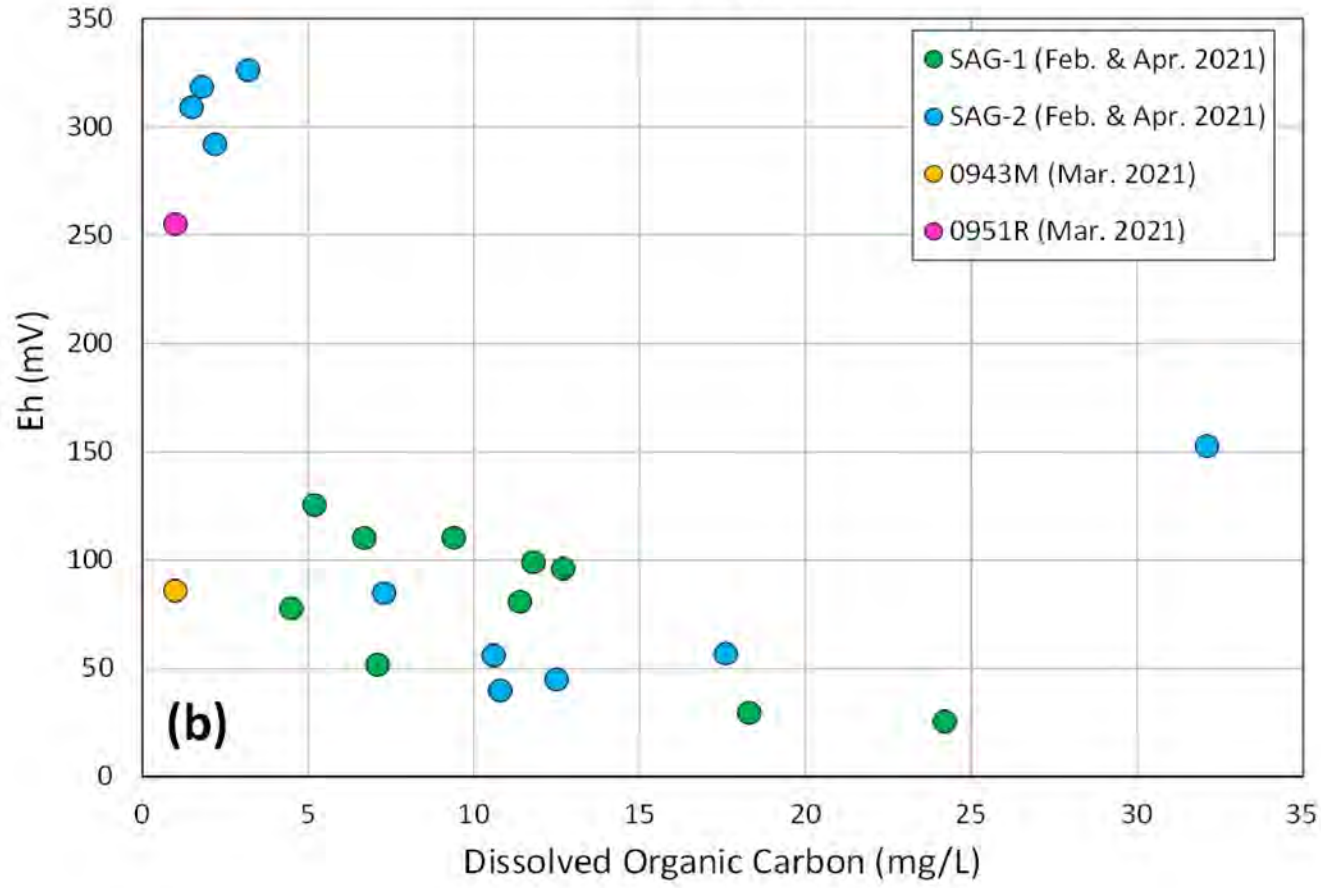


FERROUS IRON AS RELATED TO REDOX POTENTIAL (A) AND DISSOLVED OXYGEN (B)

FIGURE 3-14

PATH: \\OMEGIS-NEW\PROJECTS\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALISAG_CHAR_REPORT\BARRICK_TI_FIG3.14_PORTRAITRX11.MXD - USER: HROSADO - DATE: 5/24/2021

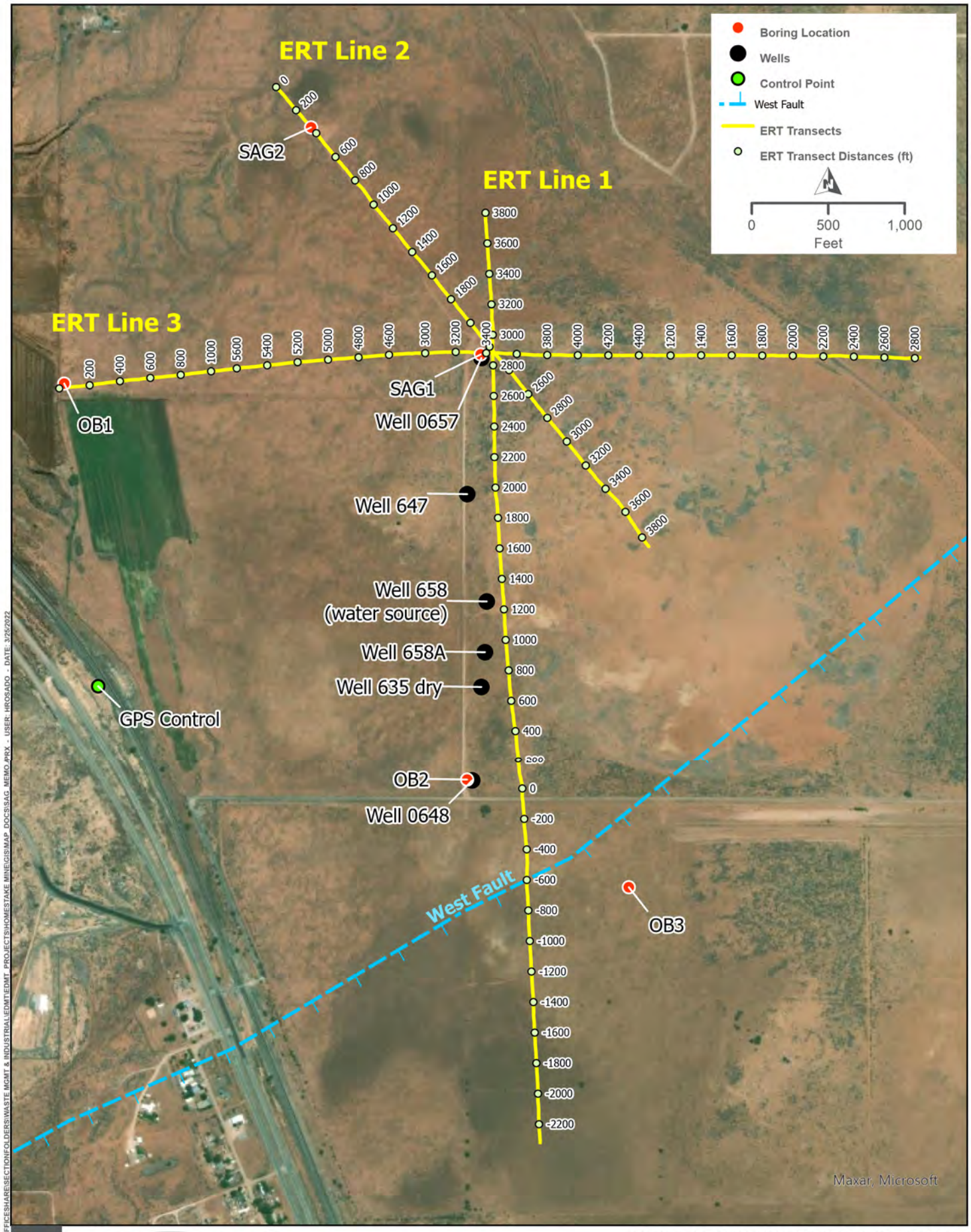




RELATIONSHIP BETWEEN NH_3-N AND NO_3-N (A) AND REDOX POTENTIAL (EH) AS A FUNCTION OF DISSOLVED ORGANIC CARBON (B)

FIGURE 3-15

PATH: \\OMEGIS-NEW\PROJECTS\PROJECTS\PROPOSALS\10171518_BARRICK_RIF_HOMESTAKEMININGSMAP_DOCS\FINALISAG_CHAR_REPORTIBARRICK_TI_FIG3.15_PORTRAITRX11.MXD - USER: HROSADO - DATE: 5/24/2021

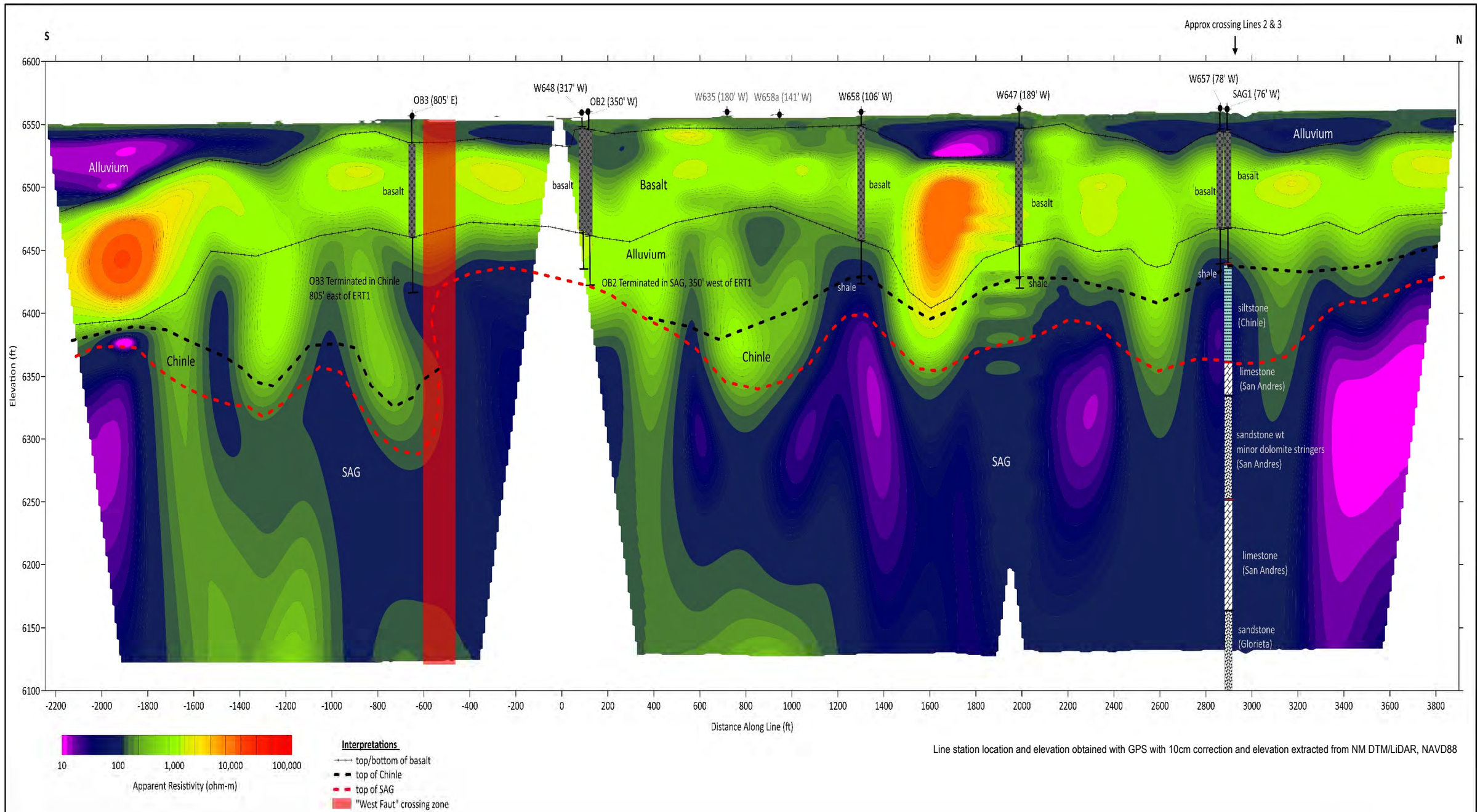


PATH: \\MAINPI-FILE01\OFFICESHARE\SECTION\FOLDERS\WASTE MGMT & INDUSTRIAL\EDMT\EDMT_PROJECTS\HOMESTAKE MINE\GIS\MAP_DOCS\SAG_MEMO.PRX - USER: HROSADO - DATE: 3/25/2022

HOMESTAKE

ERT TRANSECT LOCATION MAP

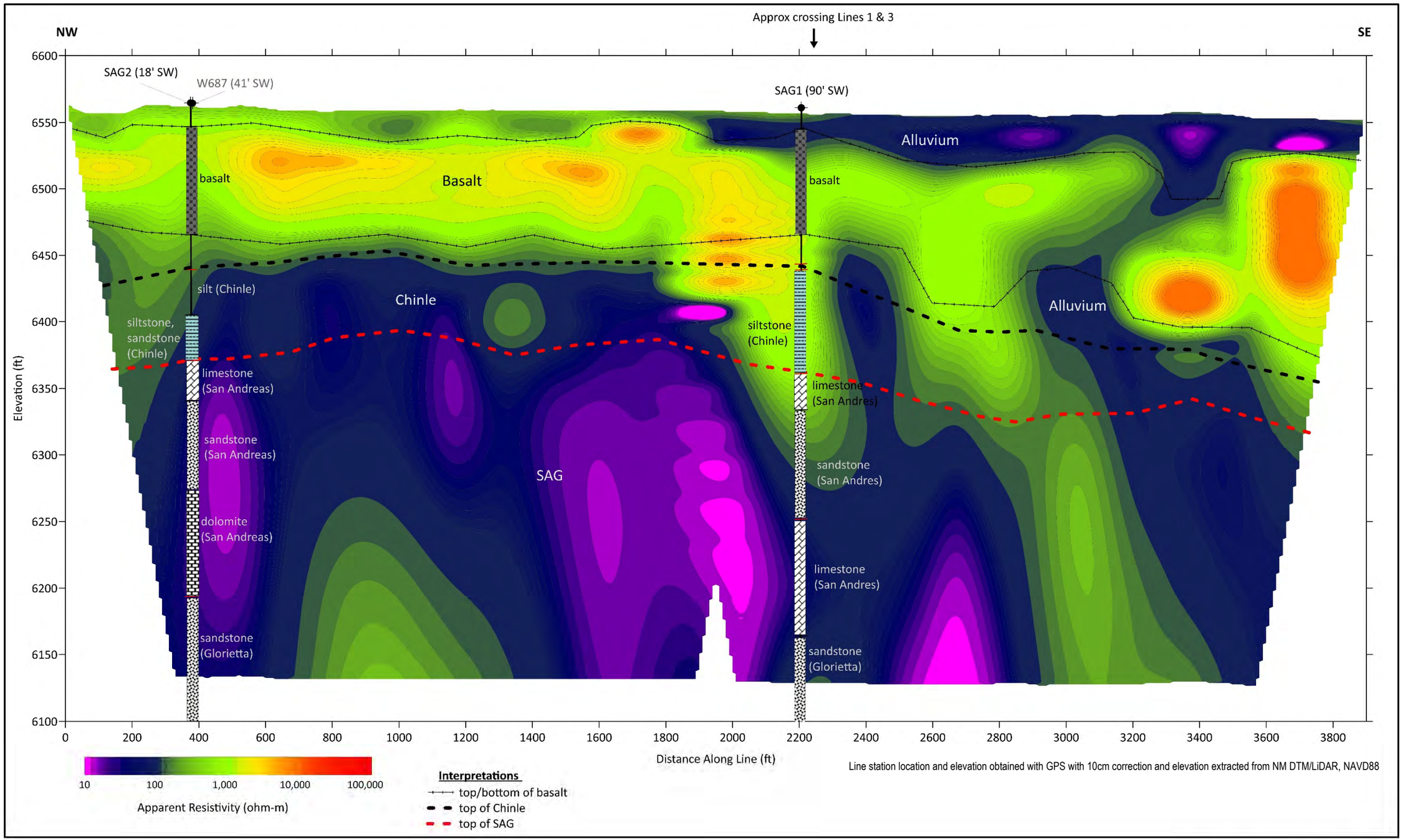
FIGURE 3.16



Line station location and elevation obtained with GPS with 10cm correction and elevation extracted from NM DTM/LiDAR, NAVD88

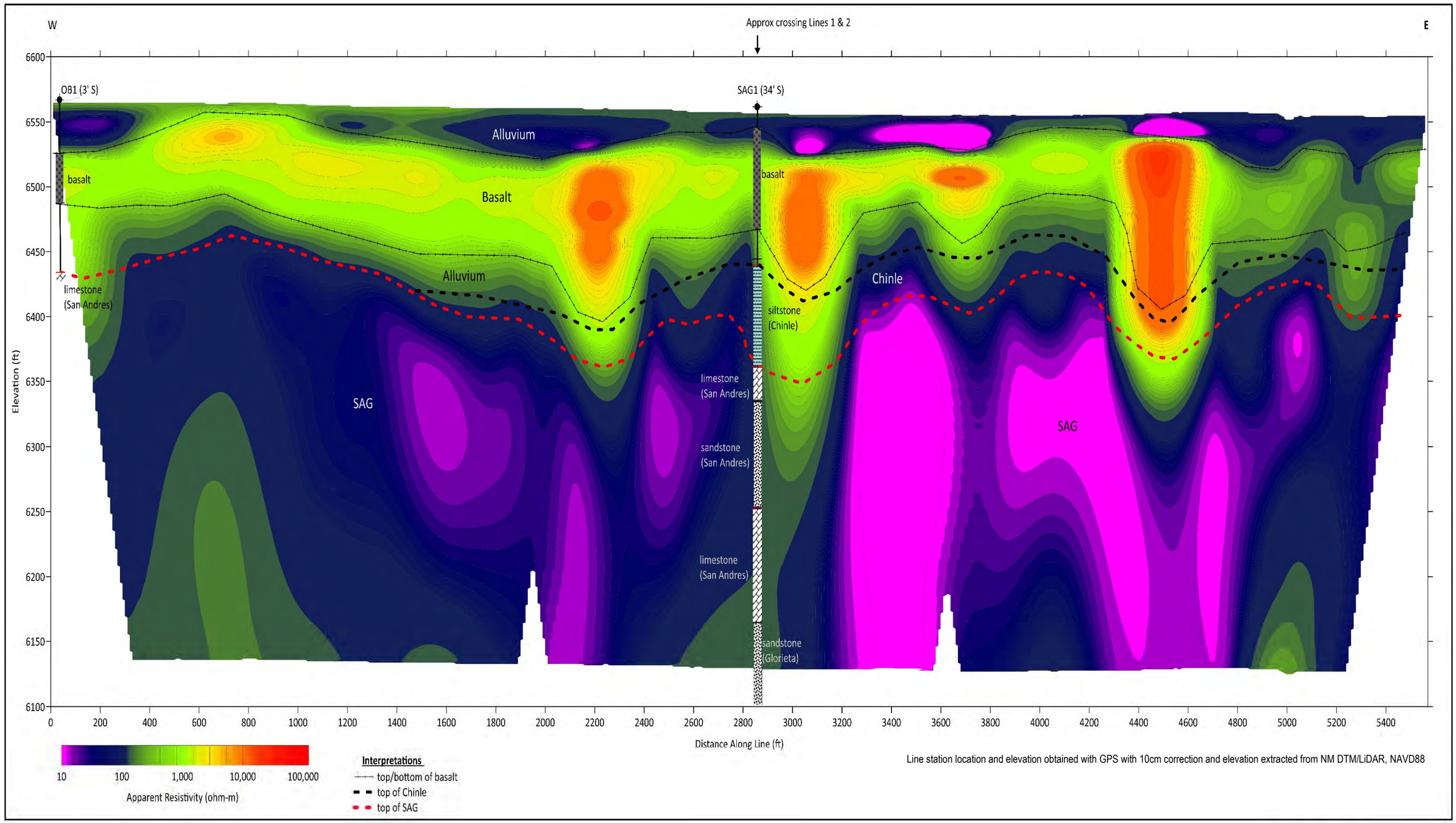
ERT LINE 1 2D INVERSION MODEL

FIGURE 3-17



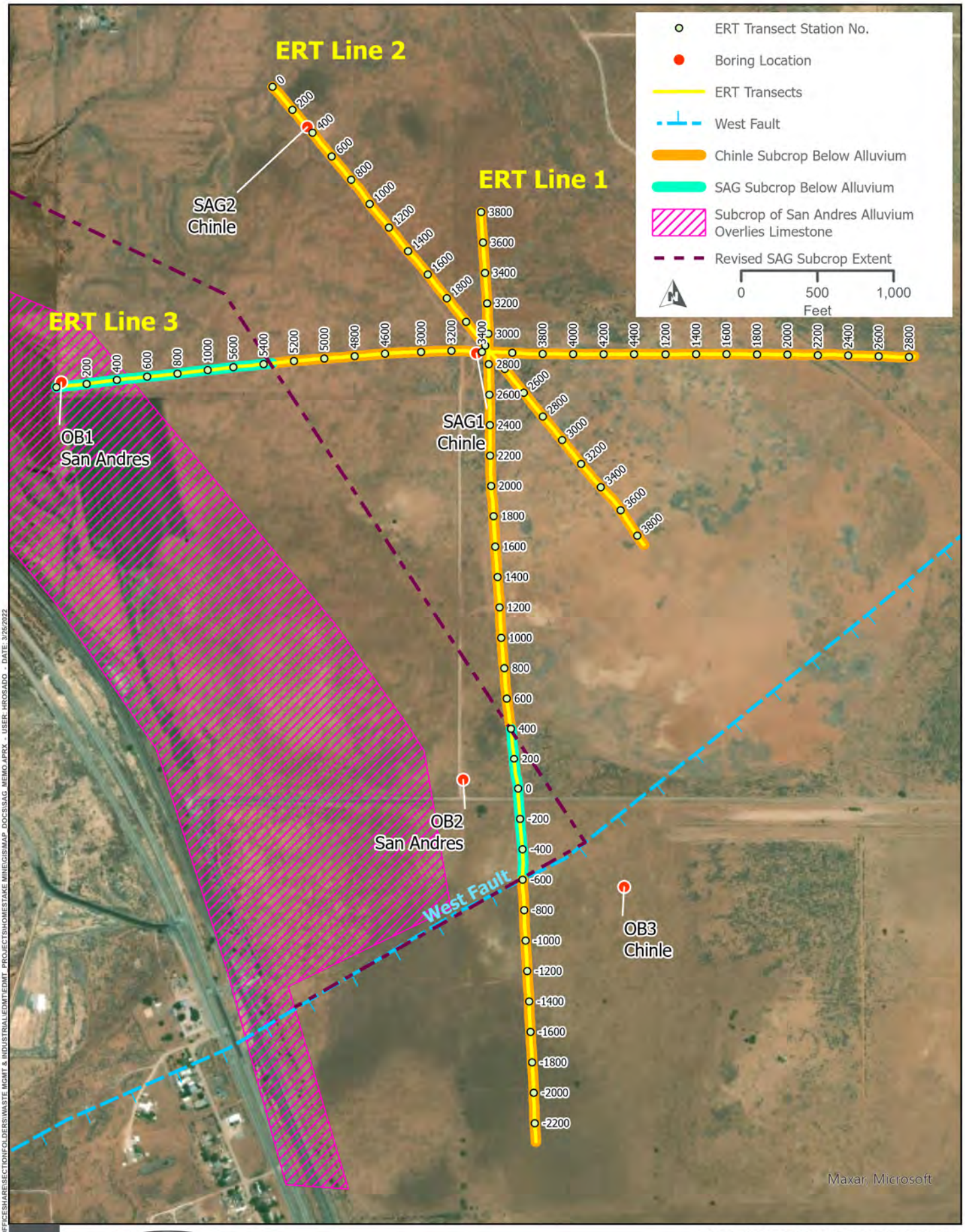
ERT LINE 2 2D INVERSION MODEL

FIGURE 3-18



ERT LINE 3 2D INVERSION MODEL

FIGURE 3-19



PATH: \\MAHPI-FILE01\OFFICESHARE\SECTION\FOLDERS\WASTE MGMT & INDUSTRIAL\EDMT\EDMT_PROJECTS\HOMESTAKE MINING\GIS\MAP_DOCS\SAG_MEMO.APRX - USER: HROSADO - DATE: 3/25/2022

HOMESTAKE

REVISED SAG SUBCROP

FIGURE 4-1

Appendix A

Boring Logs

LEGEND

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

LOGS

WELL / BOREHOLE ID

LEGEND

GENERAL INFORMATION

PROJECT NUMBER: 10255185-002

HDR INSPECTOR: Matthew T Keaveney

	USCS / ROCK TYPE	DESCRIPTION
	BASALT	Basalt
	CH	Fat Clay
	CL	Lean Clay
	CLAYSTONE	Claystone
	DOLOMITE	Dolomite
	LIMESTONE	Limestone
	MUDSTONE	Mudstone
	ML	Silt
	SANDSTONE	Sandstone
	SILTSTONE	Siltstone
	SM	Silty Sand
	SP	Poorly-graded Sand
	SW	Well-graded Sand
		Abbreviations: ELEV - elevation FT AMSL - feet above mean sea level FT BGS - feet below ground surface x-bedded - crossbedded fm - formation rough - refers to fracture textures smooth - refers to fracture textures stepped - refers to fracture textures

OB1
OB2
OB3
SAG1
SAG2

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB1

GENERAL INFORMATION
- **PROJ. NUMBER:** 10255185-002
- **START DATE:** 12/01/2020
- **COMPLETED:** 12/04/2020
- **HDR INSPECTOR:** Matthew T Keaveney

DRILLING INFORMATION
- **COMPANY:** Cascade Drilling LP
- **EQUIPMENT:** RotoSonic LS600
- **METHOD:** Sonic
- **BOREHOLE DIAMETER:** 6-10 inches
- **BOREHOLE DEPTH:** 136 feet

COORDINATES
- **X:** -107.9154
- **Y:** 35.2257
- **GROUND ELEV (FT AMSL):** 6569

WATER TABLE
- **DEPTH TO WATER:** 133.50 ft bgs

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
0	ML	SILT (ML); soft; brown (7.5yr 5/3); dry; mostly SILT.						
5	SP	Poorly-graded SAND (SP); pale brown (10yr 6/3); dry; mostly SAND, fine, rounded.						
10	SP	Poorly-graded SAND (SP); reddish brown (5yr 5/4); dry; mostly SAND, fine, rounded.						
	SP	Poorly-graded SAND (SP); pale brown (10yr 6/3); dry; mostly SAND, fine, rounded.						
15	SP	Poorly-graded SAND (SP); reddish brown (5yr 5/4); slightly moist; mostly SAND, fine, rounded.						
	SM	SILTY SAND (SM); very dark grayish brown (2.5y 3/2); slightly moist; mostly SAND, fine, rounded; some SILT.						
20	SP	Poorly-graded SAND (SP); reddish brown (5yr 5/4); slightly moist; mostly SAND, fine, rounded.						
25								
30								
35	ML	SANDY SILT (ML); medium dense; pale brown (10yr 6/3); slightly moist; mostly SILT; some SAND, fine, rounded; Basalt cobble at 33 feet bgs.						
	ML	SILT with SAND (ML); variegated, pale brown (10yr 6/3), dark bluish gray (5b 4/1); moist; mostly SILT; little SAND, fine; little COBBLES, 3- to 5-inch diameter, basalt.						

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
45	ML	SILT with SAND (ML); variegated, pale brown (10yr 6/3), dark bluish gray (5b 4/1); moist; mostly SILT; little SAND, fine; little COBBLES, 3- to 5-inch diameter, basalt.						
	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
50								
55								
60								
65								
70								
75								
80	SP	Poorly-graded SAND (SP); medium dense; grayish brown (10yr 5/2); moist; mostly SAND, fine, rounded, relatively spherical.						
	SW	Well-graded SAND (SW); loose; brown (7.5yr 3/4); wet; mostly SAND, mostly medium, some fine, little coarse, rounded and subangular.						

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SW	Well-graded SAND (SW); loose; brown (7.5yr 3/4); wet; mostly SAND, mostly medium, some fine, little coarse, rounded and subangular.						
	CL	LEAN CLAY (CL); stiff; dusky red (10r 3/2); wet; mostly CLAY, non-plastic, non-cohesive.						
90								
95								
	SW	Well-graded SAND (SW); medium dense; brown (7.5yr 5/4); wet; mostly SAND, mostly medium, some fine; little CLAY stringers.						
100	ML	SILT with GRAVEL (ML); medium stiff; light gray (10yr 7/2); slightly moist; mostly SILT; little to some GRAVEL; COBBLES at 105 feet below grade; weather San Andres formation.						
105								
110								
115								
120								
125								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
135	ML	SILT with GRAVEL (ML); medium stiff; light gray (10yr 7/2); slightly moist; mostly SILT; little to some GRAVEL; COBBLES at 105 feet below grade; weather San Andres formation.	**Acid Reactive**					
	LIMESTONE	LIMESTONE; white (10yr 8.5/1); dry; San Andres Limestone; fresh; moderately hard; some rock broken/pulverized by rig.	**End of Borehole.**					
140								
145								
150								
155								
160								
165								
170								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB2

GENERAL INFORMATION
- **PROJ. NUMBER:** 10255185-002
- **START DATE:** 12/15/2020
- **COMPLETED:** 12/19/2020
- **HDR INSPECTOR:** Matthew T Keaveney

DRILLING INFORMATION
- **COMPANY:** Cascade Drilling LP
- **EQUIPMENT:** RotoSonic LS600
- **METHOD:** Sonic
- **BOREHOLE DIAMETER:** 6-10 inches
- **BOREHOLE DEPTH:** 136 feet

COORDINATES
- **X:** -107.9067
- **Y:** 35.2185
- **GROUND ELEV (FT AMSL):** 6559

WATER TABLE
- **DEPTH TO WATER:** 125.83 ft bgs

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILT (ML); loose; reddish brown (5yr 4/3); dry; mostly SILT; trace GRAVEL, fine, subrounded.						
	ML	SILT (ML); loose; light yellowish brown (10yr 6/4); dry; mostly SILT.						
5	ML	SILT (ML); stiff; strong brown (7.5yr 5/6); dry; mostly SILT.						
10								
15	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
20								
25								
30								
35								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
45	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
50								
55								
60								
65								
70								
75								
80								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
90	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
95								
100	SW	Well-graded SAND with GRAVEL (SW); medium dense; brown (7.5yr 5/4); dry; mostly SAND, mostly medium, little fine, little coarse, subangular; some GRAVEL, fine, subrounded.						
105	CH	FAT CLAY with Sand (CH); medium stiff; yellowish red (5yr 4/6); moist; mostly CLAY, cohesive, high plasticity; some SAND, fine.						
110	SP	Poorly-graded SAND (SP); medium dense; reddish yellow (7.5yr 6/6); dry; mostly SAND, fine, subrounded.						
115	SW	Well-graded SAND with CLAY (SW); dense; reddish yellow (7.5yr 6/6); dry; mostly SAND, mostly fine, little medium, trace coarse; some CLAY; few GRAVEL, fine, subrounded.						
120	SW	Well-graded SAND (SW); loose; light brown (7.5yr 6/4); dry; mostly SAND, mostly fine, little medium; trace GRAVEL, fine, subrounded.						
125	SP	Poorly-graded SAND (SP); loose; strong brown (7.5yr 5/6); moist; mostly SAND, fine; trace GRAVEL, fine, rounded.						
	SP	Poorly-graded SAND (SP); loose; strong brown (7.5yr 5/6); wet; mostly SAND, fine; trace GRAVEL, fine, rounded.						

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
135	SP	Poorly-graded SAND (SP); loose; strong brown (7.5yr 5/6); wet; mostly SAND, fine; trace GRAVEL, fine, rounded.						
	SW	Well-graded SAND with GRAVEL (SW); medium dense; very pale brown (10yr 8/2); wet; San Andres Formation.	**End of Borehole.**					
140								
145								
150								
155								
160								
165								
170								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB3

GENERAL INFORMATION
- **PROJ. NUMBER:** 10255185-002
- **START DATE:** 12/28/2020
- **COMPLETED:** 12/30/2020
- **HDR INSPECTOR:** Matthew T Keaveney

DRILLING INFORMATION
- **COMPANY:** Cascade Drilling LP
- **EQUIPMENT:** RotoSonic LS600
- **METHOD:** Sonic
- **BOREHOLE DIAMETER:** 6-10 inches
- **BOREHOLE DEPTH:** 137.5 feet

COORDINATES
- **X:** -107.9024
- **Y:** 35.2164
- **GROUND ELEV (FT AMSL):** 6555

WATER TABLE
- **DEPTH TO WATER:** 110.46 ft bgs

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILT (ML); medium stiff; reddish brown (5yr 4/4); dry; mostly SILT.						
	ML	SILT (ML); medium stiff; reddish brown (5yr 5/4); dry; mostly SILT.						
5	ML	SILT (ML); medium stiff; yellowish red (5yr 4/6); dry; mostly SILT.						
	ML	SILT (ML); medium stiff; brown (7.5yr 5/2); dry; mostly SILT.						
10	ML	SILT (ML); stiff; variegated, light brown (7.5yr 6/3), strong brown (7.5yr 5/6); dry; mostly SILT.						
15								
20	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
25								
30								
35								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB3

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
45	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
50								
55								
60								
65								
70								
75								
80								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB3

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
90	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
95	SP	Poorly-graded SAND (SP); dense; dark reddish brown (5yr 3/2); moist; mostly SAND, fine.						
100	SP	Poorly-graded SAND (SP); medium dense; yellowish red (5yr 5/6); wet; mostly SAND, medium.						
105	SW	Well-graded SAND (SW); loose; reddish brown (5yr 5/4); moist; mostly SAND, mostly fine, some medium, little coarse; little GRAVEL, fine, subrounded.						
110	SP	Poorly-graded SAND (SP); medium dense; yellowish red (5yr 4/6); wet; mostly SAND, medium.						
115	SP	Poorly-graded SAND (SP); dense; light reddish brown (5yr 6/3); wet; mostly SAND, medium.						
120	SP	Poorly-graded SAND with CLAY (SP); dense; reddish brown (5yr 5/3); wet; mostly SAND, medium; some CLAY.						
125	CH	FAT CLAY with SAND (CH); stiff; dark reddish brown (5yr 3/2); moist; mostly CLAY, cohesive, high plasticity; little SAND, fine.						
	SW	Well-graded SAND with SAND and GRAVEL (SW); medium dense; reddish brown (5yr 5/3); wet; mostly SAND, mostly fine, little medium, some coarse; little SAND; little GRAVEL, fine and coarse, subrounded; Chinle Formation.						

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
OB3

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
135	SW	Well-graded SAND with SAND and GRAVEL (SW); medium dense; reddish brown (5yr 5/3); wet; mostly SAND, mostly fine, little medium, some coarse; little SAND; little GRAVEL, fine and coarse, subrounded; Chinle Formation.						
	SW	Well-graded SAND with SAND and GRAVEL (SW); medium dense; reddish brown (5yr 5/3); dry; mostly SAND, mostly fine, little medium, some coarse; little SAND; little GRAVEL, fine and coarse, subrounded; Chinle Formation.	**End of Borehole.**					
140								
145								
150								
155								
160								
165								
170								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG1

GENERAL INFORMATION
- **PROJ. NUMBER:** 10255185-002
- **START DATE:** 12/12/2020
- **COMPLETED:** 01/09/2021
- **HDR INSPECTOR:** Matthew T Keaveney

DRILLING INFORMATION
- **COMPANY:** Cascade Drilling LP
- **EQUIPMENT:** RotoSonic LS600, Boart Longyear LF 90D
- **METHOD:** Sonic, Rock Coring
- **BOREHOLE DIAMETER:** PQ (4.89 inches)
- **BOREHOLE DEPTH:** 500 feet

COORDINATES
- **X:** -107.9062
- **Y:** 35.2261
- **GROUND ELEV (FT AMSL):** 6560

WATER TABLE
- **DEPTH TO WATER:** 128.00 ft below grade

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILT (ML); loose; strong brown (7.5yr 5/6); dry; mostly SILT.						
	ML	SILT (ML); loose; yellowish brown (10yr 5/4); dry; mostly SILT.						
5	ML	SILT (ML); medium stiff; weak red (10yr 4/3); slightly moist; mostly SILT.						
	ML	SILT (ML); medium stiff; loose; yellowish red (5yr 4/6); dry; mostly SILT.						
10	ML	SILT (ML); yellowish brown (10yr 5/4); dry; mostly SILT.						
	ML	SILT (ML); yellowish brown (10yr 5/4); dry; mostly SILT; some BASALT COBBLES.						
	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
15								
20								
25								
30								
35								

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
45	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
50								
55								
60								
65								
70								
75								
80								

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
90	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
95	SP	Poorly-graded SAND (SP); medium dense; gray (5y 5/1); moist; mostly SAND, medium, subrounded.						
	SP	Poorly-graded SAND (SP); medium dense; reddish brown (5yr 4/3); slightly moist; mostly SAND, fine, subangular to subrounded.						
100	SP	Poorly-graded SAND (SP); medium dense; reddish brown (5yr 4/4); moist; mostly SAND, fine, subangular to subrounded.						
105	SW	Well-graded SAND (SW); loose; reddish brown (5yr 5/3); wet; mostly SAND, mostly fine, some medium, trace coarse, subangular; trace GRAVEL, fine, subrounded.						
110	SW	Well-graded SAND with GRAVEL (SW); medium dense; yellowish red (5yr 4/6); moist; mostly SAND, mostly medium, trace coarse, subangular to subrounded; little GRAVEL, angular and rounded, fine to coarse.						
115	ML	SILT (ML); stiff; brown (7.5yr 5/3); dry; mostly SILT, Chinle Formation.						
120	ML	SILTSTONE (ML); stiff; gray (N5); moist; Chinle Formation.						
125								

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILTSTONE (ML); stiff; gray (N5); moist; Chinle Formation.						
135	MUDSTONE	MUDSTONE; very thinly bedded; bluish gray (10b 5/1); intensely weathered; very soft; moderately fractured; little to no dip; spacing: mostly 4-24"; tight to open; clean infilling; not healed; smooth; Chinle Fm.		60	90	54	65	39
140				36	94.4	34	41.7	15
				60	90	54	71.7	43
145								
	SILTSTONE	SILTSTONE; reddish gray (5yr 5/2); slightly weathered to moderately weathered; moderately soft; moderately fractured; little to no dip; spacing: 1-30", mostly 2-6"; tight to open; very thin infilling; intensely weathered fracturing; not healed; slightly rough; Chinle Fm.		60	95	57	80	48
150								
				60	96.7	58	91.7	55
155								
				60	100	60	83.3	50
160	SILTSTONE	SILTSTONE; very thinly bedded; reddish brown (2.5yr 4/3); slightly weathered; moderately soft; moderately fractured to intensely fractured; ~20° dips, trace vertical fractures; spacing: 3-6"; open; clean to very thin infilling; moderately weathered to intensely weathered fracturing; slightly rough; Chinle Fm.		60	100	60	60	36
165								
				60	100	60	53.3	32
170	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded to laminated; reddish brown (2.5yr 4/3), light reddish gray (2.5yr 7/1); fresh (unweathered) to slightly weathered; moderately soft; little to no dip; open; clean infilling; moderately rough; Chinle Fm; some crossbedding.		60	90	54	81.7	49

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded to laminated; reddish brown (2.5yr 4/3), light reddish gray (2.5yr 7/1); fresh (unweathered) to slightly weathered; moderately soft; little to no dip; open; clean infilling; moderately rough; Chinle Fm; some crossbedding.						
				60	100	60	91.7	55
180								
				60	100	60	100	60
185								
	SILTSTONE	SILTSTONE; very thinly bedded; reddish brown (2.5yr 4/3); slightly weathered; moderately soft; intensely fractured; ~20° dips, trace vertical fractures; spacing: 3-6"; open; clean to very thin infilling; moderately weathered to intensely weathered fracturing; slightly rough; Chinle Fm.						
	SILTSTONE			30	90	27	90	27
			Sample sent to Golder and ACZ at 189-190'.					
190		SILTSTONE; very thinly bedded; reddish brown (2.5yr 4/3); slightly weathered; moderately soft; moderately fractured to intensely fractured; ~20° dips, trace vertical fractures; spacing: 3-6"; open; clean to very thin infilling; moderately weathered to intensely weathered fracturing; slightly rough; Chinle Fm.		30	100	30	93.3	28
				60	96.7	58	88.3	53
195								
				60	96.7	58	81.7	49
			Acid Reactive; sample sent to Golder and ACZ at 202-203'.					
200	LIMESTONE	LIMESTONE; white (7.5yr 8/1); moderately weathered; moderately soft; vertical fracture; moderately healed; San Andres Fm.						
	LIMESTONE	LIMESTONE; variegated, white (7.5yr 8/1), very pale brown (10yr 8/2), pale yellow (2.5y 8/1); intensely weathered to decomposed (weathered to SAND and GRAVEL); very intensely fractured; not healed; San Andres Fm; little recovery.	**Acid Reactive**	60	58.3	35	33.3	20
205								
				36	33.3	12	0	0
210								
				24	58.3	14	0	0
				48	100	48	62.5	30
	LIMESTONE	LIMESTONE; very pale brown (10yr 8/2); moderately weathered; hard; moderately fractured; vertical fractures present; spacing: 1-12"; open; intensely weathered fracturing; not healed; moderately rough; San Andres Fm.	**Acid Reactive; sample sent to Golder at 216-217'.**					
215								
				12	100	12	100	12
	LIMESTONE	LIMESTONE; variegated, white (7.5yr 8/1), very pale brown (10yr 8/2), pale yellow (2.5y 8/1); intensely weathered to decomposed; very intensely fractured; not healed; San Andres Fm.	**Acid Reactive**	60	96.7	58	13.3	8
	LIMESTONE		**Acid Reactive**					

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	LIMESTONE	LIMESTONE; very pale brown (10yr 8/2); intensely weathered; hard; intensely fractured; vertical fractures present; moderately open to wide; not healed; moderately rough; San Andres Fm.						
				60	91.7	55	36.7	22
225	SILTSTONE	SILTSTONE; very thinly bedded; variegated, pinkish gray (7.5yr 7/2), pink (7.5yr 7/4), red (2.5yr 5/8); intensely weathered to decomposed; very soft; intensely fractured; horizontal fractures, vertical fractures present; spacing: 1-5"; slightly open to wide; not healed; rough; San Andres Fm; oxidation zones present.		60	50	30	10	6
230	LIMESTONE	LIMESTONE; variegated, very pale brown (10yr 7/3), white (10yr 8/1), light brownish gray (10yr 6/2); moderately weathered to intensely weathered; intensely fractured; wide; not healed; rough; San Andres Fm; poorly-graded SAND, rounded.						
	LIMESTONE	LIMESTONE; very thinly bedded; white (10yr 8/1); slightly weathered; hard; moderately fractured; steep/vertical fracture; slightly open; clean infilling; not healed; moderately rough; San Andres Fm.		60	85	51	0	0
235	LIMESTONE	LIMESTONE; variegated, very pale brown (10yr 7/3), white (10yr 8/1), light brownish gray (10yr 6/2); moderately weathered to intensely weathered; intensely fractured; wide; not healed; rough; San Andres Fm.	**Sample sent to Golder and ACZ at 235.5-236.5'.**					
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; white (10yr 8/1); slightly weathered; hard; intensely fractured to very intensely fractured; steep/vertical fracture; slightly open; very thin infilling; infilling: silt; not healed; moderately rough; San Andres Fm.		60	8.3	5	16.7	10
240				60	36.7	22	10	6
	SANDSTONE	SANDSTONE; fine-grained; variegated, very pale brown (10yr 7/3), white (10yr 8/1), light brownish gray (10yr 6/2); moderately weathered to intensely weathered; intensely fractured; wide; not healed; rough; San Andres Fm; poorly-graded SAND, rounded.						
245				60	18.3	11	0	0
250								
				84	47.6	40	11.9	10
255	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; white (10yr 8/1); slightly weathered; hard; moderately fractured; steep/vertical fracture; slightly open; clean infilling; not healed; moderately rough; San Andres Fm.						
	SANDSTONE	SANDSTONE; fine-grained; pale brown (2.5y 8/3); decomposed; San Andres Fm; poorly-graded SAND, rounded.						
260	SANDSTONE	SANDSTONE; fine-grained; variegated, white (2.5yr 8/1), light gray (2.5y 7/2); slightly weathered; hard; moderately fractured; ~15° dips; open; clean infilling; slightly rough; San Andres Fm; poorly-graded SAND, rounded.		36	80.6	29	69.4	25
				60	91.7	55	60	36

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; variegated, white (2.5yr 8/1), light gray (2.5y 7/2); slightly weathered; hard; moderately fractured; ~15° dips; open; clean infilling; slightly rough; San Andres Fm; poorly-graded SAND, rounded.						
				60	100	60	86.7	52
270								
				60	90	54	85	51
275								
				60	96.7	58	96.7	58
280								
	DOLOMITE	DOLOSTONE; white (N8); moderately weathered; moderately fractured; ~20° dips; tight; very thin infilling; infilling: calcite; not healed; San Andres Fm; bivalve fossils.	**Not Acid Reactive; sample sent to Golder and ACZ at 283-284'.**					
				60	100	60	93.3	56
285								
	SANDSTONE	SANDSTONE; fine-grained; light gray (10yr 7/2); intensely weathered; hard; intensely fractured; spacing: 3-12"; moderately wide; rough; San Andres Fm; well-graded sand, subangular.						
				42	85.7	36	52.4	22
290								
				66	93.9	62	80.3	53
295								
				66	75.8	50	51.5	34
300	DOLOMITE	DOLOSTONE; white (N8); moderately weathered; moderately fractured; ~20° dips; tight; very thin infilling; infilling: calcite; not healed; San Andres Fm; bivalve fossils.	**Not Acid Reactive**					
	LIMESTONE	LIMESTONE; pale brown (10yr 6/3); intensely weathered; open; San Andres Fm; small vertical voids present.	**Acid Reactive**					
				60	65	39	0	0
305								
	SANDSTONE	SANDSTONE; variegated, very pale brown (10yr 7/3), white (10yr 8/1), yellow (10yr 7/8); moderately weathered to intensely weathered; hard; intensely fractured; 0-45° dips; spacing: 1-12"; slightly open;		60	100	60	43.3	26

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; variegated, very pale brown (10yr 7/3), white (10yr 8/1), yellow (10yr 7/8); moderately weathered to intensely weathered; hard; intensely fractured; 0-45° dips; spacing: 1-12"; slightly open; moderately rough; San Andres Fm.						
				60	100	60	16.7	10
315	LIMESTONE	LIMESTONE; variegated, white (10yr 8/1), very pale brown (10yr 8/4); slightly weathered; hard; moderately fractured; steep-vertical dips; tight to slightly open; San Andres Fm.	**Acid Reactive; sample sent to Golder at 318-319'.**					
				66	90.9	60	84.8	56
320								
				60	100	60	90	54
325	LIMESTONE	LIMESTONE; variegated, white (10yr 8/1), very pale brown (10yr 7/3), brownish yellow (10yr 6/6); intensely weathered; hard; intensely fractured; steep-vertical dips; tight to slightly open; very thin infilling; infilling: calcite; San Andres Fm.	**Acid Reactive**					
	LIMESTONE	LIMESTONE; variegated, white (10yr 8/1), very pale brown (10yr 7/3), brownish yellow (10yr 6/6); intensely weathered; hard; very intensely fractured; steep-vertical dips; tight to slightly open; very thin infilling; infilling: calcite; San Andres Fm.	**Acid Reactive**	30	43.3	13	26.7	8
330	LIMESTONE	LIMESTONE; white (10yr 8/1); slightly weathered to moderately weathered; moderately fractured; San Andres Fm; calcite crystals in voids, bivalve fossil voides.	**Acid Reactive**	30	76.7	23	73.3	22
				60	100	60	51.7	31
335	CLAYSTONE	CLAYSTONE; variegated, olive gray (5y 5/2), reddish yellow (7.5yr 6/6); intensely weathered to decomposed; very soft; very thin infilling; infilling: clay; smooth; San Andres Fm.	**Not Acid Reactive**					
	DOLOMITE	DOLOSTONE; variegated, white (7.5yr 8/1), reddish yellow (7.5yr 7/6), weak red (10yr 4/3); slightly weathered; intensely fractured; steep fractures; spacing: 3-10"; slightly open; clean infilling; moderately weathered fracturing; not healed; moderately rough; San Andres Fm.	**Acid Reactive**	60	100	60	65	39
	LIMESTONE	LIMESTONE; pinkish gray (7.5yr 6/2); intensely weathered; hard; intensely fractured; moderately open; not healed; moderately rough; San Andres Fm; bivalve fossils.	**Acid Reactive**					
340	LIMESTONE	LIMESTONE; gray (7.5yr 6/1); slightly weathered; hard; moderately fractured to intensely fractured; spacing: 4-14"; open to wide; intensely weathered fracturing; not healed; smooth; San Andres Fm; bivalve fossils.		60	100	60	63.3	38
345								
				60	98.3	59	83.3	50
350								
	DOLOMITE	DOLOSTONE; brownish yellow (10yr 6/6), white (10yr 8/1); slightly weathered; moderately fractured; little to no dip; spacing: 4-18"; tight to slightly open; clean infilling; moderately weathered fracturing; not	**Not Acid Reactive; sample sent to Golder at 354.5-355.5'.**	60	100	60	100	60

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	DOLOMITE	DOLOSTONE; brownish yellow (10yr 6/6), white (10yr 8/1); slightly weathered; moderately fractured; little to no dip; spacing: 4-18"; tight to slightly open; clean infilling; moderately weathered fracturing; not healed; moderately rough; San Andres Fm.						
				60	86.7	52	86.7	52
360	DOLOMITE	DOLOSTONE; very thinly bedded; light gray (N7), white (N8); fresh (unweathered) to slightly weathered; moderately fractured; little to no dip; slightly open; clean infilling; not healed; slightly rough; San Andres Fm.	Not Acid Reactive					
				60	100	60	85	51
	SILTSTONE	SILTSTONE; very thinly bedded; dark bluish gray (5pb 4/1), light bluish gray (10b 8/1); slightly weathered; soft; little to no dip; Glorieta Sandstone; suspect pyrite.						
365	SANDSTONE							
	SANDSTONE	SANDSTONE; very thinly bedded; yellow (10yr 7/6); decomposed; very soft; very intensely fractured; Glorieta Sandstone; rock decomposed into fat clay.						
		SANDSTONE; very pale brown (10yr 7/4); moderately weathered; moderately hard; intensely fractured; 20° dip; tight to slightly open; clean infilling; slightly rough; Glorieta Sandstone.						
				60	73.3	44	70	42
370								
	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.		60	100	60	30	18
375	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); intensely weathered; very intensely fractured; horizontal and 45° dips; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.						
	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.		60	100	60	93.3	56
380								
				60	100	60	98.3	59
385								
				60	93.3	56	93.3	56
390								
				60	98.3	59	25	15
395								
	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.						
				60	100	60	40	24

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.	**Sample sent to Golder at 402-403'.**					
				60	**100**	**60**	**55**	**33**
405								
				60	**100**	**60**	**56.7**	**34**
410								
				60	**100**	**60**	**31.7**	**19**
415	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); slightly weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.						
				60	**100**	**60**	**76.7**	**46**
420	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.						
				60	**100**	**60**	**100**	**60**
425			**Sample sent to Golder and ACZ at 426-427'.**					
	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); slightly weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.		**60**	**88.3**	**53**	**70**	**42**
430								
				60	**100**	**60**	**96.7**	**58**
435								
	SANDSTONE	SANDSTONE; fine-grained; laminated; very pale brown (10yr 7/4); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone; crossbedding.						
				60	**100**	**60**	**70**	**42**
440								
	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone.		**60**	**100**	**60**	**100**	**60**

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone.						
				60	90	54	83.3	50
450								
				60	100	60	100	60
455								
				60	100	60	100	60
460								
				60	100	60	100	60
465			Sample sent to Golder and ACZ at 464-465'.					
				60	100	60	100	60
470	SANDSTONE	SANDSTONE; fine-grained; reddish brown (2.5yr 5/3); fresh (unweathered) to slightly weathered; moderately fractured; little to no dip; tight to slightly open; very thin infilling; infilling: clay; rough; Yeso Fm.						
				60	100	60	85	51
475	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone.						
	SANDSTONE	SANDSTONE; fine-grained; brownish yellow (10yr 6/6); moderately weathered; moderately fractured to intensely fractured; little to no dip; tight to slightly open; very thin infilling; infilling: clay; rough; Yeso Fm.		60	100	60	48.3	29
480								
				60	100	60	66.7	40
485	SANDSTONE	SANDSTONE; fine-grained; laminated; light bluish gray (10b 8/1); moderately weathered; intensely fractured; horizontal and 45° dips, vertical fractures; clean infilling; not healed; rough; Glorieta Sandstone.						
				54	100	54	100	54
	SANDSTONE	SANDSTONE; fine-grained; brownish yellow (10yr 6/6); moderately weathered; moderately fractured to						

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG1

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
495	SANDSTONE	SANDSTONE; fine-grained; brownish yellow (10yr 6/6); moderately weathered; moderately fractured to intensely fractured; little to no dip; tight to slightly open; very thin infilling; infilling: clay; rough; Yeso Fm.		60	100	60	100	60
500				30	100	30	53.3	16
			End of Borehole.					
505								
510								
515								
520								
525								
530								

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG2

GENERAL INFORMATION
- **PROJ. NUMBER:** 10255185-002
- **START DATE:** 12/05/2020
- **COMPLETED:** 12/30/2021
- **HDR INSPECTOR:** Matthew T Keaveney

DRILLING INFORMATION
- **COMPANY:** Cascade Drilling LP
- **EQUIPMENT:** RotoSonic LS600, Boart Longyear LF 90D
- **METHOD:** Sonic, Rock Coring
- **BOREHOLE DIAMETER:** PQ (4.89 inches)
- **BOREHOLE DEPTH:** 500 feet

COORDINATES
- **X:** -107.9097
- **Y:** 35.2302
- **GROUND ELEV (FT AMSL):** 6566

WATER TABLE
- **DEPTH TO WATER:** 131.00 ft below grade

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILT (ML); medium stiff; brown (7.5yr 5/3); dry; mostly SILT.						
	ML	SILT (ML); loose; gray (5yr 6/1); dry; mostly SILT; little GRAVEL, fine, subrounded.						
5	BASALT	IGNEOUS ROCK (BASALT); gray (5yr 6/1); dry; moderately hard, fresh, appears weathered due to drilling method.						
	ML	SILT with SAND (ML); loose; reddish yellow (5yr 6/6); dry; mostly SILT; little SAND, fine.						
10	ML	SILT (ML); variegated, reddish yellow (5yr 6/6), gray (5yr 6/1); dry; mostly SILT; few-little COBBLES, basalt, 5- to 8-inches diameter.						
15								
	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
20								
25								
30								
35								

PROJECT: Homestake Mining Company - SAG Investigation
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GEOLOGIC BORING LOG

WELL / BOREHOLE ID
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DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
45	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
50								
55								
60								
65								
70								
75								
80								

PROJECT: Homestake Mining Company - SAG Investigation
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WELL / BOREHOLE ID
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DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
90	BASALT	IGNEOUS ROCK (BASALT); gray (N6), weak red (2.5yr 4/2); moderately hard, fresh, appears weathered due to drilling method in some areas.						
95								
	SW	Well-graded SAND (SW); medium dense; dark reddish gray (2.5yr 3/1); mostly SAND, mostly fine, some medium.						
100	SW	Well-graded SAND (SW); medium dense; dark reddish brown (2.5yr 3/3); mostly SAND, mostly medium, little fine, trace coarse.						
105	SM	SILTY SAND (SM); medium dense; mottled, brown (7.5yr 4/2), strong brown (7.5yr 5/6); mostly SILT.						
	CH	SANDY FAT CLAY (CH); stiff; variegated, brown (7.5yr 4/2), strong brown (7.5yr 5/6); mostly CLAY; some SAND, fine.						
	CH	FAT CLAY (CH); stiff; very dark gray (7.5yr 3/1); mostly CLAY, cohesive, medium plasticity.						
110	SP	Poorly-graded SAND (SP); medium dense; brown (7.5yr 5/4); mostly SAND, fine.						
115	CH	FAT CLAY (CH); stiff; reddish brown (5yr 4/4); mostly CLAY, high plasticity, cohesive.						
	CH	FAT CLAY with SAND and GRAVEL (CH); stiff; reddish brown (5yr 4/4); mostly CLAY; some SAND, fine to medium; little GRAVEL, coarse; trace COBBLES, 3-inch diameter.						
120	ML	SILT (ML); stiff; gray (5y 5/1); mostly SILT, Chinle Formation.						
125								

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WELL / BOREHOLE ID
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DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	ML	SILT (ML); stiff; gray (5y 5/1); mostly SILT, Chinle Formation.						
135								
140	ML	SILT with SAND (ML); stiff; loose; olive brown (2.5y 4/4); mostly SILT, Chinle Formation; little SAND, fine.						
	ML	SILT (ML); stiff; very dark grayish brown (2.5y 3/2); mostly SILT, Chinle Formation.						
145	ML	SILT with SAND (ML); medium dense; reddish brown (5yr 4/4); mostly SILT, Chinle Formation; little SAND, fine.						
150								
155								
	SILTSTONE	SEDIMENTARY (SILTSTONE); dark reddish gray (10r 4/1); fresh; moderately soft; slightly fractured; little to no dip; tight to slightly open; clean infilling; not healed; stepped; Chinle Formation.						
160	SILTSTONE	SILTSTONE; dark reddish gray (10r 4/1); fresh (unweathered); moderately soft; slightly fractured; little to no dip; tight to slightly open; clean infilling; not healed; stepped fracture surfaces; Chinle Fm.	**Sample sent to Golder and ACZ at 163-164'.**	**42**	**100**	**42**	**79.8**	**33.5**
165				**60**	**88.3**	**53**	**59.2**	**35.5**
	SANDSTONE	SANDSTONE; pale red (10r 6/2); slightly weathered; moderately soft; moderately fractured; steep dip; slightly open; clean infilling; not healed; rough; Chinle Fm.						
	SANDSTONE							
170		SANDSTONE; laminated; reddish gray (10r 5/1); slightly weathered; moderately soft; moderately fractured; little to no dip; slightly open; clean infilling; not healed; rough; Chinle Fm.		**36**	**88.9**	**32**	**30.6**	**11**
				36	**100**	**36**	**88.9**	**32**

PROJECT: Homestake Mining Company - SAG Investigation
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WELL / BOREHOLE ID
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DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; laminated; reddish gray (10r 5/1); slightly weathered; moderately soft; moderately fractured; little to no dip; slightly open; clean infilling; not healed; rough; Chinle Fm.						
				60	94.2	56.5	84.2	50.5
180								
				60	100	60	91.7	55
185								
				60	100	60	94.2	56.5
190								
				24	62.5	15	62.5	15
	LIMESTONE	LIMESTONE; gray (N6); fresh (unweathered) (unweathered); moderately soft; very slightly fractured; little to no dip; tight to slightly open; clean infilling; not healed; moderately rough; San Andres Fm.	**Acid Reactive; sample sent to Golder at 194-195'.**	54	100	54	94.4	51
195								
	LIMESTONE	LIMESTONE; light gray (N7); slightly weathered; moderately soft; very slightly fractured; little to no dip; open; not healed; rough; San Andres Fm.	**Acid Reactive**					
	LIMESTONE	LIMESTONE; gray (N6); fresh (unweathered); moderately soft; very slightly fractured; little to no dip; open; not healed; smooth; San Andres Fm.	**Acid Reactive**	60	100	60	85	51
200								
	LIMESTONE	LIMESTONE; gray (N6); slightly weathered; moderately soft; very slightly fractured; little to no dip; open; not healed; rough; San Andres Fm.	**Acid Reactive**					
	LIMESTONE		**Acid Reactive**					
	LIMESTONE	LIMESTONE; gray (N6); moderately weathered; moderately soft; very slightly fractured; vertical fracture; open; not healed; rough; San Andres Fm.	**Acid Reactive**	60	90	54	83.3	50
	LIMESTONE	LIMESTONE; gray (N6); slightly weathered; moderately soft; very slightly fractured; slightly open; partly healed; slightly rough; San Andres Fm.	**Acid Reactive**					
205	LIMESTONE	LIMESTONE; variegated, pinkish white (7.5yr 8.5/1), white (N8); moderately weathered; moderately soft; intensely fractured; no dip to ~45°; open; thin infilling; rough; San Andres Fm.						
				60	98.3	59	83.3	50
210								
				60	100	60	93.3	56
215	LIMESTONE	LIMESTONE; gray (N6); slightly weathered; moderately soft; intensely fractured; little to no dip; slightly open; clean infilling; rough; San Andres Fm.	**Acid Reactive; sample sent to Golder and ACZ at 215-216'**					
				66	80.3	53	50	33

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	LIMESTONE	LIMESTONE; gray (N6); slightly weathered; moderately soft; intensely fractured; little to no dip; slightly open; clean infilling; rough; San Andres Fm.	**Acid Reactive**					
	LIMESTONE	LIMESTONE; very pale brown (10yr 8/2); moderately weathered; moderately soft; moderately fractured; slightly open; rough; San Andres Fm.						
	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); slightly weathered; moderately hard; moderately fractured; horizontal fractures; moderately open to open; clean to very thin infilling; not healed; slightly rough; San Andres Fm.		**60**	**85**	**51**	**73.3**	**44**
225								
				48	**100**	**48**	**100**	**48**
230								
				66	**95.5**	**63**	**87.9**	**58**
235								
				60	**96.7**	**58**	**76.7**	**46**
240	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured; horizontal fractures; moderately open to open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.						
	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; very intensely fractured; moderately open to open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.	**Not Acid Reactive; sample sent to Golder and ACZ at 244-245'.**	**60**	**100**	**60**	**68.3**	**41**
	DOLOMITE							
245	SANDSTONE	DOLOSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured; horizontal fractures; moderately open to open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.						
		SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; slightly fractured; horizontal fractures; open to moderately wide; clean to very thin infilling; not healed; moderately rough; San Andres Fm.		**66**	**100**	**66**	**72.7**	**48**
	SANDSTONE							
250	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; very intensely fractured; horizontal fractures; open to moderately wide; clean to very thin infilling; not healed; moderately rough; San Andres Fm.						
		SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured; horizontal fractures; open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.		**60**	**96.7**	**58**	**60**	**36**
255								
				60	**90**	**54**	**70**	**42**
260								
				18	**100**	**18**	**33.3**	**6**
				78	**74.4**	**58**	**53.8**	**42**

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DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
270	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured; horizontal fractures; open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.						
				24	100	24	100	24
				60	85	51	43.3	26
275			**Void at 275 feet, oxidation at void, loss of circulation at void.**					
				24	100	24	100	24
280	SANDSTONE	SANDSTONE; very pale brown (10yr 8/2); moderately weathered; moderately hard; intensely fractured to very intensely fractured; horizontal fractures; open; clean to very thin infilling; not healed; moderately rough; San Andres Fm.		36	97.2	35	66.7	24
	SANDSTONE	SANDSTONE; light gray (7.5yr 7/1); slightly weathered; slightly fractured; ~45° dip; moderately open; clean to very thin infilling; not healed; slightly rough; San Andres Fm.	**Sample sent to Golder at 283-284'.**	60	95	57	81.7	49
285	DOLOMITE	DOLOSTONE; light gray (N7); fresh (unweathered); moderately fractured to intensely fractured; ~45° dips; moderately open to open; clean infilling; not healed; slightly rough; San Andres Fm.	**Not Acid Reactive**					
	DOLOMITE	DOLOSTONE; gray (7.5yr 6/1); moderately weathered; intensely fractured to very intensely fractured; moderately open; clean to very thin infilling; not healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	60	100	60	85	51
290	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); moderately weathered; moderately fractured; moderately open; clean to very thin infilling; not healed; slightly rough; San Andres Fm.	**Not Acid Reactive**					
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); moderately weathered; very intensely fractured; moderately open; clean to very thin infilling; not healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	60	100	60	100	60
295	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); moderately weathered; moderately fractured; moderately open; clean to very thin infilling; not healed; rough; San Andres Fm.						
				60	100	60	53.3	32
300	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); moderately weathered; very intensely fractured; moderately open; clean to very thin infilling; not healed; rough; San Andres Fm.	**Not Acid Reactive**					
	DOLOMITE	DOLOSTONE; light gray (N7); slightly weathered; intensely fractured; tight to slightly open; clean infilling; slightly rough; San Andres Fm; bivalve shells.	**Not Acid Reactive**	60	100	60	73.3	44
305	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; ~45° dips; moderately open; clean infilling; partly healed; slightly rough; San Andres Fm.	**Not Acid Reactive**					
				60	100	60	88.3	53

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WELL / BOREHOLE ID
SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; ~45° dips; moderately open; clean infilling; partly healed; slightly rough; San Andres Fm.	**Sample sent to Golder at 310-311'.**					
				60	**100**	**60**	**43.3**	**26**
	DOLOMITE	DOLOSTONE; white (N8); moderately weathered; very intensely fractured; rough; San Andres Fm.	**Not Acid Reactive**					
315	DOLOMITE	DOLOSTONE; variegated, light gray (7.5yr 7/1), reddish yellow (7.5yr 6/6); moderately weathered; slightly fractured; open; very thin infilling; partly healed; rough; San Andres Fm.	**Not Acid Reactive**					
	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; very intensely fractured; clean infilling; slightly rough; San Andres Fm.	**Not Acid Reactive**					
				60	**96.7**	**58**	**96.7**	**58**
	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; moderately fractured; clean infilling; slightly rough; San Andres Fm.	**Not Acid Reactive**					
320	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; moderately fractured; little to no dip; very thin infilling; infilling: clay; not healed; slightly rough; San Andres Fm.	**Not Acid Reactive**					
				60	**100**	**60**	**90**	**54**
325								
				60	**100**	**60**	**83.3**	**50**
330								
	DOLOMITE	DOLOSTONE; white (N8); slightly weathered; intensely fractured; little to no dip; very thin infilling; infilling: clay; moderately healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	**60**	**96.7**	**58**	**93.3**	**56**
335								
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); slightly weathered to moderately weathered; little to no dip; tight to slightly open; partly healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	**42**	**95.2**	**40**	**79.8**	**33.5**
340								
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); intensely weathered; little to no dip; tight to slightly open; partly healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	**66**	**90.9**	**60**	**84.8**	**56**
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); slightly weathered to moderately weathered; little to no dip; tight to slightly open; partly healed; slightly rough; San Andres Fm.	**Not Acid Reactive**					
345								
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); slightly weathered to moderately weathered; ~45° angles at 353-353.5 ft; tight to slightly open; very thin infilling; partly healed; slightly rough; San Andres Fm.	**Not Acid Reactive**	**60**	**100**	**60**	**86.7**	**52**
350								
				60	**100**	**60**	**100**	**60**
			Sample sent to Golder at 354-355'.					

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WELL / BOREHOLE ID
SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	DOLOMITE	DOLOSTONE; white (7.5yr 8/1); slightly weathered to moderately weathered; ~45° angles at 353-353.5 ft; tight to slightly open; very thin infilling; partly healed; slightly rough; San Andres Fm.						
				48	95.8	46	85.4	41
360								
				24	83.3	20	70.8	17
				60	100	60	86.7	52
365								
				60	100	60	75	45
370								
	DOLOMITE	DOLOSTONE; fine-grained; very thinly bedded; light gray (N7); moderately weathered; moderately hard; moderately fractured; spacing: 3-8"; very thin infilling; infilling: clay; intensely weathered fracturing; not healed; moderately rough; San Andres Fm; x-bedded.	**Not Acid Reactive**					
	SANDSTONE	SANDSTONE; fine-grained; ; intensely weathered; very hard; very intensely fractured; vertical fractures present; spacing: <1-7"; clean infilling; not healed; slightly rough; Glorieta Sandstone.		60	96.7	58	32.5	19.5
375								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; light gray (2.5yr 7/2); slightly weathered; very hard; moderately fractured; no dip to ~20° dip; spacing: 3-8"; clean infilling; not healed; moderately rough; Glorieta Sandstone.						
				60	100	60	20	12
380								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; light gray (2.5yr 7/2), brownish yellow (10yr 6/8); slightly weathered; moderately hard; moderately fractured; little to no dip for horizontal fractures, vertical fractures throughout; clean infilling; intensely weathered fracturing; not healed; slightly rough; Glorieta Sandstone.						
				60	100	60	90	54
385								
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; very pale brown (10yr 7/4); slightly weathered; hard; slightly fractured; spacing: 5-13"; slightly open; very thin infilling; not healed; moderately rough; Glorieta Sandstone.						
	SANDSTONE							
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; gray (N5); intensely weathered; very soft; moderately fractured; tight; decomposed fracturing; smooth; Glorieta Sandstone; crossbedded.						
				60	100	60	91.7	55
390		SANDSTONE; fine-grained; thinly bedded; very pale brown (10yr 7/3); slightly weathered; hard; slightly fractured to moderately fractured; ~20° dip; spacing: 3-8"; tight to slightly open; clean infilling; not healed; moderately rough; Glorieta Sandstone; crossbedded.						
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; gray (N6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded.		60	100	60	85	51
395			**Sample sent to Golder at 396-397'.**					
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; brownish yellow (10yr 6/6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, oxidation.		60	100	60	95	57

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WELL / BOREHOLE ID: SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; brownish yellow (10yr 6/6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, oxidation.						
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; gray (N6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, trace oxidation.						
405	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; gray (N6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, trace oxidation.		60	100	60	96.7	58
				60	100	60	91.7	55
410								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; brownish yellow (10yr 6/6); fresh (unweathered); hard; moderately fractured; ~20° dip; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, oxidation.		60	100	60	95	57
415								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; gray (N6); fresh (unweathered); hard; moderately fractured; ~20° dip, 45° fracture at 424 feet; spacing: 7-13"; tight; clean infilling; not healed; slightly rough; Glorieta Sandstone; crossbedded, trace oxidation.		60	96.7	58	96.7	58
420								
				60	100	60	73.3	44
425								
	SILTSTONE	SILTSTONE; very thinly bedded; gray (N6); intensely weathered; very soft; very intensely fractured; spacing: 2-3"; slightly open; moderately rough; Glorieta Sandstone; crossbedded.						
	SANDSTONE	SANDSTONE; fine-grained; very thinly bedded; gray (N5); fresh (unweathered); very intensely fractured; vertical fractures; clean infilling; slightly rough; Glorieta Sandstone; crossbedded.		60	70	42	0	0
430								
				60	100	60	0	0
435								
	SANDSTONE	SANDSTONE; very thinly bedded to laminated; variegated, gray (N6), gray (N5); moderately weathered; hard; Glorieta Sandstone; crossbedded with mudstone, some soft intensely weathered layers.		60	98.3	59	95	57
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; gray (N6); slightly weathered; hard; slightly fractured; little to no dip; tight; clean infilling; fresh (unweathered) fracturing; not healed; slightly rough; Glorieta Sandstone.	**Sample sent to Golder and ACZ at 439.5-440.5'.**					
440								
				60	100	60	45	27

PROJECT: Homestake Mining Company - SAG Investigation
CLIENT: Barrick
LOCATION: Grants, New Mexico

GEOLOGIC BORING LOG

WELL / BOREHOLE ID
SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; gray (N6); slightly weathered; hard; slightly fractured; little to no dip; tight; clean infilling; fresh (unweathered) fracturing; not healed; slightly rough; Glorieta Sandstone.						
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; gray (N6); slightly weathered; hard; moderately fractured; vertical fractures; tight; clean infilling; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone.		60	100	60	65	39
450								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; gray (N6); slightly weathered; hard; moderately fractured; no vertical fractures; tight; clean infilling; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone.		60	100	60	100	60
455								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; white (N8), light yellowish brown (10yr 6/4); slightly weathered; hard; moderately fractured; no vertical fractures; tight; clean infilling; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone; little oxidation.		60	90	54	90	54
	SANDSTONE							
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; dark gray (N4); slightly weathered; hard; moderately fractured; no vertical fractures; tight; clean infilling; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone.						
460								
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded to very thinly bedded; white (5yr 8/1); slightly weathered; hard; moderately fractured; no vertical fractures; tight; clean infilling; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone.	**Sample sent to Golder and ACZ at 463-464'.**	60	100	60	100	60
		SANDSTONE; fine-grained; thinly bedded to very thinly bedded; white (2.5yr 8/1), light gray (5yr 7/1); slightly weathered; hard; moderately fractured; vertical healed fracture at 469.5-470.5 feet; tight; thin infilling; infilling: calcite; fresh (unweathered) fracturing; partly healed; slightly rough; Glorieta Sandstone; color gradient from 461.5 ft (white) to 465 ft (light gray).						
465								
				60	80	48	68.3	41
470								
	SANDSTONE	SANDSTONE; fine-grained; variegated, brownish yellow (10yr 6/6), yellowish brown (10yr 5/6), pale brown (10yr 6/3); moderately weathered; hard; very intensely fractured; g; moderately rough; Glorieta Sandstone; healed with calcite and refractured.		60	100	60	0	0
475								
	SANDSTONE	SANDSTONE; fine-grained; variegated, light gray (10yr 7/2), yellow (10yr 7/6), white (N8); decomposed; very soft; Glorieta Sandstone.						
	SANDSTONE							
	SANDSTONE	SANDSTONE; fine-grained; variegated, light brownish gray (10yr 6/2), yellowish brown (10yr 5/4), white (N8); moderately weathered; hard; very intensely fractured; open; infilling: calcite; partly healed; moderately rough; Yeso Fm; healing refractured.		60	100	60	28.3	17
480		SANDSTONE; fine-grained; ; slightly weathered; hard; moderately fractured; steep dips; thin infilling; infilling: calcite, some clay; Yeso Fm; slightly crossbedded.						
				42	100	42	100	42
485								
	SANDSTONE	SANDSTONE; fine-grained; ; slightly weathered; hard; vertical fractures; tight; slightly rough; Yeso Fm; intensely weathered at 488.5 feet.						
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; light brownish gray (2.5y 6/2); fresh (unweathered); hard; moderately fractured; 20° dips; tight; clean infilling; slightly rough; Yeso Fm.		66	90.9	60	75.8	50

GEOLOGIC BORING LOG

WELL / BOREHOLE ID: SAG2

DEPTH (FT BGS)	USCS / ROCK TYPE	MATERIAL DESCRIPTION	REMARKS	RUN LENGTH (IN)	RECOVERY (%)	RECOVERY (IN)	RQD (%)	RQD (IN)
	SANDSTONE	SANDSTONE; fine-grained; thinly bedded; light brownish gray (2.5y 6/2); fresh (unweathered); hard; moderately fractured; 20° dips; tight; clean infilling; slightly rough; Yeso Fm.						
				60	100	60	88.3	53
495	SANDSTONE	SANDSTONE; very thinly bedded; gray (N6); fresh (unweathered); hard; moderately fractured; steep fracture at 495ft; slightly open; clean to very thin infilling; infilling: calcite; slightly rough; Glorieta Sandstone.						
				36	100	36	100	36
	SANDSTONE	SANDSTONE; medium sand; very thinly bedded; weak red (2.5yr 4/2); fresh (unweathered); hard; moderately fractured; little to no dip; slightly rough; Yeso Fm; subrounded sand.						
500			**End of Borehole.**					
505								
510								
515								
520								
525								
530								

Appendix B

Well Construction

Homestake Mining Company
Water FLUTe Multilevel Well Construction

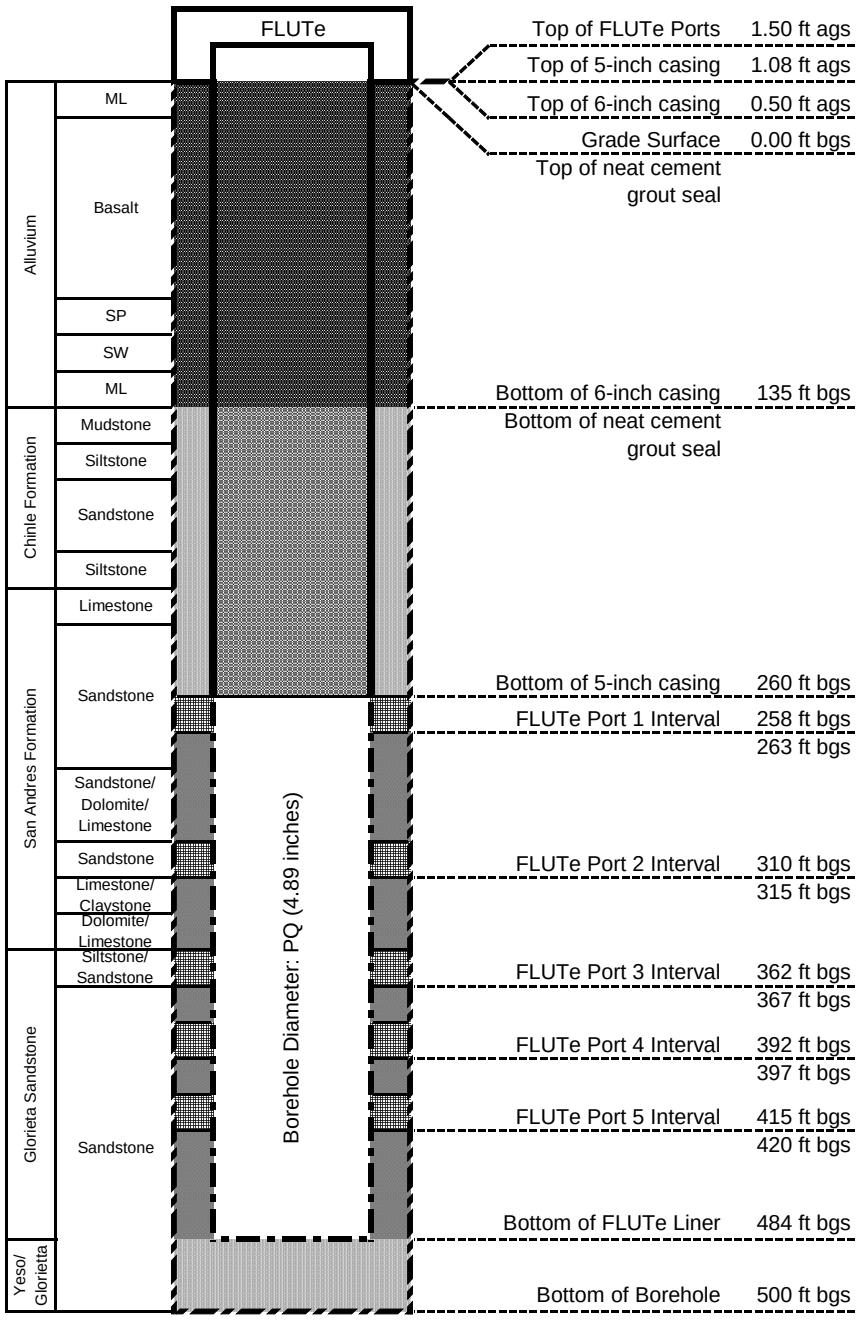
Well ID:	**SAG1**	**Project:**	**Homestake Mining Company - SAG Investigation**
Location:	**Grants, New Mexico**	**Client:**	**Barrick**
Drilling Contractor:	**Cascade**	**Project Number:**	**10255185-002**
Date Drilled:	**12/12/2020-1/9/2021**	**Drilling Rig:**	**RotoSonic LS600, Boart Longyear LF 90D**
Date Completed:	**2/18/2021**	**Drilling Method:**	**Sonic, Rock Coring**
Cover Type:	**Stick up**	**Development Method:**	**Purging**
Grade Elevation:	**Not yet surveyed**	**Point of Diversion File:**	**B-00028-POD1427**
Borehole Depth:	**500 feet**	**Coordinate System:**	**WGS 1984 (Mobile Phone GPS)**
Borehole Diameter:	**10 in/260 ft; 4.89 in/500 ft**	**X: -107.9062**	**Y: 35.2261**

Well Information		
Well ID:	SAG1	
Start Date:	Feb. 01, 2021	
Static Water Level:	128.00 feet below grade	
Static Water Level Date:	2/18/2021	
Measuring Point:	Tag Line	
Well/Liner Depth:	484 feet	
Hole Diameter:	5 inches	
Water FLUTe Liner Install:	Feb. 18, 2021	
Recommended Purge Press.:	109 PSI	
Recommended Smpl. Press.:	87 PSI	
Ports can be purged simultaneously.		
Casing		
Interval (feet below grade):	0-135	0-260
Material:	Steel	Steel
Casing Diameter (inches):	6.065	5
Joint Type:	Threaded	Threaded
Seal(s) / QTY(s)		
Neat Cement Grout:	0-135 feet bgs	
Concrete Mix:	Not Applicable	
Bentonite Slurry:	Not Applicable	
Bentonite Pellets:	Not Applicable	
Other:	Not Applicable	

Water FLUTe Construction

	Port 1	Port 2	Port 3	Port 4	Port 5
Sampling Interval (feet below grade)	258-263	310-315	362-367	392-397	415-420
Pump Depth (feet below grade)	224	225	226	227	228
Purge Volume (liters)	4.31	4.38	4.42	4.46	4.51
Sample Stroke Vol. (liters)	2.27	2.27	2.27	2.27	2.27
Minimum Recommended Discard (liters)	0.237	0.25	0.285	0.254	0.257
Remaining Sample Volume (liters)	2.03	2.02	2.02	2.02	2.01
Transducer?	No	No	No	No	No

** NOT TO SCALE*



WGS: Wideband Global SATCOM
GPS: Global Positioning System
PSI: Pounds per square inch
ft: feet
bgs: below grade surface
ags: above grade surface
smpl.: sample
press.: pressure
ML: Silt
CH: Fat clay
CL: Lean clay
SP: Poorly-graded sand
SW: Well-graded sand
SM: Silty sand

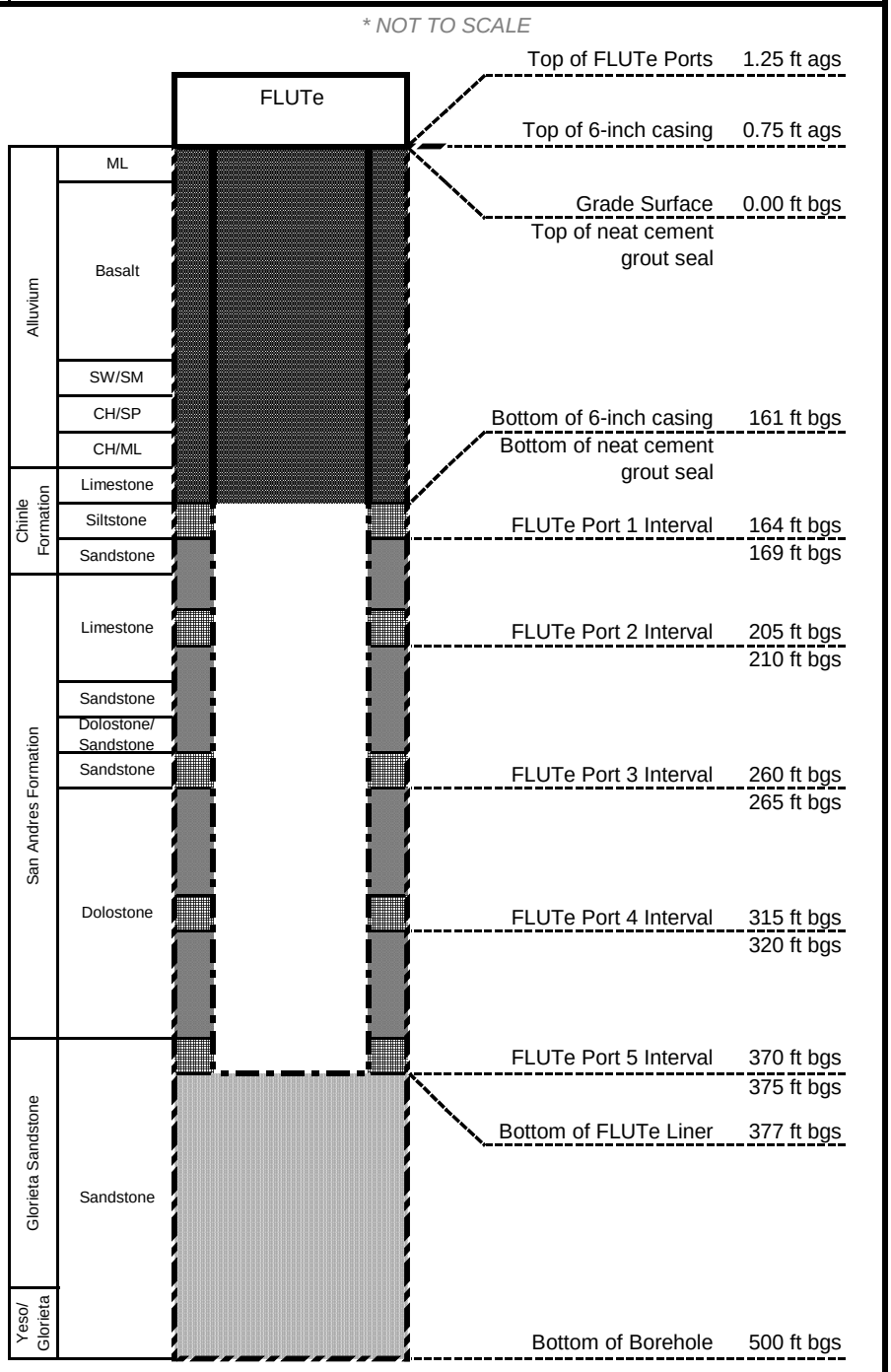
Homestake Mining Company
Water FLUTe Multilevel Well Construction

Well ID:	**SAG2**	**Project:**	**Homestake Mining Company - SAG Investigation**
Location:	**Grants, New Mexico**	**Client:**	**Barrick**
Drilling Contractor:	**Cascade**	**Project Number:**	**10255185-002**
Date Drilled:	**12/5/2020-12/30/2021**	**Drilling Rig:**	**RotoSonic LS600, Boart Longyear LF 90D**
Date Completed:	**2/17/2021**	**Drilling Method:**	**Sonic, Rock Coring**
Cover Type:	**Stick up**	**Development Method:**	**Purging**
Grade Elevation:	**Not yet surveyed**	**Point of Diversion File:**	**B-00028-POD1428**
Borehole Depth:	**500 feet**	**Coordinate System:**	**WGS 1984 (Mobile Phone GPS)**
Borehole Diameter:	**10 in/161 ft/4.89 in/500 ft**	**X: -107.9097**	**Y: 35.2302**

Well Information	
Well ID:	SAG2
Start Date:	Jan. 20, 2021
Static Water Level:	131.00 feet below grade
Static Water Level Date:	2/17/2021
Measuring Point:	Tag Line
Well/Liner Depth:	377 feet
Hole Diameter:	5 inches
Water FLUTe Liner Install:	Feb. 17, 2021
Recommended Purge Press.:	110 PSI
Recommended Smpl. Press.:	88 PSI
Ports can be purged simultaneously.	
Casing	
Interval (feet below grade):	0-161.5
Material:	Steel
Casing Diameter (inches):	6.065
Joint Type:	Threaded
Seal(s) / QTY(s)	
Neat Cement Grout:	0-161.5 feet bgs
Concrete Mix:	Not Applicable
Bentonite Slurry:	Not Applicable
Bentonite Pellets:	Not Applicable
Other:	Not Applicable

Water FLUTe Construction

	Port 1	Port 2	Port 3	Port 4	Port 5
Sampling Interval (feet below grade)	164-169	205-210	260-265	315-320	370-375
Pump Depth (feet below grade)	227	228	229	230	231
Purge Volume (liters)	4.31	4.38	4.42	4.46	4.51
Sample Stroke Vol. (liters)	2.25	2.25	2.25	2.25	2.25
Minimum Recommended Discard (liters)	0.237	0.250	0.252	0.254	0.257
Remaining Sample Volume (liters)	2.01	2.00	1.99	1.99	1.99
Transducer?	No	No	No	No	No



WGS: Wideband Global SATCOM
GPS: Global Positioning System
PSI: Pounds per square inch
ft: feet
bgs: below grade surface
ags: above grade surface
smpl.: sample
press.: pressure
ML: Silt
CH: Fat clay
CL: Lean clay
SP: Poorly-graded sand
SW: Well-graded sand
SM: Silty sand

Homestake Mining Company
Alluvium Piezometer Construction

Well ID:	**OB1**	**Project:**	**Homestake Mining Company - SAG Investigation**
Location:	**Grants, New Mexico**	**Client:**	**Barrick**
Drilling Contractor:	**Cascade**	**Project Number:**	**10255185-002**
Date Drilled:	**12/1/2020-12/4/2020**	**Drilling Rig:**	**RotoSonic LS600**
Date Completed:	**12/4/2020**	**Drilling Method:**	**Sonic**
Cover Type:	**Stick-Up**	**Development Method:**	**Surging/Purging**
Grade Elevation:	**Not yet surveyed**	**Point of Diversion File:**	**B-00028-POD1430**
Borehole Depth:	**136 feet**	**Coordinate System:**	**WGS 1984 (Mobile Phone GPS)**
Borehole Diameter:	**8-10 inches**	**X: -107.9154**	**Y: 35.2257**

General Well Information	
Well ID:	OB1
Start Date:	Dec. 01, 2020
End Date:	Dec. 04, 2020
Static Water Level (ft bgs):	Dry
Static Water Level Date:	Dec. 05, 2020
Measuring Point:	Top of PVC
Well Depth:	131.5 feet
Riser Pipe	
Interval (feet below grade):	Surface-111.5 feet
Material:	Schedule 40 PVC
Diameter:	4 inches
Joint Type:	Flush-Joint Threaded
Outer Casing	
Interval:	No Casing Installed
Material:	Not Applicable
Diameter:	Not Applicable
Joint Type:	Not Applicable
Screen	
Interval (feet):	111.5-131.5 feet
Diameter (inches):	4 inches
Material:	Schedule 40 PVC
Slot Size:	10-slot
Filter Pack	
Interval (feet):	107-136 feet
Sand (#1-size):	107-136 feet
Gravel:	Not Applicable
Natural:	Not Applicable
Amount:	Not Applicable
Sump	
Interval (feet):	No Sump Installed
Diameter (inches):	Not Applicable
Material:	Not Applicable
Joint Type:	Not Applicable
Seals/Quantity	
Cement-Bentonite Grout:	0-20 feet bgs
Bentonite Slurry:	20-102 feet bgs
Bentonite Chips:	102-107 feet bgs
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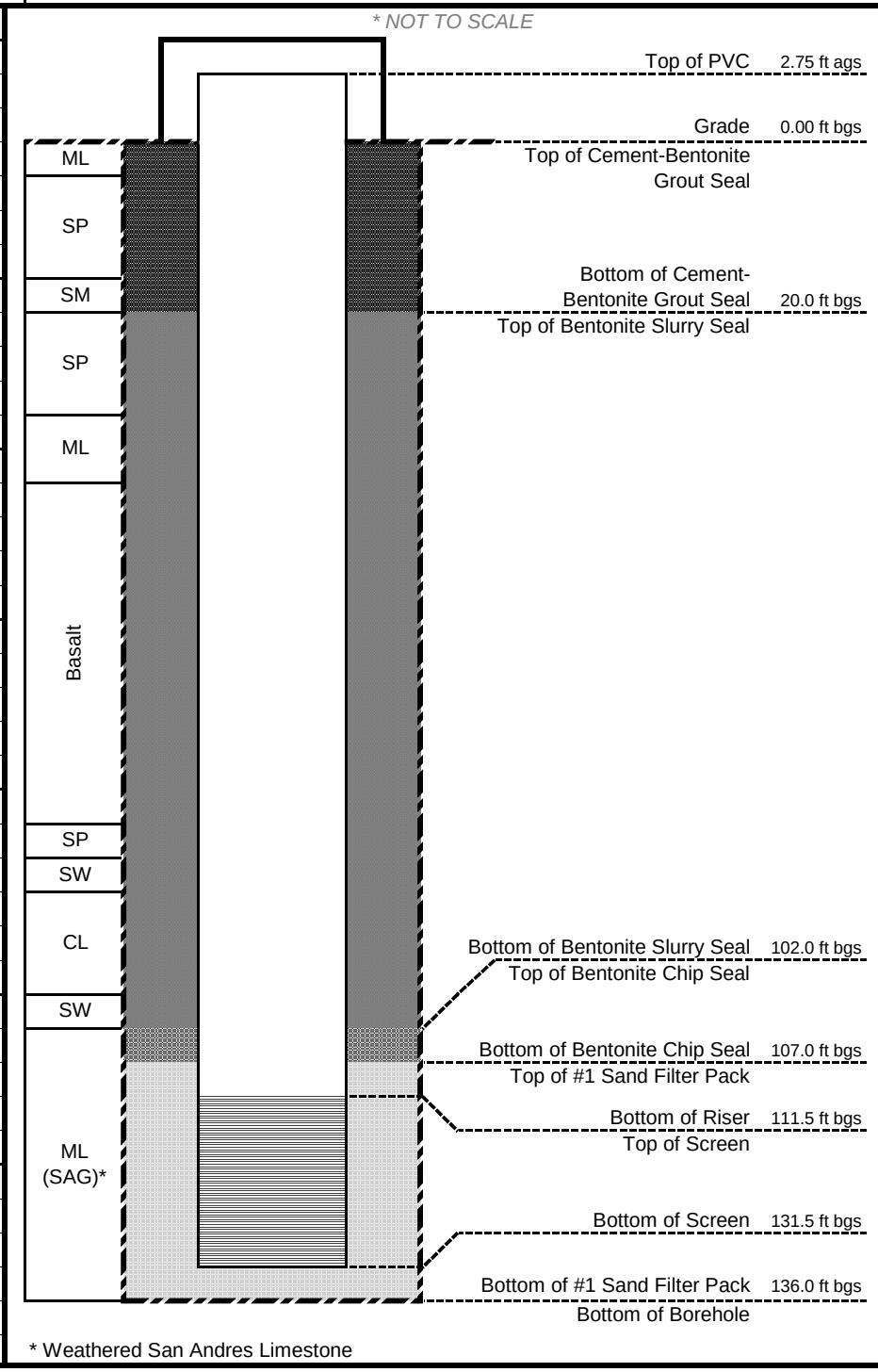

* Weathered San Andres Limestone

WGS: Wideband Global SATCOM
GPS: Global Positioning System
PSI: Pounds per square inch
ft: feet
bgs: below grade surface
ags: above grade surface
smpl.: sample
press.: pressure
ML: Silt
CH: Fat clay
CL: Lean clay
SP: Poorly-graded sand
SW: Well-graded sand
SM: Silty sand

Homestake Mining Company
Alluvium Piezometer Construction

Well ID:	**OB2**	**Project:**	**Homestake Mining Company - SAG Investigation**
Location:	**Grants, New Mexico**	**Client:**	**Barrick**
Drilling Contractor:	**Cascade**	**Project Number:**	**10255185-002**
Date Drilled:	**12/15/20-12/19/20**	**Drilling Rig:**	**RotoSonic LS600**
Date Completed:	**12/19/2020**	**Drilling Method:**	**Sonic**
Cover Type:	**Stick-Up**	**Development Method:**	**Surging/Purging**
Grade Elevation:	**Not yet surveyed**	**Point of Diversion File:**	**B-00028-POD1431**
Borehole Depth:	**136 feet**	**Coordinate System:**	**WGS 1984 (Mobile Phone GPS)**
Borehole Diameter:	**8 inches**	**X: -107.9067**	**Y: 35.2185**

General Well Information	
Well ID:	OB2
Start Date:	Dec. 15, 2020
End Date:	Dec. 19, 2020
Static Water Level (ft bgs):	125.83 ft bgs
Static Water Level Date:	Dec. 22, 2020
Measuring Point:	Top of PVC
Well Depth:	131.0 feet
Riser Pipe	
Interval (feet below grade):	Surface-111 feet
Material:	Schedule 40 PVC
Diameter:	4 inches
Joint Type:	Flush-Joint Threaded
Outer Casing	
Interval:	No Casing Installed
Material:	Not Applicable
Diameter:	Not Applicable
Joint Type:	Not Applicable
Screen	
Interval (feet):	111-131 feet
Diameter (inches):	4 inches
Material:	Schedule 40 PVC
Slot Size:	10-slot
Filter Pack	
Interval (feet):	108-132 feet
Sand (#1-size):	108-132 feet (12 bags)
Gravel:	Not Applicable
Natural:	Not Applicable
Amount:	Not Applicable
Sump	
Interval (feet):	No Sump Installed
Diameter (inches):	Not Applicable
Material:	Not Applicable
Joint Type:	Not Applicable
Seals/Quantity	
Cement-Bentonite Grout:	0-20 feet bgs
Bentonite Slurry:	20-103 ft bgs
Bentonite Chips:	103-108 feet bgs
Bentonite Chips:	132-136 ft bgs
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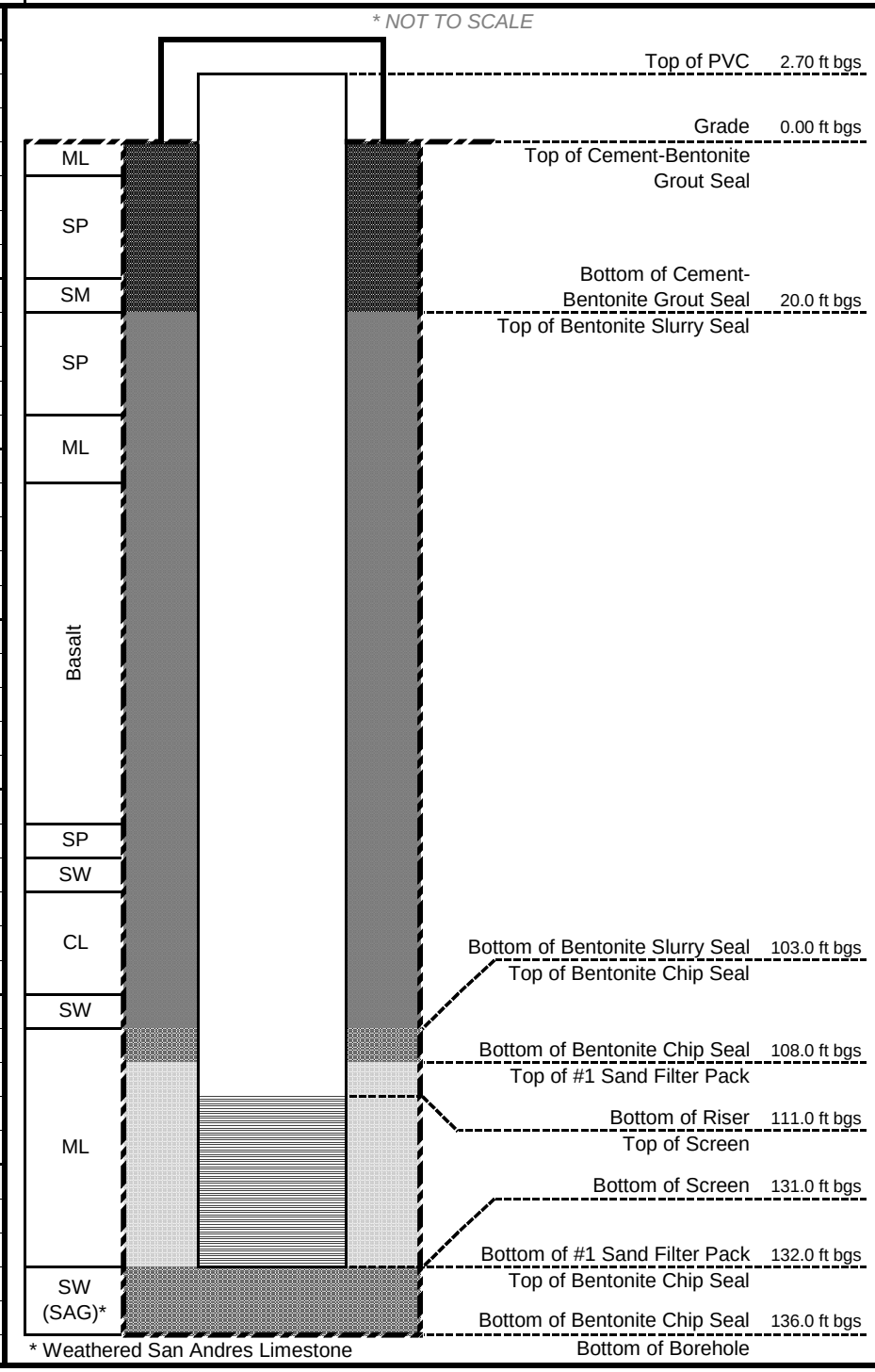

WGS: Wideband Global SATCOM
GPS: Global Positioning System
PSI: Pounds per square inch
ft: feet
bgs: below grade surface
ags: above grade surface
smpl.: sample
press.: pressure
ML: Silt
CH: Fat clay
CL: Lean clay
SP: Poorly-graded sand
SW: Well-graded sand
SM: Silty sand

Homestake Mining Company
Alluvium Piezometer Construction

Well ID:	**OB3**	**Project:**	**Homestake Mining Company - SAG Investigation**
Location:	**Grants, New Mexico**	**Client:**	**Barrick**
Drilling Contractor:	**Cascade**	**Project Number:**	**10255185-002**
Date Drilled:	**12/28/20-12/30/20**	**Drilling Rig:**	**RotoSonic LS600**
Date Completed:	**12/30/2020**	**Drilling Method:**	**Sonic**
Cover Type:	**Stick-Up**	**Development Method:**	**Surging/Purging**
Grade Elevation:	**Not yet surveyed**	**Point of Diversion File:**	**B-00028-POD1432**
Borehole Depth:	**137.5**	**Coordinate System:**	**WGS 1984 (Mobile Phone GPS)**
Borehole Diameter:	**6-10 inches**	**X: -107.9024**	**Y: 35.2164**

General Well Information	
Well ID:	OB3
Start Date:	Dec. 28, 2020
End Date:	Dec. 30, 2020
Static Water Level (ft bgs):	110.46 ft bgs
Static Water Level Date:	Dec. 30, 2020
Measuring Point:	Top of PVC
Well Depth:	126.0 feet
Riser Pipe	
Interval (feet below grade):	Surface-111 feet
Material:	Schedule 40 PVC
Diameter:	4 inches
Joint Type:	Flush-Joint Threaded
Outer Casing	
Interval:	No Casing Installed
Material:	Not Applicable
Diameter:	Not Applicable
Joint Type:	Not Applicable
Screen	
Interval (feet):	111-126 feet
Diameter (inches):	4 inches
Material:	Schedule 40 PVC
Slot Size:	10-slot
Filter Pack	
Interval (feet):	109-128.5 feet
Sand (#1-size):	109-128.5 feet
Gravel:	Not Applicable
Natural:	Not Applicable
Amount:	Not Applicable
Sump	
Interval (feet):	No Sump Installed
Diameter (inches):	Not Applicable
Material:	Not Applicable
Joint Type:	Not Applicable
Seals/Quantity	
Cement-Bentonite Grout:	0-20 feet bgs
Bentonite Slurry:	20-99 feet bgs
Bentonite Chips:	99-109 feet bgs
Bentonite Chips:	128.5-137.5 feet bgs
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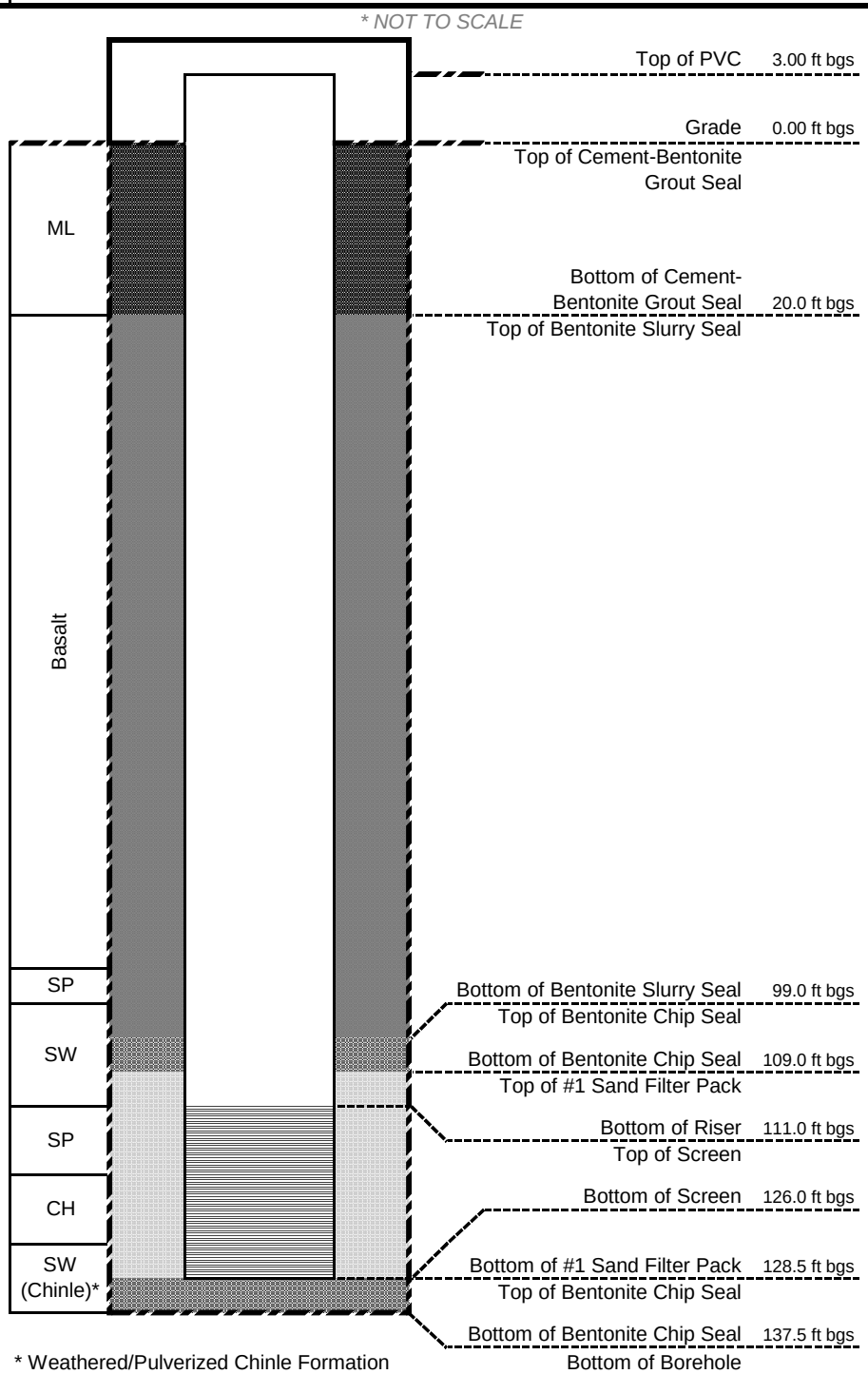


* Weathered/Pulverized Chinle Formation

WGS: Wideband Global SATCOM
GPS: Global Positioning System
PSI: Pounds per square inch
ft: feet
bgs: below grade surface
ags: above grade surface
smpl.: sample
press.: pressure
ML: Silt
CH: Fat clay
CL: Lean clay
SP: Poorly-graded sand
SW: Well-graded sand
SM: Silty sand

Appendix C

Core Photos


RUN #1 161.5-165 3.5ft (100%) Recovery (42in) 33.5in (79.8%) SAG2
RUN #2 165-167ft 53in (88.3%) 35.5in (59.2%)
HOMESTAKE MINE
GRANTS, NM
P TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX #1
RUNS 1-2
161.5-167
SAG2
BOX 2
CORE RUNS 2,3


SAG2
CORE RUN 1,2
161.5-165
165-170
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 2
RUNS 2-3
167-171ft
P TOP


HOMESTAKE MINE
GRANTS, NM
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 3
RUNS 3-4
171-176ft


HOMESTAKE MINE
GRANTS, NM
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 4
RUNS 5
176-180ft


HOMESTAKE MINE
GRANTS, NM
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 5
RUNS 5-6
180-184.5ft


HOMESTAKE MINE
GRANTS, NM
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 6
RUNS 6-7
184.5-189.5ft


HOMESTAKE MINE
GRANTS, NM
P TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 7
RUNS 7-8
189.5-193ft


HOMESTAKE MINE
GRANTS, NM
P TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 8
RUNS 9-10
193-199ft


MINE
GRANTS, N.M
SAG2
HOMESTAKE MINE
GRANTS, NM
TOP
hole PRODUCTS
HOMEST...E MINE
GRANTS, NM
SAG2
BOX # 9
RUNS 10-11
199-203Ft


SAG2
Box 9
RUNS 10,11
199-203
HOMESTAKE MINE
GRANTS, NM
TOP
hole PRODUCTS
HOMEST...E MINE
GRANTS, NM
SAG2
BOX # 10
RUN 11
203-207.5ft


HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 11
RUN 12
207.5-212ft
P TOP


HOMESTAKE MINE
GRANTS, NM
P TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 12
RUN 12-13
212-217ft


HMC
GRANTS
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 13
RUN 13-14
217-222.75ft


HMC
GRANTS, NM
P TOP
hole PRODUCTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 14
RUN 14-15
222.75ft-228ft


HMC
GRANTS
P TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX #15
RUN 16
228-232ft


HMC
GRANTS
B TOP
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX #16
RUN 17
232-236ft


HMC
GRANTS
SAG2
BOX 17
RUNS 17
232-236
HMC
GRANTS
HOMESTAKE MINE
GRANTS, NM
SAG2
BOX # 17
RUN 17-18
236-240ft


RUNS 17-18
236-240
GRANTS, NM
SAG2
BOX # 18
RUN 18-19
240-244.5ft


SAG2
BOX 20
RUNS 20-21
250-255
GRANTS
P TOP
hole PRODUCTS
GRANTS, NM
SAG2
BOX # 19
RUN 19-20
244-250ft


GRANTS, NM
SAG2
BOX # 20
RUN 20-21
250-255ft
GRANTS
P TOP
hole PRODUCTS
SAG2


SAG2
#21
RUNS 22.23
255.5-259.5
GRANTS, NM
SAG2
BOX # 22
RUN 22-23
259.5ft-264ft
HMC
Grants
TOP
HMC
Sag2


SAG2
#22
RUNS 22.23
259.5-264
GRANTS, NM
SAG2
BOX # 23
RUN 23-24
264-270ft
HMC
Grants
TOP


HMC
Grants
P TOP
hole PRODUCTS
Sag 2
#23 25
HMC
GRANTS
P TOP
hole PRODUCTS
GRANTS, NM
SAG2
BOX # 24
RUN 24-26
270.275ft


27 278-280
HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 19, 2021 BORING: SAG2
DEPTH: 275-279 BOX #: 25
RUN #: 26-27
TOP
275
← RUN 26
RUN 26
278
RUN 27 →
280
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 19, 2021 BORING: SAG2
DEPTH: 279-280 Box #: 26
RUN #: 27
TOP
279
Run 27
280
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 20, 2021 BORING: SAG2
DEPTH: 280-284.5 Box #: 27
RUN #: 28-29
TOP
280
283
284.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 284.5-289.5 Box #: 28
RUN #: 29-30
TOP
284.5
RUN 29
RUN 29
288
RUN 30
289.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 289.5-293 Box #: 29
RUN #: 30
TOP
289.5
RUN 30
RUN 30
293
BOTTOM


RUNS 31
293-297.5
HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 293-297.5 BOX #: 30
RUN #: 31
TOP
293
RUN 31
RUN 31
297.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 297.5-301.5 BOX #: 31
RUN #: 31-32
TOP
297.5
RUN 31
300
RUN 32
RUN 32
301.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2020 BORING: SAG2
DEPTH: 301.5-306 Box #: 32
RUN #: 32-33
TOP
301.5
RUN 32
303
RUN 33
RUN 33
306
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2020 BORING: SAG2
DEPTH: 306-312.5 Box #: 33
RUN #: 33-34
TOP
306
RUN 33
308
RUN 34
RUN 34
312.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2020 BORING: SAG2
DEPTH: 325-335.5 Box #: 34
RUN #: 34, 35
TOP
325
RUN 34
RUN 35
335.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2020 BORING: SAG2
DEPTH: 335.5-320 Box #: 35
RUN #: 35-36
TOP
335.5
RUN 35
RUN 36
320
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH 320-335 Box #: 36
RUN #: 36-37
TOP
320
← RUN 36
RUN 36
325
RUN 37 →
335
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH 335-345 Box #: 37
RUN #: 37-38
TOP
335
← RUN 37
RUN 37
340
RUN 38 →
345
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 329.5-334 Box #: 38
RUN #: 38-39
TOP
← RUN 38
RUN 38
RUN 39
BOTTOM

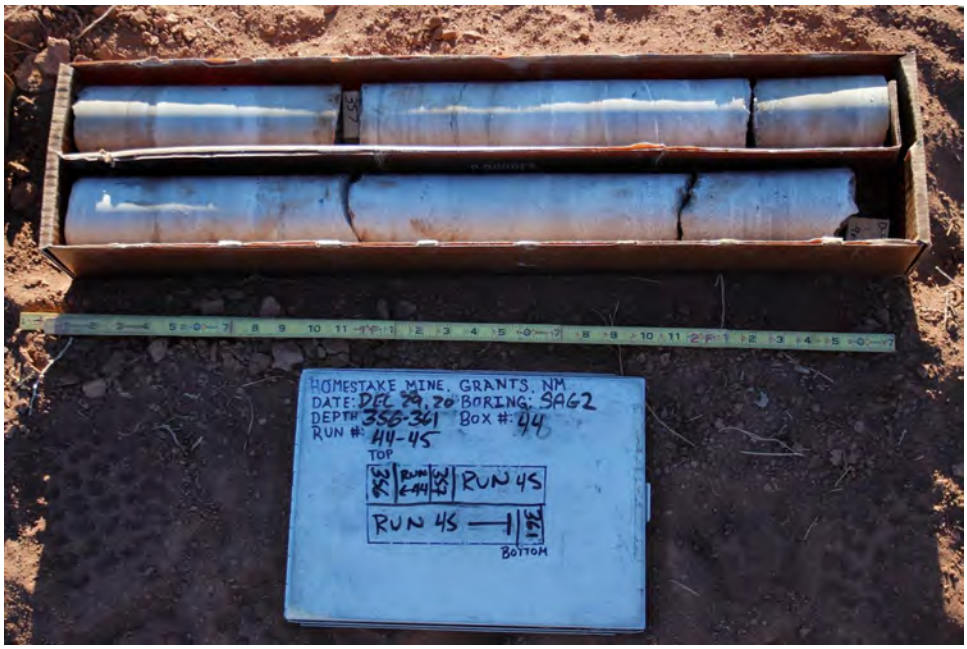

HOMESTAKE MINE, GRANTS, NM
DATE: DEC. 28, 2010 BORING: SAG2
DEPTH: 334-339 Box #: 39
RUN #: 39-40
TOP
← RUN 39
RUN 39
RUN 40
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 28, 2020 BORING: SAG2
DEPTH: 339-343 Box #: 40
RUN #: 40-41
TOP
339
← RUN 40
RUN 40
340
RUN 41 →
343
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29, 20 BORING: SAG2
DEPTH: 343-348 Box #: 41
RUN #: 41-42
TOP
343
← RUN 41
RUN 41
345
RUN 42 →
348
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29,20 BORING: SAG2
DEPTH 348-352 Box #: 42
RUN #: 42
TOP
348
← RUN 42
RUN 42 →
352
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29,20 BORING: SAG2
DEPTH 352-356 Box #: 43
RUN #: 43
TOP
352
← RUN 43
RUN 43 →
356
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29, 20 BORING: SAG2
DEPTH 356-361 Box #: 44
RUN #: 44-45
TOP
RUN 45
RUN 45
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29, 20 BORING: SAG2
DEPTH 361-370.5 Box #: 45-46
RUN #: 46-47
361 TOP
RUN 45
363
RUN 46
363.5
363.5
RUN 46
366
366
RUN 46
368
368
RUN 47
370.5 BOTTOM


SAG2
CORE BOX #47
RUNS 47-48
HOMESTAKE MINE, GRANTS, NM
BORING: SAG2
BOX #: 47-48
RUN #: 47-50
← RUN 47 →
RUN 48 →
← RUN 48 →
RUN 49 →
BOTTOM


HOMESTAKE MINE, GRANTS, NM
BORING: SAG2
BOX #: 49-50
RUN #: 49-50
← RUN 49
RUN 49
RUN 50
RUN 50 →
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29, 20 BORING: SAG2
DEPTH: 388-397.5 BOX #: S1-S2
RUN #: S1-S2
388 TOP
RUN S1
RUN S1
392.5
397.5
RUN S2
RUN S2
397.5 BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 29, 20 BORING: SAG2
DEPTH:
RUN #:
BOX #: S3-S4
397.5 TOP
398
RUN S3
499.5
RUN S3
402
RUN S3
RUN S4
1169.5
402
409.5
RUN S4
406 BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 30 20 BORING: SAG2
DEPTH: 406-418 Box #: 55-56
RUN #: 54-56
406 TOP
← RUN 54
418 BOTTOM
408.25
408.25
RUN 55
411
411
RUN 55-1
413
413
← RUN 56 →
416.6 BOTTOM
hole PRODUCTS
P TOP


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 30 2021 BORING: SAG2
DEPTH: 415.5-425 Box #: 57-58
RUN #: 56-58
415.5 TOP
← RUN 56
417.5
417.5
RUN 56
418
RUN 57
420
420
RUN 57
422
422
RUN 57
423
RUN 58 →
425 BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 20 2021 BORING: SAG2
DEPTH: 425-435.5 Box #: 59-60
RUN #: 58-60
425 TOP
RUN 58
427
427
RUN 58
428
RUN 59
429.5
429.5
RUN 59
433
433
RUN 60
435.5 BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 20 2021 BORING: SAG2
DEPTH: 435.5-443 Box #: 61-62
RUN #: 60-62
435.5 TOP
RUN 60
437
437
RUN 60
438
RUN 61
439.5
439.5
RUN 61
441
441
RUN 61
443
RUN 62
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: DEC 20 2021 BORING: SAG2
DEPTH: 443.5-452.5 Box #: 63-64
RUN #: 62-63
443.5 TOP
RUN 62
446
446
RUN 62
448
448
RUN 63
450.5
450.5
RUN 63
452.5 BOTTOM


DATE:
DEPTH: 452.5-462 Box #: 65-66
RUN #: 63-65
452.5 TOP
RUN 63
453
RUN 64
455
455
RUN 64
457
457
RUN 64
458
RUN 65
459.5
459.5
RUN 65
462 BOTTOM


DATE: DEC 20 2021 BORING: SAG2
DEPTH: 462-472.5 BOX #: 67-68
RUN #: 65-67
462 TOP
463
464.5
464.5
466.5
466.5
468
469
469
472.5 BOTTOM


DATE: DEC 20 2021 BORING: SAG2
DEPTH: 472.5-480.5 BOX #: 69-70
RUN #: 67-69
472.5 TOP
RUN 67
473
RUN 68
479
474
RUN 68
475.5
475.5
RUN 68
478
478
RUN 69
480.5 BOTTOM


DATE: DEC 30 2020 BORING: SAG2
DEPTH 480.5-489.5 Box # 71-72
RUN # 69-71
480.5 TOP
← RUN 69
482.5
485
RUN 70
487
RUN 71 →
489.5 BOTTOM


DATE: DEC 30 2020 BORING: SAG2
DEPTH 489.5-498.5 Box # 73-74
RUN # 71-73
489.5 TOP
← RUN 71
492
RUN 72
494
RUN 72
496.5
RUN 73 →
498.5 BOTTOM


HOMESTAKE MINE GRANTS, NM
DATE: DEC 20 2018
BORING: SAG2
DEPTH 498.5-500 Box # 75
RUN # 73
498.5
RUN 73
500
TERMINAL DEPTH
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 4, 2021 BORING: SAG1
DEPTH: 135-140ft Box #: 1
RUN #: 1
TOP
135
140
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 4, 2021 BORING: SAG1
DEPTH: 140-145 Box #: 2
RUN #: 2,3
TOP
140
143
145
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 4, 2021 BORING: SAG1
DEPTH: 145-150.5 BOX #: 3
RUN #: 3-4
TOP
145
RUN 3
148
RUN 4
150.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 5, 2021 BORING: SAG1
DEPTH: 150.5-155.5 BOX #: 4
RUN #: 4-5
TOP
150.5
RUN 4
153
RUN 5
153.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 5 2021 BORING: SAG1
DEPTH: 155.5-195 Box #: 5
RUN #: 5,6
TOP
RUN 5
RUN 6
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 5, 2021 BORING: SAG2
DEPTH: 169.5-178 Box #: B-9
RUN # 8-9
169.5
← RUN 8
171
171
RUN 8
173
RUN 9
173.25
173.25
RUN 9
175.5
175.5
RUN 9
178
178 BOTTOM
HMC GRANTS
P TOP
hole PRODUCTS
www.hole PRODUCTS.com


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 5, 2021 BORING: SAG2
DEPTH: 178-188 Box #: 10-11
RUN # 10-11
178
RUN 10
180.5
180.5
RUN 10
183
183
RUN 11
185.5
185.5
RUN 11 →
188
188 BOTTOM
HMC GRANTS
P TOP
hole PRODUCTS
www.hole PRODUCTS.com


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 5 2021 BORING: SAG2
DEPTH 188-196.5 BOX # 12-13
RUN # 11-14
188
RUN 12
190.5
190.5
RUN 13
192
192
RUN 13
RUN 14
194
194
RUN 14
196.5
BOTTOM
HMC GRANTS
P TOP
hole PRODUCTS


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 5 2021 BORING: SAG2
DEPTH 199.5-208 BOX # 14-15
RUN # 14-16
199.5
RUN 14
199
199
RUN 15
201.5
201.5
RUN 15
RUN 16
205
205
RUN 16-1
208
BOTTOM
HMC GRANTS
P TOP
hole PRODUCTS


HOMESTAKE MINE GRANTS, NM
DATE: JAN.6.2021 BORING: SAG1
DEPT# 208-219 BOX # 16-17
RUN # 17-21
208 TOP
RUN ← 17
11'
RUN 18
213
213
RUN 19
215
215
RUN 19
2'
217
217
RUN ← 20
18'
RUN 21 →
219 BOTTOM
HMC GRANTS
P TOP


HOMESTAKE MINE GRANTS, NM
DATE: JAN.6.2021 BORING: SAG1
DEPT# 219-228 BOX # 18-19
RUN # 21-22
219 TOP
← RUN 21
221.5
221.5
RUN 21
3'
RUN 22
224
224
RUN 22
226
226
RUN 22 →
2'
228 BOTTOM
HMC GRANTS
P TOP


HOMESTAKE MINE GRANTS, NM
DATE: JAN. 6, 2021 BORING: SAG1
DEPTH 228-239 Box #: 20-21
RUN # 23-25
228 TOP
RUN 23
230.5
230.5
RUN 23
233
RUN 24 →
234
234
RUN 24
236
236
RUN 24
238
RUN 25 →
239 BOTTOM
hole PRODUCTS
P TOP


HOMESTAKE MINE GRANTS, NM
DATE: JAN. 6, 2021 BORING: SAG1
DEPTH 239-258.5 Box #: 22-23
RUN # 27-28
239 TOP
← RUN 25
241
241
RUN 25
243
RUN 25
243.5
243.5
RUN 26
246
RUN 27
253
253
253
RUN 28 →
258.5 BOTTOM
hole PRODUCTS
P TOP


HOMESTAKE MINE GRANTS, NM
DATE: JAN. 6 2021 BORING: SAG1
DEPT: 258.5-269 Box #24-25
RUN #28-31
258.5 RUN 28 RUN 29 261.5
261.5 RUN 29 RUN 30 264
264 RUN 30 266.5
266.5 RUN 30 RUN 31 269 BOTTOM
hole PRODUCTS


HOMESTAKE MINE GRANTS, NM
DATE: JAN. 6 2021 BORING: SAG1
DEPT: 269-279 Box # 26-27
RUN # 26-27
269 RUN 31
RUN 31 RUN 32 274
274 RUN 32
RUN 32 RUN 33 279 BOTTOM
hole PRODUCTS

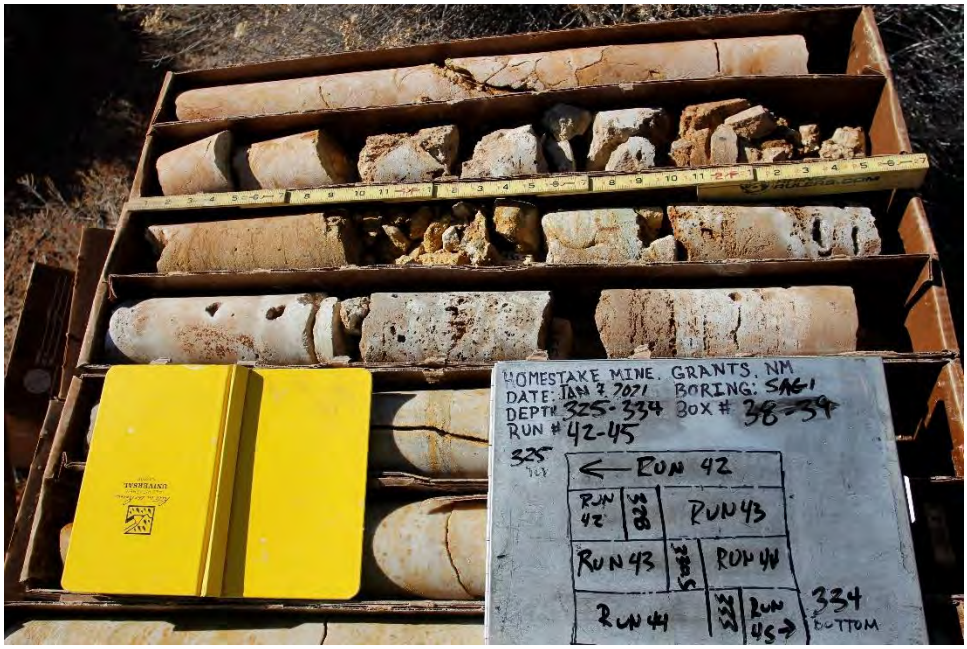

HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 7, 2021 BORING: SAG1
DEPTH: 279-287.3 Box # 28-29
RUN # 33-34
279
RUN 33
281
281
RUN 33
283
283
RUN 34
285
285
RUN 34
287.3
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 7, 2021 BORING: SAG1
DEPTH: 287.3-297 Box # 30-31
RUN # 34-36
287.5
RUN 35
290
290
RUN 35
292
RUN 36
292
294.5
RUN 36
297
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG 1
DEPTH 297-308.5 BOX #32-33
RUN #37-38
297
300
302.5
306
308.5
RUN 37
RUN 37
RUN 38
RUN 38
RUN 39
300
302.5
306
308.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG 1
DEPTH 308.5-315 BOX # 32-33
RUN #34-35
308.5
310
312
313.5
315
RUN 34
RUN 34
RUN 35
RUN 35
310
312
313.5
315
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7, 2021
BORING: SAG1
DEPTH 315-325
BOX # 36-37
RUN # 40-42
315
TOP
RUN 40
RUN 41
318
318
RUN 41
320.5
320.5
RUN 41
322.5
322.5
RUN 41
RUN 42
325
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7, 2021
BORING: SAG1
DEPTH 325-334
BOX # 38-39
RUN # 42-45
325
TOP
RUN 42
RUN 42
RUN 43
RUN 43
RUN 44
RUN 44
RUN 45
334
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG-1
DEPT: 334-342.5 BOX # 40
RUN # 45-46
334
← RUN 45
336
336
RUN 46
338
338
RUN 46
340
340
RUN 46 →
342.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG-1
DEPT: 342.5-352 BOX # 42-43
RUN # 46-48
342.5
RUN 47
345
345
RUN 47
347
347
RUN 47
RUN 48
349.5
349.5
RUN 48
352
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING:
DEPTH: 352-361 Box # 44-45
RUN # 48-50
352
← RUN 48
RUN 49
354
354
RUN 49
356
356
RUN 49
R 50
358.5
358.5
RUN 50 →
361
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING:
DEPTH: 361-371 Box # 46-47
RUN # 50-52
361
← RUN 50
R
363.5
363.5
RUN 51
366
366
RUN 51
R 52
368.5
368.5
RUN 52 →
371
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG 1
DEPTH: 371-379.5 BOX # 48-49
RUN # 52-54
371
← RUN 52
373
373
RUN 53
375.5
375.5
RUN 53
377
377
RUN 53
RUN 54 →
379.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 7 2021 BORING: SAG 1
DEPTH: 379.5-388.5 BOX # 50-51
RUN # 54-56
379.5
← RUN 54
381.5
381.5
RUN 54
384
384
RUN 55
386.5
386.5
RUN 55
388.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8, 2021 BORING: SAG 1
DEPTH 368.5-377.5 BOX # 52-53
RUN # 56-57
← RUN 56
RUN 56
RUN 57
RUN 57 →
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8, 2021 BORING: SAG 1
DEPTH 397-406 BOX # 54-55
RUN # 57-59
RUN 58
RUN 58
RUN 59
RUN 59
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8 2021 BORING: SAG 1
DEPT: 406 - 416 BOX # SG-57
RUN # 59 - 61
406
RUN 59
RUN 60
409.5
409.5
RUN 60
411
411
RUN 60
RUN 61
413.5
413.5
RUN 61 →
416
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8 2021 BORING: SAG 1
DEPT: 416 - 425 BOX # 58-59
RUN # 61-63
416
← RUN 61
418
418
RUN 62
420.5
420.5
RUN 62
422.5
422.5
RUN 62
RUN 63 →
BOTTOM

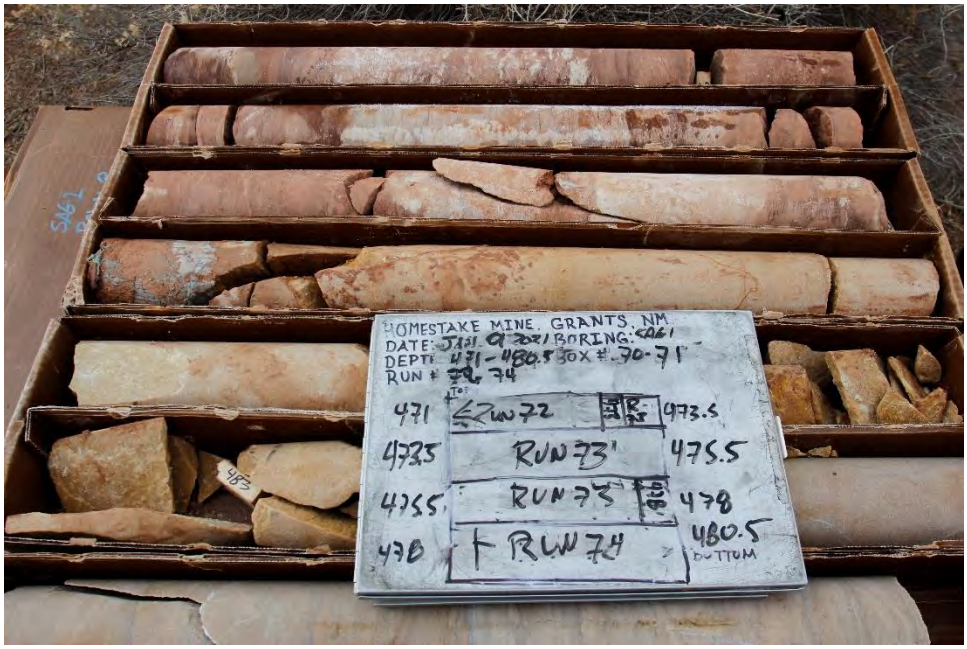

HOMESTAKE MINE, GRANTS, NM
DATE: JUL. 8 2021 BORING: SAG1
DEPTH 425 - 434.5 BOX # 60-61
RUN # 63 - 65
TOP
425
← RUN 63
427.5
427.5
RUN 63
RUN 64
429.5
429.5
RUN 64
432
432
RUN 64
RUN 65
434.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JUL. 8 2021 BORING: SAG1
DEPTH 434.5 - 443 BOX # 62-63
RUN # 65-66
TOP
434.5
← RUN 65
436
436
RUN 65
RUN 66
438.5
438.5
RUN 66
441
441
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8 2021 BORING: SAG1
DEPTH 443 - 452.5 BOX # 64-65
RUN # 67-68
TOP
443
RUN 67
445.5
445.5
RUN 67
447.5
442.5
RUN 68
450
450
RUN 68
452.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN. 8 2021 BORING: SAG1
DEPTH 457.5 461 BOX # 66-67
RUN # 68 - 70
TOP
RUN 69
RUN 69
456.5
RUN 69
RUN 70
459
459
RUN 70
461
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 9 2021 BORING: SAG1
DEPT: 461- 471 BOX #: 68-69
RUN # 70-72
461
RUN 70
RUN 71
RUN 71
RUN 72
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JAN 9 2021 BORING: SAG1
DEPT: 471- 480.5 BOX #: 70-71
RUN # 73, 74
471
RUN 72
473.5
473.5
RUN 73
475.5
475.5
RUN 73
478
478
RUN 74
480.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JUL 09 2021 BORING: CDG1
DEPTH: 480.5-490 BOX #: 72-73
RUN #: 74-76
Box 72 out of order
480.5
RUN 74
482
482
RUN 74
RUN 75
484
484
RUN 75
486.5
486.5
RUN 75
RUN 76
490
BOTTOM


HOMESTAKE MINE, GRANTS, NM
DATE: JUL 09 2021 BORING: CDG1
DEPTH: 490-498.5 BOX #: 74-75
RUN #: 76-78
490
RUNS 76
492.5
492.5
RUNS 76
RUN 77
494.5
494.5
RUNS 77
496.5
496.5
RUNS 77
RUN 78
498.5
BOTTOM


HOMESTAKE MINE, GRANTS, NM.
BORING: SAG1
RUN # 78
4985 RUN 78 - TO
hole PRODUCTS
P TOP
HMC GRANTS

Appendix D

Physical Property Analysis Reporting

GOLDER

February 12 2021 20437011(1000)

John Ifkovits
HDR Inc.
1 International Boulevard
10th Floor, Suite 1000
Mahwah, NJ 07495
USA

Dear John,

This letter reports the results of laboratory testing carried out on the sample received at our office in Mississauga. The results of the tests are summarized in the attached tables and figures.

The testing services reported herein have been performed in accordance with the indicated recognized standard, unless noted otherwise. This report is for the sole use of the designated client. This report constitutes a testing service only and does not represent any results interpretation or opinion regarding specification compliance or material suitability.

We trust that the results are sufficient for your current requirements. If you have any questions, please do not hesitate to call us.

Regards

Golder Associates Ltd.

Marijana Manojlovic
Laboratory Manager

MM/lh

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK
ASTM D 7263 Method A

Borehole Number		SAG-1		SAG-1
Sample ID		426		464
Depth, m		426		464
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	78.66	59.57	36.36	33.33
Wet Mass of Rock + Wax in Air, g	81.74	61.74	38.16	35.00
Wet Mass of Rock + Wax in Water, g	45.57	34.28	21.10	19.37
Weight of Wax, g	3.080	2.170	1.800	1.670
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	3.392	2.390	1.982	1.839
Volume of Rock, cm^3	32.86	25.13	15.12	13.83
Specific Gravity, measured	2.66	2.66	2.68	2.68
Volume of Solids, cm^3	29.05	22.11	13.34	12.19
Volume of Voids, cm^3	3.810	3.024	1.775	1.633
Porosity	0.116	0.120	0.117	0.118
Water Content %, measured	1.80	1.30	1.70	2.00
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.394	2.370	2.405	2.411
Dry Density, g/cm^3	2.352	2.340	2.365	2.363

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK ASTM D 7263 Method A				
Borehole Number		SAG-1		SAG-1
Sample ID		189		202
Depth, m		189		202
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	46.21	24.59	71.28	31.01
Wet Mass of Rock + Wax in Air, g	48.07	25.55	73.10	32.22
Wet Mass of Rock + Wax in Water, g	27.98	14.83	42.97	18.65
Weight of Wax, g	1.860	0.960	1.820	1.210
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	2.048	1.057	2.004	1.333
Volume of Rock, cm^3	18.09	9.687	28.19	12.27
Specific Gravity, measured	2.78	2.78	2.67	2.67
Volume of Solids, cm^3	16.08	8.571	26.35	11.45
Volume of Voids, cm^3	2.011	1.116	1.839	0.814
Porosity	0.111	0.115	0.065	0.066
Water Content %, measured	3.40	3.20	1.30	1.40
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.555	2.539	2.528	2.528
Dry Density, g/cm^3	2.471	2.460	2.496	2.493

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
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GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK ASTM D 7263 Method A				
Borehole Number		SAG-1		SAG-1
Sample ID		216		235.5
Depth, m		216		235.5
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	74.35	70.64	42.90	29.30
Wet Mass of Rock + Wax in Air, g	76.34	72.43	45.74	31.56
Wet Mass of Rock + Wax in Water, g	45.09	42.89	24.73	16.16
Weight of Wax, g	1.990	1.790	2.840	2.260
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	2.192	1.971	3.128	2.489
Volume of Rock, cm^3	29.13	27.63	17.93	12.95
Specific Gravity, measured	2.68	2.68	2.83	2.83
Volume of Solids, cm^3	27.69	26.31	14.80	10.13
Volume of Voids, cm^3	1.441	1.329	3.125	2.815
Porosity	0.049	0.048	0.174	0.217
Water Content %, measured	0.20	0.20	2.40	2.20
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.553	2.556	2.393	2.263
Dry Density, g/cm^3	2.547	2.551	2.337	2.215

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK
ASTM D 7263 Method A

Borehole Number		SAG-1		SAG-1
Sample ID		283		318
Depth, m		283		318
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	50.64	44.86	96.32	64.39
Wet Mass of Rock + Wax in Air, g	52.63	47.10	100.9	66.98
Wet Mass of Rock + Wax in Water, g	26.15	24.66	55.27	36.62
Weight of Wax, g	1.990	2.240	4.530	2.590
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	2.192	2.467	4.989	2.852
Volume of Rock, cm^3	24.35	20.02	40.69	27.58
Specific Gravity, measured	2.87	2.87	2.65	2.65
Volume of Solids, cm^3	16.00	13.76	35.02	23.64
Volume of Voids, cm^3	8.351	6.264	5.676	3.939
Porosity	0.343	0.313	0.139	0.143
Water Content %, measured	10.30	13.60	3.80	2.80
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.080	2.240	2.367	2.335
Dry Density, g/cm^3	1.886	1.972	2.280	2.271

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
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GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK ASTM D 7263 Method A				
Borehole Number		SAG-1		SAG-1
Sample ID		354.5		402
Depth, m		354.5		402
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	68.33	42.18	128.5	55.05
Wet Mass of Rock + Wax in Air, g	71.30	44.34	133.8	57.80
Wet Mass of Rock + Wax in Water, g	39.50	24.10	74.25	31.74
Weight of Wax, g	2.970	2.160	5.300	2.750
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	3.271	2.379	5.837	3.029
Volume of Rock, cm^3	28.60	17.91	53.88	23.09
Specific Gravity, measured	2.65	2.65	2.68	2.68
Volume of Solids, cm^3	25.01	15.39	46.03	19.94
Volume of Voids, cm^3	3.591	2.513	7.850	3.147
Porosity	0.126	0.140	0.146	0.136
Water Content %, measured	3.10	3.40	4.20	3.00
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.389	2.356	2.386	2.384
Dry Density, g/cm^3	2.317	2.278	2.289	2.315

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK
ASTM D 7263 Method A

Borehole Number		SAG-2		SAG-2
Sample ID		163		194
Depth, m		163		194
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	66.85	49.77	124.4	74.24
Wet Mass of Rock + Wax in Air, g	68.63	51.08	127.5	76.84
Wet Mass of Rock + Wax in Water, g	40.18	29.78	76.67	45.48
Weight of Wax, g	1.780	1.310	3.080	2.600
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	1.960	1.443	3.392	2.863
Volume of Rock, cm^3	26.54	19.90	47.49	28.55
Specific Gravity, measured	2.68	2.68	2.72	2.72
Volume of Solids, cm^3	24.60	18.31	45.37	27.02
Volume of Voids, cm^3	1.942	1.581	2.124	1.529
Porosity	0.073	0.079	0.045	0.054
Water Content %, measured	1.40	1.40	0.80	1.00
Water Temperature ^{o}C	20.1	20.1	20.1	20.1
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.519	2.502	2.619	2.600
Dry Density, g/cm^3	2.484	2.467	2.598	2.574

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK
ASTM D 7263 Method A

Borehole Number		SAG-2		SAG-2
Sample ID		215		244
Depth, m		215		244
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	41.09	28.02	122.2	71.60
Wet Mass of Rock + Wax in Air, g	42.33	29.25	126.8	74.37
Wet Mass of Rock + Wax in Water, g	25.10	17.10	69.39	41.47
Weight of Wax, g	1.240	1.230	4.650	2.770
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	1.366	1.355	5.121	3.051
Volume of Rock, cm^3	15.90	10.82	52.39	29.91
Specific Gravity, measured	2.68	2.68	2.87	2.87
Volume of Solids, cm^3	15.30	10.35	39.89	23.19
Volume of Voids, cm^3	0.594	0.466	12.50	6.723
Porosity	0.037	0.043	0.239	0.225
Water Content %, measured	0.20	1.00	6.70	7.60
Water Temperature °C	20.1	20.1	20.1	20.1
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.585	2.590	2.331	2.394
Dry Density, g/cm^3	2.580	2.565	2.185	2.225

Notes: - Two trials were performed on one core specimen
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK
ASTM D 7263 Method A

Borehole Number		SAG-2		SAG-2
Sample ID		283		310
Depth, m		283		310
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	59.38	30.07	64.68	45.80
Wet Mass of Rock + Wax in Air, g	61.78	31.87	68.99	48.72
Wet Mass of Rock + Wax in Water, g	33.18	16.58	37.62	26.54
Weight of Wax, g	2.400	1.800	4.310	2.920
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	2.643	1.982	4.747	3.216
Volume of Rock, cm^3	26.01	13.34	26.68	19.00
Specific Gravity, measured	2.86	2.86	2.86	2.86
Volume of Solids, cm^3	19.15	9.524	21.44	15.31
Volume of Voids, cm^3	6.855	3.812	5.243	3.694
Porosity	0.264	0.286	0.197	0.194
Water Content %, measured	8.40	10.40	5.50	4.60
Water Temperature ^{o}C	20.1	20.1	20.1	20.1
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.283	2.255	2.424	2.410
Dry Density, g/cm^3	2.106	2.043	2.298	2.304

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK

ASTM D 7263 Method A

Borehole Number		SAG-2		SAG-2
Sample ID		354		396
Depth, m		354		396
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	90.09	69.33	52.46	41.07
Wet Mass of Rock + Wax in Air, g	93.82	72.49	54.69	43.32
Wet Mass of Rock + Wax in Water, g	52.52	40.27	29.71	23.14
Weight of Wax, g	3.730	3.160	2.230	2.250
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	4.108	3.480	2.456	2.478
Volume of Rock, cm^3	37.27	28.80	22.57	17.74
Specific Gravity, measured	2.88	2.88	2.66	2.66
Volume of Solids, cm^3	29.46	22.62	19.02	14.85
Volume of Voids, cm^3	7.812	6.173	3.551	2.892
Porosity	0.210	0.214	0.157	0.163
Water Content %, measured	6.20	6.40	3.70	4.00
Water Temperature °C	20.1	20.1	20.1	20.1
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.417	2.407	2.324	2.315
Dry Density, g/cm^3	2.276	2.263	2.241	2.226

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
Project Name	HDR/LabTesting/MississaugaLab	Checked By	MM
Date Tested	February 2021		

GOLDER

DENSITY AND POROSITY DETERMINATIONS OF IRREGULAR SHAPE SAMPLES - ROCK ASTM D 7263 Method A				
Borehole Number		SAG-2		SAG-2
Sample ID		439.5		463
Depth, m		439.5		463
Trial No.	1	2	1	2
Wet Mass of Rock in Air, g	145.1	126.5	57.35	43.88
Wet Mass of Rock + Wax in Air, g	149.4	132.2	58.31	44.54
Wet Mass of Rock + Wax in Water, g	84.93	74.41	33.16	25.51
Weight of Wax, g	4.290	5.720	0.960	0.660
Density of paraffin, g/cm^3	0.908	0.908	0.908	0.908
Displaced Wax, cm^3	4.725	6.300	1.057	0.727
Volume of Rock, cm^3	59.86	51.64	24.15	18.35
Specific Gravity, measured	2.70	2.70	2.69	2.69
Volume of Solids, cm^3	52.68	45.75	20.70	15.76
Volume of Voids, cm^3	7.180	5.886	3.450	2.585
Porosity	0.120	0.114	0.143	0.141
Water Content %, measured	2.00	2.40	3.00	3.50
Water Temperature °C	22.0	22.0	22.0	22.0
Density of Water at test temperature, g/cm^3	0.998	0.998	0.998	0.998
Wet Density, g/cm^3	2.424	2.450	2.375	2.392
Dry Density, g/cm^3	2.376	2.392	2.306	2.311

Notes: - Two trials were performed on one core specimen.
- Water contents determined from tested specimens

Project Number	20437011 (1000)	Tested By	SK
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Appendix E

FLUTe™ Methods

Information Available in a FLUTe Transmissivity Profile

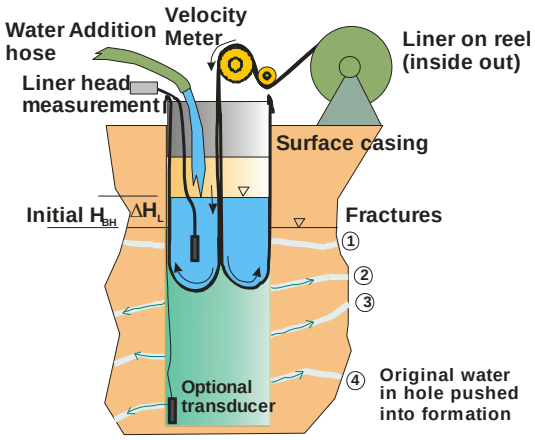
Introduction

The FLUTe transmissivity profiling method is relatively new to the hydrologic community and sometimes not well understood. This paper describes how to use a Profile and how it compares to traditional measurements. The geometry of the measurement is shown in Fig. 1.

How the profile is measured

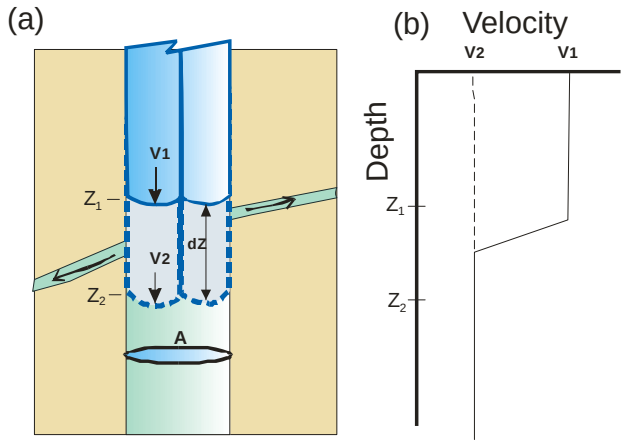
An ordinary FLUTe blank liner is installed in an open borehole to the water table. The liner is restrained and filled with water to a level 10 ft, or more, above the formation water table as tagged in the open hole. The liner is then released and the descent rate of the liner is measured as well as the head in the open hole beneath the liner. The water level inside the liner is maintained as nearly constant and well above the formation water table to develop a substantial overpressure in the borehole.

Fig. 1. Geometery of profile measurement



The release of the liner develops an instantaneous increase in the borehole pressure which causes a very steep gradient at the borehole wall and a large flow rate of water out of the borehole. That outward flow develops a lower gradient as the flow rate from the borehole approaches the steady state flow rate. The initial high flow rate rapidly decays to the steady state flow rate. Fortunately, that approach to the steady state occurs before the liner has descended more than 10-15 ft. typically, but can persist longer. That initial high flow is called the "transient." A correction for the transient will be discussed hereafter.

Fig. 2. Velocity change upon passing a fracture



Flow rate into the fracture, $\Delta Q = A(V_1 - V_2)$, where $V_1 > V_2$

$T = \Delta Q \ln(r_0/r_w)/(2\pi \Delta H_{BH})$ in the interval Z_1 to Z_2

As the liner descends by the eversion of the liner (the reverse of inversion), the water is driven from the borehole as rapidly as the transmissivity of the borehole allows. Initially, all the flow paths in the borehole are open and the liner descent is most rapid. However, as the liner descends, it sequentially seals, from the top down, the permeable features (fractures, bedding planes, or permeable beds). The sealing of each permeable feature reduces the transmissivity below the everting liner and the liner descent rate slows. That is the essence of the transmissivity profiling

method. The velocity change as the liner seals a flow zone, when multiplied by the cross section of the borehole, is the flow rate of the feature sealed by the liner (Figure 2). In other words, the descending liner is essentially a flow meter which measures the flow rate out of the hole. Each time a permeable feature is sealed, the flow rate out of the borehole drops and so does the descent rate of the liner. A plot of the liner velocity with depth shows a monotonic decrease in velocity of the descending liner. Each decrease in velocity identifies the location of a permeable feature and the magnitude of the velocity change is a direct measure of the flow capacity of that feature. Figure 3 is a typical data set.

The calculation of transmissivity from the liner descent

The liner decent is measured by an encoder on a roller at the surface in the machine called a "Profiler". The encoder measures the liner depth every half second, typically. From the liner depth and the time is calculated the velocity of the liner as it travels that discrete depth interval. High in the hole where the liner is descending more rapidly, the interval traveled per time step is larger than it is deep in the hole where the liner is traveling more slowly. Therefore, the spatial resolution of the location of a permeable feature is better deeper in the hole. However, the distance traveled in a half second time step is usually less than a hole diameter.

Because the driving pressure in the borehole is measured on the same half second time interval, the transmissivity can be calculated from the change in velocity as follows (The Thiem equation):

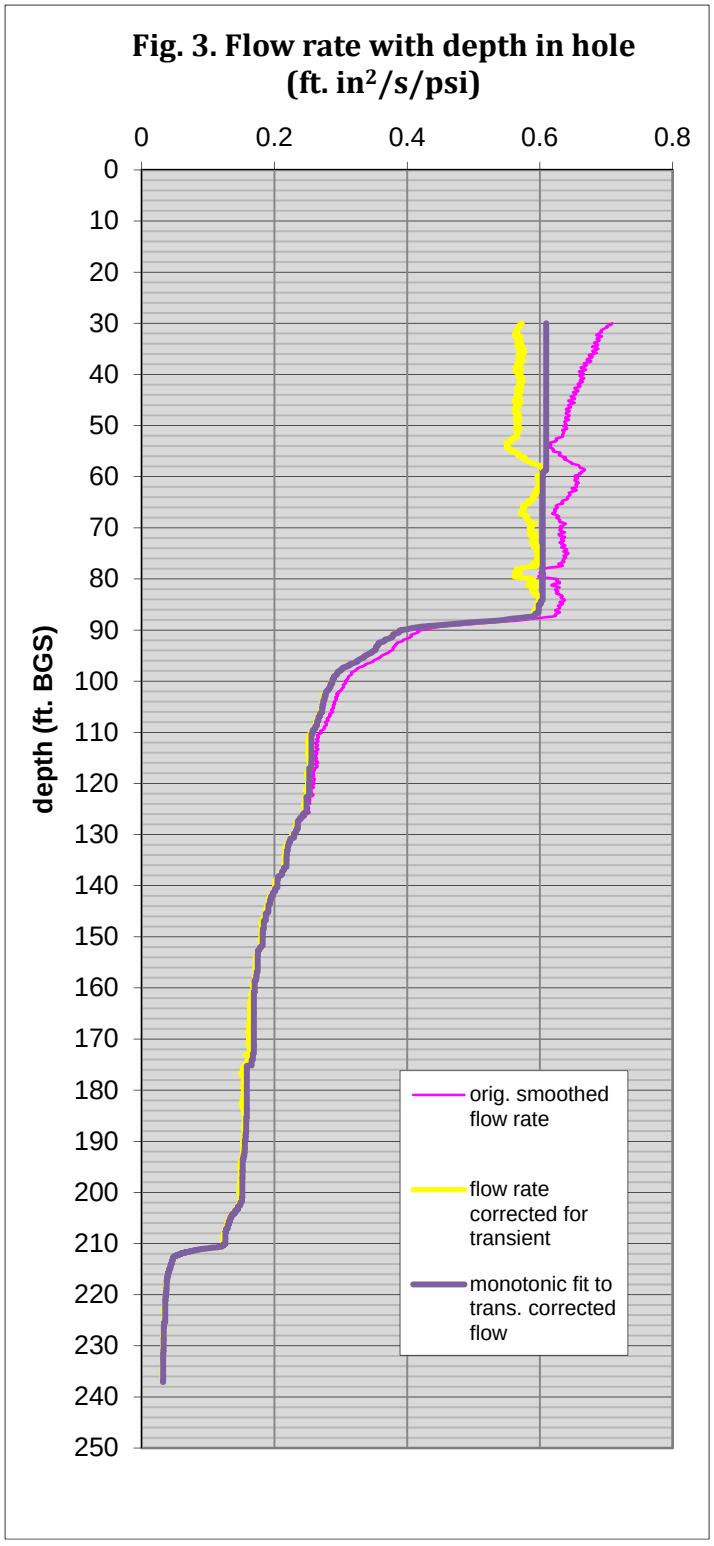
$T = \Delta Q/H \ \ln(r/r_0)/(2\pi)$, where $\Delta Q = \Delta v\, A$, where Δv is the velocity change over the interval traveled in a half second, and A is the borehole cross section. The ratio r/r_0 is the radius of influence divided by the borehole diameter. As with packer testing, r/r_0 is assumed to be constant. The term H is the measured driving head beneath the liner. From this simple expression, a transmissivity can be calculated for each interval of the borehole traversed in each half second. If there is no velocity change, the transmissivity is zero, within the limit of resolution of the measurement. Experience shows that the resolution is dependent upon the liner velocity and about 1% of the velocity.

The data as plotted in the Results Spreadsheet

The measurements are made in the English units so the flow rate out of the borehole is in ft/s in^2/psi which is a volumetric flow rate per unit driving pressure. That result is plotted in the first graph of the results sheet as the pink curve of Fig. 3. Because of the transient, the first portion of the pink curve is a steeply decaying flow rate which is not due to flow into the casing wall (the casing extends to 52 ft.). In those situations where the transient is obvious (e.g., a rapid decay in a surface casing before the liner enters the borehole) a first order correction is often made to the data to remove the transient effect on the velocity. That correction is made by calculating the transient to steady state in a 1D cylindrical geometry using the conductivity estimated from the borehole flow rate and an estimate of the storativity of the formation. There are several reasonable constraints on the transient correction. The subtraction of the estimated transient flow must not produce an increasing velocity with depth in the casing. In the casing, the corrected flow rate should be constant. When a casing measurement is not

available (e.g., when the measurement is started below the surface casing), the constraint is only that the velocity should not increase with depth after the transient is removed.

The corrected flow rate in the example of Fig. 3 is the yellow curve. In this data set, the casing extends to 52 ft bgs and indeed the corrected flow rate in the casing from 30 to 52 ft. is relatively constant.



Another concern is that as the liner traverses an enlargement of the borehole, the liner dilates and the velocity of the descending liner must therefore decrease proportionately. As the liner exits the enlargement, the diameter will return to the nominal borehole diameter and the velocity will increase. This drop in velocity followed by an increase in velocity is ignored as unrelated to a flow zone associated with the initial drop in velocity. The method for ignoring such a temporary drop in velocity is to fit a monotonically decreasing curve to the data set. That curve is the black curve in Figure 3. The monotonic fit suggests that the portion of the borehole below the casing (30 to 52 ft.) has numerous extensive enlargements. Note, a 10% increase in borehole diameter will cause a 21% decrease in the liner velocity. Below 52 ft. the yellow curve and the black curve are essentially the same. The degree to which the yellow curve matches the black curve is a measure of the data quality and associated resolution. The transmissivity is calculated from changes in the flow rate of the black monotonic fit curve. If there is a permeable interval in the enlargement, the monotonic fit causes that transmissivity to be assigned to the upper portion of the enlargement where the initial velocity decrease occurred.

The drop in velocity from 52 to 54 ft. is typical of an enlargement below the bottom edge of the casing. The rise in velocity/flowrate from 54 to 58 ft is typical of the entrance of the liner into a borehole whose diameter is less than the casing.

The second graph of the result spreadsheet (Fig. 4) is the plot of the transmissivity calculated for each half second of travel down the borehole. Because the interval traveled per time step is longer at the top of the hole, the plot can be visually deceiving. The large drop at 90 ft is shown as a very large transmissivity whereas the major drop in flow rate at 212 ft is shown as many small transmissivities over very short intervals. In order to overcome that illusion, the fourth graph on the results sheet (Fig. 5) is an integration of the variable interval transmissivities in Fig. 4 over a constant interval, usually a one foot interval. This is the result expected if the transmissivity profile was determined by a continuous series of one foot straddle packer tests. Here the large flow at 90 ft in Fig. 5 is more clearly a large flow about twice that at 212 ft. Figure 5 may be the plot most easily compared to other measurements in the borehole. It is the plot of the data "sum over the interval" (col. U) versus the "depth of the interval" (col. V).

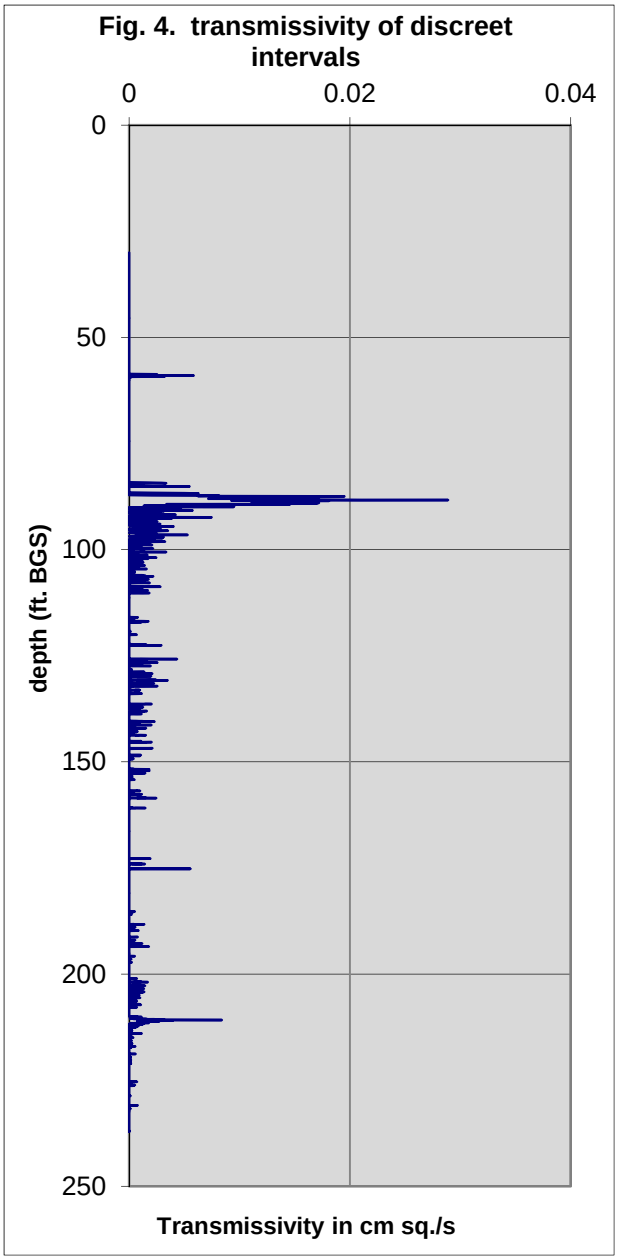
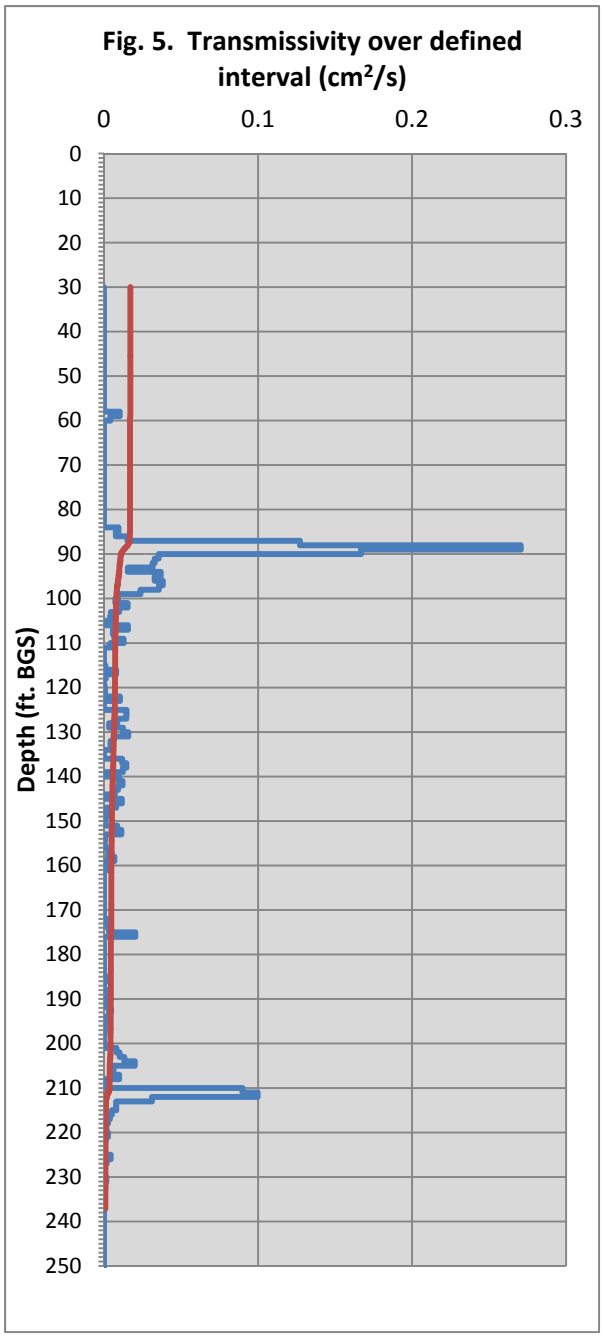
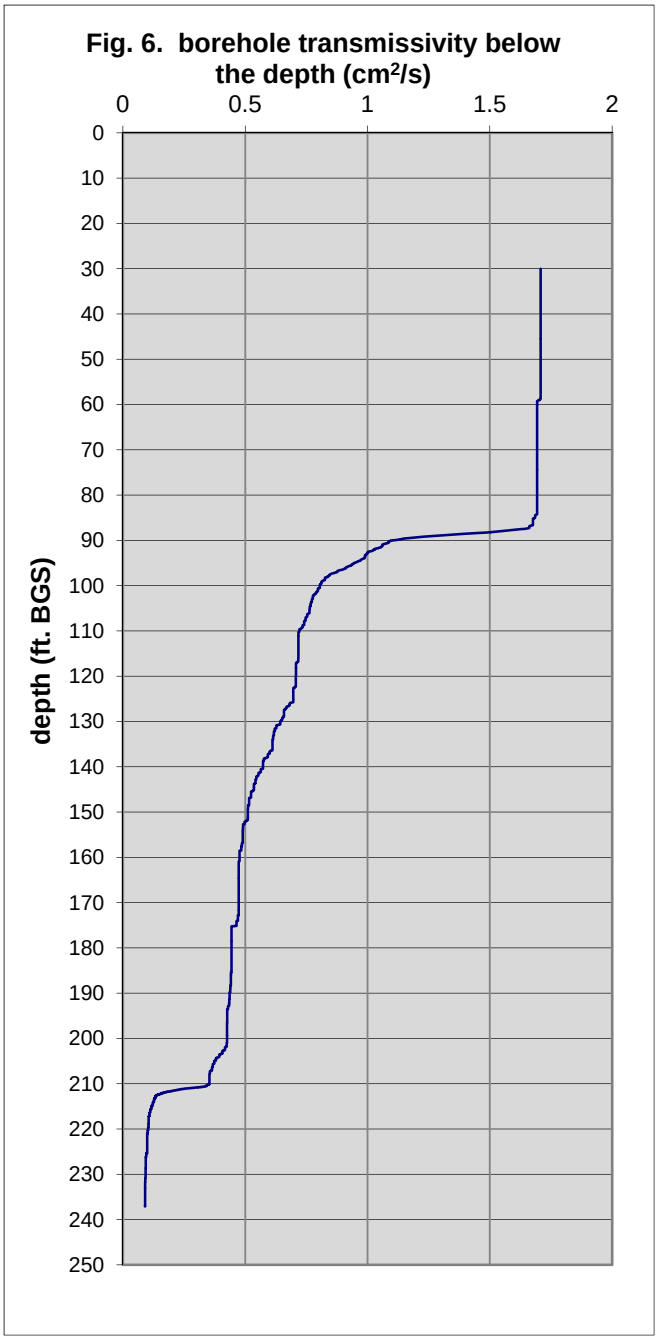


Figure 6 is the third graph of the "Results". This plot is the integral of the transmissivity data of the second curve (Fig. 4) from the bottom of the hole to the top of the hole. The result is identical to the monotonic fit curve of Fig. 3, but in units of transmissivity of the borehole below the indicated depth. Since the liner velocity is a measure of the transmissivity of the borehole beneath the bottom of the liner, Figure 6 should have the same shape as Fig. 3. The utility of Fig. 6 is that the transmissivity of any interval of the borehole is easily determined by the difference of values of Figure 6 between two depths. For example, the transmissivity of the interval between 93 ft (T=1 cm2/s) and 153 ft (T=0.5 cm2/s) is 0.5 cm2/s. The transmissivity of the interval from 84 ft to 93 ft is about 0.69 cm2/s. In this simple manner, one can determine the transmissivity of any interval in the borehole. Figure 6 is also helpful in that it is easy to see where there are very large flow zones, probably fractures, at 90 ft and 112 ft. The interval from 123 to 146 ft is a slope of more distributed permeability either as a matrix permeability or a pervasive fractured zone. In

contrast, the interval from 160 to 170 ft. is relatively impermeable. The curve of Figure 6 is the plot of column T, the integral transmissivity below the liner, versus column O, the depth of the liner. The value of the integral transmissivity at the top of the hole is the total borehole transmissivity (1.7 cm2/s).





The red curve of Fig. 5 is the nominal resolution limit of the transmissivity data. The red curve is simply 1% of the value of the integral transmissivity of Fig. 6. In many situations, transmissivity peaks of Fig. 5

just below the red curve will match measured flow zones in the borehole. If the yellow curve of Fig. 3 is essentially the same as the black curve, the resolution limit is often better than the red curve on Fig. 5.

Conclusion

A particular advantage of the profiling technique is that the sum of the measured transmissivities is the transmissivity of the entire borehole. Such is not the case, for example, with straddle packer tests. If there is any leakage in the straddle packer tests due to a rough hole wall or bypass in the formation to the open hole above or below the packers, the total sum of the packer measurements will exceed the total borehole transmissivity.

Another significant advantage is that the transmissivity profile is a continuous measurement allowing the determination of the transmissivity of any interval in the borehole. Also, of course, the Profiling technique requires a very small part of the time required for detailed straddle packer testing of a borehole and much higher resolution than most packer tests.

A disadvantage of the profiling technique is if the borehole transmissivity is primarily due to a large fracture at the bottom of the borehole, the large velocity throughout the rest of the borehole down to that large fracture provides poor resolution of much less permeable flow paths in the upper portion of the borehole.

A detailed description of the transmissivity profiling method is available in a paper submitted to Ground Water by Keller, et al. The transmissivity profile is often used to determine where discrete sampling intervals should be located for assessing the extent and type of ground water contamination. The technique has also been used in conjunction with the Water FLUTe multilevel sampling and head measurement system to assess municipal ground water supplies and the hydrologic environment near mining operations. Any questions about the method or profiling results should be directed to info@flut.com or to 505-455-1300 or 505-930-1154.

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Brief Description of Installation Procedure

for

Water FLUTes

Installation procedure for Water FLUTes

Purpose

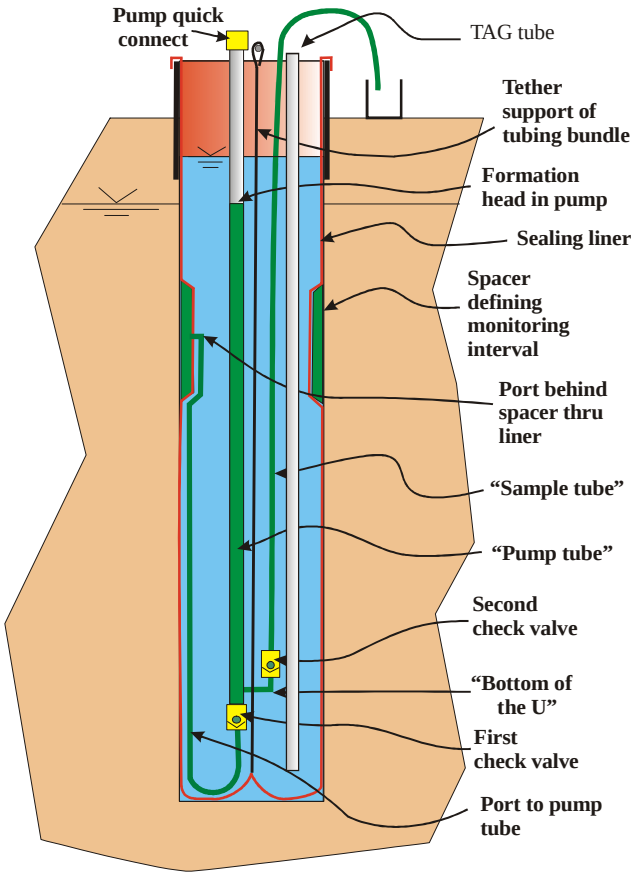
This is intended as a brief general description of the procedure and the equipment used for the Water FLUTe installation method.

The Water FLUTe system

The Water FLUTe system is a multi level ground water sampling system as is described in detail in Cherry, et al[1]. The system consists of a flexible borehole liner composed of a urethane coated nylon fabric with attachments for the purpose of drawing water from the formation and for measurement of the depth of the water table at each sampling interval. Figure 1 depicts the liner as fully installed in a borehole with only one sampling interval shown for clarity. The external annular spacer defines an interval of the borehole that is not sealed by the liner. The ground water sample is drawn from that interval and conducted to the pump system shown in the center of the borehole. The long pump tubing allows a relatively large (~1 gal.) sample to be displaced to the surface by nitrogen gas pressure. The pumping procedure allows a thorough purge of the pumping system and a water sample can then be obtained with essentially no risk of aeration of the sample. The water level at the port is measured with a manual electric tag liner lowered into the pump tube. Pressure transducers are often incorporated into the system to allow a continuous recording of the head variations in the formation.

Fig. 1. Water FLUTe pump system

(Single port system shown for clarity)



The installation procedure

The Water FLUTe system is everted into the borehole as is normally done for many flexible liner systems. Figure 2 shows the main components of the installation procedure (the pumping system is omitted from the drawing). The liner is positioned on a shipping reel near the wellhead. The liner is inside-out relative to its final state in the borehole.

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[1] *A New Depth-Discrete Multilevel Monitoring Approach for Fractured Rock,* Ground Water Monitoring & Remediation 27, no. 2/ Spring 2007/pages 57–70.

An air vent tube is first located in the borehole to allow the air above the water table to escape as the liner is installed. A second tube called a pump tube is lowered to the bottom of the hole to allow the water to escape beneath the liner as the liner is everted into the hole (eversion is the opposite procedure to inversion). The top end of the liner is fastened to the surface casing with a large hose clamp. Then the liner is pushed into the casing by hand for a depth of ~3 ft to form an annular pocket. Water is added to the annular pocket which pressurizes the liner and drives it down the hole, pulling itself off the shipping reel. The liner passes through itself and is said to be everting down the borehole. The water level inside the liner is well above the water level in the formation so that the liner interior pressure is higher than the formation pressure, causing a seal of the borehole. As the liner descends, it pushes the borehole water into the formation. If the formation is of low transmissivity, the water must be pumped from beneath the liner via the pump tube. When the liner reaches the bottom of the hole, the tether supporting the pump tubing is tied to a strong bar at the wellhead to prevent any further descent of the tubing bundle.

Fig. 2. Typical Water FLUTe Liner Installation

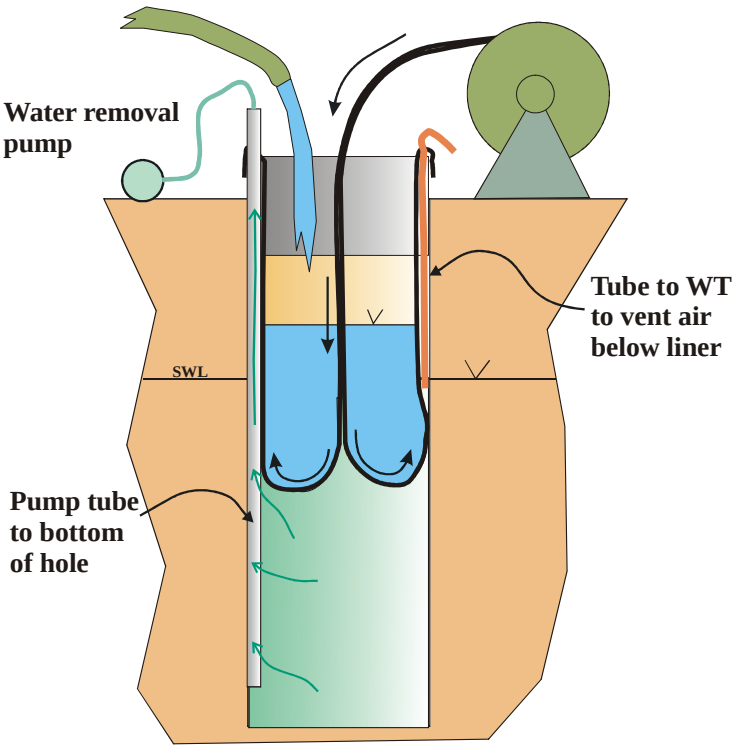


Figure 1 shows the liner fully everted and sealing the borehole. The individual pumping systems are tested to assure that they are fully functional before the pump tube is removed. In order to remove the pump tube, a pump is lowered inside the liner and the water is removed from the liner until the liner begins to collapse. (Sometimes a large tube built into the tubing bundle, called a tag tube, is used as an air lift pump to remove the water from the interior of the liner.) The pump tube is then pulled out of the hole and the liner is refilled to a level about 10 ft above the water table in the formation so as to pressurize the liner and seal the borehole. The sealing liner isolates each sampling interval in the hole to allow a discrete water sample to be drawn from that interval defined by the length of the annular spacer on the exterior of the liner.

The quick connect fittings are added to the top of the pump tubing for connection of the gas source. A nitrogen bottle is used to expel the water from the pumping system as shown in Figure 3.

Special circumstances

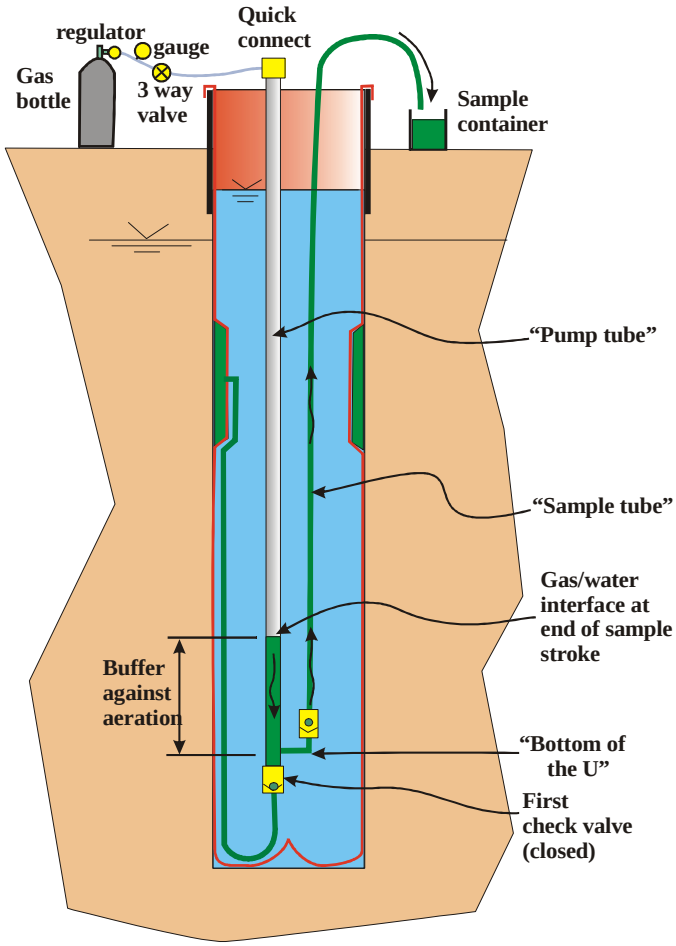
If the water table is very near the surface, a temporary extension of the casing is added to develop a higher driving pressure for the installation of the liner. When the liner is fully

installed, a weighted mud is used as a filling of the liner from the bottom to the top to better pressurize the liner. The mud still allows the liner to be removed by the reverse of the installation process.

In karst formations, a device called an eversion aid can be used inside the bottom end of the liner to cause it to propagate more nearly vertically than a liner driven with water alone. This allows the liner to propagate through large caverns intersected by the borehole.

Water FLUTe liners can be installed equally easily in angled holes or even horizontal holes using the same eversion procedure.

Fig. 3. Pumping Procedure



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Sampling guidelines for *Water FLUTe* systems installed after May, 2009

Rev. April, 2010

Water level in the liner.

The liner water level should be ~10 ft above the highest formation water level to provide a good seal of the liner in the hole (5 ft minimum excess head). The formation water level can be measured via the "pump tube" for each port. The water level inside the liner should be tagged in the ½ x 5/8" tube labeled "TAG" adjacent to the sampling tubes. If the water level inside the liner is measured in the liner, outside the Tag Tube, lower the weighted tag line very slowly to avoid damage to the liner. Water can be added to the liner by simply pouring water into the liner or through the TAG tube, whichever is easier. Do not fill the liner more than 10 ft above the highest formation water level. The water level in the liner should be checked prior to each sampling episode. (Beware that filling the liner with de-ionized water can give a false water level reading.) It is not recommended to manually tag water levels more than 200 ft below the surface. The wet film adhesion may prevent the removal of the tag line. A special Teflon coated tag line can be used to extend that limit.

Water flow

The water flow into the pumping system is shown in Fig. 1. Water flows from the formation through the spacer pore space, through the port tube, through the first check valve, and fills the "pump tube". The "sample tube" is also filled at the same time. The water level rises in the pump tube to the water table for that port.

Setting up the gas pressure source

The water is pumped with gas pressure. The FLUTe pump design is such that there is very low risk of aeration of the sample. The gas source is usually a nitrogen bottle with a regulator for setting the prescribed driving pressure. The arrangement of the FLUTe gas drive system is shown in Fig. 2. The regulator is set to the proper gas pressure defined later by closing the three way valve to prevent gas flow out of the quick connect fitting. The

pressure gauge on the FLUTe pump driver is much more sensitive than the regulator for setting the regulator pressure. The FLUTe pump driver must be securely connected to the regulator at the normal ¼" NPT connection on the regulator outlet.
The regulator is first attached to the top fitting on the gas bottle (a special nitrogen regulator fitting connects to a nitrogen bottle). Tighten the nut securely. Turn the pressure regulator handle counter-clockwise until is moves freely (the no pressure position). Rotate the main valve on the regulator (nearer the bottle) clockwise to fully closed. Open the valve on the bottle (counter clockwise). The main bottle pressure gauge on the regulator will rise to the bottle pressure. Close the regulator valve (clockwise) until the pressure starts to rise on the pressure gauge on the FLUTe pump driver (three way valve closed with no flow out of the quick connect). Adjust the regulator to the desired pressure for purging, provided by FLUTe. Connect the quick connect to the top fitting of the pump tube (see Fig. 2). Open the three way valve to drive the water out of the pump.

Purging

Water is pumped from the tubing by applying the gas pressure to the interface at the static water level in the pump tube (Fig. 1 and 2). The water is driven down in the pump tube and up through the second check valve to the surface via the sample tube. By driving the water with a sufficient gas pressure (the "recommended purge pressure") to drive all of the water in the pump tube and the sample tube to the surface, the water in the pump tubing is nearly all expelled. The purge stroke (~1 gal. of water) is complete when gas is expelled from the sample tube following the water flow. <u>The pressure in the system must then be vented (i.e., dropped to atmospheric by turning the three way valve to the vent position)</u>, to allow the pump tube to refill by flow via the port tube. The recharge flow from the port tube consists of the port tube water, the water in the pore space of the spacer, and water from the medium. Because of the relatively large volume in the pump tube, most of the recharge is from the medium. The recharge will take about as long as the first purge stroke. However, a low conductivity medium will require more time.

Purging the pump tube a second time will remove any of the water that has resided in the spacer and port tube volume. That is highly recommended, since the water resident in the tubing and spacer is probably not typical of the formation water. If the refill has been prompt, the second purge water

volume will be similar to the first stroke. Two more purge strokes, for a total of four purge strokes, are recommended to remove water that may have been in long contact with the liner or spacer. (Note, systems manufactured before May, 2009 use larger pumps and were only stroked twice. The purge volume is slightly larger for this new procedure and takes about the same time as the two stroke system. This new system stresses the liner less at the spacer and has numerous other advantages.)

Sampling

The sampling flow is best driven on the fifth cycle using a "recommended sampling pressure" which is less than that needed to drive gas through the bottom of the pump tube. The pressure recommended is that which will drive the water to near, but not out of, the bottom of the large tube. That recommended pressure, "the sampling pressure," is calculated in the spreadsheet provided with each system. The pressure regulator is set to the sample pressure, which is lower than the purge pressure. Opening the three way valve will now apply the sample pressure to the system causing flow from the sample tube.

The first flow of the sampling cycle sweeps along droplets of water left in the tubing from the purge cycle. That residual water is depleted of volatile components. Tests have shown that the first tube volume of the sample flow should be discarded as depleted in volatiles (the "discard volume" is also calculated in the spreadsheet). Thereafter, the samples can be collected from the sample tube outflow. The volume to be discarded is shown in the spreadsheet as "discard volume". The sample tube water flow rate will start fast, then slow, and finally stop. That occurs as the water column being driven approaches the applied pressure/head. The typical sampling pressure drives to within 25 ft. of the bottom of the pump tube (the U). The large buffer zone remaining in the pump tube assures against aeration of the sample.

This procedure should provide an ample sample (~3 liters) of good quality drawn directly from the formation. If a larger sample volume is needed, simply drop the pressure (i.e., vent the three way valve again), let the pump refill and apply the pressure again. No discard is needed for subsequent sampling flows.

Caution: If the pumping system refills very slowly, there may not be sufficient water in the pump to fill the "sample tube" to the surface when the stroke is performed. In that case, there will be spitting of gas from the sample water and it will be followed by a flow of gas only. The sample water should never show "spitting" and the sample stroke should never end with gas flow from the sample tube. The proper sample flow will slow until it stops flowing. Should this evidence of insufficient recharge be observed, allow the pump to refill for a longer time and repeat the sample stroke. One can tag the water level in the large tube, as described in the head measurement procedure, to assure that the pumping system has been sufficient refilled.

Measuring the head in the system

The water level at each port can be manually measured by removing the plug from the top of the pump tube and lowering a slender (~1/4") electric water level meter until it contacts the water level in the pump tube. It is not recommended to manually tag water levels more than 200 ft below the surface. The wet film adhesion may prevent the removal of the tag line. A special Teflon coated tag line can be used to extend that limit.

The water level in the large tubes may not be the current water level. After sampling, if there is any leakage of the second check valve (sand in the tube, etc…) the water in the sample tube can backflow into the larger tube, adding to the water that fills the large tube during the recharge. Also, if the water level in the formation is dropping between head measurements, the water level in the pump tube will not follow the descent if the first check valve is a good seal. For these two reasons, and for the freezing concern below, it is best to finish the sampling stroke by raising the pressure to the "purge pressure" value to purge the pumping system of all water. Then upon refilling, the level is the current head for each port. If head measurements are made between sampling events, each port's pumping system should be first be purged one stroke to allow the tubing to refill to the current head value. Always replace the plugs in the top of the pump tubes when finished sampling.

If the water might freeze in the sampling tubing near the surface, purge the entire volume of water from each sampling line, after sampling, before leaving it. Use the recommended purge pressure to remove all water, not the sampling pressure. **Each line should be blowing gas when the purge is**

complete. If the tubes were purged after sampling prior to head measurements, that is sufficient.

Since the Water FLUTe uses PVDF tubing, the purge of the entire system after sampling should not be neglected, even if head measurements are not to be made. This removes the water column in the sampling tube. For deep water tables, the long term pressure of the standing water in the sampling tube might lead to excessive creep of the tubing which is susceptible to "cold flow", a characteristic of Teflon like materials. (This is not a concern except for very deep water tables (>300 ft).

In most cases, the performance of a final purge of the system after sampling is useful, even if not essential.

Simultaneous purge and sampling of all tubes

The FLUTe pumping system for each port is essentially identical in length, pump volume and elevation in the hole. This allows all ports to be purged and sampled simultaneously for a great saving in sampling time. The only difference for simultaneous sampling is that the pressure source must include a tube to each port fitting at the wellhead. FLUTe offers a manifold pump driver system at extra cost (the single port driver is provided with the Water FLUTe). The recommended purge and sample pressures are the same as used for single port sampling.

In some cases, the buoyancy of the sampling system is so great when emptied of water during the simultaneous purge that the tubing bundle can cause the liner to invert. The sampling volume spreadsheet provided with the liner notes whether the system can be purged simultaneously. This is only a problem for smaller hole diameters, many ports, and a small excess head in the liner. The new pump design allows simultaneous sampling in most situations.

A short summary is provided as the following checklist:

<u>Check List</u>

1. Check/restore the water level in the liner.
2. Connect the gas driver source to the gas drive (pump) tube for the port.

3. Set the regulator to the recommended purge pressure.
4. Turn the three way valve and expel the tube water at the suggested purge pressure. Collect the purged water volume for verification of a good purge. Note the water flow time of the purge stroke (~4 min.).
5. Allow the tubing to refill. Repeat the purge. Collect the purge volume to assure the amount removed is at least the "port tube volume". Was the refill long enough?
6. Purge a total of four times, more if desired.
7. Allow the tubing to refill for the sample stroke.
8. Reduce the driving pressure to the "sampling pressure". Apply the pressure and collect the first flow to measure the discard volume. Discard that water. Collect the samples.
9. Perform a final purge of the water out of the sampling lines by raising the driving pressure to the purge pressure value.
10. When the sampling system has refilled, tag the water level, if desired, for the current water table. If a port system is refilling very slowly, tag it at a later time.

See the spreadsheet provided with each *Water FLUTe* for the recommended purge and sampling pressures. Those are the pressures that can also be used for a simultaneous purge of the several ports. The spreadsheet flags the condition where all ports should not be purged simultaneously. In most cases, several, to all, of the ports can be purged simultaneously.

Optimum sampling procedure:
Since it is often desirable to minimize the amount of time that the sample water resides in the pumping tubing, it is useful to note the actual time that is required for the recharge of the system. Since the fill rate slows dramatically for the last portion of the recharge, it is not necessary to wait for a complete refill. For most formations, the recharge is dominated by the tubing pressure drop. In that case, the time required for the purge stroke to be completed is about the same time required for the refill. (The exception is for a tight formation that recharges the tubing very slowly.) Hence the second purge can be started after waiting the same length of time as the first purge endured. If the second purge is of a similar volume (usually somewhat less) than the first purge volume, the refill time was long enough. After the same delay, the sampling stroke can be initiated. This timing of the strokes allows one to reduce the retention time in the pumping system. For the very large sample volumes produced, the refill time can be shortened

even more, as long as the sample volume is adequate after the discard of the first flow.

In some situations, the retention time is still too long. FLUTe can often increase the sample tube and port tube diameters for greater flow rates. However, the standard design is well matched for to a wide range of hole diameters, depths, and water table elevations. For very deep wells, the tubing may need to be of higher pressure capacity for the required driving pressures. For water table depths below 700 ft., this may be a concern. FLUTe initiated a design change from Nylon 11 to PVDF tubing in the Water FLUTe systems in 2002 to avoid any concern about tubing interaction with the sample water. However, the prescribed purge is sufficient for the use of Nylon tubing systems.

For special situations such as a very large difference (>50ft) between the water tables at the ports or large fluctuations in the water table, the pumping system may be extended to greater depths. However, the sampling procedure above is sufficient for that situation also.

Questions: Call 888-333-2433 and ask for Carl Keller, or a field engineer.

Figure 1. Water FLUTe pump system

(Single port system shown for clarity)

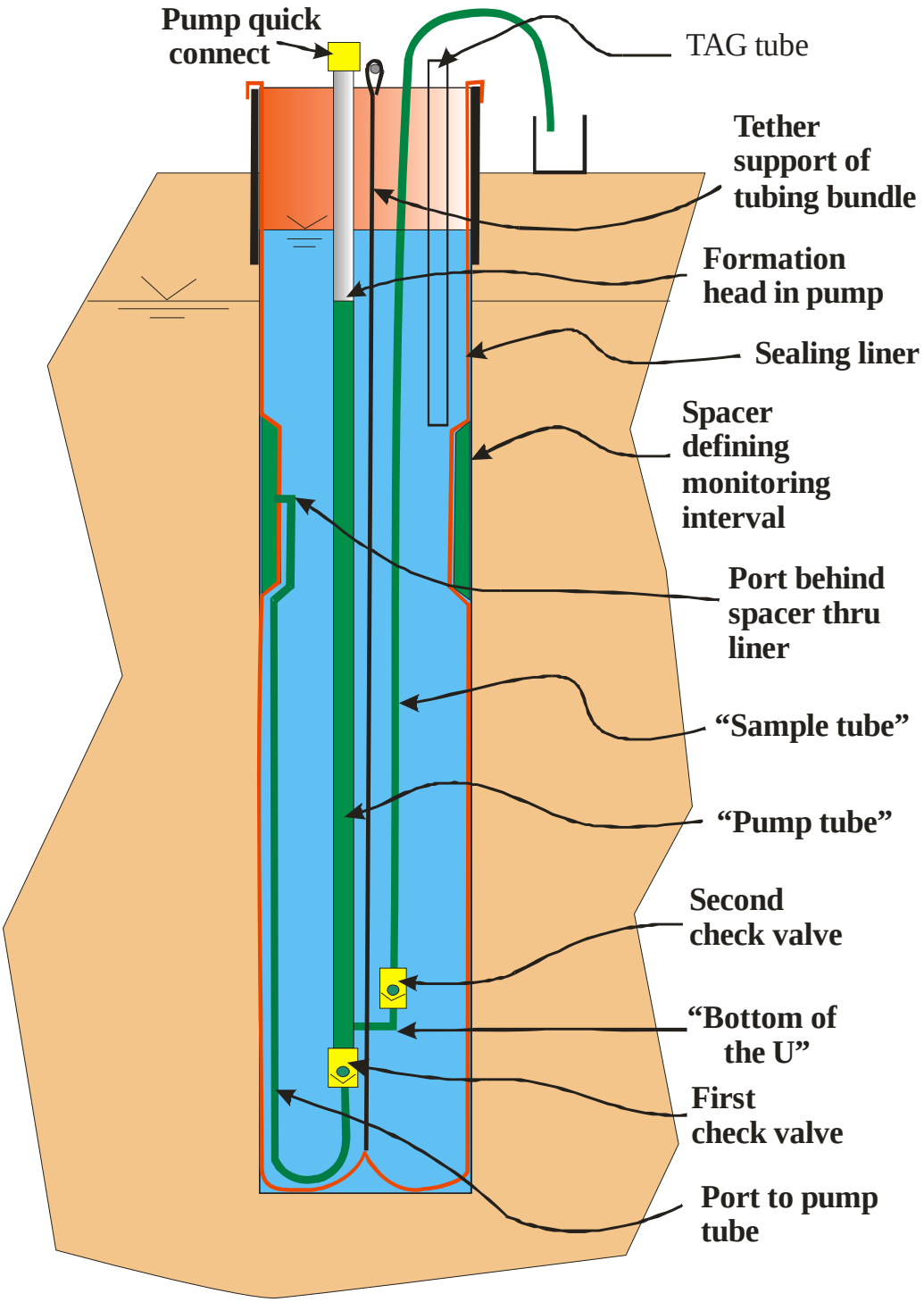
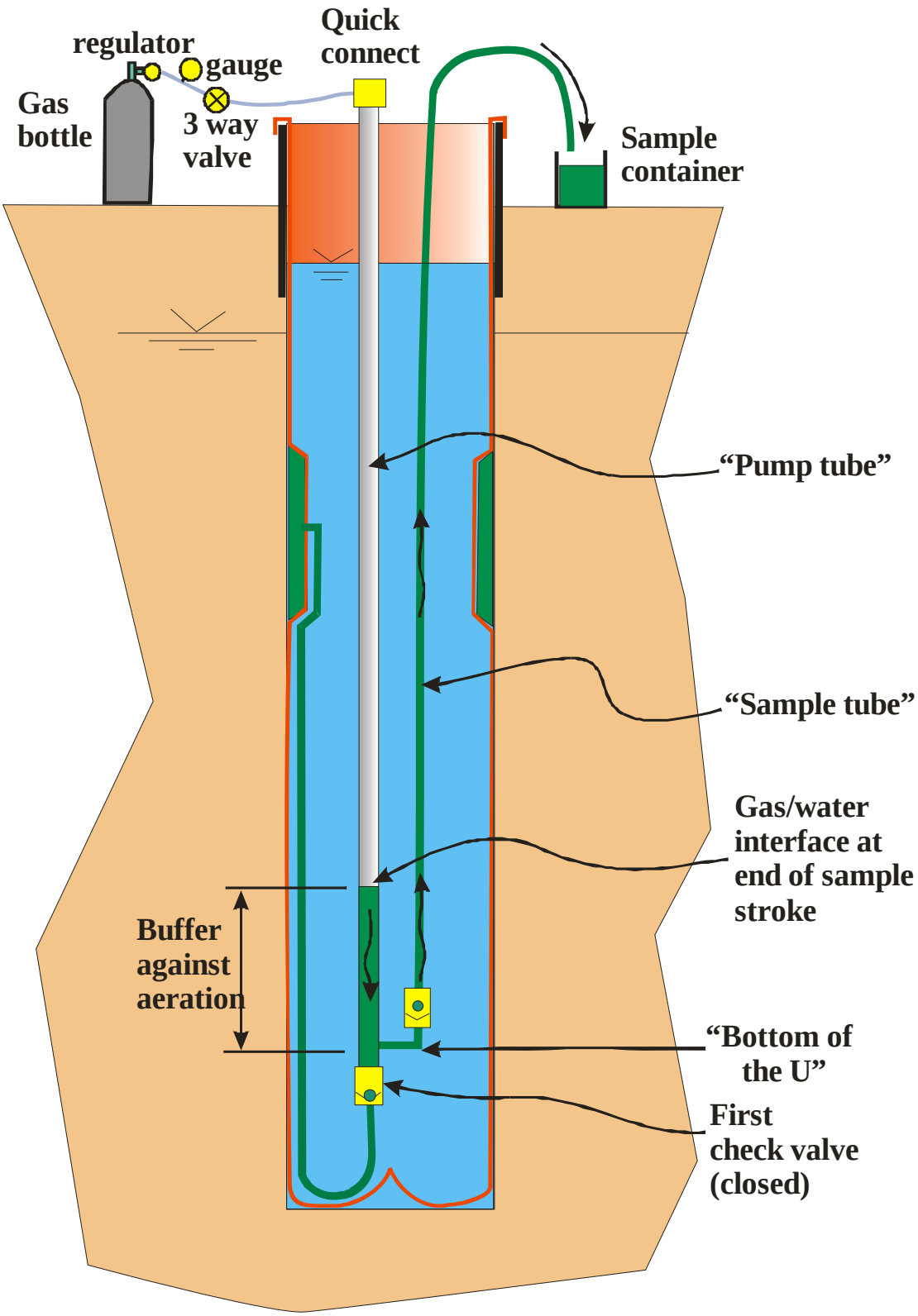


Fig. 2. Pumping Procedure



Appendix F

Borehole Geophysical Logs

JET WEST
GEOPHYSICAL SERVICES, LLC.

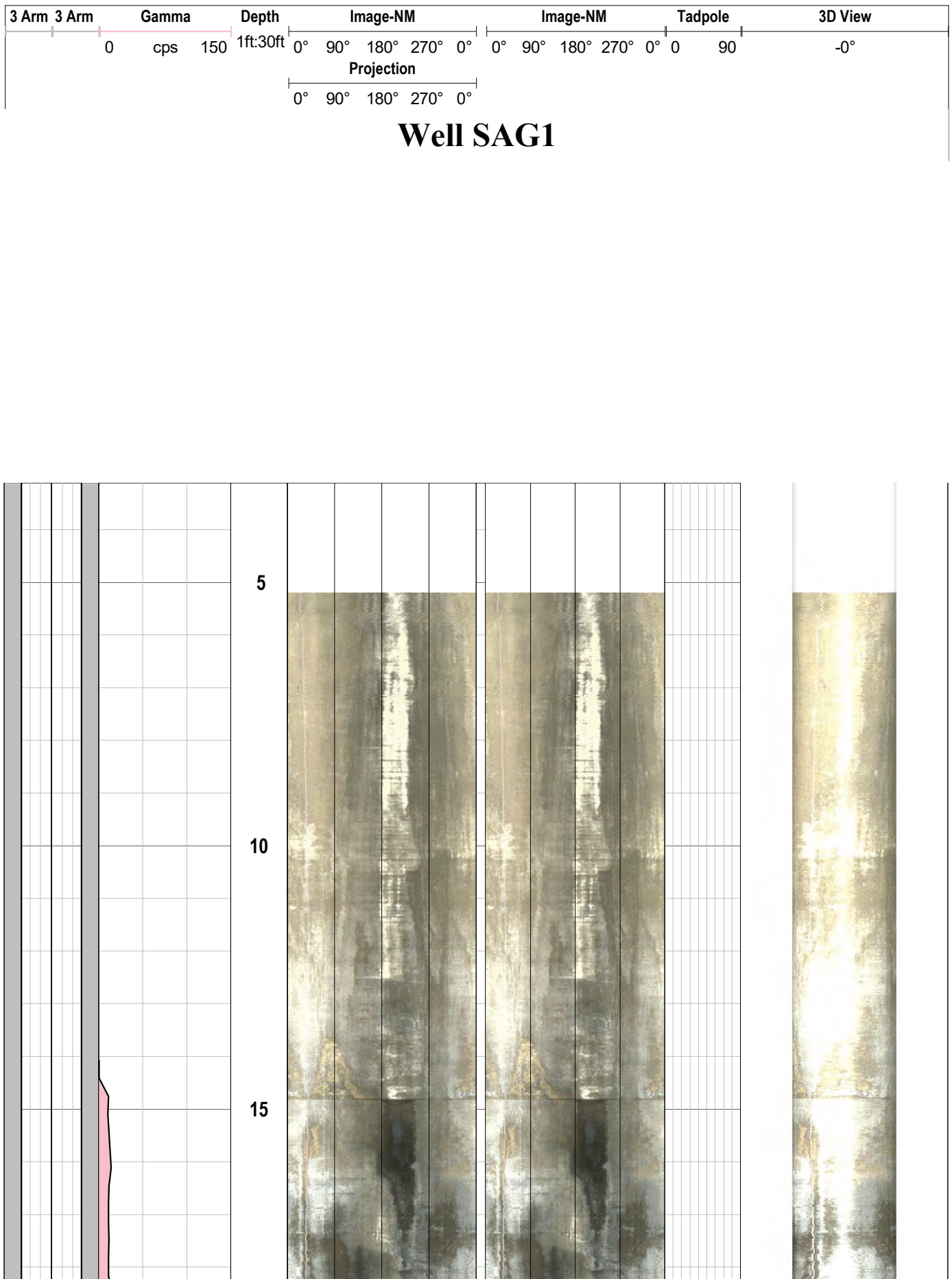
Northing: Easting:	COMPANY Homestake Mine WELL ID SAG1 FIELD COUNTY Cibola STATE New Mexico	
	TYPE OF LOG: Optical Imager, Caliper LOCATION SEC TWP RGE	OTHER SERVICES Acoustic Imager Heat Pulse Flowmeter Electrics (16", 64", SPR,SP) Induction, Gamma Ray Temp., Fluid Res. API No.

PERMANENT DATUM	Ground Level	ELEVATION	K.B.
LOG MEAS. FROM	Ground Level	ABOVE PERM. DATUM	T.O.C
DRILLING MEAS. FROM	Ground Level		G.L.

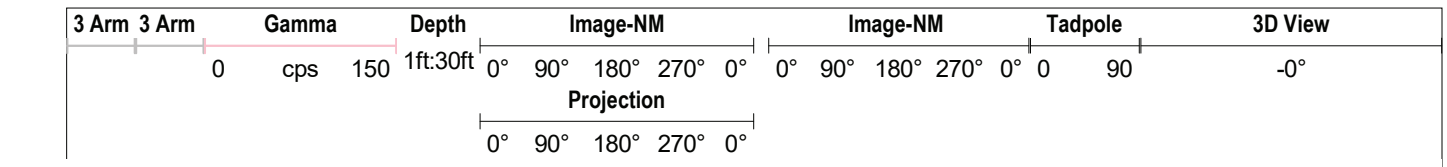
DATE	January 27 &13, 2021	TYPE FLUID IN HOLE	Water
RUN No.	1, 4	SALINITY	
TYPE LOG	Flow Log	DENSITY	
DEPTH-DRILLER	500 ft.	LEVEL	128 ft.
DEPTH-LOGGER	483 to 497 ft.	MAX. REG. TEMP	62.2 Degrees F
BTM LOGGED INTERVAL	497 ft.	DIGITIZE INTERVAL	0.1 - 0.4, 0.01
TOP LOGGED INTERVAL	Surface		
OPERATING RIG TIME	09:00-19:30		
RECORDED BY	T. Staatz / A. Henderson (1-13)		
WITNESSED BY	M. Keaveney - HDR		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	10 in.	0.0 ft.	158 ft.	6.56 in. Steel		-0.7 ft.	158 ft.
2	4.89 in. (PQ)	132 ft.	500 ft.				
3	* 7 in.	132 ft.	260 ft.	5.00 in. I.D. Steel Casing		-1.0 ft.	260 ft.

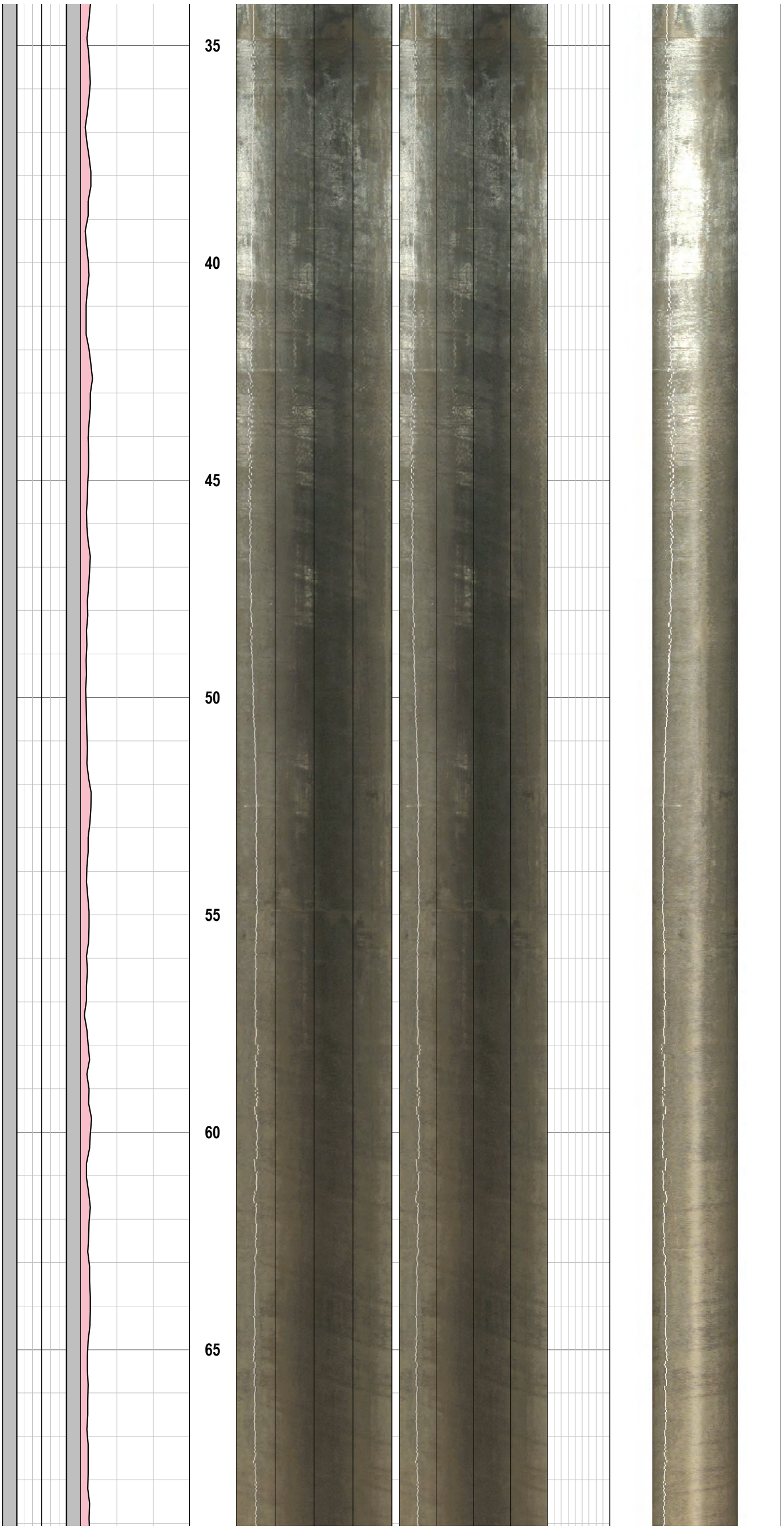
REMARKS: 1st trip Hole bridged at 204 feet. * Hole was reamed with a 7" bit from 132 feet to 260 feet.
261 feet of 5" I.D. Steel casing was dropped in as a liner. Top of Casing is 1 foot Above Ground Level.
4.89 inch (PQ) from 260 feet to 500 feet.


3 Arm
3 Arm
Gamma
0
cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
5
10
15
20
25
30

Well SAG1

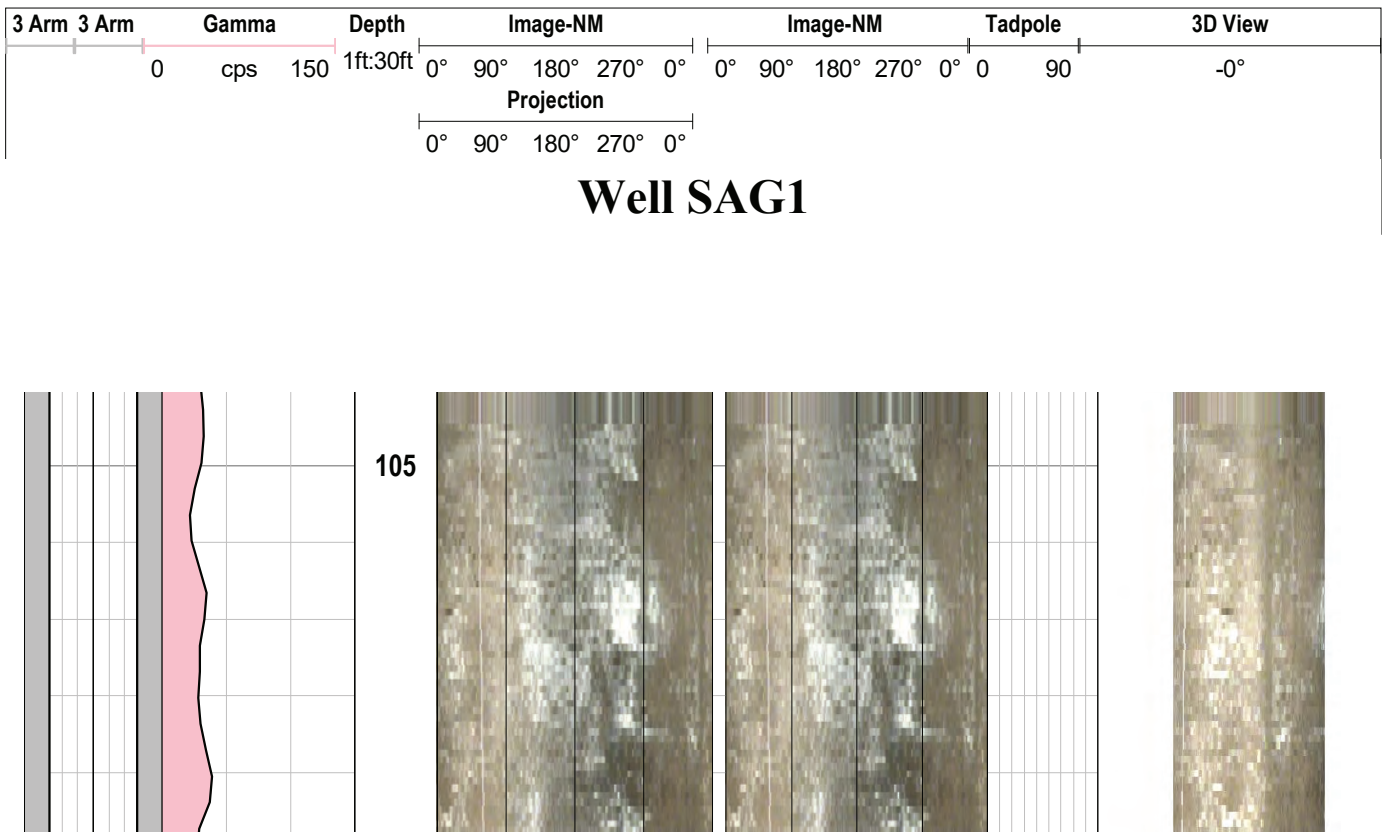

3 Arm
3 Arm
Gamma
0
cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG1


35
40
45
50
55
60
65


3 Arm
3 Arm
Gamma
0
cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
70
75
80
85
90
95
100

Well SAG1


3 Arm
3 Arm
Gamma
0
cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
105
110
115
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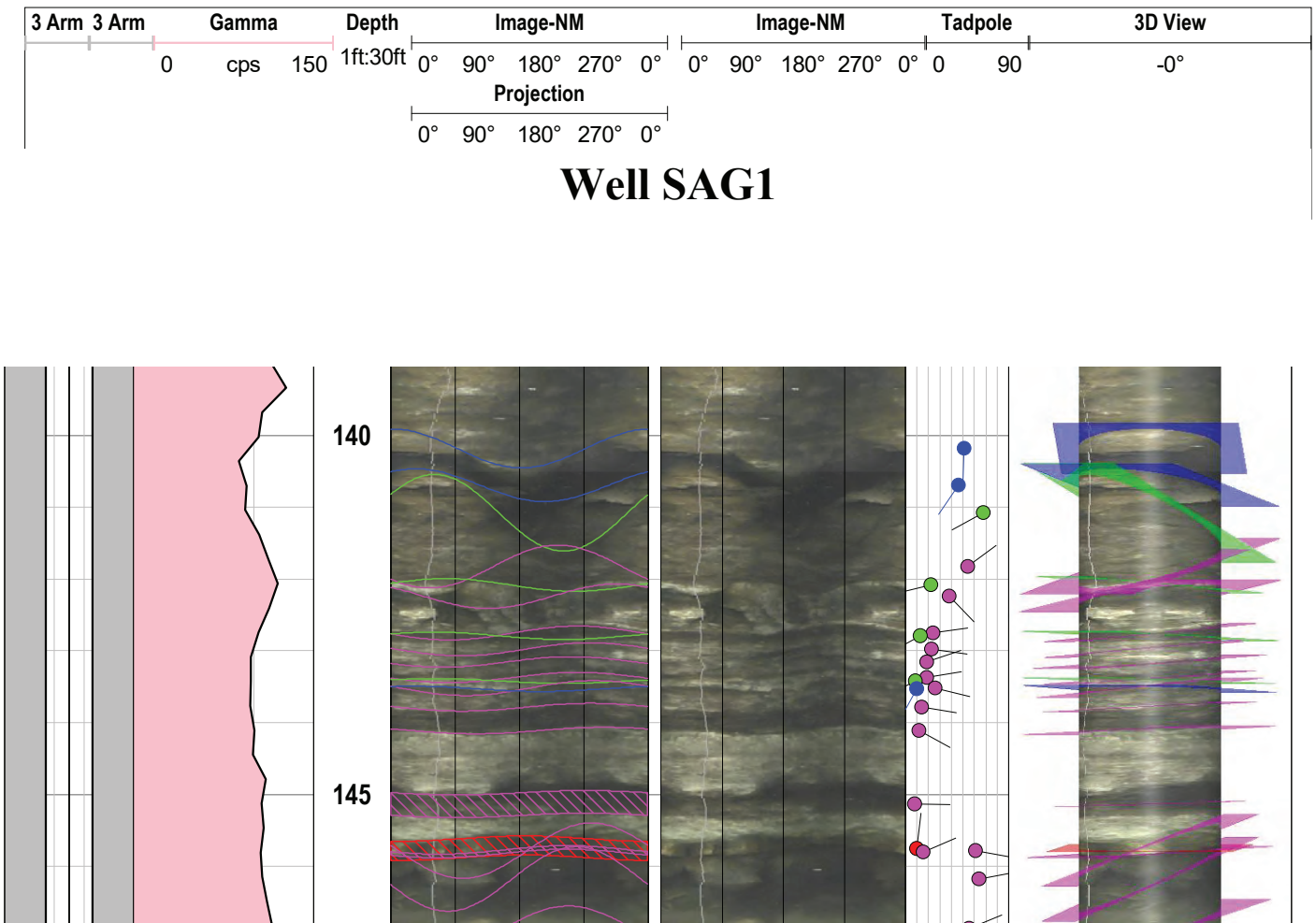
125
130
135

Well SAG1


3 Arm
3 Arm
Gamma
0
cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0 90
3D View
-0°
Well SAG1
140
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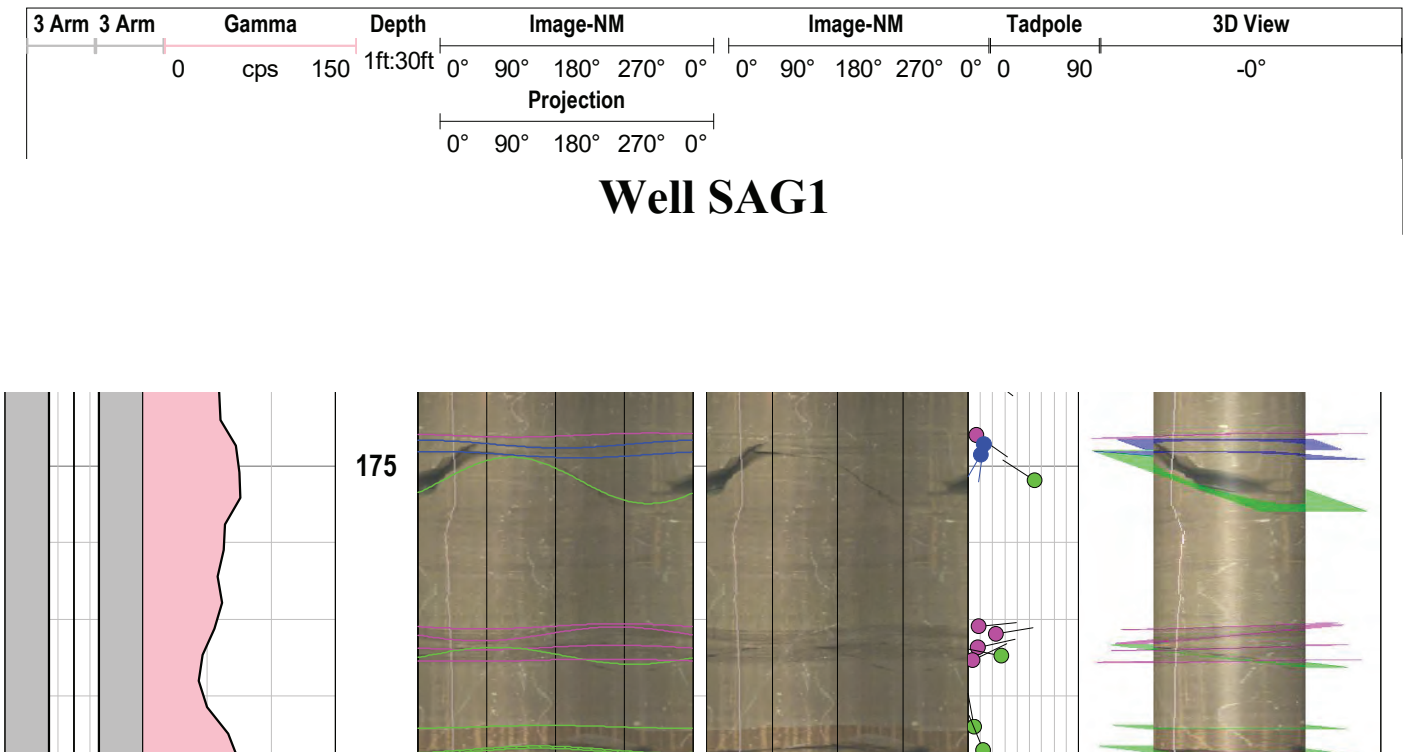
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3 Arm
Gamma
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cps
150
Depth
1ft:30ft
Image-NM
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image-NM
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG1
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195
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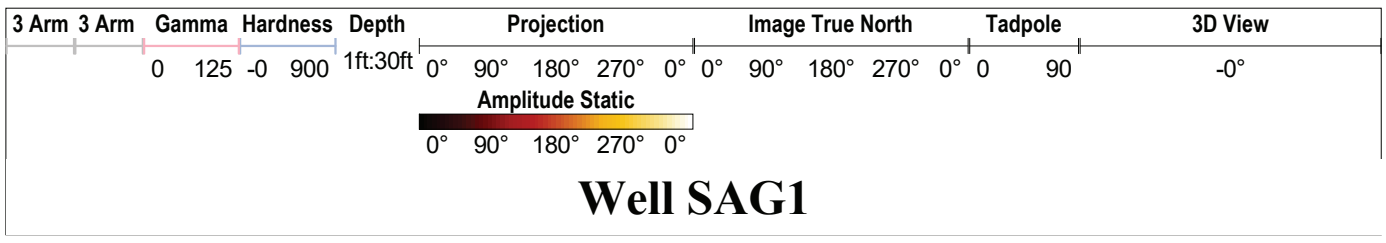
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3 Arm
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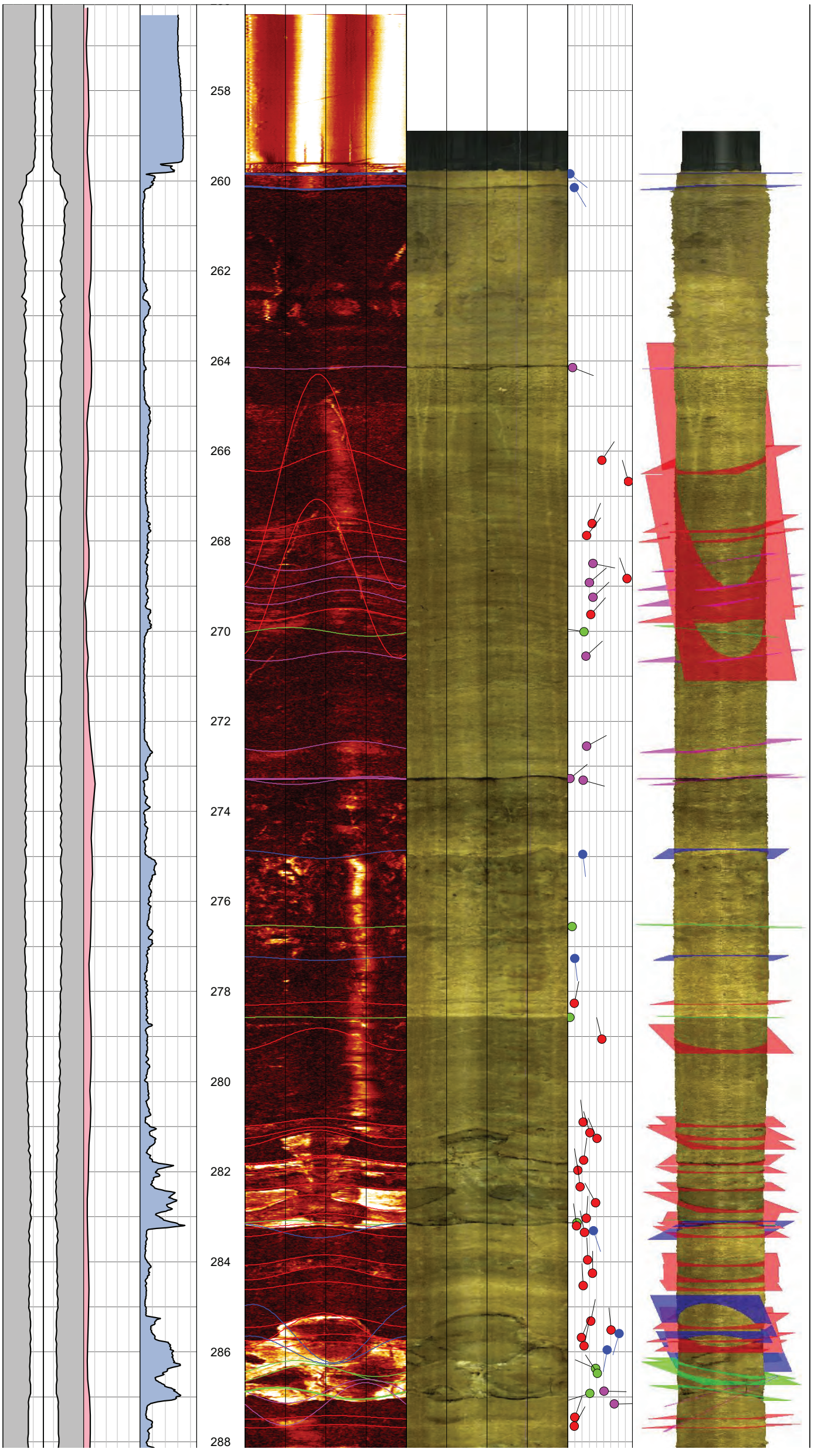
Hardness
-0
900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG1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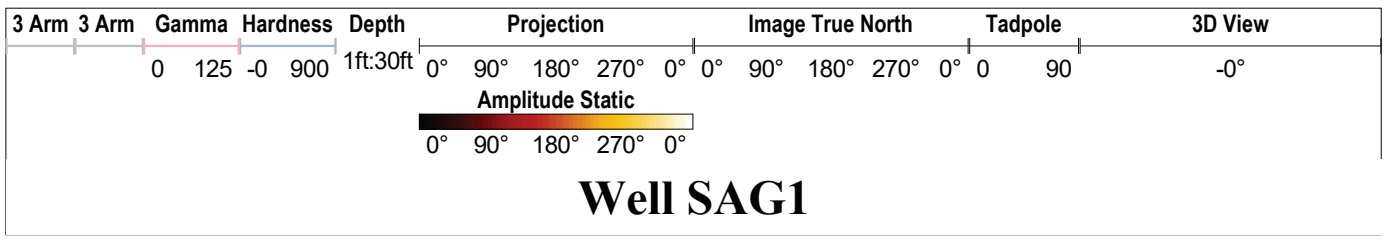
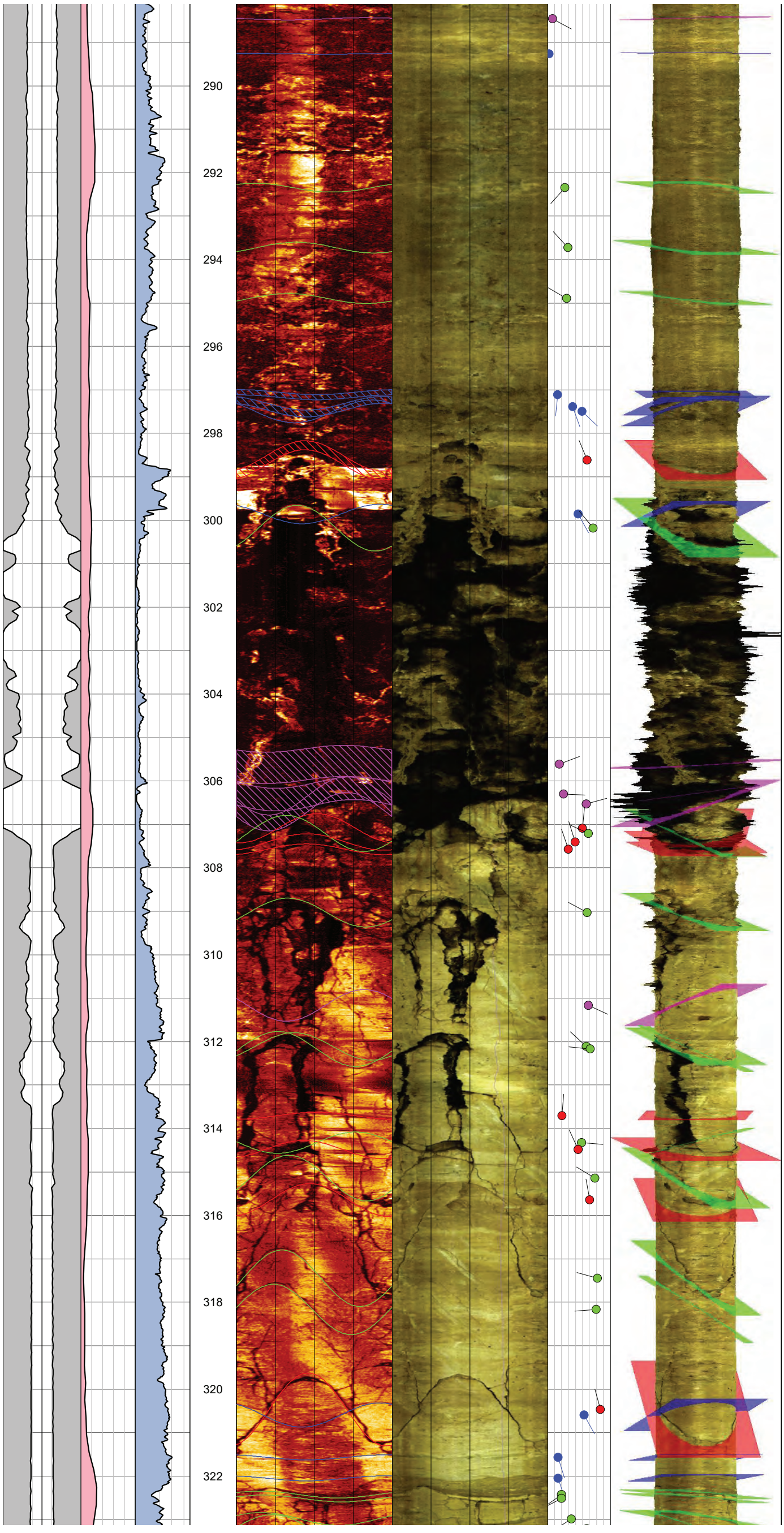

3 Arm
3 Arm
Gamma
0
125
Hardness
-0
900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG1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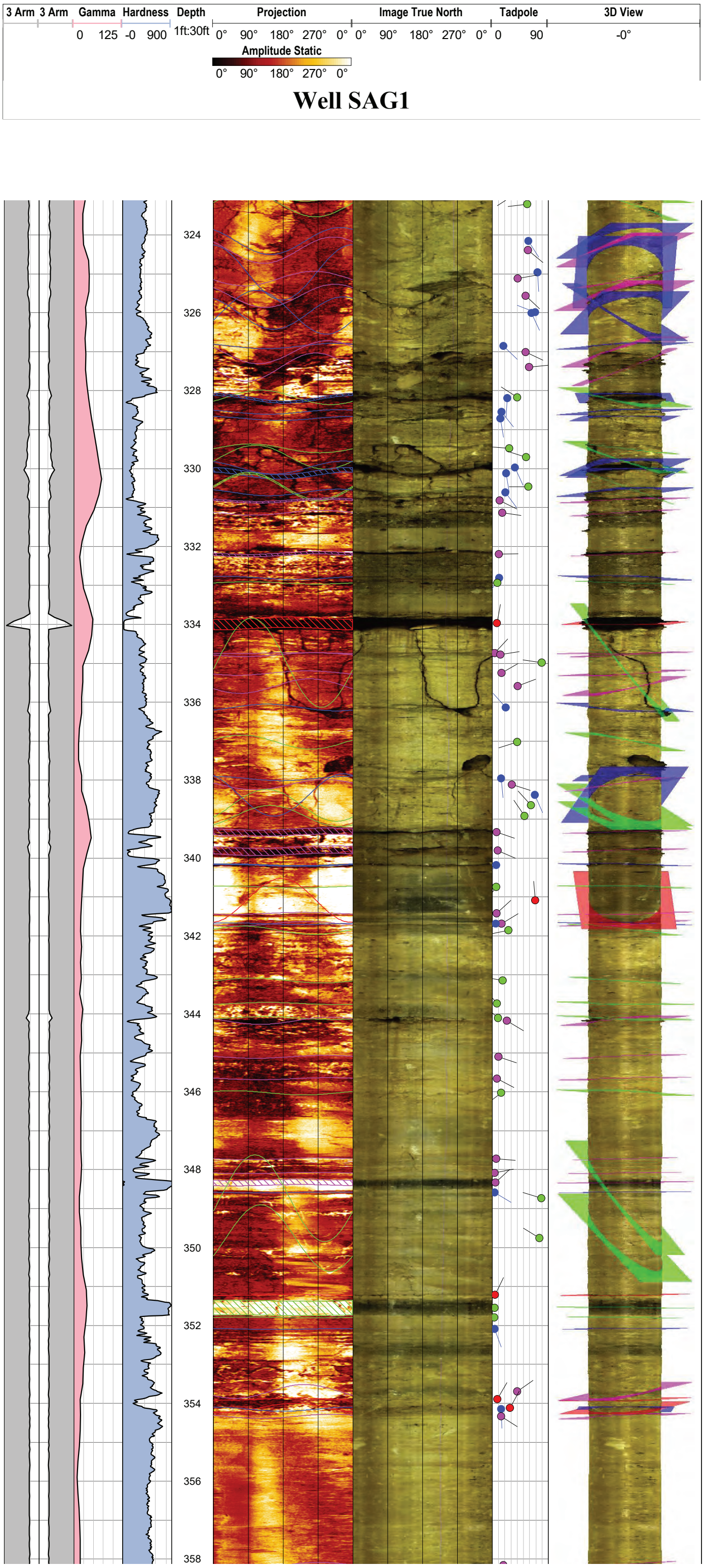
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3 Arm
Gamma
0
125
Hardness
-0
900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG1
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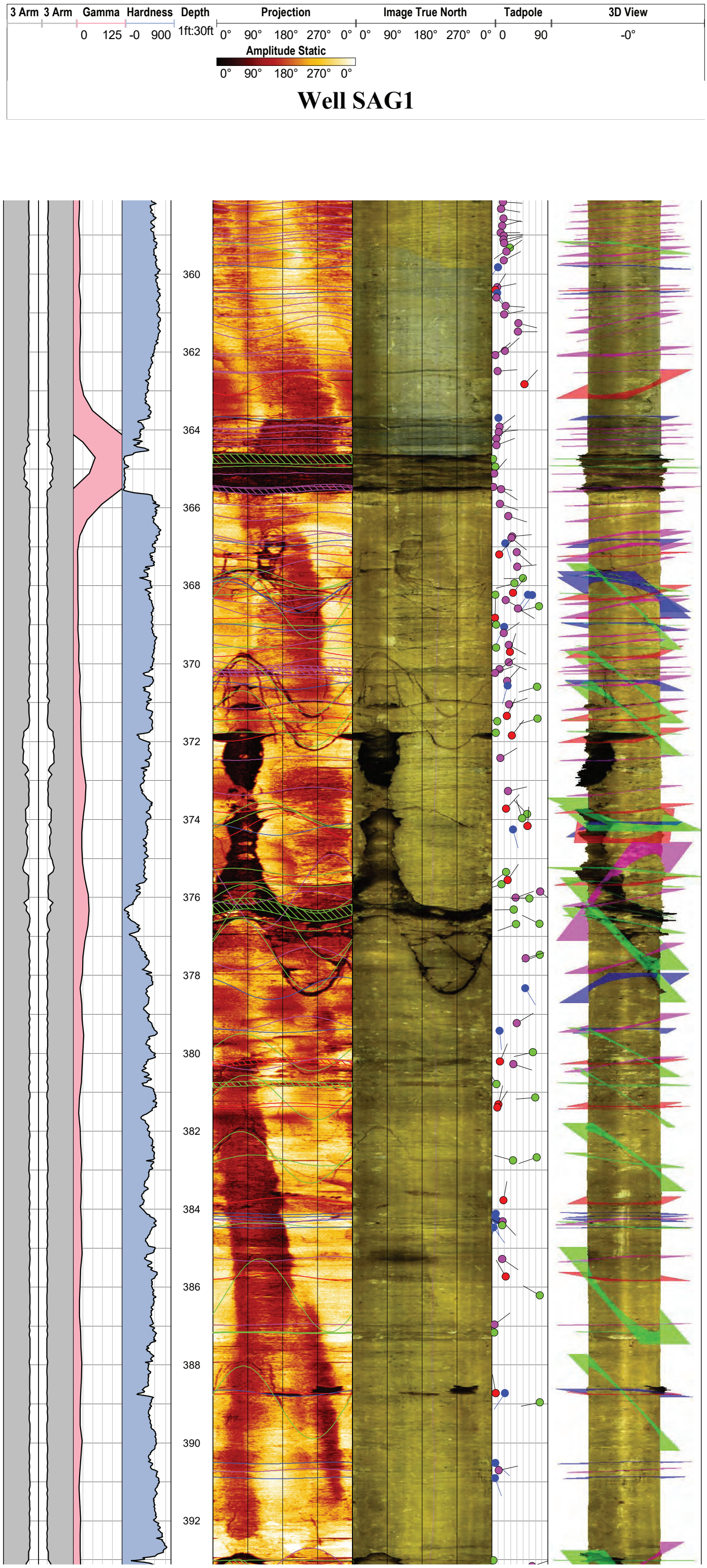
3 Arm
3 Arm
Gamma
0 125
Hardness
-0 900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0 90
3D View
-0°
Well SAG1
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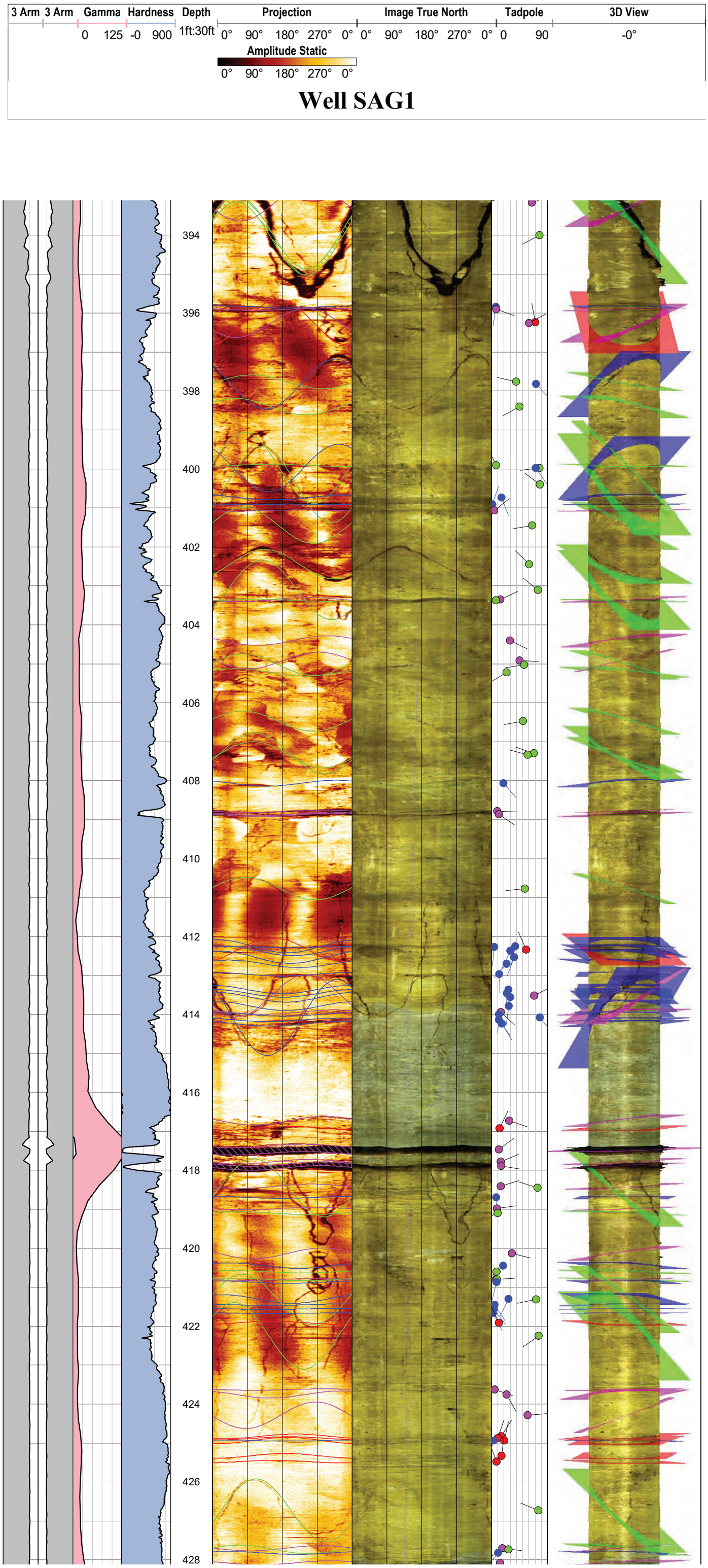
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3 Arm
Gamma
0 125
Hardness
-0 900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0 90
3D View
-0°
Well SAG1
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396
398
400
402
404
406
408
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426
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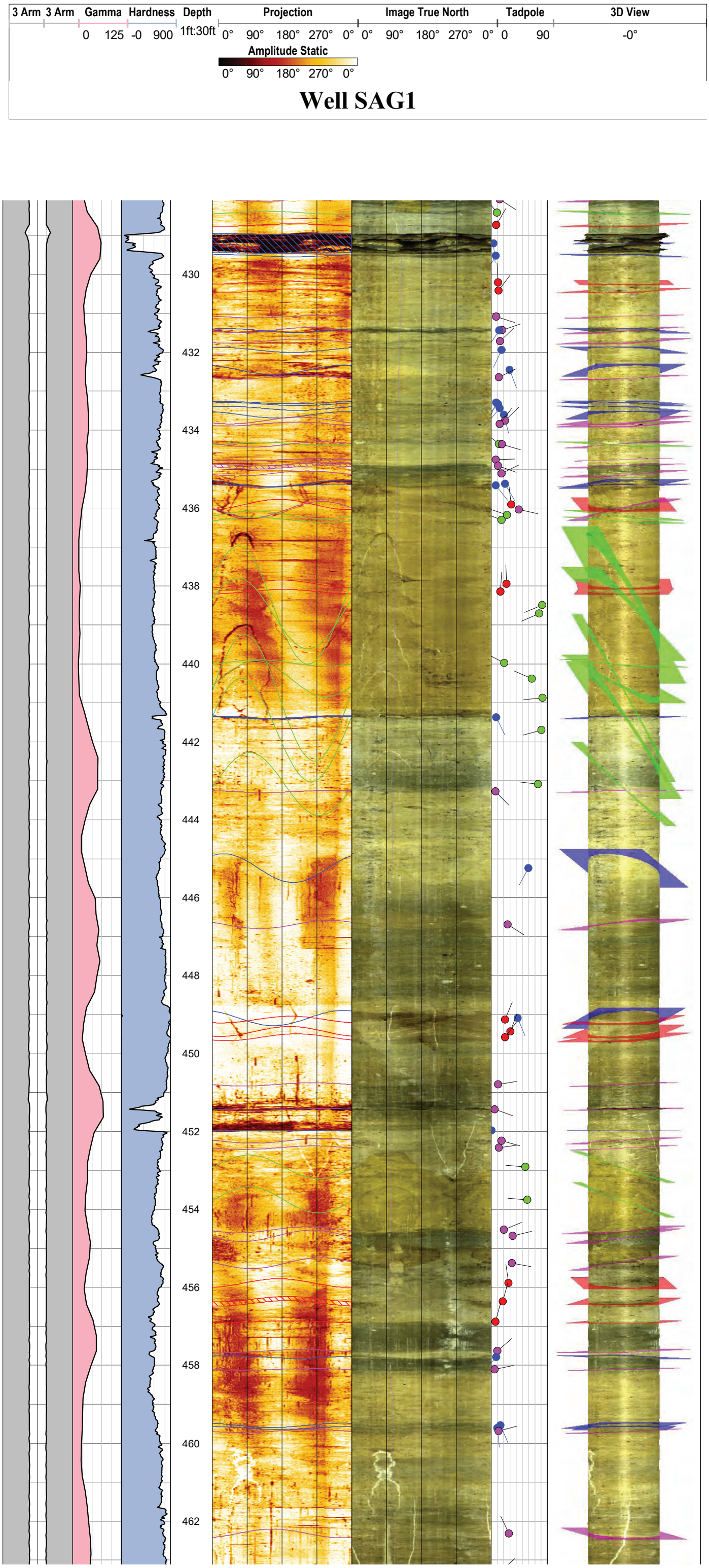
3 Arm
3 Arm
Gamma
0 125
Hardness
-0 900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0 90
3D View
-0°
Well SAG1
430
432
434
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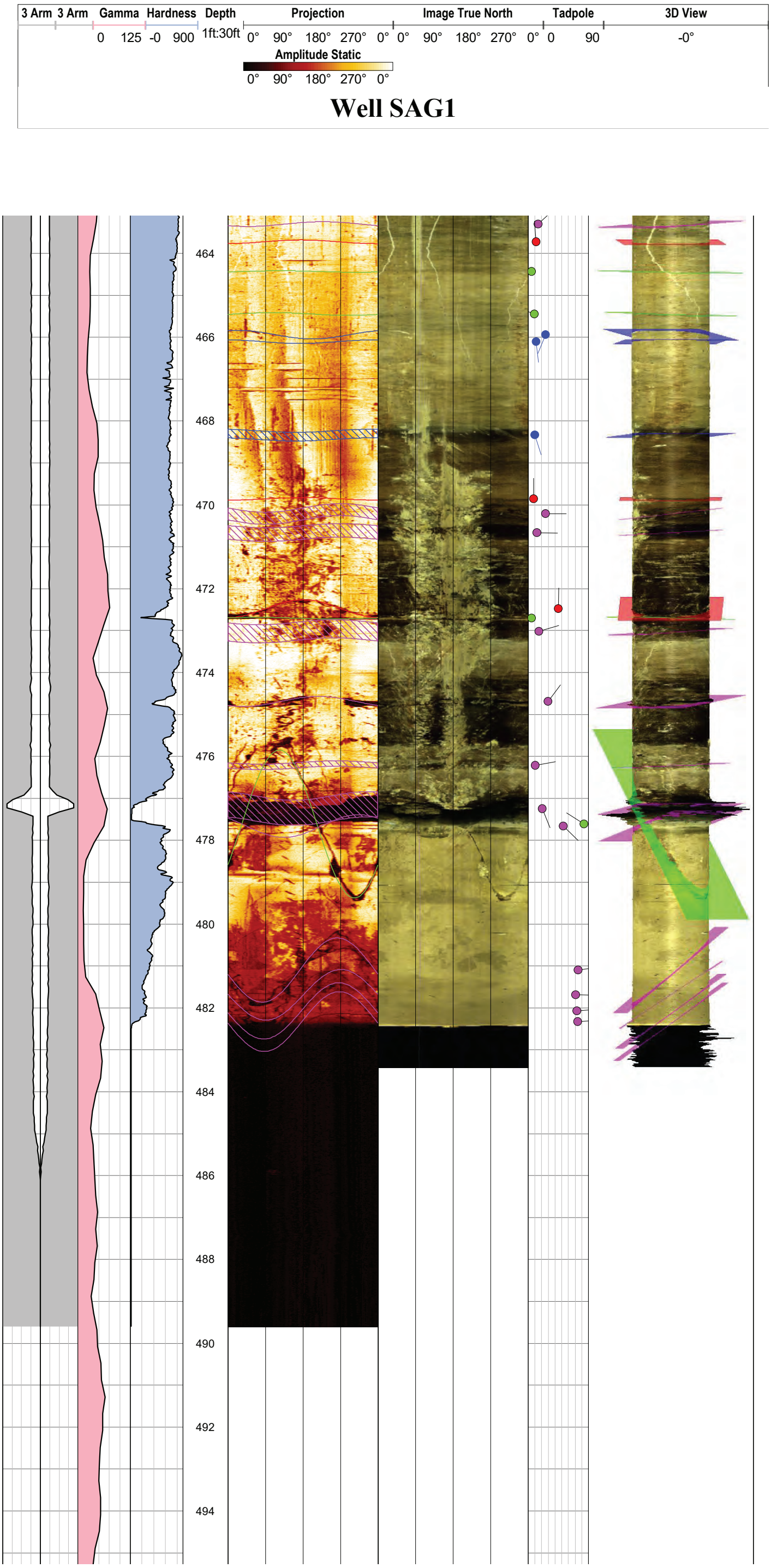
3 Arm
3 Arm
Gamma
0
125
Hardness
-0
900
Depth
1ft:30ft
Projection
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG1
464
466
468
470
472
474
476
478
480
482
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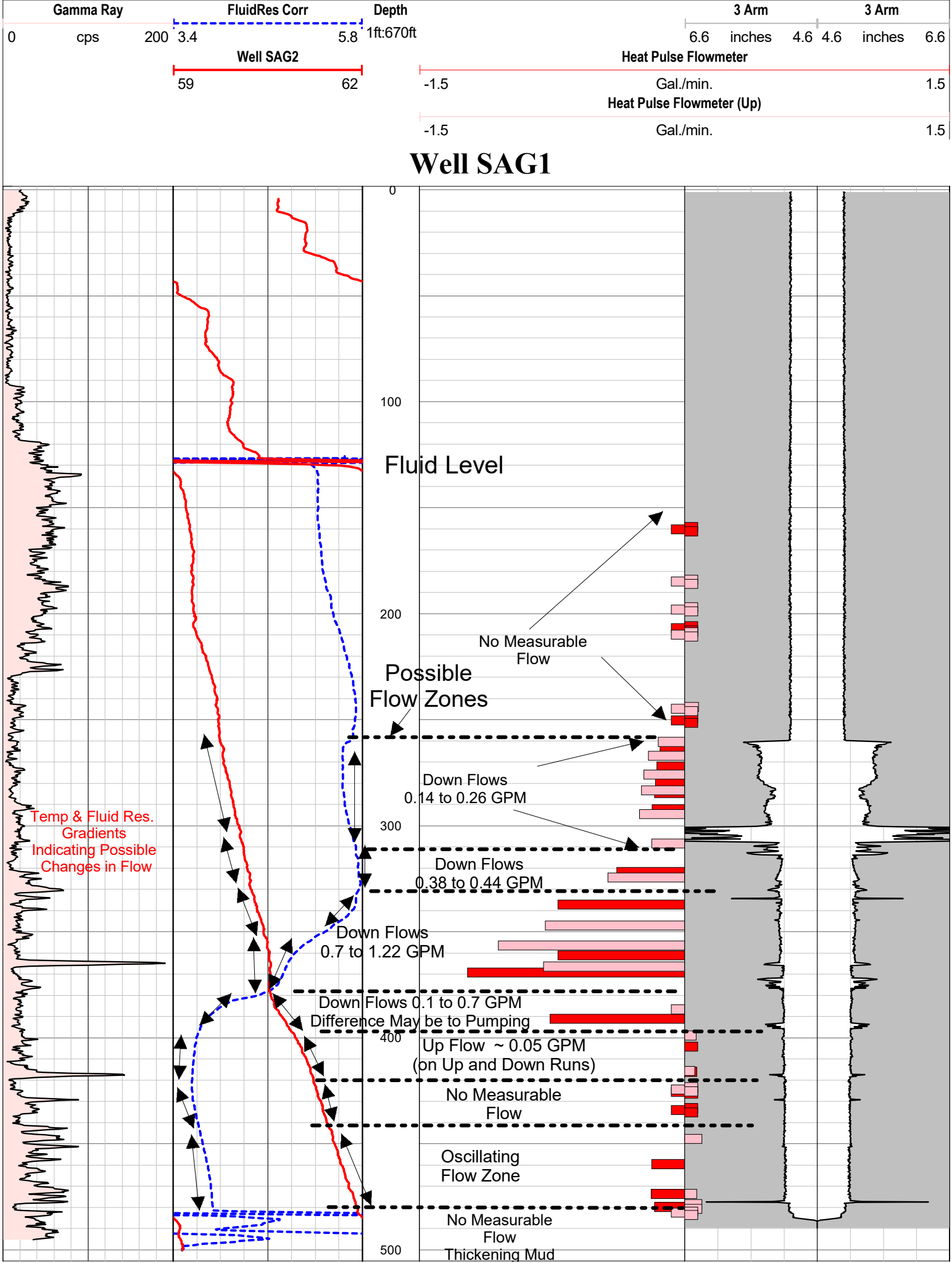
488
490
492
494


Gamma Ray
0
cps
200
FluidRes Corr
3.4
5.8
Well SAG2
59
62
Depth
1ft:670ft
3 Arm
6.6
inches
4.6
3 Arm
4.6
inches
6.6
Heat Pulse Flowmeter
-1.5
Gal./min.
1.5
Heat Pulse Flowmeter (Up)
-1.5
Gal./min.
1.5
Well SAG1
0
100
200
300
400
500
Fluid Level
No Measurable Flow
Possible Flow Zones
Down Flows 0.14 to 0.26 GPM
Down Flows 0.38 to 0.44 GPM
Down Flows 0.7 to 1.22 GPM
Down Flows 0.1 to 0.7 GPM Difference May be to Pumping
Up Flow ~ 0.05 GPM (on Up and Down Runs)
No Measurable Flow
Oscillating Flow Zone
No Measurable Flow Thickening Mud
Temp & Fluid Res. Gradients Indicating Possible Changes in Flow

JET WEST
GEOPHYSICAL SERVICES, LLC.

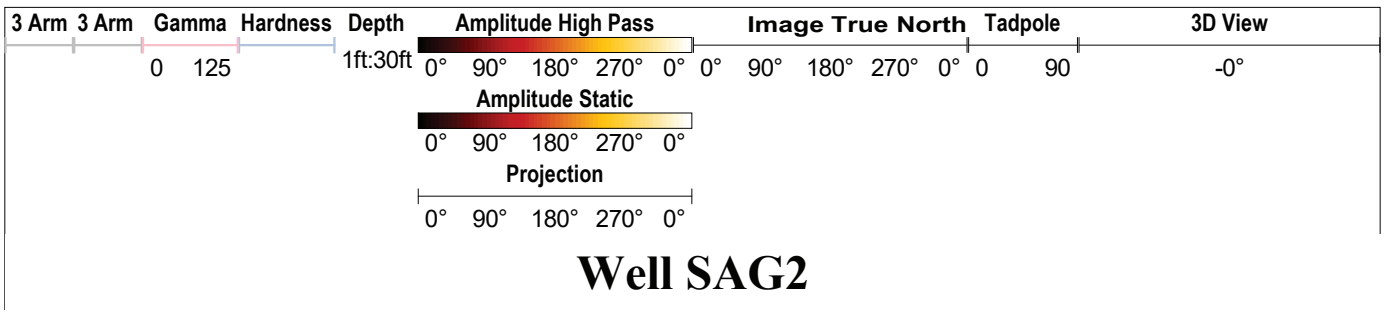
Northing: Easting:	COMPANY Homestake Mine WELL ID SAG2 FIELD COUNTY Cibola STATE New Mexico	
	TYPE OF LOG: Optical Imager, Acoustic Imager Projections, Hardness Caliper, Gamma Ray LOCATION SEC TWP RGE	OTHER SERVICES Heat Pulse Flowmeter Electrics (16", 64", SPR,SP) Induction, Temp., Fld. Res. API No.

PERMANENT DATUM	Ground Level	ELEVATION	K.B.
LOG MEAS. FROM	Ground Level	ABOVE PERM. DATUM	T.O.C
DRILLING MEAS. FROM	Ground Level		G.L.

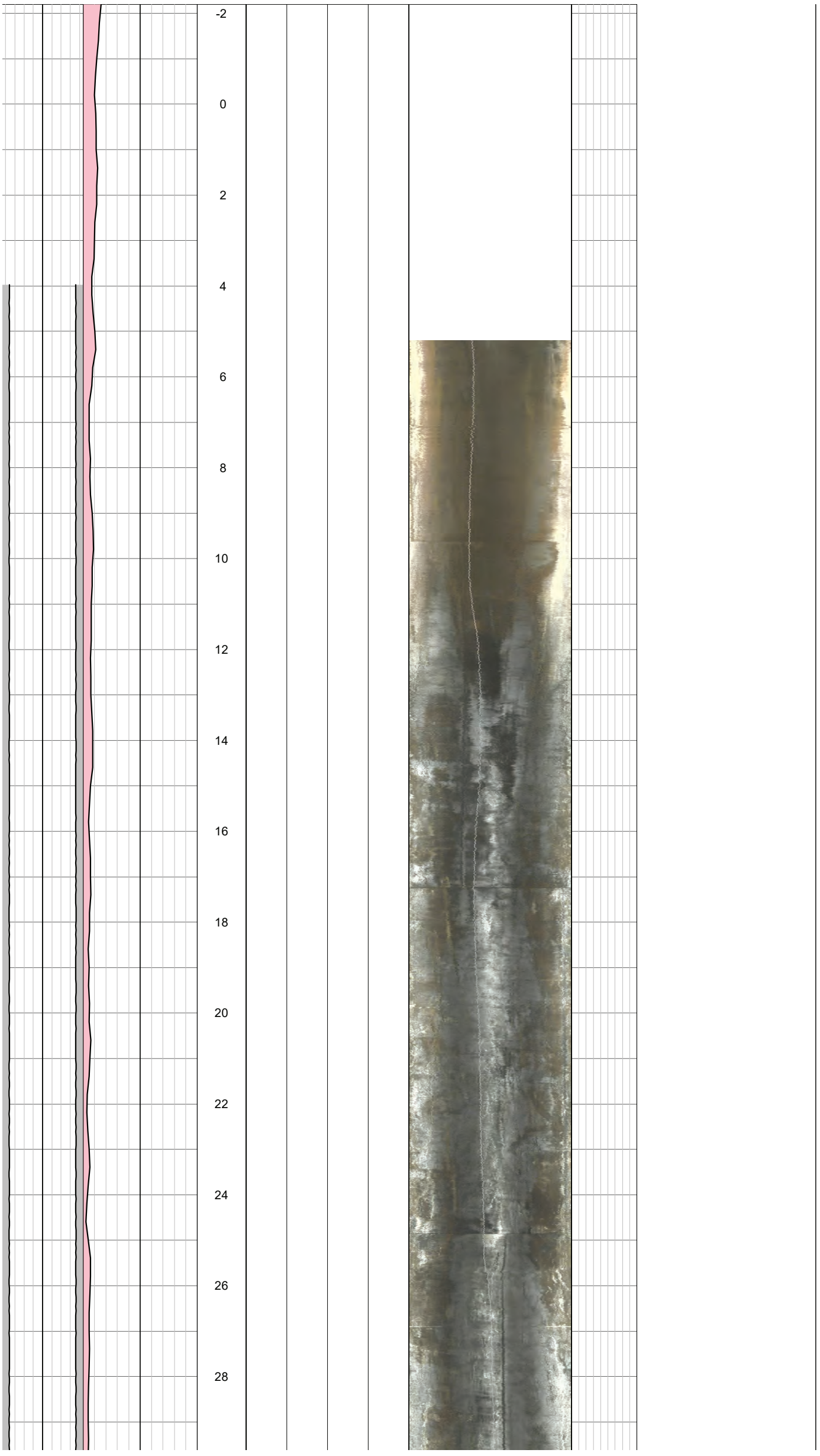
DATE	January 8, 2021	TYPE FLUID IN HOLE	Water
RUN No.	1-4	SALINITY	
TYPE LOG	Flow Log	DENSITY	
DEPTH-DRILLER	500 ft.	LEVEL	132 ft.
DEPTH-LOGGER	436 to 446 ft.	MAX. REG. TEMP	60.5 Degrees F
BTM LOGGED INTERVAL	445 ft.	DIGITIZE INTERVAL	0.1 - 0.4, 0.01
TOP LOGGED INTERVAL	Surface		
OPERATING RIG TIME	10:30-19:30		
RECORDED BY	T. Staatz / C. Thomason		
WITNESSED BY	M. Keaveney - HDR		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	10 in.	0.0 ft.	158 ft.	6.56 in. Steel		-0.7 ft.	158 ft.
2	4.89 in. (PQ)	158 ft.	500 ft.				
3							

REMARKS:


3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2


-2
0
2
4
6
8
10
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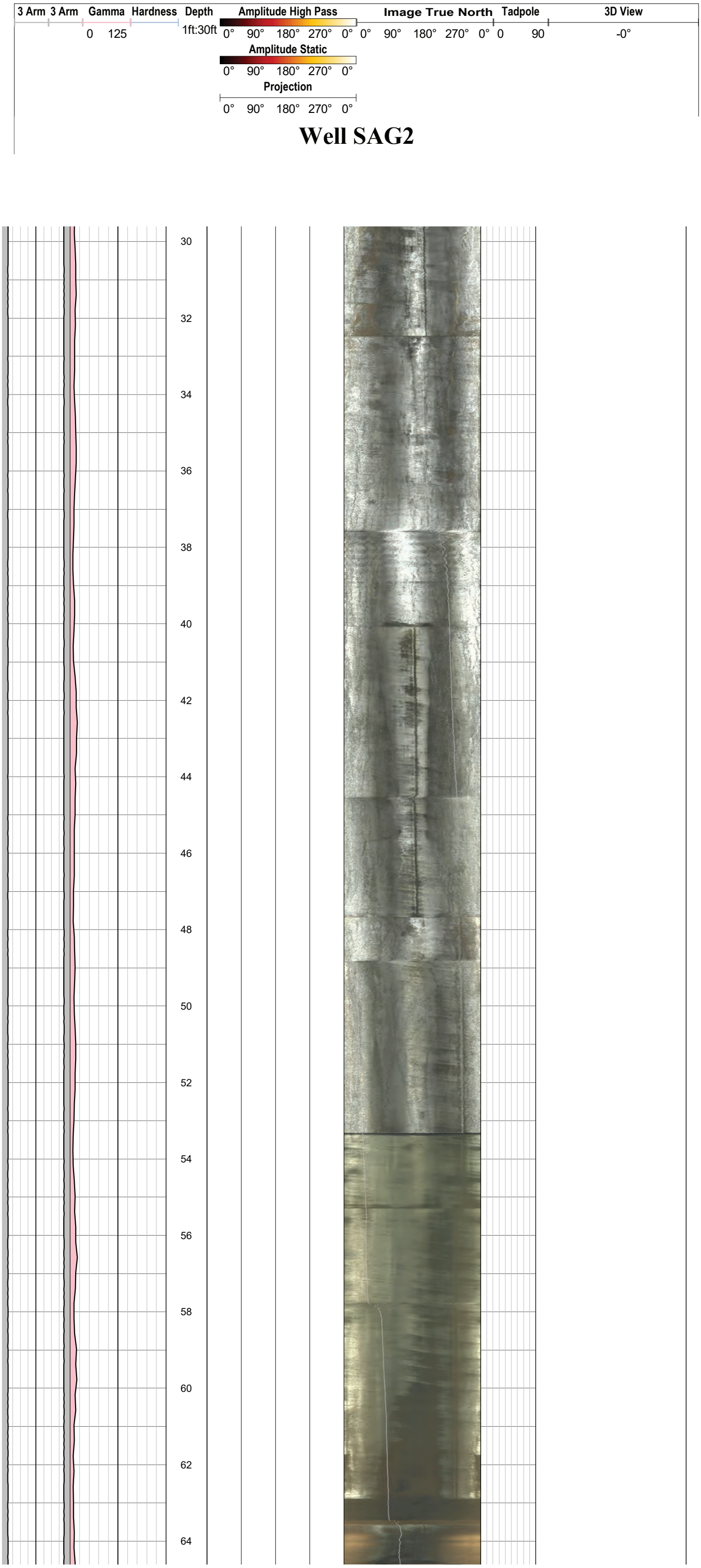
3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
30
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54
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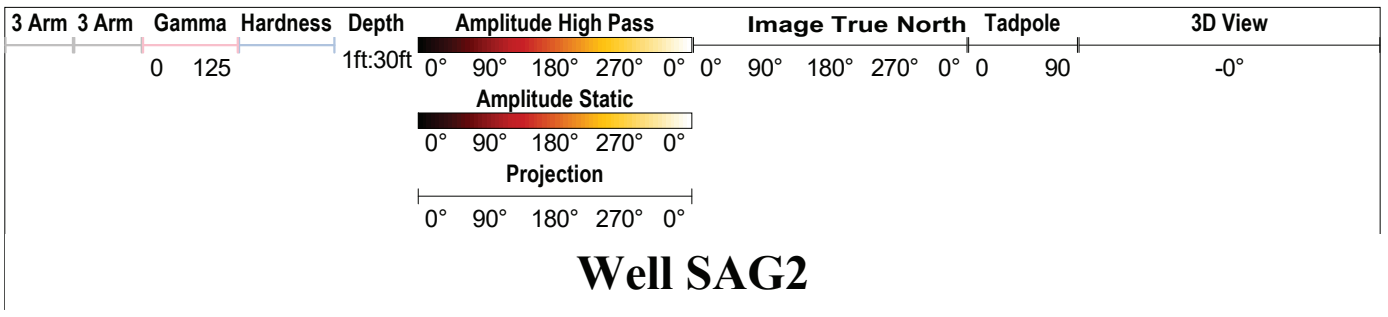
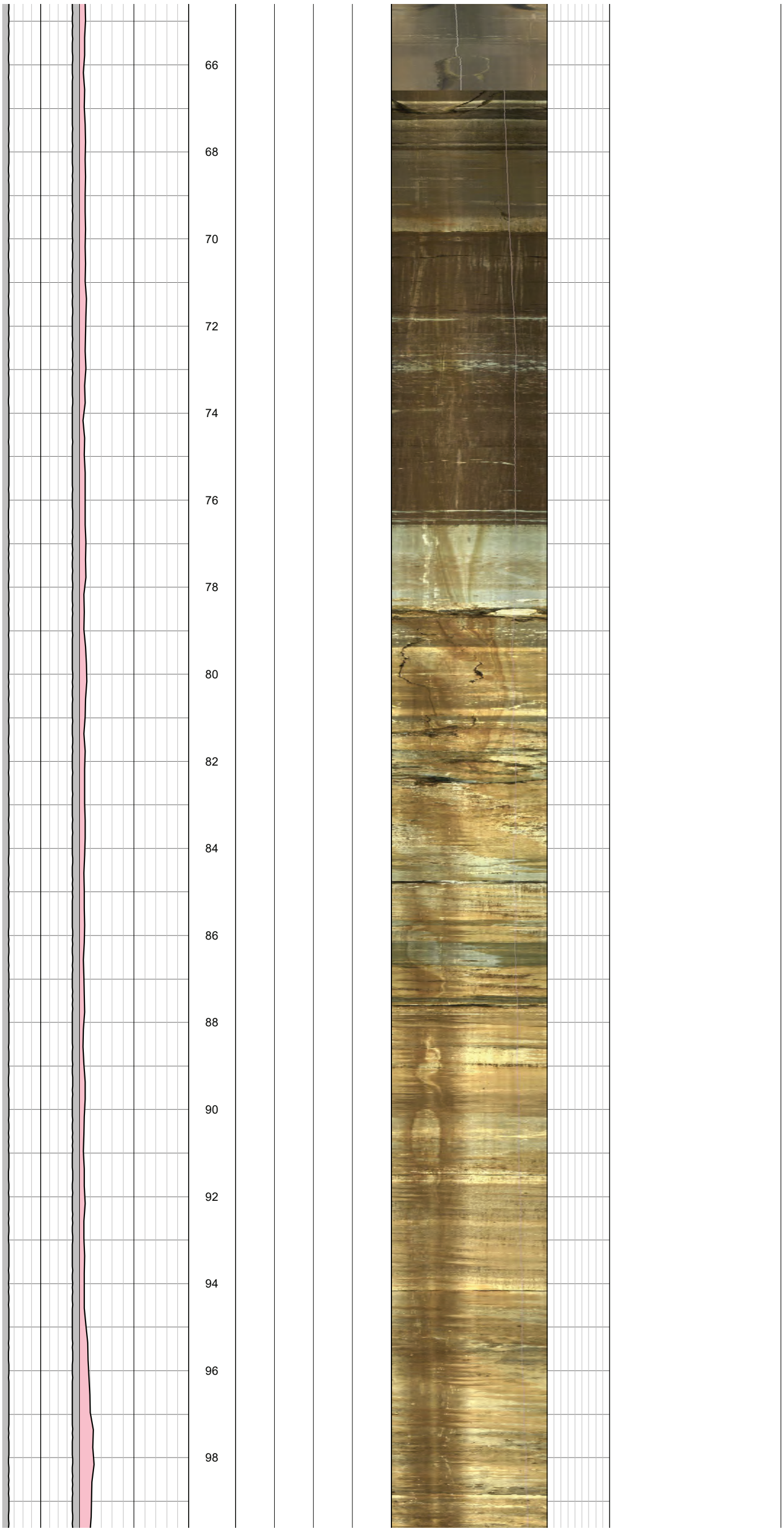
60
62
64

Well SAG2


3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2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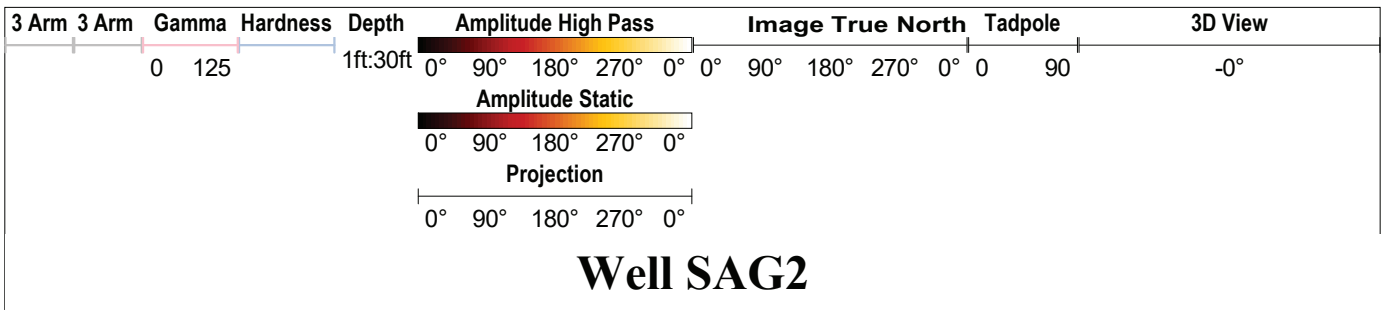
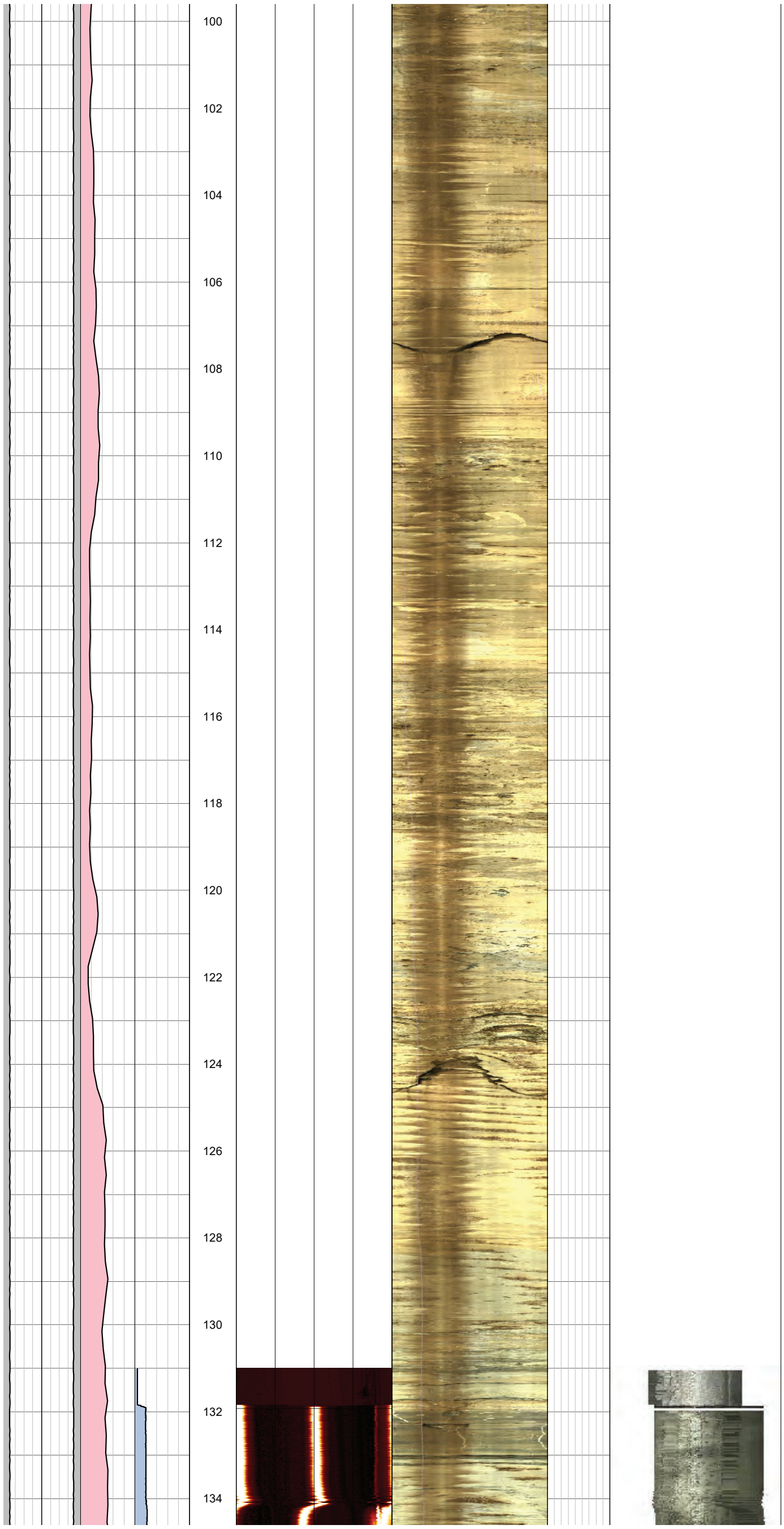

3 Arm
3 Arm
Gamma
Hardness
Depth
1ft:30ft
0
125
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2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132
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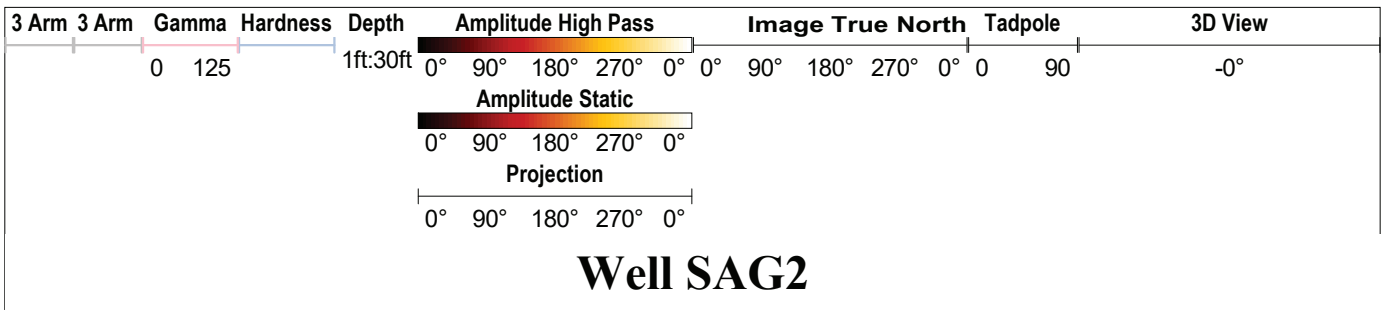
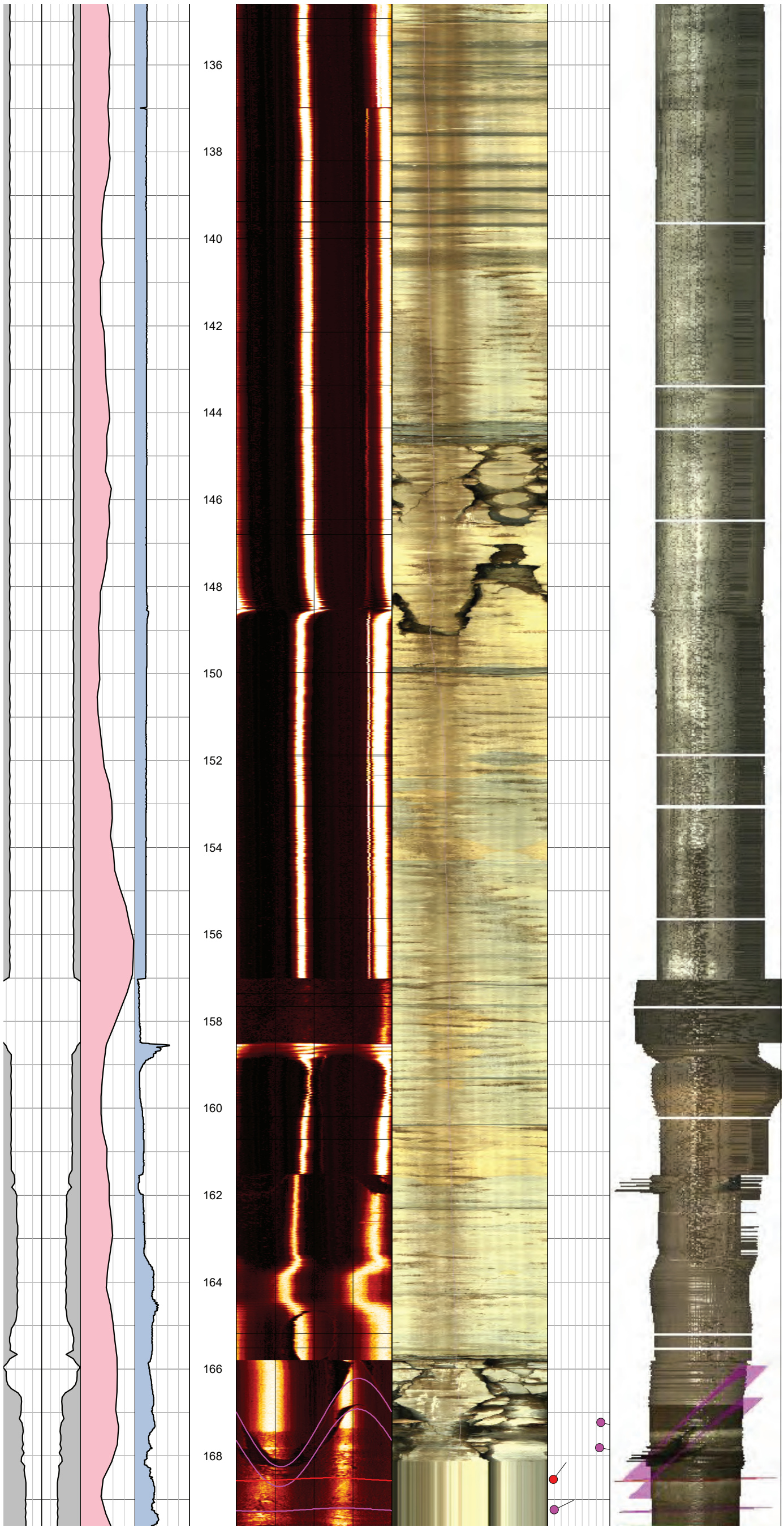

3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2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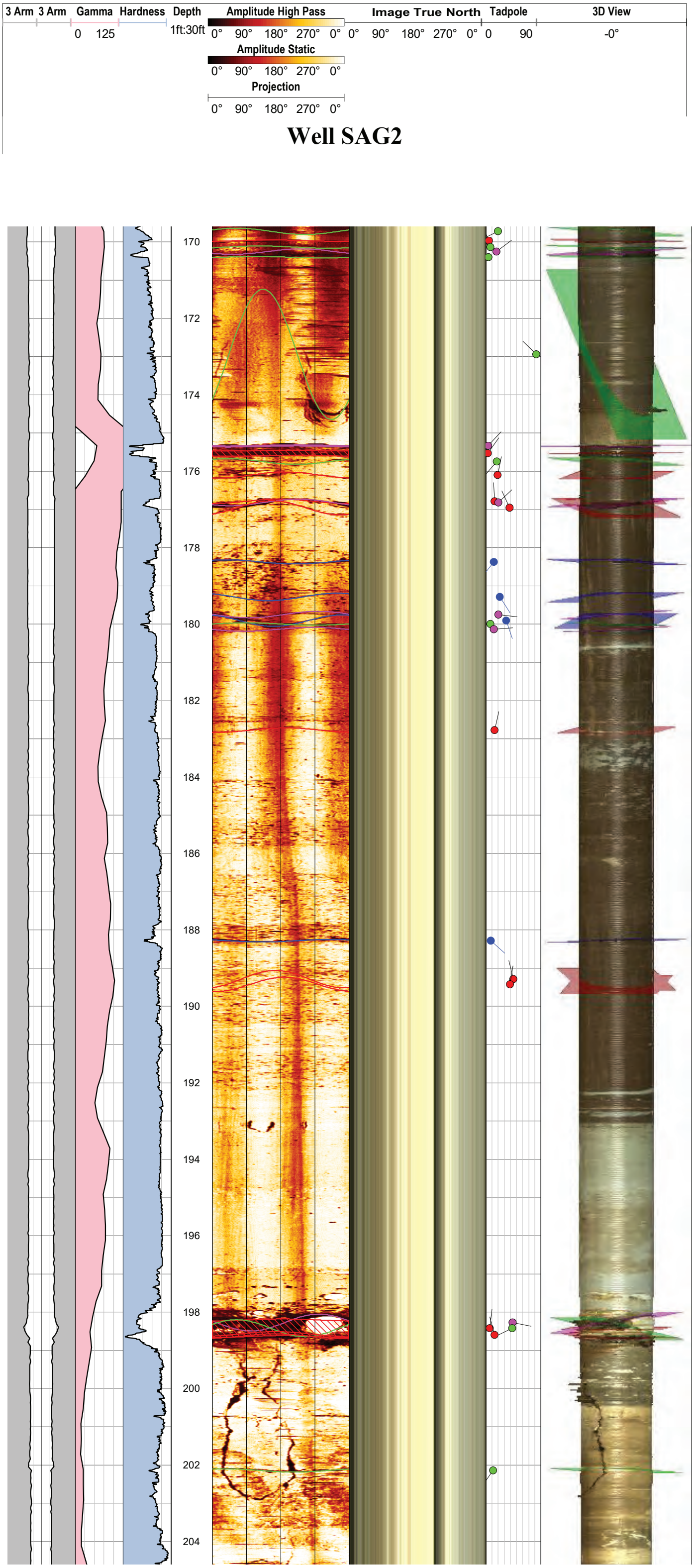
3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG2
170
172
174
176
178
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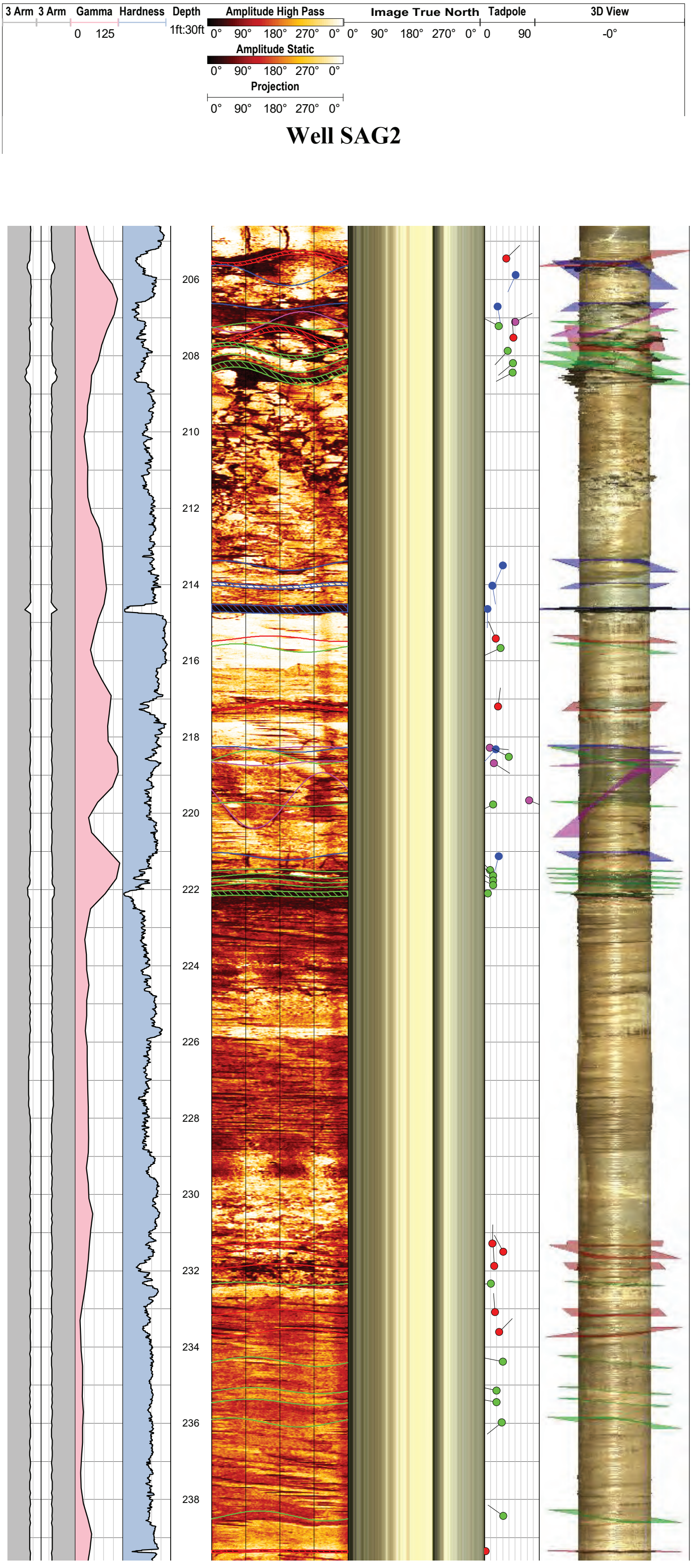
202
204


3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG2
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238

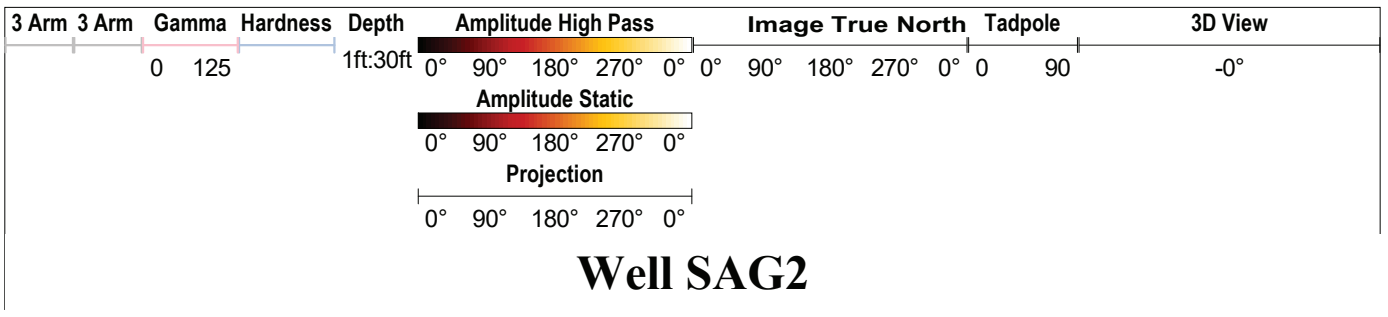
3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
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Image True North
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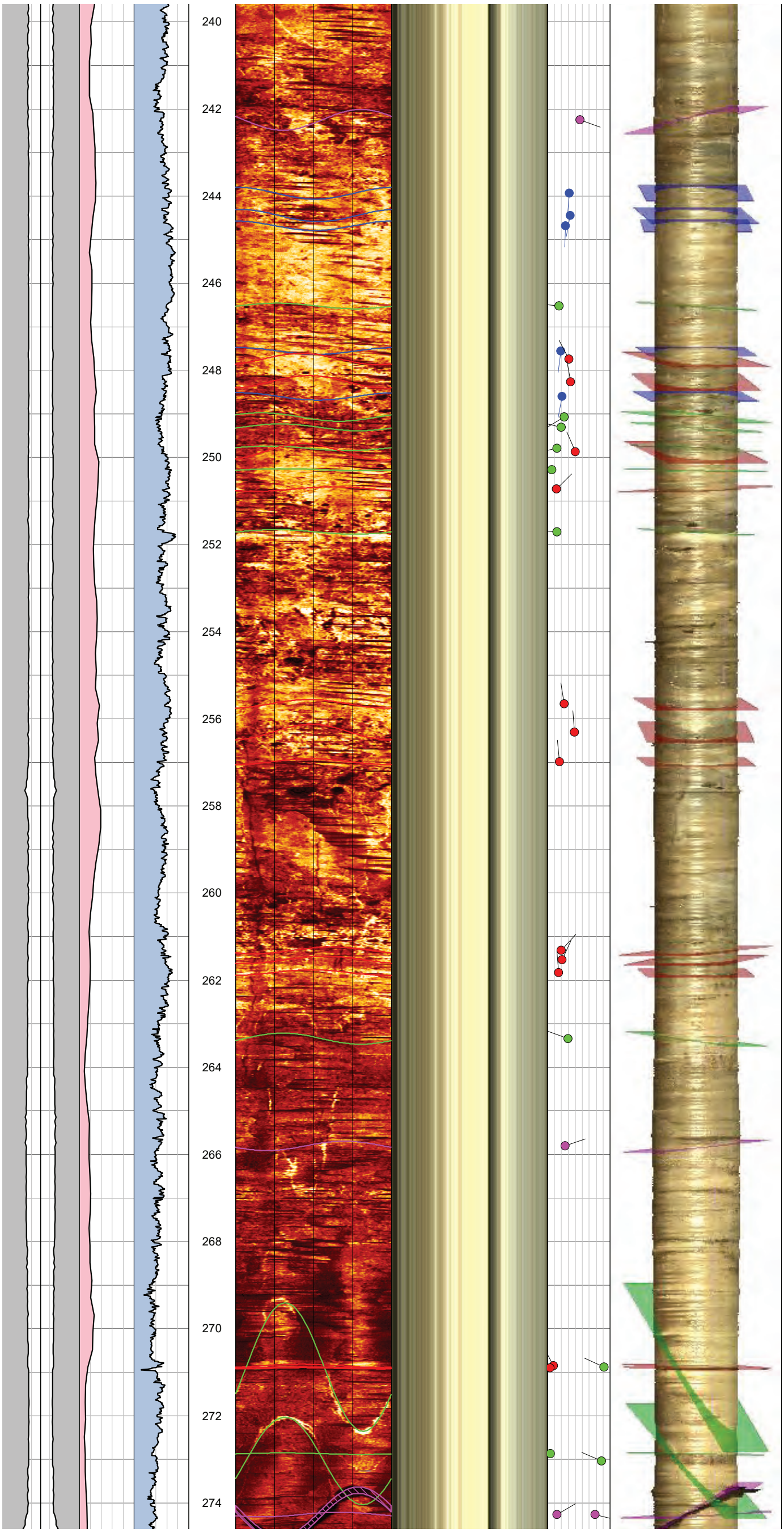
Tadpole
0
90
3D View
-0°

Well SAG2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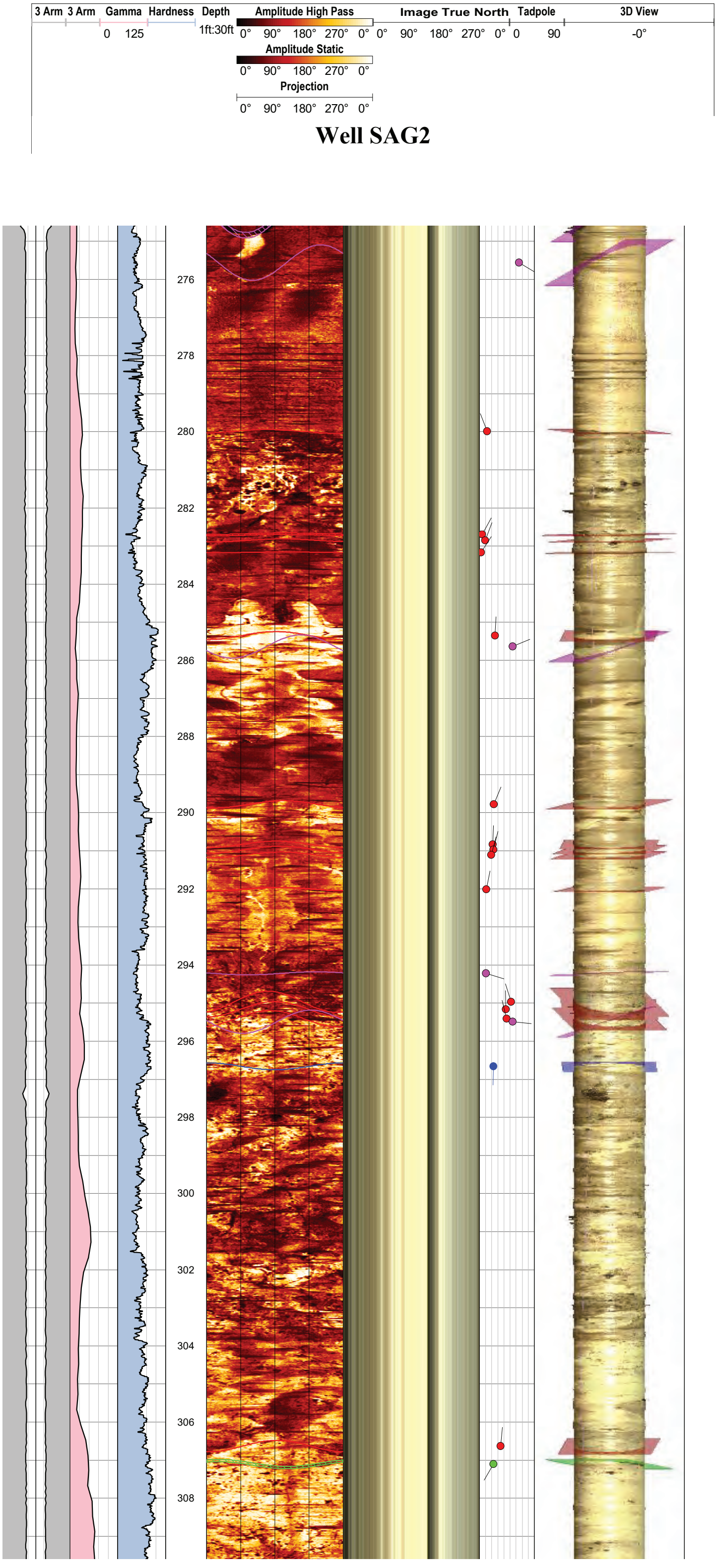
3 Arm
3 Arm
Gamma
0
125
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
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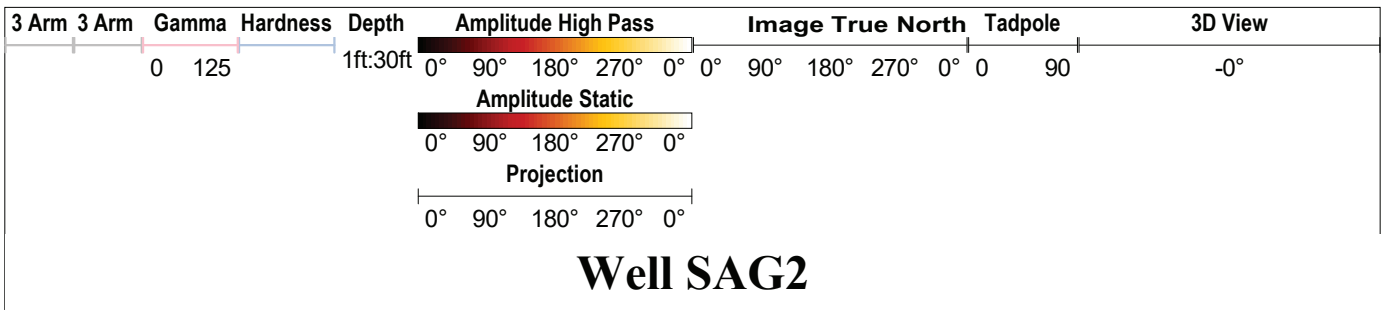
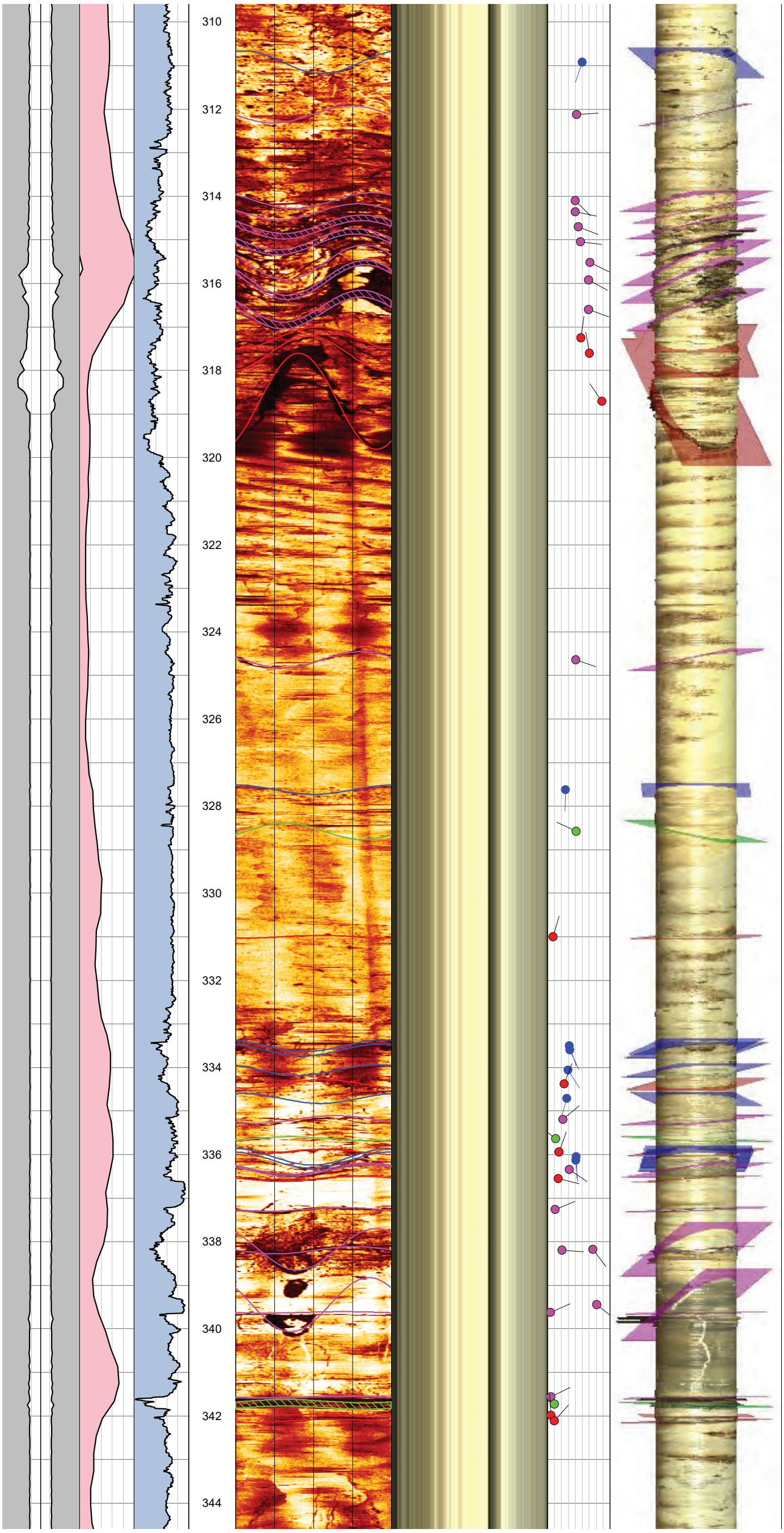
308

Well SAG2


3 Arm
3 Arm
Gamma
Hardness
Depth
1ft:30ft
0
125
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2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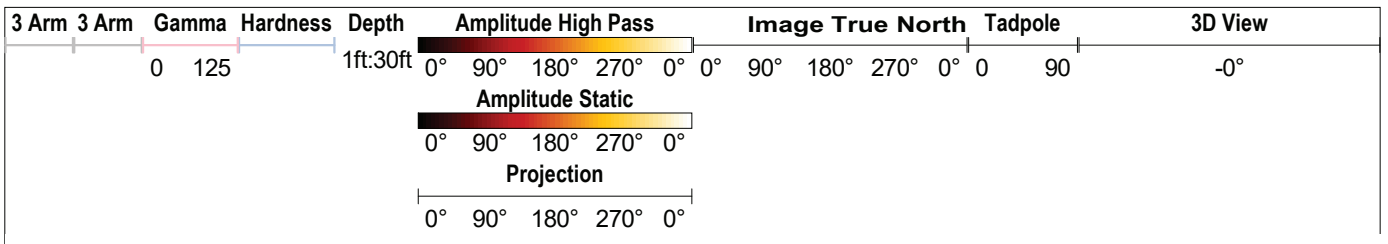
3 Arm
3 Arm
Gamma
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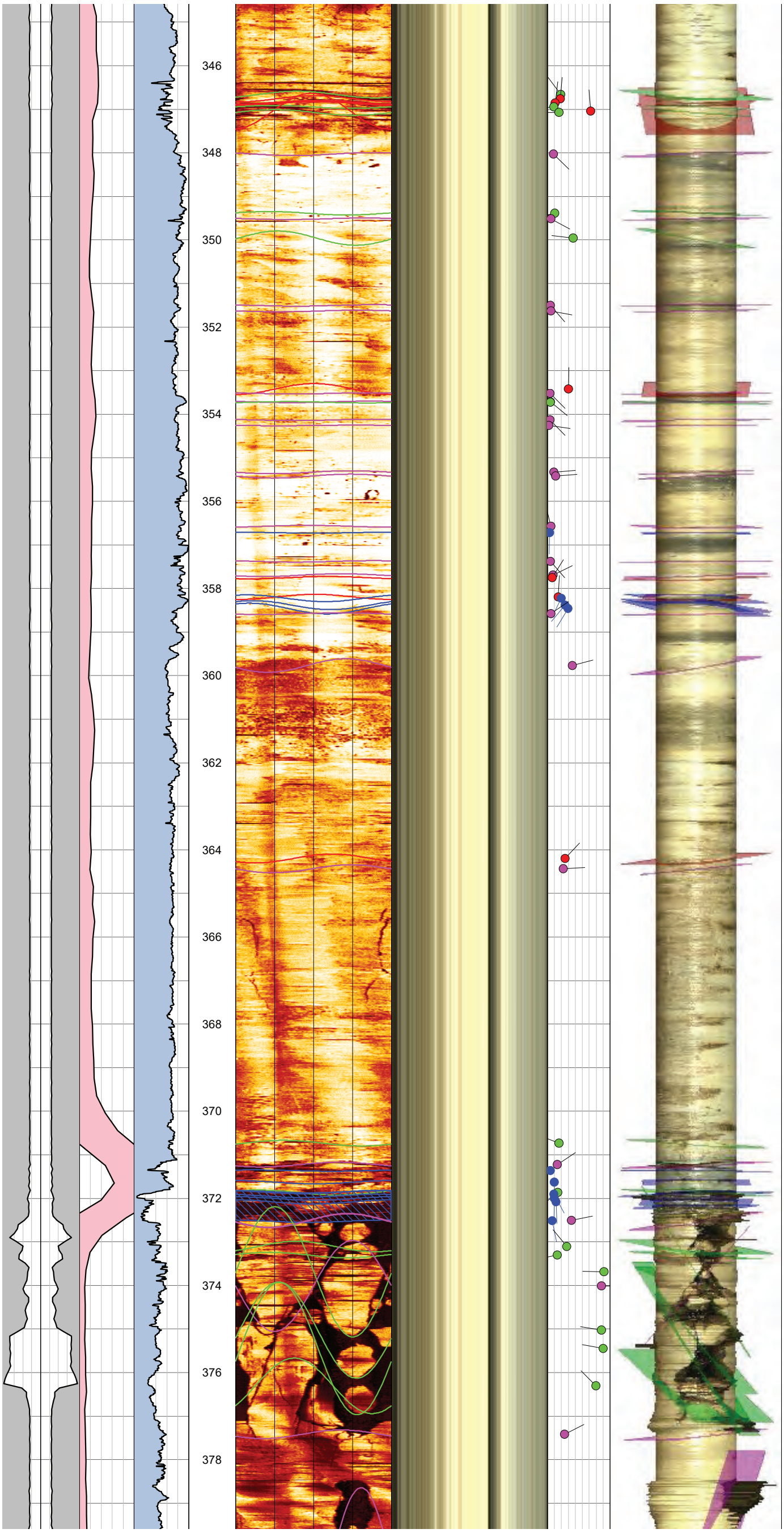
Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°

Well SAG2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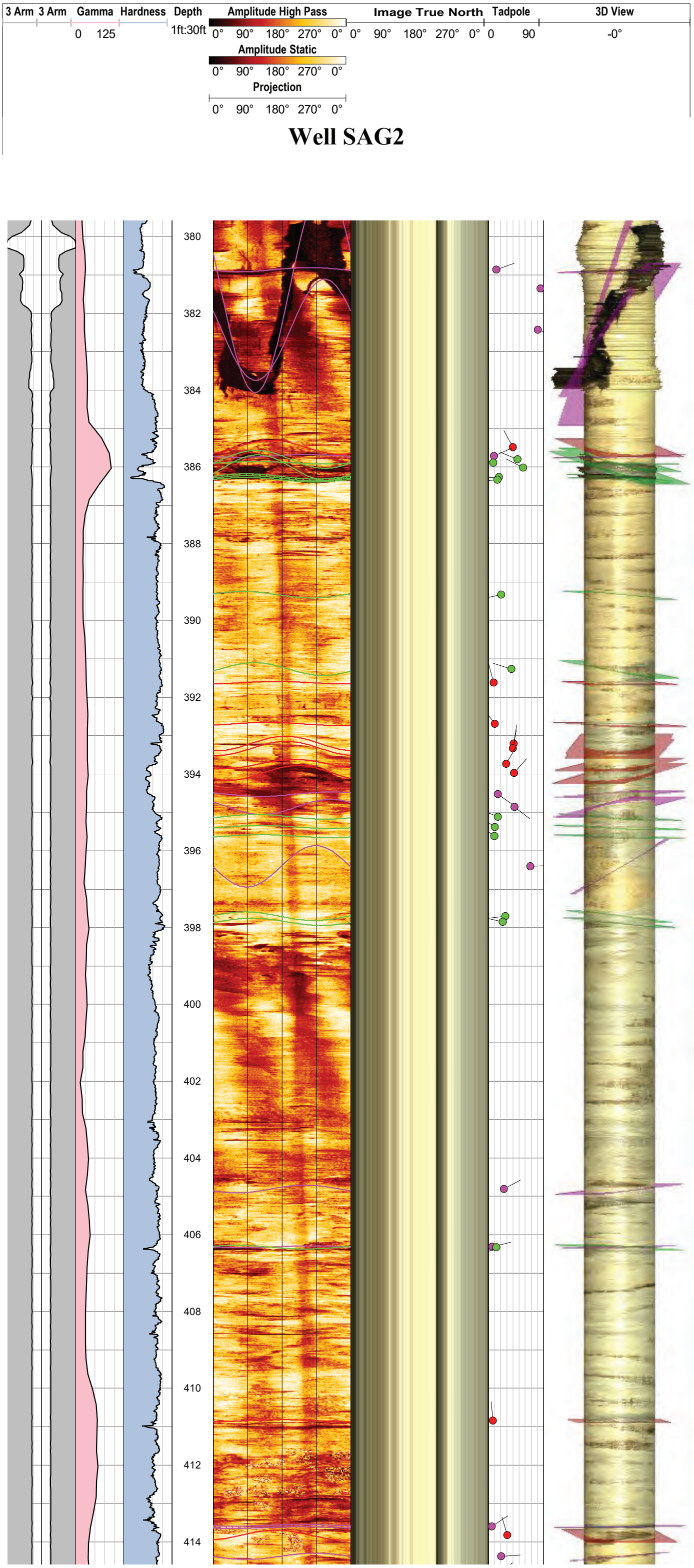
376
378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3 Arm
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Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG2
380
382
384
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388
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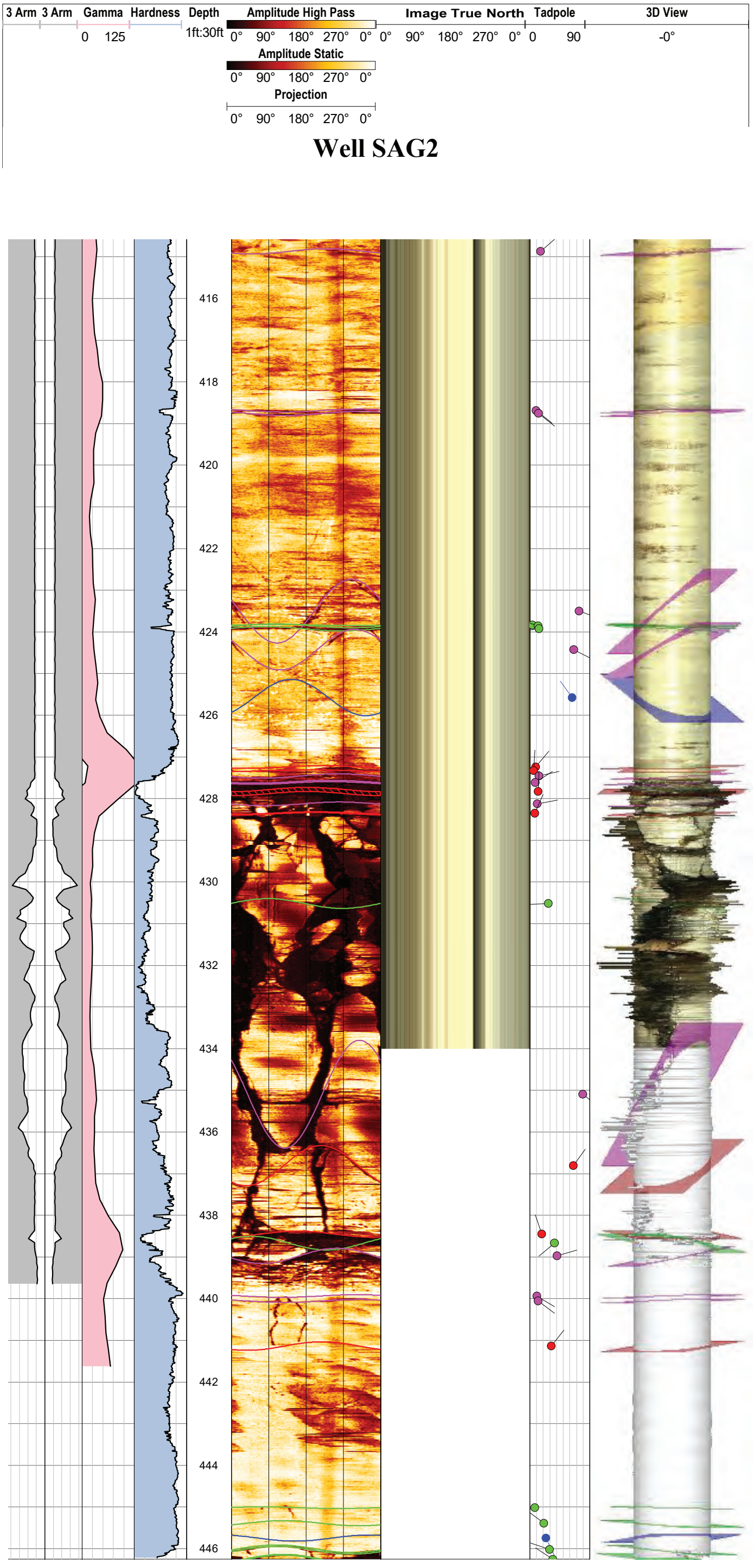
392
394
396
398
400
402
404
406
408
410
412
414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Hardness
Depth
1ft:30ft
Amplitude High Pass
0° 90° 180° 270° 0°
Amplitude Static
0° 90° 180° 270° 0°
Projection
0° 90° 180° 270° 0°
Image True North
0° 90° 180° 270° 0°
Tadpole
0
90
3D View
-0°
Well SAG2
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418
420
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430
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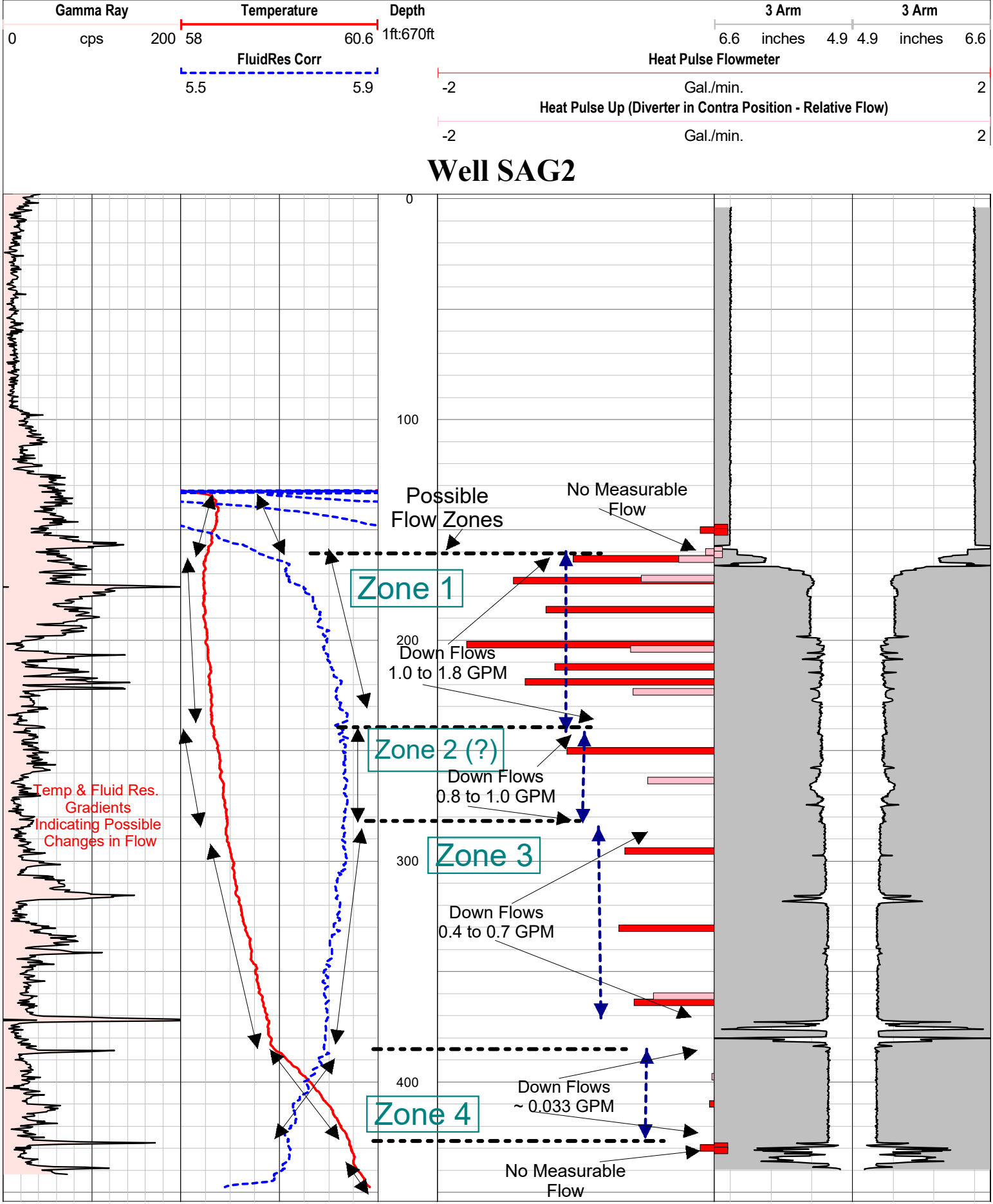
440
442
444
446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cps
200
Temperature
58
60.6
Depth
1ft:670ft
FluidRes Corr
5.5
5.9
3 Arm
6.6
inches
4.9
3 Arm
4.9
inches
6.6
Heat Pulse Flowmeter
-2
Gal./min.
2
Heat Pulse Up (Diverter in Contra Position - Relative Flow)
-2
Gal./min.
2
Well SAG2
0
100
200
300
400
Possible
Flow Zones
No Measurable
Flow
Zone 1
Down Flows
1.0 to 1.8 GPM
Zone 2 (?)
Down Flows
0.8 to 1.0 GPM
Zone 3
Down Flows
0.4 to 0.7 GPM
Down Flows
~ 0.033 GPM
Zone 4
No Measurable
Flow
Temp & Fluid Res.
Gradients
Indicating Possible
Changes in Flow

Appendix G

Solids Chemical Analysis Reporting

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

April 08, 2021

Report to:
David Levy
Worthington Miller Environmental, LLC
1027 W Horsetooth Rd Ste 200

Fort Collins, CO 80526

cc: Adam Arguello

Bill to:
David Levy
Worthington Miller Environmental, LLC
1027 W Horsetooth Rd
Suite 210
Fort Collins, CO 1080526

Project ID:
ACZ Project ID: L63799

David Levy:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on January 18, 2021. This project has been assigned to ACZ's project number, L63799. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L63799. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after July 07, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Worthington Miller Environmental, LLC

April 08, 2021

Project ID:
ACZ Project ID: L63799

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 5 miscellaneous samples from Worthington Miller Environmental, LLC on January 18, 2021. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L63799. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. (B1) Applies to: L63799-01/CALCIUM

Calcium detected in prep blank above the method reporting limit.

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-CS-163-164

ACZ Sample ID: ***L63799-01***
Date Sampled: *01/12/21 14:00*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	4980		*	mg/Kg	5	25	02/03/21 23:08	kja
Barium, total (3050)	M6010D ICP	100	130			mg/Kg	0.7	3.5	01/28/21 20:22	kja
Boron, total (3050)	M6010D ICP	100	6.46	B		mg/Kg	2	10	01/28/21 20:22	kja
Calcium, extractable (NH4)	M6010D ICP	1	2.65		*	meq/100g	0.005	0.025	02/09/21 17:31	jlw
Calcium, soluble (Water)	M6010D ICP	50	24.5	B	*	mg/Kg	5	25	01/28/21 18:52	kja
Calcium, total (3050)	M6010D ICP	100	592			mg/Kg	10	50	02/03/21 23:08	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	2.76		*	meq/100g	0.02	0.11	02/10/21 18:14	jlw
Iron, total (3050)	M6010D ICP	100	20200		*	mg/Kg	6	15	01/28/21 20:22	kja
Lithium, extractable (NH4)	M6010D ICP	1	0.0021	B		meq/100g	0.0012	0.0058	02/09/21 17:31	jlw
Lithium, soluble (Water)	M6010D ICP	50	<0.4	U	*	mg/Kg	0.4	2	01/27/21 17:34	jlw
Lithium, total (3050)	M6010D ICP	100	1.66	B	*	mg/Kg	0.8	4	01/28/21 20:22	kja
Magnesium, extractable (NH4)	M6010D ICP	1	0.82			meq/100g	0.02	0.08	02/09/21 17:31	jlw
Magnesium, soluble (Water)	M6010D ICP	50	19.4	B	*	mg/Kg	10	50	01/27/21 17:34	jlw
Magnesium, total (3050)	M6010D ICP	100	479			mg/Kg	20	100	02/03/21 23:08	kja
Manganese, total (3050)	M6010D ICP	100	57.7			mg/Kg	1	5	01/28/21 20:22	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:08	kja
Phosphorus, total (3050)	M6010D ICP	100	<10	U		mg/Kg	10	50	01/28/21 20:22	kja
Potassium, extractable (NH4)	M6010D ICP	1	0.51			meq/100g	0.01	0.03	02/09/21 17:31	jlw
Potassium, soluble (Water)	M6010D ICP	50	113		*	mg/Kg	10	50	01/27/21 17:34	jlw
Potassium, total (3050)	M6010D ICP	100	1970		*	mg/Kg	20	100	02/03/21 23:08	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.0632	B		mg/Kg	0.05	0.125	01/28/21 11:39	mfm
Silicon, recoverable (3050)	M6010D ICP	100	1020		*	mg/Kg	10	50	01/28/21 20:22	kja
Sodium, extractable (NH4)	M6010D ICP	1	0.08		*	meq/100g	0.01	0.04	02/09/21 17:31	jlw
Sodium, soluble (Water)	M6010D ICP	50	12.4	B	*	mg/Kg	10	50	01/27/21 17:34	jlw
Sodium, total (3050)	M6010D ICP	100	38.8	B		mg/Kg	20	100	02/03/21 23:08	kja
Strontium, total (3050)	M6010D ICP	100	10.4			mg/Kg	0.9	4.5	02/03/21 23:08	kja
Titanium, total (3050)	M6010D ICP	100	286		*	mg/Kg	0.5	2.5	01/28/21 20:22	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.819			mg/Kg	0.05	0.25	01/28/21 11:39	mfm
Vanadium, total (3050)	M6010D ICP	100	20.5			mg/Kg	1	2.5	02/03/21 23:08	kja

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-CS-163-164

ACZ Sample ID: ***L63799-01***
Date Sampled: *01/12/21 14:00*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 10:37	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	<0.1	U	*	%	0.1	0.5	02/10/21 10:37	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.1	B	*	%	0.1	0.5	02/10/21 10:37	jpb
Moisture Content	D2216-80	1	1.3		*	%	0.1	0.5	01/25/21 11:45	krs
Solids, Percent	D2216-80	1	98.7		*	%	0.1	0.5	01/25/21 11:45	krs
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 9:30	sjm
Ammonium Acetate Extraction	USDA No. 60 (18)								02/08/21 13:15	gkh
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 9:33	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 11:00	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 10:30	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 10:56	krs
Water Extraction	ASA No. 9 10-2.3.2								01/27/21 9:30	krs

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3, soluble (Water)	SM2320B - Titration									
Bicarbonate as CaCO3		1	24.8		*	mg/L	2	20	01/27/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Total Alkalinity		1	24.8		*	mg/L	2	20	01/27/21 0:00	eep
Chloride, soluble (Water)	SM4500Cl-E	5	211		*	mg/Kg	2.5	10	02/09/21 14:56	ttg
Fluoride, soluble (Water)	SM4500F-C	75	<8.25	U	*	mg/Kg	8.25	26.3	01/27/21 18:47	eep
Sulfate, soluble (Water)	D516-07 - Turbidimetric	10	137		*	mg/Kg	10	50	01/28/21 9:48	rbt

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-SALS-215-216

ACZ Sample ID: ***L63799-02***
Date Sampled: *01/12/21 14:30*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	2840		*	mg/Kg	5	25	02/03/21 23:12	kja
Barium, total (3050)	M6010D ICP	100	53.7			mg/Kg	0.7	3.5	01/28/21 20:26	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 20:26	kja
Calcium, total (3050)	M6010D ICP	200	98100			mg/Kg	20	100	02/04/21 22:46	kja
Iron, total (3050)	M6010D ICP	100	4070		*	mg/Kg	6	15	01/28/21 20:26	kja
Lithium, total (3050)	M6010D ICP	100	1.56	B	*	mg/Kg	0.8	4	01/28/21 20:26	kja
Magnesium, total (3050)	M6010D ICP	100	420			mg/Kg	20	100	02/03/21 23:12	kja
Manganese, total (3050)	M6010D ICP	100	264			mg/Kg	1	5	01/28/21 20:26	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:12	kja
Phosphorus, total (3050)	M6010D ICP	100	126			mg/Kg	10	50	01/28/21 20:26	kja
Potassium, total (3050)	M6010D ICP	100	616		*	mg/Kg	20	100	02/03/21 23:12	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.133			mg/Kg	0.05	0.125	01/28/21 11:44	mfm
Silicon, recoverable (3050)	M6010D ICP	100	743		*	mg/Kg	10	50	01/28/21 20:26	kja
Sodium, total (3050)	M6010D ICP	100	<20	U		mg/Kg	20	100	02/03/21 23:12	kja
Strontium, total (3050)	M6010D ICP	100	27.7			mg/Kg	0.9	4.5	02/03/21 23:12	kja
Titanium, total (3050)	M6010D ICP	100	6.27		*	mg/Kg	0.5	2.5	01/28/21 20:26	kja
Uranium, total (3050)	M6020B ICP-MS	500	1.01			mg/Kg	0.05	0.25	01/28/21 11:44	mfm
Vanadium, total (3050)	M6010D ICP	100	3.27			mg/Kg	1	2.5	02/03/21 23:12	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	3.1		*	%	0.1	0.5	02/10/21 11:14	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	3.0		*	%	0.1	0.5	02/10/21 11:14	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.1	B	*	%	0.1	0.5	02/10/21 11:14	jpb
Moisture Content	D2216-80	1	0.2	B	*	%	0.1	0.5	01/25/21 21:10	krs
Solids, Percent	D2216-80	1	99.8		*	%	0.1	0.5	01/25/21 21:10	krs
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.30		*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	0.28		*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.07	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.37		*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	0.30		*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-SALS-215-216

ACZ Sample ID: ***L63799-02***
Date Sampled: *01/12/21 14:30*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 9:37	sjm
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 11:13	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 11:00	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 12:06	krs

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-SALS-244-245

ACZ Sample ID: ***L63799-03***
Date Sampled: *01/13/21 14:45*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	99	460		*	mg/Kg	4.95	24.8	02/03/21 23:16	kja
Barium, total (3050)	M6010D ICP	100	22.9			mg/Kg	0.7	3.5	01/28/21 20:37	kja
Boron, total (3050)	M6010D ICP	990	<19.8	U	*	mg/Kg	19.8	99	02/04/21 22:50	kja
Calcium, total (3050)	M6010D ICP	990	219000			mg/Kg	99	495	02/04/21 22:50	kja
Iron, total (3050)	M6010D ICP	100	1720		*	mg/Kg	6	15	01/28/21 20:37	kja
Lithium, total (3050)	M6010D ICP	100	4.35		*	mg/Kg	0.8	4	01/28/21 20:37	kja
Magnesium, total (3050)	M6010D ICP	990	126000			mg/Kg	198	990	02/04/21 22:50	kja
Manganese, total (3050)	M6010D ICP	100	406			mg/Kg	1	5	01/28/21 20:37	kja
Molybdenum, total (3050)	M6010D ICP	99	<1.98	U		mg/Kg	1.98	9.9	02/03/21 23:16	kja
Phosphorus, total (3050)	M6010D ICP	100	275			mg/Kg	10	50	01/28/21 20:37	kja
Potassium, total (3050)	M6010D ICP	99	197		*	mg/Kg	19.8	99	02/03/21 23:16	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.102	B		mg/Kg	0.05	0.125	01/28/21 11:46	mfm
Silicon, recoverable (3050)	M6010D ICP	100	371		*	mg/Kg	10	50	01/28/21 20:37	kja
Sodium, total (3050)	M6010D ICP	99	227			mg/Kg	19.8	99	02/03/21 23:16	kja
Strontium, total (3050)	M6010D ICP	99	73.1			mg/Kg	0.891	4.46	02/03/21 23:16	kja
Titanium, total (3050)	M6010D ICP	990	14.4	B	*	mg/Kg	4.95	24.8	02/04/21 22:50	kja
Uranium, total (3050)	M6020B ICP-MS	500	2.51			mg/Kg	0.05	0.25	01/28/21 11:46	mfm
Vanadium, total (3050)	M6010D ICP	99	12.7			mg/Kg	0.99	2.48	02/03/21 23:16	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	14.1		*	%	0.1	0.5	02/10/21 11:32	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	14.0		*	%	0.1	0.5	02/10/21 11:32	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.1	B	*	%	0.1	0.5	02/10/21 11:32	jpb
Moisture Content	D2216-80	1	5.7		*	%	0.1	0.5	01/26/21 1:52	krs
Solids, Percent	D2216-80	1	94.3		*	%	0.1	0.5	01/26/21 1:52	krs
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.02	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-SALS-244-245

ACZ Sample ID: ***L63799-03***
Date Sampled: *01/13/21 14:45*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 9:45	sjm
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 11:26	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 11:30	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 13:16	krs

Subcontract

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Miscellaneous subcontract	Subcontracted Work									
Subcontract XRD	Subcontracted Work									

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-GSS-439.5-440.5

ACZ Sample ID: ***L63799-04***
Date Sampled: *01/13/21 15:45*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	2980		*	mg/Kg	5	25	02/03/21 23:20	kja
Barium, total (3050)	M6010D ICP	100	60.7			mg/Kg	0.7	3.5	01/28/21 20:48	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 20:48	kja
Calcium, total (3050)	M6010D ICP	100	12400			mg/Kg	10	50	02/03/21 23:20	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	1.51		*	meq/100g	0.02	0.11	02/10/21 18:22	jlw
Iron, total (3050)	M6010D ICP	100	3700		*	mg/Kg	6	15	01/28/21 20:48	kja
Lithium, total (3050)	M6010D ICP	100	<0.8	U	*	mg/Kg	0.8	4	01/28/21 20:48	kja
Magnesium, total (3050)	M6010D ICP	100	1340			mg/Kg	20	100	02/03/21 23:20	kja
Manganese, total (3050)	M6010D ICP	100	62.8			mg/Kg	1	5	01/28/21 20:48	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:20	kja
Phosphorus, total (3050)	M6010D ICP	100	122			mg/Kg	10	50	01/28/21 20:48	kja
Potassium, total (3050)	M6010D ICP	100	981		*	mg/Kg	20	100	02/03/21 23:20	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.247			mg/Kg	0.05	0.125	01/28/21 11:50	mfm
Silicon, recoverable (3050)	M6010D ICP	100	519		*	mg/Kg	10	50	01/28/21 20:48	kja
Sodium, total (3050)	M6010D ICP	100	<20	U		mg/Kg	20	100	02/03/21 23:20	kja
Strontium, total (3050)	M6010D ICP	100	9.00			mg/Kg	0.9	4.5	02/03/21 23:20	kja
Titanium, total (3050)	M6010D ICP	100	9.41		*	mg/Kg	0.5	2.5	01/28/21 20:48	kja
Uranium, total (3050)	M6020B ICP-MS	500	1.16			mg/Kg	0.05	0.25	01/28/21 11:50	mfm
Vanadium, total (3050)	M6010D ICP	100	1.82	B		mg/Kg	1	2.5	02/03/21 23:20	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.4	B	*	%	0.1	0.5	02/10/21 11:51	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	0.4	B	*	%	0.1	0.5	02/10/21 11:51	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 11:51	jpb
Moisture Content	D2216-80	1	2.3		*	%	0.1	0.5	01/26/21 6:35	krs
Solids, Percent	D2216-80	1	97.7		*	%	0.1	0.5	01/26/21 6:35	krs
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.20		*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	0.20		*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.17		*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.37		*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	0.20		*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-GSS-439.5-440.5

ACZ Sample ID: ***L63799-04***
Date Sampled: *01/13/21 15:45*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 9:52	sjm
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 10:41	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 11:40	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 12:00	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 13:40	krs

Subcontract

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Miscellaneous subcontract	Subcontracted Work									
Subcontract XRD	Subcontracted Work									

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-GSS-463-464

ACZ Sample ID: ***L63799-05***
Date Sampled: *01/13/21 16:00*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	4180		*	mg/Kg	5	25	02/03/21 23:23	kja
Barium, total (3050)	M6010D ICP	100	1070			mg/Kg	0.7	3.5	01/28/21 20:52	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 20:52	kja
Calcium, total (3050)	M6010D ICP	100	12500			mg/Kg	10	50	02/03/21 23:23	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	1.98		*	meq/100g	0.02	0.11	02/10/21 18:30	jlw
Iron, total (3050)	M6010D ICP	100	2960		*	mg/Kg	6	15	01/28/21 20:52	kja
Lithium, total (3050)	M6010D ICP	100	1.10	B	*	mg/Kg	0.8	4	01/28/21 20:52	kja
Magnesium, total (3050)	M6010D ICP	100	5150			mg/Kg	20	100	02/03/21 23:23	kja
Manganese, total (3050)	M6010D ICP	100	99.5			mg/Kg	1	5	01/28/21 20:52	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:23	kja
Phosphorus, total (3050)	M6010D ICP	100	145			mg/Kg	10	50	01/28/21 20:52	kja
Potassium, total (3050)	M6010D ICP	100	1530		*	mg/Kg	20	100	02/03/21 23:23	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.0975	B		mg/Kg	0.05	0.125	01/28/21 11:55	mfm
Silicon, recoverable (3050)	M6010D ICP	100	995		*	mg/Kg	10	50	01/28/21 20:52	kja
Sodium, total (3050)	M6010D ICP	100	20.6	B		mg/Kg	20	100	02/03/21 23:23	kja
Strontium, total (3050)	M6010D ICP	100	30.8			mg/Kg	0.9	4.5	02/03/21 23:23	kja
Titanium, total (3050)	M6010D ICP	100	9.06		*	mg/Kg	0.5	2.5	01/28/21 20:52	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.173	B		mg/Kg	0.05	0.25	01/28/21 11:55	mfm
Vanadium, total (3050)	M6010D ICP	100	3.23			mg/Kg	1	2.5	02/03/21 23:23	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.6		*	%	0.1	0.5	02/10/21 12:09	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	0.6		*	%	0.1	0.5	02/10/21 12:09	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 12:09	jpb
Moisture Content	D2216-80	1	3.5		*	%	0.1	0.5	01/26/21 11:17	krs
Solids, Percent	D2216-80	1	96.5		*	%	0.1	0.5	01/26/21 11:17	krs
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.09	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	0.09	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.04	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.13		*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	0.09	B	*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG2-GSS-463-464

ACZ Sample ID: ***L63799-05***
Date Sampled: *01/13/21 16:00*
Date Received: *01/18/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 10:00	sjm
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 11:15	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 11:53	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 12:30	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 14:03	krs

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513500													
WG513500PBW	PBW	01/27/21 17:35				U	mg/L		-20	20			
WG513500LCSW1	LCSW	01/27/21 17:48	WC210113-1	820.0001		783.4	mg/L	96	90	110			
WG513432PBS	PBS	01/27/21 17:57				2.8	mg/L		-20	20			
L63831-01DUP	DUP	01/27/21 18:24			34.4	35.9	mg/L				4	20	
WG513500LCSW2	LCSW	01/27/21 18:44	WC210113-1	820.0001		787	mg/L	96	90	110			

Aluminum, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.967	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.15	0.15			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-15	15			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	8190		8488.26	mg/Kg		3990	12400			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	8190		8610	mg/Kg		3990	12400	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	101.1313	18000	30330.3	mg/Kg	12192	75	125			M3
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	101.1313	18000	30269.7	mg/Kg	12132	75	125	0	20	M3

Barium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.958	mg/L	98	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.021	0.021			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-2.1	2.1			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	138		131.8	mg/Kg		114	162			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	138		141.9	mg/Kg		114	162	7	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50	53.7	103.6	mg/Kg	100	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50	53.7	102.7	mg/Kg	98	75	125	1	20	

Boron, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.967	mg/L	98	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.06	0.06			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-6	6			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	265		289.8	mg/Kg		189	341			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	265		289.9	mg/Kg		189	341	0	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50.05	U	45.14	mg/Kg	90	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50.05	U	45.9	mg/Kg	92	75	125	2	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	2		1.932	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.06	0.06			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-6	6			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	265		289.872	mg/Kg		189	341			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	265		285.6	mg/Kg		189	341	1	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	50.5505	15.7	71.054	mg/Kg	110	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	50.5505	15.7	69.852	mg/Kg	107	75	125	2	20	

Worthington Miller Environmental, LLC ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Calcium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		97.3	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.3	0.3			
WG513934PBS	PBS	02/09/21 17:27				.01	meq/100g		-0.015	0.015			

Calcium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513529													
WG513529ICV	ICV	01/28/21 18:21	II210127-1	100		97.46	mg/L	97	90	110			
WG513529ICB	ICB	01/28/21 18:25				U	mg/L		-0.3	0.3			
WG513432PBS	PBS	01/28/21 18:48				.7	mg/Kg		-0.3	0.3			B1
L63799-01AS	AS	01/28/21 18:56	II210108-2	3400.14	24.5	3493	mg/Kg	102	75	125			
L63799-01ASD	ASD	01/28/21 18:59	II210108-2	3400.14	24.5	3530.5	mg/Kg	103	75	125	1	20	
L63831-01DUP	DUP	01/28/21 19:10			55.9	58.15	mg/Kg				4	20	RA

Calcium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		98.38	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.3	0.3			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-30	30			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	4790		4597.56	mg/Kg		3910	5660			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	4790		4656	mg/Kg		3910	5660	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	6868.2828	2400	9060.71	mg/Kg	97	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	6868.2828	2400	9053.64	mg/Kg	97	75	125	0	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	100		96.96	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.3	0.3			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-30	30			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	4790		4539.15	mg/Kg		3910	5660			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	4790		4529	mg/Kg		3910	5660	0	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	6868.2828	2350	8779.93	mg/Kg	94	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	6868.2828	2350	8709.23	mg/Kg	93	75	125	1	20	

Carbon, total (TC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
WG513988LCSS	LCSS	02/10/21 10:18	PCN62618	4.35		4.5	%	103	80	120			
L63799-01DUP	DUP	02/10/21 10:55			U	U	%				0	20	RA

Carbon, total inorganic (TIC) ASA No. 9 29-2.2.4 (calc TC - TOC)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
L63799-01DUP	DUP	02/10/21 10:55			U	U	%				0	20	RA

Worthington Miller Environmental, LLC ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Carbon, total organic (TOC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
L63799-01DUP	DUP	02/10/21 10:55			.1	.1	%				0	20	RA

Cation Exchange Capacity (CEC) USDA No. 60 (19)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514100													
WG514100ICV	ICV	02/10/21 17:42	II210127-1	100		100.2	mg/L	100	90	110			
WG514100ICB	ICB	02/10/21 17:46				U	mg/L		-0.6	0.6			
WG514022PBS	PBS	02/10/21 18:10				.02	meq/100g		-0.07	0.07			
L63799-01DUP	DUP	02/10/21 18:18			2.76	2.76	meq/100g				0	20	
L63799-05AS	AS	02/10/21 18:34	IICECSPIKE	10.9	1.98	10.81	meq/100g	81	75	125			
L63799-05ASD	ASD	02/10/21 18:38	IICECSPIKE	10.9	1.98	10.83	meq/100g	81	75	125	0	20	

Chloride, soluble (Water) SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514062													
WG514062ICB	ICB	02/09/21 11:56				U	mg/L		-1.5	1.5			
WG514062ICV	ICV	02/09/21 11:56	WI200506-2	55.055		58.49	mg/L	106	90	110			
WG514062LFB	LFB	02/09/21 13:29	WI200327-3	30.03		31.94	mg/L	106	90	110			
WG513432PBS	PBS	02/09/21 13:29				U	mg/Kg		-7.5	7.5			
L63799-01AS	AS	02/09/21 14:56	WI200327-3	150.15	211	389.3	mg/Kg	119	90	110			M3
L63831-01DUP	DUP	02/09/21 15:32			807	888.2	mg/Kg				10	20	

Fluoride, soluble (Water) SM4500F-C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513493													
WG513493ICV	ICV	01/27/21 15:09	WC210120-1	2.002		2.06	mg/L	103	90	110			
WG513493ICB	ICB	01/27/21 15:13				U	mg/L		-0.22	0.22			
WG513504													
WG513504ICV	ICV	01/27/21 18:27	WC210120-1	2.002		1.94	mg/L	97	90	110			
WG513504ICB	ICB	01/27/21 18:31				U	mg/L		-0.22	0.22			
WG513504LFB	LFB	01/27/21 18:38	WC201221-2	5.015		4.86	mg/L	97	90	110			
WG513432PBS	PBS	01/27/21 18:43				U	mg/L		-0.22	0.22			
L63831-01AS	AS	01/27/21 18:56	WC201221-2	376.125	10.8	380.15	mg/L	98	90	110			
L63831-01DUP	DUP	01/27/21 18:59			10.8	14.18	mg/L				27	20	RA

Iron, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.945	mg/L	97	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.18	0.18			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-18	18			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	15100		14450	mg/Kg		9520	20700			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	15100		14090	mg/Kg		9520	20700	3	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100.18	4070	4160	mg/Kg	90	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100.18	4070	4034	mg/Kg	-36	75	125	3	20	M3

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Lithium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	2		1.981	mg/L	99	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.024	0.024			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.0035	0.0035			
L63799-01DUP	DUP	02/09/21 17:35			0.0021	.002	meq/100g				4	20	
L63831-04AS	AS	02/09/21 17:50	IINH4SPIKE	0.144	0.0021	.1493	meq/100g	102	75	125			
L63831-04ASD	ASD	02/09/21 17:54	IINH4SPIKE	0.144	0.0021	.1463	meq/100g	100	75	125	2	20	

Lithium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	2		1.992	mg/L	100	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.024	0.024			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.024	0.024			
L63831-01DUP	DUP	01/27/21 17:46			U	U	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	4.985	.102	5.055	mg/Kg	99	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	4.985	.102	5.035	mg/Kg	99	75	125	0	20	

Lithium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.942	mg/L	97	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.024	0.024			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-2.4	2.4			
L63799-02MS	MS	01/28/21 20:30	II210108-2	99.7	1.56	100.8	mg/Kg	100	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	99.7	1.56	103.5	mg/Kg	102	75	125	3	20	

Magnesium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		97.38	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.05	0.05			

Magnesium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	100		99.41	mg/L	99	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			50.5	51.65	mg/Kg				2	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	250.0113	9.68	262.2	mg/Kg	101	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	250.0113	9.68	264.05	mg/Kg	102	75	125	1	20	

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		98.29	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	2320		2276.01	mg/Kg		1760	2880			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	2320		2312	mg/Kg		1760	2880	2	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	5050.22826	6040	11998.8	mg/Kg	118	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	5050.22826	6040	11938.2	mg/Kg	117	75	125	1	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	100		96.4	mg/L	96	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	2320		2235.42	mg/Kg		1760	2880			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	2320		2246	mg/Kg		1760	2880	0	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	5050.22826	5880	11554.4	mg/Kg	112	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	5050.22826	5880	11433.2	mg/Kg	110	75	125	1	20	

Manganese, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.927	mg/L	96	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.03	0.03			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-3	3			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	319		316.3	mg/Kg		262	377			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	319		318.1	mg/Kg		262	377	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50.05	264	303.8	mg/Kg	80	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50.05	264	305.8	mg/Kg	84	75	125	1	20	

Moisture Content D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513342													
L63799-01DUP	DUP	01/25/21 16:27			1.3	1.3	%				0	20	

Molybdenum, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.969	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.06	0.06			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-6	6			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	44.2		43.144	mg/Kg		35.3	53.2			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	44.2		42.54	mg/Kg		35.3	53.2	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.298	U	46.319	mg/Kg	92	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.298	U	46.389	mg/Kg	92	75	125	0	20	

Worthington Miller Environmental, LLC ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Phosphorus, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	5.0075		5.13	mg/L	102	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.3	0.3			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-30	30			
WG513411LCSS2	LCSS	01/28/21 20:15	PCN60281	842		711.02	mg/Kg		673.6	1010.4			
WG513411LCSSD2	LCSSD	01/28/21 20:18	PCN60281	842		706.37	mg/Kg		673.6	1010.4	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100.5	126	221.8	mg/Kg	95	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100.5	126	222.4	mg/Kg	96	75	125	0	20	

Potassium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	20		19.44	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.02	0.02			

Potassium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	20		19.85	mg/L	99	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			174	173.4	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	499.84235	81.8	587	mg/Kg	101	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	499.84235	81.8	588.5	mg/Kg	101	75	125	0	20	

Potassium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	20		19.52	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	2050		2078.01	mg/Kg		1440	2660			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	2050		2097	mg/Kg		1440	2660	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	10096.81547	5120	19270.8	mg/Kg	140	75	125			M1
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	10096.81547	5120	19240.5	mg/Kg	140	75	125	0	20	M1

Selenium, total (3050) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513503													
WG513503ICV	ICV	01/28/21 11:21	MS210115-2	.05		.04915	mg/L	98	90	110			
WG513503ICB	ICB	01/28/21 11:23				U	mg/L		-0.0003	0.0003			
WG513411PBS	PBS	01/28/21 11:33				U	mg/Kg		-0.15	0.15			
WG513411LCSS1	LCSS	01/28/21 11:35	PCN62459	172		175.43737	mg/Kg		136	208			
WG513411LCSSD1	LCSSD	01/28/21 11:37	PCN62459	172		177.37362	mg/Kg		136	208	1	20	
L63799-01MS	MS	01/28/21 11:41	MS201117-9	12.5	.0632	11.46534	mg/Kg	91	75	125			
L63799-01MSD	MSD	01/28/21 11:42	MS201117-9	12.5	.0632	11.67475	mg/Kg	93	75	125	2	20	

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Silicon, recoverable (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	20		20.31	mg/L	102	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.3	0.3			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-30	30			
L63799-02MS	MS	01/28/21 20:30	II210108-2	1000.8	743	1999	mg/Kg	125	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	1000.8	743	1823	mg/Kg	108	75	125	9	20	

Sodium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		96.2	mg/L	96	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.03	0.03			
L63799-01DUP	DUP	02/09/21 17:35			0.08	.07	meq/100g				4	20	
L63831-04AS	AS	02/09/21 17:50	IINH4SPIKE	4.35	0.03	4.27	meq/100g	97	75	125			
L63831-04ASD	ASD	02/09/21 17:54	IINH4SPIKE	4.35	0.03	4.08	meq/100g	93	75	125	5	20	

Sodium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	100		97.63	mg/L	98	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			U	U	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	500.0705	4.8	506	mg/Kg	100	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	500.0705	4.8	507	mg/Kg	100	75	125	0	20	

Sodium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		97.29	mg/L	97	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	137		116.82	mg/Kg		98.8	175			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	137		115.5	mg/Kg		98.8	175	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	10101.4241	112	9818.21	mg/Kg	96	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	10101.4241	112	9861.64	mg/Kg	97	75	125	0	20	

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513342													
L63799-01DUP	DUP	01/25/21 16:27			98.7	98.7	%				0	20	
WG513342PBS	PBS	01/26/21 16:00				U	%		-0.1	0.1			

Worthington Miller Environmental, LLC ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Strontium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.916	mg/L	96	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.027	0.027			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-2.7	2.7			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	96.9		97.3863	mg/Kg		78.8	115			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	96.9		93.28	mg/Kg		78.8	115	4	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.7525	32	94.3037	mg/Kg	123	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.7525	32	94.5663	mg/Kg	123	75	125	0	20	

Sulfate, soluble (Water) D516-07 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513525													
WG513525ICB	ICB	01/28/21 8:49				U	mg/L		-3	3			
WG513525ICV	ICV	01/28/21 8:49	WI210121-1	20		20.6	mg/L	103	90	110			
WG513525LFB	LFB	01/28/21 9:48	WI210105-3	10		9.7	mg/L	97	90	110			
WG513432PBS	PBS	01/28/21 10:09				1.1	mg/L		-3	3			
L63831-01DUP	DUP	01/28/21 10:10			710	729	mg/L				3	20	
L63831-01AS	AS	01/28/21 10:10	SO4TURB5X	100	710	846.7	mg/L	137	90	110			M3

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	.01	%				200	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
WG513840LCSS	LCSS	02/10/21 10:11	PCN62619	4.01		3.35	%	84	80	120			
L63799-01MS	MS	02/10/21 10:34	PCN62542	1.3	U	1.21	%	93	80	120			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63799***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Titanium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.984	mg/L	99	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.015	0.015			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-1.5	1.5			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	417		463.6	mg/Kg		94.5	739			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	417		470.5	mg/Kg		94.5	739	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100	6.27	112.6	mg/Kg	106	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100	6.27	112.7	mg/Kg	106	75	125	0	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	2		1.941	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.015	0.015			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-1.5	1.5			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	417		441.738	mg/Kg		94.5	739			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	417		427.6	mg/Kg		94.5	739	3	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	101	260	463.287	mg/Kg	201	75	125			M1
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	101	260	428.139	mg/Kg	166	75	125	8	20	M1

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Uranium, total (3050) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513503													
WG513503ICV	ICV	01/28/21 11:21	MS210115-2	.05		.04821	mg/L	96	90	110			
WG513503ICB	ICB	01/28/21 11:23				U	mg/L		-0.0003	0.0003			
WG513411PBS	PBS	01/28/21 11:33				U	mg/Kg		-0.15	0.15			
WG513411LCSS1	LCSS	01/28/21 11:35	PCN62459	37.1		32.72653	mg/Kg		28.6	45.7			
WG513411LCSSD1	LCSSD	01/28/21 11:37	PCN62459	37.1		32.37679	mg/Kg		28.6	45.7	1	20	
L63799-01MS	MS	01/28/21 11:41	MS201117-9	12.5	.819	13.34613	mg/Kg	100	75	125			
L63799-01MSD	MSD	01/28/21 11:42	MS201117-9	12.5	.819	13.27097	mg/Kg	100	75	125	1	20	

Vanadium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.885	mg/L	94	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.03	0.03			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-1.5	1.5			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	99.9		86.675	mg/Kg		78.9	121			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	99.9		85.98	mg/Kg		78.9	121	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.4495	14.6	71.5686	mg/Kg	113	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.4495	14.6	71.7	mg/Kg	113	75	125	0	20	

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63799-01	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG514046	Calcium, extractable (NH4)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513529	Calcium, soluble (Water)	M6010D ICP	B1	Target analyte detected in prep / method blank at or above the method reporting limit. See Case Narrative.
			M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG514062	Chloride, soluble (Water)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513504	Fluoride, soluble (Water)	SM4500F-C	DD	Sample required dilution due to matrix color or odor.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513490	Lithium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513490	Magnesium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					the analyte is not available.
	WG514046	Sodium, extractable (NH4)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513490	Sodium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513525	Sulfate, soluble (Water)	D516-07 - Turbidimetric	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			D516-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63799-02	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63799-03	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513872	Boron, total (3050)	M6010D ICP	DB	Sample required dilution due to low bias result.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513872	Titanium, total (3050)	M6010D ICP	DB	Sample required dilution due to low bias result.
			M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63799-04	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Worthington Miller Environmental, LLC ACZ Project ID: ***L63799***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63799-05	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Cation Exchange Capacity (CEC)	USDA No. 60 (19)
Silicon, recoverable (3050)	M6010D ICP

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR
Moisture Content	D2216-80
Solids, Percent	D2216-80
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bicarbonate as CaCO3	SM2320B - Titration
Carbonate as CaCO3	SM2320B - Titration
Chloride, soluble (Water)	SM4500Cl-E
Fluoride, soluble (Water)	SM4500F-C
Hydroxide as CaCO3	SM2320B - Titration
Sulfate, soluble (Water)	D516-07 - Turbidimetric
Total Alkalinity	SM2320B - Titration

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Worthington Miller Environmental, LLC

ACZ Project ID: L63799
Date Received: 01/18/2021 13:53
Received By:
Date Printed: 1/19/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?		X	
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
6626	1.8	NA	15	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Worthington Miller Environmental, LLC

ACZ Project ID:	L63799
Date Received:	01/18/2021 13:53
Received By:	
Date Printed:	1/19/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L63799

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: aarguello@barrick.com
Address: P.O. Box 98, Highway 605
Grants, NM 87020
Telephone: 505-287-4456

Copy of Report to:

Name: David Levy
Company: Worthington Miller Environmental
E-mail: david.levy@wm-env.com
Telephone: 970-443-0776

Invoice to:

Name: David Levy
Company: Worthington Miller Environmental
E-mail: david.levy@wm-env.com
Address: 1027 W. Horsetooth Rd. Ste. 200
Fort Collins, CO 80526
Telephone: 970-443-0776

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Matthew T Kearney **Sampler's Site Information** State New Mexico Zip code 87020 Time Zone MST

***Sampler's Signature:** [signature] *I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Quote Group HMC-GEOCHEM-2020
PO#: N/A
Reporting state for compliance testing: NA
Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Quote No. LOWER-CHINLE-S	Quote No. SAN-ANDRES-LS	Quote No. GLORIETA-SS						
SAG2-CS-163-164	1/12/2021 14:00	rock	1	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
SAG2-SALS-215-216	1/12/2021 14:30	rock	1	[ ]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
SAG2-SALS-244-245	1/13/2021 14:45	rock	1	[ ]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
SAG2-GSS-439.5-440.5	1/13/2021 15:45	rock	1	[ ]	[ ]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
SAG2-GSS-463-464	1/13/2021 16:00	rock	1	[ ]	[ ]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Cation Exchange Capacity (CEC) is not needed for the two samples under Quote No. SAN-ANDRES-LS (no need to modify Quote as CEC may be requested for future samples).

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matthew T Kearney	1430 1/19/21	[signature]	1/18/21 13:53

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L63799 Chain of Custod

DCM SCIENCE LABORATORY, INC.
12421 W. 49th Avenue, Unit #6
Wheat Ridge, CO 80033 (303) 463-8270

Semi-Quantitative X-Ray Diffraction Analysis

Client:
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Analysis Date:	2-23-21
Reporting Date:	2-24-21
Receipt Date:	2-18-21
Client Job No.:	25714
Client Project:	None Given
DCMSL Project:	ACZ80

Client Sample No.:	**L63799-03**	**L63799-04**
Phase		
Calcite	<2*	3
Dolomite	97	3
Illite	-	<2*
Kaolinite	-	4
K-Feldspar	-	6
Pyrite	-	<2*
Quartz	1	82
Unaccounted	<5	<5

*May be present

The samples were prepared for x-ray diffraction analysis and scanned over a range of 3° to 45° 2Θ Cu Kα radiation, 40kV, 25mA. Mineral phases were identified with the aid of computer-assisted programs accessing a powder diffraction database. Estimates of mineral concentrations are based on relative peak heights and reference intensity ratios (RIR) measured in-house.

All information provided by client, including samples results, is considered proprietary and confidential. Client results and other information will not be released to anyone but the client except by client request. When the laboratory is required by law or authorized by contractual arrangement to release confidential information, the client or individual concerned shall, unless prohibited by law, be notified of the information provided.

Jason Barnes

Jason Barnes, Analyst

0293
AC280

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Scott Habermehl
Company: ACZ Labs
E-mail: scotth@acz.com
Address: 2773 Downhill Dr.
Telephone: (970)879-6590 x101

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Accounts Payable
Company: ACZ Labs
E-mail: vgault@acz.com
Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: _____ **Sampler's Site Information** **State** CO **Zip code** _____ **Time Zone** _____

***Sampler's Signature:** _____

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Subcontract
PO#: 25714
Reporting state for compliance testing:
Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	XRD Bulk	Optical Mineralogy						
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
L63799-03	1/13/21	RK	1	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
L63799-04	1/13/21	RK	1	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

DCM Science, 12421 W. 49th St. Unit 6, Wheat Ridge CO 80033 att. Ron Schott Contact: David Levy

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/17/21 15:00	D Harvey	2/18/21 10:38

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 17, 2021

Report to:
David Levy
Worthington Miller Environmental, LLC
1027 W Horsetooth Rd Ste 200

Fort Collins, CO 80526

cc: Adam Arguello

Bill to:
David Levy
Worthington Miller Environmental, LLC
1027 W Horsetooth Rd
Suite 210
Fort Collins, CO 1080526

Project ID:
ACZ Project ID: L63831

David Levy:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on January 20, 2021. This project has been assigned to ACZ's project number, L63831. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L63831. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after June 15, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Worthington Miller Environmental, LLC

March 17, 2021

Project ID:
ACZ Project ID: L63831

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 5 miscellaneous samples from Worthington Miller Environmental, LLC on January 20, 2021. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L63831. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. (B1) Applies to: L63831-01/CALCIUM

Calcium detected in prep blank above the method reporting limit.

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-CS-189-190

ACZ Sample ID: ***L63831-01***
Date Sampled: *01/17/21 13:30*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	18000		*	mg/Kg	5	25	02/03/21 23:27	kja
Barium, total (3050)	M6010D ICP	101	191			mg/Kg	0.707	3.54	01/28/21 20:56	kja
Boron, total (3050)	M6010D ICP	101	14.3			mg/Kg	2.02	10.1	01/28/21 20:56	kja
Calcium, extractable (NH4)	M6010D ICP	1	4.91		*	meq/100g	0.005	0.025	02/09/21 17:39	jlw
Calcium, soluble (Water)	M6010D ICP	100	55.9		*	mg/Kg	10	50	01/28/21 19:03	kja
Calcium, total (3050)	M6010D ICP	100	2400			mg/Kg	10	50	02/03/21 23:27	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	7.40		*	meq/100g	0.02	0.11	02/10/21 18:42	jlw
Iron, total (3050)	M6010D ICP	101	37400		*	mg/Kg	6.06	15.2	01/28/21 20:56	kja
Lithium, extractable (NH4)	M6010D ICP	1	0.0131			meq/100g	0.0012	0.0058	02/09/21 17:39	jlw
Lithium, soluble (Water)	M6010D ICP	100	<0.8	U	*	mg/Kg	0.8	4	01/27/21 17:42	jlw
Lithium, total (3050)	M6010D ICP	101	24.1		*	mg/Kg	0.808	4.04	01/28/21 20:56	kja
Magnesium, extractable (NH4)	M6010D ICP	1	2.40			meq/100g	0.02	0.08	02/09/21 17:39	jlw
Magnesium, soluble (Water)	M6010D ICP	100	50.5	B	*	mg/Kg	20	100	01/27/21 17:42	jlw
Magnesium, total (3050)	M6010D ICP	100	6040			mg/Kg	20	100	02/03/21 23:27	kja
Manganese, total (3050)	M6010D ICP	101	187			mg/Kg	1.01	5.05	01/28/21 20:56	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:27	kja
Phosphorus, total (3050)	M6010D ICP	101	642			mg/Kg	10.1	50.5	01/28/21 20:56	kja
Potassium, extractable (NH4)	M6010D ICP	1	1.34			meq/100g	0.01	0.03	02/09/21 17:39	jlw
Potassium, soluble (Water)	M6010D ICP	100	174		*	mg/Kg	20	100	01/27/21 17:42	jlw
Potassium, total (3050)	M6010D ICP	100	5120		*	mg/Kg	20	100	02/03/21 23:27	kja
Selenium, total (3050)	M6020B ICP-MS	505	0.169			mg/Kg	0.0505	0.126	01/28/21 11:57	mfm
Silicon, recoverable (3050)	M6010D ICP	101	1030		*	mg/Kg	10.1	50.5	01/28/21 20:56	kja
Sodium, extractable (NH4)	M6010D ICP	1	0.16		*	meq/100g	0.01	0.04	02/09/21 17:39	jlw
Sodium, soluble (Water)	M6010D ICP	100	<20	U	*	mg/Kg	20	100	01/27/21 17:42	jlw
Sodium, total (3050)	M6010D ICP	100	112			mg/Kg	20	100	02/03/21 23:27	kja
Strontium, total (3050)	M6010D ICP	100	32.0			mg/Kg	0.9	4.5	02/03/21 23:27	kja
Titanium, total (3050)	M6010D ICP	101	232		*	mg/Kg	0.505	2.53	01/28/21 20:56	kja
Uranium, total (3050)	M6020B ICP-MS	505	0.449			mg/Kg	0.0505	0.253	01/28/21 11:57	mfm
Vanadium, total (3050)	M6010D ICP	100	14.6			mg/Kg	1	2.5	02/03/21 23:27	kja

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-CS-189-190

ACZ Sample ID: ***L63831-01***
Date Sampled: *01/17/21 13:30*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 12:28	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	<0.1	U	*	%	0.1	0.5	02/10/21 12:28	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.1	B	*	%	0.1	0.5	02/10/21 12:28	jpb
Moisture Content	D2216-80	1	4.1		*	%	0.1	0.5	01/25/21 16:46	sjm
Solids, Percent	D2216-80	1	95.9		*	%	0.1	0.5	01/25/21 16:46	sjm
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 13:30	sjm
Ammonium Acetate Extraction	USDA No. 60 (18)								02/08/21 14:45	gkh
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 11:48	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 12:06	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 13:00	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 14:26	krs
Water Extraction	ASA No. 9 10-2.3.2								01/27/21 10:00	krs

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3, soluble (Water)	SM2320B - Titration									
Bicarbonate as CaCO3		1	34.4		*	mg/L	2	20	01/27/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Total Alkalinity		1	34.4		*	mg/L	2	20	01/27/21 0:00	eep
Chloride, soluble (Water)	SM4500Cl-E	50	807		*	mg/Kg	25	100	02/09/21 15:32	ttg
Fluoride, soluble (Water)	SM4500F-C	75	10.8	B	*	mg/Kg	8.25	26.3	01/27/21 18:52	eep
Sulfate, soluble (Water)	D516-07 - Turbidimetric	50	710		*	mg/Kg	50	250	01/28/21 10:10	rbt

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-SALS-235.5-236.5

ACZ Sample ID: ***L63831-02***
Date Sampled: *01/17/21 13:55*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	545		*	mg/Kg	5	25	02/03/21 23:46	kja
Barium, total (3050)	M6010D ICP	100	101			mg/Kg	0.7	3.5	01/28/21 21:00	kja
Boron, total (3050)	M6010D ICP	1000	<20	U	*	mg/Kg	20	100	02/04/21 23:05	kja
Calcium, total (3050)	M6010D ICP	1000	355000			mg/Kg	100	500	02/04/21 23:05	kja
Iron, total (3050)	M6010D ICP	100	4130		*	mg/Kg	6	15	01/28/21 21:00	kja
Lithium, total (3050)	M6010D ICP	100	5.68		*	mg/Kg	0.8	4	01/28/21 21:00	kja
Magnesium, total (3050)	M6010D ICP	1000	26400			mg/Kg	200	1000	02/04/21 23:05	kja
Manganese, total (3050)	M6010D ICP	100	561			mg/Kg	1	5	01/28/21 21:00	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:46	kja
Phosphorus, total (3050)	M6010D ICP	100	243			mg/Kg	10	50	01/28/21 21:00	kja
Potassium, total (3050)	M6010D ICP	100	179		*	mg/Kg	20	100	02/03/21 23:46	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.421			mg/Kg	0.05	0.125	01/28/21 11:59	mfm
Silicon, recoverable (3050)	M6010D ICP	100	359		*	mg/Kg	10	50	01/28/21 21:00	kja
Sodium, total (3050)	M6010D ICP	100	98.7	B		mg/Kg	20	100	02/03/21 23:46	kja
Strontium, total (3050)	M6010D ICP	100	128			mg/Kg	0.9	4.5	02/03/21 23:46	kja
Titanium, total (3050)	M6010D ICP	1000	15.6	B	*	mg/Kg	5	25	02/04/21 23:05	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.520			mg/Kg	0.05	0.25	01/28/21 11:59	mfm
Vanadium, total (3050)	M6010D ICP	100	12.5			mg/Kg	1	2.5	02/03/21 23:46	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	12.9		*	%	0.1	0.5	02/10/21 12:47	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	12.9		*	%	0.1	0.5	02/10/21 12:47	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 12:47	jpb
Moisture Content	D2216-80	1	2.9		*	%	0.1	0.5	01/26/21 6:09	sjm
Solids, Percent	D2216-80	1	97.1		*	%	0.1	0.5	01/26/21 6:09	sjm
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.03	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.03	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-SALS-235.5-236.5

ACZ Sample ID: ***L63831-02***
Date Sampled: *01/17/21 13:55*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 13:38	sjm
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 12:20	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 14:30	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 14:50	krs

Subcontract

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Miscellaneous subcontract	Subcontracted Work									
Subcontract XRD	Subcontracted Work									

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-SALS-283-284

ACZ Sample ID: ***L63831-03***
Date Sampled: *01/17/21 14:05*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	119		*	mg/Kg	5	25	02/03/21 23:49	kja
Barium, total (3050)	M6010D ICP	100	38.7			mg/Kg	0.7	3.5	01/28/21 21:04	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 21:04	kja
Calcium, total (3050)	M6010D ICP	500	139000			mg/Kg	50	250	02/04/21 23:09	kja
Iron, total (3050)	M6010D ICP	100	934		*	mg/Kg	6	15	01/28/21 21:04	kja
Lithium, total (3050)	M6010D ICP	100	2.33	B	*	mg/Kg	0.8	4	01/28/21 21:04	kja
Magnesium, total (3050)	M6010D ICP	500	80700			mg/Kg	100	500	02/04/21 23:09	kja
Manganese, total (3050)	M6010D ICP	100	168			mg/Kg	1	5	01/28/21 21:04	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:49	kja
Phosphorus, total (3050)	M6010D ICP	100	188			mg/Kg	10	50	01/28/21 21:04	kja
Potassium, total (3050)	M6010D ICP	100	28.1	B	*	mg/Kg	20	100	02/03/21 23:49	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.277			mg/Kg	0.05	0.125	01/28/21 12:00	mfm
Silicon, recoverable (3050)	M6010D ICP	100	245		*	mg/Kg	10	50	01/28/21 21:04	kja
Sodium, total (3050)	M6010D ICP	100	172			mg/Kg	20	100	02/03/21 23:49	kja
Strontium, total (3050)	M6010D ICP	100	63.9			mg/Kg	0.9	4.5	02/03/21 23:49	kja
Titanium, total (3050)	M6010D ICP	500	7.35	B	*	mg/Kg	2.5	12.5	02/04/21 23:09	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.675			mg/Kg	0.05	0.25	01/28/21 12:00	mfm
Vanadium, total (3050)	M6010D ICP	100	3.14			mg/Kg	1	2.5	02/03/21 23:49	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	8.8		*	%	0.1	0.5	02/10/21 13:05	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	8.7		*	%	0.1	0.5	02/10/21 13:05	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.1	B	*	%	0.1	0.5	02/10/21 13:05	jpb
Moisture Content	D2216-80	1	9.4		*	%	0.1	0.5	01/26/21 12:51	sjm
Solids, Percent	D2216-80	1	90.7		*	%	0.1	0.5	01/26/21 12:51	sjm
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-SALS-283-284

ACZ Sample ID: ***L63831-03***
Date Sampled: *01/17/21 14:05*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 13:47	sjm
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 12:33	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 15:00	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 15:13	krs

Subcontract

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Miscellaneous subcontract	Subcontracted Work									

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-GSS-426-427

ACZ Sample ID: ***L63831-04***
Date Sampled: *01/17/21 14:30*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	2560		*	mg/Kg	5	25	02/03/21 23:53	kja
Barium, total (3050)	M6010D ICP	100	288			mg/Kg	0.7	3.5	01/28/21 21:07	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 21:07	kja
Calcium, extractable (NH4)	M6010D ICP	1	19.5		*	meq/100g	0.005	0.025	02/09/21 17:46	jlw
Calcium, soluble (Water)	M6010D ICP	5	87.0		*	mg/Kg	0.5	2.5	01/27/21 17:50	jlw
Calcium, total (3050)	M6010D ICP	100	27200			mg/Kg	10	50	02/03/21 23:53	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	1.46		*	meq/100g	0.02	0.11	02/10/21 18:46	jlw
Iron, total (3050)	M6010D ICP	100	1690		*	mg/Kg	6	15	01/28/21 21:07	kja
Lithium, extractable (NH4)	M6010D ICP	1	0.0021	B		meq/100g	0.0012	0.0058	02/09/21 17:46	jlw
Lithium, soluble (Water)	M6010D ICP	5	0.102	B	*	mg/Kg	0.04	0.2	01/27/21 17:50	jlw
Lithium, total (3050)	M6010D ICP	100	<0.8	U	*	mg/Kg	0.8	4	01/28/21 21:07	kja
Magnesium, extractable (NH4)	M6010D ICP	1	0.38			meq/100g	0.02	0.08	02/09/21 17:46	jlw
Magnesium, soluble (Water)	M6010D ICP	5	9.68		*	mg/Kg	1	5	01/27/21 17:50	jlw
Magnesium, total (3050)	M6010D ICP	100	441			mg/Kg	20	100	02/03/21 23:53	kja
Manganese, total (3050)	M6010D ICP	100	63.3			mg/Kg	1	5	01/28/21 21:07	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:53	kja
Phosphorus, total (3050)	M6010D ICP	100	50.1			mg/Kg	10	50	01/28/21 21:07	kja
Potassium, extractable (NH4)	M6010D ICP	1	0.45			meq/100g	0.01	0.03	02/09/21 17:46	jlw
Potassium, soluble (Water)	M6010D ICP	5	81.8		*	mg/Kg	1	5	01/27/21 17:50	jlw
Potassium, total (3050)	M6010D ICP	100	810		*	mg/Kg	20	100	02/03/21 23:53	kja
Selenium, total (3050)	M6020B ICP-MS	500	<0.05	U		mg/Kg	0.05	0.125	01/28/21 12:02	mfm
Silicon, recoverable (3050)	M6010D ICP	100	781		*	mg/Kg	10	50	01/28/21 21:07	kja
Sodium, extractable (NH4)	M6010D ICP	1	0.03	B	*	meq/100g	0.01	0.04	02/09/21 17:46	jlw
Sodium, soluble (Water)	M6010D ICP	5	4.80	B	*	mg/Kg	1	5	01/27/21 17:50	jlw
Sodium, total (3050)	M6010D ICP	100	<20	U		mg/Kg	20	100	02/03/21 23:53	kja
Strontium, total (3050)	M6010D ICP	100	13.8			mg/Kg	0.9	4.5	02/03/21 23:53	kja
Titanium, total (3050)	M6010D ICP	100	8.48		*	mg/Kg	0.5	2.5	01/28/21 21:07	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.125	B		mg/Kg	0.05	0.25	01/28/21 12:02	mfm
Vanadium, total (3050)	M6010D ICP	100	1.72	B		mg/Kg	1	2.5	02/03/21 23:53	kja

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-GSS-426-427

ACZ Sample ID: ***L63831-04***
Date Sampled: *01/17/21 14:30*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.8		*	%	0.1	0.5	02/10/21 13:24	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	0.8		*	%	0.1	0.5	02/10/21 13:24	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	<0.1	U	*	%	0.1	0.5	02/10/21 13:24	jpb
Moisture Content	D2216-80	1	1.5		*	%	0.1	0.5	01/26/21 19:33	sjm
Solids, Percent	D2216-80	1	98.5		*	%	0.1	0.5	01/26/21 19:33	sjm
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 13:56	sjm
Ammonium Acetate Extraction	USDA No. 60 (18)								02/08/21 15:30	gkh
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 12:22	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 12:46	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 15:30	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 15:36	krs
Water Extraction	ASA No. 9 10-2.3.2								01/27/21 11:00	krs

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3, soluble (Water)	SM2320B - Titration									
Bicarbonate as CaCO3		1	51.0		*	mg/L	2	20	01/27/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	01/27/21 0:00	eep
Total Alkalinity		1	51.0		*	mg/L	2	20	01/27/21 0:00	eep
Chloride, soluble (Water)	SM4500Cl-E	5	7.88	B	*	mg/Kg	2.5	10	02/09/21 13:29	ttg
Fluoride, soluble (Water)	SM4500F-C	10	2.46	B	*	mg/Kg	1.1	3.5	01/27/21 19:03	eep
Sulfate, soluble (Water)	D516-07 - Turbidimetric	5	88.0		*	mg/Kg	5	25	01/28/21 9:49	rbt

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-GSS-464-465

ACZ Sample ID: ***L63831-05***
Date Sampled: *01/17/21 14:35*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6010D ICP	100	6390		*	mg/Kg	5	25	02/03/21 23:57	kja
Barium, total (3050)	M6010D ICP	100	95.2			mg/Kg	0.7	3.5	01/28/21 21:15	kja
Boron, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	01/28/21 21:15	kja
Calcium, total (3050)	M6010D ICP	100	27000			mg/Kg	10	50	02/03/21 23:57	kja
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	1	3.19		*	meq/100g	0.02	0.11	02/10/21 18:57	jlw
Iron, total (3050)	M6010D ICP	100	2940		*	mg/Kg	6	15	01/28/21 21:15	kja
Lithium, total (3050)	M6010D ICP	100	2.02	B	*	mg/Kg	0.8	4	01/28/21 21:15	kja
Magnesium, total (3050)	M6010D ICP	100	7460			mg/Kg	20	100	02/03/21 23:57	kja
Manganese, total (3050)	M6010D ICP	100	181			mg/Kg	1	5	01/28/21 21:15	kja
Molybdenum, total (3050)	M6010D ICP	100	<2	U		mg/Kg	2	10	02/03/21 23:57	kja
Phosphorus, total (3050)	M6010D ICP	100	208			mg/Kg	10	50	01/28/21 21:15	kja
Potassium, total (3050)	M6010D ICP	100	2420		*	mg/Kg	20	100	02/03/21 23:57	kja
Selenium, total (3050)	M6020B ICP-MS	500	0.188			mg/Kg	0.05	0.125	01/28/21 12:04	mfm
Silicon, recoverable (3050)	M6010D ICP	100	2040		*	mg/Kg	10	50	01/28/21 21:15	kja
Sodium, total (3050)	M6010D ICP	100	30.7	B		mg/Kg	20	100	02/03/21 23:57	kja
Strontium, total (3050)	M6010D ICP	100	16.7			mg/Kg	0.9	4.5	02/03/21 23:57	kja
Titanium, total (3050)	M6010D ICP	100	27.7		*	mg/Kg	0.5	2.5	01/28/21 21:15	kja
Uranium, total (3050)	M6020B ICP-MS	500	0.260			mg/Kg	0.05	0.25	01/28/21 12:04	mfm
Vanadium, total (3050)	M6010D ICP	100	4.55			mg/Kg	1	2.5	02/03/21 23:57	kja

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	1	1.2		*	%	0.1	0.5	02/10/21 13:42	jpb
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	1	1.0		*	%	0.1	0.5	02/10/21 13:42	jpb
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	1	0.2	B	*	%	0.1	0.5	02/10/21 13:42	jpb
Moisture Content	D2216-80	1	3.9		*	%	0.1	0.5	01/27/21 2:15	sjm
Solids, Percent	D2216-80	1	96.1		*	%	0.1	0.5	01/27/21 2:15	sjm
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.07	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur HNO3 Residue		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Organic Residual		1	<0.01	U	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Pyritic Sulfide		1	0.07	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Sulfur Total		1	0.08	B	*	%	0.01	0.1	02/10/21 0:00	jpb
Total Sulfur minus Sulfate		1	0.07	B	*	%	0.01	0.1	02/10/21 0:00	jpb

Worthington Miller Environmental, LLC
Project ID:
Sample ID: SAG1-GSS-464-465

ACZ Sample ID: ***L63831-05***
Date Sampled: *01/17/21 14:35*
Date Received: *01/20/21*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								01/25/21 14:05	sjm
Cation Exchange Capacity Extraction	USDA No. 60 (19)								02/09/21 12:56	gkh
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								01/26/21 13:00	krs
Digestion - Hot Plate	M3050B ICP								02/02/21 16:00	krs
Digestion - Hot Plate	M3050B ICP-MS								01/27/21 16:00	krs

Subcontract

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Miscellaneous subcontract	Subcontracted Work									
Subcontract XRD	Subcontracted Work									

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513500													
WG513500PBW	PBW	01/27/21 17:35				U	mg/L		-20	20			
WG513500LCSW1	LCSW	01/27/21 17:48	WC210113-1	820.0001		783.4	mg/L	96	90	110			
WG513432PBS	PBS	01/27/21 17:57				2.8	mg/L		-20	20			
L63831-01DUP	DUP	01/27/21 18:24			34.4	35.9	mg/L				4	20	
WG513500LCSW2	LCSW	01/27/21 18:44	WC210113-1	820.0001		787	mg/L	96	90	110			

Aluminum, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.967	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.15	0.15			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-15	15			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	8190		8488.26	mg/Kg		3990	12400			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	8190		8610	mg/Kg		3990	12400	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	101.1313	18000	30330.3	mg/Kg	12192	75	125			M3
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	101.1313	18000	30269.7	mg/Kg	12132	75	125	0	20	M3

Barium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.958	mg/L	98	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.021	0.021			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-2.1	2.1			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	138		131.8	mg/Kg		114	162			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	138		141.9	mg/Kg		114	162	7	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50	53.7	103.6	mg/Kg	100	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50	53.7	102.7	mg/Kg	98	75	125	1	20	

Boron, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.967	mg/L	98	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.06	0.06			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-6	6			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	265		289.8	mg/Kg		189	341			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	265		289.9	mg/Kg		189	341	0	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50.05	U	45.14	mg/Kg	90	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50.05	U	45.9	mg/Kg	92	75	125	2	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	2		1.932	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.06	0.06			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-6	6			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	265		289.872	mg/Kg		189	341			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	265		285.6	mg/Kg		189	341	1	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	50.5505	15.7	71.054	mg/Kg	110	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	50.5505	15.7	69.852	mg/Kg	107	75	125	2	20	

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Calcium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		97.3	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.3	0.3			
WG513934PBS	PBS	02/09/21 17:27				.01	meq/100g		-0.015	0.015			

Calcium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	100		98.56	mg/L	99	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.3	0.3			
WG513432PBS	PBS	01/27/21 17:30				.68	mg/Kg		-0.3	0.3			BA
L63831-01DUP	DUP	01/27/21 17:46			55.2	58.32	mg/Kg				5	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	340.014	87	429	mg/Kg	101	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	340.014	87	431.05	mg/Kg	101	75	125	0	20	
WG513529													
WG513529ICV	ICV	01/28/21 18:21	II210127-1	100		97.46	mg/L	97	90	110			
WG513529ICB	ICB	01/28/21 18:25				U	mg/L		-0.3	0.3			
WG513432PBS	PBS	01/28/21 18:48				.7	mg/Kg		-0.3	0.3			B1
L63799-01AS	AS	01/28/21 18:56	II210108-2	3400.14	24.5	3493	mg/Kg	102	75	125			
L63799-01ASD	ASD	01/28/21 18:59	II210108-2	3400.14	24.5	3530.5	mg/Kg	103	75	125	1	20	
L63831-01DUP	DUP	01/28/21 19:10			55.9	58.15	mg/Kg				4	20	RA

Calcium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		98.38	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.3	0.3			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-30	30			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	4790		4597.56	mg/Kg		3910	5660			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	4790		4656	mg/Kg		3910	5660	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	6868.2828	2400	9060.71	mg/Kg	97	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	6868.2828	2400	9053.64	mg/Kg	97	75	125	0	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	100		96.96	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.3	0.3			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-30	30			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	4790		4539.15	mg/Kg		3910	5660			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	4790		4529	mg/Kg		3910	5660	0	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	6868.2828	2350	8779.93	mg/Kg	94	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	6868.2828	2350	8709.23	mg/Kg	93	75	125	1	20	

Carbon, total (TC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
WG513988LCSS	LCSS	02/10/21 10:18	PCN62618	4.35		4.5	%	103	80	120			
L63799-01DUP	DUP	02/10/21 10:55			U	U	%				0	20	RA

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Carbon, total inorganic (TIC) ASA No. 9 29-2.2.4 (calc TC - TOC)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
L63799-01DUP	DUP	02/10/21 10:55			U	U	%				0	20	RA

Carbon, total organic (TOC) ASA No.9 29-2.2.4 Combustion/IR

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513988													
WG513988PBS	PBS	02/10/21 10:00				U	%		-0.3	0.3			
L63799-01DUP	DUP	02/10/21 10:55			.1	.1	%				0	20	RA

Cation Exchange Capacity (CEC) USDA No. 60 (19)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514100													
WG514100ICV	ICV	02/10/21 17:42	II210127-1	100		100.2	mg/L	100	90	110			
WG514100ICB	ICB	02/10/21 17:46				U	mg/L		-0.6	0.6			
WG514022PBS	PBS	02/10/21 18:10				.02	meq/100g		-0.07	0.07			
L63799-01DUP	DUP	02/10/21 18:18			2.76	2.76	meq/100g				0	20	
L63799-05AS	AS	02/10/21 18:34	IICECSPIKE	10.9	1.98	10.81	meq/100g	81	75	125			
L63799-05ASD	ASD	02/10/21 18:38	IICECSPIKE	10.9	1.98	10.83	meq/100g	81	75	125	0	20	

Chloride, soluble (Water) SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514062													
WG514062ICB	ICB	02/09/21 11:56				U	mg/L		-1.5	1.5			
WG514062ICV	ICV	02/09/21 11:56	WI200506-2	55.055		58.49	mg/L	106	90	110			
WG514062LFB	LFB	02/09/21 13:29	WI200327-3	30.03		31.94	mg/L	106	90	110			
WG513432PBS	PBS	02/09/21 13:29				U	mg/Kg		-7.5	7.5			
L63799-01AS	AS	02/09/21 14:56	WI200327-3	150.15	211	389.3	mg/Kg	119	90	110			M3
L63831-01DUP	DUP	02/09/21 15:32			807	888.2	mg/Kg				10	20	

Fluoride, soluble (Water) SM4500F-C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513493													
WG513493ICV	ICV	01/27/21 15:09	WC210120-1	2.002		2.06	mg/L	103	90	110			
WG513493ICB	ICB	01/27/21 15:13				U	mg/L		-0.33	0.33			
WG513504													
WG513504ICV	ICV	01/27/21 18:27	WC210120-1	2.002		1.94	mg/L	97	90	110			
WG513504ICB	ICB	01/27/21 18:31				U	mg/L		-0.33	0.33			
WG513504LFB	LFB	01/27/21 18:38	WC201221-2	5.015		4.86	mg/L	97	90	110			
WG513432PBS	PBS	01/27/21 18:43				U	mg/L		-0.33	0.33			
L63831-01AS	AS	01/27/21 18:56	WC201221-2	376.125	10.8	380.15	mg/L	98	90	110			
L63831-01DUP	DUP	01/27/21 18:59			10.8	14.18	mg/L				27	20	RA

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Iron, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.945	mg/L	97	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.18	0.18			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-18	18			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	15100		14450	mg/Kg		9520	20700			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	15100		14090	mg/Kg		9520	20700	3	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100.18	4070	4160	mg/Kg	90	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100.18	4070	4034	mg/Kg	-36	75	125	3	20	M3

Lithium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	2		1.981	mg/L	99	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.024	0.024			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.0035	0.0035			
L63799-01DUP	DUP	02/09/21 17:35			0.0021	.002	meq/100g				4	20	
L63831-04AS	AS	02/09/21 17:50	IINH4SPIKE	0.144	0.0021	.1493	meq/100g	102	75	125			
L63831-04ASD	ASD	02/09/21 17:54	IINH4SPIKE	0.144	0.0021	.1463	meq/100g	100	75	125	2	20	

Lithium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	2		1.992	mg/L	100	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.024	0.024			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.024	0.024			
L63831-01DUP	DUP	01/27/21 17:46			U	U	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	4.985	.102	5.055	mg/Kg	99	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	4.985	.102	5.035	mg/Kg	99	75	125	0	20	

Lithium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.942	mg/L	97	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.024	0.024			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-2.4	2.4			
L63799-02MS	MS	01/28/21 20:30	II210108-2	99.7	1.56	100.8	mg/Kg	100	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	99.7	1.56	103.5	mg/Kg	102	75	125	3	20	

Magnesium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		97.38	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.05	0.05			

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	100		99.41	mg/L	99	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			50.5	51.65	mg/Kg				2	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	250.0113	9.68	262.2	mg/Kg	101	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	250.0113	9.68	264.05	mg/Kg	102	75	125	1	20	

Magnesium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		98.29	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	2320		2276.01	mg/Kg		1760	2880			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	2320		2312	mg/Kg		1760	2880	2	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	5050.22826	6040	11998.8	mg/Kg	118	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	5050.22826	6040	11938.2	mg/Kg	117	75	125	1	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	100		96.4	mg/L	96	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	2320		2235.42	mg/Kg		1760	2880			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	2320		2246	mg/Kg		1760	2880	0	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	5050.22826	5880	11554.4	mg/Kg	112	75	125			
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	5050.22826	5880	11433.2	mg/Kg	110	75	125	1	20	

Manganese, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.927	mg/L	96	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.03	0.03			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-3	3			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	319		316.3	mg/Kg		262	377			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	319		318.1	mg/Kg		262	377	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	50.05	264	303.8	mg/Kg	80	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	50.05	264	305.8	mg/Kg	84	75	125	1	20	

Moisture Content D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513366													
L63831-01DUP	DUP	01/25/21 23:27			4.1	3.9	%				5	20	

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Molybdenum, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.969	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.06	0.06			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-6	6			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	44.2		43.144	mg/Kg		35.3	53.2			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	44.2		42.54	mg/Kg		35.3	53.2	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.298	U	46.319	mg/Kg	92	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.298	U	46.389	mg/Kg	92	75	125	0	20	

Phosphorus, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	5.0075		5.13	mg/L	102	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.3	0.3			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-30	30			
WG513411LCSS2	LCSS	01/28/21 20:15	PCN60281	842		711.02	mg/Kg		673.6	1010.4			
WG513411LCSSD2	LCSSD	01/28/21 20:18	PCN60281	842		706.37	mg/Kg		673.6	1010.4	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100.5	126	221.8	mg/Kg	95	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100.5	126	222.4	mg/Kg	96	75	125	0	20	

Potassium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	20		19.44	mg/L	97	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.02	0.02			

Potassium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	20		19.85	mg/L	99	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			174	173.4	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	499.84235	81.8	587	mg/Kg	101	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	499.84235	81.8	588.5	mg/Kg	101	75	125	0	20	

Potassium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	20		19.52	mg/L	98	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	2050		2078.01	mg/Kg		1440	2660			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	2050		2097	mg/Kg		1440	2660	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	10096.81547	5120	19270.8	mg/Kg	140	75	125			M1
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	10096.81547	5120	19240.5	mg/Kg	140	75	125	0	20	M1

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Selenium, total (3050) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513503													
WG513503ICV	ICV	01/28/21 11:21	MS210115-2	.05		.04915	mg/L	98	90	110			
WG513503ICB	ICB	01/28/21 11:23				U	mg/L		-0.0003	0.0003			
WG513411PBS	PBS	01/28/21 11:33				U	mg/Kg		-0.15	0.15			
WG513411LCSS1	LCSS	01/28/21 11:35	PCN62459	172		175.43737	mg/Kg		136	208			
WG513411LCSSD1	LCSSD	01/28/21 11:37	PCN62459	172		177.37362	mg/Kg		136	208	1	20	
L63799-01MS	MS	01/28/21 11:41	MS201117-9	12.5	.0632	11.46534	mg/Kg	91	75	125			
L63799-01MSD	MSD	01/28/21 11:42	MS201117-9	12.5	.0632	11.67475	mg/Kg	93	75	125	2	20	

Silicon, recoverable (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	20		20.31	mg/L	102	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.3	0.3			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-30	30			
L63799-02MS	MS	01/28/21 20:30	II210108-2	1000.8	743	1999	mg/Kg	125	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	1000.8	743	1823	mg/Kg	108	75	125	9	20	

Sodium, extractable (NH4) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514046													
WG514046ICV	ICV	02/09/21 17:00	II210127-1	100		96.2	mg/L	96	90	110			
WG514046ICB	ICB	02/09/21 17:04				U	mg/L		-0.6	0.6			
WG513934PBS	PBS	02/09/21 17:27				U	meq/100g		-0.03	0.03			
L63799-01DUP	DUP	02/09/21 17:35			0.08	.07	meq/100g				4	20	
L63831-04AS	AS	02/09/21 17:50	IINH4SPIKE	4.35	0.03	4.27	meq/100g	97	75	125			
L63831-04ASD	ASD	02/09/21 17:54	IINH4SPIKE	4.35	0.03	4.08	meq/100g	93	75	125	5	20	

Sodium, soluble (Water) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513490													
WG513490ICV	ICV	01/27/21 17:02	II210127-1	100		97.63	mg/L	98	90	110			
WG513490ICB	ICB	01/27/21 17:06				U	mg/L		-0.6	0.6			
WG513432PBS	PBS	01/27/21 17:30				U	mg/Kg		-0.6	0.6			
L63831-01DUP	DUP	01/27/21 17:46			U	U	mg/Kg				0	20	RA
L63831-04AS	AS	01/27/21 17:54	II210108-2	500.0705	4.8	506	mg/Kg	100	75	125			
L63831-04ASD	ASD	01/27/21 17:57	II210108-2	500.0705	4.8	507	mg/Kg	100	75	125	0	20	

Sodium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	100		97.29	mg/L	97	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.6	0.6			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-60	60			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	137		116.82	mg/Kg		98.8	175			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	137		115.5	mg/Kg		98.8	175	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	10101.4241	112	9818.21	mg/Kg	96	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	10101.4241	112	9861.64	mg/Kg	97	75	125	0	20	

Worthington Miller Environmental, LLC

ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513366													
L63831-01DUP	DUP	01/25/21 23:27			95.9	96.1	%				0	20	
WG513366PBS	PBS	01/27/21 8:57				U	%		-0.1	0.1			

Strontium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.916	mg/L	96	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.027	0.027			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-2.7	2.7			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	96.9		97.3863	mg/Kg		78.8	115			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	96.9		93.28	mg/Kg		78.8	115	4	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.7525	32	94.3037	mg/Kg	123	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.7525	32	94.5663	mg/Kg	123	75	125	0	20	

Sulfate, soluble (Water) D516-07 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513525													
WG513525ICB	ICB	01/28/21 8:49				U	mg/L		-3	3			
WG513525ICV	ICV	01/28/21 8:49	WI210121-1	20		20.6	mg/L	103	90	110			
WG513525LFB	LFB	01/28/21 9:48	WI210105-3	10		9.7	mg/L	97	90	110			
WG513432PBS	PBS	01/28/21 10:09				1.1	mg/L		-3	3			
L63831-01DUP	DUP	01/28/21 10:10			710	729	mg/L				3	20	
L63831-01AS	AS	01/28/21 10:10	SO4TURB5X	100	710	846.7	mg/L	137	90	110			M3

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	.01	%				200	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Worthington Miller Environmental, LLC ACZ Project ID: ***L63831***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
WG513840LCSS	LCSS	02/10/21 10:11	PCN62619	4.01		3.35	%	84	80	120			
L63799-01MS	MS	02/10/21 10:34	PCN62542	1.3	U	1.21	%	93	80	120			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Titanium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513532													
WG513532ICV	ICV	01/28/21 19:37	II210119-2	2		1.984	mg/L	99	90	110			
WG513532ICB	ICB	01/28/21 19:41				U	mg/L		-0.015	0.015			
WG513411PBS	PBS	01/28/21 20:04				U	mg/Kg		-1.5	1.5			
WG513411LCSS1	LCSS	01/28/21 20:08	PCN62459	417		463.6	mg/Kg		94.5	739			
WG513411LCSSD1	LCSSD	01/28/21 20:11	PCN62459	417		470.5	mg/Kg		94.5	739	1	20	
L63799-02MS	MS	01/28/21 20:30	II210108-2	100	6.27	112.6	mg/Kg	106	75	125			
L63799-02MSD	MSD	01/28/21 20:33	II210108-2	100	6.27	112.7	mg/Kg	106	75	125	0	20	
WG513872													
WG513872ICV	ICV	02/04/21 22:08	II210119-2	2		1.941	mg/L	97	90	110			
WG513872ICB	ICB	02/04/21 22:11				U	mg/L		-0.015	0.015			
WG513669PBS	PBS	02/04/21 22:35				U	mg/Kg		-1.5	1.5			
WG513669LCSS	LCSS	02/04/21 22:39	PCN62459	417		441.738	mg/Kg		94.5	739			
WG513669LCSSD	LCSSD	02/04/21 22:42	PCN62459	417		427.6	mg/Kg		94.5	739	3	20	
L63831-01MS	MS	02/04/21 22:57	II210129-2	101	260	463.287	mg/Kg	201	75	125			M1
L63831-01MSD	MSD	02/04/21 23:01	II210129-2	101	260	428.139	mg/Kg	166	75	125	8	20	M1

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513840													
WG513840PBS	PBS	02/10/21 10:00				U	%		-0.03	0.03			
L63799-01DUP	DUP	02/10/21 10:46			U	U	%				0	20	RA

Uranium, total (3050) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513503													
WG513503ICV	ICV	01/28/21 11:21	MS210115-2	.05		.04821	mg/L	96	90	110			
WG513503ICB	ICB	01/28/21 11:23				U	mg/L		-0.0003	0.0003			
WG513411PBS	PBS	01/28/21 11:33				U	mg/Kg		-0.15	0.15			
WG513411LCSS1	LCSS	01/28/21 11:35	PCN62459	37.1		32.72653	mg/Kg		28.6	45.7			
WG513411LCSSD1	LCSSD	01/28/21 11:37	PCN62459	37.1		32.37679	mg/Kg		28.6	45.7	1	20	
L63799-01MS	MS	01/28/21 11:41	MS201117-9	12.5	.819	13.34613	mg/Kg	100	75	125			
L63799-01MSD	MSD	01/28/21 11:42	MS201117-9	12.5	.819	13.27097	mg/Kg	100	75	125	1	20	

Worthington Miller Environmental, LLC

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NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Vanadium, total (3050) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG513798													
WG513798ICV	ICV	02/03/21 22:30	II210119-2	2		1.885	mg/L	94	90	110			
WG513798ICB	ICB	02/03/21 22:33				U	mg/L		-0.03	0.03			
WG513669PBS	PBS	02/03/21 22:57				U	mg/Kg		-1.5	1.5			
WG513669LCSS	LCSS	02/03/21 23:01	PCN62459	99.9		86.675	mg/Kg		78.9	121			
WG513669LCSSD	LCSSD	02/03/21 23:04	PCN62459	99.9		85.98	mg/Kg		78.9	121	1	20	
L63831-01MS	MS	02/03/21 23:31	II210129-2	50.4495	14.6	71.5686	mg/Kg	113	75	125			
L63831-01MSD	MSD	02/03/21 23:42	II210129-2	50.4495	14.6	71.7	mg/Kg	113	75	125	0	20	

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63831-01	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG514046	Calcium, extractable (NH4)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513529	Calcium, soluble (Water)	M6010D ICP	B1	Target analyte detected in prep / method blank at or above the method reporting limit. See Case Narrative.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG514062	Chloride, soluble (Water)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513504	Fluoride, soluble (Water)	SM4500F-C	DD	Sample required dilution due to matrix color or odor.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513490	Lithium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513490	Magnesium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG514046	Sodium, extractable (NH4)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513490	Sodium, soluble (Water)	M6010D ICP	DD	Sample required dilution due to matrix color or odor.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513525	Sulfate, soluble (Water)	D516-07 - Turbidimetric	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			D516-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63831-02	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513872	Boron, total (3050)	M6010D ICP	DB	Sample required dilution due to low bias result.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513872	Titanium, total (3050)	M6010D ICP	DB	Sample required dilution due to low bias result.
			M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63831-03	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513872	Titanium, total (3050)	M6010D ICP	DB	Sample required dilution due to low bias result.
			M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63831-04	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG514046	Calcium, extractable (NH4)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513490	Calcium, soluble (Water)	M6010D ICP	BA	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 20X the concentration in the method blank.
			M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG514062	Chloride, soluble (Water)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513504	Fluoride, soluble (Water)	SM4500F-C	DJ	Sample dilution required due to insufficient sample.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513490	Lithium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513490	Magnesium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					the analyte is not available.
	WG514046	Sodium, extractable (NH4)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513490	Sodium, soluble (Water)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513525	Sulfate, soluble (Water)	D516-07 - Turbidimetric	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			D516-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L63831-05	WG513798	Aluminum, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513988	Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			ASA No.9 29-2.2.4 Combustion/IR	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513532	Iron, total (3050)	M6010D ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Lithium, total (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513798	Potassium, total (3050)	M6010D ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG513532	Silicon, recoverable (3050)	M6010D ICP	ZQ	Analyte was not evaluated in the laboratory control standard. Either the analyte is not included in the scope of the analytical method or a commercial standard containing the analyte is not available.
	WG513840	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG513532	Titanium, total (3050)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG513840	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Cation Exchange Capacity (CEC)	USDA No. 60 (19)
Silicon, recoverable (3050)	M6010D ICP

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Carbon, total (TC)	ASA No.9 29-2.2.4 Combustion/IR
Carbon, total inorganic (TIC)	ASA No. 9 29-2.2.4 (calc TC - TOC)
Carbon, total organic (TOC)	ASA No.9 29-2.2.4 Combustion/IR
Moisture Content	D2216-80
Solids, Percent	D2216-80
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bicarbonate as CaCO3	SM2320B - Titration
Carbonate as CaCO3	SM2320B - Titration
Chloride, soluble (Water)	SM4500Cl-E
Fluoride, soluble (Water)	SM4500F-C
Hydroxide as CaCO3	SM2320B - Titration
Sulfate, soluble (Water)	D516-07 - Turbidimetric
Total Alkalinity	SM2320B - Titration

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Worthington Miller Environmental, LLC

ACZ Project ID: L63831
Date Received: 01/20/2021 16:06
Received By:
Date Printed: 1/21/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA34440	5.8	NA	15	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Worthington Miller Environmental, LLC

ACZ Project ID:	L63831
Date Received:	01/20/2021 16:06
Received By:	
Date Printed:	1/21/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L63831

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello	Address: P.O. Box 98, Highway 605
Company: Homestake Mining Company	Grants, NM 87020
E-mail: aarguello@barrick.com	Telephone: 505-287-4456

Copy of Report to:

Name: David Levy	E-mail: david.levy@wm-env.com
Company: Worthington Miller Environmental	Telephone: 970-443-0776

Invoice to:

Name: David Levy	Address: 1027 W. Horsetooth Rd. Ste. 200
Company: Worthington Miller Environmental	Fort Collins, CO 80526
E-mail: david.levy@wm-env.com	Telephone: 970-443-0776

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Matthew T Kearney **Sampler's Site Information** State NM Zip code 87020 Time Zone MST

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Quote Group HMC-GEOCHEM-2020

PO#: N/A

Reporting state for compliance testing: NA

Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Quote No. LOWER-CHINLE-S	Quote No. SAN-ANDRES-LS	Quote No. GLORIETA-SS	Bulk X-ray diffraction (subcontract)	Optical Mineralogy (subcontract)			
SAG1-CS-189-190	1/17/21 13:30	rock	1	X							
SAG1-SALS-235.5-236.5	1/17/21 13:55	rock	1		X		X	X			
SAG1-SALS-283-284	1/17/21 14:05	rock	1		X						
SAG1-GSS-426-427	1/17/21 14:30	rock	1			X					
SAG1-GSS-464-465	1/17/21 14:35	rock	1			X	X	X			

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Cation Exchange Capacity (CEC) is not needed for the two samples under Quote No. SAN-ANDRES-LS.

Mineralogy (XRD and optical) to be conducted only on two samples as indicated above.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Matthew T Kearney	1/18/21 1230		1/20/21 1606

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L63831 Chain of Custod

March 17, 2021

Mr. Scott Habermehl
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Dear Mr. Habermehl:

We have performed petrographic analysis on your two samples (client no. **L63831-02** and **L63831-05**).

Thank you for the opportunity to provide this service. If you have any questions, please call.

Sincerely,

Ron Schott
Analyst

12421 W. 49th Ave. ● Unit 6 ● Wheat Ridge, Colorado 80033
303-463-8270 ● Fax 303-463-8267 ● 800-852-7340
www.dcmsciencelab.com

12421 W. 49th Avenue, Unit #6
Wheat Ridge, CO 80033 - (303) 463-8270

Petrographic Analysis

Client:
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Analysis Date:	3-12-21
Reporting Date:	3-17-21
Receipt Date:	2-18-21
Client Job No.:	25714
Project Title:	None Given
DCMSL Project:	ACZ77

The purpose of the project is to determine the bulk mineralogy of two samples (client no. **L63831-02** and **L63831-05**). The samples were prepared as standard polished thin sections for study by reflected polarized light microscopy (RL) and transmitted polarized light microscopy (PL). Quantitative mineral estimates in this report are based on XRD results (ACZ78) in conjunction with microscopy work. Color photomicrographs are included to document relevant features.

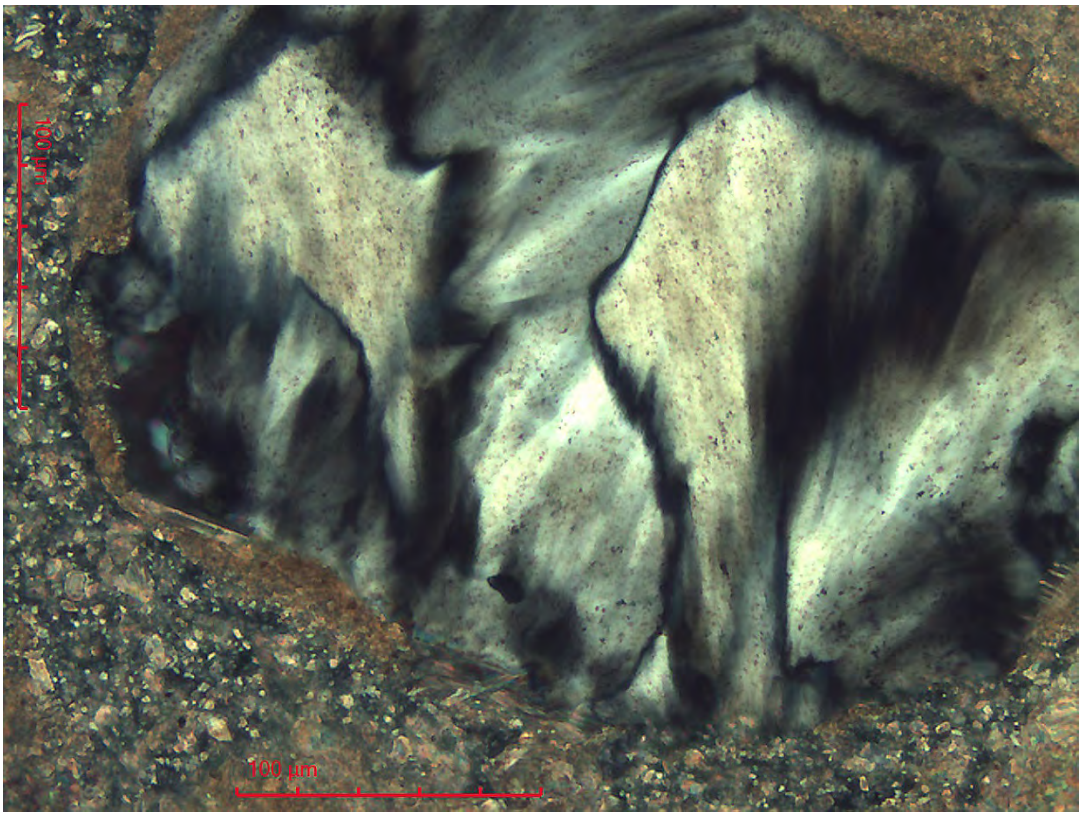
Client Sample No.: **L63831-02**

Microscopic Description

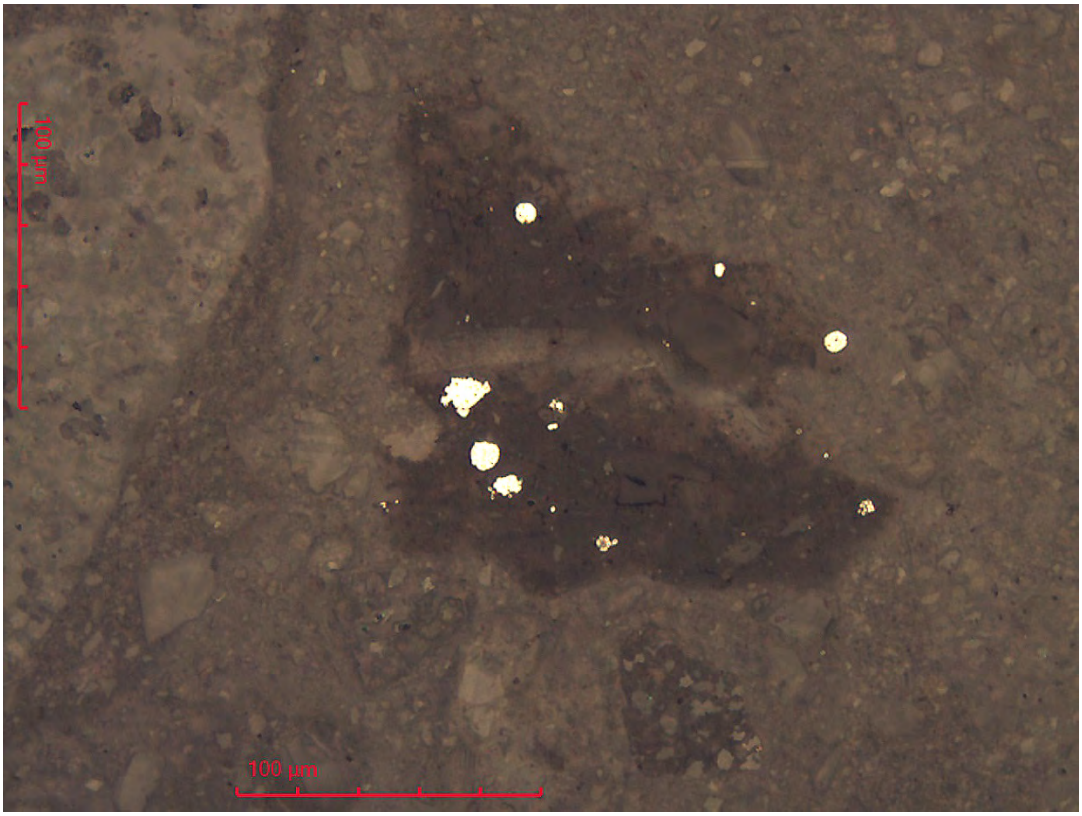
Major Mineralogy: Calcite 81% *Dolomite 18%* *Quartz 1%*

Trace Mineralogy: Pyrite, Goethite/Hematite, Mn Oxide, Organic Material

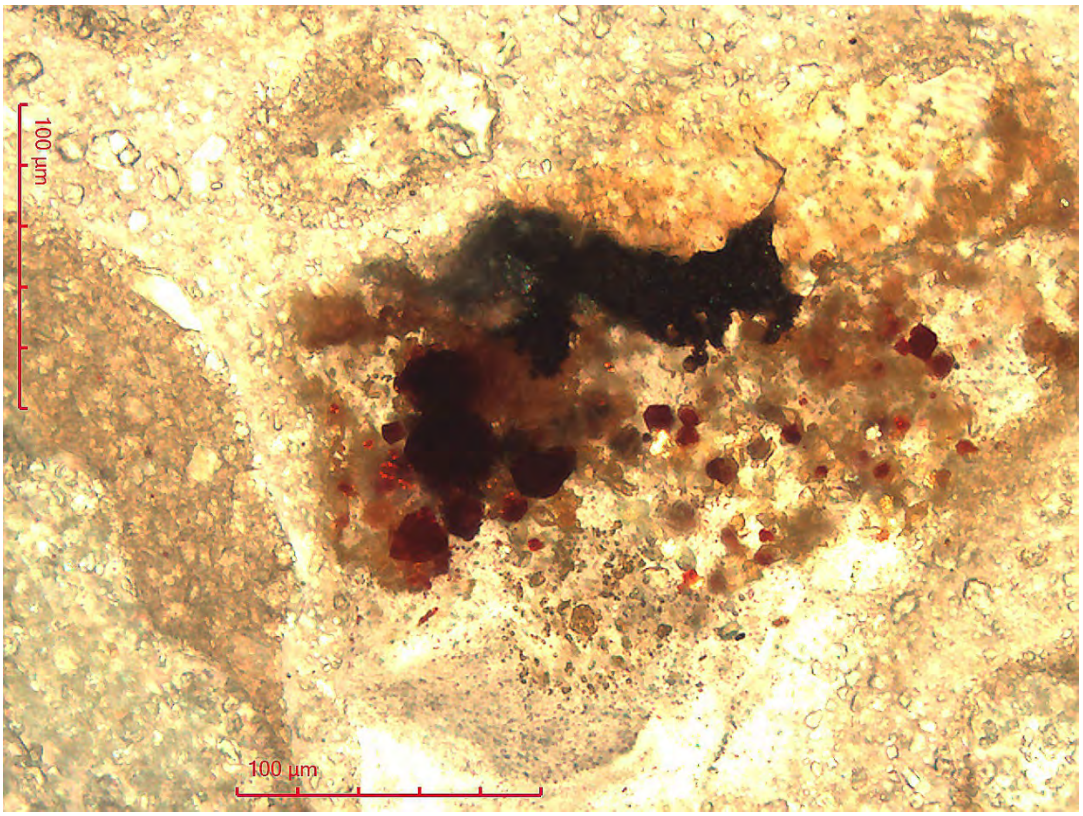
This sample is composed of a tan colored pulverized limestone. In thin section the mineralogy is simple. The primary phase is fine to coarse grained sparry calcite with a grain size that varies from 1µm to 250µm. Intermixed with calcite is rhomb shaped grains of dolomite up to 50µm. Quartz is present in low amounts and occurs as liberated angular fragments and small pockets of fibrous chalcedony up to 275µm in size. Crosscutting larger fragments of sparry calcite are thin seams of dark brown organic material. The organics commonly carry small pyrite framboids up to 15µm. Iron oxide is present in trace amounts and occurs as small masses and as pseudomorphs after pyrite. Iron oxide is sometimes seen with black opaque patches of Mn oxide.



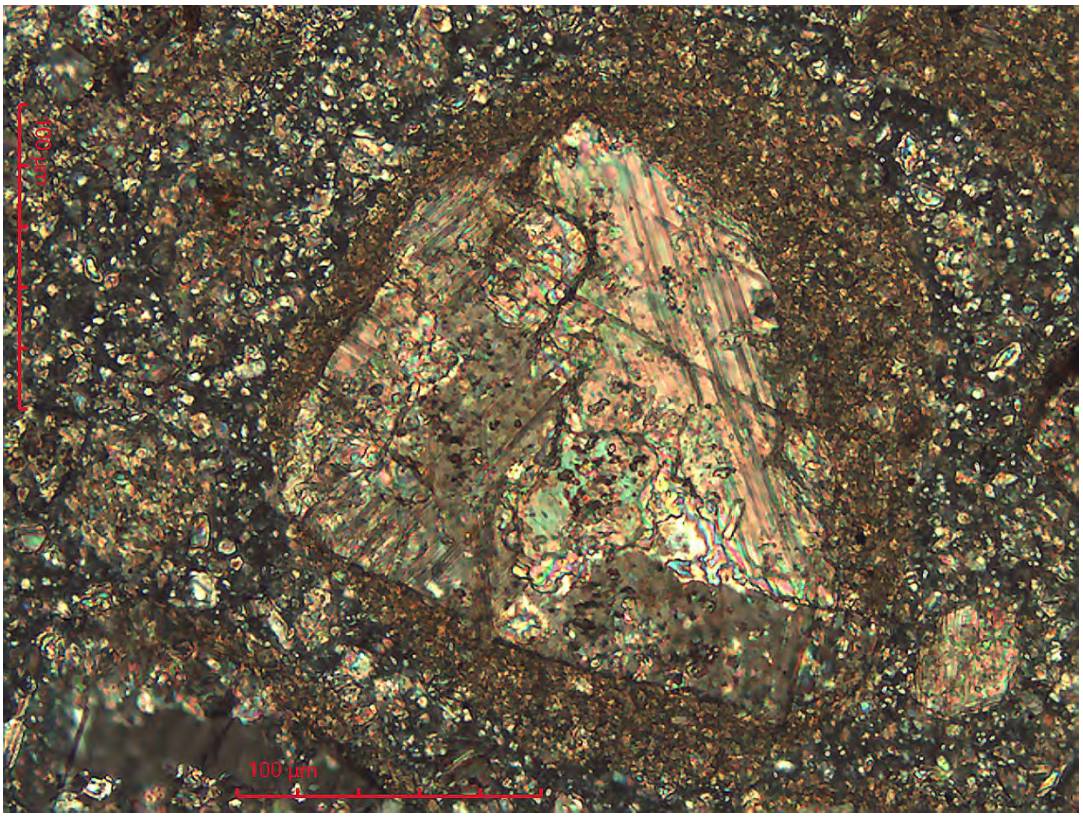
Client Sample No.: **L63831-02**
Liberated fragment of fibrous looking chalcedony – 200X PL



Client Sample No.: **L63831-02**
Several pyrite framboids included in brown organic material – 200X RL



Client Sample No.: **L63831-02**
Red iron oxide pseudomorphs after pyrite with a patch of black opaque Mn oxide in calcite – 200X PL



Client Sample No.: **L63831-02**
Fragment of sparry calcite surrounded by pulverized carbonate – 200X PL

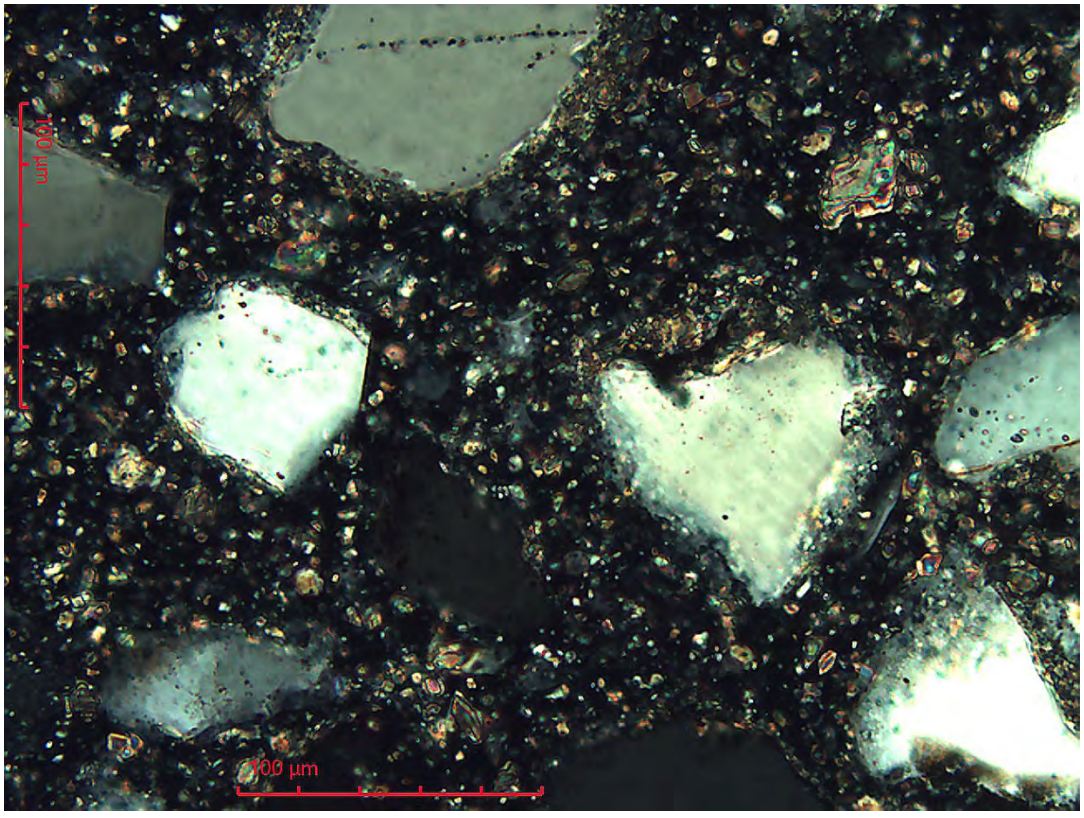
Client Sample No.: **L63831-05**

Microscopic Description

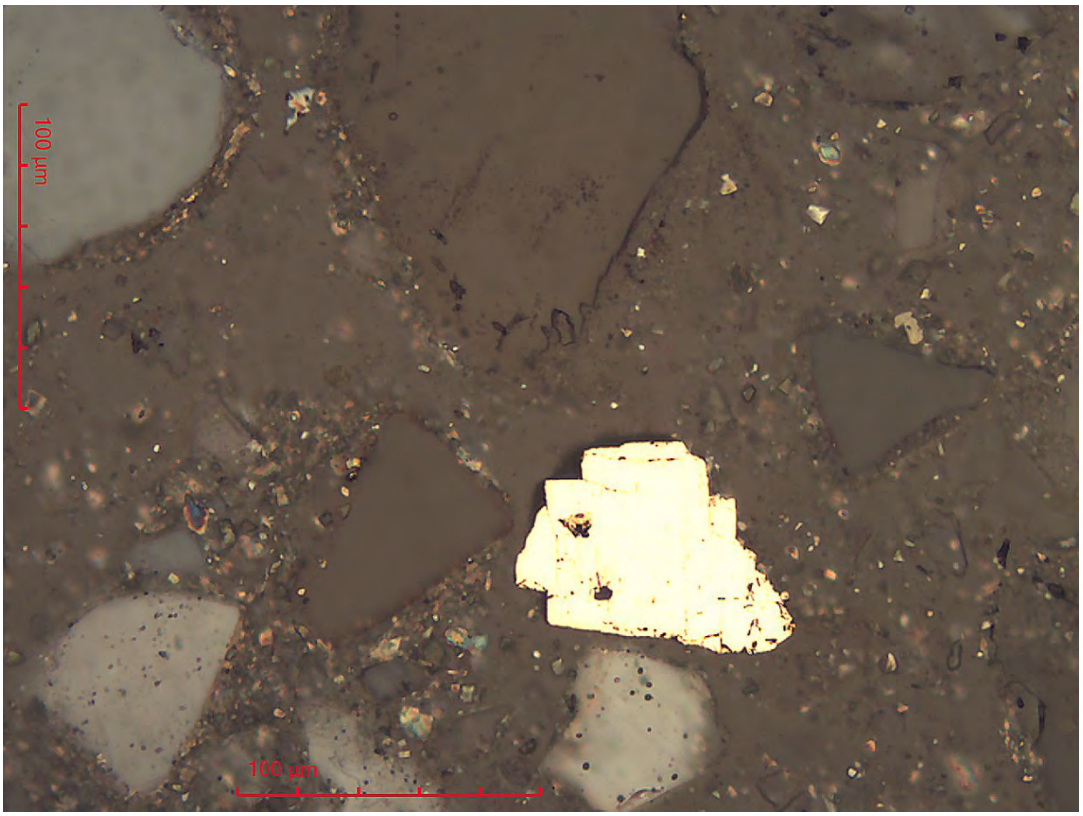
Major Mineralogy: Quartz 63% Kaolinite 12% Dolomite 10% K-spar 8%
Calcite 6% Illite 1%

Trace Mineralogy: Zircon, Rutile, Apatite, Pyrite, Tourmaline, Iron Oxide, Plagioclase

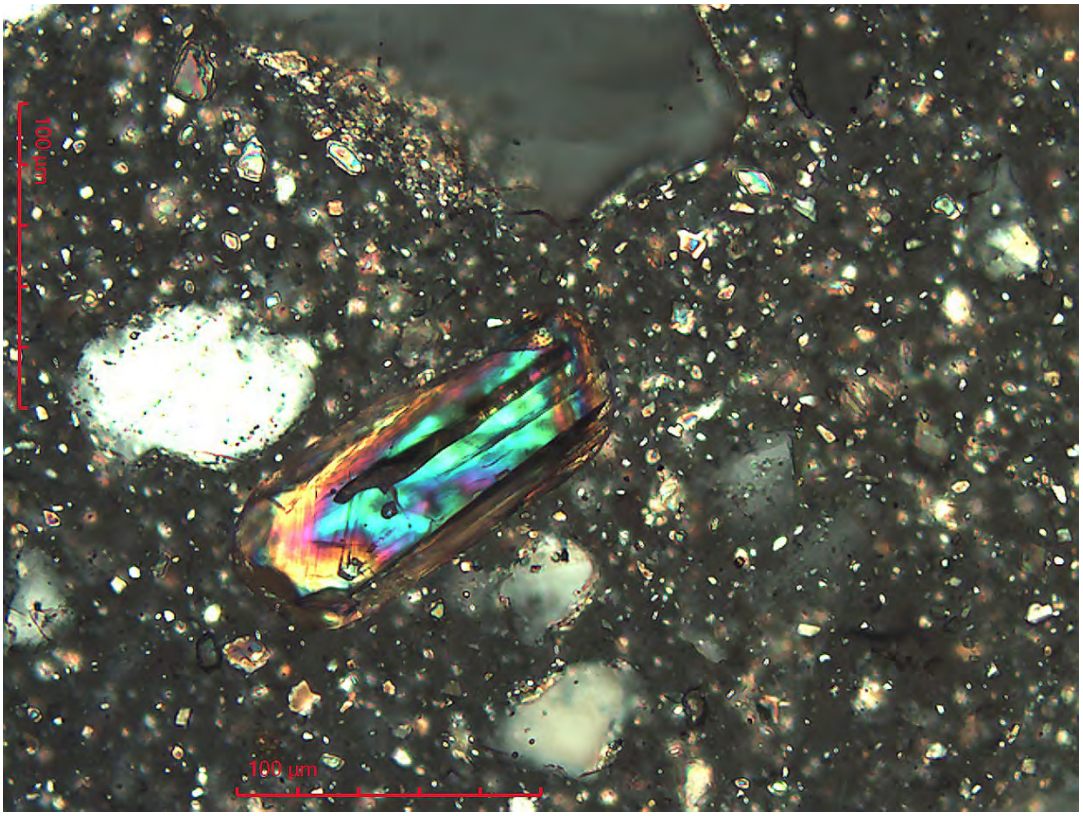
In thin section this sample appears to be a pulverized carbonate cemented sandstone. Quartz is the primary hard silicate and occurs as angular to well rounded grains with measurements that vary significantly from 1µm up to 300µm. Plagioclase and potassium feldspar are present in low amounts and occur as angular grains up to 150µm. XRD indicates low levels of clay in the form of kaolinite and illite, however, clay is not discernible in thin section by light microscopy. Dolomite and calcite are well represented and occur as fine liberated grains in the size range of 1µm to 75µm. Pyrite is present as a trace and occurs as liberated fragments and cubes up to 75µm. The sulfide shows no apparent oxidation. Accessory minerals include zircon, honey colored rutile, brown tourmaline, colorless apatite and iron oxide.



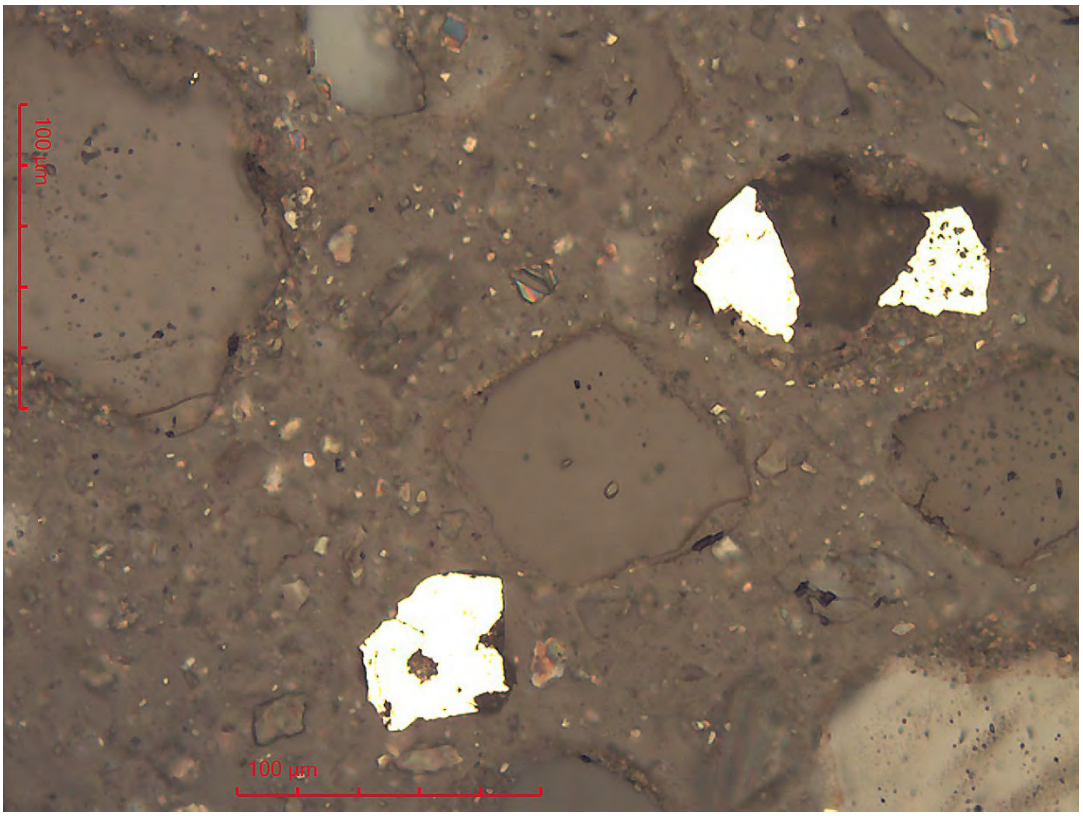
Client Sample No.: **L63831-05**
Area photo showing angular clasts of quartz/feldspar surrounded by fine grained carbonate – 200X PL



Client Sample No.: **L63831-05**
Blocky cube of liberated pyrite surrounded by quartz/feldspar and carbonate – 200X RL



Client Sample No.: **L63831-05**
Colorful zircon with quartz/feldspar and carbonate – 200X PL



Client Sample No.: **L63831-05**
Liberated fragments of pyrite surrounded by quartz/feldspar and carbonate – 200X RL

0290
ACZ77

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Scott Habermehl	Address: 2773 Downhill Dr.
Company: ACZ Labs	
E-mail: scotth@acz.com	Telephone: (970)879-6590 x101

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Accounts Payable	Address:
Company: ACZ Labs	
E-mail: vgault@acz.com	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☒

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: ______ **Sampler's Site Information State** CO **Zip code**______ **Time Zone**______

***Sampler's Signature:** ______ *I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: Subcontract

PO#: 25714

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	XRD Bulk	Optical Mineralogy						
L63831-02	1/17/21	RK	1	☒	☒	☐	☐	☐	☐	☐	☐
L63831-05	1/17/21	RK	1	☒	☒	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

DCM Science, 12421 W. 49th St. Unit 6, Wheat Ridge CO 80033 att. Ron Schott Contact: David Levy

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/17/21 15:00	D Harvey	2/18/21 10:38

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

Appendix H

Optical Mineralogy Reporting

March 17, 2021

Mr. Scott Habermehl
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Dear Mr. Habermehl:

We have performed petrographic analysis on your two samples (client no. **L63831-02** and **L63831-05**).

Thank you for the opportunity to provide this service. If you have any questions, please call.

Sincerely,

Ron Schott
Analyst

12421 W. 49th Ave. ● Unit 6 ● Wheat Ridge, Colorado 80033
303-463-8270 ● Fax 303-463-8267 ● 800-852-7340
www.dcmsciencelab.com

12421 W. 49th Avenue, Unit #6
Wheat Ridge, CO 80033 - (303) 463-8270

Petrographic Analysis

Client:
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Analysis Date:	3-12-21
Reporting Date:	3-17-21
Receipt Date:	2-18-21
Client Job No.:	25714
Project Title:	None Given
DCMSL Project:	ACZ77

The purpose of the project is to determine the bulk mineralogy of two samples (client no. **L63831-02** and **L63831-05**). The samples were prepared as standard polished thin sections for study by reflected polarized light microscopy (RL) and transmitted polarized light microscopy (PL). Quantitative mineral estimates in this report are based on XRD results (ACZ78) in conjunction with microscopy work. Color photomicrographs are included to document relevant features.

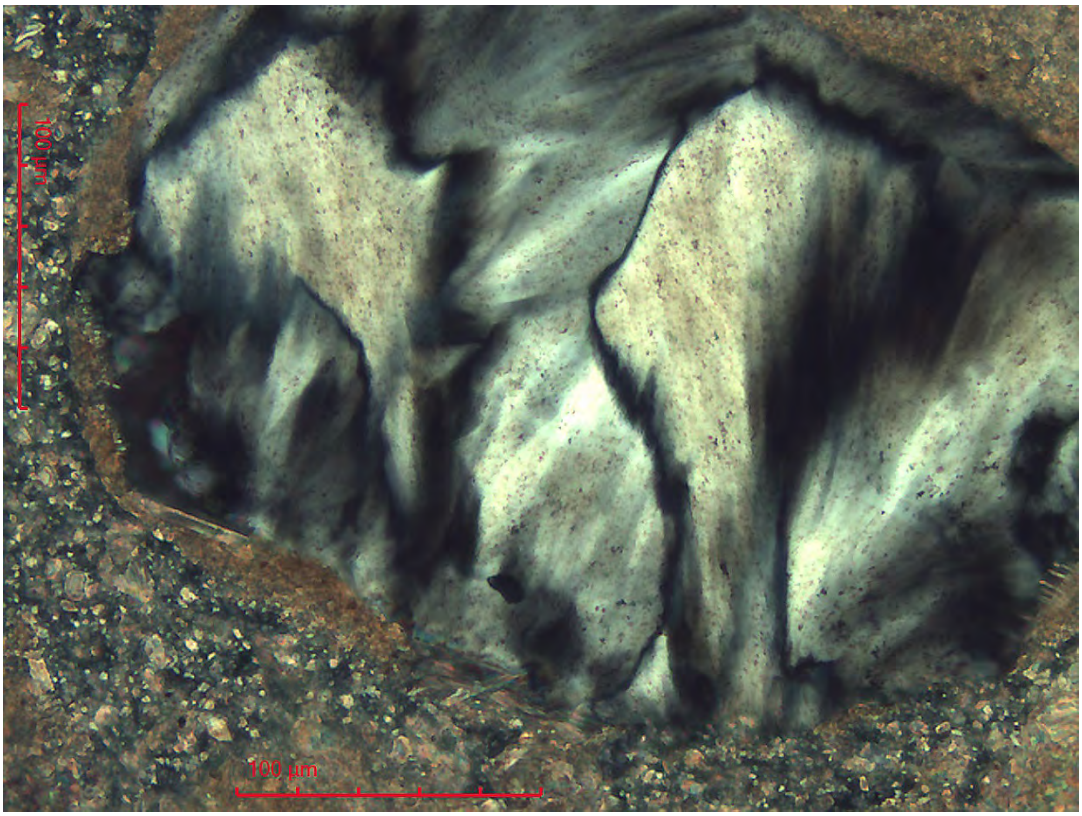
Client Sample No.: **L63831-02**

Microscopic Description

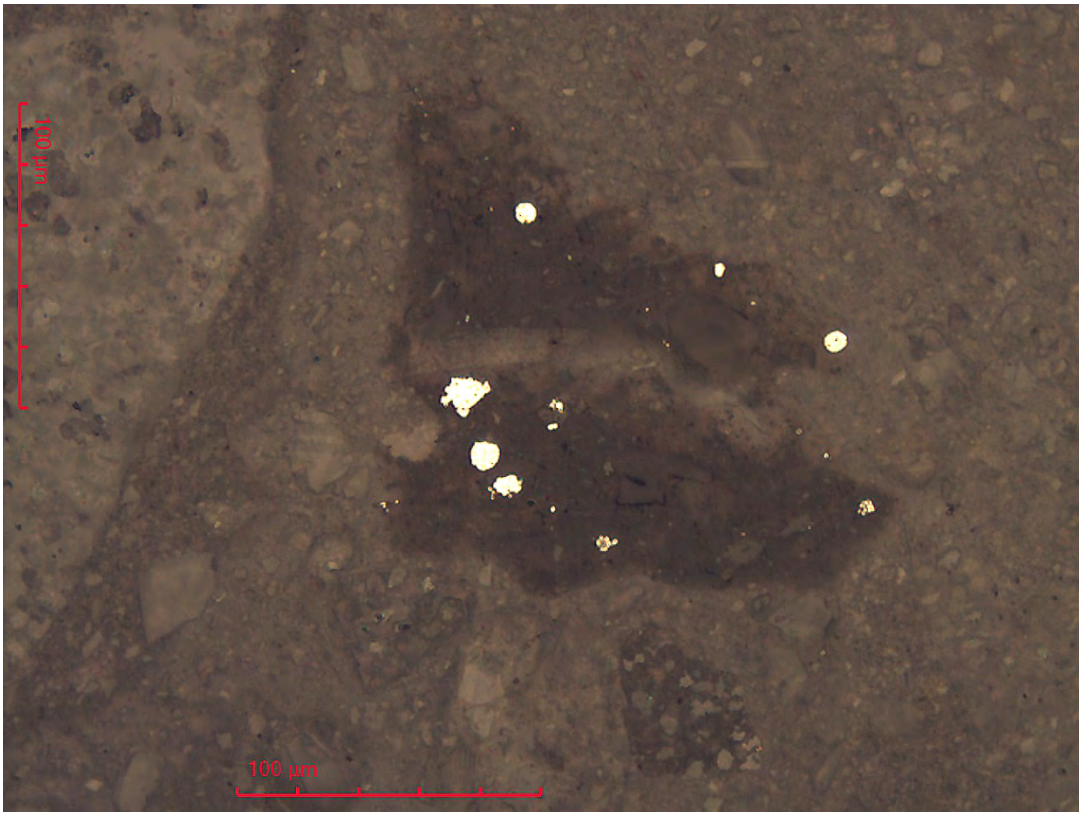
Major Mineralogy: Calcite 81% *Dolomite 18%* *Quartz 1%*

Trace Mineralogy: Pyrite, Goethite/Hematite, Mn Oxide, Organic Material

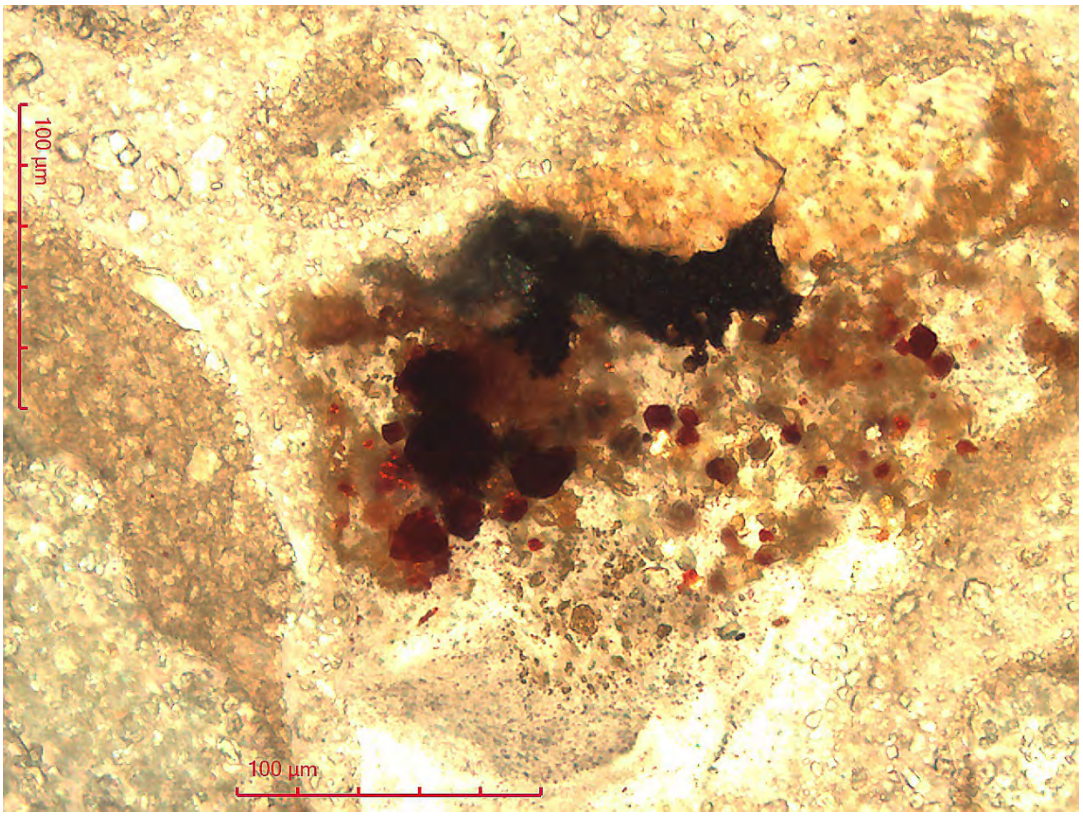
This sample is composed of a tan colored pulverized limestone. In thin section the mineralogy is simple. The primary phase is fine to coarse grained sparry calcite with a grain size that varies from 1µm to 250µm. Intermixed with calcite is rhomb shaped grains of dolomite up to 50µm. Quartz is present in low amounts and occurs as liberated angular fragments and small pockets of fibrous chalcedony up to 275µm in size. Crosscutting larger fragments of sparry calcite are thin seams of dark brown organic material. The organics commonly carry small pyrite framboids up to 15µm. Iron oxide is present in trace amounts and occurs as small masses and as pseudomorphs after pyrite. Iron oxide is sometimes seen with black opaque patches of Mn oxide.



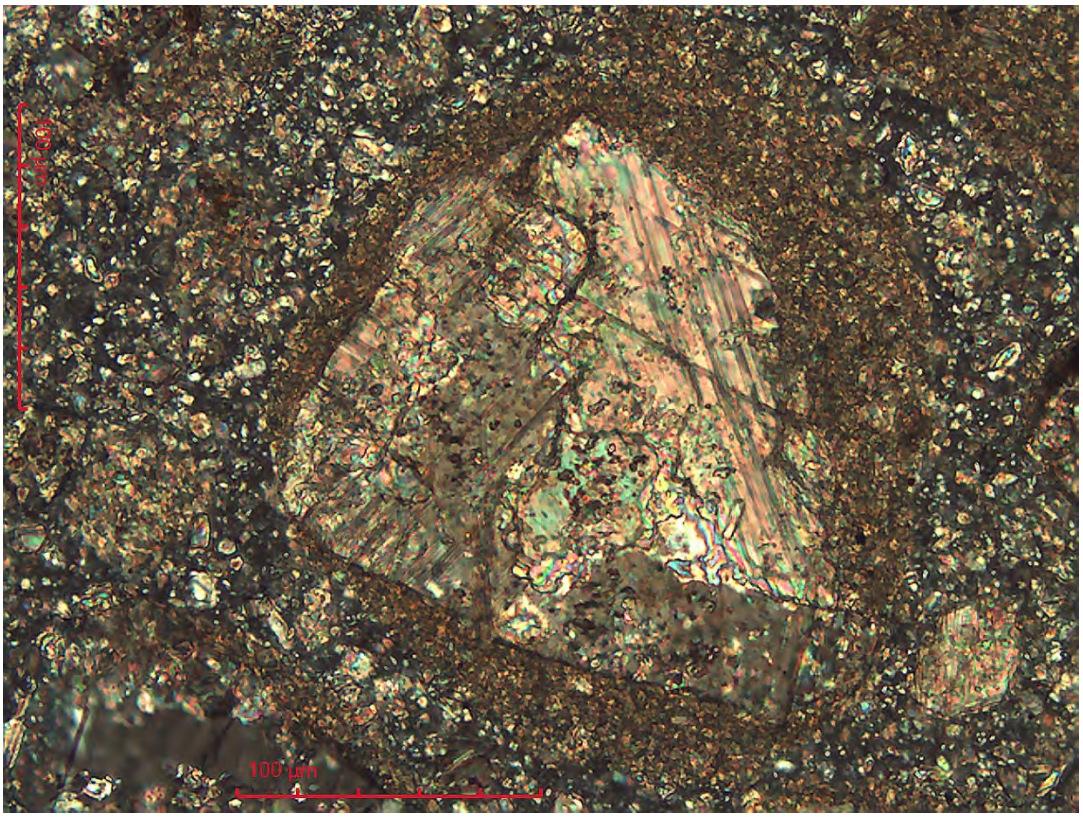
Client Sample No.: **L63831-02**
Liberated fragment of fibrous looking chalcedony – 200X PL



Client Sample No.: **L63831-02**
Several pyrite framboids included in brown organic material – 200X RL



Client Sample No.: **L63831-02**
Red iron oxide pseudomorphs after pyrite with a patch of black opaque Mn oxide in calcite – 200X PL



Client Sample No.: **L63831-02**
Fragment of sparry calcite surrounded by pulverized carbonate – 200X PL

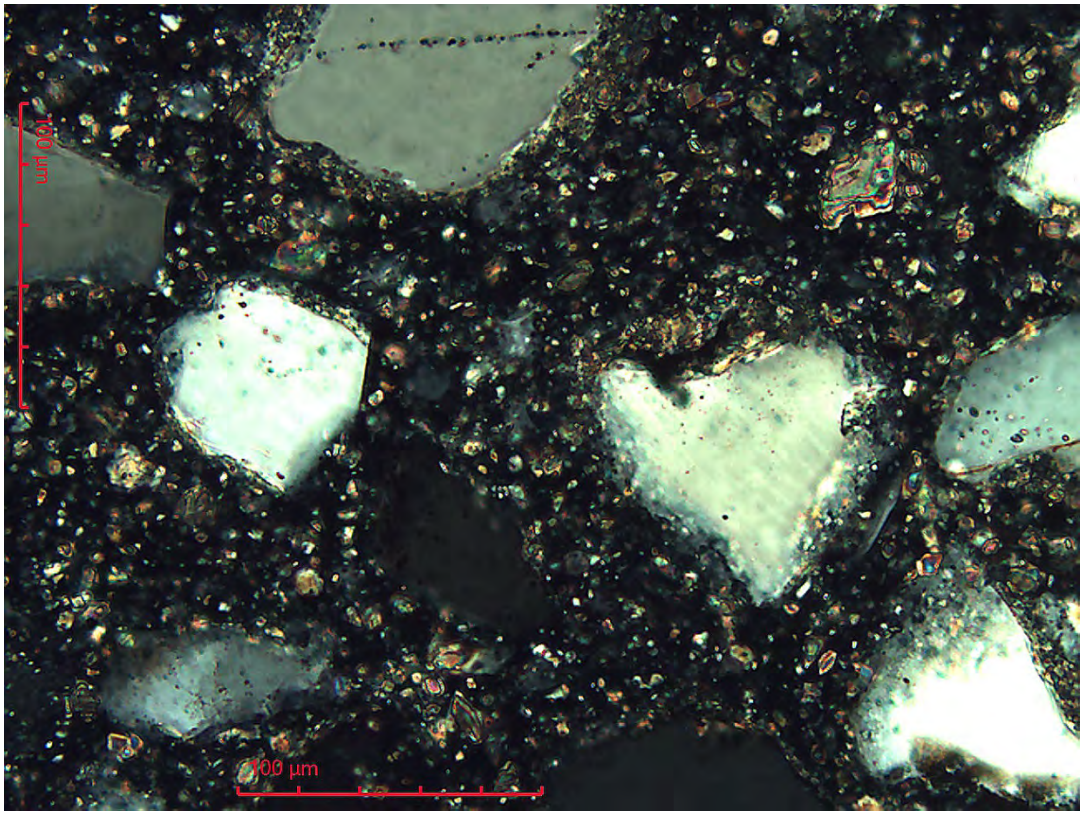
Client Sample No.: **L63831-05**

Microscopic Description

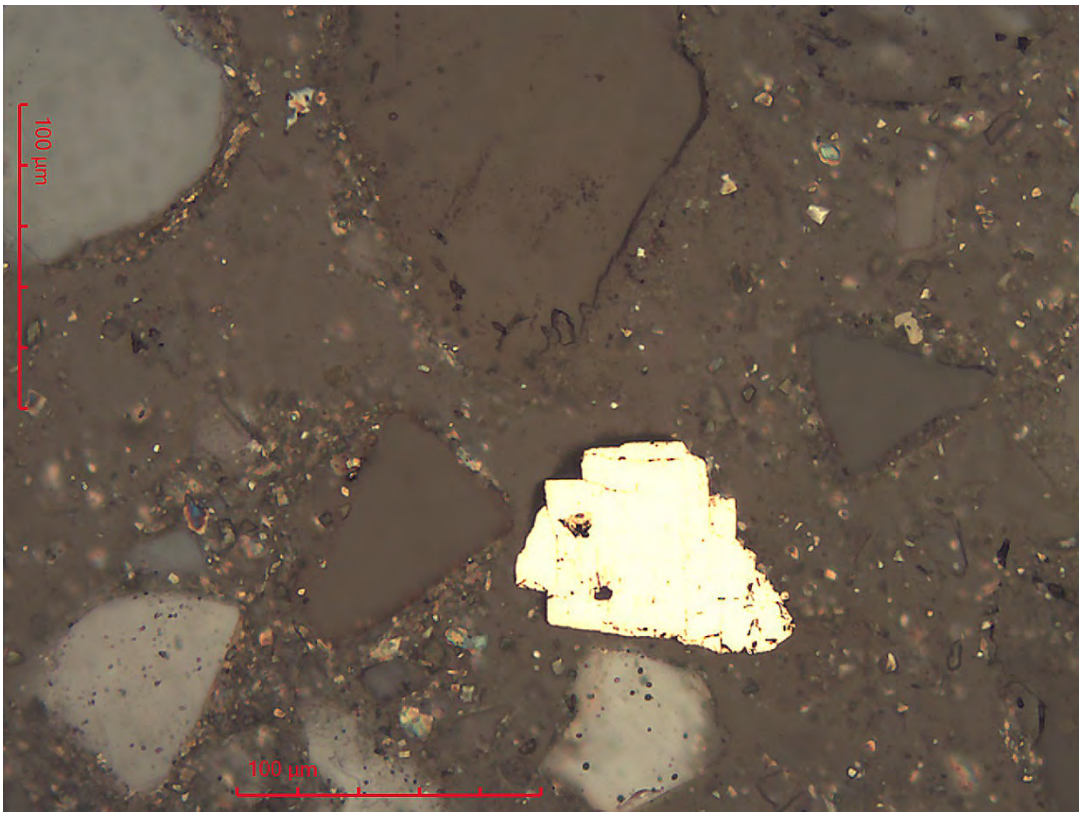
Major Mineralogy: Quartz 63% Kaolinite 12% Dolomite 10% K-spar 8%
Calcite 6% Illite 1%

Trace Mineralogy: Zircon, Rutile, Apatite, Pyrite, Tourmaline, Iron Oxide, Plagioclase

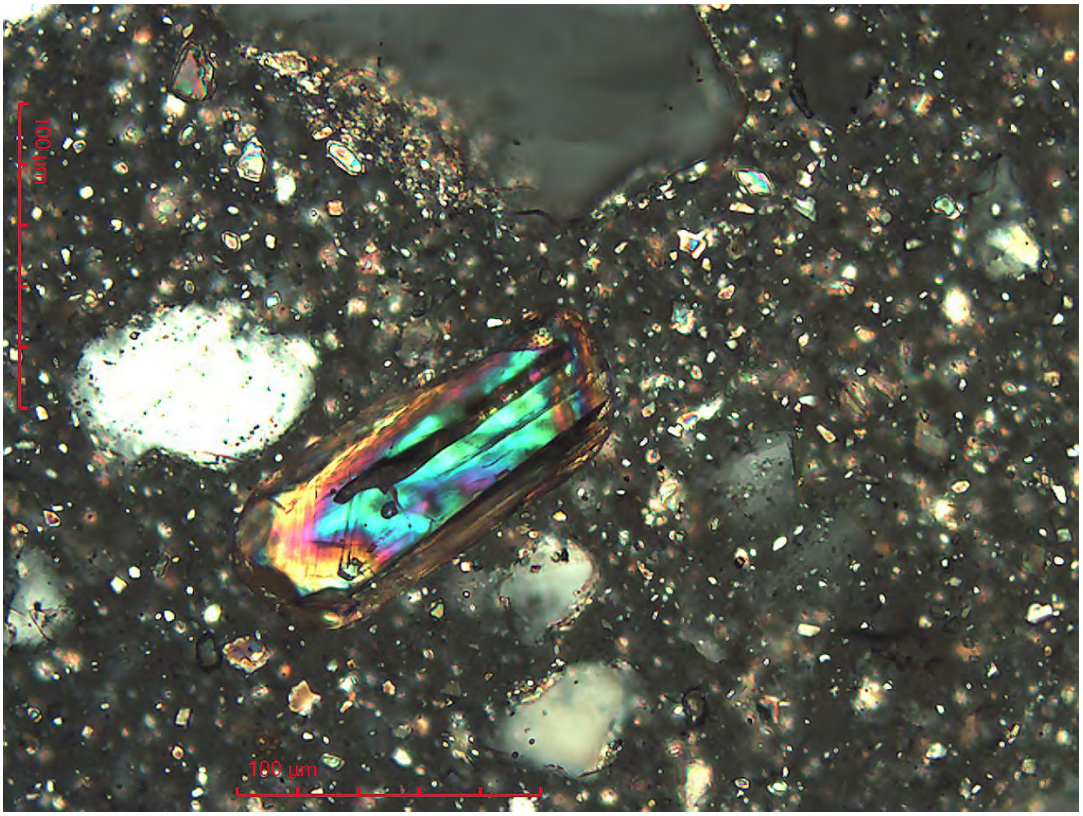
In thin section this sample appears to be a pulverized carbonate cemented sandstone. Quartz is the primary hard silicate and occurs as angular to well rounded grains with measurements that vary significantly from 1µm up to 300µm. Plagioclase and potassium feldspar are present in low amounts and occur as angular grains up to 150µm. XRD indicates low levels of clay in the form of kaolinite and illite, however, clay is not discernible in thin section by light microscopy. Dolomite and calcite are well represented and occur as fine liberated grains in the size range of 1µm to 75µm. Pyrite is present as a trace and occurs as liberated fragments and cubes up to 75µm. The sulfide shows no apparent oxidation. Accessory minerals include zircon, honey colored rutile, brown tourmaline, colorless apatite and iron oxide.



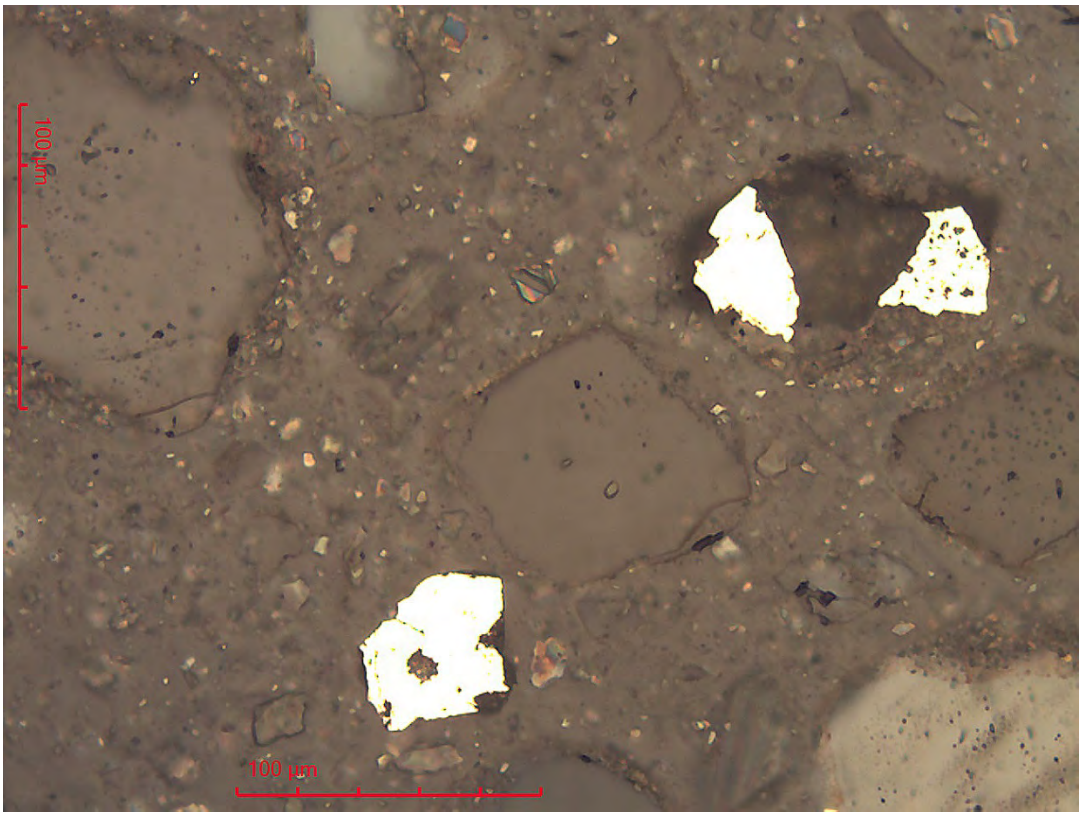
Client Sample No.: **L63831-05**
Area photo showing angular clasts of quartz/feldspar surrounded by fine grained carbonate – 200X PL



Client Sample No.: **L63831-05**
Blocky cube of liberated pyrite surrounded by quartz/feldspar and carbonate – 200X RL



Client Sample No.: **L63831-05**
Colorful zircon with quartz/feldspar and carbonate – 200X PL



Client Sample No.: **L63831-05**
Liberated fragments of pyrite surrounded by quartz/feldspar and carbonate – 200X RL

0290
ACZ77

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Scott Habermehl	Address: 2773 Downhill Dr.
Company: ACZ Labs	
E-mail: scotth@acz.com	Telephone: (970)879-6590 x101

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Accounts Payable	Address:
Company: ACZ Labs	
E-mail: vgault@acz.com	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☒
If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: ______ **Sampler's Site Information** **State** CO **Zip code** ______ **Time Zone** ______
***Sampler's Signature:** ______
*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: Subcontract
PO#: 25714
Reporting state for compliance testing:
Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	XRD Bulk	Optical Mineralogy						
L63831-02	1/17/21	RK	1	☒	☒	☐	☐	☐	☐	☐	☐
L63831-05	1/17/21	RK	1	☒	☒	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

DCM Science, 12421 W. 49th St. Unit 6, Wheat Ridge CO 80033 att. Ron Schott Contact: David Levy

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/17/21 15:00	D Harvey	2/18/21 10:38

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

Appendix I

Water Quality Reporting

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 26, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Use BILLING
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64441

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on February 25, 2021. This project has been assigned to ACZ's project number, L64441. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64441. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 25, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-1

ACZ Sample ID: ***L64441-01***
Date Sampled: *02/22/21 10:42*
Date Received: *02/25/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	135		*	mg/L	0.1	0.5	03/09/21 18:55	jlw
Iron, dissolved	M200.7 ICP	1	14.9			mg/L	0.06	0.15	03/09/21 18:55	jlw
Magnesium, dissolved	M200.7 ICP	1	45.5			mg/L	0.2	1	03/09/21 18:55	jlw
Manganese, dissolved	M200.7 ICP	1	0.821		*	mg/L	0.01	0.05	03/09/21 18:55	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0409			mg/L	0.0002	0.0005	03/04/21 11:02	mfm
Potassium, dissolved	M200.7 ICP	1	3.99			mg/L	0.2	1	03/09/21 18:55	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00023	B		mg/L	0.0001	0.00025	03/03/21 14:18	enb
Sodium, dissolved	M200.7 ICP	1	95.7			mg/L	0.2	1	03/09/21 18:55	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00175			mg/L	0.0001	0.0005	03/04/21 11:02	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/03/21 14:18	enb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	205			mg/L	2	20	03/02/21 0:00	jck
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/02/21 0:00	jck
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/02/21 0:00	jck
Total Alkalinity		1	205			mg/L	2	20	03/02/21 0:00	jck
Carbon, dissolved organic (DOC)	SM5310B	1	24.2		*	mg/L	1	5	03/12/21 21:52	ttg
Chloride	SM4500Cl-E	1	72.6		*	mg/L	0.5	2	03/10/21 13:30	bjp/wtc
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		524			mg/L	0.2	5	03/26/21 0:00	calc
Lab Filtration (0.45um filter)	SOPWC050	1							02/26/21 9:36	mlh
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/12/21 1:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.259		*	mg/L	0.05	0.2	03/17/21 13:16	syw
Residue, Filterable (TDS) @180C	SM2540C	5	860			mg/L	100	200	02/25/21 18:42	eep
Sulfate	D516-02/-07/-11 - Turbidimetric	20	399		*	mg/L	20	100	03/17/21 14:42	wtc
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	02/26/21 14:05	mlh

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company

ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515138													
WG515138PBW1	PBW	03/01/21 19:21				2.1	mg/L		-20	20			
WG515138LCSW3	LCSW	03/01/21 19:39	WC210217-1	820.0001		779.2	mg/L	95	90	110			
WG515138LCSW6	LCSW	03/01/21 22:48	WC210217-1	820.0001		780.2	mg/L	95	90	110			
WG515138PBW2	PBW	03/01/21 22:56				4.2	mg/L		-20	20			
WG515138LCSW9	LCSW	03/02/21 2:25	WC210217-1	820.0001		804.8	mg/L	98	90	110			
WG515138PBW3	PBW	03/02/21 2:33				2.8	mg/L		-20	20			
L64471-03DUP	DUP	03/02/21 4:15			106	106.1	mg/L				0	20	
WG515138LCSW12	LCSW	03/02/21 6:02	WC210217-1	820.0001		788.9	mg/L	96	90	110			
WG515138PBW4	PBW	03/02/21 6:10				U	mg/L		-20	20			
WG515138LCSW15	LCSW	03/02/21 9:21	WC210217-1	820.0001		810	mg/L	99	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	100		98.17	mg/L	98	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.3	0.3			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	68.00934		67.96	mg/L	100	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	68.00934	276	331.3	mg/L	81	85	115			M3
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	68.00934	276	330.4	mg/L	80	85	115	0	20	M3

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515785													
WG515785LFB	LFB	03/12/21 21:05	WI210128-1	50		49.6	mg/L	99	90	110			
L64484-01DUP	DUP	03/12/21 22:38			9.4	9.8	mg/L				4	20	RA
L64484-02AS	AS	03/12/21 23:23	WI210128-1	50	11.8	62.4	mg/L	101	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515599													
WG515599ICB	ICB	03/10/21 13:05				U	mg/L		-1.5	1.5			
WG515599ICV	ICV	03/10/21 13:05	WI200506-2	55.055		59.36	mg/L	108	90	110			
WG515599LFB1	LFB	03/10/21 13:28	WI200327-3	30.03		31.11	mg/L	104	90	110			
L64424-04DUP	DUP	03/10/21 13:30			74.4	74.37	mg/L				0	20	
L64424-05AS	AS	03/10/21 13:30	WI200327-3	30.03	66.8	89.01	mg/L	74	90	110			M2
WG515599LFB2	LFB	03/10/21 13:32	WI200327-3	30.03		31.3	mg/L	104	90	110			

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	2		1.935	mg/L	97	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.18	0.18			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	1.0018		1.005	mg/L	100	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	1.0018	.18	1.129	mg/L	95	85	115			
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	1.0018	.18	1.127	mg/L	95	85	115	0	20	

Homestake Mining Company ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	100		97.88	mg/L	98	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.6	0.6			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	50.00226		49.29	mg/L	99	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	50.00226	47	93.94	mg/L	94	85	115			
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	50.00226	47	93.81	mg/L	94	85	115	0	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	2		1.927	mg/L	96	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.03	0.03			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	.5005		.471	mg/L	94	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	.5005	12.3	12.09	mg/L	-42	85	115			M3
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	.5005	12.3	12.05	mg/L	-50	85	115	0	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515277													
WG515277ICV	ICV	03/04/21 10:25	MS210115-2	.01992		.0192	mg/L	96	90	110			
WG515277ICB	ICB	03/04/21 10:27				U	mg/L		-0.00044	0.00044			
WG515277LFB	LFB	03/04/21 10:39	MS201228-2	.0501		.04556	mg/L	91	85	115			
L64420-05AS	AS	03/04/21 10:48	MS201228-2	.0501	.00723	.05525	mg/L	96	70	130			
L64420-05ASD	ASD	03/04/21 10:50	MS201228-2	.0501	.00723	.0563	mg/L	98	70	130	2	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515731													
WG515731ICV	ICV	03/11/21 22:47	WI210302-17	2.416		2.302	mg/L	95	90	110			
WG515731ICB	ICB	03/11/21 22:48				U	mg/L		-0.02	0.02			
WG515735													
WG515735LFB	LFB	03/12/21 1:48	WI201001-11	2		1.801	mg/L	90	90	110			
L64441-01AS	AS	03/12/21 1:51	WI201001-11	2	U	1.854	mg/L	93	90	110			
L64532-01DUP	DUP	03/12/21 1:53			U	U	mg/L				0	20	RA

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515716													
WG515716ICV	ICV	03/17/21 13:01	WI210310-5	11.988		12.562	mg/L	105	90	110			
WG515716ICB	ICB	03/17/21 13:03				U	mg/L		-0.05	0.05			
WG515716LFB1	LFB	03/17/21 13:04	WI210310-4	10		10.003	mg/L	100	90	110			
L64408-02AS	AS	03/17/21 13:07	WI210310-4	10	U	10.287	mg/L	103	90	110			
L64409-01DUP	DUP	03/17/21 13:10			U	U	mg/L				0	20	RA
WG515716ICV1	ICV	03/17/21 15:05	WI210310-5	11.988		12.421	mg/L	104	90	110			
WG515716ICB1	ICB	03/17/21 15:07				U	mg/L		-0.05	0.05			
WG515716ICV2	ICV	03/17/21 16:10	WI210310-5	11.988		12.048	mg/L	101	90	110			
WG515716ICB2	ICB	03/17/21 16:11				U	mg/L		-0.05	0.05			
WG515716LFB2	LFB	03/17/21 16:24	WI210310-4	10		10.693	mg/L	107	90	110			

Homestake Mining Company

ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	20		19.88	mg/L	99	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.6	0.6			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	99.97791		99.67	mg/L	100	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	99.97791	3.61	104.9	mg/L	101	85	115			
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	99.97791	3.61	104.3	mg/L	101	85	115	1	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG514981													
WG514981PBW	PBW	02/25/21 18:20				U	mg/L		-20	20			
WG514981LCSW	LCSW	02/25/21 18:21	PCN62451	1000		978	mg/L	98	80	120			
L64442-09DUP	DUP	02/25/21 18:59			1710	1690	mg/L				1	10	

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515228													
WG515228ICV	ICV	03/03/21 12:51	MS210115-2	.05		.04864	mg/L	97	90	110			
WG515228ICB	ICB	03/03/21 12:54				U	mg/L		-0.00022	0.00022			
WG515228LFB	LFB	03/03/21 12:57	MS201228-2	.05		.04831	mg/L	97	85	115			
L64424-04AS	AS	03/03/21 13:54	MS201228-2	.1	.0036	.10236	mg/L	99	70	130			
L64424-04ASD	ASD	03/03/21 13:57	MS201228-2	.1	.0036	.09754	mg/L	94	70	130	5	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515523													
WG515523ICV	ICV	03/09/21 18:29	II210219-1	100		98.24	mg/L	98	95	105			
WG515523ICB	ICB	03/09/21 18:35				U	mg/L		-0.6	0.6			
WG515523LFB	LFB	03/09/21 18:49	II210301-2	100.0235		98.41	mg/L	98	85	115			
L64541-03AS	AS	03/09/21 19:08	II210301-2	100.0235	60.4	157.5	mg/L	97	85	115			
L64541-03ASD	ASD	03/09/21 19:11	II210301-2	100.0235	60.4	156.3	mg/L	96	85	115	1	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515987													
WG515987ICV	ICV	03/17/21 13:43	WI210317-2	20		20.6	mg/L	103	90	110			
WG515987ICB	ICB	03/17/21 13:43				U	mg/L		-3	3			
WG515987LFB	LFB	03/17/21 14:38	WI210317-1	25		9.4	mg/L		90	110			
L64424-03DUP	DUP	03/17/21 14:39			1420	1445.1	mg/L				2	20	
L64424-04AS	AS	03/17/21 14:48	SO4TURB	10	2090	2109.3	mg/L	193	90	110			M3

Homestake Mining Company

ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515028													
WG515028ICV	ICV	02/26/21 13:40	WC210226-3	.392		.42	mg/L	107	90	110			
WG515028ICB	ICB	02/26/21 13:42				U	mg/L		-0.05	0.05			
WG515028LFB	LFB	02/26/21 13:45	WC210226-6	.2417733		.269	mg/L	111	80	120			
L64430-01AS	AS	02/26/21 13:51	WC210226-6	.2417733	U	.279	mg/L	115	75	125			
L64430-01ASD	ASD	02/26/21 13:54	WC210226-6	.2417733	U	.291	mg/L	120	75	125	4	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515277													
WG515277ICV	ICV	03/04/21 10:25	MS210115-2	.05		.05025	mg/L	101	90	110			
WG515277ICB	ICB	03/04/21 10:27				U	mg/L		-0.00022	0.00022			
WG515277LFB	LFB	03/04/21 10:39	MS201228-2	.05		.04723	mg/L	94	85	115			
L64420-05AS	AS	03/04/21 10:48	MS201228-2	.05	.00828	.0608	mg/L	105	70	130			
L64420-05ASD	ASD	03/04/21 10:50	MS201228-2	.05	.00828	.06081	mg/L	105	70	130	0	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515228													
WG515228ICV	ICV	03/03/21 12:51	MS210115-2	.05		.04731	mg/L	95	90	110			
WG515228ICB	ICB	03/03/21 12:54				U	mg/L		-0.0011	0.0011			
WG515228LFB	LFB	03/03/21 12:57	MS201228-2	.05		.04682	mg/L	94	85	115			
L64424-04AS	AS	03/03/21 13:54	MS201228-2	.1	U	.08432	mg/L	84	70	130			
L64424-04ASD	ASD	03/03/21 13:57	MS201228-2	.1	U	.08446	mg/L	84	70	130	0	20	

Inorganic Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64441***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64441-01	WG515523	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515785	Carbon, dissolved organic (DOC)	SM5310B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515599	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515523	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515735	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515716	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515987	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-1
Locator:

ACZ Sample ID: ***L64441-01***
Date Sampled: *02/22/21 10:42*
Date Received: *02/25/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:05		1	0.22	0.21	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/24/21 14:21		0.33	1	2.4	pCi/L	*	fdw

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		1.55	1.1	1.5	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515604																
WG515604PBW	PBW	03/16/21						.03	0.07	0.13			0.26			
WG515604LCSW	LCSW	03/16/21	PCN62879	20				23	0.69	0.14	115	43	148			
L64435-02DUP	DUP-RPD	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				67	20	RG
L64435-02DUP	DUP-RER	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				0.25	2	
L64507-01DUP	DUP-RPD	03/16/21			0.1	0.08	0.09	.11	0.1	0.21				10	20	
L64502-03MS	MS	03/16/21	PCN62879	40	0.16	0.1	0.1	36	1	0.14	90	43	148			

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515708																
WG515708PBW	PBW	03/24/21						.32	0.68	0.7			1.4			
L64441-01DUP	DUP-RPD	03/24/21			0.33	1	2.4	0	1	2.4				200	20	RG
L64441-01DUP	DUP-RER	03/24/21			0.33	1	2.4	0	1	2.4				0.23	2	
WG515708LCSW	LCSW	03/24/21	PCN61541	9.1				11	1.3	0.94	121	47	123			
L64571-05MS	MS	03/24/21	PCN61541	91	240	18	23	180	13	17	-66	47	123			M3
L64494-03DUP	DUP-RPD	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				173	20	RG
L64494-03DUP	DUP-RER	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				0.41	2	

ACZ Laboratories, Inc.
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Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64441***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64441***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64441-01	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515708	Radium 228, dissolved	M904.0	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64441
Date Received: 02/25/2021 11:28
Received By:
Date Printed: 2/26/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?	X		

A change was made in the Report to: Address section prior to ACZ custody.

A change was made in the Report to: Address section prior to ACZ custody.

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA34629	5	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s) but was thawed by receipt at ACZ.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64441
Date Received: 02/25/2021 11:28
Received By:
Date Printed: 2/26/2021

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64441

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: aarguello@barrick.com
Address: PO Box 98
Grants NM 87020
Telephone: 505-285-1041

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: aarguello@barrick.com
Address: PO Box 98
Grants NM 87020
Telephone: 505-285-1041

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information** State ~~NM~~ NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered freud and punishable by State Law.

PROJECT INFORMATION

Quote #: Bottle Order B046704
PO#: 4500091369
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	B046704
SAG1-1	2/22/2021 1042	GW	8	X

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/23/21 16:30	[signature]	2/23/21 1128

L64441 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 26, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Use BILLING
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID:
ACZ Project ID: L64484

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on February 26, 2021. This project has been assigned to ACZ's project number, L64484. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64484. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 25, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Case Narrative

Homestake Mining Company

March 26, 2021

Project ID:
ACZ Project ID: L64484

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 2 groundwater samples from Homestake Mining Company on February 26, 2021. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L64484. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic, radiochemistry parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. (N1) Applies to: /TOTAL DISSOLVED SOLIDS

Oven range is 80 C to 91 C. Over the weekend, the oven had a minor exceedance hit in oven temperature. When the oven temperature was checked on Monday 3/1/21, the max temp read at 94.1 C. The WG was removed from the oven on 3/1/21 when the oven was back in range. The WG was examined and there was no splattering of samples.

Homestake Mining Company
Project ID:
Sample ID: SAG1-2

ACZ Sample ID: ***L64484-01***
Date Sampled: *02/23/21 13:51*
Date Received: *02/26/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	144		*	mg/L	0.1	0.5	03/10/21 12:23	jlw
Iron, dissolved	M200.7 ICP	1	0.924			mg/L	0.06	0.15	03/11/21 15:34	jlw
Magnesium, dissolved	M200.7 ICP	1	47.4			mg/L	0.2	1	03/10/21 12:23	jlw
Manganese, dissolved	M200.7 ICP	1	4.33		*	mg/L	0.01	0.05	03/10/21 12:23	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0292			mg/L	0.0002	0.0005	03/04/21 11:44	enb
Potassium, dissolved	M200.7 ICP	1	4.82			mg/L	0.2	1	03/10/21 12:23	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00021	B		mg/L	0.0001	0.00025	03/04/21 11:44	enb
Sodium, dissolved	M200.7 ICP	1	123			mg/L	0.2	1	03/10/21 12:23	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00703			mg/L	0.0001	0.0005	03/04/21 11:44	enb
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/04/21 11:44	enb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	201			mg/L	2	20	03/06/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/06/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/06/21 0:00	eep
Total Alkalinity		1	201			mg/L	2	20	03/06/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	9.4		*	mg/L	1	5	03/12/21 22:27	ttg
Chloride	SM4500Cl-E	1	94.3		*	mg/L	0.5	2	03/16/21 15:02	bjp/syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		555			mg/L	0.2	5	03/26/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/13/21 0:36	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.739		*	mg/L	0.05	0.2	03/17/21 20:35	wtc/syw
Residue, Filterable (TDS) @180C	SM2540C	10	1120		*	mg/L	200	400	02/26/21 19:52	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	50	461		*	mg/L	50	250	03/17/21 14:42	wtc
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 17:40	eep

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Homestake Mining Company
Project ID:
Sample ID: SAG1-3

ACZ Sample ID: ***L64484-02***
Date Sampled: *02/23/21 15:52*
Date Received: *02/26/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	170		*	mg/L	0.1	0.5	03/10/21 12:26	jlw
Iron, dissolved	M200.7 ICP	1	1.03			mg/L	0.06	0.15	03/11/21 15:37	jlw
Magnesium, dissolved	M200.7 ICP	1	50.5			mg/L	0.2	1	03/10/21 12:26	jlw
Manganese, dissolved	M200.7 ICP	1	7.61		*	mg/L	0.01	0.05	03/10/21 12:26	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0351			mg/L	0.0002	0.0005	03/04/21 11:53	enb
Potassium, dissolved	M200.7 ICP	1	4.87			mg/L	0.2	1	03/10/21 12:26	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00037			mg/L	0.0001	0.00025	03/04/21 11:53	enb
Sodium, dissolved	M200.7 ICP	1	123			mg/L	0.2	1	03/10/21 12:26	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00537			mg/L	0.0001	0.0005	03/04/21 11:53	enb
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/04/21 11:53	enb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	174			mg/L	2	20	03/06/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/06/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/06/21 0:00	eep
Total Alkalinity		1	174			mg/L	2	20	03/06/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	11.8		*	mg/L	1	5	03/12/21 23:10	ttg
Chloride	SM4500Cl-E	1	91.4		*	mg/L	0.5	2	03/16/21 15:02	bjp/syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		632			mg/L	0.2	5	03/26/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U		mg/L	0.02	0.1	03/13/21 0:38	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.579		*	mg/L	0.05	0.2	03/17/21 20:36	wtc/syw
Residue, Filterable (TDS) @180C	SM2540C	10	1140		*	mg/L	200	400	02/26/21 19:54	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	629		*	mg/L	20	100	03/18/21 14:05	wtc
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 17:45	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515410													
WG515410PBW1	PBW	03/06/21 15:11				2.9	mg/L		-20	20			
WG515410LCSW3	LCSW	03/06/21 15:30	WC210305-1	820.0001		770.4	mg/L	94	90	110			
WG515410LCSW6	LCSW	03/06/21 18:22	WC210305-1	820.0001		774.5	mg/L	94	90	110			
WG515410PBW2	PBW	03/06/21 18:29				3.1	mg/L		-20	20			
L64543-01DUP	DUP	03/06/21 21:28			109	109.1	mg/L				0	20	
WG515410LCSW9	LCSW	03/06/21 21:48	WC210305-1	820.0001		782	mg/L	95	90	110			
WG515410PBW3	PBW	03/06/21 21:55				2.2	mg/L		-20	20			
WG515410LCSW12	LCSW	03/07/21 1:02	WC210305-1	820.0001		772.1	mg/L	94	90	110			
WG515410PBW4	PBW	03/07/21 1:08				3.2	mg/L		-20	20			
WG515410LCSW15	LCSW	03/07/21 4:46	WC210305-1	820.0001		786.6	mg/L	96	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515583													
WG515583ICV	ICV	03/10/21 11:41	II210219-1	100		99.3	mg/L	99	95	105			
WG515583ICB	ICB	03/10/21 11:47				U	mg/L		-0.3	0.3			
WG515583LFB	LFB	03/10/21 12:00	II210301-2	68.00934		67.78	mg/L	100	85	115			
L64484-02AS	AS	03/10/21 12:29	II210301-2	68.00934	170	225.5	mg/L	82	85	115			MA
L64484-02ASD	ASD	03/10/21 12:39	II210301-2	68.00934	170	229	mg/L	87	85	115	2	20	

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515785													
WG515785LFB	LFB	03/12/21 21:05	WI210128-1	50		49.6	mg/L	99	90	110			
L64484-01DUP	DUP	03/12/21 22:38			9.4	9.8	mg/L				4	20	RA
L64484-02AS	AS	03/12/21 23:23	WI210128-1	50	11.8	62.4	mg/L	101	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515920													
WG515920ICB	ICB	03/16/21 14:08				U	mg/L		-1.5	1.5			
WG515920ICV	ICV	03/16/21 14:08	WI200506-2	55.055		59.03	mg/L	107	90	110			
WG515920LFB1	LFB	03/16/21 15:02	WI200327-3	30.03		30.52	mg/L	102	90	110			
L64484-01DUP	DUP	03/16/21 15:02			94.3	92.98	mg/L				1	20	
WG515920LFB2	LFB	03/16/21 15:05	WI200327-3	30.03		30.71	mg/L	102	90	110			
L64476-09AS	AS	03/16/21 16:03	5XCL	30	2.81	28.05	mg/L	84	90	110			M2

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515612													
WG515612ICV	ICV	03/11/21 14:52	II210219-1	2		1.953	mg/L	98	95	105			
WG515612ICB	ICB	03/11/21 14:58				U	mg/L		-0.18	0.18			
WG515612LFB	LFB	03/11/21 15:11	II210301-2	1.0018		.975	mg/L	97	85	115			
L64484-02AS	AS	03/11/21 15:40	II210301-2	1.0018	1.03	1.897	mg/L	87	85	115			
L64484-02ASD	ASD	03/11/21 15:50	II210301-2	1.0018	1.03	1.935	mg/L	90	85	115	2	20	

Homestake Mining Company ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515583													
WG515583ICV	ICV	03/10/21 11:41	II210219-1	100		98.75	mg/L	99	95	105			
WG515583ICB	ICB	03/10/21 11:47				U	mg/L		-0.6	0.6			
WG515583LFB	LFB	03/10/21 12:00	II210301-2	50.00226		49.27	mg/L	99	85	115			
L64484-02AS	AS	03/10/21 12:29	II210301-2	50.00226	50.5	96.27	mg/L	92	85	115			
L64484-02ASD	ASD	03/10/21 12:39	II210301-2	50.00226	50.5	97.63	mg/L	94	85	115	1	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515583													
WG515583ICV	ICV	03/10/21 11:41	II210219-1	2		1.967	mg/L	98	95	105			
WG515583ICB	ICB	03/10/21 11:47				U	mg/L		-0.03	0.03			
WG515583LFB	LFB	03/10/21 12:00	II210301-2	.5005		.466	mg/L	93	85	115			
L64484-02AS	AS	03/10/21 12:29	II210301-2	.5005	7.61	7.517	mg/L	-19	85	115			M3
L64484-02ASD	ASD	03/10/21 12:39	II210301-2	.5005	7.61	7.62	mg/L	2	85	115	1	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515279													
WG515279ICV	ICV	03/04/21 10:43	MS210115-2	.01992		.02053	mg/L	103	90	110			
WG515279ICB	ICB	03/04/21 10:46				U	mg/L		-0.00044	0.00044			
WG515279LFB	LFB	03/04/21 10:49	MS201228-2	.0501		.05129	mg/L	102	85	115			
L64484-01AS	AS	03/04/21 11:47	MS201228-2	.0501	.0292	.07809	mg/L	98	70	130			
L64484-01ASD	ASD	03/04/21 11:50	MS201228-2	.0501	.0292	.07862	mg/L	99	70	130	1	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515797													
WG515797ICV	ICV	03/12/21 23:16	WI210302-17	2.416		2.367	mg/L	98	90	110			
WG515797ICB	ICB	03/12/21 23:17				U	mg/L		-0.02	0.02			
WG515799													
WG515799LFB	LFB	03/13/21 0:17	WI201001-11	2		2.088	mg/L	104	90	110			
L64435-01AS	AS	03/13/21 0:20	WI201001-11	2	U	2.151	mg/L	108	90	110			
L64435-02DUP	DUP	03/13/21 0:22			U	U	mg/L				0	20	RA
L64484-02AS	AS	03/13/21 0:39	WI201001-11	2	U	2.115	mg/L	106	90	110			
L64553-01DUP	DUP	03/13/21 0:41			.203	.203	mg/L				0	20	

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516014													
WG516014ICV	ICV	03/17/21 19:01	WI210310-5	11.988		12.285	mg/L	102	90	110			
WG516014ICB	ICB	03/17/21 19:02				U	mg/L		-0.05	0.05			
WG516016													
WG516016LFB	LFB	03/17/21 20:27	WI210310-4	10		10.768	mg/L	108	90	110			
L64469-03AS	AS	03/17/21 20:30	WI210310-4	10	.667	11.123	mg/L	105	90	110			
L64469-04DUP	DUP	03/17/21 20:33			U	U	mg/L				0	20	RA

Homestake Mining Company ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515583													
WG515583ICV	ICV	03/10/21 11:41	II210219-1	20		20.01	mg/L	100	95	105			
WG515583ICB	ICB	03/10/21 11:47				U	mg/L		-0.6	0.6			
WG515583LFB	LFB	03/10/21 12:00	II210301-2	99.97791		99.44	mg/L	99	85	115			
L64484-02AS	AS	03/10/21 12:29	II210301-2	99.97791	4.87	103.9	mg/L	99	85	115			
L64484-02ASD	ASD	03/10/21 12:39	II210301-2	99.97791	4.87	105.8	mg/L	101	85	115	2	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515058													
WG515058PBW	PBW	02/26/21 19:00				U	mg/L		-20	20			
WG515058LCSW	LCSW	02/26/21 19:02	PCN62451	1000		998	mg/L	100	80	120			
L64487-01DUP	DUP	02/26/21 20:00			616	624	mg/L				1	10	

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515279													
WG515279ICV	ICV	03/04/21 10:43	MS210115-2	.05		.04952	mg/L	99	90	110			
WG515279ICB	ICB	03/04/21 10:46				U	mg/L		-0.00022	0.00022			
WG515279LFB	LFB	03/04/21 10:49	MS201228-2	.05		.04946	mg/L	99	85	115			
L64484-01AS	AS	03/04/21 11:47	MS201228-2	.05	.00021	.05094	mg/L	101	70	130			
L64484-01ASD	ASD	03/04/21 11:50	MS201228-2	.05	.00021	.05242	mg/L	104	70	130	3	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515583													
WG515583ICV	ICV	03/10/21 11:41	II210219-1	100		98.24	mg/L	98	95	105			
WG515583ICB	ICB	03/10/21 11:47				U	mg/L		-0.6	0.6			
WG515583LFB	LFB	03/10/21 12:00	II210301-2	100.0235		98.13	mg/L	98	85	115			
L64484-02AS	AS	03/10/21 12:29	II210301-2	100.0235	123	211.8	mg/L	89	85	115			
L64484-02ASD	ASD	03/10/21 12:39	II210301-2	100.0235	123	216.9	mg/L	94	85	115	2	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515987													
WG515987ICV	ICV	03/17/21 13:43	WI210317-2	20		20.6	mg/L	103	90	110			
WG515987ICB	ICB	03/17/21 13:43				U	mg/L		-3	3			
L64547-05AS	AS	03/17/21 14:14	WI210317-1	1250	124	580.4	mg/L	37	90	110			M3
L64547-06DUP	DUP	03/17/21 14:14			544	512.8	mg/L				6	20	
WG515987LFB	LFB	03/17/21 14:38	WI210317-1	25		9.4	mg/L		90	110			
WG516035													
WG516035ICB	ICB	03/18/21 11:52				U	mg/L		-3	3			
WG516035ICV	ICV	03/18/21 11:52	WI210317-2	20		20.8	mg/L	104	90	110			
WG516035LFB	LFB	03/18/21 13:22	WI210105-3	10		9.8	mg/L	98	90	110			
L64502-03AS	AS	03/18/21 14:04	SO4TURB20X	10	414	407.7	mg/L	-63	90	110			M3
L64502-04DUP	DUP	03/18/21 14:07			710	703.5	mg/L				1	20	

Homestake Mining Company

ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64519-02AS	AS	03/02/21 18:48	WC210302-6	.21956	.026	.246	mg/L	100	75	125			
L64519-02ASD	ASD	03/02/21 18:53	WC210302-6	.21956	.026	.26	mg/L	107	75	125	6	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515279													
WG515279ICV	ICV	03/04/21 10:43	MS210115-2	.05		.05098	mg/L	102	90	110			
WG515279ICB	ICB	03/04/21 10:46				U	mg/L		-0.00022	0.00022			
WG515279LFB	LFB	03/04/21 10:49	MS201228-2	.05		.04994	mg/L	100	85	115			
L64484-01AS	AS	03/04/21 11:47	MS201228-2	.05	.00703	.05919	mg/L	104	70	130			
L64484-01ASD	ASD	03/04/21 11:50	MS201228-2	.05	.00703	.05795	mg/L	102	70	130	2	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515279													
WG515279ICV	ICV	03/04/21 10:43	MS210115-2	.05		.04884	mg/L	98	90	110			
WG515279ICB	ICB	03/04/21 10:46				U	mg/L		-0.0011	0.0011			
WG515279LFB	LFB	03/04/21 10:49	MS201228-2	.05		.04799	mg/L	96	85	115			
L64484-01AS	AS	03/04/21 11:47	MS201228-2	.05	U	.04817	mg/L	96	70	130			
L64484-01ASD	ASD	03/04/21 11:50	MS201228-2	.05	U	.04756	mg/L	95	70	130	1	20	

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64484***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64484-01	WG515583	Calcium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG515785	Carbon, dissolved organic (DOC)	SM5310B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515920	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515583	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515799	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516016	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515058	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
	WG515987	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
L64484-02	WG515583	Calcium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG515785	Carbon, dissolved organic (DOC)	SM5310B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515920	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515583	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516016	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515058	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
	WG516035	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.

Homestake Mining Company
Project ID:
Sample ID: SAG1-2
Locator:

ACZ Sample ID: ***L64484-01***
Date Sampled: *02/23/21 13:51*
Date Received: *02/26/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:08		0.17	0.24	0.31	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/24/21 14:21		0.87	0.86	2	pCi/L	*	fdw

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		0.751	2.4	4.4	pCi/L	*	djc

Homestake Mining Company
Project ID:
Sample ID: SAG1-3
Locator:

ACZ Sample ID: ***L64484-02***
Date Sampled: *02/23/21 15:52*
Date Received: *02/26/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:10		2.2	0.31	0.06	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/24/21 14:21		0.62	1.1	2.4	pCi/L	*	fdw

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		1.34	2.1	3.6	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

Homestake Mining Company

ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515604																
WG515604PBW	PBW	03/16/21						.03	0.07	0.13			0.26			
WG515604LCSW	LCSW	03/16/21	PCN62879	20				23	0.69	0.14	115	43	148			
L64435-02DUP	DUP-RPD	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				67	20	RG
L64435-02DUP	DUP-RER	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				0.25	2	
L64507-01DUP	DUP-RPD	03/16/21			0.1	0.08	0.09	.11	0.1	0.21				10	20	
L64502-03MS	MS	03/16/21	PCN62879	40	0.16	0.1	0.1	36	1	0.14	90	43	148			

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515708																
WG515708PBW	PBW	03/24/21						.32	0.68	0.7			1.4			
L64441-01DUP	DUP-RPD	03/24/21			0.33	1	2.4	0	1	2.4				200	20	RG
L64441-01DUP	DUP-RER	03/24/21			0.33	1	2.4	0	1	2.4				0.23	2	
WG515708LCSW	LCSW	03/24/21	PCN61541	9.1				11	1.3	0.94	121	47	123			
L64571-05MS	MS	03/24/21	PCN61541	91	240	18	23	180	13	17	-66	47	123			M3
L64494-03DUP	DUP-RPD	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				173	20	RG
L64494-03DUP	DUP-RER	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				0.41	2	

ACZ Laboratories, Inc.
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Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64484***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

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RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64484***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64484-01	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515708	Radium 228, dissolved	M904.0	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L64484-02	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515708	Radium 228, dissolved	M904.0	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Homestake Mining Company ACZ Project ID: ***L64484***

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
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Sample Receipt

Homestake Mining Company

ACZ Project ID: L64484
Date Received: 02/26/2021 11:49
Received By:
Date Printed: 3/1/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?		X	

The date was enetered per the information on the containers for samples 1-2

The date was enetered per the information on the containers for samples 1-2

The date was enetered per the information on the containers for samples 1-2

7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
7187	3.6	<=6.0	15	N/A

ACZ Laboratories, Inc.
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Sample Receipt

Homestake Mining Company

ACZ Project ID: L64484
Date Received: 02/26/2021 11:49
Received By:
Date Printed: 3/1/2021

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L 64484

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Argyello
Company: Homestake Mining Co.
E-mail: aargyello@barrick.com
Address: PO Box 98 Grants, NM 87020
Telephone: 505-285-1041

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Adam Argyello
Company: Homestake Mining Co.
E-mail: aargyello@barrick.com
Address: PO Box 98 Grants, NM 87020
Telephone: 505-285-1041

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]
If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Argyello **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]
*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: GROUNDWATER
PO#:
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater	ANALYSES REQUESTED (attach list or use quote number)
SAG1-2	2/3 1351	GW	8	X	
SAG1-3	1 1552	GW	8	X	
	entered per container JD 2/5/21				

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Adam Argyello	2/3/21 1755	[signature]	2/5/21 1145

FRMAD050.06.14.14

White - Return with sample. Yellow - Retain for your records.

L64484 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 25, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64518

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2021. This project has been assigned to ACZ's project number, L64518. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64518. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 24, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-4

ACZ Sample ID: ***L64518-01***
Date Sampled: *02/25/21 09:56*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	332		*	mg/L	0.1	0.5	03/10/21 15:18	jlw
Iron, dissolved	M200.7 ICP	1	3.46		*	mg/L	0.06	0.15	03/10/21 15:18	jlw
Magnesium, dissolved	M200.7 ICP	1	61.3			mg/L	0.2	1	03/10/21 15:18	jlw
Manganese, dissolved	M200.7 ICP	1	2.13		*	mg/L	0.01	0.05	03/10/21 15:18	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00866			mg/L	0.0002	0.0005	03/10/21 18:58	bsu
Potassium, dissolved	M200.7 ICP	1	3.64			mg/L	0.2	1	03/10/21 15:18	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00020	B		mg/L	0.0001	0.00025	03/10/21 18:58	bsu
Sodium, dissolved	M200.7 ICP	1	74.5			mg/L	0.2	1	03/10/21 15:18	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00201			mg/L	0.0001	0.0005	03/10/21 18:58	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 18:58	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	148			mg/L	2	20	03/08/21 0:00	jck
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Total Alkalinity		1	148			mg/L	2	20	03/08/21 0:00	jck
Carbon, dissolved organic (DOC)	SM5310B	1	7.1		*	mg/L	1	5	03/12/21 23:36	ttg
Chloride	SM4500Cl-E	1	40.3		*	mg/L	0.5	2	03/23/21 17:08	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1080			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/17/21 23:28	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.159	B	*	mg/L	0.05	0.2	03/17/21 20:48	wtc/syw
Residue, Filterable (TDS) @180C	SM2540C	5	1670			mg/L	100	200	03/02/21 16:07	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	50	1070		*	mg/L	50	250	03/22/21 17:30	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 18:14	eep

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-5

ACZ Sample ID: ***L64518-02***
Date Sampled: *02/25/21 11:57*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	402		*	mg/L	0.1	0.5	03/10/21 15:22	jlw
Iron, dissolved	M200.7 ICP	1	1.94		*	mg/L	0.06	0.15	03/10/21 15:22	jlw
Magnesium, dissolved	M200.7 ICP	1	63.1			mg/L	0.2	1	03/10/21 15:22	jlw
Manganese, dissolved	M200.7 ICP	1	3.66		*	mg/L	0.01	0.05	03/10/21 15:22	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0112			mg/L	0.0002	0.0005	03/10/21 19:00	bsu
Potassium, dissolved	M200.7 ICP	1	3.19			mg/L	0.2	1	03/10/21 15:22	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00018	B		mg/L	0.0001	0.00025	03/10/21 19:00	bsu
Sodium, dissolved	M200.7 ICP	1	72.8			mg/L	0.2	1	03/10/21 15:22	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00196			mg/L	0.0001	0.0005	03/10/21 19:00	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:00	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	152			mg/L	2	20	03/08/21 0:00	jck
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Total Alkalinity		1	152			mg/L	2	20	03/08/21 0:00	jck
Carbon, dissolved organic (DOC)	SM5310B	1	12.7			mg/L	1	5	03/17/21 18:01	ttg
Chloride	SM4500Cl-E	1	40.0		*	mg/L	0.5	2	03/23/21 17:10	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1260			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/17/21 23:30	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.191	B	*	mg/L	0.05	0.2	03/17/21 20:49	wtc/syw
Residue, Filterable (TDS) @180C	SM2540C	5	1960			mg/L	100	200	03/02/21 16:09	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	50	1220		*	mg/L	50	250	03/22/21 17:30	syw
Sulfide as S	SM4500S2-D	1	0.026	B		mg/L	0.02	0.1	03/02/21 18:19	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515490													
WG515490PBW1	PBW	03/08/21 18:48				U	mg/L		-20	20			
WG515490LCSW3	LCSW	03/08/21 19:06	WC210305-1	820.0001		754.1	mg/L	92	90	110			
L64519-02DUP	DUP	03/08/21 21:42			237	251.2	mg/L				6	20	
WG515490LCSW6	LCSW	03/08/21 22:00	WC210305-1	820.0001		760.7	mg/L	93	90	110			
WG515490LCSW9	LCSW	03/09/21 1:48	WC210305-1	820.0001		768.8	mg/L	94	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.93	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.3	0.3			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	68.00934		67.56	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	68.00934	402	450.6	mg/L	71	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	68.00934	402	445.2	mg/L	64	85	115	1	20	M3

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515785													
WG515785LFB	LFB	03/12/21 21:05	WI210128-1	50		49.6	mg/L	99	90	110			
L64484-01DUP	DUP	03/12/21 22:38			9.4	9.8	mg/L				4	20	RA
L64484-02AS	AS	03/12/21 23:23	WI210128-1	50	11.8	62.4	mg/L	101	90	110			
WG516007													
WG516007LFB	LFB	03/17/21 17:36	WI210128-1	50		46.5	mg/L	93	90	110			
L64519-01DUP	DUP	03/17/21 18:27			32.1	32.4	mg/L				1	20	
L64519-02AS	AS	03/17/21 18:54	WI210128-1	50	12.5	59.4	mg/L	94	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516323													
WG516323ICB	ICB	03/23/21 16:38				U	mg/L		-1.5	1.5			
WG516323ICV	ICV	03/23/21 16:38	WI200506-2	55.055		59.14	mg/L	107	90	110			
WG516323LFB1	LFB	03/23/21 17:08	WI200327-3	30.03		31.12	mg/L	104	90	110			
L64502-01AS	AS	03/23/21 17:08	WI200327-3	30.03	74	96.59	mg/L	75	90	110			M2
L64502-02DUP	DUP	03/23/21 17:08			10.4	10.5	mg/L				1	20	
WG516323LFB2	LFB	03/23/21 17:12	WI200327-3	30.03		31.48	mg/L	105	90	110			

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.934	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.18	0.18			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	1.0018		.978	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	1.0018	1.94	2.771	mg/L	83	85	115			M2
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	1.0018	1.94	2.761	mg/L	82	85	115	0	20	M2

Homestake Mining Company

ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.74	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	50.00226		49.29	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	50.00226	63.1	110.4	mg/L	95	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	50.00226	63.1	109.3	mg/L	92	85	115	1	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.937	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.03	0.03			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	.5005		.47	mg/L	94	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	.5005	3.66	3.928	mg/L	54	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	.5005	3.66	3.886	mg/L	45	85	115	1	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.01992		.01995	mg/L	100	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00044	0.00044			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.0501		.05001	mg/L	100	85	115			
L64485-02AS	AS	03/10/21 18:41	MS210304-2	.0501	.00464	.05752	mg/L	106	70	130			
L64485-02ASD	ASD	03/10/21 18:43	MS210304-2	.0501	.00464	.05498	mg/L	100	70	130	5	20	
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.0501	.00211	.05274	mg/L	101	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.0501	.00211	.0534	mg/L	102	70	130	1	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516017													
WG516017ICV	ICV	03/17/21 21:45	WI210302-17	2.416		2.335	mg/L	97	90	110			
WG516017ICB	ICB	03/17/21 21:46				U	mg/L		-0.02	0.02			
WG516019													
WG516019LFB	LFB	03/17/21 23:18	WI201001-11	2		2.03	mg/L	102	90	110			
L64502-01AS	AS	03/17/21 23:21	WI201001-11	2	U	2.12	mg/L	106	90	110			
L64502-02DUP	DUP	03/17/21 23:23			U	U	mg/L				0	20	RA

Homestake Mining Company ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516014													
WG516014ICV	ICV	03/17/21 19:01	WI210310-5	11.988		12.285	mg/L	102	90	110			
WG516014ICB	ICB	03/17/21 19:02				U	mg/L		-0.05	0.05			
WG516016													
WG516016LFB	LFB	03/17/21 20:27	WI210310-4	10		10.768	mg/L	108	90	110			
L64469-03AS	AS	03/17/21 20:30	WI210310-4	10	.667	11.123	mg/L	105	90	110			
L64469-04DUP	DUP	03/17/21 20:33			U	U	mg/L				0	20	RA
L64697-03AS	AS	03/17/21 21:05	WI210310-4	10	4.6	15.809	mg/L	112	90	110			M1
L64697-04DUP	DUP	03/17/21 21:08			.486	.486	mg/L				0	20	RA

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	20		19.64	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	99.97791		98.89	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	99.97791	3.19	106.7	mg/L	104	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	99.97791	3.19	104.8	mg/L	102	85	115	2	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515186													
WG515186PBW	PBW	03/02/21 15:20				U	mg/L		-20	20			
WG515186LCSW	LCSW	03/02/21 15:22	PCN62451	1000		992	mg/L	99	80	120			
L64520-01DUP	DUP	03/02/21 16:20			978	978	mg/L				0	10	

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05099	mg/L	102	90	110			
WG515624ICB	ICB	03/10/21 18:30				.00011	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04935	mg/L	99	85	115			
L64485-02AS	AS	03/10/21 18:41	MS210304-2	.05	.00059	.05286	mg/L	105	70	130			
L64485-02ASD	ASD	03/10/21 18:43	MS210304-2	.05	.00059	.05046	mg/L	100	70	130	5	20	
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00613	.05769	mg/L	103	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00613	.05807	mg/L	104	70	130	1	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		96.82	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	100.0235		97.68	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	100.0235	72.8	170	mg/L	97	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	100.0235	72.8	168.5	mg/L	96	85	115	1	20	

Homestake Mining Company ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516251													
WG516251ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516251ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516251LFB	LFB	03/22/21 16:39	WI210105-3	10		10	mg/L	100	90	110			
L60987-30DUP	DUP	03/22/21 16:39			U	U	mg/L				0	20	RA
L60988-30AS	AS	03/22/21 16:39	WI210105-3	10	19.9	30.1	mg/L	102	90	110			

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64519-02AS	AS	03/02/21 18:48	WC210302-6	.21956	.026	.246	mg/L	100	75	125			
L64519-02ASD	ASD	03/02/21 18:53	WC210302-6	.21956	.026	.26	mg/L	107	75	125	6	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05053	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04928	mg/L	99	85	115			
L64485-02AS	AS	03/10/21 18:41	MS210304-2	.05	.0437	.09735	mg/L	107	70	130			
L64485-02ASD	ASD	03/10/21 18:43	MS210304-2	.05	.0437	.09452	mg/L	102	70	130	3	20	
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00705	.05795	mg/L	102	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00705	.05965	mg/L	105	70	130	3	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05038	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.0011	0.0011			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04914	mg/L	98	85	115			
L64485-02AS	AS	03/10/21 18:41	MS210304-2	.05	.00325	.05517	mg/L	104	70	130			
L64485-02ASD	ASD	03/10/21 18:43	MS210304-2	.05	.00325	.05304	mg/L	100	70	130	4	20	
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	U	.04857	mg/L	97	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	U	.0501	mg/L	100	70	130	3	20	

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64518***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64518-01	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515785	Carbon, dissolved organic (DOC)	SM5310B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515587	Iron, dissolved	M200.7 ICP	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516016	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L64518-02	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515587	Iron, dissolved	M200.7 ICP	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516016	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-4
Locator:

ACZ Sample ID: ***L64518-01***
Date Sampled: *02/25/21 9:56*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:23		0.82	0.21	0.17	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 14:10		0.41	0.89	2.1	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		4.01	2.4	2.8	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG1-5
Locator:

ACZ Sample ID: ***L64518-02***
Date Sampled: *02/25/21 11:57*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:24		0.44	0.19	0.2	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 14:10		-0.2	0.84	2.1	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		4.75	3.6	5.4	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

Homestake Mining Company

ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515604																
WG515604PBW	PBW	03/16/21						.03	0.07	0.13			0.26			
WG515604LCSW	LCSW	03/16/21	PCN62879	20				23	0.69	0.14	115	43	148			
L64435-02DUP	DUP-RPD	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				67	20	RG
L64435-02DUP	DUP-RER	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				0.25	2	
L64507-01DUP	DUP-RPD	03/16/21			0.1	0.08	0.09	.11	0.1	0.21				10	20	
L64502-03MS	MS	03/16/21	PCN62879	40	0.16	0.1	0.1	36	1	0.14	90	43	148			

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515791																
WG515791PBW	PBW	03/21/21						.16	0.68	1.7			3.4			
L64507-01DUP	DUP-RER	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				0.63	2	
L64507-02MS	MS	03/21/21	PCN61541	9.11	0.71	0.92	2.3	8.1	1.2	2.2	81	47	123			
WG515791LCSW	LCSW	03/21/21	PCN61541	9.11				8.7	1.4	2.6	96	47	123			
L64507-01DUP	DUP-RPD	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				1000	20	RG
L64574-02DUP	DUP-RER	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				0.07	2	
L64574-02DUP	DUP-RPD	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				33	20	RG

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64518***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

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RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64518***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64518-01	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L64518-02	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Homestake Mining Company ACZ Project ID: ***L64518***

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64518
Date Received: 03/02/2021 12:19
Received By:
Date Printed: 3/3/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
5105	1.8	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64518
Date Received: 03/02/2021 12:19
Received By:
Date Printed: 3/3/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64518

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Argyle

Company: Homestake Mining Company

E-mail: aargyelle@barrick.com

Address: Box 98 Grants NM

Telephone: 505-28[illegible]

Copy of Report to:

Name:

Company:

E-mail:

Telephone:

Invoice to:

Name: Same as Report to

Company:

E-mail:

Address:

Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Argyle **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Grandview

PO#: 4500091369

Reporting state for compliance testing:

Check box if samples include NRC licensed material? [ ]

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	ANALYSES REQUESTED (attach list or use quote number)
SAG1-4	2/25/21 0956	GW	8	[X]
SAG1-5	2/25/21 1157	GW	8	[X]
				[ ]
				[ ]
				[ ]
				[ ]
				[ ]
				[ ]
				[ ]
				[ ]

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/26/21 1730	[signature]	3/2/21 12:19

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L64518 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 25, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64519

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2021. This project has been assigned to ACZ's project number, L64519. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64519. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 24, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-3

ACZ Sample ID: ***L64519-01***
Date Sampled: *02/26/21 09:30*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	176		*	mg/L	0.1	0.5	03/10/21 15:38	jlw
Iron, dissolved	M200.7 ICP	1	1.20		*	mg/L	0.06	0.15	03/10/21 15:38	jlw
Magnesium, dissolved	M200.7 ICP	1	46.5			mg/L	0.2	1	03/10/21 15:38	jlw
Manganese, dissolved	M200.7 ICP	1	0.837		*	mg/L	0.01	0.05	03/10/21 15:38	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0107			mg/L	0.0002	0.0005	03/10/21 19:02	bsu
Potassium, dissolved	M200.7 ICP	1	4.14			mg/L	0.2	1	03/10/21 15:38	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00364			mg/L	0.0001	0.00025	03/10/21 19:02	bsu
Sodium, dissolved	M200.7 ICP	1	67.8			mg/L	0.2	1	03/10/21 15:38	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00790			mg/L	0.0001	0.0005	03/10/21 19:02	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:02	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	275			mg/L	2	20	03/08/21 0:00	jck
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Total Alkalinity		1	275			mg/L	2	20	03/08/21 0:00	jck
Carbon, dissolved organic (DOC)	SM5310B	1	32.1			mg/L	1	5	03/17/21 18:13	ttg
Chloride	SM4500Cl-E	1	56.7		*	mg/L	0.5	2	03/23/21 17:10	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		631			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.025	B	*	mg/L	0.02	0.1	03/17/21 23:35	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.099	B	*	mg/L	0.05	0.2	03/17/21 20:51	mtc/syw
Residue, Filterable (TDS) @180C	SM2540C	5	970			mg/L	100	200	03/02/21 16:12	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	411		*	mg/L	20	100	03/22/21 17:31	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 18:25	eep

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-4

ACZ Sample ID: ***L64519-02***
Date Sampled: *02/26/21 11:28*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	153		*	mg/L	0.1	0.5	03/10/21 15:41	jlw
Iron, dissolved	M200.7 ICP	1	3.80		*	mg/L	0.06	0.15	03/10/21 15:41	jlw
Magnesium, dissolved	M200.7 ICP	1	48.2			mg/L	0.2	1	03/10/21 15:41	jlw
Manganese, dissolved	M200.7 ICP	1	1.91		*	mg/L	0.01	0.05	03/10/21 15:41	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0175			mg/L	0.0002	0.0005	03/10/21 19:03	bsu
Potassium, dissolved	M200.7 ICP	1	4.43			mg/L	0.2	1	03/10/21 15:41	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00010	B		mg/L	0.0001	0.00025	03/10/21 19:03	bsu
Sodium, dissolved	M200.7 ICP	1	82.8			mg/L	0.2	1	03/10/21 15:41	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00486			mg/L	0.0001	0.0005	03/10/21 19:03	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:03	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	237			mg/L	2	20	03/08/21 0:00	jck
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/08/21 0:00	jck
Total Alkalinity		1	237			mg/L	2	20	03/08/21 0:00	jck
Carbon, dissolved organic (DOC)	SM5310B	1	12.5			mg/L	1	5	03/17/21 18:41	ttg
Chloride	SM4500Cl-E	1	61.7		*	mg/L	0.5	2	03/23/21 17:10	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		581			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/17/21 23:36	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.786		*	mg/L	0.05	0.2	03/18/21 17:15	syw
Residue, Filterable (TDS) @180C	SM2540C	5	930			mg/L	100	200	03/02/21 16:14	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	436		*	mg/L	20	100	03/22/21 17:31	syw
Sulfide as S	SM4500S2-D	1	0.026	B		mg/L	0.02	0.1	03/02/21 18:42	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company

ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515490													
WG515490PBW1	PBW	03/08/21 18:48				U	mg/L		-20	20			
WG515490LCSW3	LCSW	03/08/21 19:06	WC210305-1	820.0001		754.1	mg/L	92	90	110			
L64519-02DUP	DUP	03/08/21 21:42			237	251.2	mg/L				6	20	
WG515490LCSW6	LCSW	03/08/21 22:00	WC210305-1	820.0001		760.7	mg/L	93	90	110			
WG515490LCSW9	LCSW	03/09/21 1:48	WC210305-1	820.0001		768.8	mg/L	94	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.93	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.3	0.3			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	68.00934		67.56	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	68.00934	402	450.6	mg/L	71	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	68.00934	402	445.2	mg/L	64	85	115	1	20	M3

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516007													
WG516007LFB	LFB	03/17/21 17:36	WI210128-1	50		46.5	mg/L	93	90	110			
L64519-01DUP	DUP	03/17/21 18:27			32.1	32.4	mg/L				1	20	
L64519-02AS	AS	03/17/21 18:54	WI210128-1	50	12.5	59.4	mg/L	94	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516323													
WG516323ICB	ICB	03/23/21 16:38				U	mg/L		-1.5	1.5			
WG516323ICV	ICV	03/23/21 16:38	WI200506-2	55.055		59.14	mg/L	107	90	110			
WG516323LFB1	LFB	03/23/21 17:08	WI200327-3	30.03		31.12	mg/L	104	90	110			
L64502-01AS	AS	03/23/21 17:08	WI200327-3	30.03	74	96.59	mg/L	75	90	110			M2
L64502-02DUP	DUP	03/23/21 17:08			10.4	10.5	mg/L				1	20	
WG516323LFB2	LFB	03/23/21 17:12	WI200327-3	30.03		31.48	mg/L	105	90	110			

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.934	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.18	0.18			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	1.0018		.978	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	1.0018	1.94	2.771	mg/L	83	85	115			M2
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	1.0018	1.94	2.761	mg/L	82	85	115	0	20	M2

Homestake Mining Company

ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.74	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	50.00226		49.29	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	50.00226	63.1	110.4	mg/L	95	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	50.00226	63.1	109.3	mg/L	92	85	115	1	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.937	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.03	0.03			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	.5005		.47	mg/L	94	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	.5005	3.66	3.928	mg/L	54	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	.5005	3.66	3.886	mg/L	45	85	115	1	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.01992		.01995	mg/L	100	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00044	0.00044			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.0501		.05001	mg/L	100	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.0501	.00211	.05274	mg/L	101	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.0501	.00211	.0534	mg/L	102	70	130	1	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516017													
WG516017ICV	ICV	03/17/21 21:45	WI210302-17	2.416		2.335	mg/L	97	90	110			
WG516017ICB	ICB	03/17/21 21:46				U	mg/L		-0.02	0.02			
WG516019													
WG516019LFB	LFB	03/17/21 23:18	WI201001-11	2		2.03	mg/L	102	90	110			
L64502-01AS	AS	03/17/21 23:21	WI201001-11	2	U	2.12	mg/L	106	90	110			
L64502-02DUP	DUP	03/17/21 23:23			U	U	mg/L				0	20	RA

Homestake Mining Company ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516014													
WG516014ICV	ICV	03/17/21 19:01	WI210310-5	11.988		12.285	mg/L	102	90	110			
WG516014ICB	ICB	03/17/21 19:02				U	mg/L		-0.05	0.05			
WG516016													
WG516016LFB	LFB	03/17/21 20:27	WI210310-4	10		10.768	mg/L	108	90	110			
L64697-03AS	AS	03/17/21 21:05	WI210310-4	10	4.6	15.809	mg/L	112	90	110			M1
L64697-04DUP	DUP	03/17/21 21:08			.486	.486	mg/L				0	20	RA
WG516078													
WG516078ICV	ICV	03/18/21 17:11	WI210310-5	11.988		12.637	mg/L	105	90	110			
WG516078ICB	ICB	03/18/21 17:12				U	mg/L		-0.05	0.05			
L64519-02AS	AS	03/18/21 17:17	WI210310-4	10	.786	10.738	mg/L	100	90	110			
L64520-01DUP	DUP	03/18/21 17:19			U	U	mg/L				0	20	RA
WG516078LFB2	LFB	03/18/21 17:56	WI210310-4	10		9.822	mg/L	98	90	110			
WG516078LFB1	LFB	03/18/21 18:18	WI210310-4	10		9.584	mg/L	96	90	110			

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	20		19.64	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	99.97791		98.89	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	99.97791	3.19	106.7	mg/L	104	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	99.97791	3.19	104.8	mg/L	102	85	115	2	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515186													
WG515186PBW	PBW	03/02/21 15:20				U	mg/L		-20	20			
WG515186LCSW	LCSW	03/02/21 15:22	PCN62451	1000		992	mg/L	99	80	120			
L64520-01DUP	DUP	03/02/21 16:20			978	978	mg/L				0	10	

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05099	mg/L	102	90	110			
WG515624ICB	ICB	03/10/21 18:30				.00011	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04935	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00613	.05769	mg/L	103	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00613	.05807	mg/L	104	70	130	1	20	

Homestake Mining Company

ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		96.82	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	100.0235		97.68	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	100.0235	72.8	170	mg/L	97	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	100.0235	72.8	168.5	mg/L	96	85	115	1	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516251													
WG516251ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516251ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516251LFB	LFB	03/22/21 16:39	WI210105-3	10		10	mg/L	100	90	110			
L60987-30DUP	DUP	03/22/21 16:39			U	U	mg/L				0	20	RA
L60988-30AS	AS	03/22/21 16:39	WI210105-3	10	19.9	30.1	mg/L	102	90	110			

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64519-02AS	AS	03/02/21 18:48	WC210302-6	.21956	.026	.246	mg/L	100	75	125			
L64519-02ASD	ASD	03/02/21 18:53	WC210302-6	.21956	.026	.26	mg/L	107	75	125	6	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05053	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04928	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00705	.05795	mg/L	102	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00705	.05965	mg/L	105	70	130	3	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05038	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.0011	0.0011			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04914	mg/L	98	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	U	.04857	mg/L	97	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	U	.0501	mg/L	100	70	130	3	20	

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64519***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64519-01	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515587	Iron, dissolved	M200.7 ICP	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516016	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L64519-02	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515587	Iron, dissolved	M200.7 ICP	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-3
Locator:

ACZ Sample ID: ***L64519-01***
Date Sampled: *02/26/21 9:30*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:25		0.3	0.17	0.21	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 14:10		0.44	0.99	2.2	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		3.8	3.6	5.7	pCi/L	*	djc

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2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-4
Locator:

ACZ Sample ID: ***L64519-02***
Date Sampled: *02/26/21 11:28*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/16/21 0:27		4.2	0.48	0.33	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 14:10		-0.25	0.9	2.2	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		2.55	2.4	3.6	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515604																
WG515604PBW	PBW	03/16/21						.03	0.07	0.13			0.26			
WG515604LCSW	LCSW	03/16/21	PCN62879	20				23	0.69	0.14	115	43	148			
L64435-02DUP	DUP-RPD	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				67	20	RG
L64435-02DUP	DUP-RER	03/16/21			0.06	0.09	0.1	.03	0.08	0.2				0.25	2	
L64507-01DUP	DUP-RPD	03/16/21			0.1	0.08	0.09	.11	0.1	0.21				10	20	
L64502-03MS	MS	03/16/21	PCN62879	40	0.16	0.1	0.1	36	1	0.14	90	43	148			

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515791																
WG515791PBW	PBW	03/21/21						.16	0.68	1.7			3.4			
L64507-01DUP	DUP-RER	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				0.63	2	
L64507-02MS	MS	03/21/21	PCN61541	9.11	0.71	0.92	2.3	8.1	1.2	2.2	81	47	123			
WG515791LCSW	LCSW	03/21/21	PCN61541	9.11				8.7	1.4	2.6	96	47	123			
L64507-01DUP	DUP-RPD	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				1000	20	RG
L64574-02DUP	DUP-RER	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				0.07	2	
L64574-02DUP	DUP-RPD	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				33	20	RG

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64519***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64519***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64519-01	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L64519-02	WG515604	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64519
Date Received: 03/02/2021 12:19
Received By:
Date Printed: 3/3/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
6627	0.3	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64519
Date Received: 03/02/2021 12:19
Received By:
Date Printed: 3/3/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64519

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello	Address: PO Box 98
Company: Homestake Mining Co.	Grants NM 87020
E-mail: aarguello@barrick.com	Telephone: 505-285-1041

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Same as Report to	Address:
Company:	
E-mail:	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: Groundwater

PO#: 4500041369

Reporting state for compliance testing:

Check box if samples include NRC licensed material? [ ]

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater for							
SAG2-3	2/26/21 930	GW	8	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
SAG2-4	2/26/21 1128	GW	8	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
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				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/26/21 1730	[signature]	3/2/21 12:19

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L64519 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 25, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64520

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2021. This project has been assigned to ACZ's project number, L64520. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64520. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 24, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-1

ACZ Sample ID: ***L64520-01***
Date Sampled: *02/26/21 15:27*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	176		*	mg/L	0.1	0.5	03/10/21 15:44	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U	*	mg/L	0.06	0.15	03/10/21 15:44	jlw
Magnesium, dissolved	M200.7 ICP	1	46.0			mg/L	0.2	1	03/10/21 15:44	jlw
Manganese, dissolved	M200.7 ICP	1	0.046	B	*	mg/L	0.01	0.05	03/10/21 15:44	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00211			mg/L	0.0002	0.0005	03/10/21 19:05	bsu
Potassium, dissolved	M200.7 ICP	1	4.10			mg/L	0.2	1	03/10/21 15:44	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00613			mg/L	0.0001	0.00025	03/10/21 19:05	bsu
Sodium, dissolved	M200.7 ICP	1	65.3			mg/L	0.2	1	03/10/21 15:44	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00705			mg/L	0.0001	0.0005	03/10/21 19:05	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:05	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	261			mg/L	2	20	03/11/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Total Alkalinity		1	261			mg/L	2	20	03/11/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	2.2	B		mg/L	1	5	03/17/21 19:08	ttg
Chloride	SM4500Cl-E	1	54.0		*	mg/L	0.5	2	03/23/21 17:10	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		629			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.31		*	mg/L	0.02	0.1	03/17/21 23:37	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	03/18/21 17:18	syw
Residue, Filterable (TDS) @180C	SM2540C	1	978			mg/L	20	40	03/02/21 16:17	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	408		*	mg/L	20	100	03/22/21 17:31	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 18:59	eep

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-2

ACZ Sample ID: ***L64520-02***
Date Sampled: *02/26/21 17:23*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	172		*	mg/L	0.1	0.5	03/10/21 15:48	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	03/10/21 15:48	jlw
Magnesium, dissolved	M200.7 ICP	1	45.6			mg/L	0.2	1	03/10/21 15:48	jlw
Manganese, dissolved	M200.7 ICP	1	0.053			mg/L	0.01	0.05	03/10/21 15:48	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00276			mg/L	0.0002	0.0005	03/10/21 19:14	bsu
Potassium, dissolved	M200.7 ICP	1	4.01			mg/L	0.2	1	03/10/21 15:48	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00582			mg/L	0.0001	0.00025	03/10/21 19:14	bsu
Sodium, dissolved	M200.7 ICP	1	63.6			mg/L	0.2	1	03/10/21 15:48	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00703			mg/L	0.0001	0.0005	03/10/21 19:14	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:14	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	266			mg/L	2	20	03/11/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Total Alkalinity		1	266			mg/L	2	20	03/11/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	3.2	B		mg/L	1	5	03/17/21 19:20	ttg
Chloride	SM4500Cl-E	1	55.6		*	mg/L	0.5	2	03/23/21 17:10	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		617			mg/L	0.2	5	03/25/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	2	2.18		*	mg/L	0.04	0.2	03/18/21 0:08	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	03/18/21 17:21	syw
Residue, Filterable (TDS) @180C	SM2540C	1	984		*	mg/L	20	40	03/02/21 19:47	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	410		*	mg/L	20	100	03/22/21 17:31	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 19:05	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company

ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515637													
WG515637PBW1	PBW	03/10/21 20:56				U	mg/L		-20	20			
WG515637LCSW3	LCSW	03/10/21 21:16	WC210305-1	820.0001		771.2	mg/L	94	90	110			
WG515637LCSW6	LCSW	03/11/21 0:08	WC210305-1	820.0001		780.7	mg/L	95	90	110			
WG515637PBW2	PBW	03/11/21 0:16				3.1	mg/L		-20	20			
L64568-01DUP	DUP	03/11/21 2:57			376	377.3	mg/L				0	20	
WG515637LCSW9	LCSW	03/11/21 3:16	WC210305-1	820.0001		780	mg/L	95	90	110			
WG515637PBW3	PBW	03/11/21 3:23				3.2	mg/L		-20	20			
WG515637LCSW12	LCSW	03/11/21 7:18	WC210305-1	820.0001		771.6	mg/L	94	90	110			
WG515637PBW4	PBW	03/11/21 7:25				3.2	mg/L		-20	20			
WG515637LCSW15	LCSW	03/11/21 10:39	WC210305-1	820.0001		797.4	mg/L	97	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.93	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.3	0.3			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	68.00934		67.56	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	68.00934	402	450.6	mg/L	71	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	68.00934	402	445.2	mg/L	64	85	115	1	20	M3
L64607-02AS	AS	03/10/21 16:17	II210301-2	68.00934	300	351	mg/L	75	85	115			M3
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	68.00934	300	352.4	mg/L	77	85	115	0	20	M3

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516007													
WG516007LFB	LFB	03/17/21 17:36	WI210128-1	50		46.5	mg/L	93	90	110			
L64519-01DUP	DUP	03/17/21 18:27			32.1	32.4	mg/L				1	20	
L64519-02AS	AS	03/17/21 18:54	WI210128-1	50	12.5	59.4	mg/L	94	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516323													
WG516323ICB	ICB	03/23/21 16:38				U	mg/L		-1.5	1.5			
WG516323ICV	ICV	03/23/21 16:38	WI200506-2	55.055		59.14	mg/L	107	90	110			
WG516323LFB1	LFB	03/23/21 17:08	WI200327-3	30.03		31.12	mg/L	104	90	110			
L64520-01AS	AS	03/23/21 17:10	WI200327-3	30.03	54	78.99	mg/L	83	90	110			M2
L64520-02DUP	DUP	03/23/21 17:10			55.6	53.52	mg/L				4	20	
WG516323LFB2	LFB	03/23/21 17:12	WI200327-3	30.03		31.48	mg/L	105	90	110			

Homestake Mining Company

ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.934	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.18	0.18			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	1.0018		.978	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	1.0018	1.94	2.771	mg/L	83	85	115			M2
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	1.0018	1.94	2.761	mg/L	82	85	115	0	20	M2
L64607-02AS	AS	03/10/21 16:17	II210301-2	1.0018	U	1.02	mg/L	102	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	1.0018	U	.983	mg/L	98	85	115	4	20	

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.74	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	50.00226		49.29	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	50.00226	63.1	110.4	mg/L	95	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	50.00226	63.1	109.3	mg/L	92	85	115	1	20	
L64607-02AS	AS	03/10/21 16:17	II210301-2	50.00226	35.6	83.78	mg/L	96	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	50.00226	35.6	83.44	mg/L	96	85	115	0	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.937	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.03	0.03			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	.5005		.47	mg/L	94	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	.5005	3.66	3.928	mg/L	54	85	115			M3
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	.5005	3.66	3.886	mg/L	45	85	115	1	20	M3
L64607-02AS	AS	03/10/21 16:17	II210301-2	.5005	.048	.52	mg/L	94	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	.5005	.048	.517	mg/L	94	85	115	1	20	

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.01992		.01995	mg/L	100	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00044	0.00044			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.0501		.05001	mg/L	100	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.0501	.00211	.05274	mg/L	101	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.0501	.00211	.0534	mg/L	102	70	130	1	20	

Homestake Mining Company ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516017													
WG516017ICV	ICV	03/17/21 21:45	WI210302-17	2.416		2.335	mg/L	97	90	110			
WG516017ICB	ICB	03/17/21 21:46				U	mg/L		-0.02	0.02			
WG516019													
WG516019LFB	LFB	03/17/21 23:18	WI201001-11	2		2.03	mg/L	102	90	110			
L64502-01AS	AS	03/17/21 23:21	WI201001-11	2	U	2.12	mg/L	106	90	110			
L64502-02DUP	DUP	03/17/21 23:23			U	U	mg/L				0	20	RA
L64521-01DUP	DUP	03/17/21 23:42			U	U	mg/L				0	20	RA
L64520-02AS	AS	03/18/21 0:09	WI201001-11	4	2.18	6.337	mg/L	104	90	110			

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516078													
WG516078ICV	ICV	03/18/21 17:11	WI210310-5	11.988		12.637	mg/L	105	90	110			
WG516078ICB	ICB	03/18/21 17:12				U	mg/L		-0.05	0.05			
L64519-02AS	AS	03/18/21 17:17	WI210310-4	10	.786	10.738	mg/L	100	90	110			
L64520-01DUP	DUP	03/18/21 17:19			U	U	mg/L				0	20	RA
WG516078LFB2	LFB	03/18/21 17:56	WI210310-4	10		9.822	mg/L	98	90	110			
WG516078LFB1	LFB	03/18/21 18:18	WI210310-4	10		9.584	mg/L	96	90	110			

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	20		19.64	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	99.97791		98.89	mg/L	99	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	99.97791	3.19	106.7	mg/L	104	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	99.97791	3.19	104.8	mg/L	102	85	115	2	20	
L64607-02AS	AS	03/10/21 16:17	II210301-2	99.97791	5.65	107.8	mg/L	102	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	99.97791	5.65	106.5	mg/L	101	85	115	1	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515186													
WG515186PBW	PBW	03/02/21 15:20				U	mg/L		-20	20			
WG515186LCSW	LCSW	03/02/21 15:22	PCN62451	1000		992	mg/L	99	80	120			
L64520-01DUP	DUP	03/02/21 16:20			978	978	mg/L				0	10	
WG515198													
WG515198PBW	PBW	03/02/21 19:00				U	mg/L		-20	20			
WG515198LCSW	LCSW	03/02/21 19:02	PCN62451	1000		1004	mg/L	100	80	120			
L64516-08DUP	DUP	03/02/21 19:31			U	U	mg/L				0	10	RA

Homestake Mining Company ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05099	mg/L	102	90	110			
WG515624ICB	ICB	03/10/21 18:30				.00011	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04935	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00613	.05769	mg/L	103	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00613	.05807	mg/L	104	70	130	1	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		96.82	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	100.0235		97.68	mg/L	98	85	115			
L64518-02AS	AS	03/10/21 15:25	II210301-2	100.0235	72.8	170	mg/L	97	85	115			
L64518-02ASD	ASD	03/10/21 15:28	II210301-2	100.0235	72.8	168.5	mg/L	96	85	115	1	20	
L64607-02AS	AS	03/10/21 16:17	II210301-2	100.0235	56.3	154.5	mg/L	98	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	100.0235	56.3	153.8	mg/L	97	85	115	0	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516251													
WG516251ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516251ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516251LFB	LFB	03/22/21 16:39	WI210105-3	10		10	mg/L	100	90	110			
L60987-30DUP	DUP	03/22/21 16:39			U	U	mg/L				0	20	RA
L60988-30AS	AS	03/22/21 16:39	WI210105-3	10	19.9	30.1	mg/L	102	90	110			

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64522-01AS	AS	03/02/21 19:28	WC210302-6	.21956	U	.259	mg/L	118	75	125			
L64522-01ASD	ASD	03/02/21 19:33	WC210302-6	.21956	U	.262	mg/L	119	75	125	1	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05053	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04928	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00705	.05795	mg/L	102	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00705	.05965	mg/L	105	70	130	3	20	

Homestake Mining Company

ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05038	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.0011	0.0011			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04914	mg/L	98	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	U	.04857	mg/L	97	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	U	.0501	mg/L	100	70	130	3	20	

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64520***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64520-01	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG515587	Iron, dissolved	M200.7 ICP	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L64520-02	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516323	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515198	Residue, Filterable (TDS) @180C	SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	RO	The duplicate originally assigned to this sample was not used for precision assessment because residue density did not meet method limits. Another duplicate in the batch was used to assess precision. Method required duplicate frequency was not met.
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-1
Locator:

ACZ Sample ID: ***L64520-01***
Date Sampled: *02/26/21 15:27*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/23/21 0:07		0.44	0.23	0.35	pCi/L		amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 14:10		0.78	0.81	2	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/21/21 16:22		1.01	0.59	0.77	pCi/L	*	djc

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-2
Locator:

ACZ Sample ID: ***L64520-02***
Date Sampled: *02/26/21 17:23*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/23/21 0:10		0.22	0.13	0.09	pCi/L		amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 16:36		0.55	0.57	1.4	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/22/21 7:02		0.554	0.55	0.87	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515994																
WG515994PBW	PBW	03/23/21						.16	0.1	0.09			0.18			
WG515994LCSW	LCSW	03/23/21	PCN62879	20				24	0.69	0.15	120	43	148			
L64520-01DUP	DUP-RPD	03/23/21			0.44	0.23	0.35	.46	0.17	0.23				4	20	
L64520-02MS	MS	03/23/21	PCN62879	20	0.22	0.13	0.09	24	0.72	0.14	119	43	148			
L64581-01DUP	DUP-RER	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				0.6	2	
L64581-01DUP	DUP-RPD	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				106	20	RG

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515791																
WG515791PBW	PBW	03/21/21						.16	0.68	1.7			3.4			
L64507-01DUP	DUP-RER	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				0.63	2	
L64507-02MS	MS	03/21/21	PCN61541	9.11	0.71	0.92	2.3	8.1	1.2	2.2	81	47	123			
WG515791LCSW	LCSW	03/21/21	PCN61541	9.11				8.7	1.4	2.6	96	47	123			
L64507-01DUP	DUP-RPD	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				1000	20	RG
L64574-02DUP	DUP-RER	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				0.07	2	
L64574-02DUP	DUP-RPD	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				33	20	RG

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64520***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64520***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64520-01	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L64520-02	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64520
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?	X		

A change was made in the Sample ID section prior to ACZ custody.

A change was made in the Sample ID section prior to ACZ custody.

A change was made in the Sample ID section prior to ACZ custody.

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
6575	2.1	<=6.0	15	Yes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64520
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64520

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: garguello@barrick.com
Address: PO Box 98, Grants, NM 87020
Telephone: 505-285-1041

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Same as Report to
Company:
E-mail:
Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: Groundwater
PO#: 4500091369
Reporting state for compliance testing:
Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater							
SAG2-1	2/26/21 1537	GW	8	☒	☐	☐	☐	☐	☐	☐	☐
~~SAG2-2~~ SAG2-2	2/26/21 1723	GW	8	☒	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/26/21 1730	[signature]	3/2/21 1220

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L64520 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

April 06, 2021

Report to:
Adam Arguello
Hydro-Engineering
PO Box 98
Grants, NM 87020

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64521

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2021. This project has been assigned to ACZ's project number, L64521. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64521. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 06, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-5

ACZ Sample ID: ***L64521-01***
Date Sampled: *02/26/21 13:25*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	195			mg/L	0.1	0.5	03/10/21 19:02	jlw
Iron, dissolved	M200.7 ICP	1	2.70			mg/L	0.06	0.15	03/10/21 19:02	jlw
Magnesium, dissolved	M200.7 ICP	1	48.6			mg/L	0.2	1	03/10/21 19:02	jlw
Manganese, dissolved	M200.7 ICP	1	4.48		*	mg/L	0.01	0.05	03/10/21 19:02	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0137			mg/L	0.0002	0.0005	03/10/21 19:16	bsu
Potassium, dissolved	M200.7 ICP	1	4.13			mg/L	0.2	1	03/10/21 19:02	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00015	B		mg/L	0.0001	0.00025	03/10/21 19:16	bsu
Sodium, dissolved	M200.7 ICP	1	66.5			mg/L	0.2	1	03/10/21 19:02	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00582			mg/L	0.0001	0.0005	03/10/21 19:16	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:16	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	214			mg/L	2	20	03/11/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Total Alkalinity		1	214			mg/L	2	20	03/11/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	7.3			mg/L	1	5	03/17/21 19:56	ttg
Chloride	SM4500Cl-E	1	55.6		*	mg/L	0.5	2	03/23/21 22:22	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		687			mg/L	0.2	5	04/06/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/17/21 23:41	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.216		*	mg/L	0.05	0.2	03/18/21 17:22	syw
Residue, Filterable (TDS) @180C	SM2540C	5	1130		*	mg/L	100	200	03/02/21 19:49	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	593		*	mg/L	20	100	03/22/21 17:02	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 19:10	eep

Homestake Mining Company
Project ID: 4500071369
Sample ID: FIELD BLANK

ACZ Sample ID: ***L64521-02***
Date Sampled: *02/26/21 13:45*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	<0.1	U		mg/L	0.1	0.5	03/10/21 19:11	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	03/10/21 19:11	jlw
Magnesium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	03/10/21 19:11	jlw
Manganese, dissolved	M200.7 ICP	1	<0.01	U	*	mg/L	0.01	0.05	03/10/21 19:11	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	<0.0002	U		mg/L	0.0002	0.0005	03/10/21 19:18	bsu
Potassium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	03/10/21 19:11	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	03/10/21 19:18	bsu
Sodium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	03/10/21 19:11	jlw
Uranium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.0005	03/10/21 19:18	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:18	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Total Alkalinity		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	<1	U		mg/L	1	5	03/17/21 20:07	ttg
Chloride	SM4500Cl-E	1	<0.5	U	*	mg/L	0.5	2	03/23/21 22:22	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		<0.2	U		mg/L	0.2	5	04/06/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	03/17/21 23:44	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	03/18/21 17:24	syw
Residue, Filterable (TDS) @180C	SM2540C	1	<20	U	*	mg/L	20	40	03/02/21 19:52	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	1	<1	U	*	mg/L	1	5	03/22/21 19:09	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 19:16	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company

ACZ Project ID: ***L64521***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515637													
WG515637PBW1	PBW	03/10/21 20:56				U	mg/L		-20	20			
WG515637LCSW3	LCSW	03/10/21 21:16	WC210305-1	820.0001		771.2	mg/L	94	90	110			
WG515637LCSW6	LCSW	03/11/21 0:08	WC210305-1	820.0001		780.7	mg/L	95	90	110			
WG515637PBW2	PBW	03/11/21 0:16				3.1	mg/L		-20	20			
L64568-01DUP	DUP	03/11/21 2:57			376	377.3	mg/L				0	20	
WG515637LCSW9	LCSW	03/11/21 3:16	WC210305-1	820.0001		780	mg/L	95	90	110			
WG515637PBW3	PBW	03/11/21 3:23				3.2	mg/L		-20	20			
WG515637LCSW12	LCSW	03/11/21 7:18	WC210305-1	820.0001		771.6	mg/L	94	90	110			
WG515637PBW4	PBW	03/11/21 7:25				3.2	mg/L		-20	20			
WG515637LCSW15	LCSW	03/11/21 10:39	WC210305-1	820.0001		797.4	mg/L	97	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	100		97.55	mg/L	98	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.3	0.3			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	68.00934		67.61	mg/L	99	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	68.00934	195	256.2	mg/L	90	85	115			
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	68.00934	195	255.8	mg/L	89	85	115	0	20	

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516007													
WG516007LFB	LFB	03/17/21 17:36	WI210128-1	50		46.5	mg/L	93	90	110			
L64519-01DUP	DUP	03/17/21 18:27			32.1	32.4	mg/L				1	20	
L64519-02AS	AS	03/17/21 18:54	WI210128-1	50	12.5	59.4	mg/L	94	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516328													
WG516328ICB	ICB	03/23/21 16:38				U	mg/L		-1.5	1.5			
WG516328ICV	ICV	03/23/21 16:38	WI200506-2	55.055		59.14	mg/L	107	90	110			
WG516328LFB1	LFB	03/23/21 22:18	WI200327-3	30.03		31.3	mg/L	104	90	110			
WG516328LFB2	LFB	03/23/21 22:22	WI200327-3	30.03		32.76	mg/L	109	90	110			
L64697-03AS	AS	03/23/21 22:28	WI200327-3	30.03	75.7	99.91	mg/L	81	90	110			M2
L64697-04DUP	DUP	03/23/21 22:28			4.41	4.83	mg/L				9	20	RA

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	2		1.947	mg/L	97	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.18	0.18			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	1.0018		.99	mg/L	99	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	1.0018	2.7	3.568	mg/L	87	85	115			
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	1.0018	2.7	3.578	mg/L	88	85	115	0	20	

Homestake Mining Company

ACZ Project ID: ***L64521***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	100		97.34	mg/L	97	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.6	0.6			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	50.00226		48.97	mg/L	98	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	50.00226	48.6	97.02	mg/L	97	85	115			
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	50.00226	48.6	96.17	mg/L	95	85	115	1	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	2		1.94	mg/L	97	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.03	0.03			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	.5005		.473	mg/L	95	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	.5005	4.48	4.727	mg/L	49	85	115			M3
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	.5005	4.48	4.742	mg/L	52	85	115	0	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.01992		.01995	mg/L	100	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00044	0.00044			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.0501		.05001	mg/L	100	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.0501	.00211	.05274	mg/L	101	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.0501	.00211	.0534	mg/L	102	70	130	1	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516017													
WG516017ICV	ICV	03/17/21 21:45	WI210302-17	2.416		2.335	mg/L	97	90	110			
WG516017ICB	ICB	03/17/21 21:46				U	mg/L		-0.02	0.02			
WG516019													
WG516019LFB	LFB	03/17/21 23:18	WI201001-11	2		2.03	mg/L	102	90	110			
L64521-01DUP	DUP	03/17/21 23:42			U	U	mg/L				0	20	RA
L64520-02AS	AS	03/18/21 0:09	WI201001-11	4	2.18	6.337	mg/L	104	90	110			

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516078													
WG516078ICV	ICV	03/18/21 17:11	WI210310-5	11.988		12.637	mg/L	105	90	110			
WG516078ICB	ICB	03/18/21 17:12				U	mg/L		-0.05	0.05			
L64519-02AS	AS	03/18/21 17:17	WI210310-4	10	.786	10.738	mg/L	100	90	110			
L64520-01DUP	DUP	03/18/21 17:19			U	U	mg/L				0	20	RA
WG516078LFB2	LFB	03/18/21 17:56	WI210310-4	10		9.822	mg/L	98	90	110			
WG516078LFB1	LFB	03/18/21 18:18	WI210310-4	10		9.584	mg/L	96	90	110			

Homestake Mining Company ACZ Project ID: ***L64521***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	20		19.65	mg/L	98	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.6	0.6			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	99.97791		98.01	mg/L	98	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	99.97791	4.13	105.1	mg/L	101	85	115			
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	99.97791	4.13	103.2	mg/L	99	85	115	2	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515198													
WG515198PBW	PBW	03/02/21 19:00				U	mg/L		-20	20			
WG515198LCSW	LCSW	03/02/21 19:02	PCN62451	1000		1004	mg/L	100	80	120			
L64516-08DUP	DUP	03/02/21 19:31			U	U	mg/L				0	10	RA

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05099	mg/L	102	90	110			
WG515624ICB	ICB	03/10/21 18:30				.00011	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04935	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00613	.05769	mg/L	103	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00613	.05807	mg/L	104	70	130	1	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515602													
WG515602ICV	ICV	03/10/21 18:39	II210219-1	100		96.93	mg/L	97	95	105			
WG515602ICB	ICB	03/10/21 18:45				U	mg/L		-0.6	0.6			
WG515602LFB	LFB	03/10/21 18:59	II210301-2	100.0235		96.9	mg/L	97	85	115			
L64521-01AS	AS	03/10/21 19:05	II210301-2	100.0235	66.5	164.4	mg/L	98	85	115			
L64521-01ASD	ASD	03/10/21 19:08	II210301-2	100.0235	66.5	162.1	mg/L	96	85	115	1	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516251													
WG516251ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516251ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516251LFB	LFB	03/22/21 16:39	WI210105-3	10		10	mg/L	100	90	110			
L60987-30DUP	DUP	03/22/21 16:39			U	U	mg/L				0	20	RA
L60988-30AS	AS	03/22/21 16:39	WI210105-3	10	19.9	30.1	mg/L	102	90	110			
WG516253													
WG516253ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516253ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516253LFB	LFB	03/22/21 19:09	WI210105-3	10		10.2	mg/L	102	90	110			
L64521-02DUP	DUP	03/22/21 19:09			U	U	mg/L				0	20	RA
L64522-01AS	AS	03/22/21 20:27	SO4TURB20X	10	411	429	mg/L	180	90	110			M3

Homestake Mining Company

ACZ Project ID: ***L64521***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64522-01AS	AS	03/02/21 19:28	WC210302-6	.21956	U	.259	mg/L	118	75	125			
L64522-01ASD	ASD	03/02/21 19:33	WC210302-6	.21956	U	.262	mg/L	119	75	125	1	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05053	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04928	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00705	.05795	mg/L	102	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00705	.05965	mg/L	105	70	130	3	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05038	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.0011	0.0011			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04914	mg/L	98	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	U	.04857	mg/L	97	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	U	.0501	mg/L	100	70	130	3	20	

Homestake Mining Company

ACZ Project ID: ***L64521***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64521-01	WG516328	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515602	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515198	Residue, Filterable (TDS) @180C	SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	RO	The duplicate originally assigned to this sample was not used for precision assessment because residue density did not meet method limits. Another duplicate in the batch was used to assess precision. Method required duplicate frequency was not met.
	WG516251	Sulfate	D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L64521-02	WG516328	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515602	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515198	Residue, Filterable (TDS) @180C	SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	RO	The duplicate originally assigned to this sample was not used for precision assessment because residue density did not meet method limits. Another duplicate in the batch was used to assess precision. Method required duplicate frequency was not met.
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG516253	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: SAG2-5
Locator:

ACZ Sample ID: ***L64521-01***
Date Sampled: *02/26/21 13:25*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/23/21 0:12		1.3	0.18	0.12	pCi/L		amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 16:36		0.67	0.79	2	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/01/21 12:12		2.81	1.5	1.8	pCi/L	*	djc

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: FIELD BLANK
Locator:

ACZ Sample ID: ***L64521-02***
Date Sampled: *02/26/21 13:45*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/23/21 0:14		-0.01	0.11	0.2	pCi/L		amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/21/21 16:36		-0.13	0.77	2.1	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/01/21 12:12		1.97	1.4	1.9	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

Homestake Mining Company

ACZ Project ID: ***L64521***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515994																
WG515994PBW	PBW	03/23/21						.16	0.1	0.09			0.18			
WG515994LCSW	LCSW	03/23/21	PCN62879	20				24	0.69	0.15	120	43	148			
L64520-01DUP	DUP-RPD	03/23/21			0.44	0.23	0.35	.46	0.17	0.23				4	20	
L64520-02MS	MS	03/23/21	PCN62879	20	0.22	0.13	0.09	24	0.72	0.14	119	43	148			
L64581-01DUP	DUP-RER	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				0.6	2	
L64581-01DUP	DUP-RPD	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				106	20	RG

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515791																
WG515791PBW	PBW	03/21/21						.16	0.68	1.7			3.4			
L64507-01DUP	DUP-RER	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				0.63	2	
L64507-02MS	MS	03/21/21	PCN61541	9.11	0.71	0.92	2.3	8.1	1.2	2.2	81	47	123			
WG515791LCSW	LCSW	03/21/21	PCN61541	9.11				8.7	1.4	2.6	96	47	123			
L64507-01DUP	DUP-RPD	03/21/21			0.51	0.97	2.6	-.34	0.94	2.3				1000	20	RG
L64574-02DUP	DUP-RPD	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				33	20	RG
L64574-02DUP	DUP-RER	03/21/21			0.23	0.99	2.5	.32	0.8	1.9				0.07	2	

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG516224																
WG516224LCSW	LCSW	04/01/21	PCN58726	200				209	26	0.42	105	91	126			
L64521-01DUP	DUP-RPD	04/01/21			2.81	1.5	1.8	1.75	1.4	2.1				46	20	RG
L64521-01DUP	DUP-RER	04/01/21			2.81	1.5	1.8	1.75	1.4	2.1				0.52	2	
L64521-02MS	MS	04/01/21	PCN58726	1000	1.97	1.4	1.9	1070	130	1.7	107	91	126			
WG516224PBW	PBW	04/02/21						.428	0.26	0.34			0.68			

RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64521***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64521-01	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG516224	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L64521-02	WG515791	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG516224	Thorium 230, dissolved	ESM 4506	D1	Sample required dilution due to matrix.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64521
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
4756	4.1	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64521
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64521

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name:	Adam Arguello	Address:	PO Box 98
Company:	Hanover Mining Co.		Grants, NM 87020
E-mail:	aarguello@barrick.com	Telephone:	505-285-1041

Copy of Report to:

Name:		E-mail:	
Company:		Telephone:	

Invoice to:

Name:	Same as Report to	Address:	
Company:			
E-mail:		Telephone:	

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☒ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☒

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information State** NM **Zip code** 87020 **Time Zone** MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: Groundwater

PO#: 4500?1369

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater							
SAG2-5	2/26/21 1325	GW	8	☒	☐	☐	☐	☐	☐	☐	☐
Field Blank	2/26/21 1345	GW	8	☒	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/26/21 1730	[signature]	3/2/21 12:20

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L64521 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

March 26, 2021

Report to:
Adam Arguello
Hydro-Engineering

,

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500071369
ACZ Project ID: L64522

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2021. This project has been assigned to ACZ's project number, L64522. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L64522. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 25, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

Homestake Mining Company
Project ID: 4500071369
Sample ID: 0999

ACZ Sample ID: ***L64522-01***
Date Sampled: *02/25/21 07:30*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	175		*	mg/L	0.1	0.5	03/10/21 15:51	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	03/10/21 15:51	jlw
Magnesium, dissolved	M200.7 ICP	1	45.7			mg/L	0.2	1	03/10/21 15:51	jlw
Manganese, dissolved	M200.7 ICP	1	0.045	B		mg/L	0.01	0.05	03/10/21 15:51	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00194			mg/L	0.0002	0.0005	03/10/21 19:20	bsu
Potassium, dissolved	M200.7 ICP	1	4.07			mg/L	0.2	1	03/10/21 15:51	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00630			mg/L	0.0001	0.00025	03/10/21 19:20	bsu
Sodium, dissolved	M200.7 ICP	1	64.0			mg/L	0.2	1	03/10/21 15:51	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00705			mg/L	0.0001	0.0005	03/10/21 19:20	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	03/10/21 19:20	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	267			mg/L	2	20	03/11/21 0:00	eep
Carbonate as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Hydroxide as CaCO3		1	<2	U		mg/L	2	20	03/11/21 0:00	eep
Total Alkalinity		1	267			mg/L	2	20	03/11/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	1.9	B		mg/L	1	5	03/17/21 20:19	ttg
Chloride	SM4500Cl-E	1	57.3		*	mg/L	0.5	2	03/23/21 22:22	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		625			mg/L	0.2	5	03/26/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.35		*	mg/L	0.02	0.1	03/17/21 23:45	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	03/18/21 17:25	syw
Residue, Filterable (TDS) @180C	SM2540C	1	988		*	mg/L	20	40	03/02/21 19:54	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	411		*	mg/L	20	100	03/22/21 20:27	syw
Sulfide as S	SM4500S2-D	1	<0.02	U		mg/L	0.02	0.1	03/02/21 19:22	eep

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company

ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515637													
WG515637PBW1	PBW	03/10/21 20:56				U	mg/L		-20	20			
WG515637LCSW3	LCSW	03/10/21 21:16	WC210305-1	820.0001		771.2	mg/L	94	90	110			
WG515637LCSW6	LCSW	03/11/21 0:08	WC210305-1	820.0001		780.7	mg/L	95	90	110			
WG515637PBW2	PBW	03/11/21 0:16				3.1	mg/L		-20	20			
L64568-01DUP	DUP	03/11/21 2:57			376	377.3	mg/L				0	20	
WG515637LCSW9	LCSW	03/11/21 3:16	WC210305-1	820.0001		780	mg/L	95	90	110			
WG515637PBW3	PBW	03/11/21 3:23				3.2	mg/L		-20	20			
WG515637LCSW12	LCSW	03/11/21 7:18	WC210305-1	820.0001		771.6	mg/L	94	90	110			
WG515637PBW4	PBW	03/11/21 7:25				3.2	mg/L		-20	20			
WG515637LCSW15	LCSW	03/11/21 10:39	WC210305-1	820.0001		797.4	mg/L	97	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.93	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.3	0.3			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	68.00934		67.56	mg/L	99	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	68.00934	300	351	mg/L	75	85	115			M3
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	68.00934	300	352.4	mg/L	77	85	115	0	20	M3

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516007													
WG516007LFB	LFB	03/17/21 17:36	WI210128-1	50		46.5	mg/L	93	90	110			
L64519-01DUP	DUP	03/17/21 18:27			32.1	32.4	mg/L				1	20	
L64519-02AS	AS	03/17/21 18:54	WI210128-1	50	12.5	59.4	mg/L	94	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516328													
WG516328ICB	ICB	03/23/21 16:38				U	mg/L		-1.5	1.5			
WG516328ICV	ICV	03/23/21 16:38	WI200506-2	55.055		59.14	mg/L	107	90	110			
WG516328LFB1	LFB	03/23/21 22:18	WI200327-3	30.03		31.3	mg/L	104	90	110			
WG516328LFB2	LFB	03/23/21 22:22	WI200327-3	30.03		32.76	mg/L	109	90	110			
L64697-03AS	AS	03/23/21 22:28	WI200327-3	30.03	75.7	99.91	mg/L	81	90	110			M2
L64697-04DUP	DUP	03/23/21 22:28			4.41	4.83	mg/L				9	20	RA

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.934	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.18	0.18			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	1.0018		.978	mg/L	98	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	1.0018	U	1.02	mg/L	102	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	1.0018	U	.983	mg/L	98	85	115	4	20	

Homestake Mining Company ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		97.74	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	50.00226		49.29	mg/L	99	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	50.00226	35.6	83.78	mg/L	96	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	50.00226	35.6	83.44	mg/L	96	85	115	0	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	2		1.937	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.03	0.03			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	.5005		.47	mg/L	94	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	.5005	.048	.52	mg/L	94	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	.5005	.048	.517	mg/L	94	85	115	1	20	

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.01992		.01995	mg/L	100	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00044	0.00044			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.0501		.05001	mg/L	100	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.0501	.00211	.05274	mg/L	101	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.0501	.00211	.0534	mg/L	102	70	130	1	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516017													
WG516017ICV	ICV	03/17/21 21:45	WI210302-17	2.416		2.335	mg/L	97	90	110			
WG516017ICB	ICB	03/17/21 21:46				U	mg/L		-0.02	0.02			
WG516019													
WG516019LFB	LFB	03/17/21 23:18	WI201001-11	2		2.03	mg/L	102	90	110			
L64521-01DUP	DUP	03/17/21 23:42			U	U	mg/L				0	20	RA
L64520-02AS	AS	03/18/21 0:09	WI201001-11	4	2.18	6.337	mg/L	104	90	110			

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516078													
WG516078ICV	ICV	03/18/21 17:11	WI210310-5	11.988		12.637	mg/L	105	90	110			
WG516078ICB	ICB	03/18/21 17:12				U	mg/L		-0.05	0.05			
L64519-02AS	AS	03/18/21 17:17	WI210310-4	10	.786	10.738	mg/L	100	90	110			
L64520-01DUP	DUP	03/18/21 17:19			U	U	mg/L				0	20	RA
WG516078LFB2	LFB	03/18/21 17:56	WI210310-4	10		9.822	mg/L	98	90	110			
WG516078LFB1	LFB	03/18/21 18:18	WI210310-4	10		9.584	mg/L	96	90	110			

Homestake Mining Company

ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	20		19.64	mg/L	98	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	99.97791		98.89	mg/L	99	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	99.97791	5.65	107.8	mg/L	102	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	99.97791	5.65	106.5	mg/L	101	85	115	1	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515198													
WG515198PBW	PBW	03/02/21 19:00				U	mg/L		-20	20			
WG515198LCSW	LCSW	03/02/21 19:02	PCN62451	1000		1004	mg/L	100	80	120			
L64516-08DUP	DUP	03/02/21 19:31			U	U	mg/L				0	10	RA

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05099	mg/L	102	90	110			
WG515624ICB	ICB	03/10/21 18:30				.00011	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04935	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00613	.05769	mg/L	103	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00613	.05807	mg/L	104	70	130	1	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515587													
WG515587ICV	ICV	03/10/21 14:40	II210219-1	100		96.82	mg/L	97	95	105			
WG515587ICB	ICB	03/10/21 14:46				U	mg/L		-0.6	0.6			
WG515587LFB	LFB	03/10/21 14:59	II210301-2	100.0235		97.68	mg/L	98	85	115			
L64607-02AS	AS	03/10/21 16:17	II210301-2	100.0235	56.3	154.5	mg/L	98	85	115			
L64607-02ASD	ASD	03/10/21 16:20	II210301-2	100.0235	56.3	153.8	mg/L	97	85	115	0	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG516253													
WG516253ICB	ICB	03/22/21 13:18				U	mg/L		-3	3			
WG516253ICV	ICV	03/22/21 13:18	WI210317-2	20		20.8	mg/L	104	90	110			
WG516253LFB	LFB	03/22/21 19:09	WI210105-3	10		10.2	mg/L	102	90	110			
L64521-02DUP	DUP	03/22/21 19:09			U	U	mg/L				0	20	RA
L64522-01AS	AS	03/22/21 20:27	SO4TURB20X	10	411	429	mg/L	180	90	110			M3

Homestake Mining Company

ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515196													
WG515196ICV	ICV	03/02/21 17:23	WC210302-3	.348		.338	mg/L	97	90	110			
WG515196ICB	ICB	03/02/21 17:28				U	mg/L		-0.05	0.05			
WG515196LFB	LFB	03/02/21 17:34	WC210302-6	.21956		.24	mg/L	109	80	120			
L64522-01AS	AS	03/02/21 19:28	WC210302-6	.21956	U	.259	mg/L	118	75	125			
L64522-01ASD	ASD	03/02/21 19:33	WC210302-6	.21956	U	.262	mg/L	119	75	125	1	20	

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05053	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.00022	0.00022			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04928	mg/L	99	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	.00705	.05795	mg/L	102	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	.00705	.05965	mg/L	105	70	130	3	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG515624													
WG515624ICV	ICV	03/10/21 18:28	MS210115-2	.05		.05038	mg/L	101	90	110			
WG515624ICB	ICB	03/10/21 18:30				U	mg/L		-0.0011	0.0011			
WG515624LFB	LFB	03/10/21 18:32	MS210304-2	.05		.04914	mg/L	98	85	115			
L64520-01AS	AS	03/10/21 19:07	MS210304-2	.05	U	.04857	mg/L	97	70	130			
L64520-01ASD	ASD	03/10/21 19:13	MS210304-2	.05	U	.0501	mg/L	100	70	130	3	20	

Homestake Mining Company

ACZ Project ID: ***L64522***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64522-01	WG515587	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG516328	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516019	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG516078	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG515198	Residue, Filterable (TDS) @180C	SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	RO	The duplicate originally assigned to this sample was not used for precision assessment because residue density did not meet method limits. Another duplicate in the batch was used to assess precision. Method required duplicate frequency was not met.
	WG516253	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadioChemistry Analytical Results

Homestake Mining Company
Project ID: 4500071369
Sample ID: 0999
Locator:

ACZ Sample ID: ***L64522-01***
Date Sampled: *02/25/21 7:30*
Date Received: *03/02/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/23/21 0:15		0.36	0.11	0.12	pCi/L		amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/24/21 16:08		1.4	1.1	2.5	pCi/L	*	fdw

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/22/21 7:02		0.183	0.26	0.44	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ Laboratories, Inc.
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Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515994																
WG515994PBW	PBW	03/23/21						.16	0.1	0.09			0.18			
WG515994LCSW	LCSW	03/23/21	PCN62879	20				24	0.69	0.15	120	43	148			
L64520-01DUP	DUP-RPD	03/23/21			0.44	0.23	0.35	.46	0.17	0.23				4	20	
L64520-02MS	MS	03/23/21	PCN62879	20	0.22	0.13	0.09	24	0.72	0.14	119	43	148			
L64581-01DUP	DUP-RPD	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				106	20	RG
L64581-01DUP	DUP-RER	03/23/21			0.13	0.12	0.26	.04	0.09	0.18				0.6	2	

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515708																
WG515708PBW	PBW	03/24/21						.32	0.68	0.7			1.4			
L64441-01DUP	DUP-RPD	03/24/21			0.33	1	2.4	0	1	2.4				200	20	RG
L64441-01DUP	DUP-RER	03/24/21			0.33	1	2.4	0	1	2.4				0.23	2	
WG515708LCSW	LCSW	03/24/21	PCN61541	9.1				11	1.3	0.94	121	47	123			
L64571-05MS	MS	03/24/21	PCN61541	91	240	18	23	180	13	17	-66	47	123			M3
L64494-03DUP	DUP-RPD	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				173	20	RG
L64494-03DUP	DUP-RER	03/24/21			0.41	0.63	0.64	.03	0.69	1.6				0.41	2	

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Radiochemistry QC Summary

Homestake Mining Company

ACZ Project ID: ***L64522***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG515903																
WG515903LCSW	LCSW	03/21/21	PCN58726	200				217	30	0.84	109	91	126			
L64520-01DUP	DUP-RER	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				0.47	2	
L64520-01DUP	DUP-RPD	03/22/21			1.01	0.59	0.77	1.44	0.7	0.86				35	20	RG
L64522-01DUP	DUP-RPD	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				126	20	RG
L64522-01DUP	DUP-RER	03/22/21			0.183	0.26	0.44	.806	0.46	0.61				1.18	2	
L64520-02MS	MS	03/22/21	PCN58726	200	0.554	0.55	0.87	208	27	0.69	104	91	126			
WG515903PBW	PBW	03/22/21						.864	0.49	0.56			1.12			

RadChem Extended Qualifier Report

Homestake Mining Company

ACZ Project ID: ***L64522***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L64522-01	WG515708	Radium 228, dissolved	M904.0	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG515903	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64522
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
7070	3.2	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500071369

ACZ Project ID: L64522
Date Received: 03/02/2021 12:20
Received By:
Date Printed: 3/3/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L64522

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: aarguello@barrick.com
Address: PO Box 98, Grants NM, 87020
Telephone: 505-285-1241

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Same as report to
Company:
E-mail:
Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** [signature]

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Groundwater
PO#: 4500091369
Reporting state for compliance testing:
Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater							
0999	2/25/21 0730	GW	8	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
				[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	2/26/21 1730	[signature]	3/2/21 12:20

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L64522 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

April 30, 2021

Report to:
Adam Arguello
Homestake Mining Company
PO Box 98
Grants, NM 87020

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID:
ACZ Project ID: L65097

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on April 06, 2021. This project has been assigned to ACZ's project number, L65097. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L65097. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 30, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

Sue Webber has reviewed and approved this report.

Homestake Mining Company

April 30, 2021

Project ID:
ACZ Project ID: L65097

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 6 groundwater samples from Homestake Mining Company on April 6, 2021. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L65097. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic, radiochemistry parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. Radium 228 (N1) - LCSW carrier recovery exceeded control limit due to an extra addition of barium carrier. Carrier recovery adjusted to 100% in activity calculations. LCSW within limits.

Homestake Mining Company
Project ID:
Sample ID: SAG2-5

ACZ Sample ID: ***L65097-01***
Date Sampled: *04/01/21 14:49*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	236			mg/L	0.1	0.5	04/13/21 17:55	jlw
Iron, dissolved	M200.7 ICP	1	3.04			mg/L	0.06	0.15	04/13/21 17:55	jlw
Magnesium, dissolved	M200.7 ICP	1	56.4			mg/L	0.2	1	04/13/21 17:55	jlw
Manganese, dissolved	M200.7 ICP	1	6.50			mg/L	0.01	0.05	04/13/21 17:55	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0173			mg/L	0.0002	0.0005	04/14/21 16:33	bsu
Potassium, dissolved	M200.7 ICP	1	4.61			mg/L	0.2	1	04/13/21 17:55	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00014	B		mg/L	0.0001	0.00025	04/14/21 16:33	bsu
Sodium, dissolved	M200.7 ICP	1	74.1			mg/L	0.2	1	04/13/21 17:55	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00303			mg/L	0.0001	0.0005	04/14/21 16:33	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:33	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	137		*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	137		*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	10.6		*	mg/L	1	5	04/20/21 9:15	ttg
Chloride	SM4500Cl-E	1	46.0		*	mg/L	0.5	2	04/20/21 15:42	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		822			mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/23/21 3:36	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.243		*	mg/L	0.05	0.2	04/22/21 15:57	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	1180		*	mg/L	200	400	04/06/21 17:49	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	769		*	mg/L	20	100	04/23/21 9:41	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/08/21 17:00	emk

Homestake Mining Company
Project ID:
Sample ID: SAG2-4

ACZ Sample ID: ***L65097-02***
Date Sampled: *04/01/21 16:31*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	145			mg/L	0.1	0.5	04/13/21 17:58	jlw
Iron, dissolved	M200.7 ICP	1	4.69			mg/L	0.06	0.15	04/13/21 17:58	jlw
Magnesium, dissolved	M200.7 ICP	1	48.4			mg/L	0.2	1	04/13/21 17:58	jlw
Manganese, dissolved	M200.7 ICP	1	2.11			mg/L	0.01	0.05	04/13/21 17:58	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0166			mg/L	0.0002	0.0005	04/14/21 16:34	bsu
Potassium, dissolved	M200.7 ICP	1	4.32			mg/L	0.2	1	04/13/21 17:58	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	04/14/21 16:34	bsu
Sodium, dissolved	M200.7 ICP	1	88.8			mg/L	0.2	1	04/13/21 17:58	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00370			mg/L	0.0001	0.0005	04/14/21 16:34	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:34	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	250		*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	250		*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	10.8		*	mg/L	1	5	04/20/21 9:38	ttg
Chloride	SM4500Cl-E	1	66.2		*	mg/L	0.5	2	04/20/21 15:43	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		561			mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/23/21 3:39	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.836		*	mg/L	0.05	0.2	04/22/21 15:59	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	840		*	mg/L	200	400	04/06/21 17:52	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	20	426		*	mg/L	20	100	04/23/21 10:01	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/08/21 17:04	emk

Homestake Mining Company
Project ID:
Sample ID: SAG2-3

ACZ Sample ID: ***L65097-03***
Date Sampled: *04/02/21 08:37*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	162			mg/L	0.1	0.5	04/13/21 18:01	jlw
Iron, dissolved	M200.7 ICP	1	3.23			mg/L	0.06	0.15	04/13/21 18:01	jlw
Magnesium, dissolved	M200.7 ICP	1	46.7			mg/L	0.2	1	04/13/21 18:01	jlw
Manganese, dissolved	M200.7 ICP	1	0.874			mg/L	0.01	0.05	04/13/21 18:01	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.01000			mg/L	0.0002	0.0005	04/14/21 16:36	bsu
Potassium, dissolved	M200.7 ICP	1	4.36			mg/L	0.2	1	04/13/21 18:01	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00051			mg/L	0.0001	0.00025	04/14/21 16:36	bsu
Sodium, dissolved	M200.7 ICP	1	70.8			mg/L	0.2	1	04/13/21 18:01	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00623			mg/L	0.0001	0.0005	04/14/21 16:36	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:36	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	249		*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	249		*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	17.6		*	mg/L	1	5	04/20/21 10:06	ttg
Chloride	SM4500Cl-E	1	56.9		*	mg/L	0.5	2	04/20/21 15:43	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		597			mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/23/21 3:41	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.379		*	mg/L	0.05	0.2	04/22/21 16:00	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	820		*	mg/L	200	400	04/06/21 17:54	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	10	397		*	mg/L	10	50	04/23/21 9:53	syw
Sulfide as S	SM4500S2-D	1	0.064	B	*	mg/L	0.02	0.1	04/08/21 17:07	emk

Homestake Mining Company
Project ID:
Sample ID: SAG2-2

ACZ Sample ID: ***L65097-04***
Date Sampled: *04/02/21 10:37*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	177			mg/L	0.1	0.5	04/13/21 18:04	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	04/13/21 18:04	jlw
Magnesium, dissolved	M200.7 ICP	1	47.2			mg/L	0.2	1	04/13/21 18:04	jlw
Manganese, dissolved	M200.7 ICP	1	0.030	B		mg/L	0.01	0.05	04/13/21 18:04	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00293			mg/L	0.0002	0.0005	04/14/21 16:42	bsu
Potassium, dissolved	M200.7 ICP	1	4.04			mg/L	0.2	1	04/13/21 18:04	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00567			mg/L	0.0001	0.00025	04/14/21 16:42	bsu
Sodium, dissolved	M200.7 ICP	1	66.0			mg/L	0.2	1	04/13/21 18:04	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00719			mg/L	0.0001	0.0005	04/14/21 16:42	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:42	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	292		*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	292		*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	1.5	B	*	mg/L	1	5	04/20/21 10:17	ttg
Chloride	SM4500Cl-E	1	54.0		*	mg/L	0.5	2	04/20/21 15:44	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		636			mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.23		*	mg/L	0.02	0.1	04/23/21 3:43	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	04/22/21 16:38	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	974		*	mg/L	20	40	04/06/21 17:57	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	10	381		*	mg/L	10	50	04/23/21 9:53	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/08/21 17:10	emk

Homestake Mining Company
Project ID:
Sample ID: SAG2-1

ACZ Sample ID: ***L65097-05***
Date Sampled: *04/02/21 12:59*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	179			mg/L	0.1	0.5	04/13/21 18:13	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	04/13/21 18:13	jlw
Magnesium, dissolved	M200.7 ICP	1	47.2			mg/L	0.2	1	04/13/21 18:13	jlw
Manganese, dissolved	M200.7 ICP	1	0.027	B		mg/L	0.01	0.05	04/13/21 18:13	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00200			mg/L	0.0002	0.0005	04/14/21 16:43	bsu
Potassium, dissolved	M200.7 ICP	1	4.17			mg/L	0.2	1	04/13/21 18:13	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00636			mg/L	0.0001	0.00025	04/14/21 16:43	bsu
Sodium, dissolved	M200.7 ICP	1	66.4			mg/L	0.2	1	04/13/21 18:13	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00715			mg/L	0.0001	0.0005	04/14/21 16:43	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:43	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	295		*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	295		*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	1.8	B	*	mg/L	1	5	04/19/21 13:32	ttg
Chloride	SM4500Cl-E	1	53.5		*	mg/L	0.5	2	04/20/21 15:45	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		641			mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.39		*	mg/L	0.02	0.1	04/23/21 3:44	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	04/22/21 16:40	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	980		*	mg/L	20	40	04/06/21 17:59	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	10	394		*	mg/L	10	50	04/23/21 9:54	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/08/21 17:20	emk

Homestake Mining Company
Project ID:
Sample ID: FIELD BLANK

ACZ Sample ID: ***L65097-06***
Date Sampled: *04/02/21 13:10*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	<0.1	U		mg/L	0.1	0.5	04/13/21 18:16	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	04/13/21 18:16	jlw
Magnesium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	04/13/21 18:16	jlw
Manganese, dissolved	M200.7 ICP	1	<0.01	U		mg/L	0.01	0.05	04/13/21 18:16	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	<0.0002	U		mg/L	0.0002	0.0005	04/14/21 16:49	bsu
Potassium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	04/13/21 18:16	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	04/14/21 16:49	bsu
Sodium, dissolved	M200.7 ICP	1	<0.2	U		mg/L	0.2	1	04/13/21 18:16	jlw
Uranium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.0005	04/14/21 16:49	bsu
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/14/21 16:49	bsu

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	3.6	B	*	mg/L	2	20	04/09/21 0:00	eep
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/09/21 0:00	eep
Total Alkalinity		1	3.6	B	*	mg/L	2	20	04/09/21 0:00	eep
Carbon, dissolved organic (DOC)	SM5310B	1	<1	U	*	mg/L	1	5	04/19/21 13:42	ttg
Chloride	SM4500Cl-E	1	0.68	B	*	mg/L	0.5	2	04/20/21 15:46	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		<0.2	U		mg/L	0.2	5	04/30/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/23/21 3:45	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	<0.05	U	*	mg/L	0.05	0.2	04/22/21 16:41	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	<20	U	*	mg/L	20	40	04/06/21 18:02	jck
Sulfate	D516-02/-07/-11 - Turbidimetric	1	1.3	B	*	mg/L	1	5	04/23/21 9:30	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/08/21 17:29	emk

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1)	EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2)	EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3)	EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4)	EPA SW-846. Test Methods for Evaluating Solid Waste.
(5)	Standard Methods for the Examination of Water and Wastewater.

Comments

(1)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2)	Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3)	Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5)	If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517179													
WG517179PBW1	PBW	04/08/21 19:10				U	mg/L		-20	20			
WG517179LCSW3	LCSW	04/08/21 19:30	WC210403-1	820.0001		853.3	mg/L	104	90	110			
WG517179LCSW6	LCSW	04/08/21 22:19	WC210403-1	820.0001		858.4	mg/L	105	90	110			
WG517179PBW2	PBW	04/08/21 22:26				4.8	mg/L		-20	20			
WG517179LCSW9	LCSW	04/09/21 0:50	WC210403-1	820.0001		864	mg/L	105	90	110			
WG517179PBW3	PBW	04/09/21 0:56				3.7	mg/L		-20	20			
L65097-03DUP	DUP	04/09/21 2:33			249	264.6	mg/L				6	20	
L65146-02DUP	DUP	04/09/21 3:56			12.6	27	mg/L				73	20	RA
WG517179LCSW12	LCSW	04/09/21 4:14	WC210403-1	820.0001		850.6	mg/L	104	90	110			
WG517179PBW4	PBW	04/09/21 4:21				4.1	mg/L		-20	20			
WG517179LCSW15	LCSW	04/09/21 7:13	WC210403-1	820.0001		873	mg/L	106	90	110			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		97.51	mg/L	98	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.3	0.3			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	68.00934		70.16	mg/L	103	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	68.00934	177	237.9	mg/L	90	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	68.00934	177	237.5	mg/L	89	85	115	0	20	

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517374													
WG517374ICV	ICV	04/14/21 20:32	WI210224-2	100		101.5	mg/L	102	90	110			
WG517374ICB	ICB	04/14/21 20:40				U	mg/L		-3	3			
WG517633													
WG517633LFB	LFB	04/20/21 8:39	WI210128-1	50		47.3	mg/L	95	90	110			
L65097-01DUP	DUP	04/20/21 9:27			10.6	10.6	mg/L				0	20	
L65097-02AS	AS	04/20/21 9:51	WI210128-1	50	10.8	59.2	mg/L	97	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517788													
WG517788ICV	ICV	04/20/21 15:34	WI210325-1	55.055		53.84	mg/L	98	90	110			
WG517788ICB	ICB	04/20/21 15:34				.69	mg/L		-1.5	1.5			
WG517788LFB1	LFB	04/20/21 15:35	WI200327-3	30.03		29.63	mg/L	99	90	110			
L63924-12AS	AS	04/20/21 15:36	WI200327-3	30.03	.73	30.25	mg/L	98	90	110			
L63925-12DUP	DUP	04/20/21 15:37			.67	.68	mg/L				1	20	RA
L65097-04AS	AS	04/20/21 15:44	WI200327-3	30.03	54	82.82	mg/L	96	90	110			
L65097-05DUP	DUP	04/20/21 15:45			53.5	56.56	mg/L				6	20	
WG517788LFB2	LFB	04/20/21 15:50	WI200327-3	30.03		29.41	mg/L	98	90	110			

Homestake Mining Company

ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	2		1.945	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.18	0.18			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	1.0018		1.01	mg/L	101	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	1.0018	U	.996	mg/L	99	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	1.0018	U	1.005	mg/L	100	85	115	1	20	

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		98.78	mg/L	99	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	50.00226		51.4	mg/L	103	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	50.00226	47.2	96.71	mg/L	99	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	50.00226	47.2	96.52	mg/L	99	85	115	0	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	2		1.945	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.03	0.03			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	.5005		.484	mg/L	97	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	.5005	.03	.515	mg/L	97	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	.5005	.03	.517	mg/L	97	85	115	0	20	

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517466													
WG517466ICV	ICV	04/14/21 16:27	MS210330-3	.01992		.01997	mg/L	100	90	110			
WG517466ICB	ICB	04/14/21 16:29				U	mg/L		-0.00044	0.00044			
WG517466LFB	LFB	04/14/21 16:31	MS210414-5	.0501		.04667	mg/L	93	85	115			
L65097-03AS	AS	04/14/21 16:38	MS210414-5	.0501	.01	.05966	mg/L	99	70	130			
L65097-03ASD	ASD	04/14/21 16:40	MS210414-5	.0501	.01	.0598	mg/L	99	70	130	0	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517975													
WG517975ICV	ICV	04/23/21 1:30	WI210302-17	2.416		2.387	mg/L	99	90	110			
WG517975ICB	ICB	04/23/21 1:32				U	mg/L		-0.02	0.02			
WG517979													
WG517979LFB	LFB	04/23/21 3:35	WI210331-13	2		2.065	mg/L	103	90	110			
L65097-01AS	AS	04/23/21 3:37	WI210331-13	2	U	2.094	mg/L	105	90	110			
L65097-02DUP	DUP	04/23/21 3:40			U	U	mg/L				0	20	RA

Homestake Mining Company ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517914													
WG517914ICV	ICV	04/22/21 15:26	WI210310-5	11.988		11.374	mg/L	95	90	110			
WG517914ICB	ICB	04/22/21 15:28				U	mg/L		-0.05	0.05			
WG517914LFB1	LFB	04/22/21 15:29	WI210310-4	10		9.658	mg/L	97	90	110			
L58834-50DUP	DUP	04/22/21 15:53			U	U	mg/L				0	20	RA
L58835-50AS	AS	04/22/21 15:56	WI210310-4	10	U	10.28	mg/L	103	90	110			
WG517914LFB2	LFB	04/22/21 16:46	WI210310-4	10		10.945	mg/L	109	90	110			

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	20		19.6	mg/L	98	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	99.97791		102.9	mg/L	103	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	99.97791	4.04	109	mg/L	105	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	99.97791	4.04	108.4	mg/L	104	85	115	1	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517019													
WG517019PBW	PBW	04/06/21 17:05				U	mg/L		-20	20			
WG517019LCSW	LCSW	04/06/21 17:07	PCN62151	1000		992	mg/L	99	80	120			
L65097-06DUP	DUP	04/06/21 18:05			U	U	mg/L				0	10	RA

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517466													
WG517466ICV	ICV	04/14/21 16:27	MS210330-3	.05		.05022	mg/L	100	90	110			
WG517466ICB	ICB	04/14/21 16:29				.00012	mg/L		-0.00022	0.00022			
WG517466LFB	LFB	04/14/21 16:31	MS210414-5	.05		.04639	mg/L	93	85	115			
L65097-03AS	AS	04/14/21 16:38	MS210414-5	.05	.00051	.05359	mg/L	106	70	130			
L65097-03ASD	ASD	04/14/21 16:40	MS210414-5	.05	.00051	.05292	mg/L	105	70	130	1	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		97.03	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	100.0235		101.2	mg/L	101	85	115			
L65097-04AS	AS	04/13/21 18:07	II210401-2	100.0235	66	165.7	mg/L	100	85	115			
L65097-04ASD	ASD	04/13/21 18:10	II210401-2	100.0235	66	165.3	mg/L	99	85	115	0	20	

Homestake Mining Company ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517986													
WG517986ICB	ICB	04/23/21 8:15				U	mg/L		-3	3			
WG517986ICV	ICV	04/23/21 8:15	WI210415-1	20		20.3	mg/L	102	90	110			
WG517986LFB	LFB	04/23/21 9:30	WI210105-3	10		9.8	mg/L	98	90	110			
L65097-01DUP	DUP	04/23/21 9:41			769	755.3	mg/L				2	20	
L65097-02AS	AS	04/23/21 10:01	SO4TURB20X	10	426	428.5	mg/L	25	90	110			M3

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517176													
WG517176ICV	ICV	04/08/21 16:33	WC210408-4	.32266		.341	mg/L	106	90	110			
WG517176ICB	ICB	04/08/21 16:40				U	mg/L		-0.05	0.05			
WG517177													
WG517177ICV	ICV	04/08/21 16:35	WC210408-4	.32266		.341	mg/L	106	90	110			
WG517177ICB	ICB	04/08/21 16:38				U	mg/L		-0.05	0.05			
WG517177LFB	LFB	04/08/21 16:41	WC210408-7	.1991067		.229	mg/L	115	80	120			
L65097-05AS	AS	04/08/21 17:23	WC210408-7	.1991067	U	.248	mg/L	125	75	125			
L65097-05ASD	ASD	04/08/21 17:26	WC210408-7	.1991067	U	.241	mg/L	121	75	125	3	20	
L65097-06AS	AS	04/08/21 17:33	WC210408-7	.1991067	U	.249	mg/L	125	75	125			
L65097-06ASD	ASD	04/08/21 17:36	WC210408-7	.1991067	U	.25	mg/L	126	75	125	0	20	MA

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517466													
WG517466ICV	ICV	04/14/21 16:27	MS210330-3	.05		.05041	mg/L	101	90	110			
WG517466ICB	ICB	04/14/21 16:29				U	mg/L		-0.00022	0.00022			
WG517466LFB	LFB	04/14/21 16:31	MS210414-5	.05		.04652	mg/L	93	85	115			
L65097-03AS	AS	04/14/21 16:38	MS210414-5	.05	.00623	.05836	mg/L	104	70	130			
L65097-03ASD	ASD	04/14/21 16:40	MS210414-5	.05	.00623	.05759	mg/L	103	70	130	1	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517466													
WG517466ICV	ICV	04/14/21 16:27	MS210330-3	.05		.05033	mg/L	101	90	110			
WG517466ICB	ICB	04/14/21 16:29				U	mg/L		-0.0011	0.0011			
WG517466LFB	LFB	04/14/21 16:31	MS210414-5	.05		.04598	mg/L	92	85	115			
L65097-03AS	AS	04/14/21 16:38	MS210414-5	.05	U	.04899	mg/L	98	70	130			
L65097-03ASD	ASD	04/14/21 16:40	MS210414-5	.05	U	.04875	mg/L	98	70	130	0	20	

Homestake Mining Company ACZ Project ID: ***L65097***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65097-01	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L65097-02	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

ACZ Laboratories, Inc.
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Inorganic Extended Qualifier Report

Homestake Mining Company ACZ Project ID: ***L65097***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65097-03	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L65097-04	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Homestake Mining Company ACZ Project ID: ***L65097***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65097-05	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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Inorganic Extended Qualifier Report

Homestake Mining Company ACZ Project ID: ***L65097***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65097-06	WG517179	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517179	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517788	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517179	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517979	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517914	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517019	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG517986	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517177	Sulfide as S	SM4500S2-D	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517179	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Homestake Mining Company
Project ID:
Sample ID: SAG2-5
Locator:

ACZ Sample ID: ***L65097-01***
Date Sampled: *04/01/21 14:49*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:21		1.2	0.29	0.65	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/15/21 18:10		-0.43	0.95	2.3	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.424	0.26	0.34	pCi/L	*	djc

Homestake Mining Company
Project ID:
Sample ID: SAG2-4
Locator:

ACZ Sample ID: ***L65097-02***
Date Sampled: *04/01/21 16:31*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:23		1.3	0.25	0.35	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/15/21 18:10		0.44	1	2.4	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.428	0.3	0.44	pCi/L	*	djc

Homestake Mining Company
Project ID:
Sample ID: SAG2-3
Locator:

ACZ Sample ID: ***L65097-03***
Date Sampled: *04/02/21 8:37*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:24		0.24	0.19	0.54	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/15/21 18:10		0.68	1.1	2.7	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.372	0.24	0.31	pCi/L	*	djc

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RadioChemistry Analytical Results

Homestake Mining Company
Project ID:
Sample ID: SAG2-2
Locator:

ACZ Sample ID: ***L65097-04***
Date Sampled: *04/02/21 10:37*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:25		0.17	0.08	0.13	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/15/21 18:10		0.28	1.1	2.7	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.393	0.31	0.46	pCi/L	*	djc

Homestake Mining Company
Project ID:
Sample ID: SAG2-1
Locator:

ACZ Sample ID: ***L65097-05***
Date Sampled: *04/02/21 12:59*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:27		0.36	0.13	0.19	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/28/21 14:48		0.22	0.87	2.4	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.189	0.28	0.49	pCi/L	*	djc

Homestake Mining Company
Project ID:
Sample ID: FIELD BLANK
Locator:

ACZ Sample ID: ***L65097-06***
Date Sampled: *04/02/21 13:10*
Date Received: *04/06/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/15/21 0:28		0.11	0.14	0.24	pCi/L	*	djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	04/28/21 14:48		-0.22	0.77	1.9	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.439	0.31	0.45	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

Homestake Mining Company

ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG517125																
WG517125PBW	PBW	04/15/21						-.03	0.09	0.1			0.2			
WG517125LCSW	LCSW	04/15/21	PCN62879	20				14	0.5	0.1	70	43	148			
L64923-01DUP	DUP-RPD	04/15/21			0.22	0.1	0.08	.16	0.1	0.09				32	20	RG
L64923-01DUP	DUP-RER	04/15/21			0.22	0.1	0.08	.16	0.1	0.09				0.42	2	
L65059-01DUP	DUP-RER	04/15/21			0.18	0.1	0.16	.25	0.11	0.11				0.47	2	
L65059-01DUP	DUP-RPD	04/15/21			0.18	0.1	0.16	.25	0.11	0.11				33	20	RG
L65059-02MS	MS	04/15/21	PCN62879	20	0.12	0.09	0.18	16	0.52	0.05	79	43	148			

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG517158																
L64619-02DUP	DUP-RPD	04/15/21			52	2.6	2.7	57	2.4	2.2				9	20	
L64700-02MS	MS	04/15/21	PCN61541	9.03	6.2	1.5	2.9	14	1.7	2.7	86	47	123			
WG517158LCSW	LCSW	04/15/21	PCN61541	9.03				6.9	1.7	1.5	76	47	123			
WG517158PBW	PBW	04/15/21						.66	0.57	0.56			1.12			
L65058-02DUP	DUP-RPD	04/15/21			0.05	2.2	5.3	1.6	2.5	6.1				188	20	RG
L65058-02DUP	DUP-RER	04/15/21			0.05	2.2	5.3	1.6	2.5	6.1				0.47	2	
WG517924																
WG517924LCSW	LCSW	04/28/21	PCN63356	9.9				7.2	0.98	0.73	73	47	123			N1
L65097-05MS	MS	04/28/21	PCN63356	9.9	0.22	0.87	2.4	8.7	1.2	2.2	86	47	123			
L65097-06DUP	DUP-RER	04/28/21			-0.22	0.77	1.9	.78	0.96	2.2				0.81	2	
WG517924PBW	PBW	04/28/21						.17	0.36	0.37			0.74			
L65097-06DUP	DUP-RPD	04/28/21			-0.22	0.77	1.9	.78	0.96	2.2				357	20	RG
L65164-01DUP	DUP-RPD	04/28/21			0.35	0.68	1.6	.29	0.8	1.9				19	20	

Homestake Mining Company

ACZ Project ID: ***L65097***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG517895																
WG517895PBW	PBW	04/22/21						.407	0.28	0.39			0.78			
WG517895LCSW	LCSW	04/22/21	PCN58726	200				221	28	0.53	111	91	126			
L65163-05DUP	DUP-RPD	04/22/21			0.413	0.26	0.34	.0602	0.19	0.36				149	20	RG
L65163-05DUP	DUP-RER	04/22/21			0.413	0.26	0.34	.0602	0.19	0.36				1.1	2	
L65163-01MS	MS	04/22/21	PCN58726	200	0.425	0.32	0.47	217	27	0.47	108	91	126			
L65097-01DUP	DUP-RER	04/22/21			0.424	0.26	0.34	.229	0.32	0.55				0.47	2	
L65097-01DUP	DUP-RPD	04/22/21			0.424	0.26	0.34	.229	0.32	0.55				60	20	RG

Homestake Mining Company ACZ Project ID: ***L65097***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65097-01	WG517125	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517158	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65097-02	WG517125	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517158	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65097-03	WG517125	Radium 226, dissolved	M903.1	D1	Sample required dilution due to matrix.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517158	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65097-04	WG517125	Radium 226, dissolved	M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517158	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65097-05	WG517125	Radium 226, dissolved	M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517924	Radium 228, dissolved	M904.0	N1	See Case Narrative.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65097-06	WG517125	Radium 226, dissolved	M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517924	Radium 228, dissolved	M904.0	N1	See Case Narrative.
			M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company

ACZ Project ID: L65097
Date Received: 04/06/2021 12:28
Received By:
Date Printed: 4/7/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
5203	15.4	<=6.0	15	Yes
3834	15.5	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company

ACZ Project ID: L65097
Date Received: 04/06/2021 12:28
Received By:
Date Printed: 4/7/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L65097

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Arguello
Company: Homestake Mining Company
E-mail: aarguello@barrick.com
Address: PO Box 98
Grants, NM 87020
Telephone: 505-285-1041

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Same as Report to
Company:
E-mail:
Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Arguello **Sampler's Site Information** State NM Zip code 87020 Time Zone MT

***Sampler's Signature:** Adam Arguello

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Groundwater
PO#:
Reporting state for compliance testing:
Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater								
SAG2-5	4/1/21 1449	GW	7	X								
SAG2-4	4/1/21 1631	GW	7	X								
SAG2-3	4/2/21 837	GW	7	X								
SAG2-2	4/2/21 1037	GW	7	X								
SAG2-1	4/2/21 1259	GW	7	X								
Field Blank	4/2/21 1310	GW	7	X								

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Adam Arguello	4/2/21 1630	[illegible] 4-6-21	1230

L65097 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

May 05, 2021

Report to:
Adam Arguello
Homestake Mining Company
PO Box 98
Grants, NM 87020

Bill to:
Adam Arguello
Homestake Mining Company
P.O. Box 98
Grants, NM 87020

Project ID: 4500091369
ACZ Project ID: L65163

Adam Arguello:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on April 08, 2021. This project has been assigned to ACZ's project number, L65163. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L65163. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after June 04, 2021. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

S. Habermehl

Scott Habermehl has reviewed
and approved this report.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-5

ACZ Sample ID: ***L65163-01***
Date Sampled: *04/05/21 09:22*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	428			mg/L	0.1	0.5	04/13/21 18:50	jlw
Iron, dissolved	M200.7 ICP	1	1.92			mg/L	0.06	0.15	04/13/21 18:50	jlw
Magnesium, dissolved	M200.7 ICP	1	65.3			mg/L	0.2	1	04/13/21 18:50	jlw
Manganese, dissolved	M200.7 ICP	1	2.99		*	mg/L	0.01	0.05	04/13/21 18:50	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00806			mg/L	0.0002	0.0005	04/16/21 13:28	mfm
Potassium, dissolved	M200.7 ICP	1	2.99			mg/L	0.2	1	04/13/21 18:50	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00013	B		mg/L	0.0001	0.00025	04/16/21 13:28	mfm
Sodium, dissolved	M200.7 ICP	1	69.3			mg/L	0.2	1	04/13/21 18:50	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00143			mg/L	0.0001	0.0005	04/16/21 13:28	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:28	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	159		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	159		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	11.4		*	mg/L	1	5	04/19/21 15:04	ttg
Chloride	SM4500Cl-E	1	29.2		*	mg/L	0.5	2	04/26/21 16:19	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1340			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.152	B	*	mg/L	0.05	0.2	04/27/21 15:19	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	1980		*	mg/L	200	400	04/08/21 15:54	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	50	1290		*	mg/L	50	250	04/27/21 16:34	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 14:43	eep

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-4

ACZ Sample ID: ***L65163-02***
Date Sampled: *04/05/21 11:08*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	345			mg/L	0.1	0.5	04/13/21 18:53	jlw
Iron, dissolved	M200.7 ICP	1	3.46			mg/L	0.06	0.15	04/13/21 18:53	jlw
Magnesium, dissolved	M200.7 ICP	1	63.8			mg/L	0.2	1	04/13/21 18:53	jlw
Manganese, dissolved	M200.7 ICP	1	2.01		*	mg/L	0.01	0.05	04/13/21 18:53	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.00620			mg/L	0.0002	0.0005	04/16/21 13:34	mfm
Potassium, dissolved	M200.7 ICP	1	3.71			mg/L	0.2	1	04/13/21 18:53	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	04/16/21 13:34	mfm
Sodium, dissolved	M200.7 ICP	1	76.7			mg/L	0.2	1	04/13/21 18:53	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00138			mg/L	0.0001	0.0005	04/16/21 13:34	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:34	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	149		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	149		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	4.5	B	*	mg/L	1	5	04/19/21 15:53	ttg
Chloride	SM4500Cl-E	1	34.9		*	mg/L	0.5	2	04/26/21 16:19	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1120			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:51	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.109	B	*	mg/L	0.05	0.2	04/27/21 15:22	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	1680		*	mg/L	200	400	04/08/21 15:56	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	50	1040		*	mg/L	50	250	04/27/21 16:34	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 14:46	eep

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-3

ACZ Sample ID: ***L65163-03***
Date Sampled: *04/05/21 12:48*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	184			mg/L	0.1	0.5	04/13/21 18:57	jlw
Iron, dissolved	M200.7 ICP	1	1.02			mg/L	0.06	0.15	04/13/21 18:57	jlw
Magnesium, dissolved	M200.7 ICP	1	53.1			mg/L	0.2	1	04/13/21 18:57	jlw
Manganese, dissolved	M200.7 ICP	1	6.13		*	mg/L	0.01	0.05	04/13/21 18:57	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0219			mg/L	0.0002	0.0005	04/16/21 13:35	mfm
Potassium, dissolved	M200.7 ICP	1	4.89			mg/L	0.2	1	04/13/21 18:57	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00013	B		mg/L	0.0001	0.00025	04/16/21 13:35	mfm
Sodium, dissolved	M200.7 ICP	1	125			mg/L	0.2	1	04/13/21 18:57	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00440			mg/L	0.0001	0.0005	04/16/21 13:35	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:35	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	180		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	180		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	6.7		*	mg/L	1	5	04/19/21 16:20	ttg
Chloride	SM4500Cl-E	1	88.7		*	mg/L	0.5	2	04/26/21 16:20	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		678			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:54	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.548		*	mg/L	0.05	0.2	04/27/21 15:25	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	1120		*	mg/L	200	400	04/08/21 15:58	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	20	613		*	mg/L	20	100	04/27/21 16:15	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 14:54	eep

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-2

ACZ Sample ID: ***L65163-04***
Date Sampled: *04/05/21 14:30*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	151			mg/L	0.1	0.5	04/13/21 19:06	jlw
Iron, dissolved	M200.7 ICP	1	0.873			mg/L	0.06	0.15	04/13/21 19:06	jlw
Magnesium, dissolved	M200.7 ICP	1	49.6			mg/L	0.2	1	04/13/21 19:06	jlw
Manganese, dissolved	M200.7 ICP	1	4.20		*	mg/L	0.01	0.05	04/13/21 19:06	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0194			mg/L	0.0002	0.0005	04/16/21 13:41	mfm
Potassium, dissolved	M200.7 ICP	1	4.81			mg/L	0.2	1	04/13/21 19:06	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	04/16/21 13:41	mfm
Sodium, dissolved	M200.7 ICP	1	122			mg/L	0.2	1	04/13/21 19:06	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00662			mg/L	0.0001	0.0005	04/16/21 13:41	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:41	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	229		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	229		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	5.2		*	mg/L	1	5	04/19/21 16:34	ttg
Chloride	SM4500Cl-E	1	86.4		*	mg/L	0.5	2	04/26/21 16:20	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		581			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:55	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.786		*	mg/L	0.05	0.2	04/27/21 15:26	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	1000		*	mg/L	200	400	04/08/21 16:00	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	20	474		*	mg/L	20	100	04/27/21 16:15	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 14:56	eep

Homestake Mining Company
Project ID: 4500091369
Sample ID: 0999

ACZ Sample ID: ***L65163-05***
Date Sampled: *04/05/21 13:20*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	150			mg/L	0.1	0.5	04/13/21 19:15	jlw
Iron, dissolved	M200.7 ICP	1	0.858			mg/L	0.06	0.15	04/13/21 19:15	jlw
Magnesium, dissolved	M200.7 ICP	1	49.0			mg/L	0.2	1	04/13/21 19:15	jlw
Manganese, dissolved	M200.7 ICP	1	4.14		*	mg/L	0.01	0.05	04/13/21 19:15	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0193			mg/L	0.0002	0.0005	04/16/21 13:43	mfm
Potassium, dissolved	M200.7 ICP	1	4.82			mg/L	0.2	1	04/13/21 19:15	jlw
Selenium, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.00025	04/16/21 13:43	mfm
Sodium, dissolved	M200.7 ICP	1	121			mg/L	0.2	1	04/13/21 19:15	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00669			mg/L	0.0001	0.0005	04/16/21 13:43	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:43	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	232		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	232		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	5.2		*	mg/L	1	5	04/19/21 16:47	ttg
Chloride	SM4500Cl-E	1	86.1		*	mg/L	0.5	2	04/26/21 16:21	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		576			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:56	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.783		*	mg/L	0.05	0.2	04/27/21 15:28	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	980		*	mg/L	200	400	04/08/21 16:02	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	20	491		*	mg/L	20	100	04/27/21 16:17	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 14:59	eep

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-1

ACZ Sample ID: ***L65163-06***
Date Sampled: *04/05/21 16:16*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	131			mg/L	0.1	0.5	04/13/21 19:18	jlw
Iron, dissolved	M200.7 ICP	1	12.8			mg/L	0.06	0.15	04/13/21 19:18	jlw
Magnesium, dissolved	M200.7 ICP	1	45.7			mg/L	0.2	1	04/13/21 19:18	jlw
Manganese, dissolved	M200.7 ICP	1	0.738		*	mg/L	0.01	0.05	04/13/21 19:18	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0274			mg/L	0.0002	0.0005	04/16/21 13:44	mfm
Potassium, dissolved	M200.7 ICP	1	4.04			mg/L	0.2	1	04/13/21 19:18	jlw
Selenium, dissolved	M200.8 ICP-MS	1	0.00012	B		mg/L	0.0001	0.00025	04/16/21 13:44	mfm
Sodium, dissolved	M200.7 ICP	1	98.1			mg/L	0.2	1	04/13/21 19:18	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.00120			mg/L	0.0001	0.0005	04/16/21 13:44	mfm
Vanadium, dissolved	M200.8 ICP-MS	1	<0.0005	U		mg/L	0.0005	0.002	04/16/21 13:44	mfm

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	209		*	mg/L	2	20	04/13/21 0:00	emk
Carbonate as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Hydroxide as CaCO3		1	<2	U	*	mg/L	2	20	04/13/21 0:00	emk
Total Alkalinity		1	209		*	mg/L	2	20	04/13/21 0:00	emk
Carbon, dissolved organic (DOC)	SM5310B	1	18.3		*	mg/L	1	5	04/19/21 16:58	ttg
Chloride	SM4500Cl-E	1	72.0		*	mg/L	0.5	2	04/26/21 16:22	syw
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		515			mg/L	0.2	5	05/05/21 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	<0.02	U	*	mg/L	0.02	0.1	04/24/21 23:57	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.281		*	mg/L	0.05	0.2	04/27/21 15:29	wtc
Residue, Filterable (TDS) @180C	SM2540C	10	880		*	mg/L	200	400	04/08/21 16:04	emk
Sulfate	D516-02/-07/-11 - Turbidimetric	20	446		*	mg/L	20	100	04/27/21 16:37	syw
Sulfide as S	SM4500S2-D	1	<0.02	U	*	mg/L	0.02	0.1	04/09/21 15:01	eep

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Homestake Mining Company ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517383													
WG517383PBW1	PBW	04/13/21 18:21				2.3	mg/L		-20	20			
L65163-06DUP	DUP	04/13/21 21:44			209	225.2	mg/L				7	20	
WG517383PBW2	PBW	04/13/21 22:09				5.1	mg/L		-20	20			
WG517383PBW3	PBW	04/14/21 1:42				4.8	mg/L		-20	20			
WG517383PBW4	PBW	04/14/21 5:02				5.6	mg/L		-20	20			

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		97.51	mg/L	98	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.3	0.3			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	68.00934		70.16	mg/L	103	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	68.00934	151	212.3	mg/L	90	85	115			
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	68.00934	151	213.1	mg/L	91	85	115	0	20	

Carbon, dissolved organic (DOC) SM5310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517374													
WG517374ICV	ICV	04/14/21 20:32	WI210224-2	100		101.5	mg/L	102	90	110			
WG517374ICB	ICB	04/14/21 20:40				U	mg/L		-3	3			
WG517633													
L65163-01DUP	DUP	04/19/21 15:16			11.4	11.4	mg/L				0	20	
L65163-02AS	AS	04/19/21 16:05	WI210128-1	50	4.5	57.6	mg/L	106	90	110			
WG517633LFB	LFB	04/20/21 8:39	WI210128-1	50		47.3	mg/L	95	90	110			

Chloride SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG518089													
WG518089ICV	ICV	04/26/21 16:15	WI210325-1	55.055		54.44	mg/L	99	90	110			
WG518089ICB	ICB	04/26/21 16:16				.62	mg/L		-1.5	1.5			
WG518089LFB1	LFB	04/26/21 16:16	WI200327-3	30.03		28.25	mg/L	94	90	110			
L65161-02DUP	DUP	04/26/21 16:18			15	17.37	mg/L				15	20	
WG518089LFB2	LFB	04/26/21 16:31	WI200327-3	30.03		30.21	mg/L	101	90	110			
L65161-01AS	AS	04/26/21 17:30	5XCL	30	95.4	121.38	mg/L	87	90	110			M2

Iron, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	2		1.945	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.18	0.18			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	1.0018		1.01	mg/L	101	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	1.0018	.873	1.844	mg/L	97	85	115			
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	1.0018	.873	1.845	mg/L	97	85	115	0	20	

Homestake Mining Company ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		98.78	mg/L	99	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	50.00226		51.4	mg/L	103	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	50.00226	49.6	98.69	mg/L	98	85	115			
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	50.00226	49.6	98.77	mg/L	98	85	115	0	20	

Manganese, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	2		1.945	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.03	0.03			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	.5005		.484	mg/L	97	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	.5005	4.2	4.448	mg/L	50	85	115			M3
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	.5005	4.2	4.488	mg/L	58	85	115	1	20	M3

Molybdenum, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517618													
WG517618ICV	ICV	04/16/21 13:16	MS210330-3	.01992		.02074	mg/L	104	90	110			
WG517618ICB	ICB	04/16/21 13:17				U	mg/L		-0.00044	0.00044			
WG517618LFB	LFB	04/16/21 13:19	MS210414-5	.0501		.04835	mg/L	97	85	115			
L65163-01AS	AS	04/16/21 13:30	MS210414-5	.0501	.00806	.05987	mg/L	103	70	130			
L65163-01ASD	ASD	04/16/21 13:32	MS210414-5	.0501	.00806	.05893	mg/L	102	70	130	2	20	

Nitrate/Nitrite as N M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG518045													
WG518045ICV	ICV	04/24/21 22:32	WI210302-17	2.416		2.338	mg/L	97	90	110			
WG518045ICB	ICB	04/24/21 22:33				U	mg/L		-0.02	0.02			
WG518047													
WG518047LFB	LFB	04/24/21 23:47	WI210331-13	2		2.043	mg/L	102	90	110			
L65163-01AS	AS	04/24/21 23:50	WI210331-13	2	U	2.06	mg/L	103	90	110			
L65163-02DUP	DUP	04/24/21 23:52			U	U	mg/L				0	20	RA

Nitrogen, ammonia M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG518171													
WG518171ICV	ICV	04/27/21 15:14	WI210310-5	11.988		12.197	mg/L	102	90	110			
WG518171ICB	ICB	04/27/21 15:16				U	mg/L		-0.05	0.05			
WG518171LFB1	LFB	04/27/21 15:17	WI210310-4	10		10.644	mg/L	106	90	110			
L65163-01DUP	DUP	04/27/21 15:20			.152	.157	mg/L				3	20	RA
L65163-02AS	AS	04/27/21 15:23	WI210310-4	10	.109	10.83	mg/L	107	90	110			
WG518171LFB2	LFB	04/27/21 16:00	WI210310-4	10		10.946	mg/L	109	90	110			

Homestake Mining Company ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	20		19.6	mg/L	98	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	99.97791		102.9	mg/L	103	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	99.97791	4.81	108.9	mg/L	104	85	115			
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	99.97791	4.81	107.7	mg/L	103	85	115	1	20	

Residue, Filterable (TDS) @180C SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517171													
WG517171PBW	PBW	04/08/21 15:45				U	mg/L		-20	20			
WG517171LCSW	LCSW	04/08/21 15:46	PCN62150	1000		980	mg/L	98	80	120			
L65165-01DUP	DUP	04/08/21 16:08			2170	2186	mg/L				1	10	

Selenium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517618													
WG517618ICV	ICV	04/16/21 13:16	MS210330-3	.05		.04993	mg/L	100	90	110			
WG517618ICB	ICB	04/16/21 13:17				.00011	mg/L		-0.00022	0.00022			
WG517618LFB	LFB	04/16/21 13:19	MS210414-5	.05		.04813	mg/L	96	85	115			
L65163-01AS	AS	04/16/21 13:30	MS210414-5	.05	.00013	.05392	mg/L	108	70	130			
L65163-01ASD	ASD	04/16/21 13:32	MS210414-5	.05	.00013	.05295	mg/L	106	70	130	2	20	

Sodium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517287													
WG517287ICV	ICV	04/13/21 17:33	II210406-1	100		97.03	mg/L	97	95	105			
WG517287ICB	ICB	04/13/21 17:39				U	mg/L		-0.6	0.6			
WG517287LFB	LFB	04/13/21 17:52	II210401-2	100.0235		101.2	mg/L	101	85	115			
L65163-04AS	AS	04/13/21 19:09	II210401-2	100.0235	122	215.7	mg/L	94	85	115			
L65163-04ASD	ASD	04/13/21 19:12	II210401-2	100.0235	122	216.4	mg/L	94	85	115	0	20	

Sulfate D516-02/-07/-11 - Turbidimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG518203													
WG518203ICB	ICB	04/27/21 15:16				U	mg/L		-3	3			
WG518203ICV	ICV	04/27/21 15:16	WI210415-1	20		20.1	mg/L	101	90	110			
WG518203LFB	LFB	04/27/21 15:50	WI210105-3	10		10.5	mg/L	105	90	110			
L65161-01DUP	DUP	04/27/21 16:22			235	229.9	mg/L				2	20	
L65161-02AS	AS	04/27/21 16:41	SO4TURB	10	3430	3497.7	mg/L	677	90	110			M3

Homestake Mining Company

ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfide as S SM4500S2-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517235													
WG517235ICV	ICV	04/09/21 14:01	WC210408-4	.32266		.31	mg/L	96	90	110			
WG517235ICB	ICB	04/09/21 14:03				U	mg/L		-0.05	0.05			
WG517235LFB1	LFB	04/09/21 14:06	WC210408-7	.1991067		.229	mg/L	115	80	120			
L65094-04AS	AS	04/09/21 14:11	WC210408-7	.1991067	U	.19	mg/L	95	75	125			
L65094-04ASD	ASD	04/09/21 14:14	WC210408-7	.1991067	U	.196	mg/L	98	75	125	3	20	
L65163-02AS	AS	04/09/21 14:48	WC210408-7	.1991067	U	.207	mg/L	104	75	125			
L65163-02ASD	ASD	04/09/21 14:51	WC210408-7	.1991067	U	.208	mg/L	104	75	125	0	20	
WG517235LFB2	LFB	04/09/21 15:23	WC210408-7	.1991067		.224	mg/L	113	80	120			

Uranium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517618													
WG517618ICV	ICV	04/16/21 13:16	MS210330-3	.05		.04962	mg/L	99	90	110			
WG517618ICB	ICB	04/16/21 13:17				U	mg/L		-0.00022	0.00022			
WG517618LFB	LFB	04/16/21 13:19	MS210414-5	.05		.046	mg/L	92	85	115			
L65163-01AS	AS	04/16/21 13:30	MS210414-5	.05	.00143	.0527	mg/L	103	70	130			
L65163-01ASD	ASD	04/16/21 13:32	MS210414-5	.05	.00143	.05134	mg/L	100	70	130	3	20	

Vanadium, dissolved M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG517618													
WG517618ICV	ICV	04/16/21 13:16	MS210330-3	.05		.04793	mg/L	96	90	110			
WG517618ICB	ICB	04/16/21 13:17				U	mg/L		-0.0011	0.0011			
WG517618LFB	LFB	04/16/21 13:19	MS210414-5	.05		.04627	mg/L	93	85	115			
L65163-01AS	AS	04/16/21 13:30	MS210414-5	.05	U	.04808	mg/L	96	70	130			
L65163-01ASD	ASD	04/16/21 13:32	MS210414-5	.05	U	.0465	mg/L	93	70	130	3	20	

Homestake Mining Company ACZ Project ID: ***L65163***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65163-01	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L65163-02	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Homestake Mining Company ACZ Project ID: ***L65163***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65163-03	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L65163-04	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Homestake Mining Company ACZ Project ID: ***L65163***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65163-05	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L65163-06	WG517383	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517633	Carbon, dissolved organic (DOC)	SM5310B	Q6	Sample was received above recommended temperature.
	WG517383	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG518089	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG517383	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG517287	Manganese, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG518047	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG518171	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG517171	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG518203	Sulfate	D516-02/-07/-11 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07/-11 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG517235	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
	WG517383	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-5
Locator:

ACZ Sample ID: ***L65163-01***
Date Sampled: *04/05/21 9:22*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/22/21 0:21		0.3	0.1	0.1	pCi/L		djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		0.28	1.2	3	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.425	0.32	0.47	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-4
Locator:

ACZ Sample ID: ***L65163-02***
Date Sampled: *04/05/21 11:08*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/22/21 0:23		0.62	0.14	0.12	pCi/L		djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		-0.73	1.2	2.9	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.208	0.32	0.55	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-3
Locator:

ACZ Sample ID: ***L65163-03***
Date Sampled: *04/05/21 12:48*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/22/21 0:24		1.1	0.17	0.12	pCi/L		djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		0.47	1	2.5	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.604	0.37	0.53	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-2
Locator:

ACZ Sample ID: ***L65163-04***
Date Sampled: *04/05/21 14:30*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/22/21 0:25		0.29	0.13	0.2	pCi/L		djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		0.43	1.2	2.8	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.406	0.4	0.64	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500091369
Sample ID: 0999
Locator:

ACZ Sample ID: ***L65163-05***
Date Sampled: *04/05/21 13:20*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/22/21 0:27		0.17	0.07	0.05	pCi/L		djc

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		-0.51	1	2.4	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.413	0.26	0.34	pCi/L	*	djc

Homestake Mining Company
Project ID: 4500091369
Sample ID: SAG1-1
Locator:

ACZ Sample ID: ***L65163-06***
Date Sampled: *04/05/21 16:16*
Date Received: *04/08/21*
Sample Matrix: *Groundwater*

Radium 226, dissolved — Prep Method:
M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/27/21 0:07		0.22	0.09	0.13	pCi/L	*	amk

Radium 228, dissolved — Prep Method:
M904.0

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	05/03/21 14:15		0.1	1.2	3	pCi/L	*	cer

Thorium 230, dissolved — Prep Method:
ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	04/22/21 8:41		0.407	0.3	0.45	pCi/L	*	djc

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(4)	An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

Homestake Mining Company

ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Radium 226, dissolved M903.1 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG517407																
WG517407PBW	PBW	04/22/21						0	0.09	0.1			0.2			
WG517407LCSW	LCSW	04/22/21	PCN62879	20				21	0.62	0.13	105	43	148			
L65114-01DUP	DUP-RPD	04/22/21			1.4	0.17	0.14	1.2	0.15	0.14				15	20	
L65149-05DUP	DUP-RPD	04/22/21			7.6	0.33	0.08	8.8	0.36	0.07				15	20	
L65143-01MS	MS	04/22/21	PCN62879	20	13	0.49	0.2	28	0.69	0.16	75	43	148			
WG517565																
WG517565PBW	PBW	04/27/21						.07	0.1	0.1			0.2			
WG517565LCSW	LCSW	04/27/21	PCN62879	20				22	0.56	0.1	110	43	148			
L65163-06DUP	DUP-RPD	04/27/21			0.22	0.09	0.13	.29	0.13	0.15				27	20	RG
L65163-06DUP	DUP-RER	04/27/21			0.22	0.09	0.13	.29	0.13	0.15				0.44	2	
L65170-01MS	MS	04/27/21	PCN62879	20	0.17	0.07	0.02	22	0.6	0.1	109	43	148			
L65274-09DUP	DUP-RPD	04/27/21			1	0.14	0.2	.85	0.11	0.06				16	20	

Radium 228, dissolved M904.0 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG518071																
WG518071LCSW	LCSW	05/03/21	PCN63356	9.89				12	1.4	0.95	121	47	123			
L65163-04DUP	DUP-RPD	05/03/21			0.43	1.2	2.8	.67	0.98	2.4				44	20	RG
WG518071PBW	PBW	05/03/21						.1	0.48	0.5			1			
L65163-04DUP	DUP-RER	05/03/21			0.43	1.2	2.8	.67	0.98	2.4				0.15	2	
L65170-02DUP	DUP-RER	05/03/21			0.2	1.1	3.1	.16	1	2.6				0.03	2	
L65170-02DUP	DUP-RPD	05/03/21			0.2	1.1	3.1	.16	1	2.6				22	20	RG
L65170-01MS	MS	05/03/21	PCN63356	16.48	0.13	1	2.5	18	2.1	3.5	108	47	123			

Homestake Mining Company

ACZ Project ID: ***L65163***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Thorium 230, dissolved ESM 4506 **Units:** pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
WG517895																
WG517895PBW	PBW	04/22/21						.407	0.28	0.39			0.78			
WG517895LCSW	LCSW	04/22/21	PCN58726	200				221	28	0.53	111	91	126			
L65163-05DUP	DUP-RPD	04/22/21			0.413	0.26	0.34	.0602	0.19	0.36				149	20	RG
L65163-05DUP	DUP-RER	04/22/21			0.413	0.26	0.34	.0602	0.19	0.36				1.1	2	
L65163-01MS	MS	04/22/21	PCN58726	200	0.425	0.32	0.47	217	27	0.47	108	91	126			
L65097-01DUP	DUP-RER	04/22/21			0.424	0.26	0.34	.229	0.32	0.55				0.47	2	
L65097-01DUP	DUP-RPD	04/22/21			0.424	0.26	0.34	.229	0.32	0.55				60	20	RG

Homestake Mining Company ACZ Project ID: ***L65163***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L65163-01	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65163-02	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65163-03	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65163-04	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65163-05	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
L65163-06	WG517565	Radium 226, dissolved	M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG518071	Radium 228, dissolved	M904.0	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG517895	Thorium 230, dissolved	ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.

Radiochemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Thorium 230, dissolved	ESM 4506

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500091369

ACZ Project ID: L65163
Date Received: 04/08/2021 11:21
Received By:
Date Printed: 4/9/2021

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
6527	8.4	<=6.0	15	Yes
6663	10.8	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Homestake Mining Company
4500091369

ACZ Project ID: L65163
Date Received: 04/08/2021 11:21
Received By:
Date Printed: 4/9/2021

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L65163

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: Adam Argyello	Address: 560 Anaconda Road
Company: Homestake Mining Company	Milan, NM 87021
E-mail: aargyello@barrick.com	Telephone: 505-285-1041

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Same as Report to	Address:
Company:	
E-mail:	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES [X] NO [ ]

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes [ ] No [X]

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Adam Argyello **Sampler's Site Information** **State** NM **Zip code** 87020 **Time Zone** MT

***Sampler's Signature:** Adam Argyello

*I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: Groundwater

PO#: 4500091369

Reporting state for compliance testing:

Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Groundwater							
SAG1-5	4/5/21 922	GW	7	X							
SAG1-4	4/5/21 1108	GW	7	X							
SAG1-3	4/5/21 1248	GW	7	X							
SAG12	4/5/21 1430	GW	7	X							
0999	4/5/21 1320	GW	7	X							
SAG1-1	4/5/21 1616	GW	7	X							

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Adam Argyello	4/6/21 1600	[signature] 4-8-21	11:52

L65163 Chain of Custody

	Water Level Date	Water Level	Water Level	Sample Date	Sample Time	Ferrous Iron (mg/L)	Volume Purged before Sample Collection (gal)	Temperature ©	pH	Conductivity (uS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Notes
SAG1-1	2/26/2021	16:00	128.2	2/22/2021	10:40	3.29	3.35	13	7.43	1238	-215.2	0.15	4.52	
SAG1-2	2/26/2021	16:02	128.33	2/23/2021	13:51	0.89	3.75	13.7	7.59	1390	-129.4	0.12	0.65	
SAG1-3	2/26/2021	16:04	128.37	2/23/2021	15:52	1	4	13.8	7.63	1488	-140.6	0.16	0.36	
SAG1-4	2/26/2021	16:06	128.46	2/25/2021	9:56	2.71	4.25	12.7	7.48	1817	-189.4	0.11	0.39	
SAG1-5	2/26/2021	16:08	128.57	2/25/2021	11:57	1.84	4.55	12.9	7.44	2011	-144.8	0.11	0.28	
SAG2-1	2/26/2021	17:40	99.07	2/25/2021	15:27	0.16	6	13.1	7.21	1220	51.3	2.79	0.45	Duplicate taken Labeled 0999 @ 7:30
SAG2-2	2/26/2021	17:42	125.57	2/25/2021	17:23	0.01	4.5	12.4	7.26	1216	84.6	2.2	2.75	
SAG2-3	2/26/2021	17:44	132.71	2/26/2021	9:30	1	4.6	12.4	7.25	1228	-89	0.08	0.31	
SAG2-4	2/26/2021	17:46	132.61	2/26/2021	11:28	3.26	4.5	12.9	7.56	1234	-195.9	0.07	0.44	
SAG2-5	2/26/2021	17:48	132.66	2/26/2021	13:25	2.12	4.5	13.2	7.49	1351	-155.6	0.14	0.83	
Field Blank	--	--	--	2/26/2021	13:45	--	--	20.4	8.04	6.3	25.9	5.84	0.24	

	Water Level Date	Water Level	Water Level	Sample Date	Sample Time	Ferrous Iron (mg/L)	Volume Purged before Sample Collection (gal)	Temperature ©	pH	Conductivity (uS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Notes
SAG1-1	4/5/2021	18:01	127.88	4/5/2021	16:16	4.8	4.5	14.2	7.57	1389	-209.5	0.2	2.61	4:1 dilution of Fe2+ measurement
SAG1-2	4/5/2021	18:03	127.89	4/5/2021	14:30	0.95	4.6	13.9	7.76	1405	-113.9	0.19	0.31	Duplicate Taken Labeled 0999 @ 13:20
SAG1-3	4/5/2021	18:06	127.91	4/5/2021	12:48	1.11	4.3	13.9	7.65	1543	-129.2	0.22	0.19	
SAG1-4	4/5/2021	18:09	128.03	4/5/2021	11:08	2.21	4.3	13.9	7.53	1879	-161.8	0.21	0.28	
SAG1-5	4/5/2021	18:12	128.12	4/5/2021	9:22	1.91	4.8	13.2	7.45	2119	-159.7	0.19	0.14	
SAG2-1	4/5/2021	18:40	99.2	4/2/2021	12:59	0.04	6.9	13.9	7.35	1256	78.9	3.49	0.22	
SAG2-2	4/5/2021	18:43	124.57	4/2/2021	10:37	0.07	4.5	13.6	7.38	1250	69	2.38	1.92	
SAG2-3	4/5/2021	18:46	132.19	4/2/2021	8:37	2.97	4.6	13.7	7.44	1221	-182.9	0.53	0.57	2:1 Dilution for Fe2+ measurement
SAG2-4	4/5/2021	18:49	132.16	4/1/2021	16:31	4.6	4.4	13.6	7.75	1265	-200.1	0.28	0.36	1:1 Dilution for Fe2+ measurement
SAG2-5	4/5/2021	18:52	132.17	4/1/2021	14:49	2.98	6.1	13.8	7.69	1556	-183.5	0.18	0.47	
Field Blank	--	--	--	4/2/2021	13:10	--	--	19.5	8.01	5.9	26.9	5.91	0.15	

Appendix J

ERT Data Inversions of Individual Line Segments

Memo

Date:	Monday, March 15, 2021
Project:	Homestake Mining Company, San Andres/Glorieta Aquifer Characterization, Grants, New Mexico
To:	Adam Arguello, PE, Homestake Mining Company
From:	Daniel St Germain, Project Manager and Glen Adams, Sr. Geophysicist, HDR
Subject:	Summary of Surface Geophysical Survey Results

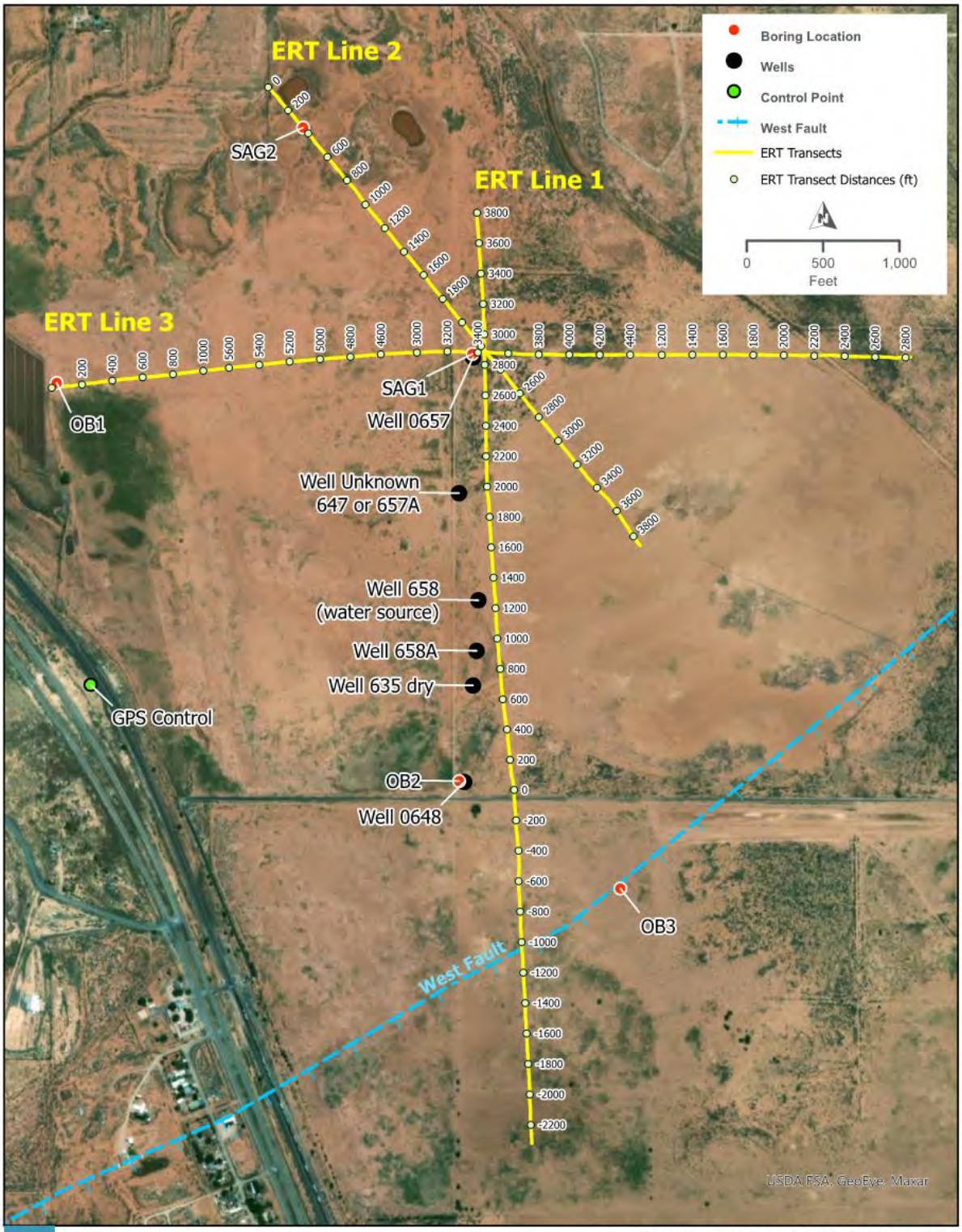
Purpose

A geophysical survey was completed to supplement the existing geologic data and further characterize the bedrock geology. Specifically, the main goal of the geophysical survey is to provide information that can be used to further assess the potential direct contact between the alluvial aquifer and the San Andres/Glorieta (SAG) aquifer. The surface geophysical survey was completed using Electrical Resistivity Tomography (ERT). ERT is well suited for the goals of this study.

Summary of Field Activities

HDR mobilized a crew and equipment to the site and completed the ERT survey between December 10 and December 18, 2020. The following sections provide details on data collection, data processing steps, and data interpretation of the ERT survey.

Three ERT transect lines were completed, collecting data over approximately 15,550 linear feet. The ERT lines were aligned roughly parallel and perpendicular to bedrock strike of the SAG and co-located with existing and recently drilled borings/wells. The ERT transect lines and boring/well locations are shown on Figure 1. A Trimble Catalyst with RTX correction service was used to record the ERT lines and borings/wells with an accuracy of approximately 4-inches. The ERT surveys were conducted according to proposed methodologies; however, a slight change to the line locations were made due to site access. Land entry permission was not granted for an adjacent parcel to the west of the mine property, so ERT line locations and borings were shifted east to avoid this area. Also, due to this shortening of the proposed lines a third line was added N-S, approximately in-line with several historic wells. All, line adjustments were discussed with and followed the guidance of the onsite client representative.



ERT TRANSECT LOCATION MAP

FIGURE 1

BARRICK MEMO

PATH: \\MAHPI-FILE01\OFFICESHARE\SECTIONFOLDERS\WASTE MGMT & INDUSTRIAL\EDMT\EDMT_PROJECTS\HOMESTAKE MINE\GIS\MAP_DOCS\SAG_MEMO.APRX • USER: HROSADO • DATE: 3/15/2021

Data Acquisition and Processing

Electrical Resistivity Tomography

An Advanced Geoscienses Inc. (AGI) SuperSting 112 electrode resistivity system was used to complete the ERT survey. Electrodes were places at 20-foot intervals along each line segment to allow for a total length per segment of approximately 2,220 feet. This length provided sufficient depth penetration of the ERT signal to characterize the geology to approximately 400-feet below land surface. Several line segments were needed to produce these long lines as shown in Figure 1. Each line segment was overlapped more than 250-ft to ensure continuous data recording without large gaps at depth. Equipment checks were run including a contact resistance check between each electrode as part of each line's setup. This resistance check plays a key role in producing quality data by checking for electrodes with poor soil coupling and/or electrode contact. In dry areas with rocky and sandy soils, it is often necessary to add water around electrodes to help improve electrical continuity between the electrode and the soil. A suitable layer of surface soil was present for most of the electrode locations along the survey lines and in areas crossing rocky terrain (including basalt outcrops) water or salt water-soaked cloth was used to improve high contact resistances. Contact resistances were able to reach acceptable levels in all cases by adjusting or adding water to the electrodes.

Data were processed using AGI's Earth Imager2D software specialized for resistivity tomography processing. Data collection included use of the dipole-dipole and strong gradient arrays and therefor combining the two array types was a key element of the processing workflow. The general processing workflow included:

1. extracting (X,Y,Z) coordinates and elevation from collected GPS data at each electrode location
2. removal of data spikes
3. inversion modeling settings with a max number of iterations,
4. applying a damping factor, and then
5. final smoothing of plotted, parameters set to match previous ERT data processing at the mill site

The number of model iterations varied based on data convergence, and in general were less than six iterations. As part of the processing data quality control (QC), the RMS error percentage is calculated for each ERT segment. Between the eight segments that make up the 3 lines, the lowest RMS was 7.8% and the highest model was 15.2%. These are very good error percentages and these data represent consistent and well-fitting models for this arid environment. Final models were produced using a contour software package from Golden Software, Surfer16. The final data plots were further smoothed by using a linear variogram and typical resistivity logarithmic scales. The cell sizes used during the final model gridding were 10-ft horizontally and 1-ft vertically to better enhance the horizontal nature of the lithology. Then a Gaussian filter of 41 by 5, horizontal/vertical cells was applied to the combined line segments that make up the final longer line plots. This filter removed high frequency noise associated with overlapping data zones, the horizontal biased nature of the filter helps image the natural stratification of the subsurface while removing near vertical distortions often found in resistivity data. Figures 2-4 present the final processed ERT profiles, representing lines 1-3 from Figure 1. Figures 5-12 present the individual line segments during the initial data inversions. Each of these figures has the raw ERT data on the top the initial model and then the inversion model. Note the RMS error calculation also shown at the bottom of each processing data plot, Figures 5-12.

Data Evaluation

ERT Data Interpretation and Boring Correlation

Data plots for each of the three ERT lines are presented on Figures 2-4 with generalized boring logs overlaid on the data. The basic geologic sequence found in the deeper borings show:

- Alluvium (silty, sandy, some clay and gravels);
- Basalt;
- Alluvium (silty, sandy, some clay and gravels);
- Chinle Formation; and
- San Andres/Glorieta Formation.

Typically, these rock types would be more resistive than silty/clayey soils and the ERT profiles would exhibit resistivities that are increasing with depth without the presence of water. Water was observed in the two deeper borings at or less than 130-feet below ground surface.

The resistivity data reinforces the interpretation of the SAG aquifer since the values are lower than expected for these same formations, implying the presence of water. To further evaluate the resistivity interpretation, the ERT data can be compared to the geophysical well logging performed at SAG2. The long and short normal geophysical logs match very closely to the values seen in the ERT model and show a similar relatively low resistances throughout the SAG depth imaged in the resistivity profiles.

The following is a list of general resistivity ranges for the more prominent geologic layers:

1. Alluvium near surface soils – 20 to 500 ohm-m
2. Basalt – 300 to 30,000 ohm-m
3. Chinle – 50 to 2,000 ohm-m
4. Top of the SAG – 50 to 500 ohm-m
5. Lower SAG – mostly 1 to 250 ohm-m with isolated areas as high as 600 ohm-m

The resistivity lines were collected in relatively straight profiles to improved data quality. Therefore, many of the borings are located some distance off the lines including a few that are more than a hundred feet away from the lines. This offset may have some bearing on the resistivity ranges noted above. Furthermore, the interpretation lines shown to represent the breaks in geology noted in the borings often cross contour lines. However, the overall shape and trends of the contours were used to guide the interpreted top of the Chinle and the top of the SAG (for example). In the interpretation more weight was given to connecting lithology from the boring logs as well as remaining in a reasonable range of resistivities for the geology. See dashed lines added to Figures 2-4.

Survey Results

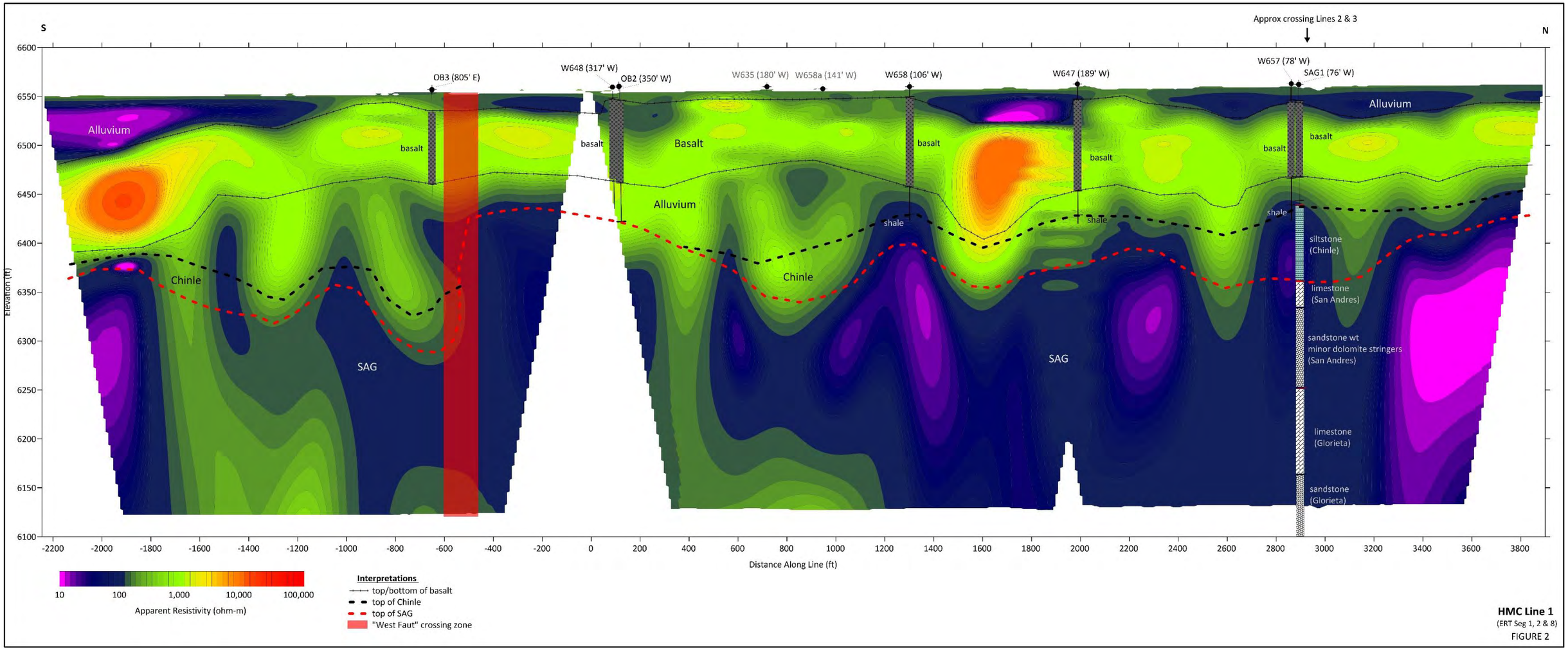
Figures 2-4 presents the interpreted ERT data profiles. The horizontal axis on these plots are distance along the lines in feet. The vertical axis is elevation above mean sea level in feet and were taken from DEM and GPS positions. Data is plotted with a 4 times vertical exaggeration. The color scale represents a logarithmic scale of resistivity values in ohm-meters. The boring logs are shown at projected positions along the ERT lines and the offset and approximate offset direction is noted in parenthesis. Also, noted near the top of the profiles are the approximate crossing line locations.

Figure 2 shows the ERT data profile and interpretation for ERT Line 1. This line is roughly oriented S-N and has a short data break and zone where overlap was not possible due to crossing a paved road. One full line segment was used to extend data coverage to the south from the road. This segment was added near the end of the field survey once access to the adjacent property was obtained. The data plot shown on this figure, therefore, shows negative distance along the bottom axis representing the extension of this line further south past the original start of the line.

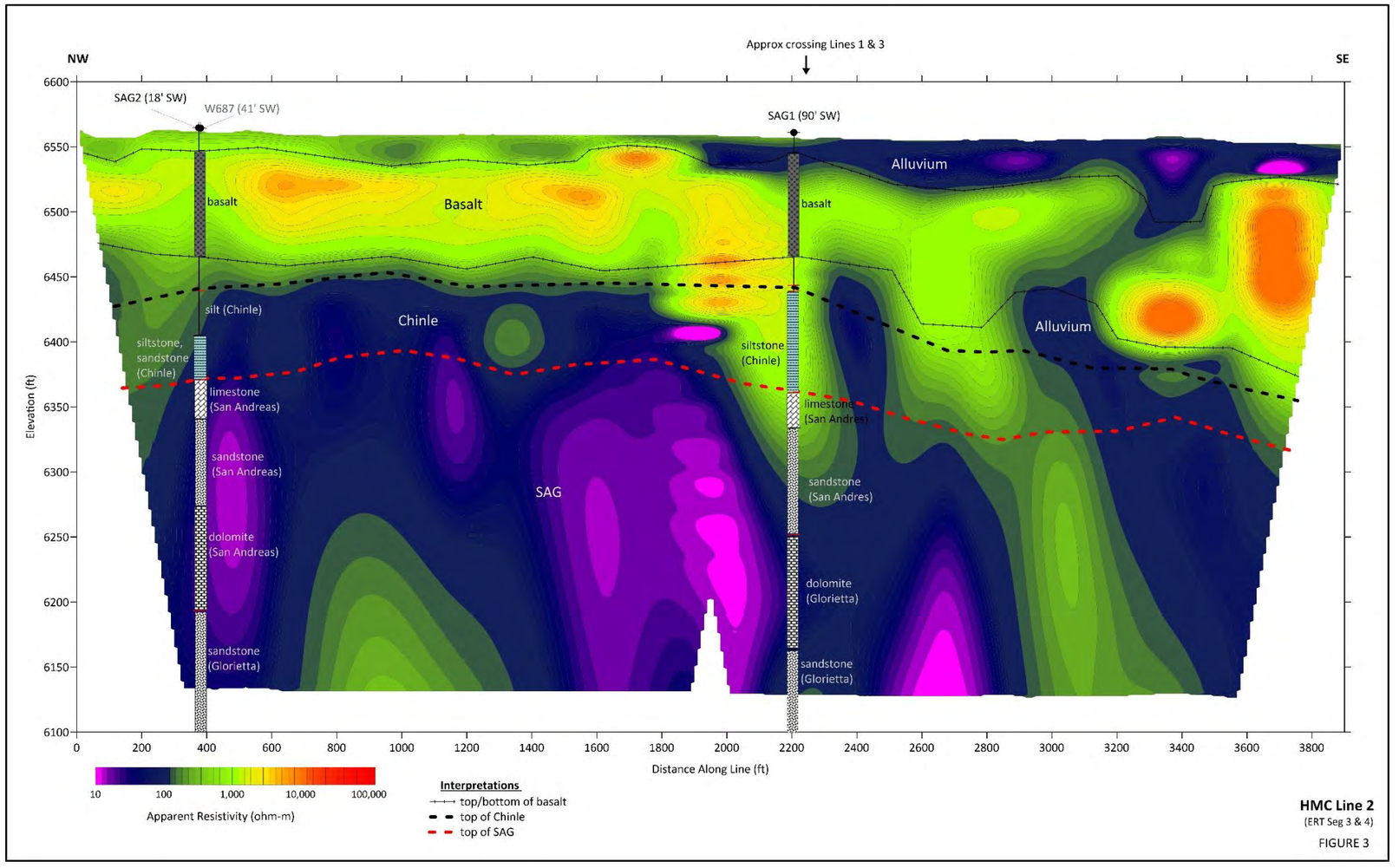
Line 1 was oriented to pass near some of the historic wells located on the site. The logs for these are limited to drillers observations and do not reach the SAG aquifer. Most note termination into a shale that most likely corelates to the top of the Chinle (noted siltstone or mudstone on the current boring logs). The interpreted basalt layer boundaries are show as black lines with ticks and the interpreted top of the Chinle as dashed black lines and interpreted top of the SAG is shown as dashed red lines. This interpretation of the SAG uses information from the other ERT lines as well as boring SAG1, shown on this figure. This boring is the only boring along this line that reaches the aquifer. One challenge in the interpretation of the top of the Chinle and SAG is the occurrence of what appears to be a variable boundary of higher and lower resistivities, producing a peak and valley affect in the resistivity data. Another notable feature along this line is the interpreted crossing of the "West Fault" that is known to trend SW to NE in this area. The interpreted fault crossing is shown on this line as a red shaded box near the projected location of boring OB3. Further evidence of this fault is present in the lack of the Chinle in boring OB2 and an apparent elevation change in the interpreted top of the SAG.

Figure 3 shows the ERT profile for ERT Line 2. This line is roughly oriented NW to SE and crosses Line 1 near the SAG1 boring. The line connects between the two deeper boring conducted as part of this study (Borings SAG1 and SAG2). However, the resistivity values at the top of the SAG near boring SAG1 correlates to a higher resistivity than what is observed on the other ERT lines and also seen at boring SAG2. It is possible the higher values seen here as the apparent trough of higher resistivity values that extend down from the basalt layer are out of plane effects from adjacent variations in the Chinle. Another note worthy observation is the apparent weakening of the continuity of the higher resistance basalt layer, starting at about 2,400-ft distance along the line. At approximately the same location of this change in this layer we also see a deeper more resistive boundary extending nearly vertically in the data, between approximately 2,500 to 3,400 feet along the line. As an overall observation from the interpretation of the top of the SAG appears to have very little dip across the line, which may indicate this line is more aligned along the strike of the formation.

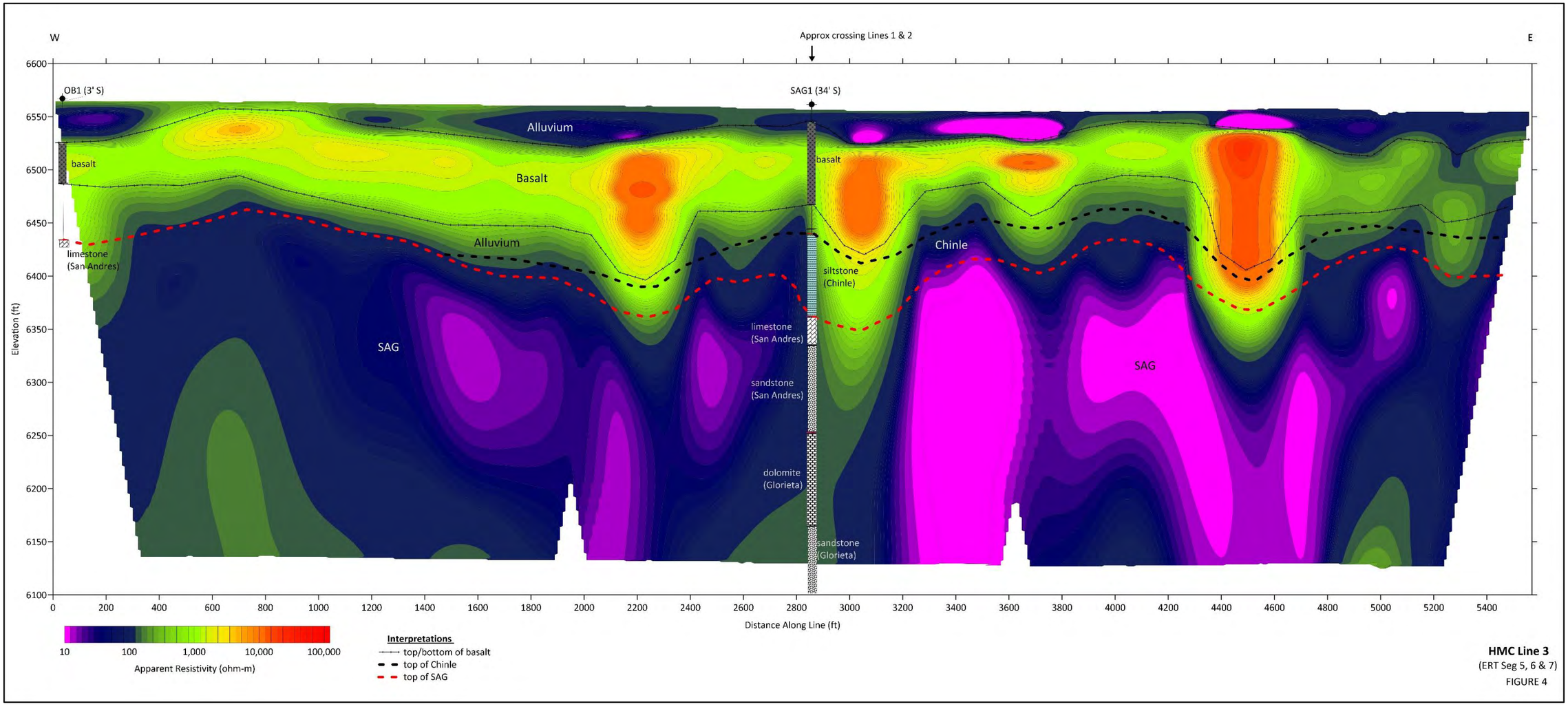
Figure 4 shows the ERT profile for ERT Line 3. This line is roughly oriented W to E and crosses Line 1 and 2 near the SAG1 boring. The line was collected starting near the property fence to the west then extending near boring SAG1 and continuing east for a total length of over 6500-feet. Similar to Line 2 and just offset from the SAG1 boring there is an apparent trough of higher resistivity values dipping into the interpreted top of the SAG aquifer. Three of these troughs of higher resistivity values are observed near 2,200, 3,000, and 4,500 feet distances along this line. Again, these features could be related to out of plane effects or possible area of lower water content in the Chinle and top of the San Andres formations. Overall, the interpreted top of the SAG is slightly lower to the east and we see lower resistivity values within the SAG east of the boring SAG1.



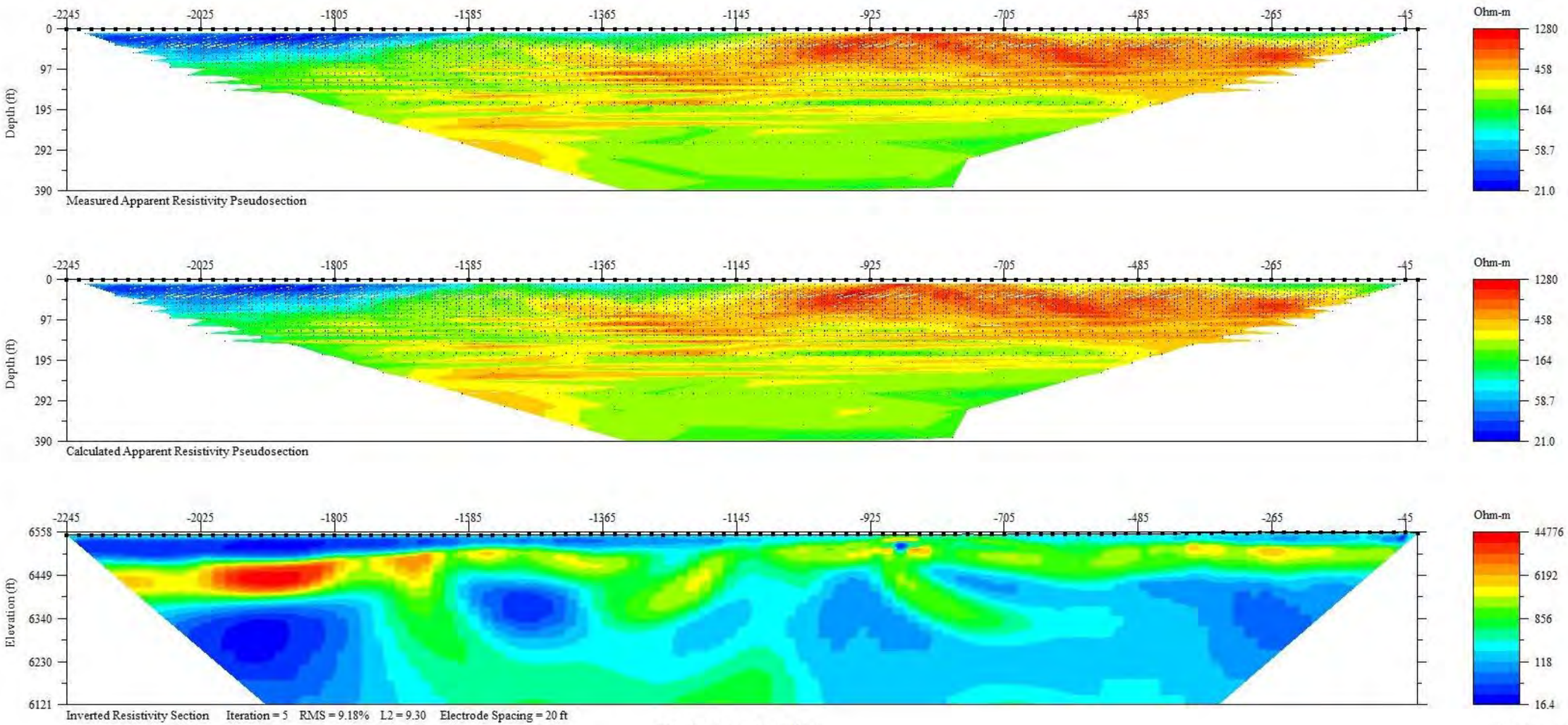
HMC Line 1
(ERT Seg 1, 2 & 8)
FIGURE 2



HMC Line 2
(ERT Seg 3 & 4)
FIGURE 3

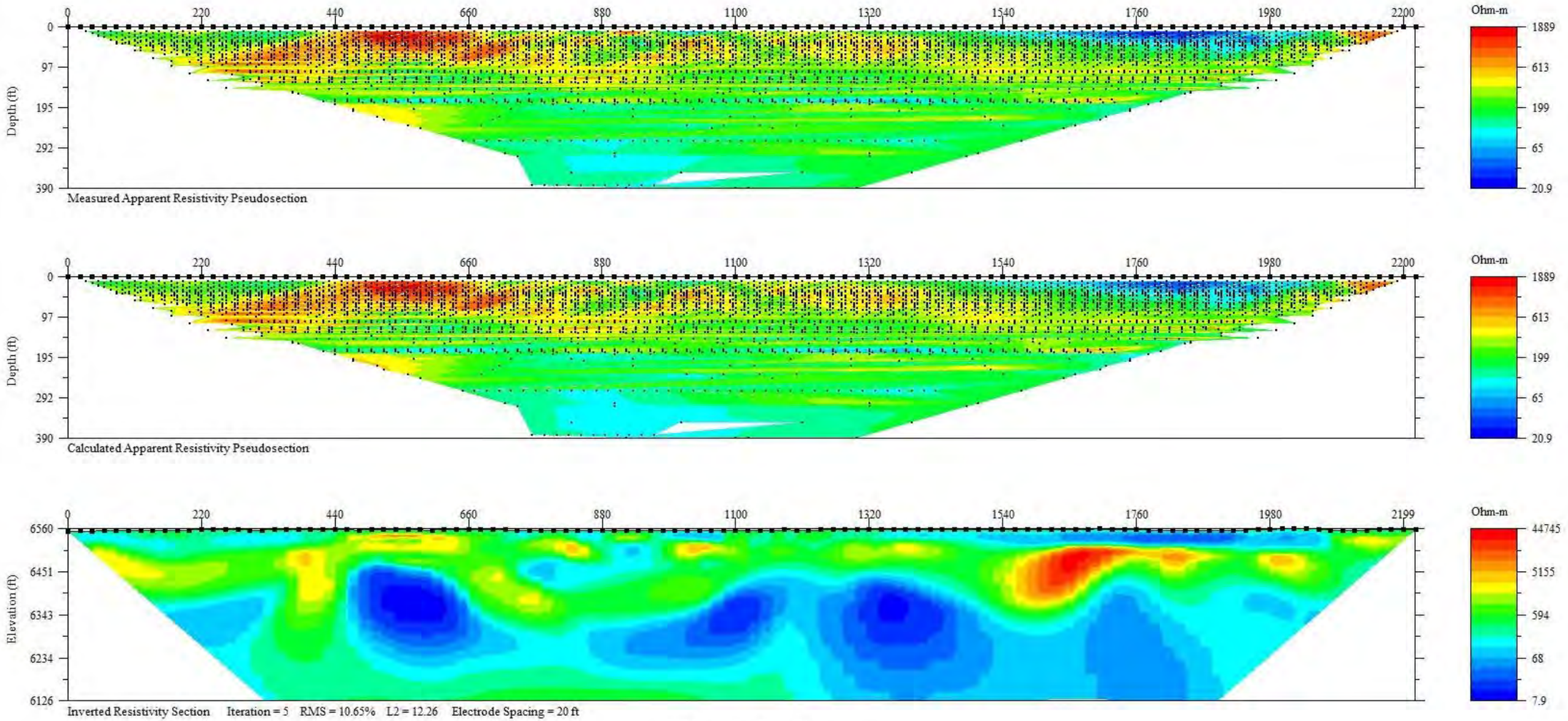


HMC Line 3
(ERT Seg 5, 6 & 7)
FIGURE 4



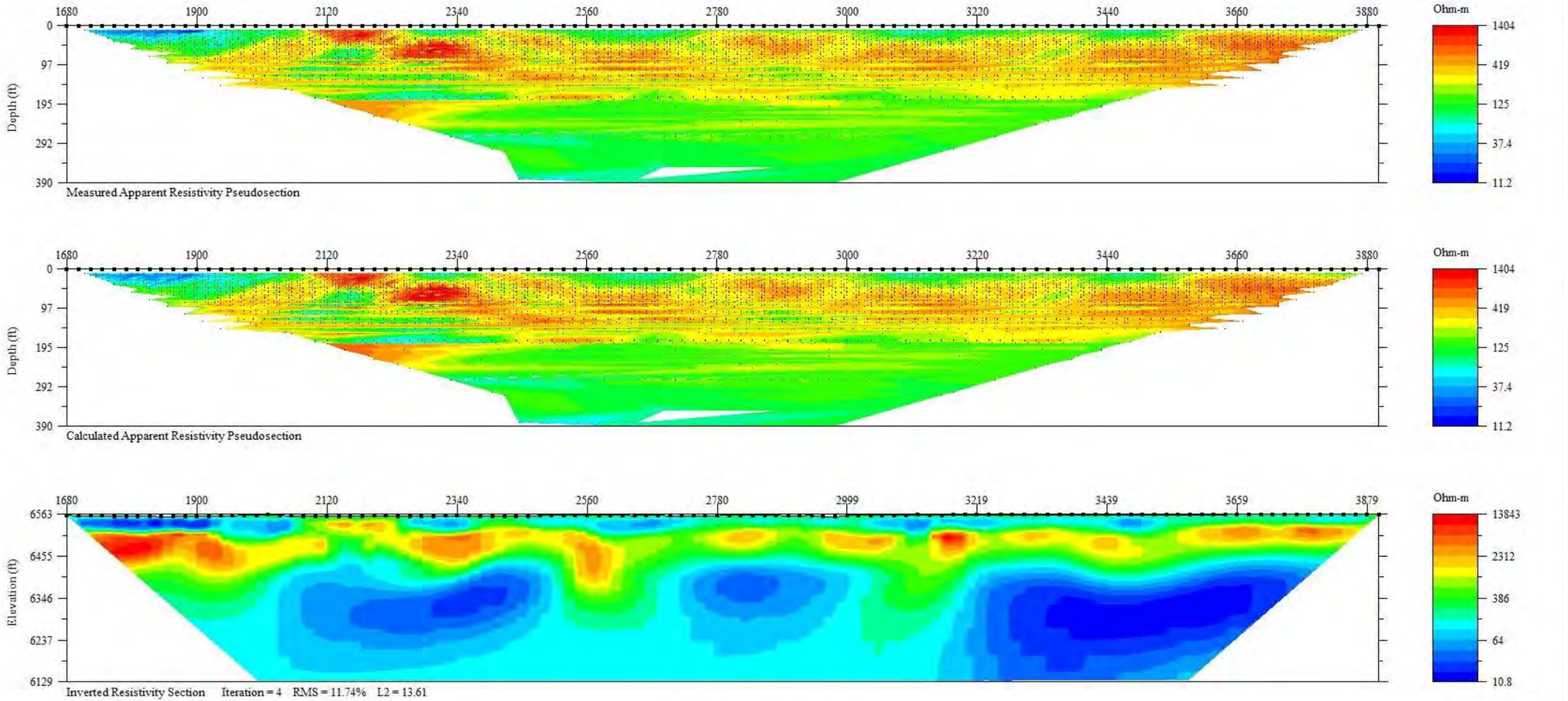
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 8
HMC Line 1
FIGURE 5



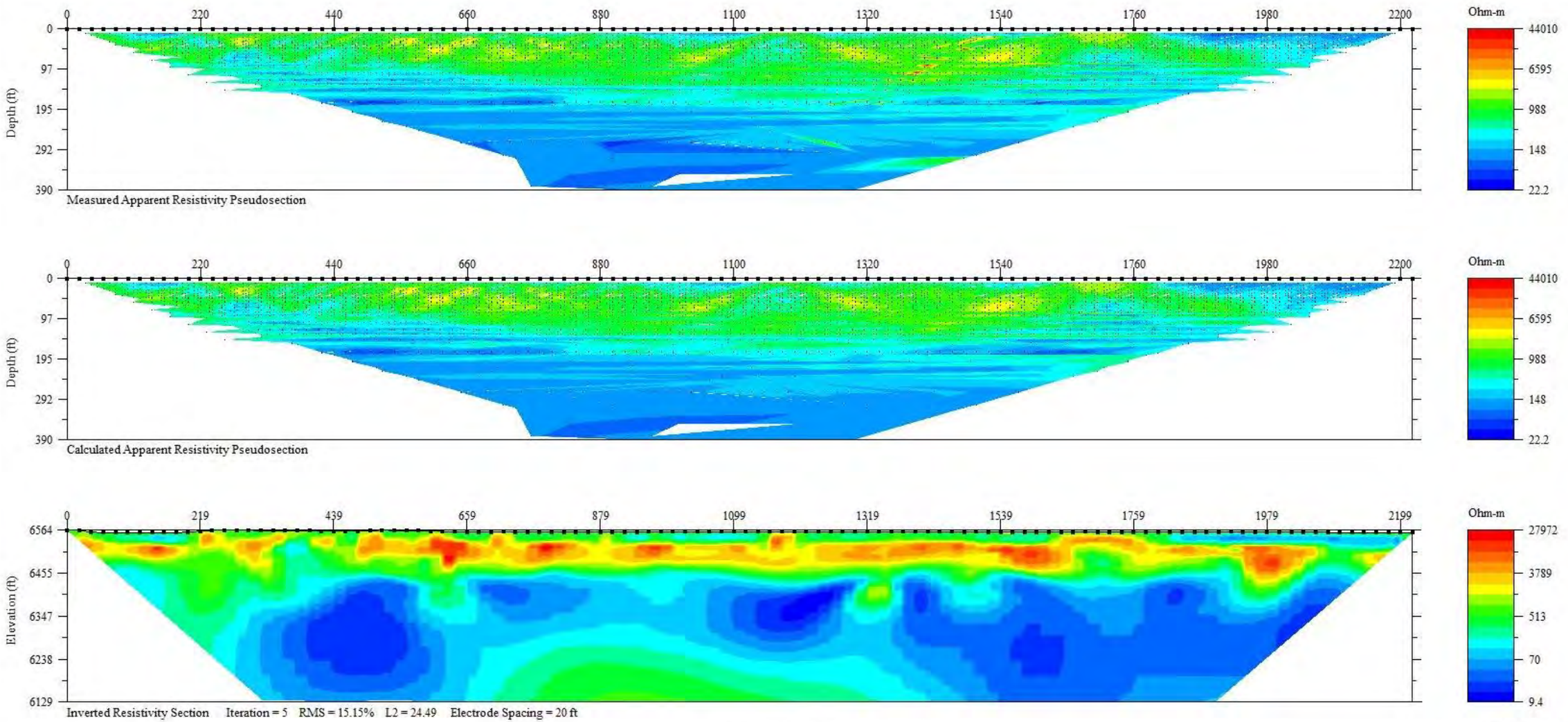
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 1
HMC Line 1
FIGURE 6



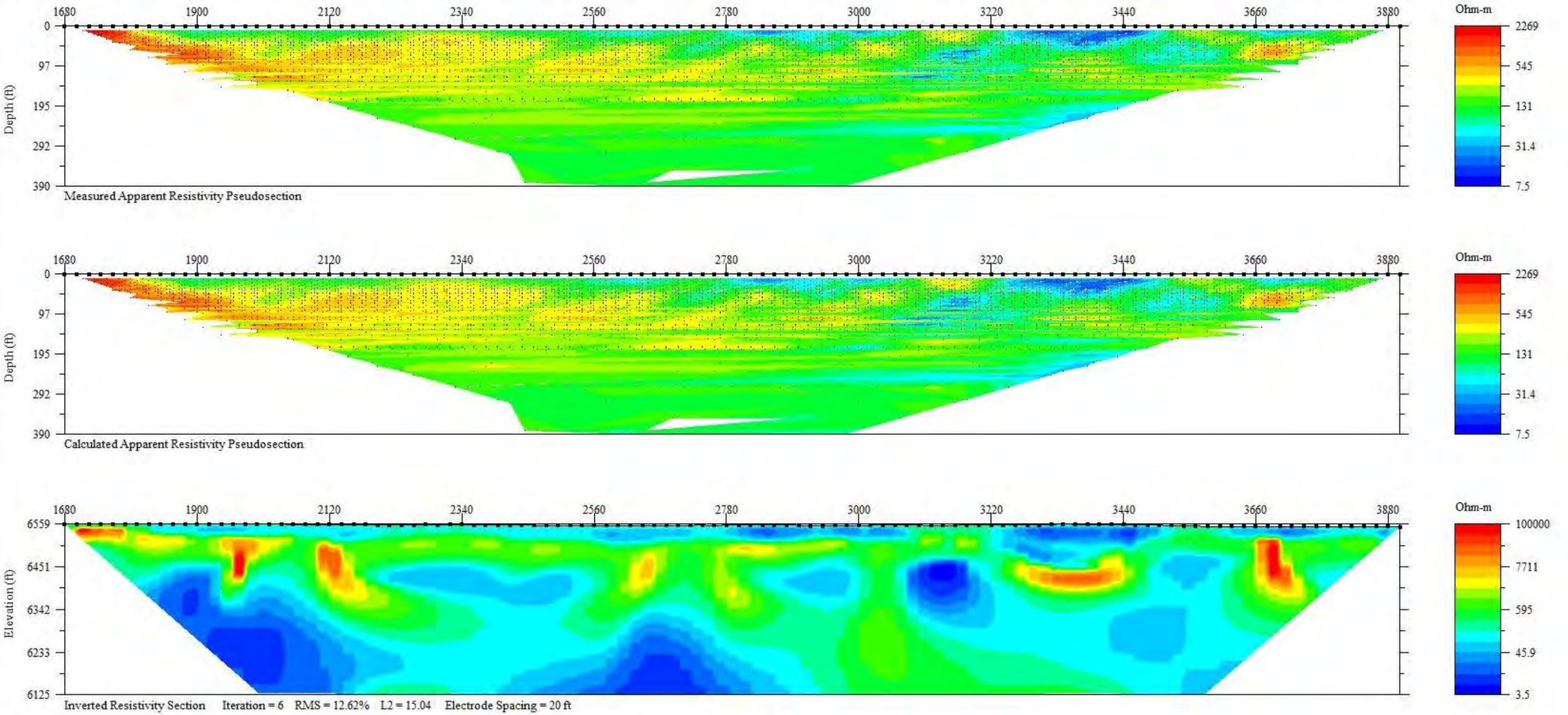
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 2
HMC Line 1
FIGURE 7



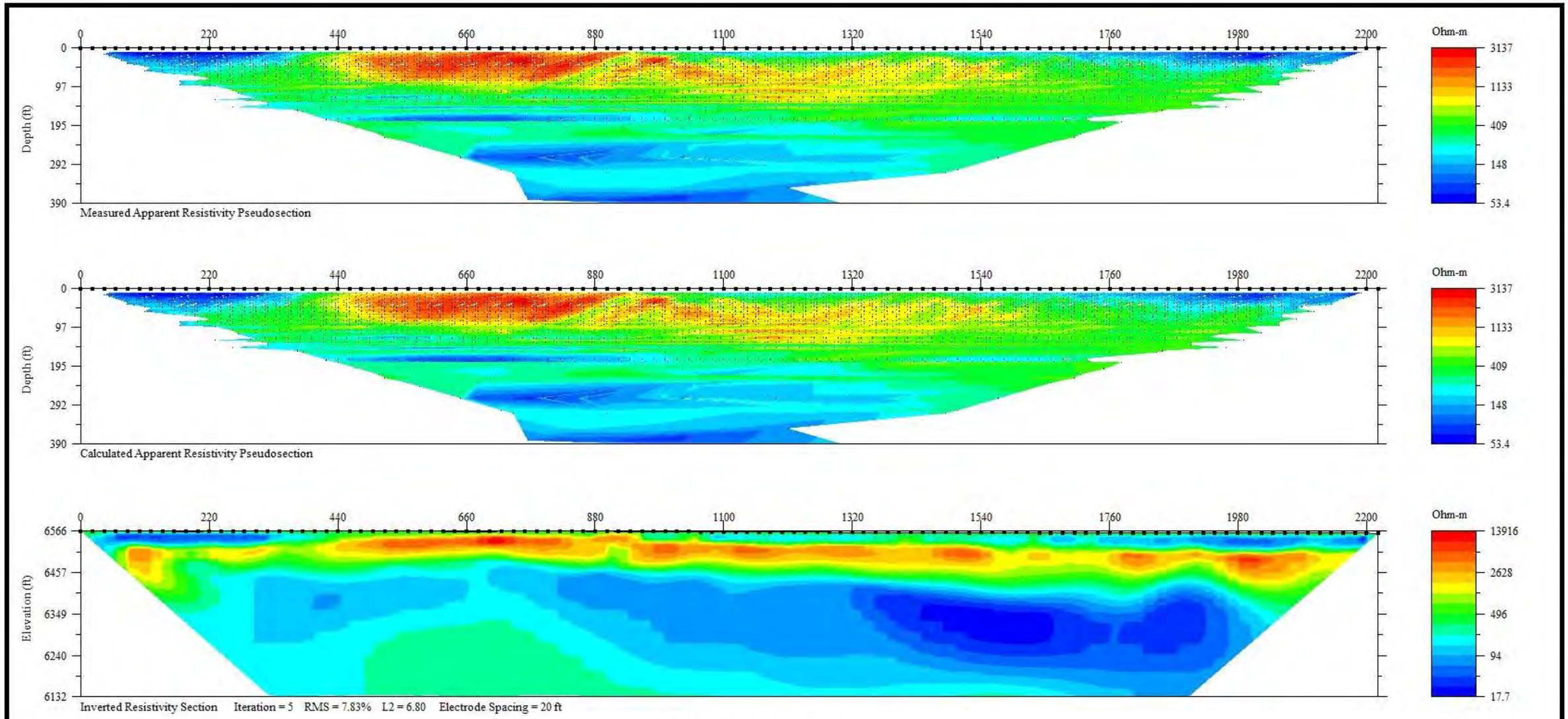
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 3
HMC Line 2
FIGURE 8



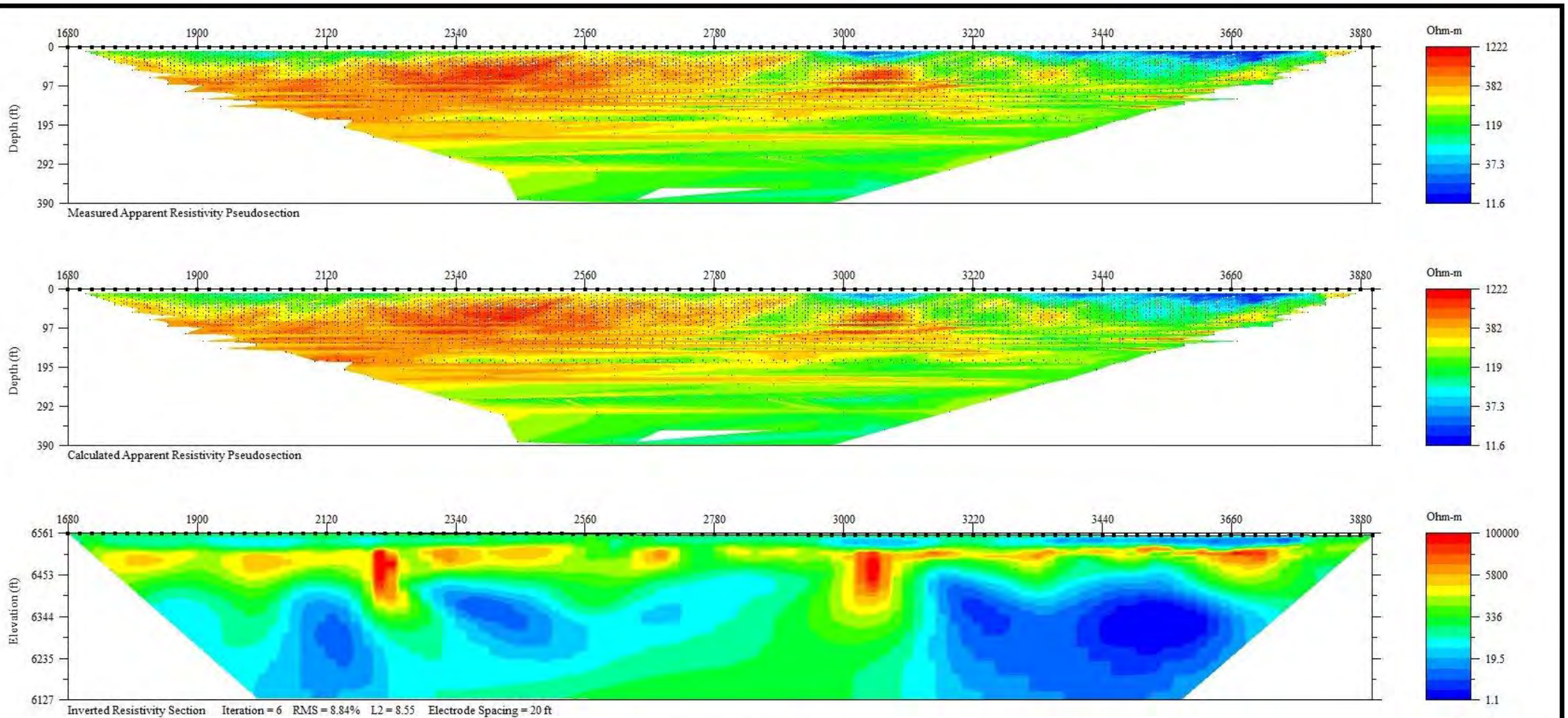
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 4
HMC Line 2
FIGURE 9



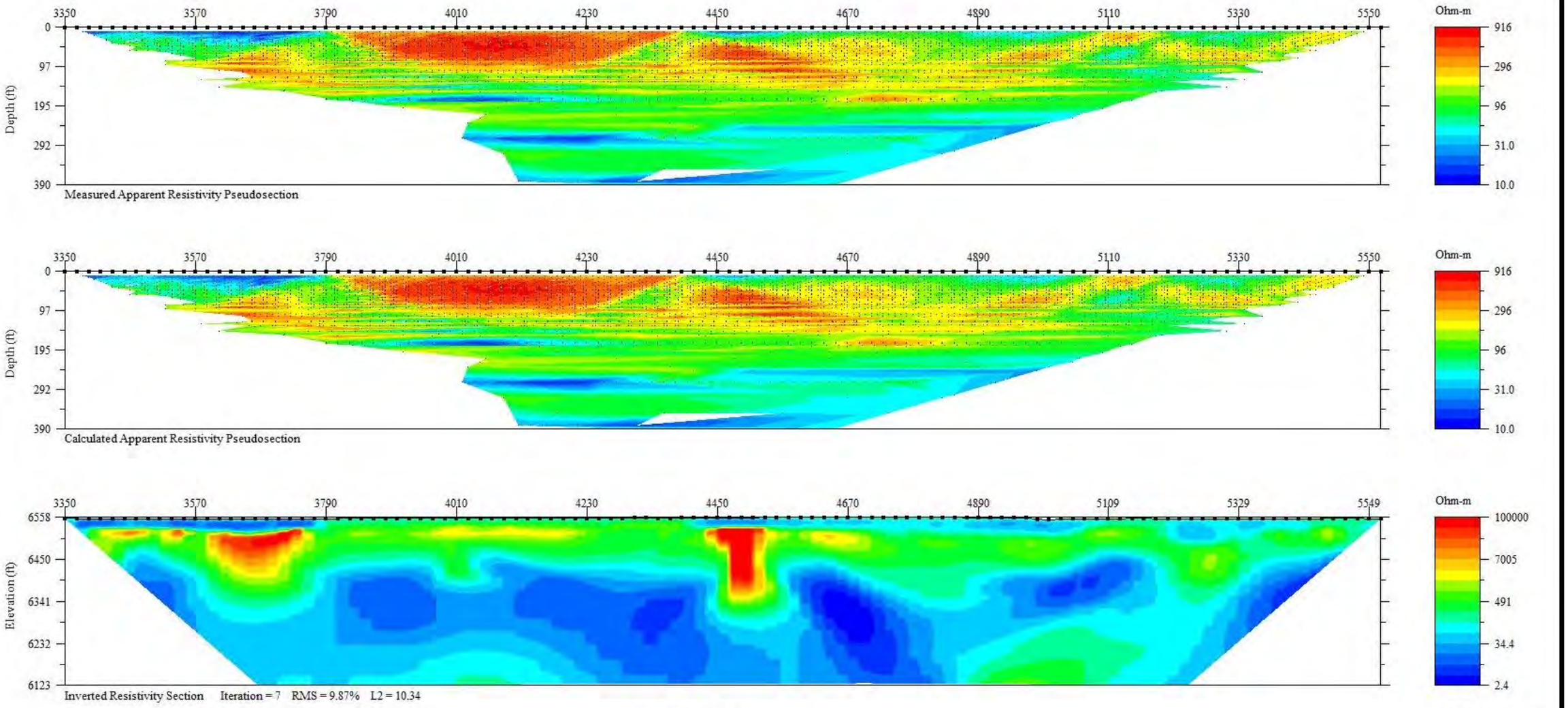
ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 5
HMC Line 3
FIGURE 10



ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 6
HMC Line 3
FIGURE 11



ERT Prcessing Data Plots
(raw, pseudosection, inverted data)

ERT Segment 7
HMC Line 3
FIGURE 12

References

ARCADIS, 2019, Supplemental Background Soil and Groundwater Investigation Report, data report provided by Homestake Mining Company from previous site work.

Baldwin, J.A. and S.K. Anderholm. 1992. Hydrogeology and Ground-Water Chemistry of the San Andres-Glorietta Aquifer in the Acoma Embayment and Eastern Zuni Uplift, West-Central New Mexico, U.S. Geological Survey, Water-Resources Investigation Report 91-4033.